DRAFT ENVIRONMENTAL IMPACT REPORT

Enterprise Research Campus Project

Boston, Massachusetts

AUGUST 2021

SUBMITTED TO

Executive Office of Energy and Environmental Affairs
Massachusetts Environmental Policy Act

PROPONENT

Tishman Speyer ERC Developer, L.L.C.

MASTER PLANNERS

Henning Larsen
Studio Gang

PRODUCED BY

vhb

TISHMAN SPEYER

August 2, 2021

Kathleen Theoharides, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900 (9th Floor)
Boston, MA 02114

Tori Kim, Director
Massachusetts Environmental Policy Act (MEPA) Office
Attn: Alex Strysky, MEPA Analyst
100 Cambridge Street, Suite 900 (9th Floor)
Boston, MA 02114

Re: Enterprise Research Campus Project, Boston (Allston) - EEA No. 16320
Draft Environmental Impact Report

Dear Secretary Theoharides and Director Kim:

On behalf of Tishman Speyer ERC Developer, L.L.C. (the "Proponent"), we are pleased to submit this Draft Environmental Impact Report (the "DEIR") for continued review under the Massachusetts Environmental Policy Act ("MEPA") for the Enterprise Research Campus Project located on an approximately 14-acre parcel at 100 Western Avenue in the Allston neighborhood of Boston (the "Project Site").

As presented in the initial MEPA filing, the February 2021 Environmental Notification Form ("ENF"), the Proponent intends to develop the Project Site into a mixed-use development of approximately 1.94 million square feet, including laboratory/R&D, office, residential, hotel, conference center, and retail uses, and uses complementary thereto, as well as expansive public realm and open space improvements to be developed in two phases (the "Project"). The Project will feature a network of more than three acres of dynamic, welcoming public open spaces. The central focal point of the Project will be a portion of a public open-space network that is envisioned to eventually connect the Honan-Allston Library, and the Allston neighborhood, with the Charles River (the "Project Greenway"). In addition to the Project Greenway, the other public open spaces will contain laneways, urban plazas, and building frontage areas, which will help create an intimate, porous urban environment that places a focus on the pedestrian experience. The public open spaces of the Project will also contain active programming, including public art exhibits, community-oriented programs, health & wellness classes, and music concerts & festivals. The Proponent has designed the Project around the public open space, acknowledging that an activated and exciting public realm will be a key amenity for the Project and the entire Allston community.

The Project Site is subject to the Planned Development Area No. 115 ("PDA") approved by the Boston Planning and Development Authority ("BPDA") and adopted by the City of Boston ("City") in 2018. As described in the DEIR, local approval of the Project is proceeding in two phases. The initial development phase of the Project is currently undergoing Large Project Review under Article 80 of the City of Boston Zoning Code. That public review process began with the filing of a Project Notification Form ("PNF") in February 2021 and is continuing with the recent filing of a Draft Project Impact Report ("DPIR") with the BPDA. Under the Article 80 public review process, the Proponent is seeking City approval of approximately 900,000 square feet of development proposed within a portion of the Project Site comprising approximately 6 acres ("Phase A"). As the final step in the zoning process for Phase A, the Proponent will also seek approval of a PDA Development Plan that specifically describes and permits that phase of the Project. The local approval process for development of the remaining approximately 4.5 acres of the Project Site ("Phase B") will require an amendment of the currently approved Master Plan for the PDA to incorporate the second phase of development, consisting of approximately 1.04 million square feet, including laboratory/R&D, office, residential, and retail uses, and uses complementary thereto, as well as additional public realm and open space improvements. The Proponent will proceed with Article 80 public review and PDA Development Plan approval for Phase B following approval of the amended Master Plan. However, to avoid segmentation under MEPA regulations, the ENF and the DEIR consider the full build out of developable area of the Project Site (Phases A and B).

In addition to world-class architecture and public realm improvements, the Proponent is committed to providing forward-thinking resiliency and sustainability measures. The Proponent also has a fundamental commitment to developing and implementing an Environmental Justice outreach plan, and robust diversity, equity, and inclusion ("DEI") initiatives, as described further in the first chapter of the DEIR.

We respectfully request that you publish notice of availability of the DEIR in the August 11, 2021 edition of the *Environmental Monitor*. To allow adequate time for public review, the Proponent requests an extension of the public review and comment period by two weeks so that public comments will be due by September 24, 2021 and a decision is anticipated to be issued on or around October 1, 2021. Requests for copies of the DEIR should be directed to Lauren DeVoe at 617-607-0091 or via e-mail at ldevoe@vhb.com.

We look forward to working with you and your staff in your continuing review of the Project.

Sincerely,

Jessica Hughes, Managing Director and Regional Director - Boston
Tishman Speyer ERC Developer, L.L.C.
c/o Tishman Speyer

Enterprise Research Campus Project

Boston, Massachusetts

SUBMITTED TO	**Executive Office of Energy & Environmental Affairs** **MEPA Office** 100 Cambridge St., Suite 900 (9th Floor) Boston, MA 02114	
PROPONENT	**Tishman Speyer ERC Developer, L.L.C.** c/o Tishman Speyer 125 High Street Boston, MA 02110	
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August 2, 2021

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Project Description

Tishman Speyer ERC Developer, L.L.C. (the "Proponent") is pleased to submit this Draft Environmental Impact Report (DEIR) to continue review under the Massachusetts Environmental Policy Act (MEPA) for the development of an approximately 14.2-acre parcel located at 100-112 Western Avenue in the Allston neighborhood of Boston (the "Project Site"). Please refer to Figures 1.1 and 1.2 for a site location map and context map, respectively.

The "Project", as proposed by the Proponent, will consist of approximately 10.5 acres of developable area and approximately 3.7 acres of private rights-of-way (i.e., streets and sidewalks) open to public use, totaling approximately 14.2 acres of improvements within the Project Site. The Project component uses will be supported by various streets, sidewalks, and other utility infrastructure elements which are to be constructed on portions of the Project Site by the Harvard Allston Land Company (HALC) (the "Enabling Infrastructure"). The Project will contain approximately 1.94 million square feet (MSF) of mixed-use development which will be developed in multiple phases, and consisting of residential, office/lab, hotel, conference functions, restaurant, and retail use, along with new public realm and open space areas.

The central focal point of the Project will be a vibrant greenway (the "Project Greenway"). The Project Greenway is planned as a material component of a larger, publicly accessible open space network (the "Greenway") that will, in stages, connect the Honan-Allston Library and Rena Park in the Allston neighborhood toward the Charles River. The Proponent envisions that the Project Greenway will provide a dynamic and activated publicly accessible open space that will greatly benefit and enhance the local Allston community, as well as the greater Boston area.

One of the core mission-related goals and objectives of the Project is the commitment to *"foster a diverse community where all are met with a sense of inclusion and belonging, and to provide a welcoming environment to all community members."*

The Project is proposed to be constructed within the PDA Area, which was designated pursuant to the PDA Master Plan for PDA No. 115, approved by the Boston Zoning Commission on March 15, 2018 (the "PDA Master Plan"). As described further below, the Proponent has planned for the Project to integrate within the broader district planning detailed in the recently provided draft document titled "Enterprise Research Campus Framework Plan, 2021 Update" (the "Framework Plan") prepared by Harvard University.

Since filing the Environmental Notification Form (ENF) on February 1, 2021, the Proponent has had the opportunity to meet with members of the Impact Advisory Group ("IAG"), the Allston community, the City of Boston (the "City"), various State agencies, elected officials, and other stakeholders to discuss the Project, and to listen to ideas and suggestions for improving the Project. The Proponent appreciates the opportunity the Project has to improve the lives of the Allston community and is grateful for the thoughtfulness and thoroughness that went into the comments provided. The suggestions offered have strengthened the Project, and the Proponent is grateful for the community's diligent and unwavering commitment to help shape the future of their neighborhood.

The Proponent is committed to working to ensure that the realization of Project offers opportunities for the Allston community to benefit from the Project's development, and is hopeful that through ongoing collaboration and dialogue with the State, community, elected officials, and the City that, together, we will foster a diverse community where all are met with a sense of inclusion and belonging.

1.1 Community Outreach and Status of Review

On March 26, 2021, the State of Massachusetts passed legislation to advance environmental justice efforts in the State. While regulations resulting from that legislation have yet to be finalized, the Proponent, in collaboration with the MEPA Office and the state's Director of Environmental Justice, has developed a Project-specific Environmental Justice (EJ) Plan, as outlined below. The Proponent will continue to work with state agencies and the local community to improve its environmental justice plan, and will also continue its outreach to EJ populations throughout the public comment period.

Through numerous, collaborative meetings with community/civic organizations, advocacy groups, elected officials, various State and City agencies, as well as public meetings with the Impact Advisory Group ("IAG"), under the City of Boston's Article 80 Large Project Review process ("Article 80"), for the Project, the Proponent has listened to, and sought to understand, the community's priorities with a goal of improving the Project wherever possible.

The Project's current community outreach process commenced on January 19, 2021, when the Proponent held a pre-Article 80 Letter of Intent meeting with the IAG and the general public to re-introduce the Project and to gather feedback on what the community and other stakeholders would like to see included in the Project.

The ENF was filed on February 1, 2021 and published on February 10, 2021. The ENF public comment period ended on March 2, 2021, and the ENF Certificate was issued on March 12, 2021. The Proponent has sought to incorporate and address requests and feedback regarding the ENF Certificate and public comments to the ENF.

Please refer to Chapter 9, *Response to ENF Comments*, for further detail.

The Secretary's Certificate on the ENF requires Harvard to request a MEPA Special Review Procedure ("SRP") to address the future development of Harvard-owned land within the

Framework Plan area other than the Project. Harvard has committed to institute such a SRP and is working with MEPA to finalize the specific procedures to be included in the SRP.

Additional IAG/public meetings were held on June 15, July 13, July 20, and July 27, 2021 on various topics and to preview elements of the DPIR filing. The Proponent also met with the Boston Civic Design Commission ("BCDC") on June 1, 2021 to present updates to the master plan since the PDA Master Plan was reviewed and approved in early 2018.

The IAG/public meetings have been well attended, with more than 50 people at each meeting (not including the Proponent and its consultants). The Proponent and its consultants have sought to present the Project and its impacts in language understandable to members of the community, without the use of jargon, and with accompanying visual presentations, and will continue to do so in all future meetings.

In addition to the IAG/public meetings, the Proponent has also held numerous meetings with civic associations, community representatives, elected officials, and City and State departments/agencies to obtain input and to develop a better understanding of the community's interests and priorities, and will continue to do so during the comment period.

1.1.1 Environmental Justice

1.1.1.1 Neighborhood Overview

Allston is uniquely diverse in terms of the number of cultures, races, and ethnicities it encompasses. It is equally diverse in terms of income levels, occupations, and age profiles. It is a true melting pot of cultural diversity, and that diversity has become the very fabric of the community's identity.

1.1.1.2 Established Community Identities

Demographics

Based on the City of Boston Neighborhood Profiles[1], the demographics of the neighborhood surrounding the Project are as follows:

- 22,312 residents in the Allston neighborhood
- 64.55% of Allston's population is between 20-34
- From 2000-2010, the population aged 18 to 24 increased by almost one third
- The Asian population grew by one third from 2000 to 2010
- The population of Allston grew 17% and the number of occupied housing units grew by 5% from 2000 to 2010
- In 2015, the median household income in Allston was $39,717, lower than Boston's median of $55,777

1 The City of Boston's Neighborhood Profiles was prepared by the Boston Planning & Development Agency's research division in August 2017.

- In 2015, 29% of Allston's population was foreign born, about the same percentage as the rest of the City.
- The Asian/Pacific Islander share of Allston's population is 20%, considerably higher than the 9% share for the rest of the City

Ethnic Populations

Based on the City of Boston's Neighborhood Profiles, the ethnic populations that reside in Allston include:

- Chinese and Chinese American residents in Lower Allston
- Brazilian families interspersed in the area
- Spanish-speaking residents interspersed in the area
- Korean residents in Allston Village
- Russian Americans: Russian Benevolent Society and elderly care facility

In connection with the Article 80 Large Project Review process, the proponent has worked with the BPDA to develop a Language Access Plan (LAP) for the Project. As part of the LAP, the Proponent has developed Fact Sheets that translate summaries of key facts about the Project, which were submitted to the City on July 28, 2021, into three languages identified by the City: Spanish, Simplified Chinese, and Brazilian Portuguese. Based on community feedback and in order to facilitate greater community outreach and inclusivity, the Proponent has also translated the Fact Sheets into Russian, Korean, and Arabic. Those translated Fact Sheets are available on the BPDA's and Proponent's websites for the Project.

In addition to the translated Fact Sheets, the Proponent will continue to work with the BPDA to offer translation services, as needed, for public presentations at Public Meetings. The Proponent also will work with the BPDA to provide interpretation services for other meetings on an as-needed basis.

The Proponent has a strong track record of community engagement and inclusion and will continue those efforts as part of the public review process for the Project.

Renters and Owners

Based on the City of Boston's Neighborhood Profiles, the housing makeup of Allston is as follows:

- In 2015, Allston had 1,400 condos, 22% of which were owner-occupied
- The number of cars per household has declined since 2000 from 0.84 to 0.61.
- The rental/owner split was stable at about 90% renters from 2000 to 2015
- There are no public housing projects in Allston. There are two major projects, Fidelis Way and Faneuil, located in Brighton

Public Transit Options

The local community is heavily reliant on public transit. Public transit options are detailed in Chapter 3, *Transportation*.

Demographics Immediately Adjacent to the Project Site

The Project Site is located in Block Group 1, Census Tract 8.03, and is adjacent to Block Group 1, Census Tract 1 and Block Group 4, Census Tract 8.02. Based on data from the 2020 census provided by the current *Environmental Justice Map Viewer*[2], the demographics in areas immediately adjacent to the Project Site are the following:

Block Group 1, Census Tract 8.03, Suffolk County

The EJ characteristics for this area are as follows:

- A median household income of $54,821, which is 63.9 % of the state median;
- A 45.1% total minority population; and
- 4.3% of households with language isolation.

Block Group 1, Census Tract 1, Suffolk County

The EJ characteristics for this area are as follows:

- A median household income of $48,098, which is 56.0% of the state median;
- A 62.0% total minority population; and
- 6.3% households with language isolation.

Block Group 4, Census Tract 8.02, Suffolk County

The EJ characteristics for this area are as follows:

- A median household income of $124,271, which is 144.8 % of the state median;
- A 52.4% total minority population; and
- 3.5% households with language isolation.

1.1.1.3 Environmental Justice Populations

Although the Project Site is indicated on the state EJ map as a white circle (due to it being a large empty parking lot), it is surrounded by EJ communities that meet the thresholds for an income community, for a minority population community, and for a language proficiency community. For that reason, the Proponent is approaching EJ planning from a complete and holistic approach.

As described above, the Proponent has conducted extensive community outreach and stakeholder engagement since it began pursuing the Project and will continue to do so through the MEPA process. While the MEPA Environmental Justice Protocol is still being

2 This is an interactive map that uses population data from the 2020 Census, based upon demographic criteria developed by the state's Executive Office of Energy and Environmental Affairs (EEA), to show which Census 2020 block groups are classified as EJ populations.

developed[3], in accordance with the DEIR Scope recommendations around the topic of Environmental Justice EJ, the Proponent has conducted an assessment of EJ populations surrounding the Project Site. Using the current *Environmental Justice Map Viewer*[4], EJ populations within a 1-mile radius and a 5-mile radius of the Project Site were identified, as shown in Figure 1.3. Directly adjacent to the Project Site are populations that fall into the following state's EJ population categories:

- "Minorities comprise 40 per cent or more of the population"; and
- "The annual median household income is not more than 65 per cent of the statewide annual median household income".

Additionally, on the outer edge of the 1-mile radius, to the south of the Project, are EJ populations that include minority and income categories in addition to those where "25 per cent or more of households lack English language proficiency."

Within a 5-mile radius of the Project Site there are other EJ populations, including the Jamaica Plain and Roxbury communities of Boston, as well as the neighboring cities of Cambridge, Somerville, and Everett (Figure 1.3).

1.1.1.4 Project-specific Environmental Justice Plan

The Proponent's proposed EJ plan for the Project is designed around three "pillars" of opportunity.

1. **Direct Environmental Impacts** – The Project is a mixed-use commercial development that includes residential units, lab/office space, retail, and conference areas, with no major point sources of pollution (the Project is not generating any energy, nor is it manufacturing any products or emitting any industrial discharges), and the Project Site is reasonably buffered from any residents or sensitive receptors. While the DEIR contains extensive information and analysis about the potential environmental impacts of the Project, and about proposals to address such impacts, the Proponent will work with the MEPA Office and the state's Director of Environmental Justice to analyse any relevant cumulative data developed and identified by the State as pertinent to the Project, including data that may become available in the upcoming Massachusetts Department of Public Health mapping tool.
2. **Expanded Public Participation –** In addition to the formal public meetings that have been hosted by the BPDA, the Proponent has met and will continue to meet with community groups in an effort to ensure an inclusive process and to reach EJ populations.

   Through the Language Access Plan, the Proponent has provided Fact Sheet translations as part of its DPIR submission to the City for three threshold languages: Spanish, Simplified Chinese, and Brazilian Portuguese. Based on community feedback and in order

3 The MEPA Public Involvement Protocol for EJ Populations was open for public comment through July 30, 2021 and is anticipated to be effective for new projects in early-October 2021 according to the MEPA website.

4 This is an interactive map that uses population data from the 2020 Census, based upon demographic criteria developed by the state's Executive Office of Energy and Environmental Affairs (EEA), to show which Census 2020 block groups are classified as EJ populations.

to facilitate greater community outreach, the Proponent has provided for additional, elective translation of the Fact Sheet into Russian, Korean, and Arabic.

The Proponent will continue additional outreach measures, with a goal of reaching and engaging EJ populations proximate to the Project. These measures will include, but will not be limited to:

- Direct mail outreach to residents of the local community using multiple languages
- Additional in-person and virtual forums with local community members at various times of the workday and including weekends
- Working with local community, religious, and faith-based organizations to identify and publish notifications of public meetings and the availability of Project documents through non-traditional sources including relevant local media channels and community organizations, including in publications/media that use languages other than English
- Launching a website to host all relevant public documents concerning the Project, including this DEIR, all other MEPA filings, and the Secretary's Certificate for the Project, seeking to provide information about the Project in clear and understandable terms with appropriate visual graphics
- Making the DPIR and this DEIR available at the Honan-Allston public library

3. **Diversity, Equity and Inclusion –**True Environmental Justice goes beyond avoiding negative impacts and including community input in the decision-making; the surrounding EJ communities will see benefit of the Project itself. From jobs, to leasing opportunities, to programming and activation planning; all these facets must incorporate conscious thought on how to invite the surrounding EJ communities to become part of the ERC.

One of the core mission-related goals and objectives of the Project is the Proponent's commitment to "foster a diverse community where all are met with a sense of inclusion and belonging, and to provide a welcoming environment to all community members." The Proponent maintains a fundamental dedication to diversity, equity, and inclusion (DEI) and has developed a DEI strategy that includes: (i) an inclusionary equity ownership program for Black and Latinx investors, (ii) using good faith efforts to award or cause to be awarded 15% or more of the total value of all of the pre-construction and construction contracts to certified MBE and WBE firms and consultants, (iii) allocating ~25% of the Project retail to local, small, Minority-owned, or Women-owned retailers, and (iv) partnering with local organizations to develop an inclusive programming strategy for the Project Greenway. In addition, to ensure inclusion of individuals and families of different incomes, the Project will provide a significantly greater percent of affordable housing than is required by the City's Inclusionary Development Policy. In Phase A, 17% of all residential units will be affordable, and in Phase B, 20% of all residential units will be affordable.

As the Project advances through the MEPA and Article 80 processes, the Proponent will continue to work with the BPDA to ensure that translation services are provided at meetings, as requested, and the Proponent will continue to work with the State to expand outreach to EJ populations to ensure an inclusive review process.

1.2 Project Overview and Status of Local Review

The Proponent intends to develop the Project in two phases. The first, described herein as "Phase A", contemplates the development of approximately 900,000 square feet, consistent with the level of density as approved in PDA Master Plan. Additionally, the Proponent will pursue entitlements with the City to develop a subsequent phase, described herein as "Phase B", to consist of 1,040,000 square feet on areas within the PDA previously contemplated as predominately surface parking lots. The combined Phase A and Phase B are at times herein referred to as the Project or the Full Build.

As noted in the prior Section 1.1, the Proponent has maintained ongoing engagement with the City, community, and elected officials in connection with Article 80 review, including numerous IAG/public meetings to listen to the thoughts and considerations of the public.

The Proponent intends to file the DPIR with the BPDA approximately concurrently with this DEIR for City and public review. The scope of the Proponent's DPIR filing is to seek Article 80 approval solely for Phase A, along with the filing of PDA Development Plan concerning Phase A. Additionally the Proponent will seek master plan entitlements for Phase B via an Amended and Restated Master Plan for Planned Development Area, No. 115 (the "Amended PDA Master Plan"). The Proponent would plan to initiate a subsequent and separate Article 80 review and community process and approval of a PDA Development Plan for Phase B, following approval of the Amended PDA Master Plan and receipt of elected official, community, and City feedback of said Amended PDA Master Plan.

1.3 Improvements to Project and Summary of Public Benefits

In response to the thoughtful and constructive comments received from the community, elected officials, City agencies, and other stakeholders, the Proponent has worked to improve and enhance the public benefits of the Project for both the Allston community and for greater Boston. The Project Site, currently and historically, has not provided access for or public benefits to the Allston community or the broader public, having been utilized, primarily, for industrial transportation uses and construction staging.

Urban Design

› Recognizing the opportunity for the Project to be a beacon of forward-thinking urban design, the Proponent is proud to have assembled a diverse, world-class team of designers, engineers, and consultants for Phase A (collectively, the "Project Team"), including:
  - **Studio Gang of Chicago, IL** (master planners, lab/office and conference center design architect; also a Women-owned Business Enterprise (WBE))
  - **Henning Larsen of Copenhagen, Denmark** (master planners, lab/office design architect)
  - **SCAPE of New York, NY** (landscape architect; WBE)
  - **Marlon Blackwell Architects of Fayetteville, AR** (hotel design architect; a Minority-and-women-owned Business Enterprise (M/WBE))

  - **MVRDV of Rotterdam, Netherlands** (residential design architect)
  - **Moody Nolan of Columbus, OH** (residential/hotel architect of record; a Minority-owned Business Enterprise (MBE)
  - **Arrowstreet of Boston, MA** (lab/office architect of record)
- The master plan for the Project has been developed with six guiding principles:
  - Ensure an accessible and active urban realm:
  - Create diverse scale of streets and urban spaces,
  - Place nature at the heart (accessible and inclusive),
  - Design the urban realm for year-round comfort,
  - Differentiate building heights to enrich pedestrian experience, and
  - Ensure sustainability in building design and construction.
- The proposed conference center is being designed by Jeanne Gang of Studio Gang and is referred to herein as the "Treehouse Conference Center". The Treehouse Conference Center is envisioned as a state-of-the-art conference space where ideas collide and connections blossom. It will be a welcoming, transparent space, showcasing environmental sustainability and embracing the interaction of built and natural environments. The Treehouse Conference Center will be owned and operated by Harvard.
- The Project's Phase A lab/office building plays a key role in the master plan, framing the southern boundary of the Project Greenway, but also providing a buffer for the open spaces and residential uses from the District Energy Facility further to the south. The building has three parts: two distinct but complementary buildings on the east and west which are appropriately massed depending on the open space north of each, and a connector sited between each component. The massing of all three elements works to be consistent with the master plan's focus on the Project Greenway by creating step-backs that increase the amount of daylight to the open space as part of the Project's micro-climate strategy.
- The design concept for the Project's Phase A residential buildings was inspired by historic residential architecture of local Boston brownstone townhouses. With their pronounced bays, textured facades and distinct materials, these architectural features are re-interpreted in a contemporary design. Residential units, regardless of their location in the building, are equipped with a corner window by extending the depth of the living room outward. This "pixelated" facade boosts views over the neighborhood, city and river.
- Marking the important corner of Western Avenue and Cattle Drive, the Project's hotel in Phase A presents an iconic figure, identifiable at the scale of the city while framing human-scaled and thoughtful streetscapes at this new publicly accessible square. This new lifestyle hotel will host a variety of active ground floor uses creating amenities that serve pedestrians in the neighborhood and those using the Project Greenway.
- A key consideration of the Proponent and Project Team was to integrate the building designs seamlessly into a network of new, publicly accessible open spaces.

Public Realm

- As the master plan design of the Project has progressed, and in response to public comments, the Proponent has increased the new publicly accessible open space improvements from approximately 3 acres to 4 acres since the ENF.
- When incorporating the streets and expansive sidewalks supporting the Project, the area dedicated to publicly accessible open space, street and sidewalk areas of the Project represents over 50% of the total approximately 14.2 acre Project Site.
- The proposed publicly accessible open space areas are planned to be actively programmed, including with public art exhibits, community-oriented events, health and wellness classes, music concerts, and other festivals. The Proponent looks forward to engaging with the IAG and the community on furthering plans for programming and enlivening the Project Greenway.
- The Project's buildings have been configured to create a more comfortable micro-climate for the Project Greenway in order to extend the seasonal usage of the open space.
- The Project Greenway will incorporate a multi-modal bike and pedestrian pathway that is designed to integrate into the larger Framework Plan with the goal of completing a portion of the future connection from the Allston neighborhood to the west with the Charles River to the east.
- As part of the Enabling Infrastructure, significant investment will be made to create new publicly accessible streetscapes, including dedicated bike paths, furnishing and planting zones, and expansive pedestrian sidewalks.
- The Project's loading and back-of-house zones have been strategically located within the building footprints, preventing the need for service alleyways that would otherwise reduce publicly accessible open space.

Sustainability and Resiliency

- In response to the ENF Certificate and ENF Comments regarding imperviousness and storm water management, the Proponent and Project Team have incorporated a "Bio-Classroom" into the Project Greenway. Designed as an educational and demonstrative bio-retention area, the Bio-Classroom will actively collect surface water from its surroundings and accommodate overflow during large storm events. Additionally, the design of the Bio-Classroom is intended to celebrate the history of areas along the Charles River as tidal salt marshes.
- As requested in various ENF Comments, this DEIR further details the designs for an extensive stormwater management system that will be integrated into the Project.
- Through integration of green roof elements, pervious pavers, open space design elements (e.g., the Bio-Classroom), the impervious area of the Project has been reduced. Stormwater will be collected and actively managed from all areas of the Project Site, regardless of whether that area's surface is pervious/impervious, via the extensive stormwater management systems.

- The Proponent has committed that the components of the Project (e.g. hotel, residential, office/lab) will be designed to be eligible for Fitwel certification. Originally created by the U.S. Centers for Disease Control, Fitwel is a building certification that supports healthier workplace environments to help improve occupancy health and productivity. Additionally, the Enabling Infrastructure and Project Greenway (to the extent eligible) will be Envision certified. The Envision program provides for a framework that assesses the sustainability, resiliency, and equity for infrastructure projects.
- The Proponent has committed to making the Project fossil fuel-neutral by 2026 and fossil-fuel-free by 2050.
- The Project will exceed compliance with Article 37 of the Code by meeting the requirements necessary to achieve a LEED Gold certification.
- The Project will integrate sustainable construction methods throughout the development of the Project's component buildings, Project Greenway, and Enabling Infrastructure.

Diversity, Equity, and Inclusion ("DEI")

- As noted in the PNF, a portion of the equity ownership in the Project has been reserved for Black and Latinx investors. The Proponent is pleased to announce that through the inclusionary investor program more than 150 individual Black and Latinx investors have committed approximately $30 million towards the ownership of the Phase A component of the Project. Those investors have a wide range of backgrounds, and for many it represented their first opportunity to invest in a large-scale development project. This represents one of the largest, if not the largest, such inclusionary investor initiative (in terms of total dollars) for a private development in the history of the City/State.
- As described further in Section 1.4.2 below, the Proponent will use good faith efforts to award or cause to be awarded 15% of the total value of the Proponent's pre-construction and construction contracts to certified MBE and WBE firms and consultants.
- The Proponent also believes that inclusionary team building and workforce development should extend to the development team. The Project Team is diverse and led by a female. Tishman Speyer's Boston office is female-led. In addition to the Proponent's internal DEI resources, the Proponent has engaged dedicated External DEI advisors as a key part of the Project Team since 2019. Since 2020, the Project has participated in the Commercial Real Estate Success Training (CREST) Internship Program, which offers paid internships to Boston-based, minority college students.
- The Proponent's vision for the proposed retail uses is to create a vibrant and active streetscape through the thoughtful curation of ground floor space in the Project -- with the goal of creating a retail village that thrives within buildings throughout the Project Site, and of attracting local, small, Minority-owned, or Women-owned retailers. The Project will include pedestrian-focused publicly accessible open space and other public realm areas that will facilitate foot traffic to future retailers.
- To foster small, local, MBE, and/or WBE retailers, the Proponent is committed to allocating approximately 25% of the retail at the Project to such retailers, and, as necessary, work with such retailers to provide advantageous lease terms.

- The Proponent will work with local, small business development and retail advocacy organizations to help identify small, local, MBE, and/or WBE retailers who may be interested in operating at the Project.
- Once the Project opens, the Project Greenway will become home to an active public realm. The Proponent is excited to partner with both local and international artists and organizations to bring the Project Greenway to life in a way that will ensure that it is diverse, inclusive and welcoming, and invites suggestions of organizations with which to consider partnering.

Housing, Social, and Economic

- The Proponent has heard a clear desire from the community for the Project to add a significant number of affordable units to the area. The Proponent shares this desire and has been working to (i) develop an affordable housing program that includes a percentage of on-site affordable units that is greater than the level required by the City's Inclusionary Development Policy (IDP) and (ii) address issues of housing affordability holistically across the Project.
- Responding to comments from elected officials and the community to increase the supply of housing in Allston, the Proponent has increased the residential component of the Project by approximately 15 units (to approximately 345 total units for the Project) and approximately 13,500 square feet (approximately 263,500 SF of total residential in the Project). The Proponent will provide a combined level of on-site residential affordability for Phase A & Phase B of approximately 18.5%, with an affordability level in Phase A of 17% and 20% in Phase B.
- The Proponent currently anticipates that 15% of Phase A's on-site units will be affordable units allocated to families earning up to 70% of the Area Median Income (AMI), which is an increase of more than 15% above the number of affordable units required under the City's IDP policy. An additional 2% of Phase A's on-site units will be affordable units allocated to additional below-market workforce housing for families earning up to 100% of AMI.
- The Proponent has heard the community express interest in on-site affordable units that are reserved for families at lower AMIs, and the Proponent is open to doing so; however, restricting units at lower levels of AMI, would require that the AMIs of certain other units be correspondingly increased to higher AMI levels. The Proponent is open to this approach and seeks the community's feedback to understand is the level of interest in the Proponent pursuing this alternative approach.
- The Proponent will comply, voluntarily, with the requirements of the newly enacted Affirmatively Furthering Fair Housing ("AFFH") zoning amendment as approved by the City of Boston.
- The Project is anticipated to be home to 5,300 on-site jobs relating to the office/R&D/lab, life sciences, hotel, retail, and parking uses within the Project, and to provide an estimated 4,000 construction jobs in a variety of trades. Additionally, the Proponent is committed to comply with the Boston Resident Jobs Policy (BRJP).

Transportation

- The Project will introduce transportation improvements for all users, including new, multimodal connections that currently do not exist. The trips generated by the Project will be accommodated through the implementation of multi-faceted transportation improvements and mitigation efforts, with a particular focus on encouraging non-vehicular travel to and from the Project Site.
- The Project will leverage the construction of a system of four new on-site multimodal streets to accommodate all roadway users consistent with the objectives of BTD's Complete Street Guidelines, incorporating pedestrian and bicycle accommodations, facilities, and amenities that encourage bicycling, walking, and transit as primary transportation modes used to access the Project Site.
- The Project includes complete street improvements along Western Avenue, from east of Hague Street to East Drive, including improvements to bicycle accommodations, and to sidewalks and pedestrian amenities.
- The Enabling Infrastructure will include the creation of four new streets: East Drive; Cattle Drive; DEF Drive; and Science Drive, all of which will be consistent with the objectives of the City of Boston's Complete Streets Guidelines.
- On- and off-site improvements are designed to improve the accommodation of pedestrians and bicyclists while increasing their safety and comfort. A new east-west shared-use path (and Project Greenway) will also conveniently connect pedestrians and bicyclists traveling through and to the Project Site from surrounding neighborhoods.
- The Proponent is working with the MBTA to increase bus service in the area to serve the Project's expected future demand. The Proponent supports elevating Route 70 and 86 to Key Bus Routes at service levels recommended in this study and commits to study and support the implementation of bus transit priority on Western Avenue and other critical locations. The exact details and structure of the mitigation commitment will be determined through a continued dialogue with MassDOT, MBTA and the City of Boston.
- The Proponent is committed to becoming a member of the Allston-Brighton Transportation Management Association or TMA (i.e., the ABTMA) and is supportive of expected future studies (such as the Allston-Brighton Neighborhood Connector Study) and to programs to develop a joint transit/connector fixed-route service between existing, future developments, and transit hubs in the area.
- The Proponent is evaluating the need to provide supplemental transit connections to/from the Project Site to supplement and/or integrate with existing MBTA transit services in the area. The Proponent anticipates an agreement with Harvard University that leverages two existing shuttle routes to support Project and Harvard University demand between Allston and Harvard Square.
- The Proponent will be continuing conversations with the City, MBTA, ABTMA, and other neighborhood stakeholders to advance these strategies and to improve transit service within the project area.
- In addition the Proponent will implement a robust program of Transportation Demand Management ("TDM") strategies to take full advantage of the Project's multiple mobility options and its synergy with the surrounding neighborhood. TDM measures will seek to

reduce reliance on single occupancy vehicles and increase trips via transit, walking and biking.

- Chief among the TDM strategies to be deployed will be to limit and actively manage a shared-parking supply for the Project. In order to encourage non-vehicular travel, the Proponent has proposed parking ratios for the Project of 0.8 spaces per 1,000 SF of lab/office space, 0.5 spaces per residential unit, and 0.2 spaces per hotel key/room, reflective of the Proponent's support of forward-thinking parking strategies and the promotion more sustainable access modes.
- Finally, the Proponent is committed to funding several proposed roadway improvements, including:
  - Windom Street at Cambridge Street and Almy Street Improvements
  - Western Avenue Improvements between East Drive and Soldiers Field Road
  - Western Avenue at Soldiers Field Road Improvements
  - Signalization of Western Avenue at East Drive / Kresge Way

1.4 Project Description

Consistent with the State, City, and community's goals for the Project Site, the Proponent envisions that the Project will transform an underutilized site into a vibrant, inclusive mixed-use development that will complement the surrounding area. The Project will include uses consistent with PDA Master Plan, which are anticipated to include the following:

- Residential;
- Retail;
- Restaurant;
- Research and Development;
- Office;
- Hotel;
- Conference Center;
- Service;
- Open space and programmed open space; and
- Parking.

Figure 1.4 represents the proposed site conditions for the Project. It is intended that the entirety of the Project will be developed in a single phase of construction.

1.4.1 Development Program

Table 1-1 summarizes the proposed development program for the Project.

Table 1-1 Proposed Project Development Program Summary

Project Element	Phase A	Phase B	Project
Site Area			**±14.2 acres**
Building Uses			
Lab / Office	*420,000 SF*	*634,000 SF*	1,054,000 SF
Residential	*245,500 SF (345 units)*	*336,300 SF (420 units)*	581,500 SF (750 units)
Hotel / Conference	*127,000 SF (250 keys)*	-	127,000 SF (250 keys)
Conference	*61,500 SF*	-	61,500 SF
Active Ground Floor[1]	*46,000 SF*	*69,700 SF*	115,700 SF
Total GFA[2]	***900,000 SF***	***1,040,000 SF***	**1,940,000 SF**
Below-Grade Parking	*300 spaces*	*300 spaces*	600 spaces
On-Street Parking/ Managed Curb Space	*Approximately 40 spaces*	*To Be Determined*	Approximately 40 spaces
Above-Grade Parking[3]	-	*640 spaces*	640 spaces
Temporary Proximate Parking[3]	*280 spaces (to be replaced)*	-	-
Total Parking	***620 spaces***	***940 spaces***	**1,280 spaces**

NOTE: All measurements are approximate.
GFA Gross Floor Area as defined in Article 2A of the Boston Zoning Code (exclusive of mechanical and structured parking areas).
1 The ground floor areas of the component buildings will include retail, restaurant, and other active ground floor uses, which are included as part of the above noted component building uses.
2 Unless labeled otherwise, all areas provided herein are described in gross floor area, as such term is used in the definition of "Floor Area Ratio" in the Boston Zoning Code; provided further that such areas devoted to garage use, whether or not within the basement of a building or serving residential uses, mechanical equipment, storage, service and loading areas, wherever located, are specifically excluded for the purposes of determining Gross Floor Area.
3 Prior to the delivery of the above grade garage contained in Phase B, temporary surface parking proximate to, or within the Project Site, will provide 280 parking spaces to satisfy Phase A parking demand.
4 Lab/Office tenants have yet to be identified.

1.4.2 Diversity, Equity, and Inclusion

One of the core mission-related goals and objectives of the Project is the Proponent's commitment to *"foster a diverse community where all are met with a sense of inclusion and belonging, and to provide a welcoming environment to all community members."*

The Proponent maintains a fundamental dedication to diversity, equity, and inclusion (DEI). This commitment to DEI, particularly its relation to the Project's planning and design, was at the core of HALC's selection of the Proponent during the RFP process. The Proponent will commit to executing DEI strategies at multiple levels of the Project. As described further in this Section 1.4.2, the Proponents has developed a multi-pronged framework of DEI initiatives.

Inclusionary Equity Ownership

Historically, there have been disparities in economic opportunities available to under-represented populations in the commercial real estate industry, particularly for wealth creation opportunities and true ownership of institutional-scale development projects.

When the Proponent set out to raise investment from Black and Latinx investors for the targeted 5% of the Project equity, there was little in the way of a "road map" for how to bring those investors into the Project ownership. The Proponent made concerted and wide-ranging efforts to identify, source, and structure the investment to allow for Black and Latinx individuals to participate.

Through the combined efforts of all involved, the Proponent was able to bring over 150 Black and Latinx individuals into the Project's ownership for the Phase A component, including local Boston-area residents, for a total of approximately $30 million. This represents one of the largest, if not the largest, such inclusionary investor initiative (in terms of total dollars) for a private development in the history of the City/State.

Procurement Process and Capacity Building

The Proponent is committed to engaging in a comprehensive procurement process throughout each phase of the development lifecycle that will ensure significant participation by minority and women-owned business enterprises, including construction contractors, subcontractors, professional service providers and consultants. In addition to awarding contracts to MBE and WBEs, the Proponent will work to identify opportunities to partner smaller MBE and WBEs with larger, more established consultants and contractors, where feasible, to build capacity within growing MBE and WBEs.

The Proponent will use best efforts to award or cause to be awarded 15% of the total value of the Proponent's pre-construction and construction contracts to certified MBE and WBE firms and consultants.

The Proponent's commitment to these efforts can be seen in the Proponent's selection of the design team for the Phase A buildings, which includes:

› **Studio Gang of Chicago, IL** *(master planners, lab/office and conference center design architect;* ***WBE****)*
› **SCAPE of New York, NY** *(landscape architect;* ***WBE****)*
› **Marlon Blackwell Architects of Fayetteville, AR** *(hotel design architect;* ***M/WBE****)*
› **Moody Nolan of Columbus, OH** *(residential/hotel architect of record;* ***MBE****)*

In addition to direct awards to MBE, WBE, and/or M/WBE firms, the Proponent has sought to address capacity building in the procurement process. Through an intentional and deliberate capacity building process, the Proponent has worked with certain larger, non-certified firms to form meaningful partnerships with smaller, certified MBE, WBE, and/or M/WBE firms.

Workforce Development and Training

The Proponent recognizes the skills and experience gap that has posed challenges for many disenfranchised persons in Boston to participate in the economic development of the area.

The Project is anticipated to provide numerous employment opportunities, including an estimated 5,300 on-site jobs relating to the office/R&D/lab, life sciences, hotel, retail, and parking uses within the Project, and an estimated 4,000 construction jobs in a variety of trades. Additionally, the Proponent will comply with the Boston Resident Jobs Policy ("BRJP") and will monitor construction employment standards to track total work hours and ensure participation among Boston residents, people of color and women among both journey people and apprentices.

The Proponent also recognizes the challenges facing many local residents seeking employment in life sciences, which has been a growing segment of the regional economy. The Proponent has identified several potential approaches to addressing the challenges facing the accessibility of the life science industry. The Proponent welcomes feedback from the community to better understand the community's interests and priorities in these areas:

- **Middle / High School Education:** The Proponent is interested in exploring the magnitude of the potential demand in the community for after-school workshops, summer internships, and/or career exploration seminars for middle and high school students from the Allston & Brighton neighborhoods.
- **Jobs Training / Certification:** A challenge to meaningful employment in the ever-evolving field of life science is often the result of a skills gap, particularly in a changing employment climate coming out of the COVID-19 pandemic. The Proponent is interested in understanding the level of interest in the community in entry-level life science training and certification programs and/or in participating in life sciences jobs fairs.
- **Demystifying Life Sciences:** The Proponent also recognizes that the life sciences industry has historically felt disconnected from the respective communities where these companies have been located. To that end, the Proponent is interested in understanding the community's interest in participating in educational events to "demystify" life science via presentations from leaders in the life sciences community.

Inclusionary Team Building

In addition to external initiatives to advance DEI (e.g., inclusionary investor program, procurement/ capacity building, etc.) the Proponent has built its development team with diversity and inclusion as a key pillar of the Project. Since 2019, Taidgh McClory, of T.H. McClory, LLC, and Milton Benjamin, of KAGE Growth Strategies, have been key members of the Proponent's team. Taidgh and Milton have been instrumental in partnering with the Proponent to incorporate DEI initiatives throughout all aspects of the Project, which has resulted in a thoughtful, meaningful DEI strategy to help address the inequities present in the broader commercial real estate industry.

The Proponent has also been an active participant and champion of the CREST Program, which provide paid internships to Boston-based, minority college students. Starting in the summer of 2020, two interns were hired by the Proponent on paid internships, one of whom has since found full employment with an unrelated Boston-based commercial real estate developer. The Proponent also has employed a CREST Program intern for the summer of 2021 who is actively working on the Project. The Proponent is committed to hiring additional CREST program interns throughout the life of the Project.

Fostering and Cultivation of Local/MBE/WBE Retailers

The Proponent's vision for the proposed retail uses is to create a vibrant and active streetscape through the thoughtful curation of ground floor space in the Project – with the goal of creating a retail village that thrives within buildings and throughout the Project. The Project calls for pedestrian-focused publicly accessible open space and other public realm areas which will facilitate foot traffic to future retailers.

To realize the vision for the public realm and adjacent retail spaces, the Proponent desires to create an inclusive environment to attract local, small, Minority-owned, or Women-owned retailers. In order to foster small, local, MBE, and/or WBE retailers, the Proponent is committed to allocating approximately 25% of the retail at the Project to such retailers, and, as necessary, work with such retailers to provide advantageous lease terms.

Additionally, the Proponent will work with local, small business development and retail advocacy organizations to help identify these retailers who may be interested in operating at the Project.

1.4.3 Public Realm Improvements and Open Space

The expansive public realm improvements proposed for the Project aim to create new connections, including for users such as Allston residents, students and faculty of Harvard, and new employees, residents, and visitors of the Project.

Through a range of inviting and engaging publicly accessible open spaces, the Project intends to establish strong connections with existing communities and advances the vision for a future connection from the existing Allston neighborhood toward Soldiers Field Road and the Charles River.

A key element of the publicly accessible open space, sidewalk rooms and greenway improvements, which total approximately 4 acres, is the Project Greenway proposed at the heart of the Project Site, which is consistent with, and enhances, the vision established in the PDA Master Plan and creating a new publicly accessible open space destination for Allston and the surrounding communities.

The result of this expanded open space is that over 50% of the Project Site is dedicated to the public realm, including publicly accessible open space, expansive sidewalks, and public streets.

1.4.4 Overview of Sustainability and Resiliency Approach

The Project consists of the development of an underutilized urban site with a new vibrant mixed-use sustainable development that supports the City's goals for a sustainable future through the development of energy-efficient, environmentally friendly buildings and low-carbon construction methods that will be LEED certifiable and resilient to climate change.

The Project will commit to meeting the requirements necessary to achieve a Gold certification using the LEEDv4 rating system for all building typologies within the Project, as well as commitment to be Fitwel certified. Originally created by the U.S. Centers for Disease

Control, Fitwel is a building certification that supports healthier workplace environments to help improve occupancy health and productivity. Additionally, the Proponent will commit that the Project be fossil-fuel neutral by 2026 and fossil fuel-free by 2050.

The Enabling Infrastructure and Project Greenway (to the extent eligible) will be Envision certified. The Envision program provides for a framework that assesses the sustainability, resiliency, and equity for infrastructure projects.

Each building of the Project will be designed with energy-efficient HVAC and lighting equipment and systems, and incorporate other potential energy conservation measures, as reasonable and feasible.

The Project Site is not within a FEMA floodplain; however, the Proponent recognizes the importance of resiliency for the neighborhood of Allston, and as such, the Project is planned to go above-and-beyond current resiliency standards, and will be designed and engineered to manage the 32-year storm (6.7 inches of rainfall). On-site stormwater management systems have been incorporated into the site design to reduce risk of precipitation-based flooding. The site design will also aim to reduce urban heat island impacts to the extent feasible by using greenery, trees, green infrastructure, shading structures, and materials with high solar reflectance/albedo.

Please refer to Chapter 4, *Stormwater*, and Chapter 6, *Climate Change*, for further details on the resiliency and sustainability, respectively, for the Project.

1.4.5 Housing and Affordability

The Project is proposed to increase its housing component in response to comments from the community and elected officials on increasing the supply of housing opportunities in Allston. As compared to the ENF filing, the residential component of Phase A has been revised, increasing by 15 units (345 apartments overall) and approximately 13,500 square feet (approximately 263,500 SF of total residential). This Proponent intends to develop the Phase A residential concurrently with other uses within the Project, and expects to deliver much needed supply of 345 residential units to Allston by 2024

The Proponent's design for the residential component calls for a diverse range of for-rent housing options, with on-site affordability in excess of the 13% requirement set forth in the City's IDP. Across the combined Phase A and Phase B, the Proponent is proposing a blended affordability of approximately 18.5% of on-site residential units, with inclusionary housing in Phase A at 17% of on-site units and 20% of on-site units in Phase B.

The Proponent currently anticipates that 15% of Phase A's on-site units will be affordable units allocated to families earning up to 70% of the Area Median Income (AMI), which is a proportion of 70% AMI units that is 15% greater than the number of affordable units required under the City's IDP policy. An additional 2% of Phase A's on-site units will be affordable units allocated to additional below-market workforce housing for families earning up to 100% of AMI.

The Proponent has heard the community express interest in units being reserved for families at lower AMIs, and the Proponent is open to doing so; however, restricting units to lower levels of AMI, would require that the AMIs of certain other units be correspondingly increased to higher AMI levels. The Proponent seeks the community's feedback to understand the level of interest in the Proponent pursuing this option.

In addition to the planned development and delivery of housing to Allston in the near term, with enhanced affordability levels, the Proponent has agreed to comply, voluntarily, with the newly enacted Affirmatively Furthering Fair Housing ("AFFH") initiative as approved by the City of Boston.

1.4.6 Uses and Building Design Approach

The Project represents a unique opportunity to transform an underutilized site into a permeable, mixed-use district composed of sustainable buildings and welcoming open spaces. The creation of this new district in Allston will help to remediate a former industrial site, turning it into a fertile new ground for exchange of ideas, innovation, and connection.

The proposed site design and building massing emphasize sensitivity to the Project's surroundings with respect to Western Avenue, the Charles River, Cambridge Street, neighboring residential areas, and Cambridge across the river. As such, structures that reach taller heights are located farthest away from sensitive boundaries such as the residential neighborhood and the Charles River.

1.4.7 Site Access and Circulation

The key vehicular access point to the Project Site is off Western Avenue, via two proposed new roadways, referred to as Cattle Drive and East Drive. (It is important to note that the names of the new streets throughout this document are placeholders until the legal names of the streets are determined and codified by the City through the Public Improvement Commission). Western Avenue is connected to the regional highway network via Soldiers Field Road to the east. The Project Site has good indirect access to Interstate-90 (I-90) via off-site ramps on Cambridge Street south of the Project Site.

Proposed vehicle access to the Project from the north will be from Western Avenue and from the south from Cambridge Street via Almy Street. The Project will include four new complete streets: East Drive; Cattle Drive; DEF Drive; and Science Drive. Refer to Section 3.4.4 of Chapter 3, *Transportation*, for additional details on-site access and circulation.

Generous sidewalks and dedicated bike paths on Western Avenue, Cattle Drive, East Drive, and Science Drive, will enhance pedestrian and bicycle movement through the Project Site. The Project will be supported by plaza spaces, a shared-use path running east-west, and a laneway connecting Western Avenue to the central Project Greenway. Refer to Sections 3.4.4 and 3.4.5 of Chapter 3, *Transportation*, for additional details on-site vehicular, pedestrian, and bicycle access and circulation.

1.4.8 Anticipated Project Phasing and Construction Mitigation

The Phase A component of the Project is anticipated to commence construction in 2022, and to start delivering buildings in approximately 2024. The Proponent is undertaking a comprehensive review of the Project’s construction impacts in accordance with Article 80B of the Code so that those impacts can be mitigated to the maximum extent feasible.

HALC has begun initial construction activities for a portion of the Enabling Infrastructure, which will involve some site preparation work within the Project Site. The Proponent intends to begin construction on the Project’s Phase A buildings, the Treehouse Conference Center, and the Phase A portion of the Project Greenway as early as the first half of 2022.

The schedule for Phase B will be dependent upon the future entitlement and review process with the City, elected officials, and community. It is anticipated that Phase B would begin construction at some point following the start of construction of Phase A, given the sequenced regulatory process for Phase B, wherein the Proponent is (i) currently pursuing the Amended PDA Master Plan to be followed by (ii) in the future an Article 80 Large Project Review and community process and approval of a PDA Development Plan.

Regarding construction mitigation, the Proponent is committed to limiting disruption to the surrounding neighborhood, and will make proactive efforts to have clear and open communications with the local community. Prior to construction commencing a point person will be assigned from the Proponent’s team to address any Project-related issues that may arise and emergency contacts will be provided and maintained for immediate follow up on emergency situations. Additionally, updates will be provided throughout the duration of construction with relevant project information.

The Project Team will actively monitor and manage the construction process and will implement strategies to mitigate impacts to the public during the construction period. The Project Team will conduct studies, prepare designs and specifications, and monitor the contractor’s performance throughout the Project’s construction.

1.5 List of Anticipated Regulatory Controls, Approvals, and Permits

Table 1-2 below lists the federal, state, and local permits and approvals anticipated to be required for the Project.

Table 1-2 List of Anticipated Regulatory Controls, Approvals, and Permits

Agency Name	Permit, Approval, or Amendment
Federal	
U.S. Environmental Protection Agency	› NPDES Construction Stormwater Discharge General Permit Filings (Construction Dewatering and Runoff)
Federal Aviation Administration	› Determination(s) of No Hazard to Air Navigation (if required)
State	
Executive Office of Energy and Environmental Affairs, MEPA Office	› Review under MEPA
Massachusetts Department of Environmental Protection	› Sewer Extension and Connection Permit (if necessary for proposed building sewer service connections, where anticipated lab use is expected to produce industrial waste)
Department of Environmental Protection, Division of Air Quality Control	› Self-Certification or Air Plan Approval (if necessary) › Construction/Demolition Notification
Massachusetts Water Resources Authority	› 8(m) Sewer Permit & 8(m) Water › MWRA Sewer Use Discharge Permit (to the extent it may be required for specific waste discharges by tenants/users) › Construction Site Dewatering Discharge Permit (if necessary)
Massachusetts Historic Commission	› Determination of No Adverse Effect (if necessary)
Department of Conservation and Recreation	› Construction and Access Permit (if necessary)
Massachusetts Department of Transportation	› Construction and Access Permit (if necessary)
City	
Boston Redevelopment Authority	› Review under Article 80B, Large Project Review › PDA Master Plan Amendment (to allow for Phase B) › PDA Development Plan Approval
Boston Zoning Commission	› PDA Master Plan Amendment (to allow for Phase B) › PDA Development Plan Approval
Boston Civic Design Commission	› Design Review
Boston Interagency Green Building Committee	› Zoning Article 37, Green Building compliance › Climate Resiliency Checklist review
Boston Water and Sewer Commission	› Site Plan Approval › Stormwater Connection and Recharge, Cross Connection/Backflow Prevention Permit Hydrant Meter Permit
Boston Inspectional Services Department	› Building and Occupancy Permits
Boston Parks Department	› Approval to remove public tree(s)
Boston Inspectional Services Department, Committee on Licenses	› Fuel Storage License, Garage Permit

Table 1-2 List of Anticipated Regulatory Controls, Approvals, and Permits (Continued)

Agency Name	Permit, Approval, or Amendment
City (Continued)	
Boston Transportation Department	› Construction Management Plan › Transportation Access Plan Agreement
Boston Fire Department	› Fuel Storage Tank Permit (to the extent required for fuel serving boilers and generators, if any); approval of life safety systems
Boston Public Improvement Commission	› Street Opening Permit(s) › Sidewalk repairs and improvements › Specific Repair Plan for Western Avenue › Street Layout Plans for Cattle Drive, East Drive, and DEF Drive, to be prepared as part of the Enabling Infrastructure › License for earth retention system (all as applicable)
Boston Department of Public Works	› Curb cut permit(s), as applicable

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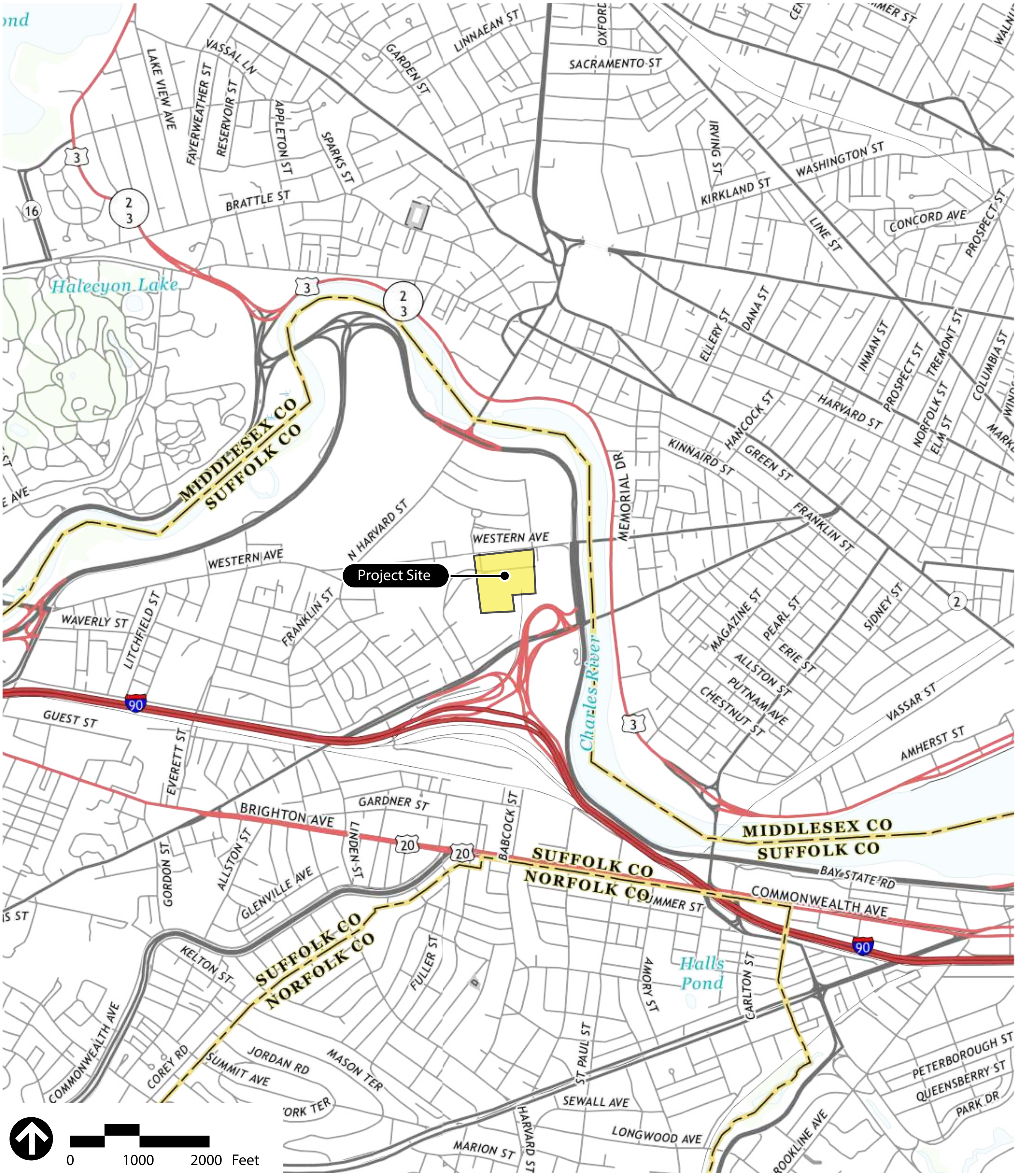


Source: USGS

Figure 1.1

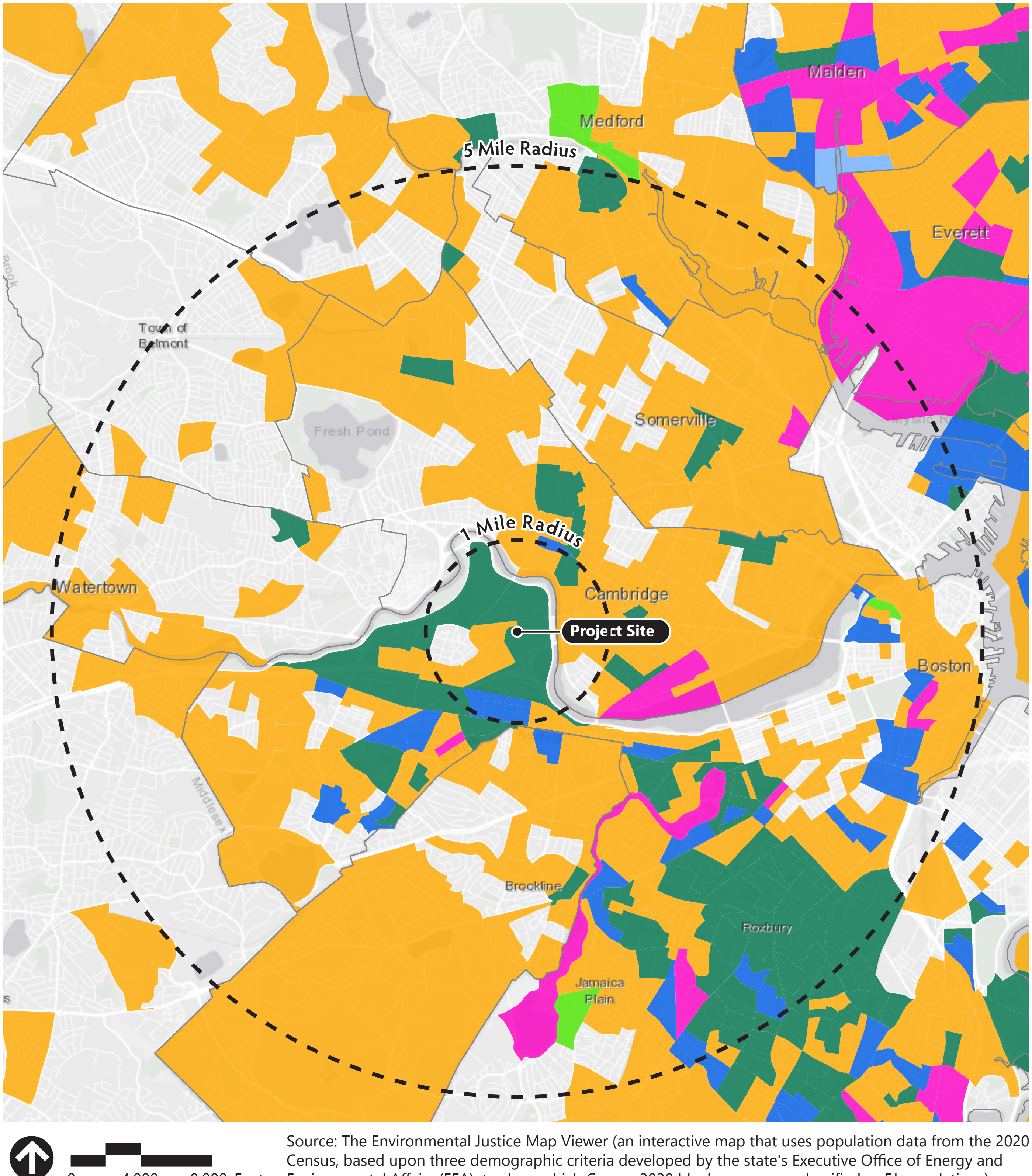
Site Location Map

Enterprise Research Campus Project
Boston, MA

Base map aerial image: Nearmap Aerial (2020)

Figure 1.2
Project Site Context

Enterprise Research Campus Project
Boston, MA



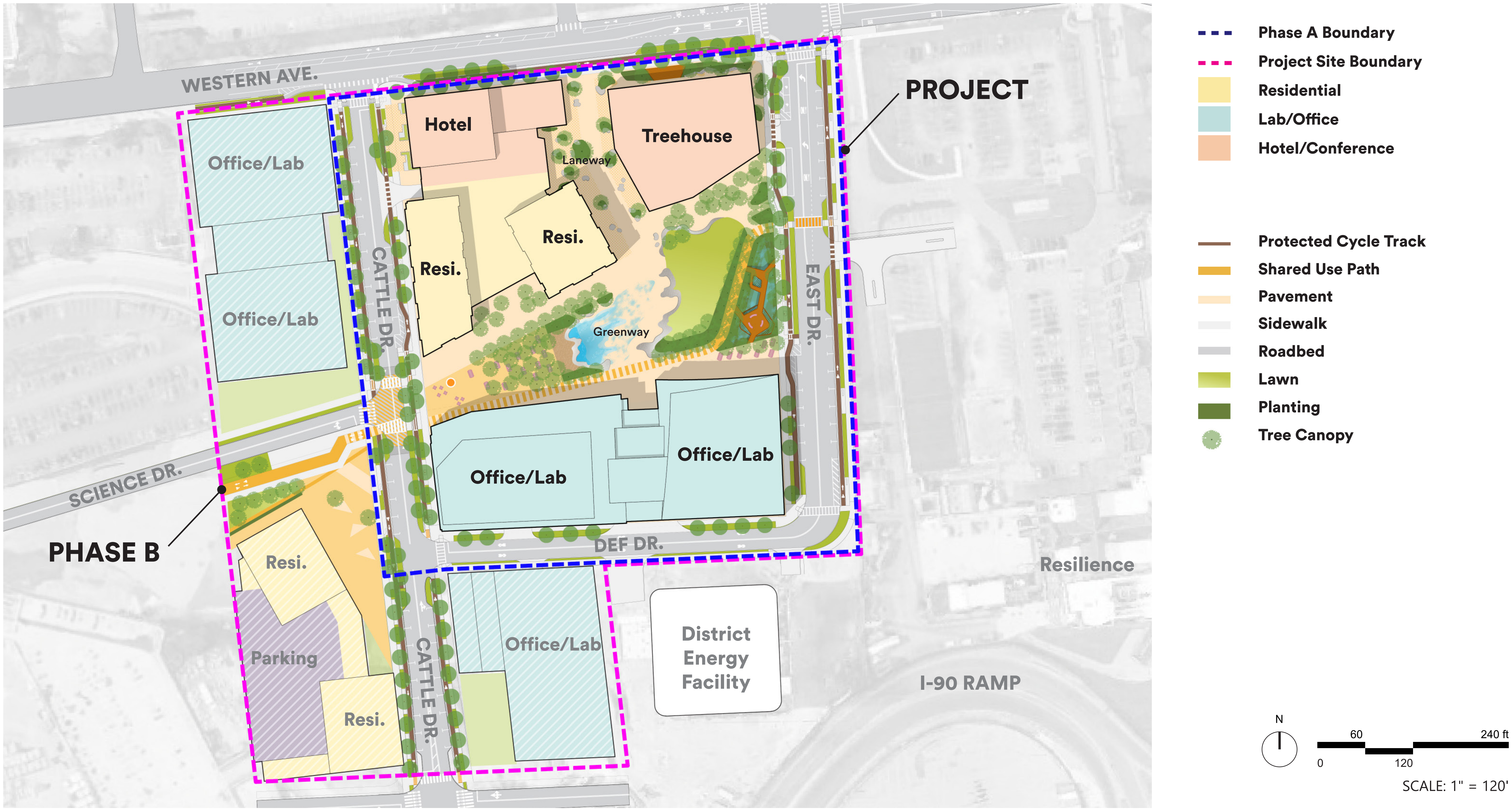
Source: The Environmental Justice Map Viewer (an interactive map that uses population data from the 2020 Census, based upon three demographic criteria developed by the state's Executive Office of Energy and Environmental Affairs (EEA), to show which Census 2020 block groups are classified as EJ populations).

- Minority
- Income
- English Isolation
- Minority and Income
- Minority and English Isolation
- Minority, Income and English Isolation

Figure 1.3

Environmental Justice Populations

Enterprise Research Campus Project
Boston, MA



Note: Illustrative purposes only. Subject to change.

Figure 1.4

Full-Build Proposed Conditions Plan

Enterprise Research Campus Project
Boston, MA

Prepared by: Henning Larsen, Studio Gang, Utile and Scape

2

Alternatives Analysis

In accordance with the ENF Certificate, the following chapter provides an expanded alternatives analysis that considers a site redevelopment plan that reduces impacts compared to the Project, or Preferred Alternative. Specifically, this chapter includes the following information (with DEIR section references in **bold**):

- An evaluation of an alternative design with a reduced building footprint and increased pervious area **(Section 2.1)**;
- A conceptual plan and quantification of environmental impacts of a reduced building footprint alternative **(Figure 2.1)**;
- A comparison of estimated impacts related to vehicular traffic, public open space, water use, wastewater generation, impervious area and stormwater management to the Preferred Alternative **(Section 2.2)**; and
- An evaluation of an alternative road layout that does not extend beyond the Project Site with a comparison of the estimated environmental impacts and traffic operations to the Preferred Alternative **(Section 2.3 and Figure 2.2)**.

2.1 Reduced Build Alternative Evaluation

The following project alternatives have been considered, as described further below:

- No-Build Alternative;
- Preferred Alternative/the Project; and
- Reduced Building Footprint Alternative.

Table 2-1 below summarizes the development programs of each project alternative.

2.1.1 No-Build Alternative

The No-Build Alternative would maintain existing conditions at the Project Site. The No-Build Alternative is used as a baseline to compare future proposed conditions in order to identify impacts and benefits associated with each Build Alternative. The No-Build Alternative would not result in any improvements to existing infrastructure, on or off-site, or provide for any public access to the Project Site.

Table 2-1 Project Alternatives Program Summary

Element/Use	No-Build Alternative	Preferred Alternative (the Project)	Reduced Building Footprint Alternative
Office/Lab	0 SF	1,054,000 SF	1,067,600 SF
Residential	0 SF	583,500 SF (765 units)	584,200 SF (750 units)
Hotel/Conference Center	0 SF	127,000 SF (250 keys)	129,200 SF (250 keys)
Conference		61,500 SF	75,000 SF
Active Ground Floor[2]	0 SF	115,700 SF[3]	84,000 SF[4]
Total Square Footage	**0 SF**	**1,940,000 GFA**	**1,962,944 GFA**
Surface Parking	0 spaces	40 spaces	40 spaces
Structured Parking	0 spaces	1,280 spaces	1,280 spaces
Tallest Building Height	n/a	190 feet	295 feet
Number of New Buildings	0	10	9

1 Master Plan for Planned Development Area No. 115.
2 Retail and/or Restaurant uses.
3 Includes approximately 1,145 restaurant seats.
4 Includes approximately 840 restaurant seats.

2.1.2 Preferred Alternative (the Project)

The Preferred Alternative, as described more fully in Chapter 1, *Project Description*, and shown in Figure 1.4, includes Phases A and B, together the "Full Build", which develops the complete 14-acre Project Site.

The Preferred Alternative consists of approximately 1,940,000 SF of mixed-use development across 10 buildings, including office/lab, residential, hotel and a conference center, with ground floor retail/restaurant uses throughout. The tallest of the proposed buildings is anticipated to be up to 190 feet in height and the entire parking supply of approximately 1,280 parking spaces will be provided in either below-grade parking or in a structured parking garage, thus reducing the amount of land area used for parking and allowing for more activated and publicly-accessible open space.

As described further in Chapter 1, *Project Description*, the Preferred Alternative has been designed to meet a variety of goals which relate to open space and public realm improvements, transportation access, sustainability, and responsiveness to the local community and emerging context in the area. The Preferred Alternative is the desired redevelopment plan for the Project Site as it better employs smart building locations, eliminates surface parking, provides an appropriate and thoughtful mix of uses and enhances connectivity through the creation of new open spaces. The Preferred Alternative provides the opportunity to deliver a world-class open space area (the Project Greenway) and other public realm spaces totaling nearly 8 acres and 56% of the Project Site, and will be an activated amenity space for use by the entire Allston community.

2.1.3 Reduced Building Footprint Alterative

As required by the MEPA Scope, the Proponent has evaluated an alternative site design with a reduced building footprint and increased pervious area. Refer to Figure 2.1 for the Reduced Building Footprint Alternative. This was accomplished by removing the building podiums and consolidating some buildings into a single massing. This results in a reduction to Active Ground Floor uses from the Residential/Hotel and Office/Lab buildings proposed as part of Phase A. Additionally, the elimination of the shared service and loading podium for the residential and hotel complex in Phase A necessitates expanding loading and service functions along Cattle Drive. The building footprint area was also reduced by combining the two Office/Lab buildings proposed under the Preferred Alternative into one building.

Under the Reduced Building Footprint Alternative, all buildings within Phase A would be increased in height as compared to the Preferred Alternative in order to accommodate a similar amount of building area required for a viable development.

As with the Preferred Alternative, all on-site parking would be provided in either below-grade parking or in a structured parking garage. The below-grade parking garage of Phase A of the Reduced Building Footprint Alternative would retain the same footprint, and single level configuration as the Preferred Alternative, and contain the same 300 spaces. For the purposes of understanding the impacts of the Reduced Building Footprint Alternative, as described further herein, it is relevant to elaborate on the reasoning behind why the Reduced Building Footprint Alternative contains the same below-grade garage orientation of the Preferred Alternative.

First, it would be impractical to reorient the below-grade parking to sit entirely beneath the building footprints of the Reduced Building Footprint Alternative, as it would require multiple levels of below-grade parking in a smaller, less efficient footprint which would be cost prohibitive from a construction standpoint and challenging due to the high water table of the Project Site. Additionally, the current below-grade garage configuration benefits from being interconnected with a singular access point, so an alternative orientation of the below-grade parking would require more parking entrances, thus further adversely affecting the pedestrian experience. Finally, maximizing the share of total parking placed below-grade was an expressed desire of both the City and the community. Due to these various considerations of the below-grade garage, some of the intents of the Reduced Building Footprint Alternative are diminished.

2.2 Comparison of Anticipated Impacts of Project Alternatives

As required by the MEPA Scope, this section quantifies and compares the estimated environmental impacts (traffic, public open space/impervious area and stormwater management measures, water use and wastewater generation) of the Reduced Building Footprint Alternative and Preferred Alternative (the Project).

Table 2-2 below summarizes the anticipated environmental impacts of each project alternative.

Table 2-2 Project Alternatives Impacts Comparison

Impact Category[1]	No-Build Alternative	Reduced Building Footprint Alternative	Preferred Alternative (the Project)
Land			
Total Site Area (acres)	±14.2	±14.2	±14.2
New Land Alteration (acres)	±14.2 (existing)[2]	-0-	-0-
New Impervious Surface Area (acres)	4.15 (existing)	11.89[3]	12.07[3]
Public Open Space (acres)	None	±5.27	±4.24 [4,5]
Additional Public Realm – streets, sidewalks, and cycle tracks (acres	None	±3.69	±3.69
Total Public Realm (size / %)	**None**	**±8.96 acres / 63%**	**±7.93 acres / 56%**
Impervious Area (%)		*84%*	*85%*
Building Heights			
Maximum Lab/Office	-	245 feet	140 feet
Maximum Residential/Hotel	-	295 feet	190 feet
Transportation			
New Daily Vehicle Trips (Adjusted)	-0-	±6,940[6]	±7,110[7]
New Parking Spaces	-0-	±1,280[8]	±1,280[8]
Water and Wastewater			
Water Use (gallons per day)	-0-	+244,419	±256,558
Sewage Generation (gallons per day)	-0-	±222,199	±233,234

1 Represents net new impacts
2 The Project Site is entirely previously altered.
3 Associated with new buildings and site hardscape public realm areas.
4 In the form of the Project Greenway, as shown on Figure 1.4, and other public realm improvements, including expanded public sidewalks along Cattle Drive, building frontage zones, laneway and urban plazas and an improved streetscape along Western Avenue.
5 Includes two publicly accessible open spaces envisioned to be located on the south side of the proposed office/lab buildings; refer to Figure 1.4.
6 Approximately 21,150 Unadjusted trips.
7 Approximately 23,420 Unadjusted trips.
8 Represents structured parking; approximately 40 surface parking spaces will also be provided on-site.

2.2.1 Public Open Space

The Reduced Building Footprint Alternative site design reconfiguration would result in an additional approximately 1.03 acres of site area available for public open space compared to the Preferred Alternative. However, the reduced footprint of the buildings would result in adverse effects to the quality and character of the open space and would limit the ability to establish a strong sense of place for the community. The Reduced Building Footprint Alternative does not provide a continuous and activated street wall along the streets surrounding the parcels, thus creating a less pedestrian-friendly experience, and failing to maintain a vibrant and active mixed-use street environment as established by the Preferred Alternative.

Due to the footprint of the structured below-grade parking and resulting limitations on soil volume, no substantial new tree canopy areas can be added in the Reduced Building Footprint Alternative, despite of the increase in open space.

In addition, building placement in the Reduced Building Footprint Alternative leaves much of the open space exposed and limits the development's ability to establish a range of comfortable and seasonally appropriate micro-climates that would minimize wind and increase solar exposure in the winter months while providing shaded areas during the summer, which is successfully achieved in the Preferred Alternative.

Part of the design intent of the Preferred Alternative was to break down the massing of the buildings via podiums, low-rise portions and/or separate buildings to create a more human-scaled, diverse urban profile. With the intent of creating more public open space, the Reduced Building Footprint Alternative consolidates the lab/office, residential, and hotel uses in Phase A into singular buildings by use, which results in taller, more imposing design character. The elimination of podiums, low-rise portions, and consolidation of buildings under the Reduced Building Footprint results in maximum building height increases of over 100 feet. Additionally, this increase to the height of the lab/office building results in less commercially desirable lab space, impairing the types and flexibility of lab usages by potential future tenants.

Finally, the building configuration resulting from the Reduced Building Footprint Alternative does not establish clear and legible edges to the Project Greenway, which would limit the development's ability to fit into the larger regional open space vision.

2.2.2 Impervious Area and Stormwater Management

The Reduced Building Footprint Alternative would result in approximately 0.18 acres less of new impervious area compared to the Preferred Alternative. Although the building footprints are reduced, the presence of the below-grade parking limits the extent to which additional public open space can be utilized to create new pervious area.

As the extent of the below-grade garage of the Preferred Alternative extends beyond the footprints of the above-grade buildings, the reduction of those building footprints as part of the Reduced Building Footprint Alternative would create additional public open space with below-grade garage beneath it.

This additional "uncovered" below-grade garage area created as part of the Reduced Building Footprint Alternative poses limits to the extent that new pervious areas can be created. New pervious areas created above the new "uncovered" garage areas would still need to be of relatively short distance from the exterior walls of the below-grade garage such that (i) stormwater drainage could land atop the below-grade garage roof and (ii) drain laterally to the soils abutting the below-grade garage exterior walls.

As described in further detail in Chapter 4, *Stormwater,* the Preferred Alternative, as designed, is able to adequately manage stormwater runoff and improve overall water quality from the Project Site compared to existing conditions.

2.2.3 Vehicular Traffic

The proposed program for the Reduced Building Footprint Alternative reduces the amount of building space allocated to Active Ground Floor uses (retail and restaurant space, as well as building lobbies). As a result, estimated total daily trip generation for this alternative program is about 10 percent less than the Preferred Alternative. However, when comparing the expected vehicle trip estimates, there is only a 2.4 percent difference in daily activity. During peak periods, there is almost no difference in AM peak hour vehicle trips (a *de minimis* 2 trips) and less than a 1.8 percent difference (13 trips) in the PM peak hour.

2.3 Alternative Roadway Layout

In accordance with the ENF Certificate, this section presents an alternative road layout (illustrated in Figure 2.2) that does not extend beyond the Project Site and compares the environmental impacts and traffic operations to the Preferred Alternative.

2.3.1 Environmental Impacts

The Alternative Roadway Layout would result in approximately 0.75 acres less of overall impervious area (associated with roadways) than the Preferred Alternative. All other environmental impacts would remain the same as the Preferred Alternative roadway layout, including vehicular traffic generation as that is generated by building users based on development program square footage.

2.3.2 Traffic Operations

The Reduced Roadway Alternative would severely limit access to and from the Project Site compared to the Preferred Alternative, which allows for more points of access. Under the Reduced Roadway Alternative, all site access points would be off Western Avenue via either Cattle Drive or East Drive (Figure 2.2). Cattle Drive would not extend to Almy Street and Windom Street, as it would under the Preferred Alternative (Figure 2.2); thereby, no connection would be available between the Project Site and Cambridge Street to the south, except via adjacent neighborhood streets. The southern connection via Cattle Drive Extension and Almy Street is beneficial because it provides the quickest path from the I-90 off-ramp to the Project Site, as well as the most direct connection between the Site and Allston Village, Brighton, and Brookline to the south and southwest, and minimizes Project traffic using nearby neighborhood streets.

Under the Preferred Alternative, vehicular traffic traveling to/from the Project Site would be able to enter and exit via either Western Avenue or Cambridge Street/Windom Street at Almy Street, providing connections to the local roadway network both north and south of the Project Site. Having the connection to the south via Cattle Drive Extension/Almy Street in the Preferred Alternative allows a more even distribution of Project-generated trips entering and exiting the Project Site as opposed to loading all of the new traffic only onto Western Avenue.

2.3.2.1 Vehicle Trip Distribution

The vehicle trip distribution for the Preferred Alternative estimates that approximately 31 percent and 49 percent of entering residential and commercial trips, respectively, will access the Site via Almy Street and Cattle Drive Extension and approximately 13 percent and 25 percent of exiting residential and commercial trips, respectively, will exit the Site via Cattle Drive Extension/Almy Street. Based on the trip generation methodology discussed in Chapter 3, *Transportation*, that corresponds to approximately 252 Project-generated vehicle trips using the Cattle Drive Extension/Almy Street connection during the weekday morning peak hour and approximately 234 vehicle trips during the weekday evening peak hour. With the Reduced Roadway Alternative, those 234 and 252 peak hour vehicle trips would enter and exit the Site via Western Avenue instead, adding more vehicles to a roadway that is already expected to experience delays. The Reduced Roadway Alternative would also add more vehicle trips to North Harvard Street, Windom Street, and the Soldiers Field Road Service Road, in comparison to the Preferred Alternative, as vehicles destined to/from the south would need to route themselves to/from Western Avenue in order to reach the Site. Such rerouting would result in additional vehicle miles traveled (VMT) overall, as compared to the Preferred Alternative with the Cattle Drive Extension. Added delay and queues at certain intersections would generate more vehicle idling and could negatively impact air quality, specifically at the intersections of Western Avenue at North Harvard Street, Cambridge Street at Soldiers Field Road, and the eastbound left-turn movement from Cambridge Street onto North Harvard Street.

2.3.2.2 Routing of Vehicle Trips

The routing of trips under the Reduced Roadway Alternative would also add more vehicles to local roadways through the Allston neighborhood. Specifically, the residential neighborhood north of Cambridge Street and east of North Harvard Street could experience more cut-through traffic as drivers attempt to avoid the existing congestion on North Harvard Street and Western Avenue. The Cattle Drive connection between Cambridge Street and Western Avenue that is featured in the Preferred Alternative would provide a direct connection between the Cambridge Street corridor and the Western Avenue Corridor that avoids travel through the existing residential neighborhoods. The roadway, therefore, is expected to remove Project and non-Project vehicles trips from the local neighborhood's streets, as motorists seek more desirable routes.

The Preferred Alternative would leverage the planned redesign of the Windom Street approach to Cambridge Street by de-emphasizing Windom Street north of Almy Street as a through route and directing traffic onto Almy Street and Cattle Drive Extension. Under the Reduced Roadway Alternative, Windom Street would not be de-emphasized and both Project-generated traffic and general traffic would be more likely to cut through the local residential neighborhood, which would cause greater impacts to the residents that live in this area. Under all future plans, Windom Street is proposed to be restricted to one-way southbound traffic between Hopedale Street and Amboy Street. Thus, the Reduced Roadway Alternative would be expected to increase cut-through traffic in the residential neighborhood specifically in the southbound direction on Windom Street and, potentially, in the northbound direction on other roadways such as Seattle Street, Amboy Street, and Hopedale Street.

2.3.2.3 Pedestrian and Bicycle Access

Finally, a lack of connection between the Project Site and Cambridge Street would limit pedestrian (including transit riders using Route 64 bus service) and bicycle access by eliminating the only roadway connection between the Site and points to the south (particularly to the southwest toward Allston Square and Brighton). This absence of this connection would force all pedestrians and bicyclists accessing the Site from the south to cut through the local Allston neighborhood on roadways such as Windom Street, Seattle Street, and North Harvard Street, or via Rena Park Path (via the shared-use path that will connect to the Project Site). The Preferred Alternative would provide a clear pathway between Cambridge Street and the Site that is designed for all users (including pedestrians and bicyclists) to directly connect between the Site and points south.

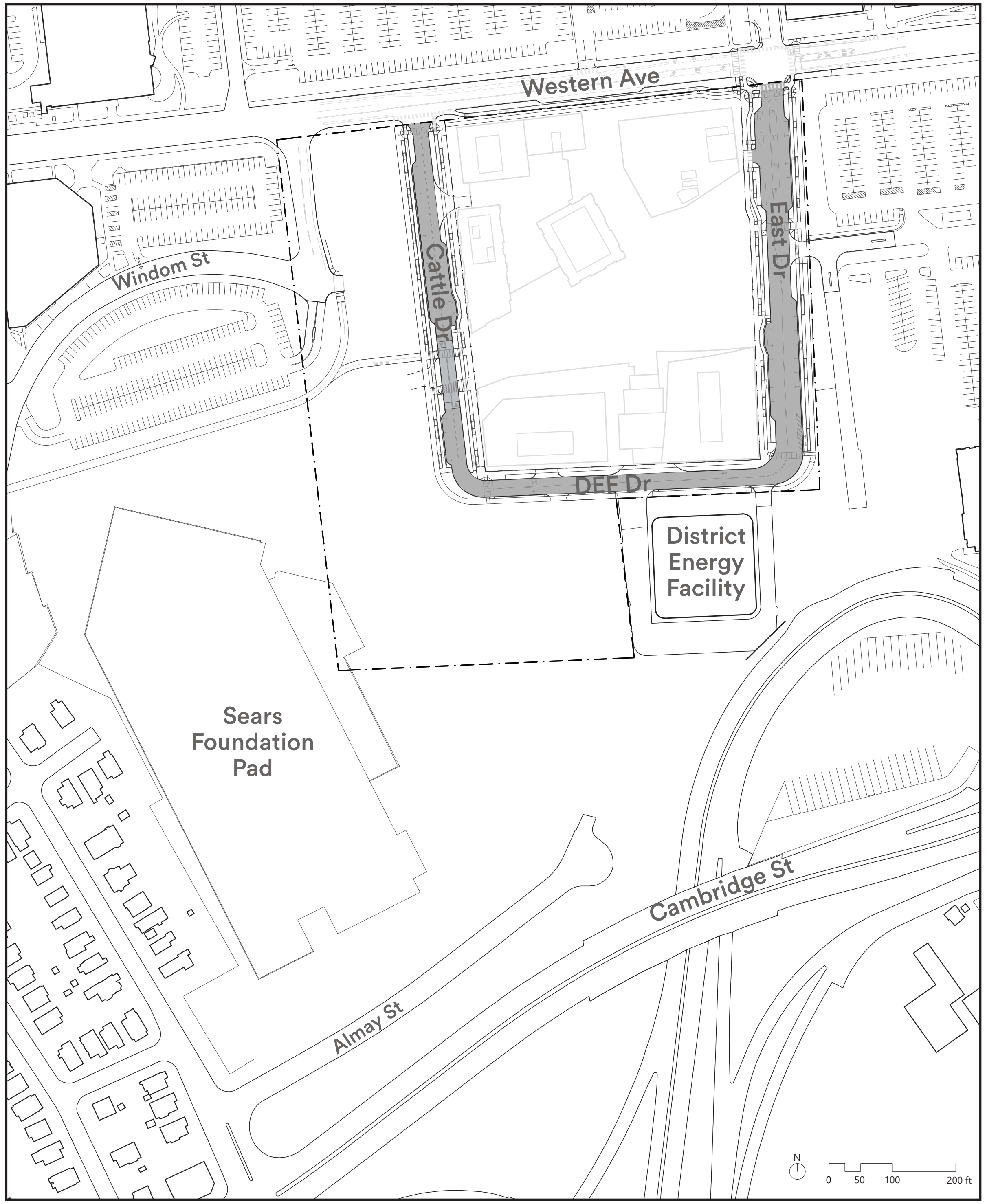
Note: Illustrative purposes only. Subject to change.

Figure 2.1

MEPA Reduced Building Footprint Alternative Analysis

Enterprise Research Campus Project
Boston, MA

Reduced Phase A



Reduced Phase B

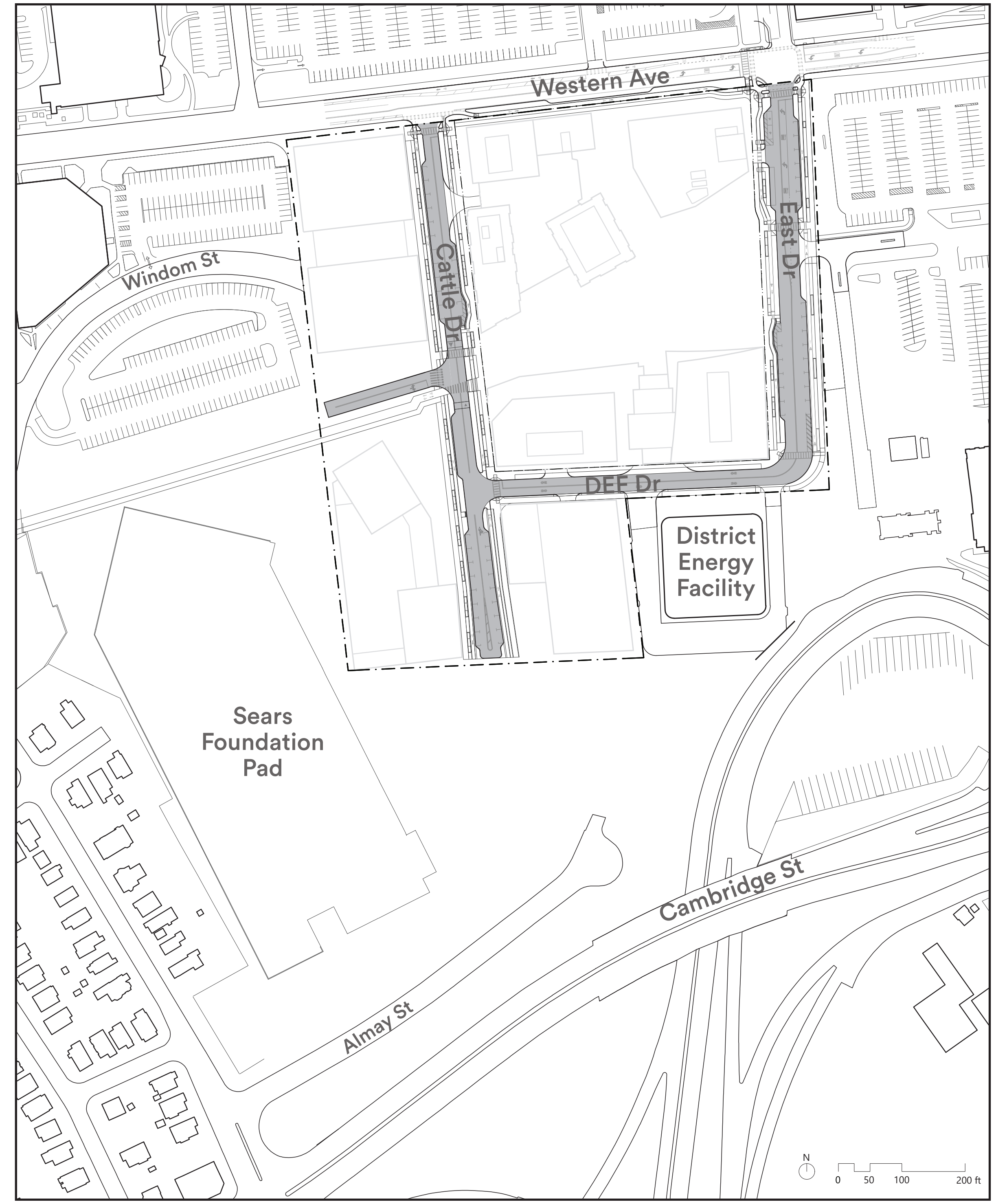


Figure 2.2

Alternative Roadway Layout

Enterprise Research Campus Project
Boston, MA

3

Transportation

3.1 Introduction

This chapter provides the analysis of the transportation impacts of the Project. Specifically, this chapter provides an overview of the existing transportation characteristics of the Project Site and the surrounding area, capacity analyses of the future transportation network with and without the Project in place, and the proposed mitigation measures necessary to offset the transportation capacity impacts of the Project. This study examines the Project impact on the vehicular, transit, pedestrian, and bicycle networks.

The Project will be built in two phases, known as Phase A and Phase B and collectively as the Full Build. Phase A is expected to include approximately 900,000 square feet of development and Phase B will include an additional approximately 1,040,000 square feet of development for a combined full build of approximately 1,940,000 square feet of development. The Project will consist of residential, office, research and development, hotel, retail, and restaurant land uses and will be supported by approximately 620 parking spaces under Phase A and 1,280 parking spaces under the Full Build. Based on the proposed phasing of the Project, the analyses in this study have been conducted with respect to both Phase A and the Full Build of the Project.

This Transportation Impact and Access Study has been developed to be included in both the Draft Project Impact Report (DPIR) for the City of Boston's Article 80 development review process and the Draft Environmental Impact Report (DEIR) for the Massachusetts Environmental Policy Act (MEPA) review process. While the Article 80 review is focused on just Phase A of the Project, the MEPA review includes both Phase A and the Full Build of the Project, and therefore, this transportation study evaluates both Phase A and the Full Build of the Project. The same Transportation Impact and Access Study is included in both submittals to ensure consistency between the two filings and simplify the review process. Furthermore, the Full Build condition reflects the full build-out of the Planned Development Area No. 115 (PDA Master Plan), and thus, provides the context of a longer-term plan for the proposed land development.

As outlined in this study, the Proponent is proposing a mitigation program that will not only help to offset the impacts of the Project but will also improve multi-modal connectivity throughout the area that supports the use of sustainable transportation modes, such as transit, walking, and bicycling. This focused approach on sustainable mobility has been guided by extensive dialog between the Proponent and neighborhood residents, stakeholders, and the Harvard Allston Task Force. (Specific responses to each comment received can be found in Chapter 9, Response to Comments.) Mitigation, as outlined in this report, includes enhanced transit service, roadway capacity improvements, new bicycle and pedestrian connections, and a robust transportation demand management program.

3.2 Summary of Key Findings and Benefits

The development of the Project is an opportunity to improve Allston by activating underdeveloped former industrial land along Western Avenue with a welcoming urban, mixed-use environment. The Project will introduce new, multimodal connections and transportation improvements for all users. These connections, such as an east-west shared-use path (and Project Greenway) and *complete streets* extensions (e.g. Cattle Drive) toward Cambridge Street, will conveniently connect pedestrians and bicyclists traveling through and to the Project Site from surrounding neighborhoods. These facilities will enhance the multimodal connectedness of the local neighborhood while accommodating the Project-generated traffic and minimizing impacts on the local neighborhood streets.

Transportation findings and benefits of the Project include the following:

› The Site enjoys excellent access to the local and regional roadway network.

› The Project will be supported by various streets, sidewalks, and other utility infrastructure elements (the "Enabling Infrastructure") which are to be constructed by the Harvard Allston Land Company (HALC). The Enabling Infrastructure will include three new complete streets currently referred to as Cattle Drive, East Drive, and DEF Drive in Phase A, and the extension of Science Drive from Stadium Road to Cattle Drive in Phase B. (It is important to note that the names of the new streets are placeholders until the legal names of the streets are determined and codified by the City through the Public Improvement Commission).

› The Project will leverage the construction of the system of new on-site streets to accommodate all roadway users consistent with the objectives of BTD's Complete Street Guidelines by incorporating bicycle lanes, wide sidewalks, and associated amenities. The new and enhanced streetscapes will improve connections between Project and the surrounding neighborhoods. These will connect to the emerging on- and off-street bicycle and pedestrian path network, such as the bicycle lanes on city streets, Rena Park path, and bicycle path improvements around Harvard University's Science and Engineering Complex (SEC). The updated and upgraded designs will encourage bicycling, walking, and transit as primary transportation modes used to access the Project Site.

› The Project will upgrade the site's frontage along Western Avenue and its cross-section to enhance the pedestrian realm, streetscape, and provide protected bicycle lanes.

› The Project will upgrade the connection for bicyclists between Cambridge Street at Windom Street to Almy Street and the new Interim Cattle Drive.

- The Project's new roadways create a new connection between Cambridge Street and Western Avenue. Cattle Drive, for example, is expected to shift existing traffic away from neighborhood roadways, such as Windom Street and North Harvard Street, while providing access for the expected Project trips.
- The Project Greenway and extension of the existing east-west path will provide a strong multimodal connection between the existing neighborhood and the Project Site that will help improve pedestrian and bicycle connectivity throughout Allston.
- The proposed multi-use development allows for the capture of internal trips between the synergistic uses within the Site, resulting in the fewer vehicle trips on the off-site roadway network than what a single-use development would otherwise produce.
- The multi-use development also provides opportunities to limit parking through the sharing of parking spaces by different users at different times of day.
- The Project Site is served by MBTA local bus routes that connect to various nearby neighborhoods and the MBTA Red Line. These strong connections and the robust pedestrian and bicycle connections to the Site are expected to result in a higher proportion of trips via sustainable transportation modes than via vehicle trips.
- The Proponent supports elevating the Route 70 and 86 to Key Bus Routes at service levels recommended in this study and commits to study and support the implementation of bus transit priority on Western Avenue and other critical locations. The exact details and structure of the mitigation commitment will be determined through a continued dialogue with both MassDOT, MBTA and the City of Boston.
- The Proponent is evaluating the need to provide supplemental transit connections to/from the Project Site to supplement and/or integrate with existing MBTA transit services in the area. The Proponent anticipates an agreement with Harvard University that leverages two existing shuttle routes to support Project and Harvard University demand between Allston and Harvard Square.
- The Proponent is also coordinating with the Allston-Brighton TMA (ABTMA), which is expected to conduct the Allston-Brighton Neighborhood Connector Study, to develop a joint transit service between existing and future developments in the area and key transit hubs.
- As part of its proposed transit improvements, the Proponent proposes to relocate a stop on Western Avenue to better serve the PDA Area and Harvard Business School while enhancing the rider experience at the bus stop. In addition, the Proponent is committed to install transit signal priority equipment at five (5) signalized intersections to improve travel to and from the Central Square MBTA station for Routes 64 and 70.
- The Project will implement a robust program of Transportation Demand Management strategies to take full advantage of its multiple mobility options and its synergy with the surrounding neighborhood.
- The targeted off-site transportation mitigation for this Project will focus on the "gateway" locations to the Project Site at Cambridge Street and along the Western

Avenue corridor. Both roadways are key access links within the Allston neighborhood.

› The Proponent proposes operational enhancements at the following roadway intersections:
  - Windom Street at Cambridge Street and Almy Street
  - Western Avenue at Soldiers Field Road
  - Western Avenue at East Drive / Kresge Way
  - Western Avenue at Stadium Road and Batten Way

3.3 Transportation Impact Analysis: Overview

The transportation impact analysis documented in this chapter was performed in general conformance with the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA)/ Executive Office of Transportation (EOT) guidelines. Prior to completing this study, the Proponent submitted a Transportation Scoping Letter (TSL) with MassDOT to obtain agreement from the state reviewing agency on the assumptions and approaches used in the transportation study. This study has been prepared based on that process (the TSL is included in Appendix C for reference). The proponent also consulted with City of Boston transportation staff at BPDA and BTD on transportation study requirements and submitted a Project Notification Form (PNF) that outlined the transportation study methodology. The City's response to the transportation aspects of the PNF is also included in Appendix C for reference.

VHB prepared this transportation assessment in five stages as documented in this chapter:

Project Description (Section 3.4) - The first stage identifies the features of the proposed Project, including the proposed roadway network, site access, and on-site pedestrian and bicycle circulation.

Existing Conditions (Section 3.5) - The second stage involved an assessment of existing (baseline) transportation conditions within the Project study area including an inventory of existing roadway geometry; observations of traffic flow, including daily and peak period traffic counts; a summary of existing public transit facilities in the area; and a review of vehicular crash data.

Future Conditions (Section 3.6) - The third stage of the study established the framework for evaluating the transportation impacts of the proposed Project. Specific travel demand forecasts for the Project were assessed along with future transportation demands on the study area roadways due to projected background traffic growth and other proposed area developments that may occur independent of the Project.

The next stage of the report includes a summary of all transportation-related analyses that have been conducted, including:

› Traffic Operations Analyses with and without the Project in-place (Section 3.7);
› Transit Service Capacity Analyses with and without the Project in-place (Section 3.8);
› Bicycle Level of Traffic Stress Analyses (Section 3.9);

- Curbside and Service Analysis (Section 3.10); and,
- Shared Parking Analysis (Section 3.11).

All analyses have been conducted with respect to Phase A of the Project (using a design year of 2025) and the Full Build of the Project (using a design year of 2030).

Transportation Mitigation (Section 3.12) - The final stage of the study discusses possible measures to improve existing and future mobility in the area by improving connectivity and operations within the study area while offsetting the transportation-related impacts associated with the development of the proposed Project.

3.4 Project Description

The following sections summarize the proposed development, the existing and proposed Site access for vehicles, pedestrians, and bicyclists, the new roadway network that will accompany Phase A and the Full Build of the Project, and the curbside activity, parking access, and loading on-Site.

3.4.1 Existing Site Conditions

The Project Site consists of an approximately 14.2-acre parcel located at 100 Western Avenue in the Allston neighborhood of Boston. The Site is vacant under Existing Conditions and is currently used for construction staging. Public access is restricted to the Site and there are no access points open for drivers, pedestrians, or bicyclists to access the Site. The Project Site is bounded by Western Avenue to the north, the Resilience Bio (formerly Sanofi-Genzyme) facility to the east, the DEF facility and vacant land to the south, and vacant land and Harvard parking lots to the west. Beyond the Resilience property to the east is Soldiers Field Road and the Charles River and beyond the DEF facility and the vacant land to the south is Cambridge Street and the I-90 On/Off-Ramps. Almy Street, which is currently open to construction vehicles only, runs parallel to Cambridge Street and dead-ends in the vacant land south of the Site.

A graphic of the existing Project Site location is provided in Figure 3.1.

3.4.2 Proposed Development Program

Consistent with the City's and community's goals for the Project Site, the Proponent envisions that the Project will transform an underutilized site into a vibrant, inclusive mixed-use project that will complement the surrounding area and adjacent neighborhood. The Full Build will contain approximately 1.94 million square feet (SF) of mixed-use development which will be developed in multiple phases, and consists of residential, office/lab, hotel, conference, restaurant, and retail use, along with new public realm and open space areas.

It is intended that the Full Build will be developed in two phases of construction: Phase A and Phase B. While the Proponent is developing the various components of the Project, the Harvard Allston Land Company will facilitate the construction of the Enabling Infrastructure that will be necessary to support and provide access to the Project, as described in Section

3.4.4. The areas not completed as part of Phase A will remain in a temporary condition until they are redeveloped and/or improved in the future. These temporary areas will either be appropriately fenced off or composed of interim uses, such as surface parking or construction staging area during the development of Phase A.

Table 3-1 summarizes the proposed development for the Project. (Chapter 1 has a full description of the development Project; refer to Table 1-1.)

Table 3-1 Proposed Project Development Program Summary

Project Element	Phase A	Phase B	Full Build
Building Uses [a]			
Lab / Office	*420,000 SF*	*634,000 SF*	1,054,000 SF
Residential	*345 units*	*420 units*	765 units
Hotel / Conference Center	*250 keys*	-	250 keys
Retail / Restaurants (Ground Floor)	*46,000 SF*	*69,700 SF*	115,700 SF
Vehicle Parking			
Below-Grade Parking	*300 spaces*	*300 spaces*	600 spaces
On-Street Parking/Managed Curb Space	*40 spaces*	*To Be Determined*	40 spaces
Above-Grade Parking [s]	-	*640 spaces*	640 spaces
Temporary Off-site Parking [c]	*280 spaces (to be replaced)*	-	-
Total Parking	**620 spaces**	**940 spaces**	**1,280 spaces**

Note: All measurements are approximate.
a The ground floor areas of the component buildings will contain retail, restaurant, and other activated uses
b Unless labeled otherwise, all areas provided herein are described in gross floor area, as such term is used in the definition of "Floor Area Ratio" in the Boston Zoning Code.
c Prior to the delivery of the Phase B Garage, temporary parking proximate to, or within the Project Site, will provide 280 parking spaces to satisfy Phase A parking demand.

3.4.3 Consistency with Local and Regional Plans

The Project is being designed with respect to several local and regional plans. Specifically, the Project will help to achieve the multimodal goals outlined in the *Allston-Brighton Mobility Plan* and the City of Boston's *Go Boston 2030* vision plan by improving multimodal accommodations and increasing the number of residents and workers that commute via walking, biking, and public transit. The Project will include several pedestrian and bicycle infrastructure improvements and will include a robust traffic demand management plan that encourages commuting via non-vehicular mode shares.

The enabling roadways accompanying the Site are also being designed to accommodate the long-range vision for the area, which include a series of new roadways and connections, as part of the Allston Multimodal Project. The Allston Multimodal Project that will reconstruct the I-90 Allston-Brighton interchange, and rebuild Cambridge Street at-grade with connections to a new street grid system south of Cambridge Street. The Project's enabling roadways, "East Drive" and "Cattle Drive," are being designed to connect to Cambridge

Street and provide continuity to the Allston Multimodal Project's roadway network. Although the condition in the 2030 analysis year does not assume the implementation of the Allston Multimodal Project's roadway network at that time, this Project's proposed infrastructure (including mitigation measures) does consider this long-term vision and supports those connections being made in the future.

3.4.4 Site Access and Proposed Street Network

The Project will be supported by various streets, sidewalks, and other utility infrastructure elements (the "Enabling Infrastructure") which are to be constructed by Harvard Allston Land Company (HALC). The Enabling Infrastructure will include three new streets currently referred to as Cattle Drive, East Drive, and DEF Drive, and the extension of Science Drive from Stadium Road to Cattle Drive. (It is important to note that the names of the new streets are placeholders until the legal names of the streets are determined and codified by the City through the Public Improvement Commission).

The Project Site's three main roadway access points will be Cattle Drive and East Drive, which will each connect to/from Western Avenue on the north side of the Site, and Cattle Drive Extension, which will connect to Cambridge Street via Windom Street and Almy Street on the south side of the Site. Both Western Avenue and Cambridge Street are connections to the regional roadway network via Soldiers Field Road, I-90, and Memorial Drive to the east and via North Harvard Street to the west. Under the 2030 Conditions, a fourth access point, Science Drive to the west of the Site, will provide an additional connection to Western Avenue via Stadium Road or Academic Way in the area around the Science and Engineering Complex.

In addition to the complete multimodal streets, an off-street pedestrian and bicycle connection will be provided to the west of the Site via an extension of Rena Path, which is expected to be in place under both 2025 and 2030 conditions, albeit with a modified configuration with completion of the Phase B street connections

Descriptions of the extent of the Enabling Infrastructure in connection with Phase A and the Full Build of the Project are described below. A graphic of the Enabling Roadways for Phase A and the Full Build of the Project is provided in Figure 3.2 and 80-scale plans of the proposed roadways are included in Appendix C.

Cattle Drive (Phases A and B)

"Cattle Drive" will be a new north/south street from Western Avenue to the DEF Drive. Cattle Drive will be a two-way road lined with grade separated bicycle lanes, furnishing zones with landscaping, and sidewalks on both sides of the street. The curb lanes will provide intermittent parking, green stormwater management infrastructure, and active (pick-up/drop-off) and service space.

South of the DEF Drive, as part of the early enabling roadways for Phase A of the Project, Cattle Drive will be constructed with an interim cross-section and alignment to provide an early direct connection to Cambridge Street (via Almy Street). "Interim Cattle Drive" will be a two-lane roadway with shared bicycle accommodation and sidewalks on both sides.

Under Phase B, the permanent Cattle Drive cross-section, as described above, will be extended to the southern limits of the PDA Area boundary.

Cross-sections of the proposed permanent and interim Cattle Drive are included in Figures 3.3a, 3.3b, and 3.3c.

East Drive (Phase A)

On the east side of the Project Site, "East Drive" will be a new north/south street from Western Avenue opposite Kresge Way to the new DEF Drive on the south side of the Project Site. East Drive will be a two-way road lined with grade-separated bicycle lanes, furnishing zones with landscaping, and sidewalks on both sides of the street. The curb lanes will provide intermittent parking, green stormwater management infrastructure, and active (pick-up/drop-off) and service space. The existing Resilience Bio access-controlled driveway off Western Avenue will be eliminated and replaced by a new access driveway from East Drive.

Cross-sections of the proposed East Drive is included in Figures 3.3d and 3.3e.

DEF Drive (Phase A)

"DEF Drive" will be a more service-oriented east-west street between East Drive and Cattle Drive and will provide one vehicle travel lane in each direction, as well as sidewalks on both sides. DEF Drive will provide driveway access to the Project Site's parking and loading/service docks, as well as gated access to Harvard's District Energy Facility.

A cross-section of the proposed DEF Drive is included in Figure 3.3f.

Science Drive (Phase B)

A new vehicle connection will be added in Phase B of the Project to the west of the Site via an extension of Science Drive from Stadium Road at the Harvard Science and Engineering Complex to Cattle Drive on the west side of the Site, north of DEF Drive. This will provide an additional roadway connection to Western Avenue via the signalized intersection of Western Avenue at Stadium Road. As currently planned, Science Drive will be a two-way roadway with one lane in each direction plus curb lanes, bicycle and pedestrian accommodations, and landscaping areas on each side of the roadway.

A cross-section of the proposed Science Drive Extension is provided in Figure 3.3g.

3.4.4.1 Phase A (2025) Street Network

For Phase A of the Project (expected to be completed by 2025), the Enabling Infrastructure will include the full extents of East Drive, Cattle Drive, and DEF Drive described above. Connections will be in place with Western Avenue to the north and to Cambridge Street via Windom Street, Almy Street, and Interim Cattle Drive to the south. Pedestrian and bicycle access will be provided at each of these locations, with an additional pedestrian and bicycle connection to the west via a new shared use path on temporary alignment. This shared use path will connect the Site with the North Harvard Street neighborhoods via the path on the south side of Science Drive and Rena Path, and will continue through the center of the Site as the Project Greenway. Under 2025 Conditions, no vehicle connection will be provided to the west from Cattle Drive south of Western Avenue.

3.4.4.2 Full Build (2030) Street Network

Under the Full Build 2030 Condition, all the streets and roadway connections in place under 2025 Conditions remain, and the following changes are expected:

- The full build cross-section of Cattle Drive will be extended south from DEF Drive to the southern limits of the Site boundary.
- Science Drive will be extended to Cattle Drive. On the south side of Science Drive, a shared use path will be constructed to replace the temporary path as part of the continuation of the Project Greenway. This shared use path will similarly connect the Site with the North Harvard Street neighborhoods.

In connection with the construction of Science Drive, Phase B will also include the closure of Hague Street and the elimination of the Hague Street approach at the intersection of Western Avenue at Hague Street / Batten Way. With the closure of Hague Street, the existing parking lots that are currently accessed of off Hague Way will be accessed via Science Drive instead. Existing traffic entering and exiting Hague Street onto Western Avenue may opt to connect via Cattle Drive to the east or Stadium Road to the west.

3.4.5 Pedestrian and Bicycle Facilities

The Project Site will be surrounded by new bicycle infrastructure connecting employees, residents, and visitors to the site. As the “front door” to the Project, Western Avenue streetscape improvements are being proposed that will enhance the experience by bicyclists, pedestrians, and transit riders traveling along this corridor by including protected bicycle lanes along both sides of the street, widened sidewalks, and enhanced transit stops.

3.4.5.1 Pedestrian and Bicycle Network

The Project will provide grade-separated bike lanes on both sides of the new East Drive and Cattle Drive between Western Avenue and the DEF Drive. Shared lane markings will be painted on DEF Drive and Interim Cattle Drive, south of DEF Drive. Proposed Site bicycle infrastructure is displayed in Figure 3.4.

A shared use path will provide pedestrian and bicycle access through the Project Site from East Drive to Cattle Drive, as part of the east-to-west Greenway which connects to the existing shared-use path linking Rena Park and the North Harvard Street neighborhoods. The Greenway intent is to provide a functional, beautiful, and safe connection between the Allston residential neighborhoods and the Charles River pathways, supplementing the facilities on Western Avenue and Cambridge Street.

All new roadways internal to the Project Site will include sidewalks on both sides of the street, as well as newly painted crosswalks at the Project Site’s new intersections with Western Avenue. Cattle Drive will also include a mid-block raised crosswalk at the Project Greenway, connecting to the shared use path that provides pedestrian and bicycle access between the SEC and the Project. East Drive will include a mid-block crosswalk north of the relocated Resilience Bio driveway entrance. Proposed Site pedestrian infrastructure is displayed in Figure 3.5.

The Project's bicycle and pedestrian accommodations and facilities will be consistent with the objectives of BTD's Complete Streets Guidelines[1], to encourage strong use of bicycling and walking, as active and sustainable transportation modes.

3.4.5.2 Bike Parking and Bike Share Stations

The Project will provide covered and secured bicycle spaces within its buildings as well as outdoor, public bicycle racks near building entrances for visitors to the Project Site's buildings, in a number and location that meets the City of Boston's *Bike Parking Guidelines*[2]. Table 3.2a and Table 3.2b summarize the proposed bicycle parking spaces for Phase A and the full build of the Project, respectively, and Figure 3.6 illustrates the locations of the proposed bicycle parking on-Site.

Table 3-2a Proposed Bicycle Parking Spaces, Phase A (2025)

Land Use	Rate (Employees / Residents)	Rate (Visitors)	Employee / Resident Spaces	Visitor Spaces
Residential	1 per unit	1 per 5 units	345	69
Office	1 per 2,500 sf	1 per 20,000 sf	168	21
Hotel and Conference Center	1 per 5,000 sf	1 per 20,000 sf	38	9
Retail	1 per 3,000 sf	1 per 5,000 sf	15	9
Total	–	–	**566**	**108**

Table 3-2b Proposed Bicycle Parking Spaces, Full Build (2030)

Land Use	Rate (Employees / Residents)	Rate (Visitors)	Employee / Resident Spaces	Visitor Spaces
Residential	1 per unit	1 per 5 units	765	153
Office	1 per 2,500 sf	1 per 20,000 sf	422	53
Hotel and Conference Center	1 per 5,000 sf	1 per 20,000 sf	38	9
Retail	1 per 3,000 sf	1 per 5,000 sf	39	23
Total	–	–	**1,264**	**238**

BlueBikes Bikeshare

The Project will encourage and support bicycle use through expansion of the Bluebikes bikeshare network by providing a bikeshare station on-site (one station is currently anticipated for each for Phase A and Phase B, which will continue to be evaluated).

1 Boston Complete Streets Design Guidelines, City of Boston, 2013.
2 *Bike Parking Guidelines*, Version 2.1; City of Boston Transportation Department; January 2021.

3.4.6 Parking Supply

Under Phase A, a vehicle parking supply of approximately 620 spaces is proposed to support the Project. Approximately 300 of those spaces are expected to be in a below-grade parking garage, about 280 "interim parking" spaces via surface or garage parking, and 40 on-street parking spaces.

Access to the below-grade parking garage is planned on the north side of DEF Drive. From DEF Drive, drivers will be able to access the below-grade parking garage to/from Cattle Drive to the west and East Drive to the east. The interim parking spaces will be located within or adjacent to the Site boundary at a location yet to be determined.

Off-site parking will be provided as a temporary condition in 2025 to support the initial project phase. No off-site parking will serve the site in the final 2030 condition under which the interim parking spaces will be replaced by an above-ground parking garage.

Under the Full Build, a total vehicle parking supply of approximately 1,280 spaces is proposed to support the Project. Approximately 600 of those spaces are expected to be in below-grade parking garages, approximately 640 parking spaces will be in an above-ground parking garage, and approximately 40 spaces will be located on-street. A summary of the parking supply by type for Phase A and the Full Build of the Project is provided in Table 3-3 below.

Table 3-3 Parking Supply by Type

Parking Type	2025 Condition (Phase A)	2030 Condition (Full Build)
Below-Grade or Structured Parking	300	1,240
Temporary Off-site Parking	up to 280	–
On-Street Parking	*Approximately 40 spaces*	*Approximately 40 spaces*
Total	**620**	**1,280**

Approximately 40 spaces will be located on-street.

All below-grade and structured parking are anticipated to be managed as valet parking. The level of valet parking will be evaluated on an ongoing basis following the opening of the Project, and in response to ongoing levels of parking demand. Valet parking management is expected to allow for up to a 25 percent gain in parking capacity in valet managed facilities over the constructed number of parking spaces.

Access to the below-grade parking garages will be planned on the north side and south side of DEF Drive, respectively, and access to the above-ground parking garage will be located on the west side of Cattle Drive south of DEF Drive. The location of these parking entrances and exits on the southern portion of the Site will reduce conflicts with pedestrians and bicyclists, as most pedestrian and bicycle activity is expected to be concentrated on the north and central portions of the Site along Western Avenue and the Project Greenway, respectively.

3.5 Existing Conditions

Evaluation of the transportation impacts associated with the Project requires an understanding of the existing transportation conditions in the study area including: an inventory of the traffic control, roadway, driveway, and intersection geometry in the study area, the collection of daily and peak hour traffic volumes, a summary of public transit options in the area, an inventory of existing pedestrian and bicycle infrastructure, and a review of recent crash history. Each of these elements is described in detail below.

3.5.1 Roadway Network

3.5.1.1 Study Area Intersections

A study area was established based on an understanding of the area's transportation network, the operational characteristics of the Project, and input from the City of Boston and MassDOT. The Project study area for the traffic analysis, as shown in Figure 3.7, consists of the following 13 existing intersections:

- Memorial Drive at John F. Kennedy Street/Larz Anderson bridge (signalized)
- North Harvard Street at Soldiers Field Road (signalized)
- North Harvard Street at Western Avenue (signalized)
- North Harvard Street at Franklin Street/ Kingsley Street (signalized)
- Cambridge Street at North Harvard Street (signalized)
- Cambridge Street at Windom Street (signalized)
- Cambridge Street at I-90 Ramps/Double Tree Hotel (signalized)
- Cambridge Street at Soldiers Field Road (signalized)
- Memorial Drive at River Street (signalized)
- Memorial Drive at Western Avenue (signalized)
- Western Avenue at Soldiers Field Road (signalized)
- Western Avenue at Kresge Way/Resilience Driveway (unsignalized)
- Western Avenue at Batten Way/Hague Street (signalized)

In addition, the study area also includes the following two interchange locations as requested by MassDOT:

- Cambridge Street Westbound at I-90 Off-Ramp
- Cambridge Street Eastbound at I-90 On-Ramp

Construction of Harvard University's Science and Engineering Complex (SEC) infrastructure in the vicinity of the Project Site results in three additional intersections, which will be included in the future No Build and Build Conditions analyses:

- Western Avenue at Stadium Road (signalized)
- Western Avenue at Academic Way (unsignalized)

- North Harvard Street at Academic Way (unsignalized)

In addition, under the Build condition analyses, the Enabling Infrastructure will be introduced, including the following new intersections providing access to the Site:

- Western Avenue at Cattle Drive
- Western Avenue at East Drive/Kresge Way
- Cattle Drive at DEF Drive
- Almy Street at Windom Street

The intersection of Western Avenue at East Drive/Kresge Way will replace the existing intersection of Western Avenue at Kresge Way/Resilience Driveway. Once East Drive is constructed, the Resilience Driveway along Western Avenue will be closed and all Resilience traffic will access Western Avenue via East Drive and a new Resilience driveway that will be constructed to intersect East Drive. In addition, the intersection of Almy Street at Windom Street exists today, but Almy Street is gated with access only provided for construction equipment, and therefore is only included in the Build condition analyses.

A graphic illustrating the roadway geometry and traffic control at the existing 13 study area intersections is provided in Figure 3.8.

3.5.1.2 Study Area Roadways

The following provides a description of existing area roadways located in the vicinity of the Project.

- **Western Avenue** is an east/west urban minor arterial roadway under local jurisdiction extending within the study area from North Harvard Street in the west to Soldiers Field Road in the east. Western Avenue carries two-way traffic with one travel lane in each direction, plus curbside dedicated bike lanes in each direction through the study area. West of Hague Street, recent construction projects have created physically separated bike lanes and bus stop boarding islands as far as the John A. Paulson School of Engineering and Applied Sciences. Sidewalks are provided along both sides of the street and crosswalks are provided at intersections. There is no posted speed limit on Western Avenue within the study area. East of the Charles River, Western Avenue is one-way in the westbound direction, connecting Central Square in Cambridge with Memorial Drive, Soldiers Field Road, and Allston.
- **Soldiers Field Road** is a two-way, median-separated four lane roadway to the north and east of the Project Site, classified as an urban principal arterial and under the jurisdiction of the Department of Conservation and Recreation (DCR). Soldiers Field Road provides access to downtown Boston and Cambridge to the east and Newton and Watertown to the west. The roadway operates as a limited-access road between Storrow Drive to the east and the Eliot Bridge to the west. There are no sidewalks or on-street parking along the length of the roadway, although the Paul Dudley White Bike Path runs along the north and east side of the road next to the Charles River. Crossings occur at the grade-separated interchanges with Cambridge Street,

Western Avenue, and North Harvard Street, or via the Weeks Footbridge over Soldiers Field Road, located between North Harvard Street and Western Avenue.

- **Memorial Drive** is located east of the Project site and runs in a general north/south direction within the study area paralleling Soldiers Field Road on the opposite side of the Charles River. The roadway is classified as an urban principal arterial and under the jurisdiction of DCR. Memorial Drive consists of two travel lanes in each direction with the Paul Dudley White Bike Path running along the south/west side of the road. Crosswalks are provided at all signalized and most unsignalized intersections. On-street parking in not allowed on either side of Memorial Drive. The posted speed limit along Memorial Drive is 35 miles per hour ("mph").
- **North Harvard Street** accommodates two-way traffic, with one lane in each direction from the Anderson Memorial Bridge crossing the Charles River into Cambridge in the north to Cambridge Street in the south. The roadway is classified as an urban minor arterial and is under local jurisdiction. North Harvard Street is generally oriented north/south, but the roadway bends significantly after crossing Western Avenue to form a boomerang shape around the north and west of the Project Site area. Continuous sidewalks are provided on both sides of the roadway and crosswalks are provided at all signalized intersections, several unsignalized intersections, and some mid-block locations. Dedicated bike lanes are provided in both directions along the length of the street, except for sharrows striped between the Franklin/Kingsley intersection and Western Ave. The posted speed limit along North Harvard Street is 25 mph.
- **Cambridge Street** is an east/west urban principal arterial under local jurisdiction that travels from Washington Square in Brighton in the west to Soldiers Field Road in the east that carries two-way traffic in two travel lanes in each direction within the study area. The road provides access to I-90 via ramps located just west of Soldiers Field Road. Sidewalks are provided on both sides of Cambridge Street, while crosswalks are provided at signalized intersections. On-street parking is provided along both sides of the street on the segment between Windom Street and North Harvard Street while no on-street parking is allowed between Soldiers Field Road and Windom Street. Dedicated bike lanes are provided in both directions along the length of the street.

  At the Charles River, Cambridge Street connects with River Street via the River Street Bridge. River Street is one-way in the eastbound direction and connections Cambridge Street with Central Square in Cambridge.
- **Hague Street** is a north/south two-way two-lane local street off Western Avenue to the south. Today, it dead-ends into the construction site, with southern egress available onto Windom Street via Rotterdam Street. There are sidewalks on both sides of the street, and no on-street parking. Crosswalks are striped on all sides of the intersection.
- **Windom Street** is a predominantly north/south two-way local roadway connecting Hague Street to Cambridge Street. The road has one lane in each direction and sidewalks on both sides of the street east of the intersection with Stadium Road. Between Hopedale Street and Stadium Road, construction has temporarily

converted the street to one-way northbound, with pedestrian accommodations on the western side only. There is a north/south crosswalk on the south side of the intersection.

Access to the Project Site from across the Charles River (Cambridge side and Memorial Drive) is available via three vehicular bridge crossings and one footbridge:

- **Anderson Memorial Bridge** between John F. Kennedy Street and Harvard Square in Cambridge and N. Harvard Street in Boston. The Bridge has two northbound lanes and one southbound lane, as well as sidewalks and bicycle lanes on both sides.
- **Western Avenue Bridge** is a one-way three-lane westbound bridge, connecting westbound traffic from Central Square and Cambridgeport in Cambridge with Allston, Solders Field Road, and I-90. Sidewalks are provided on both sides of the street. The Western Avenue Bridge is located approximately 1,000 feet east of the Project Site and is the closest river crossing to the Site.
- **River Street Bridge** is a one-way three-lane eastbound bridge connecting eastbound traffic from Allston, Solders Field Road, and I-90 with Central Square and Cambridgeport in Cambridge. Sidewalks are provided on both sides of the street.
- **John W. Weeks Footbridge** is a pedestrian bridge over the Charles River between Memorial Drive and Riverbend Park in Cambridge and the Dudley White Bike Path on the south side of the river. Crossing this bridge does not require the use of stairs. Another footbridge, with stairs on both ends, provides a connection over Soldiers Field Road between the south side of the Dudley White Bike Path and the Harvard Business School campus.

3.5.2 Existing Public Transportation

The Site is in the Allston neighborhood of Boston and is directly served by several MBTA bus lines and transit services, as described in the following sections.

3.5.2.1 MBTA Bus Routes

The Project Site is currently served by several Massachusetts Bay Transportation Authority's (MBTA) bus routes (see Figure 3.9): Route 70 serves the Project Site directly with stops on Western Avenue, whereas Routes 66 and 86 are reached on North Harvard Street, and Route 64 on Cambridge Street. The stops closest to the Project Site are directly adjacent to the northeast corner of the Project Site, just east of the intersection of Resilience Driveway and Western Avenue, served by the Route 70. Riders on Route 66 and 86 can transfer to the Route 70 at Barry's Corner, or walk to the Project Site via connections provided by Rena Path, Western Avenue, or through Harvard Business School pathways, all within a 1/3-mile walking distance.

Peak period frequencies and headways for MBTA local bus services are summarized in Table 3-4. Schedule characteristics refer to Spring 2021 schedule.

Table 3-4 MBTA Bus Services

Bus Route	Origin / Destination	AM Peak Period (Inbound) Headway (minutes)
Route 64	Oak Square – University Park or Kendall/MIT	15-20
Route 66	Harvard Square – Nubian Station	9-10
Route 70	Market Place Drive - University Park	7-15
Route 86	Sullivan Square Station - Reservoir Station (Cleveland Circle)	10-11

Source: MBTA Spring 2021 Schedule

The Red Line's Harvard station (stop serving Cambridge's Harvard Square) is the closest rapid transit station to the Project Site, located about a 0.9-mile walk across the Charles River to the north. Access to Harvard station is possible via the Harvard Transit System and MBTA Routes 66 and 86.

The Red Line's Central station (stop serving Cambridge's Central Square) is located one mile west of the Project via Western Avenue; it's served by the area's MBTA Route 66 and 86.

The Boston Landing Commuter Rail station on the Framingham/Worcester Line is the closest existing commuter rail stop to the Project Site, located 1.2 miles to the west. There is no direct MBTA bus service to that station from the Project Site.

The closest Green Line surface stop is at Harvard Avenue on the B branch, also approximately 1.2-mile distance from the Project Site.

A description of each MBTA bus route that services the Project Site is provided below:

Route 64 – Oak Square – University Park or Kendall/MIT

This route is a Local service route that operates between Oak Square in Brighton and University Park or Kendall Square in Cambridge via Union Square in Allston. Route 64 passes just south of the Project Site on Cambridge Street, with nearby stops at Seattle Street (just west of Windom Street) and the Mass Pike exit next to the DoubleTree Suites by Hilton Hotel. Route 64 connects with the Red Line subway at Central Square during all service hours, and Kendall/MIT during the weekday peaks.

Route 64 operates seven days a week and provides relatively infrequent service except for weekday AM peak periods. On weekdays Route 64 operates between 5:21 AM and 1:30 AM with 15-20 minute headways during AM peak hours and 20-35 minute headways during PM peak hours. On weekends, Saturday service runs hourly between 5:20 AM and 1:26 AM and Sunday service every 58-65 minutes between 8:18 AM and 7:07 PM.

Route 66 – Harvard Square – Nubian Station

Route 66 is a Key Bus route that provides crosstown service between Harvard Square in Cambridge and Nubian Square in Roxbury. It serves Harvard Square, Union Square in Allston, Brookline, the Longwood Medical Area, and Roxbury, and connects with the Red Line, all four branches of the Green Line, the Orange Line, and the Silver Line. The Route serves North Harvard Street and Cambridge Street north and west of the Project Site, with the closest stops located at *N Harvard St at Western Ave* (a stop which Routes 86 and 70 also serves). Three additional stops are located along North Harvard Street south of Western Avenue.

Route 66 operates seven days a week. On weekdays, the route operates from 4:45 AM to 1:37 AM with frequent and generally regular service from the early AM through the end of the evening. Headways are every 9-10 minutes during the AM Peak and every 10-15 minutes during the PM Peak. On Saturdays, service operates between 4:39 AM and 1:37 AM every 12 minutes during peak hours. On Sundays, service operates between 5:50 AM and 1:32 AM every 15-20 minutes.

Route 70 - Market Place Drive (Waltham Center) - University Park (Cambridge)

Route 70 is a Local bus route providing service seven days a week between Waltham and University Park in Cambridge, via Watertown Square and Allston. Route 70 services the Project Site via Western Avenue with stops at *Western Ave at/opp Sanofi* (now Resilience) and *125/130 Western Ave*.

Route 70 operates seven days a week. On weekdays, the route operates from 5:09 AM to 1:35 AM with relatively frequent but irregular service from the early AM through the end of the evening. Headways are every 7-15 minutes during the AM Peak and every 10-20 minutes during the PM Peak. On Saturdays, service operates between 5:00 AM and 1:30 AM every 10-30 minutes. On Sundays, service operates between 6:00 AM and 1:31 AM every 20-40 minutes.

Route 86 - Sullivan Square Station - Reservoir Station (Cleveland Circle)

Route 86 is a Local crosstown route that operates between Reservoir station in Cleveland Circle and Sullivan station, via Brighton, Allston, Harvard Square, and Somerville's Union Square. Route 86 services the Project Site with the closest stop at *N Harvard St at Western Ave* (a stop which Routes 66 and 70 also serves).

On weekdays, the route operates from 5:00 AM to 1:10 AM with relatively frequent and generally regular service from the early AM through the end of the evening. Headways are every 10-11 minutes during the AM Peak and every 15 minutes during the PM Peak. On Saturdays, service operates between 5:00 AM and 1:05 AM every 16-20 minutes. On Sundays, service operates between 7:30 AM and 10:09 PM roughly every 30 minutes.

3.5.2.2 Non-MBTA Transit

Harvard University provides transit services to facilitate access to, from, and within Harvard University campus areas including connections between Allston and Harvard Square. The following Harvard University transit route provides service adjacent to the Project Site.

Allston Campus Express Route – Harvard University Transit System

Harvard University Transit Services operates a looping clockwise transit route between the Allston Campus, Harvard Square, and Memorial Hall on weekdays during the academic year. Buses head westbound on Western Avenue past the Project Site and return to Harvard Square northbound on North Harvard Street. Stops closest to the Project Site are located at 1 Western Avenue at the Harvard Business School (located east of Kresge Way/Resilience

Driveway) and the Harvard Innovation Lab (located west of Hague Street/Batten Way). To better serve the Science and Engineering Complex (SEC), once the Harvard SEC enabling roadways are open, the stop at the Innovation Lab will move to Stadium Drive.

Based on the Spring 2021 schedule, on weekdays, buses depart from 1 Western Ave roughly every 30 minutes between 7:00 AM and 2:30 PM. In the Fall 2019 schedule (representative of a pre-COVID condition), buses would depart approximately every 15 minutes from 7:30 AM to 10:45 PM. The schedule for this route is likely to change in Fall 2021 with the opening of the Science and Engineering Complex (SEC) to students. On weekends, the Harvard University Transit System provides two on-demand evening service vans from 5:00 PM to 12:15 AM.

SEC to Quad (formerly Barry's Corner) Route – Harvard University Transit System

Harvard University Transit Services operates a transit route between Harvard Square, the Kennedy School, and the Continuum building at Barry's Corner in Allston. While this bus route is temporarily suspended due to the COVID-19 pandemic, under normal conditions, it operates on weekday morning and evening peak periods during the University's academic year on 20-minute headways. This route is being extended in the Fall of 2021 to serve the Science and Engineering Complex and north to the Quad.

3.5.2.3 MBTA Bus Service Passenger Comfort Metric (Existing Condition)

The MBTA has two different methods of measuring capacity on board its vehicles: passenger comfort and passenger crowding. The first way to evaluate capacity on MBTA vehicles is based on passenger comfort, which considers level of crowding and duration of crowding. MassDOT's Office of Performance Management and Innovation (OPMI) provides this metric for reporting and is presented in this section. The second metric, which was the basis of this study's impact analysis of the Project, is presented in Section 3.8.1. OPMI does not currently have a method to estimate the passenger comfort metric for future conditions; hence MassDOT's analysis method for analyzing future passenger crowding is based on the second method.

Passenger comfort metric is computed by identifying how many people on the vehicle are considered uncomfortable and then multiplying it by the number of minutes those uncomfortable conditions last, yielding passenger minutes in uncomfortable conditions. This value is then compared to the total number of passenger minutes (i.e., the amount of time all passengers spent on board the vehicle) to determine the percent of time that the vehicle was considered uncomfortable.

How passenger comfort is measured varies depending on the time of day. During "high-volume" periods (namely peak service periods), the following thresholds are used:

- For loads of 140 percent or less of seated capacity on the bus, all passengers are considered comfortable.
- For loads of more than 140 percent of seated capacity, all passengers are considered uncomfortable.

During "low-volume" periods, the following thresholds are used:

- For loads of 125 percent or less of seated capacity on the bus, all passengers are considered comfortable.
- For loads above 125 percent and up to 140 percent of seated capacity, seated passengers are considered comfortable.
- For loads of more than 140 percent of seated capacity, all passengers are considered uncomfortable.

The MBTA standard for passenger comfort is a minimum of 92 percent of passenger minutes in comfortable conditions, with a target level of 96 percent being preferred.[3] Based on Fall 2019 data, only Routes 70 and 86 meet the 92 percent minimum standard (see Table 3-5), yet fall short of the desired target. Routes 64 and 66 do not meet the minimum standard for passenger crowding under the MBTA's Service Delivery Policy. A closer investigation of passenger crowding is provided in Section 3.8, which explores passenger loads by weekday service periods.

Table 3-5 Existing (Fall 2019) Passenger Comfort Metric

MBTA Bus Route	Percent of Passenger Minutes in Comfortable Conditions
86	92.2%
70	93.3%
64	88.3%
66	89.1%

Source: Metric provided by Massachusetts Department of Transportation, Office of Performance Management and Innovation (OPMI).

3.5.3 Pedestrian and Bicycle Facilities

The Site is supported by existing local pedestrian and bicycle facilities, which are described in the following sections. A discussion of existing pedestrian and bicycle volumes is provided in Sections 3.5.4.4 and 3.5.4.5, respectively.

3.5.3.1 Existing Pedestrian Network

Pedestrian facilities and accommodations in the vicinity of the Project Study Area are illustrated in Figure 3.10. Sidewalks are provided along all study area roadways, including North Harvard Street, Western Avenue, and Cambridge Street. Crosswalks are also provided at all existing Study Area intersections. Most sidewalks and crosswalks within the study area are in fair to good condition and provide accessible curb ramps at crossings.

3 *Service Delivery Policy, 2021 Update*; Massachusetts Bay Transportation Authority (MBTA); June 7, 2021; Table 11: Passenger Comfort Standard.

The Dr. Paul Dudley White Path, which runs along both sides of the Charles River, serves as a multi-use path for pedestrians and cyclists within the Project Study Area. Pedestrians can cross the river via all river crossings, including the pedestrian-only John W. Weeks Footbridge, which links the northeastern side of the Harvard Business School Campus to the intersection of Memorial Drive and DeWolfe Street.

Sidewalks and pedestrian facilities connect the Site and the study area with other nearby neighborhoods and points of interest in Boston and Cambridge. The Site is within a 25-minute walk (approximately one mile) of Allston Village, Boston Landing, Harvard Square, and Central Square.

3.5.3.2 Existing Bicycle Accommodations

Bicycle accommodations are provided in both directions on most roadways surrounding the Project Site. A graphic illustrating the existing bicycle facilities is provided in Figure 3.11.

- Along Western Avenue, dedicated bike lanes are provided in both directions between Spurr Street to the west (near Barry’s Corner) and Soldiers Field Road to the east.
- The Dr. Paul Dudley White Bike Path extends along both sides of the Charles River on the east side of Soldiers Field Road and on the west side of Memorial Drive. The Dudley White Bike Path provides a public recreational and commuter off-street facility through the Esplanade into downtown Boston and Kendall Square in one direction and to Watertown and downtown Waltham in the other direction.
- Along North Harvard Street, curbside bike lanes are striped in both directions from the City of Cambridge across the Anderson Bridge to Cambridge Street. South of Western Avenue, the bike lanes are next to parking lanes for the majority of the North Harvard Street, whereas north of Western Avenue, the bike lanes are mostly curbside. The northbound approach at Western Avenue and the southbound approach at Cambridge Street provide sharrows for short distances due to the addition of a turn lane at each intersection.
- Along Cambridge Street, bike lanes are striped in both directions from the bridge over I-90 to Soldiers Field Road. A short westbound segment between Soldiers Field Road and the I-90 off-ramp is a sidewalk-level protected bike lane. The bike lanes for the eastbound and remaining westbound segments are either standard or buffered. The westbound bike lane is situated next to parking between Windom Street and Lincoln Street. It should also be noted that the westbound approaches at Windom Street and North Harvard Street provide sharrows for short distances due to the addition of a right-turn lane at each intersection.

Bluebikes Stations

Bikeshare in the metro Boston area is provided by the Bluebikes system. Bluebikes allows riders to pick up a bike at any Bluebikes station within Boston, Cambridge, and 8 additional surrounding communities and then return the bike at any other station. Bikes are unlocked via a mobile app and can be picked up or returned at over 300 stations in the Boston area.

There are two existing Bluebikes stations within a quarter-mile radius of the Site. The first Bluebikes station is located at the Harvard Innovation Lab at 125 Western Avenue (located on the north side of the roadway, approximately 400 feet west of Hague Street) and contains 19 bicycle docks. The second station is located at Soldiers Field Park on the northwest corner of the intersection of Western Avenue at Soldiers Field Road and contains 15 bicycle docks. These docking locations are shown in Figure 3.12.

3.5.4 Existing Traffic Volumes

3.5.4.1 Data Collection

Due to the ongoing change in travel patterns and reduced traffic volumes resulting from the COVID-19 pandemic during the preparation of this traffic study, traffic count data collected in April 2017 were used to identify traffic volumes at most study area intersections. Additionally, traffic count data from April, May, and October 2018 was used for the three intersections along Memorial Drive as well as the intersection of North Harvard Street at Franklin Street/Kingsley Street.

Traffic volumes at the intersections of Western Avenue at Kresge Way/Resilience Driveway and at Batten Way/Hague Street were collected in April 2012 and balanced with 2017 traffic volumes. Because the volumes entering and exiting from the side streets at these intersections mainly serve driveways to Harvard University properties and the Resilience facility, those traffic patterns are deemed representative of pre-pandemic conditions.

Traffic volumes were adjusted in accordance with the recommended Massachusetts Department of Transportation (MassDOT) COVID-19 guidelines (from its Engineering Directive, published on May 11, 2020) to establish the 2021 Existing Conditions for the Project. MassDOT considers 2019 to be existing and no adjustments are applied to counts from 2019. Additionally, traffic volumes from projects that may have been built or occupied since the time of the traffic counts are added to the network to reflect a comprehensive 2021 condition. (All traffic count data is included in Appendix C.)

3.5.4.2 Seasonal Adjustment

The traffic data collected for the study area was obtained during the months of April, May, and October, months when most classes at nearby Harvard University were in session. To quantify the seasonal variation of traffic volumes in the area, historic traffic data available from MassDOT were reviewed. Specifically, 2019 monthly traffic volumes were reviewed at MassDOT permanent count station AET 13 along I-90 east of the Allston-Brighton interchange. Based on the review, traffic volumes in all three months are slightly higher than average month conditions. To present a conservative analysis, the observed traffic volumes were not adjusted to a lower average condition. (The seasonal adjustment factors are included in Appendix C.)

3.5.4.3 Existing Conditions Traffic Volumes

Based on the compiled vehicular traffic data from the Project study area intersections, the existing weekday morning peak hour occurs between 8:00 AM and 9:00 AM, while the existing weekday evening peak hour occurs between 5:00 PM and 6:00 PM. Additionally, separate peak hours were identified for the three intersections along Memorial Drive in Cambridge due to different travel patterns for through volumes along Memorial Drive. For the intersections along Memorial Drive, the existing weekday morning peak hour occurs between 7:30 AM and 8:30 AM, while the existing weekday evening peak hour occurs between 4:30 PM and 5:30 PM.

The resulting 2021 Existing Condition morning and evening peak hour vehicle volumes are shown in Figures 3.13 and 3.14, respectively.

3.5.4.4 Existing Conditions Pedestrian Volumes

Pedestrian counts at intersections were conducted as part of the traffic data collection effort. The counts represent observed activity in a typical weekday (non-holiday) in a period when schools were in session. Figures 3.15 and 3.16 present the 2021 Existing Condition pedestrian volumes, based on those field observations, for the morning and evening peak hours, respectively.

The highest pedestrian volumes in the study area were observed at the intersection of North Harvard Street/Anderson Bridge at Soldiers Field Road, with a total of 560 pedestrians crossing in the morning peak hour and 646 pedestrians crossing in the evening peak hour. A considerable amount of this activity is likely driven by pedestrians walking between the Harvard University's Allston campus and the Harvard University's Cambridge campus and/or Harvard Square. This intersection also lies along the Dr. Paul Dudley White Path, which is a high-desire route for pedestrians and cyclists. The pedestrian volumes along Western Avenue do not include pedestrians accessing the Harvard SEC, as that project was not yet completed when traffic counts were conducted.

3.5.4.5 Existing Conditions Bicycle Volumes

Bicycle volumes at the study area intersections (Figures 3.17 and 3.18) were collected simultaneously with the vehicle and pedestrian turning movement counts. Within the immediate Study Area, there are on-street bicycle lanes on Western Avenue and North Harvard Street in both directions of travel adjacent to the Site. To the south of the Site, bicycle lanes exist in both directions along Cambridge Street, which connect to the Paul Dudley White Bike Path east of the Project Site.

According to the traffic count data, on Western Avenue adjacent to the Project Site approximately 37 cyclists travel eastbound and 13 cyclists travel westbound during the morning peak hour. During the evening peak hour on this segment of Western Avenue, approximately 16 cyclists travel eastbound and 46 cyclists travel westbound. The highest bicycle volumes in the study area were observed at the intersection of John F. Kennedy Street/Anderson Bridge at Memorial Drive, with a total of 202 cyclists in the morning peak hour and 196 cyclists in the evening peak hour.

Bicycle volumes along Western Avenue do not include cyclists accessing the Harvard SEC, as that project was not yet completed when traffic counts were conducted.

3.5.5 Existing Area Parking

On-street parking surrounding the Project Site consists of a variety of different parking regulations including two-hour parking, residential permit parking, unrestricted parking, and reserved parking. Western Avenue adjacent to the Project Site consists entirely of *No Stopping* restrictions or bus stops, whereas Cambridge Street and North Harvard Street consist of a greater variety of regulations. A graphic of the on-street parking regulations near the Site is provided in Figure 3.19.

3.5.6 Roadway Safety

3.5.6.1 Crash Data Inventory

A detailed crash inventory was conducted to identify potential motor vehicle crash trends in the traffic study area. The most current vehicle crash data for the traffic study area intersections were obtained from MassDOT (for the years 2014 through 2018) and the City of Boston (2017-2019). The MassDOT database is comprised of crash data from the Massachusetts Registry of Motor Vehicles (RMV) Division primarily for use in traffic studies and safety evaluations. Data files are provided for an entire city or town for an entire year, though not all crashes that are reported by the City of Boston Police Department are recorded in the RMV database. (More information on the City's crash data is provided in the next section.)

A summary of the study intersections vehicle crash history based on the available RMV data is presented in Table 3-6, and the detailed crash data is provided in Appendix C.

Crash rates are calculated based on the number of crashes at an intersection and the volume of traffic traveling through that intersection daily. Rates that exceed MassDOT's average for crashes at intersections in the MassDOT district in which the town or city is located could indicate operational, design, physical condition, or geometric deficiencies that are contributing to safety issues at an intersection.

For this Project's study area, the calculated crash rates for intersections were compared to MassDOT's District 6 average. In District 6 (the MassDOT district for Boston and Cambridge), the average crash rate is 0.71 crashes per million vehicles entering signalized intersections and 0.52 crashes per million vehicles entering unsignalized intersections.

Table 3-6 MassDOT Crash Portal Vehicular Crash Summary (2014-2018)

	North Harvard Street at:				Cambridge Street at:				Western Avenue at:		
	Memorial Drive (JFK St)	Soldiers Field Road	Western Avenue	Cambridge Street	Windom Street	I-90 Ramps	Soldiers Field Road	Memorial Drive (River St)	Memorial Drive	Soldiers Field Road	Batten Way
Signalized	yes	yes	yes	yes	Yes	yes	yes	yes	yes	yes	yes
MassDOT Crash Rates	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Calculated Crash Rate	1.16	2.02	0.06	0.10	0.04	0.05	1.76	1.03	0.90	0.19	0.09
Exceeds Crash Rate	Yes	Yes	No	No	No	No	Yes	Yes	Yes	No	No
2014	40	40	1	2	0	2	25	12	17	7	1
2015	8	8	1	0	1	0	21	16	10	3	0
2016	12	12	0	0	0	2	19	15	16	0	0
2017	8	9	0	3	0	0	17	10	10	1	1
2018	9	10	0	2	1	0	24	9	10	2	0
Total	**77**	**79**	**2**	**7**	**2**	**4**	**106**	**62**	**63**	**13**	**2**
Collision Type											
Angle	14	14	1	3	0	2	43	26	33	6	0
Front-to-front	0	0	0	1	0	0	0	0	0	0	0
Head-on	2	2	0	0	0	0	0	1	4	0	0
Rear-end	11	13	1	0	1	1	21	13	8	6	2
Rear-to-Rear	0	0	0	0	0	0	0	0	1	0	0
Sideswipe, opp. dir.	2	2	0	1	0	0	1	3	1	0	0
Sideswipe, same dir.	9	9	0	0	1	1	30	14	10	1	0
Single vehicle crash	38	38	0	2	0	0	11	3	6	0	0
Unknown	0	0	0	0	0	0	0	1	0	0	0
Not reported	1	1	0	0	0	0	0	1	0	0	0
Total	**77**	**79**	**2**	**7**	**2**	**4**	**106**	**62**	**63**	**13**	**2**
Crash Severity											
Fatal injury	0	0	0	0	0	0	0	0	0	0	0
Non-fatal injury	20	20	1	0	1	1	20	21	24	1	2
Property damage only (none injured)	57	59	0	5	1	3	85	36	38	12	0
Not Reported	0	0	1	1	0	0	1	3	1	0	0
Unknown	0	0	0	1	0	0	0	2	0	0	0
Total	**77**	**79**	**2**	**7**	**2**	**4**	**106**	**62**	**63**	**13**	**2**
Time of Day											
Weekday, 7 AM - 9 AM	10	10	0	0	0	0	11	1	3	3	0
Weekday, 4 PM - 6 PM	6	6	0	0	0	0	6	6	3	2	0
Saturday, 11 AM - 2 PM	1	1	0	0	0	1	3	3	0	0	0
Weekday, other time	42	44	1	5	1	2	60	37	46	5	0
Weekend, other time	18	18	1	2	1	1	26	15	11	3	2
Total	**77**	**79**	**2**	**7**	**2**	**4**	**106**	**62**	**63**	**13**	**2**
Pavement Conditions											
Dry	46	47	1	4	1	4	85	51	54	13	2
Wet	30	31	1	2	1	0	17	6	5	0	0
Snow	1	1	0	0	0	0	2	3	2	0	0
Ice	0	0	0	0	0	0	2	0	2	0	0
Not reported	0	0	0	0	0	0	0	1	0	0	0
Unknown	0	0	0	1	0	0	0	1	0	0	0
Total	**77**	**79**	**2**	**7**	**2**	**4**	**106**	**62**	**63**	**13**	**2**
Non Motorist (Bike, Ped)	**12**	**12**	**1**	**1**	**0**	**0**	**1**	**5**	**7**	**0**	**0**

Note: No crashes were reported at the intersections of N Harvard St at Franklin St/Kingsley St or Western Ave at Kresge Way/Resilience Dwy.
Source: MassDOT Crash Portal, accessed March 2021.

The MassDOT crash data portal contained information for eleven intersections in the Study Area (no crashes were reported at the intersections of North Harvard Street at Franklin Street/Kingsley Street or Western Avenue at Kresge Way/Resilience Driveway over the five-year reporting period). Over the five-year period, crashes at those intersections included angle crashes, rear-end crashes and sideswipe crashes. According to the MassDOT records, these crashes resulted only in property damage and non-fatal injuries, and no fatalities. In addition, seven intersections had crashes involving bicycles or pedestrians in that reporting period. (The City of Boston Vision Zero database reflects a different reporting periods and the records may differ.)

A review of the crash data in Table 3-6 indicates that there were five study area intersections with calculated crash rates above the MassDOT Highway District's crash rate averages:

- Memorial Drive at JFK Street / Anderson Bridge
- North Harvard Street at Soldiers Field Road
- Cambridge Street at Soldiers Field Road
- Memorial Drive at River Street
- Memorial Drive at Western Avenue

Four of the five intersections that exceed the MassDOT average crash rate (i.e., Memorial Drive at JFK Street / Anderson Bridge, North Harvard Street at Soldiers Field Road, Memorial Drive at River Street, and Memorial Drive at Western Avenue) were evaluated via road safety audits (RSAs) as part of this Project. These studies are described in Section 3.5.6.3. The intersection of Cambridge Street and Soldiers Field Road recently had safety improvements implemented, which are not reflected in the reported data.

City of Boston Vision Zero Data

Not all crashes located within the City of Boston are included in the RMV crash database. Therefore, additional City Emergency Response (EMS) crash data were obtained though the Vision Zero Crash Map available on the City of Boston website[4]. Crashes resulting in an EMS call at the study area intersections are presented below in Table 3-7 for the most recent three-year period between 2017 and 2019. Although limited information is available about each individual crash, this data is presented to represent the overall crash characteristics of the study area and to supplement the MassDOT RMV data set.

4 *Vision Zero Boston*, January 2021. <https://apps.boston.gov/vision-zero/>.

Table 3-7 Vision Zero Database Vehicular Crash Summary (2017-2019)

	North Harvard Street at:		Cambridge Street at:	Western Avenue at:		
	Western Avenue	Cambridge Street	Windom Street	Soldiers Field Road	Kresge Way / Resilience Dwy	Batten Way / Hague Street
Signalized?	Yes	Yes	Yes	Yes	No	Yes
Year						
2017	1	2	1	1	0	1
2018	3	2	1	3	0	0
2019	2	1	2	2	1	0
Total	**6**	**5**	**4**	**6**	**1**	**1**
Yearly Avg	*2.00*	*1.67*	*1.33*	*2.00*	*0.33*	*0.33*
Type of Crash						
Motor Vehicle	2	5	4	5	1	1
Pedestrian	1	0	0	0	0	0
Bicycle	3	0	0	1	0	0
Total	**6**	**5**	**4**	**6**	**1**	**1**

Source: City of Boston Vision Zero database.

The locations with the highest number of crashes in the Vision Zero database over the most recent three-year period are North Harvard Street at Western Avenue and Western Avenue at Soldiers Field Road. Both locations experienced six crashes over the three-year period and those two intersections were the only intersections in the Vision Zero database to have reported crashes involving pedestrians or bicyclists.

3.5.6.2 Highway Safety Improvement Program

VHB reviewed MassDOT's Highway Safety Improvement Program (HSIP) database to identify whether any of the Study Area intersections are HSIP-eligible. The HSIP database identifies "crash clusters," locations that may warrant a higher priority for safety improvement funds. An HSIP-eligible location is eligible for FHWA and MassDOT funds to address the identified safety issues at these locations. An HSIP-eligible cluster is one in which the total number of equivalent property damage only[5] (EPDO) crashes in the area is within the top five percent of all clusters in that region.

According to the HSIP database, all five of the previously cited study area intersections having crash rates above the MassDOT average fall within an HSIP-eligible cluster.

Of the five HSIP-eligible locations, the intersections of Memorial Drive at River Street and Memorial Drive at Western Avenue also are a top 200 intersection cluster for 2015-2017, which means that these two locations have a total number of EPDO crashes that fall within the top 200 locations across Massachusetts.

5 Equivalent property damage only (EPDO) is a method of combining the number of crashes with the severity of the crashes based on a weighted scale. Crashes involving property damage only are reported at a minimal level of importance, while collisions involving personal injury (or fatalities) are weighted more heavily.

In addition, the intersections of Memorial Drive at JFK Street / Anderson Bridge and North Harvard Street at Soldiers Field Road also fall within a specified HSIP-bicycle cluster, which means that these two locations have a total number of EPDO crashes involving bicyclists in the area that fall within the top five percent of all clusters in that region.

Based on the identification of HSIP-eligible locations, VHB coordinated with MassDOT to determine what study area locations were eligible for road safety audits, as described in the following section.

3.5.6.3 Road Safety Audit Coordination

A road safety audit (RSA) is a formal safety review of a roadway or intersection. As part of the MEPA review process for the Project, VHB coordinated with MassDOT to determine which study area locations required RSAs. Based on the list of HSIP-eligible locations and a review of the City of Boston Vision Zero data, MassDOT determined that RSAs were required at the following five locations:

- Memorial Drive at JFK Street / Anderson Bridge, Cambridge
- North Harvard Street at Soldiers Field Road, Allston
- North Harvard Street at Western Avenue (Barry's Corner), Allston
- Memorial Drive at Western Avenue, Cambridge
- Memorial Drive at River Street, Cambridge

Four of the five HSIP-eligible locations were recommended for an RSA. MassDOT did not require conducting an RSA at the intersection of Cambridge Street at Soldiers Field Road because of the recently completed multimodal roadway improvements at this location in 2018. Improvements at this intersection included: reconstruction of new sidewalk and crosswalk ramps, elimination of the right-turn slip lane from Cambridge Street to the I-90 on-ramp, and enhanced bicycle accommodations along Cambridge Street.

RSAs were conducted at all five locations by VHB in June 2021 and were funded by the Proponent. During the RSAs, participants noted a variety of potential safety issues related to matters such as signage and pavement markings, vehicle speeds, traffic circulation, intersections operations and roadway geometry, signal visibility, lighting, pavement conditions, and pedestrian and bicycle accommodations. The results of the RSAs provide the City of Boston, the City of Cambridge, DCR, and MassDOT with a list of potential safety enhancements to improve safety conditions at each intersection. The full road safety audit reports are anticipated to be posted on the MassDOT website in Summer 2021.

3.6 Future Conditions

Traffic volumes in the study area were projected to a 2025 design/analysis year and a 2030 design/analysis year. Design years of 2025 and 2030 are used to determine the impacts of Phase A and the Full Build of the Project, respectively.

Independent of the Project, volumes on the roadway network under the future No-Build conditions were assumed to include existing traffic and new traffic resulting from background traffic growth. Under the Build condition, Project-generated traffic volumes were added to the No-Build volumes to reflect the Build conditions within the Project study area.

Impacts of COVID-19 on Future Conditions

Over the last year, the COVID-19 pandemic has had a major impact on the local and regional transportation network with significant reductions in traffic and transit volumes. The COVID-19 pandemic changed commuting patterns across the region—at least temporarily—when many people that previously commuted by driving or taking public transit to work or school instead worked from home or reduced trip-making. Although more people will return to working in person compared to the pandemic conditions, it is unlikely that the transportation network will be used in the same manner as pre-pandemic conditions in the near-term. Many employers, workers, and students may continue to adopt a flexible work schedule that does not require commuting every day or at traditional rush hour times. For those who do commute from home to work or school, their mode choice may be different than the one typically made prior to the pandemic.

Given the uncertainty of future trip generation and use of the transportation network in a post-pandemic period, it is difficult to estimate exactly how roadway and transit systems will operate in 2025 and 2030. The future conditions activity levels (traffic volumes and transit ridership) used in this analysis represent a reasonable estimate of the demands on the transportation network in 2025 and 2030 by projecting pre-pandemic travel behaviors.

The following sections outline the assumptions used to estimate future traffic and transit growth to provide an analysis on the impact of the Project on the transportation network.

3.6.1 Background Traffic Growth

Traffic growth on area roadways is a function of the expected land development, economic activity, and changes in demographics (e.g. population) and associated travel demand. Several methods can be used to estimate this growth to create a future condition. A procedure frequently employed is to estimate or calculate an annual percentage increase in traffic volumes based on recent trends on area roadways and apply that increase to study area traffic volumes. Another procedure is to identify estimated traffic generated by planned new major development projects that would be expected to impact the Project study area roadways. The application of both methods to this study are described next.

3.6.1.1 Historical Traffic Growth

To account for the potential future growth in traffic volumes along the study area roadways that cannot be directly attributed to new development projects in the area, an annual percentage change was considered based on each roadway type:

- For all roadways classified as local roadways, urban collectors, or urban minor arterials, no annual growth rate is applied; instead only new traffic generated from known background projects are added to these roadways. (The basis for this is recent guidance from the City of Boston Transportation Department, which recommends not applying a general growth rate to traffic volumes. BTD cites that growth rates vary widely from year to year and using a single, consistent percentage does not reflect potential decreases in vehicular traffic and increases in other modes[6].)

As a result, no growth rate in general traffic is applied to the existing traffic volumes along North Harvard Street, Western Avenue (west of Soldiers Field Road), and all side streets and driveways.

- For roadways classified as Interstate highways or urban principal arterials, an annual growth rate of 0.4 percent was applied to develop the future condition traffic volumes. This rate accounts for general traffic growth on the regional roadways. (This follows MassDOT guidance to apply an annual growth rate to roadways under state jurisdiction, as stated in the TSL included in Appendix C).

  Based on the reported MassDOT growth rate on urban arterials between 2018 and 2019, a 0.4-percent annual growth rate is applied to the existing/baseline traffic volumes along Soldiers Field Road, Memorial Drive, Cambridge Street, the I-90 Ramps, and all Charles River crossings.

3.6.1.2 2025 Study Area Specific Growth from Background Projects

To develop the future traffic volumes, the expected vehicle trips associated with other planned and/or approved developments near the Project Site were incorporated in the future condition analyses. The projected traffic volumes expected to be generated by each project are based on published traffic studies, if available, or based on ITE trip generation projections. These volumes are added to the study area roadways based on existing travel patterns.

Based on research by VHB on the Boston Planning & Development Agency (BPDA) website, the City of Cambridge Community Development Department website, and discussions with the City of Boston staff, several planned development projects within the vicinity of the study area are included in the future traffic conditions, independent of the Project. (Collectively, these constitute the Background Projects.) The list below (and illustrated in Figure 3.20) includes all planned and/or approved projects in the surrounding area of the Project Site that are expected to have an impact on traffic volumes in the year 2025:

- **Harvard University Soldiers Field Housing Complex Renovation –** This project is located at 111 Western Avenue and includes plans to renovate the existing 429,000 SF of Soldiers Field Park housing complex with approximately 739 residents in 478 apartments. This project is approved by the BPDA, and since it will not change the number of units within the development it is not anticipate any traffic impacts within the study area. Therefore, it is included for references purposes only.
- **Harvard University Science and Engineering Complex (SEC) –** This project consists of the recently-completed SEC building at 150 Western Avenue. The project is approximately 550,000 SF and will house up to 300 faculty members and 900

6 Memo: *Traffic Counts During and Post-Pandemic*; Boston Transportation Department & Public Works; January 21, 2021.

graduate and undergraduate students. While the building has finished construction as of 2021, it hasn't been fully occupied and the full peak hour traffic impacts are not yet materialized on the roadway network and therefore traffic associated with this project is only included in the future conditions.

- **Harvard Business School Faculty and Administrative Offices –** As envisioned, this project consists of an approximately 4-story, 110,000 SF building providing office space for Harvard faculty and administration. The building will be located at the northeast corner of what is now Ohiri Field along Batten Way and Gordon Road and was included in the 2013 Harvard Institutional Master Plan (IMP) as Site 3.
- **Harvard University Mixed-Use Project –** As envisioned, this project consists of a new 3,000 seat basketball arena, approximately 250,000 SF of residential space, and 10,000-30,000 SF of ground-floor retail space. The basketball arena is expected to replace an existing facility and therefore is not anticipated to generate any new project trips. This project will be located at 175 North Harvard Street just north of Barry's Corner and was included in the 2013 Harvard IMP as Site 5.
- **Harvard University Gateway Project –** As envisioned, this project consists of approximately 300,000 SF of total development, including up to 250,000-265,000 SF of office space and 35,000-50,000 SF of ground-floor retail space. This project will be located northeast of Barry's Corner and west of Academic Way and was included in the 2013 Harvard IMP as Site 6.
- **180 Western Ave –** This project will consist of the development of a new mixed-use building totaling approximately 200,100 SF. The project will include approximately 270 residential units, 13,900 SF of ground-floor retail and 78 parking spaces. A PNF for this project was filed in March 2021 and the project is currently under review.
- **365 Western Avenue –** This project will contain 65 new residential units with approximately 37 garage parking spaces on the site of a currently underutilized commercial property with a car wash and has been approved by the BPDA.
- **Common Albright –** This project is located at 525 Lincoln Street and consists of 129,175 SF of residential uses with approximately 1,250 SF of ground floor community spaces, 80 residential units, and 30 parking spaces. A PNF was filed for this project in July 2019. The project has been approved by the BPDA but has not yet started construction.
- **176 Lincoln Street –** This project will consist of the demolition of the existing and long-vacant building on-site and the creation of a new, three-building, mixed-use project totaling approximately 808,000 SF. The project will include 548,000 SF of office and/or research and development space in two primarily commercial buildings, and one building will be primarily residential with approximately 314 units. Approximately 20,000 SF of ground-floor retail space will be spread throughout the three buildings. A PNF for this project was filed in October 2020 and is currently under review. This project is expected to be constructed in one phase and be completed by 2025.
- **Boston Landing –** This project consists of the redevelopment of an underutilized 14-acre site in the Allston-Brighton neighborhood located at 38-180 Guest Street. The

full build-out of this project includes up to 1.65 million SF of development, split between up to 900,000 SF of office space, 295 residential units, 323,000 SF of sports facilities, 97,000 SF of retail/restaurant space, and a 175-key hotel. Construction of the full development is ongoing, and many of the proposed land uses have been constructed and occupied at the time of this study. An estimate of the percent of project completion at the time of traffic count collection in April 2017 was used to determine the additional traffic volumes that would be added to the roadway network between 2017 and the 2021 Existing Condition. The remaining unbuilt portions of this project include approximately 275,000 SF of sports facilities, 320,000 SF of office space, the 175-key hotel, and 60,000 SF of retail space, which are assumed to be completed by 2025.

- **Nexus at the Allston Innovation Corridor –** This project is located at 250-280 and 305 Western Avenue and consists of 514,000 SF of office and research and development uses with approximately 21,900 SF of ground floor retail uses, 40 residential units, and approximately 2,500 SF of civic space. A DPIR was filed for this project in November 2019 and the project is still under review. For this report, it was assumed that Phase I consisting of 250-280 Western Avenue (and consisting of approximately 60-percent of the full project build-out) will be complete by 2025 while the remainder of the project at 305 Western Avenue will be complete by 2030.
- **WBZ-TV/CBS Studio –** This project is located at the existing WBZ-TV Studio facility at 1170-1200 Soldiers Field Road. A new facility will be constructed on the project site while the existing facility remains open and in operation until the project is complete. Once complete, WBZ-TV will transition its operations into the new building. This project is BPDA Board approved.
- **Skating Club of Boston (1234-1240 Soldiers Field Road) –** This project consists of the redevelopment of two parcels of land totaling approximately 3.14 acres located at 1234 and 1240 Soldiers Field Road. The site will be developed with approximately 655 residential units, 255 hotel rooms, and approximately 14,500 SF of retail space with approximately 405 parking spaces. A PNF for this project was filed in September 2020 and the project is currently under review. For this report, it was assumed that Phase I consisting of 1240 Soldiers Field Road (and consisting of approximately 60-percent of the full project build-out) will be complete by 2025 while the remainder of the project at 1234 Soldiers Field Road will be complete by 2030.
- **Allston Yards –** This project will redevelop an approximately 11-acre site with a mixed-use development consisting of approximately 868 residential units, 350,000 SF of office space, 50,000 SF of retail space, and a 67,000 SF supermarket replacing the existing Stop & Shop on-site. The project site is located south of I-90, east of Arthur Street, and west of Everett Street. The project has been approved by the BPDA but has not yet started construction. This project will be constructed in four phases and it is assumed approximately half of the development will be completed by 2025 while the full build will be completed by 2030.

The 2025 No-Build Condition peak hour traffic volumes were developed by adding the traffic volumes associated with these known development projects.

3.6.1.3 2030 Study Area Specific Growth from Background Projects

In addition to the projects listed above expected to be completed and operation by 2025, the following background project components are expected to be completed between 2025 and 2030 and therefore are included in the 2030 future conditions but are not included in the 2025 future conditions. These include the following development projects and project phases:

- **Volpe Redevelopment (U.S. DOT Site) –** The Volpe redevelopment project in Cambridge's Kendall Square area includes approximately 3.0 million square feet of development consisting of up to 879,000 SF of office space, 897,750 SF of research and development space, 100,000 SF of retail/entertainment space, 1,300 residential units, a 200-key hotel, and 20,000 of community space. While this development is located nearly two miles east of the Site, the traffic report filed for the project included study area intersections along Memorial Drive and identified impacts within the Full Build study area. The special permit for the Volpe redevelopment was filed in February 2021 and is currently under review. Based on the special permit, the full build-out of the project is expected within 10-15 years. To provide a conservative analysis, it is assumed that the full build of the project will be completed by 2030, but under 2025 conditions there will not be any project-related impacts within the Full Build study area.
- **Nexus at the Allston Innovation Corridor –** This project is located at 250-280 & 305 Western Avenue and consists of 514,000 SF of office and research and development uses with approximately 21,900 SF of ground floor retail uses, 40 residential units, and approximately 2,500 SF of civic space. While approximately 60-percent of the project is expected to be completed by 2025 (as described previously), the full project is expected to be open and operational by 2030.
- **Skating Club of Boston (1234-1240 Soldiers Field Road) –** This project consists of approximately 655 residential units, 255 hotel rooms, and approximately 14,500 SF of retail space. While approximately 60-percent of the project is expected to be completed by 2025 (as described previously), the full project is expected to be open and operational by 2030.
- **Allston Yards –** This project will redevelop an approximately 11-acre site with a mixed-use development consisting of approximately 868 residential units, 350,000 SF of office space, 50,000 SF of retail space, and a 67,000 SF supermarket replacing the existing Stop & Shop on-site. While approximately half of the project is expected to be completed by 2025 (as described previously), the full project is expected to be open and operational by 2030.

As stated previously, the 2030 future conditions include both the projects listed above and the projects included in the 2025 future conditions. The 2030 No-Build condition **does not** assume that Phase A of the Project is in place; therefore, the No-Build condition represents a condition in 2030 where the Project Site is still vacant.

3.6.2 Roadway Improvements

In assessing future traffic conditions, proposed and approved roadway improvements within the study area were considered. Based on research by VHB and discussions with the City of Boston, there are several roadway improvement projects that may affect traffic volumes under the future conditions. These improvements are anticipated to be in place prior to 2025 (unless otherwise noted) and therefore are included in all 2025 and 2030 future conditions.

Details of each roadway improvement project are provided below, and the location of each roadway improvement project is provided in Figure 3.21.

Harvard SEC Enabling Roadways

As part of the Harvard SEC project, several new roadways are being completed that will improve connectivity throughout the area. Specifically, three new roadways are being constructed that will be open to all users: Academic Way, Stadium Road, and Science Drive:

- Construction of Academic Way between North Harvard Street, Western Avenue, and Science Drive with two-way travel in the north-south direction (one travel lane in each direction), curb lanes north of Western Avenue, sidewalks on the west side of the roadway, and a shared use path on the east side of the roadway.
- Construction of Stadium Road between Western Avenue and Windom Street with two-way travel in the north-south direction (one travel lane in each direction), curb lanes for transit activities, and sidewalks on both sides of the roadway.
- Construction of Science Drive between Academic Way and Windom Street with two-way travel in the east-west direction (one travel lane in each direction), curb lanes, a sidewalk on the north side of the roadway, and a shared use path on the south side of the roadway.
- Installation of a new traffic signal at the intersection of Western Avenue at Stadium Road providing signalized control for all approaches and protected signalized pedestrian crossings.
- Installation of signal conduit at the intersections of Western Avenue at Academic Way and North Harvard Street at Academic Way to allow signals to be installed at these intersections, when and if warranted.
- Development of a mobility hub on Stadium Road that will serve the Harvard University Allston Express and Barry's Corner transit services as well as relocated MBTA bus stops on Western Avenue.
- Creation of a shared use path along the south side of Science Drive and on the south and east side of the parking lots off Hague Street creating a pedestrian and bicycle connection between Rena Path and Western Avenue via Hague Street.
- Crosswalks at all intersections with rectangular rapid-flashing beacons (RRFBs) at the unsignalized crossings of Western Avenue and Academic Way and North Harvard Street and Academic Way.

- Creation of a sidewalk-level separated bicycle lane on the south side of Western Avenue and an on-road buffered bicycle lane on the north side of Western Avenue between Academic Way and Batten Way.

As of Spring 2021, the SEC contractor was completing construction with all SEC related roadways expected to fully open by Fall of 2021. Since the roadways were not in place during the collection of the existing traffic counts in 2017-2018, the SEC roadways are not included in the 2021 Existing Conditions but are included in the 2025 and 2030 future analysis conditions. As a result, three new intersections are added to the study area analyses in the future conditions: Western Avenue at Academic Way, Western Avenue at Stadium Road, and North Harvard Street at Academic Way.

The opening of the SEC roadways is expected to result in a localized shift in existing traffic patterns, which are accounted for in the 2025 and 2030 future conditions. Vehicles that turn right from Western Avenue westbound onto North Harvard Street northbound at Barry's Corner under existing conditions were rerouted to travel northbound on Academic Way in advance of Barry's Corner. In the reverse direction, vehicles that turn left from North Harvard Street southbound onto Western Avenue eastbound at Barry's Corner under existing conditions were rerouted to travel southbound on Academic Way instead and therefore also avoid Barry's Corner. In addition, the connection of Stadium Road to Windom Street was taken into account and 75-percent and 25-percent of existing vehicles that turn right and left, respectively, onto Hague Street from Western Avenue under existing conditions, were rerouted to the new Stadium Road connection in the future conditions.

Western Avenue at Soldiers Field Road Improvements

Roadway improvement plans are currently in the construction phase at the intersection of Western Avenue at Soldiers Field Road. These improvements, done in collaboration with the Department of Conservation and Recreation (DCR), are expected to enhance bicycle and pedestrian accommodations and improve safety at the intersection. Specifically, the improvements are:

- Add eastbound and westbound bicycle lanes through the intersection connecting the Dr. Paul Dudley White bike path with the bicycle facilities along Western Avenue to the west.
- Restripe the crosswalks and add bicycle crossing markings.
- Modify signal equipment to provide mast arm mounted signals for the Western Avenue westbound approach to Soldiers Field Road.
- Modify the signal timings to include bicycle phases.
- Add *No Turn on Red* restrictions to the Western Avenue eastbound and westbound approaches to reduce the potential for conflicts between vehicles and pedestrians or bicyclists.

The improvement project is funded by Harvard University and expected to be complete in 2021.

Cambridge Street and Windom Street Improvements

The City of Boston-designed improvements along the Cambridge Street corridor and at the intersection of Cambridge Street at Windom Street are expected to be in place by 2025. These improvements will enhance bicycle and pedestrian accommodations, improve safety, and reduce cut-through traffic on local streets. Specifically, the improvements are:

- Add a buffered bike lane on the south side of Cambridge Street between Linden Street and the I-90 Off-Ramp
- Add a buffered bike lane on the north side of Cambridge Street between the I-90 Off-Ramp and Windom Street
- Eliminate the dedicated right-turn lane along the Cambridge Street westbound approach to Windom Street
- Reduce the cross-section of Windom Street by eliminating one of the two southbound lanes approaching Cambridge Street, removing the median, narrowing the northbound receiving lane, and adding flexposts and a modular base to tighten the intersection
- Reduce the crossing distance for pedestrians crossing the Windom Street approach with the tightened intersection.
- Modify the existing signal timings at Windom Street and North Harvard Street and add an exclusive pedestrian phase at the Windom Street signal.
- Shift the gore point east for the I-90 On-Ramp from Cambridge Street eastbound to reduce vehicle/bicycle conflicts and add a designated pedestrian and bicycle crossing across the on-ramp entrance.

Part of the goal of the improvement project is to reduce the number of vehicles that use Windom Street to reverse directions on Cambridge Street. Under existing conditions, drivers have been observed to avoid congestion on the I-90 Off-Ramp to Cambridge Street eastbound by taking the I-90 Off-Ramp to Cambridge Street westbound, turn right onto Windom Street, make a U-turn, and turn left from Windom Street onto Cambridge Street to head eastbound towards Soldiers Field Road and the River Street Bridge. The City's improvements at Cambridge and Windom Street, which are nearing completion, will tighten the Windom Street approach and eliminate the median making it significantly more difficult to reverse direction in this manner. Therefore, to incorporate this change in the 2025 and 2030 traffic volume networks, drivers using Windom Street to reverse direction on Cambridge Street were redistributed from the I-90 Off-Ramp to Cambridge Street westbound to the I-90 Off-Ramp to Cambridge Street eastbound.

Windom Street One-Way Conversion

In tandem with the described improvements at the intersection of Cambridge Street at Windom Street, the City of Boston is changing traffic patterns along Windom Street from two-way traffic flow to one-way traffic flow in the southbound direction between Hopedale Street and Amboy Street. This change is being made to reduce cut-through traffic on Windom Street by eliminating the ability for drivers to use Windom Street to connect between Cambridge Street in the south and Western Avenue in the north. This change is expected to be in place this summer. To incorporate this traffic restriction in the 2025 and 2030 traffic volume networks, northbound cut-through traffic was redistributed from Windom Street to North Harvard Street and Soldiers Field Road Service Road.

Allston Multimodal Project

Long-term plans for the study area roadway network include the reconstruction of the Allston-Brighton interchange along I-90 into a new urban interchange, the construction of a new multimodal transit station on the Worcester Line of the commuter rail (West Station), and the development of a new network of streets and pedestrian/bicycle improvements on land north of the highway (known as the Allston Multimodal Project).

MassDOT and its design team are currently working to establish a preferred alternative and complete all necessary state and federal environmental documentation. As of June 2021, the project was on track to file a Notice of Project Change by the end of the year.[7] Although MassDOT has indicated plans to begin construction by 2024 (as listed on the project website as of July 2021), according to the Boston Region MPO's long-range transportation plan, *Destination 2040*, the project is not expected to start construction until the 2030-2034 period.[8] MassDOT expects a construction period of 8 to 10 years, lasting into the next decade.

Based on discussions with the City of Boston and MassDOT, the completion of this project is not included in this study, because the Allston Multimodal Project is unlikely to be completed prior to the 2030 analysis year. However, the new roadways through the Site are designed to consider the long-term vision of the area's street network, and thus, will allow for future roadway network connections when the Allston Multimodal Project is complete.

Figure 3.22 provides details on the Allston Multimodal Project and other future potential roadway connections that may occur after completion of the Full Build of the Project in 2030.

3.6.3 2025 and 2030 No Build Traffic Volumes

The 2025 No-Build traffic volumes were developed using a growth rate of 0.4-percent per year between 2021 and 2025 along all roads classified as Interstate highways and urban principal arterials, and by adding in the 2025 background projects and roadway improvement projects described above to the Existing Conditions traffic volumes. The resulting 2025 No-Build weekday morning and weekday evening peak hour traffic volume networks are presented in Figures 3.23 and 3.24, respectively.

The 2030 No-Build traffic volumes were developed using a growth rate of 0.4-percent per year between 2021 and 2030 along all roads classified as Interstate highways and urban principal arterials, and by adding in the 2030 background projects and roadway improvement projects described above to the Existing Conditions traffic volumes. The

7 I-90 Allston Interchange: A Multimodal Transportation Project; Task Force Meeting Presentation; MassDOT; June 3, 2021. www.mass.gov/allston-multimodal-project

8 *Destination 2040:* Long-Range Transportation Plan of the Boston Region Metropolitan Planning Organization (MPO), CTPS, August 2019. www.ctps.org/data/pdf/plans/LRTP/destination/Destination-2040-LRTP-20191030.pdf#page=119

resulting 2030 No-Build weekday morning and weekday evening peak hour traffic volume networks are presented in Figures 3.25 and 3.26, respectively.

3.6.4 Trip Generation

The 2025 and 2030 Build Conditions were developed by adding the Project-generated trips to the 2025 and 2030 No Build traffic volume networks. The following sections outline the trip generation used to develop the Build Condition traffic volume networks.

3.6.4.1 Trip Generation Methodology

The rate at which any development generates traffic is dependent upon the size, location, and concentration of surrounding developments. Estimating the demand for movements associated with the Project is a complex exercise considering many factors, such as the mix of land uses in the Project's development program, the availability of transit service in the area, and other mobility characteristics. The calculation involves the following five steps, which are presented below and detailed in the following sections:

- Estimate trips by applying trip rates based on standard data from the Institute of Transportation Engineers (ITE) *Trip Generation Manual*[9], using ITE Land Use Codes (LUC) for each component of the Project. The ITE manual yields "unadjusted" vehicle trips, which do not reflect non-automobile modes of transportation typical of a multimodal urban environment, such as public transportation, bicycling and walking;
- Convert unadjusted vehicle trips into total person trips using an average vehicle occupancy;
- Determine the shared trips between Project's land uses, referred to herein as "Internal Capture", which reflect trips that remain within the Project Site and do not create any impacts to the area's transportation network; and
- Calculate trips by each mode of travel by applying expected mode shares and vehicle occupancy, resulting in *adjusted* trips;
- Apply credit for "pass-by" trips visiting the Site that may already be present on the local roadway network and therefore do not count as "new" Project-generated trips.

The Site is vacant under Existing Conditions and, therefore, no adjustments are made for existing trips, as there are none.

3.6.4.2 Applied Land Use Codes

The relevant ITE land use codes for the Project program are as follows:

- Residential – LUC 221: Multifamily Housing (Mid-Rise)
- Residential – LUC 222: Multifamily Housing (High-Rise)
- Office – LUC 710: General Office Building
- Lab/R&D – LUC 760: Research and Development Center

9 *Trip Generation Manual, 10th Edition*, Institute of Transportation Engineers, Washington, D.C., 2017.

- Hotel – LUC 310: Hotel
- Retail – LUC 820: General Shopping Center
- Restaurant – LUC 932: High-Turnover (Sit Down) Restaurant

The Office/Research component of the Project will include a range of office, research and development and life sciences uses. For this analysis, 40 percent of the space is dedicated to office use and 60 percent is allocated to research and development uses. For the retail/restaurant space, the estimate assumes a 50/50 split between the two land uses based on what is expected to be incorporated into the ground floor space.

For the hotel, the number of rooms/keys were analyzed using the standard ITE land use code, which includes guest amenities and conference space; thus, the proposed Treehouse Conference Center was not analyzed separately and is not expected to have a measurable impact on the average weekday morning and weekday evening peak hour traffic analysis beyond the estimated event activity captured under the hotel land use code.[10] Special events that may happen during evenings or weekends at the Treehouse Conference Center's ballroom are not expected to occur daily nor are they expected to generate significant activity during peak traffic hours.

3.6.4.3 Vehicle Occupancy Assumptions

A national Average Vehicle Occupancy (AVO) rate is used to convert ITE's unadjusted trips into person trips, as the next step in estimating Project-generated trips. Vehicle occupancy (the number of persons in a vehicle) are based on the national data by the U.S. Department of Transportation.[11] An AVO of 1.18 persons per vehicle for peak hour work-based trips (office, research/development, and residential trips), 1.67 persons per vehicle for hotel trips, and 1.82 persons per vehicle for retail and restaurant trips were used.

AVO is applied again to convert person trips by vehicle to an adjusted, Project-generated vehicle trip estimate once internal trip capture credits are applied. In that calculation, the analysis applies local, rather than national, AVO characteristics to derive adjusted Project vehicle trips. Based on 2010 Census data, local AVOs of 1.19 persons per vehicle for peak hour work-based trips (office and research/development trips) and 1.27 persons per vehicle for peak hour home-based trips (residential trips) were used. For hotel, retail, and restaurants trips, national AVO data were used instead of local data due to a lack of representative data.

3.6.4.4 Internal Trip Capture

Because the proposed development is a mixed-use project, the trip generation characteristics of the Project Site will be different from a single-use project. Some of the expected trips generated by the proposed development will be contained on-site as "internal" or "shared vehicle" trips. For example, workers at the office or R&D space on-site

10 ITE describes the Hotel LUC 310, as follows: "A hotel is a place of lodging that provides sleeping accommodations and supporting facilities such as restaurants, cocktail lounges, meeting and banquet rooms or convention facilities, limited recreational facilities (pool, fitness room), and/or other retail and service shops."

11 Summary of Travel Trends: 2017 National Household Travel Survey, US Department of Transportation, Federal Highway Administration, Washington D.C., 2017

may patronize the retail shops or restaurants after work, or residents who live in the development may also work in the office or R&D on-site. While these shared trips represent new trip activity to the individual uses, they would not show up as new trips on the surrounding roadway network.

As described in the ITE Trip Generation Handbook,[12] *"because of the complementary nature of these land uses, some trips are made among the on-site uses. This capture of trips internal to the Project Site has the net effect of reducing vehicle trip generation between the overall Project Site and the external street system (compared to the total number of trips generated by comparable land uses developed individually on stand-alone sites) an internal capture rate can generally be defined as the percentage of total person trips generated by a site that are made entirely within the site. The trip origin, destination, and travel path are all within the site."* Based on the methodology outlined in the ITE Trip Generation Handbook, internal capture rates were applied to the gross person trips.

3.6.4.5 Mode Share Assumptions

Mode Shares were applied to the net person trips to determine the number of vehicle, transit, pedestrian, and bicycle trips expected to be generated by the Project. As requested by the City of Boston, different mode shares were used for 2025 and 2030 to reflect changing mobility trends within the City of Boston.

2025 Mode Shares

Mode shares for the residential, office, and R&D portions of Phase A of the Project are based on adjustments to the U.S. Census Bureau 2012-2016 American Community Survey (ACS) five-year estimates for Allston area Census Tracts. To determine the peak hour peak direction mode shares to account for travelers using different modes at different times of the day for different tip purposes, the ACS data was adjusted based on BTD Access Boston data for Zone 17 (Allston), which provides a finer breakdown of mode shares by direction and period. Mode shares for the hotel, restaurant, and retail portions of Phase A of the Project are based on BTD Access Boston data for Zone 17 (Allston) for the "other" category.

Additional adjustments were made to the 2012-2016 ACS data and the Access Boston data to account for the aspirational *GoBoston 2030*[13] mode share goals, which incorporate a reported and desired reduced share of residents and workers commuting via automobile within the City of Boston. This adjustment was made by applying a 10-percent reduction to the automobile mode shares reported in the ACS and Access Boston data and proportionally increasing the respective mode shares for transit, walk, and bicycling modes. The methodology to determine these mode share adjustments was developed with BPDA.

Table 3-8 summarizes the assumed 2025 mode shares for the Project-generated trips and mode share calculations are provided in Appendix C.

12 *Trip Generation Handbook, 3rd Edition*, Institute of Transportation Engineers, Washington, D.C., 2017.

13 https://www.boston.gov/departments/transportation/go-boston-2030

Table 3-8 2025 Mode Shares by Land Use (Peak Hour, Peak Direction)

Land Use	Vehicle	Transit	Walk	Bike
Residential	28%	36%	28%	8%
Office/R&D	47%	33%	17%	3%
Hotel/Retail/Restaurant	39%	12%	42%	7%

Note: **Peak hour/peak direction mode share** presented.
Note: May not equal 100% due to rounding.

2030 Mode Shares

To develop the mode shares used for the Project's 2030 Full Build condition, additional adjustments were made to the mode shares assumed for Phase A in 2025 to account for continued shifts in travel mode choices between 2025 and 2030. Based on direction from the BPDA, the adjustment applies a two-percent annual reduction in vehicle mode share between 2025 and 2030, while proportionally applying that shift in mode share to transit, pedestrian, and bicycle modes.

Table 3-9 summarizes the assumed 2030 mode shares for the Project-generated trips. Complete mode share calculations are provided in Appendix C.

Table 3-9 2030 Mode Shares by Land Use (Peak Hour, Peak Direction)

Land Use	Vehicle	Transit	Walk	Bike
Residential	25%	37%	29%	8%
Office/R&D	43%	36%	18%	3%
Hotel/Retail/Restaurant	35%	13%	45%	8%

Note: **Peak hour/peak direction mode share** presented.
Note: May not equal 100% due to rounding.

3.6.4.6 Pass-by Trips

While the ITE rates provide estimates for all the traffic associated with each land use, not all traffic generated by the Project will be new to the area roadways. A portion of the vehicle-trips generated by the retail and restaurant land uses will likely be drawn from the traffic volume on roadways adjacent to the Project Site. For example, someone traveling on Western Avenue may choose to deviate from their original travel path to visit the Project Site restaurant, before heading back to continue to their destination.

For this evaluation, ITE pass-by rates for LUC 820 (Shopping Center) and LUC 932 (High-Turnover (Sit Down) Restaurant) were used for the retail and restaurant trip generation, respectively, and applied to existing trips on Western Avenue. Specifically, 34-percent and 43-percent of the retail and restaurant trip generation was assumed to be drawn from the surrounding roadway network during the weekday evening, respectively, as outlined in the ITE Trip Generation Handbook. For all other time periods studied, a 25-percent pass-by rate was assumed.

3.6.4.7 Ridehailing Trips

In the past decade, a rapidly increasing mode of transportation is the use of transportation network companies (TNCs), such as Uber and Lyft. ITE does not provide any hard data on the effects of TNCs on trip generation and TNC operators do not publicly release granular data on trip origin-destination patterns. VHB assumes that person trip activity is captured in the ITE-based trip generation methodology. Yet TNCs can generate *dead-head* trips coming or leaving a project site – vehicle trips without a passenger.

To account for the added vehicle trip generation of dead-head TNC activity, VHB created a method to estimate TNC shares for the Project-generated trips. These were estimated based on the proportion of total arriving and departing TNC rides in the City of Boston in 2019 (as documented by Massachusetts Department of Public Utilities),[14] the total number of residents and employees within the City of Boston from 2019 ACS 5-Year Census data, and an MAPC survey on TNC trip purpose.[15] Using these data sources, a TNC trip rate per resident/worker was developed and applied to the Project based on the total number of residents and workers expected on-Site. Hotel trips were assumed to follow similar patterns as residential trips and retail/restaurant trips were assumed to correlate to an average of the residential and worker rates, under an assumption that most retail/restaurant TNC trips start or end at a residence or workplace. The TNC trip rates were applied to the total vehicle trips expected to be generated by each use to determine how many of the Project-generated vehicle trips are expected to be TNC trips. To account for TNC deadheads (trips that arrive or depart without a passenger on board), the difference between the total number of entering and exiting TNCs over the course of the peak hour was assumed to equal the number of TNC trips without a passenger on-board.

Calculations outlining the TNC trip generation methodology are provided in Appendix C.

3.6.4.8 Project-generated Trips

Based on the methodology described above, internal capture credit, mode share credit, and pass-by credit for the retail and restaurant portion of the Project were applied to the unadjusted new vehicle trips based on the ITE trip generation rates for the applicable land use codes to develop the total Project-generated trips for Phase A under 2025 Conditions and for the Full Build under 2030 Conditions.

2025 Project-generated Trips

Table 3-10 presents the 2025 Phase A Project-generated net new vehicle trips by mode. Trip generation calculations to develop the 2025 Phase A net new project-generated trips are included in Appendix C for reference.

14 Massachusetts Department of Public Utilities (DPU), Rideshare 2019 Data Report, available at https://tnc.sites.digital.mass.gov/

15 *Fare Choices, A Survey of Ride-Hailing Passengers in Metro Boston*, Metropolitan Area Planning Council (MAPC); February 2018.

Table 3-10 2025 Phase A Project-Generated Trips by Mode

	Net New Vehicle Trips [a]	Net New Transit Trips	Net New Bicycle Trips	Net New Walk Trips
Weekday Morning Peak Hour				
Enter	211	177	32	184
Exit	96	60	23	119
Total	307	237	55	303
Weekday Evening Peak Hour				
Enter	119	64	33	178
Exit	247	214	32	189
Total	366	278	65	367
Weekday Daily				
Enter	2,029	1,067	513	1,754
Exit	2,003	1,078	518	1,764
Total	4,032	2,145	1,031	3,518

a Net vehicle trips not including pass-by trips associated with the retail and restaurant uses.

Table 3-11 presents a breakdown of the 2025 Phase A Project-generated net-new peak hour vehicle trips by land use.

Table 3-11 2025 Phase A Project-Generated Peak-Hour Vehicle Trips by Use

	Residential [a]	Office [b]	R&D [c]	Hotel [d]	Retail / Restaurant [e]	TNC Deadhead [f]	Total Project-Generated Vehicle Trips	Pass-By [g]	Total Net New Vehicle Trips
Weekday Morning									
Enter	6	72	81	26	34	-	**219**	-8	**211**
Exit	17	8	25	15	30	9	**104**	-8	**96**
Total	23	80	106	41	64	9	**323**	-16	**307**
Weekday Evening									
Enter	12	15	20	31	51	2	**131**	-12	**119**
Exit	7	73	127	27	25	-	**259**	-12	**247**
Total	19	88	147	58	76	2	**390**	-24	**366**

Note: Internal capture and mode share credits applied to all vehicle trips by land use.
a Residential vehicle trips based on LUC 221 (Mid-Rise Residential) for 115 units and LUC 222 (High-Rise Residential) for 230 units.
b Office vehicle trips based on LUC 710 (General Office Building) for 168,000 sf.
c R&D vehicle trips based on LUC 760 (Research and Development Center) for 630 employees (based on 252,000 sf).
d Hotel vehicle trips based on LUC 310 (Hotel) for 250 rooms.
e Retail/Restaurant vehicle trips based on LUC 820 (General Shopping Center) for 23,000 sf and LUC 932 (High-Turnover (Sit Down) Restaurant) for 23,000 sf.
f TNC deadhead trips represent TNC trips without passengers on board. These are assumed to equal the difference between entering and exiting TNC trips during each hour.
g Pass-by Credits of 25% applied to weekday morning peak hour retail and restaurant trip generation and credits of 34% and 47% applied to weekday evening peak hour retail and restaurant trip generation, respectively.

2030 Project-Generated Trips

Table 3-12 presents the 2030 Full Build Project-generated net new vehicle trips by mode. Trip generation calculations to develop the 2030 Full Build net-new project-generated trips are included in Appendix C for reference.

Table 3-12 2030 Full Build Project-Generated Peak-hour Trips by Mode

	Net New Vehicle Trips [a]	Net New Transit Trips	Net New Bicycle Trips	Net New Walk Trips
Weekday Morning Peak Hour				
Enter	432	435	72	417
Exit	185	136	50	261
Total	617	571	122	678
Weekday Evening Peak Hour				
Enter	225	145	67	380
Exit	513	537	71	416
Total	738	682	138	796
Weekday Daily				
Enter	3,585	2,319	984	3,505
Exit	3,533	2,351	991	3,515
Total	7,118	4,670	1,975	7,020

a Net vehicle trips not including pass-by trips associated with the retail and restaurant uses.

Table 3-13 presents a breakdown of the 2030 Full Build Project-generated net-new peak hour vehicle trips by land use.

Table 3-13 2030 Full Build Project-Generated Peak-Hour Vehicle Trips by Use

	Residential [a]	Office [b]	R&D [c]	Hotel [d]	Retail / Restaurant [e]	TNC Deadhead [f]	Total Project-Generated Vehicle Trips	Pass-By [g]	Total Net New Vehicle Trips
Weekday Morning									
Enter	11	147	185	24	81	-	**448**	-16	**432**
Exit	32	17	56	10	70	16	**201**	-16	**185**
Total	43	164	241	34	151	16	**649**	-32	**617**
Weekday Evening									
Enter	22	32	47	22	118	9	**250**	-25	**225**
Exit	13	157	289	20	59	-	**538**	-25	**513**
Total	35	189	336	42	177	9	**788**	-50	**738**

Note: Internal capture and mode share credits applied to all vehicle trips by land use.
a Residential vehicle trips based on LUC 221 (Mid-Rise Residential) for 115 units and LUC 222 (High-Rise Residential) for 650 units.
b Office vehicle trips based on LUC 710 (General Office Building) for 421,600 sf.
c R&D vehicle trips based on LUC 760 (Research and Development Center) for 1,581 employees (based on 632,400 sf).
d Hotel vehicle trips based on LUC 310 (Hotel) for 250 rooms.
e Retail/Restaurant vehicle trips based on LUC 820 (General Shopping Center) for 57,900 sf and LUC 932 (High-Turnover (Sit Down) Restaurant) for 57,900 sf.
f TNC deadhead trips represent TNC trips without passengers on board. These are assumed to equal the difference between entering and exiting TNC trips during each hour.
g Pass-by Credits of 25% applied to weekday morning peak hour retail and restaurant trip generation and credits of 34% and 47% applied to weekday evening peak hour retail and restaurant trip generation, respectively.

3.6.5 Trip Distribution

The directional distribution of the traffic approaching and departing the Project Site is a function of population densities, the location of employment opportunities, existing travel patterns, and the efficiency of the roadway system. The adjusted Project-generated vehicle trips are distributed through the Study Area based on a Project vehicular trip distribution. The Project vehicular trip distribution is supported by BTD's published distribution data by mode for Area 17 (the zone for Allston). Table 3-14 summarizes the vehicular trip distribution patterns by land use. It is assumed that commercial land uses (i.e., Office, R&D, Retail, and Hotel) follow the same distribution pattern, while Residential land uses follow a different pattern. Figure 3.27a and Figure 3.27b illustrate the entering and exiting Site distributions for the 2025 Build Conditions and Figures 3.27c and Figure 3.27d illustrate the entering and exiting Site distributions for the 2030 Build Conditions, respectively.

Table 3-14 Project Vehicular Trip Distribution

Corridor (to/from)	Commercial (Office, R&D, Retail, Hotel)	Residential
North Harvard Street (north)	5%	10%
Soldiers Field Road (west)	5%	4%
Western Avenue (west)	26%	26%
Cambridge Street (west)	12%	13%
I-90 (east and west)	35%	24%
Soldiers Field Road (east)	12%	14%
Western Avenue/River Street (east)	5%	9%
Total	**100%**	**100%**

Source: BTD published distribution data for Area 17: Allston.

3.6.6 2025 and 2030 Build Traffic Volumes

The 2025 Build Conditions traffic volumes were developed by assigning the 2025 Project-generated vehicle trips, summarized in Table 3-11, to the Study Area roadways based on the trip distribution summarized above, and adding them to the 2025 No-Build traffic volumes. The 2025 Project-generated weekday morning and weekday evening peak hour traffic volume networks are presented in Figures 3.28 and 3.29, respectively. The resulting 2025 Build weekday morning and weekday evening peak hour traffic volume networks are presented in Figures 3.30 and 3.31, respectively.

The 2030 Build Conditions traffic volumes were developed by assigning the 2030 Project-generated vehicle trips, summarized in Table 3-13, to the Study Area roadways based on the trip distribution summarized above, and adding them to the 2030 No-Build traffic volumes. The 2030 Project-generated weekday morning and weekday evening peak hour traffic volume networks are presented in Figures 3.32 and 3.33, respectively. The resulting 2030 Build weekday morning and weekday evening peak hour traffic volume networks are presented in Figures 3.34 and 3.35, respectively.

3.7 Traffic Operations Analysis

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic flow within the study area. To assess the quality of flow, roadway capacity analyses were conducted with respect to Existing and projected No-Build and Build traffic volumes for both weekday morning and weekday evening peak hours. Capacity analyses provide an indication of how well the roadway facilities can serve the traffic demands placed upon them. Roadway operating conditions are classified by calculated levels of service.

Level-of-Service Criteria

The evaluation criteria used to analyze area intersections in this traffic study are based on the *Highway Capacity Manual* (HCM)[16]. The term "Level-of-Service", or LOS, is used to denote the different operating conditions that occur on a given roadway segment under various traffic volume loads. It is a qualitative measure that considers several factors including roadway geometry, speed, travel delay and freedom to maneuver. LOS provides an index to the operational qualities of a roadway segment or an intersection. LOS designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. In addition to LOS, two other measures of effectiveness (MOEs) are typically used to quantify the traffic operations at intersections; volume-to-capacity ratio (v/c) and delay (expressed in seconds per vehicle). For example, an existing v/c ratio of 0.9 for an intersection indicates that the intersection is operating at 90 percent of its available capacity. A delay of 15 seconds for a vehicular movement or approach indicates that vehicles on the movement or approach will experience an average additional travel time of 15 seconds. For a given LOS letter designation there may be a wide range of values for both v/c ratios and delay. Comparison of intersection capacity results therefore requires that, in addition to the LOS, the other MOEs should also be considered.

The LOS designations, which are based on delay, are reported differently for signalized and unsignalized intersections. For signalized intersections, the analysis considers the operation of all traffic entering the intersection and the LOS designation is for overall conditions at the intersection. For unsignalized intersections, however, the analysis assumes that traffic on the major street is not affected by traffic on the side streets. Thus, the LOS designation is for the critical movement exiting the side street, which is generally the left turn out of the side street or site driveway. Table 3-15 shows the LOS criteria for both signalized intersections and unsignalized intersections.

16 Highway Capacity Manual; 6th Edition; Transportation Research Board (Washington, D.C.), 2016

Table 3-15 Level-of-Service Criteria for Intersection Capacities

Level of Service	Unsignalized Intersection Control Delay (sec/vehicle)	Signalized Intersection Control Delay (sec/vehicle)
LOS A	≤ 10	≤ 10
LOS B	> 10-15	> 10-20
LOS C	> 15-25	> 20-35
LOS D	> 25-35	> 35-55
LOS E	> 35-50	> 55-80
LOS F	> 50	> 80

Source: HCM 6th Edition

In general traffic engineering practices, conditions of LOS D or better are generally considered acceptable for signalized intersections. However, in balancing the needs of vehicular traffic with those of pedestrians this can be difficult to achieve in all instances in an urban setting. The analytical methodologies typically used for the analysis of unsignalized intersections use conservative analysis parameters, such as long critical gaps. Actual field observations indicate that drivers on minor streets generally accept shorter gaps in traffic than those used in the analysis procedures and therefore experience less delay than reported by the analysis software. The analysis methodologies also do not fully consider the beneficial grouping effects caused by nearby signalized intersections. The net effect of these analysis procedures is the over-estimation of calculated delays at unsignalized intersections in the study area. Cautious judgment should therefore be exercised when interpreting the capacity analysis results at unsignalized intersections.

3.7.1 Intersection Capacity Analysis

Consistent with BTD and MassDOT guidelines, Synchro 10 software was used to model LOS operations at the Project Study Area intersections. Both signalized and unsignalized intersection capacity analyses were conducted under Existing, 2025 No-Build, 2030 No-Build, 2025 Build, and 2030 Build conditions.

3.7.1.1 Existing, 2025 No-Build, and 2025 Build Intersection Capacity Analysis Results

The LOS analysis was conducted for the Study Area intersections to evaluate intersection capacity the weekday morning and weekday evening peak hours under 2021 Existing Conditions, 2025 No Build Conditions, and 2025 Build Conditions. The signalized and unsignalized intersection capacity analysis results for the study area intersections are summarized next and provided in Table 3-16 and Table 3-17. The capacity analysis worksheets are provided in Appendix C along with diagrams depicting the 50th percentile and 95th percentile queue.

The roadways associated with Harvard's SEC are not included as part of the Existing condition because the project and its enabling roadways were not complete at the time of this analysis. The SEC project is included as a future background development project.

Several background infrastructure projects are assumed to be complete by the 2025 horizon analysis condition. As part of the SEC, new roadways are in place south of Western Avenue, including Academic Way, Stadium Road, and Science Drive. At the intersection of Soldiers Field Road and Western Avenue, changes will be made to signal timings and pavement markings to enhance safety for pedestrians and cyclists. Along Cambridge Street, changes will be made to several intersections including pavement markings, signage, and signal timings. Windom Street will also be converted into a one-way southbound street along the portion north of Almy Street.

Results Discussion: Existing vs. 2025 No Build Conditions at Signalized Intersections

Several intersections within the Study Area already function with long delays and queues under Existing peak-hour conditions. Between the Existing conditions and the future 2025 No-Build conditions, many Study Area intersections will experience changes in operational capacity because of background project traffic growth and new transportation infrastructure. Of note are the following anticipated changes to overall intersection LOS between the Existing and 2025 No Build Conditions:

- The intersection of Soldiers Field Road (WB) at Western Avenue operates at LOS F in both conditions in the morning peak hour and reduces from LOS E to LOS F in the evening peak hour.
- The pair of intersections that form the connection between Soldiers Field Road and Western Avenue will be modified prior to future 2025 conditions, including signal timing changes and pavement markings. Among these modifications include the elimination of a permitted eastbound right-turn on red. While these changes being funded and constructed by Harvard University are anticipated to significantly improve safety for pedestrians and cyclists, they will reduce overall intersection operations and increase vehicle queues, especially on the eastbound approach. The intersection of Soldiers Field Road (EB) at Western Avenue reduces from LOS C to LOS E by 2025 in the morning peak hour and from LOS E to LOS F by 2025 in the evening peak hour.
- The intersection of Cambridge Street at North Harvard Street reduces from LOS C to LOS F by 2025 in the morning peak hour, and from LOS C to LOS E by 2025 in the evening peak hour. This is primarily due to the elimination of right-turn-on-red permissions for southbound vehicles and signal timing changes as part of the reconstruction of Cambridge Street planned by the City.
- The intersection of Cambridge Street at Windom Street reduces from LOS C to LOS F by 2025 in the morning peak hour, and from LOS C to LOS E by 2025 in the evening peak hour. This is primarily due to the elimination of the exclusive westbound right-turn lane and the exclusive southbound right-turn lane as part of the reconstruction of Cambridge Street as proposed by the City. Additionally, an exclusive pedestrian phase will be implemented as part of the project, which serves to increase safety for pedestrians and cyclists but worsens the overall traffic operations at the intersection.
- The intersection of Memorial Drive at River Street reduces from LOS E to LOS F by 2025 in the morning peak hour, and from LOS D to LOS E by 2025 in the evening peak hour.

Results Discussion: 2025 No-Build vs. Build Conditions at Signalized Intersections

The following changes may occur in overall LOS between the future 2025 No-Build Conditions and the 2025 Build Conditions as a result of the Project:

- The intersection of Soldiers Field Road (EB) at Western Avenue is not expected to change in terms of overall intersection LOS, but delay is expected to increase by more than 25 seconds between the 2025 No-Build and 2025 Build conditions. Most of this delay is felt by eastbound right-turning vehicles, which will experience queues of approximately 375 feet (on average) under 2025 Build conditions. *To mitigate the effects of Project trips at this location, adjustments are proposed to signal timings and intersection configuration. These modifications are described in Section 3.12.3.2.*
- The intersection of Soldiers Field Road (WB) and North Harvard Street reduces from LOS D to LOS E between the 2025 No-Build and 2025 Build conditions during the evening peak hour. However, the addition of Project trips in 2025 does not increase overall delay by more than 6 seconds. Note that the analyses at this intersection were analyzed in Synchro with the southbound approach as a single shared through-left turn lane, as that is how it is marked. However, drivers going through have been observed to move around vehicles waiting to turn left by traveling into the bike lane, and therefore, the results shown for this intersection represent a conservative analysis.
- The intersection of Cambridge Street at Windom Street maintains an LOS F under all conditions during the morning peak hour and reduces from LOS E to LOS F during the evening peak hour between both future 2025 No-Build and Build conditions. Because Windom Street will connect with the Project Site via Almy Street and the future Cattle Drive, it is anticipated that a portion of Project-related trips will be added to this intersection to access the Project. With the removal of a southbound turning lane and a westbound exclusive right-turn lane, overall intersection operations experience increased delays under the 2025 Build conditions. *To mitigate the effects of Project trips at this location, adjustments are proposed to signal timings and intersection configuration. These modifications are described in Section 3.12.3.1.*

The addition of Project trips in 2025 at other signalized intersections is anticipated to have a negligible impact on traffic operations within the Study Area.

Results Discussion: 2025 No-Build vs. Build Conditions at Unsignalized Intersections

The intersection capacity analysis results for the study area's unsignalized intersections under 2021 Existing Conditions, 2025 No Build Conditions, and 2025 Build Conditions are summarized in Table 3-17.

As unsignalized intersections, the two Site driveways intersecting Western Avenue at East Drive and Cattle Drive are both expected to operate at up to LOS F during the weekday morning and weekday evening peak hours with average queues extending up to 40 feet at East Drive and up to 225 feet at Cattle Drive. *Due to the operational impacts at these key gateways into and out of the Project Site, different mitigation options, including signalization, were reviewed at these locations, as outlined in Section 3.12.3.4.*

At the intersections of Western Avenue at Academic Way and North Harvard Street at Academic Way / South Campus Drive, the stop-controlled Academic Way approaches at both intersections are expected to operate at LOS C through E under 2025 No Build and 2025 Build Conditions. On the Academic Way stop-controlled approaches, the 95th-percentile queues are not expected to exceed four vehicle lengths either with or without the Project in place. *Note that when these intersections were constructed, underground conduit was installed to allow for future signalization of these locations. A summary of signal warrant analyses at these locations is included in Section 3.12.4.1.*

The intersection of Cattle Drive at DEF Drive, internal to the Project Site, is expected to operate at LOS B.

At the intersection of Windom Street at Almy Street, the unsignalized approaches is expected to operate at LOS A. *At the intersection of Windom Street at Almy Street, the Proponent is proposing to reconstruct the intersection with a design that reinforces the south-east movement between Windom Street to the south and Almy Street to the east as the primary through movement. This configuration will guide vehicles onto Almy Street and away from the local neighborhood on Windom Street by designating the Windom Street southbound approach as the stop-controlled approach. These improvements are discussed in detail in Section 3.12.3.1.*

Table 3-16 Signalized Intersection Capacity Analysis: Existing and 2025 Future Conditions

	2021 Existing Condition					2025 No-Build Condition					2025 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Memorial Drive at JFK Street/Anderson Bridge															
Weekday morning															
EB T/R	1.18	120	F	~551	#685	1.24	144	F	~597	#733	1.24	144	F	~597	#733
WB T/R	0.60	24	C	194	256	0.63	25	C	206	271	0.63	25	C	206	271
NB T/R	0.94	38	D	210	#452	1.00	50	D	~229	#503	1.01	51	D	~240	#507
SB T/R	0.60	30	C	172	215	0.72	34	C	220	338	0.74	35	D	227	349
Overall	**1.06**	**66**	**E**			**1.12**	**79**	**E**			**1.12**	**79**	**E**		
Weekday evening															
EB T/R	1.06	77	E	~416	#547	1.05	75	E	~411	#541	1.05	75	E	~411	#541
WB T/R	0.90	39	D	331	#460	0.95	46	D	355	#496	0.95	46	D	355	#496
NB T/R	0.95	40	D	232	#463	1.08	79	E	~447	m#565	1.09	82	F	~455	m#548
SB T/R	0.52	25	C	158	225	0.58	27	C	181	277	0.60	27	C	189	288
Overall	**1.00**	**50**	**D**			**1.07**	**63**	**E**			**1.07**	**64**	**E**		
Soldiers Field Road WB at North Harvard Street/Anderson Bridge															
Weekday morning															
WB L/T	0.82	89	F	50	m65	0.80	76	E	52	m47	0.80	76	E	52	m56
WB R	0.18	74	E	20	m28	0.17	64	E	21	m13	0.17	70	E	22	m16
NB L/T	0.64	3	A	7	m6	0.70	4	A	17	m11	0.73	5	A	23	m14
SB T/R	0.91	29	C	340	m389	1.11	81	F	~273	m#410	1.12	87	F	~315	m#449
Overall	**0.94**	**24**	**C**			**1.10**	**44**	**D**			**1.12**	**48**	**D**		
Weekday evening															
WB L/T	1.72	413	F	~153	#282	1.70	404	F	~150	#280	1.70	404	F	~150	#280
WB R	0.55	39	D	45	124	0.55	39	D	45	126	0.55	39	D	45	126
NB L/T	0.71	8	A	28	m24	1.01	25	C	282	m291	1.05	38	D	299	m302
SB T/R	0.78	19	B	226	m355	0.88	26	C	324	m408	0.90	28	C	337	m167
Overall	**0.97**	**50**	**D**			**1.18**	**54**	**D**			**1.21**	**61**	**E**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-16 Signalized Intersection Capacity Analysis: Existing and 2025 Future Conditions (continued)

	2021 Existing Condition					2025 No-Build Condition					2025 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Soldiers Field Road EB at North Harvard Street															
Weekday morning															
EB L	1.19	165	F	~209	#320	1.12	139	F	~186	#347	1.12	139	F	~186	#347
EB L/T/R	1.06	124	F	~149	#260	1.56	322	F	~258	#440	1.59	333	F	~265	#447
NB T/R	0.63	32	C	163	194	0.63	32	C	162	221	0.64	32	C	165	226
SB L/T	1.55	278	F	~573	m#679	1.74	362	F	~783	m#644	1.78	378	F	~800	m#647
Overall	**1.71**	**162**	**F**			**1.97**	**232**	**F**			**2.01**	**240**	**F**		
Weekday evening															
EB L	1.39	252	F	~210	#368	1.47	284	F	~229	#390	1.47	284	F	~229	#390
EB L/T/R	1.58	336	F	~221	#389	1.84	447	F	~269	#445	1.84	447	F	~269	#445
NB T/R	0.58	31	C	141	203	0.71	33	C	201	#300	0.73	33	C	210	#328
SB L/T	1.20	110	F	~141	m#222	1.51	251	F	~662	m#660	1.56	273	F	~686	m#667
Overall	**1.45**	**138**	**F**			**1.80**	**207**	**F**			**1.85**	**214**	**F**		
North Harvard Street at Western Avenue (Barry's Corner) [f]															
Weekday morning															
EB L	0.59	25	C	100	#183	0.69	31	C	129	#249	0.73	33	C	129	#269
EB T/R	0.51	33	C	206	320	0.63	39	D	271	#422	0.73	43	D	339	#547
WB L	0.24	24	C	44	84	0.30	27	C	47	85	0.33	26	C	47	85
WB T/R	0.80	50	D	301	#514	0.71	46	D	270	#423	0.78	49	D	316	#508
NB L	0.87	68	E	143	178	0.86	62	E	165	#306	0.84	60	E	152	#273
NB T/R	0.72	43	D	222	260	0.94	71	E	328	#526	0.70	42	D	222	327
SB L/T	0.85	72	E	152	189	0.56	46	D	126	203	0.61	49	D	126	203
SB R	0.37	37	D	87	116	0.58	40	D	159	245	0.60	41	D	159	245
Overall	**0.70**	**46**	**D**			**0.76**	**48**	**D**			**0.70**	**44**	**D**		
Weekday evening															
EB L	0.78	55	D	76	#186	1.05	118	F	~148	#322	1.34	233	F	~232	#405
EB T/R	0.33	38	D	149	223	0.46	41	D	215	309	0.52	43	D	248	349
WB L	0.34	29	C	89	139	0.39	31	C	90	142	0.41	31	C	90	142
WB T/R	1.05	100	F	~674	#896	0.92	70	E	518	#756	1.10	119	F	~741	#984
NB L	1.05	130	F	~165	#293	1.45	281	F	~271	#458	1.25	203	F	~204	#381
NB T/R	0.46	41	D	190	272	0.63	45	D	271	381	0.51	42	D	218	313
SB L/T	0.94	90	F	332	#501	0.97	95	F	372	#582	0.97	95	F	371	#582
SB R	0.59	48	D	180	259	0.79	58	E	265	#387	0.79	58	E	265	#387
Overall	**0.88**	**75**	**E**			**1.05**	**89**	**F**			**1.13**	**101**	**F**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Improvements from No Build to Build due to re-routing of non-Project vehicle trips from North Harvard Street to Cattle Drive Extension

Table 3-16 Signalized Intersection Capacity Analysis: Existing and 2025 Future Conditions (continued)

	2021 Existing Condition					2025 No-Build Condition					2025 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
North Harvard Street at Franklin Street/Kingsley Street [f]															
Weekday morning															
EB L/T/R	0.48	34	C	27	77	0.44	34	C	23	90	0.44	34	C	23	90
WB L/T/R	0.12	29	C	7	27	0.09	30	C	6	29	0.09	30	C	6	29
NB L/T	0.52	11	B	64	331	0.73	16	B	114	#623	0.60	12	B	80	#462
SB T/R	0.63	13	B	81	#415	0.63	13	B	80	#471	0.62	13	B	79	#464
Overall	**0.57**	**15**	**B**			**0.64**	**17**	**B**			**0.56**	**15**	**B**		
Weekday evening															
EB L/T/R	0.00	31	C	0	0	0.00	31	C	0	#29	0.00	31	C	0	#29
WB L/T/R	0.51	37	D	7	36	0.41	34	C	6	40	0.41	34	C	6	40
NB L/T	0.34	5	A	0	194	0.46	6	A	0	285	0.38	5	A	0	219
SB T/R	0.74	12	B	0	#586	0.83	16	B	0	#706	0.83	16	B	0	#700
Overall	**0.69**	**12**	**B**			**0.76**	**14**	**B**			**0.75**	**14**	**B**		
Cambridge Street at North Harvard Street [f, g]															
Weekday morning															
EB L	0.79	65	E	103	#188	0.84	75	E	132	#258	0.80	69	E	123	#239
EB T	0.91	29	C	501	#654	1.15	103	F	~740	#879	1.18	113	F	~770	#908
WB T	0.83	12	B	258	m301	1.14	86	F	~541	m401	1.15	94	F	~554	m204
WB R	0.34	16	B	45	m51	1.42	212	F	~625	m#520	1.19	114	F	~470	m199
SB L	0.81	49	D	248	#395	0.83	51	D	260	#424	0.83	51	D	260	#424
SB R	0.23	16	B	53	92	0.24	15	B	60	103	0.23	15	B	58	100
Overall	**0.94**	**26**	**C**			**1.15**	**105**	**F**			**1.06**	**97**	**F**		
Weekday evening															
EB L	0.98	98	F	166	#319	1.17	163	F	~208	#369	1.14	153	F	~199	#357
EB T	0.65	14	B	272	335	0.90	30	C	415	525	0.92	31	C	427	539
WB T	1.05	42	D	~563	m#604	1.13	83	F	~650	m#658	1.16	95	F	~667	m#603
WB R	0.34	10	A	42	m42	0.88	21	C	273	m366	0.74	19	B	190	m287
SB L	0.83	56	E	229	#374	0.95	72	E	287	#481	0.95	72	E	287	#481
SB R	0.43	19	B	127	197	0.48	23	C	144	224	0.47	22	C	141	220
Overall	**0.96**	**33**	**C**			**1.08**	**57**	**E**			**1.09**	**61**	**E**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.
f Improvements from No Build to Build due to re-routing of non-Project vehicle trips from North Harvard Street to Cattle Drive Extension.
g Proposed changes to signal timings and signage/pavement markings at this intersection between the Existing and No Build Conditions (such as eliminating the westbound right-turn-on-red capability) are anticipated to reduce vehicle operations while increasing safety for pedestrians and bicyclists.

Table 3-16 Signalized Intersection Capacity Analysis: Existing and 2025 Future Conditions (continued)

	2021 Existing Condition					2025 No-Build Condition					2025 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Cambridge Street at Windom Street [f]															
Weekday morning															
EB L	0.10	29	C	3	m4	0.21	48	D	11	m11	0.72	51	D	39	m39
EB T	0.33	8	A	78	m103	0.38	11	B	47	m185	0.38	11	B	47	m182
WB T	0.90	31	C	458	#594	1.25	142	F	~887	#1361	1.40	208	F	~1069	#1535
WB R	0.42	17	B	0	51	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SB L	0.74	51	D	202	281	0.91	92	F	104	#227	1.08	144	F	~137	#275
SB R	0.05	33	C	7	29	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Overall	**0.82**	**26**	**C**			**1.07**	**109**	**F**			**1.23**	**160**	**F**		
Weekday evening															
EB L	0.11	23	C	3	m4	0.19	44	D	12	m13	0.38	44	D	24	m27
EB T	0.38	6	A	73	m89	0.45	11	B	52	m310	0.45	11	B	56	m311
WB T	0.97	40	D	552	#743	1.09	71	E	553	#1204	1.15	95	F	641	#1273
WB R	0.30	15	B	10	56	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SB L	0.29	37	D	70	107	1.27	218	F	~151	#288	1.82	447	F	~256	#413
SB R	0.05	34	C	0	28	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Overall	**0.74**	**28**	**C**			**1.00**	**62**	**E**			**1.10**	**97**	**F**		
Cambridge Street at I-90 Ramps/ Soldiers Field Road [g]															
Weekday morning															
EB L	0.07	53	D	9	29	0.10	53	D	13	36	0.13	54	D	18	46
EB T	1.97	505	F	~659	#793	1.84	389	F	~603	#736	1.86	454	F	~607	#740
WB T/R	0.25	14	B	4	3	0.34	18	B	54	72	0.37	20	B	68	82
NB L/T/R	0.26	59	E	23	55	0.20	58	E	18	81	0.20	58	E	18	81
NE L/R	0.50	32	C	199	287	0.72	38	D	327	468	0.66	36	D	289	414
NE R	0.54	29	C	220	279	0.78	37	D	374	469	0.72	34	C	329	414
Overall	**0.74**	**207**	**F**			**0.87**	**159**	**F**			**0.85**	**163**	**F**		
Weekday evening															
EB L	0.05	49	D	10	27	0.19	51	D	43	85	0.23	52	D	52	98
EB T	1.78	417	F	~697	#698	1.72	289	F	~662	#797	1.76	407	F	~684	#821
WB T/R	0.23	1	A	0	0	0.31	5	A	18	26	0.32	6	A	22	34
NB L/T/R	0.37	64	E	27	54	0.26	63	E	19	78	0.26	63	E	19	78
NE L/R	0.53	32	C	221	319	0.64	35	D	289	411	0.63	35	C	282	402
NE R	0.57	29	C	249	316	0.70	32	C	330	414	0.69	32	C	323	404
Overall	**0.79**	**174**	**F**			**0.86**	**146**	**F**			**0.86**	**154**	**F**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Proposed improvements between EX and NB Conds. (such as eliminating right-turn lanes and adding an exclusive ped phase) are anticipated to reduce vehicle operations while increasing safety for peds and bicyclists.
g Operations to improve between EX and NB Conds. due to rerouting of Windom Street cut-through traffic.

Table 3-16 Signalized Intersection Capacity Analysis: Existing and 2025 Future Conditions (continued)

	2021 Existing Condition					2025 No-Build Condition					2025 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Soldiers Field Road EB at Cambridge Street [f]															
Weekday morning															
EB T/R	0.72	28	C	386	m257	0.86	27	C	515	m413	0.81	26	C	469	m361
EB R	0.40	17	B	109	m89	0.50	15	B	197	m132	0.50	17	B	187	m137
WB L/T	0.22	1	A	1	m2	0.28	1	A	1	m1	0.30	1	A	1	m1
SB L	1.22	197	F	~296	#450	1.04	134	F	~219	#401	1.05	136	F	~224	#404
SB L/T	1.09	132	F	~251	#337	0.98	97	F	201	#315	1.01	106	F	~210	#330
SB R	0.05	52	D	0	0	0.08	52	D	0	30	0.08	52	D	0	30
Overall	**0.75**	**54**	**D**			**0.82**	**39**	**D**			**0.80**	**40**	**D**		
Weekday evening															
EB T/R	0.76	24	C	317	m255	0.92	28	C	410	m350	0.91	28	C	402	m338
EB R	0.57	22	C	160	m143	0.57	42	D	191	m161	0.58	46	D	191	m154
WB L/T	0.21	1	A	2	2	0.26	1	A	1	1	0.27	1	A	1	1
SB L	1.17	177	F	~284	#443	1.05	137	F	~232	#415	1.08	145	F	~245	#431
SB L/T	1.09	130	F	~257	#351	1.13	144	F	~274	#395	1.18	163	F	~297	#420
SB R	0.13	53	D	0	58	0.14	53	D	0	73	0.14	53	D	0	73
Overall	**0.72**	**51**	**D**			**0.80**	**51**	**D**			**0.81**	**55**	**E**		
Soldiers Field Road WB at Cambridge Street															
Weekday morning															
EB L/T	0.64	0	A	0	m0	0.73	0	A	0	m0	0.69	0	A	0	m0
NB L	0.82	71	E	235	#355	0.96	95	F	283	#476	1.05	120	F	~333	#538
NB L/T/R	1.11	146	F	~317	#485	1.38	248	F	~480	#702	>1.20	>120	F	~483	#705
Overall	**0.84**	**26**	**C**			**0.99**	**44**	**D**			**0.96**	**49**	**D**		
Weekday evening															
EB L/T	0.66	0	A	0	m0	0.76	0	A	0	m0	0.76	0	A	0	m0
NB L	0.55	45	D	189	284	0.65	48	D	241	351	0.67	49	D	250	363
NB L/T/R	0.54	45	D	160	254	0.67	49	D	225	341	0.68	49	D	233	351
Overall	**0.71**	**9**	**A**			**0.83**	**11**	**B**			**0.83**	**11**	**B**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Operations to improve between Existing Conditions and future Conditions due to rerouting of cut-through traffic from Windom Street northbound and Soldiers Field Road Service Road southbound to I-90 Cambridge Street eastbound Off-Ramp in order to access Soldiers Field Road south of Cambridge Street and River Street.

~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-16 Signalized Intersection Capacity Analysis: Existing and 2025 Future Conditions (continued)

	2021 Existing Condition					2025 No-Build Condition					2025 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Memorial Drive at River Street															
Weekday morning															
EB L/T	0.88	36	D	371	m#785	0.96	41	D	474	m#875	0.96	43	D	454	m#880
EB R	1.29	171	F	~794	m#1262	1.39	214	F	~916	m#1368	1.39	215	F	~915	m#1366
NB T/R	0.75	42	D	353	435	0.79	43	D	380	466	0.80	44	D	382	470
SB L/T	1.06	84	F	~422	#608	1.15	120	F	~518	#736	1.16	121	F	~519	#736
Overall	**1.16**	**78**	**E**			**1.25**	**98**	**F**			**1.26**	**99**	**F**		
Weekday evening															
EB L/T	0.93	46	D	531	#874	1.04	70	E	616	#988	1.05	73	E	622	#1000
EB R	0.95	57	E	480	#887	1.04	79	E	542	#979	1.05	82	F	546	#990
NB T/R	0.78	41	D	385	471	0.83	43	D	431	523	0.83	43	D	431	523
SB L/T	0.93	51	D	284	#398	0.95	54	D	284	#415	0.95	54	D	284	#415
Overall	**0.93**	**48**	**D**			**0.98**	**60**	**E**			**0.98**	**62**	**E**		
Memorial Drive at Western Avenue															
Weekday morning															
WB L/T/R	1.00	70	E	~333	#442	1.10	101	F	~413	#510	1.11	104	F	~419	#517
NB L	1.10	124	F	~274	#470	1.21	161	F	~330	#530	1.22	167	F	~338	#540
NB T	0.66	20	B	314	446	0.66	20	B	318	450	0.66	20	B	318	450
SB T/R	1.20	137	F	~636	#748	1.17	124	F	~606	#746	1.17	124	F	~606	#746
Overall	**1.11**	**92**	**F**			**1.21**	**101**	**F**			**1.23**	**103**	**F**		
Weekday evening															
WB L/T/R	1.17	130	F	~444	#542	1.26	167	F	~504	#601	1.26	169	F	~506	#605
NB L	1.21	157	F	~425	#640	1.29	188	F	~477	#697	1.31	194	F	~487	#707
NB T	0.72	21	C	366	522	0.75	22	C	391	559	0.75	22	C	391	559
SB T/R	1.15	120	F	~525	#663	1.17	127	F	~547	#685	1.17	127	F	~547	#686
Overall	**1.24**	**109**	**F**			**1.33**	**130**	**F**			**1.34**	**131**	**F**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-16 Signalized Intersection Capacity Analysis: Existing and 2025 Future Conditions (continued)

	2021 Existing Condition					2025 No-Build Condition					2025 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Soldiers Field Road WB at Western Ave [f]															
Weekday Morning															
WB T/R	1.18	125	F	~447	#588	1.68	350	F	~595	#691	1.63	325	F	~602	#699
NB L/T	0.47	37	D	78	106	0.99	36	D	154	214	0.55	33	C	114	162
Overall	**0.60**	**112**	**F**			**0.78**	**278**	**F**			**0.73**	**271**	**F**		
Weekday Evening															
WB T/R	1.08	75	E	~428	#525	0.87	180	F	~573	#669	1.33	183	F	~578	#673
NB L/T	0.85	50	D	125	#197	0.87	48	D	147	#235	0.84	45	D	142	#223
Overall	**0.77**	**70**	**E**			**0.90**	**154**	**F**			**0.90**	**157**	**F**		
Soldiers Field Road EB at Western Ave [f]															
Weekday morning															
EB R	0.72	43	D	100	154	0.67	35	D	134	193	0.77	40	D	151	215
WB L	0.86	18	B	87	m85	1.06	56	E	~402	m97	1.03	40	D	~398	m85
WB T	0.53	2	A	6	m6	0.97	25	C	~430	m156	0.86	19	B	330	m122
SB T/R	0.97	54	D	286	m265	1.14	111	F	~353	m#290	1.15	116	F	~361	m#295
Overall	**0.87**	**30**	**C**			**1.14**	**60**	**E**			**1.09**	**57**	**E**		
Weekday evening															
EB R	1.00	83	F	120	#238	1.47	258	F	~306	#426	1.69	355	F	~376	#501
WB L	0.73	12	B	84	m78	0.81	12	B	98	m77	0.81	12	B	96	m75
WB T	0.44	1	A	15	m16	0.67	9	A	99	m67	0.66	9	A	100	m67
SB T/R	1.20	141	F	~251	#365	1.48	265	F	~312	#428	1.49	270	F	~314	#432
Overall	**0.90**	**56**	**E**			**1.20**	**123**	**F**			**1.25**	**151**	**F**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Proposed changes to signal timings and signage/pavement markings at this intersection between the Existing and No Build Conditions (such as eliminating the eastbound right-turn-on-red capability) are anticipated to reduce vehicle operations while increasing safety for pedestrians and bicyclists. Improvements from No Build to Build due to re-routing of non-Project vehicle trips from Soldiers Field Road Service Road to Cattle Drive Extension.

~ Volume exceeds capacity, queue is theoretically infinite.
\# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-16 Signalized Intersection Capacity Analysis: Existing and 2025 Future Conditions (continued)

	2021 Existing Condition					2025 No-Build Condition					2025 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Western Ave at Batten Way/Hague Street [f]															
Weekday morning															
EB L	0.24	15	B	16	76	0.58	24	C	42	#207	0.54	25	C	26	#150
EB T/R	0.54	18	B	101	#356	0.48	14	B	123	#408	0.54	15	B	149	#497
WB L	0.12	13	B	7	40	0.14	10	B	10	49	0.11	10	A	8	40
WB T/R	0.70	23	C	148	#534	0.87	30	C	325	#905	1.03	59	E	494	#1114
NB L/T	0.55	35	C	46	121	0.20	47	D	14	37	0.11	47	D	6	22
NB R	0.15	31	C	0	58	0.46	49	D	25	57	0.61	58	E	28	62
SB L/T/R	0.48	38	D	15	58	0.52	50	D	31	77	0.52	50	D	31	74
Overall	**0.62**	**24**	**C**			**0.76**	**26**	**C**			**0.90**	**43**	**D**		
Weekday evening															
EB L	0.11	14	B	5	30	0.20	15	B	10	51	0.20	15	B	6	41
EB T/R	0.60	21	C	113	329	0.70	23	C	190	#586	0.75	24	C	203	#689
WB L	0.15	15	B	8	44	0.15	14	B	8	41	0.11	12	B	5	31
WB T/R	0.78	28	C	165	#580	0.81	29	C	242	#713	1.00	54	D	345	#969
NB L/T	0.50	34	C	40	101	0.23	47	D	10	31	0.14	46	D	7	24
NB R	0.08	32	C	0	4	0.31	48	D	10	31	0.52	49	D	20	50
SB L/T/R	0.09	34	C	0	16	1.13	156	F	~129	#272	0.34	45	D	17	85
Overall	**0.61**	**27**	**C**			**0.74**	**43**	**D**			**0.78**	**41**	**D**		
Western Ave at Stadium Road															
Weekday morning	*Intersection does not exist under Existing Condition*														
EB L/T/R						0.60	12	B	0	#522	0.60	11	B	0	#515
WB L/T/R						0.69	14	B	0	#590	0.78	17	B	0	#673
NB L/T/R						0.39	40	D	8	30	0.30	39	D	6	24
SB L/T/R						0.05	37	D	1	9	0.05	38	D	1	9
Overall						**0.61**	**13**	**B**			**0.67**	**15**	**B**		
Weekday evening															
EB L/T/R						0.59	13	B	69	#524	0.61	13	B	73	#550
WB L/T/R						0.69	16	B	89	#647	0.82	21	C	126	#819
NB L/T/R						0.38	41	D	15	55	0.39	41	D	15	58
SB L/T/R						0.02	39	D	1	9	0.02	39	D	1	9
Overall						**0.58**	**16**	**B**			**0.69**	**19**	**B**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Improvements from No Build to Build due to re-routing of non-Project vehicle trips from Hague Street to Cattle Drive Extension.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-17 Unsignalized Intersection Capacity Analysis: Existing and 2025 Future Conditions

	2021 Existing Conditions					2025 No-Build Conditions					2025 Build Conditions				
Location / Movement	D [a]	v/c [b]	Del [c]	LOS [d]	95 Q [e]	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Western Avenue at Kresge Way / East Drive [f]															
Weekday Morning															
NB L/T/R [g]	35	0.22	35	D	21	27	0.19	35	E	16	n/a	n/a	n/a	n/a	n/a
NB L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20	0.37	96	F	34
NB R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	60	0.37	37	E	40
Weekday Evening															
NB L/T/R	70	0.26	23	C	26	59	0.20	20	C	18	n/a	n/a	n/a	n/a	n/a
NB L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	38	0.24	35	E	23
NB R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	130	0.34	19	C	37
Western Avenue at Academic Way															
Weekday Morning	*Intersection does not exist under Existing Condition*														
NB L/T/R						2	0.01	16	C	0	3	0.01	15	C	1
SB L/T/R						60	0.18	18	C	16	76	0.19	16	C	17
Weekday Evening															
NB L/T/R						27	0.11	22	C	9	27	0.13	26	D	11
SB L/T/R						76	0.34	29	D	36	82	0.43	37	E	49
North Harvard Street at Academic Way / South Campus Drive															
Weekday Morning	*Intersection does not exist under Existing Condition*														
EB L/T/R						33	0.24	40	E	22	33	0.30	50	F	28
WB L/T/R						141	0.52	32	D	70	157	0.59	36	E	86
Weekday Evening															
EB L/T/R						131	1.22	232	F	216	131	1.32	275	F	231
WB L/T/R						103	0.29	19	C	30	147	0.37	20	C	42

a Demand, in vehicles
b Volume to capacity ratio.
c Average total delay, in seconds per vehicle.
d Level-of-service.
e 95th percentile queue, in feet.
f Resilience Driveway is the northbound approach under Existing and No Build Conditions. East Drive is the northbound approach under Build Conditions.
g Operations degrade from LOS D under Existing Conditions to LOS E under No Build Conditions due to delay exceeding LOS D threshold of 35.0 seconds.

Table 3-17 Unsignalized Intersection Capacity Analysis: Existing and 2025 Future Conditions (continued)

	2021 Existing Conditions					2025 No-Build Conditions					2025 Build Conditions				
Location / Movement	D [a]	v/c [b]	Del [c]	LOS [d]	95 Q [e]	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Western Avenue at Cattle Drive															
Weekday Morning															
NB L/R	*Intersection does not exist under Existing Condition*					*Intersection does not exist under No-Build Condition*					288	0.91	68	F	221
Weekday Evening															
NB L/R											223	0.91	80	F	197
Cattle Drive at DEF Drive															
Weekday Morning															
WB L/R	*Intersection does not exist under Existing Condition*					*Intersection does not exist under No-Build Condition*					76	0.15	14	B	13
Weekday Evening															
WB L/R											185	0.29	13	B	30
Windom Street at Almy Street															
Weekday Morning															
SB L/R	*Intersection does not exist under Existing Condition*					*Intersection does not exist under No-Build Condition*					115	0.12	9	A	10
Weekday Evening															
SB L/R											93	0.11	10	A	9

a Demand, in vehicles
b Volume to capacity ratio.
c Average total delay, in seconds per vehicle.
d Level-of-service.
e 95th percentile queue, in feet.

3.7.1.2 2030 No-Build and Build Intersection Capacity Analysis Results

The LOS analysis was also conducted for 2030 No-Build and 2030 Build conditions during the weekday morning and weekday evening peak hours and compared to 2021 Existing conditions. The results of this for the study area signalized and unsignalized intersections are summarized next and provided in Table 3-18 and Table 3-19. The capacity analysis worksheets are provided in Appendix C along with diagrams depicting the 50th percentile (average) and 95th percentile queue lengths.

In terms of roadway network changes between 2025 and 2030, Hague Street, which currently connects Windom Street to Western Avenue, is anticipated to be removed. Additionally, Science Drive, which will be constructed as part of the SEC project, will extend to connect with Cattle Drive on the Project Site. These infrastructure changes are reflected in the analysis (and are described in more detail in Section 3.4.4.2).

Results Discussion: 2030 No-Build vs. Build Conditions at Signalized Intersections

As a result of the Project, the following changes may occur in overall LOS between the future 2030 No-Build conditions and the 2030 Build conditions:

- The intersection of Soldiers Field Road (EB) at Western Avenue is not expected to change in terms of overall intersection LOS, but delay is expected to increase by more than 50 seconds between the 2030 No-Build and 2030 Build conditions. The bulk of this delay is felt by eastbound right-turning vehicles, which will experience queues of approximately 490 feet (on average) under 2030 Build conditions. *To mitigate the effects of Project trips at this location, adjustments are proposed to signal timings and intersection configuration. These modifications are described in Section 3.12.3.2 and Section 3.12.3.3.*
- The intersection of Soldiers Field Road (WB) and North Harvard Street reduces from LOS E to LOS F between the 2030 No-Build and 2030 Build conditions during the evening peak hour. However, it should be noted that the addition of Project trips in 2030 does not increase overall delay by more than 16 seconds. Note that the analyses at this intersection were analyzed in Synchro with the southbound approach as a single shared through-left turn lane, as that is how it is marked. However, drivers going through have been observed to move around vehicles waiting to turn left by traveling into the bike lane and therefore the results shown for this intersection represent a conservative analysis.
- The intersection of Memorial Drive at John F. Kennedy Street reduces from LOS E to LOS F in the 2030 Build condition during the evening peak hour. However, delay only increases by three seconds (or, by 4 percent overall) as a result of the Project; this intersection is functioning on the upper limit of the criteria for LOS E under 2030 No-Build conditions.
- The intersection of Cambridge Street at Windom Street maintains an LOS F under all conditions during the morning peak hour and reduces from LOS E to LOS F during the evening peak hour between the 2030 No-Build and Build conditions. Because Windom Street will connect with the Project Site via Almy Street and the future

Cattle Drive Extension, it is anticipated that a portion of Project-related trips will be added to this intersection to access the Project. With the removal of a southbound turning lane and a westbound exclusive right-turn lane, overall intersection operations experience heavy delays under the 2030 Build conditions. *To mitigate the effects of Project trips at this location, adjustments are proposed to signal timings and intersection configuration. These modifications are described in Section 3.12.3.1*.

- The intersection of Memorial Drive at River Street reduces from LOS E to LOS F between the 2030 No-Build and 2030 Build conditions during the evening peak hour. However, overall delay only increases at this location by four seconds (or by 5 percent). This intersection operates at the upper limit of LOS E under the 2030 No-Build conditions, and the added delay due to Project trips just passes the threshold of LOS F.
- The intersection of Western Avenue at Stadium Road reduces from LOS B to LOS C during the weekday morning peak hour and from LOS B to LOS F during the weekday evening peak hour between the 2030 No-Build and 2030 Build conditions. The main reason for the increase in delay is because of the new connection of Science Drive between Stadium Road and Cattle Drive. This new connection will allow vehicles from the Site and Cattle Drive to use the Stadium Road northbound approach to access Western Avenue. *To mitigate the effects of Project trips at this location, adjustments are proposed to signal timings. These modifications are described in Section 3.12.3.5*.
- The intersection of Western Avenue at Batten Way improves from LOS C to LOS B during the weekday morning peak hour and from LOS D to LOS C during the weekday evening peak hour between the 2030 No-Build and 2030 Build conditions. The decrease in delay at this intersection is due to the closure of Hague Street, which eliminates one of the four approaches to this intersection and reduces the number of turning movements that needs to be accommodated. *To optimize operations at this location with the elimination of the Hague Street approach and to improve coordination along the Western Avenue corridor, adjustments are proposed to signal timings. These modifications are described in Section 3.12.3.5*.
- The addition of Project trips in 2030 at other signalized intersections within the Study Area is anticipated to have a negligible impact on traffic operations. *Future implementation of the roadway network planned as part of the I-90 Allston Multimodal Project is expected to further benefit the street network as new connections will be made possible.*

Results Discussion: 2030 No-Build vs. Build Conditions at Unsignalized Intersections

The Site driveways that intersect Western Avenue at East Drive and Cattle Drive are both expected to operate at up to LOS F during the weekday morning and weekday evening peak hours with average queues extending up to 105 feet at East Drive and up to 240 feet at Cattle Drive. *In response to the operational impacts at these key gateways into and out of the Project Site, different mitigation options including signalization were reviewed at these locations, as outlined in Section 3.12.3.4.*

At the intersections of Western Avenue at Academic Way and North Harvard Street at Academic Way / South Campus Drive, the stop-controlled Academic Way approaches at both intersections are expected to operate at LOS C through F under 2030 No Build and 2030 Build Conditions. On the Academic Way stop-controlled approaches, the 95th-percentile queues are not expected to exceed five vehicle lengths with or without the Project in place and are not expected to spill back into upstream intersections. *Note that when these intersections were constructed, underground conduit was installed to allow for future signalization of these locations. A summary of signal warrant analyses at these locations is included in Section 3.12.4.1*.

At the intersections of Cattle Drive at DEF Drive and Windom Street at Almy Street, the unsignalized approaches are expected to have delays of 15 seconds or less with negligible changes between the 2025 and 2030 Build Conditions.

Table 3-18 Signalized Intersection Capacity Analysis: Existing and 2030 Future Conditions

	2021 Existing Condition					2030 No-Build Condition					2030 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Memorial Drive at JFK Street/Anderson Bridge															
Weekday morning															
EB T/R	1.18	120	F	~551	#685	1.32	179	F	~664	#801	1.32	179	F	~664	#801
WB T/R	0.60	24	C	194	256	0.66	25	C	216	284	0.66	25	C	216	284
NB T/R	0.94	38	D	210	#452	1.04	60	E	~320	#533	1.05	65	E	~406	#546
SB T/R	0.60	30	C	172	215	0.82	40	D	262	#434	0.86	44	D	280	#467
Overall	**1.06**	**66**	**E**			**1.18**	**97**	**F**			**1.19**	**98**	**F**		
Weekday evening															
EB T/R	1.06	77	E	~416	#547	1.09	87	F	~437	#568	1.09	87	F	~437	#568
WB T/R	0.90	39	D	331	#460	1.02	63	E	~412	#558	1.02	63	E	~412	#558
NB T/R	0.95	40	D	232	#463	1.14	101	F	~497	m#558	1.16	110	F	~517	m#525
SB T/R	0.52	25	C	158	225	0.63	28	C	202	307	0.66	29	C	214	324
Overall	**1.00**	**50**	**D**			**1.12**	**78**	**E**			**1.13**	**81**	**F**		
Soldiers Field Road WB at North Harvard Street/ Anderson Bridge															
Weekday morning															
WB L/T	0.82	89	F	50	m65	0.80	75	E	52	m46	0.80	75	E	52	m51
WB R	0.18	74	E	20	m28	0.18	63	E	25	m12	0.18	67	E	26	m17
NB L/T	0.64	3	A	7	m6	0.79	8	A	32	m24	0.85	10	B	44	m31
SB T/R	0.91	29	C	340	m389	1.21	121	F	~532	m#591	1.24	136	F	~605	m#606
Overall	**0.94**	**24**	**C**			**1.20**	**62**	**E**			**1.24**	**70**	**E**		
Weekday evening															
WB L/T	1.72	413	F	~153	#282	1.76	380	F	~157	#288	1.76	427	F	~157	#288
WB R	0.55	39	D	45	124	0.57	40	D	49	131	0.57	40	D	49	131
NB L/T	0.71	8	A	28	m24	1.10	62	E	323	m306	1.17	94	F	~353	m#424
SB T/R	0.78	19	B	226	m355	0.93	31	C	355	m#197	0.96	35	C	367	m#265
Overall	**0.97**	**50**	**D**			**1.27**	**75**	**E**			**1.33**	**91**	**F**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-18 Signalized Intersection Capacity Analysis: Existing and 2030 Future Conditions (continued)

	2021 Existing Condition					2030 No-Build Condition					2030 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Soldiers Field Road EB at North Harvard Street															
Weekday morning															
EB L	1.19	165	F	~209	#320	1.18	162	F	~206	#370	1.18	162	F	~206	#370
EB L/T/R	1.06	124	F	~149	#260	1.63	350	F	~276	#461	1.63	350	F	~276	#461
NB T/R	0.63	32	C	163	194	0.64	32	C	167	228	0.67	33	C	175	238
SB L/T	1.55	278	F	~573	m#679	1.86	417	F	~852	m#627	1.94	452	F	~889	m#635
Overall	**1.71**	**162**	**F**			**2.10**	**264**	**F**			**2.17**	**278**	**F**		
Weekday evening															
EB L	1.39	252	F	~210	#368	1.56	337	F	~258	#425	1.59	337	F	~258	#425
EB L/T/R	1.58	336	F	~221	#389	1.96	499	F	~292	#472	1.96	499	F	~292	#472
NB T/R	0.58	31	C	141	203	0.75	34	C	214	#336	0.80	36	D	234	#376
SB L/T	1.20	110	F	~141	m#222	1.64	309	F	~735	m#677	1.75	363	F	~833	m#698
Overall	**1.45**	**138**	**F**			**1.94**	**244**	**F**			**2.05**	**261**	**F**		
North Harvard Street at Western Avenue															
Weekday morning															
EB L	0.59	25	C	100	#183	0.75	37	D	137	#281	0.88	56	E	~146	#289
EB T/R	0.51	33	C	206	320	0.67	41	D	292	#463	0.90	59	E	~477	#702
WB L	0.24	24	C	44	84	0.31	27	C	47	85	0.44	28	C	47	85
WB T/R	0.80	50	D	301	#514	0.74	48	D	286	#455	0.89	61	E	~384	#592
NB L	0.87	68	E	143	178	0.95	83	F	187	#372	0.90	70	E	174	#332
NB T/R	0.72	43	D	222	260	0.94	70	E	328	#526	0.67	40	D	222	327
SB L/T	0.85	72	E	152	189	0.56	46	D	126	203	0.57	47	D	126	203
SB R	0.37	37	D	87	116	0.68	43	D	192	#335	0.68	43	D	192	#335
Overall	**0.70**	**46**	**D**			**0.80**	**52**	**D**			**0.82**	**54**	**D**		
Weekday evening															
EB L	0.78	55	D	76	#186	1.36	225	F	~248	#432	1.28	333	F	~302	#486
EB T/R	0.33	38	D	149	223	0.56	45	D	265	372	0.67	50	D	331	456
WB L	0.34	29	C	89	139	0.44	32	C	90	142	0.50	33	C	90	142
WB T/R	1.05	100	F	~674	#896	0.96	79	E	542	#792	1.28	191	F	~937	#1189
NB L	1.05	130	F	~165	#293	1.45	283	F	~281	#472	1.26	205	F	~212	#391
NB T/R	0.46	41	D	190	272	0.61	45	D	271	381	0.50	42	D	218	313
SB L/T	0.94	90	F	332	#501	0.94	86	F	372	#582	0.93	86	F	371	#582
SB R	0.59	48	D	180	259	0.84	63	E	297	#450	0.84	63	E	297	#450
Overall	**0.88**	**75**	**E**			**1.20**	**101**	**F**			**1.25**	**131**	**F**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-18 Signalized Intersection Capacity Analysis: Existing and 2030 Future Conditions (continued)

	2021 Existing Condition					2030 No-Build Condition					2030 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
North Harvard Street at Franklin Street/ Kingsley Street [f]															
Weekday morning															
EB L/T/R	0.48	34	C	27	77	0.44	34	C	23	90	0.44	34	C	23	90
WB L/T/R	0.12	29	C	7	27	0.09	30	C	6	29	0.09	30	C	6	29
NB L/T	0.52	11	B	64	331	0.77	17	B	125	#669	0.64	13	B	88	#507
SB T/R	0.63	13	B	81	#415	0.64	13	B	83	#488	0.64	13	B	81	#480
Overall	**0.57**	**15**	**B**			**0.67**	**18**	**B**			**0.57**	**15**	**B**		
Weekday evening															
EB L/T/R	0.00	31	C	0	0	0.00	31	C	0	#29	0.00	31	C	0	#29
WB L/T/R	0.51	37	D	7	36	0.41	34	C	6	40	0.41	34	C	6	40
NB L/T	0.34	5	A	0	194	0.47	6	A	0	296	0.39	6	A	0	227
SB T/R	0.74	12	B	0	#586	0.87	19	B	0	#751	0.87	19	B	0	#745
Overall	**0.69**	**12**	**B**			**0.79**	**16**	**B**			**0.79**	**16**	**B**		
Cambridge Street at North Harvard Street [f, g]															
Weekday morning															
EB L	0.79	65	E	103	#188	0.84	75	E	132	#258	0.80	69	E	123	#239
EB T	0.91	29	C	501	#654	1.19	119	F	~786	#925	1.24	138	F	~842	#980
WB T	0.83	12	B	258	m301	1.19	111	F	~588	m391	1.21	120	F	~605	m178
WB R	0.34	16	B	45	m51	1.47	239	F	~665	m#513	1.25	141	F	~512	m169
SB L	0.81	49	D	248	#395	0.85	53	D	270	#440	0.85	53	D	270	#440
SB R	0.23	16	B	53	92	0.24	15	B	61	104	0.24	15	B	59	101
Overall	**0.94**	**26**	**C**			**1.19**	**123**	**F**			**1.10**	**119**	**F**		
Weekday evening															
EB L	0.98	98	F	166	#319	1.17	163	F	~208	#369	1.14	153	F	~199	#357
EB T	0.65	14	B	272	335	0.94	33	C	448	568	0.96	36	D	468	594
WB T	1.05	42	D	~563	m#604	1.17	100	F	~681	m#654	1.23	127	F	~741	m#597
WB R	0.34	10	A	42	m42	0.91	22	C	274	m365	0.76	20	B	207	m277
SB L	0.83	56	E	229	#374	1.04	94	F	~344	#543	1.04	94	F	~344	#543
SB R	0.43	19	B	127	197	0.48	23	C	144	224	0.47	22	C	141	220
Overall	**0.96**	**33**	**C**			**1.13**	**66**	**E**			**1.15**	**77**	**E**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.
f Improvements from No Build to Build due to re-routing of non-Project vehicle trips from North Harvard Street to Cattle Drive Extension.
g Proposed changes to signal timings and signage/pavement markings at this intersection between the Existing and No Build Conditions (such as eliminating the westbound right-turn-on-red capability) are anticipated to reduce vehicle operations while increasing safety for pedestrians and bicyclists.

Table 3-18 Signalized Intersection Capacity Analysis: Existing and 2030 Future Conditions (continued)

	2021 Existing Condition					2030 No-Build Condition					2030 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Cambridge Street at Windom Street [f]															
Weekday morning															
EB L	0.10	29	C	3	m4	0.21	48	D	11	m11	1.16	134	F	~74	m#66
EB T	0.33	8	A	78	m103	0.39	11	B	50	m186	0.39	11	B	50	m181
WB T	0.90	31	C	458	#594	1.32	170	F	~971	#1445	1.52	262	F	~1223	#1686
WB R	0.42	17	B	0	51	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SB L	0.74	51	D	202	281	0.91	92	F	104	#227	1.19	183	F	~163	#307
SB R	0.05	33	C	7	29	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Overall	**0.82**	**26**	**C**			**1.12**	**128**	**F**			**1.36**	**203**	**F**		
Weekday evening															
EB L	0.11	23	C	3	m4	0.19	44	D	12	m13	0.56	46	D	36	m38
EB T	0.38	6	A	73	m89	0.47	11	B	64	m318	0.47	11	B	71	m313
WB T	0.97	40	D	552	#743	1.13	87	F	617	#1262	1.21	121	F	~875	#1357
WB R	0.30	15	B	10	56	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SB L	0.29	37	D	70	107	1.27	218	F	~151	#288	2.27	643	F	~343	#515
SB R	0.05	34	C	0	28	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Overall	**0.74**	**28**	**C**			**1.03**	**72**	**E**			**1.20**	**135**	**F**		
Cambridge Street at I-90 Ramps/ Soldiers Field Road [g]															
Weekday morning															
EB L	0.07	53	D	9	29	0.10	53	D	13	36	0.16	55	D	22	53
EB T	1.97	505	F	~659	#793	1.90	475	F	~630	#763	1.92	480	F	~634	#767
WB T/R	0.25	14	B	4	3	0.36	19	B	66	77	0.40	21	C	78	88
NB L/T/R	0.26	59	E	23	55	0.20	58	E	18	81	0.20	58	E	18	81
NE L/R	0.50	32	C	199	287	0.76	40	D	356	508	0.71	37	D	323	463
NE R	0.54	29	C	220	279	0.83	39	D	410	513	0.78	36	D	369	463
Overall	**0.74**	**207**	**F**			**0.91**	**166**	**F**			**0.90**	**169**	**F**		
Weekday evening															
EB L	0.05	49	D	10	27	0.19	51	D	43	85	0.29	53	D	66	119
EB T	1.78	417	F	~697	#698	1.79	420	F	~700	#836	1.85	447	F	~733	#869
WB T/R	0.23	1	A	0	0	0.33	7	A	28	39	0.34	7	A	33	50
NB L/T/R	0.37	64	E	27	54	0.26	63	E	19	78	0.26	63	E	19	78
NE L/R	0.53	32	C	221	319	0.66	36	D	302	429	0.65	36	D	296	421
NE R	0.57	29	C	249	316	0.72	33	C	345	431	0.72	33	C	340	425
Overall	**0.79**	**174**	**F**			**0.89**	**157**	**F**			**0.90**	**168**	**F**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Proposed improvements between EX and NB Conds. (such as eliminating right-turn lanes and adding an exclusive ped phase) are anticipated to reduce vehicle operations while increasing safety for peds and bicyclists.
g Operations to improve between EX and NB Conds. due to rerouting of Windom Street cut-through traffic.

Table 3-18 Signalized Intersection Capacity Analysis: Existing and 2030 Future Conditions (continued)

	2021 Existing Condition					2030 No-Build Condition					2030 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Soldiers Field Road EB at Cambridge Street [f]															
Weekday morning															
EB T/R	0.72	28	C	386	m257	0.91	29	C	553	m446	0.86	28	C	518	m403
EB R	0.40	17	B	109	m89	0.52	14	B	206	m119	0.52	16	B	202	m132
WB L/T	0.22	1	A	1	m2	0.29	1	A	1	m1	0.32	1	A	1	m1
SB L	1.22	197	F	~296	#450	1.08	147	F	~238	#420	1.11	157	F	~251	#438
SB L/T	1.09	132	F	~251	#337	1.03	113	F	~225	#341	1.10	134	F	~253	#371
SB R	0.05	52	D	0	0	0.08	52	D	0	42	0.08	52	D	0	42
Overall	**0.75**	**54**	**D**			**0.86**	**42**	**D**			**0.85**	**46**	**D**		
Weekday evening															
EB T/R	0.76	24	C	317	m255	0.94	29	C	429	m354	0.94	29	C	427	m343
EB R	0.57	22	C	160	m143	0.60	42	D	203	m168	0.63	45	D	205	m161
WB L/T	0.21	1	A	2	2	0.27	1	A	1	1	0.28	1	A	1	1
SB L	1.17	177	F	~284	#443	1.12	160	F	~263	#452	1.19	182	F	~290	#483
SB L/T	1.09	130	F	~257	#351	1.20	170	F	~304	#427	1.32	220	F	~358	#485
SB R	0.13	53	D	0	58	0.15	53	D	0	76	0.15	53	D	0	76
Overall	**0.72**	**51**	**D**			**0.83**	**57**	**E**			**0.86**	**69**	**E**		
Soldiers Field Road WB at Cambridge Street															
Weekday morning															
EB L/T	0.64	0	A	0	m0	0.77	0	A	0	m0	0.74	0	A	0	m0
NB L	0.82	71	E	235	#355	1.00	107	F	297	#506	1.11	141	F	~375	#582
NB L/T/R	1.11	146	F	~317	#485	1.43	269	F	~507	#729	1.50	297	F	~547	#775
Overall	**0.84**	**26**	**C**			**1.03**	**47**	**D**			**1.03**	**58**	**E**		
Weekday evening															
EB L/T	0.66	0	A	0	m0	0.79	1	A	0	m0	0.79	0	A	0	m0
NB L	0.55	45	D	189	284	0.66	48	D	246	358	0.69	50	D	260	375
NB L/T/R	0.54	45	D	160	254	0.71	51	D	244	366	0.74	53	D	261	386
Overall	**0.71**	**9**	**A**			**0.86**	**11**	**B**			**0.88**	**12**	**B**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Operations improve between Existing Conditions and No Build Conditions due to rerouting of cut-through traffic from Windom Street northbound and Soldiers Field Road Service Road southbound to I-90 Cambridge Street eastbound Off-Ramp in order to access Soldiers Field Road south of Cambridge Street and River Street. Operations improve on certain movements between No Build and Build Conditions due to rerouting of traffic onto Cattle Drive and East Drive.

~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-18 Signalized Intersection Capacity Analysis: Existing and 2030 Future Conditions (continued)

	2021 Existing Condition					2030 No-Build Condition					2030 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Memorial Drive at River Street															
Weekday morning															
EB L/T	0.88	36	D	371	m#785	1.02	55	D	587	m#954	1.03	58	E	588	m#961
EB R	1.29	171	F	~794	m#1262	1.42	225	F	~947	m#1397	1.43	230	F	~956	m#1405
NB T/R	0.75	42	D	353	435	0.84	46	D	410	501	0.84	47	D	416	510
SB L/T	1.06	84	F	~422	#608	1.30	182	F	~670	#842	1.31	185	F	~674	#844
Overall	**1.16**	**78**	**E**			**1.34**	**121**	**F**			**1.35**	**124**	**F**		
Weekday evening															
EB L/T	0.93	46	D	531	#874	1.09	90	F	646	#1050	1.11	97	F	658	#1071
EB R	0.95	57	E	480	#887	1.07	90	F	557	#1013	1.09	96	F	569	#1036
NB T/R	0.78	41	D	385	471	0.93	54	D	522	#668	0.94	54	D	525	#673
SB L/T	0.93	51	D	284	#398	1.05	81	F	~335	#500	1.05	81	F	~336	#501
Overall	**0.93**	**48**	**D**			**1.05**	**77**	**E**			**1.06**	**81**	**F**		
Memorial Drive at Western Avenue															
Weekday morning															
WB L/T/R	1.00	70	E	~333	#442	1.14	118	F	~443	#541	1.16	123	F	~453	#551
NB L	1.10	124	F	~274	#470	1.29	196	F	~374	#579	1.30	202	F	~383	#588
NB T	0.66	20	B	314	446	0.68	21	C	335	476	0.68	21	C	335	476
SB T/R	1.20	137	F	~636	#748	1.25	157	F	~680	#821	1.25	157	F	~681	#822
Overall	**1.11**	**92**	**F**			**1.29**	**123**	**F**			**1.30**	**126**	**F**		
Weekday evening															
WB L/T/R	1.17	130	F	~444	#542	1.29	184	F	~529	#628	1.30	186	F	~533	#631
NB L	1.21	157	F	~425	#640	1.47	263	F	~594	#820	1.48	269	F	~602	#830
NB T	0.72	21	C	366	522	0.83	26	C	478	691	0.83	26	C	478	691
SB T/R	1.15	120	F	~525	#663	1.22	149	F	~591	#730	1.22	149	F	~591	#730
Overall	**1.24**	**109**	**F**			**1.47**	**153**	**F**			**1.48**	**155**	**F**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-18 Signalized Intersection Capacity Analysis: Existing and 2030 Future Conditions (continued)

	2021 Existing Condition					2030 No-Build Condition					2030 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Soldiers Field Road WB at Western Ave [f]															
Weekday Morning															
WB T/R	1.18	125	F	~447	#588	1.75	381	F	~630	#726	1.77	390	F	~627	#723
NB L/T	0.47	37	D	78	106	0.99dl	37	D	164	226	0.89	51	D	153	#246
Overall	**0.60**	**112**	**F**			**0.81**	**302**	**F**			**0.95**	**319**	**F**		
Weekday Evening															
WB T/R	1.08	75	E	~428	#525	1.40	211	F	~623	#718	1.40	185	F	~640	#736
NB L/T	0.85	50	D	125	#197	0.90	53	D	155	#250	0.61	34	C	133	186
Overall	**0.77**	**70**	**E**			**0.94**	**180**	**F**			**0.78**	**183**	**F**		
Soldiers Field Road EB at Western Ave [f]															
Weekday morning															
EB R	0.72	43	D	100	154	0.69	36	D	140	201	0.83	44	D	177	#270
WB L	0.86	18	B	87	m85	1.11	75	E	~430	m97	1.11	74	E	~427	m86
WB T	0.53	2	A	6	m6	0.98	27	C	~443	m148	0.92	23	C	367	m120
SB T/R	0.97	54	D	286	m265	1.16	120	F	~368	m#287	1.19	130	F	~380	m#292
Overall	**0.87**	**30**	**C**			**1.17**	**70**	**E**			**1.16**	**72**	**E**		
Weekday evening															
EB R	1.00	83	F	120	#238	1.52	283	F	~325	#446	2.01	490	F	~489	#610
WB L	0.73	12	B	84	m78	0.88	13	B	~358	m80	0.88	13	B	~359	m79
WB T	0.44	1	A	15	m16	0.69	10	A	111	m66	0.69	10	A	116	m67
SB T/R	1.20	141	F	~251	#365	1.56	299	F	~336	#454	1.58	309	F	~343	#461
Overall	**0.90**	**56**	**E**			**1.27**	**135**	**F**			**1.41**	**201**	**F**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Proposed changes to signal timings and signage/pavement markings at this intersection between the Existing and No Build Conditions (such as eliminating the eastbound right-turn-on-red capability) are anticipated to reduce vehicle operations while increasing safety for pedestrians and bicyclists. Improvements from No Build to Build on certain movements due to re-routing of non-Project vehicle trips from Soldiers Field Road Service Road to Cattle Drive Extension.

~ Volume exceeds capacity, queue is theoretically infinite.
\# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-18 Signalized Intersection Capacity Analysis: Existing and 2030 Future Conditions (continued)

	2021 Existing Condition					2030 No-Build Condition					2030 Build Condition				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Western Ave at Batten Way/Hague Street [f]															
Weekday morning															
EB L	0.24	15	B	16	76	0.61	26	C	43	#212	0.33	7	A	24	m11
EB T/R	0.54	18	B	101	#356	0.50	14	B	130	#433	0.57	9	A	199	#398
WB L	0.12	13	B	7	40	0.14	10	B	10	50	n/a	n/a	n/a	n/a	n/a
WB T/R	0.70	23	C	148	#534	0.89	32	C	340	#930	0.89	24	C	201	#773
NB L/T	0.55	35	C	46	121	0.20	47	D	14	37	n/a	n/a	n/a	n/a	n/a
NB R	0.15	31	C	0	58	0.46	49	D	25	57	n/a	n/a	n/a	n/a	n/a
SB L/T/R	0.48	38	D	15	58	0.52	50	D	31	77	0.50	38	D	21	#67
Overall	**0.62**	**24**	**C**			**0.78**	**27**	**C**			**0.80**	**18**	**B**		
Weekday evening															
EB L	0.11	14	B	5	30	0.20	15	B	10	52	0.15	14	B	1	m13
EB T/R	0.60	21	C	113	329	0.73	24	C	205	#626	0.71	17	B	18	m#480
WB L	0.15	15	B	8	44	0.16	14	B	8	41	n/a	n/a	n/a	n/a	n/a
WB T/R	0.78	28	C	165	#580	0.83	30	C	252	#736	0.93	37	D	305	m#794
NB L/T	0.50	34	C	40	101	0.23	47	D	10	31	n/a	n/a	n/a	n/a	n/a
NB R	0.08	32	C	0	4	0.31	48	D	10	31	n/a	n/a	n/a	n/a	n/a
SB L/T/R	0.09	34	C	0	16	1.13	156	F	~129	#272	0.86	68	E	92	#212
Overall	**0.61**	**27**	**C**			**0.75**	**43**	**D**			**0.81**	**32**	**C**		
Western Ave at Stadium Road															
Weekday morning															
EB L/T/R	*Intersection does not exist under Exiting Condition*					0.62	12	B	0	#542	0.80	23	C	131	#623
WB L/T/R						0.71	15	B	0	#609	0.78	27	C	235	m#547
NB L/T/R						0.39	40	D	8	30	0.50	34	C	33	#108
SB L/T/R						0.05	37	D	1	9	0.01	31	C	1	9
Overall						**0.62**	**14**	**B**			**0.67**	**25**	**C**		
Weekday evening															
EB L/T/R						0.61	14	B	74	#560	0.99	59	E	224	#626
WB L/T/R						0.71	16	B	94	#668	1.22	120	F	222	m#700
NB L/T/R						0.38	41	D	15	55	0.54	29	C	86	#260
SB L/T/R						0.02	39	D	1	9	0.01	24	C	1	9
Overall						**0.59**	**16**	**B**			**0.84**	**85**	**F**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Hague Street approach to be eliminated under 2030 Build Conditions
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-19 Unsignalized Intersection Capacity Analysis: Existing and 2030 Future Conditions

	2021 Existing Conditions					2030 No-Build Conditions					2030 Build Conditions				
Location / Movement	D [a]	v/c [b]	Del [c]	LOS [d]	95 Q [e]	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Western Avenue at Kresge Way / East Drive [f]															
Weekday Morning															
NB L/T/R	35	0.22	35	D	21	27	0.19	36	E	16	n/a	n/a	n/a	n/a	n/a
NB L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	27	0.79	264	F	69
NB R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	98	0.65	65	F	90
Weekday Evening															
NB L/T/R	70	0.26	23	C	26	59	0.20	20	C	18	n/a	n/a	n/a	n/a	n/a
NB L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	65	0.58	74	F	70
NB R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	217	0.64	33	D	104
Western Avenue at Academic Way															
Weekday Morning	*Intersection does not exist under Existing Condition*														
NB L/T/R						2	0.01	17	C	0	3	0.01	15	C	1
SB L/T/R						60	0.18	18	C	16	87	0.21	16	C	20
Weekday Evening															
NB L/T/R						27	0.11	21	C	9	27	0.15	29	D	13
SB L/T/R						76	0.33	28	D	34	93	0.56	51	F	72
North Harvard Street at Academic Way															
Weekday Morning	*Intersection does not exist under Existing Condition*														
EB L/T/R						33	0.27	44	E	25	33	0.37	67	F	36
WB L/T/R						141	0.55	35	D	76	168	0.67	44	E	107
Weekday Evening															
EB L/T/R						131	1.40	312	F	243	131	1.72	465	F	281
WB L/T/R						103	0.31	21	C	33	174	0.46	22	C	59

a Demand, in vehicles
b Volume to capacity ratio.
c Average total delay, in seconds per vehicle.
d Level-of-service.
e 95th percentile queue, in feet.
f Resilience Driveway is the northbound approach under Existing and No-Build Conditions. East Drive is the northbound approach under Build Conditions.

Table 3-19 Unsignalized Intersection Capacity Analysis: Existing and 2030 Future Conditions (continued)

	2021 Existing Conditions					2030 No-Build Conditions					2030 Build Conditions				
Location / Movement	D [a]	v/c [b]	Del [c]	LOS [d]	95 Q [e]	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Western Avenue at Cattle Drive															
Weekday Morning NB L/R	*Intersection does not exist under Existing Condition*					*Intersection does not exist under No-Build Condition*					266	0.88	64	F	200
Weekday Evening NB L/R											255	0.98	94	F	238
Cattle Drive at DEF Drive															
Weekday Morning WB L/R	*Intersection does not exist under Existing Condition*					*Intersection does not exist under No-Build Condition*					65	0.16	15	C	14
Weekday Evening WB L/R											185	0.32	14	B	35
Windom Street at Almy Street															
Weekday Morning SB L/R	*Intersection does not exist under Existing Condition*					*Intersection does not exist under No-Build Condition*					115	0.12	9	A	10
Weekday Evening SB L/R											93	0.11	10	A	10

a Demand, in vehicles
b Volume to capacity ratio.
c Average total delay, in seconds per vehicle.
d Level-of-service.
e 95th percentile queue, in feet.

3.7.2 Merge/Diverge Analyses

As requested by MassDOT, merge and diverge analyses were conducted for two specific locations: Cambridge Street Westbound at I-90 Off-Ramp and Cambridge Street Eastbound at I-90 On-Ramp. The analysis reflects the 2021 Existing Conditions, 2025 No Build Conditions, 2025 Build Conditions, 2030 No Build Conditions, and 2030 Build Conditions. Traffic volumes at these locations were derived from the April 2017 turning movement counts.

3.7.2.1 Analysis Method

The analysis of merge and diverge operations at these two locations is based on procedures presented in *Chapter 14 – Freeway Merge and Diverge Segments*, of the Highway Capacity Manual. The procedure, typically applied to limited-access highways with interchanges, focuses on the interaction between mainline through traffic and traffic merging from or diverging to access ramps. The analysis takes into account geometric and operational factors, such as the length and taper of the acceleration/deceleration lanes, free-flow vehicle speed along the mainline and on the ramps themselves, and the number of vehicles in the right-most (or left-most for left exits) two lanes of the mainline. The focus of the analysis is at the ramp junction with the mainline where entering vehicles attempt to find gaps in the adjacent traffic stream. The action of this merging traffic creates vehicle turbulence along the mainline, which can affect freeway operations. The converse of this action is the diverge movement which forces exiting vehicles to shift in advance and occupy the correct travel lane to exit the freeway, which can cause temporary instability as the vehicles shift lanes and decelerate. According to the HCM, the influence area for both movements is approximately 1,500 feet before the diverge areas and beyond the merge areas (including acceleration and deceleration lanes).

Table 3-20 shows the Level-of-Service criteria for evaluating freeway merging and diverging segments.

Table 3-20 Level-of-Service Criteria for Merge and Diverge Areas

Level of Service	Merge and Diverge Segment Density Range
A	0 to 10 pc/mi/ln
B	10 to 20 pc/mi/ln
C	20 to 38 pc/mi/ln
D	28 to 35 pc/mi/ln
E	Greater than 35 pc/mi/ln
F	Demand Exceeds Capacity

Source: Highway Capacity Manual, Washington, D.C., 2016.
Note: Criteria measured in vehicle density (passenger car/mile/lane).

Merge and diverge analyses were conducted using the Highway Capacity Software (HCS) Version 7. HCS is typically used to conducted merge/diverge analyses at exit points along limited-access freeways/highways. While Cambridge Street has merge and diverge points where the I-90 On-Ramp and Off-Ramp intersect the roadway, the mainline of Cambridge Street does not have the same characteristics as a limited-access freeway, and therefore, there are some limitations to using HCS to conduct such an analysis at these locations. For example, HCS analyses assume a minimum speed on the mainline of 45 miles per hour and a minimum of two through lanes on the mainline at a merge/diverge point. The posted speed limit on Cambridge Street is only 35 mph in the eastbound direction and 40 mph in the westbound direction and the mainline of Cambridge Street in the westbound direction has only one through lane at the merge point with the I-90 Off-Ramp. Therefore, caution should be exercised when interpreting the results of the HCS analyses at the merge/diverge points along Cambridge Street.

3.7.2.2 Merge/Diverge Analysis Results 2025 and 2030 No-Build and Build

Table 3-21 and Table 3-22 present the results of the merge/diverge analyses for the 2025 and 2030 conditions, respectively; the analysis worksheets are included in Appendix C for reference.

The diverge point of Cambridge Street Eastbound at the I-90 On-Ramp and the merge point of Cambridge Street Westbound at the I-90 Off-Ramp are expected to operate at LOS A or B under the 2021 Existing Conditions, 2025 No Build Conditions, and 2025 Build Conditions. The addition of the Project-generated trips under the 2025 Build Conditions is expected to have a negligible impact on operations.

The diverge point of Cambridge Street Eastbound at the I-90 On-Ramp and the merge point of Cambridge Street Westbound at the I-90 Off-Ramp are expected to operate at LOS A or B under the 2021 Existing Conditions, 2030 No Build Conditions, and 2030 Build Conditions. The addition of the Project-generated trips under the 2030 Build Conditions is expected to have a negligible impact on operations.

Table 3-21 Merge/Diverge Segment Capacity Analysis – Existing and 2025 Conditions

	2021 Existing Conditions			2025 No-Build Conditions			2025 Build Conditions		
Location/Period	**Demand [a]**	**Density [b]**	**LOS [c]**	**Demand**	**Density**	**LOS**	**Demand**	**Density**	**LOS**
Cambridge Street EB at I-90 On-Ramp									
Weekday Morning	654	4.0	A	756	9.9	A	800	10.2	B
Weekday Evening	794	5.2	A	922	11.3	B	944	11.5	B
Cambridge Street WB at I-90 Off-Ramp									
Weekday Morning	2,066	15.2	B	2,146	15.8	B	2,179	16.1	B
Weekday Evening	2,020	14.8	B	2,042	15.0	B	2,124	15.7	B

a demand within influence area, in vehicles per hour.
b density in ramp influence area, in passenger cars per mile per lane.
c level of service.

Table 3-22 Merge/Diverge Segment Capacity Analysis – Existing and 2030 Conditions

	2021 Existing Conditions			2030 No Build Conditions			2030 Build Conditions		
Location/Period	**Demand** [a]	**Density** [b]	**LOS** [c]	**Demand**	**Density**	**LOS**	**Demand**	**Density**	**LOS**
Cambridge Street EB at I-90 On-Ramp									
Weekday Morning	654	4.0	A	789	10.1	B	856	10.7	B
Weekday Evening	794	5.2	A	961	11.6	B	994	11.9	B
Cambridge Street WB at I-90 Off-Ramp									
Weekday Morning	2,066	15.2	B	2,168	16.0	B	2,212	16.3	B
Weekday Evening	2,020	14.8	B	2,119	15.6	B	2,207	16.3	B

a demand within influence area, in vehicles per hour.
b density in ramp influence area, in passenger cars per mile per lane.
c level of service.

3.8 Transit Service Capacity Analysis

The passenger capacity analysis is a multi-step process that looks at available capacity on MBTA buses to accommodate ridership generated by the Project. The analysis uses Fall 2019 data to represent the existing/baseline condition for both service levels and ridership, and 2025 and 2030 as the future condition years.

Section 3.8.1 details the analysis method applied to assess the MBTA's bus service passenger capacity. Section 3.8.2 presents the expected future conditions for both service changes and ridership that are considered in the analysis. Section 3.8.3 summarizes the peak-hour bus capacity for each weekday service period for existing, future 2025, and future 2030 conditions, exploring ridership demands with and without the Project and with expected new activity from other background projects.

3.8.1 Passenger Capacity Analysis Methodology

The major steps in this analysis are summarized below. Further detail on each of the steps follows the bulleted list.

- Step 1: Determine the systemwide peak hours for each route and service period
- Step 2: Determine existing available passenger capacity, based on the MBTA's Service Delivery Policy (2017)
- Step 3: Assess background (No Build) condition
- Step 4: Add Project Trips and assess passenger capacity impacts

Step 1: Determine the systemwide peak hours

Step 1A: Identify bus routes serving the site

The first step in the process was to identify the MBTA bus routes (and corresponding bus stops) that would be used by transit riders to access the Project Site. Four MBTA bus routes (Route 64, 66, 70, and 86), and their eight corresponding bus stops (one for each direction) were identified for further analysis.

Step 1B: Adjust the times buses serve the site

Because the start time of each bus trip is not the time when the bus arrives at the stop serving the Project Site, the travel time to reach the Project Site was computed. Using MBTA schedule data, the travel time from the start of the route to the bus stop serving the Project Site was extracted for each route by direction and time of day. These travel time adjustments were then applied to all trips in the Fall 2019 dataset used in this analysis.

Step 1C: Identify the systemwide peak hour

For the purposes of this capacity analysis, the nine weekday MBTA service periods were examined, as follows:

- Sunrise: First trip to 5:59 AM
- Early AM: 6:00 AM to 6:59 AM
- AM Peak: 7:00 AM to 8:59 AM
- Midday Base: 9:00 AM to 1:29 PM
- Midday School: 1:30 PM to 3:59 PM
- PM Peak: 4:00 PM to 6:29 PM
- Evening: 6:30 PM to 9:59 PM
- Late Evening: 10:00 PM to 11:59 PM
- Night: 12:00 AM to Last trip

For each of the nine service periods, the systemwide peak hour (i.e., the peak hour of the four bus routes being examined) needed to be identified. To do this, the passenger load on buses arriving at the site for all four routes (both directions) were summed up. The four consecutive 15-minute periods with the highest loads were designated as the peak hour for each service period. In cases where the service period was only one hour (e.g., Early AM), the peak hour was simply the duration of the period.

Step 2: Determine existing available capacity

The next step in the process was to assess existing passenger demand for each route (each direction separately) against available service capacity for the nine service periods for a typical weekday.

Existing passenger demands were computed by summing the load on buses during the identified peak hour using Fall 2019 Automated Passenger Count (APC) data obtained from the MBTA. The detailed APC data for each bus route is provided in Appendix C.

Existing service capacity was computed based on (1) the number of buses operated during the identified peak hour of each service period and (2) multiplied by the passenger capacity of each bus (55 people per bus during the AM and PM Peak service periods, 48 people per bus during all other times, per MBTA Delivery Service Policy bus passenger crowding standards, shown in Table 3-23). Subtracting the passenger demand from the service capacity during each service period's peak hour yielded the available capacity for additional passengers.

Table 3-23 Bus Passenger Capacity (Persons per Vehicle), per MBTA Service Delivery Policy

Service Period:	Sunrise	Early AM	AM Peak	Midday Base	Midday School	PM Peak	Evening	Late Evening	Night
Load Standard:	Off-Peak Load		Peak Load	Off-Peak Load		Peak Load	Off-Peak Load		
Route 64	48	48	55	48	48	55	48	48	48
Route 66	48	48	55	48	48	55	48	48	48
Route 70	48	48	55	48	48	55	48	48	48
Route 86	48	48	55	48	48	55	48	48	48

Service Delivery Policy; Massachusetts Bay Transportation Authority (MBTA); Appendix B: Vehicle Load, Table B1: Bus and Trackless Trolley. Median load of the 40-foot bus fleet is applied.

Step 3: Assess background (No Build) condition

Other developments in the vicinity of the Project Site are expected to be completed in the coming years, which would also generate ridership on the MBTA bus network. Step 3 of this analysis builds out the background condition by loading transit trips generated by these other developments onto the MBTA bus network to explore what transit capacity remains for Project Trips. This analysis assumes no changes in capacity to the MBTA bus network.

Step 3A: Identify background trips for the 2025 and full build (2030) horizons

Based on a review of available documents, the Table 3-24 below shows the development projects that were identified for inclusion in the future background condition, along with what year, and which bus routes would be impacted. The trip-making characteristics for each development were factored into the future ridership assessment.

Table 3-24 Background Development Projects Applied to Future Bus Capacity Analysis

Development	Background Year to Include In?	Routes Affected
HBS Faculty & Administrative Office Building	2025, 2030	66, 70, 86
Harvard Gateway Project	2025, 2030	66, 70, 86
Harvard Mixed Use Project	2025, 2030	66, 70, 86
Allston Yards - Phase 1	2025	64, 66, 86
Allston Yards - Full Build	2030	64, 66, 86
Nexus at the Allston Innovation Corridor	2025, 2030	70, 86
Skating Club (1234-1240 Soldiers Field Road)	2025, 2030	70, 86
Boston Landing	2025, 2030	64, 66, 86
176 Lincoln Street	2025, 2030	64, 66, 70, 86

Step 3B: Grow existing transit trips to 2025 and 2030

In most analyses, a growth rate is typically applied to existing ridership numbers to account for a growth in travel (through population growth and other means) over time. However, the

COVID-19 pandemic has upended that approach. Current projections indicate that it may take a few years to see transit ridership return to pre-pandemic levels;[17] thus, no growth rate was applied to the Fall 2019 data to generate the 2025 base ridership data. (Only the increases expected from known background projects in the area are added to the baseline ridership levels.)

Between 2025 and 2030, assuming travel on public transit resumes baseline levels, a 0.84 percent annual growth rate was applied. This number is consistent with the Boston Planning & Development Agency's population projections for the area during that time period.[18]

Step 3C: Add in background trips

Next, each project's background trips were loaded onto the network. Since trips added to the network must flow through the peak load point (i.e., the part of the route with the maximum load on the bus), it was assumed that:

- All trips destined for the development would start at the beginning of the route and exit at the stop closest to the development
- All trips exiting the development would board at the stop closest to the development and alight at last stop of the route.

Assuming no changes in capacity (same capacity as Step 2), the passenger demand was used to determine available capacity for Project Trips during the nine service periods.

Step 4: Add in Project Trips and Assess Capacity Impacts

Step 4A: Compute the Project Trips for the peak hours during the nine service periods

For the AM and PM Peak service periods, the transit trip numbers derived from ITE Trip Generation rates were used directly as the Project Trips. (See Section 3.6.4.8 on trip generation for the Project.) For the seven remaining service periods, the process involved scaling the daily trip estimate to each of the seven service periods. To accomplish this, a "representative stop" similar to the ones serving the Project Site needed to be identified. Based on the mix of land uses proposed for the Project Site, a pair of bus stops in Watertown (one in the inbound direction, the other in the outbound direction), served by Route 70, was identified as the "representative stop". Using the "representative stop" and Fall 2019 boarding and alighting activity, temporal factors (e.g., Daily to Sunrise, Daily to Midday Base, etc.) were computed. In essence, the daily transit trip number was scaled down using the temporal factors to provide the transit trips for the peak hours of the seven remaining service periods.

For the proportion of trips entering/exiting the site, it was assumed that the service periods before the AM Peak period would be the same as the AM Peak period, and service periods

17 *MBTA Ridership Trends & Projections*, as presented by MassDOT OTP at the Fiscal and Management Control Board (FMCB) Meeting, February 22, 2021. https://cdn.mbta.com/sites/default/files/2021-02/2021-02-22-fmcb-18-ridership-trends-projections.pdf

18 *Boston's Population Projections: 2010-2030*, BPDA Research Division, July 2019. Available at http://www.bostonplans.org/getattachment/46ec6863-e3ae-463a-9de0-c2b44d62e175

after the PM Peak period would be the same as the PM Peak period. Between the AM and PM Peak periods, a 50% entering/50% exiting split was assumed.

Step 4B: Assign trips to routes

Next, the Project transit trips were assigned to each of the four MBTA bus routes by direction according to the trip distribution based on BTD's published distribution data by mode for Area 17 (the zone for Allston); these percentages are the same as those applied in the 2017 transportation impact study for the 2018 PDA Master Plan (see Table 3-25).[19]

Table 3-25 Transit Trip Distribution

Route	Direction	Residential	Office
Route 64	Inbound (to University Park)	1%	2%
	Outbound (to Oak Square)	0%	0%
Route 66	Inbound (to Dudley Station)	9%	13%
	Outbound (to Harvard Station)	22%	17%
Route 70	Inbound (to University Park)	16%	20%
	Outbound (to Cedarwood)	25%	20%
Route 86	Inbound (to Reservoir Station)	22%	21%
	Outbound (to Sullivan Square Station)	5%	7%
Total		**100%**	**100%**

Source: BTD's published trip distribution data for Area 17: Allston.

Similar to the entering/exiting trip assignment in Step 4A, it was assumed that the periods before the AM Peak period would have the same distribution as the AM Peak period, while the service periods after the PM Peak period would be the same as the PM Peak period. Between the AM and PM Peak periods, an average of the AM and PM Peak period distributions was assumed.

Similar to how the background trips were handled (Step 3C), the Project transit trips were loaded onto the bus network, passing through each of the route's the peak load point.

Step 4C: Compare demand against capacity

Again assuming no changes in capacity (same capacity as Step 2), the anticipated passenger demand was compared to capacity to determine capacity impacts during the nine service periods.

Step 4D: Evaluate adding bus trips to address capacity constraints

In cases where there was a significant capacity issue with the addition of Project Trips (i.e., more than a few persons over capacity), bus trips were added to increase capacity. Since bus trips typically are assigned as round trips (one trip in the outbound direction and one trip in the inbound direction) for scheduling purposes, this practice was employed for this analysis as well.

19 Transportation Impact Study, Harvard Enterprise Research Campus Planned Development Area, November 2017, Table 12, p. 52.

3.8.2 Future Transit Conditions

3.8.2.1 Future Transit Service Improvements

This section provides an overview of on-going studies and initiatives related to transit services in the project area. Given the current service cuts implemented in response to the COVID-19 pandemic, it is uncertain whether the recommendations outlined in these studies and initiatives will be implemented. Aside from improvements as part of the MBTA's Better Bus Project, no other service capacity improvements are anticipated for the four MBTA bus routes that were examined (Routes 64, 66, 70, and 86).

Better Bus Project

The Better Bus project is a five-year, $8 billion capital investment program that began in 2018. It includes bus stop priority treatments (e.g., transit signal priority, bus lanes), bus stop accessibility improvements, and fleet and infrastructure enhancements. The first phase of the study generated 47 cost-neutral, short-term proposals to improve bus operations.

Several of these proposals led to changes for the Route 70 and Route 64. The MBTA merged the Route 70 and Route 70A (a change reflected in this transit capacity analysis). The MBTA extended the Route 64 midday service between Allston/Brighton and Kendall Square, and made a minor rerouting change along Brooks Street.

Among the project's recommendations, three relevant proposals were not implemented by the MBTA: a proposed transit signal priority system on Soldiers Field Road that would improve travel times for Route 70 and Route 64; designating the Route 70 and Route 86 key bus routes, which would result in more frequent service (peak period headways reduced to 10 minutes for both routes) and longer service days; and providing additional service on weekdays, Saturdays and Sundays.

Allston Early Action Transit Study

To address transit and mobility deficiencies in the area, MassDOT and the MBTA conducted the *Allston Early Action Transit Study*, [20] which assessed the Allston-Brighton area bus network, the Green Line along Commonwealth Avenue, and the Boston Landing commuter rail station. This study recommends bus service improvements in the Project area beyond what was included in the Better Bus Project. It suggests a possible rerouting of Route 66 that would result in the bus traveling along Everett Street and Western Avenue using existing bus stops. It also emphasizes the need to expand Route 70 and Route 86 service to key bus route levels, with peak headways reduced to 10 minutes for both routes.

The results of capacity analyses conducted for this Project's impact assessment support the findings of the Allston Early Action Transit Study and the Proponent endorses the future implementation of the study's recommendations by the MBTA.

20 *Allston Early Action Transit Study*, prepared by the Central Transportation Planning Staff for the Massachusetts Department of Transportation, December 2018. www.mass.gov/files/documents/2019/01/28/AllstonEarlyActionTransitStudy.pdf

Western Avenue Corridor Study and Rezoning

The Western Avenue Corridor Study and Rezoning is an ongoing BPDA initiative that will inform recommendations for new or modified zoning along Western Avenue between Barry's Corner and Leo Birmingham Parkway. Western Avenue was identified as a priority corridor in *Go Boston 2030*. Accordingly, the study is considering public realm improvements and transportation enhancements in coordination with the ongoing Allston-Brighton Mobility Study including strategic bus stop upgrades, transit signal priority, and bus priority lanes.

Allston Brighton Mobility Plan

As part of the Allston-Brighton Mobility Study, the BPDA evaluated existing and future transportation conditions and assessing the transportation impacts from planned development in the area.[21] The *Allston Brighton Mobility Plan*, released in draft by the Allston-Brighton Mobility Study team in November 2020 and adopted by the BPDA Board in May 2021, identifies a series of policies and tactics that will improve safety, comfort and mobility for transit riders, bicyclists, walkers, and drivers, and guide development mitigation and transportation investment.

Transit-related recommendations include the A-B Transit Corridor, a pilot project to transform Washington Street and Cambridge Street between Oak Square and Union Square into a bus priority corridor. This transit corridor project will include bus stop and intersection modifications to prioritize bus travel time and reliability of service and enhancing the pedestrian realm for safer and more comfortable access to transit.

Specifics of the plan calls for bus stop modifications to improve the location and quality of those stops and intersection modifications that introduce transit signal priority and queue jumps,

The plan also advocates for: direct transit connections to high-demand destinations including Longwood Medical Area and Kendall Square; high frequency service on the Worcester Line to improve travel times to Downtown Boston and the Seaport; the construction of West Station; and expanding the role and services of the Allston-Brighton TMA.

Bus Network Redesign

The MBTA's Bus Network Redesign is an ongoing initiative that stems from the Better Bus Project. The Redesign, scheduled for completion in 2022 with phased implementation over the subsequent four years, will guide the agency's recommendations for a new and improved bus network that better serves the needs of the region. The proposed changes will address route design, frequency of service, span of service, stop spacing, and coverage area.

The MBTA has reallocated resources to continue service to the Project area (Allston) during the pandemic despite system-wide service cuts. There is clear demand for service in the Allston area and the need for improved service will continue to grow. The Redesign project has not released any proposals for how the bus services in the Allston area may change.

21 www.bostonplans.org/planning/planning-initiatives/allston-brighton-mobility-study

3.8.2.2 Future Transit Ridership Projections

The 2025 and 2030 No Build and Build Conditions reflect a future scenario that incorporate anticipated passenger volume increases resulting from area development projects and the Project.

The Project-generated transit trips were distributed to the bus routes according to the distribution outlined in Table 3-26 to develop the bus ridership volumes for the 2025 Build Condition and the 2030 Build Condition.

Although the Project Site is located approximately 1.2 miles east of the Boston Landing Commuter Rail station and some Project tenants and residents are expected to use this service, the transit capacity analysis focused on adjacent bus routes, which provide the most convenient or direct access to the Project site.

Table 3-26 Project-Generated Transit Trip (Rider) Distribution Among MBTA Bus Routes

Transit Line	Percent of Project Generated Trips	2025 Daily Project Generated Trips	2030 Daily Project Generated Trips
Route 64	1.5%	32	70
Route 66	30.5%	648	1419
Route 70	40.5%	861	1884
Route 86	27.5%	585	1279

3.8.3 Transit Service Capacity Analysis Results

Table 3-27 shows the results of the bus passenger crowding evaluation of Fall 2019 ridership and service levels. Table 3-28a and Table 3-28b present the results of the transit capacity analysis for 2025 and Table 3-29a and Table 3-29b present the results of the transit capacity analysis for 2030.

The numbers in the tables represent the number of people (riders) remaining within (or exceeding) the Service Delivery Policy threshold (capacity) for bus passenger comfort. In other words, the numbers represent the riders that can be accommodated on each route at its peak load point, during each of the nine weekday service periods' peak hours (note, the peak hour for each period is the one-hour span that sees the highest ridership during the entire period).

3.8.3.1 Existing (Fall 2019 Baseline) Transit Service Capacity

The Route 86 is the only service experiencing capacity exceedances, which occur during the AM Peak period. The other bus routes that serve the Project Site do not exceed their capacity in either direction. Note that the data reflect average passenger load conditions at the peak load point; individual buses or trips may experience higher loads and exceed capacity at certain times on certain trips.

3.8.3.2 2025 Transit Service Capacity

Under the No-Build condition with anticipated transit riders from background projects and no changes to MBTA bus service levels, capacity exceedances are projected on each of the four routes, with the worst capacity exceedances being on Route 86. *Please refer to Section 3.12.2.2 for the evaluation of capacity under possible mitigated conditions.*

Aside from Route 64 (which is expected to see a negligible number of Project trips), the addition of Project trips may exacerbate these capacity exceedances and introduce additional exceedances during other time periods. Not surprisingly, the AM and PM Peak periods see the greatest degree of capacity exceedances, as these are periods with high demand for travel.

3.8.3.3 2030 Transit Service Capacity

For 2030, the remaining Project Trips (i.e., the ones not already added to the 2025 network) are added to the No-Build condition that includes estimated riders from other area background projects. Compared to 2025, under the 2030 No-Build condition more service periods are projected to experience capacity exceedances. Routes 70 and 86 are projected to continue to experience the most capacity exceedances over multiple service periods. *Please refer to Section 3.12.2.2 for the evaluation of capacity under possible mitigated conditions.*

Table 3-27 Existing Bus Passenger Capacity Analysis: Available Passenger Capacity at the Peak Load Point, Based on Average Passenger Loads

		Sunrise Peak Hour	Early AM Peak Hour	AM Peak Hour	Midday Base Peak Hour	Midday School Peak Hour	PM Peak Hour	Evening Peak Hour	Late Evening Peak Hour	Night Peak Hour
Route 64	Inbound - To Site	36	66	44	46	33	130	118	45	44
	Inbound - From Site	36	61	38	43	33	126	118	44	44
	Outbound - To Site	0	130	83	78	29	7	26	41	46
	Outbound - From Site	0	131	81	87	24	6	26	41	44
Route 66	Inbound - To Site	176	298	294	266	163	87	71	80	105
	Inbound - From Site	132	84	99	154	54	75	69	78	104
	Outbound - To Site	122	29	83	57	87	73	104	117	163
	Outbound - From Site	137	113	81	57	156	206	237	160	179
Route 70	Inbound - To Site	14	35	60	54	28	117	133	59	85
	Inbound - From Site	15	40	61	52	25	115	139	62	90
	Outbound - To Site	157	146	78	53	66	45	59	45	35
	Outbound - From Site	152	134	77	52	63	42	59	42	35
Route 86	Inbound - To Site	67	140	57	30	96	54	81	59	41
	Inbound - From Site	106	184	123	55	85	29	80	61	41
	Outbound - To Site	27	13	**-8**	49	40	67	146	71	86
	Outbound - From Site	28	14	**-1**	52	36	42	136	51	82

Based on the MBTA Service Delivery Policy standard for bus passenger capacity, which varies between peak and off-peak service. A positive value indicates available passenger capacity; a negative value indicates overcrowding

Table 3-28a Transit Capacity Analysis Results: Available Passenger Capacity in 2025 – Routes 64 and 66

			Sunrise Pk Hour	Early AM Pk Hour	AM Peak Pk Hour	Midday Base Pk Hour	Midday School Pk Hour	PM Peak Pk Hour	Evening Pk Hour	Late Evening Pk Hour	Night Pk Hour
Route 64	2025 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	31	61	35	34	16	100	104	38	42
		Inbound - From Site	32	56	29	29	16	96	104	37	42
		Outbound - To Site	0	43	**-23**	7	17	67	69	44	45
		Outbound - From Site	0	34	**-45**	**-18**	15	55	62	40	44
	2025 Build (Phase A) Project Trips	Inbound - To Site	1	1	3	0	1	0	0	0	0
		Inbound - From Site	0	0	1	0	1	0	0	0	0
		Outbound - To Site	0	0	0	0	1	1	0	0	0
		Outbound - From Site	0	0	0	0	1	3	1	1	0
	2025 Build Remaining Capacity	Inbound - To Site	30	60	32	34	15	100	104	38	42
		Inbound - From Site	32	56	28	29	15	96	104	37	42
		Outbound - To Site	0	43	**-23**	7	16	66	69	44	45
		Outbound - From Site	0	34	**-45**	**-18**	14	52	61	39	44
Route 66	2025 No-Build (with Background Projects)	Inbound - To Site	156	267	247	242	126	65	60	76	104
		Inbound - From Site	125	74	80	124	1	28	45	70	103
		Outbound - To Site	98	**-11**	45	29	48	48	92	114	162
		Outbound - From Site	131	105	68	36	120	156	214	149	176
	2025 Build (Phase A) Project Trips	Inbound - To Site	5	9	19	9	15	13	6	2	1
		Inbound - From Site	2	3	7	9	15	42	19	7	2
		Outbound - To Site	9	16	35	9	15	7	3	1	0
		Outbound - From Site	3	5	12	9	15	24	11	4	1
	2025 Build Remaining Capacity	Inbound - To Site	151	258	228	233	111	52	54	74	103
		Inbound - From Site	123	71	73	115	**-14**	**-14**	26	63	101
		Outbound - To Site	89	**-27**	10	20	33	41	89	113	162
		Outbound - From Site	128	100	56	27	105	132	203	145	175

A positive value indicates available passenger capacity; a negative value indicates overcrowding (according to the MBTA Service Delivery Policy standard for bus passenger capacity).

Table 3-28b Transit Capacity Analysis Results: Available Passenger Capacity in 2025 – Routes 70 and 86

			Sunrise Pk Hour	Early AM Pk Hour	AM Peak Pk Hour	Midday Base Pk Hour	Midday School Pk Hour	PM Peak Pk Hour	Evening Pk Hour	Late Evening Pk Hour	Night Pk Hour
Route 70	2025 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	4	17	28	14	**-31**	28	90	47	83
		Inbound - From Site	6	21	30	12	**-36**	22	89	46	83
		Outbound - To Site	135	142	72	47	52	36	54	43	35
		Outbound - From Site	137	128	68	46	49	32	54	38	34
	2025 Build (Phase A) Project Trips	Inbound - To Site	8	15	32	12	20	15	7	3	1
		Inbound - From Site	3	5	11	12	20	48	22	8	2
		Outbound - To Site	11	19	40	12	20	12	5	2	1
		Outbound - From Site	4	6	14	12	20	39	18	7	2
	2025 Build Remaining Capacity	Inbound - To Site	**-4**	2	**-4**	2	**-51**	13	83	44	82
		Inbound - From Site	3	16	19	**0**	**-56**	**-26**	67	38	81
		Outbound - To Site	124	123	32	35	32	24	49	41	34
		Outbound - From Site	133	122	54	34	29	**-7**	36	31	32
Route 86	2025 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	46	101	**-15**	**-18**	53	21	61	49	38
		Inbound - From Site	85	147	51	6	45	**-16**	55	51	37
		Outbound - To Site	19	**-3**	**-37**	26	**-9**	**-6**	107	58	83
		Outbound - From Site	21	**-1**	**-29**	28	**-13**	**-30**	97	37	78
	2025 Build (Phase A) Project Trips	Inbound - To Site	10	18	38	8	14	4	2	1	0
		Inbound - From Site	3	6	13	8	14	13	6	2	1
		Outbound - To Site	3	5	11	8	14	14	6	2	1
		Outbound - From Site	1	2	4	8	14	46	21	8	2
	2025 Build Remaining Capacity	Inbound - To Site	36	83	**-53**	**-26**	39	17	59	48	38
		Inbound - From Site	82	141	38	**-2**	31	**-29**	49	49	36
		Outbound - To Site	16	**-8**	**-48**	18	**-23**	**-20**	101	56	82
		Outbound - From Site	20	**-3**	**-33**	20	**-27**	**-76**	76	29	76

A positive value indicates available passenger capacity; a negative value indicates overcrowding (according to the MBTA Service Delivery Policy standard for bus passenger capacity).

Table 3-29a Transit Capacity Analysis Results: Available Passenger Capacity in 2030 – Routes 64 and 66

			Sunrise Pk Hour	Early AM Pk Hour	AM Peak Pk Hour	Midday Base Pk Hour	Midday School Pk Hour	PM Peak Pk Hour	Evening Pk Hour	Late Evening Pk Hour	Night Pk Hour
Route 64	2030 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	29	55	24	27	**-38**	94	100	37	41
		Inbound - From Site	30	51	19	23	**-43**	91	101	36	42
		Outbound - To Site	0	35	**-34**	2	12	63	67	44	44
		Outbound - From Site	0	27	**-57**	**-24**	10	49	59	38	43
	2030 Project Trips (added Phase B Trips)	Inbound - To Site	1	2	4	1	1	0	0	0	0
		Inbound - From Site	0	1	1	1	1	0	0	0	0
		Outbound - To Site	0	0	0	1	1	1	1	0	0
		Outbound - From Site	0	0	0	1	1	5	2	0	0
	2030 Build Remaining Capacity	Inbound - To Site	28	53	20	26	**-39**	94	100	37	41
		Inbound - From Site	30	50	18	22	**-44**	91	101	36	42
		Outbound - To Site	0	35	**-34**	1	11	62	66	44	44
		Outbound - From Site	0	27	**-57**	**-25**	9	44	57	38	43
Route 66	2030 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	146	252	211	225	97	36	43	68	102
		Inbound - From Site	119	59	57	104	**-29**	**-31**	16	57	100
		Outbound - To Site	84	**-37**	**-12**	5	19	25	77	108	161
		Outbound - From Site	123	95	35	12	91	113	193	141	173
	2030 Project Trips (added Phase B Trips)	Inbound - To Site	7	11	29	11	18	15	6	2	0
		Inbound - From Site	2	3	8	11	18	63	24	9	3
		Outbound - To Site	11	20	50	11	18	9	4	1	1
		Outbound - From Site	3	6	14	11	18	35	13	5	2
	2030 Build Remaining Capacity	Inbound - To Site	139	241	182	214	79	21	37	66	102
		Inbound - From Site	117	56	49	93	**-47**	**-94**	**-8**	48	97
		Outbound - To Site	73	**-57**	**-62**	**-6**	1	16	73	107	160
		Outbound - From Site	120	89	21	1	73	78	180	136	171

A positive value indicates available passenger capacity; a negative value indicates overcrowding (according to the MBTA Service Delivery Policy standard for bus passenger capacity).

Table 3-29b Transit Capacity Analysis Results: Available Passenger Capacity in 2030 – Routes 70 and 86

			Sunrise Pk Hour	Early AM Pk Hour	AM Peak Pk Hour	Midday Base Pk Hour	Midday School Pk Hour	PM Peak Pk Hour	Evening Pk Hour	Late Evening Pk Hour	Night Pk Hour
Route 70	2030 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	**-7**	**-6**	**-19**	**-13**	**-59**	0	75	39	80
		Inbound - From Site	1	9	4	**-16**	**-64**	**-39**	59	34	80
		Outbound - To Site	122	118	21	28	16	10	38	36	34
		Outbound - From Site	130	115	42	27	13	**-26**	25	26	32
	2030 Project Trips (added Phase B Trips)	Inbound - To Site	11	18	46	15	24	17	6	2	0
		Inbound - From Site	3	5	13	15	24	73	28	11	3
		Outbound - To Site	13	23	58	15	24	14	6	2	0
		Outbound - From Site	3	7	16	15	24	57	22	8	2
	2030 Build Remaining Capacity	Inbound - To Site	**-18**	**-24**	**-65**	**-28**	**-83**	**-17**	69	37	80
		Inbound - From Site	**-2**	4	**-9**	**-31**	**-88**	**-112**	31	23	77
		Outbound - To Site	109	95	**-37**	13	**-8**	**-4**	32	34	34
		Outbound - From Site	127	108	26	12	**-11**	**-83**	3	18	30
Route 86	2030 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	29	72	**-74**	**-48**	23	**-4**	47	41	36
		Inbound - From Site	77	132	20	**-23**	15	**-53**	37	42	35
		Outbound - To Site	11	**-18**	**-73**	2	**-45**	**-49**	83	51	81
		Outbound - From Site	16	**-14**	**-59**	5	**-49**	**-107**	58	24	75
	2030 Project Trips (added Phase B Trips)	Inbound - To Site	13	22	55	10	16	5	2	0	0
		Inbound - From Site	4	6	16	10	16	19	7	3	0
		Outbound - To Site	3	6	15	10	16	17	7	3	0
		Outbound - From Site	1	1	4	10	16	69	27	10	3
	2030 Build Remaining Capacity	Inbound - To Site	16	50	**-129**	**-58**	7	**-9**	45	41	36
		Inbound - From Site	73	126	4	**-33**	**-1**	**-72**	30	39	35
		Outbound - To Site	8	**-24**	**-88**	**-8**	**-61**	**-66**	76	48	81
		Outbound - From Site	15	**-15**	**-63**	**-5**	**-65**	**-176**	31	14	72

A positive value indicates available passenger capacity; a negative value indicates overcrowding (according to the MBTA Service Delivery Policy standard for bus passenger capacity).

3.9 Bicycle Level of Traffic Stress Analysis

This section provides a discussion and summary of the bicycle level of comfort study which was conducted to assess area bicycle infrastructure conditions and the effectiveness of significant improvements that are slated for the area roadways.

3.9.1 Bicycle Level of Traffic Stress Methodology

Bicyclists have varying levels of comfort when traveling on/along streets depending on the type of bicycle facility provided, vehicle volumes, traffic speed, bicyclist proximity to adjacent vehicle traffic and parked cars, and potential conflicts with turning, stopping, and idling cars, trucks, and buses. The City of Boston has developed a Bicycle Level of Traffic Stress (BLTS) methodology, which is an indication of how stressful a certain facility is for a cyclist, on a scale from 1 to 4. LTS 1 indicates the most favorable, lowest-stress conditions, while LTS 4 indicates the least favorable, highest-stress conditions. Table 3-30 describes the four levels of traffic stress in more detail.

Bike facilities along streets are separated into four major categories: protected bike lane, bike lane with no parking, bike lane with parking, and no bike lane. Protected bike lanes are always rated as LTS 1 because they physically separate the bike lane from traffic with flexposts, curbs, or even parked cars. The other bike lane treatments vary in their LTS rating based on factors such as vehicular volumes, speeds, and conflict factors. Conflict factors include adjacent industrial, commercial, or hotel land uses; key bus route (frequent bus service); valet zone; pick-up/drop-off zone; cab stand; or school. Conflict factors can generally be described as factors that may increase curbside activity or conflicting movements, and therefore, increase BLTS.

While the City of Boston provides a BLTS map online for roadways under existing conditions, data may be inaccurate. For example, average daily traffic (ADT) volumes are estimated if recent ADT volumes are not available. Therefore, to determine the LTS of each roadway within the study area, we supplement the data and apply engineering judgment. Both ADT and TMC counts were used to estimate roadway volumes. Where ADT volumes were not available, TMC counts were used to estimate ADT by assuming the peak hour volume was approximately 9 percent of the daily volume, a common value for factoring peak hour volumes. In addition, the analysis evaluates both sides of the roadway separately to obtain a finer understanding of gaps in the network.

Table 3-30 City of Boston – Bicycle Level of Traffic Stress Score Definitions

Level of Comfort / Traffic Stress	Description
1	Corridor is comfortable for all ages including children. LTS 1 roadways are characterized by protected bike lanes or greenways, and very little to no intermingling with vehicular traffic.
2	Tolerated by most adults. There may be some turning conflicts, but cyclists are mostly separated from traffic through bike lanes. This type of corridor demands more attention form riders than an LTS 1 and is likely not suitable for children. Projects must improve bicycle facilities to meet an LTS 2 standard or better.
3	Roadways may have bike lanes next to multilane vehicular traffic with above average traffic volumes or vehicular speeds higher than Boston's default speed limit. An LTS 3 may also include shared lanes on streets that are not multilane and experience vehicular traffic at the City's default speed limit or lower.
4	Tolerated by only the most experienced and able-bodied riders.

Source: Bicycle Level of Traffic Stress Technical Documentation, December 2020, Version 1.0

3.9.2 Existing Conditions BLTS

In this study area, the key roadways connecting to the Project Site, including Western Avenue, Cambridge Street, and North Harvard Street, have segments that are rated BLTS 4 (see Table 3-31 below and graphically in Figure 3.36a), under Existing Conditions. While these roadways have bike lanes, the volume of traffic is high (>6,000 vehicles per day) or there are many conflict factors present, including a key bus route along North Harvard Street (Route 66).

Key gaps in the network without any bicycle facilities include the Western Avenue and Cambridge Street bridges, which also have one-way traffic restrictions limiting the circulation of both vehicles and bicyclists.

In addition to the bike facilities along roadways, the Project Site is served by several off-street separated paths are present in the area that provide important regional connections. The Dr. Paul Dudley White shared-use path is provided along both sides of the Charles River next to Soldiers Field Road and Memorial Drive. Also, the current Rena Path connects to North Harvard Street just north of the Boston Public Library branch and will connect to the two-way cycle paths on Academic Way and Science Drive. In addition, the Harvard Business School Campus north of Western Avenue is generally bicycle- and pedestrian-friendly.

3.9.3 Future Conditions BLTS

Many of the planned roadway improvements in the study area are expected to improve BLTS. Next follows a list of improvements that aim to improve access to the site and make bicycling safer and more comfortable for riders.

No Build Roadway Improvement Projects

- Western Avenue/Soldiers Field Road Interim Intersection Improvements: Adds a protected eastbound (contraflow) bike lane across the intersection as well as a standard westbound bike lane across the intersection (but not across the Western Avenue bridge). This connects the Dr. Paul Dudley White Bike Path along Soldiers Field Road and the Charles River to Western Avenue. As a result, LTS improves to LTS 1 in the eastbound direction and LTS 3 in the westbound direction.
- Western Avenue Restriping: Adds protected bike lanes (with flexposts) in both directions between Hague Street and Soldiers Field Road. Connects with improvements at the Western Avenue/Soldiers Field Road intersection.
- Windom Street: Converted to one-way southbound between Amboy Street and Hopedale Street. The expected decrease in traffic on Windom Street improves LTS from 3 to 2.
- Cambridge Street: In the eastbound direction, has a standard bike lane from Harvard Avenue to Linden Street and a protected bike lane (with flexposts) from Linden Street to Soldiers Field Road. In the westbound direction, has a protected bike lane from Soldiers Field Road to Windom Street, a standard bike lane from Windom Street to Lincoln Street, and a protected bike lane (with flexposts) from Lincoln Street to Franklin Street.
- Harvard Enabling Roadways: Creates a two-way cycle track on the east side of Academic Way and the south side of Science Drive. Also continues as a standalone path from Science Drive to connect to Hague Street. Hague Street will have a northbound standard bike lane and a southbound shared-use lane. Additionally, on Western Avenue, there will be standard bike lanes in each direction west of Academic Way and protected bike lanes in each direction between Academic Way and Hague Street. The eastbound protected bike lane will be sidewalk-level, while the westbound protected bike lane will be street-level with flexposts.
- 180 Western Avenue: Project will provide an eastbound sidewalk-level protected bike lane from North Harvard Street to Travis Street.

The bicycle LTS under 2025 and 2030 No Build Conditions are summarized below in Table 3-31 and in Figure 3.36b.

Build Roadways with Enabling Infrastructure Improvements

Proposed Project Roadways and Improvements including Enabling Infrastructure within the PDA Area that are assumed in the Build analysis include:

- **Cattle Drive:** Create sidewalk-level protected bike lanes in both directions between Western Avenue and DEF Drive (2025 Build). Extend sidewalk-level protected bike lanes in both directions to southern Site limits (2030 Build). Interim Cattle Drive between Windom Street and the Project Site limits is currently proposed to have shared-use lanes (2025 Build).
- **East Drive:** Sidewalk-level protected bike lanes in both directions will be provided (2025 and 2030 Build conditions).

- **DEF Drive:** With low volumes, shared-use lanes are proposed (2025 and 2030 Build conditions).
- The two-way cycle track south of Science Drive will also continue through the Site within the extended Project Greenway (2030 Build).
- **Western Avenue:** For 2025 Build, create an eastbound sidewalk-level protected bike lane from Cattle Drive to Kresge Way. In 2030 Build, complete connection between two sections of eastbound sidewalk-level protected bike lanes by constructing an eastbound sidewalk-level protected bike lane from Batten Way to Cattle Drive.
- **Windom Street at Almy Street:** Reconfigured T-intersection so Windom Street southbound is a stop-controlled approach and there is a continuous centerline from Windom Street to Almy Street/Cattle Drive. *As part of the Project's proposed 2025 Phase A mitigation (described in detail in Section 3.12.3.1), bike lanes will be striped through this intersection on Windom Street/Almy Street, with a curb and/or flexposts protecting the bike u-turn movement from Cambridge Street westbound to Almy Street eastbound.*

The bicycle LTS under 2025 and 2030 Future Build and Build with Mitigation Conditions are summarized in Table 3-31 and in Figures 3.36c and 3.36d.

Table 3-31 Bicycle Level of Comfort (Level of Traffic Stress) Analysis Summary

Roadway	Segment	Existing	No-Build	2025 Build [a]	2030 Build [a]
Major Roadways					
North Harvard St	Cambridge St to Hooker St	4	4	4	4
North Harvard St	Hooker St to Franklin St	4	4	4	4
North Harvard St	Franklin St to Western Ave	4	4	4	4
North Harvard St	Western Ave to Soldiers Field Rd	4	4	4	4
North Harvard St	Soldiers Field Rd to Memorial Dr	4	4	4	4
Cambridge St	North Harvard to Windom St	4	1 EB/4 WB	1 EB/4 WB	1 EB/4 WB
Cambridge St	Windom St to I-90 Off-Ramps	4	1	1	1
Cambridge St	I-90 Off-Ramps to Soldiers Field Rd	4 EB/1 WB	1	1	1
Cambridge St	Soldiers Field Rd intersections	4	1	1	1
Cambridge St	Soldiers Field Rd to Memorial Dr	4	4	4	4
Western Ave	Spurr St to North Harvard St	4	4	4	4
Western Ave	North Harvard St to Travis St	4	1 EB/4 WB	1 EB/4 WB	1 EB/4 WB
Western Ave	Travis St to Academic Way	4	4	4	4
Western Ave	Academic Way to Stadium Rd	4	1	1	1
Western Ave	Stadium Rd to Hague St	4	1	1	1
Western Ave	Hague St to Cattle Dr	4	1	1	1
Western Ave	Cattle Dr to Kresge Way	4	1	1	1
Western Ave	Kresge Way to Soldiers Field Rd	4	1	1	1
Western Ave	Soldiers Field Rd intersections	4	1 EB/3 WB	1 EB/3 WB	1 EB/3 WB
Western Ave	Soldiers Field Rd to Memorial Dr	4	4	4	4

1=Comfortable for all users; 4= Tolerated by only the most experienced and able-bodied riders – See Table 3-30 above for detailed criteria.
DNE = Does not exist under that condition
a Both Future Build Conditions include the implementation of mitigation items proposed as a part of this Project.

Table 3-31 Bicycle Level of Comfort (Level of Traffic Stress) Analysis Summary (continued)

Roadway	Segment	Existing	No-Build	2025 Build [a]	2030 Build [a]
Local/Connector Roads					
Windom St	north of Almy Street	3	2	2	2
Windom St	south of Almy Street	3	2	1 NB/2 SB	1 NB/2 SB
Rotterdam St	all	3	2	2	n/a
Hague St	all	3	2	2	n/a
SEC/ERC Roadways					
Academic Way	N Harvard St to Western Ave	DNE	1	1	1
Academic Way	Western Ave to Science Dr	DNE	1	1	1
Science Dr	Academic Way to Windom St	DNE	1	1	1
Science Dr	Windom St to Cattle Dr	DNE	1	1	1
Stadium Rd	all	DNE	2	2	2
Cattle Dr	Western Ave to DEF Dr	DNE	DNE	1	1
Cattle Dr	DEF Dr to PDA Area Site Limits	DNE	DNE	3	1
Cattle Dr/Almy St	ERC Site Limits to Windom St	DNE	DNE	3	3
DEF Dr	Cattle Dr to East Dr	DNE	DNE	2	2
East Dr	Western Ave to DEF Dr	DNE	DNE	1	1
Neighborhood Roadways					
Rena St	all	2	2	2	2
Travis St	all	2	2	2	2
Kingsley St	all	2	2	2	2
Bertram St	all	2	2	2	2
Oxford St	all	1	1	1	1
Hopedale St	all	2	2	2	2
Seattle St	all	2	2	2	2
Hooker St	all	1	1	1	1
Sorrento St	all	1	1	1	1
Harvard Roadways					
Batten Way	all	3	3	3	3
Gordon Rd	all	2	2	2	2
Kresge Way	Western Ave to Soldiers Field Park	3	3	3	3
Kresge Way Drop-Off Loop	all	3	1	1	1
Kresge Way	Soldiers Field Park to Harvard Way	1	1	1	1
Harvard Way	all	1	1	1	1
South Campus Dr	all	1	1	1	1

1=Comfortable for all users; 4= Tolerated by only the most experienced and able-bodied riders – See Table 3-30 above for detailed criteria.
DNE = Does not exist under that condition
a Both Future Build Conditions include the implementation of mitigation items proposed as a part of this Project.

3.10 Curbside and Service Analysis

Details associated with curbside loading and off-street access are presented in this section. The Project's curbside street allocation along the Enabling Roadways and along Western Avenue will accommodate transit stops, passenger drop-off/pick-up activity, valet needs, and parking. The flexible use of these curb areas, rather than designating the space for a single purpose, allows curbside areas to be available for the purpose that is in greatest need at certain periods. Truck loading will take place off-street at appropriate loading areas within the Project structures.

3.10.1 Curbside Loading Space Needs Analysis

Linear feet of curb space needed for loading activities was calculated for each use in the Phase A site as well as for special event activities associated with the Treehouse Conference Center. These calculations rely on the expected pickup/drop-off/valet trips associated with each use as well as assumptions regarding curbside dwell times by loading activity type. To remain conservative in establishing curb space, a substantial portion of residential and hotel vehicle trips are assumed to take place as pickup/drop-off actions. See the pickup/drop-off percentages and trips in Table 3-32 below.

Table 3-32 Design Condition Pick-up/Drop-Off and Valet Trips by Use, Phase A (2025)

Land Use	PUDO/Valet Share (of Vehicle Trips)	PUDO/Valet Trips (Weekday Evening Peak Hour)
Office/Lab	10%	21
Residential	37%	7
Hotel/Conference Center	100%	88
Retail / Restaurant	50%	26

Dwell time assumptions by land use are displayed in Table 3-33 below. Dwell times for office, lab, retail, and restaurant use are lower and are assumed to last an average of 60 seconds. Dwell times for residential and hotel use are longer and last 180 seconds.

Table 3-33 Typical Dwell Times for Passenger Pick-up/Drop-off Vehicle Loading

Land Use	Typical Dwell Time (Seconds)[22]	Analysis Dwell Time (Seconds)
Office/Lab/Retail	30 to 60 for TNC/Taxi activity	60
Residential	30 to 60 for TNC/Taxi activity, 180 for personal vehicle loading	180
Hotel/Conference Center	30 to 60 for TNC/Taxi activity, 180 for valet loading	180

22 Typical dwell times for TNC/Taxi activity are based on leading industry research such as the San Francisco Curb Study, a partnership between the SFMTA, Uber, and a consultant team. https://issuu.com/fehrandpeers/docs/sf_curb_study_2018-10-19_issuu

Linear feet of Curb Needed by Use

A loading vehicle is assumed to require 20 linear feet of space when stopped/parked, while 40 additional feet are needed to help facilitate that vehicles can safely pull in and out of the PUDO area. The linear feet of curb needed for curbside loading trips associated with each use can be calculated as follows:

$$Linear\ feet\ needed = \frac{Dwell\ Time\ seconds \times PUDO\ Trips \times 20\ feet}{3{,}600\ seconds} + 40\ feet$$

Results of this calculation (rounded up to the nearest 20 feet) and the recommended linear feet of curb space to be dedicated for each typical daily (non-special event) use is shown in Table 3-34. To remain conservative, an additional twenty feet of space for each use was added to the linear feet indicated by this calculation in the Recommended Linear Feet column.

Table 3-34 Design Assumptions: Linear Feet of Loading Space Needed

Land Use	Minimum Linear Feet of Loading Space Needed	Recommended Linear Feet of Loading Space
Office/Lab	*60 feet*	*80 feet*
Residential	*60 feet*	*80 feet*
Hotel/Conference Center	*140 feet*	*160 feet*
Retail/Restaurant	*60 feet*	*80 feet*
Total	*320 feet*	*400 feet*

3.10.2 Curbside Management Plan

The total amount of provided loading and flexible curb space will meet the anticipated demand for loading space per the above analysis. Street curb areas will be designated for specific uses as depicted in Figure 3.37.

Western Avenue will feature a 180-foot shared drop-off and valet area. This area will serve as the primary pickup / drop-off area for the hotel and the Treehouse Conference Center. An auxiliary 80-foot shuttle pickup / drop-off area for conference activities and the Project Greenway will be provided along East Drive. A dedicated 80-foot pickup / drop-off area for the eastern lab building will be provided at the southern end of East Drive. A 60-foot pickup / drop-off area for the residential building will be provided on Cattle Drive.

Some curb areas, particularly those on East Drive, will function as flexible curb space that can also be utilized for passenger loading or expanded bicycle and micromobility storage depending on circumstances. While these areas will typically operate as on-street parking, they will be managed as TNC/passenger loading zones, additional bicycle parking, or bus and coach stops and layover areas during special events and as hourly, daily, and seasonal curb usage patterns change. These areas would also accommodate pickup/drop-off activity associated with retail uses.

The remainder of curb space will be allocated for on-street parking, with approximately 40 on-street parking spaces in total.

3.10.3 Events Parking and Activity Management

Special events occurring throughout the year within the Project, Project Greenway, and Treehouse Conference Center may require an appropriate events management operation for peak arrival and departure times, managed via a transportation coordinator position. A transportation coordinator would oversee the access aspects of events management plan, including transit buses, valet parking operations, curb use, and bike share dock/bike availability, depending on the type and scale of each event. A goal of the transportation coordinator shall be to minimize vehicle use by patrons.

Given the constrained size of the Project's parking garage, it is not intended that there will be dedicated spaces allocated for conference activities; however, there will be shared hotel and visitor spaces available within the shared parking garage. Special Event parking is intended to be accommodated off-site at the nearby Harvard University facilities, including those across Western Avenue and within walking distance of the site. Also, as noted earlier, curb space has been designed and allocated for busy times for passenger loading and is expected to be occasionally used by special events shuttle buses.

3.10.4 Service Loading Access (Phase A)

Consolidated building service and loading areas are planned to accommodate all buildings under the proposed Project (Phase A). Loading and service for the buildings in the southern portion of the Project Site will take place along DEF Drive. Loading for the building in the northwest portion of the Project Site will take place off Cattle Drive. All regular loading and service activities will occur internal to the footprints of Project buildings. (Please refer to Figure 3.38.)

3.11 Shared Parking Demand Analysis

A shared parking demand analysis was conducted to determine the total expected demand for vehicular parking across all proposed parking facilities within a fully shared parking system. Instead of dedicating parking spaces to specific land uses, for this mixed-use development the parking supply will instead be shared among all uses to maximize efficiency and ensure that only the necessary amount of parking is constructed to meet expected demand. Shared parking allows fewer spaces to be built while still accommodating expected project parking demand.

The Proponent's approach to parking management will advance to goals of promoting alternative, more sustainable access modes to the Site while discouraging persons from driving and parking in Allston.

3.11.1 Parking Ratios

Table 3-35 below displays the parking ratios associated with each land use at the Project Site. These rates are consistent across both Phase A (2025) and Full Build (2030) conditions.

- The **Access Boston Rate** is the parking ratio (spaces per unit) recommended by the City of Boston's *Access Boston* guidelines for each land use.[23]
- The **Shared Parking Rate** indicates the realized parking ratio at the peak demand point considering the efficiencies gained by shared parking among uses. This rate was derived by reducing *Access Boston* rates to reflect the high transit mode share, connected bicycle and pedestrian network, and robust transportation demand management programming on-site, consistent with new guidelines being propagated by the City. The Shared Parking Rate also includes a 7 percent adjustment for an expected captive market effect to reflect that a portion of users of the site will both live and work at the Project Site.
- The **Effective Rate** indicates the peak parking rate experienced by users of each land use type based on their respective expected demand patterns. The Effective Rates are higher than the Shared Parking Rates because the point of peak demand for parking for each land use does not overlap at the same time (e.g., residential parking demand is greatest at night, while office parking demand is greatest during mid-morning).
- Standard **ITE Rates** are included for reference in the table; these rates do not reflect the mixed-use and multimodal character of the Project Site.

Table 3-35 Proposed Vehicle Parking Ratios

Land Use (unit)	Access Boston Rate (City of Boston)	Shared Parking Rate (at Peak Demand Point)	Effective Rate (Peak Demand by Land Use)	ITE Rates
Office (per 1,000 sf)	1.0	0.75	0.8	1.63 (Office – Urban)
Residential (per dwelling unit)	1.0	0.25	0.5	0.98 (High-Rise Apartment)
Hotel (per room)	0.4	0.13	0.2	0.76 (Hotel – Urban)

3.11.2 Parking Demand

Table 3-36 below indicates the Phase A (2025) total expected shared parking demand at the peak demand point (associated with the Shared Parking Rates listed in Table 3-35), the peak parking demand for each land use that would be expected in an unshared condition, and compares these demands with the spaces that would be required under the City of Boston's *Access Boston* parking ratios. The shared parking model indicates a space savings of 14.4 percent when using a shared parking system in comparison with an unshared system.

23 Guidelines by the Boston Transportation Department for use by the Zoning Board of Appeal; refer to District-Based Parking Goals; *Access Boston 2000-2010*, Attachment A.

The total expected demand is 40 percent below the total parking spaces based on existing *Access Boston* parking guidelines for Allston.

Table 3-36 Phase A (2025) Expected Vehicle Parking Demand

Land Use	Expected Demand (Shared, at Peak Demand Point, Weekday, 10 AM)	Peak Demand by Land Use and Peak Demand Hour (Unshared)	Demand at Access Boston Rates (City)
Office	409	409 (10 AM)	440
Residential	87	161 (12 AM)	345
Hotel	32	47 (7 AM)	100
Total	**528**	**617**	**885**

The total expected 2025 demand of 528 spaces can be accommodated in the proposed 580 on-site and off-site shared parking spaces with some reserved for visitor parking and potential inefficiencies in parking capacity available at any one time.

Table 3-37 below indicates the Full Build (2030) total expected shared parking demand at the peak demand point (associated with the Shared Parking Rates listed in Table 3-35), the peak parking demand for each land use that would be expected in an unshared condition, and the recommended spaces that would be associated with the City of Boston's *Access Boston* parking ratios. The shared parking model indicates a space savings of 12.8 percent when using a shared parking system in comparison with an unshared system. The total expected demand is 37 percent below the total parking spaces recommended based on existing City of Boston Access Boston parking guidelines for Allston.

Table 3-37 Full Build (2030) Expected Vehicle Parking Demand

Land Use	Expected Demand (Shared, at Peak Demand Point, Weekday, 10 AM)	Peak Demand by Land Use and Peak Demand Hour (Unshared)	Demand at Access Boston Rates (City)
Office	1,079	1,079 (10 AM)	1160
Residential	192	356 (12 AM)	765
Hotel	32	47 (7 AM)	100
Total	**1,303**	**1,482**	**2,025**

The total expected 2030 demand of 1,303 spaces can be accommodated in the proposed 1,240 on-site shared parking spaces using active management and valet strategies to optimize space efficiency.

The charts below display the modeled parking demand, under shared, unshared, and Access Boston parking guidelines, for 2025 and 2030 by land use and time of day.

Chart: Shared Parking Analysis, Phase A (2025) Condition

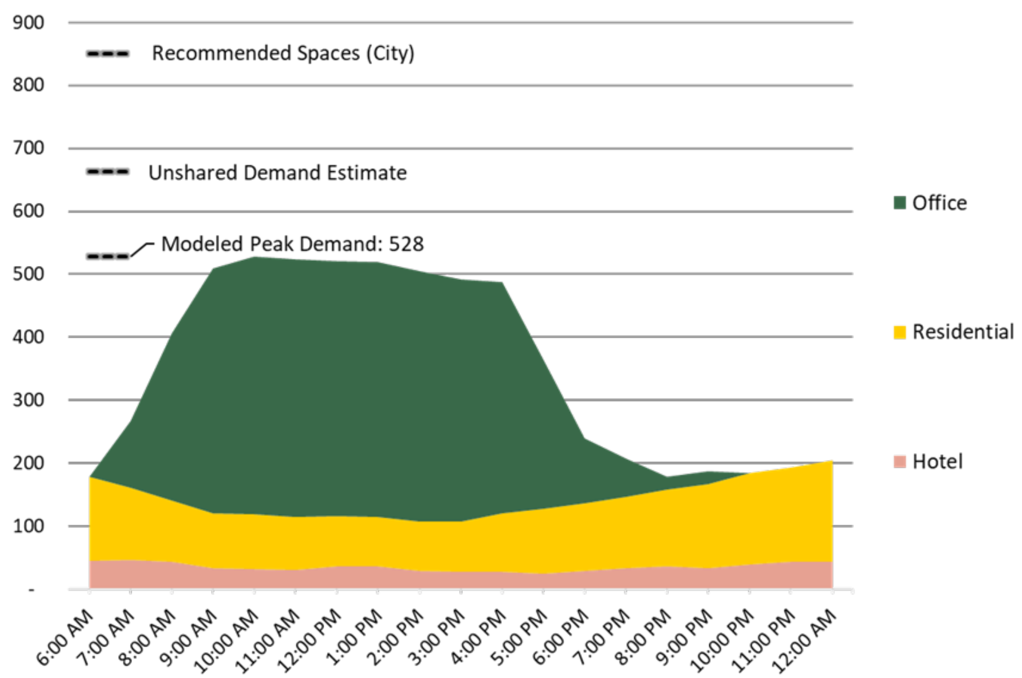
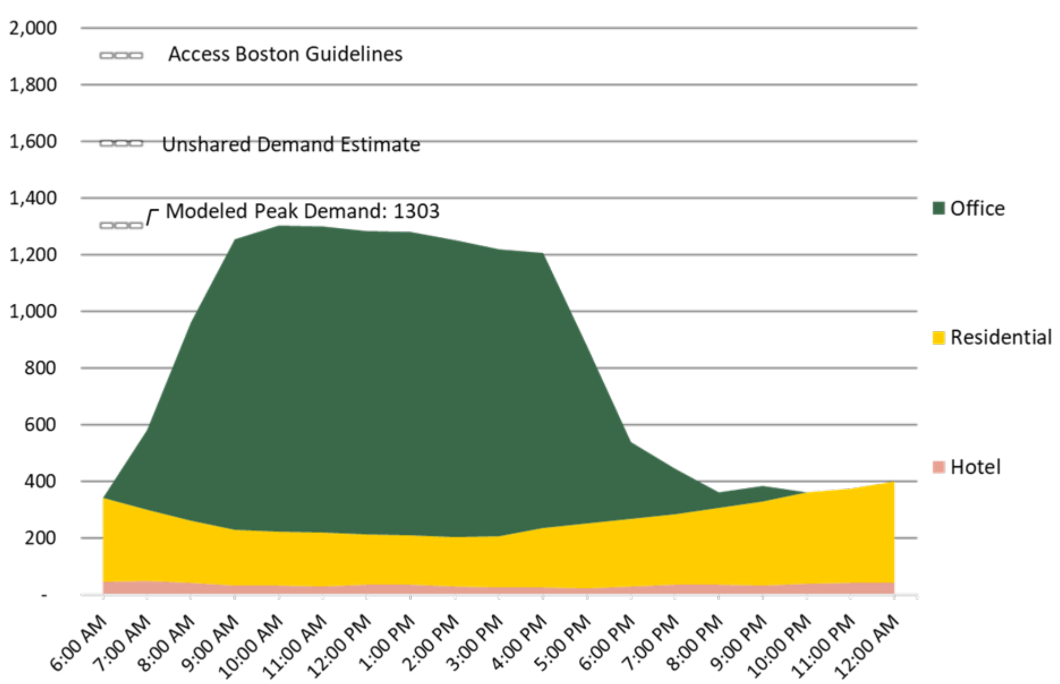


Chart: Shared Parking Analysis, Full Build (2030) Condition



3.12 Transportation Mitigation

The preceding chapter sections have outlined the expected impacts of the Project on the study area transportation systems and the configuration of the on-Site transportation facilities as they are currently proposed. A primary focus of the transportation mitigation approach for the Project has been to accommodate sustainable transportation modes by creating new and enhanced walking and bicycle connections between the Project Site and the surrounding area. The Project is also committed to implementing transit enhancements, services, and transit priority measures to facilitate MBTA transit bus operations to accommodate the expected increase in the number of transit riders. The Project's site plan and streetscape design, new off-site multimodal connections, and supported transit service enhancements are, in combination, aimed at reducing traffic impacts generated by the Project – by supporting and encouraging trips by transit, bicycle and on foot.

Capacity analyses for the Build with Mitigation condition for MBTA transit services and roadways have been conducted and are summarized within this section of the chapter. In addition, this section also summarizes additional measures to reduce reliance on private vehicles through the Project's proposed transportation demand management (TDM) program and the Proponent's plans to implement well-designed bicycle network and pedestrian network connections.

The Proponent will work with the City of Boston, MassDOT, and DCR to finalize the proposed improvement plans detailed in this section.

3.12.1 Proposed Streetscape Improvements and Multimodal Connections

Streetscape improvements are proposed in line with the sustainable mobility goals of the Project to improve overall access to and circulation around the Project Site. These roadway improvements have been designed with all users in mind, including transit riders, pedestrians, and bicyclists and drivers. This section also provides a description of the proposed streetscape improvements that upgrade Western Avenue and the Project's off-site roadway and pathway connections to the Project Site.

The Project includes several enhancements to the local pedestrian and bicycle accommodations. These improvements are proposed to bolster the existing pedestrian and bicycle accommodations in the area and further promote walking and biking as daily travel choices over private vehicles. Figure 3.39 and Figure 3.40 illustrate the future bicycle and pedestrian infrastructure, respectively, on-Site and in the surrounding study area.

3.12.1.1 Enabling Infrastructure Improvements

The Project will be supported by various streets, sidewalks, and other utility infrastructure elements (the "Enabling Infrastructure") which are to be constructed by the Harvard Allston Land Company). The Enabling Infrastructure will include three new complete streets currently referred to as Cattle Drive, East Drive, and DEF Drive in Phase A, and the extension of Science Drive from Stadium Road to Cattle Drive in Phase B (previously shown in Figure 3.2 and Figures 3.3 a through g).

Cattle Drive (Phases A and B)

"Cattle Drive" will be a new north/south street from Western Avenue that connects to the southern limits of the PDA Area boundary and features grade separated bicycle lanes, furnishing zones with landscaping, and sidewalks on both sides of the street. The curb lanes will provide flexible uses including intermittent parking, green stormwater management infrastructure, and active (pick-up/drop-off) and service space.

East Drive (Phase A)

On the east side of the Project Site, "East Drive" will be a new north/south street from Western Avenue opposite Kresge Way to the new DEF Drive on the south side of the Project Site. East Drive will provide grade-separated bicycle lanes, furnishing zones with landscaping, sidewalks on both sides of the street, and flexible use curb lanes.

DEF Drive (Phase A)

"DEF Drive" will be a more service-oriented east-west street with one vehicle travel lane in each direction shared with bicycles, as well as sidewalks on both sides. DEF Drive will provide driveway access to the Project Site's parking and loading/service docks, as well as gated access to Harvard's District Energy Facility.

Science Drive (Phase B)

A new complete street will be added in Phase B of the Project to the west of the Site via an extension of Science Drive from Stadium Road at the Harvard Science and Engineering Complex to Cattle Drive on the west side of the Site, north of DEF Drive.

3.12.1.2 Western Avenue Improvements between Batten Way and Soldiers Field Road (Phase A/2025)

Western Avenue will serve as the front door to the Project Site and therefore the Proponent is proposing to upgrade the Western Avenue cross-section between Batten Way and Soldiers Field Road to better accommodate all users and make the roadway a more attractive gateway to the Site. Specifically, the Proponent is proposing the following improvements along the Western Avenue cross section:

- Install an eastbound protected bike lane at sidewalk-level along the Site frontage and east of East Drive that will connect to the recently completed eastbound protected bike lane west of Batten Way
- Reconstruct the sidewalk, lighting and landscaping on the south side of Western Avenue along the Site frontage
- Restripe Western Avenue between Batten Way and Soldiers Field Road with a westbound protected on-road bike lane and with eastbound and westbound turn lanes at East Drive/Kresge Way
- Install a traffic signal at the intersection of East Drive/Kresge Way with underground interconnect conduit and cable connecting this intersection to the existing signal system at Batten Way / Hague Street.

- Create a protected intersection at Western Avenue at East Drive / Kresge Way with bicycle accommodations set back from the parallel vehicle traffic, dedicated bicycle paths provided through the intersection, and protected crosswalks for pedestrians with ADA compliant design.
- Relocate the existing bus stop on the north side of Western Avenue that serves the MBTA 70 bus in the outbound direction and the Harvard transit stop from east of Kresge Way to a preferred far-side transit stop location west of Kresge Way, to have the bus stop downstream of the proposed signalized intersection
- Perform pavement milling and overlay of Western Avenue from Batten Way to Soldiers Field Road
- Install new regulatory signage and pavement markings along the corridor

The implementation of the improvements in this segment will complete a connection that provides a continuous, sidewalk-level, eastbound bicycle lane on the south side of Western Avenue and a protected, street level bike lane westbound between Academic Way and Soldiers Field Road, where bicyclists can connect to/from the Paul Dudley White bike path along the Charles River.

A graphic of the proposed improvements for Phase A 2025 Conditions along Western Avenue is provided in Figure 3.41.

3.12.1.3 Interim Cattle Drive Connection (Enabling Roadway, Phase A)

The construction of Cattle Drive will provide a new north-south connection for traffic, bicyclists, and pedestrians, between Cambridge Street, the Project Site streets, and Western Avenue.

This connection will benefit existing and Project-generated traffic traveling between Cambridge Street and Western Avenue by creating a link between the I-90 Off-Ramp and different destinations along Western Avenue and points north and west, including Harvard Business School, the new Harvard Science and Engineering Complex, and Barry’s Corner. This will reduce traffic on local neighborhood streets, including North Harvard Street and Windom Street. While Windom Street is proposed to be one-way in the southbound direction under the No-Build Conditions, this new Cattle Drive connection is expected to divert much of the traffic, both northbound and southbound, that use Windom Street under Existing Conditions.

3.12.1.4 Cambridge Street at Windom Street Bicycle Lane Connection (Phase A/2025)

Bicycle facility improvements at the intersection of Cambridge Street at Windom Street include a southbound on-road bike lane on Windom Street approaching Cambridge Street, bike lane markings through the intersection to connect to the eastbound bike lane on Cambridge Street, and a northbound protected bike lane on Windom Street departing Cambridge Street to Almy Street (and the interim Cattle Drive Extension).

3.12.1.5 East-West Multi-use Path Connections

Construction of a Project Greenway in the center of the Site for pedestrian and bicyclists will link Cattle Drive and East Drive and serve as a focal point within the Site. On the west end of the Project Site, a raised mid-block crossing at Cattle Drive will connect the Project Greenway with a temporary shared-use path to provide a continuous off-road connection for pedestrians and bicyclists between North Harvard Street, Rena Path, the Project Site and East Drive. This connection will be upgraded in the future with the implementation of Science Drive and its shared-use path (noted next).

3.12.1.6 Science Drive Connection (Enabling Roadway, 2030)

The construction of Science Drive, as part of Phase B of the Project, will provide a new east-west connection between Cattle Drive and Stadium Road that will serve as a parallel route to Western Avenue. This connection will help to reduce the number of vehicles that turn left from Cattle Drive onto Western Avenue by providing access to another signalized intersection to the west at Stadium Road. In addition, this will serve as a direction connection between Cattle Drive and the Harvard Science and Engineering Complex without the need for vehicles to travel on Western Avenue.

Introduced within this phase of Science Drive is the construction of a shared-use path on the south side of Science Drive that will replace the temporary path connecting Rena Path and the Project Greenway.

3.12.2 Proposed Transit Service Improvements

The Proponent supports elevating the Route 70 and 86 to Key Bus Routes at service levels recommended in this study. (Section 3.12.2.1 presents the analysis to determine the number of new bus trips needed to support both new Project and background development transit demand; Section 3.12.2.2 estimates the reductions to bus passenger crowding that would result from an increased trip frequency.) The Proponent commits to study and support the implementation of bus transit priority on Western Avenue and other critical locations (discussed in Section 3.12.2.3). The Proponent is committed to enhanced neighborhood connector transit services, in cooperation with other Allston-area stakeholders, to provide supplemental connections to key transit hubs, namely Harvard Square and Boston Landing (described in Section 3.12.2.4).

For reference, Figure 3.42 provides a map of the walking route, distance, and time between the Site and the nearest stop on each MBTA bus line and Figure 3.43 illustrates the MBTA public transit services and the proposed relocated bus stop that will serve the Site.

3.12.2.1 Bus Service Enhancements

The transit capacity analysis in Section 3.8.3 provides an estimate of when bus trips could be expected, at certain times, to exceed the MBTA's *Service Delivery Policy* capacity. This analysis was updated to reflect the transit trip generation and assignment with supplemental transit connections (see Section 3.12.2.4). The analysis serves to determine the number of new bus trips needed to support both new Project and background development transit demand.

Implementation of these supplemental transit services will shift the expected transit trip (rider) assignment among the MBTA routes as a result of the increased frequencies on specific services and desirable new connections. The revised transit trip assignment is displayed below in Table 3-38.

Table 3-38 Project-Generated Transit Trip (Rider) Distribution Among MBTA Bus Routes, with Supplemental Transit

Transit Line	Percent of Project Generated Trips	2025 Daily Project Generated Trips	2030 Daily Project Generated Trips
Route 64	1%	21	47
Route 66	5%	106	233
Route 70	49%	1,042	2,279
Route 86	5%	106	233
Harvard Square Route	20%	425	930
Boston Landing Route	20%	425	930

As detailed next, adding bus trips at levels congruent with recommendations made by the *Allston Early Action Transit Study* (completed in 2018) would meet peak passenger demand and encourage public transit usage by site residents and patrons. For example, both the Route 70 and Route 86 would benefit having their service run at key bus route levels, with peak headways reduced to 10 minutes for both routes.

Analysis Discussion

Based on this analysis, a projected 32 new bus trips per weekday (including inbound and outbound trips), split across the Route 70 and Route 86, will be required to accommodate the combined new passenger demand generated by the Project and the assumed background development (see Table 3-24 Background Development Projects Applied to Future Bus Capacity Analysis) in 2025. (For context, about half of the expected new passenger demand on the Route 70 is generated by the Project and half by other development. About 5% of the expected new passenger demand on the Route 86 is generated by the Project, while 95% is generated by other development.)

No enhancements to Route 64 and Route 66 are anticipated to be necessary to support Project transit demand in 2025. However, these services will also exceed their existing capacity at certain time periods due to background development. Enhancements to these services necessary to address background growth are not included in this analysis.

In 2030, a projected 66 new bus trips (including inbound and outbound trips) may be required to accommodate the combined new passenger demand generated by the Project (about 60% of new trips) as well as the assumed background development and background annual growth rate (about 40% of new transit demand on Route 70). New transit demand on the Route 86 is mostly generated by other development and background growth (90%) with the Project contributing about 10% of all new trips by 2030. (Note that these percentages are based on the identified development proposals considered in this analysis. As a result, the Project's share of future growth is likely to decrease as other developments add demands to the route).

Table 3-39 summarizes the total number of new bus trips (round trips, consisting of an inbound and an outbound service run) needed to accommodate Project-generated and background development transit trips by route. Table 3-40a summarizes the daily distribution of these new weekday bus trips needed per MBTA Service Delivery Policy service period for each route in 2025. Table 3-40b summarizes the daily distribution of these new weekday bus trips needed per MBTA Service Delivery Policy service period for each route in 2030.

Table 3-39 New Weekday Bus Trips Needed to Accommodate Future Transit Demand in Allston

	Route 64	Route 66	Route 70	Route 86
2025 Build Condition	0	0	16	16
2030 Build Condition	0	0	38	28

Table 3-40a New Weekday Bus Trips Needed to Accommodate Future Transit Demand, per Route, 2025

	Sunrise	Early AM	AM Peak	Midday Base	Midday School	PM Peak	Evening	Late Evening	Night
Route 70 Inbound	0	0	2	1	2	3	0	0	0
Route 70 Outbound	0	0	2	1	2	3	0	0	0
Route 86 Inbound	0	0	2	1	2	3	0	0	0
Route 86 Outbound	0	0	2	1	2	3	0	0	0

Table 3-40b New Weekday Bus Trips Needed to Accommodate Future Transit Demand, per Route, 2030

	Sunrise	Early AM	AM Peak	Midday Base	Midday School	PM Peak	Evening	Late Evening	Night
Route 70 Inbound	0	1	4	1	4	9	0	0	0
Route 70 Outbound	0	1	4	1	4	9	0	0	0
Route 86 Inbound	0	1	4	1	2	6	0	0	0
Route 86 Outbound	0	1	4	1	2	6	0	0	0

As shown in Table 3-41a and Table 3-41b, adding bus trips during the AM Peak, Midday Base, Midday School and PM Peak service periods would reduce headways (increase frequency) and encourage public transit usage by site residents and patrons. These headways are congruent with recommendations made by the *Allston Early Action Transit Study* completed in 2018.

In some cases, recommended service frequency exceeds recommendations made in the *Allston Early Action Transit Study*. These periods are:

- Route 70, 2025: Midday School (1 extra trip per hour)
- Route 86, 2025: Midday Base (1 extra trip per hour from 9 AM – 10 AM only), Midday School (1 extra trip per hour)
- Route 70, 2030: Early AM (1 extra trip per hour), AM Peak (1 extra trip per hour), Midday School (2 extra trips per hour), PM Peak (1 extra trip per hour)
- Route 86, 2030: Early AM (1 extra trip per hour), AM Peak (1 extra trip per hour), Midday Base (1 extra trip per hour from 9 AM – 10 AM only), Midday School (1 extra trip per hour)

Table 3-41a Route 70: Proposed Headways to Meet Anticipated Future Demand

	Sunrise	Early AM	AM Peak	Midday Base	Midday School	PM Peak	Evening	Late Evening	Night
Existing	15	15	12	20	15	15	15	30	30
Key Bus Route Standard	15	15	10	15	15	10	20	20	20
2025	15	15	10	15	12	12	15	30	30
2030	15	12	9	15	10	9	15	30	30

Table 3-41b Route 86: Proposed Headways to Meet Anticipated Future Demand

	Sunrise	Early AM	AM Peak	Midday Base	Midday School	PM Peak	Evening	Late Evening	Night
Existing	20	12	12	15	15	15	12	30	30
Key Bus Route Standard	15	15	10	15	15	10	20	20	20
2025	20	12	10	12	12	12	12	30	30
2030	20	10	9	12	12	10	12	30	30

The *Allston Early Action Transit Study* recommended focusing service enhancements on the trunk section of the Route 70 between Central Square in Cambridge and University Park in Waltham.

The Proponent proposes to provide support to the increase in bus service (trip frequency) for Route 70 and 86 to the recommended service levels presented in Table 3-41a and Table 3-41b. The exact details and structure of this mitigation commitment will be determined through a continued dialogue with both MassDOT and the MBTA to be documented in the Project’s Section 61 Findings.

3.12.2.2 Revised 2025 and 2030 MBTA Transit Service Capacity Analysis

The following tables present the revised future transit service capacity analysis that reflects the updated transit assignment presented in Table 3-38 and the recommended service enhancements presented in Tables 3-41a and 3-41b. The numbers in the tables represent the number of people (riders) remaining within (or exceeding) the Service Delivery Policy threshold (capacity) for bus passenger comfort.

Due to negligible Project impacts, no Project-related service adjustments are suggested for Routes 64 and 66; however, these routes do continue to experience capacity constraints resulting from background development projects in the area. No-Build and Build scenarios for Route 70 and 86 both reflect the added bus trips recommended in Tables 3-41a and 3-41b.

Table 3-42a Revised Future Transit Capacity Analysis Results: Available Passenger Capacity in 2025 – Routes 64 and 66

			Sunrise Pk Hour	Early AM Pk Hour	AM Peak Pk Hour	Midday Base Pk Hour	Midday School Pk Hour	PM Peak Pk Hour	Evening Pk Hour	Late Evening Pk Hour	Night Pk Hour
Route 64	2025 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	31	61	35	34	16	100	104	38	42
		Inbound - From Site	32	56	29	29	16	96	104	37	42
		Outbound - To Site	0	43	**-23**	7	17	67	69	44	45
		Outbound - From Site	0	34	**-45**	**-18**	15	55	62	40	44
	2025 Build (Phase A) Project Trips	Inbound - To Site	0	1	2	0	0	0	0	0	0
		Inbound - From Site	0	0	1	0	0	0	0	0	0
		Outbound - To Site	0	0	0	0	0	1	0	0	0
		Outbound - From Site	0	0	0	0	0	2	1	0	0
	2025 Build Remaining Capacity	Inbound - To Site	31	60	33	34	16	100	104	38	42
		Inbound - From Site	32	56	28	29	16	96	104	37	42
		Outbound - To Site	0	43	**-23**	7	17	66	69	44	45
		Outbound - From Site	0	34	**-45**	**-18**	15	53	61	40	44
Route 66	2025 No-Build (with Background Projects)	Inbound - To Site	156	267	247	242	126	65	60	76	104
		Inbound - From Site	125	74	80	124	1	28	45	70	103
		Outbound - To Site	98	**-11**	45	29	48	48	92	114	162
		Outbound - From Site	131	105	68	36	120	156	214	149	176
	2025 Build (Phase A) Project Trips	Inbound - To Site	1	2	4	2	2	2	1	0	0
		Inbound - From Site	0	1	2	2	2	5	2	1	0
		Outbound - To Site	1	2	4	2	2	2	1	0	0
		Outbound - From Site	0	1	2	2	2	5	2	1	0
	2025 Build Remaining Capacity	Inbound - To Site	155	265	243	240	124	63	59	76	104
		Inbound - From Site	125	73	78	122	**-1**	23	43	69	103
		Outbound - To Site	97	**-13**	41	27	46	46	91	114	162
		Outbound - From Site	131	104	66	34	118	151	212	148	176

A positive value indicates available passenger capacity; a negative value indicates overcrowding (according to the MBTA Service Delivery Policy standard for bus passenger capacity).

Table 3-42b Revised Future Transit Capacity Analysis Results: Available Passenger Capacity in 2025 – Routes 70 and 86

			Sunrise Pk Hour	Early AM Pk Hour	AM Peak Pk Hour	Midday Base Pk Hour	Midday School Pk Hour	PM Peak Pk Hour	Evening Pk Hour	Late Evening Pk Hour	Night Pk Hour
Route 70	2025 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	4	17	83	62	17	83	90	47	83
		Inbound - From Site	6	21	85	60	12	77	89	46	83
		Outbound - To Site	135	142	127	95	100	91	54	43	35
		Outbound - From Site	137	128	123	94	97	87	54	38	34
	2025 Build (Phase A) Project Trips	Inbound - To Site	10	18	39	15	24	19	9	3	1
		Inbound - From Site	3	6	13	15	24	64	29	11	3
		Outbound - To Site	13	23	48	15	24	12	6	2	1
		Outbound - From Site	4	8	16	15	24	41	19	7	2
	2025 Build Remaining Capacity	Inbound - To Site	**-6**	**-1**	44	47	**-7**	64	81	44	82
		Inbound - From Site	3	15	72	45	**-12**	13	60	35	80
		Outbound - To Site	122	119	79	80	76	79	48	41	34
		Outbound - From Site	133	120	107	79	73	46	35	31	32
Route 86	2025 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	46	101	40	30	101	76	61	49	38
		Inbound - From Site	85	147	106	54	93	40	55	51	37
		Outbound - To Site	19	**-3**	18	74	39	50	107	58	83
		Outbound - From Site	21	**-1**	26	76	35	25	97	37	78
	2025 Build (Phase A) Project Trips	Inbound - To Site	1	2	4	2	2	2	1	0	0
		Inbound - From Site	0	1	2	2	2	5	2	1	0
		Outbound - To Site	1	2	4	2	2	2	1	0	0
		Outbound - From Site	0	1	2	2	2	5	2	1	0
	2025 Build Remaining Capacity	Inbound - To Site	45	99	36	28	99	74	60	49	38
		Inbound - From Site	85	146	104	52	91	35	53	50	37
		Outbound - To Site	18	**-5**	14	72	37	48	106	58	83
		Outbound - From Site	21	**-2**	24	74	33	20	95	36	78

A positive value indicates available passenger capacity; a negative value indicates overcrowding (according to the MBTA Service Delivery Policy standard for bus passenger capacity).

Table 3-43a Revised Future Transit Capacity Analysis Results: Available Passenger Capacity in 2030 – Routes 64 and 66

			Sunrise Pk Hour	Early AM Pk Hour	AM Peak Pk Hour	Midday Base Pk Hour	Midday School Pk Hour	PM Peak Pk Hour	Evening Pk Hour	Late Evening Pk Hour	Night Pk Hour
Route 64	2030 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	30	55	25	27	**-37**	94	100	37	41
		Inbound - From Site	30	51	19	23	**-42**	91	101	36	42
		Outbound - To Site	0	35	**-34**	2	13	63	67	44	44
		Outbound - From Site	0	27	**-57**	**-24**	11	50	59	39	43
	2030 Project Trips (added Phase B Trips)	Inbound - To Site	1	1	2	1	1	0	0	0	0
		Inbound - From Site	0	1	0	1	1	0	0	0	0
		Outbound - To Site	0	0	0	1	1	0	1	0	0
		Outbound - From Site	0	0	0	1	1	3	1	1	0
	2030 Build Remaining Capacity	Inbound - To Site	29	54	23	26	**-38**	94	100	37	41
		Inbound - From Site	30	50	19	22	**-43**	91	101	36	42
		Outbound - To Site	0	35	**-34**	1	12	63	66	44	44
		Outbound - From Site	0	27	**-57**	**-25**	10	47	58	38	43
Route 66	2030 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	150	259	226	232	110	47	48	70	103
		Inbound - From Site	121	61	62	111	**-16**	6	33	63	102
		Outbound - To Site	92	**-23**	19	12	32	30	79	109	161
		Outbound - From Site	126	99	45	19	104	132	202	144	174
	2030 Project Trips (added Phase B Trips)	Inbound - To Site	2	3	7	1	3	2	0	1	0
		Inbound - From Site	1	0	1	1	3	8	4	1	1
		Outbound - To Site	2	3	7	1	3	2	0	1	0
		Outbound - From Site	1	0	1	1	3	8	4	1	1
	2030 Build Remaining Capacity	Inbound - To Site	148	256	219	231	107	45	48	69	103
		Inbound - From Site	120	61	61	110	**-19**	**-2**	29	62	101
		Outbound - To Site	90	**-26**	12	11	29	28	79	108	161
		Outbound - From Site	125	99	44	18	101	124	198	143	173

A positive value indicates available passenger capacity; a negative value indicates overcrowding (according to the MBTA Service Delivery Policy standard for bus passenger capacity).

Table 3-43b Revised Future Transit Capacity Analysis Results: Available Passenger Capacity in 2030 – Routes 70 and 86

			Sunrise Pk Hour	Early AM Pk Hour	AM Peak Pk Hour	Midday Base Pk Hour	Midday School Pk Hour	PM Peak Pk Hour	Evening Pk Hour	Late Evening Pk Hour	Night Pk Hour
Route 70	2030 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	**-9**	39	84	32	33	161	73	39	80
		Inbound - From Site	1	56	112	29	28	110	52	31	79
		Outbound - To Site	120	162	123	73	108	175	37	36	34
		Outbound - From Site	130	161	150	72	105	137	24	26	32
	2030 Project Trips (added Phase B Trips)	Inbound - To Site	13	22	56	17	29	24	9	4	1
		Inbound - From Site	4	7	16	17	29	96	37	14	4
		Outbound - To Site	16	28	70	17	29	15	5	2	0
		Outbound - From Site	5	8	21	17	29	61	23	9	2
	2030 Build Remaining Capacity	Inbound - To Site	**-22**	17	28	15	4	137	64	35	79
		Inbound - From Site	**-3**	49	96	12	**-1**	14	15	17	75
		Outbound - To Site	104	134	53	56	79	160	32	34	34
		Outbound - From Site	125	153	129	55	76	76	1	17	30
Route 86	2030 No-Build (with Background Projects) Remaining Capacity	Inbound - To Site	38	136	70	6	83	108	48	42	36
		Inbound - From Site	80	185	141	31	75	65	41	43	36
		Outbound - To Site	13	33	44	56	15	73	88	53	82
		Outbound - From Site	17	35	53	59	11	44	77	31	77
	2030 Project Trips (added Phase B Trips)	Inbound - To Site	2	3	7	1	3	2	0	1	0
		Inbound - From Site	1	0	1	1	3	8	4	1	1
		Outbound - To Site	2	3	7	1	3	2	0	1	0
		Outbound - From Site	1	0	1	1	3	8	4	1	1
	2030 Build Remaining Capacity	Inbound - To Site	36	133	63	5	80	106	48	41	36
		Inbound - From Site	79	185	140	30	72	57	37	42	35
		Outbound - To Site	11	30	37	55	12	71	88	52	82
		Outbound - From Site	16	35	52	58	8	36	73	30	76

A positive value indicates available passenger capacity; a negative value indicates overcrowding (according to the MBTA Service Delivery Policy standard for bus passenger capacity).

3.12.2.3 Transit Priority and Stop Improvements

Bus transit priority improvements and bus stop improvements along Western Avenue and other study area locations support the successful implementation of higher frequency of bus service. By reducing travel times and increasing service reliability, the MBTA is able to better use its resources to provide bus service where it's most needed. Thus, the Proponent is in discussions with the MBTA about the following additional studies:

- Feasibility of bus transit priority treatments along Western Avenue between Barry's Corner and Soldiers Field Road, *including the potential impacts of such transit priority treatments on the proposed multimodal streetscape designs (presented earlier in Section 3.12.1.2) will be evaluated as part of this study*.
- A traffic analysis of the four "quad" intersections of Western Avenue at Soldiers Field Road, Western Avenue at Memorial Drive, Cambridge Street at Soldiers Field Road, and River Street at Memorial Drive, to evaluate the existing coordination, signal timing, and intersection configuration, and to assess the potential for changes (including transit signal priority) that would reduce delay for MBTA buses (namely, Route 70 and Route 64)
- Feasibility of a transit bus queue jump lane on the Soldiers Field Frontage Road southbound approach to Cambridge Street

The Proponent will work with the MBTA to further define the Project's support of these or any alternative studies, and any additional commitments related to implementing the recommended transit priority measures. These commitments will be developed in conjunction with the City of Boston, MBTA, MassDOT, DCR, and neighborhood stakeholders as part of the Article 80 and MEPA review processes.

The Proponent, as part of its Western Avenue improvements, will work with the MBTA to evaluate the benefit of adding/improving a bus shelter and other pedestrian/rider amenities to the Route 70 stop at Western Avenue opposite Resilience (to be relocated to Western Avenue at East Drive).

3.12.2.4 Neighborhood Transit Connector Services

The Proponent is committed to developing alternative mobility options for Project tenants, residents, and guests to help alleviate the capacity constraints in the existing and future MBTA bus routes serving the Project area. The transit analysis indicates enhanced connections to transit stations in Harvard Square and Boston Landing would be beneficial and would improve the convenience and likelihood of public transit use. Towards that end, the Proponent:

- Anticipates an agreement with Harvard University that leverages two existing shuttle routes to support Project and Harvard University demand between Allston and Harvard Square. These routes will continue to be open and available to members of the Allston community.
- Commits to becoming a member of the Allston-Brighton TMA (ABTMA) and is supportive of expected future studies (such as the Allston-Brighton Neighborhood

Connector Study) and programs to develop a joint transit/connector fixed-route service between existing and future developments in the area and regional transit hubs.

The mitigation strategies proposed above are consistent with the *Allston-Brighton Mobility Plan*, which encourages direct connections between Allston-Brighton and high-demand destinations in the region, high frequency Urban Rail service between Downtown Boston and the Boston Landing commuter rail station, and the further study of Allston-area transit opportunities in coordination with the ABTMA and the City of Boston.

The service plan details for the neighborhood transit connections are expected to be determined in collaboration with the City of Boston and Allston-Brighton Transportation Management Association (ABTMA) via the Allston-Brighton Neighborhood Connector Study and with the MBTA via the Bus Network Redesign project. These efforts will include broad input from residents and Allston-Brighton stakeholders.

3.12.3 Proposed Roadway Operational Improvements

Operational improvements are recommended for the following intersections and roadways:

- Windom Street at Cambridge Street and Almy Street
- Western Avenue at Soldiers Field Road
- Western Avenue at East Drive / Kresge Way
- Western Avenue at Stadium Road and Batten Way

Provided next are the details of each specific improvement and Section 3.12.4 details the traffic operational analyses of these improvements. Due to the phased nature of the PDA Area development, the proposed implementation phase for these proposed improvements is noted in the narrative. As part of the on-going permitting of Phase B development portion of the PDA Area, the Proponent is committed to work with the City of Boston, MassDOT and DCR to monitor additional long-term mitigation needs. Changes in land development adjacent to the Project and updates to the Allston Multimodal Project could lead to modifications to roadway configuration, in particular with regard to the intersection of Western Avenue at Soldiers Field Road.

3.12.3.1 Windom Street at Cambridge Street and Almy Street (Phase A/2025)

As a key access point between the Site and points south, the intersections of Windom Street at Cambridge Street and Windom Street at Almy Street are proposed to be improved to accommodate additional Project-generated vehicle, pedestrian, and bicycle traffic. Specifically, the Proponent is proposing the following improvements at these locations:

- Expand the cross-section of the Windom Street approach at Cambridge Street from one southbound lane that will be installed in the No Build Conditions to two southbound lanes (one left-turn lane and one right-turn lane) to provide more vehicular capacity and queue storage for vehicles exiting the Site

- Install a southbound on-road bike lane on Windom Street approaching Cambridge Street with bike markings through the intersection to connect to the eastbound bike lane on Cambridge Street
- Install a northbound protected bike lane on Windom Street departing Cambridge Street
- Realign the intersection of Windom Street at Almy Street to emphasize Almy Street as the main travel route with Windom Street north of Almy Street acting as the minor leg of the T-intersection operating under stop-control
- Perform minor curbing, landscape and concrete sidewalk work related to the Windom Street at Almy Street re-alignment
- Modify the traffic signal system to include additional signal faces for second Windom approach lane, loop detection and controller phasing / timing adjustments
- Add new regulatory signage and pavement markings
- Add new continuous delineator and modular base
- Perform pavement mill and overlay for Windom approach and immediate Cambridge Street intersection area

A graphic of the proposed improvements is provided in Figure 3.44.

3.12.3.2 Western Avenue at Soldiers Field Road (Phase A/2025)

Western Avenue at Solders Field Road serves as the gateway intersection for vehicles entering and exiting the Site from the west. Specifically, the Western Avenue eastbound right-turn movement onto Soldiers Field Road is a key movement to accommodate vehicles exiting the Site heading for I-90, Soldiers Field Road eastbound, or the River Street Bridge. Improvements at this intersection are intended to improve operations for this right-turn movement without negatively impacting the proposed pedestrian and bicycle improvements that will be in place under the No Build Conditions.

Specifically, the Proponent is proposing the following improvements at this location:

- Modify signal phasing to allow the eastbound right-turn movement to have a green light concurrently with the southbound through movement
- Restripe Soldiers Field Road frontage road south of the intersection to accommodate eastbound right-turning traffic and southbound through traffic at the same time with the eastbound right-turning traffic joining the Soldiers Field Road frontage road with two designated lanes merging down to one lane after the traffic signal
- Perform pavement milling and overlay of Soldiers Field Road frontage road from Western Avenue to approximately midpoint of Resilience (formerly Sanofi) building
- Add new regulatory signage and pavement markings

A graphic of the proposed improvements is provided in Figure 3.45.

3.12.3.3 Western Avenue at Soldiers Field Road (Potential Phase B/2030)

To accommodate the increase in Project-generated vehicles between Phase A and the Full Build and to further improve the bicycle accommodations proposed with the Phase A mitigation, the Proponent recommends improvements along the south side of Western Avenue between East Drive and Solders Field Road, as follows:

- Extend the second turn lane on Western Avenue eastbound approaching Soldiers Field Road by approximately 250 feet to provide additional vehicle queuing storage and improved operations for the Western Avenue eastbound right-turn movement
- To allow for this right-turn lane extension, convert the existing on-road protected bicycle lane to an off-road bicycle accommodation within this section
- Shift the Route 70 inbound bus stop on Western Avenue to directly east of East Drive, while creating of a floating bus stop (with a bus shelter) between the protected bike lane and the roadway

The implementation of this mitigation improvement would require securing construction and pedestrian easements of private property along the southern right-of-way boundary of Western Avenue.

Again, construction of the Allston Multimodal Project may negate the need for these additional mitigation measures by shifting traffic from the Western Avenue – Soldiers Field Road – Interstate 90 movement to both the Cattle Drive and East Drive connections south toward Cambridge Street and to a newly located access ramps to Interstate 90.

As part of the Phase B permitting, the Proponent is committed to work with the City of Boston, MassDOT and DCR to develop the design concept for this mitigation and review the need to implement based on accurate construction schedules for Phase B and the Allston Multimodal Project.

3.12.3.4 Western Avenue at East Drive / Kresge Way (Phase A/2025)

The Proponent is proposing to install a traffic signal at the intersection of Western Avenue at East Drive / Kresge Way to accommodate vehicles turning into and out of the Site and pedestrians crossing Western Avenue at this location. The signalized intersection will be designed as a protected intersection with bicycle accommodations set back from the parallel vehicle traffic and with dedicated bicycle paths provided through the intersection. In addition, crosswalks will be provided across the Western Avenue westbound approach, East Drive northbound approach, and Kresge Way southbound approach. The signal is proposed to be coordinated with the adjacent signalized intersection of Western Avenue at Soldiers Field Road and connected to the City of Boston signal network via interconnection to the signal controller at the Western Avenue at Batten Way intersection.

This location is the preferred location for a traffic signal over the intersection of Western Avenue at Cattle Drive because it more closely aligns with pedestrian desire lines and long-term planning for the area. As noted in Section 3.12.1.2, the existing bus stop on the north side of Western Avenue that serves the MBTA 70 bus in the outbound direction and the Harvard transit service is proposed to be relocated from east of Kresge Way to west of Kresge Way. Since this stop will be one of the key stops that serves the Site, it will be important to provide a safe crossing for pedestrians traveling between the Site on the south side of Western Avenue and the bus stop on the north side of Western Avenue. A traffic signal at the intersection of Western Avenue at East Drive / Kresge Way will provide a protected crossing for pedestrians crossing Western Avenue that will be ADA compliant. The crossing at this location is also expected to be the main pedestrian route between the Site and Harvard Business School due to the Kresge Way northern approach to this intersection that includes sidewalks on both sides of the roadway that connect into the Harvard Business School campus.

A traffic signal at this location also aligns with long-term planning in the Allston area. As discussed in Section 3.6.2, long-term planning beyond 2030 shows a new network of streets south of Cambridge Street and a new I-90 interchange connection as part of the Allston Multimodal Project. Those plans show East Drive as a main north-south connection with the roadway continuing south of DEF Drive and connecting with Cambridge Street and the new I-90 On/Off-Ramps. Once complete, East Drive will be the main route between Soldiers Field Road and the Western Avenue Bridge to the north and west and I-90 to the south and a traffic signal will very likely be warranted, regardless of Project-generated traffic. While these connections will not be in place by 2025 or 2030 when the Project is complete, it is important to include long-term planning when determining mitigation that will be in place for years after 2025 and 2030.

No signal is proposed at Cattle Drive at this time. With the location of a traffic signal at East Drive, it is likely that Site traffic and non-Site traffic using Cattle Drive and East Drive will reroute accordingly to take advantage of the protected movements that a traffic signal provides in order to turn left onto Western Avenue. Therefore, a revised traffic distribution at these two intersections have been analyzed in Section 3.12.4, which includes revised signal warrant analyses to confirm that traffic signals are not necessary at both East Drive and Cattle Drive.

3.12.3.5 Western Avenue at Stadium Road and Batten Way Signal Timing and Phasing Improvements (Phase B/2030)

To improve operations at the intersections of Western Avenue at Stadium Road and at Batten Way and to accommodate both the closure of Hague Street and redistributed traffic volumes that increase Stadium Road use due to the new Science Drive connection, the Proponent is proposing to modify the existing traffic signal timing and phasing at these locations. Changes to the signal timing and phasing at these two locations include eliminating the Hague Street phase from the Batten Way / Hague Street signal since Hague Street will be closed in Phase B and increasing the cycle lengths of both signals to provide more capacity for vehicles on Western Avenue and Stadium Road. The two intersections will be coordinated for through vehicles along Western Avenue. Section 3.12.4.2 and Section 3.12.4.3 summarizes the intersection capacity analyses with and without the proposed signal modifications and quantifies the benefits of the modifications.

3.12.3.6 RSA Implementation

At the request of MassDOT, the Proponent funded road safety audits at five study area intersections, which were conducted in June 2021. Each RSA included an inventory of identified safety issues as well as potential roadway enhancements that would address each safety issue. The recommended enhancements range from low-cost and short-term treatments, such as refreshing pavement markings and reviewing/replacing existing signage, to high-cost and long-term treatments, such as implementing road *diets* and replacing traffic control equipment. The full list of safety issues and potential safety enhancements is provided in each of the RSA reports.

The RSA reports that were funded by the Proponent will be a vital resource in guiding the implementation of roadway improvements at these locations by the City of Boston, the City of Cambridge, MassDOT, DCR, and other agencies or developers. The Proponent has focused its roadway mitigation on intersections that will be more impacted by the additional Project-generated traffic, including Western Avenue at Solders Field Road.

In addition, several of the RSA intersections are expected to experience improvements within the next five-to-ten years as part of other projects and/or studies. For example, the private development at 180 Western Avenue is expected to include improvements at the intersection of Western Avenue at North Harvard Street and the DCR has an on-going long-term study examining potential improvements along the Memorial Drive corridor. Thus, as these other developments and studies progress, the RSA reports that were funded by the Proponent can be used as an important reference with potential safety enhancements already identified at each intersection.

3.12.4 Traffic Operations Analysis with Roadway Mitigation

To inform the recommended roadway improvements, transportation analyses were conducted at each of the locations where mitigation measures are proposed. The analyses include (1) evaluating unsignalized intersections to determine the need for signalization (signal warrant analysis) and (2) evaluating traffic operations (intersection capacity analysis).

In addition, a revised 2030 Build Condition with Mitigation traffic volume network was developed at specific study area intersections to account for the proposed traffic signal at the intersection of Western Avenue at East Drive / Kresge Way and the resulting expected changes in local vehicle trip distribution decisions.

3.12.4.1 Signal Warrant Analyses

To inform the proposed roadway mitigation that addresses certain operational concerns identified by the intersection capacity analysis, traffic signal warrants were evaluated at the following four unsignalized intersections:

- Western Avenue at Kresge Way / East Drive
- Western Avenue at Cattle Drive
- Western Avenue at Academic Way
- North Harvard Street at Academic Way

Method

The Federal Highway Administration (FHWA) has established criteria for evaluating the need for traffic signal control at an intersection. Several warrants, published in the Manual on

Uniform Traffic Control Devices (MUTCD)[24], provide guidelines for determining the need for a signal based on such factors as traffic volume, pedestrian volume, progressive movement of traffic, vehicular delay, and others. While satisfaction of one or more of these warrants alone does not necessarily justify installation of a traffic signal, warrants in combination with capacity analysis, crash analysis, and a study of intersection safety provide valuable criteria for evaluating the need for a traffic signal.

There are nine warrants defined in the MUTCD. The warrants consider the roadway geometry, traffic volume entering the intersection, travel speeds, pedestrian activity, and special considerations such as proximity to schools and active railroad grade crossings. Even if these warrants are satisfied, other considerations such as traffic flow progression, sight distance, and physical constraints must be considered before pursuing traffic signal control.

The nine warrants defined in the MUTCD are as follows:

- **Warrant 1 (Eight Hour Vehicular Volume)** – Warrant 1 is based on any eight hours of a day where the traffic entering the intersection reaches a threshold that warrants considering signal control.
- **Warrant 2 (Four Hour Vehicular Volume)** – Warrant 2 is for any four hours of a day.
- **Warrant 3 (Peak Hour)** – Warrant 3 is for the peak hour of any given day.
- **Warrant 4 (Pedestrian)** – Warrant 4 is based on pedestrian volumes for a peak hour or a four-hour period. The minimum threshold for Warrant 4 is 107 pedestrian crossings at an intersection per hour.
- **Warrant 5 (School Crossing) –** Warrant 5 is based on the proximity of at intersection to a school crossing. This warrant is not applicable to the four candidate intersections, as there are no established school crossings near the Project Site.
- **Warrant 6 (Coordinated Signal System)** – Warrant 6 is based on the spacing of traffic signals for a coordinated signal system. This warrant is not applicable to the four considered intersections as they will not be part of a larger coordinated signal system.
- **Warrant 7 (Crash Experience)** – Warrant 7 is satisfied when five collisions correctable by signalization occur over the most recent 12 months. *This warrant is not applicable because the four considered intersections are new intersections and existing crash data cannot be analyzed*.
- **Warrant 8 (Roadway Network)** – Warrant 8 is applicable when the two roadways are the common intersection of two major routes. *This warrant is also not applicable*.
- **Warrant 9 (Intersection Near a Grade Crossing)** – Warrant 9 is applicable when the intersection is located near an at-grade railroad crossing. *This warrant is not applicable as there are no active at-grade crossings near the Project Site.*

Of the applicable warrants for these locations, three are based on vehicular volumes and one is based on pedestrian volumes.

24 *Manual on Uniform Traffic Control Devices*, 2009 Edition; US Department of Transportation Federal Highway Administration, Washington DC, December 2009.

Signal Warrant Analysis Results

For the three intersections along Western Avenue, future hourly vehicle volumes for the major street (i.e., Western Avenue) were determined using calculated morning and evening peak hour traffic volumes and previously collected ATR data from 2018 at a location east of Hague Street. Hourly volumes for the minor street were determined using the same methodology. For the intersection of North Harvard Street and Academic Way, previously collected ATR data from 2016 was used to determine hourly volumes along the major and minor streets.

For the pedestrian volume warrant (Warrant 4), the intersections of Cattle Drive and East Drive with Western Avenue were evaluated by estimating pedestrian volumes using previously collected pedestrian movement counts and projected future transit riders using MBTA bus stops on Western Avenue. This warrant could not be evaluated at the two new intersections along Academic Way, as there are no existing data to indicate baseline levels of pedestrian activity at these locations.

The intersections of Western Avenue at Academic Way and North Harvard Street at Academic Way are being constructed with signal conduits as part of the SEC project, so that signals may be installed in the future if/when signalization is warranted. The signal warrant evaluation at these two intersections is provided to help determine whether traffic signals may be warranted at these two locations in the future analysis conditions.

Table 3-44 presents the results of the preliminary volume-based warrant analyses at the four considered intersections based on the 2025 and 2030 Build Conditions. The signal warrant analysis worksheets are provided in Appendix C.

At the intersection of Western Avenue at Kresge Way / East Drive, the pedestrian warrant is the only warrant met, under both 2025 and 2030 Build conditions. At the intersection of Western Avenue and Cattle Drive, the eight-hour, four-hour, and peak hour warrants are all met in both future Build conditions.

At neither the intersection of Western Avenue at Academic Way nor North Harvard Street at Academic Way are the volume-based warrants met under the 2025 and 2030 Build Conditions.

Table 3-44 Preliminary Signal Warrant Analysis Summary

	2025 Build Conditions				2030 Build Conditions			
Location	**Warrant 1 (8-Hour) Met**	**Warrant 2 (4-Hour) Met**	**Warrant 3 (Peak Hour) Met**	**Warrant 4 (Pedestrian) Met**	**Warrant 1 (8-Hour) Met**	**Warrant 2 (4-Hour) Met**	**Warrant 3 (Peak Hour) Met**	**Warrant 4 (Pedestrian) Met**
Western Ave at Kresge Way / East Dr	No	No	No	**Yes**	No	No	No	**Yes**
Western Ave at Cattle Dr	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	No
Western Ave at Academic Way	No	No	No	n/a	No	No	No	n/a
N Harvard St at Academic Way	No	No	No	n/a	No	No	No	n/a

Note: Based on 85th-percentile speeds under 40 miles per hour, as all proposed roadways are expected to be low speed roadways.

While this preliminary analysis suggests that a signal may be a recommended at the Cattle Drive intersection, other factors are accounted for in the proposed intersection improvements. The intersection of East Drive / Kresge Way is better situated to safely accommodate pedestrian and transit riders crossing Western Avenue to access Harvard Business School, the PDA Area, and the MBTA bus stops near the intersection. This activity is significant enough in volume to meet the pedestrian warrant. Furthermore, both future network changes to the roadways south of Western Avenue (as part of the Framework Plan and Allston Multimodal Project) and potential changes to Harvard Business School roadway network north of Western Avenue, suggest a preferred focus on traffic control at Kresge Way and East Drive, rather than at Cattle Drive. Thus, the traffic assignments and signal warrants were re-evaluated to inform a mitigation condition that assumes a traffic signal at Kresge Way/East Drive and STOP sign control at Cattle Drive as presented in the next section.

Build with Mitigation Traffic Volumes

Adding a traffic signal at the intersection of Western Avenue at East Drive / Kresge Way and assuming STOP sign control at the intersection of Western Avenue at Cattle Drive, is expected to change motorist use of these intersections. Site traffic and non-Site traffic using Cattle Drive and East Drive will reroute accordingly to take advantage of the protected movements that a traffic signal provides to turn left onto Western Avenue. Furthermore, based on conversations with Harvard Business School, if a traffic signal were to be installed at the intersection of Western Avenue at East Drive / Kresge Way, Harvard Business School would consider modifications within the campus to allow internal connections to provide access to the primary campus parking lot from Kresge Way and Batten Way, which would also effect traffic volumes at this intersection. Therefore, a revised traffic distribution was assessed to quantify the expected changes in driver travel patterns with the signalization at East Drive.

Detailed *Build with Mitigation* Site trip distribution calculations are provided in Appendix C.

Based on the revised Project-generated traffic and the revised Harvard Business School traffic, the 2025 and 2030 Build with Mitigation Conditions traffic volume networks were developed. Figures 3.46 and 3.47 illustrate the 2025 Build with Mitigation traffic volumes and Figures 3.48 and 3.49 illustrate the 2030 Build with Mitigation traffic volumes.

Mitigation Conditions Signal Warrant Analyses

To analyze the impacts of the revised volume distributions assumed in the 2025 and 2030 Build with Mitigation Conditions, an updated signal warrant analysis was conducted at the intersections of Western Avenue at Cattle Drive and Western Avenue at East Drive / Kresge Way (Table 3-45 presents the results). The signal warrant analysis worksheets are provided in Appendix C.

Table 3-45 Revised Signal Warrant Analysis Summary

	2025 Build Conditions with Mitigation				2030 Build Conditions with Mitigation			
Location	Warrant 1 (8-Hour) Met	Warrant 2 (4-Hour) Met	Warrant 3 (Peak Hour) Met	Warrant 4 (Pedestrian) Met	Warrant 1 (8-Hour) Met	Warrant 2 (4-Hour) Met	Warrant 3 (Peak Hour) Met	Warrant 4 (Pedestrian) Met
Western Ave at Kresge Way / East Dr	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Western Ave at Cattle Dr	**Yes**	**Yes**	No	No	No	No	No	No

Note: Based on 85th-percentile speeds under 40 miles per hour, as all proposed roadways are expected to be low speed roadways.

Both intersections meet Warrants 1 and 2 under the 2025 Build with Mitigations traffic volumes, while under the 2030 Build with Mitigations traffic volume the intersection of Western Avenue at East Drive / Kresge Way meets Warrants 1, 2, 3, and 4 while the intersection of Western Avenue at Cattle Drive does not meet any warrants. The reason for the intersection of Western Avenue at Cattle Drive meeting fewer warrants in 2030 as compared to 2025 is due to the opening of Science Drive in Phase B, which will serve as an alternative route for vehicles to depart the Site to the west.

Based on the results of the signal warrant analyses for the 2025 and 2030 Build with Mitigation Conditions combined with the desired pedestrian lines, long-range planning for the local roadway network, and the concern of unnecessary traffic signals impacting traffic flow along Western Avenue, the Proponent commits to installing a traffic signal on Western Avenue at Kresge Way and East Drive. The evaluation of this proposed signalized intersection and all other intersections where operational improvements are proposed are included in the following sections.

3.12.4.2 2025 Build with Mitigation Intersection Capacity Analyses

Intersection capacity analyses were conducted at all study area intersections that are expected to see geometry changes, signal timing/phasing modification, or revised traffic volumes as part of the 2025 Build with Mitigation Conditions. The results of these analyses compared against the 2025 No Build and 2025 Build without Mitigation Conditions are provided below. The capacity analysis worksheets are provided in Appendix C along with diagrams depicting the 50th percentile and 95th percentile queue. The signalized and unsignalized intersection capacity analysis results for the impacted study area intersections are summarized below in Table 3-46 and Table 3-47, respectively.

As shown in the tables below, the proposed mitigation is expected to improve overall operations at all impacted study area intersections. At the intersection of Cambridge Street at Windom Street, the southbound Windom Street approach is expected to improve from expected delays of up to 447 seconds without mitigation to delays not expected to be longer than 81 seconds with the proposed mitigation, which is a second southbound turn lane. The queues on the southbound approach are expected to be significantly lower with the proposed mitigation. It should be noted that these improvements in vehicle operations are achieved without eliminating the pedestrian safety enhancements put in place in the No Build Condition, such as exclusive pedestrian phasing.

At the intersection of Solders Field Road at Western Avenue, the proposed modifications to the signal timings are expected to reduce the eastbound right-turn movement average delay during the weekday evening peak hour from 355 seconds without mitigation to 18 seconds with mitigation. In addition, the 95th-percentile queues during this hour are expected to approximately decrease by 50 percent. These improvements are observed by providing an additional phase during which the eastbound right-turn movement will have a green light by allowing them to flow concurrently with the southbound through movements within separate, delineated lanes that safely merge further south on the Soldiers Field Frontage Road

The proposed newly signalized intersection of Western Avenue at East Drive / Kresge Way is expected to operate at overall LOS B with all individual movements expected to operate at LOS D or better and experience queues of 290 feet or less. The unsignalized Cattle Drive approach to Western Avenue is also expected to operate at acceptable level of services under the 2025 Build with Mitigation Conditions, with the delay not expected to be greater than 47 seconds and the queues not expected to exceed five vehicles.

Table 3-46 Signalized Intersection Capacity Analysis: 2025 Future Conditions with Mitigation

	2025 No-Build Condition					2025 Build Condition – No Mitigation					2025 Build Condition – With Mitigation				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Cambridge Street at Windom Street															
Weekday morning															
EB L	0.21	48	D	11	m11	0.72	51	D	39	m39	0.77	53	D	39	m39
EB T	0.38	11	B	47	m185	0.38	11	B	47	m182	0.38	11	B	48	m183
WB T/R	1.25	142	F	~887	#1361	1.40	208	F	~1069	#1535	1.39	200	F	~1069	#1535
SB L/R	0.91	92	F	104	#227	1.08	144	F	~137	#275	n/a	n/a	n/a	n/a	n/a
SB L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.80	70	E	90	#185
SB R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.16	37	D	25	57
Overall	**1.07**	**109**	**F**			**1.23**	**160**	**F**			**1.19**	**150**	**F**		
Weekday evening															
EB L	0.19	44	D	12	m13	0.38	44	D	24	m27	0.41	44	D	24	m28
EB T	0.45	11	B	52	m310	0.45	11	B	56	m311	0.45	11	B	57	m313
WB T	1.09	71	E	553	#1204	1.15	95	F	641	#1273	1.14	92	F	641	#1273
SB L/R	1.27	218	F	~151	#288	1.82	447	F	~256	#413	n/a	n/a	n/a	n/a	n/a
SB L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.84	81	F	85	#187
SB R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.45	40	D	75	134
Overall	**1.00**	**62**	**E**			**1.10**	**97**	**F**			**1.01**	**67**	**E**		
Soldiers Field Road EB at Western Ave [f]															
Weekday morning															
EB R	0.67	35	D	134	193	0.77	40	D	151	215	0.33	9	A	52	100
WB L	1.06	56	E	~402	m97	1.03	40	D	~398	m85	1.03	40	D	~398	m85
WB T	0.97	25	C	~430	m156	0.86	19	B	330	m122	0.86	19	B	330	m122
SB T/R	1.14	111	F	~353	m#290	1.15	116	F	~361	m#295	1.15	116	F	~361	m#295
Overall	**1.14**	**60**	**E**			**1.09**	**57**	**E**			**1.09**	**52**	**D**		
Weekday evening															
EB R	1.47	258	F	~306	#426	1.69	355	F	~376	#501	0.72	18	B	222	243
WB L	0.81	12	B	98	m77	0.81	12	B	96	m75	0.81	12	B	96	m75
WB T	0.67	9	A	99	m67	0.66	9	A	100	m67	0.66	9	A	100	m67
SB T/R	1.48	265	F	~312	#428	1.49	270	F	~314	#432	1.49	270	F	~314	#432
Overall	**1.20**	**123**	**F**			**1.25**	**151**	**F**			**1.08**	**71**	**E**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Improvements from No Build to Build due to re-routing of non-Project vehicle trips from Soldiers Field Road Service Road to Cattle Drive Extension.

~ Volume exceeds capacity, queue is theoretically infinite.
\# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-46 Signalized Intersection Capacity Analysis: 2025 Future Conditions with Mitigation (continued)

	2025 No-Build Condition					2025 Build Condition – No Mitigation					2025 Build Condition – With Mitigation				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Western Ave at East Drive / Kresge Way															
Weekday morning	*Intersection unsignalized under 2025 No Build Conditions*					*Intersection unsignalized under 2025 Build Conditions without Mitigation*									
EB L											0.18	5	A	11	28
EB T/R											0.41	6	A	98	161
WB L											0.14	4	A	5	m15
WB T/R											0.68	9	A	211	m137
NB L											0.13	36	D	17	m42
NB T/R											0.51	39	D	66	m126
Overall											**0.65**	**11**	**B**		
Weekday evening															
EB L											0.07	5	A	5	14
EB T/R											0.60	9	A	187	293
WB L											0.14	3	A	2	m14
WB T/R											0.60	5	A	15	m290
NB L											0.23	32	C	30	m65
NB T/R											0.24	32	C	14	70
Overall											**0.53**	**10**	**B**		
Western Ave at Batten Way / Hague Street [f]															
Weekday morning															
EB L	0.58	24	C	42	#207	0.54	25	C	26	#150	0.38	16	B	23	#125
EB T/R	0.48	14	B	123	#408	0.54	15	B	149	#497	0.54	15	B	149	#497
WB L	0.14	10	B	10	49	0.11	10	A	8	40	0.11	10	A	8	40
WB T/R	0.87	30	C	325	#905	1.03	59	E	494	#1114	0.89	31	C	354	#951
NB L/T	0.20	47	D	14	37	0.11	47	D	6	22	0.11	47	D	6	22
NB R	0.46	49	D	25	57	0.61	58	E	28	62	0.61	58	E	28	62
SB L/T/R	0.52	50	D	31	77	0.52	50	D	31	74	0.52	50	D	31	74
Overall	**0.76**	**26**	**C**			**0.90**	**43**	**D**			**0.79**	**26**	**C**		
Weekday evening															
EB L	0.20	15	B	10	51	0.20	15	B	6	41	0.16	14	B	6	38
EB T/R	0.70	23	C	190	#586	0.75	24	C	203	#689	0.75	24	C	203	#689
WB L	0.15	14	B	8	41	0.11	12	B	5	31	0.11	12	B	5	31
WB T/R	0.81	29	C	242	#713	1.00	54	D	345	#969	0.91	37	D	291	#883
NB L/T	0.23	47	D	10	31	0.14	46	D	7	24	0.14	46	D	7	24
NB R	0.31	48	D	10	31	0.52	49	D	20	50	0.52	49	D	20	50
SB L/T/R	1.13	156	F	~129	#272	0.34	45	D	17	85	0.34	45	D	17	85
Overall	**0.74**	**43**	**D**			**0.78**	**41**	**D**			**0.72**	**33**	**C**		

f Improvements from No Build to Build due to re-routing of non-Project vehicle trips from Hague Street to Cattle Drive Extension.

Table 3-47 Unsignalized Intersection Capacity Analysis: 2025 Future Conditions with Mitigation

	2025 No-Build Condition					2025 Build Condition – No Mitigation					2025 Build Condition – With Mitigation				
Location / Movement	D [a]	v/c [b]	Del [c]	LOS [d]	95 Q [e]	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Western Avenue at Cattle Drive															
Weekday Morning															
NB L/R	*Intersection does not exist under 2025 No Build Condition*					288	0.91	68	F	221	191	0.59	31	D	88
Weekday Evening															
NB L/R						223	0.91	80	F	197	158	0.67	47	E	106
Cattle Drive at DEF Drive															
Weekday Morning															
WB L/R	*Intersection does not exist under 2025 No Build Condition*					76	0.15	14	B	13	60	0.12	13	B	10
Weekday Evening															
WB L/R						185	0.29	13	B	30	142	0.23	13	B	22

a Demand, in vehicles
b Volume to capacity ratio.
c Average total delay, in seconds per vehicle.
d Level-of-service.
e 95th percentile queue, in feet.

3.12.4.3 2030 Build with Mitigation Intersection Capacity Analyses

Intersection capacity analyses were conducted at all study area intersections that are expected to see geometry changes, signal timing/phasing modification, or revised traffic volumes as part of the 2030 Build with Mitigation Conditions. The results of these analyses compared against the 2030 No Build and 2030 Build without Mitigation Conditions are provided below. The capacity analysis worksheets are provided in Appendix C along with diagrams depicting the 50^{th} percentile and 95^{th} percentile queue. The signalized and unsignalized intersection capacity analysis results for the impacted study area intersections are summarized below in Table 3-48 and Table 3-49, respectively.

The proposed mitigation is expected to improve overall operations at nearly all impacted study area intersections. At the intersection of Cambridge Street at Windom Street, the southbound Windom Street approach is expected to improve from expected delays of up to 643 seconds without mitigation to delays expected to be no longer than 124 seconds with the proposed mitigation, which entails a second southbound turn lane. The queues on the southbound approach are projected to be reduced by half with mitigation. It should be noted that these improvements in vehicle operations are achieved without eliminating the pedestrian safety enhancements put in place in the No Build Condition, such as exclusive pedestrian phasing.

At the intersection of Solders Field Road at Western Avenue, the proposed modifications to the signal timings and extension of the second eastbound right-turn lane by 250 feet are expected to reduce the eastbound right-turn movement average delay during the weekday evening peak hour from 490 seconds without mitigation to 23 seconds with mitigation, as well as accommodate projected queuing.

The proposed newly signalized intersection of Western Avenue at East Drive / Kresge Way is expected to operate at overall LOS B with all individual movements expected to operate at LOS D or better and experience queues of 255 feet or less. The unsignalized Cattle Drive approach to Western Avenue is also expected to also operate at acceptable level of services under the 2030 Build with Mitigation Conditions, with the delay not expected to be greater than 35 seconds and the queues not expected to exceed four vehicles. Operations on the unsignalized Cattle Drive are expected to improve between 2025 and 2030 due to the opening of Science Drive.

At the intersection of Western Avenue at Stadium Road, the proposed modifications to the signal timings are expected to improve the overall level of service during the weekday evening peak hour from LOS F without mitigation to LOS D with mitigation.

Table 3-48 Signalized Intersection Capacity Analysis: 2030 Future Conditions with Mitigation

	2030 No-Build Condition					2030 Build Condition – No Mitigation					2030 Build Condition – With Mitigation				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Cambridge Street at Windom Street															
Weekday morning															
EB L	0.21	48	D	11	m11	1.16	134	F	~74	m#66	1.24	169	F	~78	m#71
EB T	0.39	11	B	50	m186	0.39	11	B	50	m181	0.39	11	B	51	m182
WB T/R	1.32	170	F	~971	#1445	1.52	262	F	~1223	#1686	1.51	255	F	~1223	#1686
SB L/R	0.91	92	F	104	#227	1.19	183	F	~163	#307	n/a	n/a	n/a	n/a	n/a
SB L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.82	73	E	95	#196
SB R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.20	37	D	31	68
Overall	**1.12**	**128**	**F**			**1.36**	**203**	**F**			**1.31**	**192**	**F**		
Weekday evening															
EB L	0.19	44	D	12	m13	0.56	46	D	36	m38	0.61	48	D	36	m38
EB T	0.47	11	B	64	m318	0.47	11	B	71	m313	0.47	12	B	73	m315
WB T	1.13	87	F	617	#1262	1.21	121	F	~875	#1357	1.21	121	F	~875	#1357
SB L/R	1.27	218	F	~151	#288	2.27	643	F	~343	#515	n/a	n/a	n/a	n/a	n/a
SB L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.00	124	F	106	#237
SB R	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.56	42	D	97	165
Overall	**1.03**	**72**	**E**			**1.20**	**135**	**F**			**1.09**	**87**	**F**		
Soldiers Field Road EB at Western Ave [f]															
Weekday morning															
EB R	0.69	36	D	140	201	0.83	44	D	177	#270	0.37	12	B	124	116
WB L	1.11	75	E	~430	m97	1.11	74	E	~427	m86	1.11	74	E	~427	m86
WB T	0.98	27	C	~443	m148	0.92	23	C	367	m120	0.92	23	C	367	m120
SB T/R	1.16	120	F	~368	m#287	1.19	130	F	~380	m#292	1.19	130	F	~380	m#292
Overall	**1.17**	**70**	**E**			**1.16**	**72**	**E**			**1.16**	**67**	**E**		
Weekday evening															
EB R	1.52	283	F	~325	#446	2.01	490	F	~489	#610	0.86	23	C	185	#430
WB L	0.88	13	B	~358	m80	0.88	13	B	~359	m79	0.88	13	B	~359	m79
WB T	0.69	10	A	111	m66	0.69	10	A	116	m67	0.69	10	A	116	m67
SB T/R	1.56	299	F	~336	#454	1.58	309	F	~343	#461	1.58	309	F	~343	#461
Overall	**1.27**	**135**	**F**			**1.41**	**201**	**F**			**1.19**	**80**	**E**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-48 Signalized Intersection Capacity Analysis: 2030 Future Conditions with Mitigation (continued)

	2030 No-Build Condition					2030 Build Condition – No Mitigation					2030 Build Condition – With Mitigation				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Western Ave at East Drive / Kresge Way															
Weekday morning	*Intersection unsignalized under 2025 No Build Conditions*					*Intersection unsignalized under 2025 Build Conditions without Mitigation*									
EB L											0.19	6	A	11	31
EB T/R											0.45	7	A	111	199
WB L											0.22	4	A	29	m6
WB T/R											0.70	7	A	199	m30
NB L											0.20	36	D	29	m58
NB T/R											0.58	41	D	77	m142
Overall											**0.68**	**12**	**B**		
Weekday evening															
EB L											0.06	7	A	4	m9
EB T/R											0.66	13	B	321	m255
WB L											0.23	5	A	11	m18
WB T/R											0.62	9	A	283	m158
NB L											0.44	34	C	62	m111
NB T/R											0.40	34	C	29	102
Overall											**0.61**	**15**	**B**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
\# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-48 Signalized Intersection Capacity Analysis: 2030 Future Conditions with Mitigation (continued)

	2030 No-Build Condition					2030 Build Condition – No Mitigation					2030 Build Condition – With Mitigation				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Western Ave at Batten Way / Hague Street [f]															
Weekday morning															
EB L	0.61	26	C	43	#212	0.33	7	A	24	m11	0.27	5	A	23	m11
EB T/R	0.50	14	B	130	#433	0.57	9	A	199	#398	0.57	9	A	199	#398
WB L	0.14	10	B	10	50	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
WB T/R	0.89	32	C	340	#930	0.89	24	C	201	#773	0.77	15	B	146	#649
NB L/T	0.20	47	D	14	37	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NB R	0.46	49	D	25	57	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SB L/T/R	0.52	50	D	31	77	0.50	38	D	21	#67	0.50	38	D	21	#67
Overall	**0.78**	**27**	**C**			**0.80**	**18**	**B**			**0.69**	**13**	**B**		
Weekday evening															
EB L	0.20	15	B	10	52	0.15	14	B	1	m13	0.11	15	B	1	m17
EB T/R	0.73	24	C	205	#626	0.71	17	B	18	m#480	0.67	19	B	32	#534
WB L	0.16	14	B	8	41	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
WB T/R	0.83	30	C	252	#736	0.93	37	D	305	m#794	0.81	22	C	218	#741
NB L/T	0.23	47	D	10	31	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NB R	0.31	48	D	10	31	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SB L/T/R	1.13	156	F	~129	#272	0.86	68	E	92	#212	0.89	77	E	106	#232
Overall	**0.75**	**43**	**D**			**0.81**	**32**	**C**			**0.73**	**28**	**C**		
Western Ave at Stadium Road															
Weekday morning															
EB L/T/R	0.62	12	B	0	#542	0.80	23	C	131	#623	0.80	23	C	131	#623
WB L/T/R	0.71	15	B	0	#609	0.78	27	C	235	m#547	0.78	27	C	220	#578
NB L/T/R	0.39	40	D	8	30	0.50	34	C	33	#108	0.50	34	C	33	#108
SB L/T/R	0.05	37	D	1	9	0.01	31	C	1	9	0.01	31	C	1	9
Overall	**0.62**	**14**	**B**			**0.67**	**25**	**C**			**0.67**	**25**	**C**		
Weekday evening															
EB L/T/R	0.61	14	B	74	#560	0.99	59	E	224	#626	0.81	30	C	215	#667
WB L/T/R	0.71	16	B	94	#668	1.22	120	F	222	m#700	1.00	38	D	187	m#857
NB L/T/R	0.38	41	D	15	55	0.54	29	C	86	#260	0.75	48	D	103	#250
SB L/T/R	0.02	39	D	1	9	0.01	24	C	1	9	0.01	32	C	1	9
Overall	**0.59**	**16**	**B**			**0.84**	**85**	**F**			**0.82**	**36**	**D**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
f Hague Street approach to be eliminated under 2030 Build Conditions
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Table 3-49 Unsignalized Intersection Capacity Analysis: 2030 Future Conditions with Mitigation

	2030 No-Build Condition					2030 Build Condition – No Mitigation					2030 Build Condition – With Mitigation				
Location / Movement	D [a]	v/c [b]	Del [c]	LOS [d]	95 Q [e]	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Western Avenue at Cattle Drive															
Weekday Morning															
NB L/R	*Intersection does not exist under 2030 No Build Condition*					266	0.88	64	F	200	153	0.46	25	C	58
Weekday Evening															
NB L/R						255	0.98	94	F	238	152	0.57	35	E	81
Cattle Drive at DEF Drive															
Weekday Morning															
WB L/R [f]	*Intersection does not exist under 2030 No Build Condition*					65	0.16	15	C	14	49	0.12	15	B	10
Weekday Evening															
WB L/R						185	0.32	14	B	35	141	0.25	14	B	25

a Demand, in vehicles
b Volume to capacity ratio.
c Average total delay, in seconds per vehicle.
d Level-of-service.
e 95th percentile queue, in feet.
f Movement improves from LOS C to LOS B due to delay decreasing from 15.3 seconds to 14.8 seconds (threshold between LOS B and C is 15.0 seconds)

3.12.5 Transportation Demand Management

The Project will include a robust set of transportation demand management (TDM) measures that align with the requirements outlined in the City of Boston's Transportation Demand Management Menu of Options. These TDM measures will support the Project's proposed transportation mode shares and parking demand rates.

3.12.5.1 Baseline TDM Measures

Baseline TDM measures in both Phase A and Phase B conditions will include:

- A designated staff person as an on-site TDM coordinator
- Membership in the Allston Brighton Transportation Management Association (TMA)
- Participation in the MBTA's Perq corporate pass program to offer pre-tax transit benefits to all tenants
- Unbundled parking that is priced at market rate
- One on-site car share parking space
- Space for a 19-dock bike share station on the site (one station each for Phase A and Phase B, if necessary) and a monetary contribution to the City's bike share program
- Provision of bike parking spaces in accordance with the City of Boston *Bike Parking Guidelines* (see section 3.4.5.2)
- Distribution of a welcome packet for all tenants that includes a description of all available transportation-related benefits and local transportation options
- Annual events that promote biking and walking, such as *Bike to Work Day* and step count competitions
- Provision of one on-site real time transportation information display

3.12.5.2 Parking Management TDM Measures

Parking management will be used to actively contribute to TDM. Parking management measures on-site will include:

- Parking reduction. The Project site's on-site parking supply is 37 percent below the City of Boston's *Access Boston* parking requirements
- A late-night guaranteed ride home that will reimburse employees for late night rides from taxis or ride-hailing apps (in coordination with the Allston-Brighton TMA)

3.12.5.3 Bicycling TDM Measures

Bicycling-specific TDM measures will also be used to contribute to the Project's overall TDM program. These measures will include:

- Provision of a bike repair station accessible to all tenants of the site.
- Subsidized bike maintenance to be offered to each tenant twice per year per the guidelines of the Allston-Brighton TMA's Bike Check! program.

3.12.5.4 Transit TDM Measures

Transit-specific TDM measures will also be used to contribute to the Project's overall TDM program. These measures will include:

- Provision of a transit service connecting the Project site to key locations nearby, notably Harvard Square. This service will be open to the public and is intended to be operated in coordination with existing bus services in the area.

3.12.5.5 Land Use Diversity TDM Measures

TDM measures related to land use diversity will also be used to contribute to the Project's overall TDM program. These measures will include:

- Laundry services on-site (both in-unit and as part of a collective on-site facility)
- Delivery supportive amenities, including dedicated curb and loading space for delivery facilitation

3.12.6 Transportation Monitoring Program

The Proponent commits to a robust transportation monitoring program to evaluate the effectiveness of its TDM program and to measure the Project's impacts on the transportation network. As detailed next, the monitoring program will include the annual collection of traffic counts and parking garage activity; a review of transit ridership; and a biennial travel choice survey of residents, employees, and patrons of the Site. The transportation monitoring program will begin six months after full occupancy of the Phase A development and continue for a period of five years after the full build-out of the Project. The results of each transportation monitoring program will be summarized in report and provided to City of Boston Transportation Department staff.

3.12.6.1 Traffic Monitoring: Vehicle Volumes and Parking Activity

Annual traffic counts will be conducted both on-Site and off-Site to evaluate the impact of the Project as compared to the estimated impact as outlined in this report.

On-Site Traffic Monitoring: Parking Activity

The actual number of weekday morning peak hour, weekday evening peak hour, and weekday daily vehicle trips generated by the Site shall be measured using simultaneous automatic traffic recorder (ATR) counts or via a parking revenue control system at each parking entrance/exit for a continuous 24-hour period on a typical weekday.

These volumes entering and exiting each parking facility will be compared against the estimated Project-generated vehicle trips presented in Section 3.6.4.8 of this report to determine if the Site is generating trips at a rate higher or lower than what was projected.

Off-Site Traffic Monitoring

The traffic monitoring program will include (1) collecting weekday morning and weekday evening peak period turning movement counts and (2) conducting operations analyses at the following study area intersections:

- Western Avenue at Cattle Drive
- Western Avenue at East Drive / Kresge Way
- Western Avenue at Soldiers Field Road
- Cambridge Street at Windom Street

These area intersections represent the key vehicular gateways to the Site and are the focus of the proposed roadway mitigation, as outlined in Section 3.12.3. Intersection operations analyses at these locations will be conducted to determine whether the proposed mitigation measures result in the intersections operating as expected.

In addition to peak period turning movement counts at the identified intersections above, the traffic monitoring program will include collecting continuous 48-hour ATR counts at the following locations:

- Western Avenue west of Cattle Drive
- Soldiers Field Road Southbound Surface Road south of Western Avenue
- Windom Street, north of Almy Street

These counts will be collected on a non-holiday week, during midweek days.

Baseline Traffic Monitoring Counts

To establish a baseline of traffic conditions in a post-COVID-19 pandemic period, new traffic counts will be conducted at all off-site traffic monitoring locations in the Fall of 2021. Recall that for this study, the Existing Conditions are based on traffic counts from 2017 and 2018, prior to the travel disruptions caused by the COVID-19 pandemic. While these previous traffic counts are appropriate for the impact analyses presented in this report (as outlined in City of Boston and MassDOT guidelines), new traffic counts may reflect changes in patterns, mode choices, and activity levels.

3.12.6.2 Transit Ridership Monitoring

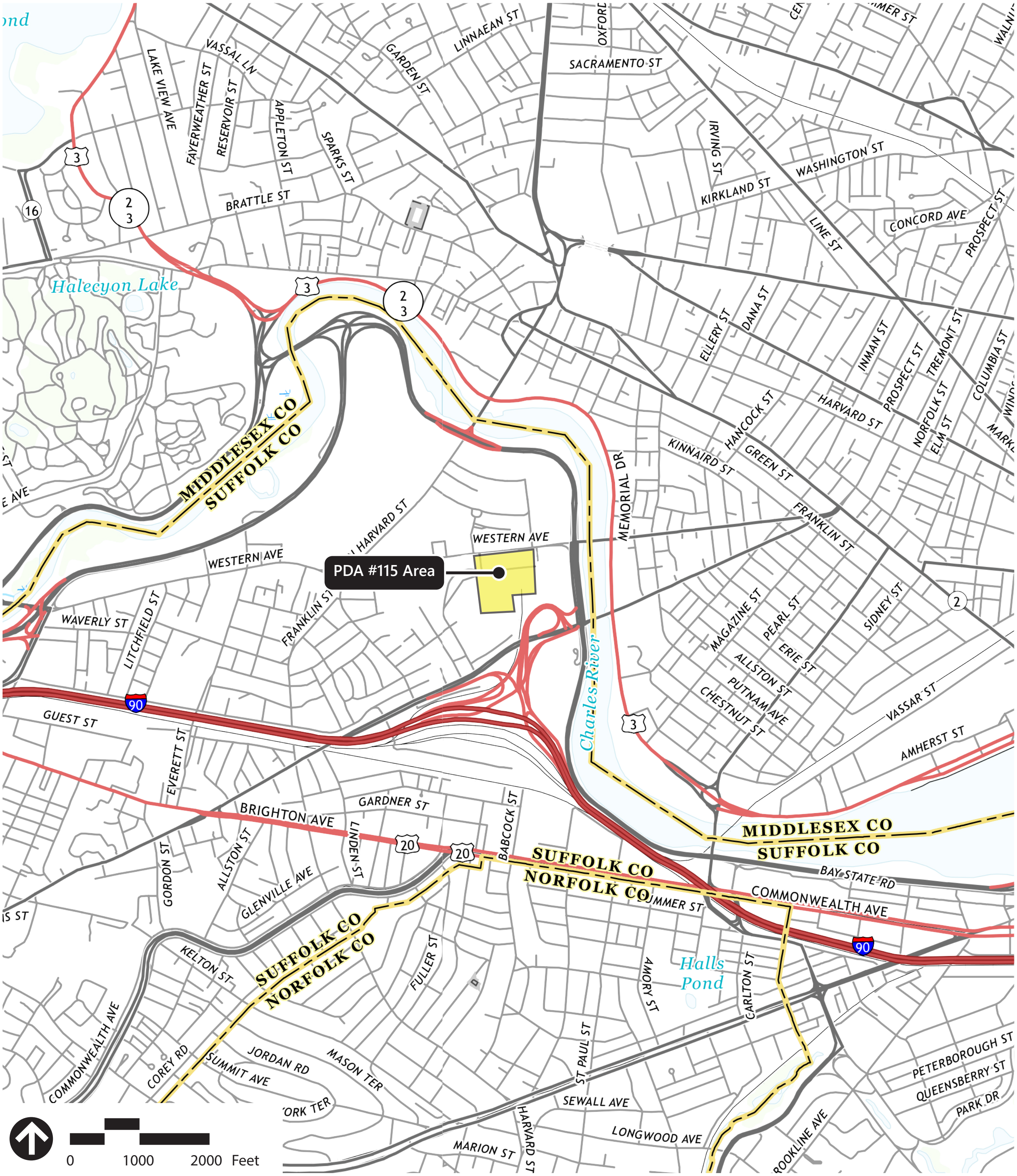
The annual reporting of the transportation monitoring program will include a review of MBTA bus and area transit ridership activity. The data will include the boarding and de-boarding activity of the area's MBTA bus routes at stops serving the Project area. Transit activity data (boardings by trip or time of day) will be gathered with the support of the transportation service providers (expected to be Harvard and the ABTMA). The review of these data will establish trends and changes in transit ridership to support adjustments to service to meet evolving passenger demand.

3.12.6.3 Travel Choice Survey

The biennial travel choice survey, administered to residents, employees, and patrons of the Project, will include questions about their commuting patterns and travel mode choices. The goal of this survey will be to (1) evaluate the effectiveness of the TDM program (and its associated measures) and (2) estimate mode choice splits. The survey will aid in the refinement and changes to TDM incentives and to understand any emerging mobility needs or concerns.

3.12.7 Coordination with Local and State Agencies

The Proponent has met with the City of Boston, MBTA, MassDOT, and DCR staff during the development of this transportation impact analysis. All roadway, transit, bicycle, pedestrian, and TDM mitigation will be coordinated with the relevant public agencies. The City of Boston, MBTA, MassDOT, and DCR staff will be involved in finalizing, designing, and implementing the proposed mitigation. In addition, all mitigation items were proposed and design following the latest local and state guidelines and with local and regional vision plans in mind.



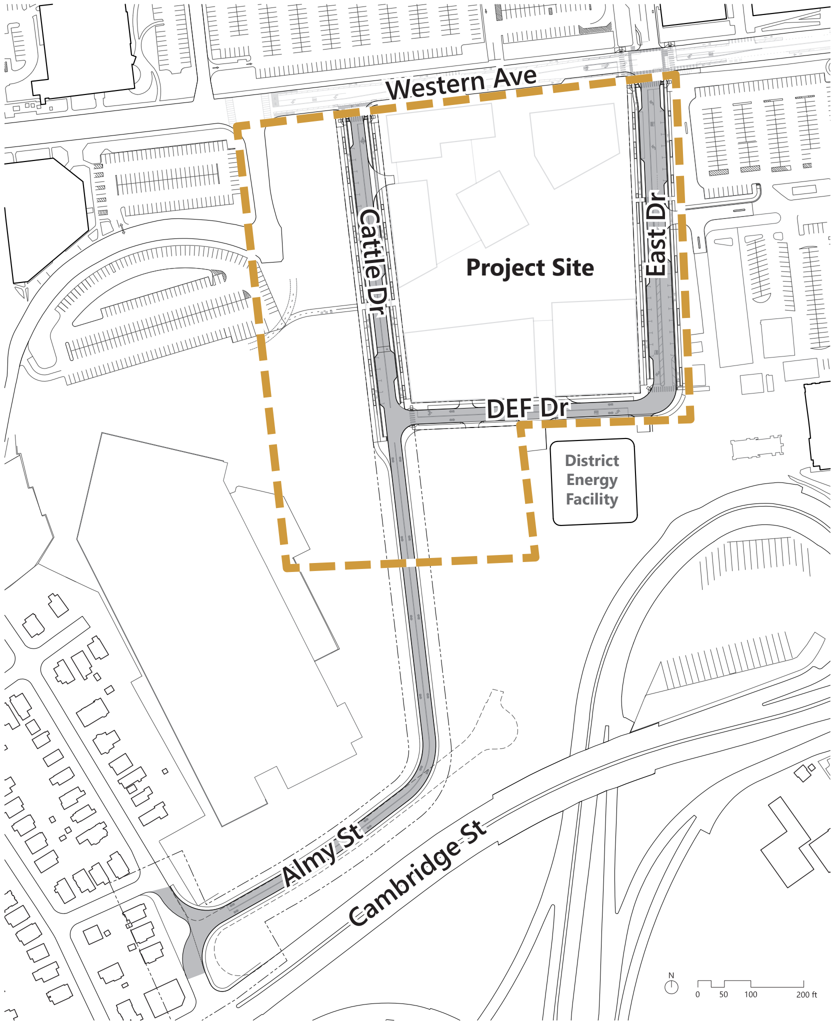
Source: USGS

Figure 3.1

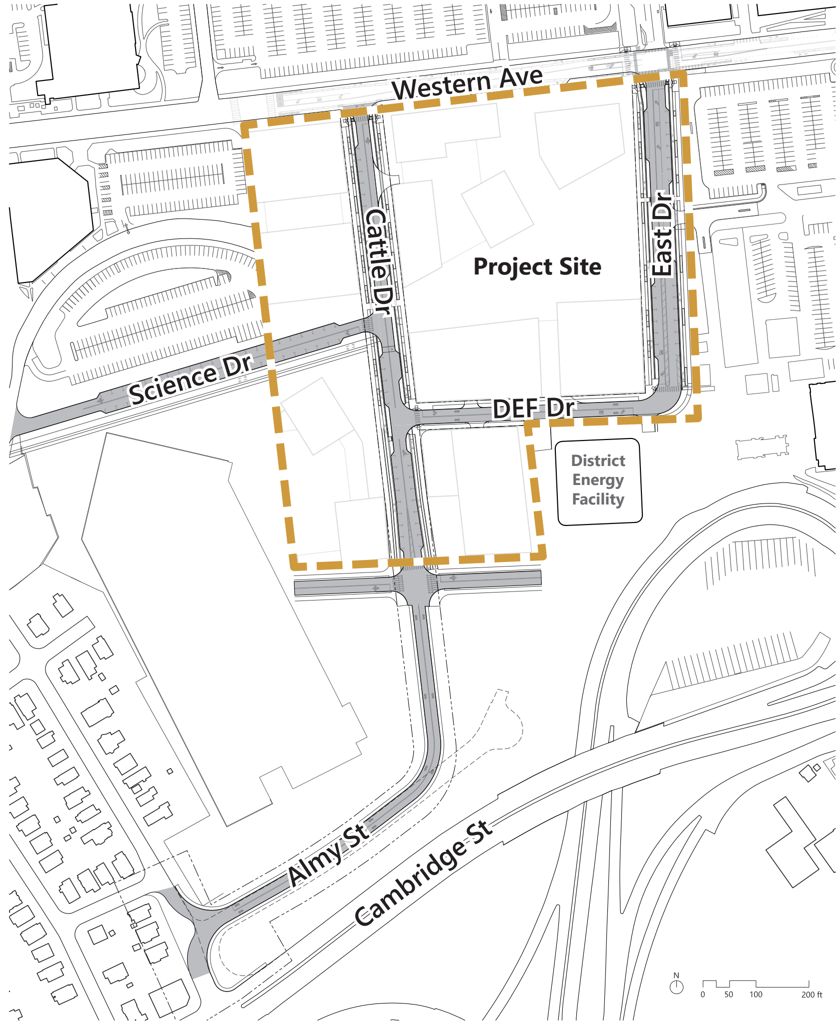
Site Location Map

Enterprise Research Campus Project
Boston, MA

Phase A



Phase B



PDA Boundary

Figure 3.2

ERC Enabling Streets

Enterprise Research Campus Project
Boston, MA

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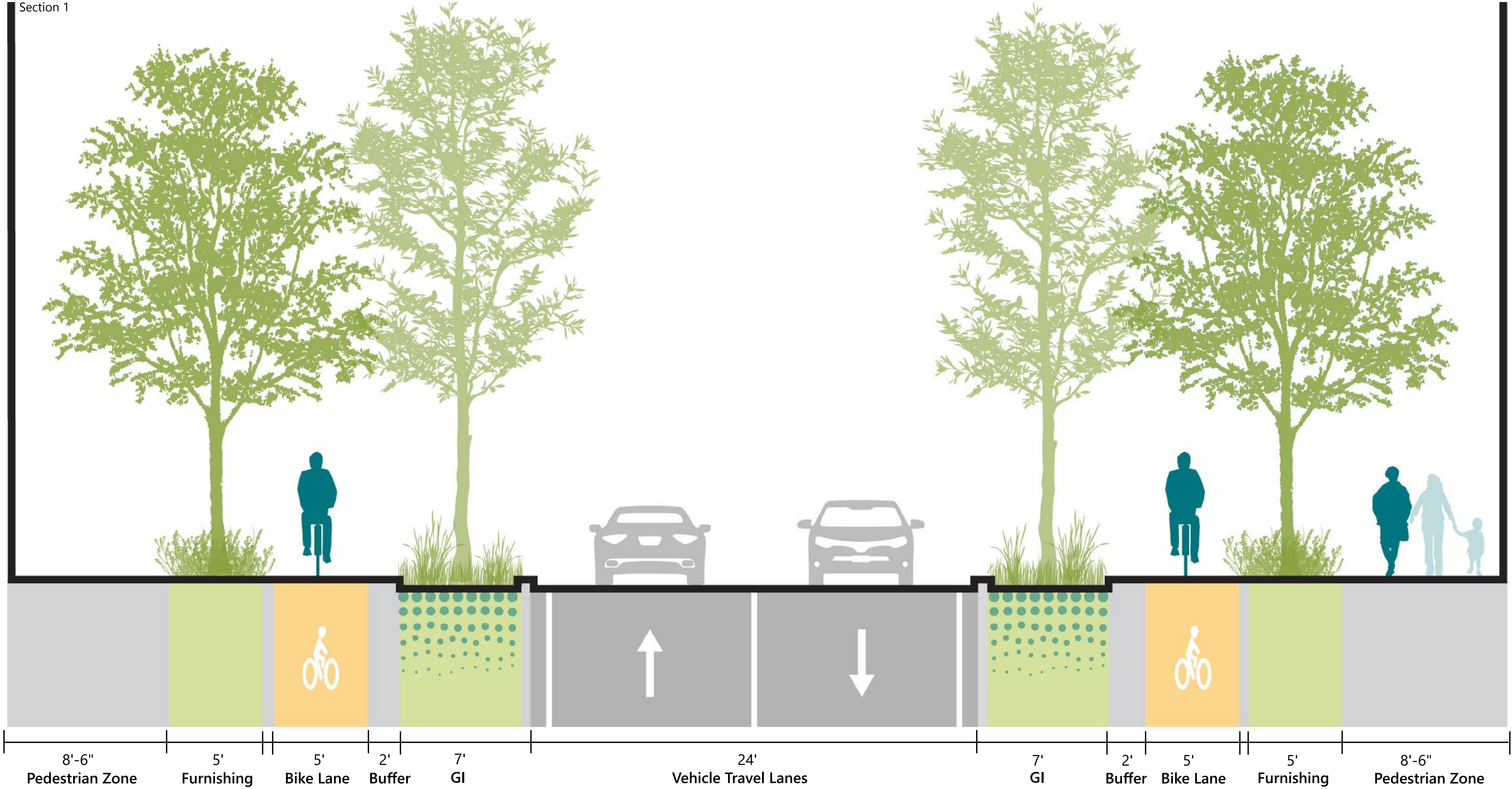


Figure 3.3a
Cattle Drive - Proposed Section
without Parking

Enterprise Research Campus Project
Boston, MA

Prepared by: Henning Larsen, Studio Gang, Utile and Scape

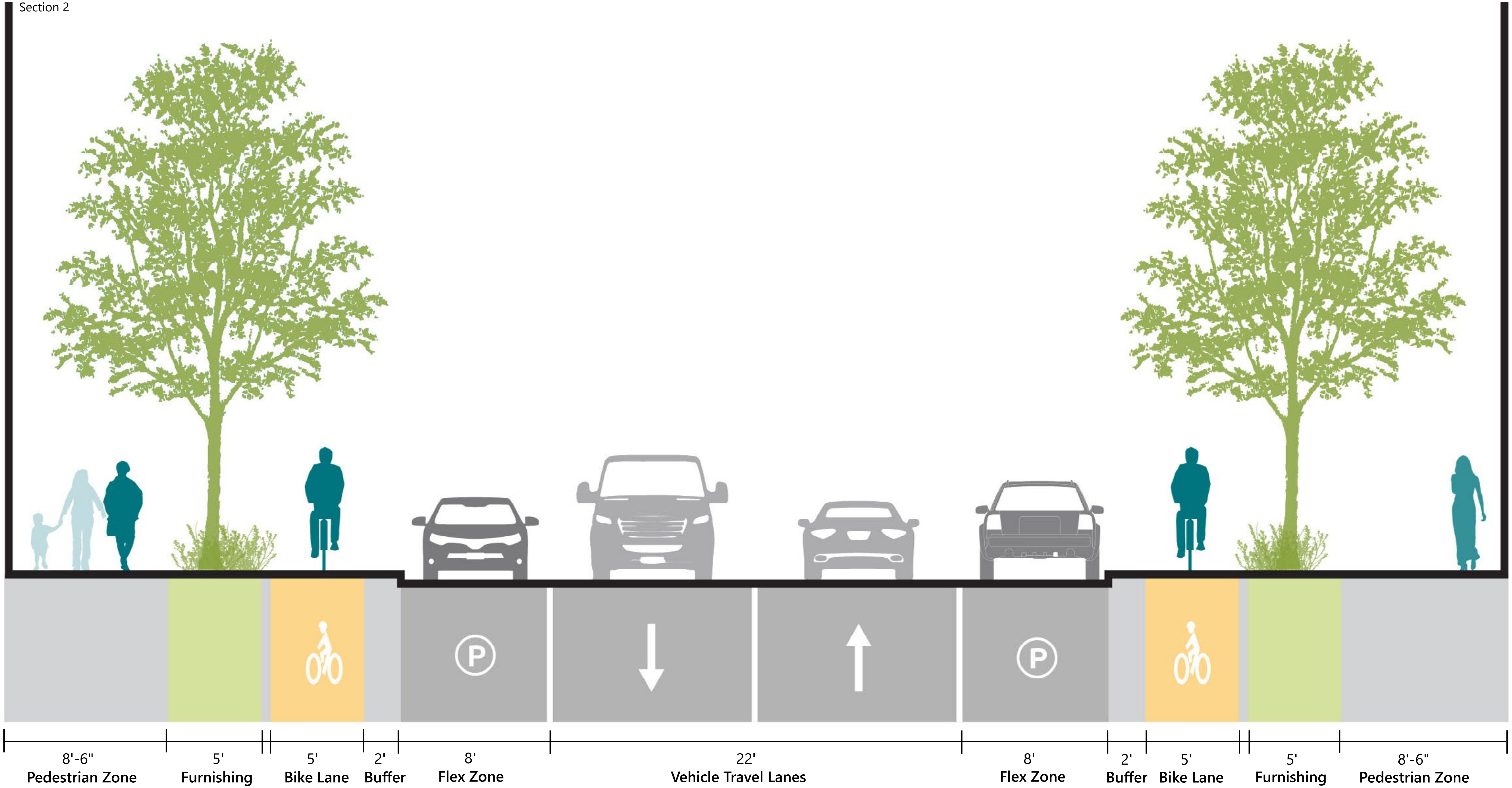
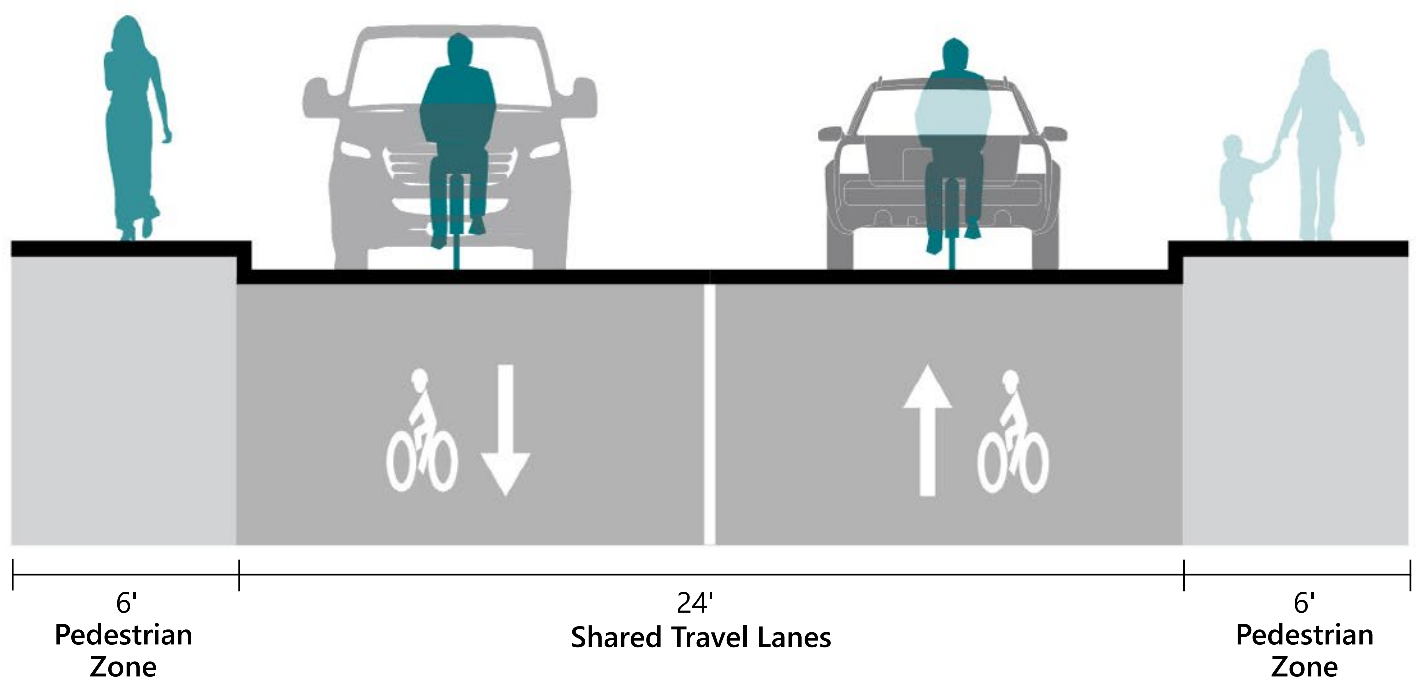


Figure 3.3b
Cattle Drive - Proposed Section
with Parking

Enterprise Research Campus Project
Boston, MA

Section 1



0 2.5 5 15 ft

Figure 3.3c

Interim Cattle Drive - Proposed

Enterprise Research Campus Project
Boston, MA

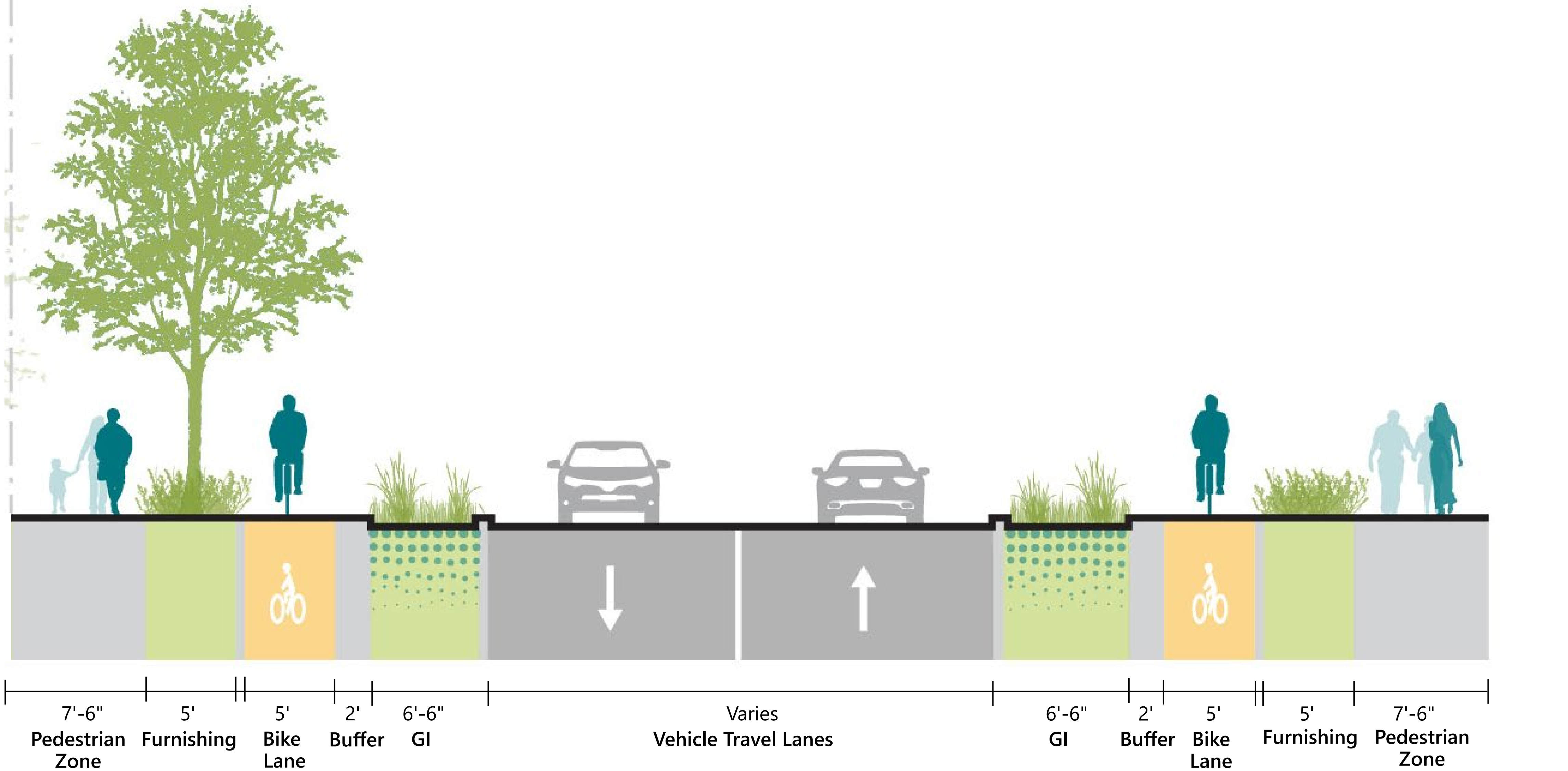


Figure 3.3d
East Drive - Proposed Section without Parking

Enterprise Research Campus Project
Boston, MA

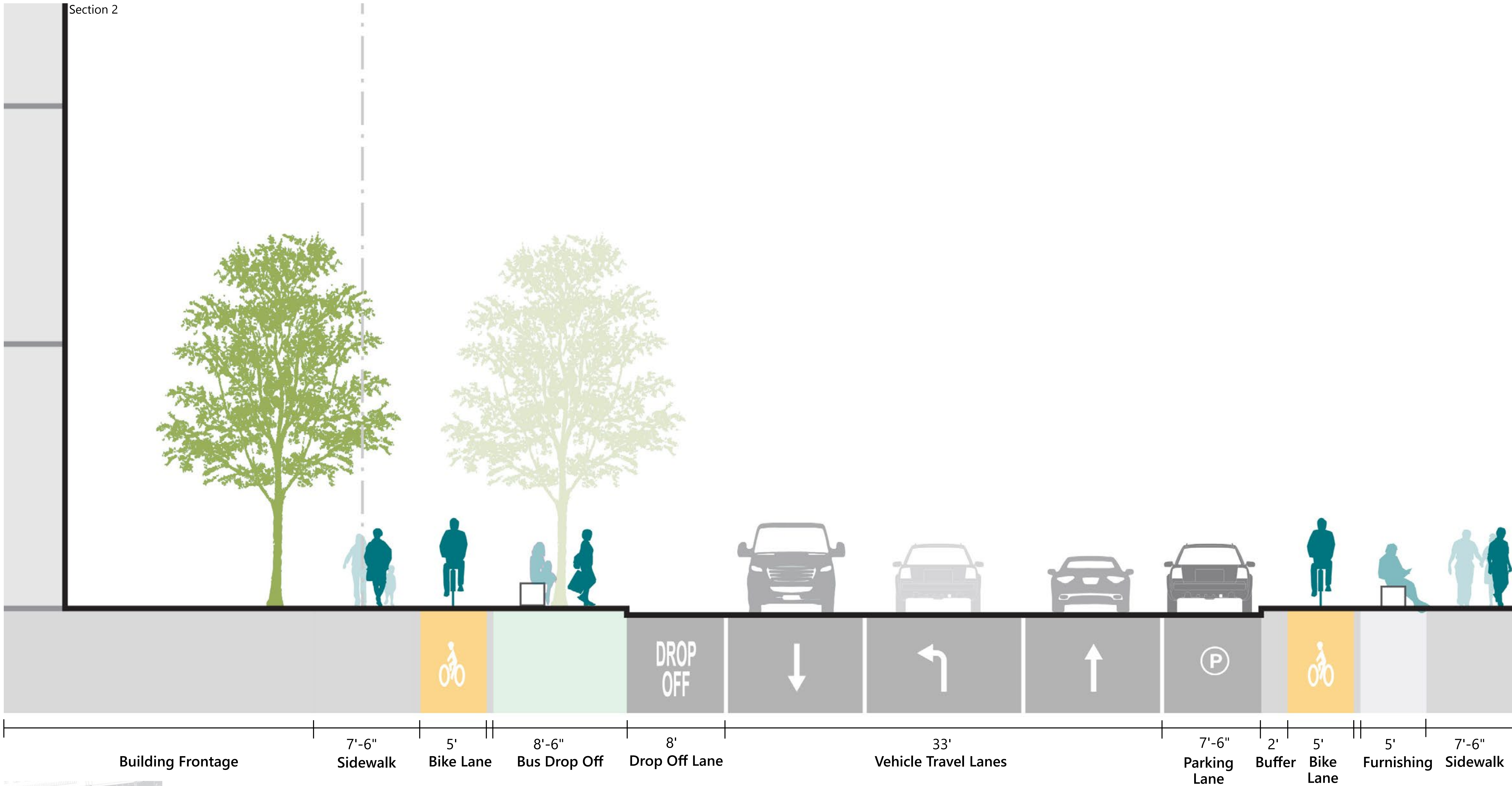


Figure 3.3e
East Drive - Proposed Section
with Parking

Enterprise Research Campus Project
Boston, MA

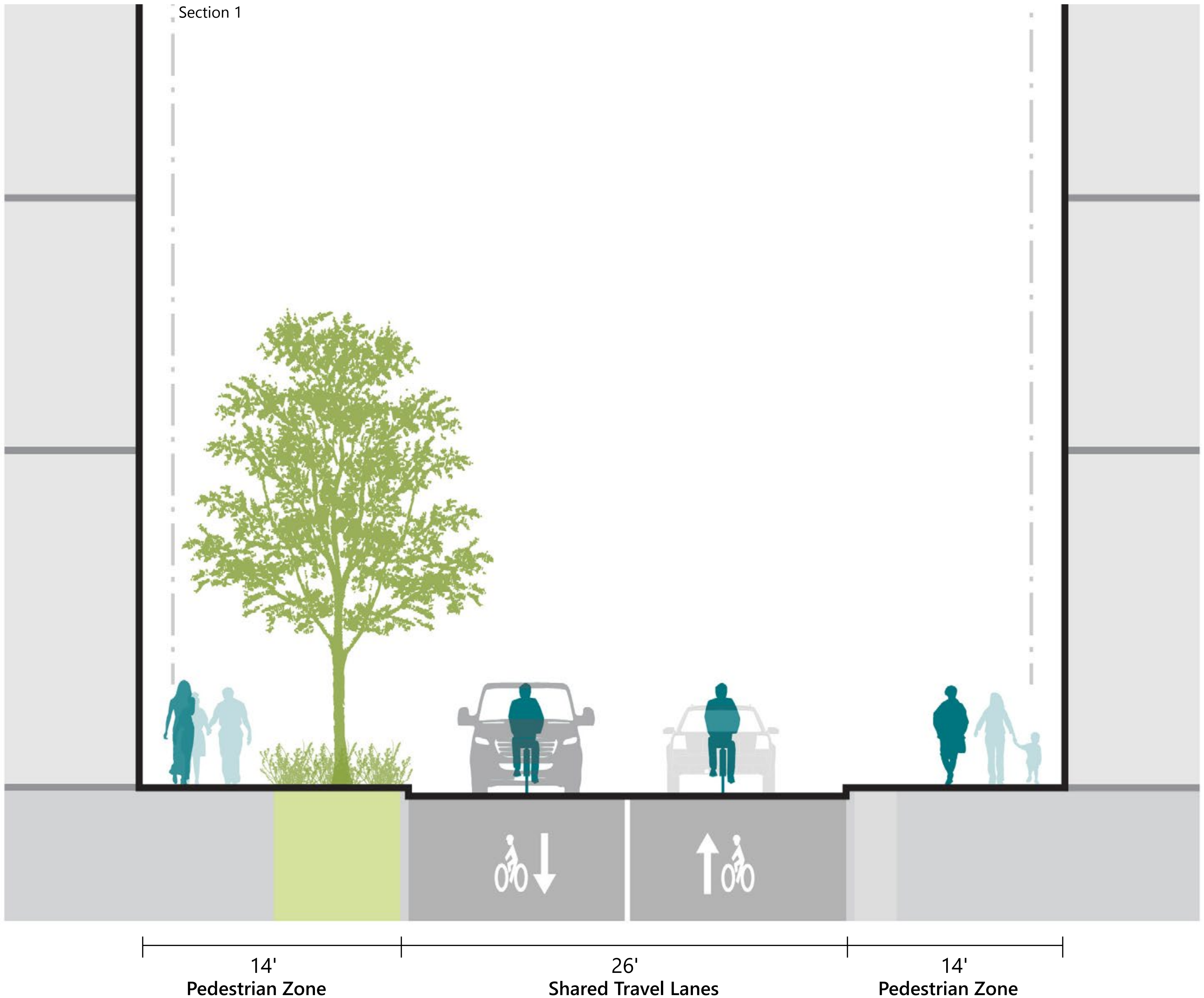


Figure 3.3f

DEF Drive - Proposed

Enterprise Research Campus Project
Boston, MA

Prepared by: Henning Larsen, Studio Gang, Utile and Scape

Section 1

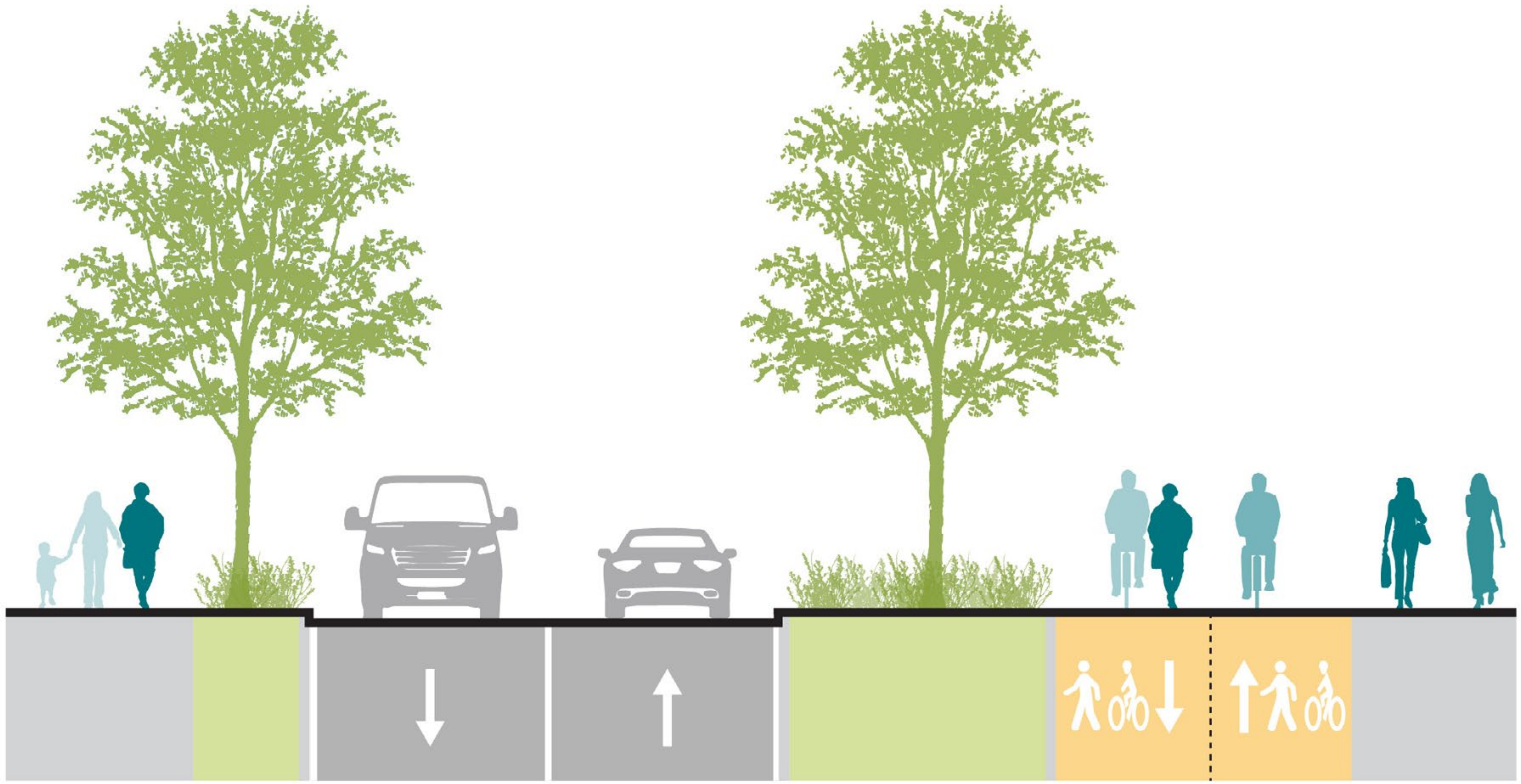


Figure 3.3g
Science Drive - Planned Section without Parking

Enterprise Research Campus Project
Boston, MA

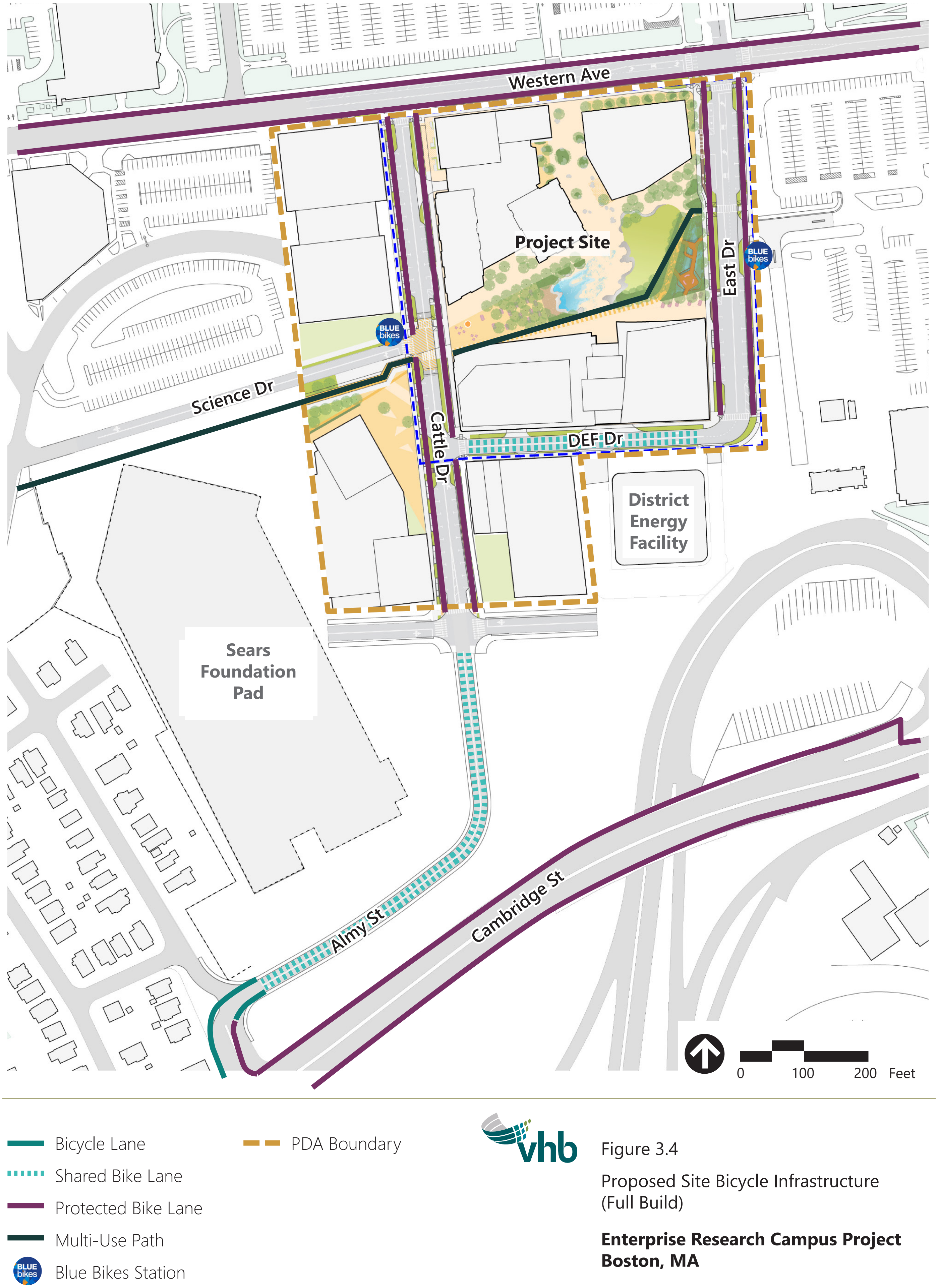
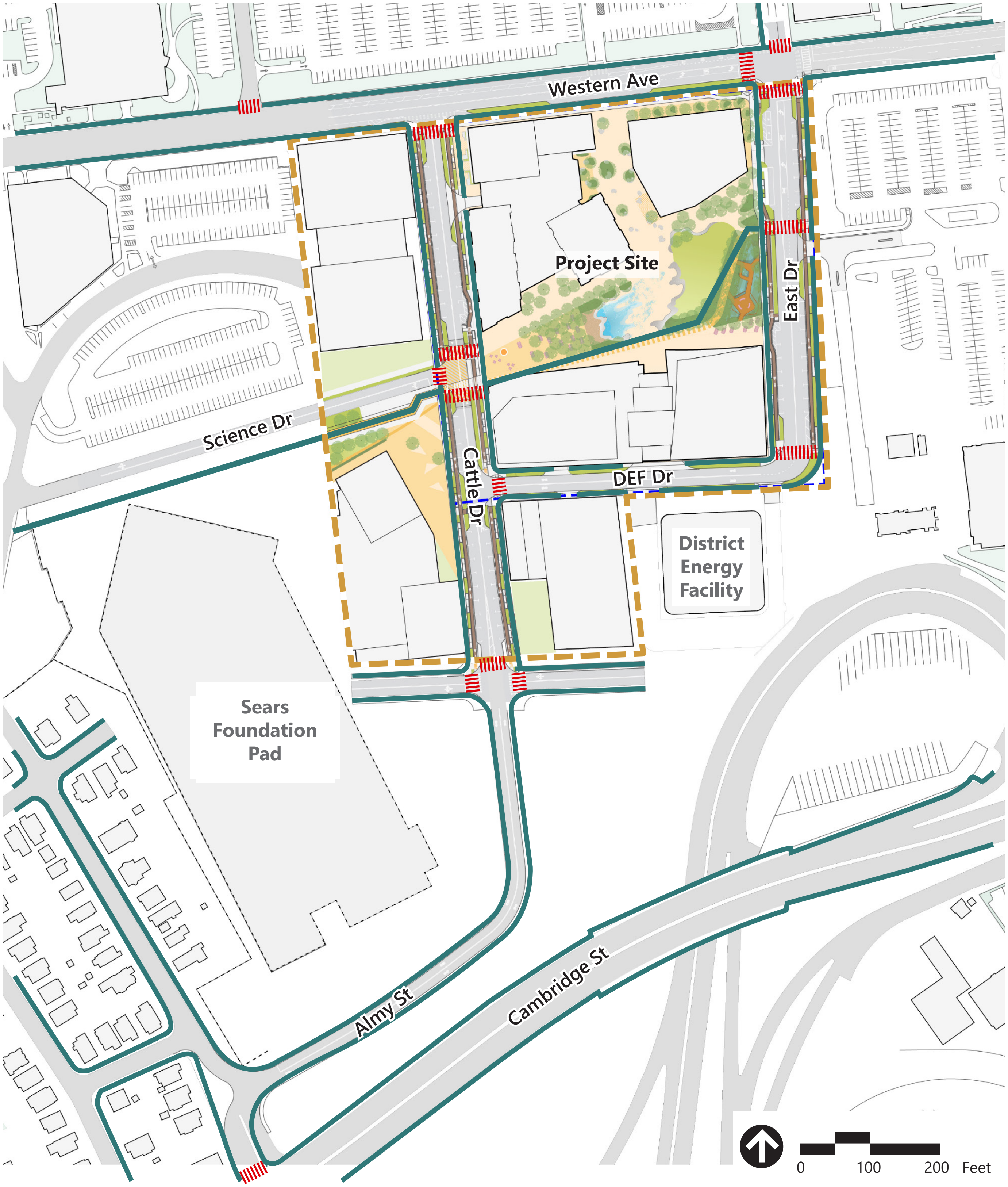


Figure 3.4

Proposed Site Bicycle Infrastructure (Full Build)

Enterprise Research Campus Project
Boston, MA



Sidewalk

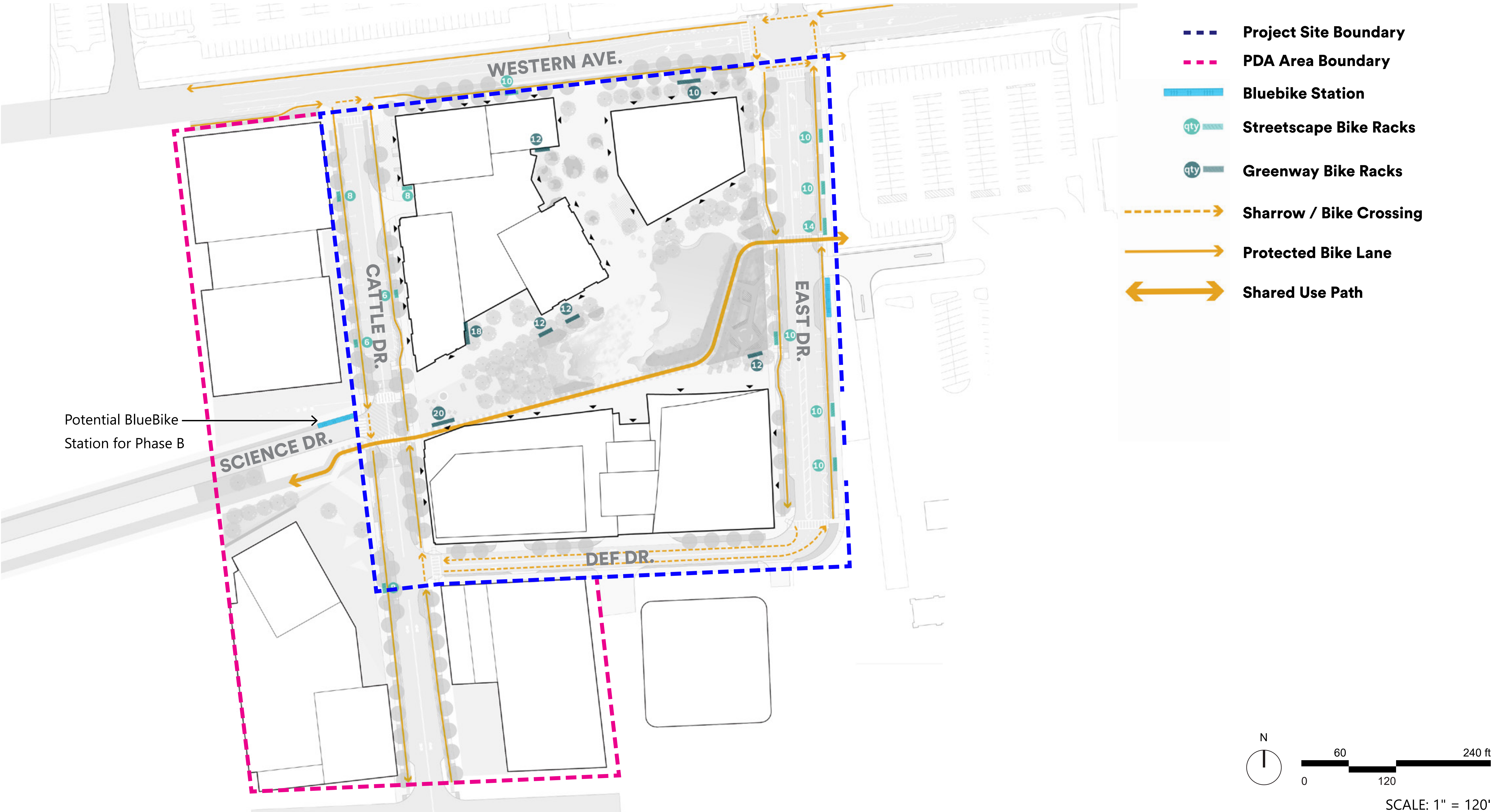
Crosswalk

PDA Boundary

Figure 3.5

Proposed Site Pedestrian Infrastructure (Full Build)

Enterprise Research Campus Project
Boston, MA



Note: Illustrative purposes only. Subject to change.

Figure 3.6

Bicycle Parking and BlueBikes Stations

Enterprise Research Campus Project
Boston, MA

Prepared by: Henning Larsen, Studio Gang, Utile and Scape

Base map aerial image: Nearmap Aerial (2020)

\# Existing and No-Build Intersection

\# ERC Intersection

Figure 3.7

Study Area Intersections

Enterprise Research Campus Project
Boston, MA

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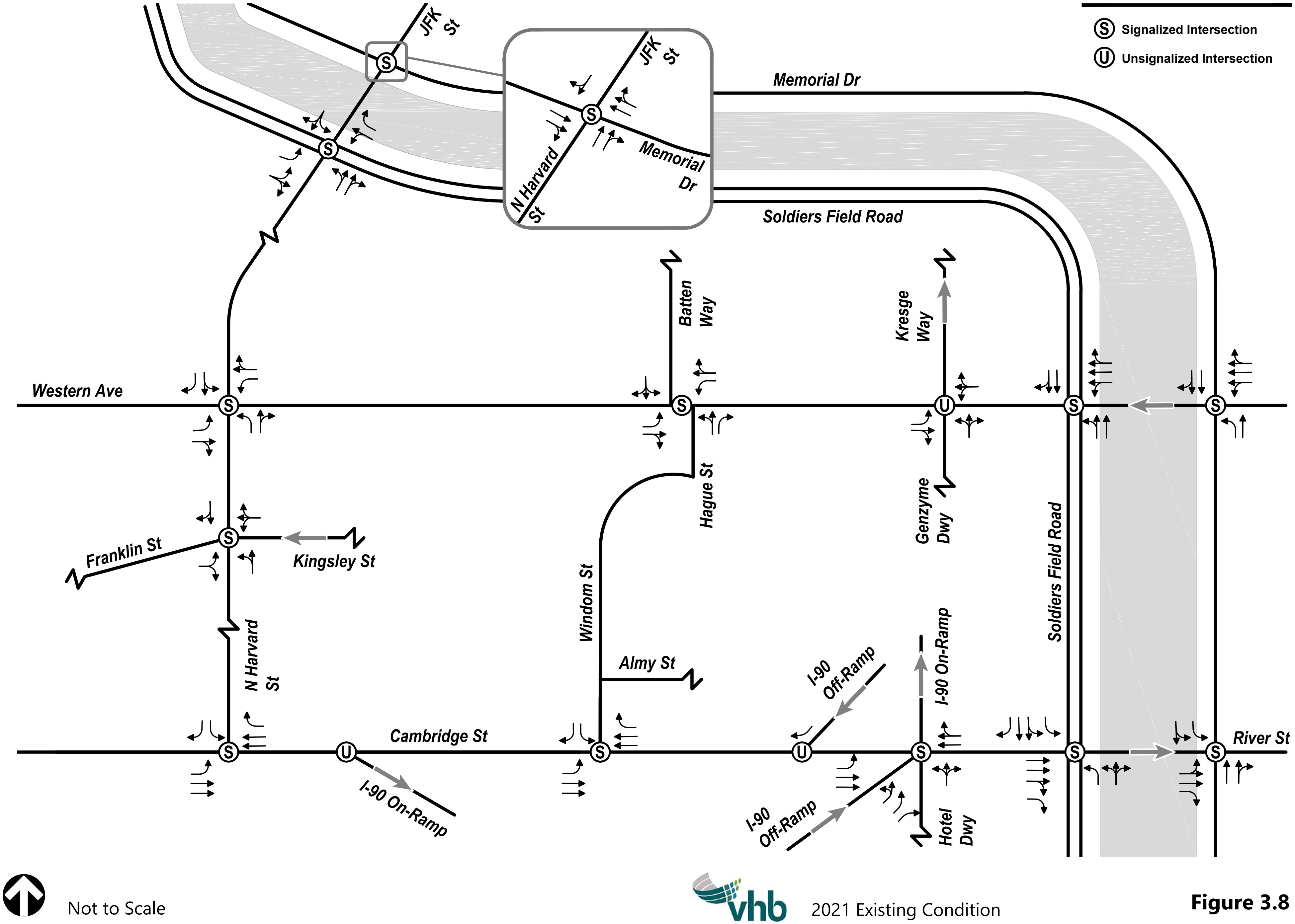
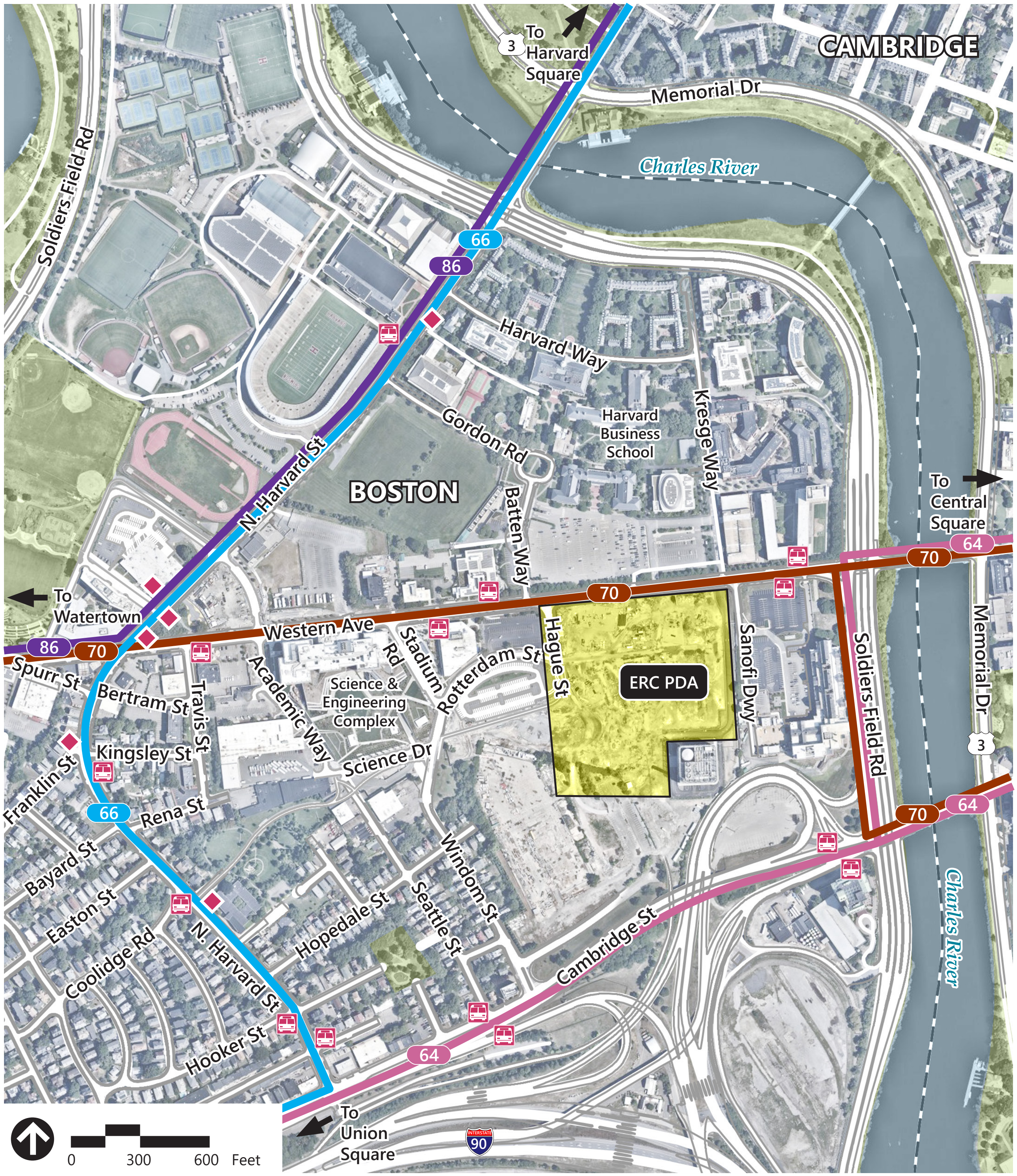


vhb

2021 Existing Condition
Roadway Geometry

Enterprise Research Campus Project
Boston, MA

Figure 3.8



Base map aerial image: Nearmap Aerial (2020)

XX MBTA Bus Route

Route 70 – Market Place Drive or Waltham Center - University Park (Cambridge) via Western Ave
Route 66 – Harvard Square – Nubian Station (Roxbury) via N. Harvard St
Route 86 – Sullivan Square - Reservoir (Cleveland Circle) via N. Harvard St (North) & Western Ave (West)
Route 64 – Oak Square – University Park or Kendall/MIT via Cambridge St

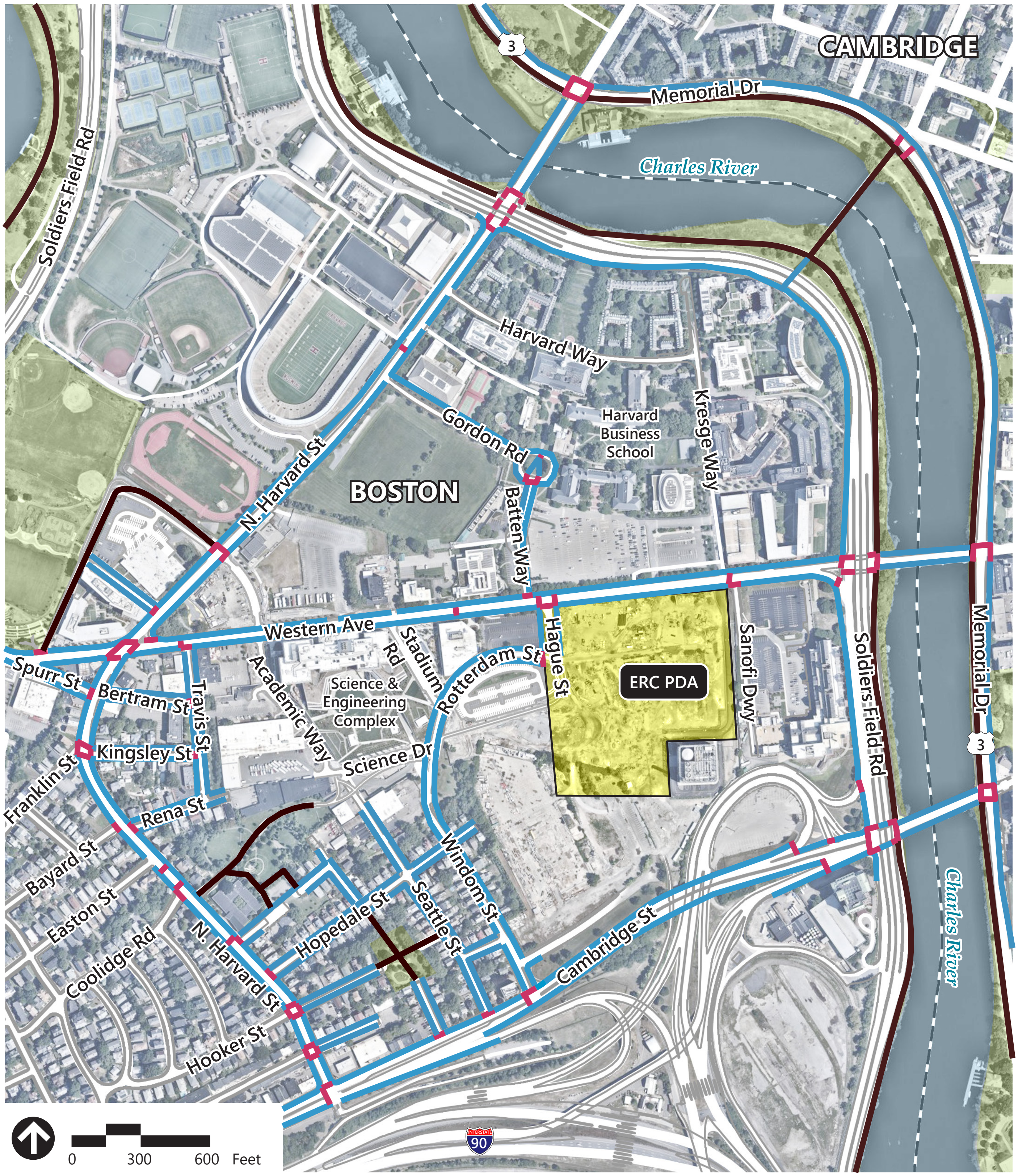
MBTA Bus Stop

MBTA Bus Shelter

Figure 3.9

Existing Public Transit Services and Stops

Enterprise Research Campus Project
Boston, MA



Base map aerial image: Nearmap Aerial (2020)

Crosswalk

Sidewalk

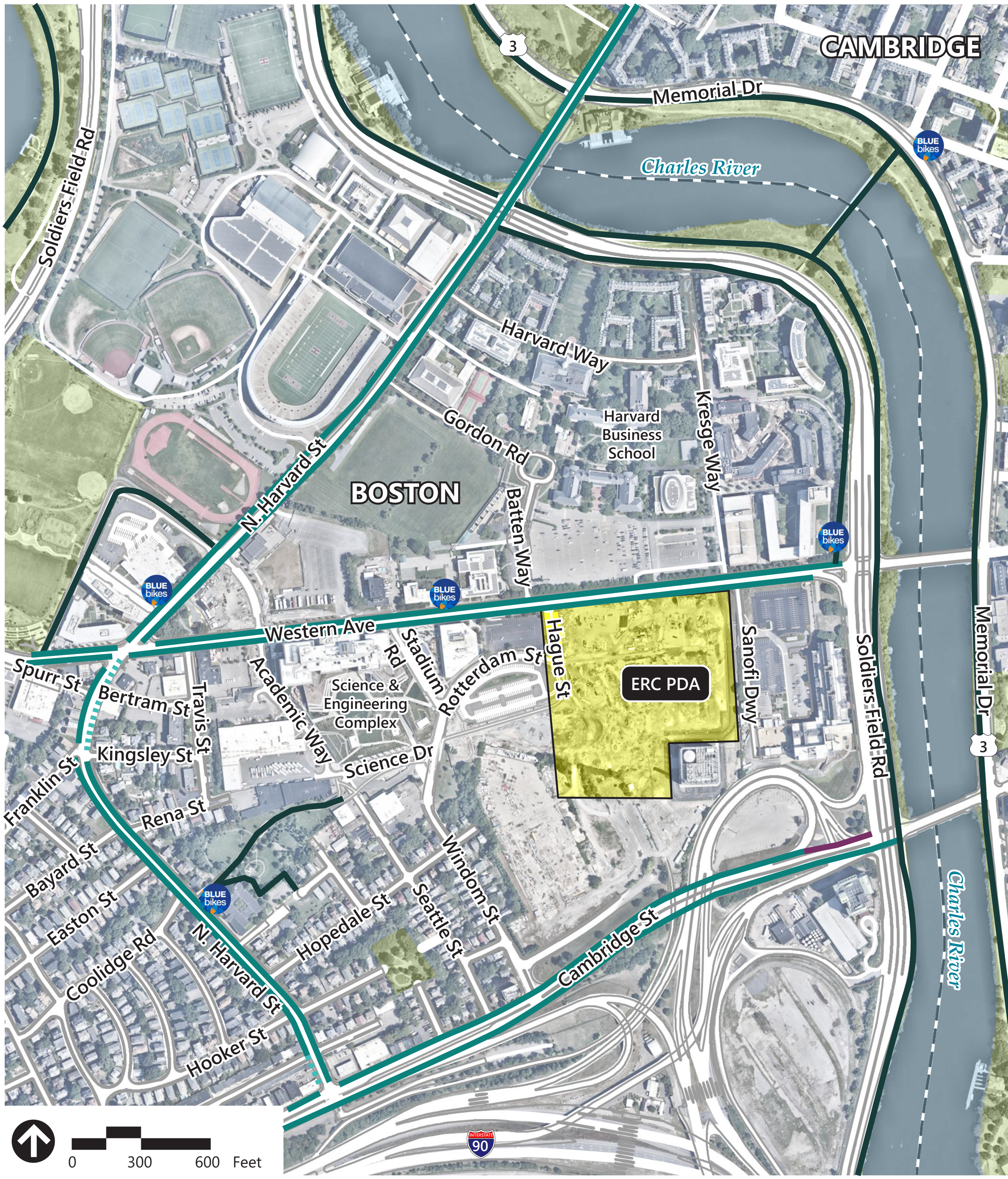
Multi-Use Path

vhb

Figure 3.10

Existing Pedestrian Infrastructure

Enterprise Research Campus Project
Boston, MA



Base map aerial image: Nearmap Aerial (2020)

- Bluebikes Station
- Bike Lane
- Shared Lane
- Protected Bike Lane
- Multi-Use Path

Figure 3.11

Existing Bicycle Facilities

Enterprise Research Campus Project
Boston, MA

Base map aerial image: Nearmap Aerial (2020)

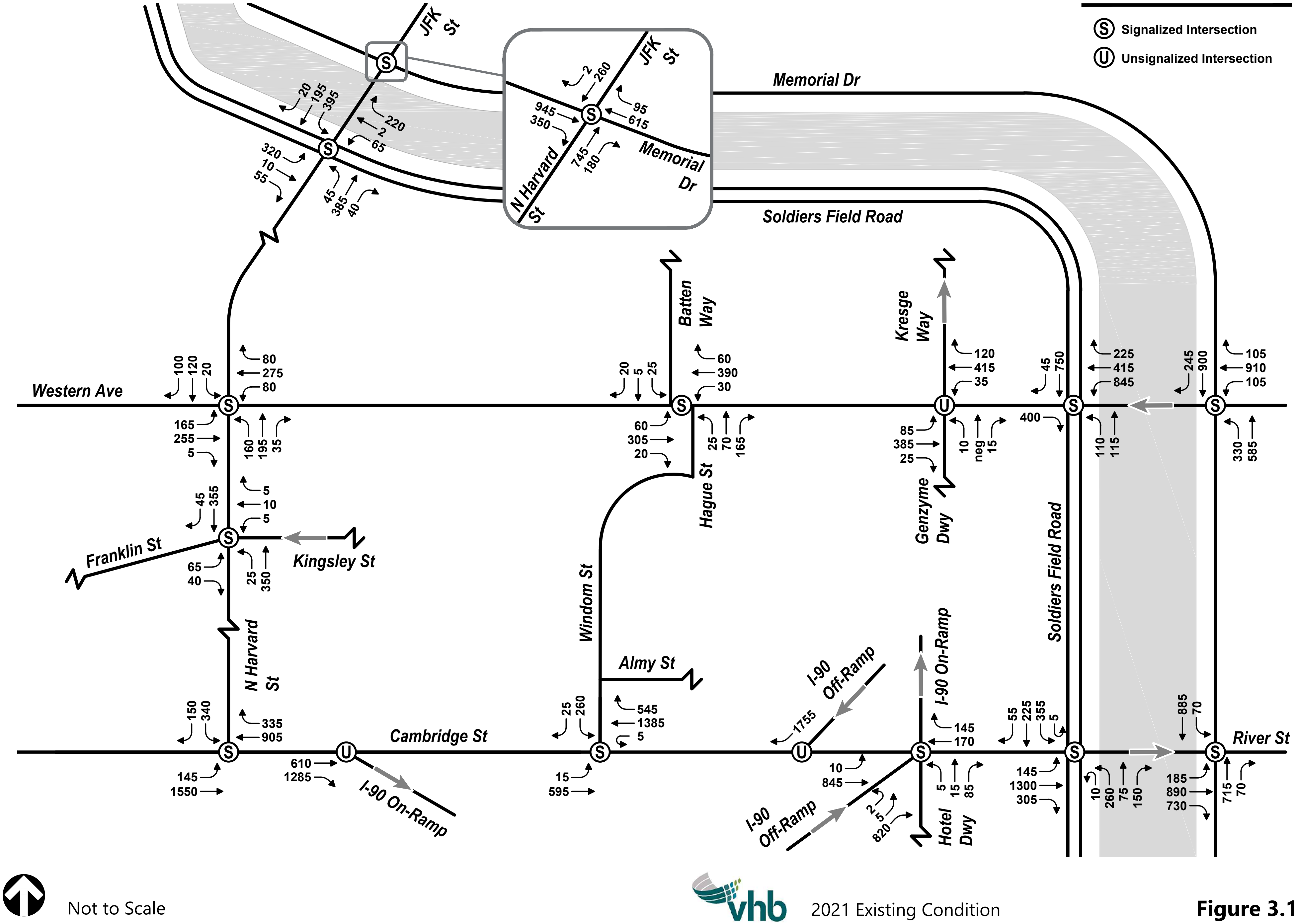
Bluebikes Station

Zipcar Location

Figure 3.12

Existing Bike Share and Car Share Locations

Enterprise Research Campus Project
Boston, MA

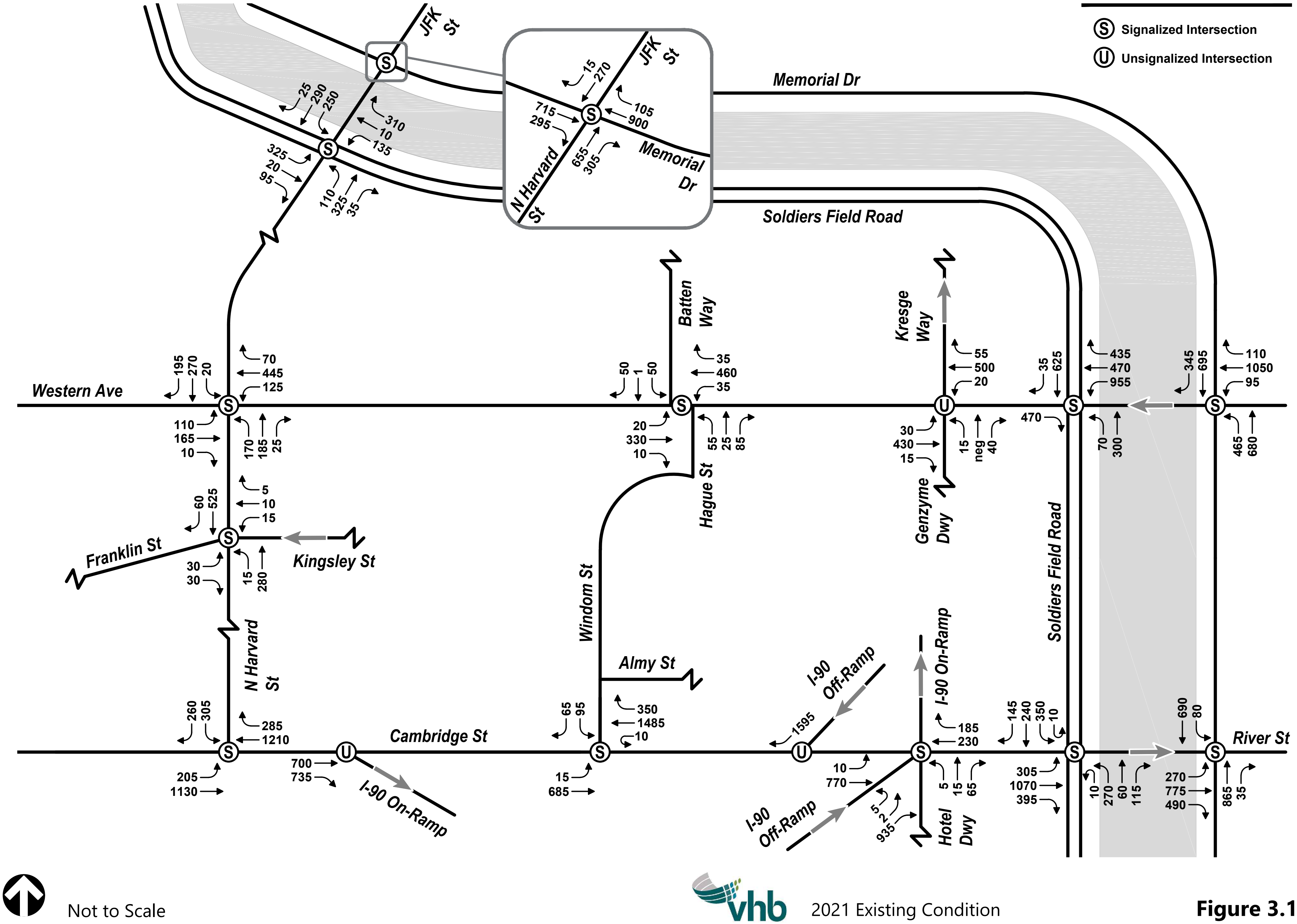


Not to Scale

2021 Existing Condition
Vehicle Volumes: Morning Peak Hour

Enterprise Research Campus Project
Boston, MA

Figure 3.13

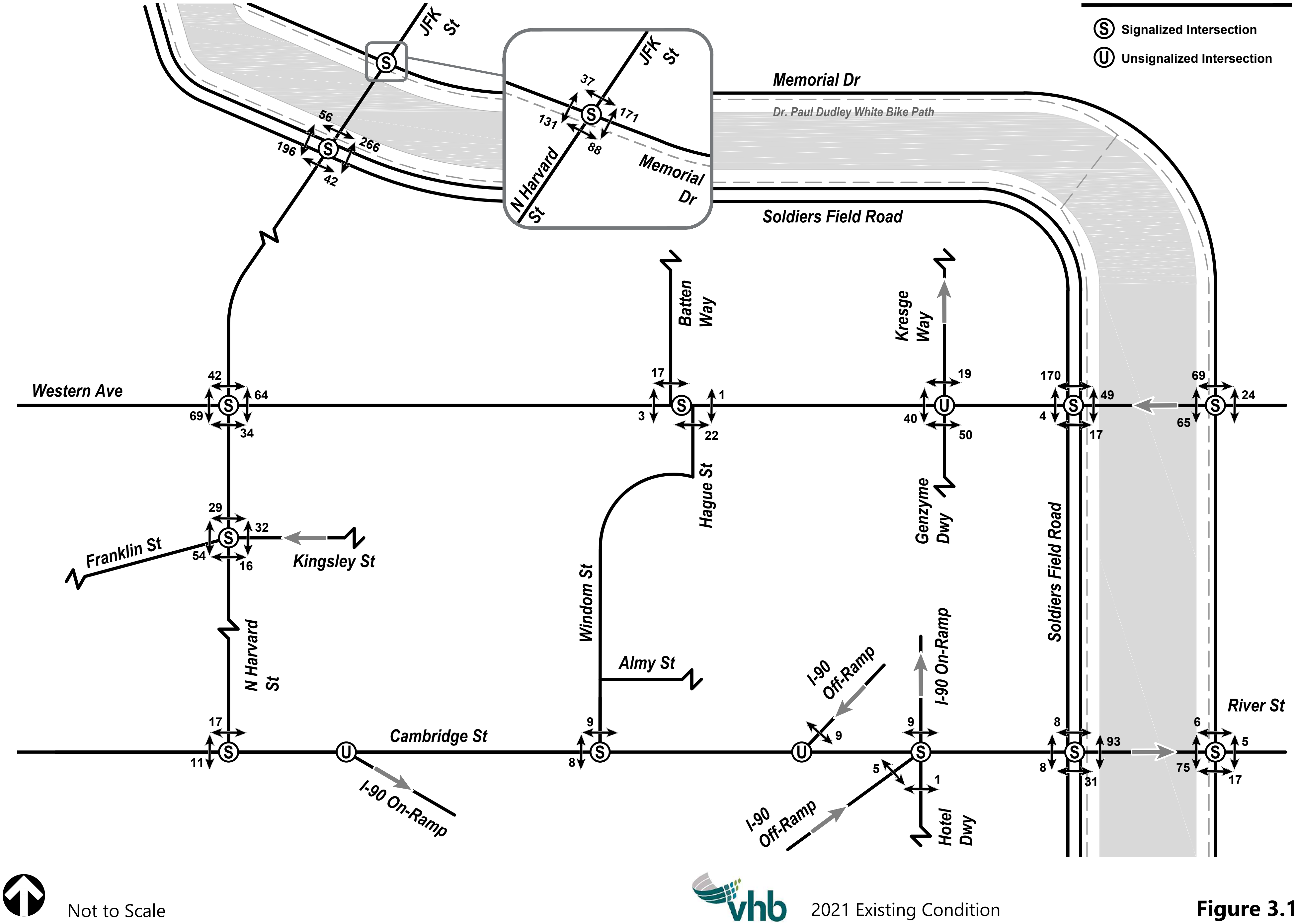


Not to Scale

2021 Existing Condition
Vehicle Volumes: Evening Peak Hour

Enterprise Research Campus Project
Boston, MA

Figure 3.14

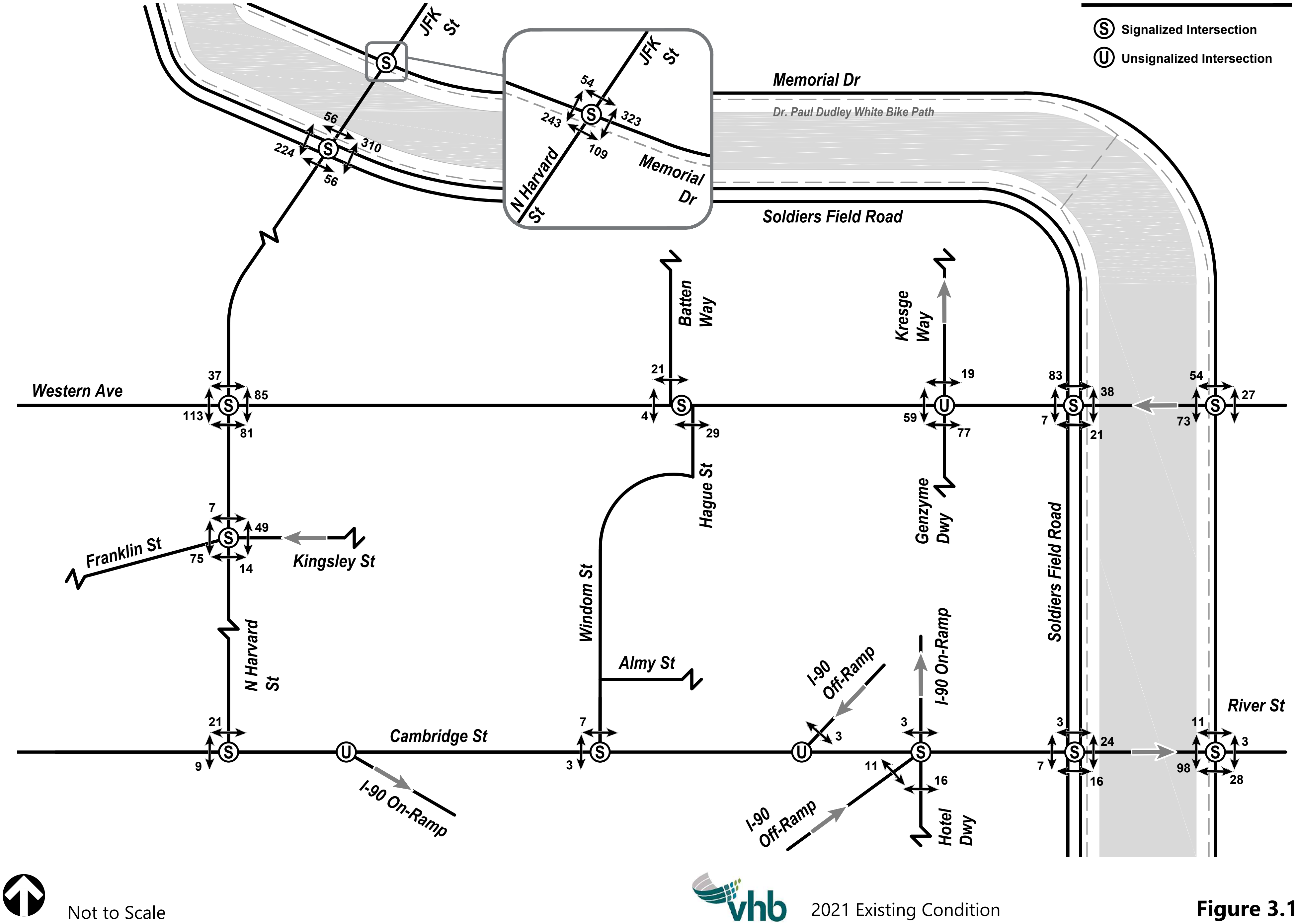


Not to Scale

2021 Existing Condition
Pedestrian Volumes: Morning Peak Hour

Figure 3.15

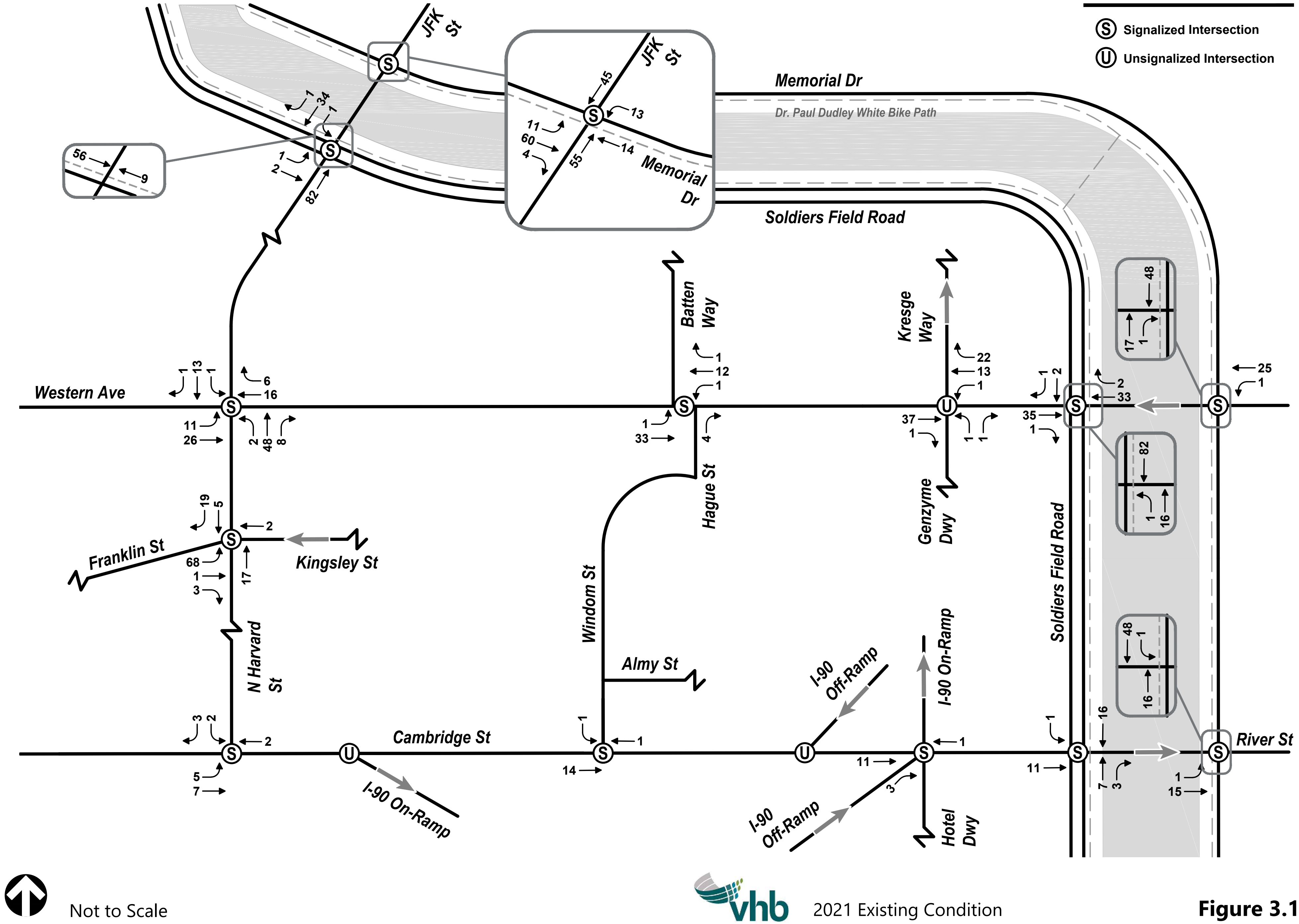
Enterprise Research Campus Project
Boston, MA



2021 Existing Condition
Pedestrian Volumes: Evening Peak Hour

Figure 3.16

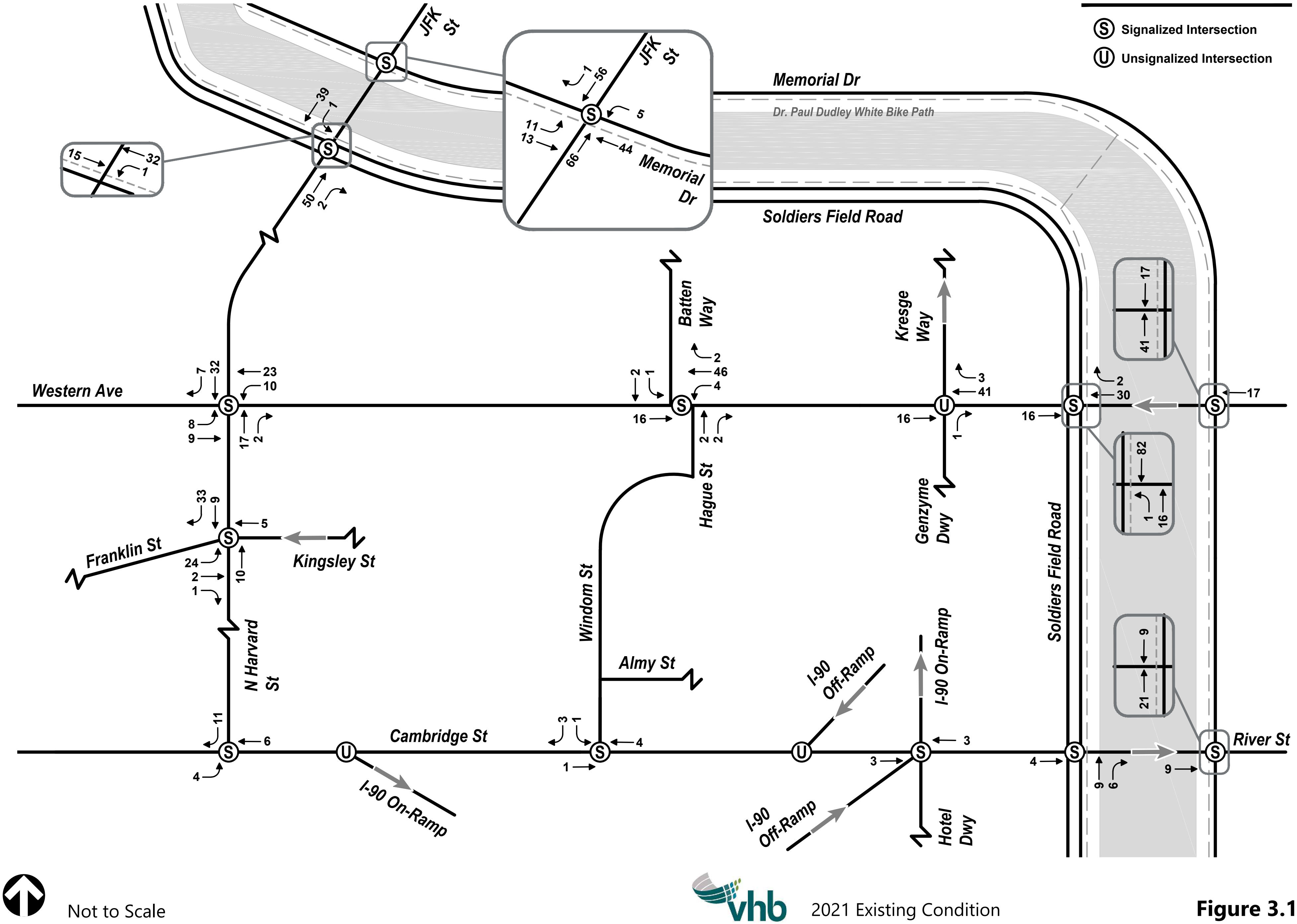
Enterprise Research Campus Project
Boston, MA



2021 Existing Condition
Bicycle Volumes: Morning Peak Hour

Enterprise Research Campus Project
Boston, MA

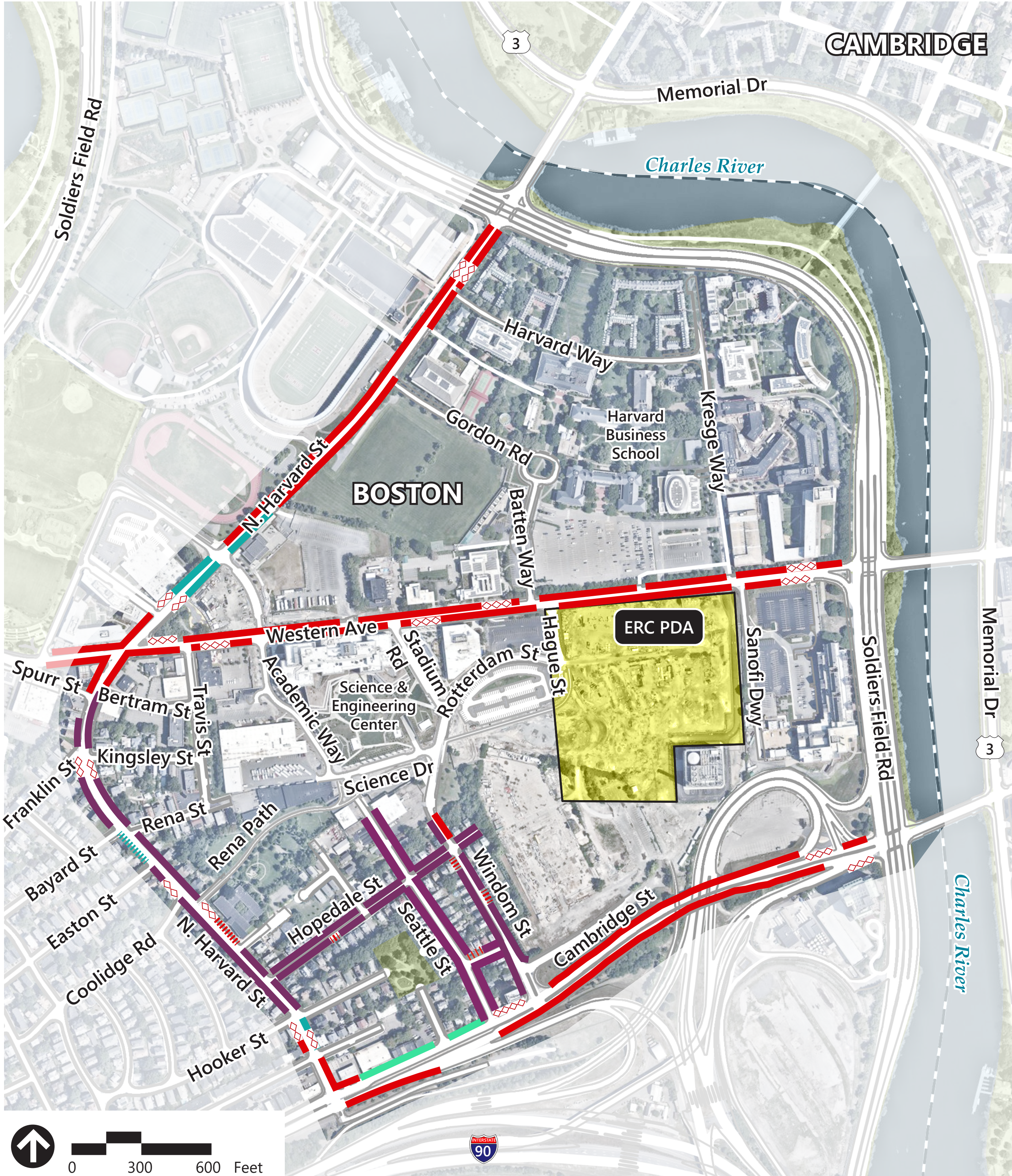
Figure 3.17



2021 Existing Condition
BIcycle Volumes: Evening Peak Hour

Figure 3.18

Enterprise Research Campus Project
Boston, MA



Base map aerial image: Nearmap Aerial (2020)

- No Stopping
- Unregulated
- 2-Hour Parking
- 2-Hour Parking M-F 8am-6pm
- Resident Permit Parking M-F 8am-6pm
- Handicaped Parking
- MBTA Bus Stop

Figure 3.19

Existing On-Street Parking and Curbside Regulations

Enterprise Research Campus Project
Boston, MA

Image Source: Google Earth Pro Aerial

IMP Projects

Non-IMP Projects

Figure 3.20

Other Area Development Projects

Enterprise Research Campus Project
Boston, MA

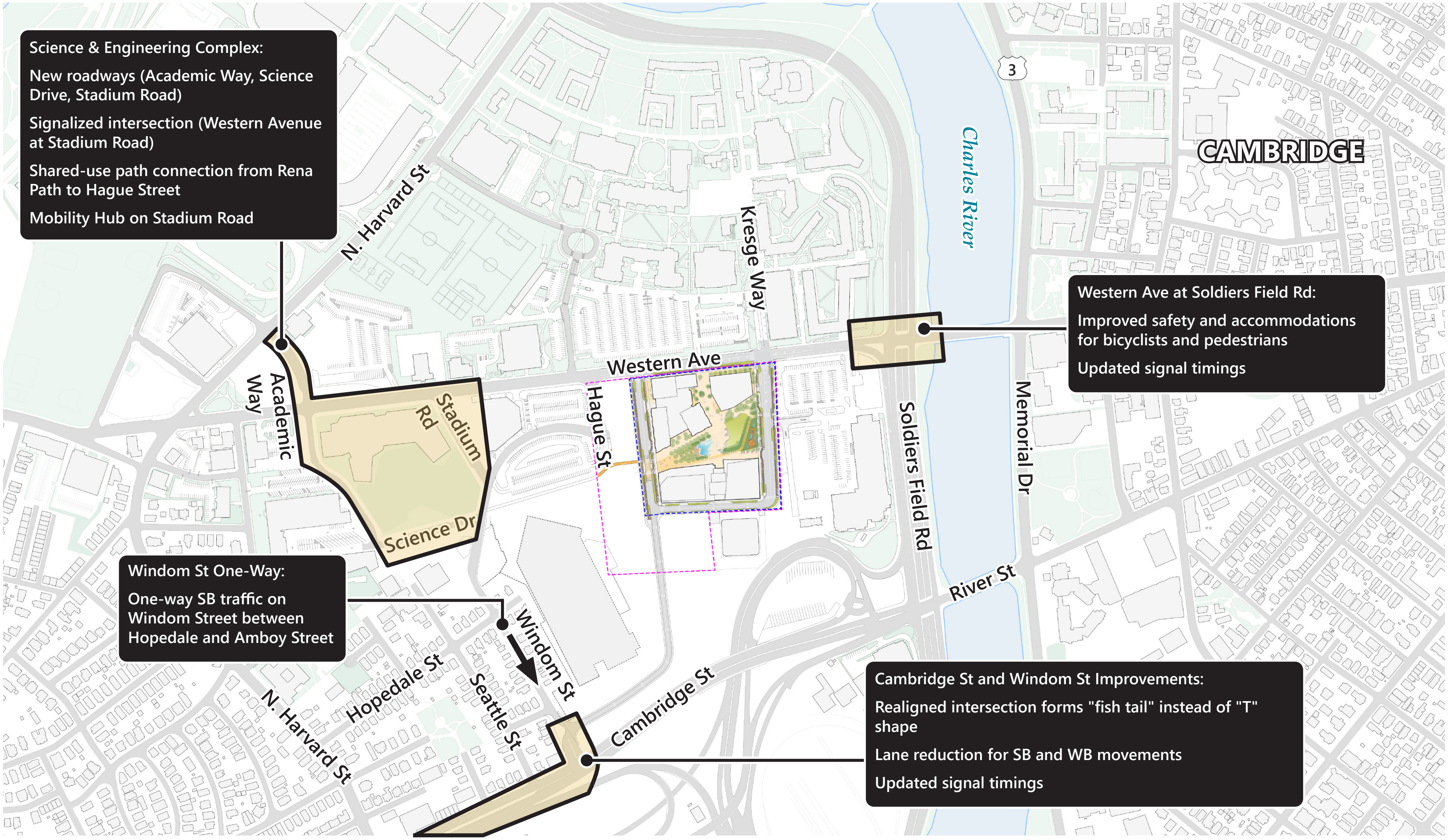
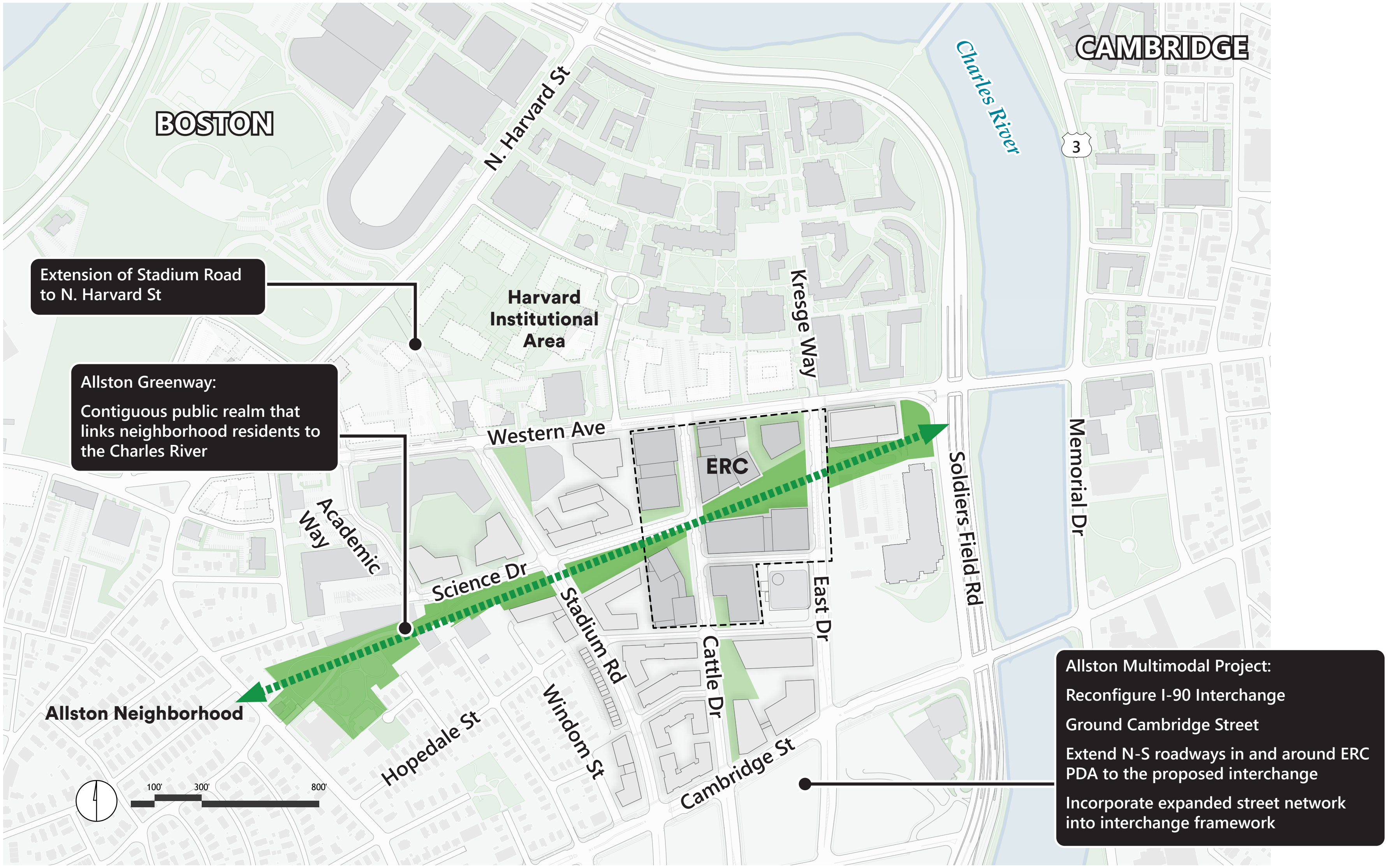


Figure 3.21

Implemented/Planned Infrastructure: 2025

Enterprise Research Campus Project
Boston, MA



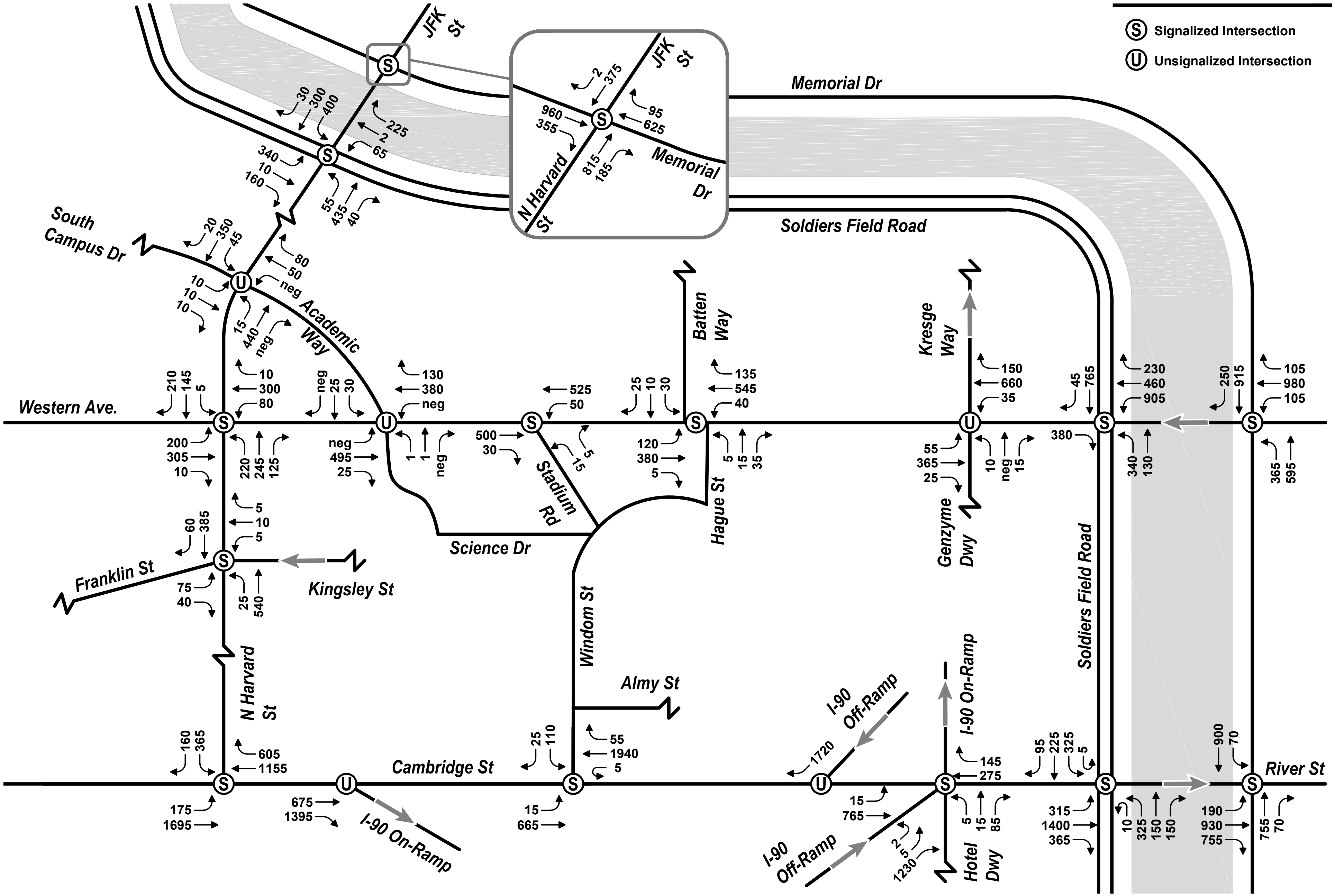
Note: Subject to change. For illustrative purposes only.

Figure 3.22

Future Potential Roadway Connections - Transportation Context

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Networks_Updated_05-27-2021.dwg



Not to Scale

2025 No-Build Condition
Vehicle Volumes: Morning Peak Hour

Figure 3.23

Enterprise Research Campus Project
Boston, MA

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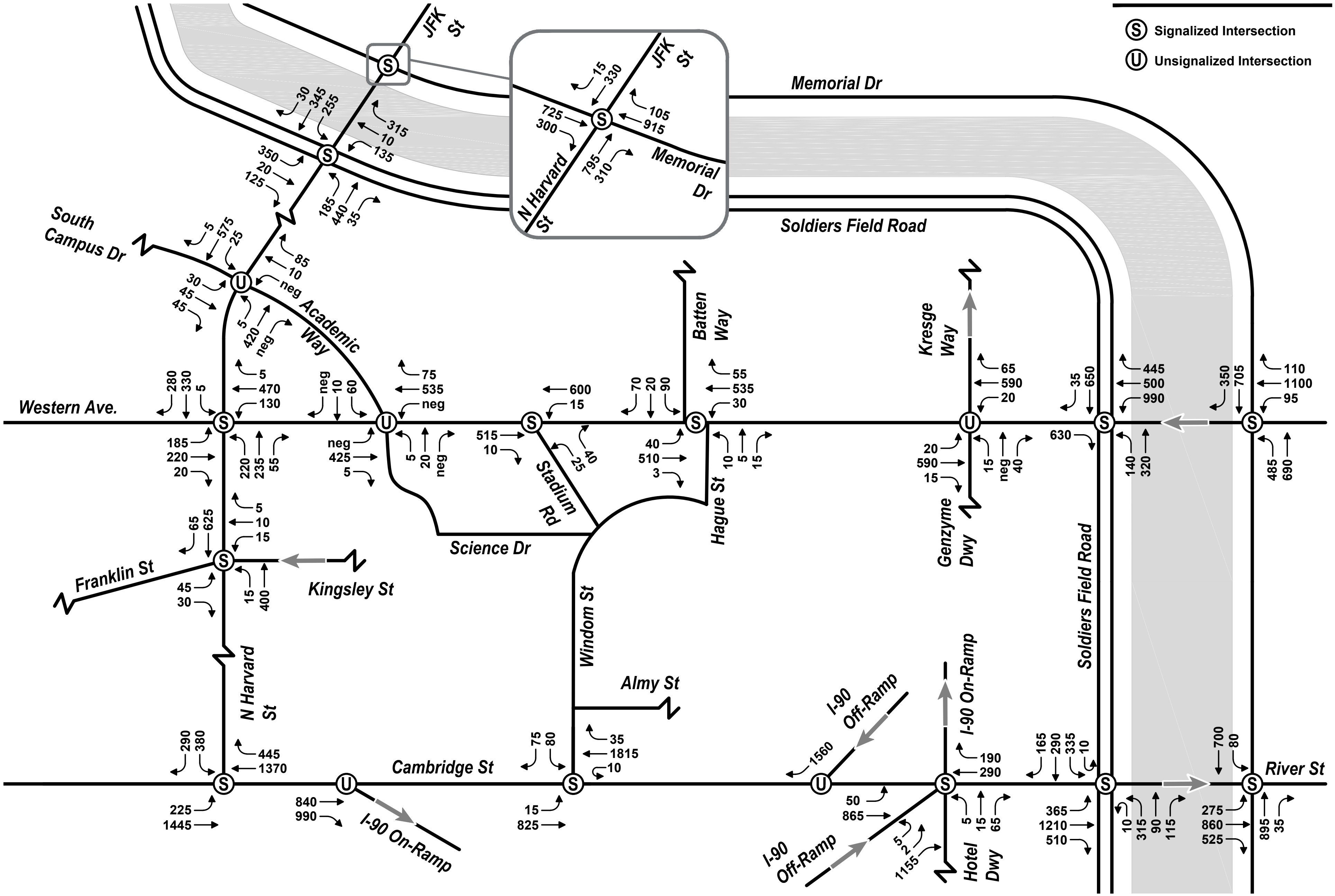
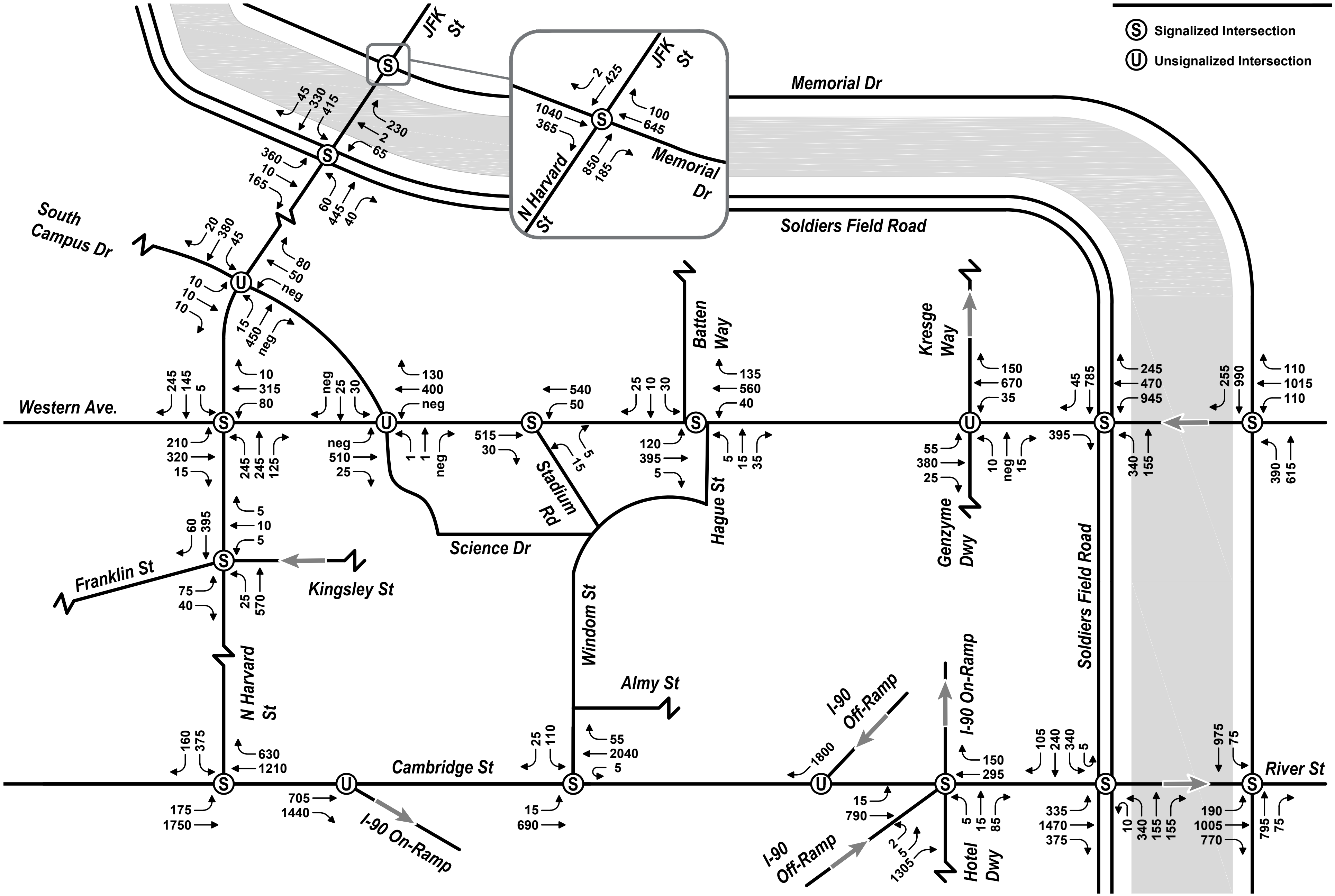


Not to Scale

2025 No-Build Condition
Vehicle Volumes: Evening Peak Hour

Figure 3.24

Enterprise Research Campus Project
Boston, MA

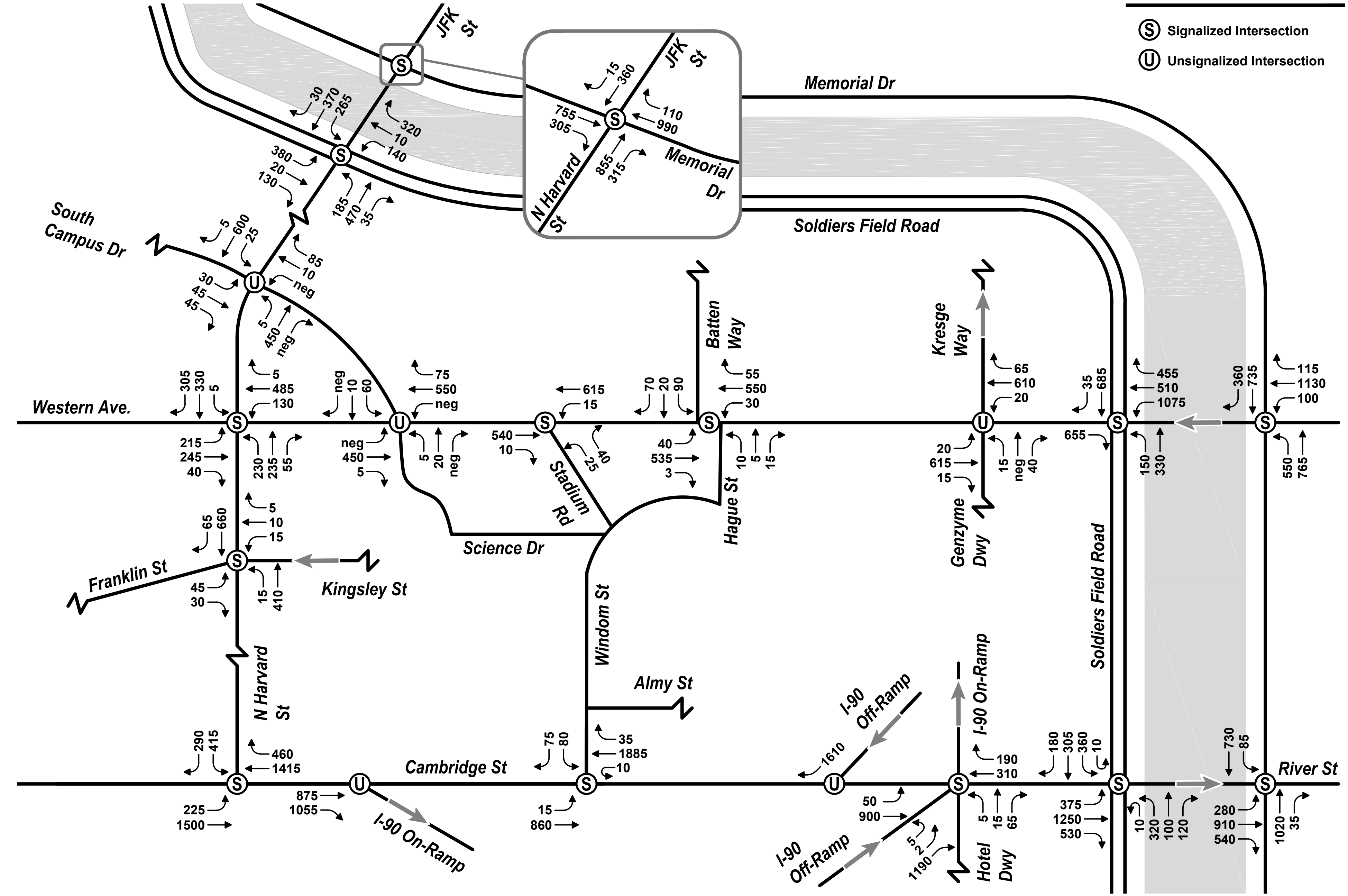


Not to Scale

2030 No-Build Condition
Vehicle Volumes: Morning Peak Hour

Figure 3.25

Enterprise Research Campus Project
Boston, MA



Not to Scale

2030 No-Build Condition
Vehicle Volumes: Evening Peak Hour

Figure 3.26

Enterprise Research Campus Project
Boston, MA

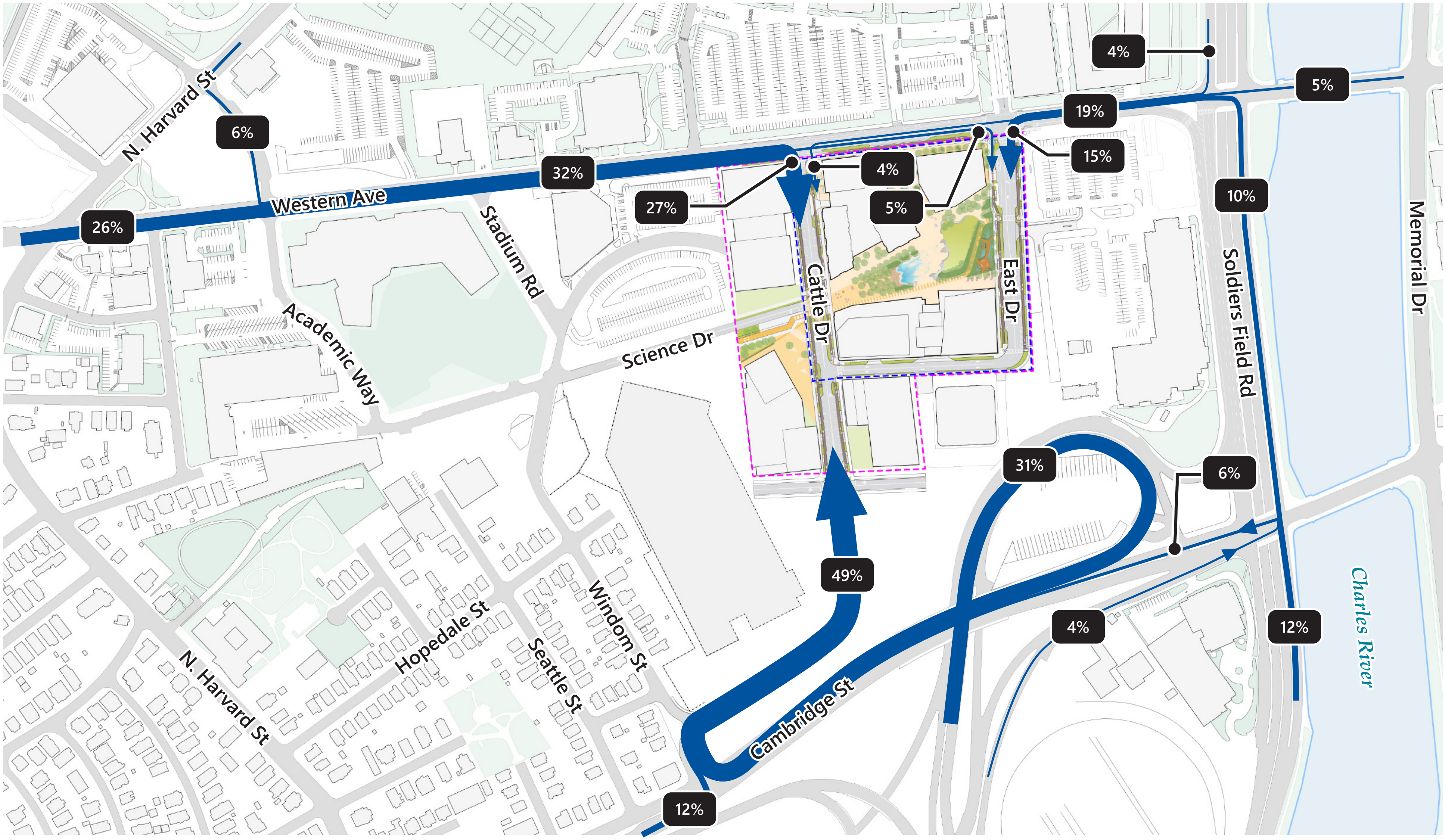


Figure 3.27a

Vehicle Trip Distribution (2025)
Morning Peak Hour - Entering

Enterprise Research Campus Project
Boston, MA

Figure 3.27b

Vehicle Trip Distribution (2025)
Evening Peak Hour - Exiting

Enterprise Research Campus Project
Boston, MA

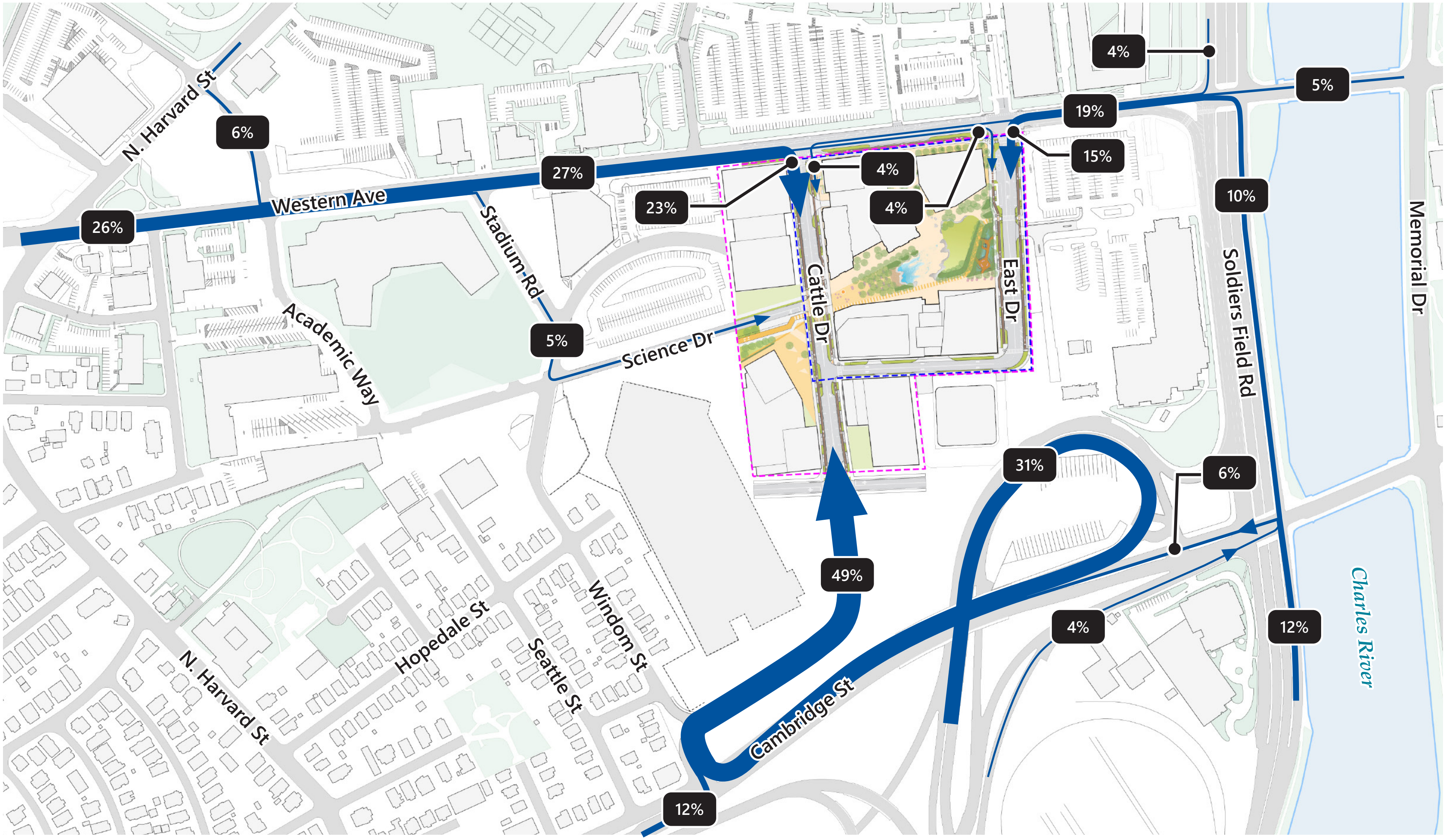


Figure 3.27c

Vehicle Trip Distribution (2030)
Morning Peak Hour - Entering

Enterprise Research Campus Project
Boston, MA

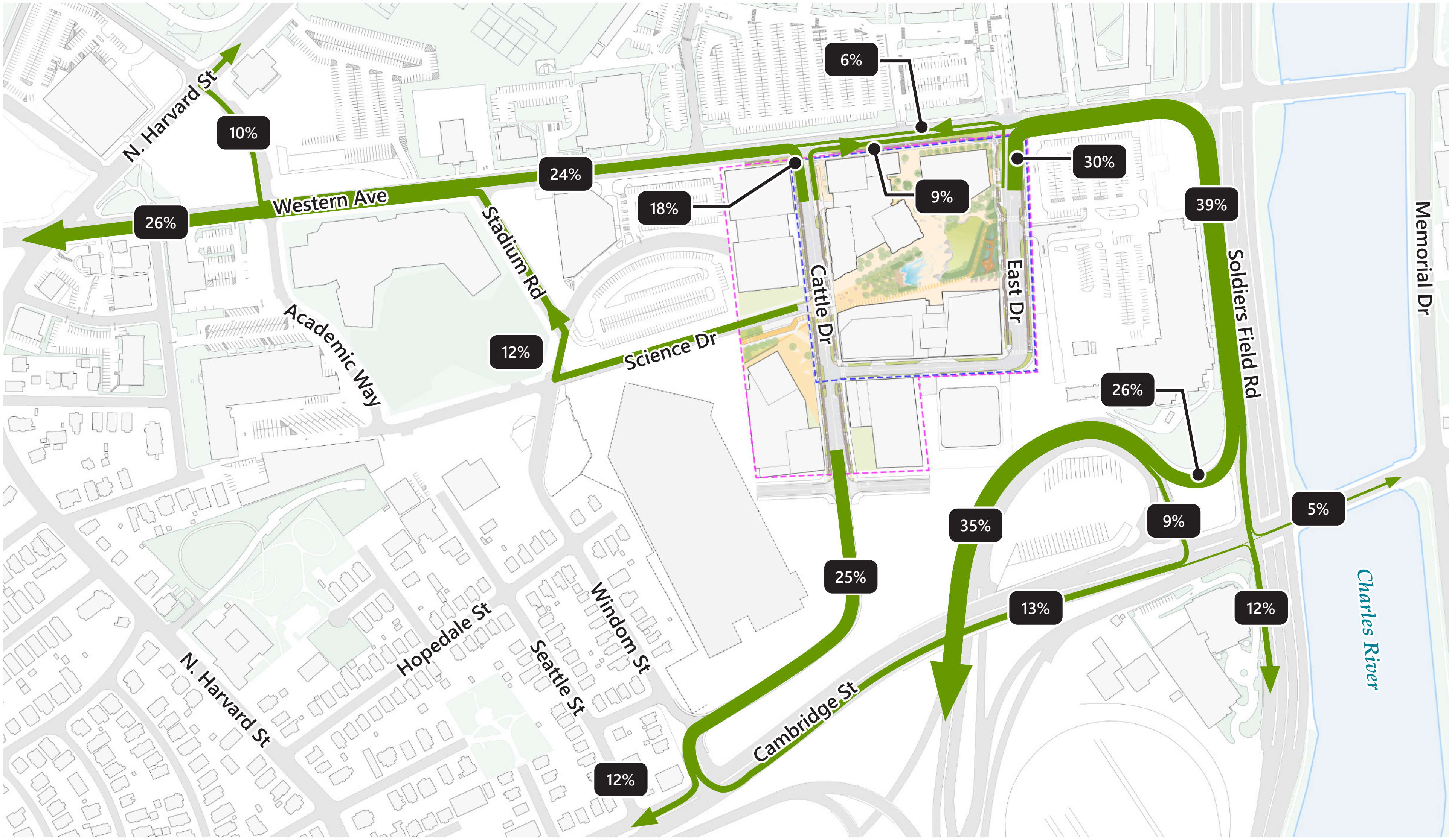
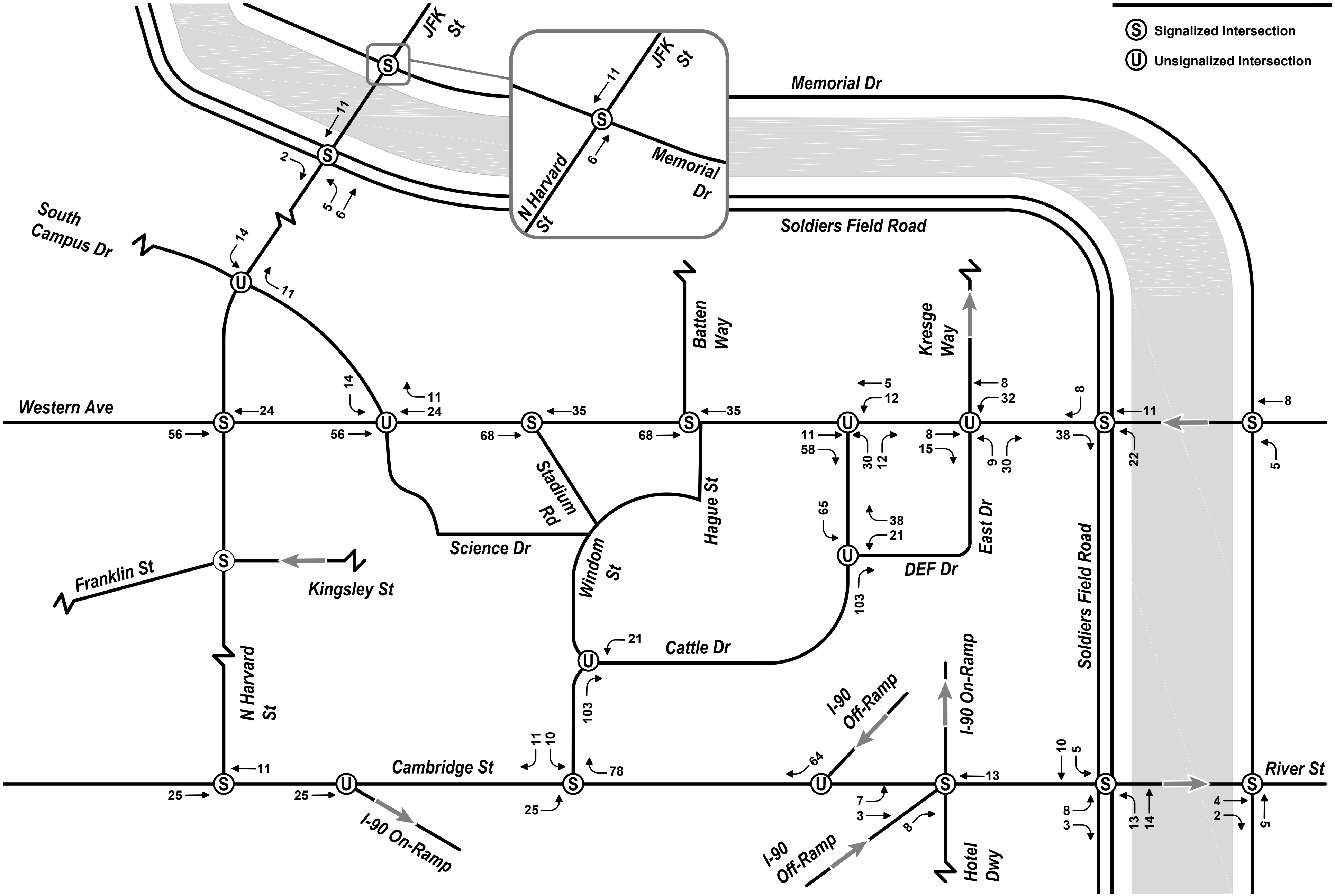


Figure 3.27d

Vehicle Trip Distribution (2030)
Evening Peak Hour - Exiting

Enterprise Research Campus Project
Boston, MA



Not to Scale

2025 Site Generated Trips
Vehicle Volumes: Morning Peak Hour

Figure 3.28

Enterprise Research Campus Project
Boston, MA

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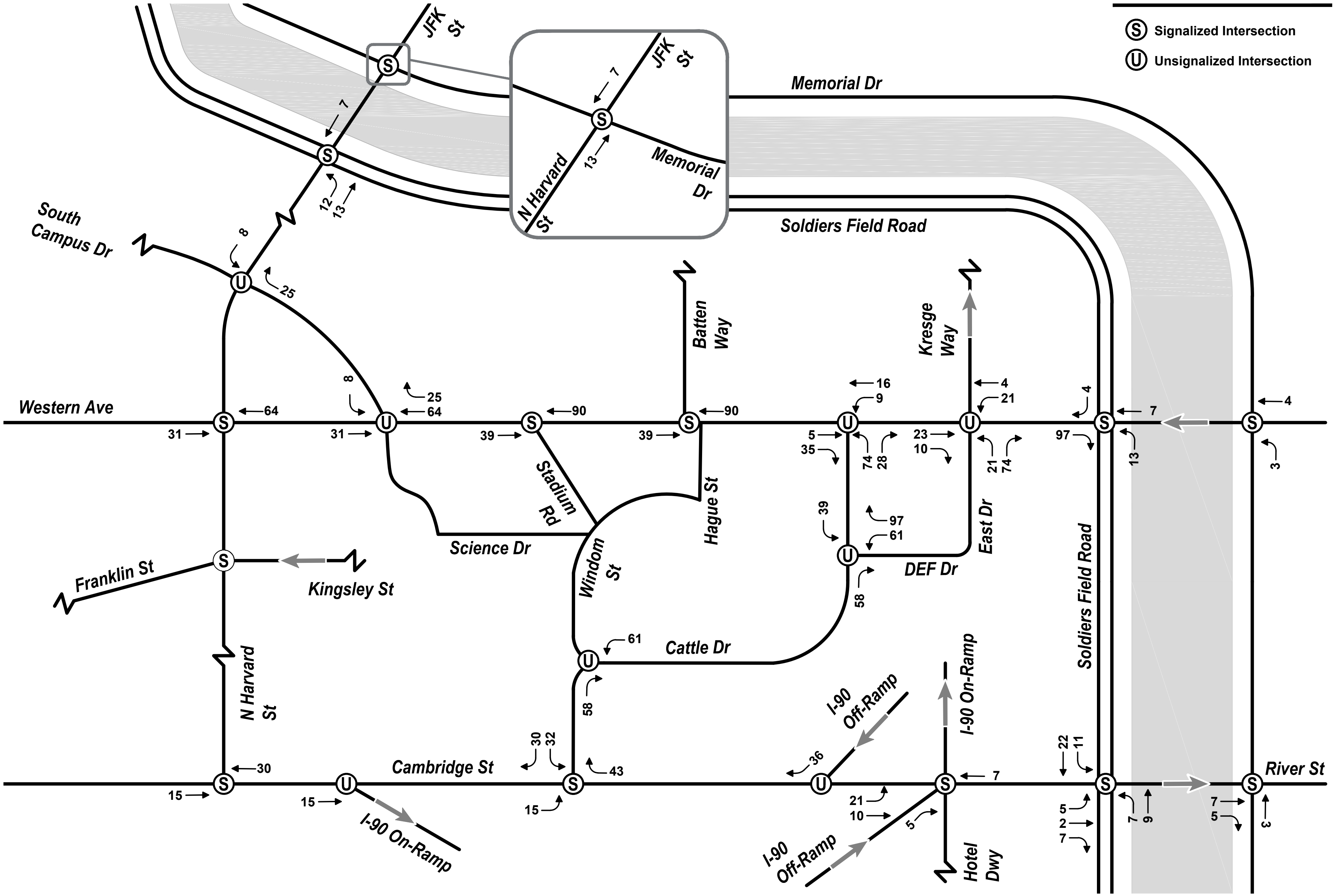
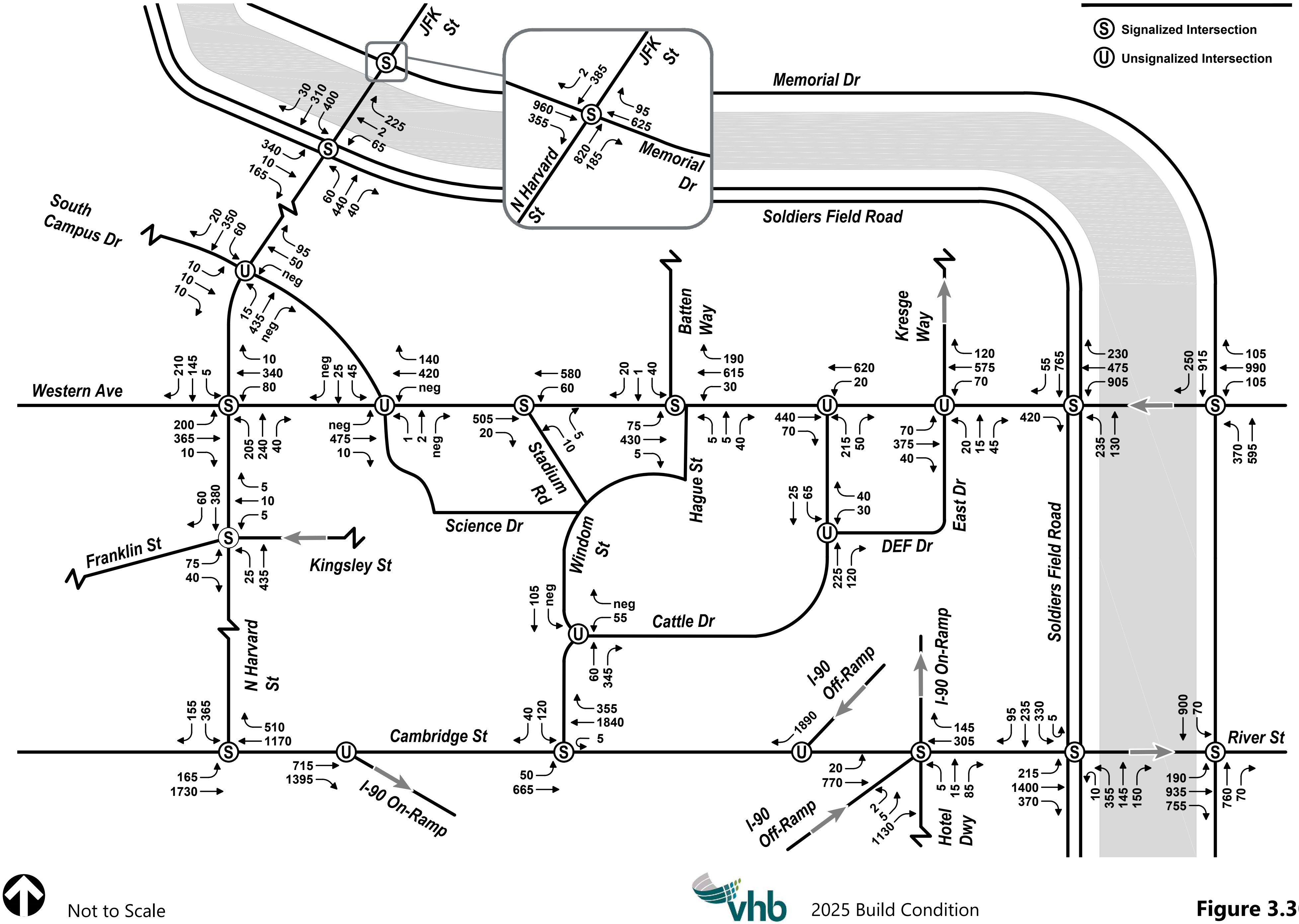


Not to Scale

2025 Site Generated Trips
Vehicle Volumes: Evening Peak Hour

Figure 3.29

Enterprise Research Campus Project
Boston, MA



2025 Build Condition
Vehicle Volumes: Morning Peak Hour

Figure 3.30

Enterprise Research Campus Project
Boston, MA

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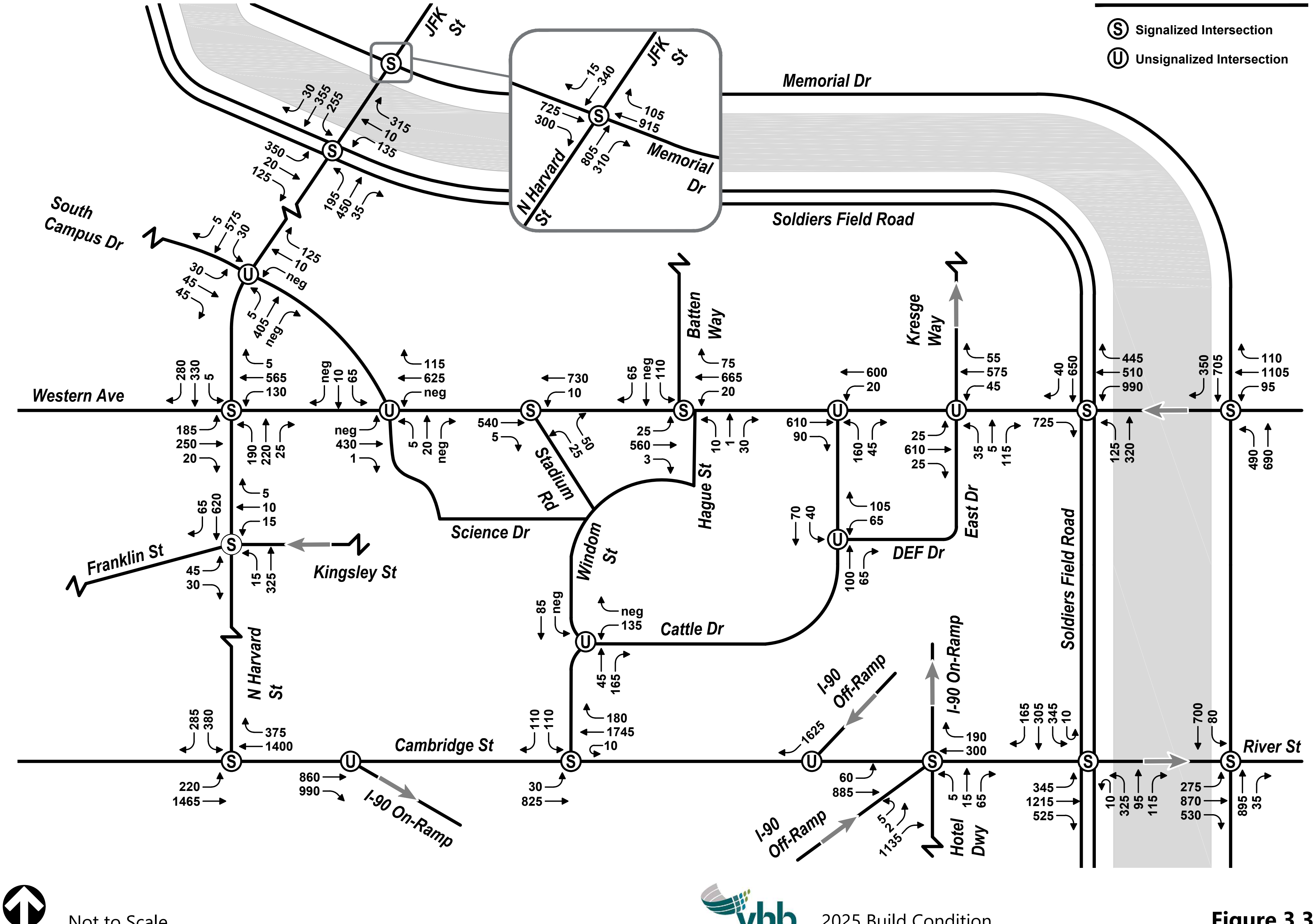
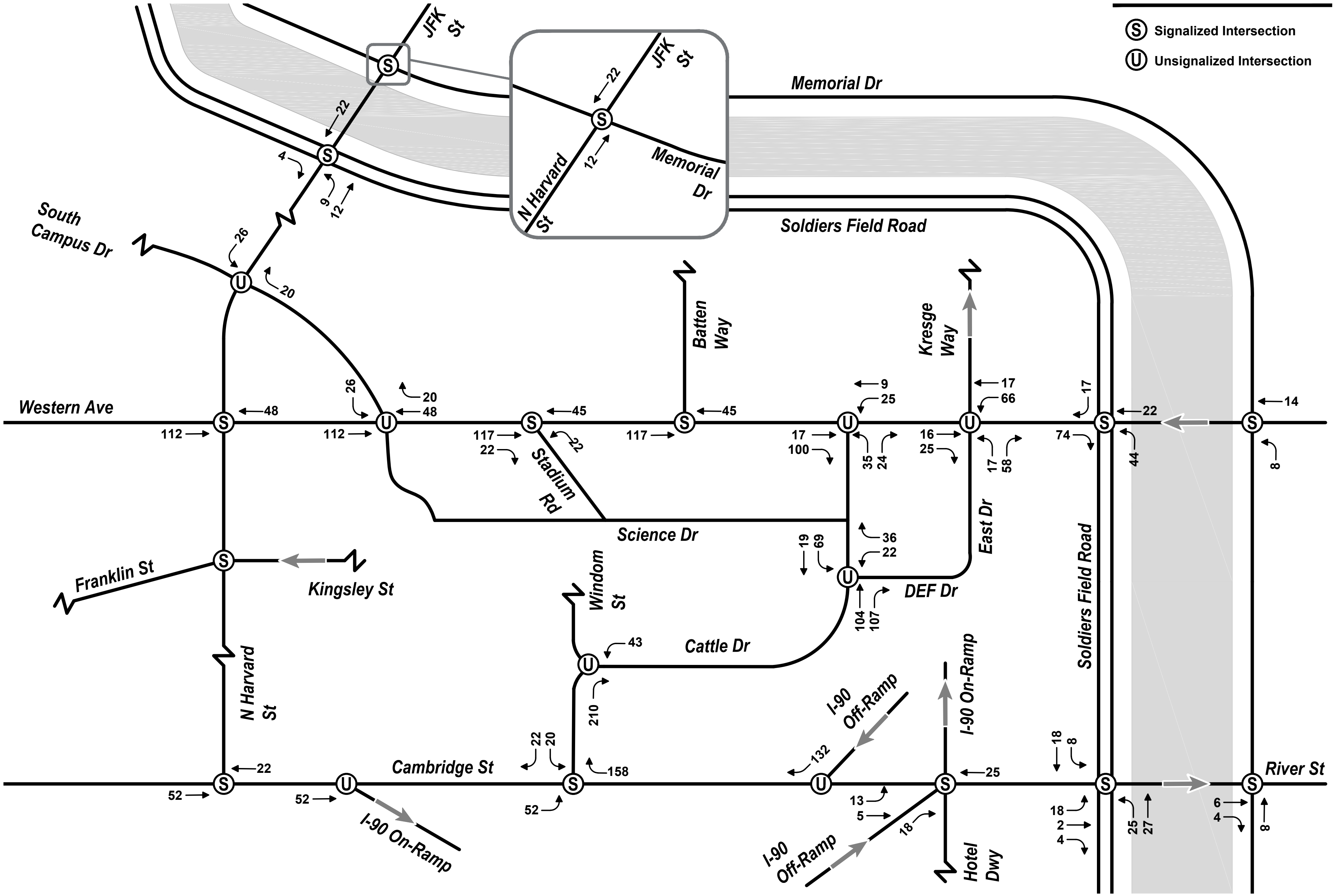


Not to Scale

2025 Build Condition
Vehicle Volumes: Evening Peak Hour

Enterprise Research Campus Project
Boston, MA

Figure 3.31

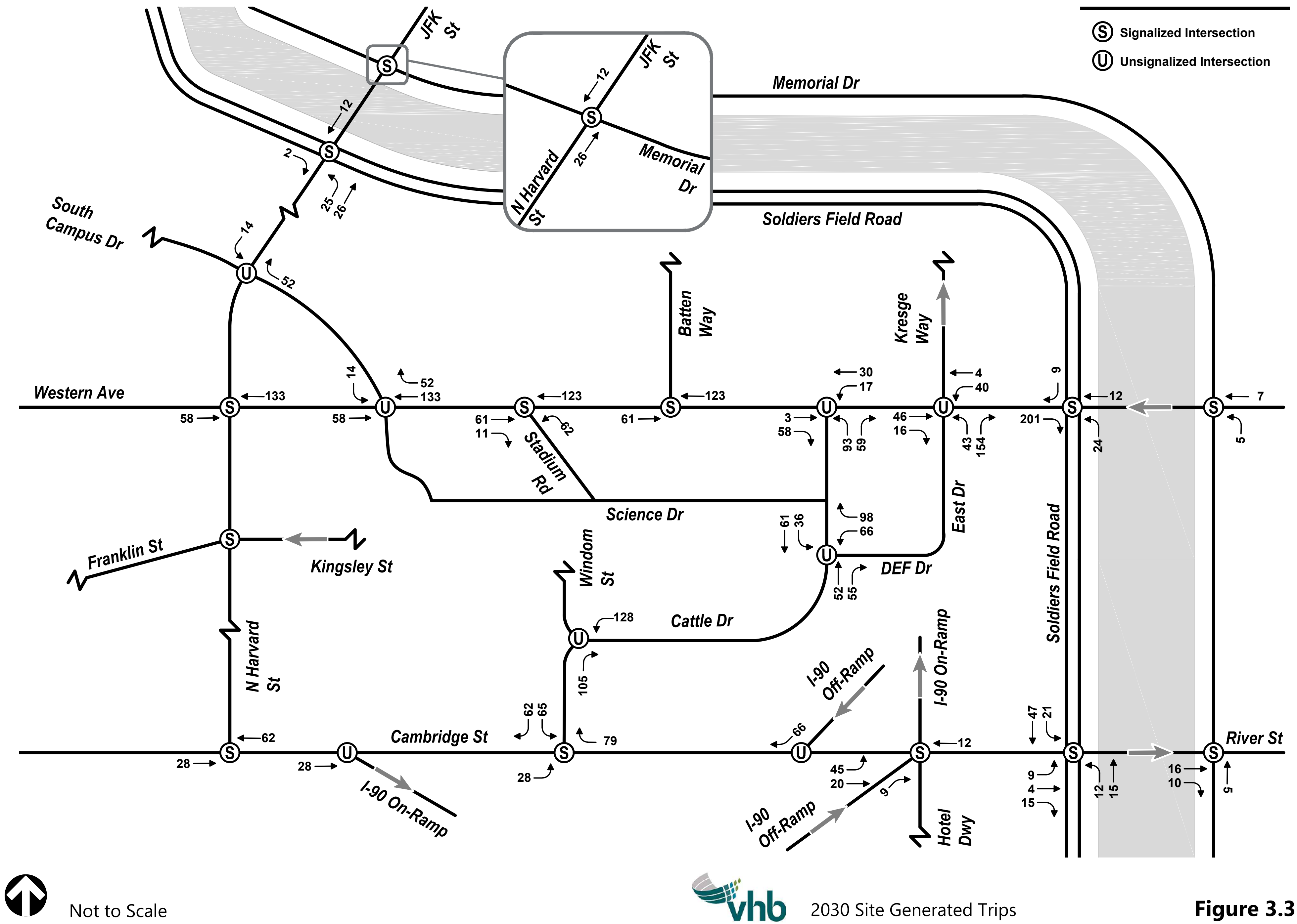


Not to Scale

2030 Site Generated Trips
Vehicle Volumes: Morning Peak Hour

Figure 3.32

Enterprise Research Campus Project
Boston, MA

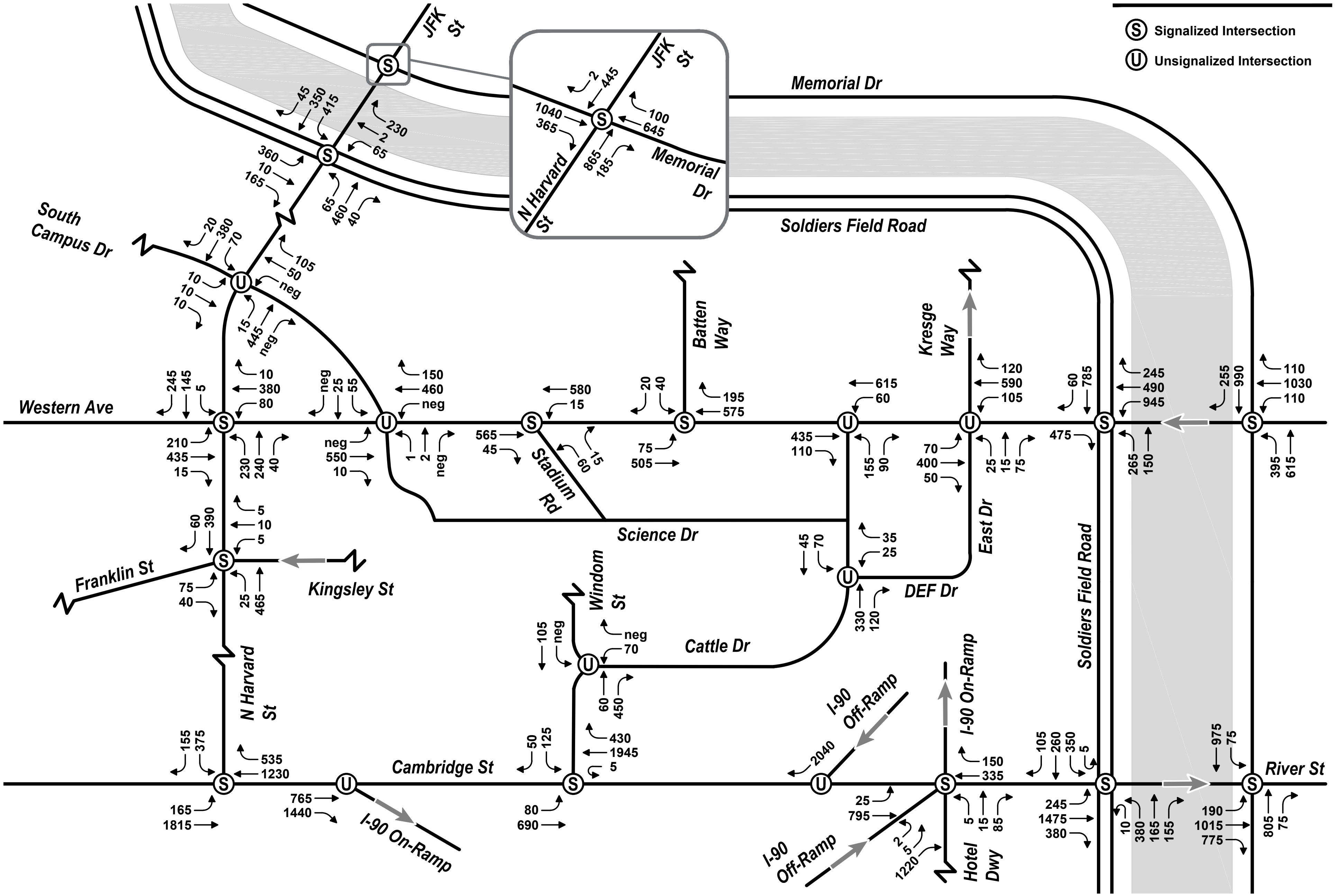


2030 Site Generated Trips
Vehicle Volumes: Evening Peak Hour

Figure 3.33

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Networks_Updated_05-27-2021.dwg

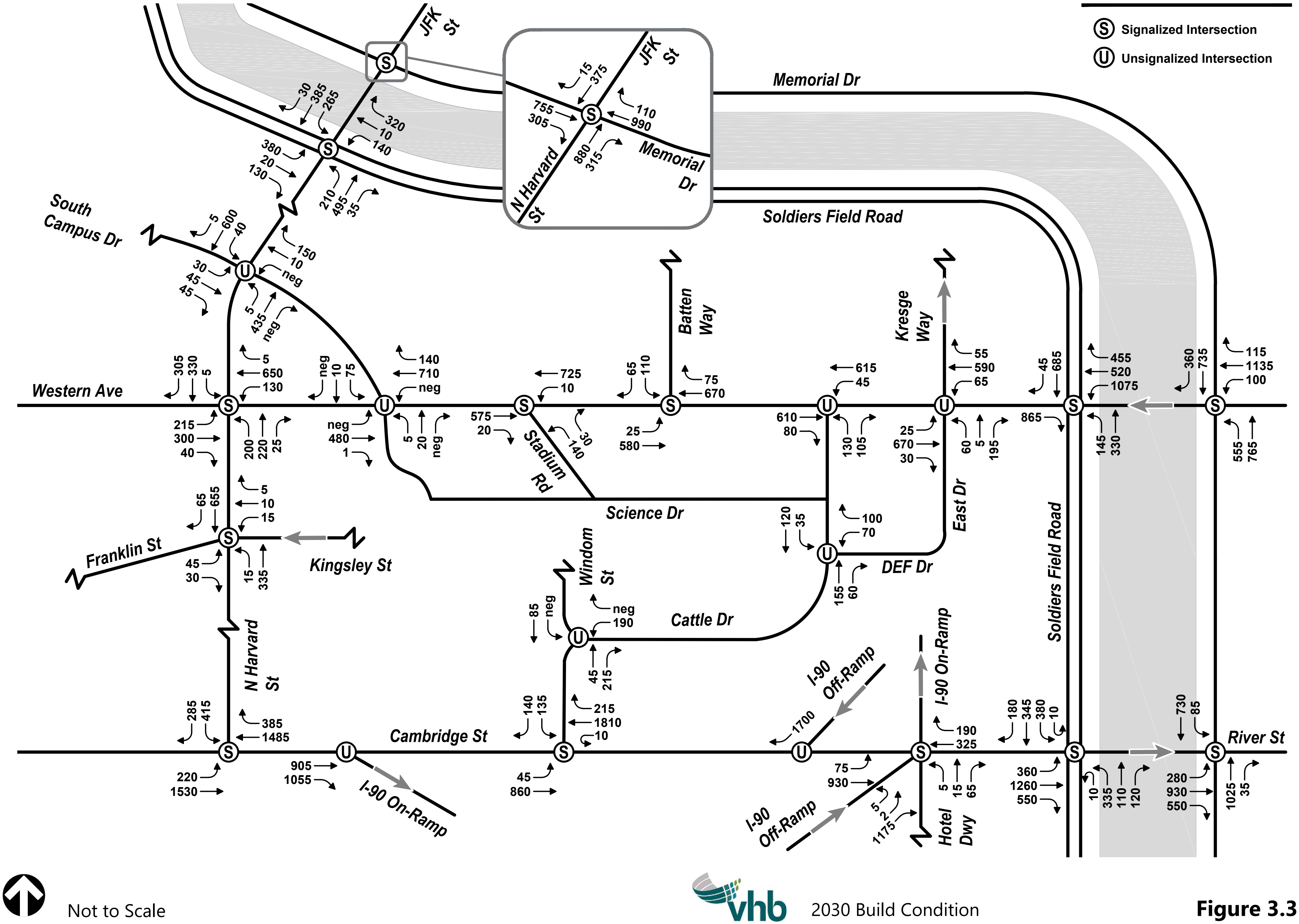


Not to Scale

2030 Build Condition
Vehicle Volumes: Morning Peak Hour

Figure 3.34

Enterprise Research Campus Project
Boston, MA

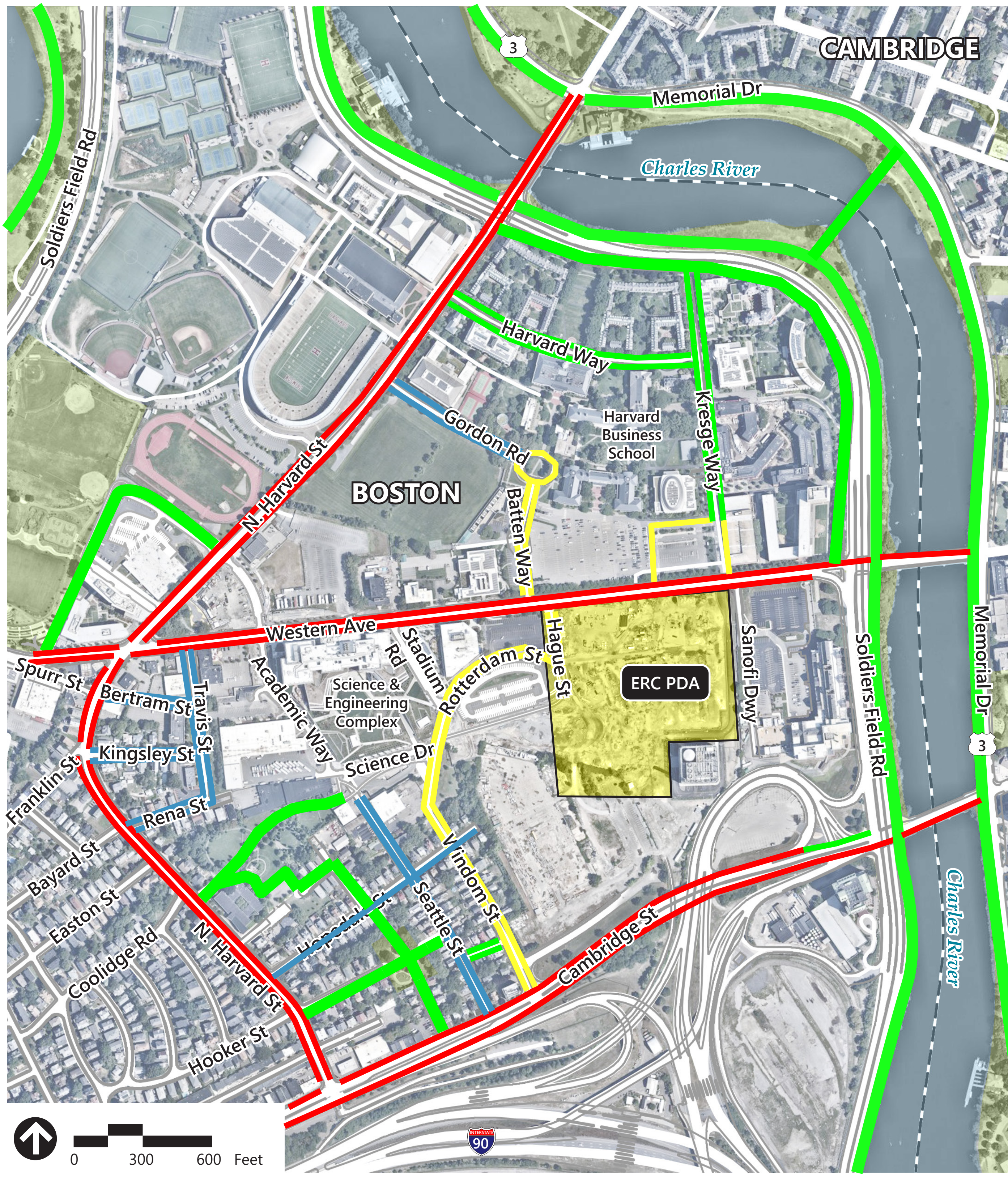


Not to Scale

2030 Build Condition
Vehicle Volumes: Evening Peak Hour

Figure 3.35

Enterprise Research Campus Project
Boston, MA



Base map aerial image: Nearmap Aerial (2020)

LTS 1 (least stressful)

LTS 2

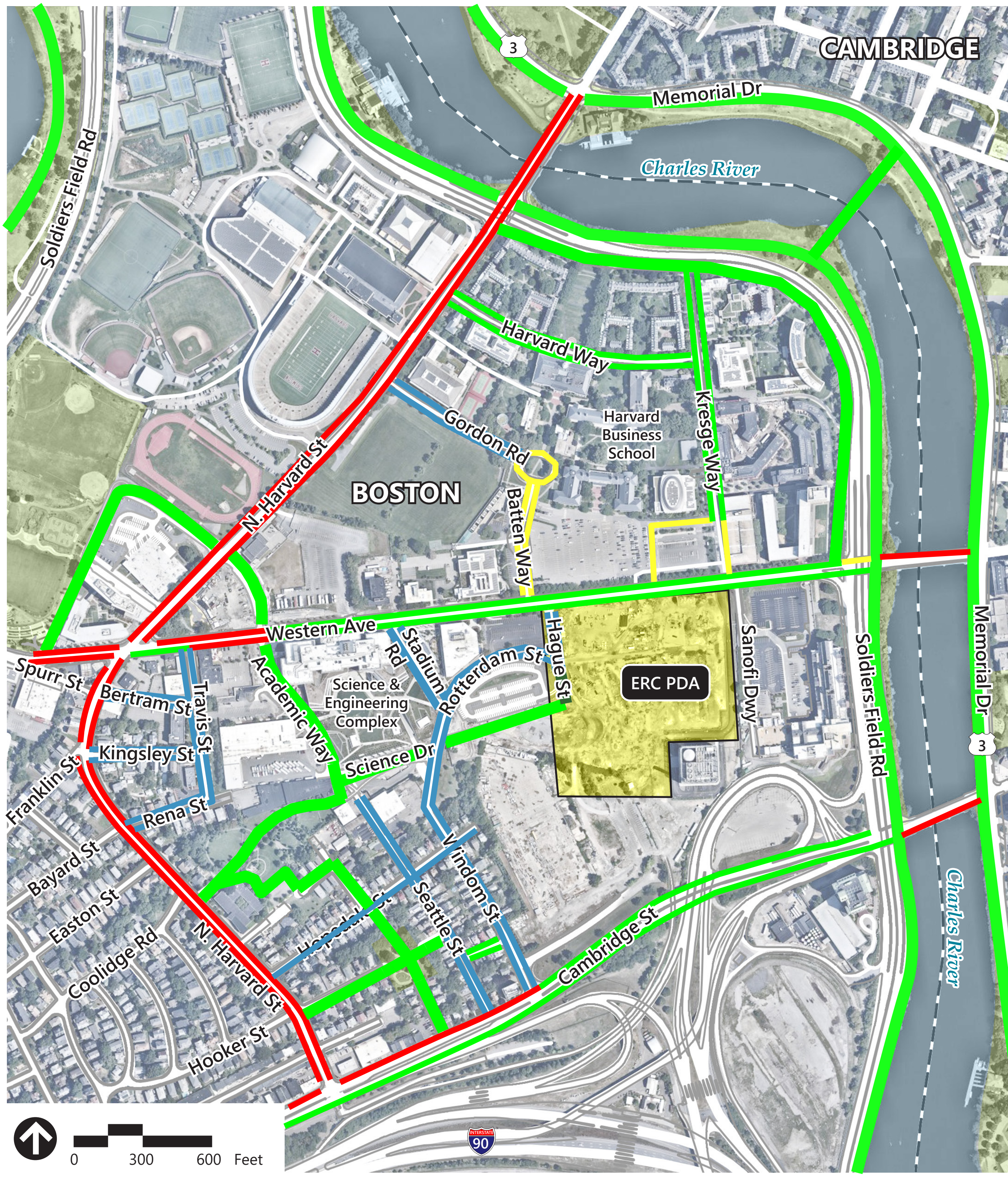
LTS 3

LTS 4 (most stressful)

Figure 3.36a

2021 Existing Conditions
Bicycle Level of Traffic Stress

Enterprise Research Campus Project
Boston, MA



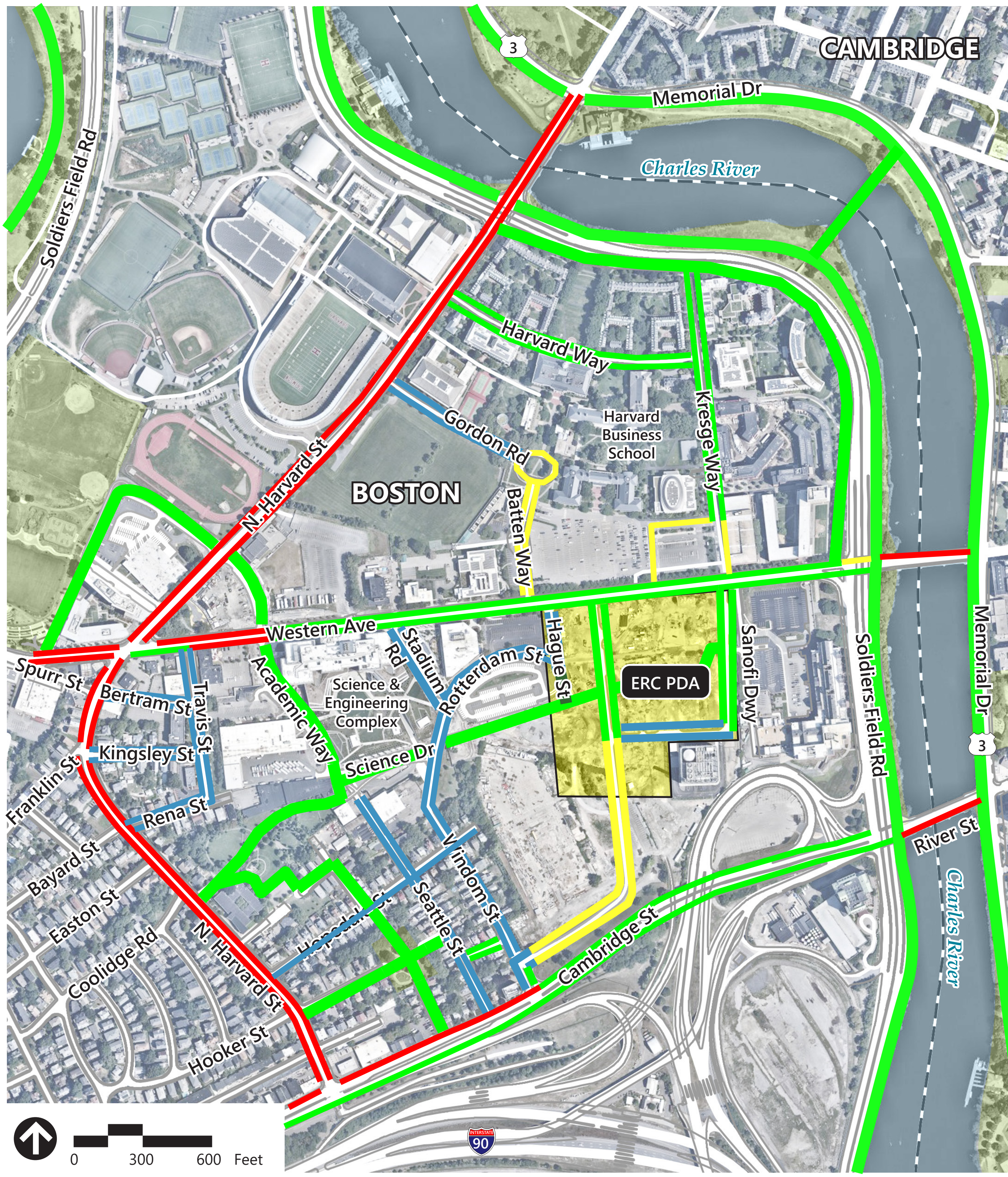
Base map aerial image: Nearmap Aerial (2020)

- LTS 1 (least stressful)
- LTS 2
- LTS 3
- LTS 4 (most stressful)

Figure 3.36b

2025/2030 No-Build Conditions
Bicycle Level of Traffic Stress

Enterprise Research Campus Project
Boston, MA



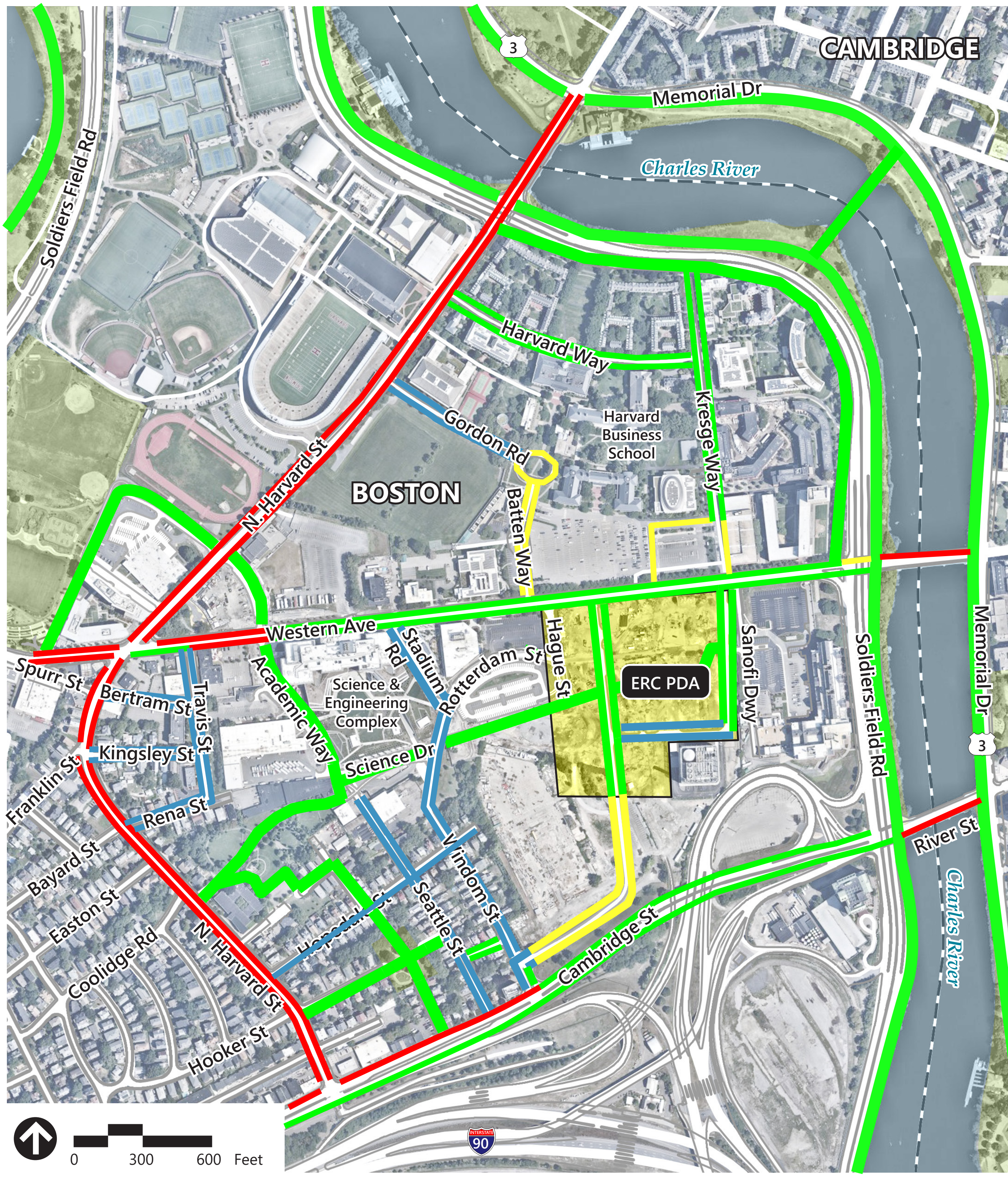
Base map aerial image: Nearmap Aerial (2020)

- LTS 1 (least stressful)
- LTS 2
- LTS 3
- LTS 4 (most stressful)

Figure 3.36c

2025 Build Conditions
Bicycle Level of Traffic Stress

Enterprise Research Campus Project
Boston, MA



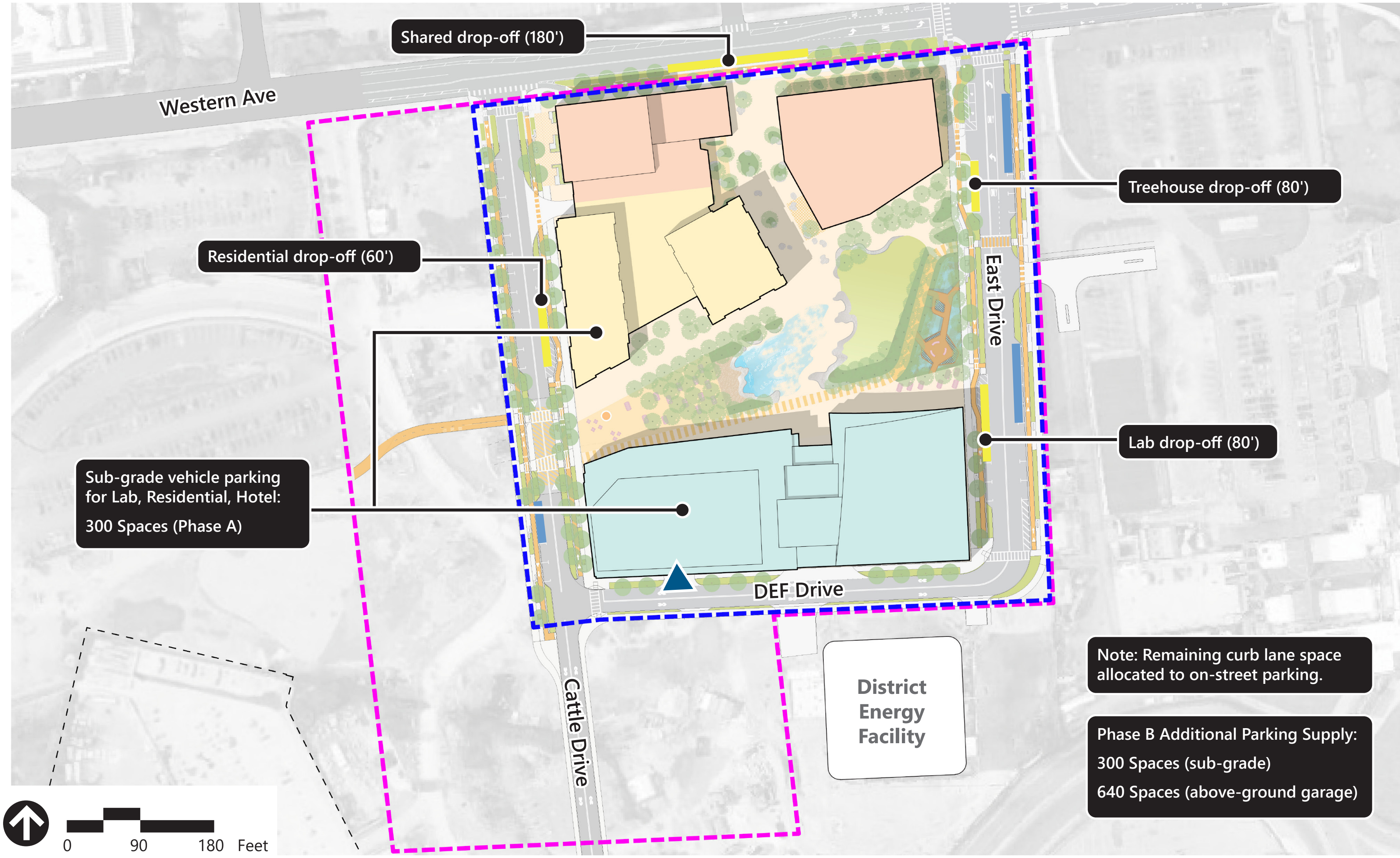
Base map aerial image: Nearmap Aerial (2020)

- LTS 1 (least stressful)
- LTS 2
- LTS 3
- LTS 4 (most stressful)

Figure 3.36d

2030 Build Conditions
Bicycle Level of Traffic Stress

Enterprise Research Campus Project
Boston, MA



Base provided by Henning-Larson

Parking Garage Entrance

Pickup/Drop-off Curb Space

Flexible Curb Space

Note: Subject to change. For illustrative purposes only.

Figure 3.37

Proposed Off-Street Parking, On-Street Parking, and Other Designated Curb Uses

Enterprise Research Campus Project
Boston, MA

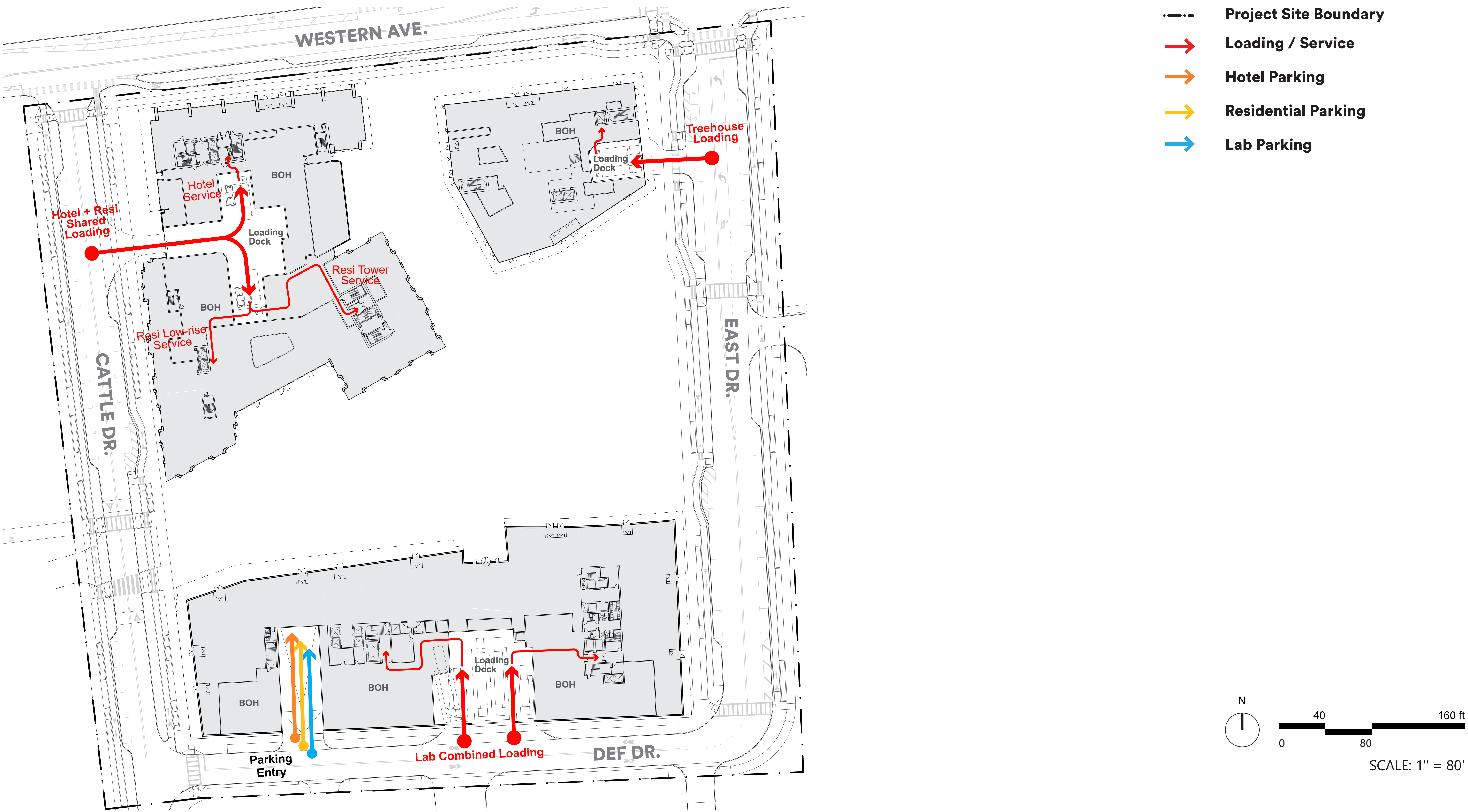
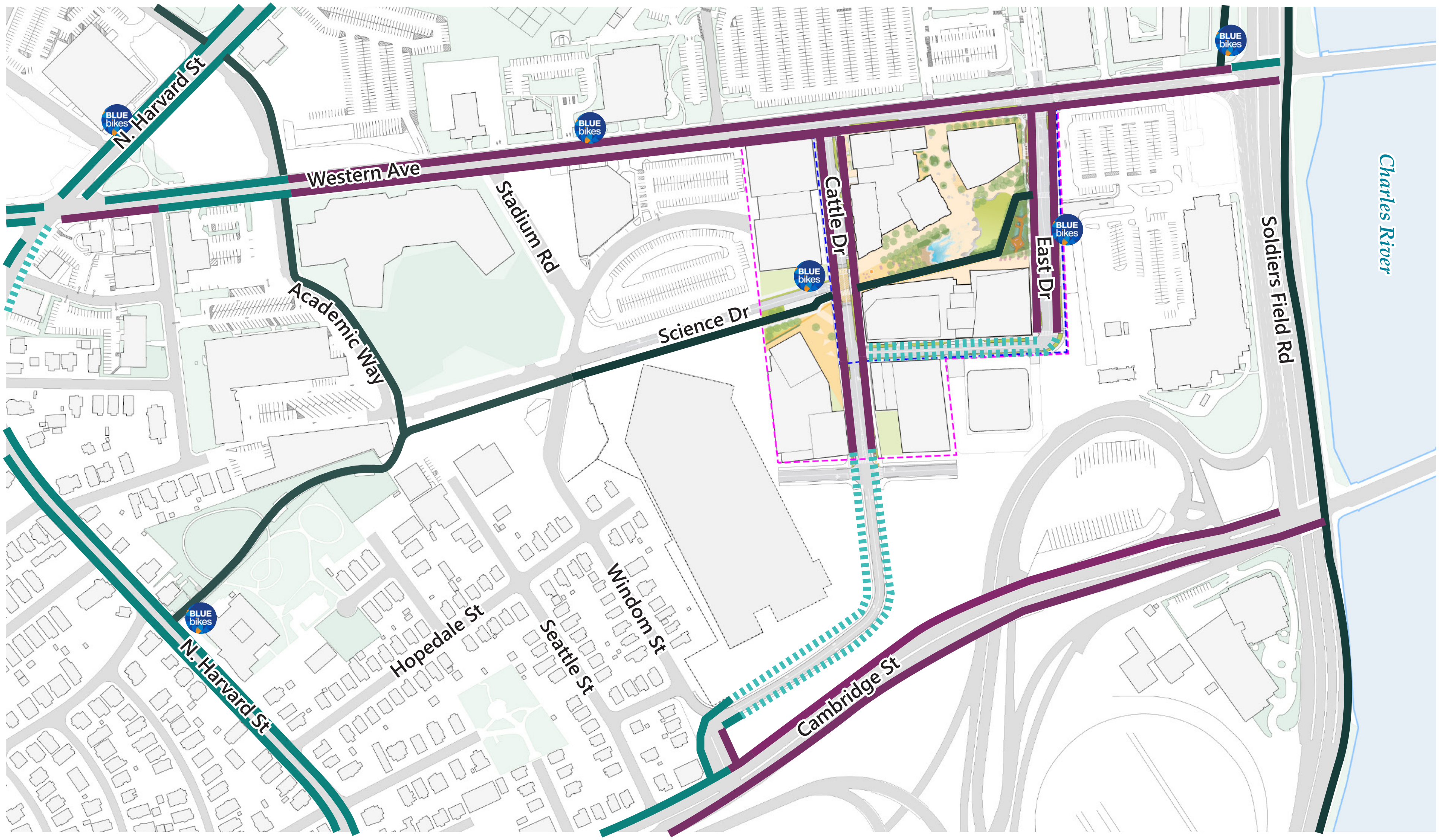


Figure 3.38

Proposed Loading Configuration

Enterprise Research Campus Project
Boston, MA



Bluebikes Station
Bike Lane
Shared Lane
Protected Bike Lane
Multi-Use Path

Figure 3.39

Future Bicycle Facilities
(Planned and Proposed)

Enterprise Research Campus Project
Boston, MA

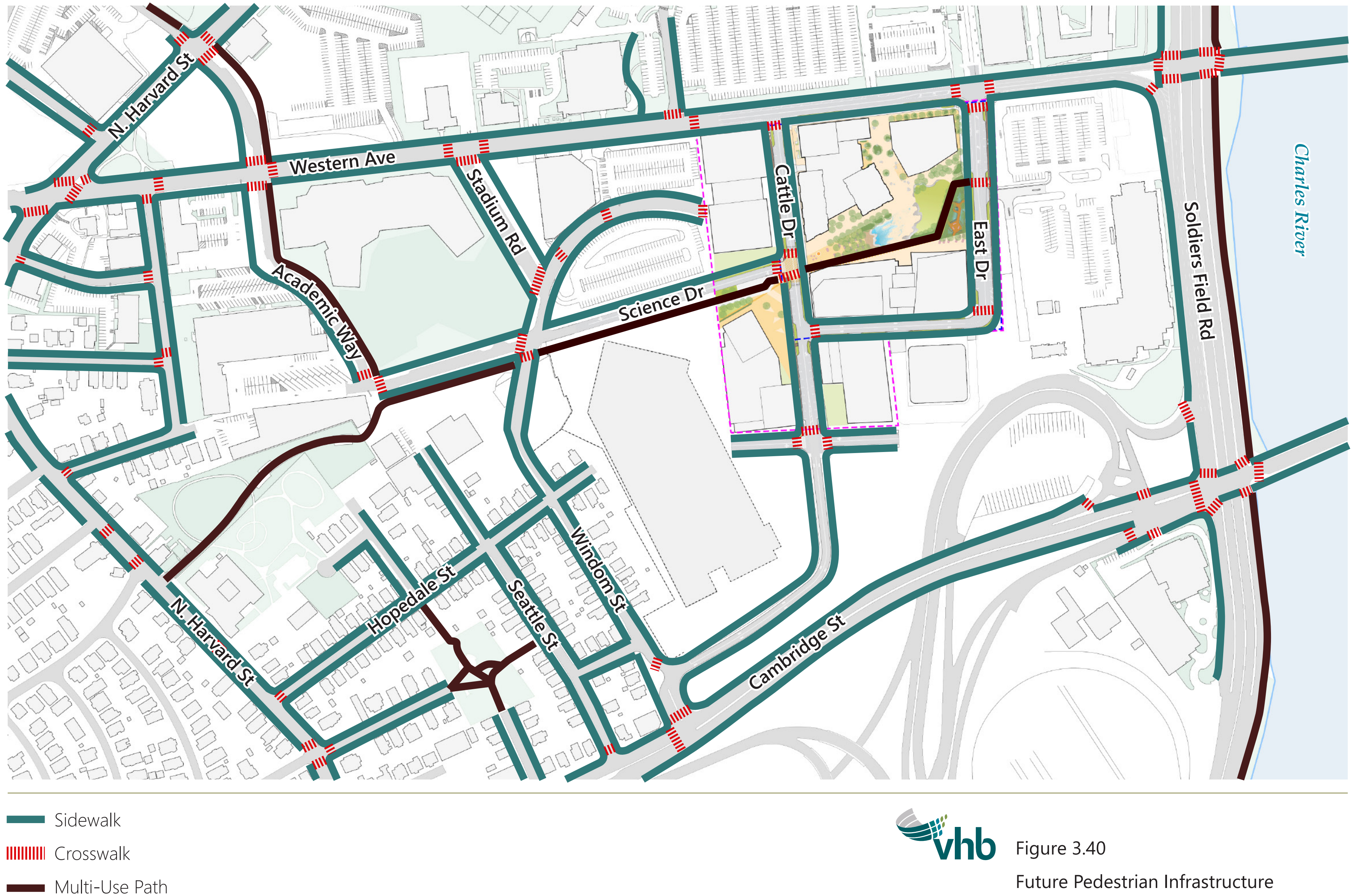


Figure 3.40

Future Pedestrian Infrastructure (Planned and Proposed)

Enterprise Research Campus Project
Boston, MA

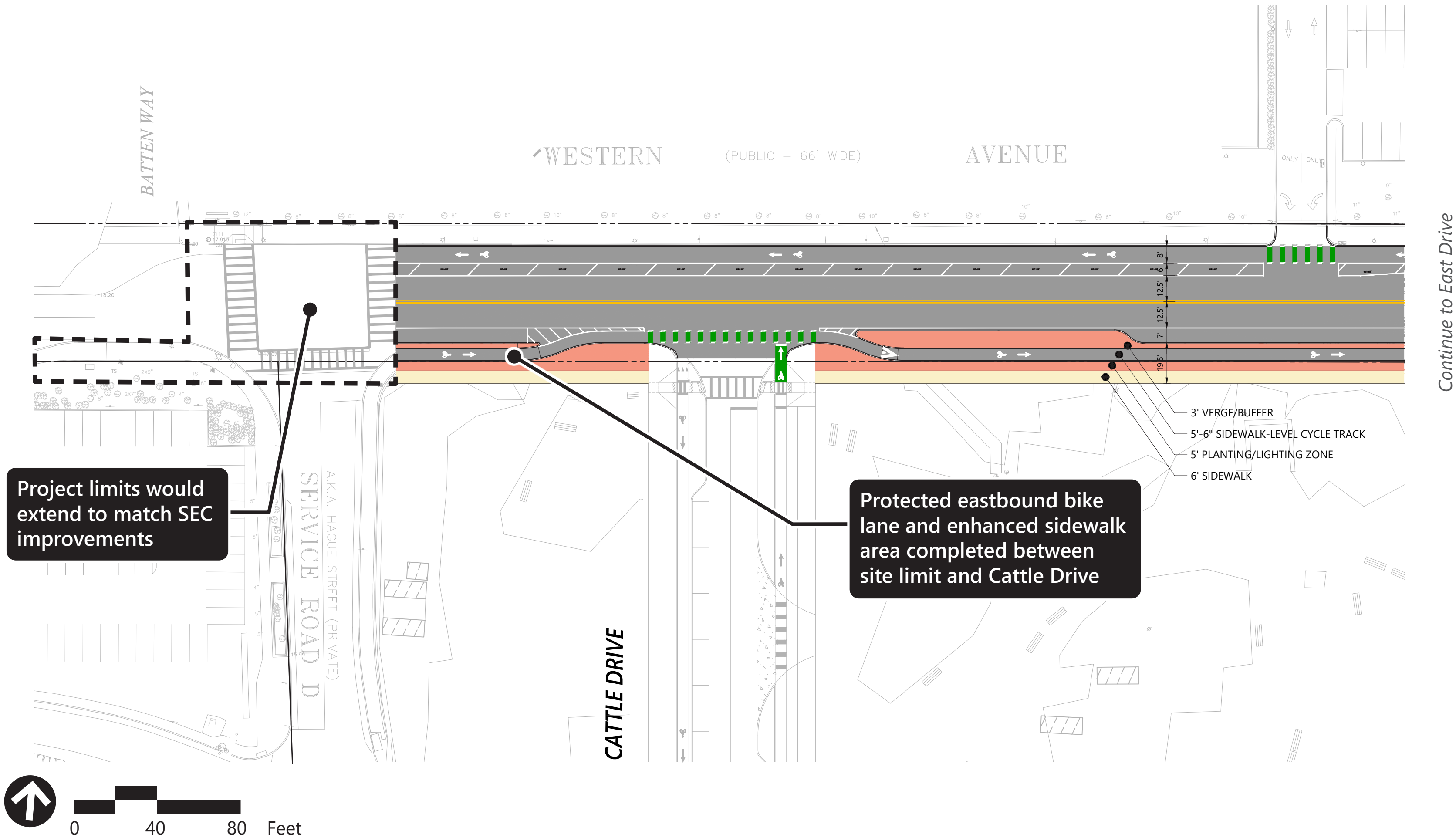


Figure 3.41b

Western Avenue Improvements
Along Site Frontage (Cattle Dr Segment)

Enterprise Research Campus Project
Boston, MA

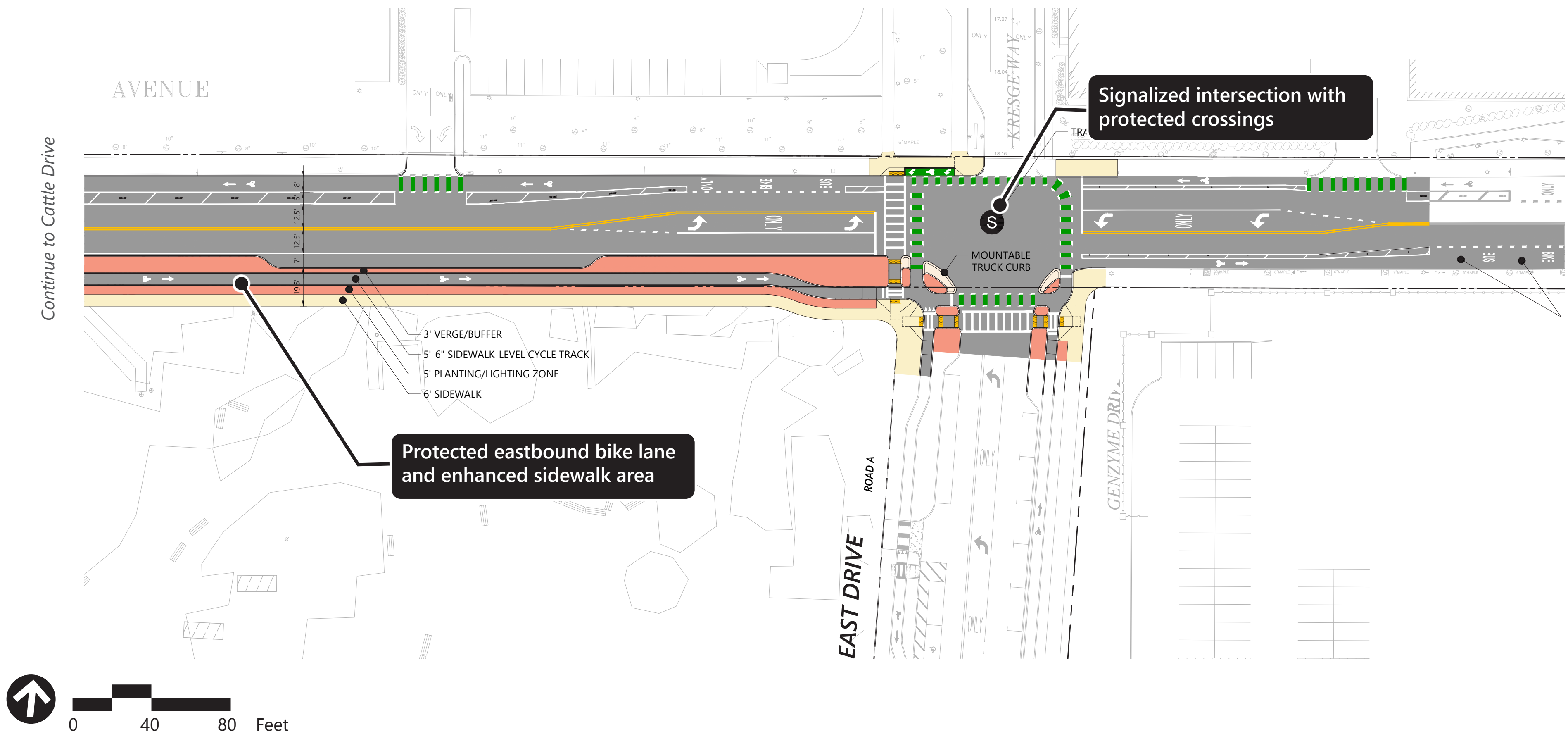


Figure 3.41a

Western Avenue Improvements
Along Site Frontage (East Dr Segment)

Enterprise Research Campus Project
Boston, MA

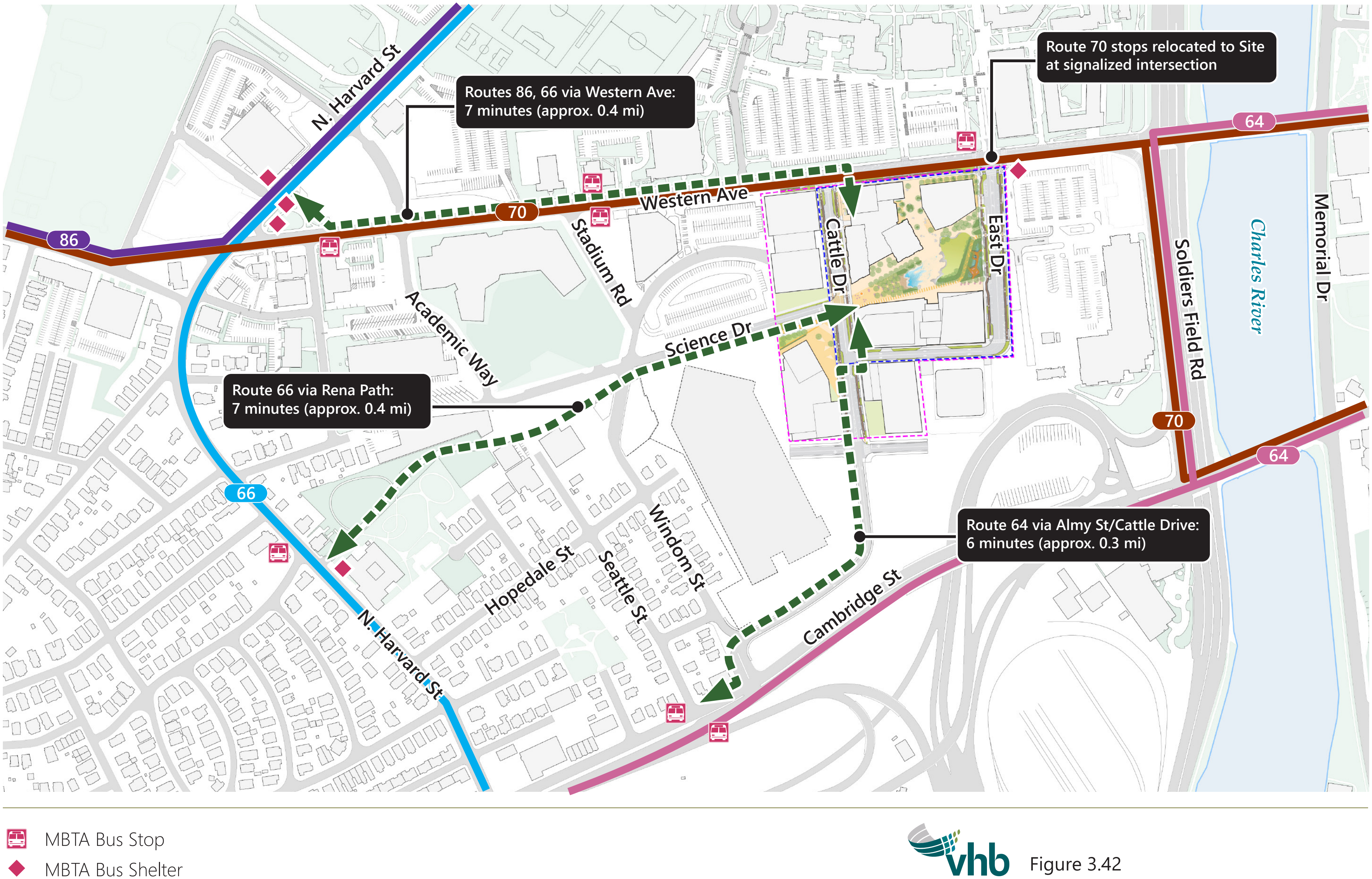
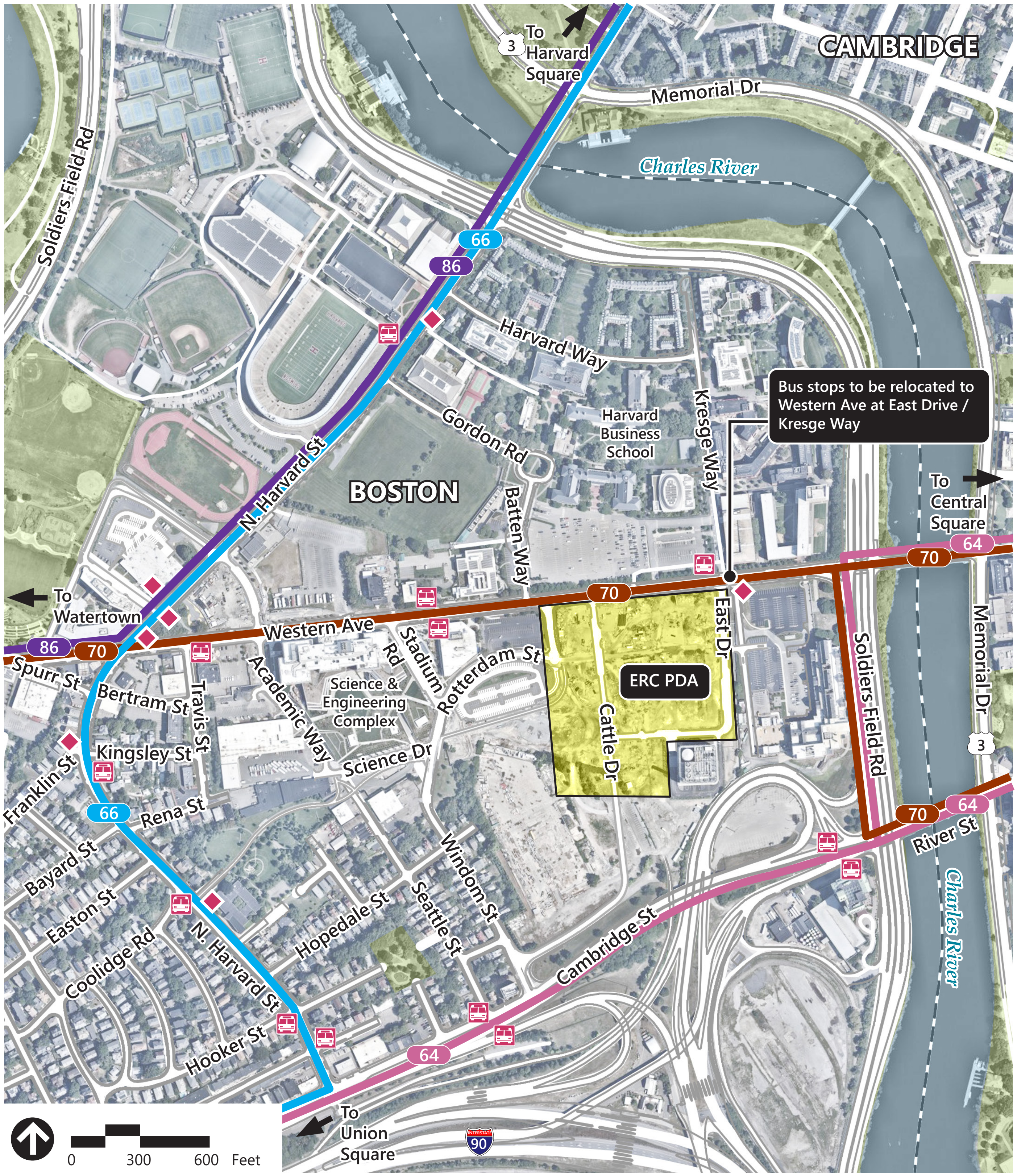


Figure 3.42

Walking Access to Public Transit Stops: Future Full Build

Enterprise Research Campus Project
Boston, MA



Base map aerial image: Nearmap Aerial (2020)

XX MBTA Bus Route

Route 70 – Market Place Drive or Waltham Center - University Park (Cambridge) via Western Ave
Route 66 – Harvard Square – Nubian Station (Roxbury) via N. Harvard St
Route 86 – Sullivan Square - Reservoir (Cleveland Circle) via N. Harvard St (North) & Western Ave (West)
Route 64 – Oak Square – University Park or Kendall/MIT via Cambridge St

MBTA Bus Stop

MBTA Bus Shelter

Figure 3.43

Future Full-Build Public Transit Services and Stops

Enterprise Research Campus Project
Boston, MA

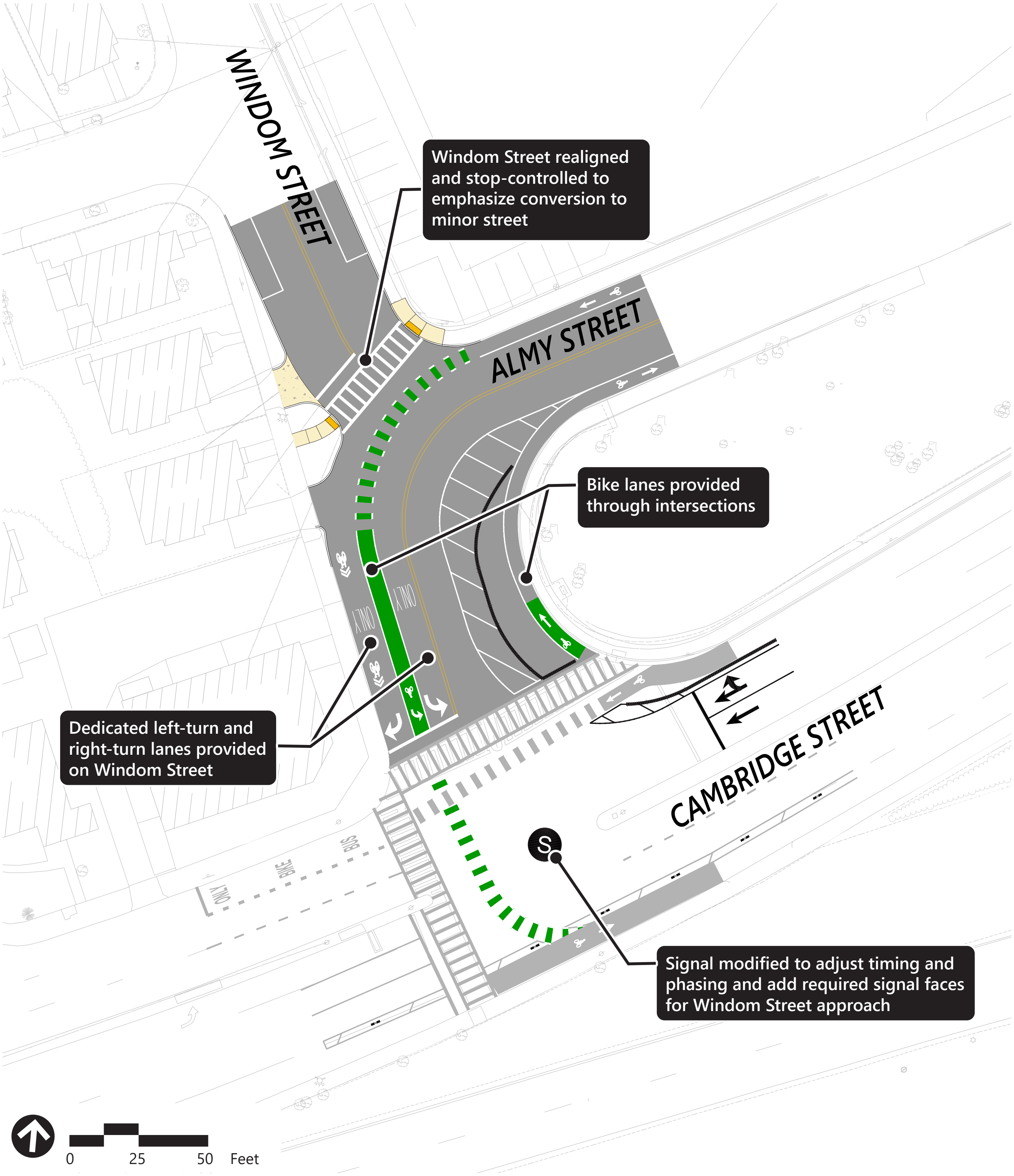
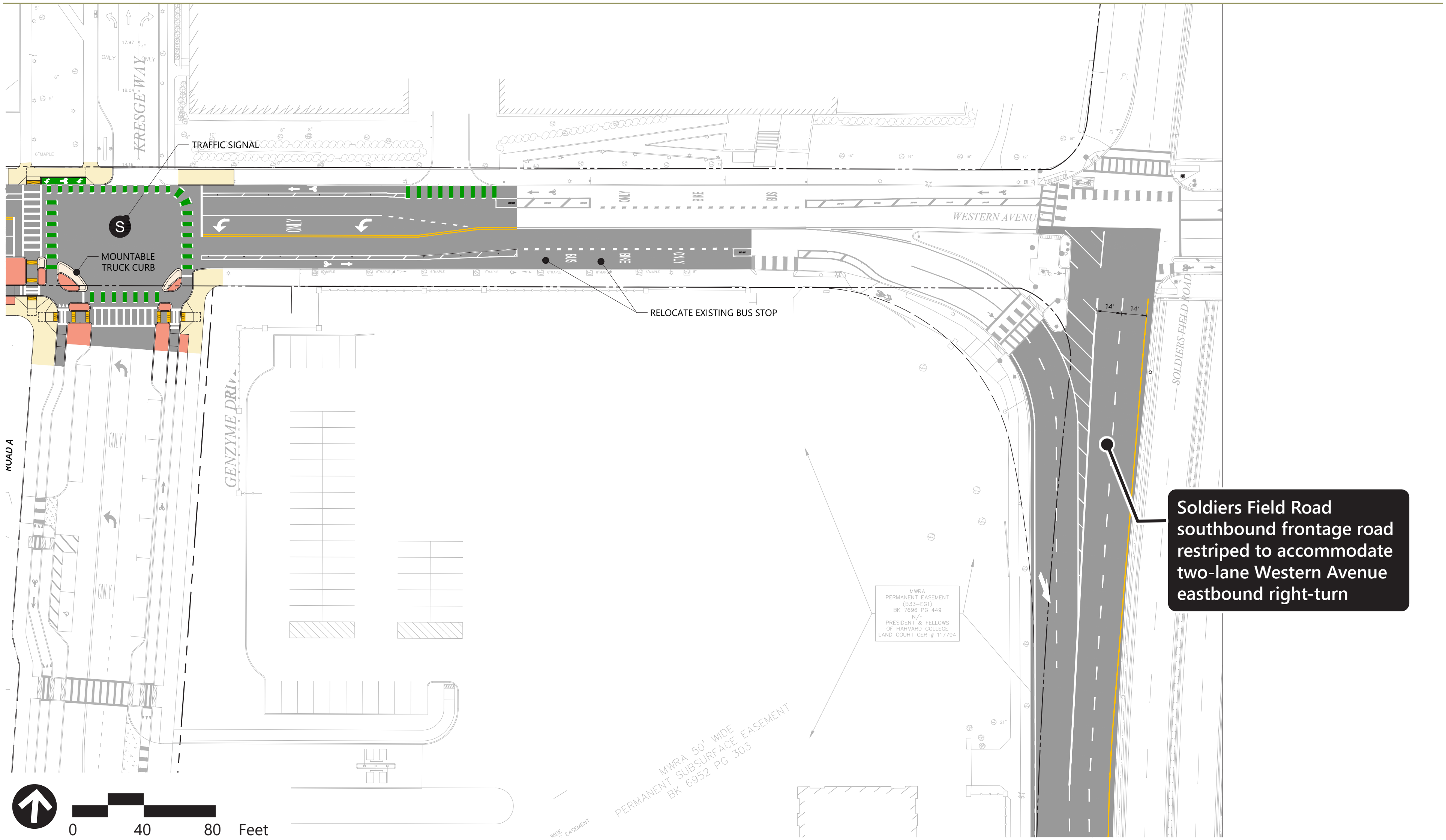


Figure 3.44

Cambridge/Windom/Almy Street Intersection Improvements

Enterprise Research Campus Project
Boston, MA

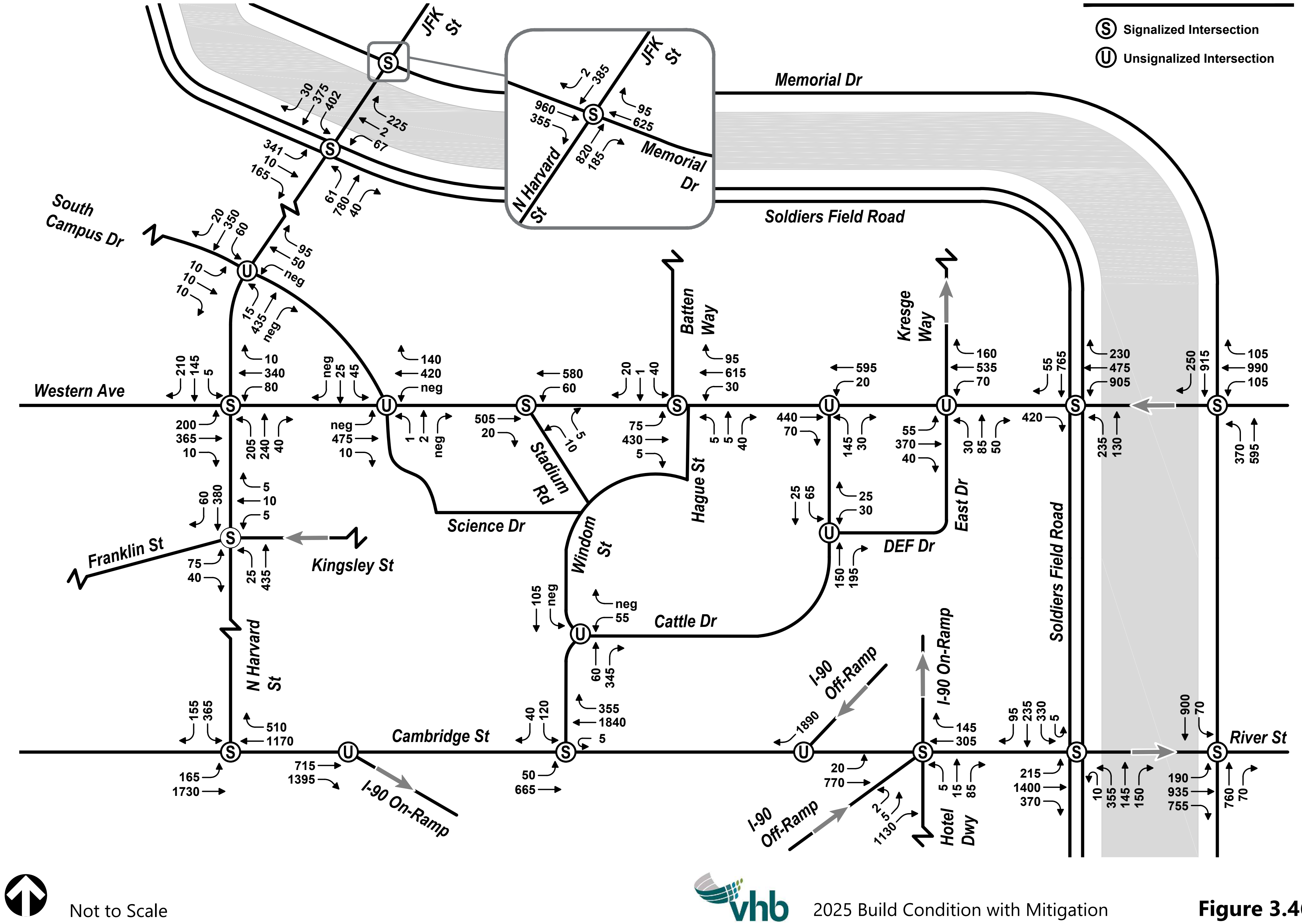


vhb

Figure 3.45

Western Avenue at Soldiers Field Road Improvements

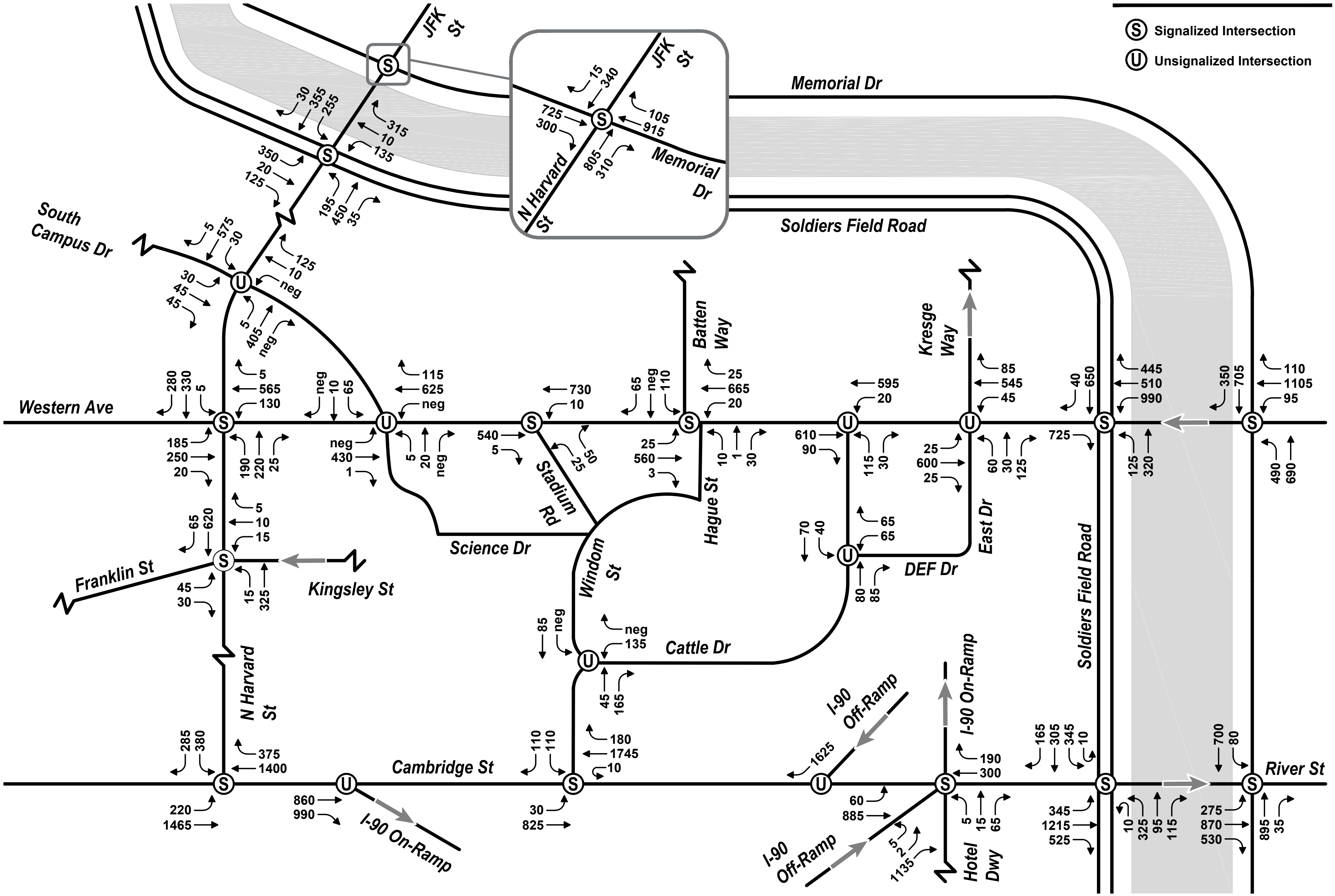
Enterprise Research Campus Project
Boston, MA



2025 Build Condition with Mitigation
Vehicle Volumes: Morning Peak Hour

Figure 3.46

Enterprise Research Campus Project
Boston, MA

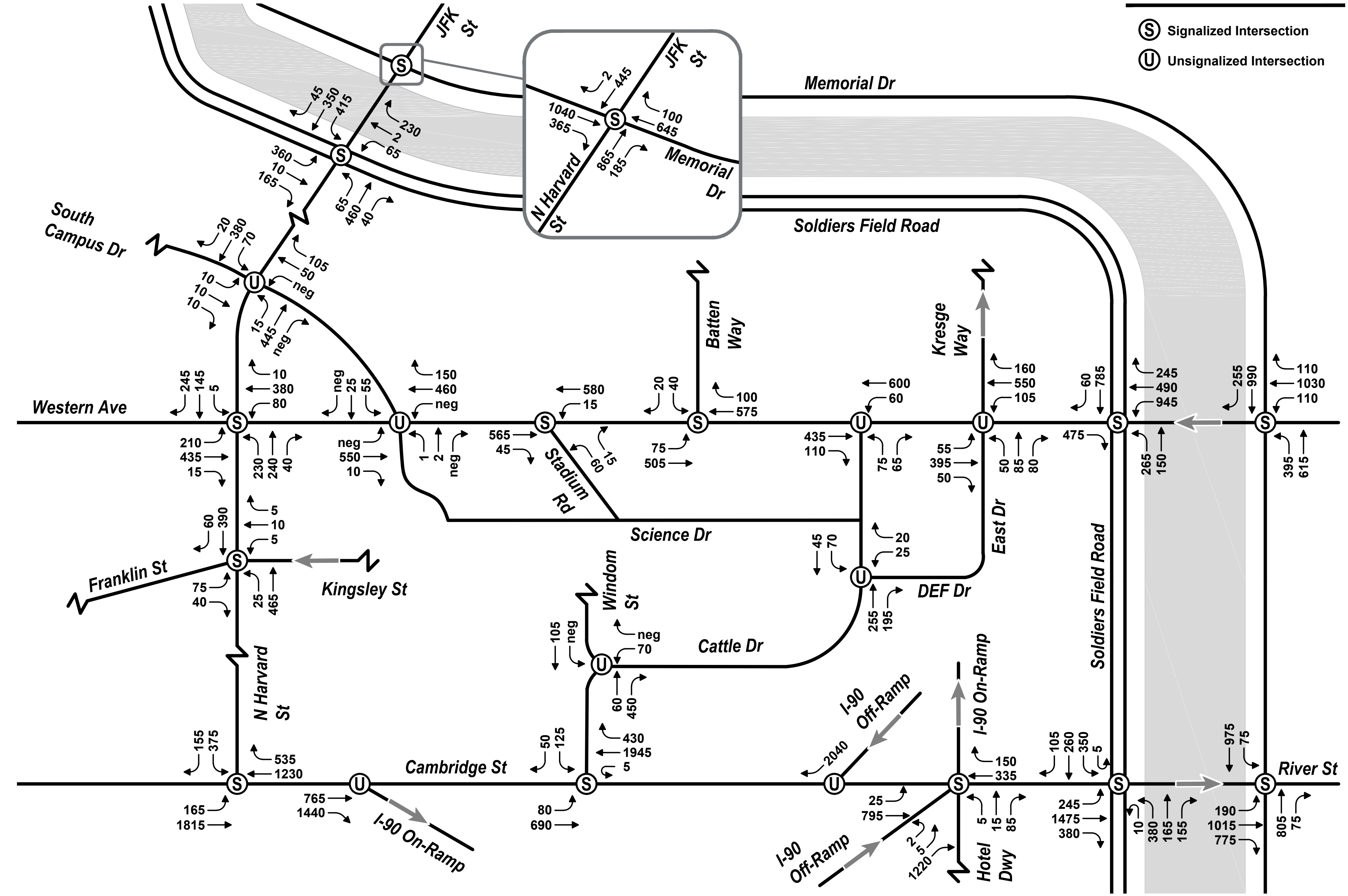


Not to Scale

2025 Build Condition with Mitigation
Vehicle Volumes: Evening Peak Hour

Enterprise Research Campus Project
Boston, MA

Figure 3.47

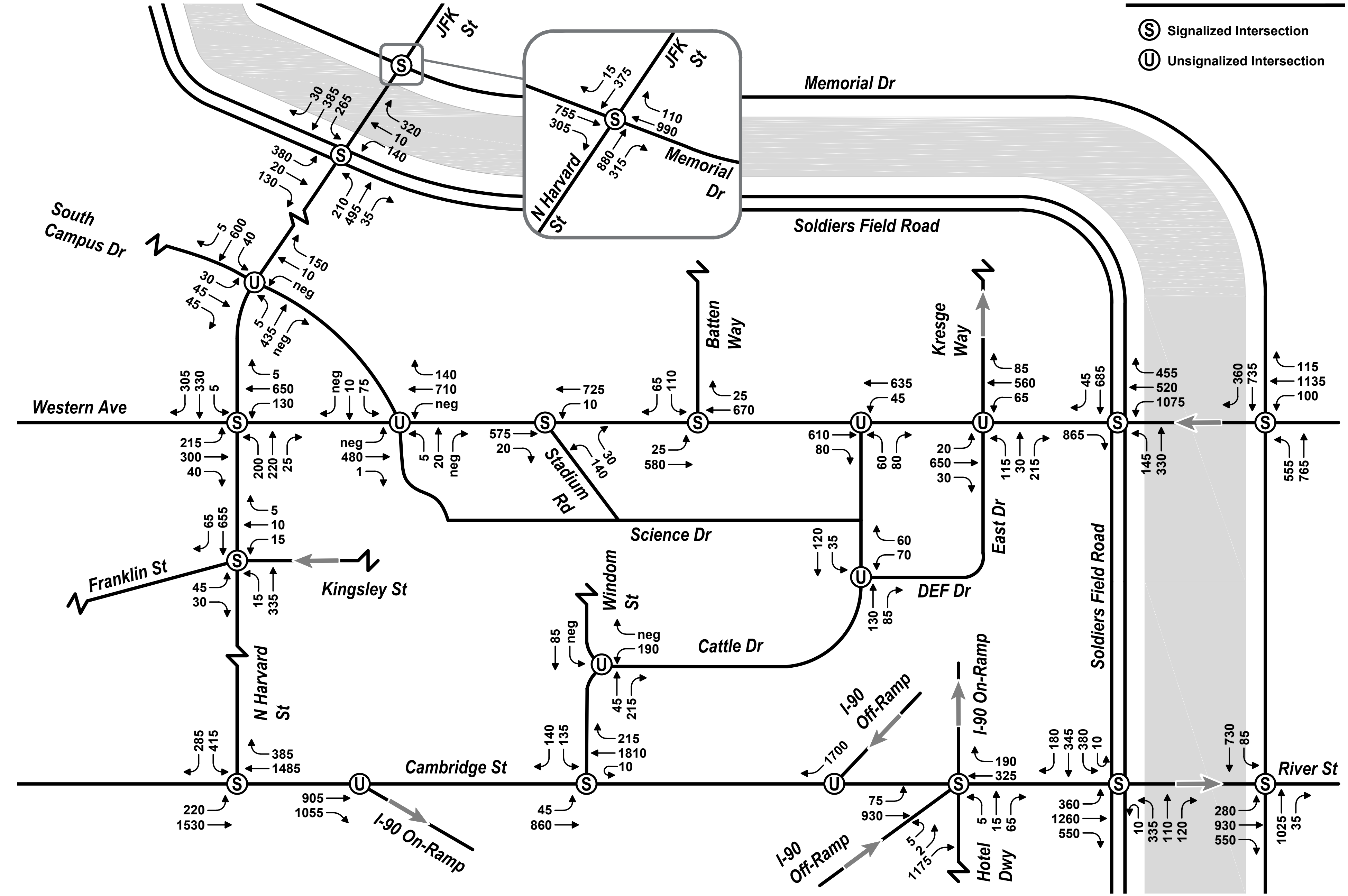


Not to Scale

2030 Build Condition with Mitigation
Vehicle Volumes: Morning Peak Hour

Figure 3.48

Enterprise Research Campus Project
Boston, MA



Not to Scale

2030 Build Condition with Mitigation
Vehicle Volumes: Evening Peak Hour

Figure 3.49

Enterprise Research Campus Project
Boston, MA

4

Stormwater

In accordance with the ENF Certificate, this chapter describes the existing stormwater infrastructure within and adjacent to the Project Site, as well as the proposed stormwater infrastructure and management required for the Project. The proposed conditions are presented to identify potential impacts and mitigation measures related to infrastructure for the Project.

The area analyzed in this chapter includes the Project Site and the HALC enabling roadways, including the existing Western Avenue to the north, the proposed East Drive to the east, the proposed DEF Drive to the south, and the proposed Cattle Drive to the west.

This chapter includes the following information (with DEIR section references in **bold**):

- The regulatory requirements related to stormwater that the Project must comply to (**Section 4.1**);
- Existing stormwater management at the Project Site and the Project's proposed stormwater management (**Section 4.2 and Section 4.3**)
- The Project's compliance with MassDEP Stormwater Management Standards (**Section 4.4**)
- The Project's approach to infiltration including proposed best management practices (BMPs) and design considerations to manage stormwater (**Section 4.4**);
- An evaluation of stormwater impacts with increased pervious area (**Section 4.3.2**)

4.1 Regulatory Context

4.1.1 U.S. EPA National Pollutant Discharge Elimination System

The United States Environmental Protection Agency (EPA) requires that all projects that disturb greater than one acre of land obtain a permit for stormwater discharges through the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for Stormwater Discharges from Construction Activity (2012, EPA). Compliance with the CGP is achieved by the following:

- Developing and implementing a Stormwater Pollution Prevention Plan (SWPPP);
- Completing, certifying, and submitting a Notice of Intent (NOI) to the EPA; and
- Complying with the requirements contained in the CGP.

Compliance with the CGP and its Standard Permit Conditions is the responsibility of the site contractor and/or site operator.

The NPDES General Permit for Remediation Activity Discharges, known as the Remediation General Permit (RGP), is required for site discharging water as a result of different remediation activities. The Project will seek authorization to discharge from any remediation activities by submitting a NOI to the EPA and complying with the requirements of the RGP.

4.1.2 MassDEP Stormwater Management Standards

In March 1997, MassDEP adopted a new Stormwater Management Policy to address non-point source pollution. In 1997, MassDEP published the Massachusetts Stormwater Handbook as guidance on the Stormwater Policy, which it subsequently revised in February 2008. The Stormwater Management Standards are regulated under the Wetlands Protection Act Regulations at 310 CMR 10.05(6)(k) through (q). The Policy prescribes specific stormwater management standards for redevelopment projects, including urban pollutant removal criteria for projects that may impact environmental resource areas.

In 2020, MassDEP convened an advisory committee to focus on aligning the Massachusetts Wetland Protection Act's Stormwater Management Standards with the requirements of the federal Municipal Storm Sewer System Permit and precipitation projections for stormwater management. The stormwater management standards will be updated with the Massachusetts Stormwater Handbook and the Massachusetts Wetlands Protection Act, to be implemented in 2021. The Project will review the updates to the Stormwater Management Standards and the Site will be designed to meet the new requirements.

4.1.3 BWSC Site Plan Review

All improvements and connections to Boston Water and Sewer Commission (BWSC) infrastructure will be reviewed by BWSC as part of the Site Plan Review process. This process includes a comprehensive design review of the proposed service connections, assessment of system demands and capacity, and establishment of service accounts for water and sewer, systems.

4.2 Existing and Planned Drainage Conditions

The existing Project Site and Enabling Infrastructure area is entirely previously developed/disturbed and presently serves as a laydown area for Harvard-related construction projects. It includes approximately 29% impervious cover totaling approximately 4.15 acres. Historically, the Project Site was nearly 100% impervious and served as a parking lot and warehouse until as recently as 2013. There is currently no active closed drainage system on-site for storage, treatment, or groundwater recharge on the Project Site. The following sections describe the existing stormwater management infrastructure surrounding the Project Site, as shown on Figure 4.1, and planned stormwater management infrastructure, as shown on Figure 4.2.

4.2.1 Western Avenue

There is an existing 20-inch BWSC storm drain main, which increases to a 24-inch main, off-site within Western Avenue that flows easterly. There is also a 12-inch MWRA storm drain main in the southern sidewalk of Western Avenue which collects catch basins from the roadway and flows easterly and eventually discharges to the Charles River.

4.2.2 East Drive

HALC plans to construct a north-south private way open to public travel along the eastern edge of the Project. Existing area stormwater overflow is directed to the 48-inch storm drain main in East Drive where it currently discharges to the MassDOT drainage system. It will eventually be connected to the BWSC drainage system. Refer to Section 4.2.5 for more information.

4.2.3 DEF Drive

HALC plans to construct an east-west private way open to public travel along the southern edge of the Project. There is an existing underground infiltration system off-site within the temporary roadway currently serving the DEF, installed by Harvard. Overflow is directed to the 48-inch storm drain main in East Drive where it currently discharges to the MassDOT drainage system. It will eventually be reconnected to the BWSC drainage system. Refer to Section 4.2.5 for more information.

4.2.4 Cattle Drive

HALC plans to construct a north-south private way open to public travel along the western edge of the Project. There is a planned 24-inch storm drain main off-site within Cattle Drive that will flow south to the intersection of Science Drive. The planned 24-inch storm drain main in Cattle Drive turns and flows easterly through the proposed Project Greenway, increasing to a 36-inch main, and will then connect to the 48-inch storm drain main in East Drive, eventually connecting to the BWSC storm drainage system. A portion of the drain main through the Project Greenway will pass through the below-grade parking on the west side (between Buildings 2 and 3). This storm drain main will be located in a BWSC easement.

4.2.5 North Allston Storm Drain Extension Project (NASDEP)

Stormwater overflows from the Project will flow to the BWSC storm drainage system.

BWSC, in collaboration with Harvard, is currently seeking permits for the North Allston Storm Drain Extension Project (NASDEP), which will create a major public infrastructure asset owned and maintained by BWSC, and represents a significant investment in shared public infrastructure for the North Allston Neighborhood. The NASDEP is designed to convey the current 10-year BWSC design storm runoff collected by the existing upstream North Allston catchment area drainage system, connecting to an existing upstream BWSC trunk drain through Rena Park, and extending through the Allston Landing North area, to a new submerged outfall into the Charles River. The planned NASDEP location and the Project's connection is shown in Figure 4.3.

In the event that the NASDEP is not available in time to serve the Project, storm drain improvements will be constructed to convey the current 10-year BWSC design storm runoff from the Project to the existing 30-inch by 36-inch BWSC storm drain main in Cambridge Street, which ultimately discharges to the Charles River (via BWSC outfall SDO-034). Peak flows from the Site will be attenuated through a stormwater storage facility before discharging to the existing BWSC drainage system in Cambridge Street, so that neither the downstream drainage system nor the upstream catchment area is adversely impacted. The storm drain improvements described in this paragraph, unlike the completed NASDEP, would not provide improved long-term resiliency to storm events and alleviate flooding for the thousands of residents in the North Allston neighborhood catchment area, and our current understanding is that those storm drain improvements would be decommissioned by BWSC when the NASDEP is completed. The Cambridge Street interim drainage system is shown in Figure 4.4.

The drainage systems that will service the Project are designed to collect and discharge the current BWSC 10-year design storm.

4.3 Proposed Stormwater Management Approach

As described in Chapter 1, *Project Description*, the Project Site will be developed with new buildings, paved roadways with sidewalks, walkways and plazas, and landscaping. It is anticipated to be approximately 85% impervious, which is an increase of 58% from the present condition. The Project will be installing green roofs on the residential and hotel building roofs, totaling up to approximately 33% of the total roof area, and up to 15% of the conference center roof area. Green roofs will help reduce impervious area by up to an additional 6%. The Project aims to reduce heat island effect by planting of trees throughout the site and it estimated that tree canopy will extend to 1.4 -acres of the site, approximately 10% of the Site.

The Project is planning and designing, in coordination with Harvard, the siting of stormwater storage and infiltration and other green infrastructure. Infiltration systems will be used to provide storage, treatment, and promote infiltration via groundwater recharge. These systems will be sized based on the impervious site area. Site runoff will be collected by catch basins, area drains, and trench drains, and directed to storage and infiltration systems. The systems will capture 1.25-inches of water quality volume from the impervious site areas, which meets standard BWSC and BPDA requirements. Above the 1.25-inches, the Proponent has committed to store and actively manage an additional 1.5-inches of runoff as a Project requirement. The infiltration systems will be designed so as to not increase existing peak runoff rates and volumes of stormwater for the 2-year, 10-year, 25-year, and 100-year rainfall events.

Climate Ready Boston indicates the existing site is vulnerable to both near- and long-term rain-based flooding. Considering that the existing site does not contain an active drainage system, was previously entirely impervious, and is currently an active construction site, the proposed planned stormwater management system will greatly improve the site's capacity to control runoff and minimize flooding. The Project team has anticipated larger storm events of the future, and is using larger year 2070 storm events (6.4-inch 10-year rainfall, 8.2-inch 25-year rainfall, and 11.7-inch 100-year rainfall) to evaluate & confirm the proposed system's ability to handle the peak flows of these larger rainfall events.

The Project will use the following systems to manage stormwater on-Site:

- Runoff from hotel, residential, and lab building roof areas will be collected by a series of green roofs and in-building tanks, which will collect 1.5-inches of volume over the roof areas. The collected water is being evaluated for re-use in several ways, including toilet flushing, cooling tower make-up, and irrigation. For rainfall greater than 1.5-inches, stormwater will be directed to the storage and infiltration systems in the Project Greenway. The systems in the Project Greenway are sized to provide the additional 1.25-inches of storage from these areas.
- Runoff from HALC's enabling roadways, Cattle Drive, East Drive, and DEF Drive will be collected by bio-infiltration cells and catch basins, and will then be directed to treatment, storage, and infiltration systems for the first 1.25-inches of runoff. Street trees in planter beds, rain gardens, porous pavement in the separated bike lanes, and permeable pavers will reduce runoff and promote infiltration. For rainfall greater than 1.25-inches, stormwater will be directed to the site stormwater system and ultimately the BWSC system. As part of the design, resiliency storage equal to 1.5-inches over the roadway area will be provided in the Project Greenway to store overflows during extreme storm events. Runoff from the Project Greenway and plaza areas, including areas above the below-grade garage, will be collected by inlet structures such as catch basins, area drains, and trench drains, and directed to either the subsurface infiltration systems or a bioswale in the Project Greenway. The Project Greenway infiltration systems and bioswale will be sized to provide storage for 2.75-inches of runoff from these areas. The Project Greenway will also feature trees and landscape areas to reduce impervious area and stormwater runoff.
- The bioswale will be a site feature designed to incorporate green space, provide storage and treatment, promote infiltration, and support plant growth. The bioswale will originally receive stormwater from the immediate walkways from the Project Greenway. If there is additional storage capacity available within the bioswale, portions of the building roofs may be directed to the bioswale. The storage will be provided by the crushed stone, growing media, and up to 12-inches of surface storage depth prior to overflowing. The bioswale plantings will be selected based on the designed water depth.

For further information on the stormwater management plan outlined above, please refer to Figures 4.5a and 4.5b. The Proponent will continue to evaluate ways to maximize green infrastructure, employ low impact development techniques, increase green space, and decrease impervious area as the design progresses, which could further optimize the stormwater management system. The stormwater engineering team will continue to refine the system design outlined above and will do so in coordination with the Harvard Enabling Infrastructure. As design progresses, the timing and sequence of stormwater storage and infiltration may be adjusted.

Improvements and connections to existing or planned BWSC infrastructure will be reviewed as part of the BWSC's Site Plan Review process. The process will include a comprehensive design review of the proposed service connections and an assessment of Project demands and system capacity.

4.3.1 Water Quality

Since 2010, groundwater levels have been monitored at or in the vicinity of the Project Site. Groundwater level measurements range from about 5 to 9 feet below the surface, corresponding to approximately elevation 11 to elevation 7 BCB. Excavation for the underground garage will be conducted within a temporary earth support system which will be designed as a groundwater cut-off wall to maintain groundwater levels outside of the excavation. Temporary construction dewatering will be conducted within the impervious earth support system to drain the site soils prior to excavation. The temporary dewatering will be conducted in accordance with appropriate permits to be obtained by the Proponent from local, State, and federal agencies, as applicable, to discharge into adjacent storm drains. It is anticipated that a National Pollutant Discharge Elimination System Remediation General Permit will be required from the EPA and that permits will be required from the BWSC.

The Project will improve the water quality of the stormwater that is not retained on-site which flows to the existing and planned BWSC systems. Inlet structures will have deep sumps and hoods to provide pre-treatment. Infiltration systems sized for 1.25-inches of runoff provide at least 80% removal of Total Suspended Solids (TSS). The Site's design for the added 1.5-inches of storage will provide additional stormwater management beyond what is typically required by BWSC and MassDEP stormwater standards. The change in land use, installation of green infrastructure, and recharge will also provide a minimum of 64% phosphorus removal which meets the reduction requirement outlined in the TMDL Report for the Lower Charles River Basin. If ongoing geotechnical investigation shows that there is higher groundwater in specific locations that prevent treatment through groundwater recharge, the Proponent will treat the stormwater runoff to adequately capture TSS and phosphorus prior to discharging to the BWSC system.

Overall, the stormwater management systems will provide stormwater storage and treatment and will promote groundwater recharge. The systems will reduce the peak rates and volume of runoff being directed to BWSC infrastructure and discharging to the Charles River.

4.3.2 Evaluation to Increase Pervious Area

As previously described, historically, the Project Site was nearly 100% impervious and served as a parking lot and warehouse until as recently as 2013. Although the existing Site is currently 29% impervious, most of this serves as a laydown/stockpile area for Harvard-related construction projects and is not green space.

The ENF filing described the proposed site with an expected 97% impervious area. This was a conservative estimate for the purpose of stormwater planning. With the incorporation of green infrastructure in the roadways and greenway, including porous pavement, permeable pavers, landscaped planters, rain gardens, and lawn, impervious area is expected to be reduced to approximately 85%.

The impervious area calculation for the Project Site does not include the streets outside the 14-acre Project Site, which consist of Science Drive and Interim Cattle Drive. These street areas will serve the eventual full build-out of the entire area north of Cambridge Street and contain about 1.61 acres of impervious surface. The existing area currently consists of either asphalt roadway or compacted gravel and is entirely impervious – therefore these streets account for no net new impervious area.

There are opportunities for green roofs on the residential, hotel, and conference center roofs. Assuming green roof of up to 33% of the hotel/residential buildings and up to 15% of the ERC Center, this may offset the site impervious area by an additional 6%.

The Project will continue to evaluate ways to reduce impervious area, to provide more green space and reduce heat island effect. Site surface materials will also be chosen to minimize contribution to heat island effect. The Project aims to reduce heat island effect by planting of trees in the roadways, greenway and plaza areas. It is estimated that tree canopy will extend to 1.2-acres of the Phase A Site.

4.4 Compliance with MassDEP Stormwater Management Standards

As described in Section 4.1.2, MassDEP adopted a new Stormwater Management Policy and published the Massachusetts Stormwater Handbook as guidance on the Stormwater Policy in 1997, which it subsequently revised in February 2008, to address non-point source pollution. The Policy prescribes specific stormwater management standards for development projects, including urban pollutant removal criteria for projects that may impact environmental resource areas. Compliance is achieved through the implementation of stormwater BMPs in the stormwater management design. A brief explanation of each Policy Standard and the system compliance is provided below.

Standard #1: No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

› **Compliance:** The proposed design will comply with this Standard. The design will incorporate the appropriate stormwater treatment and no new untreated stormwater will be directly discharged to, nor will erosion be caused to wetlands or waters of the Commonwealth as a result of stormwater discharges related to the Project.

Standard #2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR.

› **Compliance**: The proposed design will comply with this Standard. The existing discharge rate will be met or decreased as a result of the improvements associated with the Project.

Standard #3: Loss of annual recharge to groundwater shall be eliminated or minimized using infiltration measures that include environmentally-sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

› **Compliance**: The stormwater management system is being designed to infiltrate the required recharge volume and the Project will meet and exceed this Standard by providing a minimum of 1.25 inches of infiltration from the impervious Site areas.

Standard #4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of TSS. This Standard is met when:

1. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
2. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and
3. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

› **Compliance**: The proposed design will comply with this Standard. Within the Project's limit of work, there will be mostly building roof, paved sidewalk, and roadways. Runoff from paved roadways areas that would contribute unwanted sediments or pollutants to the existing storm drain system will be collected by structures for a high-level of pre-treatment, directed to recharge systems along the roadways and then directed into the BWSC system. Runoff from the building roofs will be collected by either green roofs or collected and directed to tanks within the building for re-use, with overflow being directed to the stormwater management systems in the Project Greenway for greater storm events. Site plaza areas will be directed to the stormwater management systems on--Site. These best management practices are designed to provide treatment, reduce pollutants, and improve water quality which meet and exceed the required water quality volume. A construction Stormwater Pollution Prevention Plan and Long-Term Pollution Prevention Plan will be provided for implementation during and after construction.

Standard #5: For land uses with higher potential pollutant loads, source control, and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention, all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the Proponent shall use the specific structural stormwater BMPs determined by the MassDEP to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

- **Compliance**: The proposed design will comply with this Standard. The Project is not associated with Higher Potential Pollutant Loads (per the Policy, Volume I, page 1-6).

Standard #6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater BMPs determined by the MassDEP to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "stormwater discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

- **Compliance**: The proposed design will comply with this Standard. The Project will not discharge untreated stormwater to a sensitive area or any other area.

Standard #7: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

- **Compliance**: This standard is not applicable to the Project, which will fully comply to all standards as a new development.

Standard #8: A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

- **Compliance**: The Project will comply with this Standard. Sedimentation and erosion controls will be incorporated as part of the design of these projects and employed during construction.

Standard #9: A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

- **Compliance**: The Project will comply with this Standard. An O&M Plan including long-term BMP operation requirements will be prepared for the Project and will assure proper maintenance and functioning of the stormwater management system.

Standard #10: All illicit discharges to the stormwater management system are prohibited.

- **Compliance**: The Project will comply with this Standard. There will be no illicit connections associated with the Project.

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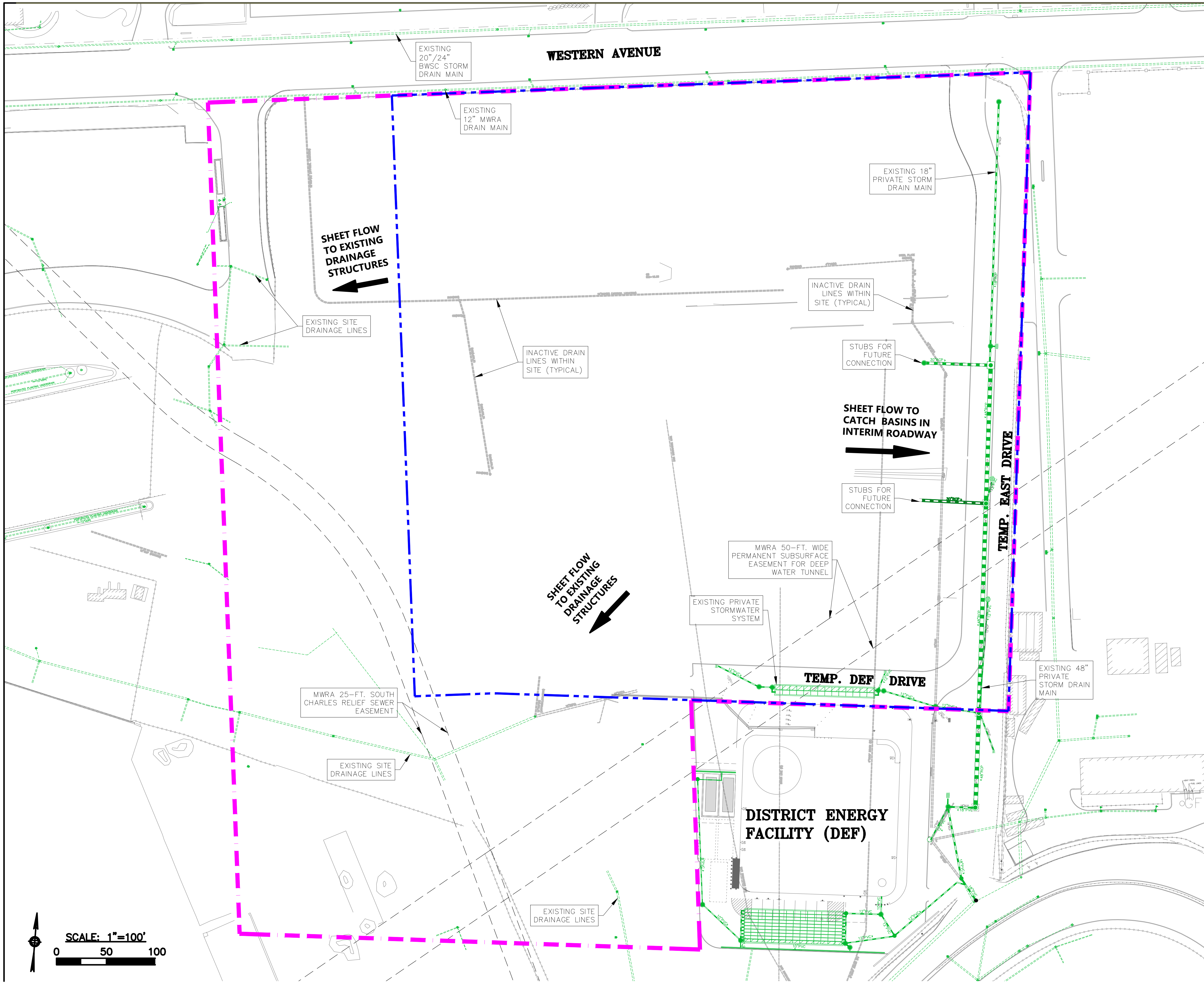


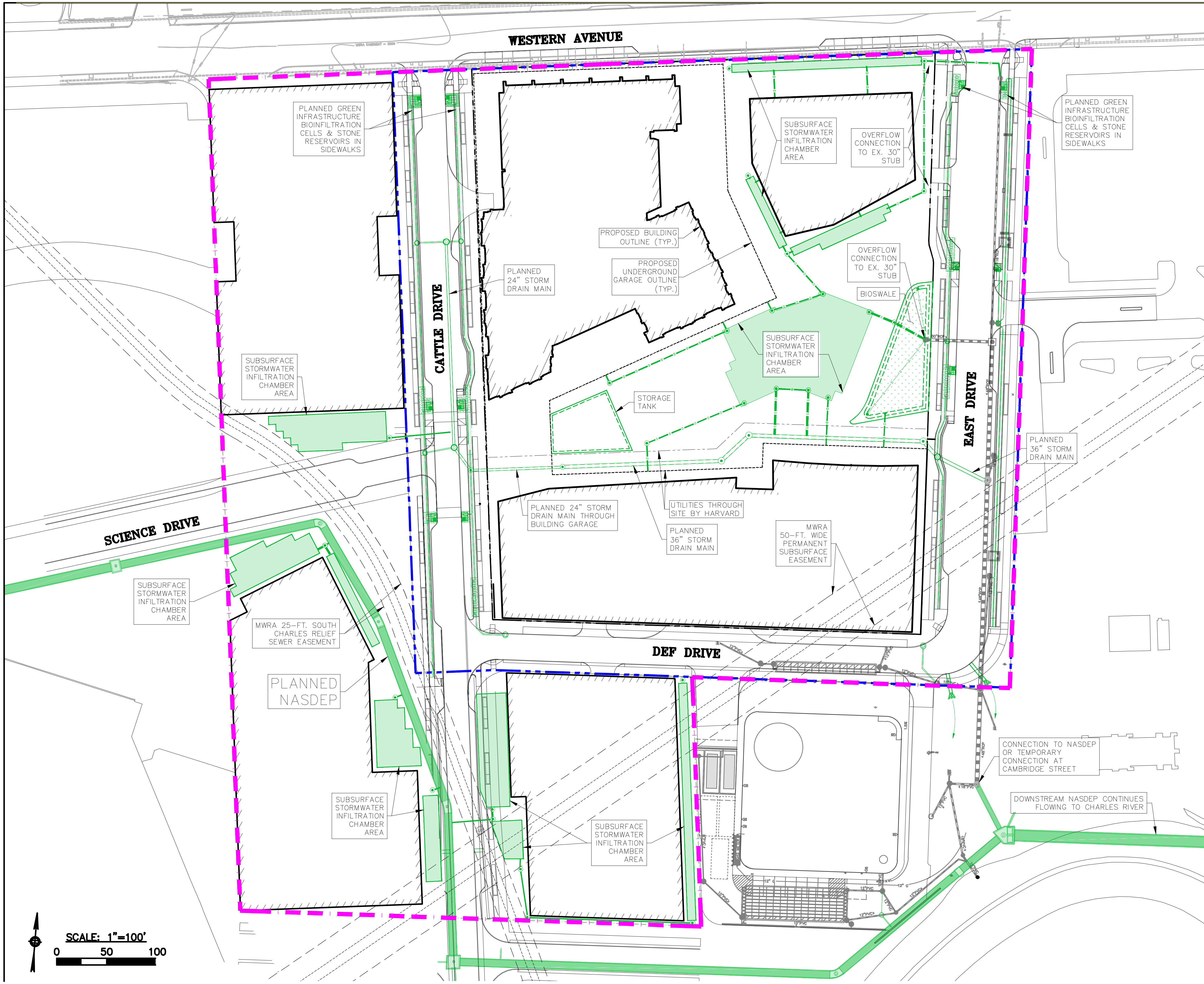
- Phase A Project Site Boundary
- Master Plan Project Site Boundary
- Existing Drainage

Nitsch Engineering

Figure 4.1

Existing Drainage

Enterprise Research Campus Project
Boston, MA



Phase 1A Project Site Boundary

Master Plan Project Site Boundary

Existing Drain

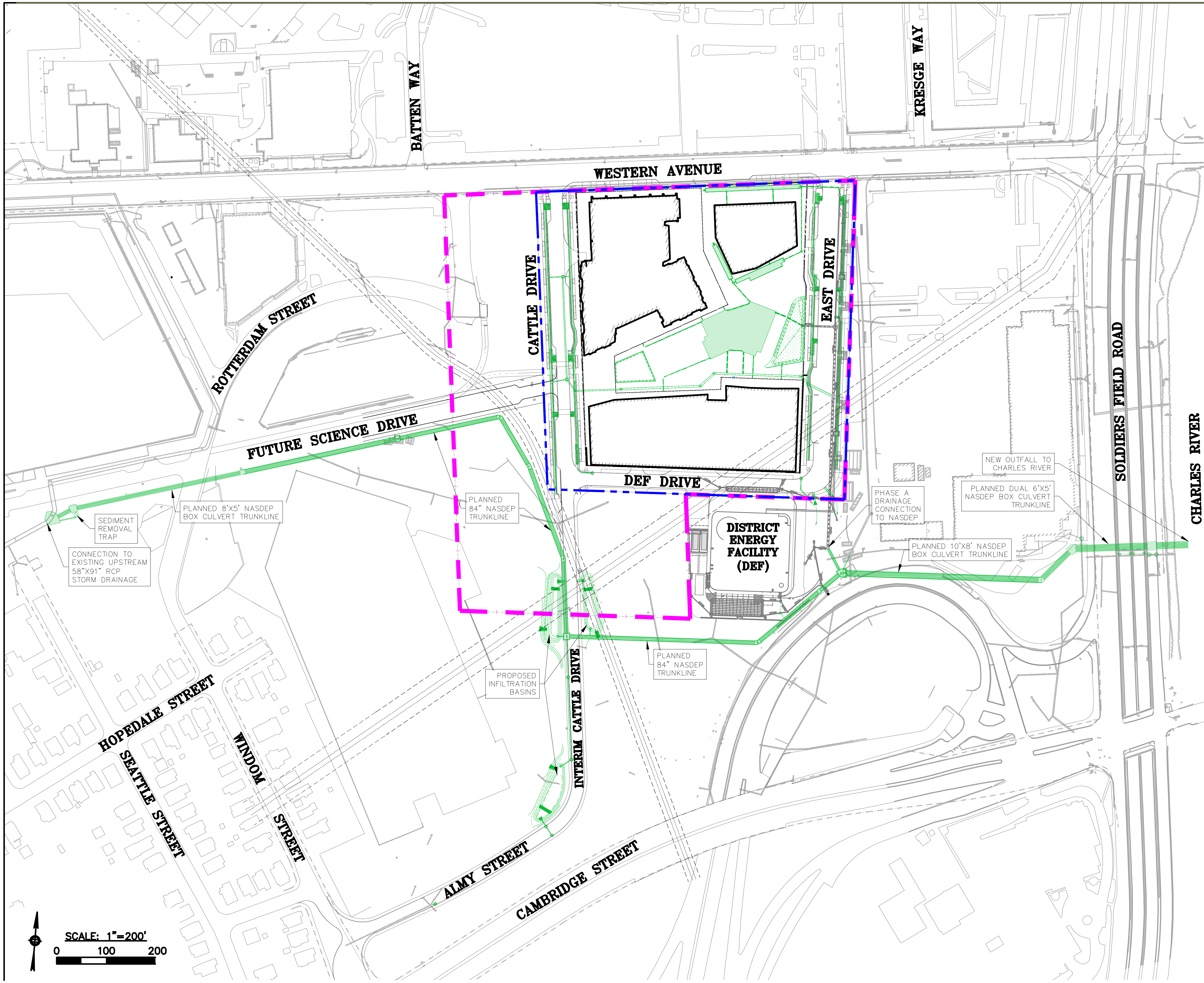
Planned/Proposed Drain

Nitsch Engineering

Figure 4.2

Proposed Drainage

Enterprise Research Campus Project
Boston, MA



Phase A Project Site Boundary

Master Plan Project Site Boundary

Planned Drain

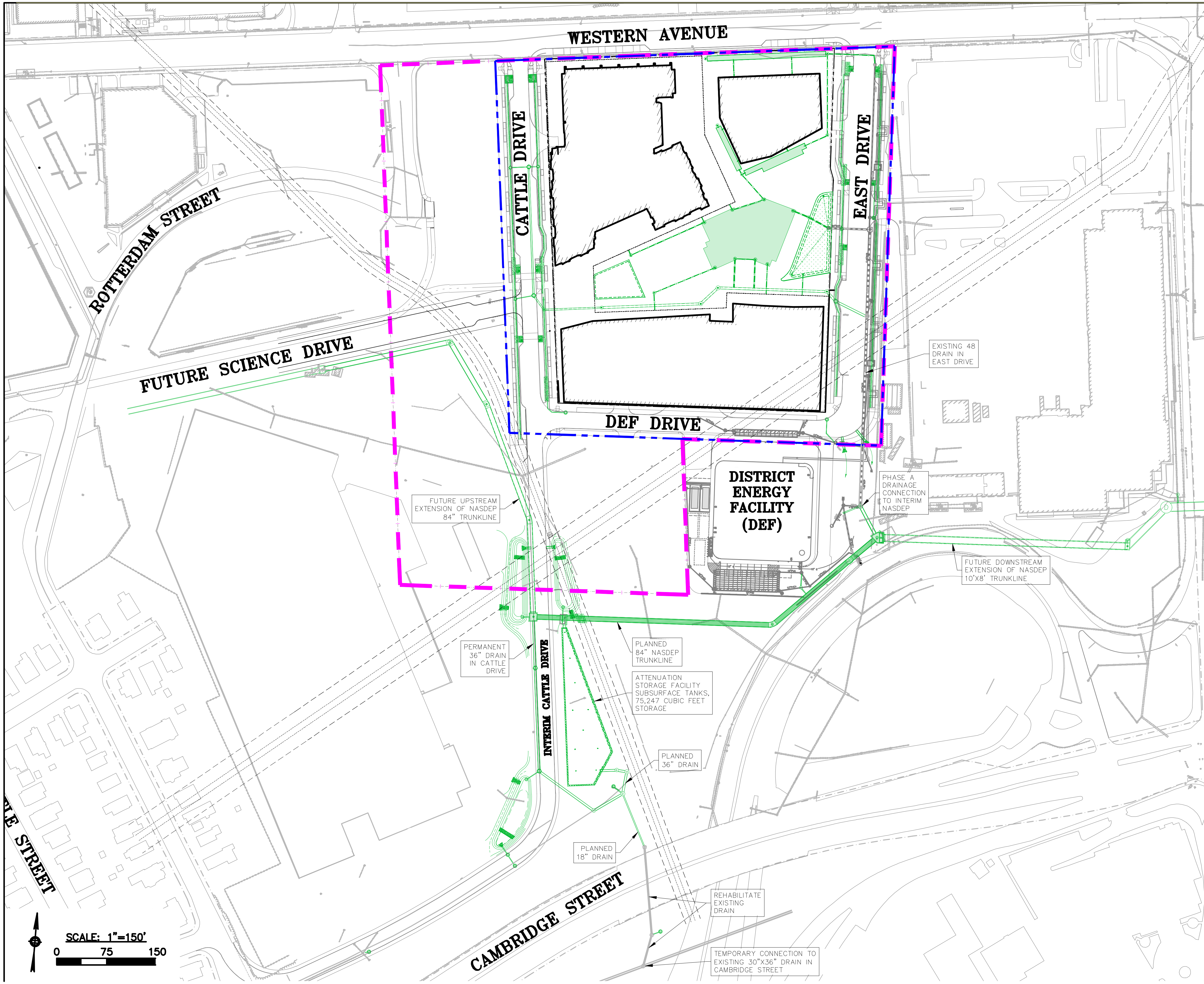
Existing Drain

Nitsch Engineering

Figure 4.3

Planned NASDEP Connection

Enterprise Research Campus Project
Boston, MA



Phase A Project Site Boundary

Master Plan Project Site Boundary

Planned Drain

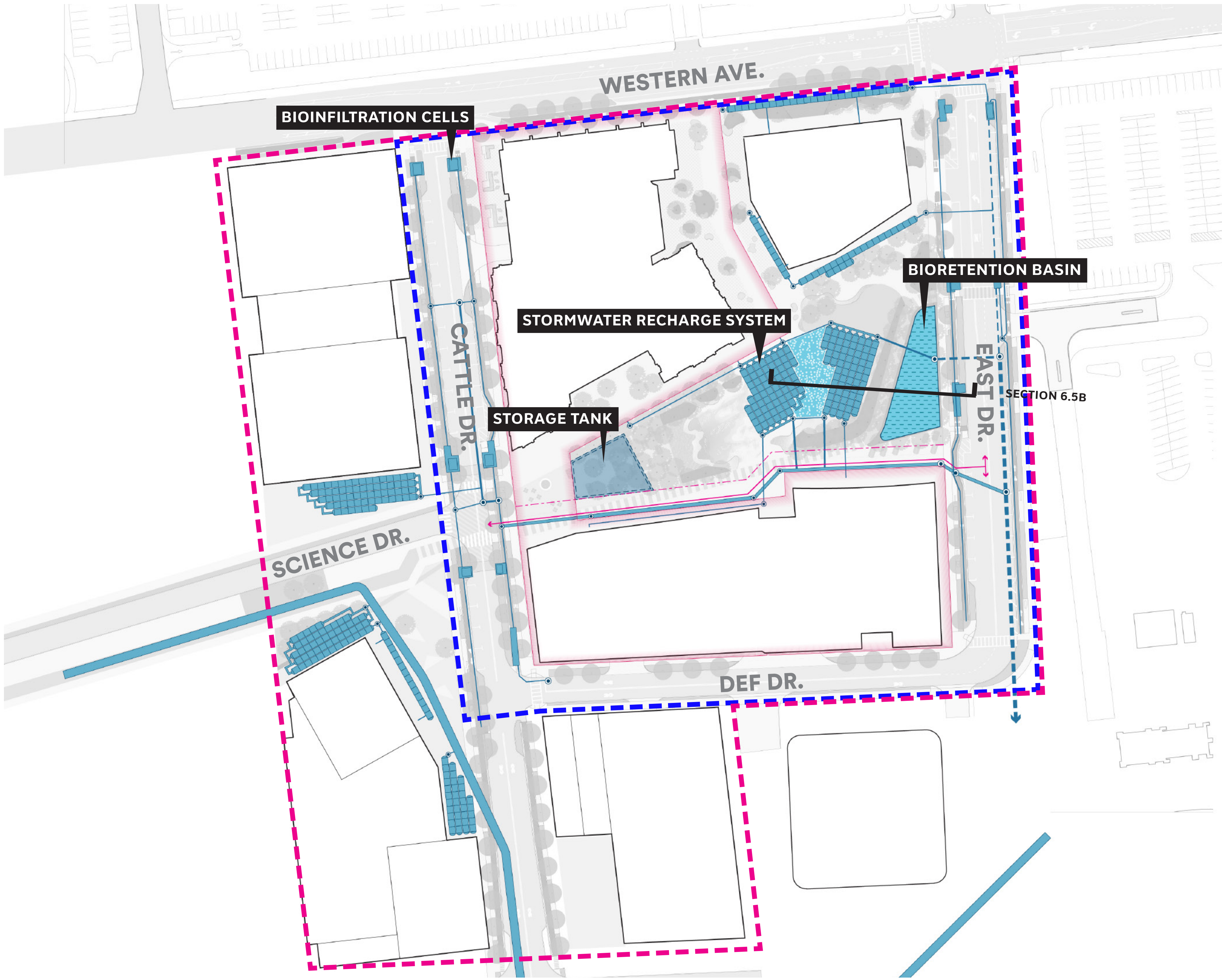
Existing Drain

Nitsch Engineering

Figure 4.4

Cambridge Street Interim Stormwater Connection

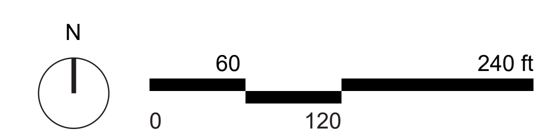
Enterprise Research Campus Project
Boston, MA



Phase A Boundary
Project Site Boundary
Manhole
Stormwater Recharge System
Bioretention Basin
Stone Reservoir
Concrete StorageTank (final location TBD)
Proposed 36in
12in Overflow Drain
24in Overflow Drain
18in RCP
48in RCP
12in Water
Utility Easement
Basement

A .14 acre bioretention basin provides infrastructural and ecological benefits to the project.

An outdoor classroom located within the bioretention basin introduces an educational component the the site.



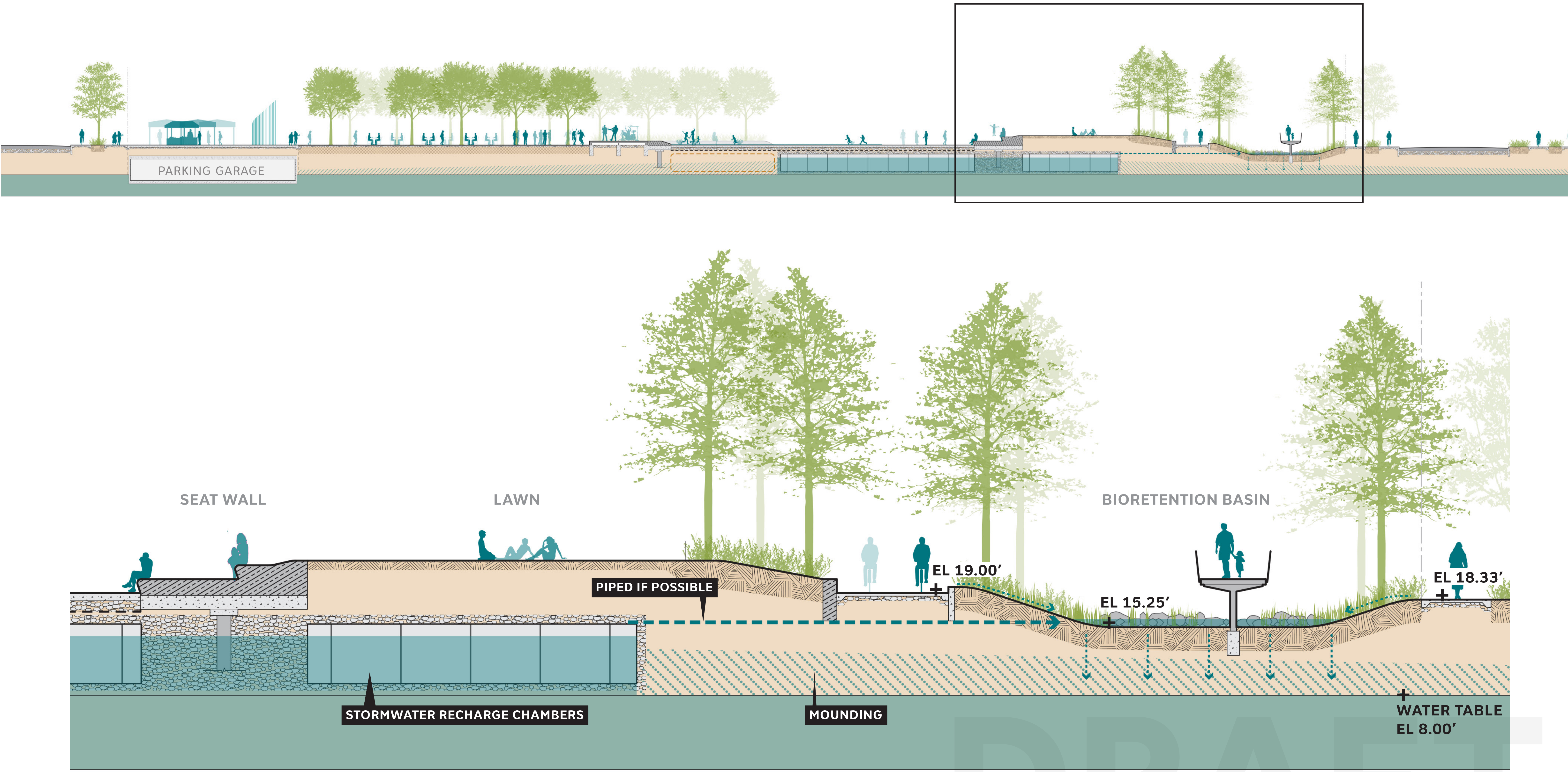
SCALE: 1" = 120'

Note: Illustrative purposes only. Subject to change.

Figure 4.5a

Stormwater Management

Enterprise Research Campus Project
Boston, MA



DRAFT

Note: Illustrative purposes only. Subject to change.

Figure 4.5b
Stormwater Management

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.

Figure 4.6

Vegetation, Permeability, and Canopy

Enterprise Research Campus Project
Boston, MA

5

Water and Wastewater

This chapter describes the existing and proposed water and wastewater infrastructure within and adjacent to the Project Site. The proposed conditions are presented to identify potential impacts and mitigation measures related to infrastructure for the Project.

The systems discussed in this chapter include those owned or managed by the Boston Water and Sewer Commission (BWSC), Massachusetts Water Resources Authority (MWRA), Harvard University, and private utility companies. This chapter identifies areas where further coordination among these entities and the design team will be required to provide adequate service for the Project.

The area analyzed in this chapter includes the Project Site and the HALC enabling roadways, including the existing Western Avenue to the north, the proposed East Drive to the east, the proposed DEF Drive to the south, and the proposed Cattle Drive to the west.

This chapter includes the following information (with DEIR section references in **bold**):

- The regulatory requirements related to water and wastewater that the Project must comply to (**Section 5.1**);
- Existing and planned water supply system (**Section 5.2)**;
- Proposed water demand and connection **(Section 5.3)**, and potential impacts and mitigation measures **(Section 5.4)**;
- Existing and planned sanitary sewage system (**Section 5.5)**;
- Proposed sewage flow and connections (**Section 5.6)**; and
- Mitigation measures the Project proposes including water conservation measures and Infiltration and Inflow (I/I) mitigation (**Section 5.7**).

5.1 Regulatory Context

5.1.1 Massachusetts Water Resources Authority

The MWRA's deep water tunnel runs through the southeast corner of the site and the construction of the proposed buildings will require an 8(m) permit. The MWRA 25-foot wide MWRA South Charles Relief Sewer Easement runs through the south west portion of the site. The proposed utilities crossing this sewer easement and proposed Phase B building's proximity to the sewer easement will require an 8(m) permit. There is also a 12-inch MWRA storm drain main in the Western Avenue sidewalk adjacent to the site. Proposed utility connections crossing the drain line and the proximity of the proposed Phase A building will require an 8(m) permit.

A MWRA Sewer Use Discharge Permit may also be required for specific building use discharges, to be applied for by the future tenant(s), once identified.

5.1.2 BWSC Site Plan Review

All improvements and connections to BWSC infrastructure will be reviewed by BWSC as part of the Site Plan Review process. This process includes a comprehensive design review of the proposed service connections, assessment of system demands and capacity, and establishment of service accounts for water, sewer, and stormwater systems. Refer to Figure 5.1 for the existing water and wastewater utilities and Figure 5.2 for the planned utilities adjacent to the site and proposed building connection locations.

5.2 Existing and Planned Water Supply System

There are four water systems within the City of Boston, and these provide service to portions of the City based on ground surface elevation. The four systems are Southern Low (commonly known as low service and abbreviated SL), Southern High (abbreviated SH), Northern Low (abbreviated NL), and Southern Extra-High (abbreviated SEH) Services. The below sections explain the water supply system elements that serve the Project Site.

5.2.1 Western Avenue

There is a 12-inch northern low water main in Western Avenue (NL 12 PCI 1891 (1993)). This water main is planned to be upgraded to a 16-inch water main and will be coordinated with the Western Avenue project improvements as part of a separate project. There are existing hydrants in the existing southern sidewalk which connect to the 12-inch main. There is also a 54-inch MWRA water main in Western Avenue.

5.2.2 East Drive

There is a new 12-inch water main in East Drive, installed by Harvard, which connects to the 12-inch water main in Western Avenue and extends down to provide services to the DEF. It is intended for the 12-inch main to eventually be accepted as a BWSC-owned main. There will also be a 12-inch main with a stub midway along East Drive for a future connection into the Project Site. The water main will be located within a BWSC easement.

5.2.3 District Energy Facility Drive

There is a temporary 12-inch water main in DEF Drive, previously-installed by Harvard, which connects to the 12-inch main in East Drive and extends to Cattle Drive. It is intended for the temporary 12-inch main in DEF Drive to ultimately be replaced with a new water main in the proposed Project Greenway.

5.2.4 Cattle Drive

There is a planned 16-inch BWSC cement-lined ductile iron water main in Cattle Drive, to be installed by HALC, which will connect from the existing 16-inch BWSC water main in Western Avenue and extend beyond DEF Drive to a connection in Windom Street. It is intended for the 16-inch main to eventually be accepted as a BWSC-owned main. The water main will be located within a BWSC easement.

5.2.5 On-Site

There is a planned 12-inch BWSC water main to be installed by HALC, which will connect to the stub of the existing 12-inch main in East Drive, crossing through the Project Site and the Project Greenway (running in the east-west direction), and connecting to Cattle Drive. A portion of this water main will pass through the below-grade parking garage between Buildings 2 and 3. The water main will be located within a BWSC easement.

5.3 Proposed Water Demand and Connection

The estimated domestic water service demand for the Project is based on estimated sewage generation, as described in Section 5.6. A conservative factor of 1.1 (+10%) is applied to the estimated average daily wastewater flows calculated with 310 CMR 15.203 values to account for consumption, system losses, and other usages to estimate an average daily water demand. The estimated domestic water demand for the Project is approximately 308,267 GPD.

The Project will require domestic water and fire protection service connections. These services will connect to the existing or planned water mains in Western Avenue, East Drive, DEF Drive, Cattle Drive, and/or running through the Project Greenway.

The number of proposed connections for domestic water and fire protection services will depend on the breakout of the lease parcels within the Project Site. The ERC Center (noted as Building 1) will be constructed by the Proponent and owned by HALC, and it may have a separate domestic water and fire protection services. Buildings 2-5 will be served by one domestic service and one fire service per lease parcel.

The domestic water and fire protection water service connections required for the Project will meet the applicable City and State codes and standards, including cross-connection backflow prevention. Compliance with the standards for the domestic water system service connection will be reviewed as part of BWSC's Site Plan Review process. This review will include sizing of domestic water and fire protection services, calculation of meter sizing, backflow prevention design, and location of hydrants and connections that conform to BWSC and Boston Fire Department requirements. Proposed hydrants will be placed in proximity to the new building entrances to ensure enough coverage across the Project Site.

5.4 Potential Impacts and Mitigation Measures

The planned water mains in the surrounding roadways have been sized for the Project. Hydrant flow data will be requested as the design progresses to ensure the Project's water services are adequately designed. Placement of hydrants in the roadways will be designed and installed by HALC and will be coordinated with the design of the Project.

5.5 Existing and Planned Sanitary Sewage Systems

The wastewater collection system that exists within the vicinity of the Project Site is owned and operated by BWSC. The system conveys wastewater to the MWRA system, which flows to the MWRA Deer Island Wastewater Treatment Plan. There are no active sewer mains on-site.

5.5.1 Western Avenue

There is a 24-inch BWSC sanitary sewer main in Western Avenue, which flows westerly and connects to the 84-inch x 112-inch MWRA South Charles Relief Sewer. The 24-inch BWSC sewer main has recently been relined by Harvard.

5.5.2 East Drive

There is a new 12-inch PVC sanitary sewer service connection in East Drive, installed by Harvard for construction of the DEF, which flows northerly and connects to the 24-inch sanitary sewer main in Western Avenue. As part of the 12-inch main construction, a 12-inch PVC stub was provided for the Project’s future sanitary building connections.

5.5.3 DEF Drive

There are no existing or planned sanitary sewer mains within DEF Drive.

5.5.4 Cattle Drive

There is a planned 8-inch BWSC sanitary sewer main in the northern side of Cattle Drive, which will flow northerly to connect to the 24-inch BWSC sanitary sewer main in Western Avenue. There is also a planned 12-inch BWSC sanitary sewer main in the southern side of Cattle Drive, starting at the Project Greenway and flowing south, which will connect to the 84-inch x 112-inch MWRA South Charles Relief Sewer.

5.6 Proposed Sewage Flow and Connections

The proposed sewer system is illustrated in Figure 5.2. The Project’s sewage generation rates were estimated using 310 CMR 15.203 along with the proposed building programs, as shown in Table 5-1. 310 CMR 15.203 lists typical sewage generation values for proposed building uses. The typical generation values are conservative values for estimating the sewage flows from new buildings. For the proposed laboratory space, a rate of 75 GPD per 1,000 square feet was used which is a value that reflects those of similar uses.

Phase A of the Project will consist of five new mixed-use buildings, four of which will be connected by an underground garage and one that will stand-alone. The proposed uses include the ERC Center (retail, meeting space and conferencing), lab/office, restaurant, retail, hotel and residential. Phase B of the Project will consist of retail, lab/office, restaurant and residential uses. There are no existing buildings on the Project Site and consequently the existing Project Site does not produce sewage flows. Therefore, the increase in sewage flows results entirely from the Project. The Project is expected to generate approximately 280,242GPD in wastewater flows. Table 5-1 describes the proposed sewage generation in GPD due to the Project.

The Project will include a below-grade parking garage and will require an oil/grit separator discharging to one of the building's sewer services. Restaurant spaces will require grease traps which will also be directed to the building sewer services.

Table 5-1 Estimated Future Sewer Generation

Phase A - Building Use	Units[1]	310 CMR Value	Total Flow
Building 1			
Conference Center	61,500 SF	varied uses	22,132 GPD
Building 2			
Lab/Office	420,000 SF	75 GPD/1,000 SF[2]	31,500 GPD
Restaurant	200 seats	35 GPD/seat	7,000 GPD
Retail	10,000 SF	50 GPD/1,000 SF	500 GPD
Building 3/5			
Residential	445 beds	110 GPD/bedroom	48,950 GPD
Restaurant	188 seats	35 GPD/seat	6,580 GPD
Retail	9,347 SF	50 GPD/1,000 SF	467 GPD
Building 4			
Hotel	250 keys	110 GPD/key	27,500 GPD
Restaurant	82 seats	35 GPD/seat	2,870 GPD
Retail	4,037 SF	50 GPD/1,000 SF	202 GPD
PHASE A TOTAL			**147,701 GPD**

Phase B - Building Use	Units[1]	310 CMR Value	Total Flow
Lab Office	634,303 SF	75 GPD/1,000 SF[2]	47,573 GPD
Residential – 1 Bedroom	542 beds	110 GPD/bedroom	59,620 GPD
Residential – 2 Bedroom	675 seats	35 GPD/seat	
Residential – 3 Bedroom	34,472 SF	50 GPD/1000 SF	
Restaurant			23,625 GPD
Retail			1,723 GPD
PHASE B TOTAL			**132,541 GPD**
PROJECT TOTAL			**280,242 GPD**

1 Units for seating, users, and square foot areas are approximate based on a preliminary program and are subject to change as the design progresses.
2 Sewage generation rate for lab office space is based on laboratory buildings with similar use.

The Proponent will coordinate with the BWSC for approval of the Project's proposed sanitary connections, including the increase in sewage flows, directed to the existing or planned BWSC sewer mains in Western Avenue, East Drive, and/or Cattle Drive. Improvements and connections to BWSC infrastructure will be reviewed as part of the BWSC's Site Plan Review. The process will include a comprehensive design review of the proposed service connections, an assessment of Project demands and system capacity, and the establishment of service accounts. Due to the anticipated lab use, the Project may require a MassDEP Sewer System Extension and Connection Permit for the building sewer service to be connected to the sewer main in the street due to the anticipated industrial lab waste, per 314 CMR 7.000. A MWRA Sewer Use Discharge Permit may also be required for specific building use discharges, to be applied for by the future tenant(s).

5.6.1 Sewage Capacity and Potential Impacts

The Project's impact on the existing and planned sewer mains in Western Avenue, East Drive, and Cattle Drive were analyzed. The minimum hydraulic capacities are:

- 8.86 million gallons per day (MGD) or 13.71 cfs for the 24-inch main in Western Avenue;
- 1.81 MGD or 2.80 cfs for the 12-inch main in East Drive;
- 1.57 MGD or 2.43 cfs for the 8-inch main in the northern side of Cattle Drive; and
- 1.03 MGD or 1.59 cfs for the 12-inch main in the southern side of Cattle Drive.

Based on the expected increase in sewer flows of 280,242 or 0.280 MGD, a peak flow factor of 3 is applied for times of higher flow, resulting in 0.840 MGD (0.280 MGD x 3 = 0.8404 MGD). Since it is likely the Project will require multiple connections to the existing and planned sewer mains in the surrounding streets, the sewage flows will be distributed out across sewer mains in the surrounding streets of Cattle Drive, East Drive, and Western Avenue until discharging to the 84-inch x 112-inch MWRA South Charles Relief Sewer and directed to the Deer Island Wastewater Treatment Plant.

5.7 Mitigation Measures

5.7.1 Water Conservation Measures

The new water services will be installed in accordance with the latest local, state, and federal codes and standards. Backflow preventers will be installed at fire protection service connections. New meters will be installed with Meter Transmitter Units (MTU's) as part of the BWSC's Automatic Meter Reading (AMR) system. Residential uses will be individually metered, which can result in a reduction in water use.

Efforts to reduce water consumption will be made. Aeration fixtures and appliances will be chosen for water conservation qualities. In public areas, sensor operated faucets and toilets will be installed.

The Project will look for ways to reduce outdoor water use by limiting irrigation or reducing irrigation on-site and by reusing stormwater, and incorporating drought-tolerant and native species on-site as allowed.

5.7.2 Infiltration and Inflow (I/I) Mitigation

The Proponent will coordinate with BWSC to reach an agreement regarding the requirement for 4:1 I/I mitigation. Since the increase in sewage flows is expected to be greater than 15,000 GPD, the BWSC will require the Project to contribute the 4:1 I/I fee calculated based on the proposed sewage flows. Since the Project will be serviced by a separate sanitary sewer and storm drain main system, I/I impact from the post-development Project is expected to be minimal. The Proponent will work with the MassDEP, the MWRA, and BWSC to development a plan to meet I/I mitigation requirements.

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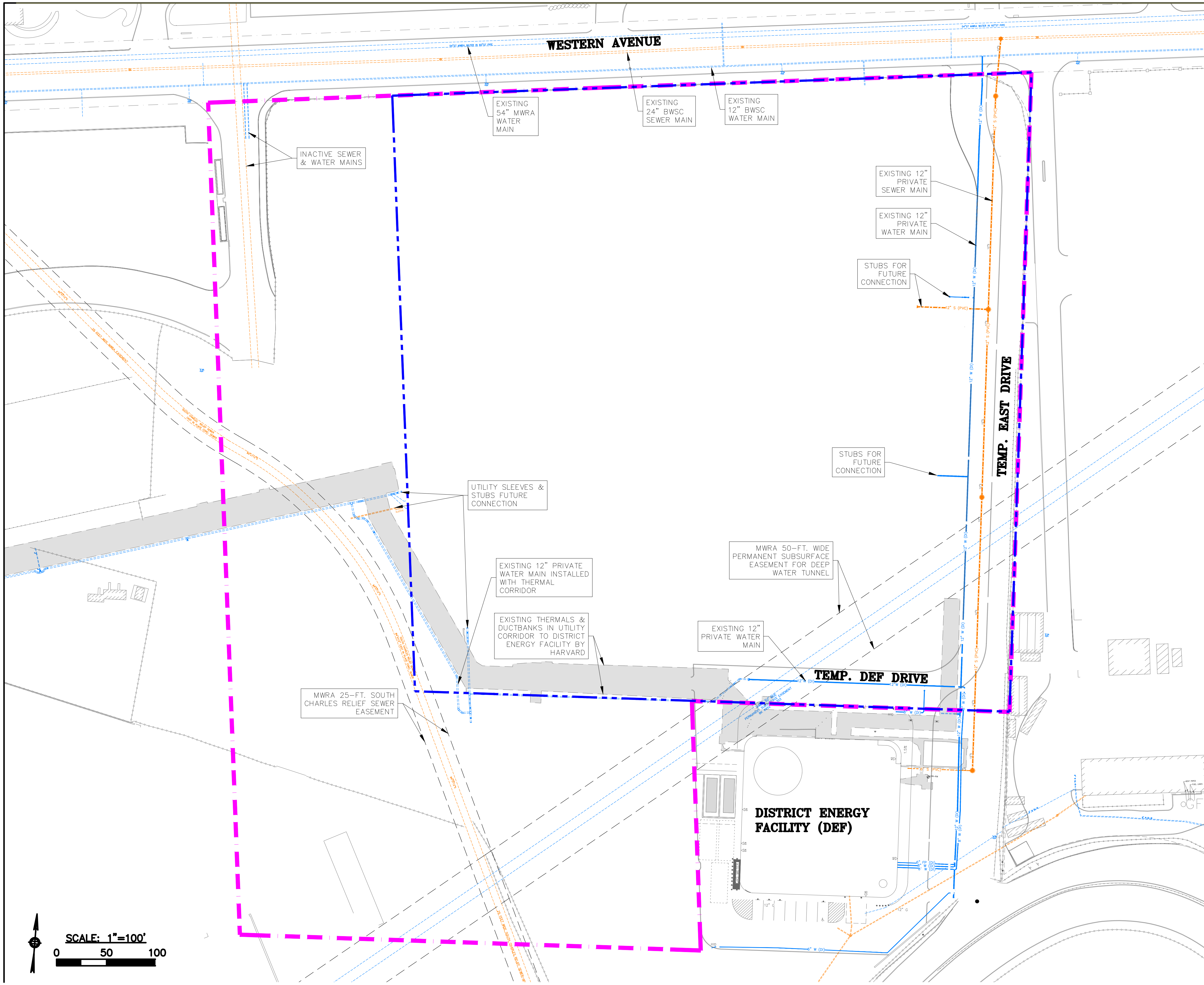


Phase A Project Site Boundary

Master Plan Project Site Boundary

Existing Water

Existing Sewer

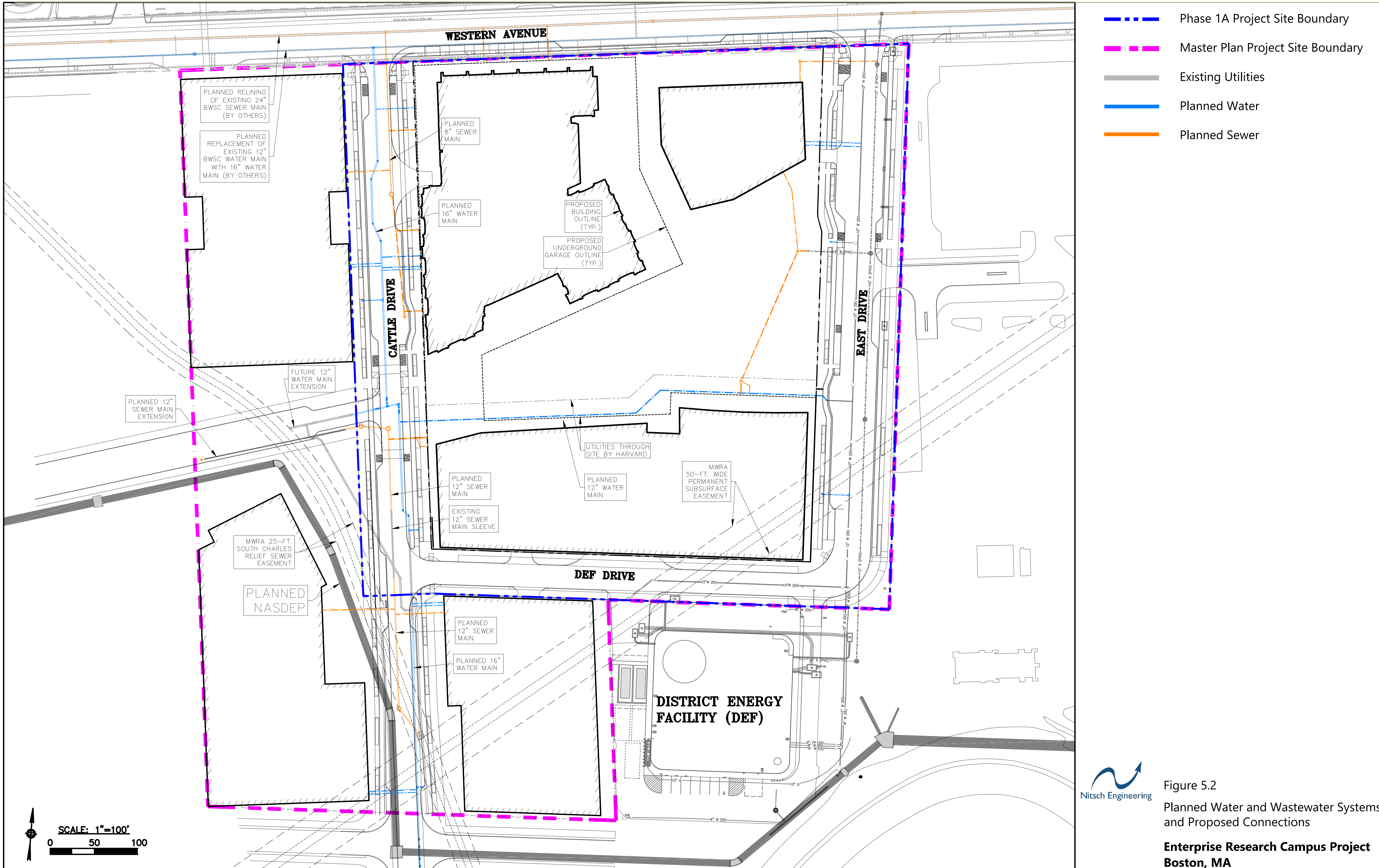
Existing Thermal Corridor

Nitsch Engineering

Figure 5.1

Existing Water and Wastewater Systems

Enterprise Research Campus Project
Boston, MA



Nitsch Engineering

Figure 5.2

Planned Water and Wastewater Systems and Proposed Connections

Enterprise Research Campus Project
Boston, MA

6

Climate Change

This chapter provides information related to Climate Change Resiliency and a comprehensive Greenhouse Gas ("GHG") emissions assessment, as requested in the EEA Secretary's Certificate on the ENF. Specifically, this chapter includes the following information (with DEIR section references in **bold**):

Adaptation and Resiliency

- Discussion of the potential effects of climate change to the Project Site, including key risks and vulnerabilities of the Project under current and projected climate conditions, and identify any project components that are likely impacted by those risks and/or will be designed to adapt to such risks **(Section 6.3.2);**
- Describe the anticipated resiliency features incorporated into the Project Site and building design, including site elements (e.g., landscaping) that may help minimize impacts associated with more frequent and intense storms and extreme heat waves **(Section 6.3.3);**
- Identify the useful life of the Project and describe the critical project assets relative to resiliency **(Section 6.3.1);**
- Describe any additional design features that may provide resiliency and support adaptation under future climate scenarios, including stormwater management systems and other applicable features, and, if the Project (including supporting infrastructure) will not be designed to meet specifications based on climate projections, provide an explanation of the reasons and a description of whether and how the Project will be able to take further steps to adapt to climate conditions at a later stage **(Section 6.3.3)**.

Stationary Source Greenhouse Gas Emissions

- Quantify the energy usage and stationary source GHG emissions associated a Base Case that conforms to the 9th Edition of the Massachusetts Building Code and a Mitigation Alternative (assuming the requirements of the Massachusetts Stretch Energy Code) that achieves greater reductions in GHG emissions **(Section 6.4.1);**
- Identify the model used to analyze stationary source GHG emissions, clearly state modeling assumptions, explicitly note which GHG reduction measures have been modeled, and identify whether certain building design or operational GHG reduction measures will be mandated by the Proponent to future occupants or merely encouraged for adoption and implementation **(Section 6.4.1 and Appendix B);**

- An evaluation of the residential and hotel building typologies designed in conformance with Passivehouse standards, including review the financial feasibility and potential incentives **(Section 6.4.1 and Appendix B);**
- An evaluation of above-Code continuous roof and wall insulation and avoiding glass curtain wall assemblies to minimize heat loss and uncontrolled infiltration through the building envelope **(Section 6.4.1 and Appendix B);**
- An evaluation of electric space heating and water heating using air source heat pumps (ASHP), variable refrigerant flow (VRF), ground source heat pumps (GSHP) and/or solar thermal systems, including review the financial feasibility and potential incentives **(Section 6.4.1 and Appendix B);**
- An evaluation of high-albedo roofing materials, external shading, and windows with improved solar heat gain coefficient (SHGC) **(Section 6.4.1 and Appendix B);**
- An evaluation of energy recovery ventilation and wastewater systems **(Section 6.4.1 and Appendix B);**
- An evaluation of rooftop solar PV systems and/or solar-ready roofs **(Section 6.4.1 and Appendix B);** and
- An evaluation of LED lighting, both exterior and interior **(Section 6.4.1 and Appendix B).**

Mobile Source Greenhouse Gas Emissions

- Quantification of potential GHG emissions associated with mobile emissions sources **(Section 6.4.3 and Appendix B);**
- Describe proposed measures and document the reductions in mobile source GHG emissions that promote the use of low-emissions vehicles, including roadway improvements implemented by the Project, TDM measures, and/or installation of electric vehicle (EV) charging stations and EV-ready infrastructure at parking spaces **(Section 6.4.3);** and
- An explanation of how TDM measures will be monitored and adjusted over time, and provide a methodology for quantifying emission reductions impacts rather than an assumed percentage reduction **(Section 6.4.3)**.

6.1 Summary of Key Findings

The key findings and proposed measures related to addressing sustainability and climate change impacts include:

- The Project will redevelop an underutilized, former industrial property, with a long history of industrial, warehousing and freight distribution uses, into a vibrant mixed-use sustainable development that supports the City's and Harvard's goals for a sustainable future through the development of energy-efficient, environmentally friendly buildings and low-carbon construction methods that will be resilient to climate change.
- Based on conceptual design, the Project will be eligible to receive LEED Gold certification at a minimum using the LEEDv4 rating system for all building typologies, exceeding the City's requirements under Article 37 - Green Buildings.

- The Project will incorporate design elements to improve on-site stormwater management and reduce risk of precipitation-based flooding, such as reducing impervious surfaces, increasing the amount of greenery and green infrastructure strategies, and exploring the feasibility and cost-effectiveness for stormwater capture and reuse for cooling tower make-up water, plumbing, and irrigation. The Project will provide a significant amount of public realm and open space improvements, including the Project Greenway, and will be engineered to manage the 32-year storm (6.7 inches of rainfall), exceeding Boston Water and Sewer Commission (BWSC) requirements. Refer to Section 4.4 of Chapter 4, *Stormwater*, for additional details in relation to stormwater infiltration.
- The Project Site is not within a current FEMA floodplain and is also located outside the boundary for the 2070 1% annual chance event used in Climate Ready Boston. The Project is targeting a ground floor elevation of 18.5-19.5′ BCB for all buildings and will assess that elevation against the new MC-FRM data when it is available.
- To address other aspects of climate change resiliency, the site design will aim to reduce urban heat island impacts to the extent feasible by using greenery, trees, green infrastructure, shading structures, and materials with high solar reflectance/albedo, and building designs will accommodate HVAC system capacity for more extreme design conditions.
- The Proponent will utilize energy-efficient HVAC and lighting equipment and systems, and incorporate other potential energy conservation measures, as reasonable and feasible.
- The Proponent will consider any available utility incentive programs in coordination with representatives of local utility companies serving the Project Site.
- Based on conceptual design, preliminary energy modeling demonstrates the overall estimated energy use reduction for all buildings proposed as part of the Project (with parking) is approximately 30 percent compared to the Base Case[1] (as described in Section 6.4.1 below), which equates to an approximately 19 percent reduction in Greenhouse Gas ("GHG") emissions as compared to the Base Case.
- The Project's proposed design demonstrates an approximately 76 percent reduction in natural gas energy and natural gas GHG emissions. With these significant reductions in fossil fuel use, the Project's primary energy source is electricity (approximately 83%) which will contribute considerably to its pathway to carbon neutrality and the Commonwealth's electricity emissions factor continues to decline.
- The Project is proposing a comprehensive TDM program and roadway improvement measures that are estimated to reduce mobile source GHG emissions by 2,814 tons per year.

1 780 CMR, Ninth Edition, Chapter 13: Energy Efficiency Amendments as of 8/7/2020

6.2 Regulatory Context

The following sections provide an overview of the state and local regulatory context related to sustainability/green building design, energy efficiency and GHG emissions, and climate change resiliency.

6.2.1 Draft MEPA Climate Change Preparedness and Resiliency Policy

The Massachusetts Environmental Protection Agency (MEPA) recently released a Draft Interim Protocol on Climate Change Adaptation and Resiliency. The draft protocol is currently open for public comment and has not yet been finalized. Once finalized, the protocol will require the completion of a Climate Change Adaptation and Resiliency Addendum to be submitted with all new project filings to MEPA. In lieu of the Addendum, projects will also be allowed to submit the Climate Risk Screening and Resilience Design Standards report from the RMAT Climate Resilience Design Standards Tool, which was also recently released in beta version by MA EEA. The Addendum is intended to encourage projects to evaluate risks and identify adaptation strategies related to sea level rise, increased precipitation, and extreme heat.

The Proponent understands that the Commonwealth of Massachusetts is working with Woods Hole Group to update the coastal flood mapping for the entire state and that those forthcoming maps may show some potential longer-term impacts to the Project site as a result of impacts to the Charles River Dam. As a result, the Project Team is working to integrate coastal flood protection measures into the design, to proactively prepare for any potential impacts that may be depicted in the new modeling. The results of the forthcoming Massachusetts Coastal Flood Risk Model (MC-FRM) data will be reviewed against the project design when that data becomes available to assess any new coastal flood impacts identified for the Project Site.

6.2.2 MEPA Greenhouse Gas Policy and Protocol

The Executive Office of Energy and Environmental Affairs (EEA) has developed the "MEPA GHG Policy", which requires project proponents to identify and describe feasible measures to minimize both mobile and stationary source GHG emissions generated by their proposed project(s).[2] Mobile sources include vehicles traveling to and from a project while stationary sources include on-site boilers, heaters, and/or internal combustion engines (direct sources) as well as the consumption of energy in the form of fossil fuels (indirect sources). Greenhouse gases include several air pollutants, such as carbon dioxide (CO_2), methane, hydrofluorocarbons, and perfluorocarbons. The MEPA GHG Policy calls for the evaluation of CO_2 emissions for a land development project because CO_2 is the predominant man-made contributor to global warming. This evaluation makes use of the terms CO_2 and GHG interchangeably.

2 MEPA Greenhouse Gas Emissions Policy and Protocol, Executive Office of Energy and Environmental Affairs, effective November 1, 2007 (revised version effective May 5, 2010).

The MEPA GHG Policy states that all projects undergoing MEPA review requiring the submission of an Environmental Impact Report (EIR) must quantify the project's GHG emissions and identify measures to avoid, minimize, or mitigate such emissions. In addition to quantifying project related GHG emissions, the MEPA GHG Policy requires proponents to quantify the effectiveness of proposed improvements in terms of energy savings, and therefore, potential emissions reductions. The goal of the MEPA GHG Policy is to identify and implement measures to minimize or reduce the total GHG emissions anticipated to be generated by that respective project.

6.2.3 Massachusetts Stretch Energy Code

As part of the Green Communities Act of 2008, Massachusetts developed an elective building code, known as the "Stretch Energy Code," that gives cities and towns the ability to choose stronger energy performance in buildings than otherwise required under the state building code. Codified by the Board of Building Regulations and Standards as 780 CMR Appendix 115.AA of the 9th edition Massachusetts Building Code, the Stretch Energy Code is an appendix to the Massachusetts Building Code, based on further amendments to the International Energy Conservation Code (IECC). The Stretch Energy Code increases the energy efficiency code requirements for new construction and major residential renovations or additions in municipalities that adopt it.

The Project's building is subject to the new energy code with a concurrency period that will end in November 2020 (the "November 2020 Energy Code"). A baseline model incorporating the November 2020 Energy Code has been considered and is included in the following analysis. The Base Case described herein includes three Section C406 measures and other energy conservation measures, as required. [3] The building envelopes must comply with the envelope backstop regulation (Section 402.1.5).

6.2.4 Harvard Green Building Standards

Harvard University's Green Building Standards[4] (the "Standards"), dated October 2017, are applicable to a range of building projects, including new construction, which is defined as Tier 1, and establish minimum performance standards taking a holistic view of sustainability. The Standards are aligned with the University-wide Sustainability Plan and vision focused on creating a healthier, low carbon campus community. The Standards are also a key tool to achieving the University's science-based climate goals for Scope 1 and 2 emissions[5]; Fossil Fuel Neutral by 2026 and Fossil Fuel Free by 2050[6].

3 The November 2020 Energy Code includes additional energy efficiency measures compared to the previous analysis. The Base Case model follows ASHRAE 90.1-2013 Appendix G as modified by Massachusetts amended sections: C401.2, C402.1.5, C402.3, C405.3, C405.4, C405.9, and C406 under the new code.

4 https://green.harvard.edu/sites/green.harvard.edu/files/HarvardGreenBuildingStandards2017.pdf

5 Scope 1 emissions are direct emissions from sources that are owned or controlled by the entity, e.g. on site combustion. Scope 2 emissions are indirect emissions from sources that are owned or controlled by the entity, e.g. purchased electricity.

6 https://green.harvard.edu/campaign/harvards-climate-action-plan

The Project would be classified as Tier 1 and will align with Harvard's Green Building Standards. Tier 1 projects at Harvard are required to achieve LEED v4 Gold certification, conduct a Living Building Challenge and Net Zero Energy Feasibility Study, and achieve enhanced levels of energy performance compared to a LEED baseline, i.e. ASHRAE 90.1-2010.

Additionally, Tier 1 projects must meet Harvard's requirements for addressing specific chemical classes of concern in furniture, carpet, wall base, and non-blackout window shades as well as LEED Building Product Disclosure and Optimization (BPDO) credits.

The Standards also include requirements for achieving LEED credits for integrated design process, indoor and outdoor water use, enhanced commissioning, and construction and demolition waste management.

The Proponent has committed to meeting Harvard's Green Building Standards and is aligned with and in support of Harvard's Fossil Fuel-Neutral by 2026 and Fossil Fuel-Free by 2050 goals.

6.3 Adaptation and Resiliency

The Project Team has considered anticipated impacts related to sea level rise and storm surge, precipitation, and extreme heat, and has completed the BPDA Climate Change Resiliency Checklist (the "Resiliency Checklist"). The Resiliency Checklist reflects the commitment of the Proponent to mitigate the impacts of climate change by considering a variety of mitigation and adaptation strategies to ensure buildings remain sound, that all damage from climate impacts is relatively minor and easily repairable, and that the occupants remain safe at the site and building level. These are further discussed in the following section.

6.3.1 Project Useful Life and Criticality

The anticipated useful life for this project is approximately 30 years. This is based on the estimated number of years before the assets may need substantial improvements or renovations.

Criticality, as defined by the RMAT guidelines, is a metric for determining consequence of failure and is based on scope, time, and severity. Scope is a measure of the geographic area and population that would be impacted by loss of the asset; time is a measure of how long the asset can remain operable; and severity is a measure of how severe the consequence of the impact would be.

The overall project has a low to moderate criticality. The Treehouse Conference Center and Hotel are considered a low criticality based on limited scope and severity and longer acceptable downtime. The residential housing would be considered a moderate criticality, due to shorter acceptable downtime and the potential for more severe consequence to human life during an impact as it will be occupied 24/7. The lab/office buildings will be designed to be core and shell and therefore any critical loads for future tenants will be covered by the tenant.

The project is also located within an Environmental Justice population area.

6.3.2 Vulnerability Assessment

6.3.2.1 Sea Level Rise and Extreme Storms / Flooding

The Project is not anticipated to be impacted by coastal flooding. It is located outside the existing 1% annual chance FEMA flood zone (100-year flood zone), as depicted in Figure 6.1, and is also located outside the boundary for the 2070 1% annual chance event used in Climate Ready Boston. As a result, the City of Boston has not defined a sea level rise base flood elevation (SLR-BFE) for this project site.

However, the Proponent understands that the Commonwealth of Massachusetts is working with Woods Hole Group to update the coastal flood mapping for the Commonwealth of Massachusetts and that those forthcoming maps may show some potential longer-term impacts to the Project as a result of impacts to the Charles River Dam. As a result, the project team is working to integrate coastal flood protection measures into the design, to proactively prepare for any potential impacts that may be depicted in the new modeling. The results of the forthcoming Massachusetts Coastal Flood Risk Model (MC-FRM) data will be reviewed against the Project design when that data becomes available to assess any new coastal flood impacts identified for the Project Site.

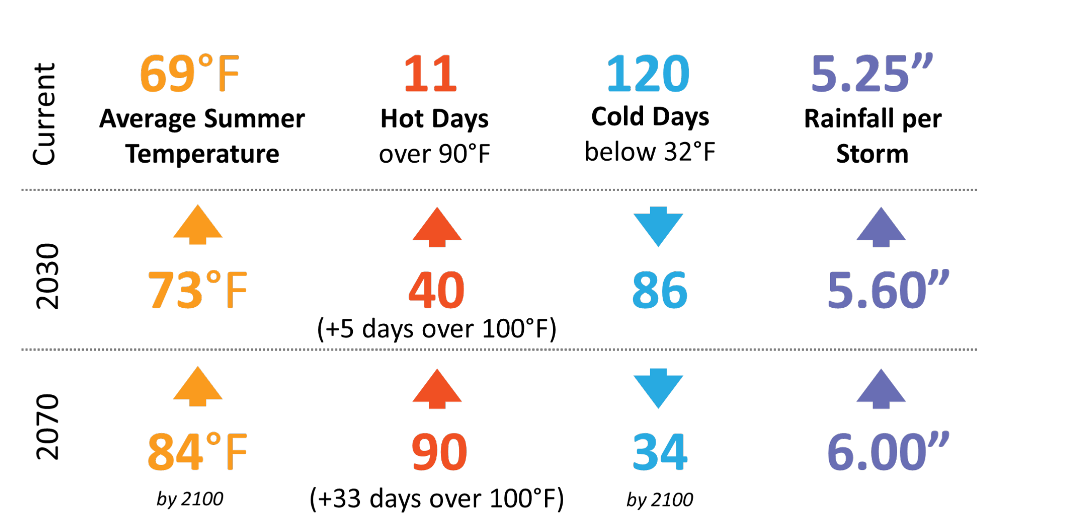
6.3.2.2 Extreme Weather and Rising Temperature

Climate change is expected to result in more extreme weather events. As presented in Graph 6-1 below, the Climate Ready Boston projections for 2030 and 2070 indicate warming temperatures, more frequent extreme heat, and increased precipitation. The Project is developing appropriate strategies for a changing climate in the near term as well as planning for a longer-term adaptation strategy over the course of the Project’s life span. For example, the HVAC systems will be sized for a 95 degree peak day, exceeding ASHRAE Fundamentals value of 90.6 degree peak day.

The Project is also considering potential risks from more extreme precipitation-base flood events. Climate projections indicate that we will experience growing intensity and frequency of rainfall events in Massachusetts, and Climate Ready Boston mapping indicates that stormwater flooding could be a potential issue on-site, even in the near term. The Project will be designed to manage the peak rates of runoff from the Site for the 2-, 10-, 25-, and 100-year design storms. The project is also reviewing the proposed stormwater management system's ability to handle larger future storm events. For example, the anticipated 2070 25-year storm in Boston is 8.20-inches compared to the 8.15 inches for the current 100-year storm event. The future 2070 storm is anticipated to be as large as 11.7-inches. The project will continue to evaluate the latest future rainfall projections as the design progresses and newer information becomes available to ensure the project can withstand more intense and frequent rainfall.

In addition to the 1.25-inches of stormwater storage required by BWSC, the Project will also be providing an additional 1.5-inches of storage to increase stormwater resiliency. These volumes result in a planned total of 2.75-inches of actively managed stormwater storage for the Project.

Graph 6-1 Current and Projected Temperatures and Rainfall



Source: Climate Ready Boston Projections

6.3.3 Resiliency Measures

The Project is exploring the use of resilient design BMPs, which requires planning today for the future risks of climate change. While the coastal flood risks to the Project Site appear to be minimal, the Project will integrate design considerations for more frequent and severe rainfall events and warming temperatures. In addition, the Project Team is evaluating proactive measures that can be incorporated into the design to protect against future coastal flood impacts, based on the understanding that the new MC-FRM flood modeling may show some impact to the site. The measures include the potential elevation of critical equipment and re-grading of the site which will result in elevating some of the existing low points.

The Project will pay attention to any changes to future sea level rise and storm surge projections as a result of the forthcoming MC-FRM maps and adapt the design, as needed, to accommodate any coastal flood risks that are identified. The following sections further describe how climate change has been considered in the early stages of the Project’s design

6.3.3.1 Site Design

The Project will incorporate design elements to improve on-site stormwater management and reduce risk of precipitation-based flooding, such as reducing impervious surfaces, increasing the amount of greenery and green infrastructure, and exploring the feasibility and cost-effectiveness for stormwater capture and reuse for cooling tower make-up water. As described previously, the Project will be designed to manage the 32-year storm (6.7 inches of rainfall) within its site boundary. The Project will include the construction of green infrastructure and infiltration systems that will be used to provide storage and promote infiltration via groundwater recharge.

Additionally, the Project will reduce the urban heat island impacts using greenery, trees, green infrastructure, shading structures, and materials with high solar reflectance/albedo. The current landscape design is estimated to provide approximately 68,000 SF of tree canopy at the Project Site.

6.3.3.2 Building Design

The Project will optimize passive strategies such as efficient building envelope design and will mitigate the urban heat island impacts using light colored hardscape materials, white membrane, and possibly green roof areas.

The Project will utilize energy-efficient HVAC and lighting equipment and systems and will design the HVAC system capacity for higher temperatures (e.g. 95-degree peak day). The Project will also explore the feasibility of district energy and on-site renewable energy and green roof systems.

The Project will intentionally size stormwater conveyance systems for increased peak rain events and will raise critical mechanical, electrical, plumbing, and fire protection equipment above the ground floor where possible to mitigate potential impacts from precipitation-based and coastal flooding. The Project is in the process of defining a design flood elevation and evaluating that elevation against proposed building elevations. The Project is targeting a ground floor elevation of 18.5-19.5’ BCB for all buildings and will assess that elevation against the new MC-FRM data when it is available. As the design progresses, the Project will develop a resilience strategy that will likely include elevation of critical systems and use of deployable flood barriers at the garage entrance and other building openings.

The Project will include emergency generators for each building. The lab/office building will have additional standby generator capacity beyond code-required life safety to allow for tenant connection to back-up power where needed. The hotel and residential building will consider opportunities to connect some additional common areas to support resilience goals for the two buildings. This will be further analyzed as the building design evolves. Generator fuel tanks will also be evaluated to ensure protection from flood impacts.

The Project is also being evaluated for rooftop solar PV system feasibility. All building will be designed to be solar-ready and if a rooftop solar PV system is deemed feasible, consideration will be given to using the PV system to provide additional redundancy during a power loss scenario.

6.4 Greenhouse Gas (GHG) Emissions

The following sections present the GHG emissions assessment associated with the Project in accordance with the MEPA GHG Policy. The assessment analyzes both the potential stationary source and mobile source emissions from Project sources.

6.4.1 Stationary Source GHG Emissions Assessment

The Proponent strongly believes that the real estate industry has an important role to play in carbon reduction, especially in Cities where emissions associated with the buildings sector are the largest contributor. The Project has developed a robust approach to climate mitigation aligned with and in support of Harvard's Fossil Fuel-Neutral By 2026 and Fossil Fuel-Free By 2050 goals and the Commonwealth's commitment to carbon neutrality by 2050. The Master Plan approach is organized around energy efficiency, electrification and renewable energy supply. Each proposed building in the master plan will be designed to be highly energy efficient with a focus on demand reduction, thus, minimizing GHG emissions associated with building energy usage. Electrification of thermal demands beyond the proposed case within each building for heating, domestic hot water, and other end uses have been analyzed as requested in the certificate.

Additionally, the Project will complete a District Energy/Microgrid Feasibility Study that will evaluate low carbon district energy solutions to further reduce fossil fuel based GHG emissions.

The Proponent has committed to joining Harvard University in their renewable energy contracts to achieve their 2026 fossil fuel neutrality goal. The proponent will join Harvard in procuring new, additional renewable energy to cover both Scope 1 and Scope 2 emissions in all properties within the Enterprise Research Campus. This will significantly contribute to reducing GHG emissions associated with the Project by eliminating GHG emissions associated with electricity consumption starting day 1, far ahead of the Massachusetts electricity grid decarbonization.

The energy modelling results presented in this section demonstrate an approach to energy efficiency on a building-by-building basis for the four (4) primary building types in the Master Plan, as follows (excluding parking garage areas):

- **Core & Shell Lab/Office:** Represents approximately 61% of total gross floor area and 5 buildings;
- **Multi-Family Residential:** Represents approximately 30% of total gross floor area and 3 buildings; and
- **Hotel:** Represents approximately 7% of total gross floor area and 1 building.
- **Treehouse Conference Center:** Represents approximately 3% of total gross floor area and 1 building.

Retail and restaurant uses are included at ground levels within each building, not as stand-alone buildings. They have been modeled integral to the primary building type in the proposed case but their energy consumption has been reported separately as requested in the alternates analysis.

The following presents the results of the stationary source GHG emissions assessment, in accordance with the MEPA GHG Policy. The stationary source analysis reflects the most recent design plans for the Project's building as of this filing.

The Project has been designed to meet the requirements of the MEPA GHG Policy in that it is committed to incorporating reasonable and feasible energy conservation measures to reduce energy consumption. The Project will also meet the requirements of the Stretch Energy Code and incorporate sustainable and high-performance building design, including energy conservation measures.

6.4.1.1 Methodology

The energy analysis is used to estimate the amount of annual energy consumption by simulating a year of building operations based on typical yearly weather and user inputs. Energy modeling was performed with IES Virtual Environment 2019. The model estimates buildings' electricity and gas usage based on building design and system assumptions using Appendix G of ASHRAE 90.1-2013 with MA Amendments. The amount of predicted consumed energy is then converted into the amount of CO_2 emitted using the standardized conversion factors. [7] CO_2 emissions were quantified for (1) the Base Case corresponding to the minimum requirements of ASHRAE 90.1-2013 with MA Amendments and (2) the Design Case, which includes all energy saving measures that were deemed to be reasonable and feasible. The stationary source assessment calculated CO_2 emissions for the following build conditions:

- Build Condition with MA Building Code (the "Base Case"): The Project assumes typical construction materials and building equipment/systems that meet the minimum requirements of the base code. This baseline is established by the energy code as being defined by ASHRAE 90.1–2013 and MA Amendments.
- Build Condition with Energy Conservation Measures (the "Design Case"): The Project assumes a combination of building envelope and system improvements, in accordance with the MEPA GHG Policy and that meet or exceed the Stretch Energy Code, as required.

Descriptions of the noteworthy building improvements and resulting building energy savings and stationary source GHG emissions reductions for each typology are presented below as well as for the entirety of the Master Plan. Specific improvements may be subject to design modification, as needed, to achieve the desired energy and GHG emissions reductions for the final building program and design.

It is important to note that each building typology has been modeled without a district energy system and, therefore, has stand-alone HVAC systems. Refer to Section 6.4.1.8 for discussion of the future District Energy Feasibility Study.

6.4.1.2 Laboratory/Office Typology

The following provides a summary of the building energy modeling for the Lab/Office Typology, which has a planned gross floor area of approximately 1,054,000 SF across five buildings in the Master Plan.

Descriptions of the noteworthy building improvements and resulting building energy savings are presented below. The proposed design was based on several key energy efficiency strategies, which include:

- Efficient building envelope that exceeds minimum code values for glazing (i.e. both U-value and solar heat gain coefficient (SHGC)). The building envelope designs will meet the

7 Electricity converted using 658 lbs CO_2 per MWh (2018 ISO New England Electric Generator Air Emissions Report). Natural Gas converted using 117 lbs CO_2 per MMBtu (US Energy Information Administration).

UxA calculation per the Stretch Energy Code. A summary of the UxA calculation for this typology is included in Appendix B;

- High efficiency air-source heat pump (ASHP) heating sized for up to 15% of building peak heating load with high efficiency condensing boilers to meet remaining heating load;
- Dedicated outside air system to satisfy outside air demands with fan coil units for efficient space conditioning in lab and office areas;
- Chiller plant consisting of high-efficiency water-cooled chillers and heat pump chillers for waste heat diversion to satisfy simultaneous heating and cooling loads;
- Low lighting power densities to be achieved from LED lighting and lighting control systems; and
- Water-based sensible energy recovery system on return air.

In accordance with the Massachusetts Stretch Energy Code Section C406.1, the energy modeling for the Laboratory/Office typology incorporates the following three additional efficiency measures for both the Base Case and Design Case;

- More efficient HVAC performance in accordance with Section C406.2;
- Reduced lighting power density system in accordance with Section C406.3; and
- Reduced air-infiltration in accordance with Section C406.10.

A summary of the various energy modeling inputs, including the energy conservation measures listed above, are presented in Table 6-1.

Table 6-1 Summary of Energy Modeling Inputs – Laboratory/Office Typology

Modeling Parameter	Base Case[8]	Design Case
Building Envelope		
Roof Insulation	U- 0.032 (R-30)	U- 0.025 (R-40)
Wall Assembly – Opaque	U- 0.055 (R-18)	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel
Slab Insulation	F- 0.51 (Unheated slab)	F- 0.51 (Unheated slab)
Air Infiltration Rate	0.25 cfm/SF façade at 0.3 in WC (75 Pa)	0.25 cfm/SF façade at 0.3 in WC (75 Pa)
Fenestration and Shading		
Vertical Glazing U-Factor	U- 0.42 (metal framing, fixed)	U- 0.32
Vertical Glazing SHGC	0.4	0.3
Overall % Window to Wall Ratio	40%	Podium: 52% Tenant floors: 48% Penthouse: 0%
HVAC		
HVAC System	Laboratory: System Type 7 – VAV with Reheat (100% OA) Office/Retail: System 7 – VAV with Reheat	Dedicated outside air system (DOAS) with heat recovery and fan coil units
Exhaust Air Energy Recovery	Laboratories: N/A (per ASHRAE 90.1-2013 Section 6.5.7.2) Non-lab spaces: 50% total energy recovery	Water-based exhaust heat recovery (50% sensible effectiveness)
Primary Cooling	Water-cooled centrifugal chillers	High-efficiency water-cooled centrifugal chillers + heat pump chiller
Primary Heating	Gas-fired hot water boiler plant	ASHP + waste heat from heat pump chiller + high-efficiency gas-fired condensing boiler plant
Service Hot Water Type	Gas storage water heater	High-efficiency gas storage water heater
Lighting		
Lighting Power Density (LPD)	Lab zones: 1.20 W/ft2 Office zones: 0.55 W/ft2	Lab zones: 1.20 W/ft2 Office zones: 0.55 W/ft2

The results shown in Table 6-2 are comprehensive for all five (5) Lab/Office buildings proposed in the Master Plan. As shown in Table 6-2, with the proposed building design and system improvements, the estimated energy use reduction for the Core & Shell Lab/Office typology is approximately 33 percent compared to the Base Case or 23 percent better than Stretch Code, which equates to an approximately 21 percent reduction (3,674 tpy) in stationary source CO_2 emissions.

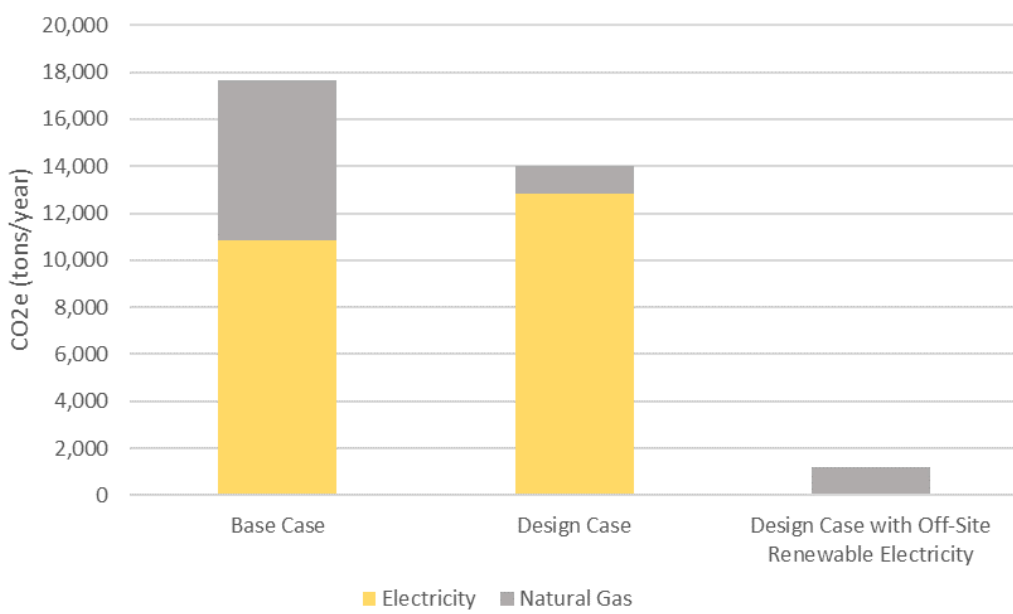
8 Base Case represents the Energy Code 780 CMR Ninth Edition, Chapter 13 Energy Efficiency Amendments as of 8/7/2020 and the Stretch Code Chapter 115AA.

Table 6-2 Preliminary Energy Model Results: Lab/Office Typology

	Total Energy Consumption			CO_2 Emissions		
	Electricity (MMBtu/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Electricity (tons/ yr)[1]	Natural Gas (tons/ yr)	Total (tons/ yr)
Base Case	112,727	116,311	229,038	10,870	6,804	17,674
Design Case	132,820	20,384	153,203	12,807	1,192	14,000
End-Use Savings	-20,093	95,927	75,835	-1,937	5,612	3,674
Percent Savings	**-18%**	**82%**	**33%**	**-18%**	**82%**	**21%**

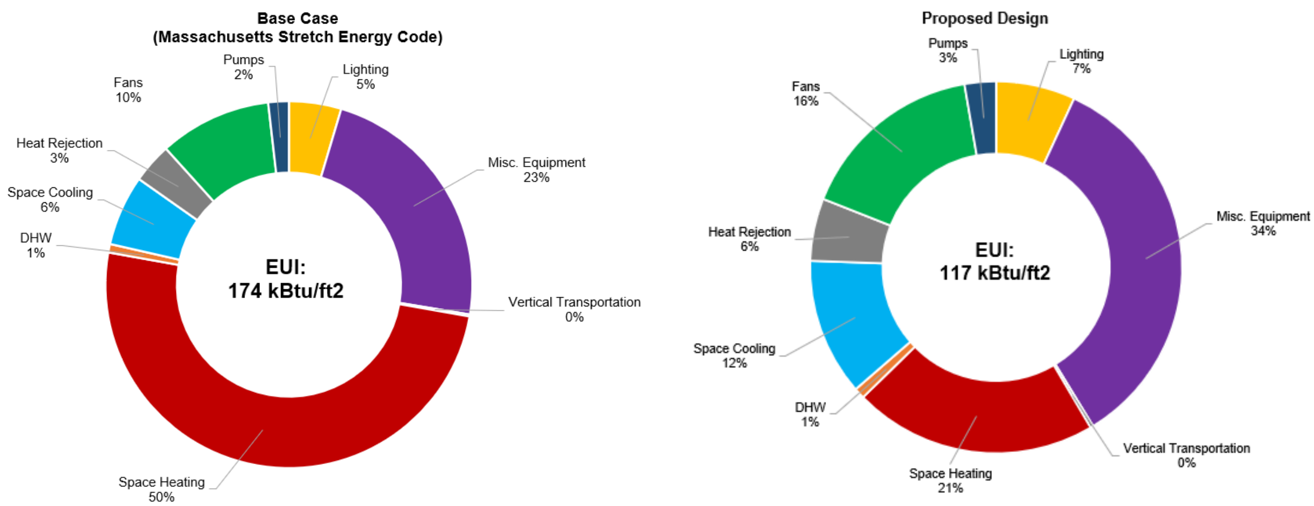
More importantly, the proposed design has reduced fossil fuel energy consumption from natural gas by 82% compared to the Base Case. Additionally, the Lab/Office typology represents approximately 75% of the energy in the masterplan such that these electrification measures have larger impact and the performance of the entire masterplan. Coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 21% to 93% compared to the Base Case.

Graph 6-2 Lab/Office GHG emissions



Graph 6-3 below presents a breakdown of the Core & Shell Lab/Office typology energy use by end use for both the Base Case and the Design Case, demonstrating a significant reduction in heating energy.

Graph 6-3 Lab/Office Typology Energy End Use



6.4.1.3 Residential Typology

The following provides a summary of the building energy modeling for the Residential Typology, which has a planned gross floor area of approximately 581,500 SF across four buildings in the Master Plan.

Descriptions of the noteworthy building improvements and resulting building energy savings are presented below. The proposed design was based on several key energy efficiency strategies which include:

- Efficient building envelope that exceeds minimum code values for glazing (i.e. both U-value and SHGC). The building envelope designs will meet the UxA calculation per the Stretch Energy Code. A summary of the UxA calculation for this typology is included in Appendix B;
- Dedicated outside air system (DOAS) and energy recovery ventilator with high-effectiveness sensible and latent energy recovery;
- Water source heat pump system coupled to hydronic loop served by cooling towers and high efficiency condensing boilers to provide space conditioning to residential units; and
- Low lighting power densities to be achieved from LED lighting and lighting control systems.

Further discussion of alternatives studied including Passive House is provided in Appendix B.

In accordance with the Massachusetts Stretch Energy Code Section C406.1, the energy modeling for the residential typology incorporates the following three additional efficiency measures for both the Base Case and Design Case;

- More efficient HVAC performance in accordance with Section C406.2;

- Reduced lighting power density system in accordance with Section C406.3; and
- Reduced air-infiltration in accordance with Section C406.9.

A summary of the various energy modeling inputs, including the energy conservation measures listed above, are presented in Table 6-3 below.

Table 6-3 Summary of Energy Modeling Inputs – Residential Typology

Modeling Parameter	Base Case[9]	Design Case
Building Envelope		
Roof Insulation	U- 0.032 (R-30)	U- 0.025 (R-40)
Wall Assembly – Opaque	U- 0.055 (R-18)	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel
Slab Insulation	F- 0.51 (Unheated slab)	F- 0.51 (Unheated slab)
Air Infiltration Rate	0.25 cfm/SF façade at 0.3 in WC (75 Pa)	0.25 cfm/SF façade at 0.3 in WC (75 Pa)
Fenestration and Shading		
Vertical Glazing U-Factor	U- 0.42 (fixed) U- 0.50 (operable)	U- 0.32 (fixed) 70% of installed glazing; U- 0.36 (operable) 30% of installed glazing
Vertical Glazing SHGC	0.4	0.3
Overall % Window to Wall Ratio	24%	Podium: 44% Residential floors: 41%
HVAC		
HVAC System	System Type 1 – Packaged Terminal Air Conditioner (PTAC)	DOAS with energy recovery ventilator (ERV) + WSHP units
Exhaust Air Energy Recovery	Not required	Energy recovery ventilator; 70% total energy recovery effectiveness
Primary Cooling	Direct Expansion (DX)	ERV: DX cooling coils; WSHP / hydronic loop with cooling towers for heat rejection
Primary Heating	Gas-fired hot water boilers	ERV: High-efficiency condensing gas furnace heating; WSHP hydronic loop with condensing gas boilers.
Service Hot Water Type	Gas storage water heater	High-efficiency gas storage water heater
Lighting		
Lighting Power Density (LPD)	Predominant space type (residential units): 0.37 W/SF	Predominant space type (residential units): 0.37 W/SF

9 Base Case represents the Energy Code 780 CMR Ninth Edition, Chapter 13 Energy Efficiency Amendments as of 8/7/2020 and the Stretch Code Chapter 115AA.

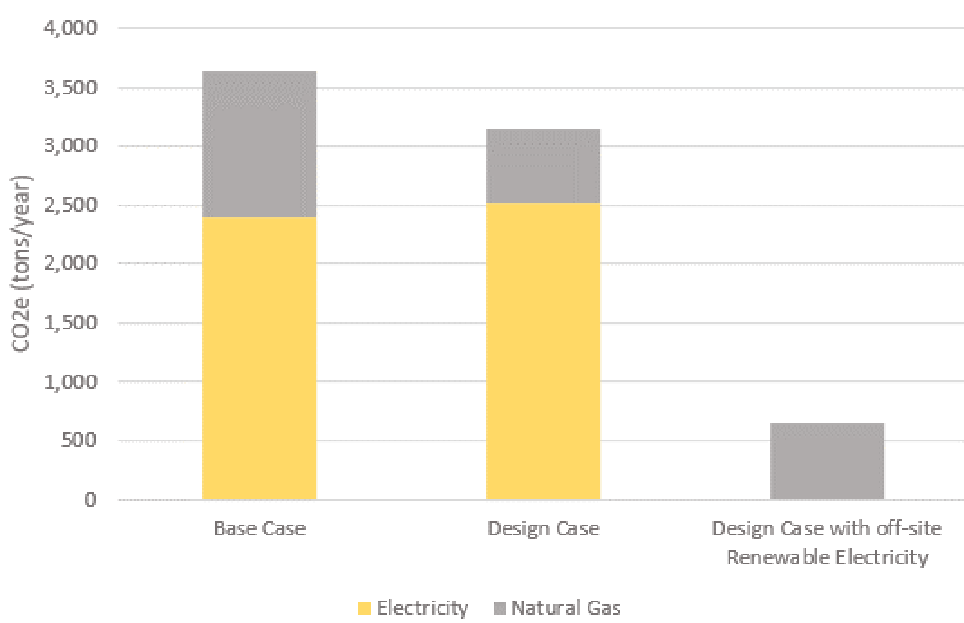
The results shown in Table 6-4 are comprehensive for all four (4) Residential buildings proposed in the Master Plan. As shown in Table 6-4, with the proposed building design and system improvements, the estimated energy use reduction for the Residential typology is approximately 20 percent compared to the Base Case or 10 percent better than Stretch Code, which equates to an approximately 13 percent reduction (487tpy) in stationary source CO_2 emissions.

Table 6-4 Preliminary Energy Model Results – Residential Typology

	Total Energy Consumption			CO_2 Emissions		
	Electricity (MMBtu/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Electricity (tons/ yr)[1]	Natural Gas (tons/ yr)	Total (tons/ yr)
Base Case	24,834	21,361	46,195	2,395	1,250	3,644
Design Case	26,105	10,943	37,048	2,517	640	3,157
End-Use Savings	-1,270	10,417	9,147	-122	609	487
Percent Savings	**-5%**	**49%**	**20%**	**-5%**	**49%**	**13%**

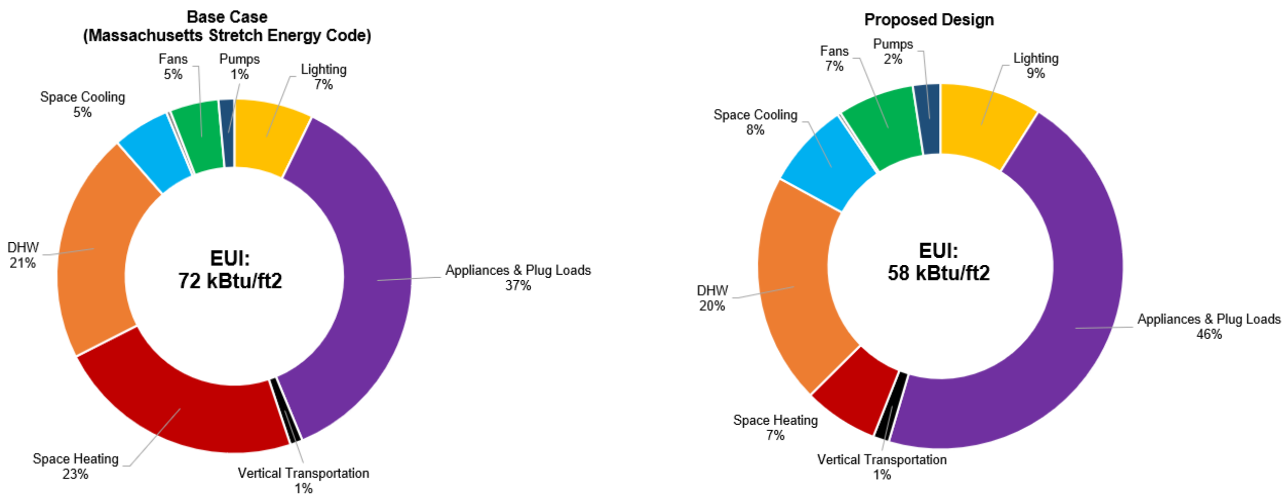
More importantly, the proposed design has reduced fossil fuel energy consumption from natural gas by 49% compared to the Base Case. Coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 13% to 82% compared to the Base Case.

Graph 6-4 Residential GHG Emissions



Graph 6-5 below present a breakdown of the Residential typology energy use by end use for both the Base Case and the Design Case demonstrating a significant reduction in heating energy.

Graph 6-5 Residential Typology Energy End Use



6.4.1.4 Hotel Typology

The following provides a summary of the building energy modeling for the Hotel typology, which is planned for a single building with a gross floor area of approximately 127,000 SF.

Descriptions of the noteworthy building improvements and resulting building energy savings are presented below. The proposed design was based on several key energy efficiency strategies, which include:

- Efficient building envelope that exceeds minimum code values for glazing (i.e. both U-value and SHGC). The building envelope designs will meet the UxA calculation per the Stretch Energy Code. A summary of the UxA calculation for this typology is included in Appendix B;
- Dedicated outside air system (DOAS) and energy recovery ventilator with high-effectiveness sensible and latent energy recovery;
- Water source heat pump system coupled to hydronic loop served by high efficiency condensing boilers and cooling towers to provide space conditioning to hotel units; and
- Low lighting power densities to be achieved from LED lighting and daylighting control systems.

Further discussion of alternatives studied including Passive House is provided in Appendix B.

In accordance with the Massachusetts Stretch Energy Code Section C406.1, the energy modeling for the Hotel typology incorporates the following three additional efficiency measures for both the Base Case and Design Case;

- More efficient HVAC performance in accordance with Section C406.2;
- Reduced lighting power density system in accordance with Section C406.3; and
- Reduced air-infiltration in accordance with Section C406.9.

A summary of the various energy modeling inputs, including the energy conservation measures listed above, are presented in Table 6-5.

Table 6-5 Summary of Energy Modeling Inputs – Hotel Typology

Modeling Parameter	Base Case[10]	Design Case
Building Envelope		
Roof Insulation	U- 0.032 (R-30)	U- 0.032 (R-30)
Wall Assembly – Opaque	U- 0.055 (R-18)	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel
Slab Insulation	F- 0.51 (Unheated slab)	F- 0.51 (Unheated slab)
Air Infiltration Rate	0.25 cfm/SF façade at 0.3 in WC (75 Pa)	0.25 cfm/SF façade at 0.3 in WC (75 Pa)
Fenestration and Shading		
Vertical Glazing U-Factor	U- 0.42 (fixed) U- 0.50 (operable)	U- 0.32 (fixed) 70% of installed glazing; U- 0.36 (operable) 30% of installed glazing
Vertical Glazing SHGC	0.4	0.3
Overall % Window to Wall Ratio	34%	Podium: 47% Hotel floors: 40%
HVAC		
HVAC System	System Type 1 – Packaged Terminal Air Conditioner (PTAC)	DOAS with energy recovery ventilator (ERV) + WSHP units
Exhaust Air Energy Recovery	Not required	Energy recovery ventilator; 70% total energy recovery effectiveness
Primary Cooling	Direct Expansion (DX)	ERV: DX cooling coils; WSHP hydronic loop with cooling towers for heat rejection
Primary Heating	Gas-fired hot water boilers	ERV: High-efficiency condensing gas furnace heating; WSHP hydronic loop with condensing gas boilers.
Service Hot Water Type	Gas storage water heater	High-efficiency gas storage water heater
Lighting		
Lighting Power Density (LPD)	Predominant space type (hotel guest rooms): 0.37 W/SF	Predominant space type (hotel guest rooms): 0.37 W/SF

10 Base Case represents the Energy Code 780 CMR Ninth Edition, Chapter 13 Energy Efficiency Amendments as of 8/7/2020 and the Stretch Code Chapter 115AA.

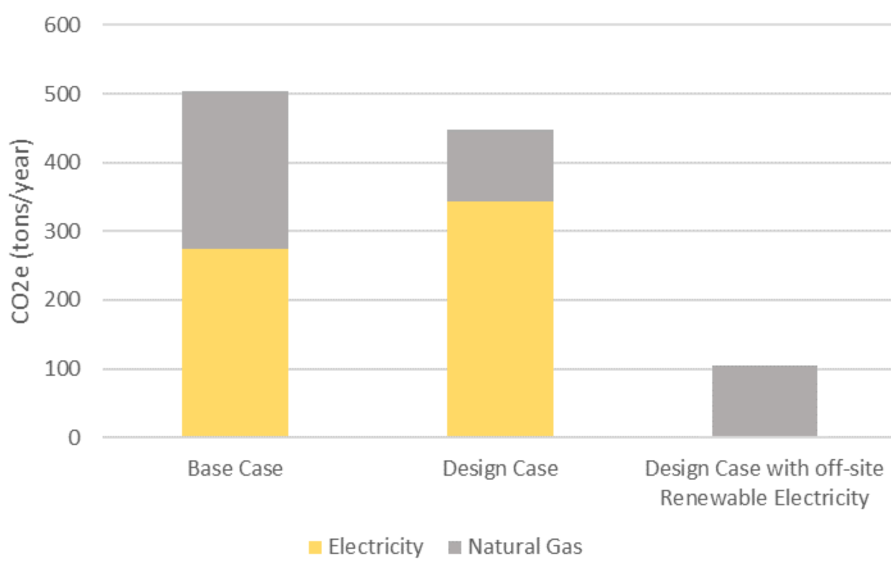
As shown in Table 6-6, with the proposed building design and system improvements, the estimated energy use for the Hotel typology is approximately 21 percent less than the Base Case or 11 percent better than Stretch Code, which equates to an approximately 11 percent reduction (56 tpy) in stationary source CO_2 emissions.

Table 6-6 Preliminary Energy Model Results – Hotel Typology

	Total Energy Consumption			CO_2 Emissions		
	Electricity (MMBtu/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Electricity (tons/ yr)[1]	Natural Gas (tons/ yr)	Total (tons/ yr)
Base Case	2,845	3,915	6,761	274	229	503
Design Case	3,552	1,785	5,337	343	104	447
End-Use Savings	-707	2,131	1,424	-68	125	56
Percent Savings	**-25%**	**54%**	**21%**	**-25%**	**54%**	**11%**

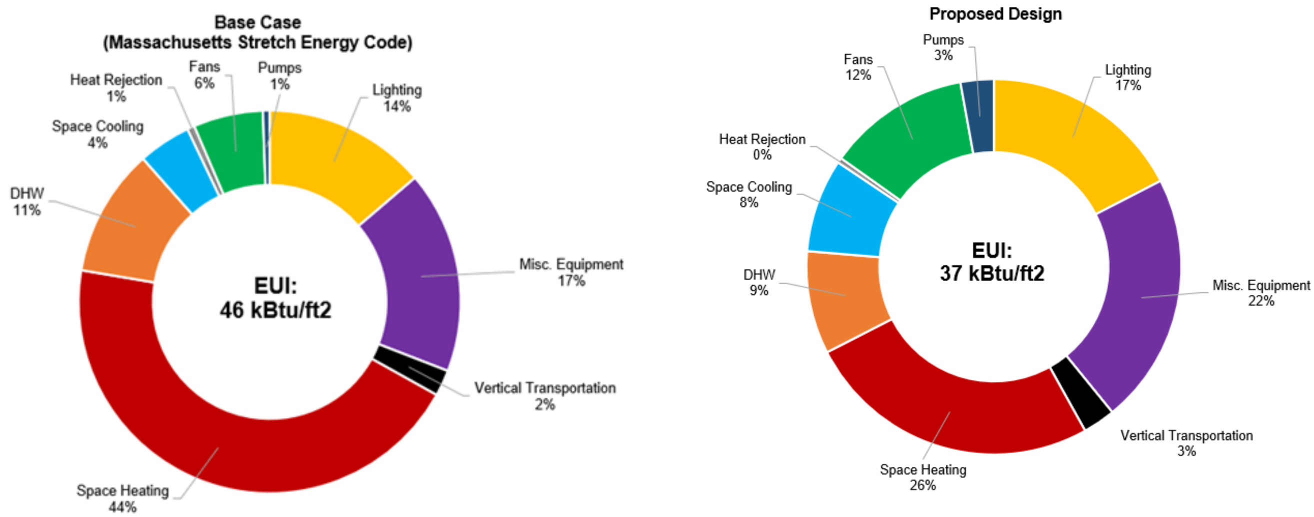
More importantly, the proposed design has reduced fossil fuel energy consumption from natural gas by 54% compared to the Base Case. Coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 11% to 79% compared to the Base Case.

Graph 6-6 Hotel GHG Emissions



Graph 6-7 below present a breakdown of the Hotel typology energy use by end use for both the Base Case and the Design Case.

Graph 6-7 Hotel Typology Energy End Use



6.4.1.5 Conference Center Typology

The following provides a summary of the building energy modeling for the Conference Center Typology, which is planned for single building of approximately 61,500 SF gross floor area.

The Conference Center has been modeled at the master plan phase with stand-alone gas boilers and water heaters as the base assumption for the building's thermal energy generation demands. These systems are also currently being studied as all-electric and the feasibility analysis associated with all-electric systems is detailed in Appendix B. The Conference Center is also being studied for connection to the District Energy Facility.

Descriptions of the noteworthy building improvements and resulting building energy savings are presented below. The proposed design was based on several key energy efficiency strategies which include:

- Efficient building envelope that exceeds minimum code values for glazing (i.e. both U-value and SHGC), including triple glazing. The building envelope design will meet the UxA calculation per the Stretch Energy Code. A summary of the UxA calculation for this typology is included in Appendix B;
- VAV air-handling units with total energy recovery;
- High efficiency water-cooled chiller plant;
- High-efficiency condensing natural gas boilers for space heating; and
- Low lighting power densities to be achieved from LED lighting and lighting control systems.

In accordance with the Massachusetts Stretch Energy Code Section C406.1, the energy modeling for the Conference Center typology incorporates the following three additional efficiency measures for both the Base Case and Design Case;

- More efficient HVAC performance in accordance with Section C406.2;
- Reduced lighting power density system in accordance with Section C406.3; and
- Reduced air-infiltration in accordance with Section C406.9.

The Treehouse Conference Center has been modeled at the master plan phase with stand-alone gas boilers and water heaters as the base assumption for the building's thermal energy generation demands, these systems are also currently being studied as all-electric. The feasibility analysis associated with all-electric systems is detailed in the Appendix B. The Treehouse Conference Center is also being studied for connection to Harvard's existing District Energy Facility which would eliminate on-site equipment for heating and domestic hot water generation. A summary of the various energy modeling inputs, including the energy conservation measures listed above, are presented in Table 6-7.

Table 6-7 Summary of Energy Modeling Inputs – Conference Center Typology

Modeling Parameter	Base Case[11]	Design Case
Building Envelope		
Roof Insulation	U- 0.032 (R-30)	U- 0.025 (R-40)
Wall Assembly – Opaque	U- 0.055 (R-18)	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel
Slab Insulation	F- 0.51 (Unheated slab)	F- 0.51 (Unheated slab)
Air Infiltration Rate	0.25 cfm/SF façade at 0.3 in WC (75 Pa)	0.25 cfm/SF façade at 0.3 in WC (75 Pa)
Fenestration and Shading		
Vertical Glazing U-Factor	U- 0.42 (fixed)	U- 0.32 (fixed)
Vertical Glazing SHGC	0.4	0.3
Overall % Window to Wall Ratio	40%	Podium: 43% Upper floors: 41%
HVAC		
HVAC System	System Type 12 – Single-zone CAV	VAV dedicated outside air system (DOAS) with energy recovery
Exhaust Air Energy Recovery	Not required	Total energy recovery wheel
Primary Cooling	Direct Expansion	On-site water-cooled chiller plant
Primary Heating	Gas-fired hot water boilers	High-efficiency condensing natural gas boilers
Service Hot Water Type	Gas storage water heater	High-efficiency gas storage water heater
Lighting		
Lighting Power Density (LPD)	Predominant space type (conference center space): 0.87 W/SF	Predominant space type (conference center space): 0.87 W/SF

11 Base Case represents the Energy Code 780 CMR Ninth Edition, Chapter 13 Energy Efficiency Amendments as of 8/7/2020 and the Stretch Code Chapter 115AA.

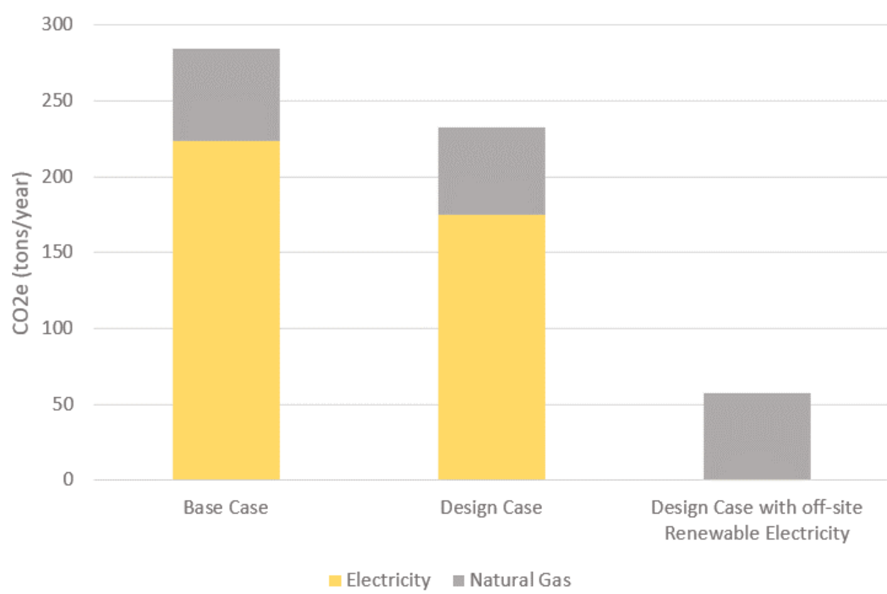
As shown in Table 6-8, with the proposed building design and system improvements, the estimated energy use reduction for the conference center typology is approximately 17 percent compared to the Base Case or approximately 7 percent better than Stretch Code, which equates to an approximately 18 percent reduction (52 tpy) in stationary source CO_2 emissions.

Table 6-8 Preliminary Energy Model Results – Conference Center Typology

	Total Energy Consumption			CO_2 Emissions		
	Electricity (MMBtu/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Electricity (tons/ yr)[1]	Natural Gas (tons/ yr)	Total (tons/ yr)
Base Case	2,324	1,039	3,363	224	61	285
Design Case	1,820	984	2,804	175	58	233
End-Use Savings	505	54	559	49	3	52
Percent Savings	**22%**	**5%**	**17%**	**22%**	**5%**	**18%**

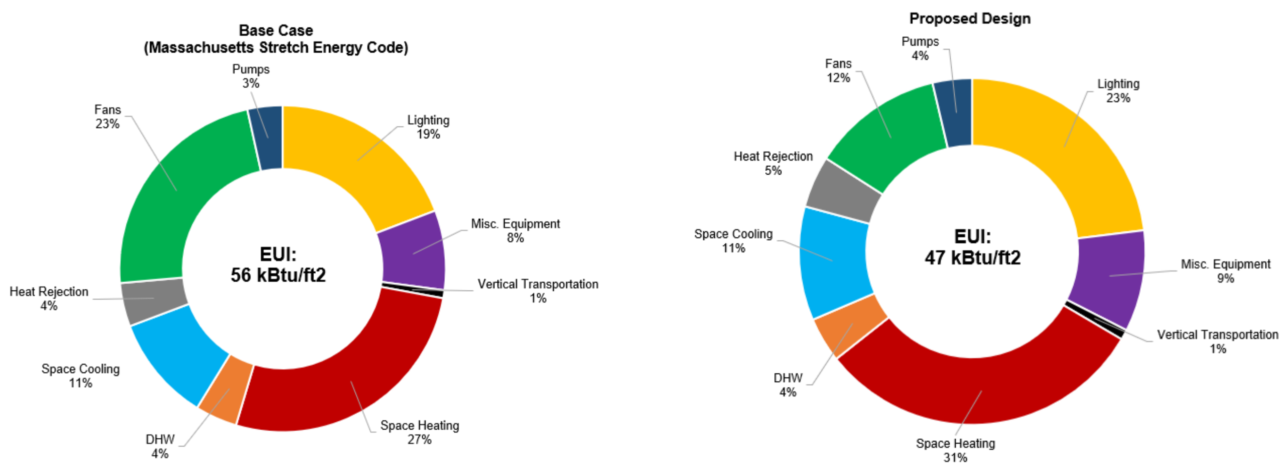
Coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 18% to 80% compared to the Base Case.

Graph 6-8 Conference Center GHG emissions



Graph 6-8 below presents a breakdown of the Conference Center typology energy use by end use for both the Base Case and the Design Case.

Graph 6-9 Conference Center Typology Energy End Use



6.4.1.6 Overall Project Emissions (Full Build)

The following provides a summary of the estimated energy performance and GHG emissions for the full Master Plan project, which comprises of approximately 1,940,000 SF gross floor area. Results associated with below-grade and above-grade parking have been provided separately as parking area is significantly less energy intensive than building area and, therefore, has a considerable impact on reporting building or Master Plan results. Table 6-9 below provides results for the buildings, parking, and buildings with parking.

Table 6-9 Project Energy Usage and Stationary Source CO_2 Emissions

	Total Energy Consumption			CO_2 Emissions		
	Electricity (MMBtu/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Electricity (tons/ yr)[1]	Natural Gas (tons/ yr)	Total (tons/ yr)
Master Plan Project without Parking						
Base Case	142,731	142,625	285,356	13,763	8,344	22,106
Design Case	164,296	34,096	198,392	15,842	1,995	17,837
End-Use Savings	-21,565	108,529	86,964	-2,079	6,349	4,270
Percent Savings	**-15%**	**76%**	**30%**	**-15%**	**76%**	**19%**
Master Plan Project Parking only						
Base Case	2,109	0	2,109	203	0	203
Design Case	1,455	0	1,455	140	0	140
End-Use Savings	654	0	654	63	0	63
Percent Savings	**31%**	**0%**	**31%**	**31%**	**0%**	**31%**
Master Plan Project with Parking						
Base Case	144,840	142,625	287,465	13,966	8,344	22,310
Design Case	165,751	34,096	199,847	15,982	1,995	17,977
End-Use Savings	-20,911	108,529	87,618	-2,016	6,349	4,333
Percent Savings	**-14%**	**76%**	**30%**	**-14%**	**76%**	**19%**

The Master Plan Project demonstrates considerable energy and stationary source GHG emissions reduction as compared to the Base Case, i.e. approximately 30 percent for energy savings (corresponding to a 20 percent energy reduction from the Stretch Code) and approximately 19 percent savings for GHG emissions. This also represents a 5% increase in energy efficiency from the ENF/PNF stage where the masterplan energy reduction was 25%.

The Master Plan Project's proposed design demonstrates a 76% reduction in natural gas energy and GHG emissions, representing a savings of 6,349 tons per year. With these significant reductions in fossil fuel use, the Project's primary energy source is electricity (approximately 83%). Coupled with the Proponent's commitment to joining Harvard University in their renewable energy contracts to procure new, additional renewable energy to cover both Scope 1 and Scope 2 emissions in all properties within the Enterprise Research Campus, the GHG emissions reduction increases from 19% to 91% compared to the Base Case, representing a savings of 20,315 tons per year. These immediate reductions in electricity GHG emissions are far ahead of the Massachusetts electrical grid and will significantly compound GHG emissions savings over the life of the project. The Master Plan is continuing to study additional means of reducing natural gas consumption through its district energy study and pending those analysis findings, will continue to study additional in-building opportunities for electrification and reduction in natural gas consumption. Refer to Appendix B for additional analysis completed.

6.4.1.7 Energy Use Intensity

Energy Use Intensity ("EUI") is a tool used to provide a common basis of comparison of energy use for various building uses. It is the total amount of energy consumed by a building over a one-year period, divided by the square footage of that building. The EUI metric therefore normalized energy consumption so one building can be compared to another regardless of its size. Based on a recent U.S. Department of Energy ("DOE") research report, within Climate Zone 5A, which is the climate zone classification of the Commonwealth of Massachusetts, are as follows;

- Large and Medium Office Buildings median EUIs are 75.2 and 37.1 kBtu/sf, respectively, under ASHRAE 90.1-2013.[12]
- Laboratory building median Site EUI across all U.S. buildings is 115.3 according to ENERGY STAR Portfolio Manager.[13]
- High-Rise and Mid-Rise Apartment median EUIs are 54.1 kBtu/sf and 49.8 kBtu/sf, respectively, under ASHRAE 90.1-2013.[14]
- Large and Small Hotels median EUIs are 91.4 and 63.3 kBtu/sf, respectively, under ASHRAE 90.1-2013.[15]
- Convention Center building median Site EUI across all U.S. buildings is 56.1 according to ENERGY STAR Portfolio Manager.[16]

Table 6-10 below provides the as-modeled EUI results for each building typology under the Base and Design Cases.

12 "Cost-Effectiveness of the ASHRAE Standard 90.1-2013 for the State of Massachusetts". *US Department of Energy*. December 2015. The prototypical Large Office is 498,600 sf and 12 floors, while the prototypical Medium Office is 53,600 sf and 3 floors.

13 https://www.energystar.gov/buildings/benchmark/understand_metrics/what_eui

14 "Cost-Effectiveness of the ASHRAE Standard 90.1-2013 for the State of Massachusetts". *US Department of Energy*. December 2015. The prototypical High-Rise Residential is 84,360 sf and 10 floors, while the prototypical Mid-Rise Apartment is 33,700 sf and 4 floors.

15 "Cost-Effectiveness of the ASHRAE Standard 90.1-2013 for the State of Massachusetts". *US Department of Energy*. December 2015. The prototypical Large Hotel is 122,132 sf and 6 floors, while the prototypical Small Hotel is 43,200 sf and 4 floors.

16 https://www.energystar.gov/buildings/benchmark/understand_metrics/what_eui

Table 6-10 Energy Use Intensity Master Plan Project Building Typologies

Building Typology	Energy Use Intensity (kBtu/sf-yr) Base Case[1]	Energy Use Intensity (kBtu/sf-yr) Design Case	Benchmark Energy Use Intensity (kBtu/sf-yr)	Percent Improvement[4]
Lab/Office	174	117	115.3 (Laboratory) [2]	-2%
Multifamily Residential	72	58	54.1 (Large Multifamily Residential) [3]	-7%
Hotel	46	37	91.4 (Large Hotel) [3]	60%
Conference Center	56	47	56.1 (Convention Center) [2]	16%
Parking Garage	7.0	4.9	-	N/A

1 The Base Case represents current MA Stretch Energy Code and ASHRAE 90.1-2013 standards.

2 Median Source EUI across U.S. buildings per ENERGY STAR Portfolio Manager. From previously-referenced database at https://www.energystar.gov/buildings/benchmark/understand_metrics/what_eui.

3 Median Site EUI for Climate Zone 5A buildings adhering to ASHRAE Standard 90.1-2013. From previously-referenced report "Cost-Effectiveness of the ASHRAE Standard 90.1-2013 for the State of Massachusetts".

4 Percent Improvement is compared against average of range of benchmark values presented.

The Laboratory/Office typology modeled EUI slightly exceeds the benchmark median EUI of laboratory buildings across the U.S. This is likely a result of benchmark laboratory energy data including such a wide variety of laboratory buildings that also widely vary in energy intensities. However, the Design Case model demonstrates significant energy savings in comparison to the Base Case building (33%).

For the Multifamily Residential typology, the modeled EUI slightly exceeds the benchmark EUI for Climate Zone 5A buildings adhering to ASHRAE Standard 90.1-2013. This exceedance is primarily the result of an increase in assumed indoor appliance energy within units in comparison to benchmarked building data; per guidance on indoor equipment energy loads from the design team, the Design Case model shows an end-use EUI for indoor electrical equipment and appliances of 22.8 kBtu/ft2, compared to a corresponding EUI of 10.9 for the benchmark buildings. For other major end-uses, the Design Case exceeds the performance of benchmark buildings. Design Case domestic hot water (DHW) EUI is 11.8 kBtu/ft2 compared to a benchmark model value of 12.2 kBtu/ft2 and the Design Case combined heating and cooling EUI is 8.2 kBtu/ft2 compared to the benchmark model value of 15.8 kBtu/ft2.

The Design Case EUIs for each individual building typology in comparison to Base Case model EUIs demonstrates the Proponent's commitment to energy efficient design by exceeding the Stretch Energy Code requirement of 10% energy reduction.

Table 7-26 below provides the EUI results that have been aggregated for each building typology based on the Master Plan Project program under the Base and Design Cases.

Table 6-11 Energy Use Intensity Master Plan Project

	Energy Use Index (kBtu/sf-yr) Base Case[1]	Design Case	Percent Improvement
Master Plan Project (without Parking)	131.7	91.6	30%
Master Plan Project (with Parking)	116.5	81.0	30%

The Base Case represents current MA Stretch Energy Code and ASHRAE 90.1-2013 standards.

6.4.1.8 Evaluation of Clean/Renewable Energy

A preliminary rooftop solar PV system feasibility analysis has been completed since the ENF filing. It is a preliminary analysis as roof plans remain in early concept phase and planning and therefore subject to change. A preliminary roof plan corresponding to the analysis results below has been provided in Appendix B.

The first step in the analysis was identifying the appropriate and available building roof area for PV systems. When podium and other low roof areas are accounted for, self-shading of buildings and mechanical area, the available roof area for PV systems is dramatically reduced from the total roof area. With the roof areas identified, the preliminary solar PV analysis was then conducted for each of the buildings, as applicable. The online software Helioscope was used for the updated analysis and assumed a high-efficiency 470W solar PV panel. Accordingly, the size of arrays for the buildings are as follows:

Treehouse Conference Center	65kW array
Hotel 4	22kW array
Lab/Office building 2E	60kW array
Lab/Office building 2W	46kW array
Lab/Office building 6	37kW array
Lab/Office building 7	42kW array
Lab/Office building 10	75kW array
Residential buildings 3+5	30kW array
Residential building 8+9	70kW array

The solar PV arrays result in a total potential of 447 kW across the Master Plan. Detailed results are provided in the table below.

Table 6-12 Estimated Energy and Greenhouse Gas Savings for Solar Analysis

	Electricity Consumption (MWh/yr)	Solar Energy Production (MWh/yr)	CO_2 Reduction (tons/yr)	Electricity Savings	CO_2 Savings
Conference 1	533	75.3	25	14.1%	10.7%
Hotel 4	1,041	26.2	9	2.5%	1.9%
Lab/Office 2E	9,311	68.7	23	0.7%	0.7%
Lab/Office 2W	6,198	53.5	18	0.9%	0.8%
Lab/Office 6	7,073	43.6	14	0.6%	0.4%
Lab/Office 7	6,439	49.1	16	0.8%	0.7%
Lab/Office 10	9,905	87.2	29	0.9%	0.9%
Residential 3+5	3,392	34.9	11	1.0%	0.8%
Residential 8+9	4,259	81.8	27	1.9%	1.8%
Total	**48,152**	**520.3**	**171**	**1.1%**	**1.0%**

The solar systems across the Master Plan would be projected to produce approximately 520 MWh per year of energy, which is equivalent to approximately 171 tons per year of greenhouse gas emissions savings. A simple payback analysis indicates paybacks of approximately 7 years. The analysis has included the Solar Massachusetts Renewable Target ("SMART") program, the MACRS Depreciation Deduction at 25 percent, and the federal tax incentive at 26 percent per the current phase out structure. Given the very limited impact of the solar PV potential on-site (1% energy and <1% emissions savings) and the Proponent's commitment to procure off-site renewable electricity in collaboration with Harvard University for 100% of electricity consumption, on-site solar PV has not been included in the Design Case.

However, further feasibility analysis will be conducted for the Treehouse Conference Center as the design develops as this is the most favorable site.

All buildings will be constructed to be solar-ready, meaning that (i) the roof structure will be capable of supporting such a system, (ii) a pathway for conduit routing will be identified, and (iii) space in the main switchgear will be provided for a future PV breaker, all so that solar PV could be installed at a later date

District Energy Study

On June 14, 2018 the BPDA board adopted the Smart Utilities Policy for Article Development Review and is applicable to developments of 1.5 million square feet and above. Because the Full Build of the PDA Master Plan (the Phase A and Phase B components of the Project, as described in Chapter 1, *Project Description*) exceeds this threshold, it is subject to Part 2 – District Energy Microgrids of the Smart Utilities Policy.

The Proponent is committed to completing a District Energy Microgrid Feasibility Study for the Project as part of a subsequent filing for the City. The study will assess the viability of a District Energy system, distributed energy resources (DER), and/or microgrid for clusters of buildings. The Proponent has worked with the City of Boston and BPDA to confirm the specific systems to be analyzed in the district energy analysis. Aligned with the City's commitment to carbon neutrality by 2050, the forthcoming results of the district energy study will not include a combined heat and power system that relies on natural gas and rather is focused on options that further reduce natural gas use across the Masterplan Electrification and Passive House Alternatives

The Proponent has prepared an extensive analysis of numerous alternative designs for the typologies at the request of DOER. All alternative analysis methodologies were coordinated with DOER prior to filing of this document. The alternative modeling cases span the four primary project typologies (Laboratory/Office, Residential, Hotel, and Conference). In addition, alternative cases are modeled specifically for Retail and Restaurant spaces which are generally included at ground level within the primary building typologies. This complete alternative analysis is reported on in Appendix B.

At the direction of DOER, the modeled thermal energy demand intensity (TEDI) is presented for each typology. TEDI is a building performance metric that equates to the annual heating energy demand for space conditioning (zone loads and ventilation loads) per unit of building floor area (units of kBtu/sf/yr). The TEDI metric allows for direct comparison of passive or low-energy load reduction strategies across design alternatives, such as envelope thermal performance, energy recovery systems, or solar gain management strategies (e.g. shading devices). The report in Appendix B presents the variety of studied electrified alternatives for each typology and Passive House alternatives for the residential and hotel typologies and compares the estimated TEDI for each alternative.

6.4.1.9 Utility Incentives

The Proponent is committed to deliver energy efficient and low GHG emissions buildings. To facilitate investment in the latest technology, high efficiency systems, and equipment, the Proponent intends to explore and utilize applicable federal, state and utility incentives available through energy efficiency, renewable energy, and potentially alternate energy credit (AEC) programs.

It is noted that the Project is scheduled to span beyond the current three-year cycle for energy efficiency incentive programs. As such, the Proponent is cognizant that available incentives may change over the horizon of the Project since most incentive programs require periodic renewal, have an expiration date, and are also subject to changing laws and regulations.

Most notably, the Proponent intends to utilize the Mass Save New Construction Program for the future build-out of the Project. This program is designed to incentivize energy efficient design for new commercial, industrial, and governmental facilities. Eversource and National Grid act as Mass Save Program Administrators (PA). Eversource is the utility provider of electricity to the Project Site. National Grid is the utility provider of natural gas to the Project Site. These utility companies also offer technical assistance and provide the incentives for implementing the eligible energy efficiency measures identified during the design phase of the Project. The utility companies must be involved during the design phase to help determine the cost-benefit of incorporating each measure into the Project energy plan and identify any additional measures that may be available.

The Mass Save Program offers a custom performance track (vs. the prescriptive track), wherein the whole-building energy modeling software is used to compare energy usage of the as-designed building to that of a baseline code-compliant reference building. The utility companies pay incentives based on the calculated savings variance. The custom track is the best option to ensure the Project will achieve the desired energy, financial, and GHG emissions reductions goals.

At the State level, the Massachusetts Renewable Portfolio Standard (RPS) and Alternative Energy Portfolio Standard (APS) incentivize generation with renewable and alternative electricity generation technologies. Specifically, RPS[17] and APS requires energy suppliers to source a percentage of the electricity they sell from renewables by purchasing RECs from renewable generators, as well as AEC programs. The Proponent intends to evaluate the feasibility of renewable and alternative energy technologies and leverage incentives provided through the RPS and APS programs for heat pump systems

6.4.1.10 Alternative Energy Credits[18]

AECs are offered through DOER as a part of the state's Alternative Energy Portfolio Standard under the Renewable Thermal program. AECs are available for useful thermal output by renewable thermal generation units (RTGU) such as air-source and ground-source heat pumps (ASHP and GSHP).

The AEC eligibility criteria are as follows:

- Generate useful thermal energy using sunlight, biomass, biogas, biofuel or naturally occurring temperature differences in ground, air or water
- Deliver a useful thermal load to a facility located in Massachusetts
- Have an operation date January 1st, 2015 or later

Building Owners can receive AEC incentive money by implementing these systems on a metered or unmetered basis. Residential buildings typically use the unmetered calculation while non-residential buildings must use the metered calculation.

- Using the unmetered calculation has the benefit that the incentive money is paid out as a lump sum in the first quarter of operation. The unmetered calculation is driven by the number of residential units and therefore will vary depending on the actual number of units in a given building.
- Using the metered calculation, incentive money is paid out in equal installments, every three months for a period of 10 years. The metered calculations are driven by actual metered data to define the useful heat for the building and therefore will vary depending on the actual performance for a building.

17 As of April 2018, the Department of Energy Resources recently redesigned its solar subsidy program. Instead of offering solar owners an additional revenue stream in the form of Solar Renewable Energy Certificates), under the SMART program, solar installations receive a guaranteed price per kWh from their utility.

18 https://www.mass.gov/service-details/qualifying-air-source-heat-pump-in-the-aps

For the AEC calculations, there is a multiplier applied depending on the system selection and even additional multipliers for highly efficient buildings, including Passive House certified buildings. These multipliers are shown in the Table 6-13 below.

Table 6-13 Alternative Energy Credits Multipliers

Technology	APS Renewable Thermal Generation Unit multiplier		
System size	**Small**	**Intermediate**	**Large**
Active solar hot water systems used for domestic hot water	3	3	3
Active solar hot water systems used for domestic hot water, space condition, or process loads	1	1	1
Active solar hot air systems	-	5	5
Solar sludge dryer	-	-	1
Ground source heat pumps	5	5	5
Deep geothermal	-	-	1
Air source heat pumps (electric or engine driven) – supplying less than 100% of building heating load[2]	2	-	-
Air source heat pump (electric or engine driven) – all other[2]	3	3	3
Compost heat exchange system	-	-	1
Biomass, biofuels, biogas	N/A	N/A	N/A

Please refer to Appendix B for full incentive calculations.

6.4.1.11 Mass Save Whole Building Energy Use Intensity (EUI) Reduction

For large buildings over 50,000 square feet, Mass Save offers Whole Building Energy Use Intensity (EUI) Reduction provides building owners and design teams with energy efficiency expertise early in the design process. The team receives technical assistance to establish and reach an EUI target. To be eligible, the project must have a goal of meeting at least a 10% EUI reduction from the MassSave baseline. Incentives are provided as follows:

- EUI reduction of at least 25% or higher receives $1.25/sf
- EUI reduction of 10-24.9% receives $0.35-0.75/sf
- Technical assistance: 75% cost share, capped at $20,000 per Sponsor
- Verification incentive: 50% of the fee, up to $10,000

Please refer to the Appendix B for full incentive analysis.

6.4.1.12 Mass Save Passive House Incentives[19]

Mass Save offers a Passive House incentive that is separate and additive to the DOER AECs. The incentive has two paths with two non-mandatory initial steps:

- Step 1 (Optional): Mass Save will pay for a Passive House feasibility study, up to $5,000.
- Step 2 (Optional): Mass Save will pay 75% of the costs of energy modeling through design, with a maximum incentive of $20,000.
- Path 1 Passive House Certification: If the project is fully Passive House certified, including pre-certification and post-construction certification.

In the first stage of Path 1, at the completion of design, if the project meets Passive House pre-certification, the developer will receive $500/unit. Then, if post-construction project is Passive House certified the developer will receive an additional $2,500/unit, for a total incentive of $3,000/unit.

A net-performance bonus is also calculated based on energy savings from the baseline ($0.75/kWh and $7.50/therm). The difference is calculated between the energy cost savings and the certification incentive ($3,000/unit).

If the net performance bonus is greater than the $3,000/unit incentive, the Owner receives additional money for the difference. If the net-performance bonus is less than the $3,000/unit incentive, the final incentive is $3,000/unit.

- Path 2 Passive House Pre-Certification: If the project only receives Passive House pre-certification.

At the completion of design, if the project meets Passive House pre-certification, the developer will receive $500/unit. Then, if the post-construction project does not achieve full Passive House certification, the net-performance bonus is calculated based on energy savings from the baseline ($0.75/kWh and $7.50/therm). The $500/unit incentive is subtracted from the net-performance bonus for the final incentive.

6.4.2 Stationary Source Air Quality Permitting

Sizable combustion equipment with the potential to emit air pollutants at the Project Site may be subject to air permitting under 310 CMR 7.00. MassDEP has established the “Environmental Results Program” (ERP) to streamline the certification process of smaller combustion equipment subject to permitting regulations. The exact sizes, makes, models of equipment to be used by the Project is currently unknown and will be determined throughout the design process. However, equipment that may be used at the Project, such as boilers or emergency generators, may be subject to permitting regulations. If a boiler with a rated capacity between 10 to 40 MMBtu per hour is used on the Project Site, the Proponent will submit the appropriate self-certification forms under the ERP process before the installation of the boiler. Additionally, if an emergency generator with a rated capacity equal to or greater than 37 kW is used on the Site, the Proponent will submit the

19 https://www.masssave.com/saving/residential-rebates/passive-house-incentives

appropriate self-certification forms under the ERP process within 60 days of generator startup.

6.4.3 Mobile Source GHG Emissions Assessment

This section presents an overview of the air quality and GHG assessment conducted for the Project, the purpose of which is to demonstrate that the Project will not result in a violation of applicable local, state, and federal air quality standards and to demonstrate there are mitigation measures that will reduce the Project's VOC and NO_X emissions. The GHG emissions are estimated to comply with the MEPA GHG Policy.

6.4.3.1 Background

The purpose of the air quality mesoscale analysis is to estimate the area-wide emissions of VOC and NO_X during a typical day in the peak ozone season (summer), consistent with the requirements of the SIP. The mesoscale analysis evaluates the change in VOC and NO_X emissions from the average daily traffic volumes and vehicle emission rates. To demonstrate compliance with the SIP criteria, the air quality study must show the Project's change in daily (24-hour period) VOC and NO_X emissions.

MassDEP has established guidelines that define the modeling and review criteria for air quality studies prepared under the Massachusetts Environmental Policy Act (MEPA). These guidelines recommend that mesoscale analyses be prepared for proposed development projects to determine the change in Project-related ozone precursor emissions. The predominant source of ozone precursor emissions anticipated from the Project is emissions from Project--related traffic. Ozone is not directly emitted by motor vehicles but is generated when VOC and NO_X emissions from motor vehicles, stationary sources, and area sources react in the atmosphere with sunlight and heat. Project-related ozone impacts are determined by assessing the changes in VOC and NO_X emissions of motor vehicles. MassDEP criteria require that proposed development projects include all reasonable and feasible emission reduction mitigation measures if the ozone emissions from the Build Condition are greater than the No -Build Condition. Massachusetts has incorporated this criterion into the SIP.

Boston is in Suffolk County which is in attainment for all National Ambient Air Quality Standards (NAAQS) criteria pollutants except for the 8-hour (1997 Revoked) and 1-hour (1979 Revoked) Ozone standards. As such, the air quality analysis calculated emission inventories of the two pollutants that contribute to the violation of the Ozone NAAQS from mobile sources: VOC and NO_X. Other criteria pollutants are not of concern for the area and are not required to be quantified.

6.4.3.2 Methodology

The mesoscale analysis evaluates the change in emissions with and without the Project: specifically, daily (24hour period) VOC and NO_X emissions from the average daily traffic volumes and vehicle emission rates. MassDEP guidelines recommend that the air quality study utilize traffic and emissions data for existing and future (No Build and Build) conditions. The traffic and emissions data are incorporated into the Environmental

Protection Agency (EPA) and MassDEP air quality models to generate emission's estimates that demonstrate whether the Project will have air quality impacts.

The mesoscale air quality analysis utilizes developed traffic data (volumes, speeds, and roadway geometry) and emission factor data for Existing, No-Build, Build, and Build with Mitigation Conditions. The mesoscale study area includes all links studied by the traffic analysis. Some of the major roadways that were included in the mesoscale analysis include Cambridge Street, North Harvard Street, Western Avenue, and Memorial Drive. The mesoscale traffic and emission factor data were incorporated into the air quality model to evaluate the changes in VOC and NO_X emissions.

Mobile source GHG emissions are based upon the traffic volumes, the distance vehicles travel and GHG emission rates. The mobile source emissions are calculated by performing a mesoscale analysis to evaluate the changes in CO_2 emissions for the existing and future conditions within the traffic study area. The GHG mobile source analysis estimates the area-wide CO_2 emissions from vehicle traffic for a period of one year. Mobile source emissions were calculated by performing an annual GHG emissions mesoscale analysis to evaluate the estimated change in CO_2 emissions for the existing and future conditions within the study area.

6.4.3.3 Emission Factor Modeling

EPA's Office of Transportation and Air Quality (OTAQ) has developed the Motor Vehicle Emission Simulator (MOVES).[20] MOVES2014b is EPA's motor vehicle emissions model for state and local agencies to estimate VOCs, NO_X, CO_2 and other emissions from cars, trucks, buses, and motorcycles.

All the vehicle emission factors used in the mesoscale analysis were obtained using EPA's MOVES2014b emissions model. MOVES2014b calculates emission factors from motor vehicles in mass per distance format (often grams per mile) for existing and future conditions and applies these factors to Vehicle Miles Travelled (VMT) data to obtain emissions inventories. The emissions calculated for this air quality assessment include Tier 3 emission standards, which is an EPA program that sets new vehicle emissions standards, including lowering the sulfur content of gasoline, heavy-duty engine, and the second phase of light-duty vehicle GHG regulations. It also includes Massachusetts specific conditions, such as the state vehicle registration age distribution and the statewide Inspection and Maintenance (I/M) Program. These stringent emissions regulation programs often result in lower emissions inventories with the passage of time when comparing similar scenarios.

The MOVES2014b model was run at a project-level to obtain emission factors for each link of the mesoscale analysis. The model was set to calculate the emissions burden by choosing to model emissions processes that are specifically related to on-road travel. Links were created that used the appropriate speeds and grades for each roadway segment.

10 MOVES2014b (Motor Vehicles Emission Simulator), December 2018, US EPA, Office of Mobile Sources, Ann Arbor, MI.

6.4.3.4 Traffic Data

The air quality study used traffic data (volumes) developed for each analysis condition. The mesoscale analysis uses typical daily peak and off-peak traffic volumes for the ozone summer season. The VMT data used in the air quality analysis were developed based on the traffic data analyzed in Chapter 3, *Transportation*.

6.4.3.5 Existing Mesoscale Emissions

The mesoscale analysis calculated the existing VOC and NO_X emissions for the Project inventory. These emissions, estimated to be 67.9 kilograms per day (kg/day) of VOCs and 31.4 kg/day of NO_X, establish an Existing Condition to which future emissions can be compared. The GHG emissions were estimated to be 38,928 short tons per year (tpy).

6.4.3.6 Future Mesoscale Emissions

Future Project-related emission calculations are based upon changes in traffic and emission factor data. The traffic data includes traffic volumes that were used to calculate VMT on the study network. The emission factor data included emission reduction programs, shifts in vehicle populations, and other factors. Under the No-Build Condition, VOC emissions were estimated to be 55.4 kg/day and NO_X emissions were estimated to be 17.7 kg/day. CO_2 emissions were estimated to be 41,119 tpy.

Under the Build Condition, as presented in Table 6-14, the VOC emissions are estimated to 60.8 kg/day and the NO_X emissions are estimated to be 19.7 kg/day. CO_2 emissions were estimated to be 47,029 tpy. The Build emissions inventory was developed by considering the effects of the Project generated trips on the No-Build network. The SIP and MEPA GHG Policy require that proposed projects with VOC, NO_X, and CO_2 emissions under the Build Condition that are greater than the No-Build Condition include all reasonable and feasible emission reduction measures.

Table 6-14 Mesoscale Analysis Results

Pollutant	Existing Conditions	No-Build Conditions	Build Conditions	Project-Related Emissions[1]
Volatile Organic Compounds (kg/day)	67.9	55.4	60.8	5.4
Oxides of Nitrogen (kg/day)	31.4	17.7	19.7	2.0
Carbon Dioxide (tpy)	38,928	41,119	47,029	5,910

1 Represents the difference in emissions between the Build and No-Build Conditions.

6.4.3.7 Proposed Mitigation Measures

A transportation mitigation program has been developed to mitigate impacts of Project-related traffic. The proponent has incorporated multiple demand reduction measures and roadway improvement measures to mitigate the impacts of the Build Condition. The roadway improvement measures proposed for the Project include physical roadway enhancements, signal coordination and signal timing optimizations at multiple intersections across the study area. These measures will greatly reduce network delay resulting in large reductions in emissions. The roadway improvement measures are expected to provide a 1.6 kg/day reduction of VOCs, a 0.8 kg/day reduction of NO_X and 2,696 tpy reduction of GHG.

The Proponent is committed to implementing a comprehensive TDM program. A full description of the updated TDM program is detailed in Section 3.12.5. Implementation of the TDM program is expected to improve air quality in the study area by promoting the use of alternative forms of transportation over the use of single-occupant motor vehicle ("SOV") trips to the Project Site. This modal shift results in lower Project-related VMT which consequentially reduces indirect Project emissions. The TDM program is consistent with the *GoBoston 2030*[21] mode share goals, which is reflected in the No Build and Build traffic analyses. Previous estimates of similar TDM programs have ranged on the order of a two percent reduction in vehicles miles traveled (VMT), which is assumed to result in comparable pollutant emission savings. As a result, the TDM plan is expected to provide a 0.11 kg/day reduction of VOCs, a 0.0.4 kg/day reduction of NO_X and a 118 tpy reduction of GHG.

These savings result in final Project-related emissions of 3.7 kg/day of VOCs, 1.2 kg/day of NO_X and 3,096 tpy of GHG. A summary of the mitigation emissions reduction is shown in Table 6-15.

Table 6-15 Mitigation Analysis Results

Pollutant	Project-related Emissions[1]	Savings Due to TDM Measures[2]	Savings Due to Roadway Improvments[3]	Mitigated Project-related Emissions
Volatile Organic Compounds (kg/day)	5.4	-0.11	-1.6	3.7
Oxides of Nitrogen (kg/day)	2.0	-0.04	-0.8	1.2
Carbon Dioxide (tpy)	5,910	-118	-2,696	3,096

1 Represents the difference in pollutant emissions between the Build and No-Build Conditions.
1 Mitigation from TDM Measures.
2 Mitigation resulting from roadway improvements such as signal time optimization or physical measures.

Electric Vehicles

The Project will provide preferred parking for low-emitting fuel-efficient vehicles and/or electric vehicle charging stations. Currently, the Proponent is proposing to install 25 percent of spaces with electric vehicle charging and the remaining 75 percent of spaces as EV-Ready spaces in accordance with the requirements of the City's EV policy. EV-Ready spaces include the construction of the appropriate infrastructure to facilitate the future installation of a charging station. Employees or visitors with electric vehicles can receive an electric charge, which will also help the Proponent continue its commitment to clean energy and alternative transportation solutions. Fully electric vehicles do not have any tailpipe emissions (such as NOx or particulates-both of which contribute to respiratory illness) and emit practically no engine heat, thereby helping to reduce the high temperature in congested corridors.

21 https://www.boston.gov/departments/transportation/go-boston-2030

6.4.4 GHG Self-Certification Letter of Commitment

In accordance with the MEPA GHG Policy, the Proponent will provide a self-certification to the MEPA Office signed by an appropriate professional (e.g., engineer, architect, or general contractor) following completion of construction to demonstrate that the stationary source GHG emissions have been mitigated. The Proponent plans to submit a self-certification following the construction of the individual buildings. A draft commitment letter for this self-certification submission is provided below for the full-build Project.

D R A F T   O N L Y

August 2, 2021

Secretary Kathleen A. Theoharides
Executive Office of Energy & Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

ATTN: Director Tori Kim, MEPA Office

Re: Letter of Commitment for Stationary Source Greenhouse Gas Emissions Self-Certification
Enterprise Research Campus Project
Boston, MA (EEA No. 16320)

On behalf of Tishman Speyer ERC Developer, L.L.C. (the "Proponent"), VHB has prepared a summary of the estimated reduction in overall energy use and stationary source Greenhouse Gas ("GHG") emissions for the Enterprise Research Campus Project in Boston.

In accordance with the current MEPA Greenhouse Gas Emissions Policy and Protocol (the "GHG Policy") dated May 2010, the stationary source GHG assessment was provided to the MEPA Office as part of the Draft Environmental Impact Report ("DEIR") filed on June 15, 2021. The Design Case assumed building design and system improvements that would result in energy reductions, in accordance with the GHG Policy.

The energy conservation measures for the Design Case are estimated to reduce the overall energy use by 30 percent resulting in a 19 percent reduction in stationary source CO_2 emissions when compared to the Stretch Code Baseline. The table below presents the estimated energy savings and CO_2 emissions reductions for the Proposed Project.

	Total Energy Consumption			CO_2 Emissions		
	Electricity (MMBtu/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Electricity (tons/ yr)[1]	Natural Gas (tons/ yr)	Total (tons/ yr)
Project without Parking						
Base Case	142,731	142,625	285,356	13,763	8,344	22,106
Design Case	164,296	34,096	198,392	15,842	1,995	17,837
End-Use Savings	-21,565	108,529	86,964	-2,079	6,349	4,270
Percent Savings	**-15%**	**76%**	**30%**	**-15%**	**76%**	**19%**
Project Parking only						
Base Case	2,109	0	2,109	203	0	203
Design Case	1,455	0	1,455	140	0	140
End-Use Savings	654	0	654	63	0	63
Percent Savings	**31%**	**0%**	**31%**	**31%**	**0%**	**31%**
Project with Parking						
Base Case	144,840	142,625	287,465	13,966	8,344	22,310
Design Case	165,751	34,096	199,847	15,982	1,995	17,977
End-Use Savings	-20,911	108,529	87,618	-2,016	6,349	4,333
Percent Savings	**-14%**	**76%**	**30%**	**-14%**	**76%**	**19%**

The building energy model results/energy savings and estimated stationary source GHG emissions reductions are preliminary. Following completion of construction of each building, the Proponent will submit a self-certification to the MEPA Office, signed by an appropriate professional, which identifies the as-built energy conservation measures and documents the stationary source GHG emissions reductions from the baseline case.

If you have any questions, please contact me at (617) 607-0091 or via email at ldevoe@vhb.com.

Very truly yours,

Lauren DeVoe, AICP, LEED AP BD+C
Senior Environmental Planner, VHB

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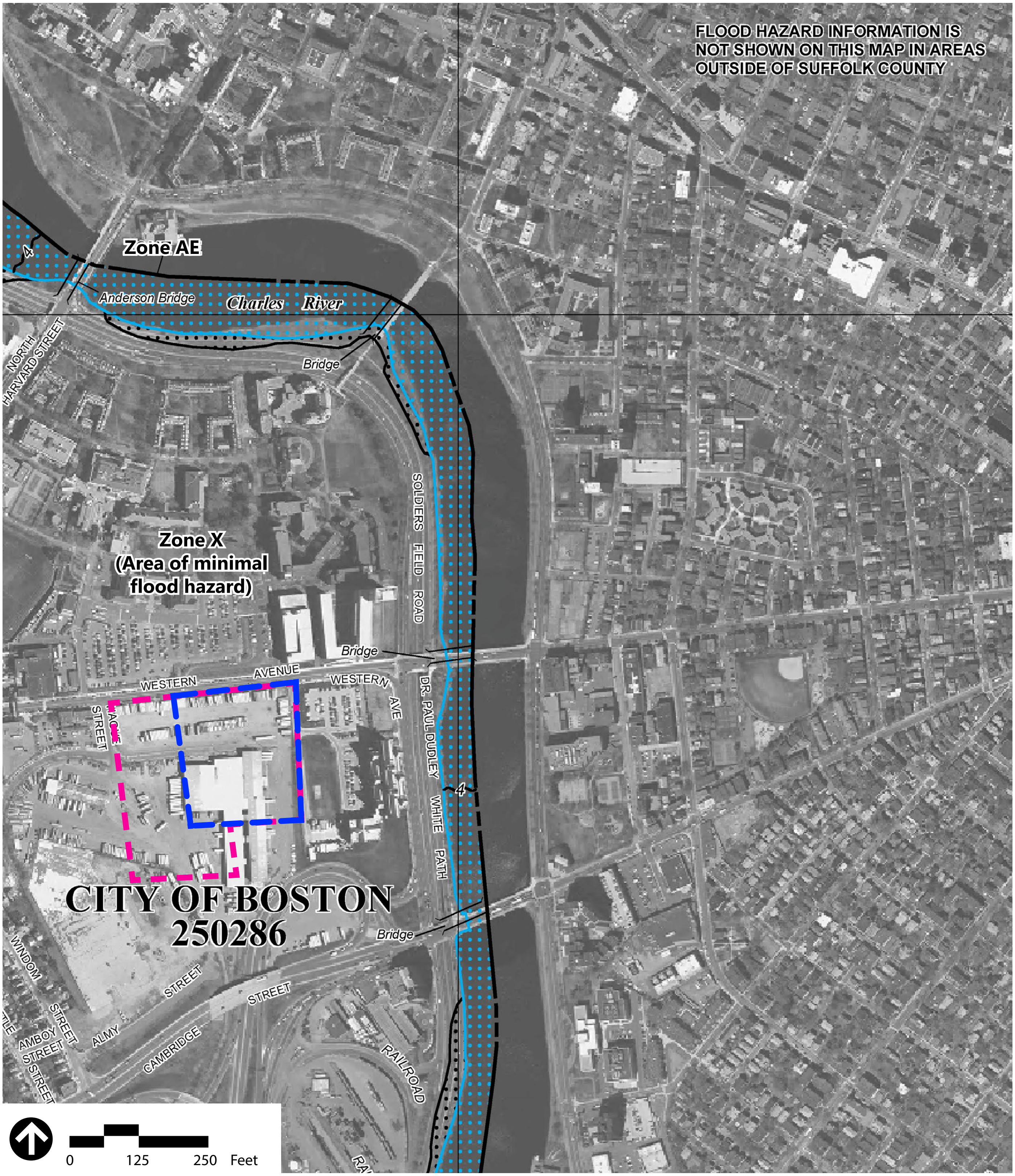

Source: FEMA Flood Insurance Rate Map 25025C0076G, September 2009

- Project Site Boundary
- PDA Area Boundary
- Zone AE: 1% annual chance floodplain boundary
- Zone X: 0.2% annual chance floodplain boundary

Figure 6.1

FEMA Floodplain Map

Enterprise Research Campus Project
Boston, MA

7

Construction Period

This chapter describes construction period impacts due to the Project. Impacts associated with the Proposed Project construction activities are temporary in nature and are typically related to truck traffic, air (dust), noise, stormwater runoff, solid waste, and vibration. The Proponent will develop a detailed Construction Management Plan (CMP) for approval by BTD prior to construction. Each CMP will be developed to reflect the input of the regulatory authorities having jurisdiction over such plans, including the Boston Fire Department and BTD. The CMP will include detailed information on construction activities, specific construction mitigation measures, and vehicle routing, work hours and staging to minimize impact on the surrounding neighborhood and the Turnpike. If any buildings within the Project Site will be occupied before all major construction is completed, the CMP will include provisions to avoid unnecessary impacts on occupied buildings and protect the safety of any employees, residents and visitors at the Project Site.

This chapter includes the following information (with DEIR section references in **bold**):

- Details of the anticipated construction schedule (**Section 7.1**);
- Construction period impacts and proposed mitigation (**Section 7.2**);
- Logistics and public protection **(Section 7.2.1);**
- Subsurface Construction **(Section 7.2.2);**
- Potential impacts during below grade construction **(Section 7.2.3);**
- Mitigation measures during below grade construction **(Section 7.2.4);**
- Discussion on construction vehicle emissions controls (**Section 7.2.5**);
- Discussion on mitigating noise during construction **(Section 7.2.6);**
- Description on Project's generation, handling, recycling and disposal of construction and demolition debris (C&D) and measures to reduce solid waste generation (**Section 7.2.7**);
- Description of measures to manage stormwater during construction (**Section 7.2.8**);
- Description of how rodent control will be managed during the construction period (**Section 7.2.9**); and
- An approach to communication and neighborhood outreach **(Section 7.2.10)**.

7.1 Construction Schedule

There will be five buildings constructed as part of this initial Phase A inclusive of a lab/office building, residential, hotel, and Treehouse Conference Center. The following construction milestones presented in Table 7-1 are expected for this Project and will be refined once a construction manager is hired for the Project. The below dates do not represent commitments on behalf of the Proponent, they are for planning purposes only and are subject to change.

Table 7-1 Phase A Construction Milestones

	Lab	Residential	Hotel	Conference Center
Approximate Start of Construction	First Half 2022	First Half 2022	First Half 2022	First Half 2022
Approximate Completion	2024	2024	2024	2024

7.2 Construction Period Impacts and Mitigation

Deliveries to the site will utilize I-90, Massachusetts Turnpike. Deliveries coming from the west will utilize Exit 131 Cambridge/Allston and follow signs toward Cambridge. They will turn left onto the Soldiers Field Frontage Road and then left onto Western Avenue. They will continue onto Western Avenue and turn left onto Hague Street or Cattle Drive, and then immediately into the construction site. Deliveries coming from the East will utilize Exit 131 Cambridge/Brighton, turn left on to the Soldiers Field Frontage Road and then left onto Western Avenue. They will continue onto Western Avenue and turn left onto Hague Street or Cattle Drive and then immediately into the construction site (see Figure 7.1 for details). Trucks leaving the site via Hague Street will turn right onto Western Avenue and follow the same path to access the Massachusetts Turnpike. No street queuing of trucks or other construction vehicles will be permitted.

As part of the Project, there will be limited contractor parking and construction staging as shown in Figure 7.1. Although the predominant method for materials and equipment delivery will be a 'just in time' delivery system. Staging on local Harvard and neighborhood streets will not be allowed. Impacts to pedestrian and vehicular flow in the area will be minimized and activities will be coordinated with other construction activity in the immediate area.

In an effort to reduce vehicle trips to and from the construction site, construction workers will be encouraged to use non-auto transportation. Recognizing that many workers may choose to drive to the Project Site, the Proponent is committed to providing construction workers parking alternatives and all workers will be prohibited from parking on neighborhood streets. Limited contractor parking will be provided in the Sears lot as shown in Figure 7.1. This parking will be monitored throughout as construction progresses. When the formal CMP plan is submitted to the Boston Transportation Department, crew sizes will be evaluated to verify parking requirements for workers during peak demand.

The construction manager for this Project will administer the CMP and will have the authority to enforce the provisions of the CMP on all contractors, subcontractors, suppliers, and vendors participating in the Project throughout the construction period. The CMP will be an exhibit to construction contracts.

7.2.1 Logistics and Public Protection

As the design progresses, the Proponent will meet with the Boston Transportation Department to evaluate measures, such as barricades, temporary walkways, scaffolding, and signage that can be employed to ensure public safety and protect nearby residents. A temporary construction fence capable of securing the site, complete with gates will be installed and scrim, artwork and signage will be hung from the fence and the fence supported as required. Where appropriate, the Proponent will find opportunities to engage artists, local talent and/or schools to create mural work as part of the temporary fence plan. Additionally, measures will be evaluated and reviewed with the appropriate city agencies to ensure utilities are protected and fire access is maintained. Construction management and scheduling, such as identifying truck and materials delivery routes, and controlling noise, vibration and dust will minimize impacts on the surrounding environment.

Construction period impacts on the local transportation system, including access points, truck routes, and hours of construction and deliveries, will be minimized by coordination with the City of Boston. The main access for the site will be off Hague Street. Overweight and Oversized vehicles, if required, will be permitted with the Massachusetts Department of Transportation (MassDOT) and the Boston Transportation Department. The Project will provide all necessary access for fire apparatus and other emergency vehicles through the work zones and to abutting properties at all times. Boston Fire District 11 will be asked to review any and all access changes as needed, and The Proponent will meet with Boston Fire Department District 11 monthly.

7.2.2 Subsurface Construction

The buildings proposed for Phase A will be supported on either shallow conventional footings or deeper foundations. The underground garage parking slab, beneath all buildings except for the Treehouse Conference Center, is planned to be at approximately 14 feet below future site grades.

The excavation for the garage will be conducted within an engineered lateral support of excavation (“SOE”) system anticipated to be an interlocking steel sheet piling wall. The SOE system will be designed to provide excavation support, limit ground movements outside the excavation to protect adjacent facilities, and to maintain groundwater levels outside the excavation by creating groundwater “cutoff” between the excavation and the surrounding area.

Temporary dewatering will be required during excavation and foundation construction for the site to remove water from the soils to be excavated, as well as to remove precipitation from the site surface. The excavation support wall will prevent withdrawal of groundwater from outside the excavation. In the event that leakage occurs through the sheet pile wall, it will be promptly sealed by the Contractor by grouting or other approved methods.

A temporary construction dewatering permit will be obtained from governing agencies prior to discharge of dewatering effluent from the site. Testing of the effluent will be conducted prior to and during discharge to confirm compliance with all permit requirements.

Excavation for construction of the building foundations, below grade parking structure, utility infrastructure (including but not limited to stormwater storage and recharge systems) and final site improvements is anticipated to generate excess soils that will need to be managed in accordance with applicable regulations. Chemical testing of the material will be undertaken during the design of the Project to define environmental quality and provide data required by appropriate facilities prior to accepting the material. Materials leaving the Project Site will be legally transported in accordance with local, State, and Federal requirements. All work will be conducted in accordance with the Massachusetts Contingency Plan (MCP) and all other MassDEP requirements. Re-use of some materials (pending material composition and geotechnical engineering parameters) is anticipated – particularly as it relates to site grading and achieving site resiliency against future site flooding potential.

7.2.3 Potential Impacts During Below Grade Construction

Potential impacts during excavation and foundation construction include airborne dust generated during site excavation, temporary lowering of area groundwater levels (during construction of the one level subsurface parking structure), ground vibrations, and ground movements outside of the excavation. The foundation design and construction for all the buildings and the garage will be conducted to control and limit potential adverse impacts, especially to the general public, adjacent structures and to groundwater levels.

7.2.4 Mitigation Measures During Below Grade Construction

Mitigation measures will be incorporated into the design and construction of the Project to limit potential adverse impacts to the general public and immediately adjacent areas, including the following:

- The Project team will conduct studies, prepare designs and specifications, and monitor the Contractor's performance for conformance to the Project’s contract documents with specific attention to protecting the general public, nearby structures and facilities, and preventing groundwater lowering.
- Performance criteria will be established in the Project specifications for the foundation installations and lateral excavation support system with respect to ground vibrations, movements, water-tightness and the construction sequence of the below grade portion of the work. The Contractor will be required to plan, employ, and modify as necessary, construction methods and take all necessary steps during the work to protect the general public, nearby structures and utilities.
- On-site field observations documenting the Contractor’s activities in combination with instrumentation that will be installed and monitored before and during the subsurface construction will be utilized to evaluate the Contractor’s methods for limiting dust, noise and vibrations. On-site observations will also be used to assess the performance of the excavation, adjacent structures and utilities, and area groundwater levels. Where

appropriate, survey control points will be established and monitored on the Project Site and in immediately adjacent buildings and utilities during the progress of below grade construction.

7.2.5 Air Quality

The Proponent will require that all contractors abide by best management practices to ensure that their daily activities do not adversely impact the air quality. These may include:

- A proactive approach to utilizing ultra-low sulfur diesel fuels or "biofuels" approved by the original engine manufacturer with sulfur content of 15 ppm or less. All contractor diesel-powered non-road construction equipment with engine horsepower (HP) ratings of 15 HP and above, which is located or used on the Project for a period in excess of 10 working days, shall be retrofitted with Emission Control Devices in order to reduce diesel emissions. In addition, all motor vehicles and construction equipment shall comply with all pertinent local, State and Federal regulations covering exhaust emission controls and safety.
- Locating diesel equipment away from the general public and sensitive receptors (e.g., fresh air intakes, air conditioners and windows); and
- Following necessary guidelines related to turning off diesel combustion engines on construction equipment not in active use, and trucks that are idling while waiting to load or unload material.

Further, the Proponent will mitigate temporary impacts to air quality and ambient dust particulate during construction by ensuring that all trucks are covered when leaving the Project Site, periodically sweeping streets in the vicinity of the Project Site, implementing dust control measures as required throughout construction, and using soil wetting techniques during excavation. The Proponent will adhere to published guidelines from the City of Boston's Environment Department for protecting air quality and preventing dust from construction. Activities that are expected to cause excessive dust or impacts to air quality will be monitored. There are no buildings being demolished as part of this Project, and it is not expected that construction activities will have material impact to air quality.

7.2.6 Noise

The Proponent will conduct all construction operations on-site in accordance with the specifications of the City of Boston Noise Ordinance and will employ measures to limit noise impacts from the construction of the Project.

The Project's typical construction hours will be from 7:00 AM to 6:00 PM, Monday through Friday, which is consistent with the City of Boston requirements. It is expected that no substantial sound generating activity will happen before 7:00 AM. When longer work hours, weekend work or shift work is required, the construction manager will submit a permit request to the City of Boston Inspectional Services, as required. Any notification to abutters will occur during normal business hours, Monday through Friday. The Proponent will comply with the City of Boston Ordinances Title 7 Section 50 "Regulations for Noise Control".

7.2.7 Construction Waste

The Proponent will be entering into a contract with a waste disposal firm that will include detailed requirements for disposal, separation, processing, re-use and recycling. All disposal will be conducted in compliance with all local, State, and Federal regulations, as well as with the Harvard University Disposal Facility List[1] and Harvard Green Building Standards.[2] Any disposal will include specific requirements and procedures for segregation, reprocessing, reuse and recycling of materials whenever possible. Given that this Project will be seeking LEED Gold, the Proponent has established that this Project will generate the least amount of waste practical and that processes that ensure generation of as little waste as possible will be utilized. A waste management plan shall be submitted by the construction manager as part of the LEED certification process and each subcontractor will be responsible for segregating their own waste into different dumpsters as directed by the construction manager. The construction manager will be responsible for ensuring that debris will be disposed of at appropriately designated licensed solid waste disposal facilities as defined by Massachusetts General Laws.

During soils excavation and removal, the Proponent will have a Licensed Site Professional evaluating and monitoring the progress of the Project daily. The Proponent will ensure that waste removal and disposal during construction will be in conformance with the City of Boston and the MassDEP regulations for solid and hazardous waste disposal.

7.2.8 Stormwater Management

Dewatering shall comply with the requirements of Storm Water Pollution Prevention Plan (SWPPP) for the NPDES permit. During construction, the Project shall provide and maintain all temporary erosion and sedimentation control measures required by the Engineer to control soil erosion and water pollution for the project site and to adjacent properties. All erosion control measures shall be established at the beginning of construction and maintained during the entire construction period.

The installation and maintenance of silt fencing, berms, ditches, sedimentation basins, construction exits, fiber mats, catch basin filters, straw, netting, gravel, trenches, mulches, grasses, slope drains, and other approved erosion control devices or methods, needed to protect any areas on or off site in accordance with the SWPPP, will be developed by the Contractor which is required by the EPA or it's locally designated agency.

7.2.9 Rodent Control

The Proponent will comply with the City of Boston guidelines to support efforts in monitoring and inspecting construction sites before, during, and after construction. The Proponent will maintain a service contract with a professional pest control firm during the construction of the Project. Rodent control prior to work start-up will consist of documentation of pre-existing conditions, employing rodent prevention measure along

1 Harvard University Disposal Facility List, 2021. https://www.ehs.harvard.edu/sites/default/files/disposal_facility_list.pdf

2 Harvard Green Building Standards, 2017. https://green.harvard.edu/sites/green.harvard.edu/files/HarvardGreenBuildingStandards2017.pdf

areas throughout the site and a follow up and walkthrough to determine if more measures are needed. The Project Site will be inspected on a regular basis and adjustments will be made to the implementation of service, if needed. The Proponent will comply with MA 780 CMR, Chapter 1, Section 108.6 and MA Sanitary Code 105 CMR, Chapter 1, Section 400.100; Chapter 9, Section 12 and Harvard University's Integrated Pest Management Standard[3].

7.2.10 Communication and Neighborhood Outreach

As part of the Proponent's commitment to our neighbors, there will be a proactive effort to have clear and open communications with the local community. Prior to construction commencing, a point person will be assigned from the Proponent's team to address any Project related issues that may arise. Emergency contacts will be provided and maintained for immediate follow up on emergency situations. The construction manager will be required to install bulletin boards with Project information, including a contact name and number for questions and coordination between the Project and public agencies, residences, institutions, and businesses. The construction manager will maintain the boards with current activity and schedule information. The Proponent will work with the various City departments and City groups to ensure a safe and effective program.

3 Harvard University's Integrated Pest Management Standard, 2018. https://www.ehs.harvard.edu/sites/default/files/harvard_construction_integrated_pest_management_standard_0.pdf

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Source: Scalora Consulting Group

Trucking Access to the Site

Trucking access to the site will be via I-90.

Deliveries coming from the west will use Exit 131 toward Cambridge, take a left onto Soldiers Field Frontage Road, followed by a left onto Western Avenue, and enter the site by taking a left onto Hague Street.

Deliveries coming from the east will use Exit 131 and stay in the right lane toward Brighton/Cambridge. Use the right lane to continue onto Cambridge St. Keep right at the fork and follow signs for Cambridge/Somerville. Use the left lane to merge onto Cambridge St. and then turn left onto Soldiers Field Frontage Road followed by a left onto Western Avenue, and enter the site by taking a left onto Hague Street.

Trucking Exiting the Site

Traffic leaving the site will do so by reversing this route.

No construction traffic will be allowed on the lower portion of Windom Street or on North Harvard Street.

Figure 7.1

Proposed Construction Truck Routes

Enterprise Research Campus Project
Boston, MA

8

Summary of Mitigation Measures/ Draft Section 61 Findings

As required by the ENF Certificate, and in accordance with 301 CMR 11.07(6)(k), this chapter provides:

- A summary of proposed mitigation measures (**Section 8.1**); and
- Draft Section 61 Findings for each State Agency action to be taken on the Project (**Section 8.2**).

8.1 Mitigation Summary and Implementation Plan

The Proponent, as set forth in Table 8-1 below, has made various commitments to implement mitigation measures, to mitigate unavoidable impacts. This section provides a summary of impacts from and mitigation required for implementation of the Project. Table 8-1 summarizes the Proponent's mitigation commitments and implementation schedule.

Table 8-1 Summary of Mitigation Measures

Category and Mitigation Measure	Responsible Party	Estimated Cost	Timing
Phase A			
Phase A Transportation			
The Proponent is in discussions with the MBTA about additional studies as described in Section 3.12.2.3 of Chapter 3, *Transportation*. The Proponent will work with the MBTA to further define the Project's support of these or any alternative studies, and any additional commitments related to implementing the recommended transit priority measures.	Proponent	TBD	Studies to be completed prior to commencement of building construction
Design and construct modifications to intersection approach areas (second lane added to the southbound (SB) Windom Street approach) within public right-of-way areas at the Cambridge Street at Windom Street intersection	Proponent	$250,000 to $300,000	Prior to Completion of Phase A
Design and construct pavement markings and signal modifications to allow eastbound overlap right-turn movement at the Western Avenue at Soldiers Field Road (SFR) intersection; includes restriping of the southbound SFR frontage road travel lanes	Proponent	$300,000 to $350,000	Prior to Completion of Phase A
Western Avenue partial reconstruction between proposed Cattle Drive and East Drive to provide sidewalk-level separated bicycle accommodation, sidewalks, streetscape, lighting, landscape, paving and marking enhancements	Proponent	$1,250,000 to $1,750,000	Prior to Completion of Phase A
Design and construct new intersection at Western Avenue and East Drive/Kresge Way, including traffic signal control system, safe pedestrian and bicyclist crosswalks, and bus stop improvements	Proponent	TBD	Prior to Completion of Phase A
Western Avenue resurfacing, pavement marking and signage upgrades between East Drive and Soldiers Field Road	Proponent	$325,000 to $375,000	Prior to Completion of Phase A
Western Avenue partial reconstruction between Cattle Drive and Batten Way to provide sidewalk level separated bicycle accommodation, sidewalks, streetscape, lighting, landscape, paving and marking enhancements	Proponent	$750,000 to $1,000,000	Prior to Completion of Phase A
Provision of extensive on-site bicycle and pedestrian accommodations and amenities, as described in further detail in Chapter 3, Transportation. Includes the installation of a Bluebikes bikeshare station.	Proponent	TBD	Prior to Completion of Phase A
Membership in Allston-Brighton TMA for Project	Proponent	TBD	Commencing at Certificate of Occupancy for first building
In cooperation with Harvard University, provide access to enhanced transit bus connection to Harvard Square	Proponent	TBD	Prior to Completion of Phase A

Category and Mitigation Measure	Responsible Party	Estimated Cost	Timing
In cooperation with A-B TMA and other neighborhood stakeholders, support planning and implementation of neighborhood transit connector service, open to public use, that connects to regional transit hubs, such as Boston Landing.	Proponent	TBD	Prior to Certificate of Occupancy for first building in Phase B
Implement a Transportation Monitoring Program, as described in further detail in Section 3.12.6 of Chapter 3, *Transportation*	Proponent	TBD	Commencing at Certificate of Occupancy for first building, with monitoring annually for 5 years Post-Occupancy or until first Phase B building is occupied
Implement a comprehensive Transportation Demand Management program, as described in further detail in Section 3.11.4 of Chapter 3, *Transportation*	Proponent	TBD	Commencing at Certificate of Occupancy for first building
Phase A Stormwater Management			
Sizing of stormwater management systems to provide a total of 2.75 inches of storage over the proposed impervious area of the site. (via a combination of roadway green infrastructure, storage tanks, green roofs, chamber systems, and bioswale).	Proponent	$1,500,000 to $3,000,000	Prior to Completion of Phase A
Build Phase A of the Project Greenway (1.4 acres) to reduce overall impervious area, provide extensive stormwater management system, and provide substantial tree canopy on site	Proponent	$19,000,000 Total	Prior to Completion of Phase A construction
Inclusion of interactive bioretention swale/bio classroom in overall design of the Project Greenway for interactive and educational stormwater management solution	Proponent	Part of $19,000,000 Total	Prior to Completion of Phase A construction
Phase A Water and Wastewater			
Fund a 4:1 sewer inflow and infiltration mitigation	Proponent	$750,000 to $1,500,000	Prior to Certificate of Occupancy
Upgrade/expand the Western Avenue water main to 16-inch main	Proponent,	TBD	Prior to Certificate of Occupancy
Reline the 24-inch sewer main in Western Avenue	Proponent	TBD	Prior to Certificate of Occupancy
Exceed a 20 percent annual potable water use reduction for interior water use and sewage conveyance through the use of low-flow/high-efficiency plumbing fixtures	Proponent	TBD	During Design & Construction
Phase A Climate Change/Resiliency			
Design buildings to accommodate HVAC system capacity for more extreme design conditions	Proponent	TBD	During Design & Construction
Utilize energy-efficient HVAC and lighting equipment and systems, and incorporate other potential energy conservation measures, as reasonable and feasible	Proponent	TBD	During Design & Construction

Category and Mitigation Measure	Responsible Party	Estimated Cost	Timing
Reduce urban heat island impacts to the extent feasible by using greenery, trees, green infrastructure, shading structures, and materials with high solar reflectance/albedo	Proponent	Part of $19,000,000 Total	During Design & Construction
Elevate building ground floors and critical equipment and re-grade of the Project Site, which will reduce vulnerability to flooding	Proponent	TBD	During Design & Construction
Include emergency generators for each building	Proponent	$3,000,000 to $4,500,000	During Design & Construction
Phase A Greenhouse Gas Emissions			
Construct and design the Phase A buildings such that the overall estimated energy use reduction for the Project (all buildings proposed at full-build, including parking) is approximately 30 percent compared to the Base Case, which equates to an approximately 19 percent reduction GHG emissions as compared to the Base Case	Proponent	TBD	During Design & Construction
Install 25 percent of spaces with electric vehicle charging and the remaining 75 percent of spaces as EV-Ready spaces in accordance with the requirements of the City's EV policy	Proponent	$250,000 to $500,000	During Design & Construction
Commitment to be Fossil Fuel Neutral by 2026	Proponent	N/A	2026
Commitment to be Fossil Fuel Free by 2050	Proponent	N/A	2050
Implement Phase A TDM Measures identified above to reduce mobile source GHG emissions	Proponent	See above	Prior to Completion of Phase A
Achieve LEEDv4 Core & Shell Gold Level certifiable across the Project	Proponent (in cooperation with Harvard with respect to the Conference Center)	TBD	During Design & Construction
Phase A Construction Impacts			
Develop a detailed Construction Management Plan (CMP) which will include detailed information on construction activities, specific construction mitigation measures, and vehicle routing, work hours and staging to minimize impact on the surrounding neighborhood	Proponent	$75,000 to $150,000	Prior to Commencement of Construction
Divert at least 75 percent of construction debris from landfills	Proponent	TBD	During Construction

Category and Mitigation Measure	Responsible Party	Estimated Cost	Timing
Phase B			
Phase B Transportation			
Design of partial Western Avenue reconstruction between East Drive and SFR to provide additional turn lane queuing, new sidewalk, and modified bicycle accommodations	Proponent	TBD	Design to be undertaken during ERC Phase B Article 80 Permitting (implementation to be coordinated with MassDOT, DCR and City of Boston)
Implement signal timing changes at the Western Avenue at Stadium Road intersection	Proponent	TBD	Prior to opening of Science Dr. extension to Cattle Dr.
In cooperation with Harvard University, provide access to enhanced transit bus connection to Harvard Square	Proponent, Harvard	TBD	Prior to Phase B Occupancy
Support operations of neighborhood transit connector service open to public use connecting to regional transit hubs, such as Boston Landing,	Proponent	TBD	Prior to Phase B Occupancy
Installation of a second Bluebikes bikeshare station, upon recommendation/approval by the City of Boston.	Proponent	TBD	Prior to Completion of Phase B
Implement a Transportation Monitoring Program, as described in further detail in Section 3.12.6 of Chapter 3, *Transportation*	Proponent	TBD	Annually for 5 years Post-Phase B (Full Build) Occupancy/ Operation
Phase B Stormwater Management			
Sizing of stormwater management systems to provide a total of 2.75 inches of storage over the proposed impervious area of the site. (via a combination of roadway green infrastructure, storage tanks, green roofs, chamber systems, and bioswale).	Proponent	$1,000,000 to $2,000,000	Prior to Completion of Phase B
Build Phase B portion of the Project Greenway to reduce overall impervious and provide substantial tree canopy on-site	Proponent	$7,000,000 Total	Prior to Completion of Phase B construction
Phase B Water and Wastewater			
Fund a 4:1 sewer inflow and infiltration mitigation	Proponent	$750,000 to $1,250,000	Prior to Completion of Phase B
Phase B Climate Change/Resiliency			
Design buildings to accommodate HVAC system capacity for more extreme design conditions	Proponent	TBD	During Design & Construction
Utilize energy-efficient HVAC and lighting equipment and systems, and incorporate other potential energy conservation measures, as reasonable and feasible	Proponent	TBD	During Design & Construction
Reduce urban heat island impacts to the extent feasible by using greenery, trees, green infrastructure, shading	Proponent	Part of $7,000,000 Total	During Design & Construction

Category and Mitigation Measure	Responsible Party	Estimated Cost	Timing
structures, and materials with high solar reflectance/albedo			
Elevate building ground floors and critical equipment and re-grade of the Project Site, which will reduce vulnerability to flooding	Proponent	TBD	During Design & Construction
Include emergency generators for each building	Proponent	$2,500,000-$3,500,000	During Design & Construction
Phase B Greenhouse Gas Emissions			
Construct and design the Phase B buildings such that the overall estimated energy use reduction for the Project (all buildings proposed at full-build, including parking) is approximately 30 percent compared to the Base Case, which equates to an approximately 19 percent reduction GHG emissions as compared to the Base Case	Proponent	TBD	During Design & Construction of Phase B
Install 25 percent of spaces with electric vehicle charging and the remaining 75 percent of spaces as EV-Ready spaces in accordance with the requirements of the City's EV policy	Proponent	$500,000 to $1,500,000	During Design & Construction
Commitment to be Fossil Fuel Neutral by 2026	Proponent	N/A	2026
Commitment to be Fossil Fuel Free by 2050	Proponent	N/A	2050
Achieve LEEDv4 Core & Shell Gold Level certifiable across the Project	Proponent	TBD	During Design & Construction
Implement Phase B TDM Measures identified above to reduce mobile source GHG emissions	Proponent	See above	During Design & Construction B
Phase B Construction Impacts			
Develop a detailed Construction Management Plan (CMP) which will include detailed information on construction activities, specific construction mitigation measures, and vehicle routing, work hours and staging to minimize impact on the surrounding neighborhood	Proponent	$75,000 to $150,000	Prior to Construction
Divert at least 75 percent of construction debris from landfills	Proponent	TBD	Construction

8.2 Draft Section 61 Findings

8.2.1 DCR Construction and Access Permit

D R A F T O N L Y

August 2, 2021

Massachusetts Department of Conservation and Recreation (DCR)
Commissioner Jim Montgomery
251 Causeway Street, 9th Floor
Boston, MA 02114

Re: EEA No. 16320 – Enterprise Research Campus, Allston, Massachusetts

In connection with the development of the ERC in Allston (the "Project Site"), the Petitioner intends to fund the design and construction of certain off-Site improvements within DCR-controlled rights of way. The Project is planned to be built in two phases, known as Phase A and Phase B. Phase A is expected to include approximately 900,000 square feet of development and Phase B is expected to include an additional approximately 1,040,000 square feet of development, for a combined full build of approximately 1,940,000 square feet of development. The Project is planned to consist of a mix of uses, including residential, office, research and development, hotel, retail, and restaurant land uses, and is planned to be supported by approximately 620 parking spaces under Phase A and approximately 1,280 parking spaces as part of the Full Build.

To support the proposed development, several off-Site mitigation measures are proposed. The following proposed improvements will impact roadways under the control of DCR.

Western Avenue at Soldiers Field Road Improvements

Western Avenue at Solders Field Road serves as the gateway intersection for vehicles entering and exiting the Site from the west. Specifically, the Western Avenue eastbound right-turn movement onto Soldiers Field Road is a key movement to accommodate vehicles exiting the Site heading for I-90, Soldiers Field Road eastbound, or the River Street Bridge. Improvements at this intersection are intended to improve operations for this right-turn movement without negatively impacting the proposed pedestrian and bicycle improvements that will be in place under the No Build Conditions.

Specifically, the Proponent is proposing the following improvements at this location:

- Modification of signal phasing to allow the eastbound right-turn movement to have a green light concurrently with the southbound through movement
- Restriping of Soldiers Field Road frontage road south of the intersection to accommodate eastbound right-turning traffic and southbound through traffic at the same time with the eastbound right-turning traffic joining the Soldiers Field Road frontage road with two designated lanes merging down to one lane after the traffic signal

- Pavement milling and overlay of Soldiers Field Road frontage road from Western Avenue to approximately midpoint of Resilience (formerly Sanofi) building
- New regulatory signage and pavement markings

A graphic of the proposed improvements is provided in Figure 3.45.

Bus Transit Priority at Intersections

The Proponent is proposing to fund the study of transit priority measures, at five intersections, the following four of which are under the jurisdiction of DCR:

- Cambridge Street at Soldiers Field Road
- Memorial Drive at River Street
- Memorial Drive at Western Avenue
- Western Avenue at Soldiers Field Road

The traffic analysis of the four "quad" intersections is intended to evaluate the existing coordination, signal timing, and intersection configuration, for changes (including transit signal priority) that are expected to reduce delays for MBTA buses (namely, Route 70 and Route 64). The Proponent will also study the feasibility of a transit bus queue jump lane on the Soldiers Field Frontage Road southbound approach to Cambridge Street.

Based on the results of the studies referenced above, the Proponent will define specific commitments related to implementing the recommended transit priority measures. These commitments will be developed in conjunction with DCR, and its partner agencies, MassDOT, MBTA, and the City of Boston.

Section 61 Findings

DCR finds that with the implementation of the mitigation measures described herein, all feasible means and measures will have been taken to avoid or minimize adverse impacts to the environment relating to construction and operation of the proposed improvement project. Appropriate conditions will be included in the permits issued for the Project to ensure implementation of the transportation mitigation measures.

Agency: Department of Conservation and Recreation

By: ______________________________________

Signed Name of Representing Authority

____

Printed Name of Representing Authority

Date: ____________________

8.2.2 MassDEP Sewer Extension and Connection Permit

D R A F T O N L Y

Findings Pursuant to

MGL Chapter 30, Section 61

PROJECT NAME: Enterprise Research Campus Project

PROJECT LOCATION: Boston

PROJECT PROPONENT: Tishman Speyer ERC Developer, LLC

EEA NUMBER: 16320

Each agency of the Commonwealth that is taking an Agency Action (e.g., issuing a permit) must make a finding, pursuant to MGL Chapter 30, Section 61, that all feasible measures have been taken by the Proponent to avoid damage to the environment or, to the extent damage to the environment cannot be avoided, to minimize and mitigate damage to the environment to the maximum extent practicable. These Section 61 Findings specify the entity responsible for funding and implementing any such mitigation measures, and the anticipated mitigation implementation schedule.

The proposed mitigation measures for the Enterprise Research Campus Project are described in the Draft Environmental Impact Report ("DEIR"), which was filed in August 2021. The following sections provide a summary of possible sewer discharges expected as a result of the Project. The proposed impact avoidance, minimization and mitigation measures are the basis upon which Section 61 Findings may be made by the MassDEP. All impact minimization measures and mitigation measures outlined herein will be funded or implemented by the Tishman Speyer ERC Developer, LLC, its Agents, Representatives and/or Contractors.

Project Description

The Project consists of the redevelopment of the 14-acre Site in Boston from a vacant lot current used as staging and storage for active construction projects into approximately 1.94 million square feet (sf) of mix of uses as described in the DEIR (including residential, retail, hotel, laboratory, and conference center), connected and supported by new publicly-accessible roadways, open space, neighborhood retail, and civic spaces. The development of the Enterprise Research Campus Project provides a unique opportunity to create an engaging open space system, create additional housing, spur economic development, and improve connections between several adjoining neighborhoods.

History of MEPA Review

The Proponent prepared and submitted, pursuant to M.G.L. c. 30, § 61 and 62A-H of

MEPA and its implementing regulations (301 CMR 11.00), an Environmental Notification Form (ENF) in February 2021. On March 12, 2021, the Secretary of Energy and Environmental Affairs (the "Secretary") issued a Certificate on the ENF. The Proponent filed a DEIR in August

2021, which responded to the DEIR Scope of the ENF Certificate. A Final Environmental Impact Report (FEIR) is forthcoming.

Permit Requirements

The Project will require a MassDEP Sewer System Extension and Connection Permit for the anticipated industrial lab waste per 314 CMR 7.000, expected from the lab buildings. Lab waste will be directed to the adjacent BWSC and MWRA sewer systems in the adjacent roadways.

Project Impacts

Once the lab users have been identified for the proposed buildings in Phases A and B, the anticipate industrial uses will be confirmed and more specific lab waste flows will be quantified for the MassDEP Sewer Extension and Connection Permit.

Mitigation Measures

Proposed work will comply with MassDEP Sewer Connection and Extension permit requirements for industrial waste users. The Project will be designed to meet BWSC and MWRA design requirements and to minimize impact to the BWSC and MWRA sewer systems. Proposed work will comply with MassDEP, BWSC, and MWRA standard and special permit terms and conditions, including:

- Coordination with the Agency to identify the applicable lab waste of concern to the MassDEP in accordance with 314 CMR 7.000.
- Opportunity for MassDEP to review and approve of proposed work as necessary.
- Written approval by MassDEP for changes in work scope.

Section 61 Findings

The potential environmental impacts of the Project and associated improvements of the Enterprise Research Campus Project quantified in the DEIR are incorporated by reference into this Section 61 Finding. Throughout the planning and environmental review processes, which have included coordination with MassDEP, the Proponent has developed measures to mitigate impacts of the Project. With the mitigation proposed and carried out in cooperation with state agencies, MassDEP finds that there are no significant unmitigated impacts.

For the reasons stated above, MassDEP hereby finds that pursuant to MGL c. 30, § 61, the construction of the Project as described above, and with the implementation by the Proponent of the noted mitigation measures, all practicable means and measures will be taken to avoid or minimize adverse environmental impacts related to the Project.

Agency: ______________________________

Commissioner: ______________________________

Date: ______________________________

8.2.3 MWRA 8(m) Permit

D R A F T O N L Y

Findings Pursuant to

MGL Chapter 30, Section 61

PROJECT NAME: Enterprise Research Campus Project

PROJECT LOCATION: Boston

PROJECT PROPONENT: Tishman Speyer ERC Developer, LLC

EEA NUMBER: 16320

Each agency of the Commonwealth that is taking an Agency Action (e.g., issuing a permit) must make a finding, pursuant to MGL Chapter 30, Section 61, that all feasible measures have been taken by the Proponent to avoid damage to the environment or, to the extent damage to the environment cannot be avoided, to minimize and mitigate damage to the environment to the maximum extent practicable. These Section 61 Findings specify the entity responsible for funding and implementing any such mitigation measures, and the anticipated mitigation implementation schedule.

The proposed mitigation measures for the Enterprise Research Campus Project are described in the Draft Environmental Impact Report ("DEIR"), which was filed in August 2021. The following sections provide a summary of possible impacts to the MWRA water and sewer systems resulting from construction of the Project and supporting infrastructure. The proposed impact avoidance, minimization and mitigation measures are the basis upon which Section 61 Findings may be made by the Massachusetts Water Resources Authority ("MWRA"). All impact minimization measures and mitigation measures outlined herein will be funded or implemented by the Tishman Speyer ERC Developer, LLC, , its Agents, Representatives and/or Contractors.

Project Description

The Project consists of the redevelopment of the approximately 14-acre Site in Boston from a vacant lot currently used as staging and storage for active construction projects into approximately 1.94 -million square feet (sf) of mix of uses as described in the DEIR (including residential, retail, hotel, laboratory, and conference center), connected and supported by new publicly-accessible roadways, open space, neighborhood retail, and civic spaces. The development of the Enterprise Research Campus Project provides a unique opportunity to create an engaging open space system, create additional housing, spur economic development, and improve connections between several adjoining neighborhoods.

History of MEPA Review

The Proponent prepared and submitted, pursuant to M.G.L. c. 30, § 61 and 62A-H of MEPA and its implementing regulations (301 CMR 11.00), an Environmental Notification Form (ENF) in February 2021. On March 12, 2021, the Secretary of Energy and Environmental Affairs (the "Secretary") issued a Certificate on the ENF. The Proponent filed a DEIR in August 2021, which responded to the DEIR Scope of the ENF Certificate. A Final Environmental Impact Report (FEIR) is forthcoming.

Permit Requirements

The MWRA's deep water tunnel runs through the southeast corner of the site and the construction of the proposed buildings will require an 8(m) permit. The MWRA 25-foot wide MWRA South Charles Relief Sewer Easement runs through the south west portion of the site. The proposed utilities crossing (if necessary) this sewer easement and proposed Phase B building's proximity to the sewer easement will require an 8(m) permit. There is also a 12-inch MWRA storm drain main in the Western Avenue sidewalk adjacent to the site. Proposed utility connections crossing the drain line and the proximity of the proposed Phase A building will require an 8(m) permit.

It is anticipated that an 8M permit(s) will be required from MWRA pursuant to Section 8(m) of chapter 372 of the Acts of 1984. Specifically, site improvements including water and sewer, other utilities, roadways and buildings are proposed in the vicinity of the MWRA systems.

Project Impacts

The Project will be designed and constructed to incorporate measures to minimize impact to the MWRA systems to the extent practicable. The following components of the Project may take place in sufficient proximity to the MWRA systems so as to require an 8M permit:

› Phase A and B buildings are anticipated to be constructed over the MWRA deep water tunnel.
› Phase B buildings and utility connections will be installed in the vicinity of the MWRA 25-ft wide MWRA South Charles Relief Sewer Easement through the southwest portion of the Site. Proposed Cattle Drive roadway and associated utility infrastructure will be installed over the MWRA South Charles Relief Sewer and the planned 12-inch sewer main in Cattle Drive will connect to it.
› New Phase A and Phase B utility connections and sidewalk improvements are anticipated to be constructed in the Western Avenue sidewalk and will cross the12-inch MWRA drain line.

Mitigation Measures

Proposed work will comply with MWRA standard and special permit terms and conditions, including:

› Coordination with the Agency to ensure no interference with the MWRA's activities or operations on the applicable land.

- Opportunity for MWRA review and approval of proposed work as MWRA deems necessary.
- Written approval by MWRA for changes in work scope.
- No blasting, drilling or other activity that could affect the integrity or operability of MWRA's property without prior written approval.
- Removal, at Proponent's expense, of conduits and/or appurtenances installed pursuant to the 8M permit, if necessary for the operation, maintenance or replacement of MWRA infrastructure.
- Conducting design, construction and excavation in accordance with all federal, state and local safety regulations including but not limited to federal OSHA regulations (29 CFR 1926) and Massachusetts Department of Public Safety regulations (520 CMR 14.00).
- Incorporation of appropriate sheeting and shoring measures during construction to protect the integrity of MWRA's water and sewer mains, with the associated design, stamped by a Massachusetts licensed Professional Engineer, submitted to MWRA prior to the start of construction.
- Adjust MWRA frames and covers to grade within limits of work. It is anticipated that construction of the Project will commence in 2022 and extend for 5-10 years. The development, including infrastructure components, is anticipated to be executed in phases. 8M permit(s) will be submitted as applicable phases advance.

Section 61 Findings

The potential environmental impacts of the Project and associated improvements of the Enterprise Research Campus Project quantified in the DEIR are incorporated by reference into this Section 61 Finding. Throughout the planning and environmental review processes, which have included coordination with MWRA, the Proponent has developed measures to mitigate impacts of the Project. With the mitigation proposed and carried out in cooperation with state agencies, MWRA finds that there are no significant unmitigated impacts.

For the reasons stated above, MWRA hereby finds that pursuant to MGL c. 30, § 61, the construction of the Project as described above, and with the implementation by the Proponent of the noted mitigation measures, all practicable means and measures will be taken to avoid or minimize adverse environmental impacts related to the Project.

Agency: ____

Commissioner: ____

Date: ____

8.2.4 Sewer Use Discharge Permits

D R A F T O N L Y

Findings Pursuant to

MGL Chapter 30, Section 61

PROJECT NAME: Enterprise Research Campus Project

PROJECT LOCATION: Boston

PROJECT PROPONENT: Tishman Speyer ERC Developer, LLC

EEA NUMBER: 16320

Each agency of the Commonwealth that is taking an Agency Action (e.g., issuing a permit) must make a finding, pursuant to MGL Chapter 30, Section 61, that all feasible measures have been taken by the Proponent to avoid damage to the environment or, to the extent damage to the environment cannot be avoided, to minimize and mitigate damage to the environment to the maximum extent practicable. These Section 61 Findings specify the entity responsible for funding and implementing any such mitigation measures, and the anticipated mitigation implementation schedule.

The proposed mitigation measures for the Enterprise Research Campus Project are described in the Draft Environmental Impact Report ("DEIR"), which was filed in August 2021. The following sections provide a summary of possible sewer discharges expected as a result of the Project. The proposed impact avoidance, minimization and mitigation measures are the basis upon which Section 61 Findings may be made by the MWRA. All impact minimization measures and mitigation measures outlined herein will be funded or implemented by the Tishman Speyer ERC Developer, LLC, , its Agents, Representatives and/or Contractors.

Project Description

The Project consists of the redevelopment of the approximately 14-acre Site in Boston from a vacant lot current used as staging and storage for active construction projects into approximately 1.94 million square feet (sf) of mix of uses as described in the DEIR (including residential, retail, hotel, laboratory, and conference center), connected and supported by new publicly-accessible roadways, open space, neighborhood retail, and civic spaces. The development of the Enterprise Research Campus Project provides a unique opportunity to create an engaging open space system, create additional housing, spur economic development, and improve connections between several adjoining neighborhoods.

History of MEPA Review

The Proponent prepared and submitted, pursuant to M.G.L. c. 30, § 61 and 62A-H of MEPA and its implementing regulations (301 CMR 11.00), an Environmental Notification Form (ENF) in February 2021. On March 12, 2021, the Secretary of Energy and Environmental Affairs (the "Secretary") issued a Certificate on the ENF. The Proponent filed a DEIR in August

2021, which responded to the DEIR Scope of the ENF Certificate. A Final Environmental Impact Report (FEIR) is forthcoming.

Permit Requirements

A MWRA Sewer Use Discharge Permit may be required for specific building use discharges, to be applied for by the future tenant(s), once identified.

Project Impacts

Once the lab users and specific building use discharges have been identified for the proposed buildings in Phases A and B, the specific lab waste flows will be quantified, and the tenants will apply for MWRA Sewer Use Discharge Permits.

Mitigation Measures

Proposed work will comply with MWRA Sewer Use Discharge Permit requirements for industrial wastes expected from the Project. The Project will be designed to meet BWSC and MWRA design requirements and to minimize impact to the BWSC and MWRA sewer systems. Proposed work will comply with MassDEP, BWSC, and MWRA standard and special permit terms and conditions, including:

- Coordination with the MWRA to identify the applicable lab waste of concern.
- Provide information on the product/service producing the waste, plant operational characteristics, waste usage, sanitary sewer connection and discharge quantity information, batch intermittent and seasonal discharges, wastewater pretreatment, wastewater process changes, non-discharges waste, characteristics of discharge, and any other information relevant to the specific lab users;
- Opportunity for MWRA to review and approve of proposed work as necessary.
- Written approval by MWRA for changes in work scope.

Section 61 Findings

The potential environmental impacts of the Project and associated improvements of the Enterprise Research Campus Project quantified in the DEIR are incorporated by reference into this Section 61 Finding. Throughout the planning and environmental review processes, which have included coordination with MWRA, the Proponent has developed measures to mitigate impacts of the Project. With the mitigation proposed and carried out in cooperation with state agencies, MWRA finds that there are no significant unmitigated impacts.
For the reasons stated above, MWRA hereby finds that pursuant to MGL c. 30, § 61, the construction of the Project as described above, and with the implementation by the Proponent of the noted mitigation measures, all practicable means and measures will be taken to avoid or minimize adverse environmental impacts related to the Project.

Agency: ______________________________

Commissioner: ______________________________

Date: ______________________________

8.2.5 Construction Site Dewatering Discharge Permit

D R A F T   O N L Y

Findings Pursuant to

MGL Chapter 30, Section 61

PROJECT NAME: Enterprise Research Campus Project

PROJECT LOCATION: Boston

PROJECT PROPONENT: Tishman Speyer ERC Developer, LLC

EEA NUMBER: 16320

Each agency of the Commonwealth that is taking an Agency Action (e.g., issuing a permit) must make a finding, pursuant to MGL Chapter 30, Section 61, that all feasible measures have been taken by the Proponent to avoid damage to the environment or, to the extent damage to the environment cannot be avoided, to minimize and mitigate damage to the environment to the maximum extent practicable. These Section 61 Findings specify the entity responsible for funding and implementing any such mitigation measures, and the anticipated mitigation implementation schedule.

The proposed mitigation measures for the Enterprise Research Campus Project are described in the Draft Environmental Impact Report ("DEIR"), which was filed in August 2021. The following sections provide a summary of possible dewatering required for the Project. The proposed impact avoidance, minimization and mitigation measures are the basis upon which Section 61 Findings may be made by the MWRA. All impact minimization measures and mitigation measures outlined herein will be funded or implemented by the Tishman Speyer ERC Developer, LLC, its Agents, Representatives and/or Contractors.

Project Description

The Project consists of the redevelopment of the approximately 14-acre Site in Boston from a vacant lot current used as staging and storage for active construction projects into approximately 1.94 million square feet (sf) of mix of uses as described in the DEIR (including residential, retail, hotel, laboratory, and conference center), connected and supported by new publicly-accessible roadways, open space, neighborhood retail, and civic spaces). The development of the Enterprise Research Campus Project provides a unique opportunity to create an engaging open space system, create additional housing, spur economic development, and improve connections between several adjoining neighborhoods.

History of MEPA Review

The Proponent prepared and submitted, pursuant to M.G.L. c. 30, § 61 and 62A-H of MEPA and its implementing regulations (301 CMR 11.00), an Environmental Notification Form (ENF) in February 2021. On March 12, 2021, the Secretary of Energy and Environmental Affairs (the "Secretary") issued a Certificate on the ENF. The Proponent filed a DEIR in August 2021, which responded to the DEIR Scope of the ENF Certificate. A Final Environmental Impact Report (FEIR) is forthcoming.

Permit Requirements

The discharge of dewatering drainage to a sanitary sewer is prohibited by the Boston Water and Sewer Commission and the MWRA. Construction phase dewatering will discharge to the storm drainage system. The Project will obtain a Drainage Discharge Permit from the Boston Water and Sewer Commission for discharge of any dewatering drainage to the storm drainage system as required. If the dewatering drainage is contaminated, the Proponent will be required to obtain a Remediation General Permit from the EPA for the discharge.

When construction of the Project is completed, the proposed building garage will have a sub-slab pressure relief dewatering system for collection of groundwater seepage below the combined garage slab, with an approximate seepage rate of 10-30 gallons per minutes (steady state). The sub-slab relief system will connect to the Site's drainage system, to be permitted through the BWSC Site Plan Review process.

Project Impacts

An MWRA Construction Dewatering Discharge Permit is not required as dewatering will be directed to the BWSC storm drain system. If it is determined that dewatering must be directed to MWRA's system, the Proponent will apply for a MWRA Construction Dewatering Discharge Permit.

Mitigation Measures

Proposed work will comply with MWRA Construction Dewatering Discharge Permit requirements, as applicable. The Project does not expect to connect directly to an MWRA storm drain system.

Section 61 Findings

The potential environmental impacts of the Project and associated improvements of the Enterprise Research Campus Project quantified in the DEIR are incorporated by reference into this Section 61 Finding. Throughout the planning and environmental review processes, which have included coordination with MWRA, the Proponent has developed measures to mitigate impacts of the Project. With the mitigation proposed and carried out in cooperation with state agencies, MWRA finds that there are no significant unmitigated impacts.

For the reasons stated above, MWRA hereby finds that pursuant to MGL c. 30, § 61, the construction of the Project as described above, and with the implementation by the Proponent of the noted mitigation measures, all practicable means and measures will be taken to avoid or minimize adverse environmental impacts related to the Project.

Agency: ____

Commissioner: ___________________________________

Date: ____

9

Response to ENF Comments

This chapter includes responses to the ENF Certificate issued March 12, 2021. Copies of the ENF Certificate and each comment letter received during the public review period of the ENF are included in Appendix D. The ENF Certificate is assigned a letter and all other comment letters are assigned a number, as listed below in Table 9-1 below. Each individual comment is assigned a comment code that corresponds to the comment delineations on the Certificate and each comment letter for reference. The responses provided herein aim to refer to specific sections of the DEIR for further information, where appropriate.

Table 9-1 List of ENF Comment Letters

Letter No.	Commenter	Affiliation	Date Received
ENF Comments			
C	Secretary Kathleen A. Theoharides	Executive Office of Energy and Environmental Affairs/MEPA Office	March 12, 2021
1	J. Lionel Lucien	Massachusetts Department of Transportation	March 02, 2021
2	Jim Montgomery	Massachusetts Department of Conservation and Recreation	March 02, 2021
3	Paul F. Ormond	Massachusetts Department of Energy Resources	March 08, 2021
4	Beth Card	Massachusetts Water Resources Authority	March 02, 2021
5	John P. Sullivan	Boston Water and Sewer Commission	February 22, 2021
6	Janet Moonan	Charles River Watershed Association	March 02, 2021
7	Anna Leslie	Allston Brighton Health Collaborative	March 02, 2021
8	Paula Alexander	Resident	March 02, 2021
9	Barbara Parmenter	Resident	March 02, 2021
10	Audrey Berry	Resident	February 21, 2021

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9.1 ENF Certificate

Comment C.1

The DEIR should include updated site plans for existing and post-development conditions at a legible scale and a detailed description of all project components.

Response

Chapter 1, *Project Description,* outlines the entire project and provides detailed project descriptions. Refer to Figure 1.4 in Chapter 1 for reference to updated, proposed conditions plan with project and use descriptions.

Comment C.2

It should identify any changes since the filing of the ENF.

Response

In response to the thoughtful and constructive comments received, the Proponent worked to improve and enhance the public benefits for the project and continue to develop project plans. Refer to Section 1.3 of Chapter 1, *Project Description,* for an update on improvements to the project

Comment C.3

Conceptual plans should be provided at a legible scale and clearly identify buildings, public areas, open space, impervious areas, pedestrian and bicycle accommodations, roadways, and stormwater and utility infrastructure.

Response

Conceptual plans showing key project features are in the figures associated with each chapter. Please refer to Figures 1.4 in Chapter 1, *Project Description,* for conceptual site plans for the project. Please refer to Figures 4.1 through 4.3 in Chapter 4, *Stormwater*, for further review of existing and proposed stormwater utilities and green infrastructure.

Comment C.4

It should provide a detailed description and plans of the Greenway and other public open space, including the area of open space to be provided in each phase, design of the surface treatment of the open space and measures to promote public use of and access to open space areas.

Response

Conceptual plans showing key project features, like the Project Greenway and public open space, are in the figures associated with each chapter. See figures 1.6 and 4.3-4.4 and see

Section 1.4.3 in Chapter 1, *Project Description,* for reference to a detailed description and related project plans.

Comment C.5

The DEIR should describe potential long-term development of open space and pathways in the vicinity of the site and how the project will be designed to support public access throughout the area.

Response

Review of the long-term impact and overall approach to open space is located in Chapter 1, *Project Description*. Refer to Section 1.4.3 in Chapter 1 for reference to open space and pathways and public access through the site.

Comment C.6

The DEIR should identify and describe State, federal and local permitting and review requirements associated with the project, provide an update on the status of each of these pending actions, analyze applicable statutory and regulatory standards and requirements, and provide a discussion of the project's consistency with those standards.

Response

A list of anticipated regulatory controls is outlined in Chapter 1, *Project Description*. Refer to Section 1.5 in Chapter 1 for a list of State, federal, and local permitting and review requirements and their status.

Comment C.7

The DEIR should identify all components in Phase A and Phase B, including on-site and off-site roadways, provide a project phasing schedule and describe environmental impacts and mitigation measures to be implemented in each phase, including open space.

Response

The DEIR identifies components to the project, including review of project phasing, roadways, environmental impacts, mitigation measures and open space. The roadway network and reference to roadway improvements, including roadways both within and outside of the PDA area, are reviewed in Sections 3.5.1 and 3.6.2 in Chapter 3, *Transportation*. The open space description in Section 1.4.3 in Chapter 1, *Project Description,* reviews the overall approach to open space. Mitigation measures are discussed in Chapter 8, *Summary of Mitigation Measures/Draft Section 61 Findings*. Refer to Section 1.4.8 of Chapter 1 for further details regarding the Project phasing.

Comment C.8

As the full extent of these roadways and this project are part of a common plan in accordance with 301 CMR 11.01(2)(c), the DEIR should describe and include plans of all on-site and off-site roadways and infrastructure to be improved and/or constructed in connection with the project, address the timing of the design and construction of these facilities and identify impacts and mitigation measures associated with the construction and operation of these roadways and infrastructure.

Response

Review of all planned roadway improvements to be constructed in connection to the project, including roadways within and outside of the PDA area, are outlined in Sections 3.5.1 and 3.6.2 of Chapter 3, *Transportation.* Figures 3.2-3.5 in Chapter 3 reference plans regarding on- and off-site roadways and infrastructure.

Comment C.9

In anticipation of these pending requirements, I encourage the Proponent to develop a plan for outreach to the EJ population in Allston which addresses the following (as appropriate):

- *Notification of public meetings and/or filings of the DEIR and permit applications at nontraditional information repositories, such as houses of worship, community centers, community web sites, environmental and community justice organizations, as well as traditional repositories, including libraries and government offices;*

Response

See Section 1.1.1 in Chapter 1, *Project Description*, for the Environmental Justice Plan.

Comment C.10

- *Use of alternative and/or community-specific media outlets to provide public notice, including local public broadcasting stations, social media, and community newspapers;*

Response

See Section 1.1.1 of Chapter 1, Project Description for further detail on the Proponent's efforts to address Environmental Justice concerns and reach out to the community.

Comment C.11

- *Engaging EJ organizations and other community-based organizations directly for assistance in outreach efforts;*

Response

See Section 1.1.1 of Chapter 1, Project Description for further detail on the Proponent's efforts to address Environmental Justice concerns and reach out to the community.

Comment C.12

- *Public education efforts regarding the technical aspects of the project, such as fact sheets with visuals that include a summary of the project and associated technologies and processes along with a description of potential impacts of similar facilities, using layperson language and terms in an effort to ensure the community understands the potential impacts of the project and can provide meaningful input;*

Response

See Section 1.1.1 of Chapter 1, Project Description, for further detail on the Proponent's efforts to address Environmental Justice concerns and reach out to the community. Fact sheets, including visuals, are being, and will continue to be, utilized in the Proponent's outreach efforts. The fact sheets have been translated into the three threshold languages, Simplified Chinese, Brazilian Portuguese, and Spanish, as well as two additional language, Korean and Russian, in response to community comment. At all community meetings the Proponent and its consultants have sought to present the Project and its impacts in clear and understandable language and to answer all questions asked by members of the public.

Comment C.13

- *Scheduling public meetings at locations and times convenient for neighborhood stakeholders, and in consideration of public transportation availability; and*

Response

In collaboration with the BPDA, public meetings have been scheduled in the evenings, online, which eliminates the need for transportation to attend meetings. In addition, all meetings, videos, and public meeting information is posted online.

Comment C.14

- *Establishing a local information repository that is convenient and accessible for the EJ Population, as well as providing such information on-line.*

Response

The DEIR will be available in the Honan Allston Library. The Proponent will inform the public at all community meetings that the DEIR is available and will provide a copy in response to all requests, both physically and online.

Comment C.15

The Proponent should utilize collaborative approaches to communicating with the public about the project, including public deliberation and consensus-building where appropriate, to address public concerns.

Response

See Section 1.1.1 of Chapter 1, Project Description for further detail on the Proponent's efforts to address Environmental Justice concerns and reach out to the community.

Comment C.16

I encourage the Proponent to commence implementation of the outreach plan prior to filing the DEIR. The DEIR should report on outreach efforts undertaken prior to the filing of the DEIR and propose further steps that could be taken during various stages of MEPA review, such as a public meeting to be held during the DEIR comment period.

Response

See Section 1.1.1 of Chapter 1, Project Description for the Proponent's current outreach plan, which will be further supplemented as outreach efforts proceed. The Proponent has conducted several public meetings in the weeks preceding the DEIR filing and will continue to do so during the comment period.

Comment C.17

I encourage the Proponent to request an extended comment period for the DEIR to provide additional time for public review of the project.

Response

The Proponent has requested a two-week extension of the DEIR comment period to provide the public additional time to comment on the Project and to aid the effort to reach the EJ populations.

Comment C.18

The Proponent should consult with the MEPA Office prior to filing the DEIR regarding its public outreach plan and potential analyses of cumulative environmental and public health impacts.

Response

Prior to filing this DEIR, the Proponent held a meeting with the MEPA Office and EEA Director of Environmental Justice during which these topics were discussed. The Proponent will continue to coordinate directly with the MEPA Office on these topics.

Comment C.19

The DEIR should include an expanded alternatives analysis that includes, at a minimum, an evaluation of an alternative design with a reduced building footprint and increased pervious area.

Response

Review of alternatives analysis is provided in Chapter 2, *Alternatives Analysis*, and, specifically, Section 2.1 analyzes the Reduced Building Footprint Alternative.

Comment C.20

For each alternative, the DEIR should provide a conceptual plan and quantify environmental impacts.

Response

Environmental impacts were taken into consideration during the review. Please refer to Section 2.2 in Chapter 2, *Alternatives Analysis*, and Figures 2.1 and 2.2 for a comparison of impacts under each alternative.

Comment C.21

It should compare the alternatives with respect to their impacts on traffic, public open space, water use, wastewater generation, impervious area, and stormwater management.

Response

See response to comment C.20 above and Section 2.2 of Chapter 2, *Alternatives Analysis*, for further detail and study.

Comment C.22

The DEIR should review an alternative road layout that does not extend beyond the project site and compare the environmental impacts and traffic operations to the Preferred Alternative.

Response

Please refer to Section 2.3.1 in Chapter 2, *Alternatives Analysis,* which presents information on environmental impacts related to the Alternative Roadway Layout alternative.

Comment C.23

The DEIR should include a traffic study prepared consistent with the EEA/MassDOT Transportation Impact Assessment (TIA) Guidelines issued in March 2014, MassDOT's comment letter, and this Scope.

Response

The transportation impact analysis, as documented in Chapter 3, *Transportation*, was performed in conformance with the Massachusetts Executive Office of Environmental Affairs (EEA)/Executive Office of Transportation (EOT)/MassDOT guidelines. Prior to completing this study, the Proponent submitted a Transportation Scoping Letter (TSL) to MassDOT to obtain agreement from the state reviewing agency on the assumptions and approaches used in the transportation study. This study has been prepared based on that process and DOT's direction. (The TSL is included in Appendix C for reference.)

Comment C.24

The TIA should provide a comprehensive evaluation of the project's use of area roadways, public and private transit, pedestrian and bicycle facilities, and other transportation modes.

Response

The transportation assessment included in Chapter 3, *Transportation*, includes a comprehensive evaluation of the project's use of area roadways, public and private transit, pedestrian and bicycle facilities, and other transportation modes.

As documented in Chapter 3, VHB prepared the transportation assessment in five stages. The first stage identifies the features of the proposed Project, including the proposed roadway network, site access, and on-site pedestrian and bicycle circulation. The second stage involved an assessment of existing transportation conditions within the Project study area including an inventory of existing roadway geometry; observations of traffic flow, including daily and peak period traffic counts; an inventory of sidewalks, bike lanes, and multi-use paths; a summary of existing public transit facilities in the area and their use; and a review of vehicular crash data. The third stage of the study established the framework for evaluating the transportation impacts of the proposed Project. Specific travel demand forecasts for the Project were assessed along with future transportation demands expected to result from projected background traffic growth and other proposed area developments that may occur independent of the Project. The fourth stage includes a summary of all transportation-related analyses that have been conducted with and without the Project in-place, including traffic capacity analyses, transit capacity analyses, and bicycle level of stress analyses. A summary of traffic capacity analyses is provided in Section 3.8, a summary of transit service capacity analyses is provided in Section 3.9, and a summary of bicycle level of traffic stress analyses is provided in Section 3.10. The final stage of the study discusses possible measures to improve existing and future mobility in the area.

Comment C.25

It should describe existing conditions, include a plan of the transportation study area, and identify the proposed site access and egress.

Response

Refer to Section 3.5 of Chapter 3, *Transportation*, for a detailed description of existing conditions. A plan of the transportation study area is included in Figure 3.9. Also, the proposed site access and egress are described in Sections 3.4.4.

Comment C.26

It should provide counts of existing traffic in the traffic study area and include projections for future traffic conditions under No Build, Build, and Build with Mitigation scenarios.

Response

Refer to Appendix C for all traffic count data and Section 3.5.4 of Chapter 3, *Transportation*, for a summary of existing condition traffic volumes. Future traffic conditions under No-Build and Build scenarios are described in Sections 3.6.3, 3.6.6, 3.7.1, 3.7.2, 3.9.3, and 3.12.4. The Build with Mitigation scenario is described in Section 3.12.4.

Comment C.27

The analysis should model future conditions in 2025 and 2030 to reflect the phased build-out of the project; the DEIR should explicitly define the building area and uses upon which the 2025 scenario is based.

Response

Traffic operations analyses were conducted for two phases of Project build-out, including Phase A in 2025, and Phase B (Full Build) in 2030. The results of the 2025 and 2030 Build conditions traffic operations analysis are described in Sections 3.7.1 and 3.9.3 of Chapter 3, *Transportation*, respectively. Refer to Sections 3.4.5 and 3.6.1 for a detailed description of the building area and land uses for the 2025 Build condition.

Comment C.28

Existing conditions should be based on historic, pre-pandemic traffic volumes adjusted to 2019 conditions to represent the 2021 Existing Conditions scenario.

Response

Historic traffic counts from 2017 and 2018 were used as a basis and adjusted to 2019 conditions to represent a 2021 Existing condition. Traffic counts were adjusted per MassDOT guidelines and added to project-generated trips from background developments completed between the time of counts and the existing condition. Refer to Sections 3.5.4.1 through 3.5.4.2 in Chapter 3, *Transportation*, for description of the data used and the adjustments made in accordance with Massachusetts Department of Transportation guidelines.

Comment C.29

The No Build and Build scenarios should incorporate background growth due to trips generated by nearby planned development projects within the timeframe analyzed in the analysis and, for MassDOT roadways, a typical background growth rate in traffic volumes.

Response

For the No-Build and Build scenarios, a typical growth rate of 0.4 percent was used on roadways under state jurisdiction in accordance with MassDOT guidelines, as described in Section 3.7.1.1 of Chapter 3, *Transportation*. Refer to Section 3.7.1 for a summary of background growth in trips due to specific development projects.

Comment C.30

Future conditions should incorporate transportation projects by MassDOT, MBTA, DCR, the City and Harvard, and describe how the project's proposed design and transportation mitigation program is consistent with the vision and mobility goals of MassDOT's Allston Multimodal Project (EEA#15278).

Response

Refer to Section 3.8.3 in Chapter 3, *Transportation*, for a summary of other area transportation projects that are reflected in the future condition analyses. As part of the Allston Multimodal Project that will reconstruct the I-90 Allston-Brighton interchange, a new street grid system is planned south of Cambridge Street. Thus, the ERC Enabling Infrastructure Roadways accompanying the Site are being designed to accommodate long-range vision plans for the area that include a series of new roadways and connections. For example, East Drive and Cattle Drive are being designed to connect to Cambridge Street and provide continuity to the Allston Multimodal Project's roadway network. Although the condition in the 2030 analysis year does not assume the implementation of the Allston Multimodal Project's roadway network at that time, this Project's proposed infrastructure (including mitigation measures) do consider this long-term vision and won't preclude those connections from being properly integrated in the future. Discussions of the proposed street network and the consistency with long-range plans are included in Section 3.4.3.

Comment C.31

The study area for the TIA should, at a minimum, include the following roadways and intersections, including proposed roadways that will be present under future conditions:

- *Western Avenue at Soldiers Field Road;*
- *Western Avenue at Kresge Way/Sanofi Genzyme Driveway/Project Driveway;*
- *Western Avenue at Batten Way/Hague Street;*
- *North Harvard Street at Soldiers Field Road;*
- *North Harvard Street at Western Avenue;*
- *North Harvard Street at Franklin Street/Kingsley Street;*
- *Cambridge Street at North Harvard Street;*
- *Cambridge Street at Windom Street;*
- *Cambridge Street at I-90 Ramps/Double Tree Hotel;*
- *Cambridge Street at Soldiers Field Road;*

- *Western Avenue at Stadium Road;*
- *Western Avenue at Academic Way;*
- *North Harvard Street at Academic Way;*
- *Western Avenue at Cattle Drive;*
- *Western Avenue at East Drive;*
- *Interim Cattle Drive at Windom Street;*
- *Western Avenue at Memorial Drive (Cambridge);*
- *River Street at Memorial Drive (Cambridge);*
- *JFK Street at Memorial Drive (Cambridge);*
- *Merge of I-90 off-ramp onto Cambridge Street westbound; and*
- *Diverge of I-90 on-ramp from Cambridge Street eastbound.*

Response

These intersections are evaluated in the study (please refer to Section 3.5.1.1 in Chapter 3, *Transportation*). Results of the operations capacity analyses for all study area locations are provided in Sections 3.8.1 and 3.8.2.

Comment C.32

Any additional intersections where project- generated trips are anticipated to increase peak hour traffic volume by five percent or more, or by more than 100 vehicles per hour, should be included in the TIA.

Response

Our traffic estimates do not anticipate that any intersections outside those identified in the study area (inclusive of those listed under MEPA in Comment C.31) will see enough increase in traffic volume to be included in the TIA. Refer to Section 3.5.1.1 in Chapter 3, *Transportation*, for a complete list of intersections studied.

Comment C.33/C34

According to MassDOT, the Proponent may be required to prepare merge/diverge analyses for the Soldiers Field Road exit and entrance ramps at North Harvard Street and River Street/Western Avenue, as well as the I-90 mainline exit and entrance ramps at the Allston Interchange, including the ramp merge/diverge locations within the interchange, depending on the expected trip distribution.

The Proponent should consult with MassDOT prior to preparing the DEIR to determine the need for theses analyses and should include the results in the DEIR (if required).

Response

A merge and diverge analyses were conducted for two specific locations where Project trips are expected based on the vehicle trip distribution: Cambridge Street Westbound at I-90 Off-Ramp and Cambridge Street Eastbound at I-90 On-Ramp. The analysis reflects the Existing conditions, future No-Build and Build conditions. Please refer to Section 3.8.2 in Chapter 3, *Transportation*.

Comment C.35

The TIA should describe the project's anticipated transportation impacts and identify appropriate mitigation measures. The Proponent should indicate a clear commitment to implement proposed mitigation measures and describe the timing of their implementation, including whether measures are implemented based on phases of the project or occupancy levels.

Response

Sections 3.8, 3.9, and 3.10 in Chapter 3, *Transportation*, evaluate potential Project impacts on traffic operations, transit service, and bicycling infrastructure. Please refer to Section 3.12 for an evaluation of mitigation measures, recommended improvements, and proposed timing for their implementation.

Comment C.36

The estimate of the adjusted vehicle trips included in the ENF is nearly 2,000 vehicle trips lower than the estimate provided in the Scoping Request. The DEIR should fully document the trip generation estimates for each mode and clarify the discrepancy between the values provided in the ENF and Scoping Request.

Response

The difference in trip generation estimates is attributed to the future mode share assumptions for the Project applied at the time of the estimate. The trip estimates included in the ENF table reflected an older/superseded set of assumptions, whereas the Scoping Request letter contained estimates based on a revised set of assumptions that reflected on-going project mode share projections being discussed with the City of Boston at that time. The estimate of Project-generated trips by mode provided in Section 3.6.4 of Chapter 3, *Transportation,* differ slightly than those presented in the Scoping Request letter and reflect the final estimates, which are based on City of Boston staff direction on future mode share assumptions for evaluating 2025 and 2030 conditions, with the expectation that travel in the city will progress toward the *Go Boston 2030* plan goals.

Comment C.37

For the total project and for each land use, the TIA should provide estimates of weekday daily and weekday morning peak period trips for each mode and describe and document any adjustment of these estimates.

Response

Refer to Section 3.7.5 in Chapter 3, *Transportation*, for a detailed method for estimating Project-generated trips by mode and land use. Estimates are provided for weekday daily, morning peak hour, and evening peak hour periods.

Comment C.38

As requested by MassDOT, the DEIR should provide an explanation of why the existing site trip generation is assumed to be negligible, compare the net adjusted trip generation with empirical trip data from a similar site, if available, and document how the mode share assumptions were developed.

Response

The Project Site has no existing land development and as such, all Project trip generation will be net-new trips to the area.

Mode share assumptions used for estimating Project-generated trips by mode are detailed in Section 3.6.4 of Chapter 3, *Transportation*. Generally, mode shares are based on adjustments to the U.S. Census Bureau 2012-2016 American Community Survey (ACS) five-year estimates for Allston area Census Tracts. The method to determine these mode share adjustments for 2025 and 2030 was developed with City of Boston/BPDA to reflect trends and the City's expectations in response to *Go Boston 2030* plan implementation.

Comment C.39/C.40/C.41/C.42/C.43

The DEIR should provide a comprehensive and detailed description of existing and proposed pedestrian facilities in the study area, including sidewalks, crosswalks, bicycle facilities and bicycle parking spaces.

It should review the regional pedestrian and bicycle network and describe potential measures to enhance connections between the site and regional routes, public transportation facilities and complementary land uses such as shopping centers and residential areas.

The TIA should evaluate these routes based on the origin-destination of potential residents, employees and visitors.

The DEIR should describe all proposed bicycle and pedestrian facilities that will be provided on the new streets, within the project site and any off-site locations, if applicable.

It should identify bicycle and pedestrian mitigation measures, including links between the project site and adjacent land uses and transit facilities, that will help ensure that walking and bicycling will be an attractive way to access the site to meet the project's mode share goals; The Proponent should consider the feasibility of expanding existing routes or promoting new routes to encourage bicycle and pedestrian travel.

Response

Refer to Section 3.5.3 of Chapter 3, *Transportation*, for a detailed description of existing pedestrian and bicycle facilities in the Study Area. Sections 3.4.5, 3.5.3, and 3.12.3 give an overview of the proposed pedestrian and bicycle facilities on the development site, including the location and number of spaces allocated to bicycle parking, and how these connect to existing and future/proposed walking and bicycling networks in the neighborhood. In Section 3.9, a summary of the bicycle level of traffic stress along local streets is provided for the existing and proposed conditions.

The site's Enabling Roadway Infrastructure are designed to provide a low level of bicycling traffic stress by providing separated bicycle lanes and sidewalks in a Complete Streets framework. A description of each new roadway and the proposed cross section is included in Section 3.3.4.

The proposed Project infrastructure and off-site mitigation are designed to account for the strong multimodal connections to/from and through the Project Site. For example, the Project's Greenway will be the largest publicly accessible open space in a network of public realm connections that will stretch from the Lower Allston neighborhood to the Charles River. That open space network will create a pedestrian/bicyclist connection from Allston to Cambridge, while linking the surrounding communities to the Charles River.

Comment C.44

The TIA should identify areas that are structurally deficient or not meeting current codes for accessibility, including sidewalks, crosswalks, ramps, and pedestrian equipment and propose mitigation measures to address these conditions.

Response

The roadways and sidewalks within the ERC Project site will all be new construction, designed to latest standards, City, and State guidelines. Refer to Section 3.12.3 of Chapter 3, *Transportation*, for a description of proposed pedestrian and bicycle improvements.

Comment C.45/C.46

The TIA should include an analysis of the transit demand on MBTA bus routes generated by the project.

It should provide an analysis of the impacts of project-generated ridership on each bus route by comparing 2021 Existing, 2025 No Build, 2025 Build, 2030 No Build and 2030 Build conditions in accordance with the MBTA's Office of Performance Management and Innovation's (OPMI) methodology for calculating passenger comfort metrics (as evaluated in the Service Delivery Policy [SDP]).

Response

Refer to Section 3.9 of Chapter 3, *Transportation*, for an analysis of the transit demand on MBTA bus routes that serve the Project and the Lower Allston area. The analysis accounts for the anticipated demand generated by the Project and several other area projects that are under construction or under development review.

Comment C.47/C.50

Mitigation should be proposed for any bus route that falls below the 96 percent route-wise minimum threshold for the comfort metric (share of passenger travel time experienced in comfortable conditions); any trip for which project-generated passengers will cause the trip to exceed the threshold; and/or any trip above the crowding threshold under 2025 No Build or 2030 No Build conditions to which project-generated passengers will be added.

The DEIR should document how proposed transit mitigation will be consistent with transit improvement measures planned by MassDOT, MBTA, and the City.

Response

Section 3.12.2 of Chapter 3, *Transportation*, describes the proposed mitigation measures to improve/increase MBTA bus service and to diminish Project ridership on any crowded MBTA bus service.

Comment C.48/C.49

The DEIR should include a review of pedestrian routes between the project site and bus stops to be used by employees and visitors and describe the existing conditions along these routes.

It should recommend any upgrades or modifications to pedestrian crossings, bus stops, sidewalks and other facilities that would help ensure safe, accessible travel for bus customers and meet the codes and standards related to the Americans with Disabilities Act (ADA), the Massachusetts Architectural Access Board (MAAB) and Federal Transit Administration (FTA) regulations and guidance.

Response

Sections 3.4.5 and 3.5.3 of Chapter 3, *Transportation*, gives an overview of the proposed pedestrian and bicycle facilities on the development site, including the walking connections to the proposed MBTA Route 70 stops on Western Avenue. As outlined in Section 3.12.3, the Proponent is proposing to install a traffic signal at the intersection of Western Avenue at East Drive / Kresge Way and provide an ADA-compliant crosswalk across Western Avenue. The accommodations at the redesigned intersection will provide a protected crossing for pedestrians walking between the Site and the outbound bus stop on the north side of Western Avenue.

Comment C.51

The TIA should describe the anticipated vehicle trip distribution.

Response

Section 3.12.4 of Chapter 3, *Transportation*, presents the anticipated vehicle trip distribution, which was developed in coordination with the City of Boston staff and their origin-destination matrix.

Comment C.52

For each intersection, the DEIR should provide capacity analyses for the weekday peak periods for 2021 Existing, 2025 No Build, 2025 Build, 2030 No Build and 2030 Build conditions and any intersections where mitigation is proposed.

Response

Capacity analyses for the weekday morning and weekday evening peak hours are provided in Section 3.7.1 of Chapter 3, *Transportation*. Further capacity analyses for the intersections where mitigation is proposed are provided in Section 3.12.4.

Comment C.53

For all analysis scenarios, the TIA should provide illustrations depicting the peak hour 50th (average) and 95th percentile queue lengths for each lane group/turning movement and a tabular summary of the results of the intersection operations analysis, including volume-to-capacity ratios (V/C), average delays and level-of-service (LOS). The DEIR should identify any instances where extended queues would block vehicle movements at study area intersections, including those involving access to the state highway system, and propose mitigation measures to address these impacts.

Response

Refer to Appendix C for illustrations depicting the peak hour 50^{th} and 95^{th} percentile queue lengths. A tabular summary of the results of the intersection operations analysis is provided in Section 3.7.1 of Chapter 3, *Transportation*. A description of all proposed roadway improvements is provided in Section 3.6.2.

Comment C.54

The DEIR should include a safety analysis for all intersections and roadway segments within the study area.

Response

Refer to Section 3.5.6 of Chapter 3, *Transportation*, for a roadway safety analysis, including an inventory of publicly available crash data and the recommendations of five Road Safety Audits (RSAs) conducted within the Study Area as a part of this Project.

Comment C.55/C.56

The analysis should calculate crash rates using MassDOT data for the most recent continuous five-year period.

The TIA should document crash rates and identify appropriate mitigation for any locations exceeding the State and/or District 6 averages.

Response

Crash rates were calculated using MassDOT data for the five-year period from 2014 – 2018. These crash rates are provided in Section 3.5.6.1 of Chapter 3, *Transportation*.

Of the intersections studied, five intersections exceeded the MassDOT District 6 average. Four of these intersections were evaluated via road safety audits (RSAs) as part of this Project, which identified potential safety improvements and other mitigation elements (Section 3.6.2). MassDOT Traffic Safety Section did not require an evaluation via an RSA at the intersection of Cambridge Street at Soldiers Field Road, because of recent (2018) installation of multi-modal roadway improvements intended to improve safety.

Comment C.57

The North Harvard Street at Soldiers Field Road as a Highway Safety Improvement Program (HSIP) bicycle cluster and North Harvard Street at Soldiers Field Road and Cambridge Street at Soldiers Field Road as HSIP vehicle clusters. Prior to submitting the DEIR, the Proponent should identify all HSIP study area intersections and coordinate with the MassDOT Highway Division's Safety Section to determine if a Road Safety Audit (RSA) is necessary.

Response

As part of the MEPA review process for this Project, VHB coordinated with MassDOT Traffic Safety Section to determine which study area locations required an RSA and to complete the RSAs. All HSIP intersections within the study area required an RSA except for Cambridge Street at Soldiers Field Road. Refer to Section 3.5.6 of Chapter 3, *Transportation*, for a summary of HSIP intersections and a description of the RSA coordination, and refer to Section 3.6.2 for a summary of the RSA recommendations.

Comment C.58

Any proposed roadway improvements, including bicycle/pedestrian facilities, that are recommended to mitigate traffic impacts should be consistent with Complete Streets design guidelines contained in the MassDOT Project Development and Design Guide.

Response

The Project's bicycle and pedestrian accommodations and facilities along streets and roadways are proposed to be consistent with the objectives of BTD's and MassDOT's Complete Streets design guidelines. Their design is intended to encourage use of bicycling and walking while creating a safer experience for bicyclists and pedestrians. Descriptions of all proposed roadway improvements are provided in Section 3.6.2 of Chapter 3, *Transportation*, and descriptions of all proposed pedestrian and bicycle improvements are summarized in Sections 3.6.2 and 3.12.3.

Comment C.59

The DEIR should include detailed plans that demonstrate the feasibility of constructing any proposed roadway improvements.

Response

Refer to Section 3.6.2 of Chapter 3, *Transportation*, for a detailed description of the proposed roadway improvements, including graphical illustrations of the proposed off-site improvements. Detailed descriptions with 80-scale conceptual design plans demonstrating the feasibility of each newly proposed roadway modification are included in Sections 3.3 and 3.12.3.

Comment C.60

The Proponent should consult with MassDOT and DCR prior to filing the DEIR regarding any roadway improvements affecting State roads.

Response

The Proponent held a joint meeting with MassDOT and DCR on July 16, 2021 to discuss the Project and proposed mitigation.

Comment C.61/C.63

The DEIR should document how the parking supply was developed and compare the number of proposed spaces to the amount required based on the most recent edition of ITE's Parking Generation, local zoning requirements and comparable facilities.

The TIA should describe the number of parking spaces that will be occupied throughout the day, identify periods of peak use and evaluate opportunities for shared parking.

Response

Refer to Section 3.4.6 of Chapter 3, *Transportation*, for a summary of on-site parking supply for the Project. Section 3.11.2 provides a summary of the shared parking analysis that evaluates the proposed parking supply against anticipated demand (by time of day), City of Boston parking guidelines, and ITE rates for developments in urban settings.

Comment C.62/C.64

It should reevaluate the number of parking spaces required for the project based on the comparison above, identify the number of parking spaces that can be reduced through implementation of TDM measures, and consider banking some land that would only be developed for parking if warranted by demand.

It should include an analysis of potential reductions in parking supply if higher non-vehicular mode shares can be achieved.

Response

The Project is planned to be developed in two phases. The Full Build project does not include any surface parking.

The proposed parking supply is lower than what either ITE or the City of Boston's *District-Based Parking Goals*, as established as part of *Access Boston*, would suggest is needed to meet the demand for these land uses. The lower supply is intended to discourage automobile trips while reflecting the travel demand supported by the proposed transit improvements, TDM incentives, and multimodal infrastructure designed to encourage use of sustainable travel modes.

Comment C.65

The DEIR should include a comprehensive TDM plan to reduce the number of single-occupancy vehicle (SOV) trips to the site by both employees and visitors and evaluate the expected trip reduction of each. It should include a thorough evaluation of TDM measures, including but not limited to the following:

- *Reducing the number of proposed parking spaces;*
- *Implementing a parking cash-out program and/or charging market rates for parking;*
- *Providing on-site amenities and conveniences that would reduce the need for automobile travel;*
- *Administering carpooling and vanpooling programs and incentives for participation;*
- *Providing free or subsidized transit passes;*
- *Improving pedestrian access to nearby transit hubs;*
- *Providing a robust set of bicycle and pedestrian amenities;*
- *Providing a mobility hub to centralize multiple mode pf transportation, including taxis and transportation network companies such as Uber and Lyft; and,*
- *Joining the Allston/Brighton Transportation Management Association (TMA).*

Response

The Project will include a robust set of transportation demand management (TDM) measures that align with the requirements outlined in the City of Boston's Transportation Demand Management *Menu of Options*. These TDM measures will support the Project's proposed transportation mode shares and parking demand rates. See Section 3.12.5 of Chapter 3, *Transportation*, for details.

Comment C.66/C.67

The DEIR should include a draft traffic monitoring program to evaluate the assumptions made in the traffic study and the adequacy of the transportation mitigation measures, including the TDM program.

The program should include annual traffic monitoring for a period of five years beginning six months after occupancy of the full build-out of the project. The monitoring program should include:

- *Simultaneous automatic traffic recorder (ATR) counts at each parking entrance for a continuous 24-hour period on a typical weekday;*
- *Weekday AM and weekday PM peak hour turning movement counts (TMC) and operations analysis at mitigated intersections and parking entrances;*
- *Travel survey of employees and patrons of the site; and,*
- *Transit ridership counts.*

Response

The Proponent is committed to a robust transportation monitoring program for this project. Section 3.12.6 of Chapter 3, *Transportation*, provides the draft transportation monitoring program for the project, which will begin six months after full occupancy of the Phase A development and continue for a period of five years after the full build-out of the Project.

Comment C.68

The DEIR should describe the stormwater management system and how it will be designed to meet the Massachusetts Department of Environmental Protection's (MassDEP) Stormwater Management Standards (SMS) to improve water quality and maintain pre-development peak discharge rates and volumes.

Response

The Project is planning and designing the siting of stormwater storage and infiltration and other green infrastructure. Infiltration systems will be used to provide storage, treatment, and promote infiltration via groundwater recharge. These systems will be sized based on the impervious site area. Refer to description of the stormwater management system in Section 4.3 of Chapter 4, *Stormwater*, and compliance with MassDEP Stormwater Management Standards in Section 4.4.

Comment C.69

It should include a plan showing the location of BMPs, low-impact design (LID) and green infrastructure measures.

Response

Review of proposed stormwater BMPS, LID and green infrastructure is shown in Chapter 4, *Stormwater*. Please refer to Figure 4.3 in Chapter 4.

Comment C.70

The DEIR should confirm that favorable groundwater conditions are present in the proposed locations of infiltration BMPs.

Response

Groundwater levels have been monitored in the vicinity of the Project Site since 2010. The Project design team has taken this information into account in the design of all subsurface program and will continue to ensure the groundwater conditions support the infiltration program. Groundwater conditions are reviewed in Chapter 4, *Stormwater*. Please refer to Section 4.3.1 of Chapter 4.

Comment C.71

The DEIR should provide analysis of the capacity of the stormwater management system under future climate conditions, as described below.

Response

Future climate conditions and storm events have been considered in the analysis and will continue to be evaluated as the design progresses. Refer to the stormwater management system capacity in Section 4.3 of Chapter 4, *Stormwater*.

Comment C.72

It should provide a detailed description, including calculations, of how specific stormwater management measures, such as infiltration, will be designed in conformance with the phosphorous and pathogen Total Maximum Daily Loads (TMDL) established for the Charles River.

Response

The Project will meet or exceed requirements for phosphorus and pathogen TMDL. Calculations for phosphorus reduction will continue to be refined as the design progresses to meet the TMDL established for the Charles River. Refer to Section 4.3 of Chapter 4, *Stormwater*.

Comment C.73

The DEIR should document the location of proposed infiltration BMPs in relation to areas of contaminated soil and/or groundwater and describe any necessary remedial actions and/or stormwater management system design considerations.

Response

Refer to Section 4.3.1 of Chapter 4, *Stormwater*, for reference to proposed stormwater management approach. Figures 4.5a-b in Chapter 4 show the locations of proposed infiltration BMPs and reference groundwater elevations in proximity to the proposed design.

Comment C.74

The DEIR should evaluate surface treatment designs to increase pervious area, particularly in the three acres of public open space to be provided by the project.

Response

The Project and public open space are being designed with a reduction in impervious surface area in mind. The Greenway and adjacent open space will utilize pervious pavers where feasible and runoff from the Project Greenway and plaza areas will be collected by inlet structures and directed to either the subsurface infiltration systems or a bioswale in the Project Greenway. The Project Greenway will also feature trees and landscape areas to reduce impervious area and stormwater runoff. Review of proposed stormwater BMPS, LID and green infrastructure is shown in Chapter 4, *Stormwater*. Please refer to Figure 4.5a in Chapter 4.

Comment C.75

In addition, the DEIR should review potential areas of the site that may be suitable for coverage by porous pavement and other measures to minimize runoff, including capture of runoff from rooftops and other impervious surfaces.

Response

Use of permeable paving will be used where feasible in the public open space. Review of proposed stormwater BMPS, LID and green infrastructure is shown in Chapter 4, *Stormwater*. Please refer to Figure 4.6 in Chapter 4 for review of the vegetation, permeability, and canopy plan.

Comment C.76

The Proponent should review comments submitted by BWSC and the Charles River Watershed Association (CRWA) and incorporate their requirements and, where feasible, recommendations into the design of the stormwater management system presented in the DEIR.

Response

Review and response to comments by BWSC and CRWA are included in later sections of this chapter.

Comment C.77

The DEIR should describe the location and size of infrastructure and connections to the City's water and sewer systems, including water and sewer service mains to be constructed by Harvard. It should document that adequate water and sewer capacity exists to serve the site.

Response

Refer to Section 5.1 of Chapter 5, *Water and Wastewater*, for the existing and planned water infrastructure and DEIR Section 5.5 for existing and planned sewer infrastructure.

Comment C.78

The DEIR should identify and describe water conservation measures that will be incorporated into design and operations. At a minimum, the DEIR should review the feasibility of installing low flow plumbing fixtures and using rainwater or gray water for irrigation and other purposes.

Response

Water conservation measures are outlined in Chapter 5, *Water and Wastewater*, and include.... Please refer to Section 5.7.1 of Chapter 5.

Comment C.79

The project will be required to mitigate its contribution of flow into the City's sanitary system.

Response

Comment noted. Infiltration and inflow mitigation analysis is reviewed in Chapter 5, *Water and Wastewater*. Please refer to Section 5.7.2 of Chapter 5.

Comment C.80

MassDEP regulations at 314 CMR 12.04(2)(d) specify that communities with CSOs must require projects generating 15,000 gpd or more of new wastewater flow to remove four gallons of I/I for each gallon of wastewater. The Proponent should consult with the City to identify appropriate I/I mitigation for this project.

Response

Review of infiltration and inflow mitigation analysis is reviewed in Chapter 5, *Water and Wastewater*. Please refer to Section 5.7.2 of Chapter 5.

Comment C.81

The DEIR should include a commitment to I/I removal and identify any mitigation projects or monetary contribution by the Proponent.

Response

Infiltration and inflow mitigation analysis is reviewed in Chapter 5, *Water and Wastewater,* and the Project's mitigation commitment is included in Chapter 8, *Summary of Mitigation Measures/Draft Section 61 Findings.* Please refer to Section 5.7.2 of Chapter 5.

Comment C.82

Groundwater discharges into the sanitary system are prohibited without a Temporary Construction Dewatering Permit from the MWRA.

Response

Noted. Refer to Section 7.2.2 in Chapter 7, *Construction Period,* for review of subsurface conditions, including the need for a temporary dewatering permit.

Comment C.83

The DEIR should indicate whether the project will require a discharge permit from the MWRA's Toxic Reduction and Control (TRAC) Department and should include a commitment to use oil/gas separators in the parking garage drainage systems.

Response

The Project shall apply for a discharge permit from the MWRA TRAC Department as required. The parking garage drainage systems shall be directed to oil/gas separators prior to discharge to the sanitary sewer system.

Comment C.84

The DEIR should discuss potential effects of climate change to the project site and describe features incorporated into the designs of the projects that will increase the resiliency of the site to likely climate change impacts.

Response

The Proponent will continue to review the potential effects of climate change. Sustainability and resiliency continue to be an important driver in the overall planning for the project. Section 6.3 in Chapter 6, *Climate Change*, describes the impacts of climate change on the project and resiliency measures being pursued.

Comment C.85

I encourage the Proponent to consult the data available from the City, including Climate Ready Boston (December 2016), and the resilientMA.org website to develop climate change scenarios for the site and identify potential adaptation measures. The Massachusetts State Hazard Mitigation & Climate Adaptation Plan (2018) may provide additional resources to assist in this analysis.

Response

The Proponent and project teams will continue to consult published data from the City of Boston and Commonwealth of Massachusetts, including review of *Climate Ready Boston* and the *Massachusetts State Hazard Mitigation & Climate Adaptation Plan,* regarding climate change and potential adaption measures. Section 6.3 in Chapter 6, *Climate Change*, describes the impacts of climate change on the project and resiliency measures being pursued. Sections 6.3.3 and 6.3.4 describe how the Project has used climate change resources in the analysis.

Comment C.86

In particular, the DEIR should provide a narrative identifying the useful life[1] of the project and describing the criticality of project assets relative to the populations affected by loss or inoperability of the project; the length of time the project can be inoperable without consequence; whether the project is located within or serves environmental justice/vulnerable populations; and the nature and severity of impacts if the project becomes inoperable.

Response

Section 6.3.1 in Chapter 6, *Climate Change*, describes the anticipated useful life of the project, criticality, and consideration of environmental justice and vulnerable populations.

Comment C.87

The DEIR should identify any key risks and vulnerabilities of the project under current and projected climate conditions, and identify any project components that are likely impacted by those risks and/or will be designed to adapt to such risks.

Response

Section 6.3.2 through 6.3.4 in Chapter 6, *Climate Change*, describe key vulnerabilities of the Project under current and project climate conditions

Comment C.88

The DEIR should identify site elements that will be designed to minimize impacts associated with more frequent and intense storms and extreme heat waves including, but not limited to:

- *Ecosystem-based adaptation measures to reduce heat island effect and mitigate stormwater runoff, such as minimizing impervious area and integrating tree canopy cover, rain gardens and LID stormwater management techniques;*

Response

The current approach to the site design utilizes green infrastructure, and ecosystem-based adaptations to help mitigate the effects of more frequent storm and heat events. Refer to Section 4.3 in Chapter 4, *Stormwater*, for the Project's stormwater management approach, including the implementation of green infrastructure to reduce heat island effect, mitigate

[1] For the purpose of this analysis, "useful life" is the estimated number of years an asset will be in use before needing reinvestment to continue performing its normal function(s). The anticipated useful life assumes regular and adequate maintenance is implemented; this differs from the design life (or service life), which is typically shorter.

stormwater runoff, minimize impervious area, and integrate tree canopy, rain gardens and LID techniques.

Comment C.89

- *Stormwater management system design that will accommodate rainfall under projected climate conditions;*

Response

Refer to Section 4.3 in Chapter 4, *Stormwater*, for the Project's stormwater management approach and accommodated for future 2070 rainfall events.

Comment C.90

- *Reuse of stormwater for irrigation and cooling tower make-up water;*

Response

Refer to Section 4.3 in Chapter 4, *Stormwater*, for the Project's stormwater management approach regarding re-use of stormwater.

Comment C.91

- *Use of on-site renewable energy systems that may provide added resiliency during periods of power loss during storms;*

Response

All buildings will be designed to be solar-ready and if a rooftop solar PV system is deemed feasible, consideration will be given to using the PV system to provide additional redundancy during a power loss scenario. Sections 6.3.5.2 and 6.5 in Chapter 6, *Climate Change*, describe the results of an onsite PV analysis for the Project.

Comment C.92

- *Protection of emergency generator fuel supplies from effects of extreme weather and flood-proofing;*

Response

Sections 6.3.5.2 in Chapter 6, *Climate Change*, describes the emergency generator approach for each typology.

Comment C.93

- *Elevation of critical infrastructure above projected base flood elevations taking into account the effects of climate change; and,*

Response

Section 6.3.5 in Chapter 6, *Climate Change*, describes the elevation of critical equipment and re-grading of the site which will result in elevating the existing low points. Section 6.3.5.2 describes protection of generator fuel tanks from flood impacts.

Comment C.94

- *Expansion of the size of emergency generators to allow for select common areas and other emergency and life safety systems to remain operational for a period of time beyond code requirements, specifically in residential buildings.*

Response

Section 6.3.5.2 in Chapter 6, *Climate Change*, describes generator capacity in support of emergency and life safety equipment, as well as operability of common areas during extreme weather and flooding events

Comment C.95

The DEIR should review potential risks and vulnerabilities of the site and identify design measures intended to increase the project's resiliency to these risks and vulnerabilities. I note that increasing landscaped open space may help minimize urban heat island effects and flood damage.

Response

The site design will aim to reduce urban heat island impacts to the extent feasible by using greenery including green roof areas, trees, green infrastructure, shading structures, and materials with high solar reflectance/albedo, and building designs will accommodate HVAC system capacity for more extreme design conditions. The planned tree canopy will cover up to approximately 51,855 SF, and up to approximately 20 percent of the total site area

Section 6.3.2 in Chapter 6, *Climate Change*, describes the project's vulnerability assessment. Section 6.3.5.1 describes the Project's strategies to minimize urban heat island effects and flood damage.

Comment C.96

In the DEIR, the Proponent should describe any additional design features that may provide resiliency and support adaptation under future climate scenarios.

Response

Refer to Section 6.3.5 in Chapter 6, *Climate Change*, for a comprehensive description of resiliency measures being implemented and explored for the Project.

Comment C.97

The Proponent should demonstrate use of best available climate projections and data in designing project elements, including stormwater management systems and other applicable features, and, if the project (including supporting infrastructure) will not be designed to meet specifications based on climate projections, provide an explanation of the reasons and a description of whether and how the project will be able to take further steps to adapt to climate conditions at a later stage.

Response

Refer to r Section 6.3 in Chapter 6, *Climate Change*, for descriptions of the climate projections used for the Project's resiliency analysis, including FEMA flood mapping (Section 6.3.3) and Climate Ready Boston projections (Section 6.3.4), which considers future climate scenarios. As described in Section 6.3.4, the Project is developing appropriate strategies for a changing climate in the near term as well as planning for a longer-term adaptation strategy over the course of the Project's life span.

Comment C.98

The analysis should quantify the direct and indirect CO2 emissions of the project's energy use (stationary sources) and transportation-related emissions (mobile sources).

Response

The Proponent has prepared a stationary source and mobile source GHG emissions analysis to quantify the Project's anticipated GHG emissions. This analysis is presented in Section 6.4 of Chapter 6, *Climate Change*.

Comment C.99

The DEIR should include a GHG analysis prepared in accordance with the GHG Policy, guidance provided in the comment letter submitted by the Department of Energy Resources (DOER), which is incorporated in this Certificate in its entirety, and this Scope.

Response

The Proponent has prepared a stationary source and mobile source GHG emissions in accordance with the MEPA GHG Policy and DOER comment letter. This analysis is presented in Section 6.4 of Chapter 6, *Climate Change*, and Appendix B.

Comment C.100

The DEIR should include an analysis that calculates and compares GHG emissions associated with: 1) a Base Case that conforms to the 9th Edition of the Massachusetts Building Code, which references the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1-2013 and the International Energy Conservation Code (IECC) 2015 and

Response

The Project includes an expansive analysis on GHG emission scenarios. The Base Case is included in the analysis presented in Section 6.4.1 of Chapter 6, *Climate Change*, and Appendix B.

Comment C.101

2) a Mitigation Alternative that achieves greater reductions in GHG emissions.

Response

A Mitigation alternative is also included in the analysis. This Design Case is included in the analysis presented in Section 6.4.1 of Chapter 6, *Climate Change*, and Appendix B.

Comment C.102

The City has adopted the Massachusetts Stretch Energy Code (SC). Therefore, the project will be required to meet the applicable version of the SC in effect at the time of construction.

Response

The Project will exceed the Stretch Energy Code as presented in the analysis is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and Appendix B.

Comment C.103

The Base Case for all buildings should be established based on the base Building Code with comparisons to building performance based on the updated SC.

Response

The Project used the base Building Code to establish the Base Case as presented in the analysis is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and Appendix B.

Comment C.104

The GHG analysis should clearly demonstrate consistency with the key objective of MEPA review, which is to document the means by which Damage to the Environment can be avoided, minimized and mitigated to the maximum extent practicable.

Response

The Proponent strongly believes that the real estate industry has an important role to play in carbon reduction, especially in cities where emissions associated with the real estate sector are the largest contributor. The Project has developed a robust approach to climate mitigation aligned with and in support of Harvard's Fossil Fuel-Neutral By 2026 and Fossil Fuel-Free By 2050 goals and the Commonwealth's commitment to carbon neutrality by 2050. The Proponent has prepared a stationary source and mobile source GHG emissions analysis to quantify the Project's anticipated GHG emissions in accordance with the MEPA GHG Policy. This analysis is presented in Section 6.4.1 of Chapter 6, *Climate Change*.

Comment C.105

The DEIR should identify the model used to analyze GHG emissions, clearly state modeling assumptions, explicitly note which GHG reduction measures have been modeled, and identify whether certain building design or operational GHG reduction measures will be mandated by the Proponent to future occupants or merely encouraged for adoption and implementation.

Response

These items are included in the stationary source emissions assessment, which is presented in Section 6.4 of Chapter 6, *Climate Change*, and Appendix B. The Proponent will mandate incorporation of reduction measures to meet the committed GHG percent reduction identified in the GHG Self-Certification Letter in Section 6.4.1 of Chapter 6.

Comment C.106

The DEIR should include the modeling printouts for each alternative and emission tables that compare base case emissions in tons per year (tpy) with the Preferred Alternative showing the anticipated reduction in tpy and percentage by emissions source.

Response

Modeling results and emission tables are included in the stationary source emissions assessment which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and Appendix B.

Comment C.107

The DEIR should provide data and analysis in the format requested in DOER's letter.

Response

Tables in? the format requested in DOER's letter are included in the stationary source emissions assessment which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and Appendix B.

Comment C.108

The DEIR should present an evaluation of mitigation measures identified in DOER's comment letter. In particular, the feasibility of each of the mitigation measures outlined below should be assessed for each of the major project elements, and if feasible, GHG emissions reduction potential associated with major mitigation elements should be evaluated to assess the relative benefits of each measure.

Response

The Proponent has reviewed and evaluated the extensive list of mitigation measures listed in the comment and DOER's comment letter. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and Appendix B.

Comment C.109

The DEIR should explain, in reasonable detail, why certain measures that could provide significant GHG reductions were not selected – either because it is not applicable to the project or is deemed technically or financially infeasible.

Response

The Proponent has reviewed and evaluated the extensive list of mitigation measures listed in the comment letter and DOER's comment letter. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in detail in Appendix B.

Coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 19 percent to 91 percent compared to the Base Case, representing a savings of 8,734 tons per year.

Comment C.110

It should include a review of available financial incentives potentially available for the project, as described in DOER's comment letter.

Response

The Proponent has reviewed the potential incentives described in DOER's comment letter. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and Appendix B.

Comment C.111

At a minimum, the DEIR should consider the following GHG mitigation measures:

- *Residential and hotel buildings designed in conformance with Passivehouse standards;*

Response

The Proponent has reviewed and evaluated the list of mitigation measures listed in the comment and DOER's comment letter, including Passive House. The Design Case has incorporated the C406.9 reduced air-infiltration additional ECM, to further enhance building envelope performance. However, the project building envelope design is only at a conceptual level, therefore the Proponent is not able to commit to a Passive House level of performance at this stage.

The Proponent and design team have focused study and analysis on electrification of heating systems and are continuing to consider this option. Decisions on systems are also pending the results of the district energy feasibility study, which has focused on reducing natural gas use for domestic hot water and heating. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in detail in Appendix B.

Comment C.112

- *Above-Code continuous roof and wall insulation and avoiding glass curtain wall assemblies to minimize heat loss and uncontrolled infiltration through the building envelope;*

Response

Proponent has reviewed and evaluated the list of mitigation measures and incorporated each into the review of GHG mitigation for the Project, including review of wall and roof assemblies and review of the building envelope. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in detail in Appendix B.

Comment C.113

- *Electric space heating and water heating using air source heat pumps (ASHP), variable refrigerant flow (VRF), ground source heat pumps (GSHP) and/or solar thermal systems;*

Response

The Proponent has reviewed and evaluated the list of mitigation measures and incorporated each into the review of GHG mitigation for the Project, including review electrification and alternative heat sources. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in detail in Appendix B.

Comment C.114

- *High-albedo roofing materials, external shading, and windows with improved solar heat gain coefficient (SHGC);*

Response

The Proponent has reviewed and evaluated the list of mitigation measures and incorporated each into the review of GHG mitigation for the Project, including improved building materials and shading in the building designs. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in detail in Appendix B.

Comment C.115

- *Energy recovery ventilation and wastewater systems;*

Response

The Proponent has reviewed and evaluated the list of mitigation measures and incorporated each into the review of GHG mitigation for the Project, including energy recovery and wastewater systems. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in detail in Appendix B.

Comment C.116

- *Rooftop solar PV systems and/or solar-ready roofs; and,*

Response

All buildings will be designed to be solar-ready and if a rooftop solar PV system is deemed feasible, consideration will be given to using the PV system to provide additional redundancy during a power loss scenario. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in detail in Appendix B.

Comment C.117

- *LED lighting, both exterior and interior.*

Response

The Proponent has incorporated LED lighting into the proposed design of the Project buildings. This measure is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in detail in Appendix B.

Comment C.118

The DEIR should analyze an alternative project design that includes Passivehouse design in the hotel and residential buildings.

Response

Proponent has reviewed and evaluated the list of mitigation measures and incorporated each into the review of GHG mitigation for the Project, including Passive House. The Design Case has incorporated the C406.9 reduced air-infiltration additional ECM, to further enhance building envelope performance. However, the project building envelope design is only at a conceptual level, therefore the Proponent is not able to commit to a Passive House level of performance at this stage. The Proponent and design team have focused study and analysis on electrification of heating systems and are continuing to consider this option. Decisions on systems are also pending the results of the district energy feasibility study, which has focused on reducing natural gas use for domestic hot water and heating. including Passive House. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change,* and in detail in Appendix B.

Comment C.119

It should evaluate the scenario detailed in DOER's comment letter that provides for partial electric space heating of lab/office space using a hybrid of centrally-located air to water (or ground to water) heat pumps and gas fired boiler in which the air source heat pump provides 80-90 percent total annual heating end use.

Response

Proponent has reviewed and evaluated the list of mitigation measures and incorporated each into the review of GHG mitigation for the Project, including electrifying the lab/office. The Proponent has included air-source heat pump (ASHP) heating sized for 15 percent of building peak heating load in the proposed design. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change,* and in detail in Appendix B.

Comment C.120

Key components of this approach that should be incorporated into the modelling presented in the DEIR include:

- *A hot water distribution loop of 120 degrees Fahrenheit (F);*
- *A centralized heating plant consisting of both an air to water heating pump and a gas-fired condensing boiler;*
- *Boiler sized for 100 percent of the peak load;*
- *Air source heat pump sized for 25 percent of the peak load; and,*
- *Prioritized air source operation with use of the boiler only when loads exceed 25 percent of the peak load.*

Response

Modeling for the reduction in GHG emissions includes review of the components listed above. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in detail in Appendix B. The Proponent has included air-source heat pump (ASHP) heating sized for 15 percent of building peak heating load in the proposed design.

Comment C.121

The DEIR should review the financial incentives identified in DOER's comment letter and incorporate these potential funding sources in analyses of Passivehouse design and electrification of space and water heating.

Response

Refer to the financial analysis outlined in Appendix B describing the incentives considered for alternative modeling cases, including incentives for Passivehouse design and electrification of HVAC components.

Comment C.122

The Proponent should consult with staff from DOER and the MEPA Office prior to submitting the DEIR.

Response

The Proponent met with staff from DOER and the MEPA Office to outline the analysis methodology prior to the submittal of the DEIR.

Comment C.123

The DEIR should clearly demonstrate that the Proponent is taking all feasible measures to mitigate GHG impacts to the maximum extent practicable, and provide a clear justification if energy efficiency measures that appear technically feasible will not be adopted for the project.

Response

The Proponent has committed to all practicable mitigation measures at this time and describes these measures in Section 6.4.1 of Chapter 6, *Climate Change*. Where measures were deemed infeasible, extensive analysis of the measures was performed and described in Section 6.4 of Chapter 6 and in detail in Appendix B.

Comment C.124

The GHG analysis should include an evaluation of potential GHG emissions associated with mobile emissions sources.

Response

The Proponent has prepared a mobile source GHG emissions analysis in accordance with the MEPA GHG Policy in Section 6.4.3 of Chapter 6, *Climate Change*.

Comment C.125

The DEIR should follow the guidance provided in the GHG Policy for Indirect Emissions from Transportation to determine mobile emissions for Existing Conditions, Build Conditions, and Build Conditions with Mitigation.

Response

The Proponent has prepared a mobile source GHG emissions analysis in accordance with the MEPA GHG Policy in Section 6.4.3 of Chapter 6, *Climate Change*.

Comment C.126

The Proponent should thoroughly explore means to reduce overall single occupancy vehicle trips.

Response

The Proponent is committed to an extensive mitigation program to support walking, bicycling and transit access to the Project as well as a comprehensive TDM program as described in Section 3.12 of Chapter 3, *Transportation*.

Comment C.127

The DEIR should also review measures to promote the use of low-emissions vehicles, including installing electric vehicle (EV) charging stations and EV-ready infrastructure at parking spaces. More information on electric vehicle infrastructure can be obtained from the MassEVolves program at www.massevolves.org.

Response

Consistent with the City of Boston's Electric Vehicle Readiness Policy, the project will equip 25 percent with electrical supply and the remaining 75 percent will be EV ready. The proposed commitment is presented in Section 6.4.3 of Chapter 6, *Climate Change*.

Comment C.128

The Build with Mitigation model should incorporate TDM measures and any roadway improvements implemented by the project, and document the reductions in GHG emissions associated with the mitigation.

Response

The Proponent has prepared a mobile source GHG emissions analysis in accordance with the MEPA GHG Policy in Section 6.4.3 of Chapter 6, *Climate Change*. The analysis includes the evaluation the proposed mitigation measures and estimated reductions.

Comment C.129

The DEIR should explain how TDM measures will be monitored and adjusted over time, and provide a methodology for quantifying emission reductions impacts rather than an assumed percentage reduction.

Response

The Proponent has prepared a comprehensive transportation monitoring program, which is presented in Section 3.12.6 of Chapter 3, *Transportation*. The Proponent has prepared a mobile source GHG emissions analysis in accordance with the MEPA GHG Policy in Section 6.4.3 of Chapter 6, *Climate Change*. The analysis includes the evaluation the proposed TDM mitigation measures and quantifies the estimated emission reductions. The Proponent will describe any changes to the proposed TDM measures and include substitute measures in the GHG Self-Certification.

Comment C.130

The DEIR should include a commitment to provide a self-certification to the MEPA Office upon construction of the project. It should be signed by an appropriate professional (e.g. engineer, architect, transportation planner, general contractor) indicating that all of the GHG mitigation measures, or equivalent measures that are designed to collectively achieve identified reductions in stationary source GHG emission and transportation-related measures, have been incorporated into the project.

Response

In accordance with the MEPA GHG Policy, the Proponent will provide a self-certification to the MEPA Office signed by an appropriate professional (e.g., engineer, architect, or general contractor) following completion of construction of each individual building to demonstrate that the stationary source GHG emissions have been mitigated. A draft Self-Certification letter is presented in Section 6.4.4 of Chapter 6, *Climate Change*.

Comment C.131

If equivalent measures are adopted, the project should commit to achieving the same level of GHG emissions (i.e., "carbon footprint") identified in the Mitigation Alternative expressed in volumetric terms (tpy).

Response

The Proponent will provide a self-certification to the MEPA Office and describe any equivalent measures used to reach the same percentage GHG reduction committed to in this DEIR (as required by the MEPA GHG Policy). A draft Self-Certification letter is presented in Section 6.4.4 of Chapter 6, *Climate Change*.

Comment C.132

The DEIR should identify the schedule for construction of various elements and phases. It should identify construction-period impacts and mitigation relative to noise, air quality, water quality, and traffic, including pedestrians, bicyclists and transit riders.

Response

An overview on construction schedule, period impacts and mitigation efforts related to the project is reviewed in Chapter 7, *Construction Period*. See sections 7.1 and 7.2 in Chapter 7 for a further review of the construction impacts.

Comment C.133

The DEIR should confirm that the project will require its construction contractors to use Ultra Low Sulfur Diesel fuel, and discuss the use of after-engine emissions controls, such as oxidation catalysts or diesel particulate filters. More information regarding construction-period diesel emission mitigation may be found on MassDEP's web site at http://www.mass.gov/dep/air/diesel/conretro.pdf.

Response

Further information on construction, including a review of air quality, is outlined in detail in Chapter 7, *Construction Period*. See section 7.2.5 in Chapter 7 for an overview of air quality related to construction efforts for the project.

Comment C.134

The DEIR should provide more information regarding the project's generation, handling, recycling, and disposal of construction and demolition debris (C&D) and identify measures to reduce solid waste generated by the project.

Response

The Proponent has committed to diverting a minimum of 75 percent of construction waste and debris from landfills. Further information on construction, including a review of project related waste is outlined in detail in Chapter 7, *Construction Period*. See section 7.2.7 in Chapter 7 for an overview of the construction waste related to the Project.

Comment C.135

I encourage the Proponent to commit to C&D recycling activities as a sustainable measure for the project.

Response

Further information on construction, including a review of project related waste is outlined in detail in Chapter 7, *Construction Period*. See Section 7.2.7 in Chapter 7 for an overview of the construction waste related to the project.

Comment C.136

Demolition of any structures must comply with the MassDEP Asbestos Regulations (310 CMR 7.15) that require a pre-demolition and post-abatement survey and inspection by a licensed asbestos *monitor, and identify regulatory requirements and potential mitigation measures for the removal, handling, and disposal of asbestos containing material (ACM) and other demolition debris.*

Response

The Project will not include the demolition of any structures on site.

Comment C.137

The DEIR should describe mitigation measures related to the excavation, treatment, handling and disposal or contaminated soil and groundwater at the site.

Response

Excavation for below-grade foundation construction for the new buildings, underground parking garages, site utilities, and other improvements will generate excess soil that will require off-site transport. Chemical testing of the material will be undertaken during the design of the Project to define environmental quality and provide data required by appropriate facilities prior to accepting the material. Materials leaving the Project Site will be legally transported in accordance with local, State, and Federal requirements. All work will be conducted in accordance with the MCP and all other MassDEP requirements.

Temporary construction dewatering will be conducted in accordance with appropriate permits to be obtained by the Proponent from local, State, and Federal agencies, as applicable, to discharge into adjacent storm drains. It is anticipated that a National Pollutant Discharge Elimination System Remediation General Permit will be required from the EPA and that permits will be required from the Boston Water and Sewer Commission (BWSC).

Comment C.138

The Proponent is reminded that any contaminated material encountered during construction must be managed in accordance with the MCP and with prior notification to MassDEP.

Response

The Proponent will manage all material during construction in accordance with the MCP and will review any necessary notices with MassDEP.

Comment C.139

The project will be required to develop a Stormwater Pollution Prevention Plan (SWPP) in accordance with its NPDES CGP to manage stormwater during the construction period.

Response

See section 7.2.8 in Chapter 7, *Construction Period*, for reference to stormwater management, including development of SWPPP and requirements of NPDES permitting.

Comment C.140

The DEIR should describe stormwater management measures that will be implemented during construction.

Response

See section 7.2.8 in Chapter 7, *Construction Period*, for reference to stormwater management efforts that will be in place during construction.

Comment C.141

It should describe potential construction period dewatering requirements, discuss how dewatering will be conducted in a manner consistent with MWRA regulations/guidelines, and identify any necessary permits.

Response

Construction dewatering and discharge is not under the authority of the MWRA for this project. In this case, discharge will be permitted as noted above, through the EPA NPDES program. Refer to Section 7.2.8 in Chapter 7, *Construction Period,* for review of dewatering compliance.

Comment C.142

The DEIR should include a separate chapter summarizing all proposed mitigation measures, including construction-period measures.

Response

Chapter 8, *Summary of Mitigation Measures/Draft Section 61 Findings*, is included in the DEIR.

Comment C.143

This chapter should also include draft Section 61 Findings for each permit to be issued by State Agencies. The DEIR should contain clear commitments to implement these mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and a schedule for implementation.

Response

Refer to Section 8.2 in Chapter 8, *Summary of Mitigation Measures/Draft Section 61 Findings*.

Comment C.144

The DEIR should clearly indicate which mitigation measures will be constructed or implemented based upon project phasing, either tying mitigation commitments to overall project square footage/phase or environmental impact thresholds, to ensure that adequate measures are in place to mitigate impacts associated with each development phase.

Response

Refer to Table 8-1 in Chapter 8, *Summary of Mitigation Measures/Draft Section 61 Findings*, for review of mitigation measures for the phases of the Project.

Comment C.145

The DEIR should contain a copy of this Certificate and a copy of each comment letter received. It should include a comprehensive response to comments on the ENF that specifically address each issue raised in the comment letter; references to a chapter or sections of the DEIR alone are not adequate and should only be used, with reference to specific page numbers, to support a direct response. This directive is not intended to, and shall not be construed to, enlarge the Scope of the DEIR beyond what has been expressly identified in this certificate.

Response

A copy of this Certificate and each comment letter, along with response to comments are included in this chapter, Chapter 9, *Response to ENF Comments*.

Comment C.146

The Proponent should circulate the DEIR to those parties who commented on the ENF, to any State Agencies from which the Proponent will seek permits or approvals, and to any parties specified in section 11.16 of the MEPA regulations

Response

The DEIR will be circulated to those parties who commented on the ENF, State Agencies who will be granting permits or approvals, and to any parties specified in section 11.16 of the MEPA regulations.

Comment C.147

The Proponent should consult with the MEPA Office prior to filing the DEIR to determine whether additional distributions or outreach may be warranted to the surrounding community.

Response

Please refer to Section 1.1 of Chapter 1, *Project Description*, for further detail on the Proponent's ongoing process regarding public outreach.

Comment C.148

Per 301 CMR 11.16(5), the Proponent may circulate copies of the EIR to commenters in CD-ROM format or by directing commenters to a project website address. However, the Proponent must make a reasonable number of hard copies available to accommodate those without convenient access to a computer and distribute these upon request on a first-come, first-served basis.

Response

The Proponent intends to print a number of hard copies to be made available upon request.

Comment C.149

The Proponent should send correspondence accompanying the CD-ROM or website address indicating that hard copies are available upon request, noting relevant comment deadlines, and appropriate addresses for submission of comments.

Response

The Proponent will facilitate communication relating to the availability of hard copies of the DEIR and the deadlines/manners of submission of comments.

Comment C.150

The DEIR submitted to the MEPA office should include a digital copy of the complete document. A copy of the DEIR should be made available for review at the Allston branch of the Boston Public Library.

Response

The Proponent will circulate a digital file of the complete DEIR to the MEPA Office and provide a copy of the DEIR to the Allston branch of the Boston Public Library.

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9.2 Massachusetts Department of Transportation

Comment 1.1

The DEIR should include a TIA prepared in conformance with the current MassDOT/EOEEA TIA Guidelines.

Response

The transportation impact analysis, as documented in Chapter 3, *Transportation*, was performed in general conformance with the Massachusetts Executive Office of Environmental Affairs (EEA)/Executive Office of Transportation (EOT)/MassDOT guidelines. Prior to completing this study, the Proponent submitted a Transportation Scoping Letter (TSL) to MassDOT to obtain agreement from the state reviewing agency on the assumptions and approaches used in the transportation study. This study has been prepared based on that process and DOT's direction. (The TSL is included in Appendix C for reference.)

Comment 1.2

The study should include a comprehensive multimodal assessment of the transportation impacts of the project. The TIA should provide an evaluation of mobility to and from the project site for the existing conditions, future No-Build conditions, and future Build conditions within the study area. The future Build conditions should include an analysis of conditions both with and without any improvements suggested to mitigate project impacts.

Response

The transportation assessment included in Chapter 3, *Transportation*, includes a comprehensive evaluation of the project's use of area roadways, public and private transit, pedestrian and bicycle facilities, and other transportation modes.

As documented in Chapter 3, VHB prepared the transportation assessment in five stages. The first stage identifies the features of the proposed Project, including the proposed roadway network, site access, and on-site pedestrian and bicycle circulation. The second stage involved an assessment of existing transportation conditions within the Project study area including an inventory of existing roadway geometry; observations of traffic flow, including daily and peak period traffic counts; an inventory of sidewalks, bike lanes, and multi-use paths; a summary of existing public transit facilities in the area and their use; and a review of vehicular crash data. The third stage of the study established the framework for evaluating the transportation impacts of the proposed Project. Specific travel demand forecasts for the Project were assessed along with future transportation demands expected to result from projected background traffic growth and other proposed area developments that may occur independent of the Project. The fourth stage includes a summary of all transportation-related analyses that have been conducted with and without the Project in-place, including traffic capacity analyses, transit capacity analyses, and bicycle level of stress analyses. A summary of traffic capacity analyses is provided in Section 3.8, a summary of transit service capacity analyses is provided in Section 3.9, and a summary of bicycle level of traffic stress analyses is provided in Section 3.10. The final stage of the study discusses possible measures to improve upon existing conditions while enhancing future mobility in the project area.

Comment 1.3

The study should propose a mitigation package intended to improve mobility for all users, with a particular focus on increased use of walking, bicycling, and transit by residents, employees, and visitors. Items listed below should be accounted for in preparing the TIA.

Response

Sections 3.8, 3.9, and 3.10, in Chapter 3, *Transportation*, evaluate potential Project impacts on traffic operations, transit service, and bicycling infrastructure. Please refer to Section 3.12 for an evaluation of mitigation measures, recommended improvements, and proposed timing for their implementation. The mitigation package includes measures that enhance mobility for all users with an emphasis on increased walking, bicycling, and transit use. A summary of the associated Transportation Demand Management (TDM) measures is included in Section 3.12.5.

Comment 1.4

MassDOT asks that the TIA consider whether LUC 310 accurately captures the trip generation of the conference facility included in the hotel.

Response

Refer to Section 3.6.4 in Chapter 3, *Transportation*, for a discussion on the land use codes used to estimate trips for each land use. For the hotel, the number of rooms/keys were analyzed using the standard ITE land use code (LUC 310), which includes guest amenities and conference space that will be primarily provided by the Treehouse Conference Center. Furthermore, a majority of the conference attendees are expected to stay at the hotel. As such , the Center is not expected to have a measurable impact on the average weekday morning and weekday evening peak hour traffic analysis beyond the estimated activity under the hotel land use code. Special events that may happen during evenings or weekends at the Treehouse Conference Center's ballroom are not expected to occur daily nor are they expected to generate significant activity during peak traffic hours.

Comment 1.5

The TIA should provide a detailed description of how the trip generation is calculated and clarify the discrepancy between the ENF and the TSL.

Response

The difference in trip generation estimates is attributed to the future mode share assumptions for the Project applied at the time of the estimate. The trip estimates included in the ENF table reflected an older/superseded set of assumptions, whereas the Scoping Request letter contained estimates based on a revised set of assumptions that reflected on-going project mode share projections being discussed with the City of Boston at that time. The estimate of Project-generated trips by mode provided in Section 3.6.4 of Chapter 3, *Transportation,* differ slightly than those presented in the Scoping Request letter and reflect the final estimates, which are based on City of Boston staff direction on future mode share assumptions for evaluating 2025 and 2030 conditions, with the expectation that travel in the city will progress toward the *Go Boston 2030* plan goals.

Comment 1.6

Should the Proponent use aspirational mode share data, MassDOT requires that the Proponent provide quantitative analysis on how the transportation improvements and policies implemented by the project will achieve that mode share goal. The TIA should include all back up data used to arrive at the mode split estimates to corroborate assumptions included in the analyses.

Response

Refer to Section 3.6.4 in Chapter 3, *Transportation*, for a discussion of mode shares that were used in the TIA. The mode shares used are based on City of Boston staff direction on future mode share assumptions for evaluating a 2025 and 2030 condition, with the expectation that travel in the city will progress toward the Go Boston 2030 plan goals. The Project's proposed transit service enhancements, sustainable transportation facilities, and Transportation Demand Management (TDM) plan (outlined in Section 3.12) comprise a comprehensive package of travel demand strategies intended to achieve the targeted mode shares that reduce automobile trips.

Comment 1.7

The TIA should also include mode share estimates for taxi/Transportation Network Company (TNC, i.e. Uber and Lyft) trips because this would likely be a popular mode for the hotel and conference patrons. In accounting for these trips, the transportation analysis should take into consideration that one person trip made by a taxi/TNC results in two vehicle trips.

Response

The use of taxi/Transportation Network Companies (TNCs) was accounted for in the trip generation calculations and curbside demand analysis as referenced in Sections 3.6.4 and 3.8.1 of Chapter 3, *Transportation*. The vehicle trip estimates for the Project incorporate the TNCs that generate dead-head trips coming or leaving a project site – those vehicle trips without a passenger. Calculations outlining the TNC trip generation methodology are provided in Appendix C.

Comment 1.8

Vehicle and transit trips should be assigned to the study area network. The TIA should provide all appropriate back up documentation to verify how the distribution percentages are calculated and assigned to the roadway network and the transit system.

Response

Refer to Section 3.6.5 in Chapter 3, *Transportation*, for a detailed description of the Project trip distribution. These distribution percentages were calculated based on the City of Boston's published distribution data for Area 17, which is based on Census survey data. Supporting calculations are provided in Appendix C.

Comment 1.9

The TSL proposes a study area consisting of the following intersections:

- *Western Avenue at Soldiers Field Road;*
- *Western Avenue at Kresge Way/Sanofi Genzyme Driveway/Project Driveway;*
- *Western Avenue at Batten Way/Hague Street;*
- *North Harvard Street at Soldiers Field Road;*
- *North Harvard Street at Western Avenue;*
- *North Harvard Street at Franklin Street/Kingsley Street;*
- *Cambridge Street at North Harvard Street;*
- *Cambridge Street at Windom Street;*
- *Cambridge Street at I-90 Ramps/Double Tree Hotel; and*
- *Cambridge Street at Soldiers Field Road.*

Response

Refer to Section 3.5.1.1 in Chapter 3, *Transportation*, for a complete list of intersections studied, including all those requested in the TSL.

Comment 1.10

In addition, by the time of the future scenarios, three additional intersections will be constructed in the study area as part of the Harvard Science and Engineering Complex:

- *Western Avenue at Stadium Road;*
- *Western Avenue at Academic Way; and*
- *North Harvard Street at Academic Way.*

Response

The transportation analysis includes intersections created as part of the Harvard Science and Engineering Complex (SEC). Refer to Section 3.5.1.1 in Chapter 3, *Transportation*, for a complete list of intersections studied.

Comment 1.11

Furthermore, the Build scenarios that include the project will include three additional project driveway intersections (Western Avenue at Kresge Way/Sanofi Genzyme Driveway/Project Driveway will be the fourth project driveway):

- *Western Avenue at Cattle Drive;*
- *Western Avenue at East Drive; and*
- *Interim Cattle Drive at Windom Street.*

Response

The transportation analysis includes intersections created as part of the Enterprise Research Campus. In addition to the intersections requested by MassDOT, the intersection of Cattle Drive at DEF Drive, which is internal to the Project Site, was studied. Refer to Section 3.5.1.1 in Chapter 3, *Transportation*, for a complete list of intersections studied.

Comment 1.12

MassDOT asks that the study area be expanded to include the following intersections:

- *Western Avenue at Memorial Drive (Cambridge);*
- *River Street at Memorial Drive (Cambridge);*
- *JFK Street at Memorial Drive (Cambridge);*
- *Merge of I-90 off-ramp onto Cambridge Street westbound; and*
- *Diverge of I-90 on-ramp from Cambridge Street eastbound.*

Response

Refer to Section 3.5.1.1 in Chapter 3, *Transportation*, for a complete list of intersections studied, including all those requested by MassDOT and additional intersections.

Comment 1.13

Finally, depending on the expected trip distribution, MassDOT may request merge/diverge analyses for the Soldiers Field Road exit and entrance ramps at North Harvard Street and River Street/Western Avenue, as well as the I-90 mainline exit and entrance ramps at the Allston Interchange, including the ramp merge/diverge locations within the interchange.

Response

A merge and diverge analyses were conducted for two specific locations where Project trips are expected based on the vehicle trip distribution: Cambridge Street Westbound at I-90 Off-Ramp and Cambridge Street Eastbound at I-90 On-Ramp. The analysis reflects the Existing conditions, future No-Build and Build conditions. The results of these analyses are provided in Sections 3.7.1 and 3.8.2 in Chapter 3, *Transportation*.

Comment 1.14

The study area will be subject to review by MassDOT in coordination with DCR when the comprehensive TIA is submitted. Please note that additional study area intersections should be included in the TIA if project-generated trips are anticipated to increase peak hour traffic volume by five percent or more, or by more than 100 vehicles per hour.

Response

Our traffic estimates do not anticipate that any intersections outside those identified in the study area (inclusive of those listed under MEPA in Comment C.31) will be impacted enough by the Project to be included in the TIA. Refer to Section 3.5.1 in Chapter 3, *Transportation* for a complete list of intersections studied.

Comment 1.15

As described in the TSL, baseline traffic volumes should use historic traffic counts adjusted to 2019 conditions, standing in for 2021, according to the revised MassDOT Guidance on Traffic Count Data. The TSL notes that counts within the study area from 2017 have been identified.

Response

Historic traffic counts from 2017 and 2018 were used as a basis and adjusted to 2019 conditions to represent a 2021 Existing condition. Traffic counts were adjusted per MassDOT guidelines and added to project-generated trips from background developments completed between the time of counts and the existing condition. Refer to Sections 3.5.4.1 through 3.5.4.3 in Chapter 3, *Transportation*, for description of the data used and the adjustments made in accordance with Massachusetts Department of Transportation guidelines.

Comment 1.16

In developing future No-Build and Build traffic volumes, the TIA should include trips generated by other nearby planned and/or approved projects as part of the background growth.

Response

Refer to Section 3.7.1 and 3.8.3 in Chapter 3, *Transportation*, for a summary of background growth in trips expected to result from specific development projects.

Comment 1.17/1.18

ITE trip rates or completed TIAs should be used to estimate the vehicle trip generation of un-built and/or yet to be occupied space. In addition, an annual growth factor should be superimposed on existing traffic volumes prior to the addition of the volumes associated with background project-specific growth.

The TSL proposes using no annual growth factor to develop future scenarios, in accordance with the City of Boston's guidance. However, MassDOT asks that for MassDOT controlled facilities, particularly I-90 and the I-90 ramps, that the analysis reflect a typical positive growth in roadway volumes.

Response

Refer to Section 3.7.1 and 3.8.3 in Chapter 3, *Transportation*, for a summary of background growth in trips expected to result from specific development projects. Trips from these projects were added to the study area intersections based on recent published traffic studies (or, for projects without published or complete traffic studies, trips are estimated for those based on ITE trip rates).

For the No-Build and Build scenarios, a typical growth rate was used on roadways classified as interstate highways or urban principal arterials in accordance with MassDOT guidelines, as described in Section 3.6.1. Specifically, an annual growth rate of 0.4-percent was applied to the existing traffic volumes along Soldiers Field Road, Memorial Drive, Cambridge Street, the I-90 Ramps, and all Charles River crossings.

Comment 1.19

The DEIR should further describe and clarify the other development planned by Harvard near the project site.

Response

Refer to Section 3.7.1 and 3.8.3 in Chapter 3, *Transportation*, for a summary of background growth in trips expected to result from specific development projects, including descriptions of planned projects by Harvard University near the Project Site.

Comment 1.20

The DEIR should clarify how this project will relate to and integrate with MassDOT, Boston, and Harvard's vision for development and transportation in the Allston area.

Response

Refer to Section 3.8.3 in Chapter 3, *Transportation*, for a summary of other area transportation projects that are reflected in the future condition analyses.

As part of the Allston Multimodal Project that will reconstruct the I-90 Allston-Brighton interchange, a new street grid system is planned south of Cambridge Street. Thus, the ERC

Enabling Infrastructure Roadways supporting the Site are being designed to accommodate long-range vision plans for the area that include a series of new roadways and connections. For example, East Drive and Cattle Drive are being designed to connect to Cambridge Street and provide continuity to the Allston Multimodal Project's roadway network. Although the condition in the 2030 analysis year does not assume the implementation of the Allston Multimodal Project's roadway network at that time, this Project's proposed infrastructure (including mitigation measures) do consider this long-term vision and won't preclude those connections from being properly integrated in the future. Discussions of the proposed street network and the consistency with long-range plans are included in Sections 3.3.3 and 3.3.4 in Chapter 3, *Transportation*.

Comment 1.21

While the planning horizon year for TIAs is typically seven years from the time of submittal of the TIA, the TSL proposes Medium Term and Long Term scenarios in 2025 and 2030, respectively, to reflect the phased development of the site. MassDOT accepts this approach and asks that the Proponent clarify with MassDOT the project-related development that should be included in the 2030 No-Build scenario.

Response

The 2030 No-Build Conditions assume that no Project-related development will be in place. Thus, the difference between the 2030 No-Build and 2030 Build Conditions provides a comparison of conditions with only other area background projects (i.e., no ERC development on Site) against future conditions inclusive of the Full Build of the Project.

Comment 1.22

Future scenarios should also incorporate planned transportation projects. The Proponent should coordinate with MassDOT, the MBTA, and the City of Boston about ongoing and planned transportation improvements in the vicinity of the project site.

Response

The Proponent coordinated with MassDOT, the MBTA and the City of Boston regarding planned transportation improvements. Refer to Section 3.8.3 in Chapter 3, *Transportation*, for a summary of other area transportation projects that are reflected in the future condition analyses.

Comment 1.23

The TSL states that the analysis for the future scenarios will not include the Massachusetts Turnpike/I-90 Interchange reconstruction (and West Station) (the Allston Multimodal Project) because, according to the Boston Region MPO's long-range transportation plan, the project is not expected to start construction until the 2030 to 2034 period. MassDOT concurs with this approach. Nevertheless, the Proponent should ensure that the design and transportation *mitigation program for this project is consistent with the vision and mobility goals of the Allston Multimodal Project.*

Response

See response to 1.20. The design and transportation mitigation program for the Project is consistent with the vision and mobility goals of the Allston Multimodal Project.

Comment 1.24

Capacity analyses should be conducted for the weekday morning and evening peak hours for both existing and future conditions for each development alternative considered. In addition, capacity analyses for Build with mitigation conditions should be provided for all intersections, particularly those with impacts to the state highway system.

Response

Capacity analyses for the weekday morning and weekday evening peak hours are provided in Section 3.7.1 of Chapter 3, *Transportation*. Further capacity analyses for the intersections where mitigation is proposed are provided in Section 3.12.4.

Comment 1.25

The TIA should provide illustrations depicting the peak hour 50th (average) and 95th percentile queue lengths for each lane group/turning movement at each study area intersection, for all analysis scenarios. The information contained in these illustrations should clearly demonstrate that the project would not result in any extended queues that would block vehicle movements to/from study area intersections, particularly those involving state highways. Appropriate mitigation should be identified at any locations where queue blockages occur. Color-coded illustrations should also be prepared depicting the level of service (LOS) for each lane group/turning movement for each case.

Response

Refer to Appendix C for illustrations depicting the peak hour 50th and 95th percentile queue lengths. A tabular summary of the results of the intersection operations analysis is provided in Sections 3.8.1.2 and 3.8.1.3 of Chapter 3, *Transportation*. A description of all proposed roadway improvements is provided in Section 3.6.2.

Comment 1.26

The TIA should include a safety analysis for all intersections and roadway segments within the study area. The analysis should calculate crash rates using MassDOT data for the most recent continuous five-year period. Crash rates should be documented, and additional mitigation considered at any locations exceeding the State and/or District 6 averages.

Response

Refer to Section 3.6 in Chapter 3, *Transportation*, for a roadway safety analysis, including an inventory of publicly available crash data and the recommendations of five Road Safety Audits (RSAs) conducted within the Study Area as a part of this Project.

Crash rates were calculated using MassDOT data for the five-year period from 2014 – 2018. These crash rates are provided in Section 3.5.6.1.

Of the intersections studied, five intersections exceeded the MassDOT District 6 average. Four of these intersections were evaluated via road safety audits (RSAs), which identified potential safety improvements and other mitigation elements (Section 3.5.6). MassDOT Traffic Safety Section did not require an evaluation via an RSA at the fifth location (the intersection of Cambridge Street at Soldiers Field Road), because of recent (2018) installation of multi-modal roadway improvements intended to improve safety.

Comment 1.27

The Proponent should determine if any study area intersections are listed in the Highway Safety Improvement Program (HSIP) and coordinate with the MassDOT Highway Division's Safety Section to determine if a Road Safety Audit (RSA) is necessary. An initial review provided in the TSL identifies North Harvard Street at Soldiers Field Road as an HSIP bicycle cluster and North Harvard Street at Soldiers Field Road and Cambridge Street at Soldiers Field Road as HSIP vehicle clusters. The Proponent should coordinate with MassDOT about the need to complete RSAs at the HSIP eligible intersections before the submission of the DEIR; MassDOT anticipates that RSAs will be required.

Response

As part of the MEPA review process for this Project, VHB coordinated with MassDOT Traffic Safety Section to determine which study area locations required an RSA. All HSIP intersections within the study area required an RSA except for Cambridge Street at Soldiers Field Road. Refer to Section 3.5.6 in Chapter 3, *Transportation*, for a summary of HSIP intersections, a description of the RSA coordination, and a summary of the RSA recommendations.

Comment 1.28

The TIA should include sufficiently detailed conceptual plans (minimum of 80-scale) for proposed roadway improvements in order to verify the feasibility of constructing such improvements. These plans should clearly show proposed lane widths and offsets, layout lines and jurisdictions, and land uses adjacent to areas where improvements are proposed.

Response

Refer to Section 3.4.4 in Chapter 3, *Transportation*, for a detailed description of the proposed street network. Conceptual roadway plans at 80-scale are included in Appendix C.

Comment 1.29

As described above, the MBTA currently operates extensive bus service near the site and the project anticipates substantial transit mode share. The TIA should contain an analysis of additional transit demand generated by the project and the capacity on the MBTA bus routes proximate to the project site.

Response

Refer to Section 3.8 in Chapter 3, *Transportation*, for an analysis of the transit capacity and demand on MBTA bus routes that serve the Project and the Lower Allston area. The analysis accounts for the anticipated demand generated by the Project and several other area projects that are under construction or under development review.

Comment 1.30

Once the transit trip generation is developed and applied to the network, the TIA should address the following issues:

The analysis should be compliant with the MBTA's Office of Performance Management and Innovation's (OPMI) methodology for calculating the existing, future No- Build, and future Build comfort metrics (as evaluated in the Service Delivery Policy [SDP]) for each bus route within the project study area.

Response

Refer to Section 3.8 in Chapter 3, *Transportation*, for an analysis of the transit capacity and demand on MBTA bus routes that serve the Project and the Lower Allston area. The analysis is compliant with the MBTA's OPMI methodology for calculating passenger comfort metrics.

Comment 1.31/1.32/1.33/1.34

Mitigation should be proposed for:

- *Any bus route receiving new passengers that falls below the 96 percent route-wise minimum threshold for the SDP comfort metric (share of passenger travel time experienced in comfortable conditions);*
- *Any trip for which the new passengers would cause the trip to exceed the threshold; and/or*
- *Any trip which was already above the crowding threshold and to which new passengers would be added.*

The Proponent should coordinate with the MassDOT PPDU and MBTA Service Planning in advance proposing of potential solutions to offset these project-related impacts.

Response

Section 3.12.2 in Chapter 3, *Transportation*, describes the proposed mitigation measures to improve/increase MBTA bus service and to diminish Project ridership on any crowded MBTA bus service.

The Proponent and the Project team met with the MassDOT PPDU and MBTA Service Planning group on April 30, 2021 and July xx, 2021 to review the results of the bus passenger crowding analysis for bus Route 70, 64, 66, and 86, and to obtain the MBTA's input on opportunities and constraints, for potential transit mitigation measures. The Proponent will continue to work with MassDOT and the MBTA to refine and support appropriate measures.

Comment 1.35/1.36/1.37

The TIA should show how residents, employees, and visitors using the bus network will travel between the site and the bus stops.

The TIA should show how pedestrian crossings and bus stops can be coordinated to ensure safe, accessible travel for bus customers. Of particular importance to the MBTA are all codes and standards related to the Americans with Disabilities Act (ADA), the Massachusetts Architectural Access Board (MAAB) along with the Federal Transit Administration (FTA) regulations and guidance.

The Proponent should present the existing conditions on routes between nearby bus stops and the project site and how those conditions should be upgraded/improved to ensure a fully accessible path of travel for all customers.

Response

Sections 3.3.5 and 3.12.3 in Chapter 3, *Transportation*, gives an overview of the proposed pedestrian and bicycle facilities on the development site, including the walking connections to the proposed MBTA Route 70 stops on Western Avenue. Section 3.5.2 outlines the existing public transit accommodations. In addition, as outlined in Section 3.12.3, the Proponent is proposing to install a traffic signal at the intersection of Western Avenue at East Drive / Kresge Way that will include an ADA-compliant crosswalk across Western Avenue. The intersection design proposes relocating and upgrading the bus stop and will provide a protected crossing for pedestrians walking between the Site and the outbound bus stop on the north side of Western Avenue. Additionally, Section 3.12.2 details proposed transit-specific improvements.

Comment 1.38

The TIA should also identify and document transit improvement proposals under evaluation by MassDOT, the MBTA, and the City of Boston. Mitigation proposed for the project should be consistent with ongoing transit improvement initiatives of these agencies.

Response

Refer to Section 3.8.2 in Chapter 3, *Transportation*, for a summary of transit improvements under evaluation by MassDOT, the MBTA, and the City of Boston. All proposed transit mitigation measures outlined in Section 3.12.2 account for the recommendations and transit improvement plans noted in those studies.

Comment 1.39

Because the project anticipates a high pedestrian mode share, it is expected that the Proponent will provide a mitigation package that ensures walking and bicycling will be an attractive way to access the site.

Response

The site's Enabling Roadway Infrastructure are designed to provide a low level of bicycling traffic stress by providing separated bicycle lanes and sidewalks in a Complete Streets framework. A description of each new roadway and the proposed cross section is included in Section 3.4.5 and 3.6.2.

The proposed Project infrastructure and off-site mitigation are designed to account for the strong multimodal connections to/from and through the Project Site. For example, the Project's Greenway will be the largest publicly accessible open space in a network of public realm connections that will stretch from the Lower Allston neighborhood to the Charles River. That open space network will create a pedestrian/bicyclist connection from Allston to Cambridge, while linking the surrounding communities to the Charles River.

The mitigation plan was developed to ensure that walking and bicycling will be an attractive way to access the site. Refer to Sections 3.4.5, 3.5.3, and 3.12.3 in Chapter 3, *Transportation*, for an overview of the proposed pedestrian and bicycle facilities on the development site, including the location and number of spaces allocated to bicycle parking, and how these connect to existing and future/proposed walking and bicycling networks in the neighborhood.

Comment 1.40/1.41

The TIA should provide an inventory of existing sidewalks and crosswalks within the study area and should address the quality and condition of those facilities.

The TIA should include a commitment to improvements in any areas that are structurally deficient or not meeting current codes for accessibility, including sidewalks, crosswalks, ramps, and pedestrian equipment. Special attention should be given to linking the proposed development to adjacent complementary land uses and transit facilities.

Response

Refer to Section 3.5.3 in Chapter 3, *Transportation*, for a detailed description of existing pedestrian and bicycle facilities in the Study Area. Sections 3.4.5, 3.5.3, and 3.12.3 gives an overview of the proposed pedestrian and bicycle facilities on the development site and how these connect to existing and future/proposed walking and bicycling networks in the neighborhood. As part of the proposed Project will be the reconstruction of the sidewalks along Western Avenue along the Site and the upgrading of the on-street bicycle lane to a sidewalk-level separated bicycle path. As outlined in Section 3.12.3, the Proponent is proposing to install a traffic signal at the intersection of Western Avenue at East Drive / Kresge Way and provide an ADA-compliant crosswalk across Western Avenue that will improve accessibility to the westbound bus stop. Also, as previously discussed, the proposed Project infrastructure and off-site mitigation are designed to account for the strong multimodal connections to/from and through the Project Site. Comment 1.42

The TIA should include a detailed inventory of the bicycle network to include bikeway types, bikeway widths, and bicycle numbers and speeds.

Response

Refer to Section 3.5.3.2 and Figure 3.13 in Chapter 3, *Transportation*, for a detailed description of existing bicycle facilities in the Study Area. The Existing Conditions bicycle volumes are presented in Section 3.5.4.5 and Figures 3.19 and 3.20. Sections 3.4.5, 3.5.3, and 3.12.3 gives an overview of the proposed pedestrian and bicycle facilities on the development site. A summary of the bicycle level of traffic stress evaluation of the on-street bicycle lanes for the existing and proposed facilities is provided in Section 3.9.

Comment 1.43/1.44/1.45

The Proponent should identify the likely travel routes for bicyclists within the study area. The degree to which these routes can safely support bicycle travel should also be examined.

The TIA should reevaluate these routes based on the origin-destination of potential residents, employees, and visitors. Based on this analysis, the Proponent should consider the feasibility of expanding some of these existing routes or considering new routes to encourage bicycle travel in and around the site.

The Proponent should work closely with MassDOT and the City of Boston to provide a seamless connection between the existing and planned bicycle facilities in the study area.

Response

Sections 3.4.5, 3.5.3, and 3.12.3 in Chapter 3, *Transportation*, gives an overview of the proposed pedestrian and bicycle facilities on the development site including how these connect to existing/future/proposed walking and bicycling networks in the neighborhood. In addition, a summary of the bicycle level of traffic stress for the existing and proposed facilities is provided in Section 3.9.

The proposed Project infrastructure and off-site mitigation are designed to account for the strong desires for multimodal connections to/from the Lower Allston neighborhood and the regional trail network adjacent to the Charles River. That open space network will create a pedestrian/bicyclist connection from Allston to Cambridge, while linking the surrounding communities to the Charles River.

The Proponent will work closely with MassDOT and the City of Boston on the final design of all proposed bicycle accommodations in order to ensure a seamless connection between existing and planned bicycle facilities.

The site's Enabling Roadway Infrastructure are designed to provide a low level of bicycling traffic stress by providing separated bicycle lanes and sidewalks in a Complete Streets framework. A description of each new roadway and the proposed cross section is included in Sections 3.4.5 and 3.6.2.

Comment 1.46/1.47/1.48

The TIA should explain the methodology used to determine the total parking required. The ITE Parking Generation Manual (5th Edition) generally provides a reasonable basis for comparison to parking requirements under local zoning.

The TIA should include a summary of parking need and supply for comparable facilities based on multiple data sources.

The TIA should also determine the number of parking spaces occupied at various times of day and identify periods of peak use.

Response

Refer to Section 3.4.6 of Chapter 3, *Transportation*, for a summary of on-site parking supply for the Project. Section 3.11.2 provides a summary of the shared parking analysis that evaluates the proposed parking supply against anticipated demand (by time of day), City of Boston parking guidelines, and ITE rates for developments in urban settings.

Comment 1.49

The TIA should include a comprehensive TDM program that would implement measures aimed at minimizing SOV and TNC trip generation to achieve the robust non-SOV mode share presented in the TSL.

Response

The Project will include a robust set of transportation demand management (TDM) measures that align with the requirements outlined in the City of Boston's Transportation Demand Management *Menu of Options*. These TDM measures will support the Project's proposed transportation mode shares and parking demand rates. See Section 3.12.5 in Chapter 3, *Transportation*, for details.

Comment 1.50

The TDM program should further investigate measures that would maximize usage of existing and potential new pedestrian, bicycle, and transit facilities. Such measures may include the following:

- *Limiting the available parking supply;*

- *Provision of a parking cash-out program and/or charging for parking;*
- *Provision of on-site amenities and conveniences that would reduce the need for automobile travel;*
- *Provision of carpooling and vanpooling programs and perks;*
- *Provision of free or subsidized transit passes;*
- *Provision of a mobility hub to centralize multiple modes of transportation including the TNC/taxi trips expected to serve the hotel;*
- *Provision of seamless, welcoming, and direct pedestrian access to nearby transit hubs; and*
- *Provision of robust bicycle and pedestrian amenities.*

Response

The Project will include a robust set of transportation demand management (TDM) measures that align with the requirements outlined in the City of Boston's Transportation Demand Management *Menu of Options*. These TDM measures will support the Project's proposed transportation mode shares and parking demand rates. See Section 3.12.5 in Chapter 3, *Transportation*, for details.

Comment 1.51

The ENF states that the project will join the Allston/Brighton Transportation Management Association (TMA). The Proponent should work with the TMA to develop a TDM program for the project.

Response

The Proponent is committed to joining the Allston/Brighton TMA. As the Project advances, the Proponent will work with the TMA to work out the implementation details of the proposed TDM measures. On May 13, 2021, the Proponent held an initial meeting with the Transportation Demand Management Director at A Better City, the parent organization that operates the Allston-Brighton TMA.

Comment 1.52

The Proponent will be required to conduct an annual transportation monitoring program for a period of five years, beginning six months after occupancy of the full-build project. The goals of the monitoring program will be to evaluate the assumptions made in the EIR and the adequacy of the mitigation measures, as well as to determine the effectiveness of the TDM program. It would include:

- *Simultaneous automatic traffic recorder (ATR) counts at each parking entrance for a continuous 24-hour period on a typical weekday;*

- *Weekday morning and evening peak hour turning movement counts (TMCs) and operations analysis at "mitigated" intersections, including those involving parking entrances;*
- *Travel survey of residents, employees, and visitors at the site (to be administered by the Transportation Coordinator); and*
- *Transit Ridership counts.*

Response

Section 3.12.6 in Chapter 3, *Transportation*, provides a proposed transportation monitoring program, which will include the collection of parking activity, off-site TMCs at specific study area intersections, and ATR volumes; compiling and reviewing transit ridership counts on MBTA bus and shuttle services; and conducting a travel choice survey of residents, employees, and visitors.

Comment 1.53

The Proponent should continue consultation with the City of Boston, DCR, and appropriate MassDOT units, including PPDU, the MBTA, and the District 6 Office.

Response

As the project progresses, the Proponent will continue to consult with the City of Boston, DCR, and several MassDOT units including PPDU, the MBTA, and District 6.

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9.3 Massachusetts Department of Conservation and Recreation

Comment 2.1

The intersection of Cambridge Street with Soldiers Field Road, which is included as a study area intersection is of particular interest to DCR, as it currently operates poorly and causes ripple effects in nearby intersections. DCR will coordinate with the Proponent, Harvard University, and the City of Boston to identify intersection and signal timing adjustments to support additional traffic from the Project, and to unlock traffic flow along and across the Charles River. In particular, DCR would like to explore the concept of eliminating one of the five signal phases to improve efficiency and cycle length in this intersection.

Response

The Proponent agrees that the intersection of Cambridge Street at the I-90 Ramps and Soldiers Field Road is a critical intersection within the study area. While the Project is not expected to have major impacts at this location (the overall delay at the intersections are not expected to increase by more than 8 seconds between the No-Build and Build Conditions in 2025 and by no more than 12 seconds between the No-Build and Build Conditions in 2030), the Proponent is committed to coordinating further with DCR, Harvard University and the City of Boston to continue to improve operations at this location.

Comment 2.2

Second, DCR strongly recommends that the Traffic Impact Assessment (TIA) devote a full section to discussion of post-pandemic trip-making as it related to the Project. Using traditional Institute of Traffic Engineers assumptions will not be sufficient without explaining adjustments to changes in travel choices regarding mode split, trip generation, and growth rates. Although the TIA must make mathematical projections of traffic volumes to conduct a full capacity analysis, as MEPA requires, the TIA must clearly explain the uncertainty of base assumptions and the resulting calculations.

Response

The Project's site plan and streetscape design, new off-site multimodal connections, and supported transit service enhancements are, in combination, aimed at reducing traffic impacts generated by the Project – by supporting and encouraging trips by transit, bicycle and on foot. The goal is to help ensure that the trips generated by the Project will align with the Go Boston 2030 mode share goals that aim to reduce reliance on vehicle travel. Given the uncertainty of future trip generation and use of the transportation network in a post-pandemic period, it is difficult to estimate exactly how roadway and transit systems will operate in 2025 and 2030. Although more people will return to working in person compared to the pandemic conditions in 2020 and early 2021, it is unlikely that the transportation network will be used in the same manner as pre-pandemic conditions in the near-term. The future conditions activity levels (traffic volumes and transit ridership) used in this analysis represent a reasonable estimate of the demands on the transportation network in 2025 and 2030 by projecting pre-pandemic travel behaviors. These estimates are based on City of Boston staff direction on future mode share assumptions for evaluating a 2025 and 2030 condition, with the expectation that travel in the city post-pandemic will progress toward the Go Boston 2030 goals.

For more information, please see the introduction to Section 3.6 in Chapter 3, *Transportation*, which discusses the impacts of COVID-19 on the trip-making assumptions as related to the Project. Growth rates and expected new background trips, which were developed with input from BPDA and MassDOT, are discussed in Section 3.6.1. In addition, an estimate of Project-generated trips by mode, including a description of the mode share assumptions applied, is provided in Section 3.6.4.

Comment 2.3

Finally, DCR strongly recommends that the Proponent take new (2021) traffic counts at all study area intersections and Automatic Traffic Recorders (ATRs) wherever historic counts were taken, so that a comparison of pre-pandemic and current traffic volumes can be made. If traffic monitoring will be a part of Total Traffic Demand (TDM) measures, traffic counts from 2021 will be an important baseline data point.

Response

Existing traffic conditions in the TIA are based on pre-pandemic counts conducted primarily in 2017 and 2018. Although the long-term impacts of the COVID-19 pandemic on traffic volumes in the region are unknown, using pre-pandemic volumes as the base condition for all analyses provides a scenario of traffic volumes that could return and ensures that existing counts do not undercount the baseline for future year analyses. This approach is consistent with MassDOT guidelines specified in Engineering Directive E-20-005 published on May 11, 2020.

As of the development of this TIA in Spring 2021, the COVID-19 restrictions in Massachusetts were slowing beginning to be lifted (and an expected end of the governor's State of Emergency order on June 15, 2021). As restrictions are lifted, traffic volumes are showing signs of returning to pre-pandemic levels. To provide a baseline for future traffic monitoring programs as compared to the early post-pandemic conditions, the Proponent is committed to conducting new traffic counts in Fall 2021 at specific study area intersections and roadways, as outlined in the traffic monitoring discussion in Section 3.12.6 of Chapter 3, *Transportation*. These counts will be scheduled only after students return to school and most workplaces are open with few or no restrictions associated with the pandemic.

9.4 Massachusetts Department of Energy Resources

Comment 3.1

For this project we expect key mitigation measures to include:

- Passivehouse (for the residential and possibly the hotel);

Response

The Proponent has reviewed and evaluated the list of mitigation measures listed in the comment and DOER's comment letter, including Passive House. The Design Case has incorporated the C406.9 reduced air-infiltration additional ECM, to further enhance building envelope performance. However, the project building envelope design is only at a conceptual level and has not been designed, therefore the Proponent is not able to commit to a Passive House level of performance at this stage.

The Proponent and design team have focused study and analysis on electrification of heating systems and are continuing to consider this option. Decisions on systems are also pending the results of the district energy feasibility study, which has focused on reducing natural gas use for domestic hot water and heating. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change,* and in detail in Appendix B.

Comment 3.2

- *Building design and construction practices that result in low heating and cooling thermal energy demand intensity (heating and cooling "TEDI") (for all buildings) by:*
  - *Maintaining envelope integrity with framed, insulated walls with continuous insulation;*
  - *Thermally-broken windows and other components to eliminate thermal bridges;*
  - *Minimizing glass curtain wall assemblies and excessive windows;*
  - *Low air-infiltration, confirmed with in-building air-infiltration testing;*
  - *Energy recovery;*
  - *Management of solar heat gains;*

Response

Proponent has reviewed and evaluated the list of mitigation measures and incorporated each into the review of GHG mitigation for the Project. The evaluation takes into account the list of measures and further detail is included in the stationary source emissions assessment, which is presented in detail in Appendix B.

Comment 3.3

- *Efficient electrification of space heating, including:*
    - *For residential, retail, restaurant, office, hotel: Air-to-air and air-to-water heat pumps for space heating;*
        - *Alternatively for above uses, particularly office: low temperature, hydronic space heating with heat-input provided by in-building, central plant consisting of air-to-water heat pump;*

Response

Proponent has reviewed and evaluated the list of mitigation measures and incorporated each into the review of GHG mitigation for the Project, including electrification technology. The evaluation takes into account the list of measures and further detail is included in the stationary source emissions assessment, which is presented in detail in Appendix B.

Comment 3.4

- *For highly ventilated lab office, including speculative core-and-shell developments: low temperature, hydronic space heating with heat-input provided by hybrid, in-building, central plant consisting of air-to-water heat pump (primary) and gas boilers (secondary);*

Response

Proponent has reviewed and evaluated the list of mitigation measures and incorporated each into the review of GHG mitigation for the Project, including electrification technology. The evaluation takes into account the list of measures and further detail is included in the stationary source emissions assessment, which is presented in detail in Appendix B.

Comment 3.5

- *Efficient electrification of water heating, where feasible;*

Response

Proponent has reviewed and evaluated the list of mitigation measures and incorporated each into the review of GHG mitigation for the Project, including electrification technology. The evaluation takes into account the list of measures and further detail is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in detail in Appendix B.

Comment 3.6

- *Extensive rooftop solar-readiness (all buildings);*

Response

All buildings will be designed to be solar-ready and if a rooftop solar PV system is deemed feasible, consideration will be given to using the PV system to provide additional redundancy for the building. Proponent has reviewed and evaluated the list of mitigation measures and incorporated each into the review of GHG mitigation. The evaluation takes into account the list of measure and further detail is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in detail in Appendix B.

Comment 3.7

- *Electric vehicle ready parking spaces (all buildings).*

Response

Consistent with the City of Boston's Electric Vehicle Readiness Policy, the project will equip 25 percent with electrical supply and the remaining 75 percent will be EV ready. The proposed commitment is presented in Section 6.4.3 of Chapter 6, *Climate Change*.

Comment 3.8

Passivehouse is recommend for all residential buildings and potentially the hotel, as well.

Response

The Proponent has reviewed and evaluated the list of mitigation measures listed in the comment and DOER's comment letter, including Passive House. The Design Case has incorporated the C406.9 reduced air-infiltration additional ECM, to further enhance building envelope performance. However, the project building envelope design is only at a conceptual level and has not been designed, therefore the Proponent is not able to commit to a Passive House level of performance at this stage.

The Proponent and design team have focused study and analysis on electrification of heating systems and are continuing to consider this option. Decisions on systems are also pending the results of the district energy feasibility study, which has focused on reducing natural gas use for domestic hot water and heating. This evaluation is included in the stationary source emissions assessment, which is presented in Section 6.4.1 of Chapter 6, *Climate Change,* and in detail in Appendix B.

Comment 3.9

High performing windows and high performing opaque spandrels should be carefully evaluated if curtain-wall construction is considered.

Response

The Proponent has reviewed and evaluated various envelope alternatives in accordance with the methodology defined through meetings with DOER. The evaluation takes into account the list of measures and further detail is included in the stationary source emissions assessment in Appendix B.

Comment 3.10

We anticipate that between the above three approaches, a feasible means exists to readily electrify space heating of any residential, restaurant, hotel, retail, and office use on this project.

Response

The Proponent has reviewed and evaluated various electrification alternatives for the modeling typologies in accordance with the methodology defined through meetings with DOER. The evaluation takes into account the list of measure and further detail is included in the stationary source emissions assessment in Appendix B.

Comment 3.11

We recommend the above be evaluated, with a priority toward heat pump water heating.

Response

The Proponent has reviewed and evaluated various electrification alternatives for the modeling typologies in accordance with the methodology defined through meetings with DOER. The evaluation takes into account the list of measure and further detail is included in the stationary source emissions assessment in Appendix B.

Comment 3.12

The project should review opportunities to maximize on-site PV by setting aside as much roof space as possible for future rooftop PV.

Response

All buildings will be designed to be solar-ready and if a rooftop solar PV system is deemed feasible, consideration will be given to using the PV system to provide additional redundancy for the building.

Comment 3.13

Even if PV is not installed during building construction, it is important to plan the project to ensure that roof space is set aside for PV and that roof space doesn't become unnecessarily encroached with HVAC appurtenances, diminishing the opportunities for future PV.

Response

All buildings will be designed to be solar-ready and if a rooftop solar PV system is deemed feasible, consideration will be given to using the PV system to provide additional redundancy for the building.

Comment 3.14

We encourage the project to maximize EV-ready parking spaces for the project.

Response

Consistent with the City of Boston's Electric Vehicle Readiness Policy, the project will equip 25 percent with electrical supply and the remaining 75 percent will be EV ready. The Proponent will commit to electric vehicle charging for the Project. The proposed commitment is presented in Section 6.4.3 of Chapter 6, *Climate Change*.

Comment 3.15

Projects should include the three C406 additional efficiency measures in their Baseline.

Response

The Proponent has incorporated three C406 measures in the Base Case for each typology as defined in Section 6.4.1 of Chapter 6, *Climate Change*, and in Appendix B.

Comment 3.16

Conduct separate models for by building type as follows:

a. Office

b. Lab/office

c. Low rise residential

d. High rise residential

e. Retail

f. Restaurant

g. Hotel

Response

The Proponent has conducted separate energy models for each typology as presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in Appendix B.

Comment 3.17

Ensure Baseline building scenarios meet all requirements including relevant MA amendments. Clearly indicate which three C406 measures are being used in the Baseline. C406 measures should be regarded as project commitments. For example, if the project choses additional solar PV, the solar PV would be considered a project commitment. Emissions reduction due to C406 measures is considered "code required" and does not count as mitigation.

Response

The Proponent insured the Base Case will meet the code requirements and has incorporated three C406 measures in the Base Case for each typology as defined in Section 6.4.1 of Chapter 6, *Climate Change*, and in Appendix B.

Comment 3.18

Separately for each modeled building develop two UA analysis tables, as follows:

a. One table that shows how the baseline complies with Table 5.5-5 of ASHRAE 90.1 2013 Appendix G plus Massachusetts Amendment C401.2.4. Fenestration limits will vary depending upon building type.

Response

The overall envelope UA calculations are presented in Appendix B. The results show that the Project typologies will meet the requirements of the energy code.

Comment 3.19

b. A second table that shows how the proposed complies with 2018 IECC Tables C- 402.1.3, C402.1.4, and C-402.4. Fenestration limit should be 30 percent when calculating minimum performance requirements for all building types.

Response

The overall envelope UA calculations are presented in Appendix B. The results show that the Project typologies will meet the requirements of the energy code.

Comment 3.20

A combination of high-performing envelope, heat recovery, and solar gain management should be used throughout with an aim toward reducing heating TEDI. Strategies to achieve this include:

a. Above code-threshold envelope (vertical walls, windows, roofs and exposed lower level floors). Priority should be given to increasing continuous insulation and framed insulated wall sections. Distinguish between R value of batt and R value of continuous insulation. Continuous insulation necessarily means insulation that is uninterrupted by hangers, studs, etc. Indicate planned wall assembly U value and wall construction type (mass, wood, metal stud, etc.). Confirm that the relationship between R-value and assembly U-factor conform to Appendix A of the Code.

b. Glass curtain wall/spandrel systems should be minimized as much as possible, and avoided where possible, as these are the lowest performing wall systems.

- *If curtain wall systems are used, evaluate systems having opaque "spandrel" portion of R-10 or better.*

c. Reduce air infiltration to Passivehouse levels to 0.08 cfm at 74 Pa (in all buildings). In-building field tests are recommended to confirm air-infiltration.

d. Ventilation Energy Recovery. High performing energy recovery is essential to achieving low TEDI.

e. Solar gain management. Manage solar gains with external shading and/or low solar heat gain coefficient (SHGC).

Response

The Proponent has reviewed and evaluated various alternatives for the modeling typologies in accordance with the methodology defined through meetings with DOER. This evaluation is included in the stationary source emissions assessment in Appendix B.

Comment 3.21

At a minimum, develop the following scenarios:

a. Low rise residential, high rise residential, and hotel:

Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. Efficient electric (electric air source heat pump/VRF or central air to water heat pump to 120F thermal distribution loop) space heating and gas water

heating. External shading and improved solar heat gain coefficient windows to control space cooling loads. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy.

- *Investigate in-building, centrally located air source heat pump water heating sub scenario to above.*

Response

The Proponent has reviewed and evaluated various alternatives for the modeling typologies in accordance with the methodology defined through meetings with DOER. This evaluation is included in the stationary source emissions assessment in Appendix B.

Comment 3.22

b. Low rise residential, high rise residential, and hotel: Passivehouse with efficient electric space heating (electric air source heat pump/VRF or central air to water heat pump to 120F thermal distribution loop) and gas water heating. This study should be performed by a qualified Passivehouse consultant and could leverage MassSave® funded feasibility study and modeling.

- *Investigate in-building, centrally located air source heat pump water heating sub scenario to above.*

Response

The Proponent has reviewed and evaluated various alternatives for the modeling typologies in accordance with the methodology defined through meetings with DOER. This evaluation is included in the stationary source emissions assessment in Appendix B.

Comment 3.23

c. Lab/office: Improved envelope and inclusion of energy recovery to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. In-building, centrally-located hybrid efficient electric space heating (air to water heat pump sized at 25 to 50 percent peak heating capacity as priority backed-up with 95 percent efficient gas boiler sized at 100 percent peak, connected to 120. thermal distribution hot water loop). External shading and improved solar heat gain coefficient windows to control space cooling loads. Energy reduction shall be attributable to reductions in heating, cooling, fan, ventilation, and pumping. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy.

Response

The Proponent has reviewed and evaluated various alternatives for the modeling typologies in accordance with the methodology defined through meetings with DOER. This evaluation is included in the stationary source emissions assessment in Appendix B.

Comment 3.24

d. Office: Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. In-building, centrally-located efficient electric space heating (air to water heat pump sized at 100 percent peak heating capacity with no gas boiler back-up). External shading and improved solar heat gain coefficient windows to control space cooling loads. Heat pump hot service hot water. Energy reduction shall be attributable to reductions in heating, cooling, fan, ventilation, and pumping. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy.

- *Investigate air to air VRF heat pump alternative for space heating*

Response

The Proponent has reviewed and evaluated various alternatives for the modeling typologies in accordance with the methodology defined through meetings with DOER. This evaluation is included in the stationary source emissions assessment in Appendix B.

Comment 3.25

e. Retail: Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. Efficient electric (electric air source heat pump/VRF) space *heating. External shading and improved solar heat gain coefficient windows to control space cooling loads. Electric air source heat pump service hot water. Energy reduction shall be attributable to reductions in heating, cooling, fan, ventilation, and pumping. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy over reductions in lighting and miscellaneous energy reduction.*

Response

The Proponent has reviewed and evaluated various alternatives for the modeling typologies in accordance with the methodology defined through meetings with DOER. This evaluation is included in the stationary source emissions assessment in Appendix B.

Comment 3.26

f. Restaurant: Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. Efficient electric (electric air source heat pump/VRF) space heating. External shading and improved solar heat gain coefficient windows to control space cooling loads. Gas service hot water. Energy reduction shall be attributable to reductions in heating, cooling, fan, ventilation, and pumping. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy over reductions in lighting and miscellaneous energy reduction.

Response

The Proponent has reviewed and evaluated various alternatives for the modeling typologies in accordance with the methodology defined through meetings with DOER. This evaluation is included in the stationary source emissions assessment in Appendix B.

Comment 3.27

Evaluate incentives, including:

a. Estimate of Alternative Energy Credits;

Response

The Proponent has evaluated the potential utility incentives available for the Project. This evaluation is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in Appendix B.

Refer to the financial analysis outlined in Appendix B describing the incentives considered for alternative modeling cases, including Alternative Energy Credits.

Comment 3.28

b. Estimates of MassSave® incentives, based on meeting with utility.

Response

The Proponent has evaluated the potential utility incentives available for the Project. This evaluation is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in Appendix B.

Refer to the financial analysis outlined in Appendix B describing the incentives considered for alternative modeling cases, including MassSave® incentives.

Comment 3.29

Evaluate rooftop solar PV. This should include building roof plans showing location of planned solar and location of roof HVAC equipment and other appurtenances.

Response

The Proponent has evaluated the potential for PV at the Project. This evaluation is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in Appendix B.

Comment 3.30

Maximize EV-ready parking spaces. Confirm commitment to installed EV charging station and EV ready spaces.

Response

The Proponent will commit to electric vehicle ready parking spaces for the Project. The proposed commitment is presented in Section 6.4.3 of Chapter 6, *Climate Change*.

Comment 3.31

Submit project modeling files to the DOER on a flash drive.

Response

The Proponent will make project modeling files available to DOER subsequent to the filing of this document.

Comment 3.32

Compare model results total and individual end uses with representative, prototype buildings developed by Pacific Northwest National Labs/Department of Energy found at the link below. Provide a summary explaining potential differences.

- *https://www.energycodes.gov/sites/default/files/documents/BECP_901_2013_Progress_Indicator_0_0.pdf*
- *http://www.energycodes.gov/sites/default/files/documents/2013EndUseTables.zip*
- *https://www.energycodes.gov/commercial-energy-cost-savings-analysis*

Response

The Proponent has compared the modeling results to the benchmark EUIs in Section 6.4.1 of Chapter 6, *Climate Change*.

Comment 3.33

Include a table similar to the example below. For "code value" ensure that the value incorporates any improved efficiency per requirements of Section C406.1 of the Massachusetts' amendments.

Measure/Area	Base Code	Proposed	% Change	Comment
AC Efficiency (EER)				
Bldg 1	*code value*	*design value*	%	
Bldg 2	*code value*	*design value*	%	
ERV Effectiveness (%)				
Bldg 1	*code value*	*design value*	%	
Bldg 2	*code value*	*design value*	%	
Boiler (% efficiency)				
Bldg 1	*code value*	*design value*	%	
Bldg 2	*code value*	*design value*	%	
LPD (Watts/sq ft)				
Bldg 1	*code value*	*design value*	%	
Bldg 2	*code value*	*design value*	%	
(continue to include service water, equipment, etc)				

Response

Tables similar to the requested have been provided in Section 6.4.1 of Chapter 6, *Climate Change*, and in Appendix B.

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9.5 Massachusetts Water Resources Authority

Comment 4.1

To ensure that the Project's wastewater flow does not increase system surcharging or overflows in large storms, the Proponent and BWSC should effect a 4:1 offset of the Project's new wastewater flow by removing stormwater and/or I/I from a hydraulically related sewer system(s).

Response

The Proponent will coordinate with BWSC to reach an agreement regarding the requirement for 4:1 I/I mitigation. Refer to Section 5.7.2 in Chapter 5, *Water and Wastewater,* for review of infiltration and inflow mitigation and Chapter 8, *Summary of Mitigation Measures/Draft Section 61 Findings,* for mitigation commitments.

Comment 4.2

Four gallons of extraneous flow should be removed for every gallon of new wastewater flow, in compliance with Massachusetts Department of Environmental Protection regulation and BWSC I/I policy.

Response

See response to Comment 4.1.

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9.6 Boston Water and Sewer Commission

Comment 5.1

The Proponent must submit a site plan and General Service Application to the Commission for the proposed Project. Prior to the initial phase of the site plan development the Proponent should meet with the Commission's Design and Engineering Customer Services to review water main, sewer and storm drainage system availability and potential upgrades that could impact the Project's development.

Response

The Owner and design team met with BWSC on March 10, 2021 to discuss the Project and the design team will continue to work with BWSC to review the water, sewer, and storm drainage work associated with the Project.

Comment 5.2

Any new or relocated water mains, sewers and storm drains must be designed and constructed at the Proponent's expense. They must be designed and constructed in conformance with the Commission's design standards, Water Distribution System and Sewer Use Regulations, and Requirements for site Plans. The site plan should include the locations of new, relocated and existing water mains, sewers (including the MWRA's sewer on site) and drains which serve the Project Site, proposed service connections, water meter locations, as well as back flow prevention devices in the facilities that will require inspection.

Response

The proposed work will be designed to meet BWSC standards, regulations, and requirements, and will be submitted to BWSC for review and approval.

Comment 5.3

With the site plan the Proponent must provide detailed estimates for water demand (including water required for landscape irrigation), wastewater generation, and storm water runoff for the Project. The Proponent should provide separate estimates of peak and continuous maximum water demand for retail, irrigation and air-conditioning make-up water for the Project. Estimates should be based on full-site build-out of the Project.

Response

Estimated sewage generation is included in Section 5.6 of Chapter 5, *Water and Wastewater*, and estimated water demand is in Section 5.3. The Proponent will provide updated estimated water demand, wastewater generation, and stormwater runoff rates as part of the Site Plan review process.

Comment 5.4

It is the Proponent's responsibility to evaluate the capacity of the water and sewer system serving the Project Site to determine if the systems are adequate to meet future Project demands. With the site plan the Proponent must include a detailed capacity analysis for the water and sewer systems serving the Project Site, as well as an analysis of the impact the Project will have on the Commission's systems and the MWRA's systems overall. The analysis should identify specific measures that will be implemented to offset the impacts of the anticipated flows on the Commission and MWRA sewer systems.

Response

A capacity analysis of the existing and planned sewer systems will be performed. The new water mains and building service connections will be designed based on the available capacity of the existing water systems in Western Avenue and East Drive. The Proponent will include a detailed capacity analysis with the site plan review.

Comment 5.5

Developers of projects involving disturbances of land of one acre or more are required to obtain an NPDES General Permit for Construction from the Environmental Protection Agency. The Proponent is responsible for determining if such a permit is required and for obtaining the permit. If such a permit is required for the proposed Project, a copy of the Notice of Intent and any pollution prevention plan submitted to EPA pursuant to the permit must be provided to the Commission's Engineering Services Department prior to the commencement of construction.

Response

The Project will require and the Proponent will obtain a NPDES General Permit for Construction.

Comment 5.6

The design of the Project must comply with the City of Boston's Complete Streets Initiative, which requires incorporation of "green infrastructure" into street designs. Green infrastructure includes greenscapes, such as trees, shrubs, grasses and other landscape plantings, as well as rain gardens and vegetative swales, infiltration basins, and paving materials and permeable surfaces. The proponent must develop a maintenance plan for the proposed green infrastructure.

Response

The Project is planning and designing the siting of stormwater storage, infiltration and other green infrastructure. Infiltration systems will be used to provide storage, treatment, and promote infiltration via groundwater recharge. These systems will be sized based on the impervious site area. Refer to Section 4.3 and Figure 4.3 in Chapter 4, *Stormwater*.

Comment 5.7

Pursuant to the policy new developments with design flow exceeding 15,000 gpd of wastewater are subject to the Department of Environmental Protection's regulation 314 CMR 12.00, section 12.04(2)(d). This regulation requires all new sewer connections with design flows exceeding 15,000 gpd to mitigate the impacts of the development by removing four gallons of infiltration and inflow (I/I) for each new gallon of wastewater flow added. The Commission will require the Proponent to develop an inflow reduction plan consistent with the regulation. The 4:1 reduction should be addressed at least 90 days prior to activation of water service and will be based on the estimated sewage generation provided with the Project site plan.

Response

The Proponent will coordinate with BWSC to reach an agreement regarding the requirement for 4:1 I/I mitigation. The Project will develop an inflow reduction plan consistent with the regulation.

Comment 5.8

Oil traps are required on drainage systems discharging from enclosed parking garages. Discharges from the oil traps must be directed to a building sewer and must not be mixed with roof or other surface runoff.

Response

Noted.

Comment 5.9

Grease traps will be required in any food service facility in the new development in accordance with the Commission's Sewer Use Regulations. The proponent is advised to consult with the Commission before preparing plans for food service facilities.

Response

Noted. The Proponent will consult with the Commission before preparing any plans for food service facilities on site.

Comment 5.10

Sanitary sewage must be kept separate from stormwater at all times and separate sanitary sewer and storm drain service connections from the building to the sewer system must be provided. Under no circumstances will stormwater be allowed to discharge to a sanitary sewer. The Commission requires that existing stormwater and sanitary sewer service connections, if any are to be re-used by the Project, be dye tested to confirm they are connected to the appropriate system.

Response

Sanitary sewage will be kept separate from stormwater at all times and separate sanitary sewer and storm drain service connections from the building to the sewer system will be provided.

Comment 5.11

The discharge of dewatering drainage to a sanitary sewer is prohibited by the Commission and the MWRA. The discharge of any dewatering drainage to the storm drainage system requires a Drainage Discharge Permit from the Commission. If the dewatering drainage is contaminated with petroleum products for example, the Proponent will be required to obtain a Remediation General Permit from the EPA for the discharge.

Response

Noted. Refer to Section 7.2.2 in Chapter 7, *Construction Period,* for review of all subsurface construction and dewatering review.

Comment 5.12

In order to achieve the reductions in phosphorus loadings required by the TMDL phosphorus concentrations in stormwater discharges to the lower Charles River from Boston must be reduced by 64 percent. To accomplish the necessary reductions in phosphorus the Commission requires developers of projects in the lower Charles River watershed to infiltrate stormwater discharging from impervious areas in accordance with DEP requirements. With the site plan the Proponent must submit a phosphorus reduction plan for the Project.

Response

The Project is planning and designing the siting of stormwater storage and infiltration and other green infrastructure. Infiltration systems will be used to provide storage, treatment, and promote infiltration via groundwater recharge. The Project will provide a minimum of 64 percent phosphorus removal which meets the reduction requirement outlined in the TMDL Report for the Lower Charles River Basin. The Proponent will also submit a phosphorus reduction plan to BWSC during the Site Plan review process.

Comment 5.13

The Proponent must fully investigate methods for infiltrating stormwater on-site before the Commission will consider a request to discharge stormwater to the Commission's system. The site plan must indicate how storm drainage from roof tops and other impervious surfaces will be managed. All projects at or above 100,000 square feet of floor area are required to retain, on site, a volume of runoff equal to 1.25 inches of rainfall times the impervious area. A feasibility assessment for infiltrating stormwater on-site must be submitted with the site plan for the Project.

Response

The Project's stormwater system will be designed to provide 2.75-inches of storage over the impervious site area. Refer to Section 4.3 in Chapter 4, *Stormwater, for details on the active stormwater management system planned for the Project Site*.

Comment 5.14

The Massachusetts Department of Environmental Protection (MassDEP) has established Performance Standards for Storm water Management. The Standards address stormwater quality, quantity and recharge. In addition to Commission standards, the proposed Project will be required to meet MassDEP's Stormwater Management Standards.

Response

The proposed design will meet or exceed the MassDEP Stormwater Management Standards as noted in Section 4.4, *Stormwater*.

Comment 5.15

In conjunction with the site plan and General Service Application the Proponent will be required to submit a Stormwater Pollution Prevention Plan. The plan must:

- *Specifically identify how the Project will comply with the Department of Environmental Protection's Performance Standards for Stormwater Management both during construction and after construction is complete.*
- *Identify specific best management measures for controlling erosion and preventing the discharge of sediment, contaminated stormwater or construction debris to the Commission's drainage system when construction is underway.*
- *Include a site map which shows, at a minimum, existing drainage patterns and areas used for storage or treatment of contaminated soils, groundwater or stormwater, and the location of major control or treatment structures to be utilized during construction.*

Response

Noted. A Stormwater Pollution Prevention plan will be submitted to BWSC during the Site Plan Review process.

Comment 5.16

The Commission requests that the Proponent install a permanent casting stating: "Don't Dump: Drains to Charles River" next to any new catch basin installed as part of the Project. The Proponent may contact the Commission's Operations Division for information regarding the purchase of the castings.

Response

"Don't Dump" plaques will be installed at new catch basins.

Comment 5.17

The Commission encourages the Proponent to explore additional opportunities for protecting stormwater quality by minimizing sanding and the use of deicing chemicals, pesticides and fertilizers.

Response

A long-term pollution prevention plan will be developed to address minimizing sanding, the use of deicing chemicals, pesticides and fertilizers.

Comment 5.18

The Proponent is required to obtain a Hydrant Permit for use of any hydrant during construction of the Project. The water used from the hydrant must be metered. The Proponent should contact the Commission's Operations Department for information on obtaining a Hydrant Permit.

Response

Hydrant Permits will be obtained through the Commission's Operations Department, as required throughout construction.

Comment 5.19

For information regarding the installation of MTUs, the Proponent should contact the Commission's Meter Installation Department.

Response

Noted. Refer to Section 5.7.1 in Chapter 5, *Water and Wastewater,* for review of water conservation measures and meter installation.

Comment 5.20

The Proponent should explore opportunities for implementing water conservation measures in addition to those required by the State Plumbing Code. In particular the Proponent should consider indoor and outdoor landscaping which requires minimal use of water to maintain. If the Proponent plans to install in-ground sprinkler systems, the Commission recommends that timers, soil moisture indicators and rainfall sensors be installed. The use of sensor-operated faucets and toilets in common areas of buildings should also be considered.

Response

The Project will look for ways to reduce outdoor water use by limiting irrigation or reducing irrigation on-site by reusing stormwater and incorporating drought-tolerant and native species on-site as allowed. Refer to Section 5.7.11 in Chapter 5, *Water and Wastewater,* for review of water conservation measures.

9.7 Charles River Watershed Association

Comment 6.1

CRWA requests the project proponent provide significantly more detail related to stormwater management in the EIR:

- *The ability of the stormwater management systems to accommodate larger storms (such as the 100-year storm event) than the 32-year storm event should be evaluated.*

Response

The Project has planned a robust stormwater management system on-site. Infiltration systems will be used to provide storage, treatment, and promote infiltration via groundwater recharge. Site runoff will be collected by catch basins, area drains, and trench drains, and directed to storage and infiltration systems. The systems will capture 1.25-inches of water quality volume from the impervious site areas, which meets standard BWSC and BPDA requirements. Above the 1.25-inches, the Proponent has committed to store and actively manage an additional 1.5-inches of runoff as a Project requirement. The 1.5-inches equals the additional stormwater volume between a 32-year storm event and a 10-year storm event.

Refer to Section 4.3 in Chapter 4, *Stormwater*, for more information on the stormwater management system's ability to handle future rainfall events and Section 6.3.2 in Chapter 6, *Climate Change*, for more information of the relevance of the 32-year storm to the NASDEP and establishment of the additional 1.5-inch of storage to be provided by the Project.

Comment 6.2

- *The ability of the stormwater management systems to handle current and predicted future rainfall amounts using the best available science should be evaluated (see addition comments under climate change section).*

Response

The Proponent is advancing the siting and design, of stormwater storage, infiltration, and other green infrastructure. The design of which will take into consideration current and predicted future rainfall amounts. The Project and planned stormwater management system will greatly improve the site's capacity to control runoff and minimize flooding. The Project team has anticipated larger storm events of the future and is using larger year 2070 storm events (6.4-inch 10-year rainfall, 8.2-inch 25-year rainfall, and 11.7-inch 100-year rainfall) to evaluate & confirm the proposed system's ability to handle the peak flows of these larger rainfall events. Refer to Section 4.3 in Chapter 4, *Stormwater*, for more information on the stormwater management system's ability to handle future rainfall events.

Comment 6.3

- *Creation of new impervious surfaces should be avoided and existing impervious surfaces should be removed wherever possible. CRWA acknowledges that the project incorporates some structured parking, which is far preferable to surface parking. The proponent should consider whether more can be done to reduce the amount of surface parking.*

Response

Historically, the Project Site was nearly 100 percent impervious and served as a parking lot and warehouse until as recently as 2013. With the incorporation of green infrastructure in the roadways and greenway, including porous pavement, permeable pavers, landscaped planters, rain gardens, and lawn, impervious area is expected to be reduced to approximately 90 percent. Refer to Section 4.3.2 in Chapter 4, *Stormwater*, for more information on reduction in impervious cover. Surface parking is limited to the on-street parking spaces.

Comment 6.4

- *Green infrastructure must be extensively incorporated into the design to capture and treat stormwater generated by impervious surfaces. More information about the types of green infrastructure specifically intended to be employed and the anticipated stormwater management benefits should be provided in the EIR so that the public can fully understand the environmental impacts of impervious surfaces on this site and mitigation alternatives.*

Response

Refer to Section 4.3 and Figure 4.3 in Chapter 4, *Stormwater,* for more information on the proposed stormwater management and green infrastructure systems.

Comment 6.5

The ENF also does not say whether the proponent has considered alternatives to impervious surfaces such as porous pavement for walkways or use of green roofs or cisterns to reduce the volume of runoff generated by the project. Additional alternative stormwater management opportunities should be presented and evaluated in the EIR.

Response

Refer to Section 4.3 and Figure 4.3 in Chapter 4, *Stormwater*, for more information on the proposed green infrastructure systems, including porous pavement, green roofs, and storage tanks for re-use.

Comment 6.6

Complete documentation of how the project is designed to address the pollutants of concern and TMDLs, including calculations, should be provided in the EIR.

Response

The Project will represent a change in land use, and the design will include installation of green infrastructure, treatment, and recharge which will provide a minimum of 64 percent phosphorus removal, which meets the reduction requirement outlined in the TMDL Report for the Lower Charles River Basin. Refer to Section 4.3.1 in Chapter 4, *Stormwater,* for more information on pollutant reduction to meet TMDL requirements.

Comment 6.7

Additional stormwater management plans detailing system sizing, type, and location should be provided in the EIR, along with calculations showing that the project complies with the phosphorus TMDL, which requires no additional inputs of phosphorus to the river and a significant reduction from existing development.

Response

The Project is planning and designing the siting of stormwater storage and infiltration and other green infrastructure. Infiltration systems will be used to provide storage, treatment, and promote infiltration via groundwater recharge. Site runoff will be collected by catch basins, area drains, and trench drains, and directed to storage and infiltration systems. The systems will capture 1.25-inches of water quality volume from the impervious site areas, which meets standard BWSC and BPDA requirements. Above the 1.25-inches, the Proponent has committed to store and actively manage an additional 1.5-inches of runoff as a Project requirement. Review of stormwater plans are noted in Figures 4.5a-b in Chapter 4, *Stormwater.*

Comment 6.8

There are a number of places in the ENF that mention energy conservation and reduction in greenhouse gas emissions, however, the overall ENF is lacking in documentation on how the proposed project will address concerns about impacts due to climate change, as well as mitigate and not further exacerbate these concerns.

Response

Refer to Chapter 6, *Climate Change,* for an extensive overview of climate change, resiliency and mitigation methods for the Project, including estimates of GHG emissions.

Comment 6.9

Further detail about how the project will specifically address these climate concerns should be provided in the EIR.

Response

Refer to Chapter 6, *Climate Change,* for an extensive overview of climate change, resiliency and mitigation methods for the Project.

Comment 6.10

We urge the project proponent to maximize the amount of trees and plantings covering the site in an effort to minimize impervious cover. We recommend use of native species and drought tolerant plantings in all cases.

Response

In response to ENF Comments regarding imperviousness and stormwater management, the Proponent and Design Team have incorporated a "Bio-Classroom" into the Project Greenway, as well as an expansive green space and extensive tree canopy. Designed as an educational and demonstrative bio-retention area, the Bio-Classroom will actively collect surface water from its surroundings and accommodate overflow during large storm events. Refer to Section 4.3.2 in Chapter 4, *Stormwater*, for updates information on tree canopy and reduction in impervious cover.

Comment 6.11

The EIR should provide additional detail, including description and plans, showing the proposed drainage routes from the project site to the Charles River under both scenarios described above.

Response

Refer to Figure 4.2 in Chapter 4, *Stormwater,* for the proposed NASDEP route and Figure 4.3 in Chapter 4 for the Cambridge Street Interim Stormwater Connection.

Comment 6.12

The EIR should also include information (description of extent, duration, frequency, etc.) in both written and visual format on the historical flooding areas that will contribute to the downstream route and provide calculations and modeling showing that the proposed project will not have adverse impacts on the downstream drainage system nor the upstream catchment area as indicated in the ENF (see quote above), both under present and anticipated climate conditions (see previous comment sections).

Response

Refer to sections 4.2 and 4.3 in Chapter 4, *Stormwater,* for review of the existing and planned drainage conditions and proposed stormwater management approach to the Project including how the Project will be mitigating its impact on the downstream drainage system.

Comment 6.13

However, the ENF does not provide any supporting information to document the estimated water use and wastewater generation. The EIR should provide documentation and calculations to support the numbers given in the ENF.

Response

Refer to Section 5.3 in Chapter 5, *Water and Wastewater,* for estimates of the anticipated water demand and Section 5.6 for estimated wastewater flows.

Comment 6.14

The EIR should provide further estimates about likely space uses and provide a real-world basis for anticipated water and wastewater needs based on constructed projects in the area with similar uses.

Response

The estimated water and wastewater use is based on 310 CMR 15.203 which is believed to be conservative and appropriate for design. The estimate for sewage flows for the lab space was estimated using a "real-world basis" rate similar to the nearby Science and Engineering Center Complex building.

Comment 6.15

Further detail on construction period dewatering, including volumes, flow rates, anticipated water quality concerns, including any posed by MCP-documented contamination, and potential impacts on the drainage system and river should be provided in the EIR.

Response

Refer to Section 7.2.2 in Chapter 7, *Construction Period,* for review of all subsurface work, including dewatering.

Comment 6.16

The ENF provides no information on proposed operation and maintenance of the drainage system, including the green stormwater infrastructure and the subsurface infiltration system. Such documentation should be provided in the EIR.

Response

Refer to Section 4.3 in Chapter 4, *Stormwater*, for information on the proposed drainage system. Maintenance and operation plans will be developed by the Proponent as design progresses. Maintenance will be the responsibility of the owner.

Comment 6.17

The project proponent should undertake an extensive program to provide information to local residents and businesses, as well as the public and entities who will be impacted by the construction period (e.g., commuters, businesses etc.), about the perceived necessity for the project, its benefits, and its impacts. This outreach should be conducted in conjunction with the provision of more details and specifics about the project in the EIR.

Response

Noted. The Proponent has been engaged is an extensive community outreach process through master plan development and permitting of this Project. This effort will continue through construction and the Proponent will regularly provide information to local residents and businesses impacted by construction. See section 7.2.10 in Chapter 7, *Construction Period,* for review of the communication and outreach plan as part of the proponent's commitment to proactive communication with the community.

9.8 Allston Brighton Health Collaborative

Comment 7.1

The plan must include increased opportunities for community members to learn and ask questions as well as an articulated plan as to how the project team will go to existing community spaces and bring the information to those spaces.

Response

Please refer to Section 1.1 of Chapter 1, *Project Description*, for further detail on the public outreach process facilitated by the Proponent.

Comment 7.2

Transportation and mobility analysis must be much more deeply assessed. Allston and Brighton do not exist in isolation and neither do transportation systems. The traffic generation estimates are startling given the fixed limitations of the corridor and no proposal for increased MBTA service. To say nothing of the additional developments and traffic generation to come from other locations on the Western Ave corridor. This requires a regional assessment, this cannot be assessed within the bound geography of the ERC.

Response

Chapter 3, *Transportation*, contains a comprehensive analysis of the multimodal transportation network and the demand implications of the Project. Refer to Section 3.7 for a summary of the traffic capacity analysis within the study area and refer to Section 3.8 for a summary of the transit service capacity analysis. Both analyses account for the expected activity generated by over a dozen additional land development projects that are proposed in the area, as outlined in Section 3.6.1. In addition, proposed mitigation to help offset the Project's traffic and transit impacts are included in Section 3.12.

Comment 7.3

I strongly recommend that the project team engage our Transportation Committee in developing project TDM and TAPA plans. What currently exists in the plan is incomplete and inadequate.

Response

Chapter 3, *Transportation*, of the DEIR outlines a recommended framework for the Project's TDM plan, its multimodal infrastructure to support sustainable transportation modes, and associated commitments to reduce traffic impacts and bolster transit activity. These recommendations will be refined and formalized in a Transportation Access Plan Agreement with the City of Boston. As part of that process, the Proponent will engage with the ABHC's Transportation Committee.

Comment 7.4

Please provide a more detailed description of greenspace and an analysis of how green space and use of green infrastructure could help mitigate stormwater drainage, water impairment, and urban heat island impacts. Is the planned green space adequate for these important environmental benefits, as well as the associated health benefits for community members, workers, and residents

Response

The Project is planning and designing, in coordination with Harvard, the siting of stormwater storage and infiltration and other green infrastructure. Infiltration systems will be used to provide storage, treatment, and promote infiltration via groundwater recharge. Additionally, the Proponent and Design Team have incorporated a "Bio-Classroom" into the Project Greenway, as well as incorporating a green space and extensive tree canopy to provide extensive public and environmental benefits to the project site. The Proponent will continue to evaluate ways to maximize green infrastructure, employ low impact development techniques, increase green space, and decrease impervious area as the design progresses, which could further optimize the stormwater management system. Please refer to Section 4.3 and Figure 4.3 in Chapter 4, *Stormwater,* for more information on the proposed stormwater management on the project site.

Comment 7.5

Please assess how increased green infrastructure might reduce the need for, or augment, the North Allston Drain Extension Project.

Response

Refer to Section 4.3 in Chapter 4, *Stormwater*, for a description of the stormwater management approach. The stormwater management system does not reduce the need for the North Allston Drain Extension Project but will be designed to augment its effectiveness in addressing area stormwater management. The NASDEP is designed to convey the current 10-year BWSC design storm runoff collected by the existing upstream North Allston catchment area drainage system, connecting to an existing upstream BWSC trunk drain through Rena Park, and extending through the Allston Landing North area, to a new submerged outfall into the Charles River. The stormwater management system for the Project will provide 2.75-inches of storage over the impervious site areas, 1.5-inches greater than typically required by BWSC/BPDA. During peak storm events that could exceed the capacity of the NASDEP, active management of this additional storage will allow more volume to be retained and infiltrated, allowing it to be released to the NASDEP when system capacity is available. .

Comment 7.6

Please provide more analysis of how proposed impervious cover will impact stormwater drainage, water impairment, and urban heat island effect, especially in light of possible future conditions of more intense storm events, higher ambient temperatures, and greater climate variability.

Response

The ENF filing described the proposed site with an expected 97 percent impervious area. This was a conservative estimate for the purpose of stormwater planning. With the incorporation of green infrastructure in the roadways and the Project Greenway, including porous pavement, permeable pavers, landscaped planters, rain gardens, and lawn, impervious area is expected to be reduced to approximately 90 percent. Refer to Section 4.3 in Chapter 4, *Stormwater*, for further review on stormwater and impervious surfaces and possible mitigation

Comment 7.7

A more complete analysis of the pollutants associated with the development and how these will be treated. As is, the statements in the ENF are more aspirational. Phosphorus is of particular concern.

Response

The Project is planning and designing the siting of stormwater storage and infiltration and other green infrastructure. Infiltration systems will be used to provide storage, treatment, and promote infiltration via groundwater recharge. The Project will provide a minimum of 64 percent phosphorus removal which meets the reduction requirement outlined in the TMDL Report for the Lower Charles River Basin. Refer to Section 4.3 in Chapter 4, *Stormwater,* for review of proposed stormwater management on the project site.

Comment 7.8

Please provide an alternative analysis that reflects more green infrastructure and low impact design for stormwater retention and treatment and other associated impact mitigation (urban heat island, tree cover, air quality mitigation, mental health). Specifically is there a way for the proposed Project Greenway to serve as a more significant stormwater treatment and conveyance feature in place of or in addition to the North Allston Drain Extension Project.

Response

Refer to Section 4.3 in Chapter 4, *Stormwater*, for a description of the stormwater management approach and Section 1.4.6.1 in Chapter 1, *Project Description,* for review of stormwater management and the Greenway's role in mitigation on site. Runoff from the Project Greenway and plaza areas, including areas above the below-grade garage, will be collected by inlet structures and directed to either the subsurface infiltration systems or a bioswale in the Project Greenway. The Project Greenway infiltration systems and bioswale will be sized to provide storage for 2.75-inches of runoff from these areas.

The Project Greenway will also feature trees and landscape areas to reduce impervious area and stormwater runoff. The bioswale will be a site feature designed to incorporate green space, provide storage and treatment, promote infiltration, and support plant growth. The bioswale will originally receive stormwater from the immediate walkways adjacent to the Project Greenway. If there is additional storage capacity available within the bioswale, portions of the building roofs may be directed to the bioswale. Bioswale storage will be provided by crushed stone, growing media, and up to 12-inches of surface storage depth prior to overflowing. The bioswale plantings will be selected based on the designed water depth.

Comment 7.9

More details on energy use and potential generation and distribution, including a consideration for zero-net carbon buildings as is likely to be required in the Boston Zoning Code in the near future.

Response

The Proponent has conducted an extensive analysis of the energy use and GHG emissions for the Project. This analysis is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in Appendix B. The Project has developed a robust approach to climate mitigation aligned with and in support of Harvard's Fossil Fuel-Neutral By 2026 and Fossil Fuel-Free By 2050 goals and the Commonwealth's commitment to carbon neutrality by 2050. The Master Plan approach is organized around energy efficiency, electrification and renewable energy supply. Each proposed building in the master plan will be designed to be highly energy efficient with a focus on demand reduction, thus, minimizing GHG emissions associated with building energy usage.

Additionally, the Project will complete a District Energy/Microgrid Feasibility Study that will evaluate low carbon district energy solutions to further reduce fossil fuel based GHG emissions.

9.9 Paula Alexander

Comment 8.1

I know there is currently a huge water/sewer pipe installation at the ERC site but the community has not been advised or recently updated with the status of this work.

Response

BWSC, in collaboration with Harvard, is currently seeking permits for the North Allston Storm Drain Extension Project (NASDEP), which will create a major public infrastructure asset owned and maintained by BWSC and represents a significant investment in shared public infrastructure for the North Allston neighborhood.

Comment 8.2

Given the immense size of the new ERC development (especially in terms of building heights and density) along with all the other developments so near to our residential homes, I am unable to provide you with my comments until we are given a true picture of what is being done with the infrastructure of water and sewer and other utilities and how all of these over-development proposals will negatively affect our quality of life in terms of water and air pollution, traffic construction vehicles, parking, transportation, etc.

Response

This DEIR provides a comprehensive assessment of the referenced impacts associated with the Project. Stormwater, water, and wastewater details are included in Chapter 4, *Stormwater*, and Chapter 5, *Water and Wastewater*. Transportation details are included in Chapter 3, *Transportation*.

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9.10 Barbara Parmenter

Comment 9.1

Green space - More detailed description of greenspace and an analysis of how green space and use of green infrastructure could help mitigate stormwater drainage, water impairment, and urban heat island impacts. Is the planned green space adequate for these important environmental benefits, as well as the associated health benefits for community members, workers, and residents.

Response

A key element of the public open space improvements, totaling approximately 4 acres, is the Project Greenway proposed at the heart of the Project Site.

The Project Greenway with also be performative for site stormwater management. Runoff from the Greenway and plaza areas will be collected by inlet structures and directed to either the subsurface infiltration systems or a bioswale in the Project Greenway.

The Project Greenway will also feature trees and landscape areas to reduce impervious area and stormwater runoff. The bioswale will be a site feature designed to incorporate green space, provide storage and treatment, promote infiltration, and support plant growth. Bioswale storage will be provided by the crushed stone, growing media, and up to 12-inches of surface storage depth prior to overflowing. The bioswale plantings will be selected based on the designed water depth.

Refer to Section 1.4.3 in Chapter 1, *Project Description*, for a description on public realm improvements and open space. Refer to Section 4.3 in Chapter 4, *Stormwater*, for description of stormwater analysis.

Comment 9.2

I would also like to see how increased green space could increase these benefits.

Response

Refer to Section 1.4.3 in Chapter 1, *Project Description*, for a description on public realm improvements and open space. Refer to Section 4.3 in Chapter 4, *Stormwater*, for a description of the stormwater management approach and Section 4.3.2 for description of increasing pervious area on site.

Comment 9.3

I also want to see how increased green infrastructure might reduce the need for, or augment, the North Allston Drain Extension Project.

Response

Refer to Section 4.3 in Chapter 4, *Stormwater*, for a description of the stormwater management approach. The stormwater management system does not reduce the need for the North Allston Drain Extension Project but will be designed to augment its effectiveness in addressing area stormwater management. The NASDEP is designed to convey the current 10-year BWSC design storm runoff collected by the existing upstream North Allston catchment area drainage system, connecting to an existing upstream BWSC trunk drain through Rena Park, and extending through the Allston Landing North area, to a new submerged outfall into the Charles River. The stormwater management system for the Project will provide 2.75-inches of storage over the impervious site areas, 1.5-inches greater than typically required by BWSC/BPDA. During peak storm events that could exceed the capacity of the NASDEP, active management of this additional storage will allow more volume to be retained and infiltrated, allowing it to be released to the NASDEP when system capacity is available.

Comment 9.4

Impervious cover - This is the inverse of green space. We need more analysis of how proposed impervious cover will impact stormwater drainage, water impairment, and urban heat island effect, especially in light of possible future conditions of more intense storm events, higher ambient temperatures, and greater climate variability.

Response

Refer to Section 4.3 in Chapter 4, *Stormwater*, for a description of the stormwater management approach and Section 4.3.2 for description of increasing pervious area on site.

Comment 9.5

I would also like to see how reduced impervious cover could reduce the environmental and health harms.

Response

Refer to Section 4.3 in Chapter 4, *Stormwater*, for a description of the stormwater management approach and Section 4.3.2 for description of increasing pervious area on site.

Comment 9.6

We need to see a fuller analysis of the pollutants associated with the development and how these will be treated. As is, the statements in the ENF are more aspirational. I am especially concerned about phosphorus.

Response

The Project will meet or exceed requirements for phosphorus and pathogen TMDL. Calculations for phosphorus reduction will continue to be refined as the design progresses to meet the TMDL established for the Charles River. Refer to Section 4.3 of Chapter 4, *Stormwater*.

Comment 9.7/9.10/9.11

Traffic generation - I would like to see more analysis regarding how the 23,000+ trips per day will be handled - the estimate is for 6,000+ vehicle trips, the others being divided up into transit, bike, TNC, walking, internal, etc. But no additional MBTA service is proposed and bicycle facilities are not detailed.

What are the proposed links to communities to which people will be commuting?

What impact will nearby development have on this capacity? Developments in Watertown and south of the Mass Pike (e.g., Allston Yards) should be included in this analysis.

Response

Chapter 3, *Transportation*, contains a comprehensive analysis of the multimodal transportation network and the demand implications of the Project. Refer to Section 3.7 for a summary of the traffic capacity analysis within the study area and refer to Section 3.8 for a summary of the transit service capacity analysis. Both analyses account for the expected activity generated by over a dozen additional land development projects that are proposed in the area, as outlined in Section 3.6.1.

The proposed mitigation to help offset the Project's traffic and transit impacts are included in Section 3.12, as are a summary of the proposed pedestrian and bicycle accommodations.

Comment 9.8

Is MBTA bus service adequate for this increase in demand?

Response

Refer to Section 3.8 in Chapter 3, *Transportation*, for a summary of the transit service capacity analysis with and without the Project. This is based on pre-pandemic passenger crowding levels and bus service, with additional riders expected from future development projects. Refer to Section 3.12.2 for a description of the proposed transit improvements, including those related to MBTA service and shuttle services.

Also, the MBTA is evaluating Allston's bus service needs as part of its Bus Network Redesign effort. Scheduled for completion in 2022, this effort will guide the agency's recommendations for a new and improved bus network that better serves the emerging needs of the area. The proposed changes will address route design, frequency of service, span of service, stop spacing, and coverage area.

Comment 9.9

Are the proposed bike facilities adequate?

Response

The Proponent is designing the ERC to support bicycling to/from and within the Project site. The goal is to expand the emerging on- and off-street bicycle lane/path network. All proposed new bicycle accommodations will follow City of Boston guidelines and standards for new bicycle facilities.

Proposed pedestrian and bicycle links will be developed between the Site, the North Harvard Street neighborhood to the east, and the Charles River to the west through a Greenway that will cross through the Site. On the east side of the Site, the Greenway will connect to a shared-use path on the south side of Science Drive that extends to Rena Path and North Harvard Street.

Please refer to Sections 3.4.5, 3.5.3, and 3.12.3 in Chapter 3, *Transportation*, for a summary of the proposed pedestrian and bicycle accommodation improvements. Refer to Section 3.9 for a summary of the bicycle level of traffic stress evaluation of the area's bike lanes.

Comment 9.12

In addition the Transportation Demand Management (TDM) incentives need to be detailed and the specific outcomes need to be modeled. As is, the incentives are very basic and there is no analysis of to what extent these might actually mitigate transportation demand. Offering MBTA passes for only 3 months seems particularly inadequate - some kind of permanent discount seems more realistic in terms of TDM.

Response

Refer to Section 3.12 in Chapter 3, *Transportation*, for the various mitigation proposals, including enhancing MBTA service, expansion of shuttle services to complement the MBTA's routes, and a summary of the proposed TDM plan.

Comment 9.13

Alternatives analysis - I believe the alternatives analysis is inadequate (no-build, 2018 PDA, Full Build, Preferred (the last three are very similar). I would like to see an alternative analysis that reflects more green infrastructure and low impact design for stormwater retention and treatment and other associated impact mitigation (urban heat island, tree cover, air quality mitigation, mental health).

Response

Refer to the Reduced Building Alternative outlined in Section 2.1 of Chapter 2, *Alternatives Analysis*.

Comment 9.14

Specifically is there a way for the proposed Project Greenway to serve as a more significant stormwater treatment and conveyance feature in place of or in addition to the North Allston Drain Extension Project.

Response

The Site is providing significant stormwater management to reduce burden to the proposed NASDEP. Refer to the proposed green infrastructure outlined in Section 4.3 and shown on Figure 4.3 of Chapter 4, *Stormwater*. See also response to Comment 7.8.

Comment 9.15

I would also like to see more details on energy use and potential generation and distribution, including a consideration for zero-net carbon buildings as is likely to be required in the Boston Zoning Code in the near future.

Response

The Proponent has conducted an extensive analysis of the energy use and GHG emissions for the Project. This analysis is presented in Section 6.4.1 of Chapter 6, *Climate Change*, and in Appendix B.

Comment 9.16

Community outreach - I would like to see a more expansive plan for outreach hard to reach communities, not just the main community organizations

Response

The Proponent will continue to work on project outreach in the community. In addition to the IAG/public meetings, the Proponent has also held numerous meetings with civic associations, community representatives, elected officials, and City and State departments/agencies to gain input and to develop a better understanding of the community's interests and priorities. Please refer to Section 1.1 and Section 1.6 of Chapter 1, *Project Description*, for further detail regarding public outreach and Environmental Justice, respectively.

Comment 9.17

Also, there needs to be a plan for outreach to those with limited English, above and beyond following the BPDA's language access plan, which is not finalized and may not be finalized within the time period in question.

Response

To help facilitate outreach for the Project to persons with Limited English Proficiency ("LEP"), the Proponent is coordinating closely with the City to implement a Language Access Plan (LAP) for the Project. The Proponent has prepared a "Project Fact Sheet" summarizing various elements of the Project, and has translated said fact sheets, including visuals, into the three threshold languages, Simplified Chinese, Brazilian Portuguese, and Spanish, as well as two additional language, Korean and Russian, in response to community comment.

Please refer to Section 1.1 of Chapter 1, *Project Description* for further detail regarding Public Outreach and language access

9.11 Audrey Berry

Comment 10.1

I think that your building plans should include more parking garages or under-building parking. When New Balance built their headquarter building, there was a big parking garage included. The same needs to happen here for all these proposed office spaces.

Response

Section 3.4.6 in Chapter 3, *Transportation*, includes a table outlining the breakdown of the parking facility type. As listed in Section 3.4.6, for the Full Build Project, all the proposed parking spaces will be located either in below-grade parking structures or an above-grade parking structure with a small amount of parking being provided on-street as curbside spaces.

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APPENDIX A: DEIR Distribution List

DEIR Distribution List

Commonwealth of Massachusetts

Secretary Kathleen A. Theoharides
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

Department of Environmental Protection – Boston Office
Attn: MEPA Coordinator
Commissioner's Office
One Winter Street
Boston, MA 02108

DEP/Northeast Regional Office
Attn: John D. Viola
205B Lowell Street
Wilmington, MA 01887

Massachusetts Dept. of Transportation
Attn: Lionel Lucien
Public/Private Development Unit
10 Park Plaza
Boston, MA 02116

Massachusetts Dept. of Transportation
Highway Division - District #6
Attn: MEPA Coordinator
185 Kneeland Street
Boston, MA 02111

Massachusetts Historical Commission
Attn: Brona Simon
The MA Archives Building
220 Morrissey Boulevard
Boston, MA 02125

Massachusetts Bay Transportation Authority
Attn: MEPA Coordinator
10 Park Plaza, 6th Floor
Boston, MA 02116

Massachusetts Water Resources Authority
Attn: Katherine Ronan
Charlestown Navy Yard
100 First Avenue, Building 39
Boston, MA 02129

Massachusetts Dept. of Energy Resources
Attn: Paul Ormond
100 Cambridge Street, 10th floor
Boston, MA 02114

Massachusetts Department of Conservation and Recreation
Attn: MEPA Coordinator
251 Causeway Street, Suite 600
Boston, MA 02114

Metropolitan Area Planning Council
Attn: Marc D. Draisen
60 Temple Place
Boston, MA 02111

City of Boston

Boston Redevelopment Authority,
d/b/a Boston Planning and Development Authority
Attn: Brian P. Golden, Director
One City Hall Square, 9th Floor
Boston, MA 02201

Boston City Council
Attn: District 9 Councilor
One City Hall Square, 5th Floor
Boston, MA 02201

Boston Water and Sewer Commission
Attn: John P. Sullivan
980 Harrison Avenue
Boston, MA 02119

Boston Public Health Commission
Attn: Rita Nieves
1010 Massachusetts Avenue
Boston, MA 02118

Boston Conservation Commission
Attn: Nicholas Moreno
One City Hall Square, Room 805
Boston, MA 02201

Boston Public Library
700 Boylston Street
Boston, MA 02116

Honan-Allston Branch
Boston Public Library
300 North Harvard Street
Boston, MA 02134

Other Interested Parties

Charles River Watershed Association
Attn: Janet Moonan
190 Park Road
Weston, MA 02493

Paula Alexander
rnina3344@hotmail.com

Barbara Parmenter
77 Harriet Street
Brighton, MA 02135

Allston Brighton Health Collaborative
Attn: Anna Leslie
anna.leslie@abhealthcollab.org

Audrey Berry
audreyinboston@gmail.com

Honan-Allston Library
300 N Harvard Street
Allston, MA 02134

APPENDIX B: Greenhouse Gas Supporting Documentation

Envelope Calculations

Appendix: Envelope UA Calculation

This appendix serves as a complement to the Draft Environmental Impact Report (DEIR) for the Enterprise Research Campus Project.

Per MA Stretch Code amendment to IECC C402.1.5, each typology within the Project is considered to have an envelope with thermal performance that meets minimum prescriptive requirements on a whole-building UxA basis. The following tables demonstrate envelope compliance with each typology. The weighted average UxA for all exterior envelope for a proposed building designs are compared to similarly weighted average envelope values for a baseline case envelope as prescripted in IECC Section C406. The proposed building designs demonstrate compliance with calculated UxA values that are less that the corresponding baseline values.

The tables below consider all external envelope area within Phase A of the project; it is assumed that envelope components will be applied in similar ratios across the entire Masterplan (Phases A & B) resulting in compliance across all buildings.

For the Baseline building calculations, it is assumed that glazing is applied with a baseline window-wall ratio of 30%. For the purposes of these preliminary envelope compliance calculations, it is assumed that doors, slabs-on-grade, and below-grade walls will meet or exceed minimum code insulation values. Thus, these components are omitted from the calculation.

Table 1 UxA Envelope Compliance Calculations – Laboratory/Office Typology

	BASELINE				PROPOSED			
Envelope type	**Baseline Assembly Type**	**Baseline Area (ft2) or Perimeter (ft)**	**Baseline U-Value**	**Baseline UA**	**Proposed Assembly Type**	**Proposed Area (ft2) or Perimeter (ft)**	**Proposed U-Value (Weighted average)**	**Proposed UA**
Roof	Insulation entirely above roof deck	64,321	0.032	2,058	Varies	66,310	0.025	1,658
Exterior wall (Above-grade)	Metal framed	134,824	0.064	8,629	Varies	113,037	0.057	6,471
Glazing (Vertical)	*Fixed fenestration*	*57,782*	*0.38*	*21,957*	*Fixed fenestration*	*79,569*	*0.320*	*25,462*
	Operable fenestration	*0*	*0.45*	*0*	*Operable fenestration*	*0*	*0.000*	*0*
	Entrance doors	*0*	*0.77*	*0*	*Entrance doors*	*0*	*0.000*	*0*
Floor	Joist/framing	1,614	0.033	53	Varies	1,614	0.033	53
Exterior wall (Below-grade)	Below-grade wall	0	0.119	0	Varies	0	0.000	0
Slab-on-grade floor	Unheated slabs	0	0.54	0	Varies	0	0.000	0
Door (Opaque)	Swinging door	0	0.37	0	Varies	0	0.000	0
Skylight	Standard skylight	1,989	0.5	995	Varies	0	0.000	0
		Baseline UA Total: 33,692					**Proposed UA Total: 33,644**	

Table 2 UxA Envelope Compliance Calculations – Residential Typology

	BASELINE				PROPOSED			
Envelope type	**Baseline Assembly Type**	**Baseline Area (ft2) or Perimeter (ft)**	**Baseline U-Value**	**Baseline UA**	**Proposed Assembly Type**	**Proposed Area (ft2) or Perimeter (ft)**	**Proposed U-Value (Weighted average)**	**Proposed UA**
Roof	Insulation entirely above roof deck	37,171	0.032	1,189	Varies	38,320	0.025	958
Exterior wall (Above-grade)	Metal framed	82,417	0.064	5,275	Varies	69,033	0.059	4,040
Glazing (Vertical)	*Fixed fenestration*	*26,107*	*0.38*	*9,921*	*Fixed fenestration*	*36,000*	*0.320*	*11,520*
	Operable fenestration	*9,215*	*0.45*	*4,147*	*Operable fenestration*	*12,706*	*0.360*	*4,574*
	Entrance doors	*0*	*0.77*	*0*	*Entrance doors*	*0*	*0.000*	*0*
Floor	Joist/framing	0	0.033	0	Varies	0	0.000	0
Exterior wall (Below-grade)	Below-grade wall	0	0.119	0	Varies	0	0.000	0
Slab-on-grade floor	Unheated slabs	0	0.54	0	Varies	0	0.000	0
Door (Opaque)	Swinging door	0	0.37	0	Varies	0	0.000	0
Skylight	Standard skylight	1,150	0.5	575	Varies	0	0.000	0
		Baseline UA Total: 21,106					**Proposed UA Total: 21,092**	

Table 3 UxA Envelope Compliance Calculations – Hotel Typology

	BASELINE				PROPOSED			
Envelope type	**Baseline Assembly Type**	**Baseline Area (ft2) or Perimeter (ft)**	**Baseline U-Value**	**Baseline UA**	**Proposed Assembly Type**	**Proposed Area (ft2) or Perimeter (ft)**	**Proposed U-Value (Weighted average)**	**Proposed UA**
Roof	Insulation entirely above roof deck	19,286	0.032	617	Varies	19,883	0.025	497
Exterior wall (Above-grade)	Metal framed	53,441	0.064	3,420	Varies	45,154	0.058	2,639
Glazing (Vertical)	*Fixed fenestration*	*16,997*	*0.38*	*6,459*	*Fixed fenestration*	*23,146*	*0.320*	*7,407*
	Operable fenestration	*5,907*	*0.45*	*2,658*	*Operable fenestration*	*8,044*	*0.360*	*2,896*
	Entrance doors	*0*	*0.77*	*0*	*Entrance doors*	*0*	*0.000*	*0*
Floor	Joist/framing	0	0.033	0	Varies	0	0.000	0
Exterior wall (Below-grade)	Below-grade wall	0	0.119	0	Varies	0	0.000	0
Slab-on-grade floor	Unheated slabs	0	0.54	0	Varies	0	0.000	0
Door (Opaque)	Swinging door	0	0.37	0	Varies	0	0.000	0
Skylight	Standard skylight	596	0.5	298	Varies	0	0.000	0
		Baseline UA Total: 13,452					**Proposed UA Total: 13,439**	

Table 4 UxA Envelope Compliance Calculations – Conference Typology

Envelope type	BASELINE				PROPOSED			
	Baseline Assembly Type	Baseline Area (ft2) or Perimeter (ft)	Baseline U-Value	Baseline UA	Proposed Assembly Type	Proposed Area (ft2) or Perimeter (ft)	Proposed U-Value (Weighted average)	Proposed UA
Roof	Insulation entirely above roof deck	18,668	0.032	597	Varies	19,246	0.025	481
Exterior wall (Above-grade)	Metal framed	32,957	0.064	2,109	Varies	27,558	0.059	1,613
Glazing (Vertical)	*Fixed fenestration*	*14,124*	*0.38*	*5,367*	*Fixed fenestration*	*19,523*	*0.320*	*6,248*
	Operable fenestration	*0*	*0.45*	*0*	*Operable fenestration*	*0*	*0.000*	*0*
	Entrance doors	*0*	*0.77*	*0*	*Entrance doors*	*0*	*0.000*	*0*
Floor	Joist/framing	0	0.033	0	Varies	0	0.000	0
Exterior wall (Below-grade)	Below-grade wall	0	0.119	0	Varies	0	0.000	0
Slab-on-grade floor	Unheated slabs	0	0.54	0	Varies	0	0.000	0
Door (Opaque)	Swinging door	0	0.37	0	Varies	0	0.000	0
Skylight	Standard skylight	577	0.5	289	Varies	0	0.000	0
			Baseline UA Total: 8,363				**Proposed UA Total: 8,342**	

Alternatives Analysis

Appendix B: Alternative Modeling Cases

This appendix serves as a complement to the Draft Environmental Impact Report (DEIR) for the Enterprise Research Campus Project.

Expanding on the Design Case and Massachusetts Stretch Code Base Cases described in Chapter 6, this appendix describes energy modeling results for a series of alternative building cases including different envelope options and electrification of building heating and domestic hot water systems. The cases described in this appendix address the modeling requests in the letter dated March 8, 2021 from The Massachusetts Department of Energy Resources (DOER) and subsequent Certificate issued March 12, 2021 by the Secretary of Energy and Environmental Affairs.

The alternative modeling cases span the four primary building typologies in the Master plan which include Core and Shell Laboratory/Office, Multifamily Residential, Hotel, and Conference Center. In addition, alternate analysis has also been modeled specifically for Retail and Restaurant spaces which are generally included at ground level within the primary building typologies. Details of the alternative cases are described in detail for each typology below.

For the four primary typologies, energy model outputs are presented on a basis of total annual energy (MMBtu) across the Master Plan project. Results are presented per individual end use, as well as per fuel type (electricity and natural gas). For the Restaurant and Retail typologies, energy model results are presented on an area-normalized basis (kBtu/ft2) due to the varying square footages of the sub-typologies within the ground levels of the primary building types.

Additionally, the modeled thermal energy demand intensity (TEDI) is presented for each typology. TEDI is a building performance metric that equates to the annual heating energy demand for space conditioning (zone loads and ventilation loads) per unit of building floor area (units of kBtu/ft2/yr). The TEDI metric considers the direct thermal energy supplied by building heating systems and does not take into account the efficiency used to generate this heat, nor any energy credits associated with heat pump heating sources that are derived from waste heat. It also does not include domestic hot water systems. The TEDI metric allows for direct comparison of passive or low-energy load reduction strategies across design alternatives, such as envelope thermal performance, energy recovery systems, or solar gain management strategies (e.g. shading devices).[1]

For the data presented below, electricity emission rates are assumed to be 658 lbs/MWh (specific to the Commonwealth of Massachusetts), while natural gas emission rates are assumed to be 117 lbs/MMBtu.

[1] "Energy Modeling Guidelines", City of Vancouver, Planning, Urban Design and Sustainability Department, Land Use Development and Policy Guidelines, Version 2.0, amended 18 July 2018

Electricity costs are assumed to be 16.27 cents/kWh.[2] Natural gas is assumed to cost 10.57/thousand cubic feet.[3]

B.1 Laboratory/Office Typology

This section describes modeling alternatives for the Core & Shell Laboratory/Office typology. The requested modeling alternatives includes the following:[4]

- *Lab/office: Improved envelope and inclusion of energy recovery to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. In-building, centrally-located hybrid efficient electric space heating (air to water heat pump sized at 25 to 50% peak heating capacity as priority backed-up with 95% efficient gas boiler sized at 100% peak, connected to 120℉ thermal distribution hot water loop). External shading and improved solar heat gain coefficient windows to control space cooling loads. Energy reduction shall be attributable to reductions in heating, cooling, fan, ventilation, and pumping. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy.*

Modeling cases presented in this appendix include the elements listed below. Quantitative envelope and systems performance data assumed for each case is summarized in the table that follows.

- **Basis of Design:** Design Case model as described in Chapter 6. Major design components include an efficient building envelope that exceeds minimum code values for glazing and whole-building envelope thermal performance. Air-source heat pump (ASHP) heating sized for 15% of building peak heating load with high-efficiency condensing boilers to meet remaining load. Dedicated outdoor air system (DOAS) with fan coil units (FCUs). High efficiency water cooled chiller plant including heat pump chillers for waste heat diversion to satisfy simultaneous heating and cooling loads. Water-based sensible heat recovery on return air. Low lighting power densities achieved from LED lighting and lighting control systems. The Basis of Design has reduced natural gas energy by 82%.

  As described in the body of this report, the Laboratory/Office typology is modeled with the following three additional efficiency measures (both Base Case and Design Case) in accordance with the Massachusetts Stretch Energy Code Section C406:

  - More efficient HVAC performance in accordance with Section C406.2.
  - Reduced lighting power density system in accordance with Section C406.3.
  - Reduced air-infiltration in accordance with Section C406.10.

[2] Per EIA, "Massachusetts State Energy Profile," accessed 2021-05-06. https://www.eia.gov/state/print.php?sid=MA

[3] Per EIA, "Massachusetts Price of Natural Gas Sold to Commercial Consumers," average of preceding 12 months, accessed 2021-05-06. https://www.eia.gov/dnav/ng/hist/n3020ma3m.htm

[4] Language per letter dated March 8, 2021 from The Massachusetts Department of Energy Resources (DOER) responding to the Environmental Notification Form (ENF) originally submitted for the project.

- **Alternative Case 1:** Same as Basis of Design, with ASHP capacity increased to 25% of total building heating capacity.
- **Alternative Case 2:** Same as Alternative Case 1, with high-performance triple glazing assembly.
- **Alternative Case 3:** Same as Alternative Case 2, with whole-building glazing ratio reduced from 41% to 40%, and 30” shading overhangs modeled at each floor to reduce solar gains.
- **Alternative Case 4:** Same as Alternative Case 3, with envelope airtightness increased to 0.08 cfm/ft2 façade at 75 Pa.
- **Alternative Case 5:** Same as Alternative Case 4, with ASHP capacity increased to 50% of total building heating capacity.

The modeling cases are summarized in Table B-1 below.

Table B-1 Summary of Energy Modeling Inputs – Laboratory/Office Alternative Cases

	Base Case	Design Case	Alt. Case 1	Alt. Case 2	Alt. Case 3	Alt. Case 4	Alt Case. 5
Building Envelope							
Roof Insulation	U- 0.032 (R-30)	U- 0.025 (R-40)	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*
Wall Assembly – Opaque	U- 0.055 (R-18)	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel	*Same as Design Case*	U- 0.05 (R-20) opaque U-0.15 (R-7) spandrel	U- 0.05 (R-20) opaque U-0.15 (R-7) spandrel	U- 0.05 (R-20) opaque U-0.15 (R-7) spandrel	U- 0.05 (R-20) opaque U-0.15 (R-7) spandrel
Air Infiltration Rate	0.25 cfm/ft2 façade at 75 Pa	0.25 cfm/ft2 façade at 75 Pa	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	0.08 cfm/ft2 façade at 75 Pa	0.08 cfm/ft2 façade at 75 Pa
Fenestration and Shading							
Vertical Glazing U-Factor	U-0.42	U-0.32	*Same as Design Case*	U-0.24	U-0.24	U-0.24	U-0.24
Vertical Glazing SHGC	0.4	0.3	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*
Window to Wall Ratio (%)	40%	41%	*Same as Design Case*	*Same as Design Case*	40%	40%	40%
Additional Shading	None	None	*Same as Design Case*	*Same as Design Case*	30” shading overhangs	30” shading overhangs	30” shading overhangs
HVAC							
Primary HVAC System	Labs: System Type 7 – VAV with Reheat (100% OA) Office/Retail: System 7 – VAV with Reheat	DOAS with heat recovery and FCUs	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*
Exhaust Air Energy Recovery	Labs: N/A (per ASHRAE 90.1-	Exhaust heat recovery (50% sensible eff.)	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*

	2013 Section 6.5.7.2) Non-lab spaces: 50% total energy recovery						
Primary Cooling	Water-cooled centrifugal chillers, 0.56 kW/ton FL + 10% efficiency improvement	Water-cooled centrifugal chillers (0.56 kW/ton FL + 10% efficiency improvement) + heat pump chiller (1.0 kW/ton FL)	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*
Primary Heating	Gas-fired hot water boiler plant, 80% thermal eff. + 10% efficiency improvement	ASHP (15% of total htg. capacity) (COP 1.8 – 3.1 depending on load & ambient conditions) + waste heat from heat pump chiller + Gas condensing boilers (95% efficient)	Same as Design Case with ASHP sized for 25% of total load	Same as Design Case with ASHP sized for 25% of total load	Same as Design Case with ASHP sized for 25% of total load	Same as Design Case with ASHP sized for 25% of total load	Same as Design Case with ASHP sized for 50% of total load
Service Hot Water	Gas storage water heater (82% thermal eff.)	Condensing gas storage water heater (95% thermal eff.)	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*
Internal Gains							
Lighting Power Density[5]	Labs: 1.2 W/SF Offices: 0.55 W/SF	Labs: 1.2 W/SF Offices: 0.55 W/SF	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*

[5] Lighting power density assumed with 10% reduction from MA Stretch Code space-by-space values across all typologies as 1 of 3 required efficiency measures per MA Stretch Energy Code Section C406.

Table B-2 Energy Model Alternative Case Results: Laboratory/Office Typology

	Base Case	Design Case	Alt. Case 1	Alt. Case 2	Alt. Case 3	Alt. Case 4	Alt. Case 5
Energy by End Use							
Lighting (MMBtu)	10,553	10,553	10,553	10,553	10,553	10,553	10,553
Misc. Equipment (MMBtu)	52,679	52,679	52,679	52,679	52,679	52,679	52,679
Vertical Transportation (MMBtu)	388	388	388	388	388	388	388
Space Heating (MMBtu)	114,607	32,424	23,024	22,423	22,464	21,774	16,883
DHW (MMBtu)	1,703	1,434	1,434	1,434	1,434	1,434	1,434
Space Cooling (MMBtu)	14,217	18,288	18,414	18,561	18,477	18,465	18,465
Heat Rejection (MMBtu)	8,097	8,322	8,412	8,518	8,485	8,521	8,521
Fans (MMBtu)	22,645	24,931	24,939	24,943	24,940	24,886	24,886
Pumps (MMBtu)	4,147	4,184	4,135	4,096	4,088	4,034	3,929
Total (MMBtu)	**229,038**	**153,203**	**143,977**	**143,595**	**143,508**	**142,733**	**137,737**
Site EUI (kBtu/ft2/year)	**174**	**116**	**109**	**109**	**109**	**109**	**105**
Energy by Fuel Type							
Electricity (MMBtu)	112,727	132,820	136,450	136,485	136,364	136,012	135,373
Natural Gas (MMBtu)	116,311	20,384	7,527	7,110	7,145	6,721	2,364
Total (MMBtu)	**229,038**	**153,203**	**143,977**	**143,595**	**143,508**	**142,733**	**137,737**
Estimated Annual Utility Cost	**$6,560,887**	**$6,541,229**	**$6,583,309**	**$6,580,711**	**$6,575,277**	**$6,554,211**	**$6,479,326**
Emissions							
Electricity (tons/yr)	10,870	12,807	13,157	13,160	13,149	13,115	13,053
Natural Gas (tons/yr)	6,804	1,192	440	416	418	393	138
Total (tons/yr)	**17,674**	**14,000**	**13,597**	**13,576**	**13,567**	**13,508**	**13,192**
TEDI (kBtu/ft2/yr)	**75.0**	**42.9**	**42.8**	**42.1**	**42.1**	**42.1**	**42.1**

As shown in Table B-2, the Design Case achieves significant energy and emissions savings in comparison to the Base Case (33% and 21%, respectively). The proposed ASHP system sized at 15% of peak heating capacity eliminates the majority of onsite natural gas consumption, resulting in an 82% reduction of natural gas compared to the Base Case and constituting just 13% of total energy. Coupled with the Proponent’s off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 21% to 93% compared to the Base Case.

The alternative modeling cases contribute to additional moderate reductions in energy and emissions from the Design Case, with each case less than 10% from the Design Case. Alternative Case 5 contains an ASHP system sized for up to 50% of peak building heating load and demonstrates a 10% reduction in energy and 6% reduction in emissions compared to the Design Case.

The basis of design has maintained ASHPs sized at 15% of the peak heating load as a balanced solution for electrification and reduction of natural gas and additional equipment and space required within the building. The case of heat pumps sized to meet 25% of peak loads (Alt 1) resulted in additional energy savings of 6% from the Design Case and natural gas savings of 94% compared to 82% in the Design case but necessitated increasing installed heat pump capacity by 62% and corresponding additional space within the building. Alt Cases 2-4 are building envelope enhancements over the Design Case. These Alternates show no additional energy savings and are not being pursued in the Design Case.

The design case achieves significant TEDI savings in comparison to the Base Case. Given that the heating energy of the Laboratory/Office typology is dominated by ventilation air, the TEDI is not significantly impacted by the envelope improvements, as evident in the relatively small changes between the modeled TEDI of the Alternative Cases, i.e. approximately 2% reduction.

The graphs below present a comparison of energy and emissions for the Base Case, Design Case, and Alternative Cases.

Figure B-1 Laboratory/Office Energy Consumption for Base, Design, and Alternative Cases

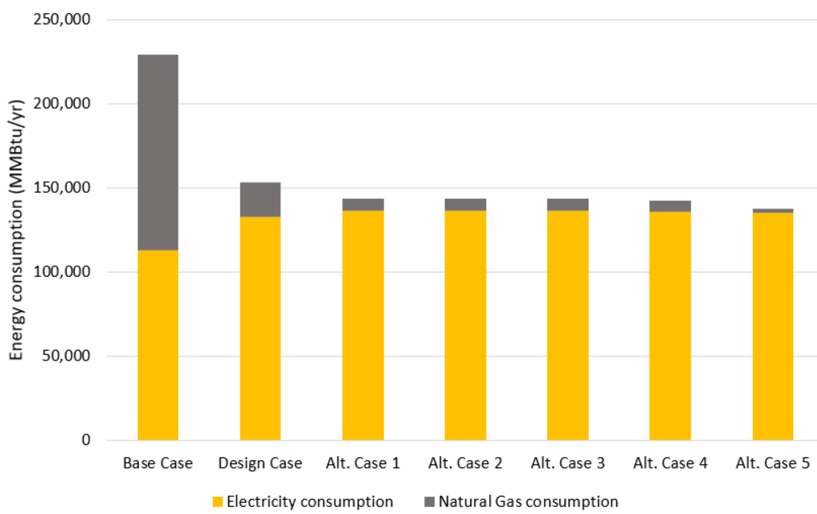
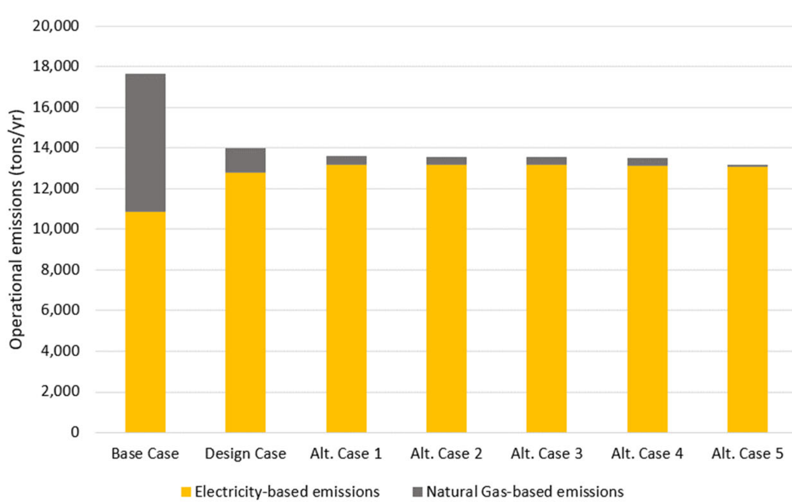


Figure B-2 Laboratory/Office Operational Emissions for Base, Design, and Alternative Cases



B.1.1 Laboratory/Office Incentives Analysis

Alternate Energy Credits (AECs)

The Design Case and alternate Cases 1-5 include air-source heat pumps for the primary heating. The scale of the ASHP system qualifies for the Intermediate-Large category for AEC incentives, therefore, to earn credits, the heat pump must serve 100% of the building heating load. Of the alternate design cases, only Alt. Case 5 will serve 100% of the heating load with the ASHP.

With the metered calculation approach, Alt. Case 5 is eligible for a total of $2,455,371 over a ten-year period.

Alternative Energy Credit (AEC)	Area	1,315,226	sf
	G - Grid Supplied Electricity	4946.72	MWh
	COP	3.10	
	Enet out (premultiplier)	4092	MHW/yr
	Multiplier	**3**	
	Enet out (postmultiplier)	12,277	MHW/yr
	Enet out (for 10 year strip)	122,769	MHW/10 yr
	Incentive/AEC	$20	
	AEC total per 10 years	**$2,455,371**	per metered calculation
	AEC payments	**$61,384**	every 3 months for 10 years+

MassSave "Whole-Building Energy Use Intensity (EUI) Reduction

It is also assumed that the Laboratory/Office typology will qualify for MassSave "Whole-Building Energy Use Intensity (EUI) Reduction" incentives.[6] The following table compares the EUI of the Design Case and Alternative Cases to the Base Case, with resulting incentive values dependent upon EUI improvement over the base case, on a square foot basis.

Case	EUI	Improvement from Base Case	Incentive ($ / ft2)	Total incentive
Base Case	174	-	-	-
Design Case	116	33.1%	$1.25	$1,644,033
Alt. 1	109	37.1%	$1.25	$1,644,033
Alt. 2	109	37.3%	$1.25	$1,644,033
Alt. 3	109	37.3%	$1.25	$1,644,033
Alt. 4	109	37.7%	$1.25	$1,644,033
Alt. 5	105	39.9%	$1.25	$1,644,033

[6] https://www.masssave.com/en/saving/business-rebates/new-buildings-and-major-renovations/whole-building-energy-use-intensity-reduction

B.2 Residential Typology

This section describes modeling alternatives for the Multifamily Residential typology. The requested modeling alternatives includes the following:[7]

- *Low rise residential, high rise residential, and hotel: Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. Efficient electric (electric air source heat pump/VRF or central air to water heat pump to 120F thermal distribution loop) space heating and gas water heating. External shading and improved solar heat gain coefficient windows to control space cooling loads. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy.*
    - *Investigate in-building, centrally located air source heat pump water heating sub scenario to above*
- *Low rise residential, high rise residential, and hotel: Passivehouse with efficient electric space heating (electric air source heat pump/VRF or central air to water heat pump to 120F thermal distribution loop) and gas water heating. This study should be performed by a qualified Passivehouse consultant and could leverage MassSave® funded feasibility study and modeling.*
    - *Investigate in-building, centrally located air source heat pump water heating sub scenario to above.*

Modeling cases presented in this appendix include the elements listed below. Quantitative envelope and systems performance data assumed for each case is summarized in the table that follows.

- **Basis of Design:** Design Case model as described in the body of this report. Major design components include an efficient building envelope that exceeds minimum code values for glazing and whole-building envelope thermal performance. Dedicated outside air system (DOAS) and energy recovery ventilator with high-effectiveness sensible and latent energy recovery. Water source heat pump system with high efficiency condensing boilers and cooling towers to provide space conditioning. Condensing gas domestic water heating. Low lighting power densities achieved from LED lighting and lighting control systems.

  As described in the body of this report, the Residential typology is modeled with the following three additional efficiency measures (both Base Case and Design Case) in accordance with the Massachusetts Stretch Energy Code Section C406:
    - More efficient HVAC performance in accordance with Section C406.2.
    - Reduced lighting power density system in accordance with Section C406.3.

[7] Language per letter dated March 8, 2021 from The Massachusetts Department of Energy Resources (DOER) responding to the Environmental Notification Form (ENF) originally submitted for the project.

  - Reduced air-infiltration in accordance with Section C406.10.

- **Alternative Case 1:** Improved envelope thermal performance and air tightness. Shading overhangs at each floor. Heating and cooling provided by air-source VRF. Improved residential appliance efficiency (10% reduction in equipment power density).

- **Alternative Case 2:** Same as Alternative Case 1, with centrally located air source heat pump water heating.

- **Alternative Case 3:** Same as Alternative Case 1, with additional efficiency and load reduction measures to meet Passive House criteria.[8] Improved glazing (U-0.14, SHGC 0.25) to manage heating loads per Passive House limits. ERV effectiveness 80% sensible / 77% latent (per manufacturer specifications of typical Passive House approved product). Centrally located air source heat pump water heating.[9] Improved residential appliance efficiency, i.e. 35% reduction in assumed apartment equipment power density.

The modeling cases are summarized in Table B-3 below.

[8] Modeling of Passive House options were carried out under supervision of John Boehs, Certified Passive House Consultant, Certification #2687

[9] Given the strict EUI limits associated with Passive House design and the high domestic hot water consumption typically observed in residential typologies, achieving Passive House performance necessitated the inclusion of centrally located ASHP water heating as an alternative to condensing gas water heating. A separate modeling case of a Passive House building with condensing gas water heaters was not considered, as the resulting domestic water heating energy caused whole-building EUI to exceed the Passive House limit.

Table B-3 Summary of Energy Modeling Inputs – Residential Alternative Cases

	Base Case	Design Case	Alt. Case 1	Alt. Case 2	Alt. Case 3
Building Envelope					
Roof Insulation	U- 0.032 (R-30)	U- 0.025 (R-40)	U- 0.017 (R-60)	U- 0.017 (R-60)	U- 0.017 (R-60)
Wall Assembly – Opaque	U- 0.055 (R-18)	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel	U- 0.033 (R-30) opaque U-0.05 (R-20) spandrel	U- 0.033 (R-30) opaque U-0.05 (R-20) spandrel	U- 0.025 (R-40)
Air Infiltration Rate	0.25 cfm/SF façade at 75 Pa	0.25 cfm/SF façade at 75 Pa	0.06 cfm/SF façade at 50 Pa	0.06 cfm/SF façade at 50 Pa	0.06 cfm/SF façade at 50 Pa
Fenestration and Shading					
Vertical Glazing U-Factor	U- 0.42 (fixed) U- 0.50 (operable)	U- 0.32 (fixed) U- 0.36 (operable)	U-0.15 (fixed and operable)	U-0.15 (fixed and operable)	U-0.14 (fixed and operable)
Vertical Glazing SHGC	0.4	0.3	0.28	0.28	0.25
Window to Wall Ratio (%)	24%	41%	30%	30%	30%
Additional Shading	None	None	30” shading overhangs	30” shading overhangs	30” shading overhangs
HVAC					
Primary HVAC System	System Type 1 – Packaged Terminal Air Conditioner (PTAC)	Energy recovery ventilator (ERV) + WSHP units	Energy recovery ventilator (ERV) + Air-source VRF	Energy recovery ventilator (ERV) + Air-source VRF	Energy recovery ventilator (ERV) + Air-source VRF
Exhaust Air Energy Recovery	N/A	Energy recovery ventilator; 70% total effectiveness	Energy recovery ventilator; 80% total effectiveness	Energy recovery ventilator; 80% total effectiveness	Energy recovery ventilator; 80% sensible / 77% latent effectiveness[10]
Primary Cooling	Direct Expansion (DX), 90.1-2013 efficiency (capacity-dependent) + 10% improvement	ERV: DX cooling coils; WSHP / hydronic loop with cooling towers	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)
Primary Heating	Gas-fired hot water boiler plant, 80% thermal eff. + 10% improvement	ERV: High-efficiency condensing gas furnace heating (95% thermal eff.); WSHP w/ condensing gas boilers.	Air-source VRF heating (COP 3.3 at 90.1-2013 reference conditions)	Air-source VRF heating (COP 3.3 at 90.1-2013 reference conditions)	Air-source VRF heating (COP 3.3 at 90.1-2013 reference conditions)
Service Hot Water	Gas storage water heater (82% thermal eff.)	Condensing gas storage water heater (95% thermal eff.)	*Same as Design Case*	Central ASHP water heating, UEF 3.45	Central ASHP water heating, UEF 3.45

[10] Per PHIUS-approved manufacturer specifications of typical unit

Internal Gains					
Lighting Power Density[11]	Apartments: 0.37 W/SF	Apartments: 0.37 W/SF	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*
Equipment power density	Apartments: 1 W/SF	Apartments: 1 W/SF	Apartments: 0.9 W/SF	Apartments: 0.9 W/SF	Apartments: 0.65 W/SF

[11] Lighting power density assumed with 10% reduction from MA Stretch Code space-by-space values across all typologies as 1 of 3 required efficiency measures per MA Stretch Energy Code Section C406.

Table B-4 Energy Model Alternative Case Results: Residential Typology

	Base Case	Design Case	Alt. Case 1	Alt. Case 2	Alt. Case 3
Energy by End Use					
Lighting (MMBtu)	3,330	3,330	3,330	3,330	3,330
Appliances & Plug Loads (MMBtu)	16,885	16,885	15,449	16,885	11,810
Vertical Transportation (MMBtu)	520	520	520	520	520
Space Heating (MMBtu)	10,455	2,447	161	225	1,324
DHW (MMBtu)	9,718	7,556	7,556	2,081	1,573
Space Cooling (MMBtu)	2,399	2,801	1,371	1,512	966
Heat Rejection (MMBtu)	170	107	266	238	548
Fans (MMBtu)	2,052	2,503	2,458	2,462	2,115
Pumps (MMBtu)	665	898	124	114	539
Total (MMBtu)	**46,195**	**37,048**	**31,236**	**27,367**	**22,726**
Site EUI (kBtu/ft2/year)	**72**	**58**	**49**	**43**	**35**
Energy by Fuel Type					
Electricity (MMBtu)	24,834	26,105	22,494	26,181	21,539
Natural Gas (MMBtu)	21,361	10,943	8,743	1,187	1,187
Total (MMBtu)	**46,195**	**37,048**	**31,236**	**27,367**	**22,726**
Estimated Annual Utility Cost	**$1,401,950**	**$1,356,338**	**$1,161,709**	**$1,260,511**	**$1,039,192**
Emissions					
Electricity (tons/yr)	2,395	2,517	2,169	2,524	2,077
Natural Gas (tons/yr)	1,250	640	511	69	69
Total (tons/yr)	**3,644**	**3,157**	**2,680**	**2,594**	**2,146**
TEDI (kBtu/ft2/yr)	**14.2**	**4.1**	**2.2**	**2.2**	**8.4**

As shown in Table B-4, the Design Case achieves energy and emissions savings in comparison to the Base Case (20% and 13%, respectively). More importantly, the proposed design has reduced fossil fuel energy consumption from natural gas by 49% compared to the Base Case. Coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 13% to 82% compared to the Base Case.

Alternative Cases 1-3 demonstrate additional reductions in energy and emissions, and Alternative Cases 2 and 3 represent elimination of all natural gas consumption within the residential portions of the building via electrification of space heating and domestic water heating. A small amount of natural gas consumption is still assumed to be present due to cooking activities in the ground floor restaurant space.

The Design Case has incorporated the C406.9 reduced air-infiltration additional ECM to further enhance building envelope performance. However, the project building envelope design is only at a conceptual level and has not been designed such that Proponent is not able to commit to a Passive House level of performance at this stage. The energy analysis above also evidences that electrification of heating and domestic hot water uses through Alt Cases 1 and 2 are driving the reduction in energy from the Design Case and have greater impacts on energy reduction and reduction in fossil fuel use. The largest reduction in Alt Case 3 is related to plug loads, not changes to the building envelope or heating and domestic hot water systems. As a result, the Proponent and design team have focused study and analysis on electrification of the heating system and is continuing to consider this option. Decision on systems is also pending the results of the district energy study that has focused on reducing natural gas use for domestic hot water and heating.

The Passive House case model (Alternative Case 3) meets the PHIUS EUI and loads targets as presented below:

Criteria	Target	Modeled
Whole-Building EUI	Source: 35.4 kBtu/ft2/year [12]	Site: 35.4 kBtu/ft2/year Source: 95.8 kBtu/ft2/year [13] **Source w/ PPA: 1.8 kBtu/ft2/year [14]**
Annual Heating Demand	3.8 kBtu/ft2/year [15]	2.1 kBtu/ft2/year
Annual Cooling Demand	7.3 kBtu/ft2/year [15]	1.5 kBtu/ft2/year
Peak Heating Load	4.2 Btu/ft2/hr [15]	2.5 Btu/ft2/hr
Peak Cooling Load	3.4 Btu/ft2/hr [15]	2.8 Btu/ft2/hr

The Passive House case achieves a Site EUI of 35.4 kBtu/ft2/year and a Source EUI of 95.8 kBtu/ft2/year based on an assumed grid electricity source conversion factor of 2.8 and natural gas source conversion factor of 1.0 (per PHIUS+ 2018 Passive Building Standard Certification Guidebook, v2.1). With the Proponent's commitment to procuring off-site renewable electricity in collaboration with Harvard University, the resulting Source EUI becomes 1.8 kBtu/ft2/year, falling well below the PHIUS-prescribed limit.

The TEDI of the design case is significantly improved from the Base Case, due to an improved envelope, energy recovery strategies, and decoupling of ventilation loads with space conditioning loads. However, the Passive House case (Case 3) demonstrates an increase in TEDI compared to the other design alternatives. This stems from the reduced residential appliance loads in the apartment units, and the additional solar gain measures assumed for this case, i.e. reduced SHGC glazing. These features were implemented to achieve the necessary Passive House peak cooling load limits outlined in the table above. Despite achieving the targeted cooling load, the measures present a heating load penalty and a corresponding increase in modeled TEDI value.

The graphs below present a comparison of energy and emissions for the Base, Design, and Alternative Cases.

[12] Based on total full-time occupancy. Assumed 2.5 occupants per apartment (average 1.5 bedrooms per apartment; PHIUS criteria establishes assumed occupancy for multifamily residential at quantity of bedrooms + 1).

[13] Assumes Site-to-Source conversion factor of 2.8 (grid electricity) and 1.0 (natural gas) per PHIUS+ 2018 Passive Building Standard Certification Guidebook, v2.1.

[14] Assumes 100% of grid electricity offset by Harvard University commitment to offsite renewable energy procurement through virtual power purchase agreements (PPAs), which are weighted with an Offset Factor of 1.0 per PHIUS+ 2018 Passive Building Standard Certification Guidebook, v2.1.

[15] Based on PHIUS+2018 Space Conditioning Criteria Calculator v2. 180,682 ft2 modeled building area. Assumed 638 whole-building occupancy.

https://www.phius.org/phius-certification-for-buildings-products/project-certification/phius-2018-getting-to-zero

Figure B-3 Residential Energy Consumption for Base, Design, and Alternative Cases

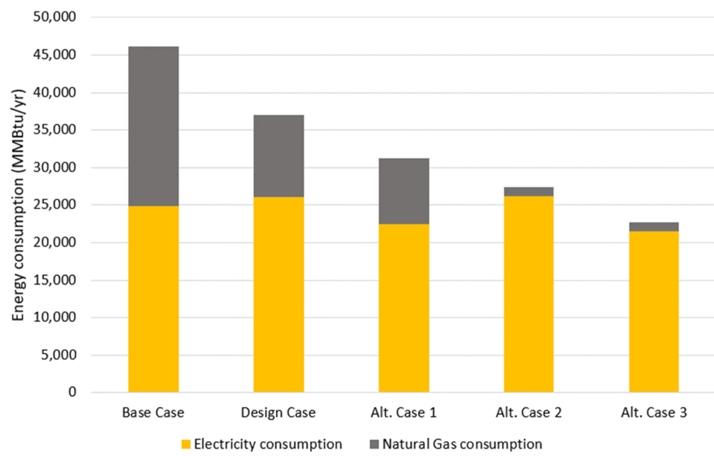
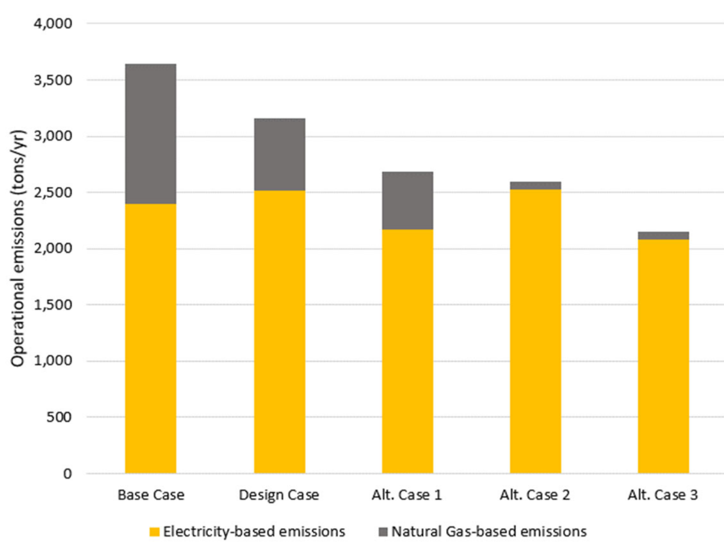


Figure B-4 Residential Operational Emissions for Base, Design, and Alternative Cases



B.2.1 Residential Incentives Analysis

Alternate Energy Credits

The Design Case for the residential typology does not include an air-source heat pump and does not qualify for AEC incentives. Alternative Cases 1-3 include Air-source VRF heating, serving 100% of the building heating load. The AEC incentives for residential and hotel typologies fall under the unmetered calculation, and therefore are driven by the unit count. With 765 residential units, a maximum incentive of $1,377,000 is available (assuming $20/AEC).

Alternative Energy Credit (AEC)	Enet out (premultiplier)	3	MHW/yr
	Multiplier	**3**	
	Enet out (postmultiplier)	9	MHW/yr
	Enet out (for 10 year strip)	90	MHW/10 yr
	Incentive/AEC	$20	
	Rebate per year/unit	**$1,800**	
	# of units	765	Residential units
	AECs for whole building	**$1,377,000**	per unmetered calculation

If Passive House Certification is achieved, the multiplier is increased from 3 to 5. This results in a total AEC incentive of $2,295,000. In addition to AECs, if the project is Passive House certified it will be eligible for the Mass Save Passive House incentive, for an additional $2,295,000.

Alternative Energy Credit (AEC)	Enet out (premultiplier)	3	MHW/yr
	Multiplier	**5**	
	Enet out (postmultiplier)	15	MHW/yr
	Enet out (for 10 year strip)	150	MHW/10 yr
	Incentive/AEC	$20	
	Rebate per year/unit	**$3,000**	
	# of units	765	Residential units
	AECs for whole building	**$2,295,000**	per unmetered calculation

MassSave Passive House

Mass Save	Pre-certified PH incentive	$500	per unit
	Passive House Incentive	$2,500	per unit
	# of units	765	Residential units
	Total Passive House Incentive	**$2,295,000**	20% paid at Stage 1 80% paid at Stage 2

MassSave Whole-Building Energy Use Intensity (EUI) Reduction

It is also assumed that the Residential typology will qualify for MassSave "Whole-Building Energy Use Intensity (EUI) Reduction" incentives.[16] The following table compares the EUI of the Design Case and Alternative Cases to the Base Case, with resulting incentive values dependent upon EUI improvement over the base case, on a square foot basis.

Case	EUI	Improvement from Base Case	Incentive ($ / ft2)	Total incentive
Base Case	72	-	-	-
Design Case	58	19.8%	$0.61	$392,330
Alt. 1	49	32.4%	$1.25	$802,166
Alt. 2	43	40.8%	$1.25	$802,166
Alt. 3	35	50.8%	$1.25	$802,166

B.3 Hotel Typology

This section describes modeling alternatives for the Hotel typology. The requested modeling alternatives includes the following:[17]

- *Low rise residential, high rise residential, and hotel: Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. Efficient electric (electric air source heat pump/VRF or central air to water heat pump to 120F thermal distribution loop) space heating and gas water heating. External shading and improved solar heat gain coefficient windows to control space cooling loads. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy.*

[16] https://www.masssave.com/en/saving/business-rebates/new-buildings-and-major-renovations/whole-building-energy-use-intensity-reduction

[17] Language per letter dated March 8, 2021 from The Massachusetts Department of Energy Resources (DOER) responding to the Environmental Notification Form (ENF) originally submitted for the project.

- *Investigate in-building, centrally located air source heat pump water heating sub scenario to above*

- *Low rise residential, high rise residential, and hotel: Passivehouse with efficient electric space heating (electric air source heat pump/VRF or central air to water heat pump to 120F thermal distribution loop) and gas water heating. This study should be performed by a qualified Passivehouse consultant and could leverage MassSave® funded feasibility study and modeling.*
  - *Investigate in-building, centrally located air source heat pump water heating sub scenario to above.*

Modeling cases presented in this appendix include the elements listed below. Quantitative envelope and systems performance data assumed for each case is summarized in the table that follows.

- **Basis of Design:** Design Case model as described in Chapter 6. Major design components include an efficient building envelope that exceeds minimum code values for glazing and whole-building envelope thermal performance. Dedicated outside air system (DOAS) and energy recovery ventilator with high-effectiveness sensible and latent energy recovery. Water source heat pump system with high efficiency condensing boilers and cooling towers to provide space conditioning. Condensing gas domestic water heating. Low lighting power densities achieved from LED lighting and lighting control systems.

  As described in the body of this report, the Hotel typology is modeled with the following three additional efficiency measures (both Base Case and Design Case) in accordance with the Massachusetts Stretch Energy Code Section C406:
  - More efficient HVAC performance in accordance with Section C406.2.
  - Reduced lighting power density system in accordance with Section C406.3.
  - Reduced air-infiltration in accordance with Section C406.10.
- **Alternative Case 1:** Improved envelope thermal performance and air tightness. Shading overhangs at each floor. Heating and cooling provided by air-source VRF.
- **Alternative Case 2:** Same as Alternative Case 1, with centrally located air source heat pump water heating.
- **Alternative Case 3:** Same as Alternative Case 1, with additional efficiency and load reduction measures to meet Passive House criteria.[18] Improved glazing (U-0.14, SHGC 0.25) to manage heating loads per Passive House limits. ERV effectiveness 80% sensible / 77% latent (per manufacturer specifications of typical Passive House approved product). Condensing gas storage water heater.

[18] Modeling of Passive House cases carried out under supervision of John Boehs, Certified Passive House Consultant, Certification #2687

- **Alternative Case 4:** Same as Alternative Case 3, with centrally located air source heat pump water heating.

The modeling cases are summarized in Table B-5 below.

Table B-5 Summary of Energy Modeling Inputs – Hotel Alternative Cases

	Base Case	Design Case	Alt. Case 1	Alt. Case 2	Alt. Case 3	Alt. Case 4
Building Envelope						
Roof Insulation	U- 0.032 (R-30)	U- 0.025 (R-40)	U- 0.017 (R-60)	U- 0.017 (R-60)	U- 0.017 (R-60)	U- 0.017 (R-60)
Wall Assembly – Opaque	U- 0.055 (R-18)	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel	U- 0.033 (R-30) opaque U-0.05 (R-20) spandrel	U- 0.033 (R-30) opaque U-0.05 (R-20) spandrel	U- 0.025 (R-40)	U- 0.025 (R-40)
Air Infiltration Rate	0.25 cfm/SF façade at 75 Pa	0.25 cfm/SF façade at 75 Pa	0.06 cfm/SF façade at 50 Pa	0.06 cfm/SF façade at 50 Pa	0.06 cfm/SF façade at 50 Pa	0.06 cfm/SF façade at 50 Pa
Fenestration and Shading						
Vertical Glazing U-Factor	U- 0.42 (fixed) U- 0.50 (operable)	U- 0.32 (fixed) U- 0.36 (operable)	U-0.15 (fixed and operable)	U-0.15 (fixed and operable)	U-0.14 (fixed and operable)	U-0.14 (fixed and operable)
Vertical Glazing SHGC	0.4	0.3	0.28	0.28	0.25	0.25
Window to Wall Ratio (%)	34%	Whole building 41%	30%	30%	30%	30%
Additional Shading	None	None	30" shading overhangs	30" shading overhangs	30" shading overhangs	30" shading overhangs
HVAC						
Primary HVAC System	System Type 1 – Packaged Terminal Air Conditioner (PTAC)	Energy recovery ventilator (ERV) + WSHP units	Energy recovery ventilator (ERV) + Air-source VRF	Energy recovery ventilator (ERV) + Air-source VRF	Energy recovery ventilator (ERV) + Air-source VRF	Energy recovery ventilator (ERV) + Air-source VRF
Exhaust Air Energy Recovery	Not required	Energy recovery ventilator; 70% total effectiveness	Energy recovery ventilator; 80% total effectiveness	Energy recovery ventilator; 80% total effectiveness	Energy recovery ventilator; 80% sensible / 77% latent effectiveness	Energy recovery ventilator; 80% sensible / 77% latent effectiveness
Primary Cooling	Direct Expansion (DX), 90.1-2013 efficiency (capacity-dependent) + 10% improvement	ERV: DX cooling coils; WSHP / hydronic loop with cooling towers	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)
Primary Heating	Gas-fired hot water boiler plant, 80% thermal eff. + 10% efficiency improvement	ERV: High-efficiency condensing gas furnace heating; WSHP w/ condensing gas	Air-source VRF heating (COP 3.3 at 90.1-2013 reference conditions)	Air-source VRF heating (COP 3.3 at 90.1-2013 reference conditions)	Air-source VRF heating (COP 3.3 at 90.1-2013 reference conditions)	Air-source VRF heating (COP 3.3 at 90.1-2013 reference conditions)

		boilers (95% thermal eff.)				
Service Hot Water	Gas storage water heater (82% thermal eff.)	Condensing gas storage water heater (95% thermal eff.)	Condensing gas storage water heater (95% thermal eff.)	Central ASHP water heating, UEF 3.45	Condensing gas storage water heater (95% thermal eff.)	Central ASHP water heating, UEF 3.45
Internal Gains						
Lighting Power Density[19]	Guestrooms: 0.37 W/SF	Guestrooms: 0.37 W/SF	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*	*Same as Design Case*

[19] Lighting power density assumed with 10% reduction from MA Stretch Code space-by-space values across all typologies as 1 of 3 required efficiency measures per MA Stretch Energy Code Section C406.

Table B-6 Energy Model Alternative Case Results: Hotel Typology

	Base Case	Design Case	Alt. Case 1	Alt. Case 2	Alt. Case 3	Alt. Case 4
Energy by End Use						
Lighting (MMBtu)	930	930	930	930	930	930
Misc. Equipment (MMBtu)	1,157	1,157	1,157	1,157	1,076	1,076
Vertical Transportation (MMBtu)	149	149	149	149	149	149
Space Heating (MMBtu)	3,013	1,364	141	141	168	168
DHW (MMBtu)	731	473	473	130	476	130
Space Cooling (MMBtu)	302	430	296	296	242	242
Heat Rejection (MMBtu)	41	23	29	29	16	16
Fans (MMBtu)	398	657	617	617	603	603
Pumps (MMBtu)	38	153	24	24	27	27
Total (MMBtu)	**6,761**	**5,337**	**3,817**	**3,474**	**3,687**	**3,342**
Site EUI (kBtu/ft2/year)	**46**	**37**	**26**	**24**	**25**	**23**
Energy by Fuel Type						
Electricity (MMBtu)	2,845	3,552	3,172	3,303	3,040	3,170
Natural Gas (MMBtu)	3,915	1,785	644	171	647	171
Total (MMBtu)	**6,761**	**5,337**	**3,817**	**3,474**	**3,687**	**3,342**
Estimated Annual Utility Cost	**$175,592**	**$187,574**	**$157,843**	**$159,233**	**$151,532**	**$152,921**
Emissions						
Electricity (tons/yr)	274	343	306	318	293	306
Natural Gas (tons/yr)	229	104	38	10	38	10
Total (tons/yr)	**503**	**447**	**344**	**328**	**331**	**316**
TEDI (kBtu/ft2/yr)	**18.3**	**9.4**	**4.1**	**4.1**	**5.6**	**5.6**

As shown in Table B-6, the Design Case achieves energy and emissions savings in comparison to the Base Case (21% and 11%, respectively). More importantly, the proposed design has reduced fossil fuel energy consumption from natural gas by 54% compared to the Base Case. Coupled with the Proponent’s off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 11% to 79% compared to the Base Case.

Alternative Cases 1-4 demonstrate additional reductions in energy and emissions, and Alternative Cases 2 and 4 represent elimination of almost all natural gas consumption via electrification of both space heating and domestic water heating. A small amount of natural gas consumption is still assumed to be present due to cooking activities in the ground floor restaurant space.

The Design Case has incorporated the C406.9 reduced air-infiltration additional ECM to further enhance building envelope performance. However, the project building envelope design is only at a conceptual level and has not been designed such that Proponent is not able to commit to a Passive House level of performance at this stage. The energy analysis above also evidences that electrification of heating and domestic hot water uses are driving the reduction in energy from the Design Case and have greater impacts on energy reduction and reduction in fossil fuel use, i.e. Alt Case 1 and 3 and 2 and 4. As a result, the Proponent and design team have focused study and analysis on electrification of the heating system and is continuing to consider this option. Decision on systems is also pending the results of the district energy study that has focused on reducing natural gas use for domestic hot water and heating.

The Passive House case model (Alternative Cases 3 and 4) meets the PHIUS EUI and loads targets as indicated in the table below. Cases 3 and 4 only differ in domestic water efficiency; thus, their modeled space conditioning results are identical.

Criteria	**Target**	**Alt. Case 3 Modeled**	**Alt. Case 4 Modeled**
Whole-Building EUI	Source: 34.8 kBtu/ft2/year [20]	Site: 25 kBtu/ft2/year Source: 62.9 kBtu/ft2/year [21] **Source w/ PPA: 4.4 kBtu/ft2/year [22]**	Site: 23 kBtu/ft2/year Source: 62.2 kBtu/ft2/year [21] **Source w/ PPA: 1.2 kBtu/ft2/year [22]**
Annual Heating Demand	3.8 kBtu/ft2/year [23]	1.2 kBtu/ft2/year	1.2 kBtu/ft2/year
Annual Cooling Demand	7.5 kBtu/ft2/year [23]	1.7 kBtu/ft2/year	1.7 kBtu/ft2/year
Peak Heating Load	4.2 Btu/ft2/hr [23]	1.2 Btu/ft2/hr	1.2 Btu/ft2/hr
Peak Cooling Load	3.4 Btu/ft2/hr [23]	2.7 Btu/ft2/hr	2.7 Btu/ft2/hr

The Passive House cases achieve Site EUIs between 23-25 kBtu/ft2/year and Source EUIs between 62.2-62.9 kBtu/ft2 based on an assumed grid electricity source conversion factor of 2.8 and natural gas source conversion factor of 1.0 (per PHIUS+ 2018 Passive Building Standard Certification Guidebook, v2.1). With the Proponent's commitment to procuring off-site renewable electricity in collaboration with Harvard University, the resulting Source EUI of the Passive House case buildings is between 1.2-4.4 kBtu/ft2/year, falling well below the PHIUS-prescribed limit. As described in the body of this report, the Proponent is also exploring the feasibility of onsite renewable energy via rooftop PV installations; such installations would also serve to reduce Source EUI and lessen the dependence on offsite renewable energy.

The Passive House case models (Cases 3 and 4) demonstrate an increase in TEDI in comparison to the other design alternates. This is a result of Cases 1 and 2 containing an energy recovery system with improved total energy recovery effectiveness and reduced-SHGC glazing incorporated in the Passive House case models reducing the amount of passive solar gains during heating season.

The graphs below present a comparison of energy and emissions for the Base, Design, and Alternative Cases.

[20] PHIUS EUI target for commercial buildings. Hotels designated as commercial type per PHIUS criteria.

[21] Assumes Site-to-Source conversion factor of 2.8 (grid electricity) and 1.0 (natural gas) per PHIUS+ 2018 Passive Building Standard Certification Guidebook, v2.1.

[22] Assumes 100% of grid electricity offset by Harvard University commitment to offsite renewable energy procurement through virtual power purchase agreements (PPAs), which are weighted with an Offset Factor of 1.0 per PHIUS+ 2018 Passive Building Standard Certification Guidebook, v2.1.

[23] Based on PHIUS+2018 Space Conditioning Criteria Calculator v2. 180,441 ft2 modeled building area. Assumed 664 whole-building occupancy.

https://www.phius.org/phius-certification-for-buildings-products/project-certification/phius-2018-getting-to-zero

Figure B-5 Hotel Energy Consumption for Base, Design, and Alternative Cases

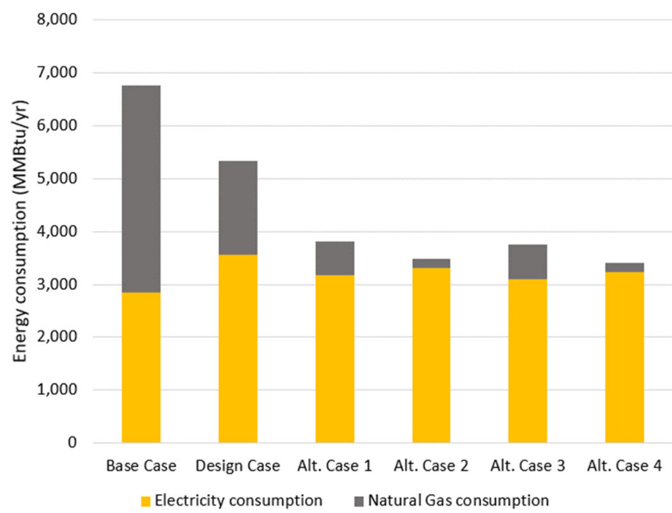
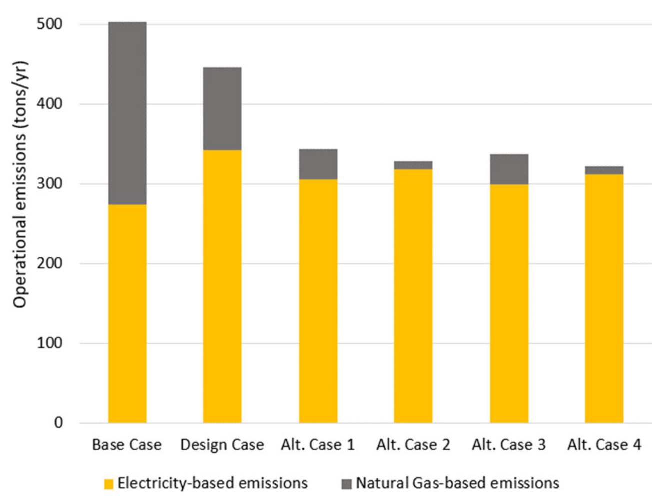


Figure B-6 Hotel Operational Emissions for Base, Design, and Alternative Cases



B.3.1 Hotel Incentives Analysis

Alternate Energy Credits

The Design Case for the residential typology does not include an air-source heat pump and does not qualify for AEC incentives. Alternative Cases 1-4 include Air-source VRF heating, serving 100% of the building heating load. The AEC incentives for residential and hotel typologies fall under the unmetered calculation, and therefore are driven by the unit count. With 250 units, a maximum incentive of $450,000 is available (assuming $20/AEC).

Alternative Energy Credit (AEC)			
	Enet out (premultiplier)	3	MHW/yr
	Multiplier	**3**	
	Enet out (postmultiplier)	9	MHW/yr
	Enet out (for 10 year strip)	90	MHW/10 yr
	Incentive/AEC	$20	
	Rebate per year/unit	**$1,800**	
	# of units	250	Hotel units
	AECs for whole building	**$450,000**	per unmetered calculation

If Passive House Certification is achieved, the multiplier is increased from 3 to 5. This results in a total AEC incentive of $750,000.

MassSave Whole-Building Energy Use Intensity (EUI) Reduction

It is also assumed that the Hotel typology will qualify for MassSave "Whole-Building Energy Use Intensity (EUI) Reduction" incentives.[24] The following table compares the EUI of the Design Case and Alternative Cases to the Base Case, with resulting incentive values dependent upon EUI improvement over the base case, on a square foot basis.

Case	EUI	Improvement from Base Case	Incentive ($ / ft2)	Total incentive
Base Case	46	-	-	-
Design Case	37	21.1%	$0.64	$93,880
Alt. 1	26	43.5%	$1.25	$181,950
Alt. 2	24	48.6%	$1.25	$181,950
Alt. 3	25	45.5%	$1.25	$181,950
Alt. 4	23	50.6%	$1.25	$181,950

B.4 Conference Typology

This section describes modeling alternatives for the Conference typology. The requested modeling alternatives includes the following.[25] It should be noted that the request below pertains to an "Office" typology; it is understood that the conditions should be applied to the Conference typology.

[24] https://www.masssave.com/en/saving/business-rebates/new-buildings-and-major-renovations/whole-building-energy-use-intensity-reduction

[25] Language per letter dated March 8, 2021 from The Massachusetts Department of Energy Resources (DOER) responding to the Environmental Notification Form (ENF) originally submitted for the project.

- *Office: Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. In-building, centrally-located efficient electric space heating (air to water heat pump sized at 100% peak heating capacity with no gas boiler back-up). External shading and improved solar heat gain coefficient windows to control space cooling loads. Heat pump hot service hot water. Energy reduction shall be attributable to reductions in heating, cooling, fan, ventilation, and pumping. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy.*
  - *Investigate air-to-air VRF heat pump alternative for space heating*

Modeling cases presented in this appendix include the elements listed below. Quantitative envelope and systems performance data assumed for each case is summarized in the table that follows.

- **Basis of Design:** Design Case model as described in the body of this report. Major design components include an efficient building envelope that exceeds minimum code values for glazing and whole-building envelope thermal performance. VAV air-handling units with total energy recovery. High efficiency water-cooled chiller plant and condensing gas boiler plant. Condensing gas domestic water heating. Low lighting power densities achieved from LED lighting and lighting control systems.

  As described in the body of this report, the Conference typology is modeled with the following three additional efficiency measures (both Base Case and Design Case) in accordance with the Massachusetts Stretch Energy Code Section C406:

  - More efficient HVAC performance in accordance with Section C406.2;
  - Reduced lighting power density system in accordance with Section C406.3;
  - Reduced air-infiltration in accordance with Section C406.10.
- **Alternative Case 1:** Improved envelope thermal performance and air tightness. Shading overhangs at each floor. Heating and cooling provided by air-source heat pump sized to meet 100% of the building heating load. Domestic water provided by air-to-water heat pump.
- **Alternative Case 2:** Same as Alternative Case 1, with space heating provided by air-to-air VRF heat pump system.

The modeling cases are summarized in Table B-7 below.

Table B-7 Summary of Energy Modeling Inputs – Conference Alternative Cases

	Base Case	Design Case	Alt. Case 1	Alt. Case 2
Building Envelope				
Roof Insulation	U- 0.032 (R-30)	U- 0.025 (R-40)	U- 0.017 (R-60)	U- 0.017 (R-60)
Wall Assembly – Opaque	U- 0.055 (R-18)	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel	U- 0.033 (R-30) opaque U-0.05 (R-20) spandrel	U- 0.033 (R-30) opaque U-0.05 (R-20) spandrel
Air Infiltration Rate	0.25 cfm/SF façade at 75 Pa	0.25 cfm/SF façade at 75 Pa	0.06 cfm/SF façade at 50 Pa	0.06 cfm/SF façade at 50 Pa
Fenestration and Shading				
Vertical Glazing U-Factor	U-0.42	U-0.32	U-0.15	U-0.15
Vertical Glazing SHGC	0.4	0.3	0.28	0.28
Window to Wall Ratio (%)	40%	Whole building 42%	30%	30%
Additional Shading	None	None	30" shading overhangs	30" shading overhangs
HVAC				
Primary HVAC System	Single-zone CAV	VAV dedicated outside air system (DOAS) with energy recovery	*Same as Design Case*	*Same as Design Case*
Exhaust Air Energy Recovery	Not required	Total energy recovery wheel (70% total effectiveness)	Total energy recovery wheel (80% total effectiveness)	Total energy recovery wheel (80% total effectiveness)
Primary Cooling	Direct Expansion (DX), 90.1-2013 efficiency (capacity-dependent) + 10% improvement	On-site water-cooled chiller plant	*Same as Design Case*	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)
Primary Heating	Gas-fired hot water boiler plant, 80% thermal eff. + 10% efficiency improvement	Condensing natural gas boilers	ASHP sized for 100% of space heating loads (COP 1.8 – 3.1 depending on load and ambient conditions)	Air-source VRF heating (COP 3.3 at 90.1-2013 reference conditions)
Service Hot Water	Gas storage water heater (82% thermal eff.)	Condensing gas storage water heater (95% thermal eff.)	Central ASHP water heating, UEF 3.45	Central ASHP water heating, UEF 3.45
Internal Gains				
Lighting Power Density[26]	Conference spaces: 0.87 W/SF	Conference spaces: 0.87 W/SF	*Same as Design Case*	*Same as Design Case*

[26] Lighting power density assumed with 10% reduction from MA Stretch Code space-by-space values across all typologies as 1 of 3 required efficiency measures per MA Stretch Energy Code Section C406.

Table B-8 Energy Model Alternative Case Results: Conference Typology

	Base Case	Design Case	Alt. Case 1	Alt. Case 2
Energy by End Use				
Lighting (MMBtu)	646	646	646	646
Misc. Equipment (MMBtu)	266	266	266	266
Vertical Transportation (MMBtu)	26	26	26	26
Space Heating (MMBtu)	899	866	177	167
DHW (MMBtu)	140	118	32	32
Space Cooling (MMBtu)	353	298	309	236
Heat Rejection (MMBtu)	145	136	122	17
Fans (MMBtu)	771	344	329	329
Pumps (MMBtu)	117	103	95	71
Total (MMBtu)	**3,363**	**2,804**	**2,003**	**1,791**
Site EUI (kBtu/ft2/year)	**56**	**47**	**33**	**30**
Energy by Fuel Type				
Electricity (MMBtu)	2,324	1,820	2,003	1,791
Natural Gas (MMBtu)	1,039	984	0	0
Total (MMBtu)	**3,363**	**2,804**	**2,003**	**1,791**
Estimated Annual Utility Cost	**$121,417**	**$96,805**	**$95,499**	**$85,381**
Emissions				
Electricity (tons/yr)	224	175	193	173
Natural Gas (tons/yr)	61	58	0	0
Total (tons/yr)	**285**	**233**	**193**	**173**
TEDI (kBtu/ft2/yr)	**12.9**	**14.6**	**9.1**	**9.1**

As shown in Table B-8, the Design Case achieves energy and emissions savings in comparison to the Base Case (17% and 18%, respectively). Coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 18% to 80% compared to the Base Case.

Alternative Cases 1 and 2 demonstrate additional reductions in energy and emissions and represent complete removal of natural gas energy via electrification of space heating and domestic water heating.

The Treehouse Conference Center has been modeled at the master plan phase with stand-alone gas boilers and water heaters as the base assumption for the building's thermal energy generation demands, these systems have also been studied as all-electric. The Treehouse Conference Center is also being studied for connection to Harvard's District Energy Facility (DEF) which would eliminate on-site equipment for heating and domestic hot water generation. The Proponent and design team is continuing to consider options for electrification of space heating and hot water should the building continue to have stand-alone systems but final decision is pending the outcome of connection to the DEF.

Despite showing improved heating energy consumption in comparison to the Base Case (through the use of efficient condensing natural gas boilers), the Design Case shows a slight increase in TEDI. This is a likely result of the solar gain reduction strategies (low-SHGC glazing) employed in the Design Case, which reduces the amount of passive heat gains within spaces during times of heating demand. The alternative cases demonstrate reductions in TEDI via improved energy recovery effectiveness and improved envelope thermal performance leading to a reduction in conductive heat losses during times of heating demand.

The graphs below present a comparison of energy and emissions for the Base Case, Design Case, and Alternative Cases.

Figure B-7 Conference Energy Consumption for Base, Design, and Alternative Cases

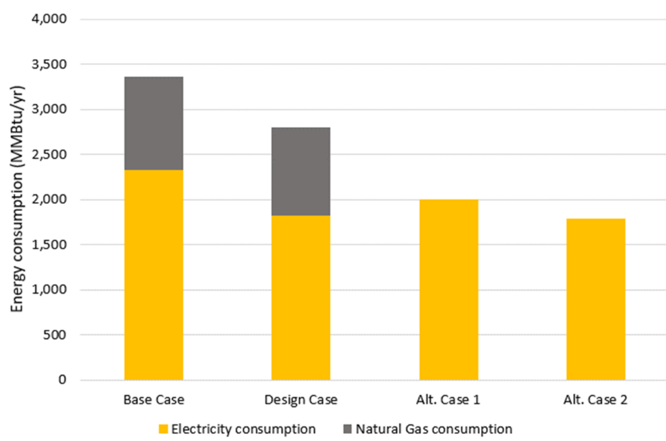
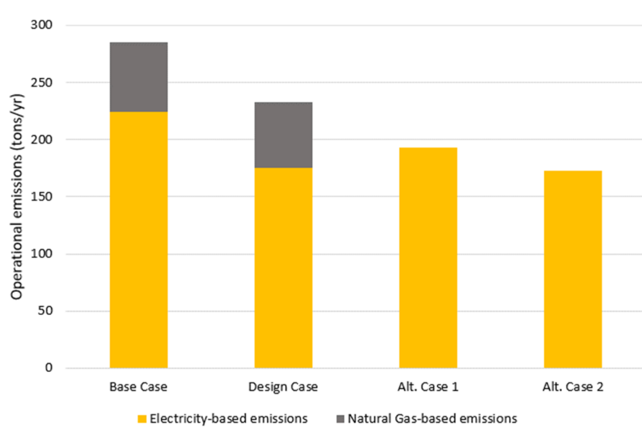


Figure B-8 Conference Operational Emissions for Base, Design, and Alternative Cases



B.4.1 Conference Incentives Analysis

Alternate Energy Credits

The Design Case is served by condensing natural gas boilers and will not qualify for AEC incentives. Alt. Design Cases 1 (COP 3.1) and 2 (COP 3.3) are served by ASHP sized for 100% of the space heating loads.

The Conference Center is subject to the metered calculation, resulting in $30,514 for Alt. Case 1.

Alternative Energy Credit (AEC)			
	Area	60,000	sf
	G - Grid Supplied Electricity	61.47	MWh
	COP	3.10	
	Enet out (premultiplier)	51	MHW/yr
	Multiplier	**3**	
	Enet out (postmultiplier)	153	MHW/yr
	Enet out (for 10 year strip)	1,526	MHW/10 yr
	Incentive/AEC	$20	
	AEC total per 10 years	**$30,514**	per metered calculation
	AEC payments	**$763**	every 3 months for 10 years+

Alt. Case 2 results in a total AEC incentive of $35,976 over a ten-year period.

Alternative Energy Credit (AEC)			
	Area	60,000	sf
	G - Grid Supplied Electricity	58.37	MWh
	COP	3.30	
	Enet out (premultiplier)	60	MHW/yr
	Multiplier	**3**	
	Enet out (postmultiplier)	180	MHW/yr
	Enet out (for 10 year strip)	1,799	MHW/10 yr
	Incentive/AEC	$20	
	AEC total per 10 years	**$35,976**	per metered calculation
	AEC payments	**$899**	every 3 months for 10 years+

MassSave Whole-Building Energy Use Intensity (EUI) Reduction

It is also assumed that the Conference typology will qualify for MassSave "Whole-Building Energy Use Intensity (EUI) Reduction" incentives.[27] The following table compares the EUI of the Design Case and Alternative Cases to the Base Case, with resulting incentive values dependent upon EUI improvement over the base case, on a square foot basis.

Case	EUI	Improvement from Base Case	Incentive ($ / ft2)	Total incentive
Base Case	56	-	-	-
Design Case	47	16.6%	$0.53	$31,584
Alt. 1	33	40.4%	$1.25	$75,000
Alt. 2	30	46.8%	$1.25	$75,000

B.5 Restaurant Typology

This section describes modeling alternatives for the Restaurant space type. The project site does not include stand-alone restaurant buildings; however, restaurants are assumed to be present at the ground level of the primary building types described above. The requested modeling alternatives includes the following.[28]

- *Restaurant: Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. Efficient electric (electric air source heat pump/VRF) space heating. External shading and improved solar heat gain coefficient windows to control space cooling loads. Gas service hot water. Energy reduction shall be attributable to reductions in heating, cooling, fan, ventilation, and pumping. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy over reductions in lighting and miscellaneous energy reduction.*

For the purpose of this study, a Restaurant space comprising 4,564 GFA within the podium (ground level) of the Multifamily Residential typology was modeled in isolation; adjacent internal surfaces (internal walls and ceilings) were modeled as having no heat transfer (adiabatic), so only heat transfer across exterior surfaces was considered. Space types for the isolated Restaurant model include a commercial kitchen, public dining area, and a public restroom. Modeling cases presented in this appendix include the elements listed below. Quantitative envelope and systems performance data assumed for each case is summarized in the table that follows.

- **Basis of Design:** Design Case model as described for the Residential typology in the body of this report, for isolated Restaurant space. Dedicated outside air system

[27] https://www.masssave.com/en/saving/business-rebates/new-buildings-and-major-renovations/whole-building-energy-use-intensity-reduction

[28] Language per letter dated March 8, 2021 from The Massachusetts Department of Energy Resources (DOER) responding to the Environmental Notification Form (ENF) originally submitted for the project.

(DOAS) and energy recovery ventilator with high-effectiveness sensible and latent energy recovery. Water source heat pump system with high efficiency condensing boilers and cooling towers to provide space conditioning. Condensing gas domestic water heating. Low lighting power densities achieved from LED lighting and lighting control systems.

- **Alternative Case:** Improved envelope thermal performance and air tightness. Shading overhangs at each floor. Heating and cooling provided by air-source VRF.

The modeling cases are summarized in Table B-9 below. For the Restaurant typology, the Stretch Code Base Case condition was integrated with the primary building typologies; a separate Restaurant Base Case was not modeled.

Table B-9 Summary of Energy Modeling Inputs – Restaurant Design Case & Alternative Case

	Design Case	Alt. Case
Building Envelope		
Roof Insulation	U- 0.025 (R-40)	U- 0.017 (R-60)
Wall Assembly – Opaque	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel	U- 0.033 (R-30) opaque U-0.05 (R-20) spandrel
Air Infiltration Rate[29]	0.25 cfm/SF façade at 75 Pa	0.06 cfm/SF façade at 50 Pa
Fenestration and Shading		
Vertical Glazing U-Factor	U-0.32	U-0.18
Vertical Glazing SHGC	0.3	0.28
Window to Wall Ratio (%)	Varies by primary building typology; Modeled case: 44% (Podium of Residential typology)	40%
Additional Shading	None	30” shading overhangs
HVAC		
Primary HVAC System	Energy recovery ventilator (ERV) + WSHP units	Energy recovery ventilator (ERV) + Air-source VRF terminal units
Exhaust Air Energy Recovery	Energy recovery ventilator; 70% total energy recovery effectiveness	Energy recovery ventilator; 80% total energy recovery effectiveness
Primary Cooling	ERV: DX cooling coils; WSHP / hydronic loop with cooling towers for heat rejection	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)
Primary Heating	ERV: High-efficiency condensing gas furnace heating; WSHP hydronic loop with condensing gas boilers (95% thermal eff.)	Air-source VRF heating (COP 3.3 at 90.1-2013 reference conditions)
Service Hot Water	Condensing gas storage water heater (95% thermal eff.)	*Same as Design Case*

[29] Design Case modeled with improved air tightness as 1 of 3 required efficiency measures per MA Stretch Energy Code Section C406.

Internal Gains		
Lighting Power Density[30]	0.98 W/SF	*Same as Design Case*

The Restaurant typology has varying floor areas across the ground floors of the primary building typologies, and the final space allocation for commercial restaurants is subject to change; for this reason, Restaurant model results are presented on an area-normalized (per square foot) basis.

Table B-10 Energy Model Alternative Case Results: Restaurant Typology (Area-normalized)

	Design Case	Alternative Case
Energy by End Use		
Lighting (kBtu/ft2/yr)	16	16
Misc. Equipment & DHW (kBtu/ft2/yr)	141	141
Vertical Transportation (kBtu/ft2/yr)	0	0
Space Heating (kBtu/ft2/yr)	29	3
DHW (kBtu/ft2/yr)	0	0
Space Cooling (kBtu/ft2/yr)	14	7
Heat Rejection (kBtu/ft2/yr)	1	1
Fans (kBtu/ft2/yr)	16	16
Pumps (kBtu/ft2/yr)	31	3
Total (kBtu/ft2/yr)	**249**	**187**
Energy by Fuel Type		
Electricity (kBtu/ft2/yr)	147	114
Natural Gas (kBtu/ft2/yr)	102	73
Total (kBtu/ft2/yr)	**249**	**187**
Estimated Annual Utility Cost	**$8.06 / ft / yr**	**$6.17 / ft / yr**
Emissions		
Electricity (lbs/ft2/yr)	28	22
Natural Gas (lbs/ft2/yr)	12	9
Total (lbs/ft2/yr)	**40**	**30**
TEDI (kBtu/ft2/yr)	**27.8**	**14.9**

As shown in Table B-10, the Restaurant model shows significantly higher energy use intensity (EUI) than the primary building typologies. This is expected from the large energy demand associated with cooking, water

[30] Lighting power density assumed with 10% reduction from MA Stretch Code space-by-space values across all typologies as 1 of 3 required efficiency measures per MA Stretch Energy Code Section C406.

heating and refrigeration. The Alternative Case achieves savings in HVAC-associated energy, with energy savings totaling 25% and emissions reductions of 24% in comparison to the Design Case. The Alternative Case shows very low heating and cooling energy through the use of efficient air-source VRF system with improved efficiency and the ability to exchange thermal energy between zones during instances of simultaneous heating and cooling demands. While the Alternative Case shows reduced natural gas consumption via electrification of space heating components, natural gas energy continues to appear due to cooking-related end uses.

The Alternative Case also shows a reduction in TEDI via improved envelope thermal performance, reduced infiltration, and an increase in energy recovery effectiveness.

The graphs below present a comparison of energy and emissions for the Design Case and Alternative Case.

Figure B-9 Restaurant Energy Consumption for Design and Alternative Case (Area-normalized)

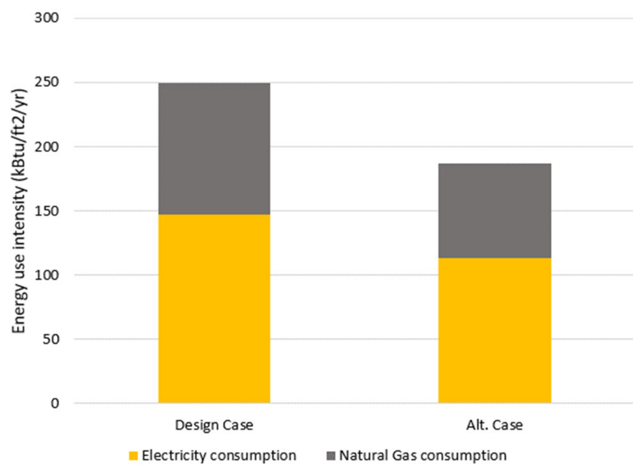
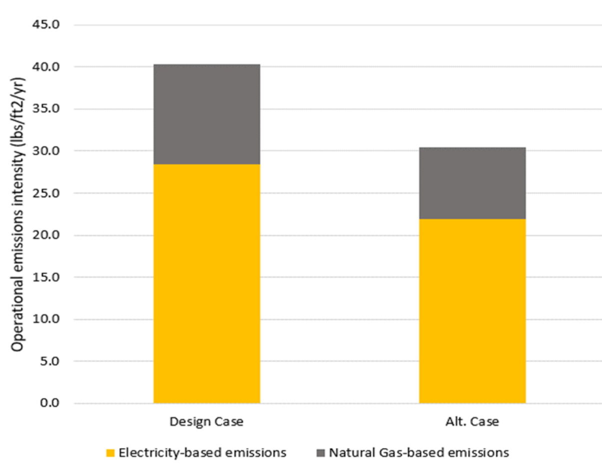


Figure B-10 Restaurant Operational Emissions for Design and Alternative Case (Area-normalized)



B.6 Retail Typology

This section describes modeling alternatives for the Retail space type. The project site does not include stand-alone Retail buildings; however, retail spaces are assumed to be present at the ground level of the primary building types described above. The requested modeling alternatives includes the following.[31]

- *Retail: Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. Efficient electric (electric air source heat pump/VRF) space heating. External shading and improved solar heat gain coefficient windows to control space cooling loads. Electric air source heat pump service hot water. Energy reduction shall be attributable to reductions in heating, cooling, fan, ventilation, and pumping. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy over reductions in lighting and miscellaneous energy reduction.*

For the purpose of this study, a Retail space comprising 5,048 ft2 GFA within the podium (ground level) of the Multifamily Residential typology was modeled in isolation; adjacent internal surfaces (internal walls and ceilings) were modeled as having no heat transfer (adiabatic), so only heat transfer across exterior surfaces was considered. Space types for the isolated Retail model include a sales area and a public restroom. Modeling cases presented in this appendix include the elements listed below. Quantitative envelope and systems performance data assumed for each case is summarized in the table that follows.

- **Basis of Design:** Design Case model as described for the Residential typology in the body of this report, for isolated Retail space. Dedicated outside air system (DOAS) and energy recovery ventilator with high-effectiveness sensible and latent energy recovery. Water source heat pump system with high efficiency condensing boilers and cooling towers to provide space conditioning. Condensing gas domestic water heating. Low lighting power densities achieved from LED lighting and lighting control systems.
- **Alternative Case:** Improved envelope thermal performance and air tightness. Shading overhangs at each floor. Heating and cooling provided by air-source VRF. Electric air source heat pump domestic water heating.

The modeling cases are summarized in Table B-11 below. For the Retail typology, the Stretch Code Base Case condition was integrated with the primary building typologies; a separate Retail Base Case was not modeled.

[31] Language per letter dated March 8, 2021 from The Massachusetts Department of Energy Resources (DOER) responding to the Environmental Notification Form (ENF) originally submitted for the project.

Table B-11 Summary of Energy Modeling Inputs – Retail Design Case & Alternative Case

	Design Case	Alt. Case
Building Envelope		
Roof Insulation	U- 0.025 (R-40)	U- 0.017 (R-60)
Wall Assembly – Opaque	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel	U- 0.033 (R-30) opaque U-0.05 (R-20) spandrel
Air Infiltration Rate	0.25 cfm/SF façade at 75 Pa	0.06 cfm/SF façade at 50 Pa
Fenestration and Shading		
Vertical Glazing U-Factor	U-0.32	U-0.18
Vertical Glazing SHGC	0.3	0.28
Window to Wall Ratio (%)	Varies by primary building typology; Modeled case: 44% (Podium of Residential typology)	40%
Additional Shading	None	30” shading overhangs
HVAC		
Primary HVAC System	Energy recovery ventilator (ERV) + WSHP units	Energy recovery ventilator (ERV) + Air-source VRF terminal units
Exhaust Air Energy Recovery	Energy recovery ventilator; 70% total energy recovery effectiveness	Energy recovery ventilator; 80% total energy recovery effectiveness
Primary Cooling	ERV: DX cooling coils; WSHP / hydronic loop with cooling towers for heat rejection	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)
Primary Heating	ERV: High-efficiency condensing gas furnace heating; WSHP hydronic loop with condensing gas boilers.	Air-source VRF heating (COP 3.3 at 90.1-2013 reference conditions)
Service Hot Water	Condensing gas storage water heater (95% thermal eff.)	Central ASHP water heating, UEF 3.45
Internal Gains		
Lighting Power Density[32]	0.95 W/SF	*Same as Design Case*

The Retail typology has varying floor areas across the ground floors of the primary building typologies, and the final space allocation for Retail spaces is subject to change; for this reason, Retail model results are presented on an area-normalized (per square foot) basis.

[32] Lighting power density assumed with 10% reduction from MA Stretch Code space-by-space values across all typologies as 1 of 3 required efficiency measures per MA Stretch Energy Code Section C406.

Table B-12 Energy Model Alternative Case Results: Retail Typology (Area-normalized)

	Design Case	Alternative Case
Energy by End Use		
Lighting (kBtu/ft2/yr)	12	12
Misc. Equipment (kBtu/ft2/yr)	3	3
Vertical Transportation (kBtu/ft2/yr)	0	0
Space Heating (kBtu/ft2/yr)	14	1
DHW (kBtu/ft2/yr)	0	0
Space Cooling (kBtu/ft2/yr)	4	2
Heat Rejection (kBtu/ft2/yr)	0	0
Fans (kBtu/ft2/yr)	7	7
Pumps (kBtu/ft2/yr)	23	2
Total (kBtu/ft2/yr)	**64**	**28**
Energy by Fuel Type		
Electricity (kBtu/ft2/yr)	51	28
Natural Gas (kBtu/ft2/yr)	13	0
Total (kBtu/ft2/yr)	**64**	**28**
Estimated Annual Utility Cost	**$2.57 / ft / yr**	**$1.35 / ft / yr**
Emissions		
Electricity (lbs/ft2/yr)	10	5
Natural Gas (lbs/ft2/yr)	1	0
Total (lbs/ft2/yr)	**11**	**5**
TEDI (kBtu/ft2/yr)	**13.7**	**5.5**

As shown in Table B-12, the Retail Alternative Case model achieves savings in HVAC-associated energy, with energy savings totaling 55% and emissions reductions of 52% in comparison to the Design Case. The Alternative Case shows very low heating and cooling energy through the use of efficient air-source VRF system with improved efficiency and the ability to exchange thermal energy between zones during instances of simultaneous heating and cooling demands.

The Alternative Case also shows a reduction in TEDI via improved envelope thermal performance, reduced infiltration, and an increase in energy recovery effectiveness.

The graphs below present a comparison of energy and emissions for the Design Case and Alternative Case.

Figure B-11 Retail Energy Consumption for Design and Alternative Case (Area-normalized)

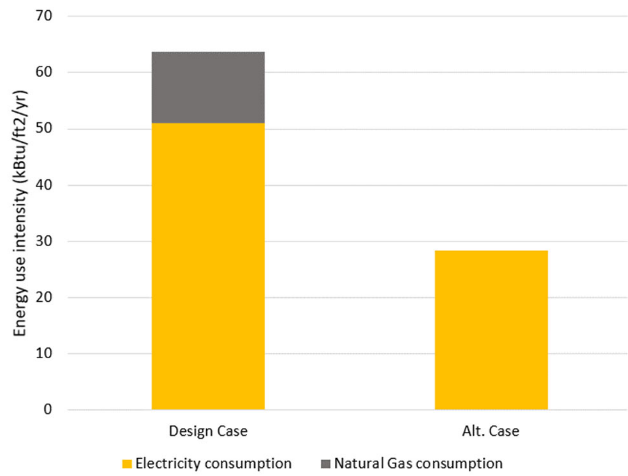
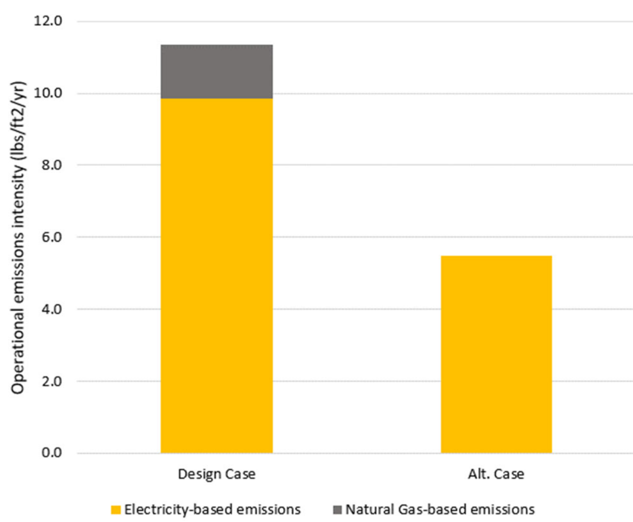


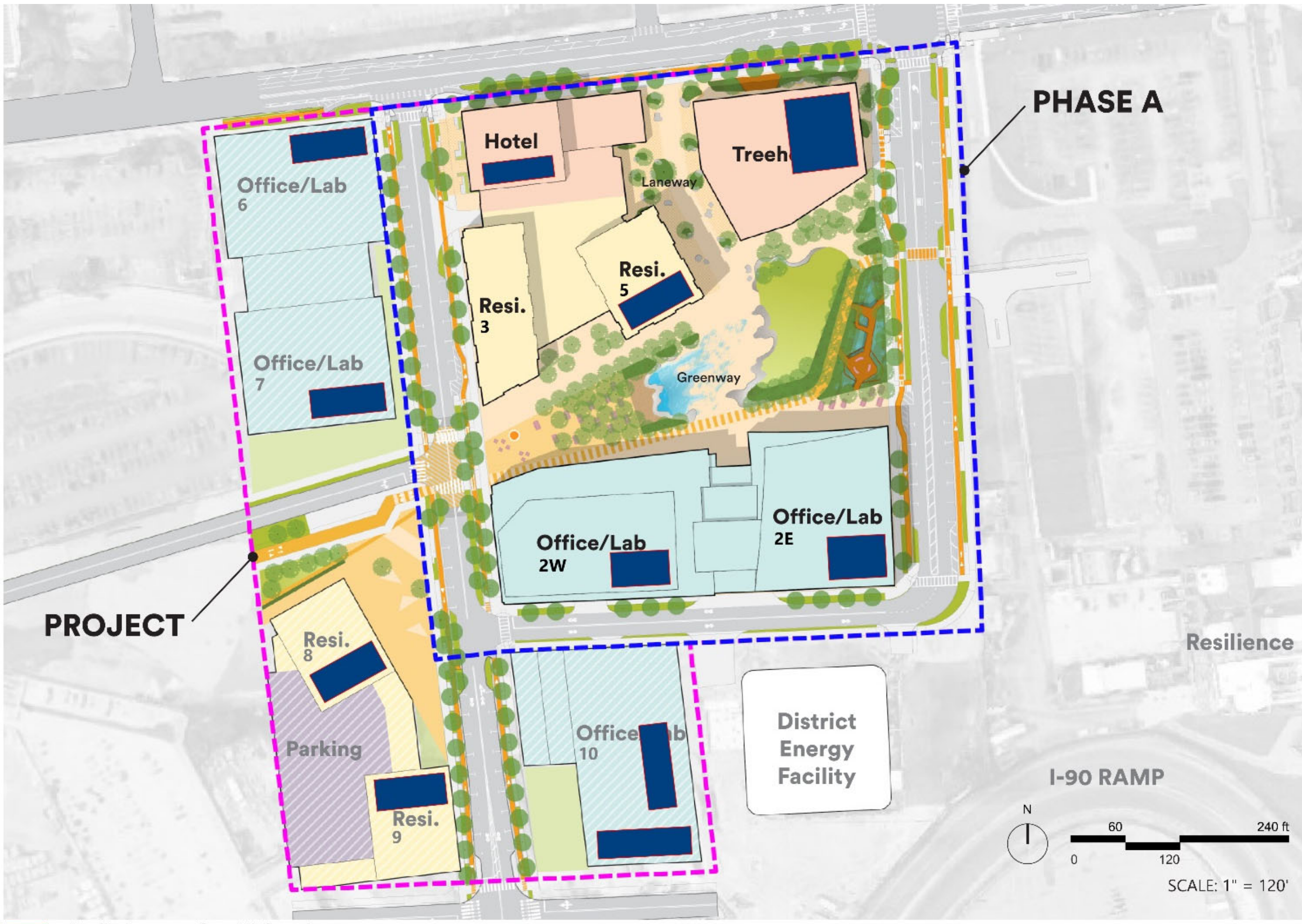
Figure B-12 Retail Operational Emissions for Design and Alternative Case (Area-normalized)



B.7 Solar PV Analysis

In support of the rooftop solar PV analysis described in the DEIR Section 6.4.1.8, Figure B-13 below indicates the potential locations of rooftop PV installations across all typologies in the Project. Per the analysis completed, all buildings had rooftop PV installations included except for one of the two Phase A Residential buildings, for which excessive shading from neighboring buildings reduced solar PV potential.

Figure B-13 Preliminary Rooftop Solar PV Roof Plan[33]



Preliminary rooftop PV locations
(Sizes and locations subject to change)

Note: Illustrative purposes only. Subject to change.

[33] Adapted from image by Henning Larsen, Studio Gang, Utile and Scape. Illustrative purposes only; subject to change.

MOVES Emission Factor Output

Harvard ERC DEIR

Emissions Factors By Link (g/mi)

Emission Factors From MOVES

	Roadway Segments		2020 Existing			2030 No Build			2030 Build			2030 Build with Mitigation	
		NO_x	VOC	CO_2	NO_x	VOC	CO_2	NO_x	VOC	CO_2	NO_x	VOC	CO_2
1	JFK Street (Mem Dr/Eliot)	0.16	0.56	437.42	0.07	0.36	337.87	0.07	0.36	337.87	0.07	0.36	337.87
2	Mem Drive (Hawthorn/JFK)	0.14	0.24	366.15	0.07	0.16	282.40	0.07	0.16	282.40	0.07	0.16	282.40
3	Mem Drive (JFK/Western)	0.14	0.15	368.10	0.07	0.10	283.91	0.07	0.10	283.91	0.07	0.10	283.91
4	Larz Anderson Bridge (SFRWB/Mem Dr)	0.19	0.66	476.54	0.09	0.42	369.67	0.09	0.42	369.67	0.09	0.42	369.67
5	SFR WB On Ramp (SFR/Bridge)	0.12	0.64	375.42	0.05	0.42	288.14	0.05	0.42	288.14	0.05	0.42	288.14
6	SFR WB Off Ramp (Bridge/SFR)	0.23	0.89	530.03	0.12	0.57	413.06	0.12	0.57	413.06	0.12	0.57	413.06
7	N Harvard St (SFR WB/SFR EB)	0.30	3.35	625.75	0.16	2.16	489.03	0.16	2.16	489.03	0.16	2.16	489.03
8	SFR EB Off Ramp (SFR/Bridge)	0.18	0.71	473.72	0.09	0.46	367.34	0.09	0.46	367.34	0.09	0.46	367.34
9	SFR EB On Ramp (Bridge/SFR)	0.16	0.73	542.54	0.08	0.48	418.32	0.08	0.48	418.32	0.08	0.48	418.32
10	N Harvard St (Academic/SFR EB)	0.16	0.24	434.65	0.07	0.16	335.58	0.07	0.16	335.58	0.07	0.16	335.58
11	S Campus Dr (End/Nharvard)	0.16	0.71	439.07	0.07	0.46	339.23	0.07	0.46	339.23	0.07	0.46	339.23
12	Academic Way (N Harvard/Western)	0.15	1.14	432.07	0.07	0.74	333.63	0.07	0.74	333.63	0.07	0.74	333.63
13	N Harvard St (Western/Academic)	0.15	0.65	432.07	0.07	0.42	333.63	0.07	0.42	333.63	0.07	0.42	333.63
14	Western Ave (Spurr/N Harvard)	0.17	0.78	454.23	0.08	0.51	351.39	0.08	0.51	351.39	0.08	0.51	351.39
15	N Havard St (Western/Kingsley)	0.18	0.78	462.48	0.08	0.51	358.05	0.08	0.51	358.05	0.08	0.51	358.05
16	Franklin St (Appian/N Harvard)	0.17	0.43	495.26	0.08	0.28	383.79	0.08	0.28	383.79	0.08	0.28	383.79
17	Kinglsey St (N Havard/Travis)	0.18	0.79	513.92	0.09	0.51	398.88	0.09	0.51	398.88	0.09	0.51	398.88
18	N Harvard St (Franklin/Cambridge)	0.16	0.24	434.81	0.07	0.16	335.70	0.07	0.16	335.70	0.07	0.16	335.70
19	Western Ave (N Harvard/Academic)	0.15	0.65	432.07	0.07	0.42	333.63	0.07	0.42	333.63	0.07	0.42	333.63
20	Academic Way (Western/End)	0.18	1.17	565.19	0.08	0.76	437.42	0.08	0.76	437.42	0.08	0.76	437.42
21	Western Ave (Academic/Stadium)	0.15	0.65	432.07	0.07	0.42	333.63	0.07	0.42	333.63	0.07	0.42	333.63
22	Driveway (Western/End)	0.18	1.38	565.19	0.08	0.90	437.42	0.08	0.90	437.42	0.08	0.90	437.42
23	Stadium Way (Western/End)	0.19	0.90	580.34	0.09	0.58	449.89	0.09	0.58	449.89	0.09	0.58	449.89
24	Western Ave (Stadium/Batten)	0.15	0.65	432.07	0.07	0.42	333.63	0.07	0.42	333.63	0.07	0.42	333.63
25	Batten Way (Western/End)	0.18	0.73	565.19	0.08	0.48	437.42	0.08	0.48	437.42	0.08	0.48	437.42
26	Western Ave (Batten/Cattle)	0.15	3.32	432.07	0.07	2.14	333.63	0.07	2.14	333.63	0.07	2.14	333.63
27	Cattle Drive (Western/DEF)	0.17	0.61	489.51	0.08	0.40	379.03	0.08	0.40	379.03	0.08	0.40	379.03
28	DEF Dr (Cattle/East)	0.18	0.62	569.40	0.09	0.41	440.84	0.09	0.41	440.84	0.09	0.41	440.84
29	Cattle Drive/Almy (DEF/Windom)	0.16	0.32	486.87	0.08	0.21	376.67	0.08	0.21	376.67	0.08	0.21	376.67
30	Western Ave (Cattle/East)	0.15	0.46	432.07	0.07	0.30	333.63	0.07	0.30	333.63	0.07	0.30	333.63
31	Kresge Way (Western/End)	0.18	0.44	567.91	0.09	0.29	439.53	0.09	0.29	439.53	0.09	0.29	439.53
32	East Drive (Western / DEF)	0.18	0.55	573.15	0.09	0.36	443.82	0.09	0.36	443.82	0.09	0.36	443.82
33	Western Ave (East/SFR EB)	0.16	0.71	439.07	0.07	0.46	339.23	0.07	0.46	339.23	0.07	0.46	339.23
34	SFR EB Off Ramp (SFR/Western)	0.17	0.60	421.85	0.08	0.39	328.01	0.08	0.39	328.01	0.08	0.39	328.01
35	SFR EB On Ramp (Western/Cambridge)	0.16	0.36	480.53	0.08	0.24	371.69	0.08	0.24	371.69	0.08	0.24	371.69
36	Western Ave (SFRWB/Mem)	0.26	3.34	575.44	0.14	2.15	449.41	0.14	2.15	449.41	0.14	2.15	449.41
37	SFR WB On Ramp (Cambridge/Western)	0.15	0.35	389.13	0.07	0.23	301.74	0.07	0.23	301.74	0.07	0.23	301.74
38	SFR WB Off Ramp (Western/SFR)	0.14	0.61	451.43	0.07	0.39	347.42	0.07	0.39	347.42	0.07	0.39	347.42
39	Western Ave (SFR/Mem)	0.16	0.78	439.67	0.07	0.51	339.77	0.07	0.51	339.77	0.07	0.51	339.77
40	Mem Drive (Western/River)	0.15	0.37	378.21	0.08	0.24	291.79	0.08	0.24	291.79	0.08	0.24	291.79
41	Western Ave (Mem/Putnam)	0.16	0.65	444.34	0.08	0.42	343.39	0.08	0.42	343.39	0.08	0.42	343.39
42	River St (Mem/Putnam)	0.15	0.52	432.07	0.07	0.34	333.63	0.07	0.34	333.63	0.07	0.34	333.63
43	Mem Drive (River/Pleasant)	0.15	0.41	375.57	0.07	0.26	289.72	0.07	0.26	289.72	0.07	0.26	289.72
44	River St (SFRWB/Mem)	0.16	0.87	411.87	0.08	0.56	320.02	0.08	0.56	320.02	0.08	0.56	320.02
45	SFR WB Off Ramp (Cambridge/SFR)	0.18	0.41	511.84	0.09	0.27	397.26	0.09	0.27	397.26	0.09	0.27	397.26
46	River St (SFREB/SFRWB)	0.25	3.33	543.14	0.13	2.15	424.57	0.13	2.15	424.57	0.13	2.15	424.57
47	SFR EB On Ramp (Cambridge/SFR)	0.15	0.53	463.75	0.07	0.34	357.57	0.07	0.34	357.57	0.07	0.34	357.57
48	Cambridge St (DoubleTree/SFREB)	0.17	1.68	421.85	0.08	1.09	328.01	0.08	1.09	328.01	0.08	1.09	328.01
49	Double Tree (Cambridge/End)	0.21	3.33	553.31	0.10	2.15	430.57	0.10	2.15	430.57	0.10	2.15	430.57
50	I90 EB Off ramp (Cambridge /Split)	0.17	0.79	491.53	0.08	0.51	380.77	0.08	0.51	380.77	0.08	0.51	380.77
51	I90 On Ramp (Cambridge/Split)	0.17	0.33	491.90	0.08	0.21	381.13	0.08	0.21	381.13	0.08	0.21	381.13
52	I90 WB Off ramp (Cambridge /Split)	0.19	0.43	517.96	0.09	0.28	402.06	0.09	0.28	402.06	0.09	0.28	402.06
53	Cambridge St (Windom/Doubletree)	0.15	0.29	398.11	0.07	0.19	309.01	0.07	0.19	309.01	0.07	0.19	309.01
54	Windom Street (Almay/Cambridge)	0.18	2.24	505.91	0.08	1.45	392.47	0.08	1.45	392.47	0.08	1.45	392.47
55	Cambridge St (N Harvard/Windom)	0.15	0.41	396.97	0.07	0.27	308.07	0.07	0.27	308.07	0.07	0.27	308.07
56	Cambridge St (Lincoln/N Harvard)	0.16	0.78	409.05	0.08	0.50	317.78	0.08	0.50	317.78	0.08	0.50	317.78
57	Idle Link	1.01	0.84	3739.28	0.35	0.61	2,821.74	0.35	0.61	2,821.74	0.35	0.61	2,821.74

yearID	monthID	dayID	hourID	stateID	countyID	zoneID	linkID	pollutantID	emissionQuant	activityTypeID	activity	emissionRate	massUnits	distanceUnits
2020	7	5	16	25	25025	250250	1	3	0.020388821	1	0.129999995	0.156837091	g	mi
2020	7	5	16	25	25025	250250	1	87	0.072537616	1	0.129999995	0.557981681	g	mi
2020	7	5	16	25	25025	250250	1	90	56.86399841	1	0.129999995	437.4153885	g	mi
2020	7	5	16	25	25025	250250	2	3	0.046922967	1	0.330000013	0.142190803	g	mi
2020	7	5	16	25	25025	250250	2	87	0.080118865	1	0.330000013	0.242784429	g	mi
2020	7	5	16	25	25025	250250	2	90	120.8280029	1	0.330000013	366.1454489	g	mi
2020	7	5	16	25	25025	250250	3	3	0.089036293	1	0.620000005	0.143606924	g	mi
2020	7	5	16	25	25025	250250	3	87	0.093371056	1	0.620000005	0.150598476	g	mi
2020	7	5	16	25	25025	250250	3	90	228.2189941	1	0.620000005	368.095149	g	mi
2020	7	5	16	25	25025	250250	4	3	0.020494973	1	0.109999999	0.18631794	g	mi
2020	7	5	16	25	25025	250250	4	87	0.072070509	1	0.109999999	0.655186451	g	mi
2020	7	5	16	25	25025	250250	4	90	52.41899872	1	0.109999999	476.5363546	g	mi
2020	7	5	16	25	25025	250250	5	3	0.012971377	1	0.109999999	0.11792161	g	mi
2020	7	5	16	25	25025	250250	5	87	0.070781276	1	0.109999999	0.643466146	g	mi
2020	7	5	16	25	25025	250250	5	90	41.29639816	1	0.109999999	375.4218035	g	mi
2020	7	5	16	25	25025	250250	6	3	0.01806834	1	0.079999998	0.225854251	g	mi
2020	7	5	16	25	25025	250250	6	87	0.07080356	1	0.079999998	0.885044524	g	mi
2020	7	5	16	25	25025	250250	6	90	42.40209961	1	0.079999998	530.026257	g	mi
2020	7	5	16	25	25025	250250	7	3	0.005933975	1	0.02	0.29669875	g	mi
2020	7	5	16	25	25025	250250	7	87	0.066920191	1	0.02	3.346009627	g	mi
2020	7	5	16	25	25025	250250	7	90	12.51509953	1	0.02	625.7549903	g	mi
2020	7	5	16	25	25025	250250	8	3	0.018422144	1	0.100000001	0.184221433	g	mi
2020	7	5	16	25	25025	250250	8	87	0.071396358	1	0.100000001	0.713963572	g	mi
2020	7	5	16	25	25025	250250	8	90	47.37200165	1	0.100000001	473.7200094	g	mi
2020	7	5	16	25	25025	250250	9	3	0.01641982	1	0.100000001	0.164198202	g	mi
2020	7	5	16	25	25025	250250	9	87	0.073132932	1	0.100000001	0.731329311	g	mi
2020	7	5	16	25	25025	250250	9	90	54.25400162	1	0.100000001	542.5400081	g	mi
2020	7	5	16	25	25025	250250	10	3	0.055985902	1	0.360000014	0.155516387	g	mi
2020	7	5	16	25	25025	250250	10	87	0.085470676	1	0.360000014	0.237418536	g	mi
2020	7	5	16	25	25025	250250	10	90	156.473999	1	0.360000014	434.64998	g	mi
2020	7	5	16	25	25025	250250	11	3	0.015831575	1	0.100000001	0.158315746	g	mi
2020	7	5	16	25	25025	250250	11	87	0.070882097	1	0.100000001	0.708820958	g	mi
2020	7	5	16	25	25025	250250	11	90	43.90670013	1	0.100000001	439.0669948	g	mi
2020	7	5	16	25	25025	250250	12	3	0.009224573	1	0.059999999	0.153742889	g	mi
2020	7	5	16	25	25025	250250	12	87	0.068557233	1	0.059999999	1.142620569	g	mi
2020	7	5	16	25	25025	250250	12	90	25.92420006	1	0.059999999	432.0700106	g	mi
2020	7	5	16	25	25025	250250	13	3	0.016911756	1	0.109999999	0.153743239	g	mi
2020	7	5	16	25	25025	250250	13	87	0.071353264	1	0.109999999	0.648666041	g	mi
2020	7	5	16	25	25025	250250	13	90	47.52780151	1	0.109999999	432.0709252	g	mi
2020	7	5	16	25	25025	250250	14	3	0.015179754	1	0.090000004	0.168663929	g	mi
2020	7	5	16	25	25025	250250	14	87	0.070471406	1	0.090000004	0.783015591	g	mi
2020	7	5	16	25	25025	250250	14	90	40.88040161	1	0.090000004	454.2266665	g	mi
2020	7	5	16	25	25025	250250	15	3	0.015780434	1	0.090000004	0.175338149	g	mi
2020	7	5	16	25	25025	250250	15	87	0.07060615	1	0.090000004	0.784512744	g	mi
2020	7	5	16	25	25025	250250	15	90	41.62310028	1	0.090000004	462.4788736	g	mi
2020	7	5	16	25	25025	250250	16	3	0.030653821	1	0.180000007	0.170299	g	mi
2020	7	5	16	25	25025	250250	16	87	0.077235997	1	0.180000007	0.429088854	g	mi
2020	7	5	16	25	25025	250250	16	90	89.14600372	1	0.180000007	495.2555566	g	mi
2020	7	5	16	25	25025	250250	17	3	0.016479339	1	0.090000004	0.183103764	g	mi
2020	7	5	16	25	25025	250250	17	87	0.071417451	1	0.090000004	0.793527201	g	mi
2020	7	5	16	25	25025	250250	17	90	46.25260162	1	0.090000004	513.9177754	g	mi
2020	7	5	16	25	25025	250250	18	3	0.054449253	1	0.349999994	0.155569296	g	mi
2020	7	5	16	25	25025	250250	18	87	0.084907927	1	0.349999994	0.24259408	g	mi
2020	7	5	16	25	25025	250250	18	90	152.1829987	1	0.349999994	434.808575	g	mi
2020	7	5	16	25	25025	250250	19	3	0.016911756	1	0.109999999	0.153743239	g	mi
2020	7	5	16	25	25025	250250	19	87	0.071353264	1	0.109999999	0.648666041	g	mi
2020	7	5	16	25	25025	250250	19	90	47.52780151	1	0.109999999	432.0709252	g	mi
2020	7	5	16	25	25025	250250	20	3	0.010628221	1	0.059999999	0.177137014	g	mi
2020	7	5	16	25	25025	250250	20	87	0.070058182	1	0.059999999	1.167636391	g	mi
2020	7	5	16	25	25025	250250	20	90	33.91139984	1	0.059999999	565.19001	g	mi
2020	7	5	16	25	25025	250250	21	3	0.016911756	1	0.109999999	0.153743239	g	mi
2020	7	5	16	25	25025	250250	21	87	0.071353264	1	0.109999999	0.648666041	g	mi
2020	7	5	16	25	25025	250250	21	90	47.52780151	1	0.109999999	432.0709252	g	mi
2020	7	5	16	25	25025	250250	22	3	0.008856818	1	0.050000001	0.177136359	g	mi
2020	7	5	16	25	25025	250250	22	87	0.069248743	1	0.050000001	1.384974846	g	mi
2020	7	5	16	25	25025	250250	22	90	28.2595005	1	0.050000001	565.1900016	g	mi
2020	7	5	16	25	25025	250250	23	3	0.014936559	1	0.079999998	0.18670699	g	mi
2020	7	5	16	25	25025	250250	23	87	0.071765505	1	0.079999998	0.89706883	g	mi
2020	7	5	16	25	25025	250250	23	90	46.42720032	1	0.079999998	580.3400169	g	mi
2020	7	5	16	25	25025	250250	24	3	0.016911756	1	0.109999999	0.153743239	g	mi
2020	7	5	16	25	25025	250250	24	87	0.071353264	1	0.109999999	0.648666041	g	mi
2020	7	5	16	25	25025	250250	24	90	47.52780151	1	0.109999999	432.0709252	g	mi
2020	7	5	16	25	25025	250250	25	3	0.017713636	1	0.100000001	0.177136359	g	mi
2020	7	5	16	25	25025	250250	25	87	0.073295698	1	0.100000001	0.732956965	g	mi
2020	7	5	16	25	25025	250250	25	90	56.51910019	1	0.100000001	565.1909935	g	mi
2020	7	5	16	25	25025	250250	26	3	0.003074861	1	0.02	0.15374306	g	mi
2020	7	5	16	25	25025	250250	26	87	0.066320211	1	0.02	3.316010609	g	mi
2020	7	5	16	25	25025	250250	26	90	8.641409874	1	0.02	432.0705034	g	mi
2020	7	5	16	25	25025	250250	27	3	0.019963734	1	0.119999997	0.166364452	g	mi
2020	7	5	16	25	25025	250250	27	87	0.073165141	1	0.119999997	0.609709522	g	mi
2020	7	5	16	25	25025	250250	27	90	58.74100113	1	0.119999997	489.5083537	g	mi
2020	7	5	16	25	25025	250250	28	3	0.021580206	1	0.119999997	0.179835056	g	mi
2020	7	5	16	25	25025	250250	28	87	0.074941583	1	0.119999997	0.624513205	g	mi
2020	7	5	16	25	25025	250250	28	90	68.32810211	1	0.119999997	569.4008637	g	mi
2020	7	5	16	25	25025	250250	29	3	0.042836841	1	0.25999999	0.164757088	g	mi
2020	7	5	16	25	25025	250250	29	87	0.08242093	1	0.25999999	0.31700359	g	mi
2020	7	5	16	25	25025	250250	29	90	126.586998	1	0.25999999	486.873087	g	mi
2020	7	5	16	25	25025	250250	30	3	0.024598908	1	0.159999996	0.153743176	g	mi
2020	7	5	16	25	25025	250250	30	87	0.0741494	1	0.159999996	0.46343376	g	mi
2020	7	5	16	25	25025	250250	30	90	69.13130188	1	0.159999996	432.0706464	g	mi
2020	7	5	16	25	25025	250250	31	3	0.032194927	1	0.180000007	0.1788607	g	mi
2020	7	5	16	25	25025	250250	31	87	0.079798855	1	0.180000007	0.443326954	g	mi
2020	7	5	16	25	25025	250250	31	90	102.223999	1	0.180000007	567.9110831	g	mi
2020	7	5	16	25	25025	250250	32	3	0.025524471	1	0.140000001	0.182317649	g	mi
2020	7	5	16	25	25025	250250	32	87	0.076605469	1	0.140000001	0.547181919	g	mi
2020	7	5	16	25	25025	250250	32	90	80.24120331	1	0.140000001	573.1514498	g	mi
2020	7	5	16	25	25025	250250	33	3	0.015831575	1	0.100000001	0.158315746	g	mi
2020	7	5	16	25	25025	250250	33	87	0.070882097	1	0.100000001	0.708820958	g	mi
2020	7	5	16	25	25025	250250	33	90	43.90670013	1	0.100000001	439.0669948	g	mi
2020	7	5	16	25	25025	250250	34	3	0.020074824	1	0.119999997	0.167290203	g	mi
2020	7	5	16	25	25025	250250	34	87	0.071623422	1	0.119999997	0.596861865	g	mi
2020	7	5	16	25	25025	250250	34	90	50.6216011	1	0.119999997	421.8466853	g	mi
2020	7	5	16	25	25025	250250	35	3	0.035388693	1	0.219999999	0.160857697	g	mi
2020	7	5	16	25	25025	250250	35	87	0.079659022	1	0.219999999	0.362086467	g	mi
2020	7	5	16	25	25025	250250	35	90	105.7170029	1	0.219999999	480.5318338	g	mi
2020	7	5	16	25	25025	250250	36	3	0.005186243	1	0.02	0.259312132	g	mi
2020	7	5	16	25	25025	250250	36	87	0.066738747	1	0.02	3.336937428	g	mi
2020	7	5	16	25	25025	250250	36	90	11.50879955	1	0.02	575.4399905	g	mi
2020	7	5	16	25	25025	250250	37	3	0.032045349	1	0.219999999	0.14566068	g	mi
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2020	7	5	16	25	25025	250250	37	90	85.60949707	1	0.219999999	389.1340797	g	mi
2020	7	5	16	25	25025	250250	38	3	0.017083095	1	0.119999997	0.142359131	g	mi
2020	7	5	16	25	25025	250250	38	87	0.072767518	1	0.119999997	0.606396001	g	mi
2020	7	5	16	25	25025	250250	38	90	54.1711998	1	0.119999997	451.4266751	g	mi

2020	7	5	16	25	25025	250250	39	3	0.014284424	1	0.090000004	0.158715821	g	mi
2020	7	5	16	25	25025	250250	39	87	0.070317358	1	0.090000004	0.781303944	g	mi
2020	7	5	16	25	25025	250250	39	90	39.5707016	1	0.090000004	439.6744447	g	mi
2020	7	5	16	25	25025	250250	40	3	0.030164579	1	0.200000003	0.150822892	g	mi
2020	7	5	16	25	25025	250250	40	87	0.074518807	1	0.200000003	0.372594031	g	mi
2020	7	5	16	25	25025	250250	40	90	75.64299774	1	0.200000003	378.2149831	g	mi
2020	7	5	16	25	25025	250250	41	3	0.017788095	1	0.109999999	0.161709959	g	mi
2020	7	5	16	25	25025	250250	41	87	0.071506798	1	0.109999999	0.650061806	g	mi
2020	7	5	16	25	25025	250250	41	90	48.87739944	1	0.109999999	444.3399974	g	mi
2020	7	5	16	25	25025	250250	42	3	0.021524007	1	0.140000001	0.153742903	g	mi
2020	7	5	16	25	25025	250250	42	87	0.073030889	1	0.140000001	0.521649205	g	mi
2020	7	5	16	25	25025	250250	42	90	60.48989868	1	0.140000001	432.070703	g	mi
2020	7	5	16	25	25025	250250	43	3	0.026815061	1	0.180000007	0.148972553	g	mi
2020	7	5	16	25	25025	250250	43	87	0.073532216	1	0.180000007	0.408512296	g	mi
2020	7	5	16	25	25025	250250	43	90	67.60220337	1	0.180000007	375.5677816	g	mi
2020	7	5	16	25	25025	250250	44	3	0.012839933	1	0.079999998	0.160499165	g	mi
2020	7	5	16	25	25025	250250	44	87	0.06938684	1	0.079999998	0.867335518	g	mi
2020	7	5	16	25	25025	250250	44	90	32.94919968	1	0.079999998	411.8650052	g	mi
2020	7	5	16	25	25025	250250	45	3	0.034540646	1	0.189999998	0.181792875	g	mi
2020	7	5	16	25	25025	250250	45	87	0.078283809	1	0.189999998	0.412020053	g	mi
2020	7	5	16	25	25025	250250	45	90	97.25019836	1	0.189999998	511.8431557	g	mi
2020	7	5	16	25	25025	250250	46	3	0.004982107	1	0.02	0.249105348	g	mi
2020	7	5	16	25	25025	250250	46	87	0.066570617	1	0.02	3.328530937	g	mi
2020	7	5	16	25	25025	250250	46	90	10.86270046	1	0.02	543.1350353	g	mi
2020	7	5	16	25	25025	250250	47	3	0.021102495	1	0.140000001	0.15073211	g	mi
2020	7	5	16	25	25025	250250	47	87	0.074211285	1	0.140000001	0.530080601	g	mi
2020	7	5	16	25	25025	250250	47	90	64.92549896	1	0.140000001	463.753562	g	mi
2020	7	5	16	25	25025	250250	48	3	0.006691607	1	0.039999999	0.167290183	g	mi
2020	7	5	16	25	25025	250250	48	87	0.067342296	1	0.039999999	1.683557444	g	mi
2020	7	5	16	25	25025	250250	48	90	16.87389946	1	0.039999999	421.8474959	g	mi
2020	7	5	16	25	25025	250250	49	3	0.004225704	1	0.02	0.211285199	g	mi
2020	7	5	16	25	25025	250250	49	87	0.066686086	1	0.02	3.334304392	g	mi
2020	7	5	16	25	25025	250250	49	90	11.06620026	1	0.02	553.3100252	g	mi
2020	7	5	16	25	25025	250250	50	3	0.015109028	1	0.090000004	0.167878079	g	mi
2020	7	5	16	25	25025	250250	50	87	0.071191296	1	0.090000004	0.791014368	g	mi
2020	7	5	16	25	25025	250250	50	90	44.2378006	1	0.090000004	491.5310982	g	mi
2020	7	5	16	25	25025	250250	51	3	0.042042233	1	0.25	0.168168932	g	mi
2020	7	5	16	25	25025	250250	51	87	0.081851527	1	0.25	0.327406108	g	mi
2020	7	5	16	25	25025	250250	51	90	122.9759979	1	0.25	491.9039917	g	mi
2020	7	5	16	25	25025	250250	52	3	0.033482756	1	0.180000007	0.186015306	g	mi
2020	7	5	16	25	25025	250250	52	87	0.077726819	1	0.180000007	0.431815642	g	mi
2020	7	5	16	25	25025	250250	52	90	93.23349762	1	0.180000007	517.9638551	g	mi
2020	7	5	16	25	25025	250250	53	3	0.040991951	1	0.270000011	0.151822034	g	mi
2020	7	5	16	25	25025	250250	53	87	0.078966849	1	0.270000011	0.292469798	g	mi
2020	7	5	16	25	25025	250250	53	90	107.4899979	1	0.270000011	398.1110874	g	mi
2020	7	5	16	25	25025	250250	54	3	0.005317566	1	0.029999999	0.177252219	g	mi
2020	7	5	16	25	25025	250250	54	87	0.067241266	1	0.029999999	2.241375596	g	mi
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2020	7	5	16	25	25025	250250	56	87	0.069886953	1	0.090000004	0.776521665	g	mi
2020	7	5	16	25	25025	250250	56	90	36.81470108	1	0.090000004	409.052218	g	mi
2020	7	5	16	25	25025	250250	57	3	1.008491397	1	0	NULL	g	mi
2020	7	5	16	25	25025	250250	57	87	0.844748795	1	0	NULL	g	mi
2020	7	5	16	25	25025	250250	57	90	3739.280029	1	0	NULL	g	mi

yearID	monthID	dayID	hourID	stateID	countyID	zoneID	linkID	pollutantID	emissionQuant	activityTypeID	activity	emissionRate	massUnits	distanceUnits
2030	7	5	16	25	25025	250250	1	3	0.009576533	1	0.129999995	0.073665641	g	mi
2030	7	5	16	25	25025	250250	1	87	0.047004938	1	0.129999995	0.36157646	g	mi
2030	7	5	16	25	25025	250250	1	90	43.92269897	1	0.129999995	337.8669276	g	mi
2030	7	5	16	25	25025	250250	2	3	0.023223121	1	0.330000013	0.07037309	g	mi
2030	7	5	16	25	25025	250250	2	87	0.052229378	1	0.330000013	0.158270837	g	mi
2030	7	5	16	25	25025	250250	2	90	93.19210052	1	0.330000013	282.4002934	g	mi
2030	7	5	16	25	25025	250250	3	3	0.044126052	1	0.620000005	0.071171052	g	mi
2030	7	5	16	25	25025	250250	3	87	0.061365936	1	0.620000005	0.098977315	g	mi
2030	7	5	16	25	25025	250250	3	90	176.0269928	1	0.620000005	283.9145023	g	mi
2030	7	5	16	25	25025	250250	4	3	0.010101747	1	0.109999999	0.091834062	g	mi
2030	7	5	16	25	25025	250250	4	87	0.046749573	1	0.109999999	0.424996122	g	mi
2030	7	5	16	25	25025	250250	4	90	40.6637001	1	0.109999999	369.6700029	g	mi
2030	7	5	16	25	25025	250250	5	3	0.005909019	1	0.109999999	0.053718356	g	mi
2030	7	5	16	25	25025	250250	5	87	0.045775771	1	0.109999999	0.416143376	g	mi
2030	7	5	16	25	25025	250250	5	90	31.69490051	1	0.109999999	288.1354608	g	mi
2030	7	5	16	25	25025	250250	6	3	0.009281615	1	0.079999998	0.116020188	g	mi
2030	7	5	16	25	25025	250250	6	87	0.045917619	1	0.079999998	0.573970251	g	mi
2030	7	5	16	25	25025	250250	6	90	33.04499817	1	0.079999998	413.0624863	g	mi
2030	7	5	16	25	25025	250250	7	3	0.003206423	1	0.02	0.160321166	g	mi
2030	7	5	16	25	25025	250250	7	87	0.043182418	1	0.02	2.159120936	g	mi
2030	7	5	16	25	25025	250250	7	90	9.780679703	1	0.02	489.0339961	g	mi
2030	7	5	16	25	25025	250250	8	3	0.009037439	1	0.100000001	0.090374386	g	mi
2030	7	5	16	25	25025	250250	8	87	0.046271399	1	0.100000001	0.46271398	g	mi
2030	7	5	16	25	25025	250250	8	90	36.73360062	1	0.100000001	367.3360007	g	mi
2030	7	5	16	25	25025	250250	9	3	0.007781114	1	0.100000001	0.077811138	g	mi
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2030	7	5	16	25	25025	250250	9	90	41.83190155	1	0.100000001	418.3190093	g	mi
2030	7	5	16	25	25025	250250	10	3	0.026307454	1	0.360000014	0.073076259	g	mi
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2030	7	5	16	25	25025	250250	10	90	120.8099976	1	0.360000014	335.5833132	g	mi
2030	7	5	16	25	25025	250250	11	3	0.00746741	1	0.100000001	0.0746741	g	mi
2030	7	5	16	25	25025	250250	11	87	0.045867391	1	0.100000001	0.458673902	g	mi
2030	7	5	16	25	25025	250250	11	90	33.92279816	1	0.100000001	339.2279765	g	mi
2030	7	5	16	25	25025	250250	12	3	0.004319972	1	0.059999999	0.071999533	g	mi
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2030	7	5	16	25	25025	250250	12	90	20.01779938	1	0.059999999	333.6299971	g	mi
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2030	7	5	16	25	25025	250250	13	87	0.046184637	1	0.109999999	0.419860335	g	mi
2030	7	5	16	25	25025	250250	13	90	36.69929886	1	0.109999999	333.6299914	g	mi
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2030	7	5	16	25	25025	250250	15	87	0.045702226	1	0.090000004	0.507802496	g	mi
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2030	7	5	16	25	25025	250250	16	3	0.014577912	1	0.180000007	0.080988398	g	mi
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2030	7	5	16	25	25025	250250	19	90	36.69929886	1	0.109999999	333.6299914	g	mi
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2030	7	5	16	25	25025	250250	21	87	0.046184637	1	0.109999999	0.419860335	g	mi
2030	7	5	16	25	25025	250250	21	90	36.69929886	1	0.109999999	333.6299914	g	mi
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2030	7	5	16	25	25025	250250	26	87	0.042719405	1	0.02	2.135970305	g	mi
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2030	7	5	16	25	25025	250250	42	90	46.70819855	1	0.140000001	333.6299882	g	mi
2030	7	5	16	25	25025	250250	43	3	0.013343744	1	0.180000007	0.074131908	g	mi

2030	7	5	16	25	25025	250250	43	87	0.047696285	1	0.180000007	0.26497935	g	mi
2030	7	5	16	25	25025	250250	43	90	52.14989853	1	0.180000007	289.721647	g	mi
2030	7	5	16	25	25025	250250	44	3	0.006287685	1	0.079999998	0.078596066	g	mi
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2030	7	5	16	25	25025	250250	45	87	0.051060684	1	0.189999998	0.268740446	g	mi
2030	7	5	16	25	25025	250250	45	90	75.47969818	1	0.189999998	397.2615744	g	mi
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2030	7	5	16	25	25025	250250	46	87	0.042912547	1	0.02	2.145627375	g	mi
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2030	7	5	16	25	25025	250250	47	3	0.009926329	1	0.140000001	0.070902352	g	mi
2030	7	5	16	25	25025	250250	47	87	0.048202712	1	0.140000001	0.344305085	g	mi
2030	7	5	16	25	25025	250250	47	90	50.05960083	1	0.140000001	357.5685758	g	mi
2030	7	5	16	25	25025	250250	48	3	0.00329793	1	0.039999999	0.082448243	g	mi
2030	7	5	16	25	25025	250250	48	87	0.043433826	1	0.039999999	1.085845685	g	mi
2030	7	5	16	25	25025	250250	48	90	13.12040043	1	0.039999999	328.0100181	g	mi
2030	7	5	16	25	25025	250250	49	3	0.002089964	1	0.02	0.104498179	g	mi
2030	7	5	16	25	25025	250250	49	87	0.042990897	1	0.02	2.149544891	g	mi
2030	7	5	16	25	25025	250250	49	90	8.61149025	1	0.02	430.5745221	g	mi
2030	7	5	16	25	25025	250250	50	3	0.007173667	1	0.090000004	0.079707405	g	mi
2030	7	5	16	25	25025	250250	50	87	0.046107817	1	0.090000004	0.512309062	g	mi
2030	7	5	16	25	25025	250250	50	90	34.26900101	1	0.090000004	380.7666627	g	mi
2030	7	5	16	25	25025	250250	51	3	0.019976901	1	0.25	0.079907604	g	mi
2030	7	5	16	25	25025	250250	51	87	0.053510237	1	0.25	0.21404095	g	mi
2030	7	5	16	25	25025	250250	51	90	95.28330231	1	0.25	381.1332092	g	mi
2030	7	5	16	25	25025	250250	52	3	0.016146142	1	0.180000007	0.089700786	g	mi
2030	7	5	16	25	25025	250250	52	87	0.050684243	1	0.180000007	0.281579119	g	mi
2030	7	5	16	25	25025	250250	52	90	72.37039948	1	0.180000007	402.0577589	g	mi
2030	7	5	16	25	25025	250250	53	3	0.0199579	1	0.270000011	0.073918145	g	mi
2030	7	5	16	25	25025	250250	53	87	0.051469456	1	0.270000011	0.190627609	g	mi
2030	7	5	16	25	25025	250250	53	90	83.43260193	1	0.270000011	309.0096245	g	mi
2030	7	5	16	25	25025	250250	54	3	0.002540019	1	0.029999999	0.08466729	g	mi
2030	7	5	16	25	25025	250250	54	87	0.043367617	1	0.029999999	1.44558726	g	mi
2030	7	5	16	25	25025	250250	54	90	11.77420044	1	0.029999999	392.4733568	g	mi
2030	7	5	16	25	25025	250250	55	3	0.013215427	1	0.180000007	0.073419038	g	mi
2030	7	5	16	25	25025	250250	55	87	0.048278533	1	0.180000007	0.268214061	g	mi
2030	7	5	16	25	25025	250250	55	90	55.45339966	1	0.180000007	308.0744303	g	mi
2030	7	5	16	25	25025	250250	56	3	0.006996695	1	0.090000004	0.077741052	g	mi
2030	7	5	16	25	25025	250250	56	87	0.045192793	1	0.090000004	0.502142125	g	mi
2030	7	5	16	25	25025	250250	56	90	28.59989929	1	0.090000004	317.7766462	g	mi
2030	7	5	16	25	25025	250250	57	3	0.351390392	1	0	NULL	g	mi
2030	7	5	16	25	25025	250250	57	87	0.612633884	1	0	NULL	g	mi
2030	7	5	16	25	25025	250250	57	90	2821.73999	1	0	NULL	g	mi

Mesoscale Analysis

Harvard ERC

Mesoscale Analysis

	2020 Existing	2030 No-Build	2030 Build	2030 Build-Mit
OXIDES OF NITROGEN (NOx)				
Emissions (kg/d)	31.4	17.7	19.7	18.9
Project Contribution (kg/d)			2.0	-0.8
VOLATILE ORGANIC COMPOUNDS (VOC)				
Emissions (kg/d)	67.9	55.4	60.8	59.2
Project Contribution (kg/d)			5.4	-1.6
GREENHOUSE GAS (CO_2)				
Emissions (short tons per year)	38,928	41,119	47,029	44,333
Project Contribution (short tons per year)			5,910	-2,696

Harvard ERC

Build With Mitigation

Link No.	Description	Speed	Roadway Link Length (miles)	Emission Factor (g/mi) NO_x	Emission Factor (g/mi) VOC	AADT (veh/day)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Peak Period Factor	Peak Traffic Data: Period Volume (vehicles)	Peak Traffic Data: Average Delay (sec)	Peak Traffic Data: Adjusted Delay (veh-sec)	Off-Peak Traffic Data: Period Volume (vehicles)	Off-Peak Traffic Data: Average Delay (sec)	Off-Peak Traffic Data: Adjusted Delay (veh-sec)	Link Emissions NO_x (grams)	Link Emissions VOC (grams)
1	JFK Street (Mem Dr/Eliot)	25	0.13	0.07	0.36	20,831	20,831	1,415	1,293	0.52	10,887	15	157,863	9,944	13	129,770	199	979
2	Mem Drive (Hawthorn/JFK)	35	0.33	0.07	0.16	31,171	31,171	5,376	4,910	0.52	16,291	44	708,669	14,880	39	582,555	724	1,628
3	Mem Drive (JFK/Western)	35	0.62	0.07	0.10	33,134	33,134	10,736	9,806	0.52	17,317	106	1,832,122	15,817	95	1,506,079	1,462	2,033
4	Larz Anderson Bridge (SFRWB/Mem Dr)	25	0.11	0.09	0.42	28,303	28,303	1,627	1,486	0.52	14,792	73	1,074,660	13,511	65	883,415	286	1,323
5	SFR WB On Ramp (SFR/Bridge)	25	0.11	0.05	0.42	3,789	3,789	218	199	0.52	1,980	0	0	1,809	0	0	22	173
6	SFR WB Off Ramp (Bridge/SFR)	25	0.08	0.12	0.57	7,125	7,125	298	272	0.52	3,724	164	611,434	3,401	148	502,624	66	327
7	N Harvard St (SFR WB/SFR EB)	25	0.02	0.16	2.16	28,349	28,349	296	271	0.52	14,816	228	3,383,966	13,533	206	2,781,758	91	1,224
8	SFR EB Off Ramp (SFR/Bridge)	25	0.10	0.09	0.46	8,015	8,015	419	383	0.52	4,189	424	1,774,117	3,826	381	1,458,397	72	371
9	SFR EB On Ramp (Bridge/SFR)	15	0.10	0.08	0.48	4,861	4,861	254	232	0.52	2,540	0	0	2,320	0	0	38	231
10	N Harvard St (Academic/SFR EB)	25	0.36	0.07	0.16	20,907	20,907	3,934	3,593	0.52	10,927	19	204,873	9,980	17	168,414	550	1,169
11	S Campus Dr (End/Nharvard)	25	0.10	0.07	0.46	2,113	2,113	110	101	0.52	1,104	233	256,794	1,009	209	211,095	16	97
12	Academic Way (N Harvard/Western)	25	0.06	0.07	0.74	3,698	3,698	116	106	0.52	1,933	35	67,650	1,765	32	55,611	16	164
13	N Harvard St (Western/Academic)	25	0.11	0.07	0.42	16,303	16,303	937	856	0.52	8,520	38	320,792	7,782	34	263,704	129	753
14	Western Ave (Spurr/N Harvard)	25	0.09	0.08	0.51	25,813	25,813	1,214	1,109	0.52	13,491	80	1,075,873	12,322	72	884,412	187	1,177
15	N Havard St (Western/Kingsley)	25	0.09	0.08	0.51	17,586	17,586	827	756	0.52	9,191	67	614,415	8,395	60	505,074	134	804
16	Franklin St (Appian/N Harvard)	20	0.18	0.08	0.28	2,491	2,491	234	214	0.52	1,302	16	20,307	1,189	14	16,693	36	125
17	Kinglsey St (N Havard/Travis)	20	0.09	0.09	0.51	453	453	21	19	0.52	237	34	8,118	216	31	6,673	4	21
18	N Harvard St (Franklin/Cambridge)	25	0.35	0.07	0.16	15,850	15,850	2,899	2,648	0.52	8,284	35	290,757	7,566	32	239,014	405	880
19	Western Ave (N Harvard/Academic)	25	0.11	0.07	0.42	19,125	19,125	1,100	1,004	0.52	9,996	83	824,641	9,130	74	677,888	151	883
20	Academic Way (Western/End)	15	0.06	0.08	0.76	559	559	18	16	0.52	292	15	4,335	267	13	3,563	3	25
21	Western Ave (Academic/Stadium)	25	0.11	0.07	0.42	21,843	21,843	1,256	1,147	0.52	11,416	15	170,665	10,427	13	140,293	173	1,009
22	Driveway (Western/End)	15	0.05	0.08	0.90	60	60	2	1	0.52	32	16	505	29	14	415	0	3
23	Stadium Way (Western/End)	15	0.08	0.09	0.58	3,049	3,049	127	116	0.52	1,594	24	38,247	1,456	22	31,441	22	142
24	Western Ave (Stadium/Batten)	25	0.11	0.07	0.42	20,242	20,242	1,164	1,063	0.52	10,579	28	300,456	9,663	26	246,987	160	935
25	Batten Way (Western/End)	15	0.10	0.08	0.48	3,396	3,396	178	162	0.52	1,775	39	68,518	1,621	35	56,325	29	162
26	Western Ave (Batten/Cattle)	25	0.02	0.07	2.14	20,907	20,907	219	200	0.52	10,927	11	121,831	9,980	10	100,150	30	893
27	Cattle Drive (Western/DEF)	20	0.12	0.08	0.40	4,453	4,453	279	255	0.52	2,327	19	43,172	2,126	17	35,489	42	211
28	DEF Dr (Cattle/East)	15	0.12	0.09	0.41	3,774	3,774	237	216	0.52	1,972	7	13,510	1,801	6	11,106	39	184
29	Cattle Drive/Almy (DEF/Windom)	20	0.26	0.08	0.21	6,129	6,129	833	761	0.52	3,203	0	0	2,926	0	0	124	330
30	Western Ave (Cattle/East)	25	0.16	0.07	0.30	20,831	20,831	1,742	1,591	0.52	10,887	6	66,956	9,944	6	55,040	240	1,002
31	Kresge Way (Western/End)	15	0.18	0.09	0.29	2,038	2,038	192	175	0.52	1,065	0	0	973	0	0	31	106
32	East Drive (Western / DEF)	15	0.14	0.09	0.36	6,868	6,868	503	459	0.52	3,590	17	59,228	3,279	15	48,688	84	343
33	Western Ave (East/SFR EB)	25	0.10	0.07	0.46	23,775	23,775	1,243	1,135	0.52	12,426	17	212,477	11,349	15	174,664	178	1,090
34	SFR EB Off Ramp (SFR/Western)	30	0.12	0.08	0.39	11,019	11,019	691	631	0.52	5,759	309	1,778,996	5,260	278	1,462,408	109	511
35	SFR EB On Ramp (Western/Cambridge)	20	0.22	0.08	0.24	13,812	13,812	1,588	1,451	0.52	7,219	178	1,283,474	6,593	160	1,055,068	232	718
36	Western Ave (SFRWB/Mem)	25	0.02	0.14	2.15	26,341	26,341	275	251	0.52	13,767	6	80,535	12,574	5	66,203	72	1,134
37	SFR WB On Ramp (Cambridge/Western)	30	0.22	0.07	0.23	11,850	11,850	1,362	1,244	0.52	6,193	0	0	5,657	0	0	184	587
38	SFR WB Off Ramp (Western/SFR)	20	0.12	0.07	0.39	7,246	7,246	454	415	0.52	3,787	51	194,264	3,459	46	159,693	58	342
39	Western Ave (SFR/Mem)	25	0.09	0.07	0.51	30,945	30,945	1,456	1,329	0.52	16,173	213	3,448,064	14,772	192	2,834,450	209	1,407
40	Mem Drive (Western/River)	35	0.20	0.08	0.24	32,228	32,228	3,369	3,077	0.52	16,843	105	1,764,356	15,384	94	1,450,373	485	1,559
41	Western Ave (Mem/Putnam)	25	0.11	0.08	0.42	20,378	20,378	1,172	1,070	0.52	10,650	186	1,978,854	9,728	167	1,626,699	171	944
42	River St (Mem/Putnam)	25	0.14	0.07	0.34	15,850	15,850	1,160	1,059	0.52	8,284	0	0	7,566	0	0	160	750
43	Mem Drive (River/Pleasant)	35	0.18	0.07	0.26	35,322	35,322	3,323	3,035	0.52	18,461	27	499,364	16,862	24	410,498	471	1,685
44	River St (SFRWB/Mem)	30	0.08	0.08	0.56	26,567	26,567	1,111	1,015	0.52	13,885	96	1,338,517	12,682	87	1,100,316	167	1,191
45	SFR WB Off Ramp (Cambridge/SFR)	20	0.19	0.09	0.27	8,680	8,680	862	787	0.52	4,536	51	232,259	4,143	46	190,926	144	443
46	River St (SFREB/SFRWB)	30	0.02	0.13	2.15	35,549	35,549	372	339	0.52	18,579	0	7,432	16,970	0	6,109	92	1,525
47	SFR EB On Ramp (Cambridge/SFR)	20	0.14	0.07	0.34	13,661	13,661	1,000	913	0.52	7,140	0	0	6,521	0	0	136	658
48	Cambridge St (DoubleTree/SFREB)	30	0.04	0.08	1.09	40,530	40,530	847	774	0.52	21,183	20	430,006	19,348	18	353,483	134	1,760
49	Double Tree (Cambridge/End)	20	0.02	0.10	2.15	1,283	1,283	13	12	0.52	671	31	21,090	612	28	17,337	3	55
50	I90 EB Off ramp (Cambridge /Split)	20	0.09	0.08	0.51	17,842	17,842	839	767	0.52	9,325	34	315,187	8,517	30	259,097	128	823
51	I90 On Ramp (Cambridge/Split)	20	0.25	0.08	0.21	4,257	4,257	556	508	0.52	2,225	0	0	2,032	0	0	85	228
52	I90 WB Off ramp (Cambridge /Split)	20	0.18	0.09	0.28	25,662	25,662	2,414	2,205	0.52	13,412	570	7,641,976	12,250	513	6,282,016	414	1,301
53	Cambridge St (Windom/Doubletree)	30	0.27	0.07	0.19	45,889	45,889	6,475	5,915	0.52	23,983	269	6,450,293	21,906	242	5,302,404	916	2,362
54	Windom Street (Almay/Cambridge)	20	0.03	0.08	1.45	8,076	8,076	127	116	0.52	4,221	42	177,693	3,855	38	146,071	21	350
55	Cambridge St (N Harvard/Windom)	30	0.18	0.07	0.27	41,934	41,934	3,945	3,603	0.52	21,916	59	1,299,634	20,018	53	1,068,353	554	2,025
56	Cambridge St (Lincoln/N Harvard)	30	0.09	0.08	0.50	53,195	53,195	2,502	2,285	0.52	27,802	26	708,941	25,393	23	582,779	372	2,404
							VMT (per day)	75,936	69,358								11.1	45.6
							VMT (per year)	27,716,550	25,315,707.2			Arterial	43,977,888			36,151,621	Daily Total (kg)	
																	NO_X	VOC

VMT Total (per year)	53,032,257.19

	NOx EF (g/s)	NOx Idle (g/day)	NOx Idle (kg/day)	VOC EF (g/s)	VOC Idle (g/day)	VOC Idle (kg/day)
Peak Period	0.0001	4,293	**4.29**	0.0002	7,484	**7.48**
Off-Peak Period	0.0001	3,529	**3.53**	0.0002	6,152	**6.15**
Total (Including Link)			**18.88**			**59.20**

Harvard ERC

Build

Link No.	Description	Roadway Speed	Roadway Link Length (miles)	Emission Factor (g/mi) NO_x	Emission Factor (g/mi) VOC	AADT (veh/day)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Peak Period Factor	Peak Traffic Data: Period Volume (vehicles)	Peak Traffic Data: Average Delay (sec)	Peak Traffic Data: Adjusted Delay (veh-sec)	Off-Peak Traffic Data: Period Volume (vehicles)	Off-Peak Traffic Data: Average Delay (sec)	Off-Peak Traffic Data: Adjusted Delay (veh-sec)	Link Emissions: NO_x (grams)	Link Emissions: VOC (grams)
1	JFK Street (Mem Dr/Eliot)	25	0.13	0.07	0.36	20,831	20,831	1,415	1,293	0.52	10,887	15	157,863	9,944	13	129,770	199	979
2	Mem Drive (Hawthorn/JFK)	35	0.33	0.07	0.16	31,171	31,171	5,376	4,910	0.52	16,291	44	708,669	14,880	39	582,555	724	1,628
3	Mem Drive (JFK/Western)	35	0.62	0.07	0.10	33,134	33,134	10,736	9,806	0.52	17,317	106	1,832,122	15,817	95	1,506,079	1,462	2,033
4	Larz Anderson Bridge (SFRWB/Mem Dr)	25	0.11	0.09	0.42	28,303	28,303	1,627	1,486	0.52	14,792	73	1,074,660	13,511	65	883,415	286	1,323
5	SFR WB On Ramp (SFR/Bridge)	25	0.11	0.05	0.42	3,789	3,789	218	199	0.52	1,980	0	0	1,809	0	0	22	173
6	SFR WB Off Ramp (Bridge/SFR)	25	0.08	0.12	0.57	7,125	7,125	298	272	0.52	3,724	164	611,434	3,401	148	502,624	66	327
7	N Harvard St (SFR WB/SFR EB)	25	0.02	0.16	2.16	28,349	28,349	296	271	0.52	14,816	228	3,383,966	13,533	206	2,781,758	91	1,224
8	SFR EB Off Ramp (SFR/Bridge)	25	0.10	0.09	0.46	8,015	8,015	419	383	0.52	4,189	424	1,774,117	3,826	381	1,458,397	72	371
9	SFR EB On Ramp (Bridge/SFR)	15	0.10	0.08	0.48	4,861	4,861	254	232	0.52	2,540	0	0	2,320	0	0	38	231
10	N Harvard St (Academic/SFR EB)	25	0.36	0.07	0.16	20,907	20,907	3,934	3,593	0.52	10,927	19	204,873	9,980	17	168,414	550	1,169
11	S Campus Dr (End/Nharvard)	25	0.10	0.07	0.46	2,113	2,113	110	101	0.52	1,104	233	256,794	1,009	209	211,095	16	97
12	Academic Way (N Harvard/Western)	25	0.06	0.07	0.74	3,698	3,698	116	106	0.52	1,933	35	67,650	1,765	32	55,611	16	164
13	N Harvard St (Western/Academic)	25	0.11	0.07	0.42	16,303	16,303	937	856	0.52	8,520	38	320,792	7,782	34	263,704	129	753
14	Western Ave (Spurr/N Harvard)	25	0.09	0.08	0.51	25,813	25,813	1,214	1,109	0.52	13,491	80	1,075,873	12,322	72	884,412	187	1,177
15	N Havard St (Western/Kingsley)	25	0.09	0.08	0.51	17,586	17,586	827	756	0.52	9,191	67	614,415	8,395	60	505,074	134	804
16	Franklin St (Appian/N Harvard)	20	0.18	0.08	0.28	2,491	2,491	234	214	0.52	1,302	16	20,307	1,189	14	16,693	36	125
17	Kinglsey St (N Havard/Travis)	20	0.09	0.09	0.51	453	453	21	19	0.52	237	34	8,118	216	31	6,673	4	21
18	N Harvard St (Franklin/Cambridge)	25	0.35	0.07	0.16	15,850	15,850	2,899	2,648	0.52	8,284	35	290,757	7,566	32	239,014	405	880
19	Western Ave (N Harvard/Academic)	25	0.11	0.07	0.42	19,125	19,125	1,100	1,004	0.52	9,996	83	824,641	9,130	74	677,888	151	883
20	Academic Way (Western/End)	15	0.06	0.08	0.76	559	559	18	16	0.52	292	15	4,335	267	13	3,563	3	25
21	Western Ave (Academic/Stadium)	25	0.11	0.07	0.42	21,843	21,843	1,256	1,147	0.52	11,416	8	86,759	10,427	7	71,320	173	1,009
22	Driveway (Western/End)	15	0.05	0.08	0.90	60	60	2	1	0.52	32	19	607	29	17	499	0	3
23	Stadium Way (Western/End)	15	0.08	0.09	0.58	1,434	1,434	60	55	0.52	749	21	15,552	685	19	12,784	10	67
24	Western Ave (Stadium/Batten)	25	0.11	0.07	0.42	21,903	21,903	1,259	1,150	0.52	11,447	17	189,452	10,456	15	155,737	173	1,012
25	Batten Way (Western/End)	15	0.10	0.08	0.48	4,151	4,151	217	198	0.52	2,170	34	73,873	1,982	31	60,726	35	198
26	Western Ave (Batten/Cattle)	25	0.02	0.07	2.14	23,322	23,322	244	223	0.52	12,189	35	430,266	11,133	32	353,697	34	996
27	Cattle Drive (Western/DEF)	20	0.12	0.08	0.40	7,548	7,548	473	432	0.52	3,945	158	622,460	3,603	142	511,687	71	358
28	DEF Dr (Cattle/East)	15	0.12	0.09	0.41	4,000	4,000	251	229	0.52	2,091	7	14,948	1,910	6	12,288	41	195
29	Cattle Drive/Almy (DEF/Windom)	20	0.26	0.08	0.21	6,129	6,129	833	761	0.52	3,203	0	0	2,926	0	0	124	330
30	Western Ave (Cattle/East)	25	0.16	0.07	0.30	20,907	20,907	1,748	1,597	0.52	10,927	1	12,019	9,980	1	9,880	241	1,006
31	Kresge Way (Western/End)	15	0.18	0.09	0.29	1,283	1,283	121	110	0.52	671	0	0	612	0	0	20	67
32	East Drive (Western / DEF)	15	0.14	0.09	0.36	5,359	5,359	392	358	0.52	2,801	21	59,094	2,558	19	48,578	65	268
33	Western Ave (East/SFR EB)	25	0.10	0.07	0.46	23,775	23,775	1,243	1,135	0.52	12,426	247	3,065,378	11,349	222	2,519,866	178	1,090
34	SFR EB Off Ramp (SFR/Western)	30	0.12	0.08	0.39	11,019	11,019	691	631	0.52	5,759	309	1,778,996	5,260	278	1,462,408	109	511
35	SFR EB On Ramp (Western/Cambridge)	20	0.22	0.08	0.24	13,812	13,812	1,588	1,451	0.52	7,219	178	1,283,474	6,593	160	1,055,068	232	718
36	Western Ave (SFRWB/Mem)	25	0.02	0.14	2.15	26,341	26,341	275	251	0.52	13,767	6	80,535	12,574	5	66,203	72	1,134
37	SFR WB On Ramp (Cambridge/Western)	30	0.22	0.07	0.23	11,850	11,850	1,362	1,244	0.52	6,193	0	0	5,657	0	0	184	587
38	SFR WB Off Ramp (Western/SFR)	20	0.12	0.07	0.39	7,246	7,246	454	415	0.52	3,787	51	194,264	3,459	46	159,693	58	342
39	Western Ave (SFR/Mem)	25	0.09	0.07	0.51	30,945	30,945	1,456	1,329	0.52	16,173	213	3,448,064	14,772	192	2,834,450	209	1,407
40	Mem Drive (Western/River)	35	0.20	0.08	0.24	32,228	32,228	3,369	3,077	0.52	16,843	105	1,764,356	15,384	94	1,450,373	485	1,559
41	Western Ave (Mem/Putnam)	25	0.11	0.08	0.42	20,378	20,378	1,172	1,070	0.52	10,650	186	1,978,854	9,728	167	1,626,699	171	944
42	River St (Mem/Putnam)	25	0.14	0.07	0.34	15,850	15,850	1,160	1,059	0.52	8,284	0	0	7,566	0	0	160	750
43	Mem Drive (River/Pleasant)	35	0.18	0.07	0.26	35,322	35,322	3,323	3,035	0.52	18,461	27	499,364	16,862	24	410,498	471	1,685
44	River St (SFRWB/Mem)	30	0.08	0.08	0.56	26,567	26,567	1,111	1,015	0.52	13,885	96	1,338,517	12,682	87	1,100,316	167	1,191
45	SFR WB Off Ramp (Cambridge/SFR)	20	0.19	0.09	0.27	8,680	8,680	862	787	0.52	4,536	51	232,259	4,143	46	190,926	144	443
46	River St (SFREB/SFRWB)	30	0.02	0.13	2.15	35,549	35,549	372	339	0.52	18,579	0	7,432	16,970	0	6,109	92	1,525
47	SFR EB On Ramp (Cambridge/SFR)	20	0.14	0.07	0.34	13,661	13,661	1,000	913	0.52	7,140	0	0	6,521	0	0	136	658
48	Cambridge St (DoubleTree/SFREB)	30	0.04	0.08	1.09	40,530	40,530	847	774	0.52	21,183	20	430,006	19,348	18	353,483	134	1,760
49	Double Tree (Cambridge/End)	20	0.02	0.10	2.15	1,283	1,283	13	12	0.52	671	31	21,090	612	28	17,337	3	55
50	I90 EB Off ramp (Cambridge /Split)	20	0.09	0.08	0.51	17,842	17,842	839	767	0.52	9,325	34	315,187	8,517	30	259,097	128	823
51	I90 On Ramp (Cambridge/Split)	20	0.25	0.08	0.21	4,257	4,257	556	508	0.52	2,225	0	0	2,032	0	0	85	228
52	I90 WB Off ramp (Cambridge /Split)	20	0.18	0.09	0.28	25,662	25,662	2,414	2,205	0.52	13,412	570	7,641,976	12,250	513	6,282,016	414	1,301
53	Cambridge St (Windom/Doubletree)	30	0.27	0.07	0.19	45,889	45,889	6,475	5,915	0.52	23,983	269	6,450,293	21,906	242	5,302,404	916	2,362
54	Windom Street (Almay/Cambridge)	20	0.03	0.08	1.45	8,076	8,076	127	116	0.52	4,221	322	1,360,343	3,855	290	1,118,257	21	350
55	Cambridge St (N Harvard/Windom)	30	0.18	0.07	0.27	41,934	41,934	3,945	3,603	0.52	21,916	59	1,295,251	20,018	53	1,064,749	554	2,025
56	Cambridge St (Lincoln/N Harvard)	30	0.09	0.08	0.50	53,195	53,195	2,502	2,285	0.52	27,802	26	708,941	25,393	23	582,779	372	2,404
							VMT (per day)	76,062	69,473								11.1	45.8
							VMT (per year)	27,762,450	25,357,631.5			Arterial	48,630,999			39,976,668	Daily Total (kg)	
																	NO_X	VOC

VMT Total (per year)	**53,120,081.84**

	NOx EF (g/s)	NOx Idle (g/day)	NOx Idle (kg/day)	VOC EF (g/s)	VOC Idle (g/day)	VOC Idle (kg/day)
Peak Period	0.0001	4,747	**4.75**	0.0002	8,276	**8.28**
Off-Peak Period	0.0001	3,902	**3.90**	0.0002	6,803	**6.80**
Total (Including Link)			**19.72**			**60.83**

Harvard ERC
No Build

Link No.	Description	Roadway Link Length: Speed	Roadway Link Length (miles)	Emission Factor (g/mi): NO_x	Emission Factor (g/mi): VOC	AADT (veh/day)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Peak Period Factor	Peak Traffic Data: Period Volume (vehicles)	Peak Traffic Data: Average Delay (sec)	Peak Traffic Data: Adjusted Delay (veh-sec)	Off-Peak Traffic Data: Period Volume (vehicles)	Off-Peak Traffic Data: Average Delay (sec)	Off-Peak Traffic Data: Adjusted Delay (veh-sec)	Link Emissions: NO_x (grams)	Link Emissions: VOC (grams)
1	JFK Street (Mem Dr/Eliot)	25	0.13	0.07	0.36	20,227	20,227	1,374	1,255	0.52	10,572	14	149,059	9,656	13	122,533	194	951
2	Mem Drive (Hawthorn/JFK)	35	0.33	0.07	0.16	31,171	31,171	5,376	4,910	0.52	16,291	44	708,669	14,880	39	582,555	724	1,628
3	Mem Drive (JFK/Western)	35	0.62	0.07	0.10	33,134	33,134	10,736	9,806	0.52	17,317	106	1,829,525	15,817	95	1,503,944	1,462	2,033
4	Larz Anderson Bridge (SFRWB/Mem Dr)	25	0.11	0.09	0.42	27,699	27,699	1,592	1,455	0.52	14,477	66	960,531	13,223	60	789,596	280	1,295
5	SFR WB On Ramp (SFR/Bridge)	25	0.11	0.05	0.42	3,411	3,411	196	179	0.52	1,783	0	0	1,629	0	0	20	156
6	SFR WB Off Ramp (Bridge/SFR)	25	0.08	0.12	0.57	7,125	7,125	298	272	0.52	3,724	164	611,434	3,401	148	502,624	66	327
7	N Harvard St (SFR WB/SFR EB)	25	0.02	0.16	2.16	27,367	27,367	286	261	0.52	14,303	186	2,656,097	13,064	167	2,183,421	88	1,182
8	SFR EB Off Ramp (SFR/Bridge)	25	0.10	0.09	0.46	8,015	8,015	419	383	0.52	4,189	424	1,774,117	3,826	381	1,458,397	72	371
9	SFR EB On Ramp (Bridge/SFR)	15	0.10	0.08	0.48	4,861	4,861	254	232	0.52	2,540	0	0	2,320	0	0	38	231
10	N Harvard St (Academic/SFR EB)	25	0.36	0.07	0.16	19,925	19,925	3,749	3,424	0.52	10,414	17	181,200	9,512	16	148,954	524	1,114
11	S Campus Dr (End/Nharvard)	25	0.10	0.07	0.46	2,113	2,113	110	101	0.52	1,104	156	172,135	1,009	140	141,502	16	97
12	Academic Way (N Harvard/Western)	25	0.06	0.07	0.74	2,491	2,491	78	71	0.52	1,302	25	31,957	1,189	22	26,270	11	110
13	N Harvard St (Western/Academic)	25	0.11	0.07	0.42	16,529	16,529	950	868	0.52	8,639	38	326,111	7,890	34	268,077	131	763
14	Western Ave (Spurr/N Harvard)	25	0.09	0.08	0.51	22,945	22,945	1,079	986	0.52	11,992	61	735,086	10,953	55	604,271	166	1,046
15	N Havard St (Western/Kingsley)	25	0.09	0.08	0.51	18,793	18,793	884	807	0.52	9,822	85	830,457	8,971	76	682,670	143	859
16	Franklin St (Appian/N Harvard)	20	0.18	0.08	0.28	2,491	2,491	234	214	0.52	1,302	16	20,307	1,189	14	16,693	36	125
17	Kinglsey St (N Havard/Travis)	20	0.09	0.09	0.51	453	453	21	19	0.52	237	34	8,118	216	31	6,673	4	21
18	N Harvard St (Franklin/Cambridge)	25	0.35	0.07	0.16	17,057	17,057	3,120	2,850	0.52	8,915	35	315,585	8,143	32	259,424	436	947
19	Western Ave (N Harvard/Academic)	25	0.11	0.07	0.42	16,242	16,242	934	853	0.52	8,489	35	294,137	7,753	31	241,793	129	750
20	Academic Way (Western/End)	15	0.06	0.08	0.76	619	619	19	18	0.52	323	11	3,461	295	10	2,845	3	28
21	Western Ave (Academic/Stadium)	25	0.11	0.07	0.42	17,767	17,767	1,021	933	0.52	9,286	7	63,142	8,481	6	51,905	141	821
22	Driveway (Western/End)	15	0.05	0.08	0.90	60	60	2	1	0.52	32	19	611	29	17	502	0	3
23	Stadium Way (Western/End)	15	0.08	0.09	0.58	1,359	1,359	57	52	0.52	710	20	14,485	649	18	11,907	10	63
24	Western Ave (Stadium/Batten)	25	0.11	0.07	0.42	18,280	18,280	1,051	960	0.52	9,554	20	189,644	8,726	18	155,895	145	844
25	Batten Way (Western/End)	15	0.10	0.08	0.48	4,227	4,227	221	202	0.52	2,209	78	171,859	2,018	70	141,275	36	201
26	Western Ave (Batten/Cattle)	25	0.02	0.07	2.14	19,397	19,397	203	185	0.52	10,138	15	149,023	9,260	13	122,503	28	829
27	Cattle Drive (Western/DEF)	20	0.12	0.08	0.40	1,283	1,283	80	73	0.52	671	24	15,893	612	21	13,065	12	61
28	DEF Dr (Cattle/East)	15	0.12	0.09	0.41	0	0	0	0	0.52	0	0	0	0	0	0	0	0
29	Cattle Drive/Almy (DEF/Windom)	20	0.26	0.08	0.21	0	0	0	0	0.52	0	0	0	0	0	0	0	0
30	Western Ave (Cattle/East)	25	0.16	0.07	0.30	19,397	19,397	1,622	1,482	0.52	10,138	0	1,521	9,260	0	1,250	223	933
31	Kresge Way (Western/End)	15	0.18	0.09	0.29	1,283	1,283	121	110	0.52	671	0	0	612	0	0	20	67
32	East Drive (Western / DEF)	15	0.14	0.09	0.36	1,359	1,359	99	91	0.52	710	10	7,136	649	9	5,866	17	68
33	Western Ave (East/SFR EB)	25	0.10	0.07	0.46	20,378	20,378	1,065	973	0.52	10,650	142	1,512,897	9,728	128	1,243,663	152	935
34	SFR EB Off Ramp (SFR/Western)	30	0.12	0.08	0.39	10,868	10,868	682	623	0.52	5,680	299	1,696,120	5,188	269	1,394,280	108	504
35	SFR EB On Ramp (Western/Cambridge)	20	0.22	0.08	0.24	12,906	12,906	1,484	1,355	0.52	6,745	143	961,203	6,161	128	790,148	216	671
36	Western Ave (SFRWB/Mem)	25	0.02	0.14	2.15	26,265	26,265	275	251	0.52	13,727	6	79,618	12,538	5	65,449	72	1,131
37	SFR WB On Ramp (Cambridge/Western)	30	0.22	0.07	0.23	11,850	11,850	1,362	1,244	0.52	6,193	0	0	5,657	0	0	184	587
38	SFR WB Off Ramp (Western/SFR)	20	0.12	0.07	0.39	7,321	7,321	459	419	0.52	3,826	53	202,027	3,495	48	166,075	58	345
39	Western Ave (SFR/Mem)	25	0.09	0.07	0.51	30,794	30,794	1,448	1,323	0.52	16,094	211	3,387,791	14,700	189	2,784,902	207	1,400
40	Mem Drive (Western/River)	35	0.20	0.08	0.24	32,153	32,153	3,361	3,070	0.52	16,804	103	1,730,817	15,348	93	1,422,802	484	1,556
41	Western Ave (Mem/Putnam)	25	0.11	0.08	0.42	20,303	20,303	1,167	1,066	0.52	10,611	184	1,947,120	9,692	165	1,600,612	171	940
42	River St (Mem/Putnam)	25	0.14	0.07	0.34	15,548	15,548	1,138	1,039	0.52	8,126	0	0	7,422	0	0	157	736
43	Mem Drive (River/Pleasant)	35	0.18	0.07	0.26	35,096	35,096	3,302	3,016	0.52	18,342	27	490,660	16,754	24	403,343	468	1,674
44	River St (SFRWB/Mem)	30	0.08	0.08	0.56	26,114	26,114	1,092	997	0.52	13,648	90	1,222,893	12,466	81	1,005,268	164	1,171
45	SFR WB Off Ramp (Cambridge/SFR)	20	0.19	0.09	0.27	8,302	8,302	824	753	0.52	4,339	49	214,350	3,963	44	176,205	138	424
46	River St (SFREB/SFRWB)	30	0.02	0.13	2.15	35,096	35,096	367	335	0.52	18,342	1	10,088	16,754	0	8,293	91	1,506
47	SFR EB On Ramp (Cambridge/SFR)	20	0.14	0.07	0.34	12,755	12,755	933	852	0.52	6,666	0	0	6,089	0	0	127	615
48	Cambridge St (DoubleTree/SFREB)	30	0.04	0.08	1.09	40,077	40,077	838	765	0.52	20,946	19	405,303	19,132	17	333,176	132	1,741
49	Double Tree (Cambridge/End)	20	0.02	0.10	2.15	1,283	1,283	13	12	0.52	671	31	21,090	612	28	17,337	3	55
50	I90 EB Off ramp (Cambridge /Split)	20	0.09	0.08	0.51	18,069	18,069	850	776	0.52	9,443	34	322,964	8,625	31	265,490	130	833
51	I90 On Ramp (Cambridge/Split)	20	0.25	0.08	0.21	3,879	3,879	507	463	0.52	2,028	0	0	1,852	0	0	77	208
52	I90 WB Off ramp (Cambridge /Split)	20	0.18	0.09	0.28	24,303	24,303	2,286	2,088	0.52	12,702	506	6,424,495	11,601	455	5,281,197	392	1,232
53	Cambridge St (Windom/Doubletree)	30	0.27	0.07	0.19	43,474	43,474	6,135	5,603	0.52	22,721	244	5,540,507	20,753	219	4,554,523	868	2,238
54	Windom Street (Almay/Cambridge)	20	0.03	0.08	1.45	3,110	3,110	49	45	0.52	1,625	109	177,226	1,484	98	145,687	8	135
55	Cambridge St (N Harvard/Windom)	30	0.18	0.07	0.27	41,557	41,557	3,909	3,571	0.52	21,719	46	1,004,505	19,838	42	825,744	549	2,006
56	Cambridge St (Lincoln/N Harvard)	30	0.09	0.08	0.50	51,836	51,836	2,438	2,227	0.52	27,092	25	682,708	24,745	23	561,214	363	2,343
							VMT (per day)	72,174	65,922								10.5	42.9
							VMT (per year)	26,343,400	24,061,501.0			Arterial	40,255,682			33,091,815	Daily Total (kg)	
																	NO_X	VOC

VMT Total (per year)	50,404,900.79

	NOx: EF (g/s)	NOx: Idle (g/day)	NOx: Idle (kg/day)	VOC: EF (g/s)	VOC: Idle (g/day)	VOC: Idle (kg/day)
Peak Period	0.0001	3,929	**3.93**	0.0002	6,851	**6.85**
Off-Peak Period	0.0001	3,230	**3.23**	0.0002	5,631	**5.63**
Total (Including Link)			**17.65**			**55.39**

Harvard ERC

Existing

Link No.	Description	Roadway Type	Roadway Link Length (miles)	Emission Factor (g/mi) NO_x	Emission Factor (g/mi) VOC	AADT (veh/day)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Peak Period Factor	Peak Traffic Data: Period Volume (vehicles)	Peak Traffic Data: Average Delay (sec)	Peak Traffic Data: Adjusted Delay (veh-sec)	Off-Peak Traffic Data: Period Volume (vehicles)	Off-Peak Traffic Data: Average Delay (sec)	Off-Peak Traffic Data: Adjusted Delay (veh-sec)	Link Emissions: NO_x (grams)	Link Emissions: VOC (grams)
1	JFK Street (Mem Dr/Eliot)	25	0.13	0.16	0.56	15,774	15,774	1,072	979	0.52	8,244	13	103,877	7,530	11	85,391	322	1,144
2	Mem Drive (Hawthorn/JFK)	35	0.33	0.14	0.24	29,058	29,058	5,012	4,578	0.52	15,187	39	584,690	13,871	35	480,639	1,363	2,328
3	Mem Drive (JFK/Western)	35	0.62	0.14	0.15	30,869	30,869	10,003	9,136	0.52	16,133	80	1,289,064	14,736	72	1,059,663	2,748	2,882
4	Larz Anderson Bridge (SFRWB/Mem Dr)	25	0.11	0.19	0.66	23,020	23,020	1,323	1,209	0.52	12,031	30	355,518	10,989	27	292,250	472	1,659
5	SFR WB On Ramp (SFR/Bridge)	25	0.11	0.12	0.64	2,204	2,204	127	116	0.52	1,152	0	0	1,052	0	0	29	156
6	SFR WB Off Ramp (Bridge/SFR)	25	0.08	0.23	0.89	6,898	6,898	288	263	0.52	3,605	160	575,057	3,293	144	472,721	125	488
7	N Harvard St (SFR WB/SFR EB)	25	0.02	0.30	3.35	21,707	21,707	227	207	0.52	11,345	59	669,338	10,362	53	550,223	129	1,453
8	SFR EB Off Ramp (SFR/Bridge)	25	0.10	0.18	0.71	6,657	6,657	348	318	0.52	3,479	296	1,029,480	3,178	266	846,274	123	475
9	SFR EB On Ramp (Bridge/SFR)	15	0.10	0.16	0.73	4,634	4,634	242	221	0.52	2,422	0	0	2,212	0	0	76	339
10	N Harvard St (Academic/SFR EB)	25	0.36	0.16	0.24	14,416	14,416	2,712	2,477	0.52	7,534	15	115,273	6,882	14	94,759	807	1,232
11	S Campus Dr (End/Nharvard)	25	0.10	0.16	0.71	0	0	0	0	0.52	0	0	0	0	0	0	0	0
12	Academic Way (N Harvard/Western)	25	0.06	0.15	1.14	0	0	0	0	0.52	0	0	0	0	0	0	0	0
13	N Harvard St (Western/Academic)	25	0.11	0.15	0.65	14,416	14,416	829	757	0.52	7,534	37	275,375	6,882	33	226,370	244	1,029
14	Western Ave (Spurr/N Harvard)	25	0.09	0.17	0.78	16,529	16,529	777	710	0.52	8,639	22	191,347	7,890	20	157,295	251	1,165
15	N Havard St (Western/Kingsley)	25	0.09	0.18	0.78	14,567	14,567	685	626	0.52	7,613	47	354,390	6,954	42	291,323	230	1,029
16	Franklin St (Appian/N Harvard)	20	0.18	0.17	0.43	2,189	2,189	206	188	0.52	1,144	16	17,731	1,045	14	14,576	67	169
17	Kinglsey St (N Havard/Travis)	20	0.09	0.18	0.79	453	453	21	19	0.52	237	37	8,710	216	33	7,160	7	32
18	N Harvard St (Franklin/Cambridge)	25	0.35	0.16	0.24	12,982	12,982	2,375	2,169	0.52	6,785	22	150,282	6,197	20	123,538	707	1,102
19	Western Ave (N Harvard/Academic)	25	0.11	0.15	0.65	15,095	15,095	868	793	0.52	7,889	43	340,814	7,206	39	280,163	255	1,077
20	Academic Way (Western/End)	15	0.06	0.18	1.17	0	0	0	0	0.52	0	0	0	0	0	0	0	0
21	Western Ave (Academic/Stadium)	25	0.11	0.15	0.65	15,095	15,095	868	793	0.52	7,889	0	0	7,206	0	0	255	1,077
22	Driveway (Western/End)	15	0.05	0.18	1.38	0	0	0	0	0.52	0	0	0	0	0	0	0	0
23	Stadium Way (Western/End)	15	0.08	0.19	0.90	0	0	0	0	0.52	0	0	0	0	0	0	0	0
24	Western Ave (Stadium/Batten)	25	0.11	0.15	0.65	15,095	15,095	868	793	0.52	7,889	10	80,865	7,206	9	66,474	255	1,077
25	Batten Way (Western/End)	15	0.10	0.18	0.73	17,435	17,435	911	832	0.52	9,112	17	150,349	8,323	15	123,593	309	1,278
26	Western Ave (Batten/Cattle)	25	0.02	0.15	3.32	15,171	15,171	159	145	0.52	7,929	14	107,037	7,242	12	87,989	47	1,006
27	Cattle Drive (Western/DEF)	20	0.12	0.17	0.61	3,170	3,170	199	182	0.52	1,657	17	28,496	1,513	15	23,425	63	232
28	DEF Dr (Cattle/East)	15	0.12	0.18	0.62	0	0	0	0	0.52	0	0	0	0	0	0	0	0
29	Cattle Drive/Almy (DEF/Windom)	20	0.26	0.16	0.32	0	0	0	0	0.52	0	0	0	0	0	0	0	0
30	Western Ave (Cattle/East)	25	0.16	0.15	0.46	15,171	15,171	1,269	1,159	0.52	7,929	0	2,379	7,242	0	1,955	373	1,125
31	Kresge Way (Western/End)	15	0.18	0.18	0.44	1,283	1,283	121	110	0.52	671	0	0	612	0	0	41	102
32	East Drive (Western / DEF)	15	0.14	0.18	0.55	1,359	1,359	99	91	0.52	710	12	8,272	649	10	6,800	35	104
33	Western Ave (East/SFR EB)	25	0.10	0.16	0.71	15,774	15,774	824	753	0.52	8,244	42	343,373	7,530	37	282,266	250	1,118
34	SFR EB Off Ramp (SFR/Western)	30	0.12	0.17	0.60	9,963	9,963	625	571	0.52	5,207	141	736,254	4,756	127	605,231	200	714
35	SFR EB On Ramp (Western/Cambridge)	20	0.22	0.16	0.36	11,246	11,246	1,293	1,181	0.52	5,877	128	752,904	5,368	115	618,918	398	896
36	Western Ave (SFRWB/Mem)	25	0.02	0.26	3.34	22,643	22,643	237	216	0.52	11,834	4	48,519	10,809	4	39,884	117	1,511
37	SFR WB On Ramp (Cambridge/Western)	30	0.22	0.15	0.35	11,095	11,095	1,276	1,165	0.52	5,799	0	0	5,296	0	0	356	845
38	SFR WB Off Ramp (Western/SFR)	20	0.12	0.14	0.61	5,661	5,661	355	324	0.52	2,958	50	147,035	2,702	45	120,869	97	412
39	Western Ave (SFR/Mem)	25	0.09	0.16	0.78	28,077	28,077	1,321	1,206	0.52	14,674	75	1,099,079	13,403	67	903,488	401	1,974
40	Mem Drive (Western/River)	35	0.20	0.15	0.37	28,907	28,907	3,022	2,760	0.52	15,108	63	954,817	13,799	57	784,899	872	2,154
41	Western Ave (Mem/Putnam)	25	0.11	0.16	0.65	18,944	18,944	1,089	995	0.52	9,901	130	1,290,097	9,043	117	1,060,513	337	1,355
42	River St (Mem/Putnam)	25	0.14	0.15	0.52	13,435	13,435	983	898	0.52	7,021	0	0	6,413	0	0	289	981
43	Mem Drive (River/Pleasant)	35	0.18	0.15	0.41	31,398	31,398	2,954	2,698	0.52	16,410	20	333,115	14,988	18	273,834	842	2,309
44	River St (SFRWB/Mem)	30	0.08	0.16	0.87	23,171	23,171	969	885	0.52	12,110	50	601,865	11,061	45	494,758	298	1,608
45	SFR WB Off Ramp (Cambridge/SFR)	20	0.19	0.18	0.41	6,868	6,868	682	623	0.52	3,590	45	162,250	3,279	41	133,376	237	538
46	River St (SFREB/SFRWB)	30	0.02	0.25	3.33	30,417	30,417	318	290	0.52	15,897	1	7,948	14,520	0	6,534	152	2,025
47	SFR EB On Ramp (Cambridge/SFR)	20	0.14	0.15	0.53	9,736	9,736	712	651	0.52	5,089	0	0	4,648	0	0	205	723
48	Cambridge St (DoubleTree/SFREB)	30	0.04	0.17	1.68	32,983	32,983	690	630	0.52	17,238	12	212,027	15,745	11	174,295	221	2,221
49	Double Tree (Cambridge/End)	20	0.02	0.21	3.33	1,283	1,283	13	12	0.52	671	32	21,325	612	29	17,530	5	86
50	I90 EB Off ramp (Cambridge /Split)	20	0.09	0.17	0.79	14,220	14,220	669	611	0.52	7,432	30	221,463	6,788	27	182,052	215	1,012
51	I90 On Ramp (Cambridge/Split)	20	0.25	0.17	0.33	3,170	3,170	414	378	0.52	1,657	0	0	1,513	0	0	133	259
52	I90 WB Off ramp (Cambridge /Split)	20	0.18	0.19	0.43	24,077	24,077	2,265	2,069	0.52	12,583	449	5,644,874	11,493	404	4,640,317	806	1,871
53	Cambridge St (Windom/Doubletree)	30	0.27	0.15	0.29	39,474	39,474	5,570	5,088	0.52	20,630	224	4,621,192	18,843	202	3,798,809	1,618	3,117
54	Windom Street (Almay/Cambridge)	20	0.03	0.18	2.24	7,940	7,940	124	114	0.52	4,150	18	73,658	3,790	16	60,550	42	534
55	Cambridge St (N Harvard/Windom)	30	0.18	0.15	0.41	33,149	33,149	3,118	2,848	0.52	17,325	21	363,819	15,824	19	299,074	901	2,465
56	Cambridge St (Lincoln/N Harvard)	30	0.09	0.16	0.78	42,372	42,372	1,993	1,820	0.52	22,145	14	302,280	20,227	12	248,486	606	2,961
							VMT (per day)	63,124	57,656								18.9	57.4
							VMT (per year)	23,040,278	21,044,499.4			Arterial	24,376,237			20,038,263	Daily Total (kg)	
																	NO_X	VOC

VMT Total (per year)	44,084,776.96

	NOx (g/s)	NOx (g/day)	NOx (kg/day)	VOC (g/s)	VOC (g/day)	VOC (kg/day)
Peak Period	0.0003	6,829	**6.83**	0.0002	5,720	**5.72**
Off-Peak Period	0.0003	5,613	**5.61**	0.0002	4,702	**4.70**
Total (Including Link)			**31.37**			**67.87**

Harvard ERC

Build With Mitgation																	
		Weekday									Weekday						Link Emissions
											Peak Traffic Data			Off-Peak Traffic Data			
Link No.	Description	Speed	Roadway Link Length (miles)	Emission Factor (g/mi) CO_2	AADT (veh/day)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/yr)	Peak Period Factor	Period Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	Period Volume (vehicles)	Average Delay (sec)	Adjusted Delay (veh-sec)	CO_2 (grams)
1	JFK Street (Mem Dr/Eliot)	25	0.13	337.9	20,831	20,831	516,594	471,846	7,603,388	0.52	3,973,802	15	57,620,131	3,629,586	13	47,366,102	333,961,355
2	Mem Drive (Hawthorn/JFK)	35	0.33	282.4	31,171	31,171	1,962,281	1,792,306	11,377,534	0.52	5,946,305	44	258,664,284	5,431,229	39	212,632,609	1,060,296,269
3	Mem Drive (JFK/Western)	35	0.62	283.9	33,134	33,134	3,918,802	3,579,351	12,093,795	0.52	6,320,649	106	668,724,670	5,773,146	95	549,718,998	2,128,834,426
4	Larz Anderson Bridge (SFRWB/Mem Dr)	25	0.11	369.7	28,303	28,303	593,911	542,465	10,330,691	0.52	5,399,188	73	392,250,986	4,931,503	65	322,446,335	420,084,117
5	SFR WB On Ramp (SFR/Bridge)	25	0.11	288.1	3,789	3,789	79,505	72,618	1,382,935	0.52	722,771	0	0	660,164	0	0	43,831,992
6	SFR WB Off Ramp (Bridge/SFR)	25	0.08	413.1	7,125	7,125	108,732	99,314	2,600,579	0.52	1,359,156	164	223,173,335	1,241,424	148	183,457,599	85,936,138
7	N Harvard St (SFR WB/SFR EB)	25	0.02	489.0	28,349	28,349	108,157	98,788	10,347,220	0.52	5,407,826	228	1,235,147,548	4,939,394	206	1,015,341,744	101,202,847
8	SFR EB Off Ramp (SFR/Bridge)	25	0.1	367.3	8,015	8,015	152,905	139,660	2,925,652	0.52	1,529,050	424	647,552,655	1,396,602	381	532,314,737	107,469,718
9	SFR EB On Ramp (Bridge/SFR)	15	0.1	418.3	4,861	4,861	92,722	84,690	1,774,124	0.52	927,220	0	0	846,903	0	0	74,214,978
10	N Harvard St (Academic/SFR EB)	25	0.36	335.6	20,907	20,907	1,435,752	1,311,385	7,630,937	0.52	3,988,200	19	74,778,750	3,642,737	17	61,471,187	921,893,442
11	S Campus Dr (End/Nharvard)	25	0.1	339.2	2,113	2,113	40,314	36,822	771,358	0.52	403,139	233	93,729,898	368,219	209	77,049,806	26,166,630
12	Academic Way (N Harvard/Western)	25	0.06	333.6	3,698	3,698	42,330	38,663	1,349,877	0.52	705,494	35	24,692,285	644,383	32	20,298,067	27,021,566
13	N Harvard St (Western/Academic)	25	0.11	333.6	16,303	16,303	342,093	312,460	5,950,478	0.52	3,109,932	38	117,088,944	2,840,546	34	96,251,895	218,378,369
14	Western Ave (Spurr/N Harvard)	25	0.09	351.4	25,813	25,813	443,165	404,778	9,421,590	0.52	4,924,059	80	392,693,719	4,497,531	72	322,810,280	297,957,774
15	N Havard St (Western/Kingsley)	25	0.09	358.0	17,586	17,586	301,923	275,770	6,418,803	0.52	3,354,695	67	224,261,380	3,064,107	60	184,352,016	206,842,051
16	Franklin St (Appian/N Harvard)	20	0.18	383.8	2,491	2,491	85,523	78,115	909,101	0.52	475,129	16	7,412,005	433,972	14	6,092,971	62,802,860
17	Kinglsey St (N Havard/Travis)	20	0.09	398.9	453	453	7,775	7,101	165,291	0.52	86,387	34	2,963,074	78,904	31	2,435,768	5,933,833
18	N Harvard St (Franklin/Cambridge)	25	0.35	335.7	15,850	15,850	1,058,241	966,575	5,785,187	0.52	3,023,545	35	106,126,433	2,761,642	32	87,240,264	679,724,778
19	Western Ave (N Harvard/Academic)	25	0.11	333.6	19,125	19,125	401,325	366,562	6,980,792	0.52	3,648,411	83	300,993,915	3,332,381	74	247,429,295	256,190,180
20	Academic Way (Western/End)	15	0.06	437.4	559	559	6,393	5,839	203,859	0.52	106,544	15	1,582,178	97,315	13	1,300,615	5,350,319
21	Western Ave (Academic/Stadium)	25	0.11	333.6	21,843	21,843	458,341	418,639	7,972,538	0.52	4,166,733	15	62,292,660	3,805,805	13	51,207,111	292,586,574
22	Driveway (Western/End)	15	0.05	437.4	60	60	576	526	22,039	0.52	11,518	16	184,292	10,521	14	151,496	482,011
23	Stadium Way (Western/End)	15	0.08	449.9	3,049	3,049	46,534	42,503	1,112,960	0.52	581,672	24	13,960,140	531,287	22	11,475,805	40,057,093
24	Western Ave (Stadium/Batten)	25	0.11	333.6	20,242	20,242	424,765	387,971	7,388,510	0.52	3,861,499	28	109,666,573	3,527,011	26	90,150,403	271,153,142
25	Batten Way (Western/End)	15	0.1	437.4	3,396	3,396	64,790	59,178	1,239,683	0.52	647,903	39	25,009,037	591,780	35	20,558,450	54,226,209
26	Western Ave (Batten/Cattle)	25	0.02	333.6	20,907	20,907	79,764	72,855	7,630,937	0.52	3,988,200	11	44,468,430	3,642,737	10	36,554,866	50,918,190
27	Cattle Drive (Western/DEF)	20	0.12	379.0	4,453	4,453	101,937	93,107	1,625,362	0.52	849,472	19	15,757,709	775,890	17	12,953,481	73,926,829
28	DEF Dr (Cattle/East)	15	0.12	440.8	3,774	3,774	86,387	78,904	1,377,425	0.52	719,892	7	4,931,258	657,534	6	4,053,696	72,867,596
29	Cattle Drive/Almy (DEF/Windom)	20	0.26	376.7	6,129	6,129	303,967	277,637	2,236,939	0.52	1,169,104	0	0	1,067,835	0	0	219,071,050
30	Western Ave (Cattle/East)	25	0.16	333.6	20,831	20,831	635,808	580,734	7,603,388	0.52	3,973,802	6	24,438,883	3,629,586	6	20,089,760	405,874,956
31	Kresge Way (Western/End)	15	0.18	439.5	2,038	2,038	69,973	63,912	743,810	0.52	388,742	0	0	355,068	0	0	58,846,651
32	East Drive (Western / DEF)	15	0.14	443.8	6,868	6,868	183,428	167,540	2,506,914	0.52	1,310,203	17	21,618,348	1,196,711	15	17,771,165	155,766,122
33	Western Ave (East/SFR EB)	25	0.1	339.2	23,775	23,775	453,532	414,246	8,677,780	0.52	4,535,318	17	77,553,932	4,142,463	15	63,752,500	294,374,586
34	SFR EB Off Ramp (SFR/Western)	30	0.12	328.0	11,019	11,019	252,250	230,400	4,022,082	0.52	2,102,084	309	649,333,668	1,919,999	278	533,778,802	158,313,983
35	SFR EB On Ramp (Western/Cambridge)	20	0.22	371.7	13,812	13,812	579,657	529,446	5,041,377	0.52	2,634,804	178	468,468,079	2,406,574	160	385,099,899	412,244,510
36	Western Ave (SFRWB/Mem)	25	0.02	449.4	26,341	26,341	100,497	91,792	9,614,430	0.52	5,024,844	6	29,395,337	4,589,586	5	24,164,168	86,416,704
37	SFR WB On Ramp (Cambridge/Western)	30	0.22	301.7	11,850	11,850	497,301	454,224	4,325,116	0.52	2,260,460	0	0	2,064,656	0	0	287,117,188
38	SFR WB Off Ramp (Western/SFR)	20	0.12	347.4	7,246	7,246	165,863	151,496	2,644,657	0.52	1,382,192	51	70,906,452	1,262,465	46	58,288,000	110,256,803
39	Western Ave (SFR/Mem)	25	0.09	339.8	30,945	30,945	531,280	485,260	11,294,889	0.52	5,903,112	213	1,258,543,452	5,391,777	192	1,034,574,133	345,387,513
40	Mem Drive (Western/River)	35	0.2	291.8	32,228	32,228	1,229,575	1,123,068	11,763,213	0.52	6,147,875	105	643,989,912	5,615,338	94	529,386,016	686,483,492
41	Western Ave (Mem/Putnam)	25	0.11	343.4	20,378	20,378	427,616	390,575	7,438,097	0.52	3,887,415	186	722,281,732	3,550,682	167	593,745,092	280,958,509
42	River St (Mem/Putnam)	25	0.14	333.6	15,850	15,850	423,296	386,630	5,785,187	0.52	3,023,545	0	0	2,761,642	0	0	270,215,656
43	Mem Drive (River/Pleasant)	35	0.18	289.7	35,322	35,322	1,212,874	1,107,813	12,892,702	0.52	6,738,186	27	182,267,938	6,154,516	24	149,831,691	672,353,085
44	River St (SFRWB/Mem)	30	0.08	320.0	26,567	26,567	405,443	370,323	9,697,075	0.52	5,068,038	96	488,558,816	4,629,038	87	401,615,306	248,264,517
45	SFR WB Off Ramp (Cambridge/SFR)	20	0.19	397.3	8,680	8,680	314,593	287,342	3,168,079	0.52	1,655,751	51	84,774,446	1,512,328	46	69,688,058	239,125,614
46	River St (SFREB/SFRWB)	30	0.02	424.6	35,549	35,549	135,628	123,879	12,975,348	0.52	6,781,380	0	2,712,552	6,193,968	0	2,229,828	110,180,043
47	SFR EB On Ramp (Cambridge/SFR)	20	0.14	357.6	13,661	13,661	364,841	333,238	4,986,280	0.52	2,606,008	0	0	2,380,272	0	0	249,611,192
48	Cambridge St (DoubleTree/SFREB)	30	0.04	328.0	40,530	40,530	309,265	282,477	14,793,549	0.52	7,731,637	20	156,952,226	7,061,913	18	129,021,142	194,097,295
49	Double Tree (Cambridge/End)	20	0.02	430.6	1,283	1,283	4,895	4,471	468,325	0.52	244,763	31	7,697,802	223,561	28	6,327,908	4,032,973
50	I90 EB Off ramp (Cambridge /Split)	20	0.09	380.8	17,842	17,842	306,328	279,794	6,512,468	0.52	3,403,648	34	115,043,300	3,108,820	30	94,570,292	223,175,747
51	I90 On Ramp (Cambridge/Split)	20	0.25	381.1	4,257	4,257	203,009	185,425	1,553,736	0.52	812,038	0	0	741,698	0	0	148,045,088
52	I90 WB Off ramp (Cambridge /Split)	20	0.18	402.1	25,662	25,662	881,147	804,821	9,366,493	0.52	4,895,264	570	2,789,321,146	4,471,230	513	2,292,935,934	677,856,817
53	Cambridge St (Windom/Doubletree)	30	0.27	309.0	45,889	45,889	2,363,548	2,158,815	16,749,493	0.52	8,753,883	269	2,354,356,826	7,995,610	242	1,935,377,494	1,397,453,764
54	Windom Street (Almay/Cambridge)	20	0.03	392.5	8,076	8,076	46,217	42,214	2,947,690	0.52	1,540,568	42	64,857,922	1,407,122	38	53,315,862	34,706,699
55	Cambridge St (N Harvard/Windom)	30	0.18	308.1	41,934	41,934	1,439,899	1,315,173	15,305,952	0.52	7,999,436	59	474,366,583	7,306,515	53	389,948,711	848,767,017
56	Cambridge St (Lincoln/N Harvard)	30	0.09	317.8	53,195	53,195	913,283	834,174	19,416,189	0.52	10,147,593	26	258,763,629	9,268,596	23	212,714,274	555,301,031
						VMT (per year)	27,716,550	25,315,707									19,063.72
												Arterial	16,051,929,270			13,195,341,632	Total (tons/year)

	Weekday	Total
VMT per year	53,032,257.19	53,032,257.19

	Weekday Idle			Total Idle		
	EF (g/s)	Idle (g/year)	Idle (tons/year)	EF (g/s)	Idle (g/year)	Idle (tons/year)
Peak Period	0.7838	12,581,769,650	**13,868.79**			**13,868.79**
Off-Peak Period	0.7838	10,342,728,657	**11,400.72**			**11,400.72**
Total			**25,269.51**	Total (Including Link)		**44,333.23**

Harvard ERC

Link No.	Description	Speed	Roadway Link Length (miles)	Emission Factor (g/mi) CO_2	AADT (veh/day)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/yr)	Peak Period Factor	Peak Traffic Data: Period Volume (vehicles)	Peak Traffic Data: Average Delay (sec)	Peak Traffic Data: Adjusted Delay (veh-sec)	Off-Peak Traffic Data: Period Volume (vehicles)	Off-Peak Traffic Data: Average Delay (sec)	Off-Peak Traffic Data: Adjusted Delay (veh-sec)	Link Emissions CO_2 (grams)
Build				Weekday							Weekday						
1	JFK Street (Mem Dr/Eliot)	25	0.13	337.9	20,831	20,831	516,594	471,846	7,603,388	0.52	3,973,802	15	57,620,131	3,629,586	13	47,366,102	333,961,355
2	Mem Drive (Hawthorn/JFK)	35	0.33	282.4	31,171	31,171	1,962,281	1,792,306	11,377,534	0.52	5,946,305	44	258,664,284	5,431,229	39	212,632,609	1,060,296,269
3	Mem Drive (JFK/Western)	35	0.62	283.9	33,134	33,134	3,918,802	3,579,351	12,093,795	0.52	6,320,649	106	668,724,670	5,773,146	95	549,718,998	2,128,834,426
4	Larz Anderson Bridge (SFRWB/Mem Dr)	25	0.11	369.7	28,303	28,303	593,911	542,465	10,330,691	0.52	5,399,188	73	392,250,986	4,931,503	65	322,446,335	420,084,117
5	SFR WB On Ramp (SFR/Bridge)	25	0.11	288.1	3,789	3,789	79,505	72,618	1,382,935	0.52	722,771	0	0	660,164	0	0	43,831,992
6	SFR WB Off Ramp (Bridge/SFR)	25	0.08	413.1	7,125	7,125	108,732	99,314	2,600,579	0.52	1,359,156	164	223,173,335	1,241,424	148	183,457,599	85,936,138
7	N Harvard St (SFR WB/SFR EB)	25	0.02	489.0	28,349	28,349	108,157	98,788	10,347,220	0.52	5,407,826	228	1,235,147,548	4,939,394	206	1,015,341,744	101,202,847
8	SFR EB Off Ramp (SFR/Bridge)	25	0.1	367.3	8,015	8,015	152,905	139,660	2,925,652	0.52	1,529,050	424	647,552,655	1,396,602	381	532,314,737	107,469,718
9	SFR EB On Ramp (Bridge/SFR)	15	0.1	418.3	4,861	4,861	92,722	84,690	1,774,124	0.52	927,220	0	0	846,903	0	0	74,214,978
10	N Harvard St (Academic/SFR EB)	25	0.36	335.6	20,907	20,907	1,435,752	1,311,385	7,630,937	0.52	3,988,200	19	74,778,750	3,642,737	17	61,471,187	921,893,442
11	S Campus Dr (End/Nharvard)	25	0.1	339.2	2,113	2,113	40,314	36,822	771,358	0.52	403,139	233	93,729,898	368,219	209	77,049,806	26,166,630
12	Academic Way (N Harvard/Western)	25	0.06	333.6	3,698	3,698	42,330	38,663	1,349,877	0.52	705,494	35	24,692,285	644,383	32	20,298,067	27,021,566
13	N Harvard St (Western/Academic)	25	0.11	333.6	16,303	16,303	342,093	312,460	5,950,478	0.52	3,109,932	38	117,088,944	2,840,546	34	96,251,895	218,378,369
14	Western Ave (Spurr/N Harvard)	25	0.09	351.4	25,813	25,813	443,165	404,778	9,421,590	0.52	4,924,059	80	392,693,719	4,497,531	72	322,810,280	297,957,774
15	N Havard St (Western/Kingsley)	25	0.09	358.0	17,586	17,586	301,923	275,770	6,418,803	0.52	3,354,695	67	224,261,380	3,064,107	60	184,352,016	206,842,051
16	Franklin St (Appian/N Harvard)	20	0.18	383.8	2,491	2,491	85,523	78,115	909,101	0.52	475,129	16	7,412,005	433,972	14	6,092,971	62,802,860
17	Kinglsey St (N Havard/Travis)	20	0.09	398.9	453	453	7,775	7,101	165,291	0.52	86,387	34	2,963,074	78,904	31	2,435,768	5,933,833
18	N Harvard St (Franklin/Cambridge)	25	0.35	335.7	15,850	15,850	1,058,241	966,575	5,785,187	0.52	3,023,545	35	106,126,433	2,761,642	32	87,240,264	679,724,778
19	Western Ave (N Harvard/Academic)	25	0.11	333.6	19,125	19,125	401,325	366,562	6,980,792	0.52	3,648,411	83	300,993,915	3,332,381	74	247,429,295	256,190,180
20	Academic Way (Western/End)	15	0.06	437.4	559	559	6,393	5,839	203,859	0.52	106,544	15	1,582,178	97,315	13	1,300,615	5,350,319
21	Western Ave (Academic/Stadium)	25	0.11	333.6	21,843	21,843	458,341	418,639	7,972,538	0.52	4,166,733	8	31,667,172	3,805,805	7	26,031,709	292,586,574
22	Driveway (Western/End)	15	0.05	437.4	60	60	576	526	22,039	0.52	11,518	19	221,727	10,521	17	182,268	482,011
23	Stadium Way (Western/End)	15	0.08	449.9	1,434	1,434	21,885	19,989	523,422	0.52	273,559	21	5,676,346	249,863	19	4,666,188	18,838,732
24	Western Ave (Stadium/Batten)	25	0.11	333.6	21,903	21,903	459,608	419,796	7,994,577	0.52	4,178,251	17	69,150,060	3,816,326	15	56,844,175	293,395,383
25	Batten Way (Western/End)	15	0.1	437.4	4,151	4,151	79,188	72,329	1,515,168	0.52	791,881	34	26,963,543	723,287	31	22,165,134	66,276,478
26	Western Ave (Batten/Cattle)	25	0.02	333.6	23,322	23,322	88,979	81,271	8,512,489	0.52	4,448,931	35	157,047,252	4,063,559	32	129,099,257	56,800,435
27	Cattle Drive (Western/DEF)	20	0.12	379.0	7,548	7,548	172,774	157,808	2,754,851	0.52	1,439,783	158	227,197,818	1,315,068	142	186,765,888	125,299,711
28	DEF Dr (Cattle/East)	15	0.12	440.8	4,000	4,000	91,570	83,638	1,460,071	0.52	763,085	7	5,456,059	696,986	6	4,485,104	77,239,652
29	Cattle Drive/Almy (DEF/Windom)	20	0.26	376.7	6,129	6,129	303,967	277,637	2,236,939	0.52	1,169,104	0	0	1,067,835	0	0	219,071,050
30	Western Ave (Cattle/East)	25	0.16	333.6	20,907	20,907	638,112	582,838	7,630,937	0.52	3,988,200	1	4,387,020	3,642,737	1	3,606,310	407,345,517
31	Kresge Way (Western/End)	15	0.18	439.5	1,283	1,283	44,057	40,241	468,325	0.52	244,763	0	0	223,561	0	0	37,051,595
32	East Drive (Western / DEF)	15	0.14	443.8	5,359	5,359	143,114	130,718	1,955,944	0.52	1,022,246	21	21,569,395	933,698	19	17,730,924	121,531,809
33	Western Ave (East/SFR EB)	25	0.1	339.2	23,775	23,775	453,532	414,246	8,677,780	0.52	4,535,318	247	1,118,862,867	4,142,463	222	919,750,985	294,374,586
34	SFR EB Off Ramp (SFR/Western)	30	0.12	328.0	11,019	11,019	252,250	230,400	4,022,082	0.52	2,102,084	309	649,333,668	1,919,999	278	533,778,802	158,313,983
35	SFR EB On Ramp (Western/Cambridge)	20	0.22	371.7	13,812	13,812	579,657	529,446	5,041,377	0.52	2,634,804	178	468,468,079	2,406,574	160	385,099,899	412,244,510
36	Western Ave (SFRWB/Mem)	25	0.02	449.4	26,341	26,341	100,497	91,792	9,614,430	0.52	5,024,844	6	29,395,337	4,589,586	5	24,164,168	86,416,704
37	SFR WB On Ramp (Cambridge/Western)	30	0.22	301.7	11,850	11,850	497,301	454,224	4,325,116	0.52	2,260,460	0	0	2,064,656	0	0	287,117,188
38	SFR WB Off Ramp (Western/SFR)	20	0.12	347.4	7,246	7,246	165,863	151,496	2,644,657	0.52	1,382,192	51	70,906,452	1,262,465	46	58,288,000	110,256,803
39	Western Ave (SFR/Mem)	25	0.09	339.8	30,945	30,945	531,280	485,260	11,294,889	0.52	5,903,112	213	1,258,543,452	5,391,777	192	1,034,574,133	345,387,513
40	Mem Drive (Western/River)	35	0.2	291.8	32,228	32,228	1,229,575	1,123,068	11,763,213	0.52	6,147,875	105	643,989,912	5,615,338	94	529,386,016	686,483,492
41	Western Ave (Mem/Putnam)	25	0.11	343.4	20,378	20,378	427,616	390,575	7,438,097	0.52	3,887,415	186	722,281,732	3,550,682	167	593,745,092	280,958,509
42	River St (Mem/Putnam)	25	0.14	333.6	15,850	15,850	423,296	386,630	5,785,187	0.52	3,023,545	0	0	2,761,642	0	0	270,215,656
43	Mem Drive (River/Pleasant)	35	0.18	289.7	35,322	35,322	1,212,874	1,107,813	12,892,702	0.52	6,738,186	27	182,267,938	6,154,516	24	149,831,691	672,353,085
44	River St (SFRWB/Mem)	30	0.08	320.0	26,567	26,567	405,443	370,323	9,697,075	0.52	5,068,038	96	488,558,816	4,629,038	87	401,615,306	248,264,517
45	SFR WB Off Ramp (Cambridge/SFR)	20	0.19	397.3	8,680	8,680	314,593	287,342	3,168,079	0.52	1,655,751	51	84,774,446	1,512,328	46	69,688,058	239,125,614
46	River St (SFREB/SFRWB)	30	0.02	424.6	35,549	35,549	135,628	123,879	12,975,348	0.52	6,781,380	0	2,712,552	6,193,968	0	2,229,828	110,180,043
47	SFR EB On Ramp (Cambridge/SFR)	20	0.14	357.6	13,661	13,661	364,841	333,238	4,986,280	0.52	2,606,008	0	0	2,380,272	0	0	249,611,192
48	Cambridge St (DoubleTree/SFREB)	30	0.04	328.0	40,530	40,530	309,265	282,477	14,793,549	0.52	7,731,637	20	156,952,226	7,061,913	18	129,021,142	194,097,295
49	Double Tree (Cambridge/End)	20	0.02	430.6	1,283	1,283	4,895	4,471	468,325	0.52	244,763	31	7,697,802	223,561	28	6,327,908	4,032,973
50	I90 EB Off ramp (Cambridge /Split)	20	0.09	380.8	17,842	17,842	306,328	279,794	6,512,468	0.52	3,403,648	34	115,043,300	3,108,820	30	94,570,292	223,175,747
51	I90 On Ramp (Cambridge/Split)	20	0.25	381.1	4,257	4,257	203,009	185,425	1,553,736	0.52	812,038	0	0	741,698	0	0	148,045,088
52	I90 WB Off ramp (Cambridge /Split)	20	0.18	402.1	25,662	25,662	881,147	804,821	9,366,493	0.52	4,895,264	570	2,789,321,146	4,471,230	513	2,292,935,934	677,856,817
53	Cambridge St (Windom/Doubletree)	30	0.27	309.0	45,889	45,889	2,363,548	2,158,815	16,749,493	0.52	8,753,883	269	2,354,356,826	7,995,610	242	1,935,377,494	1,397,453,764
54	Windom Street (Almay/Cambridge)	20	0.03	392.5	8,076	8,076	46,217	42,214	2,947,690	0.52	1,540,568	322	496,525,138	1,407,122	290	408,163,948	34,706,699
55	Cambridge St (N Harvard/Windom)	30	0.18	308.1	41,934	41,934	1,439,899	1,315,173	15,305,952	0.52	7,999,436	59	472,766,696	7,306,515	53	388,633,538	848,767,017
56	Cambridge St (Lincoln/N Harvard)	30	0.09	317.8	53,195	53,195	913,283	834,174	19,416,189	0.52	10,147,593	26	258,763,629	9,268,596	23	212,714,274	555,301,031
						VMT (per year)	27,762,450	25,357,632									19,085.93
												Arterial	17,750,314,595			14,591,483,753	Total (tons/year)

	Weekday	Total
VMT per year	53,120,081.84	53,120,081.84

	Weekday Idle (g/s)	Weekday Idle (g/year)	Weekday Idle (tons/year)	Total Idle (g/s)	Total Idle (g/year)	Total Idle (tons/year)
Peak Period	0.7838	13,912,992,370	**15,336.19**			**15,336.19**
Off-Peak Period	0.7838	11,437,048,118	**12,606.98**			**12,606.98**
Total			**27,943.17**	Total (Including Link)		**47,029.09**

Harvard ERC

Link No.	Description	Speed	Roadway Link Length (miles)	Emission Factor (g/mi) CO_2	AADT (veh/day)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/yr)	Peak Period Factor	Peak Traffic Data: Period Volume (vehicles)	Peak Traffic Data: Average Delay (sec)	Peak Traffic Data: Adjusted Delay (veh-sec)	Off-Peak Traffic Data: Period Volume (vehicles)	Off-Peak Traffic Data: Average Delay (sec)	Off-Peak Traffic Data: Adjusted Delay (veh-sec)	Link Emissions: CO_2 (grams)
No Build					Weekday						Weekday						
1	JFK Street (Mem Dr/Eliot)	25	0.13	337.9	20,227	20,227	501,621	458,170	7,383,000	0.52	3,858,619	14	54,406,535	3,524,381	13	44,724,394	324,281,316
2	Mem Drive (Hawthorn/JFK)	35	0.33	282.4	31,171	31,171	1,962,281	1,792,306	11,377,534	0.52	5,946,305	44	258,664,284	5,431,229	39	212,632,609	1,060,296,269
3	Mem Drive (JFK/Western)	35	0.62	283.9	33,134	33,134	3,918,802	3,579,351	12,093,795	0.52	6,320,649	106	667,776,573	5,773,146	95	548,939,624	2,128,834,426
4	Larz Anderson Bridge (SFRWB/Mem Dr)	25	0.11	369.7	27,699	27,699	581,241	530,893	10,110,303	0.52	5,284,005	66	350,593,733	4,826,298	60	288,202,371	411,122,323
5	SFR WB On Ramp (SFR/Bridge)	25	0.11	288.1	3,411	3,411	71,586	65,385	1,245,193	0.52	650,782	0	0	594,411	0	0	39,466,256
6	SFR WB Off Ramp (Bridge/SFR)	25	0.08	413.1	7,125	7,125	108,732	99,314	2,600,579	0.52	1,359,156	164	223,173,335	1,241,424	148	183,457,599	85,936,138
7	N Harvard St (SFR WB/SFR EB)	25	0.02	489.0	27,367	27,367	104,413	95,369	9,989,089	0.52	5,220,655	186	969,475,550	4,768,435	167	796,948,508	97,700,086
8	SFR EB Off Ramp (SFR/Bridge)	25	0.1	367.3	8,015	8,015	152,905	139,660	2,925,652	0.52	1,529,050	424	647,552,655	1,396,602	381	532,314,737	107,469,718
9	SFR EB On Ramp (Bridge/SFR)	15	0.1	418.3	4,861	4,861	92,722	84,690	1,774,124	0.52	927,220	0	0	846,903	0	0	74,214,978
10	N Harvard St (Academic/SFR EB)	25	0.36	335.6	19,925	19,925	1,368,370	1,249,840	7,272,806	0.52	3,801,028	17	66,137,890	3,471,778	16	54,368,047	878,627,685
11	S Campus Dr (End/Nharvard)	25	0.1	339.2	2,113	2,113	40,314	36,822	771,358	0.52	403,139	156	62,829,267	368,219	140	51,648,225	26,166,630
12	Academic Way (N Harvard/Western)	25	0.06	333.6	2,491	2,491	28,508	26,038	909,101	0.52	475,129	25	11,664,405	433,972	22	9,588,618	18,198,198
13	N Harvard St (Western/Academic)	25	0.11	333.6	16,529	16,529	346,844	316,800	6,033,123	0.52	3,153,126	38	119,030,492	2,879,998	34	97,847,927	221,411,402
14	Western Ave (Spurr/N Harvard)	25	0.09	351.4	22,945	22,945	393,925	359,802	8,374,747	0.52	4,376,941	61	268,306,513	3,997,805	55	220,558,915	264,851,355
15	N Havard St (Western/Kingsley)	25	0.09	358.0	18,793	18,793	322,655	294,707	6,859,579	0.52	3,585,061	85	303,116,876	3,274,518	76	249,174,455	221,045,797
16	Franklin St (Appian/N Harvard)	20	0.18	383.8	2,491	2,491	85,523	78,115	909,101	0.52	475,129	16	7,412,005	433,972	14	6,092,971	62,802,860
17	Kinglsey St (N Havard/Travis)	20	0.09	398.9	453	453	7,775	7,101	165,291	0.52	86,387	34	2,963,074	78,904	31	2,435,768	5,933,833
18	N Harvard St (Franklin/Cambridge)	25	0.35	335.7	17,057	17,057	1,138,869	1,040,218	6,225,963	0.52	3,253,910	35	115,188,430	2,972,053	32	94,689,595	731,513,333
19	Western Ave (N Harvard/Academic)	25	0.11	333.6	16,242	16,242	340,826	311,303	5,928,439	0.52	3,098,414	35	107,360,040	2,830,025	31	88,254,339	217,569,561
20	Academic Way (Western/End)	15	0.06	437.4	619	619	7,084	6,470	225,898	0.52	118,062	11	1,263,266	107,836	10	1,038,456	5,928,732
21	Western Ave (Academic/Stadium)	25	0.11	333.6	17,767	17,767	372,818	340,524	6,484,919	0.52	3,389,250	7	23,046,901	3,095,669	6	18,945,494	237,991,982
22	Driveway (Western/End)	15	0.05	437.4	60	60	576	526	22,039	0.52	11,518	19	222,878	10,521	17	183,215	482,011
23	Stadium Way (Western/End)	15	0.08	449.9	1,359	1,359	20,733	18,937	495,873	0.52	259,161	20	5,286,885	236,712	18	4,346,035	17,847,220
24	Western Ave (Stadium/Batten)	25	0.11	333.6	18,280	18,280	383,587	350,360	6,672,249	0.52	3,487,155	20	69,220,034	3,185,094	18	56,901,696	244,866,857
25	Batten Way (Western/End)	15	0.1	437.4	4,227	4,227	80,628	73,644	1,542,717	0.52	806,279	78	62,728,482	736,438	70	51,565,375	67,481,505
26	Western Ave (Batten/Cattle)	25	0.02	333.6	19,397	19,397	74,005	67,594	7,079,967	0.52	3,700,243	15	54,393,576	3,379,724	13	44,713,742	47,241,786
27	Cattle Drive (Western/DEF)	20	0.12	379.0	1,283	1,283	29,372	26,827	468,325	0.52	244,763	24	5,800,887	223,561	21	4,768,566	21,300,951
28	DEF Dr (Cattle/East)	15	0.12	440.8	0	0	0	0	0	0.52	0	0	0	0	0	0	0
29	Cattle Drive/Almy (DEF/Windom)	20	0.26	376.7	0	0	0	0	0	0.52	0	0	0	0	0	0	0
30	Western Ave (Cattle/East)	25	0.16	333.6	19,397	19,397	592,039	540,756	7,079,967	0.52	3,700,243	0	555,036	3,379,724	0	456,263	377,934,289
31	Kresge Way (Western/End)	15	0.18	439.5	1,283	1,283	44,057	40,241	468,325	0.52	244,763	0	0	223,561	0	0	37,051,595
32	East Drive (Western / DEF)	15	0.14	443.8	1,359	1,359	36,283	33,140	495,873	0.52	259,161	10	2,604,568	236,712	9	2,141,061	30,810,881
33	Western Ave (East/SFR EB)	25	0.1	339.2	20,378	20,378	388,742	355,068	7,438,097	0.52	3,887,415	142	552,207,320	3,550,682	128	453,936,977	252,321,074
34	SFR EB Off Ramp (SFR/Western)	30	0.12	328.0	10,868	10,868	248,795	227,244	3,966,985	0.52	2,073,288	299	619,083,819	1,893,697	269	508,912,190	156,145,299
35	SFR EB On Ramp (Western/Cambridge)	20	0.22	371.7	12,906	12,906	541,647	494,728	4,710,795	0.52	2,462,030	143	350,839,216	2,248,765	128	288,404,169	385,212,083
36	Western Ave (SFRWB/Mem)	25	0.02	449.4	26,265	26,265	100,209	91,529	9,586,881	0.52	5,010,446	6	29,060,588	4,576,435	5	23,888,990	86,169,092
37	SFR WB On Ramp (Cambridge/Western)	30	0.22	301.7	11,850	11,850	497,301	454,224	4,325,116	0.52	2,260,460	0	0	2,064,656	0	0	287,117,188
38	SFR WB Off Ramp (Western/SFR)	20	0.12	347.4	7,321	7,321	167,591	153,074	2,672,205	0.52	1,396,590	53	73,739,946	1,275,615	48	60,617,248	111,405,311
39	Western Ave (SFR/Mem)	25	0.09	339.8	30,794	30,794	528,688	482,893	11,239,792	0.52	5,874,316	211	1,236,543,562	5,365,475	189	1,016,489,324	343,702,696
40	Mem Drive (Western/River)	35	0.2	291.8	32,153	32,153	1,226,695	1,120,438	11,735,665	0.52	6,133,477	103	631,748,153	5,602,188	93	519,322,791	684,875,802
41	Western Ave (Mem/Putnam)	25	0.11	343.4	20,303	20,303	426,032	389,128	7,410,549	0.52	3,873,017	184	710,698,675	3,537,532	165	584,223,345	279,917,922
42	River St (Mem/Putnam)	25	0.14	333.6	15,548	15,548	415,234	379,265	5,674,993	0.52	2,965,954	0	0	2,709,039	0	0	265,068,692
43	Mem Drive (River/Pleasant)	35	0.18	289.7	35,096	35,096	1,205,099	1,100,712	12,810,057	0.52	6,694,993	27	179,091,056	6,115,064	24	147,220,164	668,043,129
44	River St (SFRWB/Mem)	30	0.08	320.0	26,114	26,114	398,532	364,011	9,531,784	0.52	4,981,651	90	446,355,886	4,550,134	81	366,922,773	244,032,735
45	SFR WB Off Ramp (Cambridge/SFR)	20	0.19	397.3	8,302	8,302	300,915	274,849	3,030,336	0.52	1,583,762	49	78,237,829	1,446,574	44	64,314,692	228,728,849
46	River St (SFREB/SFRWB)	30	0.02	424.6	35,096	35,096	133,900	122,301	12,810,057	0.52	6,694,993	1	3,682,246	6,115,064	0	3,026,957	108,776,475
47	SFR EB On Ramp (Cambridge/SFR)	20	0.14	357.6	12,755	12,755	340,653	311,145	4,655,698	0.52	2,433,234	0	0	2,222,464	0	0	233,062,383
48	Cambridge St (DoubleTree/SFREB)	30	0.04	328.0	40,077	40,077	305,810	279,320	14,628,258	0.52	7,645,250	19	147,935,583	6,983,008	17	121,609,093	191,928,610
49	Double Tree (Cambridge/End)	20	0.02	430.6	1,283	1,283	4,895	4,471	468,325	0.52	244,763	31	7,697,802	223,561	28	6,327,908	4,032,973
50	I90 EB Off ramp (Cambridge /Split)	20	0.09	380.8	18,069	18,069	310,216	283,344	6,595,113	0.52	3,446,841	34	117,881,977	3,148,272	31	96,903,801	226,007,927
51	I90 On Ramp (Cambridge/Split)	20	0.25	381.1	3,879	3,879	185,012	168,986	1,415,993	0.52	740,049	0	0	675,945	0	0	134,920,523
52	I90 WB Off ramp (Cambridge /Split)	20	0.18	402.1	24,303	24,303	834,498	762,213	8,870,620	0.52	4,636,102	506	2,344,940,643	4,234,517	455	1,927,637,007	641,970,279
53	Cambridge St (Windom/Doubletree)	30	0.27	309.0	43,474	43,474	2,239,151	2,045,193	15,867,941	0.52	8,293,152	244	2,022,285,187	7,574,789	219	1,662,401,040	1,323,903,566
54	Windom Street (Almay/Cambridge)	20	0.03	392.5	3,110	3,110	17,796	16,254	1,134,999	0.52	593,191	109	64,687,452	541,808	98	53,175,728	13,363,701
55	Cambridge St (N Harvard/Windom)	30	0.18	308.1	41,557	41,557	1,426,941	1,303,337	15,168,209	0.52	7,927,447	46	366,644,438	7,240,762	42	301,396,707	841,128,724
56	Cambridge St (Lincoln/N Harvard)	30	0.09	317.8	51,836	51,836	889,959	812,870	18,920,316	0.52	9,888,432	25	249,188,494	9,031,884	23	204,843,122	541,119,110
						VMT (per year)	26,343,400	24,061,501									17,988.68
												Arterial	14,693,324,041			12,078,512,630	Total (tons/year)

	Weekday	Total
VMT per year	**50,404,900.79**	**50,404,900.79**

	Weekday Idle (g/s)	Weekday Idle (g/year)	Weekday Idle (tons/year)	Total Idle (g/s)	Total Idle (g/year)	Total Idle (tons/year)
Arterial						
Peak Period	0.7838	11,516,872,232	**12,694.96**			**12,694.96**
Off-Peak Period	0.7838	9,467,339,475	**10,435.78**			**10,435.78**
Total			**23,130.74**	Total (Including Link)		**41,119.43**

Harvard ERC

Existing					Weekday						Weekday						Link Emissions
Link No.	Description	Type	Roadway Link Length (miles)	Emission Factor (g/mi) CO_2	AADT (veh/day)	Seasonally Adjusted ADT (veh/day)	VMT Peak (veh-miles)	VMT Off-Peak (veh-miles)	Annual Weekday Trips (veh/yr)	Peak Period Factor	Peak Traffic Data: Period Volume (vehicles)	Peak Traffic Data: Average Delay (sec)	Peak Traffic Data: Adjusted Delay (veh-sec)	Off-Peak Traffic Data: Period Volume (vehicles)	Off-Peak Traffic Data: Average Delay (sec)	Off-Peak Traffic Data: Adjusted Delay (veh-sec)	CO_2 (grams)
1	JFK Street (Mem Dr/Eliot)	25	0.13	437.4	15,774	15,774	391,189	357,304	5,757,638	0.52	3,009,147	13	37,915,256	2,748,491	11	31,167,889	327,402,351
2	Mem Drive (Hawthorn/JFK)	35	0.33	366.1	29,058	29,058	1,829,245	1,670,793	10,606,176	0.52	5,543,166	39	213,411,892	5,063,010	35	175,433,294	1,281,523,008
3	Mem Drive (JFK/Western)	35	0.62	368.1	30,869	30,869	3,651,003	3,334,748	11,267,340	0.52	5,888,714	80	470,508,252	5,378,626	72	386,777,005	2,571,421,020
4	Larz Anderson Bridge (SFRWB/Mem Dr)	25	0.11	476.5	23,020	23,020	483,047	441,205	8,402,295	0.52	4,391,339	30	129,764,077	4,010,956	27	106,671,373	440,439,906
5	SFR WB On Ramp (SFR/Bridge)	25	0.11	375.4	2,204	2,204	46,246	42,240	804,416	0.52	420,417	0	0	384,000	0	0	33,219,503
6	SFR WB Off Ramp (Bridge/SFR)	25	0.08	530.0	6,898	6,898	105,277	96,158	2,517,934	0.52	1,315,962	160	209,895,941	1,201,972	144	172,543,038	106,765,679
7	N Harvard St (SFR WB/SFR EB)	25	0.02	625.8	21,707	21,707	82,816	75,643	7,922,951	0.52	4,140,817	59	244,308,204	3,782,134	53	200,831,324	99,156,525
8	SFR EB Off Ramp (SFR/Bridge)	25	0.1	473.7	6,657	6,657	126,989	115,989	2,429,778	0.52	1,269,889	296	375,760,139	1,159,890	266	308,890,185	115,103,469
9	SFR EB On Ramp (Bridge/SFR)	15	0.1	542.5	4,634	4,634	88,403	80,745	1,691,478	0.52	884,027	0	0	807,451	0	0	91,769,473
10	N Harvard St (Academic/SFR EB)	25	0.36	434.6	14,416	14,416	989,995	904,240	5,261,765	0.52	2,749,986	15	42,074,790	2,511,779	14	34,587,196	823,329,412
11	S Campus Dr (End/Nharvard)	25	0.1	439.1	0	0	0	0	0	0.52	0	0	0	0	0	0	0
12	Academic Way (N Harvard/Western)	25	0.06	432.1	0	0	0	0	0	0.52	0	0	0	0	0	0	0
13	N Harvard St (Western/Academic)	25	0.11	432.1	14,416	14,416	302,498	276,296	5,261,765	0.52	2,749,986	37	100,511,998	2,511,779	33	82,624,969	250,080,134
14	Western Ave (Spurr/N Harvard)	25	0.09	454.2	16,529	16,529	283,781	259,200	6,033,123	0.52	3,153,126	22	69,841,732	2,879,998	20	57,412,757	246,636,500
15	N Havard St (Western/Kingsley)	25	0.09	462.5	14,567	14,567	250,090	228,427	5,316,862	0.52	2,778,782	47	129,352,299	2,538,080	42	106,332,874	221,304,281
16	Franklin St (Appian/N Harvard)	20	0.18	495.3	2,189	2,189	75,157	68,647	798,907	0.52	417,537	16	6,471,826	381,370	14	5,320,106	71,219,342
17	Kinglsey St (N Havard/Travis)	20	0.09	513.9	453	453	7,775	7,101	165,291	0.52	86,387	37	3,179,042	78,904	33	2,613,302	7,645,141
18	N Harvard St (Franklin/Cambridge)	25	0.35	434.8	12,982	12,982	866,750	791,671	4,738,344	0.52	2,476,427	22	54,852,867	2,261,916	20	45,091,298	721,095,341
19	Western Ave (N Harvard/Academic)	25	0.11	432.1	15,095	15,095	316,752	289,315	5,509,702	0.52	2,879,567	43	124,397,284	2,630,135	39	102,259,650	261,864,015
20	Academic Way (Western/End)	15	0.06	565.2	0	0	0	0	0	0.52	0	0	0	0	0	0	0
21	Western Ave (Academic/Stadium)	25	0.11	432.1	15,095	15,095	316,752	289,315	5,509,702	0.52	2,879,567	0	0	2,630,135	0	0	261,864,015
22	Driveway (Western/End)	15	0.05	565.2	0	0	0	0	0	0.52	0	0	0	0	0	0	0
23	Stadium Way (Western/End)	15	0.08	580.3	0	0	0	0	0	0.52	0	0	0	0	0	0	0
24	Western Ave (Stadium/Batten)	25	0.11	432.1	15,095	15,095	316,752	289,315	5,509,702	0.52	2,879,567	10	29,515,559	2,630,135	9	24,262,996	261,864,015
25	Batten Way (Western/End)	15	0.1	565.2	17,435	17,435	332,590	303,781	6,363,706	0.52	3,325,900	17	54,877,344	3,037,806	15	45,111,418	359,670,907
26	Western Ave (Batten/Cattle)	25	0.02	432.1	15,171	15,171	57,879	52,866	5,537,250	0.52	2,893,965	14	39,068,522	2,643,286	12	32,115,921	47,849,651
27	Cattle Drive (Western/DEF)	20	0.12	489.5	3,170	3,170	72,565	66,279	1,157,037	0.52	604,709	17	10,400,995	552,328	15	8,550,043	67,965,535
28	DEF Dr (Cattle/East)	15	0.12	569.4	0	0	0	0	0	0.52	0	0	0	0	0	0	0
29	Cattle Drive/Almy (DEF/Windom)	20	0.26	486.9	0	0	0	0	0	0.52	0	0	0	0	0	0	0
30	Western Ave (Cattle/East)	25	0.16	432.1	15,171	15,171	463,034	422,926	5,537,250	0.52	2,893,965	0	868,189	2,643,286	0	713,687	382,797,331
31	Kresge Way (Western/End)	15	0.18	567.9	1,283	1,283	44,057	40,241	468,325	0.52	244,763	0	0	223,561	0	0	47,874,017
32	East Drive (Western / DEF)	15	0.14	573.2	1,359	1,359	36,283	33,140	495,873	0.52	259,161	12	3,019,226	236,712	10	2,481,927	39,789,459
33	Western Ave (East/SFR EB)	25	0.1	439.1	15,774	15,774	300,915	274,849	5,757,638	0.52	3,009,147	42	125,330,984	2,748,491	37	103,027,189	252,798,898
34	SFR EB Off Ramp (SFR/Western)	30	0.12	421.8	9,963	9,963	228,062	208,307	3,636,403	0.52	1,900,514	141	268,732,689	1,735,889	127	220,909,249	184,080,556
35	SFR EB On Ramp (Western/Cambridge)	20	0.22	480.5	11,246	11,246	471,961	431,079	4,104,728	0.52	2,145,277	128	274,810,015	1,959,451	115	225,905,059	433,939,527
36	Western Ave (SFRWB/Mem)	25	0.02	575.4	22,643	22,643	86,387	78,904	8,264,553	0.52	4,319,350	4	17,709,336	3,945,203	4	14,557,797	95,115,082
37	SFR WB On Ramp (Cambridge/Western)	30	0.22	389.1	11,095	11,095	465,626	425,293	4,049,631	0.52	2,116,482	0	0	1,933,149	0	0	346,686,860
38	SFR WB Off Ramp (Western/SFR)	20	0.12	451.4	5,661	5,661	129,581	118,356	2,066,138	0.52	1,079,838	50	53,667,926	986,301	45	44,117,227	111,925,186
39	Western Ave (SFR/Mem)	25	0.09	439.7	28,077	28,077	482,039	440,285	10,248,045	0.52	5,355,994	75	401,163,965	4,892,051	67	329,773,168	405,522,328
40	Mem Drive (Western/River)	35	0.2	378.2	28,907	28,907	1,102,874	1,007,342	10,551,079	0.52	5,514,370	63	348,508,207	5,036,709	57	286,487,984	798,115,228
41	Western Ave (Mem/Putnam)	25	0.11	444.3	18,944	18,944	397,524	363,090	6,914,676	0.52	3,613,856	130	470,885,475	3,300,819	117	387,087,098	337,971,371
42	River St (Mem/Putnam)	25	0.14	432.1	13,435	13,435	358,794	327,715	4,903,635	0.52	2,562,814	0	0	2,340,820	0	0	296,620,359
43	Mem Drive (River/Pleasant)	35	0.18	375.6	31,398	31,398	1,078,110	984,723	11,460,180	0.52	5,989,499	20	121,586,827	5,470,681	18	99,949,339	774,733,370
44	River St (SFRWB/Mem)	30	0.08	411.9	23,171	23,171	353,611	322,981	8,457,392	0.52	4,420,135	50	219,680,709	4,037,257	45	180,586,517	278,664,312
45	SFR WB Off Ramp (Cambridge/SFR)	20	0.19	511.8	6,868	6,868	248,939	227,375	2,506,914	0.52	1,310,203	45	59,221,170	1,196,711	41	48,682,221	243,797,918
46	River St (SFREB/SFRWB)	30	0.02	543.1	30,417	30,417	116,047	105,994	11,102,049	0.52	5,802,327	1	2,901,164	5,299,722	0	2,384,875	120,598,237
47	SFR EB On Ramp (Cambridge/SFR)	20	0.14	463.8	9,736	9,736	260,025	237,501	3,553,758	0.52	1,857,321	0	0	1,696,437	0	0	230,729,488
48	Cambridge St (DoubleTree/SFREB)	30	0.04	421.8	32,983	32,983	251,674	229,874	12,038,698	0.52	6,291,853	12	77,389,797	5,746,845	11	63,617,574	203,139,791
49	Double Tree (Cambridge/End)	20	0.02	553.3	1,283	1,283	4,895	4,471	468,325	0.52	244,763	32	7,783,469	223,561	29	6,398,329	5,182,575
50	I90 EB Off ramp (Cambridge /Split)	20	0.09	491.5	14,220	14,220	244,130	222,983	5,190,139	0.52	2,712,552	30	80,834,046	2,477,587	27	66,448,889	229,600,329
51	I90 On Ramp (Cambridge/Split)	20	0.25	491.9	3,170	3,170	151,177	138,082	1,157,037	0.52	604,709	0	0	552,328	0	0	142,287,826
52	I90 WB Off ramp (Cambridge /Split)	20	0.18	518.0	24,077	24,077	826,724	755,112	8,787,974	0.52	4,592,909	449	2,060,378,975	4,195,065	404	1,693,715,691	819,333,554
53	Cambridge St (Windom/Doubletree)	30	0.27	398.1	39,474	39,474	2,033,118	1,857,007	14,407,870	0.52	7,530,067	224	1,686,735,030	6,877,803	202	1,386,565,103	1,548,701,874
54	Windom Street (Almay/Cambridge)	20	0.03	505.9	7,940	7,940	45,440	41,504	2,898,103	0.52	1,514,652	18	26,885,075	1,383,451	16	22,100,630	43,985,093
55	Cambridge St (N Harvard/Windom)	30	0.18	397.0	33,149	33,149	1,138,235	1,039,640	12,099,305	0.52	6,323,529	21	132,794,101	5,775,777	19	109,162,176	864,542,544
56	Cambridge St (Lincoln/N Harvard)	30	0.09	409.1	42,372	42,372	727,465	664,451	15,465,733	0.52	8,082,944	14	110,332,184	7,382,789	12	90,697,563	569,366,312
						VMT (per year)	23,040,278	21,044,499									20,367.16
												Arterial	8,897,326,578			7,313,965,931	**Total (tons/year)**

	Weekday	Total
VMT per year	**44,084,776.96**	**44,084,776.96**

	Weekday (g/s)	Weekday (g/year)	Weekday (tons/year)	Total (g/s)	Total (g/year)	Total (tons/year)
Peak Period	1.0387	9,241,554,330	**10,187.07**			**10,187.07**
Off-Peak Period	1.0387	7,596,935,206	**8,374.19**			**8,374.19**
Total			**18,561.25**	Total (Including Link)		**38,928.41**

Harvard ERC

Weekday Traffic

Link No.	Roadway Description	Existing: Roadway S.A.F.	Existing: Roadway ADT (veh/day)	Existing: Seasonal ADT (veh/day)	No Build: Roadway ADT (veh/day)	No Build: Seasonal ADT (veh/day)	No Build: Traffic Increase (existing)	Build: Roadway ADT (veh/day)	Build: Seasonal ADT (veh/day)	Build: Traffic Increase (existing)	Build: Traffic Increase (no-build)	Build with Mitigation: Roadway ADT (veh/day)	Build with Mitigation: Seasonal ADT (veh/day)	Build with Mitigation: Traffic Increase (existing)	Build with Mitigation: Traffic Increase (no-build)
1	JFK Street (Mem Dr/Eliot)	100%	15,774	15,774	20,227	20,227	28%	20,831	20,831	32%	3%	20,831	20,831	32%	3%
2	Mem Drive (Hawthorn/JFK)	100%	29,058	29,058	31,171	31,171	7%	31,171	31,171	7%	0%	31,171	31,171	7%	0%
3	Mem Drive (JFK/Western)	100%	30,869	30,869	33,134	33,134	7%	33,134	33,134	7%	0%	33,134	33,134	7%	0%
4	Larz Anderson Bridge (SFRWB/Mem Dr)	100%	23,020	23,020	27,699	27,699	20%	28,303	28,303	23%	2%	28,303	28,303	23%	2%
5	SFR WB On Ramp (SFR/Bridge)	100%	2,204	2,204	3,411	3,411	55%	3,789	3,789	72%	11%	3,789	3,789	72%	11%
6	SFR WB Off Ramp (Bridge/SFR)	100%	6,898	6,898	7,125	7,125	3%	7,125	7,125	3%	0%	7,125	7,125	3%	0%
7	N Harvard St (SFR WB/SFR EB)	100%	21,707	21,707	27,367	27,367	26%	28,349	28,349	31%	4%	28,349	28,349	31%	4%
8	SFR EB Off Ramp (SFR/Bridge)	100%	6,657	6,657	8,015	8,015	20%	8,015	8,015	20%	0%	8,015	8,015	20%	0%
9	SFR EB On Ramp (Bridge/SFR)	100%	4,634	4,634	4,861	4,861	5%	4,861	4,861	5%	0%	4,861	4,861	5%	0%
10	N Harvard St (Academic/SFR EB)	100%	14,416	14,416	19,925	19,925	38%	20,907	20,907	45%	5%	20,907	20,907	45%	5%
11	S Campus Dr (End/Nharvard)	100%	0	0	2,113	2,113	#DIV/0!	2,113	2,113	#DIV/0!	0%	2,113	2,113	#DIV/0!	0%
12	Academic Way (N Harvard/Western)	100%	0	0	2,491	2,491	#DIV/0!	3,698	3,698	#DIV/0!	48%	3,698	3,698	#DIV/0!	48%
13	N Harvard St (Western/Academic)	100%	14,416	14,416	16,529	16,529	15%	16,303	16,303	13%	-1%	16,303	16,303	13%	-1%
14	Western Ave (Spurr/N Harvard)	100%	16,529	16,529	22,945	22,945	39%	25,813	25,813	56%	13%	25,813	25,813	56%	13%
15	N Havard St (Western/Kingsley)	100%	14,567	14,567	18,793	18,793	29%	17,586	17,586	21%	-6%	17,586	17,586	21%	-6%
16	Franklin St (Appian/N Harvard)	100%	2,189	2,189	2,491	2,491	14%	2,491	2,491	14%	0%	2,491	2,491	14%	0%
17	Kinglsey St (N Havard/Travis)	100%	453	453	453	453	0%	453	453	0%	0%	453	453	0%	0%
18	N Harvard St (Franklin/Cambridge)	100%	12,982	12,982	17,057	17,057	31%	15,850	15,850	22%	-7%	15,850	15,850	22%	-7%
19	Western Ave (N Harvard/Academic)	100%	15,095	15,095	16,242	16,242	8%	19,125	19,125	27%	18%	19,125	19,125	27%	18%
20	Academic Way (Western/End)	100%	0	0	619	619	#DIV/0!	559	559	#DIV/0!	-10%	559	559	#DIV/0!	-10%
21	Western Ave (Academic/Stadium)	100%	15,095	15,095	17,767	17,767	18%	21,843	21,843	45%	23%	21,843	21,843	45%	23%
22	Driveway (Western/End)	100%	0	0	60	60	#DIV/0!	60	60	#DIV/0!	0%	60	60	#DIV/0!	0%
23	Stadium Way (Western/End)	100%	0	0	1,359	1,359	#DIV/0!	1,434	1,434	#DIV/0!	6%	3,049	3,049	#DIV/0!	124%
24	Western Ave (Stadium/Batten)	100%	15,095	15,095	18,280	18,280	21%	21,903	21,903	45%	20%	20,242	20,242	34%	11%
25	Batten Way (Western/End)	100%	17,435	17,435	4,227	4,227	-76%	4,151	4,151	-76%	-2%	3,396	3,396	-81%	-20%
26	Western Ave (Batten/Cattle)	100%	15,171	15,171	19,397	19,397	28%	23,322	23,322	54%	20%	20,907	20,907	38%	8%
27	Cattle Drive (Western/DEF)	100%	3,170	3,170	1,283	1,283	-60%	7,548	7,548	138%	488%	4,453	4,453	40%	247%
28	DEF Dr (Cattle/East)	100%	0	0	0	0	#DIV/0!	4,000	4,000	#DIV/0!	#DIV/0!	3,774	3,774	#DIV/0!	#DIV/0!
29	Cattle Drive/Almy (DEF/Windom)	100%	0	0	0	0	#DIV/0!	6,129	6,129	#DIV/0!	#DIV/0!	6,129	6,129	#DIV/0!	#DIV/0!
30	Western Ave (Cattle/East)	100%	15,171	15,171	19,397	19,397	28%	20,907	20,907	38%	8%	20,831	20,831	37%	7%
31	Kresge Way (Western/End)	100%	1,283	1,283	1,283	1,283	0%	1,283	1,283	0%	0%	2,038	2,038	59%	59%
32	East Drive (Western / DEF)	100%	1,359	1,359	1,359	1,359	0%	5,359	5,359	294%	294%	6,868	6,868	406%	406%
33	Western Ave (East/SFR EB)	100%	15,774	15,774	20,378	20,378	29%	23,775	23,775	51%	17%	23,775	23,775	51%	17%
34	SFR EB Off Ramp (SFR/Western)	100%	9,963	9,963	10,868	10,868	9%	11,019	11,019	11%	1%	11,019	11,019	11%	1%
35	SFR EB On Ramp (Western/Cambridge)	100%	11,246	11,246	12,906	12,906	15%	13,812	13,812	23%	7%	13,812	13,812	23%	7%
36	Western Ave (SFRWB/Mem)	100%	22,643	22,643	26,265	26,265	16%	26,341	26,341	16%	0%	26,341	26,341	16%	0%
37	SFR WB On Ramp (Cambridge/Western)	100%	11,095	11,095	11,850	11,850	7%	11,850	11,850	7%	0%	11,850	11,850	7%	0%
38	SFR WB Off Ramp (Western/SFR)	100%	5,661	5,661	7,321	7,321	29%	7,246	7,246	28%	-1%	7,246	7,246	28%	-1%
39	Western Ave (SFR/Mem)	100%	28,077	28,077	30,794	30,794	10%	30,945	30,945	10%	0%	30,945	30,945	10%	0%
40	Mem Drive (Western/River)	100%	28,907	28,907	32,153	32,153	11%	32,228	32,228	11%	0%	32,228	32,228	11%	0%
41	Western Ave (Mem/Putnam)	100%	18,944	18,944	20,303	20,303	7%	20,378	20,378	8%	0%	20,378	20,378	8%	0%
42	River St (Mem/Putnam)	100%	13,435	13,435	15,548	15,548	16%	15,850	15,850	18%	2%	15,850	15,850	18%	2%
43	Mem Drive (River/Pleasant)	100%	31,398	31,398	35,096	35,096	12%	35,322	35,322	13%	1%	35,322	35,322	13%	1%
44	River St (SFRWB/Mem)	100%	23,171	23,171	26,114	26,114	13%	26,567	26,567	15%	2%	26,567	26,567	15%	2%
45	SFR WB Off Ramp (Cambridge/SFR)	100%	6,868	6,868	8,302	8,302	21%	8,680	8,680	26%	5%	8,680	8,680	26%	5%
46	River St (SFREB/SFRWB)	100%	30,417	30,417	35,096	35,096	15%	35,549	35,549	17%	1%	35,549	35,549	17%	1%
47	SFR EB On Ramp (Cambridge/SFR)	100%	9,736	9,736	12,755	12,755	31%	13,661	13,661	40%	7%	13,661	13,661	40%	7%
48	Cambridge St (DoubleTree/SFREB)	100%	32,983	32,983	40,077	40,077	22%	40,530	40,530	23%	1%	40,530	40,530	23%	1%
49	Double Tree (Cambridge/End)	100%	1,283	1,283	1,283	1,283	0%	1,283	1,283	0%	0%	1,283	1,283	0%	0%
50	I90 EB Off ramp (Cambridge /Split)	100%	14,220	14,220	18,069	18,069	27%	17,842	17,842	25%	-1%	17,842	17,842	25%	-1%
51	I90 On Ramp (Cambridge/Split)	100%	3,170	3,170	3,879	3,879	22%	4,257	4,257	34%	10%	4,257	4,257	34%	10%
52	I90 WB Off ramp (Cambridge /Split)	100%	24,077	24,077	24,303	24,303	1%	25,662	25,662	7%	6%	25,662	25,662	7%	6%
53	Cambridge St (Windom/Doubletree)	100%	39,474	39,474	43,474	43,474	10%	45,889	45,889	16%	6%	45,889	45,889	16%	6%
54	Windom Street (Almay/Cambridge)	100%	7,940	7,940	3,110	3,110	-61%	8,076	8,076	2%	160%	8,076	8,076	2%	160%
55	Cambridge St (N Harvard/Windom)	100%	33,149	33,149	41,557	41,557	25%	41,934	41,934	27%	1%	41,934	41,934	27%	1%
56	Cambridge St (Lincoln/N Harvard)	100%	42,372	42,372	51,836	51,836	22%	53,195	53,195	26%	3%	53,195	53,195	26%	3%

Harvard ERC
Weekday Vehicle Delay

Link No.	Description	Directions	Existing: Delay By Approach NB or EB (sec)	Existing: Delay By Approach SB or WB (sec)	Existing: Adjusted Delay * NB or EB (sec)	Existing: Adjusted Delay * SB or WB (sec)	Existing: Combined Delay (sec)	No Build: Delay By Approach NB or EB (sec)	No Build: Delay By Approach SB or WB (sec)	No Build: Adjusted Delay * NB or EB (sec)	No Build: Adjusted Delay * SB or WB (sec)	No Build: Combined Delay (sec)	Build: Delay By Approach NB or EB (sec)	Build: Delay By Approach SB or WB (sec)	Build: Adjusted Delay * NB or EB (sec)	Build: Adjusted Delay * SB or WB (sec)	Build: Combined Delay (sec)	Build-Mit: Delay By Approach NB or EB (sec)	Build-Mit: Delay By Approach SB or WB (sec)	Build-Mit: Adjusted Delay * NB or EB (sec)	Build-Mit: Adjusted Delay * SB or WB (sec)	Build-Mit: Combined Delay (sec)
1	JFK Street (Mem Dr/Eliot)	2	0.0	25.2	0	25.2	12.6	0	28.2	0	28.2	14.1	0	29	0	29	14.5	0	29	0	29	14.5
2	Mem Drive (Hawthorn/JFK)	2	77.0	0.0	77	0	38.5	87	0	87	0	43.5	87	0	87	0	43.5	87	0	87	0	43.5
3	Mem Drive (JFK/Western)	2	120.4	39.4	120.4	39.4	79.9	148.5	62.8	148.5	62.8	105.65	148.8	62.8	148.8	62.8	105.8	148.8	62.8	148.8	62.8	105.8
4	Larz Anderson Bridge (SFRWB/Mem Dr)	2	40.1	19.0	40.1	19	29.55	101.3	31.4	101.3	31.4	66.35	110.3	35	110.3	35	72.65	110.3	35	110.3	35	72.65
5	SFR WB On Ramp (SFR/Bridge)	1	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	SFR WB Off Ramp (Bridge/SFR)	1	0.0	159.5	0	159.5	159.5	0	164.2	0	164.2	164.2	0	164.2	0	164.2	164.2	0	164.2	0	164.2	164.2
7	N Harvard St (SFR WB/SFR EB)	2	8.1	109.9	8.1	109.9	59	62.4	309	62.4	309	185.7	93.7	363.1	93.7	363.1	228.4	93.7	363.1	93.7	363.1	228.4
8	SFR EB Off Ramp (SFR/Bridge)	1	295.9	0.0	295.9	0	295.9	423.5	0	423.5	0	423.5	423.5	0	423.5	0	423.5	423.5	0	423.5	0	423.5
9	SFR EB On Ramp (Bridge/SFR)	1	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	N Harvard St (Academic/SFR EB)	2	30.6	0.0	30.6	0	15.3	34.0	0.8	34	0.8	17.4	36.3	1.2	36.3	1.2	18.75	36.3	1.2	36.3	1.2	18.75
11	S Campus Dr (End/Nharvard)	2	0.0	0.0	0	0	0	311.7	0	311.7	0	155.85	465	0	465	0	232.5	465	0	465	0	232.5
12	Academic Way (N Harvard/Western)	2	0.0	0.0	0	0	0	21.0	28.1	21	28.1	24.55	22.4	47.6	22.4	47.6	35	22.4	47.6	22.4	47.6	35
13	N Harvard St (Western/Academic)	2	0.0	73.1	0	73.1	36.55	0.2	75.3	0.2	75.3	37.75	0.2	75.1	0.2	75.1	37.65	0.2	75.1	0.2	75.1	37.65
14	Western Ave (Spurr/N Harvard)	2	44.3	0	44.3	0	22.15	122.6	0	122.6	0	61.3	159.5	0	159.5	0	79.75	159.5	0	159.5	0	79.75
15	N Havard St (Western/Kingsley)	2	81.0	12.1	81	12.1	46.55	149.9	19.2	149.9	19.2	84.55	115	18.7	115	18.7	66.85	115	18.7	115	18.7	66.85
16	Franklin St (Appian/N Harvard)	2	31.0	0.0	31	0	15.5	31.2	0	31.2	0	15.6	31.2	0	31.2	0	15.6	31.2	0	31.2	0	15.6
17	Kinglsey St (N Havard/Travis)	1	0	36.8	0	36.8	36.8	0	34.3	0	34.3	34.3	0	34.3	0	34.3	34.3	0	34.3	0	34.3	34.3
18	N Harvard St (Franklin/Cambridge)	2	5.2	39.1	5.2	39.1	22.15	6.3	64.5	6.3	64.5	35.4	5.5	64.7	5.5	64.7	35.1	5.5	64.7	5.5	64.7	35.1
19	Western Ave (N Harvard/Academic)	2	0	86.4	0	86.4	43.2	0.0	69.3	0	69.3	34.65	0	165	0	165	82.5	0	165	0	165	82.5
20	Academic Way (Western/End)	2	0	0.0	0	0	0	21.4	0	21.4	0	10.7	29.7	0	29.7	0	14.85	29.7	0	29.7	0	14.85
21	Western Ave (Academic/Stadium)	2	0.0	0.0	0	0	0	13.6	0.0	13.6	0	6.8	15.2	0	15.2	0	7.6	29.9	0	29.9	0	14.95
22	Driveway (Western/End)	2	0	0.0	0	0	0	0	38.7	0	38.7	19.35	0	38.5	0	38.5	19.25	0	32	0	32	16
23	Stadium Way (Western/End)	2	0	0.0	0	0	0	40.8	0	40.8	0	20.4	41.5	0	41.5	0	20.75	48	0	48	0	24
24	Western Ave (Stadium/Batten)	2	20.5	0.0	20.5	0	10.25	16.1	23.6	16.1	23.6	19.85	16.2	16.9	16.2	16.9	16.55	37.7	19.1	37.7	19.1	28.4
25	Batten Way (Western/End)	2	0	33.0	0	33	16.5	0	155.6	0	155.6	77.8	0	68.1	0	68.1	34.05	0	77.2	0	77.2	38.6
26	Western Ave (Batten/Cattle)	2	27.0	0.0	27	0	13.5	0.0	29.4	0	29.4	14.7	0.0	70.6	0	70.6	35.3	0	22.3	0	22.3	11.15
27	Cattle Drive (Western/DEF)	2	34.4	0.0	34.4	0	17.2	47.4	0	47.4	0	23.7	313.6	2.0	313.6	2	157.8	35.1	2	35.1	2	18.55
28	DEF Dr (Cattle/East)	2	0	0.0	0	0	0	0	0	0	0	0	0	14.3	0	14.3	7.15	0	13.7	0	13.7	6.85
29	Cattle Drive/Almy (DEF/Windom)	2	0	0.0	0	0	0	0	0	0	0	0	0.0	0.0	0	0	0	0	0	0	0	0
30	Western Ave (Cattle/East)	2	0.6	0.0	0.6	0	0.3	0.3	0	0.3	0	0.15	0.3	1.9	0.3	1.9	1.1	10.4	1.9	10.4	1.9	6.15
31	Kresge Way (Western/End)	1	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	East Drive (Western / DEF)	2	23.3	0.0	23.3	0	11.65	20.1	0	20.1	0	10.05	42.2	0	42.2	0	21.1	33	0	33	0	16.5
33	Western Ave (East/SFR EB)	2	82.6	0.7	82.6	0.7	41.65	283.3	0.8	283.3	0.8	142.05	492.4	1	492.4	1	246.7	25.7	8.5	25.7	8.5	17.1
34	SFR EB Off Ramp (SFR/Western)	1	0	141.4	0	141.4	141.4	0	298.6	0	298.6	298.6	0	308.9	0	308.9	308.9	0	308.9	0	308.9	308.9
35	SFR EB On Ramp (Western/Cambridge)	1	0	128.1	0	128.1	128.1	0	142.5	0	142.5	142.5	0	177.8	0	177.8	177.8	0	177.8	0	177.8	177.8
36	Western Ave (SFRWB/Mem)	2	0.0	8.2	0	8.2	4.1	0	11.6	0	11.6	5.8	0	11.7	0	11.7	5.85	0	11.7	0	11.7	5.85
37	SFR WB On Ramp (Cambridge/Western)	1	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	SFR WB Off Ramp (Western/SFR)	1	49.7	0.0	49.7	0	49.7	52.8	0	52.8	0	52.8	51.3	0	51.3	0	51.3	51.3	0	51.3	0	51.3
39	Western Ave (SFR/Mem)	1	74.9	0.0	74.9	0	74.9	210.5	0	210.5	0	210.5	213.2	0	213.2	0	213.2	213.2	0	213.2	0	213.2
40	Mem Drive (Western/River)	2	75.6	50.8	75.6	50.8	63.2	125.4	80.6	125.4	80.6	103	128.1	81.4	128.1	81.4	104.75	128.1	81.4	128.1	81.4	104.75
41	Western Ave (Mem/Putnam)	1	0	130.3	0	130.3	130.3	0	183.5	0	183.5	183.5	0	185.8	0	185.8	185.8	0	185.8	0	185.8	185.8
42	River St (Mem/Putnam)	1	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	Mem Drive (River/Pleasant)	2	40.6	0.0	40.6	0	20.3	53.5	0	53.5	0	26.75	54.1	0	54.1	0	27.05	54.1	0	54.1	0	27.05
44	River St (SFRWB/Mem)	1	49.7	0.0	49.7	0	49.7	89.6	0	89.6	0	89.6	96.4	0	96.4	0	96.4	96.4	0	96.4	0	96.4
45	SFR WB Off Ramp (Cambridge/SFR)	1	45.2	0.0	45.2	0	45.2	49.4	0	49.4	0	49.4	51.2	0	51.2	0	51.2	51.2	0	51.2	0	51.2
46	River St (SFREB/SFRWB)	2	0.2	0.8	0.2	0.8	0.5	0.5	0.6	0.5	0.6	0.55	0.3	0.5	0.3	0.5	0.4	0.3	0.5	0.3	0.5	0.4
47	SFR EB On Ramp (Cambridge/SFR)	1	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	Cambridge St (DoubleTree/SFREB)	2	23.2	1.4	23.2	1.4	12.3	32.1	6.6	32.1	6.6	19.35	33.3	7.3	33.3	7.3	20.3	33.3	7.3	33.3	7.3	20.3
49	Double Tree (Cambridge/End)	2	63.6	0.0	63.6	0	31.8	62.9	0	62.9	0	31.45	62.9	0	62.9	0	31.45	62.9	0	62.9	0	31.45
50	I90 EB Off ramp (Cambridge /Split)	1	29.8	0.0	29.8	0	29.8	34.2	0	34.2	0	34.2	33.8	0	33.8	0	33.8	33.8	0	33.8	0	33.8
51	I90 On Ramp (Cambridge/Split)	1	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	I90 WB Off ramp (Cambridge /Split)	1	0	448.6	0	448.6	448.6	0	505.8	0	505.8	505.8	0	569.8	0	569.8	569.8	0	569.8	0	569.8	569.8
53	Cambridge St (Windom/Doubletree)	2	412.6	35.4	412.6	35.4	224	400.6	87.1	400.6	87.1	243.85	417.2	120.7	417.2	120.7	268.95	417.2	120.7	417.2	120.7	268.95
54	Windom Street (Almay/Cambridge)	2	0	35.5	0	35.5	17.75	0	218.1	0	218.1	109.05	1.6	643.0	1.6	643	322.3	1.6	82.6	1.6	82.6	42.1
55	Cambridge St (N Harvard/Windom)	2	6.4	35.6	6.4	35.6	21	11.8	80.7	11.8	80.7	46.25	13.1	105.1	13.1	105.1	59.1	13.5	105.1	13.5	105.1	59.3
56	Cambridge St (Lincoln/N Harvard)	2	27.3	0.0	27.3	0	13.65	50.4	0	50.4	0	25.2	51	0	51	0	25.5	51	0	51	0	25.5

PM PEAK CONDITION
DELAY BY APPROACH (seconds)

No.	Description	Existing EB	Existing WB	Existing NB	Existing SB	No Build EB	No Build WB	No Build NB	No Build SB	Build EB	Build WB	Build NB	Build SB	Build-Mit EB	Build-Mit WB	Build-Mit NB	Build-Mit SB
1	Larz Anderson Bridge/JFK Street & Memorial Drive	77.0	39.4	40.1	25.2	87.0	62.8	101.3	28.2	87.0	62.8	110.3	29.0	87.0	62.8	110.3	29.0
2	North Harvard Street & Soldiers Field Road EB	295.9	0.0	30.6	109.9	423.5	0.0	34.0	309.0	423.5	0.0	36.3	363.1	423.5	0.0	36.3	363.1
3	N Harvard St. & Western Ave.	44.3	86.4	81.0	73.1	122.6	69.3	149.9	75.3	159.5	165.0	115.0	75.1	159.5	165.0	115.0	75.1
4	N Harvard St. & Franklin St./Kingsley St.	31.0	36.8	5.2	12.1	31.2	34.3	6.3	19.2	31.2	34.3	5.5	18.7	31.2	34.3	5.5	18.7
5	Cambridge Street & North Harvard Street	27.3	35.6		39.1	50.4	80.7		64.5	51.0	105.1		64.7	51.0	105.1		64.7
6	Cambridge Street & Windom Street	6.4	35.4		35.5	11.8	87.1		218.1	13.1	120.7		643.0	13.5	120.7		82.6
7	I-90 Off-Ramp & Double Tree Driveway/I-90 On-Ramp & Cambridge Street	412.6	1.4	63.6	29.8	400.6	6.6	62.9	34.2	417.2	7.3	62.9	33.8	417.2	7.3	62.9	33.8
8	Soldiers Field Road EB & Cambridge Street	23.2	0.8	0.0	128.1	32.1	0.6	0.0	142.5	33.3	0.5	0.0	177.8	33.3	0.5	0.0	177.8
9	Memorial Drive & River Street	49.7	0.0	40.6	50.8	89.6	0.0	53.5	80.6	96.4	0.0	54.1	81.4	96.4	0.0	54.1	81.4
10	Memorial Drive/Memorial Drve & Western Avenue	0.0	130.3	75.6	120.4	0.0	183.5	125.4	148.5	0.0	185.8	128.1	148.8	0.0	185.8	128.1	148.8
11	Soldiers Field Road EB & Western Avenue	82.6	8.2	0.0	141.4	283.3	11.6	0.0	298.6	492.4	11.7	0.0	308.9	25.7	11.7	0.0	308.9
12	Driveway/Kresge Way & Western Avenue	0.6	0.7	23.3		0.3	0.8	20.1		0.3	1.0	42.2		10.4	8.5	33.0	
13	Hague Street/Batten Way & Western Avenue	20.5	27.0	33.0	34.4	23.6	29.4	47.4	155.6	16.9	70.6		68.1	19.1	22.3		77.2
14	Academic Way & Western Avenue	0.0	0.0	0.0	0.0	0.0	0.0	21.4	28.1	0.0	0.0	29.7	47.6	0.0	0.0	29.7	47.6
15	Stadium Way/Driveway & Western Avenue	0.0	0.0	0.0	0.0	13.6	16.1	40.8	38.7	15.2	16.2	41.5	38.5	29.9	37.7	48.0	32.0
16	North Harvard Street & South Campus Drive/Academic Way	0.0	0.0	0.0	0.0	311.7	21.0	0.2	0.8	465.0	22.4	0.2	1.2	465.0	22.4	0.2	1.2
17	Cattle Drive & Western Avenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	313.6		0.0	1.9	35.1	
18	Cattle Drive & DEF Drive	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		14.3	0.0	2.0		13.7	0.0	2.0
19	Windom Street & Almy Street	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0		10.0	1.6	0		10
5018	Cambridge Street & I-90 Off-Ramp	0.0	0.0		448.6	0.0	0.0		505.8	0.0	0.0		569.8	0	0		569.8
5163	Soldiers Field Road WB & Cambridge Street/River Street	0.2	0.0	45.2	0.0	0.5	0.0	49.4	0.0	0.3	0.0	51.2	0.0	0.3	0	51.2	0
5172	North Harvard Street/Larz Anderson Bridge & Soldiers Field Road WB	0.0	159.5	8.1	19.0	0.0	164.2	62.4	31.4	0.0	164.2	93.7	35.0	0	164.2	93.7	35
5192	Soldiers Field Road WB & Western Avenue	0.0	74.9	49.7	0.0	0.0	210.5	52.8	0.0	0.0	213.2	51.3	0.0	0	213.2	51.3	0

Harvard ERC

Weekday Average Daily Traffic (ADT) for Mesoscale Roadway Network

	Roadway Segments	Speed (mph)	Existing Volume (ADT)	K Factor	S.A.F.	Unadjusted PM Peak Hour Existing	No-Build	Build	Build-Mit
				6.6%	1.00				
1	JFK Street (Mem Dr/Eliot)	25	15,774			1,045	1,340	1,380	1,380
2	Mem Drive (Hawthorn/JFK)	35	29,058			1,925	2,065	2,065	2,065
3	Mem Drive (JFK/Western)	35	30,869			2,045	2,195	2,195	2,195
4	Larz Anderson Bridge (SFRWB/Mem Dr)	25	23,020			1,525	1,835	1,875	1,875
5	SFR WB On Ramp (SFR/Bridge)	25	2,204			146	226	251	251
6	SFR WB Off Ramp (Bridge/SFR)	25	6,898			457	472	472	472
7	N Harvard St (SFR WB/SFR EB)	25	21,707			1,438	1,813	1,878	1,878
8	SFR EB Off Ramp (SFR/Bridge)	25	6,657			441	531	531	531
9	SFR EB On Ramp (Bridge/SFR)	15	4,634			307	322	322	322
10	N Harvard St (Academic/SFR EB)	25	14,416			955	1,320	1,385	1,385
11	S Campus Dr (End/Nharvard)	25	0			0	140	140	140
12	Academic Way (N Harvard/Western)	25	0			0	165	245	245
13	N Harvard St (Western/Academic)	25	14,416			955	1,095	1,080	1,080
14	Western Ave (Spurr/N Harvard)	25	16,529			1,095	1,520	1,710	1,710
15	N Havard St (Western/Kingsley)	25	14,567			965	1,245	1,165	1,165
16	Franklin St (Appian/N Harvard)	20	2,189			145	165	165	165
17	Kinglsey St (N Havard/Travis)	20	453			30	30	30	30
18	N Harvard St (Franklin/Cambridge)	25	12,982			860	1,130	1,050	1,050
19	Western Ave (N Harvard/Academic)	25	15,095			1,000	1,076	1,267	1,267
20	Academic Way (Western/End)	15	0			0	41	37	37
21	Western Ave (Academic/Stadium)	25	15,095			1,000	1,177	1,447	1,447
22	Driveway (Western/End)	15	0			0	4	4	4
23	Stadium Way (Western/End)	15	0			0	90	95	202
24	Western Ave (Stadium/Batten)	25	15,095			1,000	1,211	1,451	1,341
25	Batten Way (Western/End)	15	17,435			1,155	280	275	225
26	Western Ave (Batten/Cattle)	25	15,171			1,005	1,285	1,545	1,385
27	Cattle Drive (Western/DEF)	20	3,170			210	85	500	295
28	DEF Dr (Cattle/East)	15	0			0	0	265	250
29	Cattle Drive/Almy (DEF/Windom)	20	0			0	0	406	406
30	Western Ave (Cattle/East)	25	15,171			1,005	1,285	1,385	1,380
31	Kresge Way (Western/End)	15	1,283			85	85	85	135
32	East Drive (Western / DEF)	15	1,359			90	90	355	455
33	Western Ave (East/SFR EB)	25	15,774			1,045	1,350	1,575	1,575
34	SFR EB Off Ramp (SFR/Western)	30	9,963			660	720	730	730
35	SFR EB On Ramp (Western/Cambridge)	20	11,246			745	855	915	915
36	Western Ave (SFRWB/Mem)	25	22,643			1,500	1,740	1,745	1,745
37	SFR WB On Ramp (Cambridge/Western)	30	11,095			735	785	785	785
38	SFR WB Off Ramp (Western/SFR)	20	5,661			375	485	480	480
39	Western Ave (SFR/Mem)	25	28,077			1,860	2,040	2,050	2,050
40	Mem Drive (Western/River)	35	28,907			1,915	2,130	2,135	2,135
41	Western Ave (Mem/Putnam)	25	18,944			1,255	1,345	1,350	1,350
42	River St (Mem/Putnam)	25	13,435			890	1,030	1,050	1,050
43	Mem Drive (River/Pleasant)	35	31,398			2,080	2,325	2,340	2,340
44	River St (SFRWB/Mem)	30	23,171			1,535	1,730	1,760	1,760
45	SFR WB Off Ramp (Cambridge/SFR)	20	6,868			455	550	575	575
46	River St (SFREB/SFRWB)	30	30,417			2,015	2,325	2,355	2,355
47	SFR EB On Ramp (Cambridge/SFR)	20	9,736			645	845	905	905
48	Cambridge St (DoubleTree/SFREB)	30	32,983			2,185	2,655	2,685	2,685
49	Double Tree (Cambridge/End)	20	1,283			85	85	85	85
50	I90 EB Off ramp (Cambridge /Split)	20	14,220			942	1,197	1,182	1,182
51	I90 On Ramp (Cambridge/Split)	20	3,170			210	257	282	282
52	I90 WB Off ramp (Cambridge /Split)	20	24,077			1,595	1,610	1,700	1,700
53	Cambridge St (Windom/Doubletree)	30	39,474			2,615	2,880	3,040	3,040
54	Windom Street (Almay/Cambridge)	20	7,940			526	206	535	535
55	Cambridge St (N Harvard/Windom)	30	33,149			2,196	2,753	2,778	2,778
56	Cambridge St (Lincoln/N Harvard)	30	42,372			2,807	3,434	3,524	3,524

Harvard ERC

Weekday ATR Volumes

Western Ave [9/27-28/2018]				
			Peak Period Data	
Begin Time	Volume	V/C Ratio	Hours	Volume
12:00 AM	653	0.18	0	0
1:00 AM	438	0.12	0	0
2:00 AM	297	0.08	0	0
3:00 AM	181	0.05	0	0
4:00 AM	300	0.08	0	0
5:00 AM	789	0.22	0	0
6:00 AM	1,567	0.44	0	0
7:00 AM	2,419	0.68	1	2,419
8:00 AM	2,506	0.70	1	2,506
9:00 AM	2,196	0.62	0	0
10:00 AM	2,066	0.58	0	0
11:00 AM	2,173	0.61	0	0
12:00 PM	2,229	0.63	0	0
1:00 PM	2,317	0.65	1	2,317
2:00 PM	2,333	0.66	1	2,333
3:00 PM	2,514	0.71	1	2,514
4:00 PM	2,478	0.70	1	2,478
5:00 PM	2,521	0.71	1	2,521
6:00 PM	2,531	0.71	1	2,531
7:00 PM	2,455	0.69	1	2,455
8:00 PM	2,155	0.61	0	0
9:00 PM	2,057	0.58	0	0
10:00 PM	1,840	0.52	0	0
11:00 PM	1,421	0.40	0	0
Total	**42,433**		**9**	**22,073**

Cambridge St [9/27-28/2018]				
			Peak Period Data	
Begin Time	Volume	V/C Ratio	Hours	Volume
12:00 AM	142	0.18	0	0
1:00 AM	85	0.12	0	0
2:00 AM	70	0.08	0	0
3:00 AM	37	0.05	0	0
4:00 AM	62	0.08	0	0
5:00 AM	301	0.22	0	0
6:00 AM	562	0.44	0	0
7:00 AM	720	0.68	1	720
8:00 AM	894	0.70	1	894
9:00 AM	720	0.62	1	720
10:00 AM	594	0.58	0	0
11:00 AM	644	0.61	0	0
12:00 PM	592	0.63	0	0
1:00 PM	675	0.65	0	0
2:00 PM	856	0.66	1	856
3:00 PM	820	0.71	1	820
4:00 PM	816	0.70	1	816
5:00 PM	832	0.71	1	832
6:00 PM	787	0.71	1	787
7:00 PM	584	0.69	0	0
8:00 PM	457	0.61	0	0
9:00 PM	387	0.58	0	0
10:00 PM	377	0.52	0	0
11:00 PM	263	0.40	0	0
Total	**12,271**		**8**	**6,443**

	Western Ave	Cambridge St	Average Data
Roadway Capacity	3,560	3,560	
Crit. V/C	65%	19%	
Critical Capacity	2,314	676	
Peak Hour (K) Factor	0.060	0.073	0.066
Peak Period Volume Factor	0.520	0.525	0.523

Harvard ERC

Emissions Factors By Link (g/mi)

Emission Factors From MOVES2014a

	Roadway Segments	Existing			No Build			Build			Build-Mit		
		NO_x	VOC	CO_2	NO_x	VOC	CO_2	NO_x	VOC	CO_2	NO_x	VOC	CO_2
1	JFK Street (Mem Dr/Eliot)	0.16	0.56	437.42	0.07	0.36	337.87	0.07	0.36	337.87	0.07	0.36	337.87
2	Mem Drive (Hawthorn/JFK)	0.14	0.24	366.15	0.07	0.16	282.40	0.07	0.16	282.40	0.07	0.16	282.40
3	Mem Drive (JFK/Western)	0.14	0.15	368.10	0.07	0.10	283.91	0.07	0.10	283.91	0.07	0.10	283.91
4	Larz Anderson Bridge (SFRWB/Mem Dr)	0.19	0.66	476.54	0.09	0.42	369.67	0.09	0.42	369.67	0.09	0.42	369.67
5	SFR WB On Ramp (SFR/Bridge)	0.12	0.64	375.42	0.05	0.42	288.14	0.05	0.42	288.14	0.05	0.42	288.14
6	SFR WB Off Ramp (Bridge/SFR)	0.23	0.89	530.03	0.12	0.57	413.06	0.12	0.57	413.06	0.12	0.57	413.06
7	N Harvard St (SFR WB/SFR EB)	0.30	3.35	625.75	0.16	2.16	489.03	0.16	2.16	489.03	0.16	2.16	489.03
8	SFR EB Off Ramp (SFR/Bridge)	0.18	0.71	473.72	0.09	0.46	367.34	0.09	0.46	367.34	0.09	0.46	367.34
9	SFR EB On Ramp (Bridge/SFR)	0.16	0.73	542.54	0.08	0.48	418.32	0.08	0.48	418.32	0.08	0.48	418.32
10	N Harvard St (Academic/SFR EB)	0.16	0.24	434.65	0.07	0.16	335.58	0.07	0.16	335.58	0.07	0.16	335.58
11	S Campus Dr (End/Nharvard)	0.16	0.71	439.07	0.07	0.46	339.23	0.07	0.46	339.23	0.07	0.46	339.23
12	Academic Way (N Harvard/Western)	0.15	1.14	432.07	0.07	0.74	333.63	0.07	0.74	333.63	0.07	0.74	333.63
13	N Harvard St (Western/Academic)	0.15	0.65	432.07	0.07	0.42	333.63	0.07	0.42	333.63	0.07	0.42	333.63
14	Western Ave (Spurr/N Harvard)	0.17	0.78	454.23	0.08	0.51	351.39	0.08	0.51	351.39	0.08	0.51	351.39
15	N Havard St (Western/Kingsley)	0.18	0.78	462.48	0.08	0.51	358.05	0.08	0.51	358.05	0.08	0.51	358.05
16	Franklin St (Appian/N Harvard)	0.17	0.43	495.26	0.08	0.28	383.79	0.08	0.28	383.79	0.08	0.28	383.79
17	Kinglsey St (N Havard/Travis)	0.18	0.79	513.92	0.09	0.51	398.88	0.09	0.51	398.88	0.09	0.51	398.88
18	N Harvard St (Franklin/Cambridge)	0.16	0.24	434.81	0.07	0.16	335.70	0.07	0.16	335.70	0.07	0.16	335.70
19	Western Ave (N Harvard/Academic)	0.15	0.65	432.07	0.07	0.42	333.63	0.07	0.42	333.63	0.07	0.42	333.63
20	Academic Way (Western/End)	0.18	1.17	565.19	0.08	0.76	437.42	0.08	0.76	437.42	0.08	0.76	437.42
21	Western Ave (Academic/Stadium)	0.15	0.65	432.07	0.07	0.42	333.63	0.07	0.42	333.63	0.07	0.42	333.63
22	Driveway (Western/End)	0.18	1.38	565.19	0.08	0.90	437.42	0.08	0.90	437.42	0.08	0.90	437.42
23	Stadium Way (Western/End)	0.19	0.90	580.34	0.09	0.58	449.89	0.09	0.58	449.89	0.09	0.58	449.89
24	Western Ave (Stadium/Batten)	0.15	0.65	432.07	0.07	0.42	333.63	0.07	0.42	333.63	0.07	0.42	333.63
25	Batten Way (Western/End)	0.18	0.73	565.19	0.08	0.48	437.42	0.08	0.48	437.42	0.08	0.48	437.42
26	Western Ave (Batten/Cattle)	0.15	3.32	432.07	0.07	2.14	333.63	0.07	2.14	333.63	0.07	2.14	333.63
27	Cattle Drive (Western/DEF)	0.17	0.61	489.51	0.08	0.40	379.03	0.08	0.40	379.03	0.08	0.40	379.03
28	DEF Dr (Cattle/East)	0.18	0.62	569.40	0.09	0.41	440.84	0.09	0.41	440.84	0.09	0.41	440.84
29	Cattle Drive/Almy (DEF/Windom)	0.16	0.32	486.87	0.08	0.21	376.67	0.08	0.21	376.67	0.08	0.21	376.67
30	Western Ave (Cattle/East)	0.15	0.46	432.07	0.07	0.30	333.63	0.07	0.30	333.63	0.07	0.30	333.63
31	Kresge Way (Western/End)	0.18	0.44	567.91	0.09	0.29	439.53	0.09	0.29	439.53	0.09	0.29	439.53
32	East Drive (Western / DEF)	0.18	0.55	573.15	0.09	0.36	443.82	0.09	0.36	443.82	0.09	0.36	443.82
33	Western Ave (East/SFR EB)	0.16	0.71	439.07	0.07	0.46	339.23	0.07	0.46	339.23	0.07	0.46	339.23
34	SFR EB Off Ramp (SFR/Western)	0.17	0.60	421.85	0.08	0.39	328.01	0.08	0.39	328.01	0.08	0.39	328.01
35	SFR EB On Ramp (Western/Cambridge)	0.16	0.36	480.53	0.08	0.24	371.69	0.08	0.24	371.69	0.08	0.24	371.69
36	Western Ave (SFRWB/Mem)	0.26	3.34	575.44	0.14	2.15	449.41	0.14	2.15	449.41	0.14	2.15	449.41
37	SFR WB On Ramp (Cambridge/Western)	0.15	0.35	389.13	0.07	0.23	301.74	0.07	0.23	301.74	0.07	0.23	301.74
38	SFR WB Off Ramp (Western/SFR)	0.14	0.61	451.43	0.07	0.39	347.42	0.07	0.39	347.42	0.07	0.39	347.42
39	Western Ave (SFR/Mem)	0.16	0.78	439.67	0.07	0.51	339.77	0.07	0.51	339.77	0.07	0.51	339.77
40	Mem Drive (Western/River)	0.15	0.37	378.21	0.08	0.24	291.79	0.08	0.24	291.79	0.08	0.24	291.79
41	Western Ave (Mem/Putnam)	0.16	0.65	444.34	0.08	0.42	343.39	0.08	0.42	343.39	0.08	0.42	343.39
42	River St (Mem/Putnam)	0.15	0.52	432.07	0.07	0.34	333.63	0.07	0.34	333.63	0.07	0.34	333.63
43	Mem Drive (River/Pleasant)	0.15	0.41	375.57	0.07	0.26	289.72	0.07	0.26	289.72	0.07	0.26	289.72
44	River St (SFRWB/Mem)	0.16	0.87	411.87	0.08	0.56	320.02	0.08	0.56	320.02	0.08	0.56	320.02
45	SFR WB Off Ramp (Cambridge/SFR)	0.18	0.41	511.84	0.09	0.27	397.26	0.09	0.27	397.26	0.09	0.27	397.26
46	River St (SFREB/SFRWB)	0.25	3.33	543.14	0.13	2.15	424.57	0.13	2.15	424.57	0.13	2.15	424.57
47	SFR EB On Ramp (Cambridge/SFR)	0.15	0.53	463.75	0.07	0.34	357.57	0.07	0.34	357.57	0.07	0.34	357.57
48	Cambridge St (DoubleTree/SFREB)	0.17	1.68	421.85	0.08	1.09	328.01	0.08	1.09	328.01	0.08	1.09	328.01
49	Double Tree (Cambridge/End)	0.21	3.33	553.31	0.10	2.15	430.57	0.10	2.15	430.57	0.10	2.15	430.57
50	I90 EB Off ramp (Cambridge /Split)	0.17	0.79	491.53	0.08	0.51	380.77	0.08	0.51	380.77	0.08	0.51	380.77
51	I90 On Ramp (Cambridge/Split)	0.17	0.33	491.90	0.08	0.21	381.13	0.08	0.21	381.13	0.08	0.21	381.13
52	I90 WB Off ramp (Cambridge /Split)	0.19	0.43	517.96	0.09	0.28	402.06	0.09	0.28	402.06	0.09	0.28	402.06
53	Cambridge St (Windom/Doubletree)	0.15	0.29	398.11	0.07	0.19	309.01	0.07	0.19	309.01	0.07	0.19	309.01
54	Windom Street (Almay/Cambridge)	0.18	2.24	505.91	0.08	1.45	392.47	0.08	1.45	392.47	0.08	1.45	392.47
55	Cambridge St (N Harvard/Windom)	0.15	0.41	396.97	0.07	0.27	308.07	0.07	0.27	308.07	0.07	0.27	308.07
56	Cambridge St (Lincoln/N Harvard)	0.16	0.78	409.05	0.08	0.50	317.78	0.08	0.50	317.78	0.08	0.50	317.78

Harvard ERC

Mesoscale Roadway Data

Link No.	Description	Speed (mph)	Link Length (miles)	Start Elev	Finish Elev	Grade (%)	Directions
1	JFK Street (Mem Dr/Eliot)	25	0.13	2	3	0.1	2
2	Mem Drive (Hawthorn/JFK)	35	0.33	2	3	0.1	2
3	Mem Drive (JFK/Western)	35	0.62	3	7	0.1	2
4	Larz Anderson Bridge (SFRWB/Mem Dr)	25	0.11	3	10	1.2	2
5	SFR WB On Ramp (SFR/Bridge)	25	0.11	10	-1	-1.9	1
6	SFR WB Off Ramp (Bridge/SFR)	25	0.08	-1	10	2.6	1
7	N Harvard St (SFR WB/SFR EB)	25	0.02	10	5	4.7	2
8	SFR EB Off Ramp (SFR/Bridge)	25	0.10	-1	5	1.1	1
9	SFR EB On Ramp (Bridge/SFR)	15	0.10	5	1	-0.8	1
10	N Harvard St (Academic/SFR EB)	25	0.36	4	5	0.1	2
11	S Campus Dr (End/Nharvard)	25	0.10	3	4	0.2	2
12	Academic Way (N Harvard/Western)	25	0.06	3	3	0.0	2
13	N Harvard St (Western/Academic)	25	0.11	3	3	0.0	2
14	Western Ave (Spurr/N Harvard)	25	0.09	3	6	0.6	2
15	N Havard St (Western/Kingsley)	25	0.09	3	7	0.8	2
16	Franklin St (Appian/N Harvard)	20	0.18	7	10	0.3	2
17	Kinglsey St (N Havard/Travis)	20	0.09	3	7	0.8	1
18	N Harvard St (Franklin/Cambridge)	25	0.35	7	8	0.1	2
19	Western Ave (N Harvard/Academic)	25	0.11	3	3	0.0	2
20	Academic Way (Western/End)	15	0.06	3	3	0.0	2
21	Western Ave (Academic/Stadium)	25	0.11	3	3	0.0	2
22	Driveway (Western/End)	15	0.05	3	3	0.0	2
23	Stadium Way (Western/End)	15	0.08	1	3	0.5	2
24	Western Ave (Stadium/Batten)	25	0.11	4	4	0.0	2
25	Batten Way (Western/End)	15	0.10	4	4	0.0	2
26	Western Ave (Batten/Cattle)	25	0.02	4	4	0.0	2
27	Cattle Drive (Western/DEF)	20	0.12	3	4	0.2	2
28	DEF Dr (Cattle/East)	15	0.12	2	3	0.2	2
29	Cattle Drive/Almy (DEF/Windom)	20	0.26	3	4	0.1	2
30	Western Ave (Cattle/East)	25	0.16	4	4	0.0	2
31	Kresge Way (Western/End)	15	0.18	3	4	0.1	1
32	East Drive (Western / DEF)	15	0.14	2	4	0.3	2
33	Western Ave (East/SFR EB)	25	0.10	3	4	0.2	2
34	SFR EB Off Ramp (SFR/Western)	30	0.12	-1	5	0.9	1
35	SFR EB On Ramp (Western/Cambridge)	20	0.22	5	4	-0.1	1
36	Western Ave (SFRWB/Mem)	25	0.02	4	8	3.8	2
37	SFR WB On Ramp (Cambridge/Western)	30	0.22	7	8	0.1	1
38	SFR WB Off Ramp (Western/SFR)	20	0.12	8	1	-1.1	1
39	Western Ave (SFR/Mem)	25	0.09	7	8	0.2	1
40	Mem Drive (Western/River)	35	0.20	3	7	0.4	2
41	Western Ave (Mem/Putnam)	25	0.11	5	7	0.3	1
42	River St (Mem/Putnam)	25	0.14	3	3	0.0	1
43	Mem Drive (River/Pleasant)	35	0.18	0	3	0.3	2
44	River St (SFRWB/Mem)	30	0.08	3	6	0.7	1
45	SFR WB Off Ramp (Cambridge/SFR)	20	0.19	-1	7	0.8	1
46	River St (SFREB/SFRWB)	30	0.02	3	7	3.8	2
47	SFR EB On Ramp (Cambridge/SFR)	20	0.14	3	-2	-0.7	1
48	Cambridge St (DoubleTree/SFREB)	30	0.04	0	2	0.9	2
49	Double Tree (Cambridge/End)	20	0.02	0	2	1.9	2
50	I90 EB Off ramp (Cambridge /Split)	20	0.09	0	1	0.2	1
51	I90 On Ramp (Cambridge/Split)	20	0.25	0	3	0.2	1
52	I90 WB Off ramp (Cambridge /Split)	20	0.18	0	9	0.9	1
53	Cambridge St (Windom/Doubletree)	30	0.27	0	5	0.4	2
54	Windom Street (Almay/Cambridge)	20	0.03	4	5	0.6	2
55	Cambridge St (N Harvard/Windom)	30	0.18	5	8	0.3	2
56	Cambridge St (Lincoln/N Harvard)	30	0.09	8	11	0.6	2

Project Data

TRAFFIC DATA	
Project Name	Harvard ERC
Existing Year	2020
No-Build Year	2030
Build Year	2030
Build with Mitigation Year	2030
Seasonal Adjustment Factor	1.00
K-Factor	6.6%

Idle Emission Factors

Year	NOx (g/hr)	VOC (g/hr)	CO2 (g/hr)
2020	1.01	0.84	3,739.28
2030	0.35	0.61	2,821.74

APPENDIX C: Transportation

Contents:

February 24, 2021

Ref: 15021.00 / EEA No. 16320

J. Lionel Lucien, P.E.
Manager, Public/Private Development Unit
Massachusetts Department of Transportation (MassDOT)
Office of Transportation Planning
10 Park Plaza, Room 4150
Boston, MA 02116

Re: Transportation Impact Analysis (TIA) Scoping Request
Enterprise Research Campus Project, Allston, Massachusetts

Dear Mr. Lucien:

On behalf of Tishman Speyer ERC Developer, LLC, and their team ("the Proponent"), VHB seeks input and concurrence on a proposed scope of work for a Transportation Impact Assessment (TIA) for the Proponent's Enterprise Research Campus Project, in the Allston neighborhood of Boston, Massachusetts. An Environmental Notification Form (ENF) for the Project is listed in the February 10, 2021 Massachusetts Environmental Policy Act (MEPA) *Environmental Monitor* (Volume 97, Issue 03).

VHB outlines in this Transportation Scoping Letter (TSL) the technical assumptions and key travel demand and transportation elements that the TIA will address. As presented at our meeting with you and state agency partners on February 22, the suggested scope outlined below was developed based on MassDOT's transportation impact assessment guidelines, VHB's experience in this area of the City of Boston, and ongoing consultation with the Boston Planning & Development Agency (BPDA) and the Boston Transportation Department (BTD) as part of the local project permitting and development review. Our intent is to submit the TIA as part of a Draft Environmental Impact Report (DEIR).

The Proponent has commenced City of Boston's Article 80B, Large Project Review with the filing of a Letter of Intent with the Boston Planning and Development Agency (BPDA) and a subsequent filing of a Project Notification Form (PNF); the Proponent expects to also file a TIA in a Draft Project Impact Report (DPIR) for City of Boston review by BPDA and Boston Transportation Department (BTD).

Engineers | Scientists | Planners | Designers

99 High Street
10th Floor
Boston, Massachusetts 02110
P 617.728.7777
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Project Overview

The Proponent is proposing to build a mixed-use office, lab/R&D, residential, retail, restaurant, and hotel/conference development on an underutilized previously developed urban site along Western Avenue in the Allston neighborhood of Boston, Massachusetts. The 1,940,000 SF development Project will be supported by various streets, sidewalks, and other utility infrastructure elements which are to be constructed by Harvard University (the "Enabling Infrastructure"). Approximately 1,280 parking spaces are proposed for the project.

MEPA Thresholds

Pursuant to the Massachusetts Environmental Policy Act (MEPA) and its implementing regulations, the Proponent filed an Environmental Notification Form (ENF) because the Project requires state agency permits/actions and exceeds a MEPA Review Threshold related to Wastewater.

While the Project does not intersect or abut the State Highway Layout (SHLO), the Project would also exceed the MEPA Review Thresholds related to traffic generation and parking: Based on Section 11.03(6) of the MEPA regulations, using unadjusted Institute of Transportation Engineers (ITE) trip generation rates, the Project exceeds the following Transportation Review Thresholds:

"a trip generation of 3,000 or more new Average Daily Trips (ADT) by motor vehicles on roadways providing access to a single location."

"construction of 1,000 or more new motor vehicle parking spaces at a single location"

Both transportation-related MEPA Review Thresholds would require a mandatory filing of an Environmental Impact Report (EIR).

Trip Generation

Project-generated traffic volume estimates were developed based on data provided in the ITE *Trip Generation*[1], applying trip rates for ITE land use codes. Unadjusted ITE-based project trips for each component are adjusted for vehicle occupancy, mode choice, and internal trip capture. The adjusted trips are the estimate of the expected vehicle trips for the Project and person-trips by transit, walking, and bicycling; these are presented in Table 1 below.

1 *Trip Generation* – Tenth Edition; Institute of Transportation Engineers (ITE); Washington D.C.; 2017.

Table 1: Estimated Project-Generated Trips by Mode

	Vehicles	Transit	Walk	Bike
Daily				
Enter	4,082	2,124	2,877	833
Exit	4,049	2,160	2,889	841
Total	8,141	4,284	5,766	1,674
AM Peak Hour				
Enter	489	408	338	89
Exit	190	131	210	58
Total	679	539	548	147
PM Peak Hour				
Enter	246	133	298	86
Exit	575	507	338	85
Total	821	640	636	171

Adjusted ITE trips based on:

- Trip rates for land use codes (LUC): 710 (Office), 760 (Research and Development Center), 221 (Mid-Rise Residential), 222 (High-Rise Residential), 820 (Retail – Shopping Center), 932 (High-Turnover Restaurant), and 310 (Hotel)
- 2017 National Household Travel Survey: for Average Vehicle Occupancy (AVO)
- 2012-2016 American Community Survey (ACS), U.S. Census, mode share data, adjusted to reflect the projected trends stated in the *Go Boston 2030* plan for Allston (Boston Transportation Department, March 2017, p. 107)
- ITE *Trip Generation Handbook* (3rd Edition) for calculation of the capture of internal trips among site uses

Proposed Analysis Conditions

The TIA would focus on the following analysis conditions:

- 2020 Existing Condition (applying pre-COVID-19 traffic volumes)
- 2030 No-Build Condition (includes background development and transportation projects)
- 2030 Build Condition (the full-build project on top of future background development)
- 2030 Build with Mitigation Condition (if applicable, to mitigate Project-related impacts)

The evaluation will also include a year 2025 analysis to represent an interim phase of the project.

Proposed Traffic Impact Analysis

A TIA would include an intersection capacity analysis to evaluate how well the Project area's roadways would perform under traffic demands placed upon them. It results in an assessment of the intersections under the traffic volume levels observed and expected during the busiest (peak) hour in the morning and in the afternoon/evening for a typical weekday. This analysis would be completed using Synchro software.

Traffic Count Data

Traffic conditions resulting from the COVID-19 virus pandemic are atypical, and thus, collecting new traffic volume data is not recommended at this time. VHB would follow MassDOT's *Guidance on Traffic Count Data*, as detailed in the Engineering Directive number E-20-005, issued by the Chief Engineer on May 11, 2020, which allows for the use of historical traffic data (no older than 2014) on any project to supplement and/or replace existing traffic counts. Available year 2017 counts would be used to establish the Existing Condition volumes, with the added incorporation of traffic from the study area's development projects that were completed/occupied since 2017 and prior to 2020.

The future conditions analyses would not include a general background growth rate, as is typically incorporated in TIA analyses. This approach follows the City of Boston Transportation Department (BTD) guidance on traffic counts (January 2021),[2] and BPDA direction, to reflect City of Boston's mode share trends and to reflect a better alignment with its goals of reducing vehicle dependency.

Future conditions would include the expected traffic to be generated by nearby planned/approved development projects, including Harvard University's 2013 Institutional Master Plan ("IMP") and non-IMP projects around the Project Site, as directed by BPDA.

Study Area Network

The proposed Transportation Impact Study Area (Figure 1) for the TIA includes the following intersections:

- Western Avenue at Soldiers Field Road (signalized)
- Western Avenue at Kresge Way/Sanofi Genzyme Driveway (unsignalized)
- Western Avenue at Batten Way/Hague Street (signalized)
- North Harvard Street at Soldiers Field Road (signalized)
- North Harvard Street at Western Avenue (signalized)
- North Harvard Street at Franklin Street/Kingsley Street (signalized)
- Cambridge Street at North Harvard Street (signalized)
- Cambridge Street at Windom Street (signalized)
- Cambridge Street at I-90 Ramps/Double Tree Hotel (signalized)
- Cambridge Street at Soldiers Field Road (signalized)

2 www.boston.gov/sites/default/files/file/2021/01/Traffic%20Counts%20During%20and%20Post-Pandemic%20Guidelines_0.pdf

Construction of Harvard University's Science and Engineering Complex (SEC) enabling infrastructure in the vicinity of the Project Site results in three additional intersections, which will be included in the future conditions analyses:

- Western Avenue at Stadium Road (signalized)
- Western Avenue at Academic Way (unsignalized)
- North Harvard Street at Academic Way (unsignalized)

Under a Build Condition analysis, the Enabling Infrastructure will be introduced, including the new intersections on Western Ave at Cattle Drive and at East Drive, the intersection of Interim Cattle Drive at Windom Street, and the intersections internal to the Project Site.

For the year 2030 condition, the analysis assumes that MassDOT will not have completed the proposed Massachusetts Turnpike/I-90 Interchange reconstruction (and West Station), also known as the Allston Multimodal Project. According to the Boston Region MPO's long-range transportation plan, *Destination 2040*, the project is not expected to start construction until the 2030-2034 period.[3]

Safety / Crash Analysis

For each study area intersection, a crash analysis will be completed using the MassDOT crash database for the most recent five years of accepted/available data. These will be supplemented with City of Boston data. A summary of these crashes will be provided along with key crash factors such as time of day, collision type, weather conditions, and non-motorist involved crashes (pedestrian/bicyclist).

A preliminary review of MassDOT crash data indicates that there is one 2008-2017 HSIP bicycle cluster, at the intersection of North Harvard Street at Soldiers Field Road, and two 2015-2017 HSIP vehicle clusters at the intersections of North Harvard Street and Soldiers Field Road and at Cambridge Street at Soldiers Field Road. Both intersections have undergone recent (since 2017) geometric and safety improvements. We seek guidance from MassDOT as to whether road safety audits (RSAs) are required for these locations.

Proposed Transit Capacity Analysis

Transit access to the Project is provided by the existing MBTA Routes 64, 66, 70, and 86 (Figure 2). No changes to existing bus transit route alignments are anticipated. The Proponent will assess capacity impacts to existing MBTA bus routes to determine the need for additional vehicles or services to accommodate Project demand. The Proponent will also explore the need for supplemental shuttle services to enhance access from key area transit nodes and the opportunities to provide this access.

MBTA transit capacity would be analyzed under Fall 2019 weekday conditions (representing the baseline existing conditions prior to COVID-19 impacts and shutdown-related reductions in ridership) and in 2030 under both a No-Build and Build Condition. The transit capacity analyses would be performed in a manner

3 *Destination 2040:* Long-Range Transportation Plan of the Boston Region Metropolitan Planning Organization (MPO), CTPS, August 2019. www.ctps.org/data/pdf/plans/LRTP/destination/Destination-2040-LRTP-20191030.pdf#page=119

consistent with MassDOT Office of Performance Management and Innovation (OPMI) methods that are used to evaluate MBTA service according to its *Service Delivery Policy* passenger comfort standards.

Parking

The TIA would include a detailed analysis of shared parking and an evaluation of parking demand. The Proponent will collaborate with BPDA and BTD to determine final parking ratios for the Project that are aligned with the City's guidelines and goals. Parking supply will be constrained, and fair market parking pricing will be deployed, to minimize dependence on automobile travel and encourage the use of alternative means of accessing the Project Site, consistent with the goals of the Harvard Enterprise Research Campus Project.

Bicycle and Pedestrian Accommodations

A TIA would also include a thorough inventory of bicycle and pedestrian accommodations in the immediate study area, including identification of planned and proposed accommodations. The Project's bicycle and pedestrian accommodations and facilities will be designed in a manner consistent with the objectives of BTD's *Complete Streets Guidelines* and MassDOT's *Separated Bike Lane Planning & Design Guide* to encourage strong use of bicycling and walking, as active and sustainable transportation modes. These new accommodations will continue to establish new connections and build on the network development already underway in the area. The Project will support bicycle use by providing a BlueBikes bikeshare station on-site.

Transportation Demand Management (TDM)

Consistent with the City's goals to reduce automobile dependency, the Project will include a robust set of TDM strategies to encourage sustainable (non-vehicular) modes of transportation and enhance mobility by non-automobile travelers. All Project transportation infrastructure improvements and TDM measures will be reflected in a Transportation Access Plan Agreement (TAPA) to be executed between the Proponent and BTD.

Final Remarks

In this TSL, we outline the main assumptions and methods to be used in this project's TIA. The proposed study will provide insight to how the Project may impact the surrounding area and existing transportation infrastructure and operations. We trust that the foregoing information will assist in defining the Commonwealth's requirements for a TIA scope of work for this Project.

We respectfully request your feedback on the suggested transportation study scope of work, assumptions, data sources, and approaches. If you have any questions or need additional information, please contact me at 617-607-2639 or *ldantas@vhb.com*.

Sincerely,

Vanasse Hangen Brustlin, Inc.

Lourenço Dantas, AICP

Transportation Team Lead/Project Manager/Senior Transportation Planner
Transportation Planning & Operations

Cc: Max Cassidy, Tishman Speyer
Steven Morris, Tishman Speyer
Michael Regan, VHB
Jason Novsam, Nelson Nygaard

Attachments:

- Figure 1 – Traffic Study Area
- Figure 2 – Existing Transit Services

Base map aerial image: Nearmap Aerial (2020)

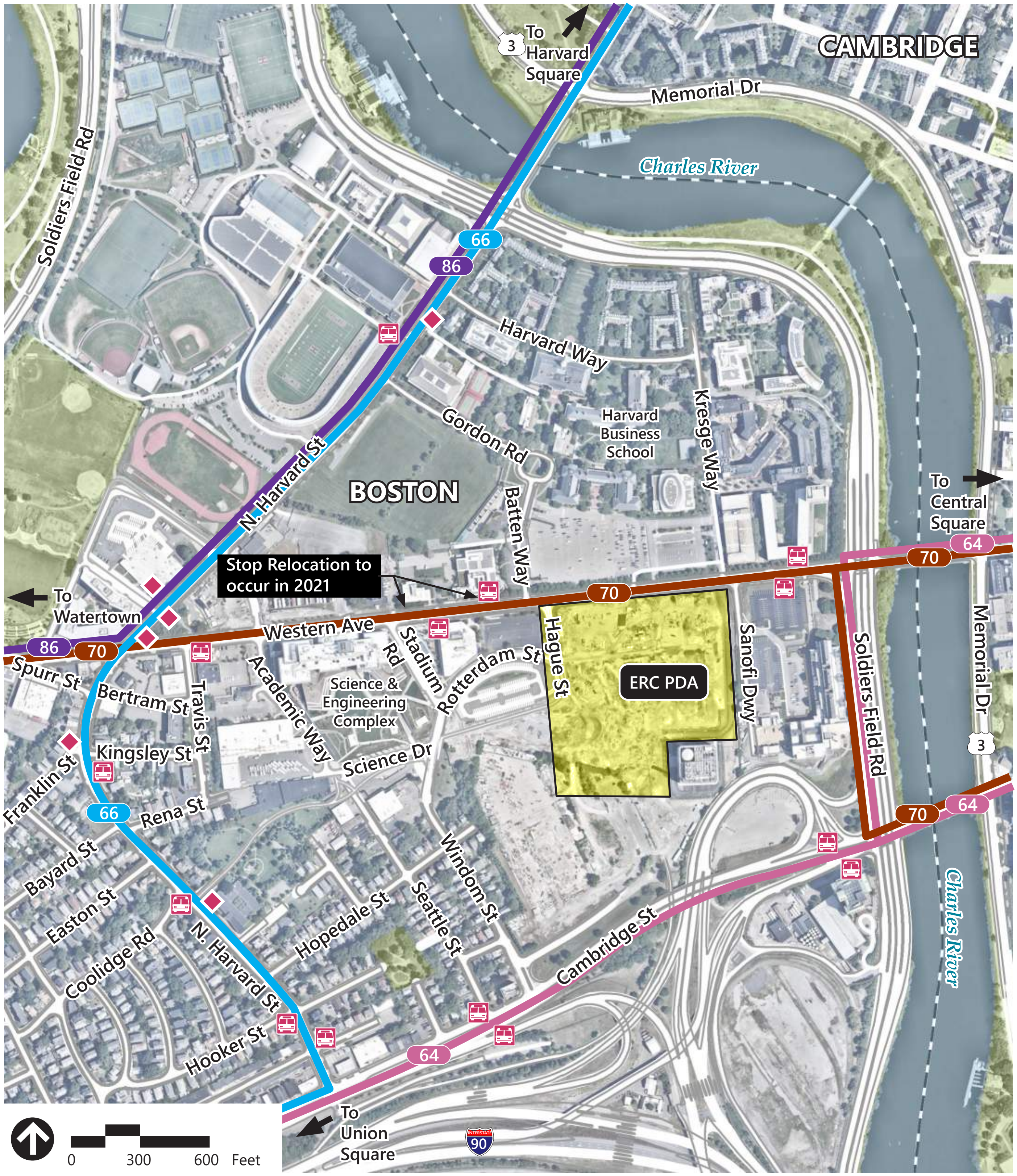
\# Existing and No-Build Intersection

\# ERC Intersection

Figure 1

Proposed Traffic Study Area Intersections

Enterprise Research Campus Project
Boston, MA



Base map aerial image: Nearmap Aerial (2020)

XX MBTA Bus Route

Route 70 – Market Place Drive or Waltham Center - University Park (Cambridge) via Western Ave
Route 66 – Harvard Square – Nubian Station (Roxbury) via N. Harvard St
Route 86 – Sullivan Square - Reservoir (Cleveland Circle) via N. Harvard St (North) & Western Ave (West)
Route 64 – Oak Square – University Park or Kendall/MIT via Cambridge St

MBTA Bus Stop

MBTA Bus Shelter

Figure 2

Existing Transit Services and Stops

Enterprise Research Campus Project
Boston, MA

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Jamey Tesler, Acting Secretary & CEO

massDOT
Massachusetts Department of Transportation

March 2, 2021

Kathleen Theoharides, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114-2150

RE: Boston: Enterprise Research Campus – ENF
(EEA #16320)

ATTN: MEPA Unit
Alex Strysky

Dear Secretary Theoharides:

On behalf of the Massachusetts Department of Transportation, I am submitting comments regarding the Environmental Notification Form for the Enterprise Research Campus project in Boston, as prepared by the Office of Transportation Planning. If you have any questions regarding these comments, please contact J. Lionel Lucien, P.E., Manager of the Public/Private Development Unit, at (857) 368-8862.

Sincerely,

David J. Mohler
Executive Director
Office of Transportation Planning

DJM/jll

cc: Jonathan Gulliver, Administrator, Highway Division
Patricia Leavenworth, P.E., Chief Engineer, Highway Division
John McInerney, District 6 Highway Director
Neil Boudreau, Assistant Administrator of Traffic and Highway Safety
Metropolitan Area Planning Council
Massachusetts Bay Transportation Authority
Boston Planning and Development Authority, City of Boston
Boston Transportation Department
Department of Conservation and Recreation

MEMORANDUM

TO: David Mohler, Executive Director
Office of Transportation Planning

FROM: J. Lionel Lucien, P.E, Manager
Public/Private Development Unit

DATE: March 2, 2021

RE: Enterprise Research Campus – ENF
(EEA #16320)

The Public/Private Development Unit (PPDU) has reviewed the Environmental Notification Form (ENF) for the proposed Enterprise Research Campus (ERC) project in the Allston neighborhood of Boston. The project is located at 100 Western Avenue and will be developed by Tishman Speyer ERC Developer ("Proponent"). The project site consists of approximately 14.22 acres of land bounded by Western Avenue to the north, Sanofi-Genzyme to the east, the District Energy Facility and undeveloped land abutting Cambridge Street to the south, and Hague Street to the west. The site has historically been the home of transportation-related industrial uses, most recently by CSX Transportation. In 2000, the site was purchased by Harvard University, and in 2015 CSX Transportation relinquished its rights to the area. The site is currently used as a construction laydown and staging area for other Harvard University facilities. The project site is part of Harvard's vision of eventual development of their land holdings between Western Avenue and Cambridge Street.

The project will include 1,940,000 square feet (sf) of development, including 1,160,000 sf of lab/office uses, 135,000 sf of hotel space (250 keys), 75,000 sf of conference space, and 750 residential units. The project will be constructed in two phases. Phase A will include 900,000 sf of development on six acres, including all the hotel and conference space, 440,000 sf of lab/office space, and 330 residential units. Phase B will include the remainder of the lab/office space (720,000 sf) and residential units (420 units). The project will be supported by 1,280 parking spaces, of which approximately 40 spaces will be located on-street and the remainder will be garage-structured. Phase A will include 620 parking spaces and Phase B will include 940.

Access to the site will be provided via two new roadways that will intersect the south side of Western Avenue, Cattle Drive and East Drive. Access will also be provided from Cambridge Street via Almy Street. A third new roadway will be created, DEF Drive, which will run east-west to connect the new Cattle Drive and East Drive. The existing disused roadways on the project site, Hague Street and Rotterdam Street, will be eliminated. Of the total project site, 3.7 acres will be allocated to private streets and sidewalks open to public use. The streets, sidewalks, and other utility infrastructure to support the project will be constructed by Harvard Allston Land Company.

The project is expected to generate 23,984 unadjusted vehicle trips per day and 6,030 adjusted vehicle trips per day. The project trip generation and parking exceed the Massachusetts Environmental Policy Act (MEPA) Environmental Impact Report (EIR) transportation thresholds, 11.03(6)(a)(6), "generation of 3,000 or more New ADT on roadways providing access to a single location," and 11.03(6)(a)(7), "construction of 1,000 or more New parking spaces at a single location." Due to the project's proximity to MassDOT facilities including, Interstate 90 (I-90), the I-90 ramps, and the bridges over I-90 and Soldiers Field Road, the project may require an Access Permit from MassDOT should any off-site mitigation involve modifications to these facilities.

Separate from the ENF, the Proponent provided MassDOT with a Transportation Scoping Letter (TSL), prepared generally in conformance with guidance provided in the MassDOT/EOEEA *Transportation Impact Assessment (TIA) Guidelines*. MassDOT provides the following comments and scope of work for the Draft Environmental Impact Report (DEIR):

Scope of Work

The DEIR should include a TIA prepared in conformance with the current MassDOT/EOEEA *TIA Guidelines*. The study should include a comprehensive multimodal assessment of the transportation impacts of the project. The TIA should provide an evaluation of mobility to and from the project site for the existing conditions, future No-Build conditions, and future Build conditions within the study area. The future Build conditions should include an analysis of conditions both with and without any improvements suggested to mitigate project impacts. The study should propose a mitigation package intended to improve mobility for all users, with a particular focus on increased use of walking, bicycling, and transit by residents, employees, and visitors. Items listed below should be accounted for in preparing the TIA.

Trip Generation

The TSL determined that trip generation projections using Institute of Transportation Engineers (ITE) *Trip Generation Manual* (10^{th} Edition) Land Use Codes (LUCs) 710 – General Office, 760 – Research & Development Center, 221 – Mid-Rise Residential, 222 – High-Rise Residential, 820 – Shopping Center, 932 – High-Turnover Restaurant, and 310 – Hotel would most accurately reflect the proposed development. MassDOT asks that the TIA consider whether LUC 310 accurately captures the trip generation of the conference facility included in the hotel.

The TSL includes an adjusted trip generation that reflects mode share. The mode share estimates are based on U.S. Census data and projected trends in the *Go Boston 2030* plan for Allston. These adjustments result in a trip generation, presented in the TSL, of 8,141 vehicle trips on an average weekday, including 679 vehicle trips during the weekday morning peak hour and 821 vehicle trips during the weekday evening peak hour. MassDOT notes that the adjusted vehicle trip generation presented in the TSL is different from the adjusted trip generation presented in the ENF. The TSL also projects 4,284 transit trips on an average weekday, including 539 transit trips during the weekday morning peak hour and 640 transit trips during the weekday evening peak hour. The TIA should provide a detailed description of how the trip generation is calculated and clarify the discrepancy between the ENF and the TSL.

Mode Split

Several MBTA bus routes stop in the vicinity of the project site including routes 64, 66, 70, and 86. The TSL presents the mode split for the proposed project, based on U.S. Census data and the *Go Boston 2030* plan for the Allston area. MassDOT generally accepts and recommends that TIAs use mode share data based on existing data or empirically projected trends. Should the Proponent use aspirational mode share data, MassDOT requires that the Proponent provide quantitative analysis on how the transportation improvements and policies implemented by the project will achieve that mode share goal.

The TIA should include all back up data used to arrive at the mode split estimates to corroborate assumptions included in the analyses. The TIA should also include mode share estimates for taxi/Transportation Network Company (TNC, i.e. Uber and Lyft) trips because this would likely be a popular mode for the hotel and conference patrons. In accounting for these trips, the transportation analysis should take into consideration that one person trip made by a taxi/TNC results in two vehicle trips.

Trip Distribution

Vehicle and transit trips should be assigned to the study area network. The TIA should provide all appropriate back up documentation to verify how the distribution percentages are calculated and assigned to the roadway network and the transit system.

Study Area

The TSL proposes a study area consisting of the following intersections:

- Western Avenue at Soldiers Field Road;
- Western Avenue at Kresge Way/Sanofi Genzyme Driveway/Project Driveway;
- Western Avenue at Batten Way/Hague Street;
- North Harvard Street at Soldiers Field Road;
- North Harvard Street at Western Avenue;
- North Harvard Street at Franklin Street/Kingsley Street;
- Cambridge Street at North Harvard Street;
- Cambridge Street at Windom Street;
- Cambridge Street at I-90 Ramps/Double Tree Hotel; and

- Cambridge Street at Soldiers Field Road.

In addition, by the time of the future scenarios, three additional intersections will be constructed in the study area as part of the Harvard Science and Engineering Complex:

- Western Avenue at Stadium Road;
- Western Avenue at Academic Way; and
- North Harvard Street at Academic Way.

Furthermore, the Build scenarios that include the project will include three additional project driveway intersections (Western Avenue at Kresge Way/Sanofi Genzyme Driveway/Project Driveway will be the fourth project driveway):

- Western Avenue at Cattle Drive;
- Western Avenue at East Drive; and
- Interim Cattle Drive at Windom Street.

MassDOT asks that the study area be expanded to include the following intersections:

- Western Avenue at Memorial Drive (Cambridge);
- River Street at Memorial Drive (Cambridge);
- JFK Street at Memorial Drive (Cambridge);
- Merge of I-90 off-ramp onto Cambridge Street westbound; and
- Diverge of I-90 on-ramp from Cambridge Street eastbound.

Finally, depending on the expected trip distribution, MassDOT may request merge/diverge analyses for the Soldiers Field Road exit and entrance ramps at North Harvard Street and River Street/Western Avenue, as well as the I-90 mainline exit and entrance ramps at the Allston Interchange, including the ramp merge/diverge locations within the interchange.

The I-90 ramps are under MassDOT jurisdiction and the bridges over Soldiers Field Road, the Charles River, and I-90 are also under MassDOT jurisdiction. Soldiers Field Road and the intersections that provide access to Soldiers Field Road are under Department of Conservation and Recreation (DCR) jurisdiction. The study area will be subject to review by MassDOT in coordination with DCR when the comprehensive TIA is submitted. Please note that additional study area intersections should be included in the TIA if project-generated trips are anticipated to increase peak hour traffic volume by five percent or more, or by more than 100 vehicles per hour.

Background Growth

As described in the TSL, baseline traffic volumes should use historic traffic counts adjusted to 2019 conditions, standing in for 2021, according to the revised MassDOT *Guidance on Traffic Count Data*. The TSL notes that counts within the study area from 2017 have been identified.

In developing future No-Build and Build traffic volumes, the TIA should include trips generated by other nearby planned and/or approved projects as part of the background growth. ITE trip rates or completed TIAs should be used to estimate the vehicle trip generation of un-built and/or yet to be occupied space. In addition, an annual growth factor should be superimposed on existing traffic volumes prior to the addition of the volumes associated with background project-specific growth. The TSL proposes using no annual growth factor to develop future scenarios, in accordance with the City of Boston's guidance. However, MassDOT asks that for MassDOT controlled facilities, particularly I-90 and the I-90 ramps, that the analysis reflect a typical positive growth in roadway volumes.

The DEIR should further describe and clarify the other development planned by Harvard near the project site. The DEIR should clarify how this project will relate to and integrate with MassDOT, Boston, and Harvard's vision for development and transportation in the Allston area.

While the planning horizon year for TIAs is typically seven years from the time of submittal of the TIA, the TSL proposes Medium Term and Long Term scenarios in 2025 and 2030, respectively, to reflect the phased development of the site. MassDOT accepts this approach and asks that the Proponent clarify with MassDOT the project-related development that should be included in the 2030 No-Build scenario.

Future scenarios should also incorporate planned transportation projects. The Proponent should coordinate with MassDOT, the MBTA, and the City of Boston about ongoing and planned transportation improvements in the vicinity of the project site. The TSL states that the analysis for the future scenarios will not include the Massachusetts Turnpike/I-90 Interchange reconstruction (and West Station) (the Allston Multimodal Project) because, according to the Boston Region MPO's long-range transportation plan, the project is not expected to start construction until the 2030 to 2034 period. MassDOT concurs with this approach. Nevertheless, the Proponent should ensure that the design and transportation mitigation program for this project is consistent with the vision and mobility goals of the Allston Multimodal Project.

Traffic Operations

Capacity analyses should be conducted for the weekday morning and evening peak hours for both existing and future conditions for each development alternative considered. In addition, capacity analyses for Build with mitigation conditions should be provided for all intersections, particularly those with impacts to the state highway system.

The TIA should provide illustrations depicting the peak hour 50th (average) and 95th percentile queue lengths for each lane group/turning movement at each study area intersection, for all analysis scenarios. The information contained in these illustrations should clearly demonstrate that the project would not result in any extended queues that would block vehicle movements to/from study area intersections, particularly those involving state highways. Appropriate mitigation should be identified at any locations where queue blockages occur. Color-coded illustrations should also be prepared depicting the level of service (LOS) for each lane group/turning movement for each case.

Safety

The TIA should include a safety analysis for all intersections and roadway segments within the study area. The analysis should calculate crash rates using MassDOT data for the most recent continuous five-year period. Crash rates should be documented, and additional mitigation considered at any locations exceeding the State and/or District 6 averages.

The Proponent should determine if any study area intersections are listed in the Highway Safety Improvement Program (HSIP) and coordinate with the MassDOT Highway Division's Safety Section to determine if a Road Safety Audit (RSA) is necessary. An initial review provided in the TSL identifies North Harvard Street at Soldiers Field Road as an HSIP bicycle cluster and North Harvard Street at Soldiers Field Road and Cambridge Street at Soldiers Field Road as HSIP vehicle clusters. The Proponent should coordinate with MassDOT about the need to complete RSAs at the HSIP eligible intersections before the submission of the DEIR; MassDOT anticipates that RSAs will be required.

Conceptual Plans

The TIA should include sufficiently detailed conceptual plans (minimum of 80-scale) for proposed roadway improvements in order to verify the feasibility of constructing such improvements. These plans should clearly show proposed lane widths and offsets, layout lines and jurisdictions, and land uses adjacent to areas where improvements are proposed.

Transit

As described above, the MBTA currently operates extensive bus service near the site and the project anticipates substantial transit mode share. The TIA should contain an analysis of additional transit demand generated by the project and the capacity on the MBTA bus routes proximate to the project site. Once the transit trip generation is developed and applied to the network, the TIA should address the following issues:

The analysis should be compliant with the MBTA's Office of Performance Management and Innovation's (OPMI) methodology for calculating the existing, future No-Build, and future Build comfort metrics (as evaluated in the Service Delivery Policy [SDP]) for each bus route within the project study area. Mitigation should be proposed for:

- Any bus route receiving new passengers that falls below the 96% route-wise minimum threshold for the SDP comfort metric (share of passenger travel time experienced in comfortable conditions);
- Any trip for which the new passengers would cause the trip to exceed the threshold; and/or

- Any trip which was already above the crowding threshold and to which new passengers would be added.

The Proponent should coordinate with the MassDOT PPDU and MBTA Service Planning in advance proposing of potential solutions to offset these project-related impacts.

The TIA should show how residents, employees, and visitors using the bus network will travel between the site and the bus stops. The TIA should show how pedestrian crossings and bus stops can be coordinated to ensure safe, accessible travel for bus customers. Of particular importance to the MBTA are all codes and standards related to the Americans with Disabilities Act (ADA), the Massachusetts Architectural Access Board (MAAB) along with the Federal Transit Administration (FTA) regulations and guidance. The Proponent should present the existing conditions on routes between nearby bus stops and the project site and how those conditions should be upgraded/improved to ensure a fully accessible path of travel for all customers.

The TIA should also identify and document transit improvement proposals under evaluation by MassDOT, the MBTA, and the City of Boston. Mitigation proposed for the project should be consistent with ongoing transit improvement initiatives of these agencies.

Pedestrian Access

The project will include new roadways internal to the project site, constructed by the Harvard Allston Land Company. All new roadways will include sidewalks on both sides of the roadway. New crosswalks will be added across the roadways that intersect Western Avenue and provide access to the project site. One of the new roadways, Cattle Drive, will include a mid-block raised crosswalk to connect with the new multi-use path to the west of the project site. This multi-use path will travel from east to west across the project site and integrate with a greenway system envisioned for the area.

Because the project anticipates a high pedestrian mode share, it is expected that the Proponent will provide a mitigation package that ensures walking and bicycling will be an attractive way to access the site. The TIA should provide an inventory of existing sidewalks and crosswalks within the study area and should address the quality and condition of those facilities. The TIA should include a commitment to improvements in any areas that are structurally deficient or not meeting current codes for accessibility, including sidewalks, crosswalks, ramps, and pedestrian equipment. Special attention should be given to linking the proposed development to adjacent complementary land uses and transit facilities.

Bicycle Access

As described in the TSL, the project will include new bicycle infrastructure connecting to the protected bike lanes along Western Avenue, including separated bike lanes on both sides of the new roadways, Cattle Drive and East Drive.

The TIA should include a detailed inventory of the bicycle network to include bikeway types, bikeway widths, and bicycle numbers and speeds. The Proponent should identify the likely travel routes for bicyclists within the study area. The degree to which these routes can safely support bicycle travel should also be examined. The TIA should reevaluate these routes based on the origin-destination of potential residents, employees, and visitors. Based on this analysis, the Proponent should consider the feasibility of expanding some of these existing routes or considering new routes to encourage bicycle travel in and around the site. The Proponent should work closely with MassDOT and the City of Boston to provide a seamless connection between the existing and planned bicycle facilities in the study area.

Parking

According to the TSL, the project would include the provision of 1,280 parking spaces. The TSL notes that the parking supply will be constrained and priced at fair market value to discourage accessing the site by single occupancy vehicle (SOV) travel. The TIA should explain the methodology used to determine the total parking required. The ITE *Parking Generation Manual* (5th Edition) generally provides a reasonable basis for comparison to parking requirements under local zoning. The TIA should include a summary of parking need and supply for comparable facilities based on multiple data sources. The TIA should also determine the number of parking spaces occupied at various times of day and identify periods of peak use.

Transportation Demand Management (TDM)

The TSL states that the Proponent is committed to implementing TDM measures. The TIA should include a comprehensive TDM program that would implement measures aimed at minimizing SOV and TNC trip generation to achieve the robust non-SOV mode share presented in the TSL. The TDM program should further investigate measures that would maximize usage of existing and potential new pedestrian, bicycle, and transit facilities. Such measures may include the following:

- Limiting the available parking supply;
- Provision of a parking cash-out program and/or charging for parking;
- Provision of on-site amenities and conveniences that would reduce the need for automobile travel;
- Provision of carpooling and vanpooling programs and perks;
- Provision of free or subsidized transit passes;
- Provision of a mobility hub to centralize multiple modes of transportation including the TNC/taxi trips expected to serve the hotel;
- Provision of seamless, welcoming, and direct pedestrian access to nearby transit hubs; and
- Provision of robust bicycle and pedestrian amenities.

The ENF states that the project will join the Allston/Brighton Transportation Management Association (TMA). The Proponent should work with the TMA to develop a TDM program for the project.

Transportation Monitoring Program

The Proponent will be required to conduct an annual transportation monitoring program for a period of five years, beginning six months after occupancy of the full-build project. The goals of the monitoring program will be to evaluate the assumptions made in the EIR and the adequacy of the mitigation measures, as well as to determine the effectiveness of the TDM program. It would include:

- Simultaneous automatic traffic recorder (ATR) counts at each parking entrance for a continuous 24-hour period on a typical weekday;
- Weekday morning and evening peak hour turning movement counts (TMCs) and operations analysis at "mitigated" intersections, including those involving parking entrances;
- Travel survey of residents, employees, and visitors at the site (to be administered by the Transportation Coordinator); and
- Transit Ridership counts.

The Proponent should continue consultation with the City of Boston, DCR, and appropriate MassDOT units, including PPDU, the MBTA, and the District 6 Office. If you have any questions regarding these comments, please contact me or Catrina Meyer at *Catrina.Meyer@dot.state.ma.us*.

To: Nupoor Monani

RE: Harvard ERC PNF
BPDA Transportation Planning Comments

Date March 16th, 2021

Listed below are the BPDA Transportation Planning Team's comments on the Harvard ERC Project Notification Form ("PNF") filed on February 2nd, 2021. The Proponent has been in close coordination with the City through the development review process, but this letter serves as a written record of Staff comments.

Go Boston 2030

Go Boston 2030, the City of Boston's long-term transportation action plan, envisions a city where all residents have better and more equitable travel choices, where efficient transportation networks foster economic opportunity, and where the City has taken steps to prepare for climate change. Whether traveling by transit, on foot, on a bike, or by car, Bostonians will be able to access all parts of the city safely and reliably. This vision was created with the help of thousands of Bostonians through a significant public engagement process.

This vision establishes foundational priorities for all transportation projects in the City, including development proposals as they impact transportation networks and the public realm. Go Boston 2030's primary goals—expanding access, improving safety, and ensuring reliability—help the City hold all projects accountable to this vision. Its aspirational targets clearly establish a yardstick for measuring success.In short, when reviewing proposals we must ask ourselves: does the project bring the City closer to achieving its transportation vision, goals, and targets?

<u>Mode Shift</u>

Goal: Reduce reliance on single occupancy vehicles and increase trips occurring via transit, walking, and biking.

Aspiration Target: By 2030, reduce single occupancy vehicle commute to work trips by 50%, increase transit trips by a third, increase walking trips by half, and increase biking rates four fold.

<u>Expanding Access</u>

Goal: Make Boston's neighborhoods interconnected for all modes of travel.

Aspirational Target: Every home in Boston will be within a 10-minute walk of a rail station or key bus route stop, and Bluebikes station, and car share.

Improving Safety
Goal: Substantially reduce collisions on every street through education, enforcement, and designs that reallocate street space to prioritize moving people safely rather than faster.
Aspirational Target: Eliminate traffic fatalities and severe injuries in Boston.

Ensuring Reliability
Goal: Prioritize making travel predictable on Boston's transit and roadway networks.
Aspirational Target: Bostonians' average commute to work time will decrease by 10%.

Please articulate how the project's transportation network analysis, proposed interventions and improvements, and Transportation Demand Management strategies help to advance the goals, projects, policies, and overall vision for transportation set out in Go Boston 2030.

Transportation Analysis
Further refinement of any updates to transportation forecasting/modeling should continue to be coordinated with BPDA Transportation and BTD staff. This includes modeling assumptions such as pipeline development, mode splits, and transit analysis methodology among others.

Parking
The proposed parking ratios are acceptable (0.8 for office/lab, 0.5 for residential, 0.2 for hotel).

Greenway Connection
The nature and materiality of the greenway as it crosses Cattle Drive and East Drive must be further refined. We hope that the greenway is legibly carried over across these streets with more than just crosswalks. Possible considerations could be traffic calming interventions, pavement markings, signage, and more.

Bike Network
Please refer to BTD's Bicycle Level of Traffic Stress Map and Methodology and provide us the project team's understanding of the development's surrounding roadway network and proposed roadway conditions' ability to promote low-stress biking as part of the project.

As currently proposed, the bike facilities on Cattle Drive disappear when it turns into "Interim Cattle Drive"/Almy Street. The Proponent should design bike facilities on this interim road to connect the project site with Cambridge Street.

Bike Parking

In accordance with BTD's Bike Parking Guidelines the site plan must include details about the proposed bike parking rooms including number of bike parking spaces, bike rack types, dimensions of the walkway aisles, and a circulation diagram showing how users will access the bike parking rooms.

Bikeshare Requirements

In accordance with BTD's Bike Parking Guidelines the Proponent will be asked to make a monetary contribution to the Bluebikes system based on the table located in the bike parking guidelines. Further, while the final number and location of Bluebikes stations(s) will be coordinated with BTD, at least one space for a 19-dock Bluebikes station should be provided on the site and included in future site plans.

Cross-Sections

The Proponent should provide proposed cross-sections for each street segment with accurate dimensions for all elements in the public realm (travel lanes, parking, buffers, bike lanes, furnishing zones, sidewalks, etc). Final cross-sections will be approved in coordination with BPDA Transportation, BTD, and PIC staff.

Loading and Driveways

All driveways and loading curb cuts should be reduced to 20' wide maximum and consolidated where possible. Further, the sidewalk must continue flush across the driveway to maintain pedestrian accessibility.

Shuttle Participation

The Proponent should confirm that they will participate in the Harvard University shuttle system and provide the location of any shuttle stop(s) on the Project Site.

TDM Measures

Transportation Demand Management efforts should be coordinated specifically with BPDA Transportation and BTD staff to align with updated TDM strategies that have recently been developed by BTD.

Proposed Roadways 80-Scale Plan

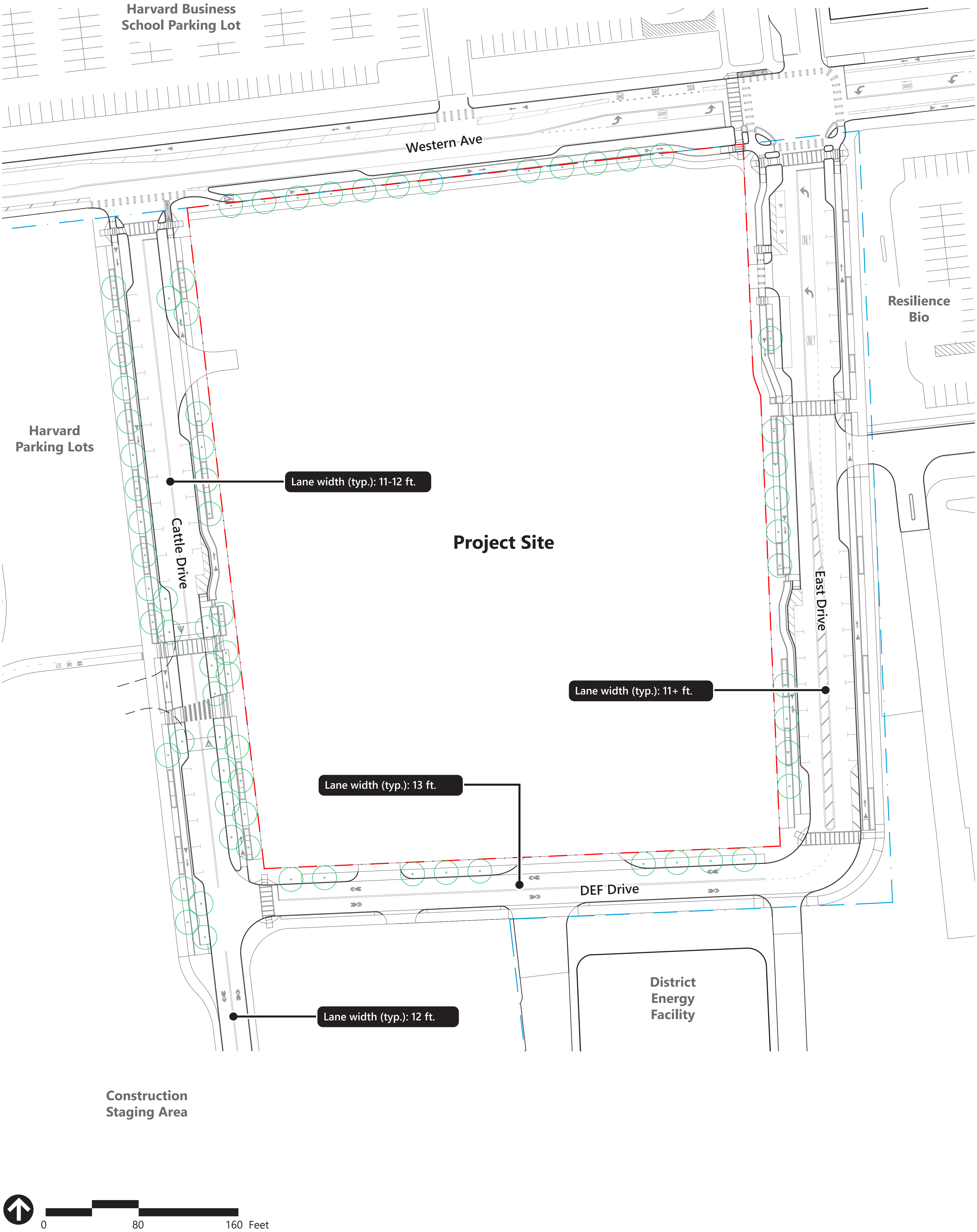


Figure C.1

Supporting Documentation - Enabling Roadways Plan

Enterprise Research Campus Project
Boston, MA

PDI File #: **175597 A**
Location: **N: Larz Anderson Bridge S: North Harvard Street**
Location: **E: Soldiers Field Road Ramps W: Soldiers Field Road Ramps**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Cars, Heavy Vehicles, and Buses (Combined)**

	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	2	42	80	0	124	38	3	15	0	56	13	49	20	0	82	11	0	39	0	50	312
7:15 AM	4	35	79	0	118	40	0	13	1	54	13	70	19	0	102	11	3	61	0	75	349
7:30 AM	2	37	82	0	121	49	1	19	0	69	24	72	14	0	110	10	2	68	1	81	381
7:45 AM	5	38	82	0	125	51	1	18	1	71	19	104	14	0	137	14	4	62	0	80	413
Total	13	152	323	0	488	178	5	65	2	250	69	295	67	0	431	46	9	230	1	286	1455
8:00 AM	5	33	93	0	131	61	0	17	2	80	9	61	8	0	78	12	3	66	0	81	370
8:15 AM	2	31	91	0	124	44	1	15	0	60	11	109	10	0	130	19	3	95	0	117	431
8:30 AM	6	30	70	0	106	58	1	14	0	73	10	111	21	0	142	13	1	66	1	81	402
8:45 AM	2	61	63	0	126	54	0	17	0	71	8	96	7	0	111	12	1	87	0	100	408
Total	15	155	317	0	487	217	2	63	2	284	38	377	46	0	461	56	8	314	1	379	1611
Grand Total	28	307	640	0	975	395	7	128	4	534	107	672	113	0	892	102	17	544	2	665	3066
Approach %	2.9	31.5	65.6	0.0		74.0	1.3	24.0	0.7		12.0	75.3	12.7	0.0		15.3	2.6	81.8	0.3		
Total %	0.9	10.0	20.9	0.0	31.8	12.9	0.2	4.2	0.1	17.4	3.5	21.9	3.7	0.0	29.1	3.3	0.6	17.7	0.1	21.7	
Exiting Leg Total					1611					768					537					150	3066
Cars	28	249	637	0	914	395	7	128	4	534	107	576	108	0	791	97	17	540	2	656	2895
% Cars	100.0	81.1	99.5	0.0	93.7	100.0	100.0	100.0	100.0	100.0	100.0	85.7	95.6	0.0	88.7	95.1	100.0	99.3	100.0	98.6	94.4
Exiting Leg Total					1511					765					474					145	2895
Heavy Vehicles	0	31	1	0	32	0	0	0	0	0	0	55	2	0	57	4	0	2	0	6	95
% Heavy Vehicles	0.0	10.1	0.2	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	8.2	1.8	0.0	6.4	3.9	0.0	0.4	0.0	0.9	3.1
Exiting Leg Total					57					1					35					2	95
Buses	0	27	2	0	29	0	0	0	0	0	0	41	3	0	44	1	0	2	0	3	76
% Buses	0.0	8.8	0.3	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	2.7	0.0	4.9	1.0	0.0	0.4	0.0	0.5	2.5
Exiting Leg Total					43					2					28					3	76

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:45 AM	5	38	82	0	125	51	1	18	1	71	19	104	14	0	137	14	4	62	0	80	413
8:00 AM	5	33	93	0	131	61	0	17	2	80	9	61	8	0	78	12	3	66	0	81	370
8:15 AM	2	31	91	0	124	44	1	15	0	60	11	109	10	0	130	19	3	95	0	117	431
8:30 AM	6	30	70	0	106	58	1	14	0	73	10	111	21	0	142	13	1	66	1	81	402
Total Volume	18	132	336	0	486	214	3	64	3	284	49	385	53	0	487	58	11	289	1	359	1616
% Approach Total	3.7	27.2	69.1	0.0		75.4	1.1	22.5	1.1		10.1	79.1	10.9	0.0		16.2	3.1	80.5	0.3		
PHF	0.750	0.868	0.903	0.000	0.927	0.877	0.750	0.889	0.375	0.888	0.645	0.867	0.631	0.000	0.857	0.763	0.688	0.761	0.250	0.767	0.937
Cars	18	107	335	0	460	214	3	64	3	284	49	341	52	0	442	54	11	286	1	352	1538
Cars %	100.0	81.1	99.7	0.0	94.7	100.0	100.0	100.0	100.0	100.0	100.0	88.6	98.1	0.0	90.8	93.1	100.0	99.0	100.0	98.1	95.2
Heavy Vehicles	0	13	0	0	13	0	0	0	0	0	0	26	1	0	27	3	0	1	0	4	44
Heavy Vehicles %	0.0	9.8	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	6.8	1.9	0.0	5.5	5.2	0.0	0.3	0.0	1.1	2.7
Buses	0	12	1	0	13	0	0	0	0	0	0	18	0	0	18	1	0	2	0	3	34
Buses %	0.0	9.1	0.3	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	3.7	1.7	0.0	0.7	0.0	0.8	2.1
Cars Enter Leg	18	107	335	0	460	214	3	64	3	284	49	341	52	0	442	54	11	286	1	352	1538
Heavy Enter Leg	0	13	0	0	13	0	0	0	0	0	0	26	1	0	27	3	0	1	0	4	44
Bus Enter Leg	0	12	1	0	13	0	0	0	0	0	0	18	0	0	18	1	0	2	0	3	34
Total Entering Leg	18	132	336	0	486	214	3	64	3	284	49	385	53	0	487	58	11	289	1	359	1616
Cars Exiting Leg					841					398					225					74	1538
Heavy Exiting Leg					27					0					16					1	44
Buses Exiting Leg					20					1					13					0	34
Total Exiting Leg					888					399					254					75	1616

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Class: **Cars**

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	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	2	35	79	0	116	38	3	15	0	56	13	37	19	0	69	11	0	39	0	50	291
7:15 AM	4	26	79	0	109	40	0	13	1	54	13	59	17	0	89	11	3	61	0	75	327
7:30 AM	2	30	82	0	114	49	1	19	0	69	24	58	13	0	95	10	2	67	1	80	358
7:45 AM	5	32	82	0	119	51	1	18	1	71	19	93	14	0	126	14	4	62	0	80	396
Total	13	123	322	0	458	178	5	65	2	250	69	247	63	0	379	46	9	229	1	285	1372
8:00 AM	5	27	92	0	124	61	0	17	2	80	9	54	8	0	71	11	3	65	0	79	354
8:15 AM	2	23	91	0	116	44	1	15	0	60	11	97	10	0	118	17	3	95	0	115	409
8:30 AM	6	25	70	0	101	58	1	14	0	73	10	97	20	0	127	12	1	64	1	78	379
8:45 AM	2	51	62	0	115	54	0	17	0	71	8	81	7	0	96	11	1	87	0	99	381
Total	15	126	315	0	456	217	2	63	2	284	38	329	45	0	412	51	8	311	1	371	1523
Grand Total	28	249	637	0	914	395	7	128	4	534	107	576	108	0	791	97	17	540	2	656	2895
Approach %	3.1	27.2	69.7	0.0		74.0	1.3	24.0	0.7		13.5	72.8	13.7	0.0		14.8	2.6	82.3	0.3		
Total %	1.0	8.6	22.0	0.0	31.6	13.6	0.2	4.4	0.1	18.4	3.7	19.9	3.7	0.0	27.3	3.4	0.6	18.7	0.1	22.7	
Exiting Leg Total					1511					765					474					145	2895

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
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	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:45 AM	5	32	82	0	119	51	1	18	1	71	19	93	14	0	126	14	4	62	0	80	396
8:00 AM	5	27	92	0	124	61	0	17	2	80	9	54	8	0	71	11	3	65	0	79	354
8:15 AM	2	23	91	0	116	44	1	15	0	60	11	97	10	0	118	17	3	95	0	115	409
8:30 AM	6	25	70	0	101	58	1	14	0	73	10	97	20	0	127	12	1	64	1	78	379
Total Volume	18	107	335	0	460	214	3	64	3	284	49	341	52	0	442	54	11	286	1	352	1538
% Approach Total	3.9	23.3	72.8	0.0		75.4	1.1	22.5	1.1		11.1	77.1	11.8	0.0		15.3	3.1	81.3	0.3		
PHF	0.750	0.836	0.910	0.000	0.927	0.877	0.750	0.889	0.375	0.888	0.645	0.879	0.650	0.000	0.870	0.794	0.688	0.753	0.250	0.765	0.940
Entering Leg	18	107	335	0	460	214	3	64	3	284	49	341	52	0	442	54	11	286	1	352	1538
Exiting Leg					841					398					225					74	1538
Total					1301					682					667					426	3076

PDI File #: **175597 A**
Location: **N: Larz Anderson Bridge S: North Harvard Street**
Location: **E: Soldiers Field Road Ramps W: Soldiers Field Road Ramps**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Heavy Vehicles

	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	4	1	0	5	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	12
7:15 AM	0	4	0	0	4	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	10
7:30 AM	0	5	0	0	5	0	0	0	0	0	0	7	1	0	8	0	0	1	0	1	14
7:45 AM	0	3	0	0	3	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	13
Total	0	16	1	0	17	0	0	0	0	0	0	30	1	0	31	0	0	1	0	1	49
8:00 AM	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	4
8:15 AM	0	5	0	0	5	0	0	0	0	0	0	6	0	0	6	2	0	0	0	2	13
8:30 AM	0	3	0	0	3	0	0	0	0	0	0	8	1	0	9	1	0	1	0	2	14
8:45 AM	0	5	0	0	5	0	0	0	0	0	0	9	0	0	9	1	0	0	0	1	15
Total	0	15	0	0	15	0	0	0	0	0	0	25	1	0	26	4	0	1	0	5	46
Grand Total	0	31	1	0	32	0	0	0	0	0	0	55	2	0	57	4	0	2	0	6	95
Approach %	0.0	96.9	3.1	0.0		0.0	0.0	0.0	0.0		0.0	96.5	3.5	0.0		66.7	0.0	33.3	0.0		
Total %	0.0	32.6	1.1	0.0	33.7	0.0	0.0	0.0	0.0	0.0	0.0	57.9	2.1	0.0	60.0	4.2	0.0	2.1	0.0	6.3	
Exiting Leg Total					57					1					35					2	95

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	4	1	0	5	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	12
7:15 AM	0	4	0	0	4	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	10
7:30 AM	0	5	0	0	5	0	0	0	0	0	0	7	1	0	8	0	0	1	0	1	14
7:45 AM	0	3	0	0	3	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	13
Total Volume	0	16	1	0	17	0	0	0	0	0	0	30	1	0	31	0	0	1	0	1	49
% Approach Total	0.0	94.1	5.9	0.0		0.0	0.0	0.0	0.0		0.0	96.8	3.2	0.0		0.0	0.0	100.0	0.0		
PHF	0.000	0.800	0.250	0.000	0.850	0.000	0.000	0.000	0.000	0.000	0.000	0.750	0.250	0.000	0.775	0.000	0.000	0.250	0.000	0.250	0.875
Entering Leg	0	16	1	0	17	0	0	0	0	0	0	30	1	0	31	0	0	1	0	1	49
Exiting Leg					31					1					16					1	49
Total					48					1					47					2	98

PDI File #: **175597 A**
Location: **N: Larz Anderson Bridge S: North Harvard Street**
Location: **E: Soldiers Field Road Ramps W: Soldiers Field Road Ramps**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Buses

	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	3	0	0	3	0	0	0	0	0	0	5	1	0	6	0	0	0	0	0	9
7:15 AM	0	5	0	0	5	0	0	0	0	0	0	5	2	0	7	0	0	0	0	0	12
7:30 AM	0	2	0	0	2	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	9
7:45 AM	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
Total	0	13	0	0	13	0	0	0	0	0	0	18	3	0	21	0	0	0	0	0	34
8:00 AM	0	4	1	0	5	0	0	0	0	0	0	5	0	0	5	1	0	1	0	2	12
8:15 AM	0	3	0	0	3	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	9
8:30 AM	0	2	0	0	2	0	0	0	0	0	0	6	0	0	6	0	0	1	0	1	9
8:45 AM	0	5	1	0	6	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	12
Total	0	14	2	0	16	0	0	0	0	0	0	23	0	0	23	1	0	2	0	3	42
Grand Total	0	27	2	0	29	0	0	0	0	0	0	41	3	0	44	1	0	2	0	3	76
Approach %	0.0	93.1	6.9	0.0		0.0	0.0	0.0	0.0		0.0	93.2	6.8	0.0		33.3	0.0	66.7	0.0		
Total %	0.0	35.5	2.6	0.0	38.2	0.0	0.0	0.0	0.0	0.0	0.0	53.9	3.9	0.0	57.9	1.3	0.0	2.6	0.0	3.9	
Exiting Leg Total					43					2					28					3	76

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	0	4	1	0	5	0	0	0	0	0	0	5	0	0	5	1	0	1	0	2	12
8:15 AM	0	3	0	0	3	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	9
8:30 AM	0	2	0	0	2	0	0	0	0	0	0	6	0	0	6	0	0	1	0	1	9
8:45 AM	0	5	1	0	6	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	12
Total Volume	0	14	2	0	16	0	0	0	0	0	0	23	0	0	23	1	0	2	0	3	42
% Approach Total	0.0	87.5	12.5	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		33.3	0.0	66.7	0.0		
PHF	0.000	0.700	0.500	0.000	0.667	0.000	0.000	0.000	0.000	0.000	0.000	0.958	0.000	0.000	0.958	0.250	0.000	0.500	0.000	0.375	0.875
Entering Leg	0	14	2	0	16	0	0	0	0	0	0	23	0	0	23	1	0	2	0	3	42
Exiting Leg					25					2					15					0	42
Total					41					2					38					3	84

PDI File #: **175597 A**
Location: **N: Larz Anderson Bridge S: North Harvard Street**
Location: **E: Soldiers Field Road Ramps W: Soldiers Field Road Ramps**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Bicycles (on Roadway and Crosswalks)

	Larz Anderson Bridge							Soldiers Field Road Ramps							North Harvard Street							Soldiers Field Road Ramps							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	1	1	0	0	10	4	16	0	0	0	0	0	1	1	0	10	0	0	0	0	10	0	0	0	0	0	0	0	27
7:15 AM	0	1	0	0	11	5	17	0	0	0	0	0	0	0	0	5	0	0	0	2	7	0	0	0	0	1	0	1	25
7:30 AM	0	4	0	0	7	1	12	0	0	0	0	0	0	0	0	18	0	0	0	0	18	0	0	0	0	0	1	1	31
7:45 AM	0	8	0	0	9	5	22	0	0	0	0	0	0	0	0	14	0	0	0	1	15	0	0	0	0	1	0	1	38
Total	1	14	0	0	37	15	67	0	0	0	0	0	1	1	0	47	0	0	0	3	50	0	0	0	0	2	1	3	121
8:00 AM	1	8	0	0	5	2	16	0	2	0	0	1	0	3	0	16	0	0	0	1	17	0	0	0	0	0	0	0	36
8:15 AM	0	8	0	0	19	2	29	0	1	0	0	0	1	2	0	24	0	0	0	1	25	0	0	1	0	0	1	2	58
8:30 AM	0	8	1	0	16	0	25	0	0	0	0	0	0	0	0	14	0	0	0	0	14	0	0	0	0	0	0	0	39
8:45 AM	0	9	0	0	16	2	27	0	0	0	0	0	0	0	0	27	0	0	0	0	27	0	0	0	0	0	0	0	54
Total	1	33	1	0	56	6	97	0	3	0	0	1	1	5	0	81	0	0	0	2	83	0	0	1	0	0	1	2	187
Grand Total	2	47	1	0	93	21	164	0	3	0	0	1	2	6	0	128	0	0	0	5	133	0	0	1	0	2	2	5	308
Approach %	1.2	28.7	0.6	0.0	56.7	12.8		0.0	50.0	0.0	0.0	16.7	33.3		0.0	96.2	0.0	0.0	0.0	3.8		0.0	0.0	20.0	0.0	40.0	40.0		
Total %	0.6	15.3	0.3	0.0	30.2	6.8	53.2	0.0	1.0	0.0	0.0	0.3	0.6	1.9	0.0	41.6	0.0	0.0	0.0	1.6	43.2	0.0	0.0	0.3	0.0	0.6	0.6	1.6	
Exiting Leg Total							243							4							52							9	308

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Larz Anderson Bridge							Soldiers Field Road Ramps							North Harvard Street							Soldiers Field Road Ramps							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	1	8	0	0	5	2	16	0	2	0	0	1	0	3	0	16	0	0	0	1	17	0	0	0	0	0	0	0	36
8:15 AM	0	8	0	0	19	2	29	0	1	0	0	0	1	2	0	24	0	0	0	1	25	0	0	1	0	0	1	2	58
8:30 AM	0	8	1	0	16	0	25	0	0	0	0	0	0	0	0	14	0	0	0	0	14	0	0	0	0	0	0	0	39
8:45 AM	0	9	0	0	16	2	27	0	0	0	0	0	0	0	0	27	0	0	0	0	27	0	0	0	0	0	0	0	54
Total Volume	1	33	1	0	56	6	97	0	3	0	0	1	1	5	0	81	0	0	0	2	83	0	0	1	0	0	1	2	187
% Approach Total	1.0	34.0	1.0	0.0	57.7	6.2		0.0	60.0	0.0	0.0	20.0	20.0		0.0	97.6	0.0	0.0	0.0	2.4		0.0	0.0	50.0	0.0	0.0	50.0		
PHF	0.250	0.917	0.250	0.000	0.737	0.750	0.836	0.000	0.375	0.000	0.000	0.250	0.250	0.417	0.000	0.750	0.000	0.000	0.000	0.500	0.769	0.000	0.000	0.250	0.000	0.000	0.250	0.250	0.806
Entering Leg	1	33	1	0	56	6	97	0	3	0	0	1	1	5	0	81	0	0	0	2	83	0	0	1	0	0	1	2	187
Exiting Leg							144							3							35							5	187
Total							241							8							118							7	374

PDI File #:	**175597 A**
Location:	**N: Larz Anderson Bridge S: North Harvard Street**
Location:	**E: Soldiers Field Road Ramps W: Soldiers Field Road Ramps**
City, State:	**Allston, MA**
Client:	**VHB/ M. Baidy**
Site Code:	**13581.03**
Count Date:	**Wednesday, April 12, 2017**
Start Time:	**7:00 AM**
End Time:	**9:00 AM**
Class:	

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	Larz Anderson Bridge							Soldiers Field Road Ramps							North Harvard Street							Soldiers Field Road Ramps							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	8	9	17	0	0	0	0	18	40	58	0	0	0	0	8	4	12	0	0	0	0	8	16	24	111
7:15 AM	0	0	0	0	12	4	16	0	0	0	0	23	21	44	0	0	0	0	12	1	13	0	0	0	0	16	16	32	105
7:30 AM	0	0	0	0	16	8	24	0	0	0	0	22	25	47	0	0	0	0	3	2	5	0	0	0	0	44	15	59	135
7:45 AM	0	0	0	0	12	3	15	0	0	0	0	42	34	76	0	0	0	0	5	3	8	0	0	0	0	25	10	35	134
Total	0	0	0	0	48	24	72	0	0	0	0	105	120	225	0	0	0	0	28	10	38	0	0	0	0	93	57	150	485
8:00 AM	0	0	0	0	14	4	18	0	0	0	0	36	14	50	0	0	0	0	1	4	5	0	0	0	0	21	9	30	103
8:15 AM	0	0	0	0	8	3	11	0	0	0	0	39	21	60	0	0	0	0	4	3	7	0	0	0	0	21	18	39	117
8:30 AM	0	0	0	0	10	3	13	0	0	0	0	33	41	74	0	0	0	0	1	13	14	0	0	0	0	34	13	47	148
8:45 AM	0	0	0	0	11	3	14	0	0	0	0	47	35	82	0	0	0	0	1	15	16	0	0	0	0	63	17	80	192
Total	0	0	0	0	43	13	56	0	0	0	0	155	111	266	0	0	0	0	7	35	42	0	0	0	0	139	57	196	560
Grand Total	0	0	0	0	91	37	128	0	0	0	0	260	231	491	0	0	0	0	35	45	80	0	0	0	0	232	114	346	1045
Approach %	0.0	0.0	0.0	0.0	71.1	28.9		0.0	0.0	0.0	0.0	53.0	47.0		0.0	0.0	0.0	0.0	43.8	56.3		0.0	0.0	0.0	0.0	67.1	32.9		
Total %	0.0	0.0	0.0	0.0	8.7	3.5	12.2	0.0	0.0	0.0	0.0	24.9	22.1	47.0	0.0	0.0	0.0	0.0	3.3	4.3	7.7	0.0	0.0	0.0	0.0	22.2	10.9	33.1	
Exiting Leg Total							128							491							80							346	1045

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Larz Anderson Bridge							Soldiers Field Road Ramps							North Harvard Street							Soldiers Field Road Ramps							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	0	0	0	0	14	4	18	0	0	0	0	36	14	50	0	0	0	0	1	4	5	0	0	0	0	21	9	30	103
8:15 AM	0	0	0	0	8	3	11	0	0	0	0	39	21	60	0	0	0	0	4	3	7	0	0	0	0	21	18	39	117
8:30 AM	0	0	0	0	10	3	13	0	0	0	0	33	41	74	0	0	0	0	1	13	14	0	0	0	0	34	13	47	148
8:45 AM	0	0	0	0	11	3	14	0	0	0	0	47	35	82	0	0	0	0	1	15	16	0	0	0	0	63	17	80	192
Total Volume	0	0	0	0	43	13	56	0	0	0	0	155	111	266	0	0	0	0	7	35	42	0	0	0	0	139	57	196	560
% Approach Total	0.0	0.0	0.0	0.0	76.8	23.2		0.0	0.0	0.0	0.0	58.3	41.7		0.0	0.0	0.0	0.0	16.7	83.3		0.0	0.0	0.0	0.0	70.9	29.1		
PHF	0.000	0.000	0.000	0.000	0.768	0.813	0.778	0.000	0.000	0.000	0.000	0.824	0.677	0.811	0.000	0.000	0.000	0.000	0.438	0.583	0.656	0.000	0.000	0.000	0.000	0.552	0.792	0.613	0.729
Entering Leg	0	0	0	0	43	13	56	0	0	0	0	155	111	266	0	0	0	0	7	35	42	0	0	0	0	139	57	196	560
Exiting Leg							56							266							42							196	560
Total							112							532							84							392	1120

PDI File #: **175597 A**
Location: **N: Larz Anderson Bridge S: North Harvard Street**
Location: **E: Soldiers Field Road Ramps W: Soldiers Field Road Ramps**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars, Heavy Vehicles, and Buses (Combined)

	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	10	39	81	0	130	69	3	11	5	88	12	62	19	0	93	16	7	52	0	75	386
4:15 PM	9	54	68	0	131	64	10	17	2	93	6	71	24	0	101	15	4	51	3	73	398
4:30 PM	8	57	75	0	140	66	3	14	0	83	18	90	13	0	121	11	2	48	0	61	405
4:45 PM	4	37	77	0	118	67	6	20	2	95	12	91	17	0	120	15	6	60	0	81	414
Total	31	187	301	0	519	266	22	62	9	359	48	314	73	0	435	57	19	211	3	290	1603
5:00 PM	3	59	68	0	130	73	6	23	0	102	9	73	29	0	111	19	7	68	0	94	437
5:15 PM	6	63	57	0	126	68	3	39	1	111	12	88	28	0	128	17	4	75	1	97	462
5:30 PM	6	75	64	0	145	81	2	40	1	124	6	73	26	0	105	26	5	89	0	120	494
5:45 PM	9	78	58	0	145	81	0	33	0	114	5	72	24	0	101	32	2	85	0	119	479
Total	24	275	247	0	546	303	11	135	2	451	32	306	107	0	445	94	18	317	1	430	1872
Grand Total	55	462	548	0	1065	569	33	197	11	810	80	620	180	0	880	151	37	528	4	720	3475
Approach %	5.2	43.4	51.5	0.0		70.2	4.1	24.3	1.4		9.1	70.5	20.5	0.0		21.0	5.1	73.3	0.6		
Total %	1.6	13.3	15.8	0.0	30.6	16.4	0.9	5.7	0.3	23.3	2.3	17.8	5.2	0.0	25.3	4.3	1.1	15.2	0.1	20.7	
Exiting Leg Total					1717					676					810					272	3475
Cars	55	433	546	0	1034	569	33	195	11	808	80	575	179	0	834	145	37	528	4	714	3390
% Cars	100.0	93.7	99.6	0.0	97.1	100.0	100.0	99.0	100.0	99.8	100.0	92.7	99.4	0.0	94.8	96.0	100.0	100.0	100.0	99.2	97.6
Exiting Leg Total					1672					674					773					271	3390
Heavy Vehicles	0	9	2	0	11	0	0	0	0	0	0	8	0	0	8	2	0	0	0	2	21
% Heavy Vehicles	0.0	1.9	0.4	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.9	1.3	0.0	0.0	0.0	0.3	0.6
Exiting Leg Total					8					2					11					0	21
Buses	0	20	0	0	20	0	0	2	0	2	0	37	1	0	38	4	0	0	0	4	64
% Buses	0.0	4.3	0.0	0.0	1.9	0.0	0.0	1.0	0.0	0.2	0.0	6.0	0.6	0.0	4.3	2.6	0.0	0.0	0.0	0.6	1.8
Exiting Leg Total					37					0					26					1	64

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
5:00 PM	3	59	68	0	130	73	6	23	0	102	9	73	29	0	111	19	7	68	0	94	437
5:15 PM	6	63	57	0	126	68	3	39	1	111	12	88	28	0	128	17	4	75	1	97	462
5:30 PM	6	75	64	0	145	81	2	40	1	124	6	73	26	0	105	26	5	89	0	120	494
5:45 PM	9	78	58	0	145	81	0	33	0	114	5	72	24	0	101	32	2	85	0	119	479
Total Volume	24	275	247	0	546	303	11	135	2	451	32	306	107	0	445	94	18	317	1	430	1872
% Approach Total	4.4	50.4	45.2	0.0		67.2	2.4	29.9	0.4		7.2	68.8	24.0	0.0		21.9	4.2	73.7	0.2		
PHF	0.667	0.881	0.908	0.000	0.941	0.935	0.458	0.844	0.500	0.909	0.667	0.869	0.922	0.000	0.869	0.734	0.643	0.890	0.250	0.896	0.947
Cars	24	260	246	0	530	303	11	133	2	449	32	287	106	0	425	92	18	317	1	428	1832
Cars %	100.0	94.5	99.6	0.0	97.1	100.0	100.0	98.5	100.0	99.6	100.0	93.8	99.1	0.0	95.5	97.9	100.0	100.0	100.0	99.5	97.9
Heavy Vehicles	0	5	1	0	6	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	8
Heavy Vehicles %	0.0	1.8	0.4	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.4
Buses	0	10	0	0	10	0	0	2	0	2	0	17	1	0	18	2	0	0	0	2	32
Buses %	0.0	3.6	0.0	0.0	1.8	0.0	0.0	1.5	0.0	0.4	0.0	5.6	0.9	0.0	4.0	2.1	0.0	0.0	0.0	0.5	1.7
Cars Enter Leg	24	260	246	0	530	303	11	133	2	449	32	287	106	0	425	92	18	317	1	428	1832
Heavy Enter Leg	0	5	1	0	6	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	8
Bus Enter Leg	0	10	0	0	10	0	0	2	0	2	0	17	1	0	18	2	0	0	0	2	32
Total Entering Leg	24	275	247	0	546	303	11	135	2	451	32	306	107	0	445	94	18	317	1	430	1872
Cars Exiting Leg					907					298					485					142	1832
Heavy Exiting Leg					2					1					5					0	8
Buses Exiting Leg					17					0					14					1	32
Total Exiting Leg					926					299					504					143	1872

PDI File #: **175597 A**
Location: **N: Larz Anderson Bridge S: North Harvard Street**
Location: **E: Soldiers Field Road Ramps W: Soldiers Field Road Ramps**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Cars**

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Email: datarequests@pdillc.com

	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	10	36	80	0	126	69	3	11	5	88	12	59	19	0	90	15	7	52	0	74	378
4:15 PM	9	52	68	0	129	64	10	17	2	93	6	62	24	0	92	14	4	51	3	72	386
4:30 PM	8	53	75	0	136	66	3	14	0	83	18	84	13	0	115	9	2	48	0	59	393
4:45 PM	4	32	77	0	113	67	6	20	2	95	12	83	17	0	112	15	6	60	0	81	401
Total	31	173	300	0	504	266	22	62	9	359	48	288	73	0	409	53	19	211	3	286	1558
5:00 PM	3	56	68	0	127	73	6	22	0	101	9	67	29	0	105	19	7	68	0	94	427
5:15 PM	6	58	57	0	121	68	3	39	1	111	12	82	28	0	122	16	4	75	1	96	450
5:30 PM	6	72	64	0	142	81	2	40	1	124	6	70	25	0	101	25	5	89	0	119	486
5:45 PM	9	74	57	0	140	81	0	32	0	113	5	68	24	0	97	32	2	85	0	119	469
Total	24	260	246	0	530	303	11	133	2	449	32	287	106	0	425	92	18	317	1	428	1832
Grand Total	55	433	546	0	1034	569	33	195	11	808	80	575	179	0	834	145	37	528	4	714	3390
Approach %	5.3	41.9	52.8	0.0		70.4	4.1	24.1	1.4		9.6	68.9	21.5	0.0		20.3	5.2	73.9	0.6		
Total %	1.6	12.8	16.1	0.0	30.5	16.8	1.0	5.8	0.3	23.8	2.4	17.0	5.3	0.0	24.6	4.3	1.1	15.6	0.1	21.1	
Exiting Leg Total					1672					674					773					271	3390

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
5:00 PM	3	56	68	0	127	73	6	22	0	101	9	67	29	0	105	19	7	68	0	94	427
5:15 PM	6	58	57	0	121	68	3	39	1	111	12	82	28	0	122	16	4	75	1	96	450
5:30 PM	6	72	64	0	142	81	2	40	1	124	6	70	25	0	101	25	5	89	0	119	486
5:45 PM	9	74	57	0	140	81	0	32	0	113	5	68	24	0	97	32	2	85	0	119	469
Total Volume	24	260	246	0	530	303	11	133	2	449	32	287	106	0	425	92	18	317	1	428	1832
% Approach Total	4.5	49.1	46.4	0.0		67.5	2.4	29.6	0.4		7.5	67.5	24.9	0.0		21.5	4.2	74.1	0.2		
PHF	0.667	0.878	0.904	0.000	0.933	0.935	0.458	0.831	0.500	0.905	0.667	0.875	0.914	0.000	0.871	0.719	0.643	0.890	0.250	0.899	0.942
Entering Leg	24	260	246	0	530	303	11	133	2	449	32	287	106	0	425	92	18	317	1	428	1832
Exiting Leg					907					298					485					142	1832
Total					1437					747					910					570	3664

PDI File #:	**175597 A**
Location:	**N: Larz Anderson Bridge S: North Harvard Street**
Location:	**E: Soldiers Field Road Ramps W: Soldiers Field Road Ramps**
City, State:	**Allston, MA**
Client:	**VHB/ M. Baidy**
Site Code:	**13581.03**
Count Date:	**Wednesday, April 12, 2017**
Start Time:	**4:00 PM**
End Time:	**6:00 PM**
Class:	

PRECISION DATA INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
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Heavy Vehicles

	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	3
4:30 PM	0	1	0	0	1	0	0	0	0	0	0	4	0	0	4	1	0	0	0	1	6
4:45 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	4	1	0	5	0	0	0	0	0	0	6	0	0	6	2	0	0	0	2	13
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
5:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
5:45 PM	0	3	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Total	0	5	1	0	6	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	8
Grand Total	0	9	2	0	11	0	0	0	0	0	0	8	0	0	8	2	0	0	0	2	21
Approach %	0.0	81.8	18.2	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		100.0	0.0	0.0	0.0		
Total %	0.0	42.9	9.5	0.0	52.4	0.0	0.0	0.0	0.0	0.0	0.0	38.1	0.0	0.0	38.1	9.5	0.0	0.0	0.0	9.5	
Exiting Leg Total					8					2					11					0	21

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	3
4:30 PM	0	1	0	0	1	0	0	0	0	0	0	4	0	0	4	1	0	0	0	1	6
4:45 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	4	1	0	5	0	0	0	0	0	0	6	0	0	6	2	0	0	0	2	13
% Approach Total	0.0	80.0	20.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		100.0	0.0	0.0	0.0		
PHF	0.000	0.500	0.250	0.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.375	0.500	0.000	0.000	0.000	0.500	0.542
Entering Leg	0	4	1	0	5	0	0	0	0	0	0	6	0	0	6	2	0	0	0	2	13
Exiting Leg					6					1					6					0	13
Total					11					1					12					2	26

PDI File #: **175597 A**
Location: **N: Larz Anderson Bridge S: North Harvard Street**
Location: **E: Soldiers Field Road Ramps W: Soldiers Field Road Ramps**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Buses**

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	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	6
4:15 PM	0	2	0	0	2	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	9
4:30 PM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	6
4:45 PM	0	3	0	0	3	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	11
Total	0	10	0	0	10	0	0	0	0	0	0	20	0	0	20	2	0	0	0	2	32
5:00 PM	0	2	0	0	2	0	0	1	0	1	0	5	0	0	5	0	0	0	0	0	8
5:15 PM	0	4	0	0	4	0	0	0	0	0	0	6	0	0	6	1	0	0	0	1	11
5:30 PM	0	3	0	0	3	0	0	0	0	0	0	2	1	0	3	1	0	0	0	1	7
5:45 PM	0	1	0	0	1	0	0	1	0	1	0	4	0	0	4	0	0	0	0	0	6
Total	0	10	0	0	10	0	0	2	0	2	0	17	1	0	18	2	0	0	0	2	32
Grand Total	0	20	0	0	20	0	0	2	0	2	0	37	1	0	38	4	0	0	0	4	64
Approach %	0.0	100.0	0.0	0.0		0.0	0.0	100.0	0.0		0.0	97.4	2.6	0.0		100.0	0.0	0.0	0.0		
Total %	0.0	31.3	0.0	0.0	31.3	0.0	0.0	3.1	0.0	3.1	0.0	57.8	1.6	0.0	59.4	6.3	0.0	0.0	0.0	6.3	
Exiting Leg Total					37					0					26					1	64

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Larz Anderson Bridge					Soldiers Field Road Ramps					North Harvard Street					Soldiers Field Road Ramps					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	6
4:15 PM	0	2	0	0	2	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	9
4:30 PM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	6
4:45 PM	0	3	0	0	3	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	11
Total Volume	0	10	0	0	10	0	0	0	0	0	0	20	0	0	20	2	0	0	0	2	32
% Approach Total	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		100.0	0.0	0.0	0.0		
PHF	0.000	0.833	0.000	0.000	0.833	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.000	0.000	0.625	0.500	0.000	0.000	0.000	0.500	0.727
Entering Leg	0	10	0	0	10	0	0	0	0	0	0	20	0	0	20	2	0	0	0	2	32
Exiting Leg					20					0					12					0	32
Total					30					0					32					2	64

PDI File #: **175597 A**
Location: **N: Larz Anderson Bridge S: North Harvard Street**
Location: **E: Soldiers Field Road Ramps W: Soldiers Field Road Ramps**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Bicycles (on Roadway and Crosswalks)

	Larz Anderson Bridge							Soldiers Field Road Ramps							North Harvard Street							Soldiers Field Road Ramps							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	1	12	0	0	0	1	14	0	0	0	0	0	1	1	0	2	0	0	1	0	3	0	0	0	0	0	0	0	18
4:15 PM	0	10	0	0	0	1	11	0	1	0	0	0	0	1	0	4	0	0	0	0	4	0	0	0	0	0	0	0	16
4:30 PM	0	2	0	0	1	2	5	0	0	0	0	0	1	1	0	10	0	0	0	0	10	0	0	0	0	1	0	1	17
4:45 PM	0	8	0	0	1	4	13	0	0	0	0	1	1	2	0	6	0	0	0	1	7	0	0	0	0	0	0	0	22
Total	1	32	0	0	2	8	43	0	1	0	0	1	3	5	0	22	0	0	1	1	24	0	0	0	0	1	0	1	73
5:00 PM	0	10	1	0	1	3	15	0	0	0	0	0	2	2	0	5	0	0	0	0	5	0	0	0	0	0	0	0	22
5:15 PM	0	10	0	0	3	8	21	0	0	1	0	0	2	3	0	11	0	0	1	0	12	0	0	0	0	0	0	0	36
5:30 PM	0	11	0	0	8	6	25	0	0	0	0	0	0	0	0	15	0	0	0	0	15	0	0	0	0	0	0	0	40
5:45 PM	0	8	0	0	3	13	24	0	2	0	0	0	0	2	2	15	0	0	1	0	18	0	0	0	0	0	0	0	44
Total	0	39	1	0	15	30	85	0	2	1	0	0	4	7	2	46	0	0	2	0	50	0	0	0	0	0	0	0	142
Grand Total	1	71	1	0	17	38	128	0	3	1	0	1	7	12	2	68	0	0	3	1	74	0	0	0	0	1	0	1	215
Approach %	0.8	55.5	0.8	0.0	13.3	29.7		0.0	25.0	8.3	0.0	8.3	58.3		2.7	91.9	0.0	0.0	4.1	1.4		0.0	0.0	0.0	0.0	100.0	0.0		
Total %	0.5	33.0	0.5	0.0	7.9	17.7	59.5	0.0	1.4	0.5	0.0	0.5	3.3	5.6	0.9	31.6	0.0	0.0	1.4	0.5	34.4	0.0	0.0	0.0	0.0	0.5	0.0	0.5	
Exiting Leg Total							123							11							76							5	215

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	Larz Anderson Bridge							Soldiers Field Road Ramps							North Harvard Street							Soldiers Field Road Ramps							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	0	10	1	0	1	3	15	0	0	0	0	0	2	2	0	5	0	0	0	0	5	0	0	0	0	0	0	0	22
5:15 PM	0	10	0	0	3	8	21	0	0	1	0	0	2	3	0	11	0	0	1	0	12	0	0	0	0	0	0	0	36
5:30 PM	0	11	0	0	8	6	25	0	0	0	0	0	0	0	0	15	0	0	0	0	15	0	0	0	0	0	0	0	40
5:45 PM	0	8	0	0	3	13	24	0	2	0	0	0	0	2	2	15	0	0	1	0	18	0	0	0	0	0	0	0	44
Total Volume	0	39	1	0	15	30	85	0	2	1	0	0	4	7	2	46	0	0	2	0	50	0	0	0	0	0	0	0	142
% Approach Total	0.0	45.9	1.2	0.0	17.6	35.3		0.0	28.6	14.3	0.0	0.0	57.1		4.0	92.0	0.0	0.0	4.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.886	0.250	0.000	0.469	0.577	0.850	0.000	0.250	0.250	0.000	0.000	0.500	0.583	0.250	0.767	0.000	0.000	0.500	0.000	0.694	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.807
Entering Leg	0	39	1	0	15	30	85	0	2	1	0	0	4	7	2	46	0	0	2	0	50	0	0	0	0	0	0	0	142
Exiting Leg							91							7							42							2	142
Total							176							14							92							2	284

PDI File #: **175597 A**
Location: **N: Larz Anderson Bridge S: North Harvard Street**
Location: **E: Soldiers Field Road Ramps W: Soldiers Field Road Ramps**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	Larz Anderson Bridge							Soldiers Field Road Ramps							North Harvard Street							Soldiers Field Road Ramps							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	1	1	0	0	0	0	28	31	59	0	0	0	0	3	7	10	0	0	0	0	15	30	45	115
4:15 PM	0	0	0	0	2	8	10	0	0	0	0	56	17	73	0	0	0	0	7	6	13	0	0	0	0	15	38	53	149
4:30 PM	0	0	0	0	2	2	4	0	0	0	0	25	19	44	0	0	0	0	9	2	11	0	0	0	0	18	22	40	99
4:45 PM	0	0	0	0	4	3	7	0	0	0	0	21	21	42	0	0	0	0	5	5	10	0	0	0	0	26	23	49	108
Total	0	0	0	0	8	14	22	0	0	0	0	130	88	218	0	0	0	0	24	20	44	0	0	0	0	74	113	187	471
5:00 PM	0	0	0	0	8	5	13	0	0	0	0	21	61	82	0	0	0	0	7	3	10	0	0	0	0	19	38	57	162
5:15 PM	0	0	0	0	7	3	10	0	0	0	0	41	48	89	0	0	0	0	21	9	30	0	0	0	0	25	29	54	183
5:30 PM	0	0	0	0	10	3	13	0	0	0	0	40	36	76	0	0	0	0	5	1	6	0	0	0	0	35	33	68	163
5:45 PM	0	0	0	0	11	9	20	0	0	0	0	23	40	63	0	0	0	0	7	3	10	0	0	0	0	11	34	45	138
Total	0	0	0	0	36	20	56	0	0	0	0	125	185	310	0	0	0	0	40	16	56	0	0	0	0	90	134	224	646
Grand Total	0	0	0	0	44	34	78	0	0	0	0	255	273	528	0	0	0	0	64	36	100	0	0	0	0	164	247	411	1117
Approach %	0.0	0.0	0.0	0.0	56.4	43.6		0.0	0.0	0.0	0.0	48.3	51.7		0.0	0.0	0.0	0.0	64.0	36.0		0.0	0.0	0.0	0.0	39.9	60.1		
Total %	0.0	0.0	0.0	0.0	3.9	3.0	7.0	0.0	0.0	0.0	0.0	22.8	24.4	47.3	0.0	0.0	0.0	0.0	5.7	3.2	9.0	0.0	0.0	0.0	0.0	14.7	22.1	36.8	
Exiting Leg Total							78							528							100							411	1117

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	Larz Anderson Bridge							Soldiers Field Road Ramps							North Harvard Street							Soldiers Field Road Ramps							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	0	0	0	0	8	5	13	0	0	0	0	21	61	82	0	0	0	0	7	3	10	0	0	0	0	19	38	57	162
5:15 PM	0	0	0	0	7	3	10	0	0	0	0	41	48	89	0	0	0	0	21	9	30	0	0	0	0	25	29	54	183
5:30 PM	0	0	0	0	10	3	13	0	0	0	0	40	36	76	0	0	0	0	5	1	6	0	0	0	0	35	33	68	163
5:45 PM	0	0	0	0	11	9	20	0	0	0	0	23	40	63	0	0	0	0	7	3	10	0	0	0	0	11	34	45	138
Total Volume	0	0	0	0	36	20	56	0	0	0	0	125	185	310	0	0	0	0	40	16	56	0	0	0	0	90	134	224	646
% Approach Total	0.0	0.0	0.0	0.0	64.3	35.7		0.0	0.0	0.0	0.0	40.3	59.7		0.0	0.0	0.0	0.0	71.4	28.6		0.0	0.0	0.0	0.0	40.2	59.8		
PHF	0.000	0.000	0.000	0.000	0.818	0.556	0.700	0.000	0.000	0.000	0.000	0.762	0.758	0.871	0.000	0.000	0.000	0.000	0.476	0.444	0.467	0.000	0.000	0.000	0.000	0.643	0.882	0.824	0.883
Entering Leg	0	0	0	0	36	20	56	0	0	0	0	125	185	310	0	0	0	0	40	16	56	0	0	0	0	90	134	224	646
Exiting Leg							56							310							56							224	646
Total							112							620							112							448	1292

PDI File #: **175597 B**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Western Avenue W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars, Heavy Vehicles, and Buses (Combined)

	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	29	24	8	0	61	13	60	17	0	90	12	37	32	0	81	0	41	12	0	53	285
7:15 AM	31	22	3	0	56	17	45	9	0	71	15	45	27	0	87	1	66	29	0	96	310
7:30 AM	41	38	11	0	90	16	64	16	0	96	12	51	30	0	93	1	56	38	0	95	374
7:45 AM	28	37	6	0	71	26	62	16	0	104	8	46	44	0	98	0	73	23	0	96	369
Total	129	121	28	0	278	72	231	58	0	361	47	179	133	0	359	2	236	102	0	340	1338
8:00 AM	23	27	4	0	54	14	75	14	0	103	8	25	41	0	74	3	72	34	0	109	340
8:15 AM	22	30	5	0	57	26	70	16	0	112	10	70	44	0	124	0	53	35	0	88	381
8:30 AM	19	23	2	0	44	18	68	19	0	105	4	40	26	0	70	1	63	40	0	104	323
8:45 AM	35	35	9	0	79	21	57	28	0	106	12	58	38	0	108	1	61	52	0	114	407
Total	99	115	20	0	234	79	270	77	0	426	34	193	149	0	376	5	249	161	0	415	1451
Grand Total	228	236	48	0	512	151	501	135	0	787	81	372	282	0	735	7	485	263	0	755	2789
Approach %	44.5	46.1	9.4	0.0		19.2	63.7	17.2	0.0		11.0	50.6	38.4	0.0		0.9	64.2	34.8	0.0		
Total %	8.2	8.5	1.7	0.0	18.4	5.4	18.0	4.8	0.0	28.2	2.9	13.3	10.1	0.0	26.4	0.3	17.4	9.4	0.0	27.1	
Exiting Leg Total					786					614					378					1011	2789
Cars	206	211	41	0	458	123	453	122	0	698	74	320	254	0	648	6	439	243	0	688	2492
% Cars	90.4	89.4	85.4	0.0	89.5	81.5	90.4	90.4	0.0	88.7	91.4	86.0	90.1	0.0	88.2	85.7	90.5	92.4	0.0	91.1	89.4
Exiting Leg Total					686					554					339					913	2492
Heavy Vehicles	13	14	7	0	34	18	39	9	0	66	7	31	22	0	60	1	32	11	0	44	204
% Heavy Vehicles	5.7	5.9	14.6	0.0	6.6	11.9	7.8	6.7	0.0	8.4	8.6	8.3	7.8	0.0	8.2	14.3	6.6	4.2	0.0	5.8	7.3
Exiting Leg Total					60					46					24					74	204
Buses	9	11	0	0	20	10	9	4	0	23	0	21	6	0	27	0	14	9	0	23	93
% Buses	3.9	4.7	0.0	0.0	3.9	6.6	1.8	3.0	0.0	2.9	0.0	5.6	2.1	0.0	3.7	0.0	2.9	3.4	0.0	3.0	3.3
Exiting Leg Total					40					14					15					24	93

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:30 AM	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:30 AM	41	38	11	0	90	16	64	16	0	96	12	51	30	0	93	1	56	38	0	95	374
7:45 AM	28	37	6	0	71	26	62	16	0	104	8	46	44	0	98	0	73	23	0	96	369
8:00 AM	23	27	4	0	54	14	75	14	0	103	8	25	41	0	74	3	72	34	0	109	340
8:15 AM	22	30	5	0	57	26	70	16	0	112	10	70	44	0	124	0	53	35	0	88	381
Total Volume	114	132	26	0	272	82	271	62	0	415	38	192	159	0	389	4	254	130	0	388	1464
% Approach Total	41.9	48.5	9.6	0.0		19.8	65.3	14.9	0.0		9.8	49.4	40.9	0.0		1.0	65.5	33.5	0.0		
PHF	0.695	0.868	0.591	0.000	0.756	0.788	0.903	0.969	0.000	0.926	0.792	0.686	0.903	0.000	0.784	0.333	0.870	0.855	0.000	0.890	0.961
Cars	106	119	22	0	247	69	241	56	0	366	35	169	144	0	348	3	228	119	0	350	1311
Cars %	93.0	90.2	84.6	0.0	90.8	84.1	88.9	90.3	0.0	88.2	92.1	88.0	90.6	0.0	89.5	75.0	89.8	91.5	0.0	90.2	89.5
Heavy Vehicles	5	8	4	0	17	9	27	3	0	39	3	15	12	0	30	1	19	7	0	27	113
Heavy Vehicles %	4.4	6.1	15.4	0.0	6.3	11.0	10.0	4.8	0.0	9.4	7.9	7.8	7.5	0.0	7.7	25.0	7.5	5.4	0.0	7.0	7.7
Buses	3	5	0	0	8	4	3	3	0	10	0	8	3	0	11	0	7	4	0	11	40
Buses %	2.6	3.8	0.0	0.0	2.9	4.9	1.1	4.8	0.0	2.4	0.0	4.2	1.9	0.0	2.8	0.0	2.8	3.1	0.0	2.8	2.7
Cars Enter Leg	106	119	22	0	247	69	241	56	0	366	35	169	144	0	348	3	228	119	0	350	1311
Heavy Enter Leg	5	8	4	0	17	9	27	3	0	39	3	15	12	0	30	1	19	7	0	27	113
Bus Enter Leg	3	5	0	0	8	4	3	3	0	10	0	8	3	0	11	0	7	4	0	11	40
Total Entering Leg	114	132	26	0	272	82	271	62	0	415	38	192	159	0	389	4	254	130	0	388	1464
Cars Exiting Leg					357					285					178					491	1311
Heavy Exiting Leg					31					26					12					44	113
Buses Exiting Leg					16					7					8					9	40
Total Exiting Leg					404					318					198					544	1464

PDI File #:	**175597 B**
Location:	**N: North Harvard Street S: North Harvard Street**
Location:	**E: Western Avenue W: Western Avenue**
City, State:	**Allston, MA**
Client:	**VHB/ M. Baidy**
Site Code:	**13581.03**
Count Date:	**Wednesday, April 12, 2017**
Start Time:	**7:00 AM**
End Time:	**9:00 AM**
Class:	

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars

	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	27	22	7	0	56	11	54	15	0	80	11	30	28	0	69	0	36	11	0	47	252
7:15 AM	25	19	3	0	47	12	41	7	0	60	14	40	22	0	76	1	63	26	0	90	273
7:30 AM	38	36	10	0	84	11	55	13	0	79	11	40	26	0	77	0	52	34	0	86	326
7:45 AM	25	34	5	0	64	25	57	14	0	96	7	43	39	0	89	0	63	21	0	84	333
Total	115	111	25	0	251	59	207	49	0	315	43	153	115	0	311	1	214	92	0	307	1184
8:00 AM	23	22	3	0	48	10	68	14	0	92	8	23	39	0	70	3	67	32	0	102	312
8:15 AM	20	27	4	0	51	23	61	15	0	99	9	63	40	0	112	0	46	32	0	78	340
8:30 AM	14	20	2	0	36	13	67	17	0	97	4	36	24	0	64	1	54	37	0	92	289
8:45 AM	34	31	7	0	72	18	50	27	0	95	10	45	36	0	91	1	58	50	0	109	367
Total	91	100	16	0	207	64	246	73	0	383	31	167	139	0	337	5	225	151	0	381	1308
Grand Total	206	211	41	0	458	123	453	122	0	698	74	320	254	0	648	6	439	243	0	688	2492
Approach %	45.0	46.1	9.0	0.0		17.6	64.9	17.5	0.0		11.4	49.4	39.2	0.0		0.9	63.8	35.3	0.0		
Total %	8.3	8.5	1.6	0.0	18.4	4.9	18.2	4.9	0.0	28.0	3.0	12.8	10.2	0.0	26.0	0.2	17.6	9.8	0.0	27.6	
Exiting Leg Total					686					554					339					913	2492

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:30 AM	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:30 AM	38	36	10	0	84	11	55	13	0	79	11	40	26	0	77	0	52	34	0	86	326
7:45 AM	25	34	5	0	64	25	57	14	0	96	7	43	39	0	89	0	63	21	0	84	333
8:00 AM	23	22	3	0	48	10	68	14	0	92	8	23	39	0	70	3	67	32	0	102	312
8:15 AM	20	27	4	0	51	23	61	15	0	99	9	63	40	0	112	0	46	32	0	78	340
Total Volume	106	119	22	0	247	69	241	56	0	366	35	169	144	0	348	3	228	119	0	350	1311
% Approach Total	42.9	48.2	8.9	0.0		18.9	65.8	15.3	0.0		10.1	48.6	41.4	0.0		0.9	65.1	34.0	0.0		
PHF	0.697	0.826	0.550	0.000	0.735	0.690	0.886	0.933	0.000	0.924	0.795	0.671	0.900	0.000	0.777	0.250	0.851	0.875	0.000	0.858	0.964
Entering Leg	106	119	22	0	247	69	241	56	0	366	35	169	144	0	348	3	228	119	0	350	1311
Exiting Leg					357					285					178					491	1311
Total					604					651					526					841	2622

PDI File #: **175597 B**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Western Avenue W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION
DATA
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Heavy Vehicles

	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	1	1	1	0	3	0	3	1	0	4	1	4	2	0	7	0	4	0	0	4	18
7:15 AM	3	1	0	0	4	4	3	2	0	9	1	3	4	0	8	0	2	1	0	3	24
7:30 AM	2	2	1	0	5	4	7	1	0	12	1	6	4	0	11	1	4	3	0	8	36
7:45 AM	2	2	1	0	5	1	4	1	0	6	1	3	4	0	8	0	7	2	0	9	28
Total	8	6	3	0	17	9	17	5	0	31	4	16	14	0	34	1	17	6	0	24	106
8:00 AM	0	1	1	0	2	2	7	0	0	9	0	2	1	0	3	0	3	0	0	3	17
8:15 AM	1	3	1	0	5	2	9	1	0	12	1	4	3	0	8	0	5	2	0	7	32
8:30 AM	4	1	0	0	5	4	1	2	0	7	0	2	2	0	4	0	6	1	0	7	23
8:45 AM	0	3	2	0	5	1	5	1	0	7	2	7	2	0	11	0	1	2	0	3	26
Total	5	8	4	0	17	9	22	4	0	35	3	15	8	0	26	0	15	5	0	20	98
Grand Total	13	14	7	0	34	18	39	9	0	66	7	31	22	0	60	1	32	11	0	44	204
Approach %	38.2	41.2	20.6	0.0		27.3	59.1	13.6	0.0		11.7	51.7	36.7	0.0		2.3	72.7	25.0	0.0		
Total %	6.4	6.9	3.4	0.0	16.7	8.8	19.1	4.4	0.0	32.4	3.4	15.2	10.8	0.0	29.4	0.5	15.7	5.4	0.0	21.6	
Exiting Leg Total					60					46					24					74	204

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:30 AM	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:30 AM	2	2	1	0	5	4	7	1	0	12	1	6	4	0	11	1	4	3	0	8	36
7:45 AM	2	2	1	0	5	1	4	1	0	6	1	3	4	0	8	0	7	2	0	9	28
8:00 AM	0	1	1	0	2	2	7	0	0	9	0	2	1	0	3	0	3	0	0	3	17
8:15 AM	1	3	1	0	5	2	9	1	0	12	1	4	3	0	8	0	5	2	0	7	32
Total Volume	5	8	4	0	17	9	27	3	0	39	3	15	12	0	30	1	19	7	0	27	113
% Approach Total	29.4	47.1	23.5	0.0		23.1	69.2	7.7	0.0		10.0	50.0	40.0	0.0		3.7	70.4	25.9	0.0		
PHF	0.625	0.667	1.000	0.000	0.850	0.563	0.750	0.750	0.000	0.813	0.750	0.625	0.750	0.000	0.682	0.250	0.679	0.583	0.000	0.750	0.785
Entering Leg	5	8	4	0	17	9	27	3	0	39	3	15	12	0	30	1	19	7	0	27	113
Exiting Leg					31					26					12					44	113
Total					48					65					42					71	226

PDI File #: **175597 B**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Western Avenue W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Buses

	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	1	1	0	0	2	2	3	1	0	6	0	3	2	0	5	0	1	1	0	2	15
7:15 AM	3	2	0	0	5	1	1	0	0	2	0	2	1	0	3	0	1	2	0	3	13
7:30 AM	1	0	0	0	1	1	2	2	0	5	0	5	0	0	5	0	0	1	0	1	12
7:45 AM	1	1	0	0	2	0	1	1	0	2	0	0	1	0	1	0	3	0	0	3	8
Total	6	4	0	0	10	4	7	4	0	15	0	10	4	0	14	0	5	4	0	9	48
8:00 AM	0	4	0	0	4	2	0	0	0	2	0	0	1	0	1	0	2	2	0	4	11
8:15 AM	1	0	0	0	1	1	0	0	0	1	0	3	1	0	4	0	2	1	0	3	9
8:30 AM	1	2	0	0	3	1	0	0	0	1	0	2	0	0	2	0	3	2	0	5	11
8:45 AM	1	1	0	0	2	2	2	0	0	4	0	6	0	0	6	0	2	0	0	2	14
Total	3	7	0	0	10	6	2	0	0	8	0	11	2	0	13	0	9	5	0	14	45
Grand Total	9	11	0	0	20	10	9	4	0	23	0	21	6	0	27	0	14	9	0	23	93
Approach %	45.0	55.0	0.0	0.0		43.5	39.1	17.4	0.0		0.0	77.8	22.2	0.0		0.0	60.9	39.1	0.0		
Total %	9.7	11.8	0.0	0.0	21.5	10.8	9.7	4.3	0.0	24.7	0.0	22.6	6.5	0.0	29.0	0.0	15.1	9.7	0.0	24.7	
Exiting Leg Total					40					14					15					24	93

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	1	1	0	0	2	2	3	1	0	6	0	3	2	0	5	0	1	1	0	2	15
7:15 AM	3	2	0	0	5	1	1	0	0	2	0	2	1	0	3	0	1	2	0	3	13
7:30 AM	1	0	0	0	1	1	2	2	0	5	0	5	0	0	5	0	0	1	0	1	12
7:45 AM	1	1	0	0	2	0	1	1	0	2	0	0	1	0	1	0	3	0	0	3	8
Total Volume	6	4	0	0	10	4	7	4	0	15	0	10	4	0	14	0	5	4	0	9	48
% Approach Total	60.0	40.0	0.0	0.0		26.7	46.7	26.7	0.0		0.0	71.4	28.6	0.0		0.0	55.6	44.4	0.0		
PHF	0.500	0.500	0.000	0.000	0.500	0.500	0.583	0.500	0.000	0.625	0.000	0.500	0.500	0.000	0.700	0.000	0.417	0.500	0.000	0.750	0.800
Entering Leg	6	4	0	0	10	4	7	4	0	15	0	10	4	0	14	0	5	4	0	9	48
Exiting Leg					18					5					8					17	48
Total					28					20					22					26	96

PDI File #: **175597 B**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Western Avenue W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Bicycles (on Roadway and Crosswalks)

	North Harvard Street							Western Avenue							North Harvard Street							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	7	0	0	0	1	8	0	3	0	0	1	0	4	14
7:15 AM	0	3	0	0	0	0	3	1	1	0	0	0	0	2	2	3	0	0	0	0	5	0	3	0	0	0	0	3	13
7:30 AM	0	10	4	0	1	0	15	0	1	1	0	0	0	2	2	7	0	0	0	0	9	0	4	0	0	0	0	4	30
7:45 AM	1	5	0	0	0	0	6	1	1	0	0	1	0	3	1	8	0	0	0	0	9	0	5	1	0	1	0	7	25
Total	1	18	4	0	1	0	24	2	3	1	0	1	2	9	5	25	0	0	0	1	31	0	15	1	0	2	0	18	82
8:00 AM	0	3	1	0	0	0	4	0	4	0	0	0	0	4	1	10	1	0	0	1	13	0	2	2	0	0	0	4	25
8:15 AM	0	6	0	0	0	0	6	3	4	0	0	0	0	7	3	11	0	0	0	0	14	0	9	5	0	0	0	14	41
8:30 AM	0	0	0	0	0	0	0	1	4	0	0	0	0	5	3	9	0	0	0	0	12	0	7	1	0	0	0	8	25
8:45 AM	1	4	0	0	0	0	5	2	4	0	0	0	0	6	1	18	1	0	0	2	22	0	5	3	0	0	0	8	41
Total	1	13	1	0	0	0	15	6	16	0	0	0	0	22	8	48	2	0	0	3	61	0	23	11	0	0	0	34	132
Grand Total	2	31	5	0	1	0	39	8	19	1	0	1	2	31	13	73	2	0	0	4	92	0	38	12	0	2	0	52	214
Approach %	5.1	79.5	12.8	0.0	2.6	0.0		25.8	61.3	3.2	0.0	3.2	6.5		14.1	79.3	2.2	0.0	0.0	4.3		0.0	73.1	23.1	0.0	3.8	0.0		
Total %	0.9	14.5	2.3	0.0	0.5	0.0	18.2	3.7	8.9	0.5	0.0	0.5	0.9	14.5	6.1	34.1	0.9	0.0	0.0	1.9	43.0	0.0	17.8	5.6	0.0	0.9	0.0	24.3	
Exiting Leg Total							94							59							36							25	214

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street							Western Avenue							North Harvard Street							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	0	3	1	0	0	0	4	0	4	0	0	0	0	4	1	10	1	0	0	1	13	0	2	2	0	0	0	4	25
8:15 AM	0	6	0	0	0	0	6	3	4	0	0	0	0	7	3	11	0	0	0	0	14	0	9	5	0	0	0	14	41
8:30 AM	0	0	0	0	0	0	0	1	4	0	0	0	0	5	3	9	0	0	0	0	12	0	7	1	0	0	0	8	25
8:45 AM	1	4	0	0	0	0	5	2	4	0	0	0	0	6	1	18	1	0	0	2	22	0	5	3	0	0	0	8	41
Total Volume	1	13	1	0	0	0	15	6	16	0	0	0	0	22	8	48	2	0	0	3	61	0	23	11	0	0	0	34	132
% Approach Total	6.7	86.7	6.7	0.0	0.0	0.0		27.3	72.7	0.0	0.0	0.0	0.0		13.1	78.7	3.3	0.0	0.0	4.9		0.0	67.6	32.4	0.0	0.0	0.0		
PHF	0.250	0.542	0.250	0.000	0.000	0.000	0.625	0.500	1.000	0.000	0.000	0.000	0.000	0.786	0.667	0.667	0.500	0.000	0.000	0.375	0.693	0.000	0.639	0.550	0.000	0.000	0.000	0.607	0.805
Entering Leg	1	13	1	0	0	0	15	6	16	0	0	0	0	22	8	48	2	0	0	3	61	0	23	11	0	0	0	34	132
Exiting Leg							65							32							16							19	132
Total							80							54							77							53	264

PDI File #: **175597 B**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Western Avenue W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION
DATA
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	North Harvard Street							Western Avenue							North Harvard Street							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	2	7	9	0	0	0	0	0	0	0	0	0	0	0	4	3	7	16
7:15 AM	0	0	0	0	1	1	2	0	0	0	0	2	6	8	0	0	0	0	0	2	2	0	0	0	0	7	7	14	26
7:30 AM	0	0	0	0	7	1	8	0	0	0	0	0	9	9	0	0	0	0	0	0	0	0	0	0	0	12	12	24	41
7:45 AM	0	0	0	0	0	2	2	0	0	0	0	3	13	16	0	0	0	0	1	6	7	0	0	0	0	4	13	17	42
Total	0	0	0	0	8	4	12	0	0	0	0	7	35	42	0	0	0	0	1	8	9	0	0	0	0	27	35	62	125
8:00 AM	0	0	0	0	1	0	1	0	0	0	0	0	24	24	0	0	0	0	1	8	9	0	0	0	0	12	2	14	48
8:15 AM	0	0	0	0	10	3	13	0	0	0	0	0	14	14	0	0	0	0	3	9	12	0	0	0	0	10	7	17	56
8:30 AM	0	0	0	0	14	5	19	0	0	0	0	1	11	12	0	0	0	0	3	3	6	0	0	0	0	20	2	22	59
8:45 AM	0	0	0	0	7	2	9	0	0	0	0	3	11	14	0	0	0	0	3	4	7	0	0	0	0	9	7	16	46
Total	0	0	0	0	32	10	42	0	0	0	0	4	60	64	0	0	0	0	10	24	34	0	0	0	0	51	18	69	209
Grand Total	0	0	0	0	40	14	54	0	0	0	0	11	95	106	0	0	0	0	11	32	43	0	0	0	0	78	53	131	334
Approach %	0.0	0.0	0.0	0.0	74.1	25.9		0.0	0.0	0.0	0.0	10.4	89.6		0.0	0.0	0.0	0.0	25.6	74.4		0.0	0.0	0.0	0.0	59.5	40.5		
Total %	0.0	0.0	0.0	0.0	12.0	4.2	16.2	0.0	0.0	0.0	0.0	3.3	28.4	31.7	0.0	0.0	0.0	0.0	3.3	9.6	12.9	0.0	0.0	0.0	0.0	23.4	15.9	39.2	
Exiting Leg Total							54							106							43							131	334

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street							Western Avenue							North Harvard Street							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	0	0	0	0	1	0	1	0	0	0	0	0	24	24	0	0	0	0	1	8	9	0	0	0	0	12	2	14	48
8:15 AM	0	0	0	0	10	3	13	0	0	0	0	0	14	14	0	0	0	0	3	9	12	0	0	0	0	10	7	17	56
8:30 AM	0	0	0	0	14	5	19	0	0	0	0	1	11	12	0	0	0	0	3	3	6	0	0	0	0	20	2	22	59
8:45 AM	0	0	0	0	7	2	9	0	0	0	0	3	11	14	0	0	0	0	3	4	7	0	0	0	0	9	7	16	46
Total Volume	0	0	0	0	32	10	42	0	0	0	0	4	60	64	0	0	0	0	10	24	34	0	0	0	0	51	18	69	209
% Approach Total	0.0	0.0	0.0	0.0	76.2	23.8		0.0	0.0	0.0	0.0	6.3	93.8		0.0	0.0	0.0	0.0	29.4	70.6		0.0	0.0	0.0	0.0	73.9	26.1		
PHF	0.000	0.000	0.000	0.000	0.571	0.500	0.553	0.000	0.000	0.000	0.000	0.333	0.625	0.667	0.000	0.000	0.000	0.000	0.833	0.667	0.708	0.000	0.000	0.000	0.000	0.638	0.643	0.784	0.886
Entering Leg	0	0	0	0	32	10	42	0	0	0	0	4	60	64	0	0	0	0	10	24	34	0	0	0	0	51	18	69	209
Exiting Leg							42							64							34							69	209
Total							84							128							68							138	418

PDI File #: **175597 B**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Western Avenue W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars, Heavy Vehicles, and Buses (Combined)

	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	33	45	1	0	79	12	78	26	0	116	6	29	26	0	61	0	48	31	0	79	335
4:15 PM	32	58	4	0	94	20	95	20	0	135	5	55	27	0	87	2	32	28	0	62	378
4:30 PM	40	37	5	0	82	12	84	21	0	117	9	42	39	0	90	2	29	34	0	65	354
4:45 PM	45	41	5	0	91	19	139	24	0	182	5	56	36	0	97	1	37	16	0	54	424
Total	150	181	15	0	346	63	396	91	0	550	25	182	128	0	335	5	146	109	0	260	1491
5:00 PM	39	61	3	0	103	22	115	36	0	173	7	35	35	0	77	0	47	26	0	73	426
5:15 PM	51	61	8	0	120	19	113	23	0	155	10	54	26	0	90	1	40	25	0	66	431
5:30 PM	66	58	7	0	131	10	94	28	0	132	6	51	40	0	97	3	37	25	0	65	425
5:45 PM	33	71	3	0	107	21	105	33	0	159	4	43	35	0	82	4	35	27	0	66	414
Total	189	251	21	0	461	72	427	120	0	619	27	183	136	0	346	8	159	103	0	270	1696
Grand Total	339	432	36	0	807	135	823	211	0	1169	52	365	264	0	681	13	305	212	0	530	3187
Approach %	42.0	53.5	4.5	0.0		11.5	70.4	18.0	0.0		7.6	53.6	38.8	0.0		2.5	57.5	40.0	0.0		
Total %	10.6	13.6	1.1	0.0	25.3	4.2	25.8	6.6	0.0	36.7	1.6	11.5	8.3	0.0	21.4	0.4	9.6	6.7	0.0	16.6	
Exiting Leg Total					712					393					656					1426	3187
Cars	328	412	32	0	772	126	805	209	0	1140	50	341	251	0	642	13	289	199	0	501	3055
% Cars	96.8	95.4	88.9	0.0	95.7	93.3	97.8	99.1	0.0	97.5	96.2	93.4	95.1	0.0	94.3	100.0	94.8	93.9	0.0	94.5	95.9
Exiting Leg Total					666					371					634					1384	3055
Heavy Vehicles	3	8	2	0	13	1	7	2	0	10	1	8	8	0	17	0	7	4	0	11	51
% Heavy Vehicles	0.9	1.9	5.6	0.0	1.6	0.7	0.9	0.9	0.0	0.9	1.9	2.2	3.0	0.0	2.5	0.0	2.3	1.9	0.0	2.1	1.6
Exiting Leg Total					13					10					10					18	51
Buses	8	12	2	0	22	8	11	0	0	19	1	16	5	0	22	0	9	9	0	18	81
% Buses	2.4	2.8	5.6	0.0	2.7	5.9	1.3	0.0	0.0	1.6	1.9	4.4	1.9	0.0	3.2	0.0	3.0	4.2	0.0	3.4	2.5
Exiting Leg Total					33					12					12					24	81

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:45 PM	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:45 PM	45	41	5	0	91	19	139	24	0	182	5	56	36	0	97	1	37	16	0	54	424
5:00 PM	39	61	3	0	103	22	115	36	0	173	7	35	35	0	77	0	47	26	0	73	426
5:15 PM	51	61	8	0	120	19	113	23	0	155	10	54	26	0	90	1	40	25	0	66	431
5:30 PM	66	58	7	0	131	10	94	28	0	132	6	51	40	0	97	3	37	25	0	65	425
Total Volume	201	221	23	0	445	70	461	111	0	642	28	196	137	0	361	5	161	92	0	258	1706
% Approach Total	45.2	49.7	5.2	0.0		10.9	71.8	17.3	0.0		7.8	54.3	38.0	0.0		1.9	62.4	35.7	0.0		
PHF	0.761	0.906	0.719	0.000	0.849	0.795	0.829	0.771	0.000	0.882	0.700	0.875	0.856	0.000	0.930	0.417	0.856	0.885	0.000	0.884	0.990
Cars	193	211	20	0	424	66	449	110	0	625	27	185	130	0	342	5	153	85	0	243	1634
Cars %	96.0	95.5	87.0	0.0	95.3	94.3	97.4	99.1	0.0	97.4	96.4	94.4	94.9	0.0	94.7	100.0	95.0	92.4	0.0	94.2	95.8
Heavy Vehicles	2	3	2	0	7	1	6	1	0	8	1	2	6	0	9	0	3	3	0	6	30
Heavy Vehicles %	1.0	1.4	8.7	0.0	1.6	1.4	1.3	0.9	0.0	1.2	3.6	1.0	4.4	0.0	2.5	0.0	1.9	3.3	0.0	2.3	1.8
Buses	6	7	1	0	14	3	6	0	0	9	0	9	1	0	10	0	5	4	0	9	42
Buses %	3.0	3.2	4.3	0.0	3.1	4.3	1.3	0.0	0.0	1.4	0.0	4.6	0.7	0.0	2.8	0.0	3.1	4.3	0.0	3.5	2.5
Cars Enter Leg	193	211	20	0	424	66	449	110	0	625	27	185	130	0	342	5	153	85	0	243	1634
Heavy Enter Leg	2	3	2	0	7	1	6	1	0	8	1	2	6	0	9	0	3	3	0	6	30
Bus Enter Leg	6	7	1	0	14	3	6	0	0	9	0	9	1	0	10	0	5	4	0	9	42
Total Entering Leg	201	221	23	0	445	70	461	111	0	642	28	196	137	0	361	5	161	92	0	258	1706
Cars Exiting Leg					336					200					326					772	1634
Heavy Exiting Leg					6					6					4					14	30
Buses Exiting Leg					16					6					7					13	42
Total Exiting Leg					358					212					337					799	1706

PDI File #: **175597 B**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Western Avenue W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars

	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	33	42	0	0	75	11	77	26	0	114	5	29	25	0	59	0	44	29	0	73	321
4:15 PM	31	57	4	0	92	17	93	19	0	129	5	49	24	0	78	2	31	27	0	60	359
4:30 PM	40	34	5	0	79	12	83	21	0	116	9	37	38	0	84	2	27	32	0	61	340
4:45 PM	42	38	4	0	84	17	132	24	0	173	5	53	34	0	92	1	34	15	0	50	399
Total	146	171	13	0	330	57	385	90	0	532	24	168	121	0	313	5	136	103	0	244	1419
5:00 PM	37	59	2	0	98	21	114	35	0	170	6	33	35	0	74	0	46	23	0	69	411
5:15 PM	49	58	8	0	115	18	112	23	0	153	10	51	25	0	86	1	36	24	0	61	415
5:30 PM	65	56	6	0	127	10	91	28	0	129	6	48	36	0	90	3	37	23	0	63	409
5:45 PM	31	68	3	0	102	20	103	33	0	156	4	41	34	0	79	4	34	26	0	64	401
Total	182	241	19	0	442	69	420	119	0	608	26	173	130	0	329	8	153	96	0	257	1636
Grand Total	328	412	32	0	772	126	805	209	0	1140	50	341	251	0	642	13	289	199	0	501	3055
Approach %	42.5	53.4	4.1	0.0		11.1	70.6	18.3	0.0		7.8	53.1	39.1	0.0		2.6	57.7	39.7	0.0		
Total %	10.7	13.5	1.0	0.0	25.3	4.1	26.4	6.8	0.0	37.3	1.6	11.2	8.2	0.0	21.0	0.4	9.5	6.5	0.0	16.4	
Exiting Leg Total					666					371					634					1384	3055

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
5:00 PM	37	59	2	0	98	21	114	35	0	170	6	33	35	0	74	0	46	23	0	69	411
5:15 PM	49	58	8	0	115	18	112	23	0	153	10	51	25	0	86	1	36	24	0	61	415
5:30 PM	65	56	6	0	127	10	91	28	0	129	6	48	36	0	90	3	37	23	0	63	409
5:45 PM	31	68	3	0	102	20	103	33	0	156	4	41	34	0	79	4	34	26	0	64	401
Total Volume	182	241	19	0	442	69	420	119	0	608	26	173	130	0	329	8	153	96	0	257	1636
% Approach Total	41.2	54.5	4.3	0.0		11.3	69.1	19.6	0.0		7.9	52.6	39.5	0.0		3.1	59.5	37.4	0.0		
PHF	0.700	0.886	0.594	0.000	0.870	0.821	0.921	0.850	0.000	0.894	0.650	0.848	0.903	0.000	0.914	0.500	0.832	0.923	0.000	0.931	0.986
Entering Leg	182	241	19	0	442	69	420	119	0	608	26	173	130	0	329	8	153	96	0	257	1636
Exiting Leg					338					198					368					732	1636
Total					780					806					697					989	3272

PDI File #: **175597 B**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Western Avenue W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Heavy Vehicles

	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	2	1	0	3	5
4:15 PM	0	1	0	0	1	0	1	1	0	2	0	2	1	0	3	0	1	0	0	1	7
4:30 PM	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	0	1	0	0	1	7
4:45 PM	1	1	0	0	2	1	5	0	0	6	0	0	2	0	2	0	1	0	0	1	11
Total	1	5	0	0	6	1	6	1	0	8	0	6	4	0	10	0	5	1	0	6	30
5:00 PM	0	1	1	0	2	0	0	1	0	1	1	0	0	0	1	0	1	1	0	2	6
5:15 PM	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	3
5:30 PM	0	1	1	0	2	0	1	0	0	1	0	2	3	0	5	0	0	2	0	2	10
5:45 PM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	2	3	2	0	7	0	1	1	0	2	1	2	4	0	7	0	2	3	0	5	21
Grand Total	3	8	2	0	13	1	7	2	0	10	1	8	8	0	17	0	7	4	0	11	51
Approach %	23.1	61.5	15.4	0.0		10.0	70.0	20.0	0.0		5.9	47.1	47.1	0.0		0.0	63.6	36.4	0.0		
Total %	5.9	15.7	3.9	0.0	25.5	2.0	13.7	3.9	0.0	19.6	2.0	15.7	15.7	0.0	33.3	0.0	13.7	7.8	0.0	21.6	
Exiting Leg Total					13					10					10					18	51

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:15 PM	0	1	0	0	1	0	1	1	0	2	0	2	1	0	3	0	1	0	0	1	7
4:30 PM	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	0	1	0	0	1	7
4:45 PM	1	1	0	0	2	1	5	0	0	6	0	0	2	0	2	0	1	0	0	1	11
5:00 PM	0	1	1	0	2	0	0	1	0	1	1	0	0	0	1	0	1	1	0	2	6
Total Volume	1	5	1	0	7	1	6	2	0	9	1	6	3	0	10	0	4	1	0	5	31
% Approach Total	14.3	71.4	14.3	0.0		11.1	66.7	22.2	0.0		10.0	60.0	30.0	0.0		0.0	80.0	20.0	0.0		
PHF	0.250	0.625	0.250	0.000	0.875	0.250	0.300	0.500	0.000	0.375	0.250	0.375	0.375	0.000	0.625	0.000	1.000	0.250	0.000	0.625	0.705
Entering Leg	1	5	1	0	7	1	6	2	0	9	1	6	3	0	10	0	4	1	0	5	31
Exiting Leg					8					6					7					10	31
Total					15					15					17					15	62

PDI File #: **175597 B**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Western Avenue W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Buses

	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	2	1	0	3	1	1	0	0	2	1	0	0	0	1	0	2	1	0	3	9
4:15 PM	1	0	0	0	1	3	1	0	0	4	0	4	2	0	6	0	0	1	0	1	12
4:30 PM	0	1	0	0	1	0	1	0	0	1	0	1	1	0	2	0	1	2	0	3	7
4:45 PM	2	2	1	0	5	1	2	0	0	3	0	3	0	0	3	0	2	1	0	3	14
Total	3	5	2	0	10	5	5	0	0	10	1	8	3	0	12	0	5	5	0	10	42
5:00 PM	2	1	0	0	3	1	1	0	0	2	0	2	0	0	2	0	0	2	0	2	9
5:15 PM	1	3	0	0	4	1	1	0	0	2	0	3	0	0	3	0	3	1	0	4	13
5:30 PM	1	1	0	0	2	0	2	0	0	2	0	1	1	0	2	0	0	0	0	0	6
5:45 PM	1	2	0	0	3	1	2	0	0	3	0	2	1	0	3	0	1	1	0	2	11
Total	5	7	0	0	12	3	6	0	0	9	0	8	2	0	10	0	4	4	0	8	39
Grand Total	8	12	2	0	22	8	11	0	0	19	1	16	5	0	22	0	9	9	0	18	81
Approach %	36.4	54.5	9.1	0.0		42.1	57.9	0.0	0.0		4.5	72.7	22.7	0.0		0.0	50.0	50.0	0.0		
Total %	9.9	14.8	2.5	0.0	27.2	9.9	13.6	0.0	0.0	23.5	1.2	19.8	6.2	0.0	27.2	0.0	11.1	11.1	0.0	22.2	
Exiting Leg Total					33					12					12					24	81

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:30 PM	North Harvard Street					Western Avenue					North Harvard Street					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:30 PM	0	1	0	0	1	0	1	0	0	1	0	1	1	0	2	0	1	2	0	3	7
4:45 PM	2	2	1	0	5	1	2	0	0	3	0	3	0	0	3	0	2	1	0	3	14
5:00 PM	2	1	0	0	3	1	1	0	0	2	0	2	0	0	2	0	0	2	0	2	9
5:15 PM	1	3	0	0	4	1	1	0	0	2	0	3	0	0	3	0	3	1	0	4	13
Total Volume	5	7	1	0	13	3	5	0	0	8	0	9	1	0	10	0	6	6	0	12	43
% Approach Total	38.5	53.8	7.7	0.0		37.5	62.5	0.0	0.0		0.0	90.0	10.0	0.0		0.0	50.0	50.0	0.0		
PHF	0.625	0.583	0.250	0.000	0.650	0.750	0.625	0.000	0.000	0.667	0.000	0.750	0.250	0.000	0.833	0.000	0.500	0.750	0.000	0.750	0.768
Entering Leg	5	7	1	0	13	3	5	0	0	8	0	9	1	0	10	0	6	6	0	12	43
Exiting Leg					18					7					7					11	43
Total					31					15					17					23	86

PDI File #: **175597 B**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Western Avenue W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Bicycles (on Roadway and Crosswalks)

	North Harvard Street							Western Avenue							North Harvard Street							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	3	7	0	0	0	0	10	0	3	2	0	0	0	5	0	1	0	0	0	0	1	0	2	0	0	0	0	2	18
4:15 PM	2	10	0	0	0	0	12	0	2	2	0	0	0	4	0	4	0	0	0	0	4	0	1	0	0	0	0	1	21
4:30 PM	1	1	0	0	0	0	2	0	2	1	0	1	0	4	0	3	0	0	0	0	3	0	1	0	0	0	0	1	10
4:45 PM	1	6	0	0	0	0	7	0	6	1	0	0	0	7	0	1	0	0	0	0	1	0	0	0	0	0	0	0	15
Total	7	24	0	0	0	0	31	0	13	6	0	1	0	20	0	9	0	0	0	0	9	0	4	0	0	0	0	4	64
5:00 PM	6	10	0	0	0	0	16	0	5	1	0	0	0	6	0	2	0	0	0	0	2	0	3	1	0	0	0	4	28
5:15 PM	1	5	0	0	0	0	6	0	7	4	0	0	0	11	1	3	0	0	0	0	4	0	3	3	0	1	0	7	28
5:30 PM	0	14	0	0	0	0	14	0	5	4	0	0	1	10	1	7	0	0	0	0	8	0	0	2	0	0	0	2	34
5:45 PM	0	3	0	0	0	0	3	0	6	1	0	0	0	7	0	4	0	0	0	0	4	0	3	2	0	1	0	6	20
Total	7	32	0	0	0	0	39	0	23	10	0	0	1	34	2	16	0	0	0	0	18	0	9	8	0	2	0	19	110
Grand Total	14	56	0	0	0	0	70	0	36	16	0	1	1	54	2	25	0	0	0	0	27	0	13	8	0	2	0	23	174
Approach %	20.0	80.0	0.0	0.0	0.0	0.0		0.0	66.7	29.6	0.0	1.9	1.9		7.4	92.6	0.0	0.0	0.0	0.0		0.0	56.5	34.8	0.0	8.7	0.0		
Total %	8.0	32.2	0.0	0.0	0.0	0.0	40.2	0.0	20.7	9.2	0.0	0.6	0.6	31.0	1.1	14.4	0.0	0.0	0.0	0.0	15.5	0.0	7.5	4.6	0.0	1.1	0.0	13.2	
Exiting Leg Total							33							17							72							52	174

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	North Harvard Street							Western Avenue							North Harvard Street							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	6	10	0	0	0	0	16	0	5	1	0	0	0	6	0	2	0	0	0	0	2	0	3	1	0	0	0	4	28
5:15 PM	1	5	0	0	0	0	6	0	7	4	0	0	0	11	1	3	0	0	0	0	4	0	3	3	0	1	0	7	28
5:30 PM	0	14	0	0	0	0	14	0	5	4	0	0	1	10	1	7	0	0	0	0	8	0	0	2	0	0	0	2	34
5:45 PM	0	3	0	0	0	0	3	0	6	1	0	0	0	7	0	4	0	0	0	0	4	0	3	2	0	1	0	6	20
Total Volume	7	32	0	0	0	0	39	0	23	10	0	0	1	34	2	16	0	0	0	0	18	0	9	8	0	2	0	19	110
% Approach Total	17.9	82.1	0.0	0.0	0.0	0.0		0.0	67.6	29.4	0.0	0.0	2.9		11.1	88.9	0.0	0.0	0.0	0.0		0.0	47.4	42.1	0.0	10.5	0.0		
PHF	0.292	0.571	0.000	0.000	0.000	0.000	0.609	0.000	0.821	0.625	0.000	0.000	0.250	0.773	0.500	0.571	0.000	0.000	0.000	0.000	0.563	0.000	0.750	0.667	0.000	0.500	0.000	0.679	0.809
Entering Leg	7	32	0	0	0	0	39	0	23	10	0	0	1	34	2	16	0	0	0	0	18	0	9	8	0	2	0	19	110
Exiting Leg							24							12							42							32	110
Total							63							46							60							51	220

PDI File #: **175597 B**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Western Avenue W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	North Harvard Street							Western Avenue							North Harvard Street							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	4	6	10	0	0	0	0	2	2	4	0	0	0	0	0	0	0	0	0	0	0	2	3	5	19
4:15 PM	0	0	0	0	2	1	3	0	0	0	0	3	5	8	0	0	0	0	2	1	3	0	0	0	0	1	7	8	22
4:30 PM	0	0	0	0	1	34	35	0	0	0	0	4	1	5	0	0	0	0	0	1	1	0	0	0	0	6	11	17	58
4:45 PM	0	0	0	0	3	3	6	0	0	0	0	5	0	5	0	0	0	0	3	0	3	0	0	0	0	3	10	13	27
Total	0	0	0	0	10	44	54	0	0	0	0	14	8	22	0	0	0	0	5	2	7	0	0	0	0	12	31	43	126
5:00 PM	0	0	0	0	10	5	15	0	0	0	0	4	11	15	0	0	0	0	1	6	7	0	0	0	0	8	12	20	57
5:15 PM	0	0	0	0	2	2	4	0	0	0	0	6	9	15	0	0	0	0	3	5	8	0	0	0	0	14	18	32	59
5:30 PM	0	0	0	0	6	5	11	0	0	0	0	7	3	10	0	0	0	0	17	1	18	0	0	0	0	13	22	35	74
5:45 PM	0	0	0	0	3	4	7	0	0	0	0	5	40	45	0	0	0	0	14	34	48	0	0	0	0	11	15	26	126
Total	0	0	0	0	21	16	37	0	0	0	0	22	63	85	0	0	0	0	35	46	81	0	0	0	0	46	67	113	316
Grand Total	0	0	0	0	31	60	91	0	0	0	0	36	71	107	0	0	0	0	40	48	88	0	0	0	0	58	98	156	442
Approach %	0.0	0.0	0.0	0.0	34.1	65.9		0.0	0.0	0.0	0.0	33.6	66.4		0.0	0.0	0.0	0.0	45.5	54.5		0.0	0.0	0.0	0.0	37.2	62.8		
Total %	0.0	0.0	0.0	0.0	7.0	13.6	20.6	0.0	0.0	0.0	0.0	8.1	16.1	24.2	0.0	0.0	0.0	0.0	9.0	10.9	19.9	0.0	0.0	0.0	0.0	13.1	22.2	35.3	
Exiting Leg Total							91							107							88							156	442

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	North Harvard Street							Western Avenue							North Harvard Street							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	0	0	0	0	10	5	15	0	0	0	0	4	11	15	0	0	0	0	1	6	7	0	0	0	0	8	12	20	57
5:15 PM	0	0	0	0	2	2	4	0	0	0	0	6	9	15	0	0	0	0	3	5	8	0	0	0	0	14	18	32	59
5:30 PM	0	0	0	0	6	5	11	0	0	0	0	7	3	10	0	0	0	0	17	1	18	0	0	0	0	13	22	35	74
5:45 PM	0	0	0	0	3	4	7	0	0	0	0	5	40	45	0	0	0	0	14	34	48	0	0	0	0	11	15	26	126
Total Volume	0	0	0	0	21	16	37	0	0	0	0	22	63	85	0	0	0	0	35	46	81	0	0	0	0	46	67	113	316
% Approach Total	0.0	0.0	0.0	0.0	56.8	43.2		0.0	0.0	0.0	0.0	25.9	74.1		0.0	0.0	0.0	0.0	43.2	56.8		0.0	0.0	0.0	0.0	40.7	59.3		
PHF	0.000	0.000	0.000	0.000	0.525	0.800	0.617	0.000	0.000	0.000	0.000	0.786	0.394	0.472	0.000	0.000	0.000	0.000	0.515	0.338	0.422	0.000	0.000	0.000	0.000	0.821	0.761	0.807	0.627
Entering Leg	0	0	0	0	21	16	37	0	0	0	0	22	63	85	0	0	0	0	35	46	81	0	0	0	0	46	67	113	316
Exiting Leg							37							85							81							113	316
Total							74							170							162							226	632

PDI File #:	**175597 D**
Location:	**N: North Harvard Street S: Conrail Driveway**
Location:	**E: Cambridge Street W: Cambridge Street**
City, State:	**Allston, MA**
Client:	**VHB/ M. Baidy**
Site Code:	**13581.03**
Count Date:	**Wednesday, April 12, 2017**
Start Time:	**7:00 AM**
End Time:	**9:00 AM**
Class:	

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars, Heavy Vehicles, and Buses (Combined)

	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	40	0	59	0	99	59	200	0	0	259	0	0	0	0	0	0	285	25	0	310	668
7:15 AM	30	0	68	0	98	66	192	0	0	258	0	0	0	0	0	0	301	30	0	331	687
7:30 AM	28	0	88	0	116	68	210	0	0	278	0	0	0	0	0	0	385	31	0	416	810
7:45 AM	47	0	76	0	123	89	217	0	0	306	0	0	0	0	0	0	376	31	1	408	837
Total	145	0	291	0	436	282	819	0	0	1101	0	0	0	0	0	0	1347	117	1	1465	3002
8:00 AM	35	0	89	0	124	75	224	0	4	303	0	0	0	0	0	0	377	30	0	407	834
8:15 AM	31	0	79	0	110	74	215	0	0	289	0	0	0	0	0	0	348	36	0	384	783
8:30 AM	37	0	76	0	113	101	233	0	0	334	0	1	0	0	1	0	401	24	0	425	873
8:45 AM	45	0	91	0	136	79	218	0	0	297	0	0	0	0	0	0	383	48	0	431	864
Total	148	0	335	0	483	329	890	0	4	1223	0	1	0	0	1	0	1509	138	0	1647	3354
Grand Total	293	0	626	0	919	611	1709	0	4	2324	0	1	0	0	1	0	2856	255	1	3112	6356
Approach %	31.9	0.0	68.1	0.0		26.3	73.5	0.0	0.2		0.0	100.0	0.0	0.0		0.0	91.8	8.2	0.0		
Total %	4.6	0.0	9.8	0.0	14.5	9.6	26.9	0.0	0.1	36.6	0.0	0.0	0.0	0.0	0.0	0.0	44.9	4.0	0.0	49.0	
Exiting Leg Total					867					3486					0					2003	6356
Cars	256	0	569	0	825	538	1565	0	4	2107	0	1	0	0	1	0	2728	220	1	2949	5882
% Cars	87.4	0.0	90.9	0.0	89.8	88.1	91.6	0.0	100.0	90.7	0.0	100.0	0.0	0.0	100.0	0.0	95.5	86.3	100.0	94.8	92.5
Exiting Leg Total					759					3301					0					1822	5882
Heavy Vehicles	18	0	45	0	63	51	78	0	0	129	0	0	0	0	0	0	82	19	0	101	293
% Heavy Vehicles	6.1	0.0	7.2	0.0	6.9	8.3	4.6	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	2.9	7.5	0.0	3.2	4.6
Exiting Leg Total					70					127					0					96	293
Buses	19	0	12	0	31	22	66	0	0	88	0	0	0	0	0	0	46	16	0	62	181
% Buses	6.5	0.0	1.9	0.0	3.4	3.6	3.9	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	1.6	6.3	0.0	2.0	2.8
Exiting Leg Total					38					58					0					85	181

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	35	0	89	0	124	75	224	0	4	303	0	0	0	0	0	0	377	30	0	407	834
8:15 AM	31	0	79	0	110	74	215	0	0	289	0	0	0	0	0	0	348	36	0	384	783
8:30 AM	37	0	76	0	113	101	233	0	0	334	0	1	0	0	1	0	401	24	0	425	873
8:45 AM	45	0	91	0	136	79	218	0	0	297	0	0	0	0	0	0	383	48	0	431	864
Total Volume	148	0	335	0	483	329	890	0	4	1223	0	1	0	0	1	0	1509	138	0	1647	3354
% Approach Total	30.6	0.0	69.4	0.0		26.9	72.8	0.0	0.3		0.0	100.0	0.0	0.0		0.0	91.6	8.4	0.0		
PHF	0.822	0.000	0.920	0.000	0.888	0.814	0.955	0.000	0.250	0.915	0.000	0.250	0.000	0.000	0.250	0.000	0.941	0.719	0.000	0.955	0.960
Cars	129	0	309	0	438	291	823	0	4	1118	0	1	0	0	1	0	1441	118	0	1559	3116
Cars %	87.2	0.0	92.2	0.0	90.7	88.4	92.5	0.0	100.0	91.4	0.0	100.0	0.0	0.0	100.0	0.0	95.5	85.5	0.0	94.7	92.9
Heavy Vehicles	7	0	18	0	25	27	39	0	0	66	0	0	0	0	0	0	50	9	0	59	150
Heavy Vehicles %	4.7	0.0	5.4	0.0	5.2	8.2	4.4	0.0	0.0	5.4	0.0	0.0	0.0	0.0	0.0	0.0	3.3	6.5	0.0	3.6	4.5
Buses	12	0	8	0	20	11	28	0	0	39	0	0	0	0	0	0	18	11	0	29	88
Buses %	8.1	0.0	2.4	0.0	4.1	3.3	3.1	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	1.2	8.0	0.0	1.8	2.6
Cars Enter Leg	129	0	309	0	438	291	823	0	4	1118	0	1	0	0	1	0	1441	118	0	1559	3116
Heavy Enter Leg	7	0	18	0	25	27	39	0	0	66	0	0	0	0	0	0	50	9	0	59	150
Bus Enter Leg	12	0	8	0	20	11	28	0	0	39	0	0	0	0	0	0	18	11	0	29	88
Total Entering Leg	148	0	335	0	483	329	890	0	4	1223	0	1	0	0	1	0	1509	138	0	1647	3354
Cars Exiting Leg					410					1754					0					952	3116
Heavy Exiting Leg					36					68					0					46	150
Buses Exiting Leg					22					26					0					40	88
Total Exiting Leg					468					1848					0					1038	3354

PDI File #: **175597 D**
Location: **N: North Harvard Street S: Conrail Driveway**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars

	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	36	0	50	0	86	48	175	0	0	223	0	0	0	0	0	0	274	24	0	298	607
7:15 AM	25	0	64	0	89	54	170	0	0	224	0	0	0	0	0	0	283	25	0	308	621
7:30 AM	26	0	76	0	102	62	196	0	0	258	0	0	0	0	0	0	369	25	0	394	754
7:45 AM	40	0	70	0	110	83	201	0	0	284	0	0	0	0	0	0	361	28	1	390	784
Total	127	0	260	0	387	247	742	0	0	989	0	0	0	0	0	0	1287	102	1	1390	2766
8:00 AM	27	0	85	0	112	66	205	0	4	275	0	0	0	0	0	0	364	25	0	389	776
8:15 AM	30	0	76	0	106	67	198	0	0	265	0	0	0	0	0	0	333	33	0	366	737
8:30 AM	31	0	70	0	101	85	220	0	0	305	0	1	0	0	1	0	382	21	0	403	810
8:45 AM	41	0	78	0	119	73	200	0	0	273	0	0	0	0	0	0	362	39	0	401	793
Total	129	0	309	0	438	291	823	0	4	1118	0	1	0	0	1	0	1441	118	0	1559	3116
Grand Total	256	0	569	0	825	538	1565	0	4	2107	0	1	0	0	1	0	2728	220	1	2949	5882
Approach %	31.0	0.0	69.0	0.0		25.5	74.3	0.0	0.2		0.0	100.0	0.0	0.0		0.0	92.5	7.5	0.0		
Total %	4.4	0.0	9.7	0.0	14.0	9.1	26.6	0.0	0.1	35.8	0.0	0.0	0.0	0.0	0.0	0.0	46.4	3.7	0.0	50.1	
Exiting Leg Total					759					3301					0					1822	5882

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	27	0	85	0	112	66	205	0	4	275	0	0	0	0	0	0	364	25	0	389	776
8:15 AM	30	0	76	0	106	67	198	0	0	265	0	0	0	0	0	0	333	33	0	366	737
8:30 AM	31	0	70	0	101	85	220	0	0	305	0	1	0	0	1	0	382	21	0	403	810
8:45 AM	41	0	78	0	119	73	200	0	0	273	0	0	0	0	0	0	362	39	0	401	793
Total Volume	129	0	309	0	438	291	823	0	4	1118	0	1	0	0	1	0	1441	118	0	1559	3116
% Approach Total	29.5	0.0	70.5	0.0		26.0	73.6	0.0	0.4		0.0	100.0	0.0	0.0		0.0	92.4	7.6	0.0		
PHF	0.787	0.000	0.909	0.000	0.920	0.856	0.935	0.000	0.250	0.916	0.000	0.250	0.000	0.000	0.250	0.000	0.943	0.756	0.000	0.967	0.962
Entering Leg	129	0	309	0	438	291	823	0	4	1118	0	1	0	0	1	0	1441	118	0	1559	3116
Exiting Leg					410					1754					0					952	3116
Total					848					2872					1					2511	6232

PDI File #: **175597 D**
Location: **N: North Harvard Street S: Conrail Driveway**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Heavy Vehicles

	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	2	0	8	0	10	5	10	0	0	15	0	0	0	0	0	0	7	0	0	7	32
7:15 AM	3	0	4	0	7	10	15	0	0	25	0	0	0	0	0	0	7	4	0	11	43
7:30 AM	0	0	9	0	9	6	7	0	0	13	0	0	0	0	0	0	9	3	0	12	34
7:45 AM	6	0	6	0	12	3	7	0	0	10	0	0	0	0	0	0	9	3	0	12	34
Total	11	0	27	0	38	24	39	0	0	63	0	0	0	0	0	0	32	10	0	42	143
8:00 AM	1	0	3	0	4	5	11	0	0	16	0	0	0	0	0	0	9	4	0	13	33
8:15 AM	1	0	1	0	2	6	10	0	0	16	0	0	0	0	0	0	13	1	0	14	32
8:30 AM	3	0	5	0	8	12	5	0	0	17	0	0	0	0	0	0	13	0	0	13	38
8:45 AM	2	0	9	0	11	4	13	0	0	17	0	0	0	0	0	0	15	4	0	19	47
Total	7	0	18	0	25	27	39	0	0	66	0	0	0	0	0	0	50	9	0	59	150
Grand Total	18	0	45	0	63	51	78	0	0	129	0	0	0	0	0	0	82	19	0	101	293
Approach %	28.6	0.0	71.4	0.0		39.5	60.5	0.0	0.0		0.0	0.0	0.0	0.0		0.0	81.2	18.8	0.0		
Total %	6.1	0.0	15.4	0.0	21.5	17.4	26.6	0.0	0.0	44.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0	6.5	0.0	34.5	
Exiting Leg Total					70					127					0					96	293

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	1	0	3	0	4	5	11	0	0	16	0	0	0	0	0	0	9	4	0	13	33
8:15 AM	1	0	1	0	2	6	10	0	0	16	0	0	0	0	0	0	13	1	0	14	32
8:30 AM	3	0	5	0	8	12	5	0	0	17	0	0	0	0	0	0	13	0	0	13	38
8:45 AM	2	0	9	0	11	4	13	0	0	17	0	0	0	0	0	0	15	4	0	19	47
Total Volume	7	0	18	0	25	27	39	0	0	66	0	0	0	0	0	0	50	9	0	59	150
% Approach Total	28.0	0.0	72.0	0.0		40.9	59.1	0.0	0.0		0.0	0.0	0.0	0.0		0.0	84.7	15.3	0.0		
PHF	0.583	0.000	0.500	0.000	0.568	0.563	0.750	0.000	0.000	0.971	0.000	0.000	0.000	0.000	0.000	0.000	0.833	0.563	0.000	0.776	0.798
Entering Leg	7	0	18	0	25	27	39	0	0	66	0	0	0	0	0	0	50	9	0	59	150
Exiting Leg					36					68					0					46	150
Total					61					134					0					105	300

PDI File #: **175597 D**
Location: **N: North Harvard Street S: Conrail Driveway**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Buses

	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	2	0	1	0	3	6	15	0	0	21	0	0	0	0	0	0	4	1	0	5	29
7:15 AM	2	0	0	0	2	2	7	0	0	9	0	0	0	0	0	0	11	1	0	12	23
7:30 AM	2	0	3	0	5	0	7	0	0	7	0	0	0	0	0	0	7	3	0	10	22
7:45 AM	1	0	0	0	1	3	9	0	0	12	0	0	0	0	0	0	6	0	0	6	19
Total	7	0	4	0	11	11	38	0	0	49	0	0	0	0	0	0	28	5	0	33	93
8:00 AM	7	0	1	0	8	4	8	0	0	12	0	0	0	0	0	0	4	1	0	5	25
8:15 AM	0	0	2	0	2	1	7	0	0	8	0	0	0	0	0	0	2	2	0	4	14
8:30 AM	3	0	1	0	4	4	8	0	0	12	0	0	0	0	0	0	6	3	0	9	25
8:45 AM	2	0	4	0	6	2	5	0	0	7	0	0	0	0	0	0	6	5	0	11	24
Total	12	0	8	0	20	11	28	0	0	39	0	0	0	0	0	0	18	11	0	29	88
Grand Total	19	0	12	0	31	22	66	0	0	88	0	0	0	0	0	0	46	16	0	62	181
Approach %	61.3	0.0	38.7	0.0		25.0	75.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	74.2	25.8	0.0		
Total %	10.5	0.0	6.6	0.0	17.1	12.2	36.5	0.0	0.0	48.6	0.0	0.0	0.0	0.0	0.0	0.0	25.4	8.8	0.0	34.3	
Exiting Leg Total					38					58					0					85	181

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	2	0	1	0	3	6	15	0	0	21	0	0	0	0	0	0	4	1	0	5	29
7:15 AM	2	0	0	0	2	2	7	0	0	9	0	0	0	0	0	0	11	1	0	12	23
7:30 AM	2	0	3	0	5	0	7	0	0	7	0	0	0	0	0	0	7	3	0	10	22
7:45 AM	1	0	0	0	1	3	9	0	0	12	0	0	0	0	0	0	6	0	0	6	19
Total Volume	7	0	4	0	11	11	38	0	0	49	0	0	0	0	0	0	28	5	0	33	93
% Approach Total	63.6	0.0	36.4	0.0		22.4	77.6	0.0	0.0		0.0	0.0	0.0	0.0		0.0	84.8	15.2	0.0		
PHF	0.875	0.000	0.333	0.000	0.550	0.458	0.633	0.000	0.000	0.583	0.000	0.000	0.000	0.000	0.000	0.000	0.636	0.417	0.000	0.688	0.802
Entering Leg	7	0	4	0	11	11	38	0	0	49	0	0	0	0	0	0	28	5	0	33	93
Exiting Leg					16					32					0					45	93
Total					27					81					0					78	186

PDI File #: **175597 D**
Location: **N: North Harvard Street S: Conrail Driveway**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Bicycles (on Roadway and Crosswalks)**

	North Harvard Street							Cambridge Street							Conrail Driveway							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
7:15 AM	1	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
7:30 AM	2	0	0	0	0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	2	0	0	0	3	6
7:45 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	8	9
Total	3	0	2	0	0	0	5	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	9	3	0	0	0	12	18
8:00 AM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	4
8:15 AM	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0	6	8
8:30 AM	1	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	2	4
8:45 AM	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0	0	1	3	5
Total	3	0	2	0	0	0	5	0	2	0	0	0	1	3	0	0	0	0	0	0	0	0	7	5	0	0	1	13	21
Grand Total	6	0	4	0	0	0	10	0	3	0	0	0	1	4	0	0	0	0	0	0	0	0	16	8	0	0	1	25	39
Approach %	60.0	0.0	40.0	0.0	0.0	0.0		0.0	75.0	0.0	0.0	0.0	25.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	64.0	32.0	0.0	0.0	4.0		
Total %	15.4	0.0	10.3	0.0	0.0	0.0	25.6	0.0	7.7	0.0	0.0	0.0	2.6	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.0	20.5	0.0	0.0	2.6	64.1	
Exiting Leg Total							8							21							0							10	39

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:30 AM	North Harvard Street							Cambridge Street							Conrail Driveway							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:30 AM	2	0	0	0	0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	2	0	0	0	3	6
7:45 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	8	9
8:00 AM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	4
8:15 AM	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0	6	8
Total Volume	4	0	3	0	0	0	7	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	15	4	0	0	0	19	27
% Approach Total	57.1	0.0	42.9	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	78.9	21.1	0.0	0.0	0.0		
PHF	0.500	0.000	0.375	0.000	0.000	0.000	0.875	0.000	0.250	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.469	0.500	0.000	0.000	0.000	0.594	0.750
Entering Leg	4	0	3	0	0	0	7	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	15	4	0	0	0	19	27
Exiting Leg							4							18							0							5	27
Total							11							19							0							24	54

PDI File #: **175597 D**
Location: **N: North Harvard Street S: Conrail Driveway**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	North Harvard Street							Cambridge Street							Conrail Driveway							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2
7:15 AM	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	5
7:30 AM	0	0	0	0	3	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	6
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	2
Total	0	0	0	0	3	6	9	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	2	2	4	15
8:00 AM	0	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	5
8:15 AM	0	0	0	0	2	4	6	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	4	5	12
8:30 AM	0	0	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	3	4	8
8:45 AM	0	0	0	0	3	2	5	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	1	1	2	9
Total	0	0	0	0	8	9	17	0	0	0	0	0	1	1	0	0	0	0	0	5	5	0	0	0	0	3	8	11	34
Grand Total	0	0	0	0	11	15	26	0	0	0	0	0	1	1	0	0	0	0	0	7	7	0	0	0	0	5	10	15	49
Approach %	0.0	0.0	0.0	0.0	42.3	57.7		0.0	0.0	0.0	0.0	0.0	100.0		0.0	0.0	0.0	0.0	0.0	100.0		0.0	0.0	0.0	0.0	33.3	66.7		
Total %	0.0	0.0	0.0	0.0	22.4	30.6	53.1	0.0	0.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	14.3	14.3	0.0	0.0	0.0	0.0	10.2	20.4	30.6	
Exiting Leg Total							26							1							7							15	49

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street							Cambridge Street							Conrail Driveway							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	0	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	5
8:15 AM	0	0	0	0	2	4	6	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	4	5	12
8:30 AM	0	0	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	3	4	8
8:45 AM	0	0	0	0	3	2	5	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	1	1	2	9
Total Volume	0	0	0	0	8	9	17	0	0	0	0	0	1	1	0	0	0	0	0	5	5	0	0	0	0	3	8	11	34
% Approach Total	0.0	0.0	0.0	0.0	47.1	52.9		0.0	0.0	0.0	0.0	0.0	100.0		0.0	0.0	0.0	0.0	0.0	100.0		0.0	0.0	0.0	0.0	27.3	72.7		
PHF	0.000	0.000	0.000	0.000	0.667	0.563	0.708	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.000	0.000	0.000	0.000	0.625	0.625	0.000	0.000	0.000	0.000	0.750	0.500	0.550	0.708
Entering Leg	0	0	0	0	8	9	17	0	0	0	0	0	1	1	0	0	0	0	0	5	5	0	0	0	0	3	8	11	34
Exiting Leg							17							1							5							11	34
Total							34							2							10							22	68

PDI File #: **175597 D**
Location: **N: North Harvard Street S: Conrail Driveway**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION
DATA
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars, Heavy Vehicles, and Buses (Combined)

	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	50	0	61	0	111	38	229	0	0	267	0	0	0	0	0	0	285	46	0	331	709
4:15 PM	57	0	80	0	137	65	264	0	0	329	0	0	0	0	0	0	245	43	1	289	755
4:30 PM	49	0	70	0	119	59	264	0	0	323	0	0	0	0	0	0	278	28	1	307	749
4:45 PM	48	0	55	0	103	83	250	0	0	333	0	0	0	0	0	0	280	42	2	324	760
Total	204	0	266	0	470	245	1007	0	0	1252	0	0	0	0	0	0	1088	159	4	1251	2973
5:00 PM	64	0	80	0	144	62	266	0	0	328	0	0	0	0	0	0	315	46	0	361	833
5:15 PM	60	0	64	0	124	60	291	0	0	351	0	0	0	0	0	0	256	51	1	308	783
5:30 PM	52	0	58	0	110	87	317	0	1	405	0	0	0	0	0	0	283	44	0	327	842
5:45 PM	59	0	88	0	147	57	310	0	1	368	0	0	0	1	1	0	244	47	1	292	808
Total	235	0	290	0	525	266	1184	0	2	1452	0	0	0	1	1	0	1098	188	2	1288	3266
Grand Total	439	0	556	0	995	511	2191	0	2	2704	0	0	0	1	1	0	2186	347	6	2539	6239
Approach %	44.1	0.0	55.9	0.0		18.9	81.0	0.0	0.1		0.0	0.0	0.0	100.0		0.0	86.1	13.7	0.2		
Total %	7.0	0.0	8.9	0.0	15.9	8.2	35.1	0.0	0.0	43.3	0.0	0.0	0.0	0.0	0.0	0.0	35.0	5.6	0.1	40.7	
Exiting Leg Total					858					2744					1					2636	6239
Cars	426	0	531	0	957	480	2145	0	2	2627	0	0	0	1	1	0	2106	331	6	2443	6028
% Cars	97.0	0.0	95.5	0.0	96.2	93.9	97.9	0.0	100.0	97.2	0.0	0.0	0.0	100.0	100.0	0.0	96.3	95.4	100.0	96.2	96.6
Exiting Leg Total					811					2639					1					2577	6028
Heavy Vehicles	3	0	17	0	20	15	24	0	0	39	0	0	0	0	0	0	39	6	0	45	104
% Heavy Vehicles	0.7	0.0	3.1	0.0	2.0	2.9	1.1	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	1.8	1.7	0.0	1.8	1.7
Exiting Leg Total					21					56					0					27	104
Buses	10	0	8	0	18	16	22	0	0	38	0	0	0	0	0	0	41	10	0	51	107
% Buses	2.3	0.0	1.4	0.0	1.8	3.1	1.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	1.9	2.9	0.0	2.0	1.7
Exiting Leg Total					26					49					0					32	107

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
5:00 PM	64	0	80	0	144	62	266	0	0	328	0	0	0	0	0	0	315	46	0	361	833
5:15 PM	60	0	64	0	124	60	291	0	0	351	0	0	0	0	0	0	256	51	1	308	783
5:30 PM	52	0	58	0	110	87	317	0	1	405	0	0	0	0	0	0	283	44	0	327	842
5:45 PM	59	0	88	0	147	57	310	0	1	368	0	0	0	1	1	0	244	47	1	292	808
Total Volume	235	0	290	0	525	266	1184	0	2	1452	0	0	0	1	1	0	1098	188	2	1288	3266
% Approach Total	44.8	0.0	55.2	0.0		18.3	81.5	0.0	0.1		0.0	0.0	0.0	100.0		0.0	85.2	14.6	0.2		
PHF	0.918	0.000	0.824	0.000	0.893	0.764	0.934	0.000	0.500	0.896	0.000	0.000	0.000	0.250	0.250	0.000	0.871	0.922	0.500	0.892	0.970
Cars	227	0	282	0	509	252	1160	0	2	1414	0	0	0	1	1	0	1060	183	2	1245	3169
Cars %	96.6	0.0	97.2	0.0	97.0	94.7	98.0	0.0	100.0	97.4	0.0	0.0	0.0	100.0	100.0	0.0	96.5	97.3	100.0	96.7	97.0
Heavy Vehicles	2	0	6	0	8	7	15	0	0	22	0	0	0	0	0	0	15	1	0	16	46
Heavy Vehicles %	0.9	0.0	2.1	0.0	1.5	2.6	1.3	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.5	0.0	1.2	1.4
Buses	6	0	2	0	8	7	9	0	0	16	0	0	0	0	0	0	23	4	0	27	51
Buses %	2.6	0.0	0.7	0.0	1.5	2.6	0.8	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	2.1	2.1	0.0	2.1	1.6
Cars Enter Leg	227	0	282	0	509	252	1160	0	2	1414	0	0	0	1	1	0	1060	183	2	1245	3169
Heavy Enter Leg	2	0	6	0	8	7	15	0	0	22	0	0	0	0	0	0	15	1	0	16	46
Bus Enter Leg	6	0	2	0	8	7	9	0	0	16	0	0	0	0	0	0	23	4	0	27	51
Total Entering Leg	235	0	290	0	525	266	1184	0	2	1452	0	0	0	1	1	0	1098	188	2	1288	3266
Cars Exiting Leg					435					1344					1					1389	3169
Heavy Exiting Leg					8					21					0					17	46
Buses Exiting Leg					11					25					0					15	51
Total Exiting Leg					454					1390					1					1421	3266

PDI File #: **175597 D**
Location: **N: North Harvard Street S: Conrail Driveway**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Cars**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	49	0	57	0	106	36	225	0	0	261	0	0	0	0	0	0	275	44	0	319	686
4:15 PM	56	0	77	0	133	57	254	0	0	311	0	0	0	0	0	0	235	38	1	274	718
4:30 PM	48	0	63	0	111	56	262	0	0	318	0	0	0	0	0	0	266	27	1	294	723
4:45 PM	46	0	52	0	98	79	244	0	0	323	0	0	0	0	0	0	270	39	2	311	732
Total	199	0	249	0	448	228	985	0	0	1213	0	0	0	0	0	0	1046	148	4	1198	2859
5:00 PM	61	0	76	0	137	61	256	0	0	317	0	0	0	0	0	0	305	43	0	348	802
5:15 PM	60	0	64	0	124	56	286	0	0	342	0	0	0	0	0	0	250	51	1	302	768
5:30 PM	49	0	56	0	105	81	313	0	1	395	0	0	0	0	0	0	271	43	0	314	814
5:45 PM	57	0	86	0	143	54	305	0	1	360	0	0	0	1	1	0	234	46	1	281	785
Total	227	0	282	0	509	252	1160	0	2	1414	0	0	0	1	1	0	1060	183	2	1245	3169
Grand Total	426	0	531	0	957	480	2145	0	2	2627	0	0	0	1	1	0	2106	331	6	2443	6028
Approach %	44.5	0.0	55.5	0.0		18.3	81.7	0.0	0.1		0.0	0.0	0.0	100.0		0.0	86.2	13.5	0.2		
Total %	7.1	0.0	8.8	0.0	15.9	8.0	35.6	0.0	0.0	43.6	0.0	0.0	0.0	0.0	0.0	0.0	34.9	5.5	0.1	40.5	
Exiting Leg Total					811					2639					1					2577	6028

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
5:00 PM	61	0	76	0	137	61	256	0	0	317	0	0	0	0	0	0	305	43	0	348	802
5:15 PM	60	0	64	0	124	56	286	0	0	342	0	0	0	0	0	0	250	51	1	302	768
5:30 PM	49	0	56	0	105	81	313	0	1	395	0	0	0	0	0	0	271	43	0	314	814
5:45 PM	57	0	86	0	143	54	305	0	1	360	0	0	0	1	1	0	234	46	1	281	785
Total Volume	227	0	282	0	509	252	1160	0	2	1414	0	0	0	1	1	0	1060	183	2	1245	3169
% Approach Total	44.6	0.0	55.4	0.0		17.8	82.0	0.0	0.1		0.0	0.0	0.0	100.0		0.0	85.1	14.7	0.2		
PHF	0.930	0.000	0.820	0.000	0.890	0.778	0.927	0.000	0.500	0.895	0.000	0.000	0.000	0.250	0.250	0.000	0.869	0.897	0.500	0.894	0.973
Entering Leg	227	0	282	0	509	252	1160	0	2	1414	0	0	0	1	1	0	1060	183	2	1245	3169
Exiting Leg					435					1344					1					1389	3169
Total					944					2758					2					2634	6338

PDI File #: **175597 D**
Location: **N: North Harvard Street S: Conrail Driveway**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
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Heavy Vehicles

	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	3	0	3	1	2	0	0	3	0	0	0	0	0	0	6	1	0	7	13
4:15 PM	0	0	2	0	2	3	5	0	0	8	0	0	0	0	0	0	6	2	0	8	18
4:30 PM	1	0	4	0	5	1	0	0	0	1	0	0	0	0	0	0	7	1	0	8	14
4:45 PM	0	0	2	0	2	3	2	0	0	5	0	0	0	0	0	0	5	1	0	6	13
Total	1	0	11	0	12	8	9	0	0	17	0	0	0	0	0	0	24	5	0	29	58
5:00 PM	2	0	3	0	5	0	6	0	0	6	0	0	0	0	0	0	6	0	0	6	17
5:15 PM	0	0	0	0	0	2	3	0	0	5	0	0	0	0	0	0	2	0	0	2	7
5:30 PM	0	0	2	0	2	4	4	0	0	8	0	0	0	0	0	0	5	1	0	6	16
5:45 PM	0	0	1	0	1	1	2	0	0	3	0	0	0	0	0	0	2	0	0	2	6
Total	2	0	6	0	8	7	15	0	0	22	0	0	0	0	0	0	15	1	0	16	46
Grand Total	3	0	17	0	20	15	24	0	0	39	0	0	0	0	0	0	39	6	0	45	104
Approach %	15.0	0.0	85.0	0.0		38.5	61.5	0.0	0.0		0.0	0.0	0.0	0.0		0.0	86.7	13.3	0.0		
Total %	2.9	0.0	16.3	0.0	19.2	14.4	23.1	0.0	0.0	37.5	0.0	0.0	0.0	0.0	0.0	0.0	37.5	5.8	0.0	43.3	
Exiting Leg Total					21					56					0					27	104

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:15 PM	0	0	2	0	2	3	5	0	0	8	0	0	0	0	0	0	6	2	0	8	18
4:30 PM	1	0	4	0	5	1	0	0	0	1	0	0	0	0	0	0	7	1	0	8	14
4:45 PM	0	0	2	0	2	3	2	0	0	5	0	0	0	0	0	0	5	1	0	6	13
5:00 PM	2	0	3	0	5	0	6	0	0	6	0	0	0	0	0	0	6	0	0	6	17
Total Volume	3	0	11	0	14	7	13	0	0	20	0	0	0	0	0	0	24	4	0	28	62
% Approach Total	21.4	0.0	78.6	0.0		35.0	65.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	85.7	14.3	0.0		
PHF	0.375	0.000	0.688	0.000	0.700	0.583	0.542	0.000	0.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.857	0.500	0.000	0.875	0.861
Entering Leg	3	0	11	0	14	7	13	0	0	20	0	0	0	0	0	0	24	4	0	28	62
Exiting Leg					11					35					0					16	62
Total					25					55					0					44	124

PDI File #:	**175597 D**
Location:	**N: North Harvard Street S: Conrail Driveway**
Location:	**E: Cambridge Street W: Cambridge Street**
City, State:	**Allston, MA**
Client:	**VHB/ M. Baidy**
Site Code:	**13581.03**
Count Date:	**Wednesday, April 12, 2017**
Start Time:	**4:00 PM**
End Time:	**6:00 PM**
Class:	

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Buses

	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	1	0	1	0	2	1	2	0	0	3	0	0	0	0	0	0	4	1	0	5	10
4:15 PM	1	0	1	0	2	5	5	0	0	10	0	0	0	0	0	0	4	3	0	7	19
4:30 PM	0	0	3	0	3	2	2	0	0	4	0	0	0	0	0	0	5	0	0	5	12
4:45 PM	2	0	1	0	3	1	4	0	0	5	0	0	0	0	0	0	5	2	0	7	15
Total	4	0	6	0	10	9	13	0	0	22	0	0	0	0	0	0	18	6	0	24	56
5:00 PM	1	0	1	0	2	1	4	0	0	5	0	0	0	0	0	0	4	3	0	7	14
5:15 PM	0	0	0	0	0	2	2	0	0	4	0	0	0	0	0	0	4	0	0	4	8
5:30 PM	3	0	0	0	3	2	0	0	0	2	0	0	0	0	0	0	7	0	0	7	12
5:45 PM	2	0	1	0	3	2	3	0	0	5	0	0	0	0	0	0	8	1	0	9	17
Total	6	0	2	0	8	7	9	0	0	16	0	0	0	0	0	0	23	4	0	27	51
Grand Total	10	0	8	0	18	16	22	0	0	38	0	0	0	0	0	0	41	10	0	51	107
Approach %	55.6	0.0	44.4	0.0		42.1	57.9	0.0	0.0		0.0	0.0	0.0	0.0		0.0	80.4	19.6	0.0		
Total %	9.3	0.0	7.5	0.0	16.8	15.0	20.6	0.0	0.0	35.5	0.0	0.0	0.0	0.0	0.0	0.0	38.3	9.3	0.0	47.7	
Exiting Leg Total					26					49					0					32	107

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	North Harvard Street					Cambridge Street					Conrail Driveway					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:15 PM	1	0	1	0	2	5	5	0	0	10	0	0	0	0	0	0	4	3	0	7	19
4:30 PM	0	0	3	0	3	2	2	0	0	4	0	0	0	0	0	0	5	0	0	5	12
4:45 PM	2	0	1	0	3	1	4	0	0	5	0	0	0	0	0	0	5	2	0	7	15
5:00 PM	1	0	1	0	2	1	4	0	0	5	0	0	0	0	0	0	4	3	0	7	14
Total Volume	4	0	6	0	10	9	15	0	0	24	0	0	0	0	0	0	18	8	0	26	60
% Approach Total	40.0	0.0	60.0	0.0		37.5	62.5	0.0	0.0		0.0	0.0	0.0	0.0		0.0	69.2	30.8	0.0		
PHF	0.500	0.000	0.500	0.000	0.833	0.450	0.750	0.000	0.000	0.600	0.000	0.000	0.000	0.000	0.000	0.000	0.900	0.667	0.000	0.929	0.789
Entering Leg	4	0	6	0	10	9	15	0	0	24	0	0	0	0	0	0	18	8	0	26	60
Exiting Leg					17					24					0					19	60
Total					27					48					0					45	120

PDI File #: **175597 D**
Location: **N: North Harvard Street S: Conrail Driveway**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**

PRECISION
D A T A
INDUSTRIES, LLC
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Class: **Bicycles (on Roadway and Crosswalks)**

	North Harvard Street							Cambridge Street							Conrail Driveway							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:15 PM	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	1	0	1	0	0	0	0	1	3
Total	2	0	0	0	0	0	2	0	3	0	0	0	0	3	0	0	0	0	0	1	1	0	1	0	0	0	0	1	7
5:00 PM	1	0	0	0	0	0	1	0	1	0	0	0	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	1	4
5:15 PM	2	0	0	0	0	0	2	0	1	0	0	0	1	2	0	0	0	0	0	0	0	0	0	2	0	0	0	2	6
5:30 PM	6	0	0	0	0	0	6	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
5:45 PM	2	0	0	0	0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	4
Total	11	0	0	0	0	0	11	0	6	0	0	0	1	7	0	1	0	0	0	0	1	0	0	4	0	0	0	4	23
Grand Total	13	0	0	0	0	0	13	0	9	0	0	0	1	10	0	1	0	0	0	1	2	0	1	4	0	0	0	5	30
Approach %	100.0	0.0	0.0	0.0	0.0	0.0		0.0	90.0	0.0	0.0	0.0	10.0		0.0	50.0	0.0	0.0	0.0	50.0		0.0	20.0	80.0	0.0	0.0	0.0		
Total %	43.3	0.0	0.0	0.0	0.0	0.0	43.3	0.0	30.0	0.0	0.0	0.0	3.3	33.3	0.0	3.3	0.0	0.0	0.0	3.3	6.7	0.0	3.3	13.3	0.0	0.0	0.0	16.7	
Exiting Leg Total							5							2							1							22	30

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	North Harvard Street							Cambridge Street							Conrail Driveway							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	1	0	0	0	0	0	1	0	1	0	0	0	0	1	0	1	0	0	0	0	1	0	0	1	0	0	0	1	4
5:15 PM	2	0	0	0	0	0	2	0	1	0	0	0	1	2	0	0	0	0	0	0	0	0	0	2	0	0	0	2	6
5:30 PM	6	0	0	0	0	0	6	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
5:45 PM	2	0	0	0	0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	4
Total Volume	11	0	0	0	0	0	11	0	6	0	0	0	1	7	0	1	0	0	0	0	1	0	0	4	0	0	0	4	23
% Approach Total	100.0	0.0	0.0	0.0	0.0	0.0		0.0	85.7	0.0	0.0	0.0	14.3		0.0	100.0	0.0	0.0	0.0	0.0		0.0	0.0	100.0	0.0	0.0	0.0		
PHF	0.458	0.000	0.000	0.000	0.000	0.000	0.458	0.000	0.500	0.000	0.000	0.000	0.250	0.583	0.000	0.250	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.500	0.000	0.000	0.000	0.500	0.639
Entering Leg	11	0	0	0	0	0	11	0	6	0	0	0	1	7	0	1	0	0	0	0	1	0	0	4	0	0	0	4	23
Exiting Leg							5							1							0							17	23
Total							16							8							1							21	46

PDI File #:	**175597 D**
Location:	**N: North Harvard Street S: Conrail Driveway**
Location:	**E: Cambridge Street W: Cambridge Street**
City, State:	**Allston, MA**
Client:	**VHB/ M. Baidy**
Site Code:	**13581.03**
Count Date:	**Wednesday, April 12, 2017**
Start Time:	**4:00 PM**
End Time:	**6:00 PM**
Class:	

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Pedestrians

	North Harvard Street							Cambridge Street							Conrail Driveway							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
4:30 PM	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:45 PM	0	0	0	0	3	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	7
Total	0	0	0	0	3	5	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	11
5:00 PM	0	0	0	0	3	4	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	9
5:15 PM	0	0	0	0	3	3	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
5:30 PM	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	3	1	4	0	0	0	0	2	2	4	13
5:45 PM	0	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	6
Total	0	0	0	0	7	14	21	0	0	0	0	0	0	0	0	0	0	0	3	1	4	0	0	0	0	6	3	9	34
Grand Total	0	0	0	0	10	19	29	0	0	0	0	0	0	0	0	0	0	0	3	1	4	0	0	0	0	7	5	12	45
Approach %	0.0	0.0	0.0	0.0	34.5	65.5		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	75.0	25.0		0.0	0.0	0.0	0.0	58.3	41.7		
Total %	0.0	0.0	0.0	0.0	22.2	42.2	64.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	2.2	8.9	0.0	0.0	0.0	0.0	15.6	11.1	26.7	
Exiting Leg Total							29							0							4							12	45

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:45 PM	North Harvard Street							Cambridge Street							Conrail Driveway							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:45 PM	0	0	0	0	3	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	7
5:00 PM	0	0	0	0	3	4	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	9
5:15 PM	0	0	0	0	3	3	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
5:30 PM	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	3	1	4	0	0	0	0	2	2	4	13
Total Volume	0	0	0	0	9	14	23	0	0	0	0	0	0	0	0	0	0	0	3	1	4	0	0	0	0	4	4	8	35
% Approach Total	0.0	0.0	0.0	0.0	39.1	60.9		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	75.0	25.0		0.0	0.0	0.0	0.0	50.0	50.0		
PHF	0.000	0.000	0.000	0.000	0.750	0.700	0.821	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.250	0.000	0.000	0.000	0.000	0.500	0.500	0.500	0.673
Entering Leg	0	0	0	0	9	14	23	0	0	0	0	0	0	0	0	0	0	0	3	1	4	0	0	0	0	4	4	8	35
Exiting Leg							23							0							4							8	35
Total							46							0							8							16	70

PDI File #: **175597 E**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: Western Avenue Bridge W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Cars, Heavy Vehicles, and Buses (Combined)**

	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	9	106	0	0	115	38	80	111	0	229	0	37	19	1	57	108	0	0	0	108	509
7:15 AM	11	155	0	0	166	42	66	212	0	320	0	41	26	0	67	99	0	0	0	99	652
7:30 AM	9	158	0	0	167	43	91	228	0	362	0	40	24	0	64	84	0	0	0	84	677
7:45 AM	8	184	0	0	192	55	71	239	0	365	0	31	24	0	55	92	0	0	0	92	704
Total	37	603	0	0	640	178	308	790	0	1276	0	149	93	1	243	383	0	0	0	383	2542
8:00 AM	13	177	0	0	190	59	82	225	0	366	0	26	25	0	51	104	0	0	0	104	711
8:15 AM	13	187	0	0	200	52	98	200	0	350	0	27	18	0	45	105	0	0	0	105	700
8:30 AM	6	186	0	0	192	71	84	216	0	371	0	31	25	0	56	86	0	0	0	86	705
8:45 AM	11	186	0	0	197	41	85	187	0	313	0	21	20	0	41	96	0	0	0	96	647
Total	43	736	0	0	779	223	349	828	0	1400	0	105	88	0	193	391	0	0	0	391	2763
Grand Total	80	1339	0	0	1419	401	657	1618	0	2676	0	254	181	1	436	774	0	0	0	774	5305
Approach %	5.6	94.4	0.0	0.0		15.0	24.6	60.5	0.0		0.0	58.3	41.5	0.2		100.0	0.0	0.0	0.0		
Total %	1.5	25.2	0.0	0.0	26.7	7.6	12.4	30.5	0.0	50.4	0.0	4.8	3.4	0.0	8.2	14.6	0.0	0.0	0.0	14.6	
Exiting Leg Total					655					0					3732					918	5305
Cars	80	1336	0	0	1416	399	611	1582	0	2592	0	253	167	1	421	710	0	0	0	710	5139
% Cars	100.0	99.8	0.0	0.0	99.8	99.5	93.0	97.8	0.0	96.9	0.0	99.6	92.3	100.0	96.6	91.7	0.0	0.0	0.0	91.7	96.9
Exiting Leg Total					652					0					3629					858	5139
Heavy Vehicles	0	1	0	0	1	2	26	21	0	49	0	0	14	0	14	44	0	0	0	44	108
% Heavy Vehicles	0.0	0.1	0.0	0.0	0.1	0.5	4.0	1.3	0.0	1.8	0.0	0.0	7.7	0.0	3.2	5.7	0.0	0.0	0.0	5.7	2.0
Exiting Leg Total					2					0					66					40	108
Buses	0	2	0	0	2	0	20	15	0	35	0	1	0	0	1	20	0	0	0	20	58
% Buses	0.0	0.1	0.0	0.0	0.1	0.0	3.0	0.9	0.0	1.3	0.0	0.4	0.0	0.0	0.2	2.6	0.0	0.0	0.0	2.6	1.1
Exiting Leg Total					1					0					37					20	58

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:45 AM	8	184	0	0	192	55	71	239	0	365	0	31	24	0	55	92	0	0	0	92	704
8:00 AM	13	177	0	0	190	59	82	225	0	366	0	26	25	0	51	104	0	0	0	104	711
8:15 AM	13	187	0	0	200	52	98	200	0	350	0	27	18	0	45	105	0	0	0	105	700
8:30 AM	6	186	0	0	192	71	84	216	0	371	0	31	25	0	56	86	0	0	0	86	705
Total Volume	40	734	0	0	774	237	335	880	0	1452	0	115	92	0	207	387	0	0	0	387	2820
% Approach Total	5.2	94.8	0.0	0.0		16.3	23.1	60.6	0.0		0.0	55.6	44.4	0.0		100.0	0.0	0.0	0.0		
PHF	0.769	0.981	0.000	0.000	0.968	0.835	0.855	0.921	0.000	0.978	0.000	0.927	0.920	0.000	0.924	0.921	0.000	0.000	0.000	0.921	0.992
Cars	40	734	0	0	774	235	312	859	0	1406	0	114	84	0	198	351	0	0	0	351	2729
Cars %	100.0	100.0	0.0	0.0	100.0	99.2	93.1	97.6	0.0	96.8	0.0	99.1	91.3	0.0	95.7	90.7	0.0	0.0	0.0	90.7	96.8
Heavy Vehicles	0	0	0	0	0	2	14	10	0	26	0	0	8	0	8	26	0	0	0	26	60
Heavy Vehicles %	0.0	0.0	0.0	0.0	0.0	0.8	4.2	1.1	0.0	1.8	0.0	0.0	8.7	0.0	3.9	6.7	0.0	0.0	0.0	6.7	2.1
Buses	0	0	0	0	0	0	9	11	0	20	0	1	0	0	1	10	0	0	0	10	31
Buses %	0.0	0.0	0.0	0.0	0.0	0.0	2.7	1.3	0.0	1.4	0.0	0.9	0.0	0.0	0.5	2.6	0.0	0.0	0.0	2.6	1.1
Cars Enter Leg	40	734	0	0	774	235	312	859	0	1406	0	114	84	0	198	351	0	0	0	351	2729
Heavy Enter Leg	0	0	0	0	0	2	14	10	0	26	0	0	8	0	8	26	0	0	0	26	60
Bus Enter Leg	0	0	0	0	0	0	9	11	0	20	0	1	0	0	1	10	0	0	0	10	31
Total Entering Leg	40	734	0	0	774	237	335	880	0	1452	0	115	92	0	207	387	0	0	0	387	2820
Cars Exiting Leg					349					0					1944					436	2729
Heavy Exiting Leg					2					0					36					22	60
Buses Exiting Leg					1					0					21					9	31
Total Exiting Leg					352					0					2001					467	2820

PDI File #: **175597 E**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: Western Avenue Bridge W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars

	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	9	105	0	0	114	38	72	110	0	220	0	37	18	1	56	98	0	0	0	98	488
7:15 AM	11	155	0	0	166	42	63	206	0	311	0	41	26	0	67	91	0	0	0	91	635
7:30 AM	9	157	0	0	166	43	83	226	0	352	0	40	21	0	61	78	0	0	0	78	657
7:45 AM	8	184	0	0	192	55	67	237	0	359	0	31	22	0	53	76	0	0	0	76	680
Total	37	601	0	0	638	178	285	779	0	1242	0	149	87	1	237	343	0	0	0	343	2460
8:00 AM	13	177	0	0	190	59	77	218	0	354	0	26	25	0	51	99	0	0	0	99	694
8:15 AM	13	187	0	0	200	50	89	195	0	334	0	27	14	0	41	98	0	0	0	98	673
8:30 AM	6	186	0	0	192	71	79	209	0	359	0	30	23	0	53	78	0	0	0	78	682
8:45 AM	11	185	0	0	196	41	81	181	0	303	0	21	18	0	39	92	0	0	0	92	630
Total	43	735	0	0	778	221	326	803	0	1350	0	104	80	0	184	367	0	0	0	367	2679
Grand Total	80	1336	0	0	1416	399	611	1582	0	2592	0	253	167	1	421	710	0	0	0	710	5139
Approach %	5.6	94.4	0.0	0.0		15.4	23.6	61.0	0.0		0.0	60.1	39.7	0.2		100.0	0.0	0.0	0.0		
Total %	1.6	26.0	0.0	0.0	27.6	7.8	11.9	30.8	0.0	50.4	0.0	4.9	3.2	0.0	8.2	13.8	0.0	0.0	0.0	13.8	
Exiting Leg Total					652					0					3629					858	5139

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:45 AM	8	184	0	0	192	55	67	237	0	359	0	31	22	0	53	76	0	0	0	76	680
8:00 AM	13	177	0	0	190	59	77	218	0	354	0	26	25	0	51	99	0	0	0	99	694
8:15 AM	13	187	0	0	200	50	89	195	0	334	0	27	14	0	41	98	0	0	0	98	673
8:30 AM	6	186	0	0	192	71	79	209	0	359	0	30	23	0	53	78	0	0	0	78	682
Total Volume	40	734	0	0	774	235	312	859	0	1406	0	114	84	0	198	351	0	0	0	351	2729
% Approach Total	5.2	94.8	0.0	0.0		16.7	22.2	61.1	0.0		0.0	57.6	42.4	0.0		100.0	0.0	0.0	0.0		
PHF	0.769	0.981	0.000	0.000	0.968	0.827	0.876	0.906	0.000	0.979	0.000	0.919	0.840	0.000	0.934	0.886	0.000	0.000	0.000	0.886	0.983
Entering Leg	40	734	0	0	774	235	312	859	0	1406	0	114	84	0	198	351	0	0	0	351	2729
Exiting Leg					349					0					1944					436	2729
Total					1123					1406					2142					787	5458

PDI File #: **175597 E**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: Western Avenue Bridge W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Heavy Vehicles

	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	1	0	0	1	0	4	1	0	5	0	0	1	0	1	8	0	0	0	8	15
7:15 AM	0	0	0	0	0	0	1	4	0	5	0	0	0	0	0	4	0	0	0	4	9
7:30 AM	0	0	0	0	0	0	5	1	0	6	0	0	3	0	3	4	0	0	0	4	13
7:45 AM	0	0	0	0	0	0	3	1	0	4	0	0	2	0	2	12	0	0	0	12	18
Total	0	1	0	0	1	0	13	7	0	20	0	0	6	0	6	28	0	0	0	28	55
8:00 AM	0	0	0	0	0	0	2	4	0	6	0	0	0	0	0	4	0	0	0	4	10
8:15 AM	0	0	0	0	0	2	6	2	0	10	0	0	4	0	4	5	0	0	0	5	19
8:30 AM	0	0	0	0	0	0	3	3	0	6	0	0	2	0	2	5	0	0	0	5	13
8:45 AM	0	0	0	0	0	0	2	5	0	7	0	0	2	0	2	2	0	0	0	2	11
Total	0	0	0	0	0	2	13	14	0	29	0	0	8	0	8	16	0	0	0	16	53
Grand Total	0	1	0	0	1	2	26	21	0	49	0	0	14	0	14	44	0	0	0	44	108
Approach %	0.0	100.0	0.0	0.0		4.1	53.1	42.9	0.0		0.0	0.0	100.0	0.0		100.0	0.0	0.0	0.0		
Total %	0.0	0.9	0.0	0.0	0.9	1.9	24.1	19.4	0.0	45.4	0.0	0.0	13.0	0.0	13.0	40.7	0.0	0.0	0.0	40.7	
Exiting Leg Total					2					0					66					40	108

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:30 AM	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:30 AM	0	0	0	0	0	0	5	1	0	6	0	0	3	0	3	4	0	0	0	4	13
7:45 AM	0	0	0	0	0	0	3	1	0	4	0	0	2	0	2	12	0	0	0	12	18
8:00 AM	0	0	0	0	0	0	2	4	0	6	0	0	0	0	0	4	0	0	0	4	10
8:15 AM	0	0	0	0	0	2	6	2	0	10	0	0	4	0	4	5	0	0	0	5	19
Total Volume	0	0	0	0	0	2	16	8	0	26	0	0	9	0	9	25	0	0	0	25	60
% Approach Total	0.0	0.0	0.0	0.0		7.7	61.5	30.8	0.0		0.0	0.0	100.0	0.0		100.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.250	0.667	0.500	0.000	0.650	0.000	0.000	0.563	0.000	0.563	0.521	0.000	0.000	0.000	0.521	0.789
Entering Leg	0	0	0	0	0	2	16	8	0	26	0	0	9	0	9	25	0	0	0	25	60
Exiting Leg					2					0					33					25	60
Total					2					26					42					50	120

PDI File #: **175597 E**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: Western Avenue Bridge W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Buses

	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	2	0	0	0	2	6
7:15 AM	0	0	0	0	0	0	2	2	0	4	0	0	0	0	0	4	0	0	0	4	8
7:30 AM	0	1	0	0	1	0	3	1	0	4	0	0	0	0	0	2	0	0	0	2	7
7:45 AM	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	4	0	0	0	4	6
Total	0	1	0	0	1	0	10	4	0	14	0	0	0	0	0	12	0	0	0	12	27
8:00 AM	0	0	0	0	0	0	3	3	0	6	0	0	0	0	0	1	0	0	0	1	7
8:15 AM	0	0	0	0	0	0	3	3	0	6	0	0	0	0	0	2	0	0	0	2	8
8:30 AM	0	0	0	0	0	0	2	4	0	6	0	1	0	0	1	3	0	0	0	3	10
8:45 AM	0	1	0	0	1	0	2	1	0	3	0	0	0	0	0	2	0	0	0	2	6
Total	0	1	0	0	1	0	10	11	0	21	0	1	0	0	1	8	0	0	0	8	31
Grand Total	0	2	0	0	2	0	20	15	0	35	0	1	0	0	1	20	0	0	0	20	58
Approach %	0.0	100.0	0.0	0.0		0.0	57.1	42.9	0.0		0.0	100.0	0.0	0.0		100.0	0.0	0.0	0.0		
Total %	0.0	3.4	0.0	0.0	3.4	0.0	34.5	25.9	0.0	60.3	0.0	1.7	0.0	0.0	1.7	34.5	0.0	0.0	0.0	34.5	
Exiting Leg Total					1					0					37					20	58

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:45 AM	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	4	0	0	0	4	6
8:00 AM	0	0	0	0	0	0	3	3	0	6	0	0	0	0	0	1	0	0	0	1	7
8:15 AM	0	0	0	0	0	0	3	3	0	6	0	0	0	0	0	2	0	0	0	2	8
8:30 AM	0	0	0	0	0	0	2	4	0	6	0	1	0	0	1	3	0	0	0	3	10
Total Volume	0	0	0	0	0	0	9	11	0	20	0	1	0	0	1	10	0	0	0	10	31
% Approach Total	0.0	0.0	0.0	0.0		0.0	45.0	55.0	0.0		0.0	100.0	0.0	0.0		100.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.750	0.688	0.000	0.833	0.000	0.250	0.000	0.000	0.250	0.625	0.000	0.000	0.000	0.625	0.775
Entering Leg	0	0	0	0	0	0	9	11	0	20	0	1	0	0	1	10	0	0	0	10	31
Exiting Leg					1					0					21					9	31
Total					1					20					22					19	62

PDI File #: **175597 E**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: Western Avenue Bridge W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Bicycles (on Roadway and Crosswalks)

	Soldiers Field Road Ramps							Western Avenue Bridge							Soldiers Field Road Ramps							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	1	0	1	0	0	0	0	7	2	9	0	0	0	0	0	2	2	0	0	0	0	0	0	0	12
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	12	3	15	0	0	0	0	2	2	4	0	0	0	0	0	0	0	19
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	22	1	23	0	4	0	0	0	11	15	0	0	0	0	0	0	0	38
7:45 AM	0	0	0	0	0	1	1	1	1	0	0	13	7	22	0	10	0	0	1	6	17	0	0	0	0	1	0	1	41
Total	0	0	0	0	1	1	2	1	1	0	0	54	13	69	0	14	0	0	3	21	38	0	0	0	0	1	0	1	110
8:00 AM	0	0	0	0	0	1	1	0	8	0	0	13	5	26	0	0	1	0	1	6	8	1	0	0	0	0	1	2	37
8:15 AM	0	0	0	0	1	1	2	0	12	0	0	29	3	44	0	0	0	0	0	8	8	0	0	0	0	0	0	0	54
8:30 AM	1	0	0	0	0	0	1	1	6	0	0	22	3	32	0	1	0	0	0	12	13	0	0	0	0	0	1	1	47
8:45 AM	0	0	0	0	0	0	0	1	5	0	0	18	4	28	0	0	0	0	4	9	13	0	0	0	0	0	0	0	41
Total	1	0	0	0	1	2	4	2	31	0	0	82	15	130	0	1	1	0	5	35	42	1	0	0	0	0	2	3	179
Grand Total	1	0	0	0	2	3	6	3	32	0	0	136	28	199	0	15	1	0	8	56	80	1	0	0	0	1	2	4	289
Approach %	16.7	0.0	0.0	0.0	33.3	50.0		1.5	16.1	0.0	0.0	68.3	14.1		0.0	18.8	1.3	0.0	10.0	70.0		25.0	0.0	0.0	0.0	25.0	50.0		
Total %	0.3	0.0	0.0	0.0	0.7	1.0	2.1	1.0	11.1	0.0	0.0	47.1	9.7	68.9	0.0	5.2	0.3	0.0	2.8	19.4	27.7	0.3	0.0	0.0	0.0	0.3	0.7	1.4	
Exiting Leg Total							23							164							65							37	289

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	Soldiers Field Road Ramps							Western Avenue Bridge							Soldiers Field Road Ramps							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:45 AM	0	0	0	0	0	1	1	1	1	0	0	13	7	22	0	10	0	0	1	6	17	0	0	0	0	1	0	1	41
8:00 AM	0	0	0	0	0	1	1	0	8	0	0	13	5	26	0	0	1	0	1	6	8	1	0	0	0	0	1	2	37
8:15 AM	0	0	0	0	1	1	2	0	12	0	0	29	3	44	0	0	0	0	0	8	8	0	0	0	0	0	0	0	54
8:30 AM	1	0	0	0	0	0	1	1	6	0	0	22	3	32	0	1	0	0	0	12	13	0	0	0	0	0	1	1	47
Total Volume	1	0	0	0	1	3	5	2	27	0	0	77	18	124	0	11	1	0	2	32	46	1	0	0	0	1	2	4	179
% Approach Total	20.0	0.0	0.0	0.0	20.0	60.0		1.6	21.8	0.0	0.0	62.1	14.5		0.0	23.9	2.2	0.0	4.3	69.6		25.0	0.0	0.0	0.0	25.0	50.0		
PHF	0.250	0.000	0.000	0.000	0.250	0.750	0.625	0.500	0.563	0.000	0.000	0.664	0.643	0.705	0.000	0.275	0.250	0.000	0.500	0.667	0.676	0.250	0.000	0.000	0.000	0.250	0.500	0.500	0.829
Entering Leg	1	0	0	0	1	3	5	2	27	0	0	77	18	124	0	11	1	0	2	32	46	1	0	0	0	1	2	4	179
Exiting Leg							17							95							35							32	179
Total							22							219							81							36	358

PDI File #: **175597 E**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: Western Avenue Bridge W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION
DATA
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	Soldiers Field Road Ramps							Western Avenue Bridge							Soldiers Field Road Ramps							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	4	2	6	0	0	0	0	10	9	19	0	0	0	0	1	0	1	0	0	0	0	1	0	1	27
7:15 AM	0	0	0	0	3	5	8	0	0	0	0	15	5	20	0	0	0	0	0	2	2	0	0	0	0	0	0	0	30
7:30 AM	0	0	0	0	6	3	9	0	0	0	0	3	8	11	0	0	0	0	1	2	3	0	0	0	0	0	0	0	23
7:45 AM	0	0	0	0	2	12	14	0	0	0	0	8	4	12	0	0	0	0	1	7	8	0	0	0	0	0	1	1	35
Total	0	0	0	0	15	22	37	0	0	0	0	36	26	62	0	0	0	0	3	11	14	0	0	0	0	1	1	2	115
8:00 AM	0	0	0	0	5	24	29	0	0	0	0	9	7	16	0	0	0	0	1	4	5	0	0	0	0	1	1	2	52
8:15 AM	0	0	0	0	9	55	64	0	0	0	0	4	4	8	0	0	0	0	4	2	6	0	0	0	0	1	0	1	79
8:30 AM	0	0	0	0	9	25	34	0	0	0	0	10	4	14	0	0	0	0	3	3	6	0	0	0	0	0	0	0	54
8:45 AM	0	0	0	0	4	39	43	0	0	0	0	6	5	11	0	0	0	0	0	0	0	0	0	0	0	0	1	1	55
Total	0	0	0	0	27	143	170	0	0	0	0	29	20	49	0	0	0	0	8	9	17	0	0	0	0	2	2	4	240
Grand Total	0	0	0	0	42	165	207	0	0	0	0	65	46	111	0	0	0	0	11	20	31	0	0	0	0	3	3	6	355
Approach %	0.0	0.0	0.0	0.0	20.3	79.7		0.0	0.0	0.0	0.0	58.6	41.4		0.0	0.0	0.0	0.0	35.5	64.5		0.0	0.0	0.0	0.0	50.0	50.0		
Total %	0.0	0.0	0.0	0.0	11.8	46.5	58.3	0.0	0.0	0.0	0.0	18.3	13.0	31.3	0.0	0.0	0.0	0.0	3.1	5.6	8.7	0.0	0.0	0.0	0.0	0.8	0.8	1.7	
Exiting Leg Total							207							111							31							6	355

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Soldiers Field Road Ramps							Western Avenue Bridge							Soldiers Field Road Ramps							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	0	0	0	0	5	24	29	0	0	0	0	9	7	16	0	0	0	0	1	4	5	0	0	0	0	1	1	2	52
8:15 AM	0	0	0	0	9	55	64	0	0	0	0	4	4	8	0	0	0	0	4	2	6	0	0	0	0	1	0	1	79
8:30 AM	0	0	0	0	9	25	34	0	0	0	0	10	4	14	0	0	0	0	3	3	6	0	0	0	0	0	0	0	54
8:45 AM	0	0	0	0	4	39	43	0	0	0	0	6	5	11	0	0	0	0	0	0	0	0	0	0	0	0	1	1	55
Total Volume	0	0	0	0	27	143	170	0	0	0	0	29	20	49	0	0	0	0	8	9	17	0	0	0	0	2	2	4	240
% Approach Total	0.0	0.0	0.0	0.0	15.9	84.1		0.0	0.0	0.0	0.0	59.2	40.8		0.0	0.0	0.0	0.0	47.1	52.9		0.0	0.0	0.0	0.0	50.0	50.0		
PHF	0.000	0.000	0.000	0.000	0.750	0.650	0.664	0.000	0.000	0.000	0.000	0.725	0.714	0.766	0.000	0.000	0.000	0.000	0.500	0.563	0.708	0.000	0.000	0.000	0.000	0.500	0.500	0.500	0.759
Entering Leg	0	0	0	0	27	143	170	0	0	0	0	29	20	49	0	0	0	0	8	9	17	0	0	0	0	2	2	4	240
Exiting Leg							170							49							17							4	240
Total							340							98							34							8	480

PDI File #: **175597 E**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: Western Avenue Bridge W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars, Heavy Vehicles, and Buses (Combined)

	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	6	134	0	0	140	87	115	268	0	470	0	76	11	2	89	103	0	0	0	103	802
4:15 PM	9	146	0	0	155	116	98	249	0	463	0	74	9	0	83	92	0	0	0	92	793
4:30 PM	4	146	0	0	150	111	107	243	0	461	0	72	9	0	81	130	0	0	0	130	822
4:45 PM	2	153	0	0	155	100	122	256	0	478	0	57	19	0	76	108	0	0	0	108	817
Total	21	579	0	0	600	414	442	1016	0	1872	0	279	48	2	329	433	0	0	0	433	3234
5:00 PM	10	145	0	0	155	117	106	233	0	456	0	63	14	1	78	125	0	0	0	125	814
5:15 PM	7	161	0	0	168	119	96	239	0	454	0	83	18	0	101	112	0	0	0	112	835
5:30 PM	9	153	0	0	162	96	119	238	0	453	0	69	22	2	93	126	0	0	0	126	834
5:45 PM	7	154	0	0	161	95	129	227	0	451	0	63	18	1	82	97	0	0	0	97	791
Total	33	613	0	0	646	427	450	937	0	1814	0	278	72	4	354	460	0	0	0	460	3274
Grand Total	54	1192	0	0	1246	841	892	1953	0	3686	0	557	120	6	683	893	0	0	0	893	6508
Approach %	4.3	95.7	0.0	0.0		22.8	24.2	53.0	0.0		0.0	81.6	17.6	0.9		100.0	0.0	0.0	0.0		
Total %	0.8	18.3	0.0	0.0	19.1	12.9	13.7	30.0	0.0	56.6	0.0	8.6	1.8	0.1	10.5	13.7	0.0	0.0	0.0	13.7	
Exiting Leg Total					1398					0					4044					1066	6508
Cars	53	1191	0	0	1244	839	865	1919	0	3623	0	557	117	6	680	876	0	0	0	876	6423
% Cars	98.1	99.9	0.0	0.0	99.8	99.8	97.0	98.3	0.0	98.3	0.0	100.0	97.5	100.0	99.6	98.1	0.0	0.0	0.0	98.1	98.7
Exiting Leg Total					1396					0					3992					1035	6423
Heavy Vehicles	1	1	0	0	2	1	7	21	0	29	0	0	2	0	2	6	0	0	0	6	39
% Heavy Vehicles	1.9	0.1	0.0	0.0	0.2	0.1	0.8	1.1	0.0	0.8	0.0	0.0	1.7	0.0	0.3	0.7	0.0	0.0	0.0	0.7	0.6
Exiting Leg Total					1					0					28					10	39
Buses	0	0	0	0	0	1	20	13	0	34	0	0	1	0	1	11	0	0	0	11	46
% Buses	0.0	0.0	0.0	0.0	0.0	0.1	2.2	0.7	0.0	0.9	0.0	0.0	0.8	0.0	0.1	1.2	0.0	0.0	0.0	1.2	0.7
Exiting Leg Total					1					0					24					21	46

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:45 PM	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:45 PM	2	153	0	0	155	100	122	256	0	478	0	57	19	0	76	108	0	0	0	108	817
5:00 PM	10	145	0	0	155	117	106	233	0	456	0	63	14	1	78	125	0	0	0	125	814
5:15 PM	7	161	0	0	168	119	96	239	0	454	0	83	18	0	101	112	0	0	0	112	835
5:30 PM	9	153	0	0	162	96	119	238	0	453	0	69	22	2	93	126	0	0	0	126	834
Total Volume	28	612	0	0	640	432	443	966	0	1841	0	272	73	3	348	471	0	0	0	471	3300
% Approach Total	4.4	95.6	0.0	0.0		23.5	24.1	52.5	0.0		0.0	78.2	21.0	0.9		100.0	0.0	0.0	0.0		
PHF	0.700	0.950	0.000	0.000	0.952	0.908	0.908	0.943	0.000	0.963	0.000	0.819	0.830	0.375	0.861	0.935	0.000	0.000	0.000	0.935	0.988
Cars	27	612	0	0	639	431	428	947	0	1806	0	272	71	3	346	463	0	0	0	463	3254
Cars %	96.4	100.0	0.0	0.0	99.8	99.8	96.6	98.0	0.0	98.1	0.0	100.0	97.3	100.0	99.4	98.3	0.0	0.0	0.0	98.3	98.6
Heavy Vehicles	1	0	0	0	1	0	4	11	0	15	0	0	2	0	2	2	0	0	0	2	20
Heavy Vehicles %	3.6	0.0	0.0	0.0	0.2	0.0	0.9	1.1	0.0	0.8	0.0	0.0	2.7	0.0	0.6	0.4	0.0	0.0	0.0	0.4	0.6
Buses	0	0	0	0	0	1	11	8	0	20	0	0	0	0	0	6	0	0	0	6	26
Buses %	0.0	0.0	0.0	0.0	0.0	0.2	2.5	0.8	0.0	1.1	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	1.3	0.8
Cars Enter Leg	27	612	0	0	639	431	428	947	0	1806	0	272	71	3	346	463	0	0	0	463	3254
Heavy Enter Leg	1	0	0	0	1	0	4	11	0	15	0	0	2	0	2	2	0	0	0	2	20
Bus Enter Leg	0	0	0	0	0	1	11	8	0	20	0	0	0	0	0	6	0	0	0	6	26
Total Entering Leg	28	612	0	0	640	432	443	966	0	1841	0	272	73	3	348	471	0	0	0	471	3300
Cars Exiting Leg					703					0					2025					526	3254
Heavy Exiting Leg					0					0					13					7	20
Buses Exiting Leg					1					0					14					11	26
Total Exiting Leg					704					0					2052					544	3300

PDI File #: **175597 E**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: Western Avenue Bridge W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars

	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	6	133	0	0	139	86	112	264	0	462	0	76	10	2	88	99	0	0	0	99	788
4:15 PM	9	146	0	0	155	116	94	245	0	455	0	74	9	0	83	89	0	0	0	89	782
4:30 PM	4	146	0	0	150	111	102	237	0	450	0	72	9	0	81	129	0	0	0	129	810
4:45 PM	2	153	0	0	155	100	115	250	0	465	0	57	17	0	74	106	0	0	0	106	800
Total	21	578	0	0	599	413	423	996	0	1832	0	279	45	2	326	423	0	0	0	423	3180
5:00 PM	9	145	0	0	154	117	103	230	0	450	0	63	14	1	78	124	0	0	0	124	806
5:15 PM	7	161	0	0	168	118	95	235	0	448	0	83	18	0	101	108	0	0	0	108	825
5:30 PM	9	153	0	0	162	96	115	232	0	443	0	69	22	2	93	125	0	0	0	125	823
5:45 PM	7	154	0	0	161	95	129	226	0	450	0	63	18	1	82	96	0	0	0	96	789
Total	32	613	0	0	645	426	442	923	0	1791	0	278	72	4	354	453	0	0	0	453	3243
Grand Total	53	1191	0	0	1244	839	865	1919	0	3623	0	557	117	6	680	876	0	0	0	876	6423
Approach %	4.3	95.7	0.0	0.0		23.2	23.9	53.0	0.0		0.0	81.9	17.2	0.9		100.0	0.0	0.0	0.0		
Total %	0.8	18.5	0.0	0.0	19.4	13.1	13.5	29.9	0.0	56.4	0.0	8.7	1.8	0.1	10.6	13.6	0.0	0.0	0.0	13.6	
Exiting Leg Total					1396					0					3992					1035	6423

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:45 PM	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:45 PM	2	153	0	0	155	100	115	250	0	465	0	57	17	0	74	106	0	0	0	106	800
5:00 PM	9	145	0	0	154	117	103	230	0	450	0	63	14	1	78	124	0	0	0	124	806
5:15 PM	7	161	0	0	168	118	95	235	0	448	0	83	18	0	101	108	0	0	0	108	825
5:30 PM	9	153	0	0	162	96	115	232	0	443	0	69	22	2	93	125	0	0	0	125	823
Total Volume	27	612	0	0	639	431	428	947	0	1806	0	272	71	3	346	463	0	0	0	463	3254
% Approach Total	4.2	95.8	0.0	0.0		23.9	23.7	52.4	0.0		0.0	78.6	20.5	0.9		100.0	0.0	0.0	0.0		
PHF	0.750	0.950	0.000	0.000	0.951	0.913	0.930	0.947	0.000	0.971	0.000	0.819	0.807	0.375	0.856	0.926	0.000	0.000	0.000	0.926	0.986
Entering Leg	27	612	0	0	639	431	428	947	0	1806	0	272	71	3	346	463	0	0	0	463	3254
Exiting Leg					703					0					2025					526	3254
Total					1342					1806					2371					989	6508

PDI File #: **175597 E**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: Western Avenue Bridge W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Heavy Vehicles

	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	1	0	0	1	1	0	4	0	5	0	0	0	0	0	3	0	0	0	3	9
4:15 PM	0	0	0	0	0	0	2	2	0	4	0	0	0	0	0	1	0	0	0	1	5
4:30 PM	0	0	0	0	0	0	1	3	0	4	0	0	0	0	0	0	0	0	0	0	4
4:45 PM	0	0	0	0	0	0	4	2	0	6	0	0	2	0	2	0	0	0	0	0	8
Total	0	1	0	0	1	1	7	11	0	19	0	0	2	0	2	4	0	0	0	4	26
5:00 PM	1	0	0	0	1	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	4
5:15 PM	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	1	0	0	0	1	4
5:30 PM	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	1	0	0	0	1	4
5:45 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	1	0	0	0	1	0	0	10	0	10	0	0	0	0	0	2	0	0	0	2	13
Grand Total	1	1	0	0	2	1	7	21	0	29	0	0	2	0	2	6	0	0	0	6	39
Approach %	50.0	50.0	0.0	0.0		3.4	24.1	72.4	0.0		0.0	0.0	100.0	0.0		100.0	0.0	0.0	0.0		
Total %	2.6	2.6	0.0	0.0	5.1	2.6	17.9	53.8	0.0	74.4	0.0	0.0	5.1	0.0	5.1	15.4	0.0	0.0	0.0	15.4	
Exiting Leg Total					1					0					28					10	39

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	1	0	0	1	1	0	4	0	5	0	0	0	0	0	3	0	0	0	3	9
4:15 PM	0	0	0	0	0	0	2	2	0	4	0	0	0	0	0	1	0	0	0	1	5
4:30 PM	0	0	0	0	0	0	1	3	0	4	0	0	0	0	0	0	0	0	0	0	4
4:45 PM	0	0	0	0	0	0	4	2	0	6	0	0	2	0	2	0	0	0	0	0	8
Total Volume	0	1	0	0	1	1	7	11	0	19	0	0	2	0	2	4	0	0	0	4	26
% Approach Total	0.0	100.0	0.0	0.0		5.3	36.8	57.9	0.0		0.0	0.0	100.0	0.0		100.0	0.0	0.0	0.0		
PHF	0.000	0.250	0.000	0.000	0.250	0.250	0.438	0.688	0.000	0.792	0.000	0.000	0.250	0.000	0.250	0.333	0.000	0.000	0.000	0.333	0.722
Entering Leg	0	1	0	0	1	1	7	11	0	19	0	0	2	0	2	4	0	0	0	4	26
Exiting Leg					1					0					16					9	26
Total					2					19					18					13	52

PDI File #: **175597 E**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: Western Avenue Bridge W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Buses**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	1	0	0	0	1	5
4:15 PM	0	0	0	0	0	0	2	2	0	4	0	0	0	0	0	2	0	0	0	2	6
4:30 PM	0	0	0	0	0	0	4	3	0	7	0	0	0	0	0	1	0	0	0	1	8
4:45 PM	0	0	0	0	0	0	3	4	0	7	0	0	0	0	0	2	0	0	0	2	9
Total	0	0	0	0	0	0	12	9	0	21	0	0	1	0	1	6	0	0	0	6	28
5:00 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	1	0	0	0	1	4
5:15 PM	0	0	0	0	0	1	1	1	0	3	0	0	0	0	0	3	0	0	0	3	6
5:30 PM	0	0	0	0	0	0	4	3	0	7	0	0	0	0	0	0	0	0	0	0	7
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Total	0	0	0	0	0	1	8	4	0	13	0	0	0	0	0	5	0	0	0	5	18
Grand Total	0	0	0	0	0	1	20	13	0	34	0	0	1	0	1	11	0	0	0	11	46
Approach %	0.0	0.0	0.0	0.0		2.9	58.8	38.2	0.0		0.0	0.0	100.0	0.0		100.0	0.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	2.2	43.5	28.3	0.0	73.9	0.0	0.0	2.2	0.0	2.2	23.9	0.0	0.0	0.0	23.9	
Exiting Leg Total					1					0					24					21	46

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Soldiers Field Road Ramps					Western Avenue Bridge					Soldiers Field Road Ramps					Western Avenue					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	1	0	0	0	1	5
4:15 PM	0	0	0	0	0	0	2	2	0	4	0	0	0	0	0	2	0	0	0	2	6
4:30 PM	0	0	0	0	0	0	4	3	0	7	0	0	0	0	0	1	0	0	0	1	8
4:45 PM	0	0	0	0	0	0	3	4	0	7	0	0	0	0	0	2	0	0	0	2	9
Total Volume	0	0	0	0	0	0	12	9	0	21	0	0	1	0	1	6	0	0	0	6	28
% Approach Total	0.0	0.0	0.0	0.0		0.0	57.1	42.9	0.0		0.0	0.0	100.0	0.0		100.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.750	0.563	0.000	0.750	0.000	0.000	0.250	0.000	0.250	0.750	0.000	0.000	0.000	0.750	0.778
Entering Leg	0	0	0	0	0	0	12	9	0	21	0	0	1	0	1	6	0	0	0	6	28
Exiting Leg					0					0					15					13	28
Total					0					21					16					19	56

PDI File #: **175597 E**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: Western Avenue Bridge W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Bicycles (on Roadway and Crosswalks)

	Soldiers Field Road Ramps							Western Avenue Bridge							Soldiers Field Road Ramps							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	3	1	4	0	4	1	0	0	4	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
4:15 PM	0	0	0	0	2	0	2	0	4	0	0	1	2	7	0	0	0	0	0	0	0	1	0	0	0	0	0	1	10
4:30 PM	0	0	0	0	1	0	1	0	4	0	0	0	4	8	0	0	0	0	0	2	2	0	0	0	0	0	0	0	11
4:45 PM	0	0	0	0	0	0	0	0	9	0	0	4	7	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
Total	0	0	0	0	6	1	7	0	21	1	0	5	17	44	0	0	0	0	0	2	2	1	0	0	0	0	0	1	54
5:00 PM	0	0	0	0	1	0	1	1	6	0	0	3	7	17	0	1	0	0	1	3	5	0	0	0	0	1	0	1	24
5:15 PM	0	0	0	0	0	1	1	0	11	0	0	6	14	31	0	0	0	0	2	5	7	0	0	0	0	0	0	0	39
5:30 PM	0	0	0	0	2	1	3	1	6	0	0	2	20	29	0	2	0	0	3	4	9	0	0	0	0	0	0	0	41
5:45 PM	0	0	0	0	0	0	0	0	5	0	0	2	23	30	0	1	0	0	0	4	5	0	0	0	0	0	0	0	35
Total	0	0	0	0	3	2	5	2	28	0	0	13	64	107	0	4	0	0	6	16	26	0	0	0	0	1	0	1	139
Grand Total	0	0	0	0	9	3	12	2	49	1	0	18	81	151	0	4	0	0	6	18	28	1	0	0	0	1	0	2	193
Approach %	0.0	0.0	0.0	0.0	75.0	25.0		1.3	32.5	0.7	0.0	11.9	53.6		0.0	14.3	0.0	0.0	21.4	64.3		50.0	0.0	0.0	0.0	50.0	0.0		
Total %	0.0	0.0	0.0	0.0	4.7	1.6	6.2	1.0	25.4	0.5	0.0	9.3	42.0	78.2	0.0	2.1	0.0	0.0	3.1	9.3	14.5	0.5	0.0	0.0	0.0	0.5	0.0	1.0	
Exiting Leg Total							18							99							26							50	193

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	Soldiers Field Road Ramps							Western Avenue Bridge							Soldiers Field Road Ramps							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	0	0	0	0	1	0	1	1	6	0	0	3	7	17	0	1	0	0	1	3	5	0	0	0	0	1	0	1	24
5:15 PM	0	0	0	0	0	1	1	0	11	0	0	6	14	31	0	0	0	0	2	5	7	0	0	0	0	0	0	0	39
5:30 PM	0	0	0	0	2	1	3	1	6	0	0	2	20	29	0	2	0	0	3	4	9	0	0	0	0	0	0	0	41
5:45 PM	0	0	0	0	0	0	0	0	5	0	0	2	23	30	0	1	0	0	0	4	5	0	0	0	0	0	0	0	35
Total Volume	0	0	0	0	3	2	5	2	28	0	0	13	64	107	0	4	0	0	6	16	26	0	0	0	0	1	0	1	139
% Approach Total	0.0	0.0	0.0	0.0	60.0	40.0		1.9	26.2	0.0	0.0	12.1	59.8		0.0	15.4	0.0	0.0	23.1	61.5		0.0	0.0	0.0	0.0	100.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.375	0.500	0.417	0.500	0.636	0.000	0.000	0.542	0.696	0.863	0.000	0.500	0.000	0.000	0.500	0.800	0.722	0.000	0.000	0.000	0.000	0.250	0.000	0.250	0.848
Entering Leg	0	0	0	0	3	2	5	2	28	0	0	13	64	107	0	4	0	0	6	16	26	0	0	0	0	1	0	1	139
Exiting Leg							11							77							22							29	139
Total							16							184							48							30	278

PDI File #: **175597 E**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: Western Avenue Bridge W: Western Avenue**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	Soldiers Field Road Ramps							Western Avenue Bridge							Soldiers Field Road Ramps							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	11	5	16	0	0	0	0	10	2	12	0	0	0	0	1	1	2	0	0	0	0	0	0	0	30
4:15 PM	0	0	0	0	6	5	11	0	0	0	0	6	2	8	0	0	0	0	0	0	0	0	0	0	0	0	1	1	20
4:30 PM	0	0	0	0	14	1	15	0	0	0	0	1	1	2	0	0	0	0	3	1	4	0	0	0	0	3	1	4	25
4:45 PM	0	0	0	0	10	4	14	0	0	0	0	2	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
Total	0	0	0	0	41	15	56	0	0	0	0	19	7	26	0	0	0	0	4	2	6	0	0	0	0	3	2	5	93
5:00 PM	0	0	0	0	10	4	14	0	0	0	0	3	4	7	0	0	0	0	1	4	5	0	0	0	0	0	0	0	26
5:15 PM	0	0	0	0	22	8	30	0	0	0	0	5	2	7	0	0	0	0	0	6	6	0	0	0	0	0	2	2	45
5:30 PM	0	0	0	0	14	5	19	0	0	0	0	8	5	13	0	0	0	0	1	5	6	0	0	0	0	0	0	0	38
5:45 PM	0	0	0	0	12	8	20	0	0	0	0	3	8	11	0	0	0	0	3	1	4	0	0	0	0	4	1	5	40
Total	0	0	0	0	58	25	83	0	0	0	0	19	19	38	0	0	0	0	5	16	21	0	0	0	0	4	3	7	149
Grand Total	0	0	0	0	99	40	139	0	0	0	0	38	26	64	0	0	0	0	9	18	27	0	0	0	0	7	5	12	242
Approach %	0.0	0.0	0.0	0.0	71.2	28.8		0.0	0.0	0.0	0.0	59.4	40.6		0.0	0.0	0.0	0.0	33.3	66.7		0.0	0.0	0.0	0.0	58.3	41.7		
Total %	0.0	0.0	0.0	0.0	40.9	16.5	57.4	0.0	0.0	0.0	0.0	15.7	10.7	26.4	0.0	0.0	0.0	0.0	3.7	7.4	11.2	0.0	0.0	0.0	0.0	2.9	2.1	5.0	
Exiting Leg Total							139							64							27							12	242

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	Soldiers Field Road Ramps							Western Avenue Bridge							Soldiers Field Road Ramps							Western Avenue							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	0	0	0	0	10	4	14	0	0	0	0	3	4	7	0	0	0	0	1	4	5	0	0	0	0	0	0	0	26
5:15 PM	0	0	0	0	22	8	30	0	0	0	0	5	2	7	0	0	0	0	0	6	6	0	0	0	0	0	2	2	45
5:30 PM	0	0	0	0	14	5	19	0	0	0	0	8	5	13	0	0	0	0	1	5	6	0	0	0	0	0	0	0	38
5:45 PM	0	0	0	0	12	8	20	0	0	0	0	3	8	11	0	0	0	0	3	1	4	0	0	0	0	4	1	5	40
Total Volume	0	0	0	0	58	25	83	0	0	0	0	19	19	38	0	0	0	0	5	16	21	0	0	0	0	4	3	7	149
% Approach Total	0.0	0.0	0.0	0.0	69.9	30.1		0.0	0.0	0.0	0.0	50.0	50.0		0.0	0.0	0.0	0.0	23.8	76.2		0.0	0.0	0.0	0.0	57.1	42.9		
PHF	0.000	0.000	0.000	0.000	0.659	0.781	0.692	0.000	0.000	0.000	0.000	0.594	0.594	0.731	0.000	0.000	0.000	0.000	0.417	0.667	0.875	0.000	0.000	0.000	0.000	0.250	0.375	0.350	0.828
Entering Leg	0	0	0	0	58	25	83	0	0	0	0	19	19	38	0	0	0	0	5	16	21	0	0	0	0	4	3	7	149
Exiting Leg							83							38							21							7	149
Total							166							76							42							14	298

PDI File #: **175597 F**
Location: **N: Windom Street**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars, Heavy Vehicles, and Buses (Combined)

	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
7:00 AM	3	43	0	46	99	279	0	378	95	1	1	97	521
7:15 AM	8	53	0	61	95	241	1	337	100	3	0	103	501
7:30 AM	3	52	0	55	101	328	0	429	128	2	0	130	614
7:45 AM	2	52	0	54	101	323	1	425	135	6	0	141	620
Total	16	200	0	216	396	1171	2	1569	458	12	1	471	2256
8:00 AM	7	65	0	72	118	310	0	428	130	3	1	134	634
8:15 AM	4	62	0	66	147	348	0	495	148	2	0	150	711
8:30 AM	3	57	0	60	132	351	0	483	145	5	0	150	693
8:45 AM	9	74	0	83	146	347	3	496	157	7	0	164	743
Total	23	258	0	281	543	1356	3	1902	580	17	1	598	2781
Grand Total	39	458	0	497	939	2527	5	3471	1038	29	2	1069	5037
Approach %	7.8	92.2	0.0		27.1	72.8	0.1		97.1	2.7	0.2		
Total %	0.8	9.1	0.0	9.9	18.6	50.2	0.1	68.9	20.6	0.6	0.0	21.2	
Exiting Leg Total				968				1501				2568	5037
Cars	37	454	0	491	933	2310	5	3248	1005	26	2	1033	4772
% Cars	94.9	99.1	0.0	98.8	99.4	91.4	100.0	93.6	96.8	89.7	100.0	96.6	94.7
Exiting Leg Total				959				1464				2349	4772
Heavy Vehicles	2	4	0	6	5	129	0	134	21	3	0	24	164
% Heavy Vehicles	5.1	0.9	0.0	1.2	0.5	5.1	0.0	3.9	2.0	10.3	0.0	2.2	3.3
Exiting Leg Total				8				25				131	164
Buses	0	0	0	0	1	88	0	89	12	0	0	12	101
% Buses	0.0	0.0	0.0	0.0	0.1	3.5	0.0	2.6	1.2	0.0	0.0	1.1	2.0
Exiting Leg Total				1				12				88	101

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
8:00 AM	7	65	0	72	118	310	0	428	130	3	1	134	634
8:15 AM	4	62	0	66	147	348	0	495	148	2	0	150	711
8:30 AM	3	57	0	60	132	351	0	483	145	5	0	150	693
8:45 AM	9	74	0	83	146	347	3	496	157	7	0	164	743
Total Volume	23	258	0	281	543	1356	3	1902	580	17	1	598	2781
% Approach Total	8.2	91.8	0.0		28.5	71.3	0.2		97.0	2.8	0.2		
PHF	0.639	0.872	0.000	0.846	0.923	0.966	0.250	0.959	0.924	0.607	0.250	0.912	0.936
Cars	21	256	0	277	542	1247	3	1792	559	14	1	574	2643
Cars %	91.3	99.2	0.0	98.6	99.8	92.0	100.0	94.2	96.4	82.4	100.0	96.0	95.0
Heavy Vehicles	2	2	0	4	1	65	0	66	14	3	0	17	87
Heavy Vehicles %	8.7	0.8	0.0	1.4	0.2	4.8	0.0	3.5	2.4	17.6	0.0	2.8	3.1
Buses	0	0	0	0	0	44	0	44	7	0	0	7	51
Buses %	0.0	0.0	0.0	0.0	0.0	3.2	0.0	2.3	1.2	0.0	0.0	1.2	1.8
Cars Enter Leg	21	256	0	277	542	1247	3	1792	559	14	1	574	2643
Heavy Enter Leg	2	2	0	4	1	65	0	66	14	3	0	17	87
Bus Enter Leg	0	0	0	0	0	44	0	44	7	0	0	7	51
Total Entering Leg	23	258	0	281	543	1356	3	1902	580	17	1	598	2781
Cars Exiting Leg				556				818				1269	2643
Heavy Exiting Leg				4				16				67	87
Buses Exiting Leg				0				7				44	51
Total Exiting Leg				560				841				1380	2781

PDI File #: **175597 F**
Location: **N: Windom Street**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Cars**

	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
7:00 AM	3	43	0	46	96	240	0	336	93	1	1	95	477
7:15 AM	8	53	0	61	94	215	1	310	97	3	0	100	471
7:30 AM	3	50	0	53	100	303	0	403	124	2	0	126	582
7:45 AM	2	52	0	54	101	305	1	407	132	6	0	138	599
Total	16	198	0	214	391	1063	2	1456	446	12	1	459	2129
8:00 AM	7	65	0	72	118	281	0	399	127	3	1	131	602
8:15 AM	4	62	0	66	147	320	0	467	142	1	0	143	676
8:30 AM	3	57	0	60	131	329	0	460	141	4	0	145	665
8:45 AM	7	72	0	79	146	317	3	466	149	6	0	155	700
Total	21	256	0	277	542	1247	3	1792	559	14	1	574	2643
Grand Total	37	454	0	491	933	2310	5	3248	1005	26	2	1033	4772
Approach %	7.5	92.5	0.0		28.7	71.1	0.2		97.3	2.5	0.2		
Total %	0.8	9.5	0.0	10.3	19.6	48.4	0.1	68.1	21.1	0.5	0.0	21.6	
Exiting Leg Total				959				1464				2349	4772

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
8:00 AM	7	65	0	72	118	281	0	399	127	3	1	131	602
8:15 AM	4	62	0	66	147	320	0	467	142	1	0	143	676
8:30 AM	3	57	0	60	131	329	0	460	141	4	0	145	665
8:45 AM	7	72	0	79	146	317	3	466	149	6	0	155	700
Total Volume	21	256	0	277	542	1247	3	1792	559	14	1	574	2643
% Approach Total	7.6	92.4	0.0		30.2	69.6	0.2		97.4	2.4	0.2		
PHF	0.750	0.889	0.000	0.877	0.922	0.948	0.250	0.959	0.938	0.583	0.250	0.926	0.944
Entering Leg	21	256	0	277	542	1247	3	1792	559	14	1	574	2643
Exiting Leg				556				818				1269	2643
Total				833				2610				1843	5286

PDI File #: **175597 F**
Location: **N: Windom Street**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Heavy Vehicles

	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
7:00 AM	0	0	0	0	3	19	0	22	1	0	0	1	23
7:15 AM	0	0	0	0	1	21	0	22	2	0	0	2	24
7:30 AM	0	2	0	2	0	16	0	16	3	0	0	3	21
7:45 AM	0	0	0	0	0	8	0	8	1	0	0	1	9
Total	0	2	0	2	4	64	0	68	7	0	0	7	77
8:00 AM	0	0	0	0	0	14	0	14	1	0	0	1	15
8:15 AM	0	0	0	0	0	15	0	15	6	1	0	7	22
8:30 AM	0	0	0	0	1	13	0	14	1	1	0	2	16
8:45 AM	2	2	0	4	0	23	0	23	6	1	0	7	34
Total	2	2	0	4	1	65	0	66	14	3	0	17	87
Grand Total	2	4	0	6	5	129	0	134	21	3	0	24	164
Approach %	33.3	66.7	0.0		3.7	96.3	0.0		87.5	12.5	0.0		
Total %	1.2	2.4	0.0	3.7	3.0	78.7	0.0	81.7	12.8	1.8	0.0	14.6	
Exiting Leg Total				8				25				131	164

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
8:00 AM	0	0	0	0	0	14	0	14	1	0	0	1	15
8:15 AM	0	0	0	0	0	15	0	15	6	1	0	7	22
8:30 AM	0	0	0	0	1	13	0	14	1	1	0	2	16
8:45 AM	2	2	0	4	0	23	0	23	6	1	0	7	34
Total Volume	2	2	0	4	1	65	0	66	14	3	0	17	87
% Approach Total	50.0	50.0	0.0		1.5	98.5	0.0		82.4	17.6	0.0		
PHF	0.250	0.250	0.000	0.250	0.250	0.707	0.000	0.717	0.583	0.750	0.000	0.607	0.640
Entering Leg	2	2	0	4	1	65	0	66	14	3	0	17	87
Exiting Leg				4				16				67	87
Total				8				82				84	174

PDI File #: **175597 F**
Location: **N: Windom Street**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Buses

	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
7:00 AM	0	0	0	0	0	20	0	20	1	0	0	1	21
7:15 AM	0	0	0	0	0	5	0	5	1	0	0	1	6
7:30 AM	0	0	0	0	1	9	0	10	1	0	0	1	11
7:45 AM	0	0	0	0	0	10	0	10	2	0	0	2	12
Total	0	0	0	0	1	44	0	45	5	0	0	5	50
8:00 AM	0	0	0	0	0	15	0	15	2	0	0	2	17
8:15 AM	0	0	0	0	0	13	0	13	0	0	0	0	13
8:30 AM	0	0	0	0	0	9	0	9	3	0	0	3	12
8:45 AM	0	0	0	0	0	7	0	7	2	0	0	2	9
Total	0	0	0	0	0	44	0	44	7	0	0	7	51
Grand Total	0	0	0	0	1	88	0	89	12	0	0	12	101
Approach %	0.0	0.0	0.0		1.1	98.9	0.0		100.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	1.0	87.1	0.0	88.1	11.9	0.0	0.0	11.9	
Exiting Leg Total				1				12				88	101

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
7:45 AM	0	0	0	0	0	10	0	10	2	0	0	2	12
8:00 AM	0	0	0	0	0	15	0	15	2	0	0	2	17
8:15 AM	0	0	0	0	0	13	0	13	0	0	0	0	13
8:30 AM	0	0	0	0	0	9	0	9	3	0	0	3	12
Total Volume	0	0	0	0	0	47	0	47	7	0	0	7	54
% Approach Total	0.0	0.0	0.0		0.0	100.0	0.0		100.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.783	0.000	0.783	0.583	0.000	0.000	0.583	0.794
Entering Leg	0	0	0	0	0	47	0	47	7	0	0	7	54
Exiting Leg				0				7				47	54
Total				0				54				54	108

PDI File #: **175597 F**
Location: **N: Windom Street**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Bicycles (on Roadway and Crosswalks)**

	Windom Street						Cambridge Street						Cambridge Street						
	North						East						West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
7:30 AM	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	2
7:45 AM	0	0	0	0	0	0	0	1	0	0	0	1	4	0	0	0	0	4	5
Total	0	1	0	0	0	1	0	1	0	0	0	1	6	0	0	0	0	6	8
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	4
8:15 AM	0	1	0	0	0	1	0	0	0	0	0	0	6	0	0	0	0	6	7
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3
8:45 AM	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	2
Total	0	1	0	0	0	1	0	1	0	0	0	1	14	0	0	0	0	14	16
Grand Total	0	2	0	0	0	2	0	2	0	0	0	2	20	0	0	0	0	20	24
Approach %	0.0	100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		100.0	0.0	0.0	0.0	0.0		
Total %	0.0	8.3	0.0	0.0	0.0	8.3	0.0	8.3	0.0	0.0	0.0	8.3	83.3	0.0	0.0	0.0	0.0	83.3	
Exiting Leg Total						0						22						2	24

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	Windom Street						Cambridge Street						Cambridge Street						
	North						East						West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:45 AM	0	0	0	0	0	0	0	1	0	0	0	1	4	0	0	0	0	4	5
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	4
8:15 AM	0	1	0	0	0	1	0	0	0	0	0	0	6	0	0	0	0	6	7
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3
Total Volume	0	1	0	0	0	1	0	1	0	0	0	1	17	0	0	0	0	17	19
% Approach Total	0.0	100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		100.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.250	0.000	0.000	0.000	0.250	0.000	0.250	0.000	0.000	0.000	0.250	0.708	0.000	0.000	0.000	0.000	0.708	0.679
Entering Leg	0	1	0	0	0	1	0	1	0	0	0	1	17	0	0	0	0	17	19
Exiting Leg						0						18						1	19
Total						1						19						18	38

PDI File #:	**175597 F**
Location:	**N: Windom Street**
Location:	**E: Cambridge Street W: Cambridge Street**
City, State:	**Allston, MA**
Client:	**VHB/ M. Baidy**
Site Code:	**13581.03**
Count Date:	**Wednesday, April 12, 2017**
Start Time:	**7:00 AM**
End Time:	**9:00 AM**
Class:	

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	Windom Street						Cambridge Street						Cambridge Street						
	North						East						West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	2	1	3	0	0	0	0	0	0	0	0	0	1	4	5	8
8:15 AM	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	1	0	1	5
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
8:45 AM	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	1	1	3
Total	0	0	0	7	2	9	0	0	0	0	0	0	0	0	0	2	6	8	17
Grand Total	0	0	0	7	2	9	0	0	0	0	0	0	0	0	0	2	6	8	17
Approach %	0.0	0.0	0.0	77.8	22.2		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	25.0	75.0		
Total %	0.0	0.0	0.0	41.2	11.8	52.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.8	35.3	47.1	
Exiting Leg Total						9						0						8	17

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Windom Street						Cambridge Street						Cambridge Street						
	North						East						West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	0	0	0	2	1	3	0	0	0	0	0	0	0	0	0	1	4	5	8
8:15 AM	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	1	0	1	5
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
8:45 AM	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	1	1	3
Total Volume	0	0	0	7	2	9	0	0	0	0	0	0	0	0	0	2	6	8	17
% Approach Total	0.0	0.0	0.0	77.8	22.2		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	25.0	75.0		
PHF	0.000	0.000	0.000	0.438	0.500	0.563	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.375	0.400	0.531
Entering Leg	0	0	0	7	2	9	0	0	0	0	0	0	0	0	0	2	6	8	17
Exiting Leg						9						0						8	17
Total						18						0						16	34

PDI File #:	**175597 F**
Location:	**N: Windom Street**
Location:	**E: Cambridge Street W: Cambridge Street**
City, State:	**Allston, MA**
Client:	**VHB/ M. Baidy**
Site Code:	**13581.03**
Count Date:	**Wednesday, April 12, 2017**
Start Time:	**4:00 PM**
End Time:	**6:00 PM**
Class:	**Cars, Heavy Vehicles, and Buses (Combined)**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
4:00 PM	10	4	0	14	28	282	0	310	124	7	1	132	456
4:15 PM	9	12	0	21	35	291	0	326	92	1	0	93	440
4:30 PM	2	20	0	22	74	357	0	431	142	2	0	144	597
4:45 PM	9	38	0	47	129	380	5	514	137	2	0	139	700
Total	30	74	0	104	266	1310	5	1581	495	12	1	508	2193
5:00 PM	16	27	0	43	81	328	1	410	170	3	0	173	626
5:15 PM	7	15	0	22	74	352	1	427	143	4	1	148	597
5:30 PM	18	27	0	45	103	374	3	480	160	6	0	166	691
5:45 PM	25	26	0	51	94	342	7	443	130	3	0	133	627
Total	66	95	0	161	352	1396	12	1760	603	16	1	620	2541
Grand Total	96	169	0	265	618	2706	17	3341	1098	28	2	1128	4734
Approach %	36.2	63.8	0.0		18.5	81.0	0.5		97.3	2.5	0.2		
Total %	2.0	3.6	0.0	5.6	13.1	57.2	0.4	70.6	23.2	0.6	0.0	23.8	
Exiting Leg Total				646				1284				2804	4734
Cars	94	167	0	261	614	2634	17	3265	1083	28	2	1113	4639
% Cars	97.9	98.8	0.0	98.5	99.4	97.3	100.0	97.7	98.6	100.0	100.0	98.7	98.0
Exiting Leg Total				642				1267				2730	4639
Heavy Vehicles	2	0	0	2	2	31	0	33	6	0	0	6	41
% Heavy Vehicles	2.1	0.0	0.0	0.8	0.3	1.1	0.0	1.0	0.5	0.0	0.0	0.5	0.9
Exiting Leg Total				2				6				33	41
Buses	0	2	0	2	2	41	0	43	9	0	0	9	54
% Buses	0.0	1.2	0.0	0.8	0.3	1.5	0.0	1.3	0.8	0.0	0.0	0.8	1.1
Exiting Leg Total				2				11				41	54

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:45 PM	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
4:45 PM	9	38	0	47	129	380	5	514	137	2	0	139	700
5:00 PM	16	27	0	43	81	328	1	410	170	3	0	173	626
5:15 PM	7	15	0	22	74	352	1	427	143	4	1	148	597
5:30 PM	18	27	0	45	103	374	3	480	160	6	0	166	691
Total Volume	50	107	0	157	387	1434	10	1831	610	15	1	626	2614
% Approach Total	31.8	68.2	0.0		21.1	78.3	0.5		97.4	2.4	0.2		
PHF	0.694	0.704	0.000	0.835	0.750	0.943	0.500	0.891	0.897	0.625	0.250	0.905	0.934
Cars	50	105	0	155	383	1398	10	1791	604	15	1	620	2566
Cars %	100.0	98.1	0.0	98.7	99.0	97.5	100.0	97.8	99.0	100.0	100.0	99.0	98.2
Heavy Vehicles	0	0	0	0	2	18	0	20	4	0	0	4	24
Heavy Vehicles %	0.0	0.0	0.0	0.0	0.5	1.3	0.0	1.1	0.7	0.0	0.0	0.6	0.9
Buses	0	2	0	2	2	18	0	20	2	0	0	2	24
Buses %	0.0	1.9	0.0	1.3	0.5	1.3	0.0	1.1	0.3	0.0	0.0	0.3	0.9
Cars Enter Leg	50	105	0	155	383	1398	10	1791	604	15	1	620	2566
Heavy Enter Leg	0	0	0	0	2	18	0	20	4	0	0	4	24
Bus Enter Leg	0	2	0	2	2	18	0	20	2	0	0	2	24
Total Entering Leg	50	107	0	157	387	1434	10	1831	610	15	1	626	2614
Cars Exiting Leg				398				719				1449	2566
Heavy Exiting Leg				2				4				18	24
Buses Exiting Leg				2				4				18	24
Total Exiting Leg				402				727				1485	2614

PDI File #:	**175597 F**
Location:	**N: Windom Street**
Location:	**E: Cambridge Street W: Cambridge Street**
City, State:	**Allston, MA**
Client:	**VHB/ M. Baidy**
Site Code:	**13581.03**
Count Date:	**Wednesday, April 12, 2017**
Start Time:	**4:00 PM**
End Time:	**6:00 PM**
Class:	

PRECISION
DATA
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars

	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
4:00 PM	10	4	0	14	28	274	0	302	122	7	1	130	446
4:15 PM	8	12	0	20	35	276	0	311	91	1	0	92	423
4:30 PM	1	20	0	21	74	351	0	425	139	2	0	141	587
4:45 PM	9	37	0	46	128	368	5	501	136	2	0	138	685
Total	28	73	0	101	265	1269	5	1539	488	12	1	501	2141
5:00 PM	16	26	0	42	80	322	1	403	168	3	0	171	616
5:15 PM	7	15	0	22	74	343	1	418	143	4	1	148	588
5:30 PM	18	27	0	45	101	365	3	469	157	6	0	163	677
5:45 PM	25	26	0	51	94	335	7	436	127	3	0	130	617
Total	66	94	0	160	349	1365	12	1726	595	16	1	612	2498
Grand Total	94	167	0	261	614	2634	17	3265	1083	28	2	1113	4639
Approach %	36.0	64.0	0.0		18.8	80.7	0.5		97.3	2.5	0.2		
Total %	2.0	3.6	0.0	5.6	13.2	56.8	0.4	70.4	23.3	0.6	0.0	24.0	
Exiting Leg Total				642				1267				2730	4639

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:45 PM	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
4:45 PM	9	37	0	46	128	368	5	501	136	2	0	138	685
5:00 PM	16	26	0	42	80	322	1	403	168	3	0	171	616
5:15 PM	7	15	0	22	74	343	1	418	143	4	1	148	588
5:30 PM	18	27	0	45	101	365	3	469	157	6	0	163	677
Total Volume	50	105	0	155	383	1398	10	1791	604	15	1	620	2566
% Approach Total	32.3	67.7	0.0		21.4	78.1	0.6		97.4	2.4	0.2		
PHF	0.694	0.709	0.000	0.842	0.748	0.950	0.500	0.894	0.899	0.625	0.250	0.906	0.936
Entering Leg	50	105	0	155	383	1398	10	1791	604	15	1	620	2566
Exiting Leg				398				719				1449	2566
Total				553				2510				2069	5132

PDI File #:	**175597 F**
Location:	**N: Windom Street**
Location:	**E: Cambridge Street W: Cambridge Street**
City, State:	**Allston, MA**
Client:	**VHB/ M. Baidy**
Site Code:	**13581.03**
Count Date:	**Wednesday, April 12, 2017**
Start Time:	**4:00 PM**
End Time:	**6:00 PM**
Class:	

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Heavy Vehicles

	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	6	0	6	0	0	0	0	6
4:15 PM	1	0	0	1	0	4	0	4	1	0	0	1	6
4:30 PM	1	0	0	1	0	1	0	1	1	0	0	1	3
4:45 PM	0	0	0	0	1	7	0	8	1	0	0	1	9
Total	2	0	0	2	1	18	0	19	3	0	0	3	24
5:00 PM	0	0	0	0	0	1	0	1	2	0	0	2	3
5:15 PM	0	0	0	0	0	4	0	4	0	0	0	0	4
5:30 PM	0	0	0	0	1	6	0	7	1	0	0	1	8
5:45 PM	0	0	0	0	0	2	0	2	0	0	0	0	2
Total	0	0	0	0	1	13	0	14	3	0	0	3	17
Grand Total	2	0	0	2	2	31	0	33	6	0	0	6	41
Approach %	100.0	0.0	0.0		6.1	93.9	0.0		100.0	0.0	0.0		
Total %	4.9	0.0	0.0	4.9	4.9	75.6	0.0	80.5	14.6	0.0	0.0	14.6	
Exiting Leg Total				2				6				33	41

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	6	0	6	0	0	0	0	6
4:15 PM	1	0	0	1	0	4	0	4	1	0	0	1	6
4:30 PM	1	0	0	1	0	1	0	1	1	0	0	1	3
4:45 PM	0	0	0	0	1	7	0	8	1	0	0	1	9
Total Volume	2	0	0	2	1	18	0	19	3	0	0	3	24
% Approach Total	100.0	0.0	0.0		5.3	94.7	0.0		100.0	0.0	0.0		
PHF	0.500	0.000	0.000	0.500	0.250	0.643	0.000	0.594	0.750	0.000	0.000	0.750	0.667
Entering Leg	2	0	0	2	1	18	0	19	3	0	0	3	24
Exiting Leg				1				3				20	24
Total				3				22				23	48

PDI File #: **175597 F**
Location: **N: Windom Street**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Buses

	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	2	0	2	2	0	0	2	4
4:15 PM	0	0	0	0	0	11	0	11	0	0	0	0	11
4:30 PM	0	0	0	0	0	5	0	5	2	0	0	2	7
4:45 PM	0	1	0	1	0	5	0	5	0	0	0	0	6
Total	0	1	0	1	0	23	0	23	4	0	0	4	28
5:00 PM	0	1	0	1	1	5	0	6	0	0	0	0	7
5:15 PM	0	0	0	0	0	5	0	5	0	0	0	0	5
5:30 PM	0	0	0	0	1	3	0	4	2	0	0	2	6
5:45 PM	0	0	0	0	0	5	0	5	3	0	0	3	8
Total	0	1	0	1	2	18	0	20	5	0	0	5	26
Grand Total	0	2	0	2	2	41	0	43	9	0	0	9	54
Approach %	0.0	100.0	0.0		4.7	95.3	0.0		100.0	0.0	0.0		
Total %	0.0	3.7	0.0	3.7	3.7	75.9	0.0	79.6	16.7	0.0	0.0	16.7	
Exiting Leg Total				2				11				41	54

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	Windom Street				Cambridge Street				Cambridge Street				
	North				East				West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	Total
4:15 PM	0	0	0	0	0	11	0	11	0	0	0	0	11
4:30 PM	0	0	0	0	0	5	0	5	2	0	0	2	7
4:45 PM	0	1	0	1	0	5	0	5	0	0	0	0	6
5:00 PM	0	1	0	1	1	5	0	6	0	0	0	0	7
Total Volume	0	2	0	2	1	26	0	27	2	0	0	2	31
% Approach Total	0.0	100.0	0.0		3.7	96.3	0.0		100.0	0.0	0.0		
PHF	0.000	0.500	0.000	0.500	0.250	0.591	0.000	0.614	0.250	0.000	0.000	0.250	0.705
Entering Leg	0	2	0	2	1	26	0	27	2	0	0	2	31
Exiting Leg				1				4				26	31
Total				3				31				28	62

PDI File #:	**175597 F**
Location:	**N: Windom Street**
Location:	**E: Cambridge Street W: Cambridge Street**
City, State:	**Allston, MA**
Client:	**VHB/ M. Baidy**
Site Code:	**13581.03**
Count Date:	**Wednesday, April 12, 2017**
Start Time:	**4:00 PM**
End Time:	**6:00 PM**
Class:	

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Bicycles (on Roadway and Crosswalks)

	Windom Street						Cambridge Street						Cambridge Street						
	North						East						West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	1	0	0	0	0	1	1	1	0	0	0	2	0	0	0	0	0	0	3
4:15 PM	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1
4:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
4:45 PM	1	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	2	3
Total	2	1	0	0	0	3	2	1	0	0	0	3	2	0	0	0	0	2	8
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
5:15 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	2
5:30 PM	1	1	0	0	0	2	0	4	0	0	0	4	0	0	0	0	0	0	6
5:45 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	3	1	0	0	0	4	0	4	0	0	0	4	1	0	0	0	1	2	10
Grand Total	5	2	0	0	0	7	2	5	0	0	0	7	3	0	0	0	1	4	18
Approach %	71.4	28.6	0.0	0.0	0.0		28.6	71.4	0.0	0.0	0.0		75.0	0.0	0.0	0.0	25.0		
Total %	27.8	11.1	0.0	0.0	0.0	38.9	11.1	27.8	0.0	0.0	0.0	38.9	16.7	0.0	0.0	0.0	5.6	22.2	
Exiting Leg Total						2						5						11	18

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Windom Street						Cambridge Street						Cambridge Street						
	North						East						West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	1	0	0	0	0	1	1	1	0	0	0	2	0	0	0	0	0	0	3
4:15 PM	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1
4:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
4:45 PM	1	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	2	3
Total Volume	2	1	0	0	0	3	2	1	0	0	0	3	2	0	0	0	0	2	8
% Approach Total	66.7	33.3	0.0	0.0	0.0		66.7	33.3	0.0	0.0	0.0		100.0	0.0	0.0	0.0	0.0		
PHF	0.500	0.250	0.000	0.000	0.000	0.750	0.500	0.250	0.000	0.000	0.000	0.375	0.250	0.000	0.000	0.000	0.000	0.250	0.667
Entering Leg	2	1	0	0	0	3	2	1	0	0	0	3	2	0	0	0	0	2	8
Exiting Leg						2						3						3	8
Total						5						6						5	16

PDI File #: **175597 F**
Location: **N: Windom Street**
Location: **E: Cambridge Street W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	Windom Street						Cambridge Street						Cambridge Street						
	North						East						West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
4:30 PM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	2
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	1	1	2	4
5:00 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
5:15 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	2
5:30 PM	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	1	1	4
5:45 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	2
Total	0	0	0	4	3	7	0	0	0	0	0	0	0	0	0	1	2	3	10
Grand Total	0	0	0	5	4	9	0	0	0	0	0	0	0	0	0	2	3	5	14
Approach %	0.0	0.0	0.0	55.6	44.4		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	40.0	60.0		
Total %	0.0	0.0	0.0	35.7	28.6	64.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	21.4	35.7	
Exiting Leg Total						9						0						5	14

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	Windom Street						Cambridge Street						Cambridge Street						
	North						East						West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
5:15 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	2
5:30 PM	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	1	1	4
5:45 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	2
Total Volume	0	0	0	4	3	7	0	0	0	0	0	0	0	0	0	1	2	3	10
% Approach Total	0.0	0.0	0.0	57.1	42.9		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	33.3	66.7		
PHF	0.000	0.000	0.000	0.500	0.250	0.583	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.500	0.750	0.625
Entering Leg	0	0	0	4	3	7	0	0	0	0	0	0	0	0	0	1	2	3	10
Exiting Leg						7						0						3	10
Total						14						0						6	20

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Cars, Heavy Vehicles, and Buses (Combined)**

	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	355	0	0	0	0	355	26	45	0	0	0	71	8	1	0	0	0	9	0	218	0	0	0	218	0	0	145	2	0	147	800
7:15 AM	311	0	0	0	0	311	64	43	0	0	0	107	9	1	0	0	0	10	0	249	1	0	0	250	0	0	142	3	0	145	823
7:30 AM	381	0	0	0	0	381	47	46	0	0	1	94	9	3	0	0	0	12	0	240	0	0	0	240	0	0	183	4	0	187	914
7:45 AM	379	0	0	0	0	379	56	53	0	0	0	109	9	2	1	0	0	12	0	231	0	0	0	231	0	1	163	4	0	168	899
Total	1426	0	0	0	0	1426	193	187	0	0	1	381	35	7	1	0	0	43	0	938	1	0	0	939	0	1	633	13	0	647	3436
8:00 AM	393	0	0	0	0	393	52	46	0	0	0	98	10	2	2	0	0	14	0	184	1	0	0	185	0	0	185	2	0	187	877
8:15 AM	432	0	0	0	0	432	40	44	0	0	1	85	32	2	0	0	0	34	0	180	2	2	0	184	0	0	177	3	0	180	915
8:30 AM	440	0	0	0	0	440	35	38	0	0	1	74	18	5	0	0	0	23	0	141	0	0	0	141	0	0	177	2	0	179	857
8:45 AM	445	0	0	0	0	445	17	33	0	0	0	50	23	4	2	0	0	29	0	151	0	0	0	151	0	0	194	1	0	195	870
Total	1710	0	0	0	0	1710	144	161	0	0	2	307	83	13	4	0	0	100	0	656	3	2	0	661	0	0	733	8	0	741	3519
Grand Total	3136	0	0	0	0	3136	337	348	0	0	3	688	118	20	5	0	0	143	0	1594	4	2	0	1600	0	1	1366	21	0	1388	6955
Approach %	100.0	0.0	0.0	0.0	0.0		49.0	50.6	0.0	0.0	0.4		82.5	14.0	3.5	0.0	0.0		0.0	99.6	0.3	0.1	0.0		0.0	0.1	98.4	1.5	0.0		
Total %	45.1	0.0	0.0	0.0	0.0	45.1	4.8	5.0	0.0	0.0	0.0	9.9	1.7	0.3	0.1	0.0	0.0	2.1	0.0	22.9	0.1	0.0	0.0	23.0	0.0	0.0	19.6	0.3	0.0	20.0	
Exiting Leg Total						382						3081						1						0						3491	6955
Cars	2927	0	0	0	0	2927	336	338	0	0	3	677	116	19	5	0	0	140	0	1537	1	2	0	1540	0	1	1332	17	0	1350	6634
% Cars	93.3	0.0	0.0	0.0	0.0	93.3	99.7	97.1	0.0	0.0	100.0	98.4	98.3	95.0	100.0	0.0	0.0	97.9	0.0	96.4	25.0	100.0	0.0	96.3	0.0	100.0	97.5	81.0	0.0	97.3	95.4
Exiting Leg Total						373						2988						1						0						3272	6634
Heavy Vehicles	123	0	0	0	0	123	1	2	0	0	0	3	1	1	0	0	0	2	0	52	3	0	0	55	0	0	25	4	0	29	212
% Heavy Vehicles	3.9	0.0	0.0	0.0	0.0	3.9	0.3	0.6	0.0	0.0	0.0	0.4	0.8	5.0	0.0	0.0	0.0	1.4	0.0	3.3	75.0	0.0	0.0	3.4	0.0	0.0	1.8	19.0	0.0	2.1	3.0
Exiting Leg Total						9						78						0						0						125	212
Buses	86	0	0	0	0	86	0	8	0	0	0	8	1	0	0	0	0	1	0	5	0	0	0	5	0	0	9	0	0	9	109
% Buses	2.7	0.0	0.0	0.0	0.0	2.7	0.0	2.3	0.0	0.0	0.0	1.2	0.8	0.0	0.0	0.0	0.0	0.7	0.0	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.7	0.0	0.0	0.6	1.6
Exiting Leg Total						0						15						0						0						94	109

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:30 AM	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
7:30 AM	381	0	0	0	0	381	47	46	0	0	1	94	9	3	0	0	0	12	0	240	0	0	0	240	0	0	183	4	0	187	914
7:45 AM	379	0	0	0	0	379	56	53	0	0	0	109	9	2	1	0	0	12	0	231	0	0	0	231	0	1	163	4	0	168	899
8:00 AM	393	0	0	0	0	393	52	46	0	0	0	98	10	2	2	0	0	14	0	184	1	0	0	185	0	0	185	2	0	187	877
8:15 AM	432	0	0	0	0	432	40	44	0	0	1	85	32	2	0	0	0	34	0	180	2	2	0	184	0	0	177	3	0	180	915
Total Volume	1585	0	0	0	0	1585	195	189	0	0	2	386	60	9	3	0	0	72	0	835	3	2	0	840	0	1	708	13	0	722	3605
% Approach Total	100.0	0.0	0.0	0.0	0.0		50.5	49.0	0.0	0.0	0.5		83.3	12.5	4.2	0.0	0.0		0.0	99.4	0.4	0.2	0.0		0.0	0.1	98.1	1.8	0.0		
PHF	0.917	0.000	0.000	0.000	0.000	0.917	0.871	0.892	0.000	0.000	0.500	0.885	0.469	0.750	0.375	0.000	0.000	0.529	0.000	0.870	0.375	0.250	0.000	0.875	0.000	0.250	0.957	0.813	0.000	0.965	0.985
Cars	1485	0	0	0	0	1485	195	184	0	0	2	381	60	9	3	0	0	72	0	809	0	2	0	811	0	1	690	9	0	700	3449
Cars %	93.7	0.0	0.0	0.0	0.0	93.7	100.0	97.4	0.0	0.0	100.0	98.7	100.0	100.0	100.0	0.0	0.0	100.0	0.0	96.9	0.0	100.0	0.0	96.5	0.0	100.0	97.5	69.2	0.0	97.0	95.7
Heavy Vehicles	51	0	0	0	0	51	0	1	0	0	0	1	0	0	0	0	0	0	0	21	3	0	0	24	0	0	14	4	0	18	94
Heavy Vehicles %	3.2	0.0	0.0	0.0	0.0	3.2	0.0	0.5	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	100.0	0.0	0.0	2.9	0.0	0.0	2.0	30.8	0.0	2.5	2.6
Buses	49	0	0	0	0	49	0	4	0	0	0	4	0	0	0	0	0	0	0	5	0	0	0	5	0	0	4	0	0	4	62
Buses %	3.1	0.0	0.0	0.0	0.0	3.1	0.0	2.1	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	0.6	1.7
Cars Enter Leg	1485	0	0	0	0	1485	195	184	0	0	2	381	60	9	3	0	0	72	0	809	0	2	0	811	0	1	690	9	0	700	3449

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars, Heavy Vehicles, and Buses (Combined)

	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
Heavy Enter Leg	51	0	0	0	0	51	0	1	0	0	0	1	0	0	0	0	0	0	0	21	3	0	0	24	0	0	14	4	0	18	94
Bus Enter Leg	49	0	0	0	0	49	0	4	0	0	0	4	0	0	0	0	0	0	0	5	0	0	0	5	0	0	4	0	0	4	62
Total Entering Leg	1585	0	0	0	0	1585	195	189	0	0	2	386	60	9	3	0	0	72	0	835	3	2	0	840	0	1	708	13	0	722	3605
Cars Exiting Leg						213						1561						1						0						1674	3449
Heavy Exiting Leg						7						35						0						0						52	94
Buses Exiting Leg						0						9						0						0						53	62
Total Exiting Leg						220						1605						1						0						1779	3605

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
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46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars

	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	312	0	0	0	0	312	26	45	0	0	0	71	7	1	0	0	0	8	0	215	0	0	0	215	0	0	142	2	0	144	750
7:15 AM	286	0	0	0	0	286	63	42	0	0	0	105	9	1	0	0	0	10	0	242	1	0	0	243	0	0	139	3	0	142	786
7:30 AM	358	0	0	0	0	358	47	45	0	0	1	93	9	3	0	0	0	12	0	232	0	0	0	232	0	0	175	3	0	178	873
7:45 AM	361	0	0	0	0	361	56	52	0	0	0	108	9	2	1	0	0	12	0	223	0	0	0	223	0	1	161	4	0	166	870
Total	1317	0	0	0	0	1317	192	184	0	0	1	377	34	7	1	0	0	42	0	912	1	0	0	913	0	1	617	12	0	630	3279
8:00 AM	361	0	0	0	0	361	52	43	0	0	0	95	10	2	2	0	0	14	0	180	0	0	0	180	0	0	183	1	0	184	834
8:15 AM	405	0	0	0	0	405	40	44	0	0	1	85	32	2	0	0	0	34	0	174	0	2	0	176	0	0	171	1	0	172	872
8:30 AM	419	0	0	0	0	419	35	36	0	0	1	72	17	4	0	0	0	21	0	135	0	0	0	135	0	0	174	2	0	176	823
8:45 AM	425	0	0	0	0	425	17	31	0	0	0	48	23	4	2	0	0	29	0	136	0	0	0	136	0	0	187	1	0	188	826
Total	1610	0	0	0	0	1610	144	154	0	0	2	300	82	12	4	0	0	98	0	625	0	2	0	627	0	0	715	5	0	720	3355
Grand Total	2927	0	0	0	0	2927	336	338	0	0	3	677	116	19	5	0	0	140	0	1537	1	2	0	1540	0	1	1332	17	0	1350	6634
Approach %	100.0	0.0	0.0	0.0	0.0		49.6	49.9	0.0	0.0	0.4		82.9	13.6	3.6	0.0	0.0		0.0	99.8	0.1	0.1	0.0		0.0	0.1	98.7	1.3	0.0		
Total %	44.1	0.0	0.0	0.0	0.0	44.1	5.1	5.1	0.0	0.0	0.0	10.2	1.7	0.3	0.1	0.0	0.0	2.1	0.0	23.2	0.0	0.0	0.0	23.2	0.0	0.0	20.1	0.3	0.0	20.3	
Exiting Leg Total						373						2988						1						0						3272	6634

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:30 AM	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Right	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Right	Bear Right	Bear Left	Hard Left	U-Turn	Total	Hard Right	Right	Thru	Left	U-Turn	Total	Total
7:30 AM	358	0	0	0	0	358	47	45	0	0	1	93	9	3	0	0	0	12	0	232	0	0	0	232	0	0	175	3	0	178	873
7:45 AM	361	0	0	0	0	361	56	52	0	0	0	108	9	2	1	0	0	12	0	223	0	0	0	223	0	1	161	4	0	166	870
8:00 AM	361	0	0	0	0	361	52	43	0	0	0	95	10	2	2	0	0	14	0	180	0	0	0	180	0	0	183	1	0	184	834
8:15 AM	405	0	0	0	0	405	40	44	0	0	1	85	32	2	0	0	0	34	0	174	0	2	0	176	0	0	171	1	0	172	872
Total Volume	1485	0	0	0	0	1485	195	184	0	0	2	381	60	9	3	0	0	72	0	809	0	2	0	811	0	1	690	9	0	700	3449
% Approach Total	100.0	0.0	0.0	0.0	0.0		51.2	48.3	0.0	0.0	0.5		83.3	12.5	4.2	0.0	0.0		0.0	99.8	0.0	0.2	0.0		0.0	0.1	98.6	1.3	0.0		
PHF	0.917	0.000	0.000	0.000	0.000	0.917	0.871	0.885	0.000	0.000	0.500	0.882	0.469	0.750	0.375	0.000	0.000	0.529	0.000	0.872	0.000	0.250	0.000	0.874	0.000	0.250	0.943	0.563	0.000	0.951	0.988
Entering Leg	1485	0	0	0	0	1485	195	184	0	0	2	381	60	9	3	0	0	72	0	809	0	2	0	811	0	1	690	9	0	700	3449
Exiting Leg						213						1561						1						0						1674	3449
Total						1698						1942						73						811						2374	6898

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
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Heavy Vehicles

	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	23	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	2	0	0	2	28
7:15 AM	21	0	0	0	0	21	1	0	0	0	0	1	0	0	0	0	0	0	0	7	0	0	0	7	0	0	2	0	0	2	31
7:30 AM	15	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	7	0	0	7	1	0	8	30
7:45 AM	8	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	0	0	1	0	0	1	15
Total	67	0	0	0	0	67	1	0	0	0	0	1	0	0	0	0	0	0	0	23	0	0	0	23	0	0	12	1	0	13	104
8:00 AM	13	0	0	0	0	13	0	1	0	0	0	1	0	0	0	0	0	0	0	4	1	0	0	5	0	0	0	1	0	1	20
8:15 AM	15	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	6	0	0	6	2	0	8	29
8:30 AM	14	0	0	0	0	14	0	1	0	0	0	1	1	1	0	0	0	2	0	6	0	0	0	6	0	0	2	0	0	2	25
8:45 AM	14	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	15	0	0	5	0	0	5	34
Total	56	0	0	0	0	56	0	2	0	0	0	2	1	1	0	0	0	2	0	29	3	0	0	32	0	0	13	3	0	16	108
Grand Total	123	0	0	0	0	123	1	2	0	0	0	3	1	1	0	0	0	2	0	52	3	0	0	55	0	0	25	4	0	29	212
Approach %	100.0	0.0	0.0	0.0	0.0		33.3	66.7	0.0	0.0	0.0		50.0	50.0	0.0	0.0	0.0		0.0	94.5	5.5	0.0	0.0		0.0	0.0	86.2	13.8	0.0		
Total %	58.0	0.0	0.0	0.0	0.0	58.0	0.5	0.9	0.0	0.0	0.0	1.4	0.5	0.5	0.0	0.0	0.0	0.9	0.0	24.5	1.4	0.0	0.0	25.9	0.0	0.0	11.8	1.9	0.0	13.7	
Exiting Leg Total						9						78						0						0						125	212

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	13	0	0	0	0	13	0	1	0	0	0	1	0	0	0	0	0	0	0	4	1	0	0	5	0	0	0	1	0	1	20
8:15 AM	15	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	6	0	0	6	2	0	8	29
8:30 AM	14	0	0	0	0	14	0	1	0	0	0	1	1	1	0	0	0	2	0	6	0	0	0	6	0	0	2	0	0	2	25
8:45 AM	14	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	15	0	0	5	0	0	5	34
Total Volume	56	0	0	0	0	56	0	2	0	0	0	2	1	1	0	0	0	2	0	29	3	0	0	32	0	0	13	3	0	16	108
% Approach Total	100.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		50.0	50.0	0.0	0.0	0.0		0.0	90.6	9.4	0.0	0.0		0.0	0.0	81.3	18.8	0.0		
PHF	0.933	0.000	0.000	0.000	0.000	0.933	0.000	0.500	0.000	0.000	0.000	0.500	0.250	0.250	0.000	0.000	0.000	0.250	0.000	0.483	0.375	0.000	0.000	0.533	0.000	0.000	0.542	0.375	0.000	0.500	0.794
Entering Leg	56	0	0	0	0	56	0	2	0	0	0	2	1	1	0	0	0	2	0	29	3	0	0	32	0	0	13	3	0	16	108
Exiting Leg						7						43						0						0						58	108
Total						63						45						2						32						74	216

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Buses**

	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	20	0	0	0	0	20	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	22
7:15 AM	4	0	0	0	0	4	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	6
7:30 AM	8	0	0	0	0	8	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	11
7:45 AM	10	0	0	0	0	10	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	0	0	1	0	0	1	14
Total	42	0	0	0	0	42	0	3	0	0	0	3	1	0	0	0	0	1	0	3	0	0	0	3	0	0	4	0	0	4	53
8:00 AM	19	0	0	0	0	19	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	23
8:15 AM	12	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	14
8:30 AM	7	0	0	0	0	7	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	9
8:45 AM	6	0	0	0	0	6	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	10
Total	44	0	0	0	0	44	0	5	0	0	0	5	0	0	0	0	0	0	0	2	0	0	0	2	0	0	5	0	0	5	56
Grand Total	86	0	0	0	0	86	0	8	0	0	0	8	1	0	0	0	0	1	0	5	0	0	0	5	0	0	9	0	0	9	109
Approach %	100.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		100.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		0.0	0.0	100.0	0.0	0.0		
Total %	78.9	0.0	0.0	0.0	0.0	78.9	0.0	7.3	0.0	0.0	0.0	7.3	0.9	0.0	0.0	0.0	0.0	0.9	0.0	4.6	0.0	0.0	0.0	4.6	0.0	0.0	8.3	0.0	0.0	8.3	
Exiting Leg Total						0						15						0						0						94	109

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:30 AM	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
7:30 AM	8	0	0	0	0	8	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	11
7:45 AM	10	0	0	0	0	10	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	0	0	1	0	0	1	14
8:00 AM	19	0	0	0	0	19	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	23
8:15 AM	12	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	14
Total Volume	49	0	0	0	0	49	0	4	0	0	0	4	0	0	0	0	0	0	0	5	0	0	0	5	0	0	4	0	0	4	62
% Approach Total	100.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		0.0	0.0	100.0	0.0	0.0		
PHF	0.645	0.000	0.000	0.000	0.000	0.645	0.000	0.500	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.625	0.000	0.000	0.000	0.625	0.000	0.000	0.500	0.000	0.000	0.500	0.674
Entering Leg	49	0	0	0	0	49	0	4	0	0	0	4	0	0	0	0	0	0	0	5	0	0	0	5	0	0	4	0	0	4	62
Exiting Leg						0						9						0						0						53	62
Total						49						13						0						5						57	124

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class: **Bicycles (on Roadway and Crosswalks)**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
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	I-90 Ramps								Cambridge Street								Double Tree Driveway								I-90 Offramp								Cambridge Street								
	North								East								South								Southwest								West								
	Right	Bear Righ	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Bear Left	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	Hard Left	U-Turn	CW-WB	CW-EB	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	CW-NWB	CW-SEB	Total	Hard Righ	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	4
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	4
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5	5
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0	2	0	0	0	0	2	5
8:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2
Total	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0	11	0	0	0	0	11	15
Grand Total	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0	15	0	0	0	0	15	19
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	100.0	0.0	0.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.8	0.0	0.0	0.0	0.0	0.0	15.8	0.0	0.0	78.9	0.0	0.0	0.0	0.0	78.9	
Exiting Leg Total								0								18								0								0								1	19

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:45 AM	I-90 Ramps								Cambridge Street								Double Tree Driveway								I-90 Offramp								Cambridge Street								
	North								East								South								Southwest								West								
	Right	Bear Righ	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Bear Left	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	Hard Left	U-Turn	CW-WB	CW-EB	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	CW-NWB	CW-SEB	Total	Hard Righ	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	4
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5	5
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0	2	0	0	0	0	2	5
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0	14	0	0	0	0	14	17
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	100.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.700	0.000	0.000	0.000	0.000	0.700	0.850
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0	14	0	0	0	0	14	17
Exiting Leg								0								17								0								0								0	17
Total								0								17								0								3								14	34

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	I-90 Ramps							
	North							
	Right	Bear Righ	Thru	Left	U-Turn	CW-EB	CW-WB	Total
7:00 AM	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	1	1
7:45 AM	0	0	0	0	0	2	1	3
Total	0	0	0	0	0	2	2	4
8:00 AM	0	0	0	0	0	3	1	4
8:15 AM	0	0	0	0	0	4	0	4
8:30 AM	0	0	0	0	0	1	0	1
8:45 AM	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	8	1	9
Grand Total	0	0	0	0	0	10	3	13
Approach %	0.0	0.0	0.0	0.0	0.0	76.9	23.1	
Total %	0.0	0.0	0.0	0.0	0.0	25.6	7.7	33.3
Exiting Leg Total								13

	Cambridge Street							
	East							
	Right	Thru	Bear Left	Left	U-Turn	CW-SB	CW-NB	Total
7:00 AM	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	1	0	1
7:30 AM	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	0	1
8:00 AM	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	2	0	2
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	2	0	2
Grand Total	0	0	0	0	0	3	0	3
Approach %	0.0	0.0	0.0	0.0	0.0	100.0	0.0	
Total %	0.0	0.0	0.0	0.0	0.0	7.7	0.0	7.7
Exiting Leg Total								3

	Double Tree Driveway							
	South							
	Right	Thru	Left	Hard Left	U-Turn	CW-WB	CW-EB	Total
7:00 AM	0	0	0	0	0	0	2	2
7:15 AM	0	0	0	0	0	1	1	2
7:30 AM	0	0	0	0	0	0	1	1
7:45 AM	0	0	0	0	0	0	1	1
Total	0	0	0	0	0	1	5	6
8:00 AM	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	1	0	1
Total	0	0	0	0	0	1	0	1
Grand Total	0	0	0	0	0	2	5	7
Approach %	0.0	0.0	0.0	0.0	0.0	28.6	71.4	
Total %	0.0	0.0	0.0	0.0	0.0	5.1	12.8	17.9
Exiting Leg Total								7

	I-90 Offramp							
	Southwest							
	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	CW-NWB	CW-SEB	Total
7:00 AM	0	0	0	0	0	0	2	2
7:15 AM	0	0	0	0	0	0	1	1
7:30 AM	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	3	3
8:00 AM	0	0	0	0	0	0	3	3
8:15 AM	0	0	0	0	0	0	1	1
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	1	1
Total	0	0	0	0	0	0	5	5
Grand Total	0	0	0	0	0	0	8	8
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	100.0	
Total %	0.0	0.0	0.0	0.0	0.0	0.0	20.5	20.5
Exiting Leg Total								8

	Cambridge Street								
	West								
	Hard Righ	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	4
7:15 AM	0	0	0	0	0	0	0	0	4
7:30 AM	0	0	0	0	0	0	0	0	2
7:45 AM	0	0	0	0	0	0	0	0	4
Total	0	0	0	0	0	0	0	0	14
8:00 AM	0	0	0	0	0	1	1	2	9
8:15 AM	0	0	0	0	0	0	0	0	7
8:30 AM	0	0	0	0	0	0	1	1	2
8:45 AM	0	0	0	0	0	1	4	5	7
Total	0	0	0	0	0	2	6	8	25
Grand Total	0	0	0	0	0	2	6	8	39
Approach %	0.0	0.0	0.0	0.0	0.0	25.0	75.0		
Total %	0.0	0.0	0.0	0.0	0.0	5.1	15.4	20.5	
Exiting Leg Total								8	39

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	I-90 Ramps							
	North							
	Right	Bear Righ	Thru	Left	U-Turn	CW-EB	CW-WB	Total
8:00 AM	0	0	0	0	0	3	1	4
8:15 AM	0	0	0	0	0	4	0	4
8:30 AM	0	0	0	0	0	1	0	1
8:45 AM	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	8	1	9
% Approach Total	0.0	0.0	0.0	0.0	0.0	88.9	11.1	
PHF	0.000	0.000	0.000	0.000	0.000	0.500	0.250	0.563
Entering Leg	0	0	0	0	0	8	1	9
Exiting Leg								9
Total								18

8:00 AM	Cambridge Street							
	East							
	Right	Thru	Bear Left	Left	U-Turn	CW-SB	CW-NB	Total
8:00 AM	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	2	0	2
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	2	0	2
% Approach Total	0.0	0.0	0.0	0.0	0.0	100.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.250
Entering Leg	0	0	0	0	0	2	0	2
Exiting Leg								2
Total								4

8:00 AM	Double Tree Driveway							
	South							
	Right	Thru	Left	Hard Left	U-Turn	CW-WB	CW-EB	Total
8:00 AM	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	1	0	1
Total Volume	0	0	0	0	0	1	0	1
% Approach Total	0.0	0.0	0.0	0.0	0.0	100.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.250
Entering Leg	0	0	0	0	0	1	0	1
Exiting Leg								1
Total								2

8:00 AM	I-90 Offramp							
	Southwest							
	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	CW-NWB	CW-SEB	Total
8:00 AM	0	0	0	0	0	0	3	3
8:15 AM	0	0	0	0	0	0	1	1
8:30 AM	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	1	1
Total Volume	0	0	0	0	0	0	5	5
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	100.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.417	0.417
Entering Leg	0	0	0	0	0	0	5	5
Exiting Leg								5
Total								10

8:00 AM	Cambridge Street								
	West								
	Hard Righ	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	0	0	0	0	0	1	1	2	9
8:15 AM	0	0	0	0	0	0	0	0	7
8:30 AM	0	0	0	0	0	0	1	1	2
8:45 AM	0	0	0	0	0	1	4	5	7
Total Volume	0	0	0	0	0	2	6	8	25
% Approach Total	0.0	0.0	0.0	0.0	0.0	25.0	75.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.500	0.375	0.400	0.694
Entering Leg	0	0	0	0	0	2	6	8	25
Exiting Leg								8	25
Total								16	50

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars, Heavy Vehicles, and Buses (Combined)

	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	253	0	0	0	0	253	59	54	0	0	0	113	7	4	1	0	0	12	0	276	0	1	0	277	0	0	120	3	1	124	779
4:15 PM	289	0	0	0	2	291	63	46	0	0	0	109	14	1	0	0	0	15	0	268	0	0	0	268	0	0	111	3	0	114	797
4:30 PM	382	0	0	0	0	382	46	64	0	0	0	110	10	0	0	0	0	10	0	236	0	0	0	236	0	0	166	3	0	169	907
4:45 PM	384	0	0	0	0	384	44	70	0	0	0	114	10	1	3	0	0	14	0	257	1	2	0	260	0	0	165	3	0	168	940
Total	1308	0	0	0	2	1310	212	234	0	0	0	446	41	6	4	0	0	51	0	1037	1	3	0	1041	0	0	562	12	1	575	3423
5:00 PM	383	0	0	0	0	383	45	58	0	0	1	104	14	6	2	0	0	22	0	231	0	1	0	232	0	0	172	3	0	175	916
5:15 PM	353	0	0	0	0	353	48	55	0	0	0	103	11	3	1	0	0	15	0	254	0	0	0	254	0	0	175	1	0	176	901
5:30 PM	426	0	0	0	0	426	43	55	0	0	0	98	14	2	2	0	0	18	0	242	0	2	0	244	0	0	166	2	0	168	954
5:45 PM	385	0	0	0	0	385	47	52	0	0	0	99	24	5	1	0	0	30	0	191	2	2	0	195	0	0	235	4	0	239	948
Total	1547	0	0	0	0	1547	183	220	0	0	1	404	63	16	6	0	0	85	0	918	2	5	0	925	0	0	748	10	0	758	3719
Grand Total	2855	0	0	0	2	2857	395	454	0	0	1	850	104	22	10	0	0	136	0	1955	3	8	0	1966	0	0	1310	22	1	1333	7142
Approach %	99.9	0.0	0.0	0.0	0.1		46.5	53.4	0.0	0.0	0.1		76.5	16.2	7.4	0.0	0.0		0.0	99.4	0.2	0.4	0.0		0.0	0.0	98.3	1.7	0.1		
Total %	40.0	0.0	0.0	0.0	0.0	40.0	5.5	6.4	0.0	0.0	0.0	11.9	1.5	0.3	0.1	0.0	0.0	1.9	0.0	27.4	0.0	0.1	0.0	27.5	0.0	0.0	18.3	0.3	0.0	18.7	
Exiting Leg Total						444						3370						0						0						3328	7142
Cars	2784	0	0	0	1	2785	391	448	0	0	1	840	104	22	10	0	0	136	0	1937	3	8	0	1948	0	0	1292	20	1	1313	7022
% Cars	97.5	0.0	0.0	0.0	50.0	97.5	99.0	98.7	0.0	0.0	100.0	98.8	100.0	100.0	100.0	0.0	0.0	100.0	0.0	99.1	100.0	100.0	0.0	99.1	0.0	0.0	98.6	90.9	100.0	98.5	98.3
Exiting Leg Total						437						3334						0						0						3251	7022
Heavy Vehicles	32	0	0	0	1	33	2	1	0	0	0	3	0	0	0	0	0	0	0	14	0	0	0	14	0	0	6	2	0	8	58
% Heavy Vehicles	1.1	0.0	0.0	0.0	50.0	1.2	0.5	0.2	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.5	9.1	0.0	0.6	0.8
Exiting Leg Total						5						20						0						0						33	58
Buses	39	0	0	0	0	39	2	5	0	0	0	7	0	0	0	0	0	0	0	4	0	0	0	4	0	0	12	0	0	12	62
% Buses	1.4	0.0	0.0	0.0	0.0	1.4	0.5	1.1	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.9	0.0	0.0	0.9	0.9
Exiting Leg Total						2						16						0						0						44	62

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
5:00 PM	383	0	0	0	0	383	45	58	0	0	1	104	14	6	2	0	0	22	0	231	0	1	0	232	0	0	172	3	0	175	916
5:15 PM	353	0	0	0	0	353	48	55	0	0	0	103	11	3	1	0	0	15	0	254	0	0	0	254	0	0	175	1	0	176	901
5:30 PM	426	0	0	0	0	426	43	55	0	0	0	98	14	2	2	0	0	18	0	242	0	2	0	244	0	0	166	2	0	168	954
5:45 PM	385	0	0	0	0	385	47	52	0	0	0	99	24	5	1	0	0	30	0	191	2	2	0	195	0	0	235	4	0	239	948
Total Volume	1547	0	0	0	0	1547	183	220	0	0	1	404	63	16	6	0	0	85	0	918	2	5	0	925	0	0	748	10	0	758	3719
% Approach Total	100.0	0.0	0.0	0.0	0.0		45.3	54.5	0.0	0.0	0.2		74.1	18.8	7.1	0.0	0.0		0.0	99.2	0.2	0.5	0.0		0.0	0.0	98.7	1.3	0.0		
PHF	0.908	0.000	0.000	0.000	0.000	0.908	0.953	0.948	0.000	0.000	0.250	0.971	0.656	0.667	0.750	0.000	0.000	0.708	0.000	0.904	0.250	0.625	0.000	0.910	0.000	0.000	0.796	0.625	0.000	0.793	0.975
Cars	1516	0	0	0	0	1516	179	218	0	0	1	398	63	16	6	0	0	85	0	910	2	5	0	917	0	0	738	10	0	748	3664
Cars %	98.0	0.0	0.0	0.0	0.0	98.0	97.8	99.1	0.0	0.0	100.0	98.5	100.0	100.0	100.0	0.0	0.0	100.0	0.0	99.1	100.0	100.0	0.0	99.1	0.0	0.0	98.7	100.0	0.0	98.7	98.5
Heavy Vehicles	14	0	0	0	0	14	2	0	0	0	0	2	0	0	0	0	0	0	0	7	0	0	0	7	0	0	4	0	0	4	27
Heavy Vehicles %	0.9	0.0	0.0	0.0	0.0	0.9	1.1	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.5	0.0	0.0	0.5	0.7
Buses	17	0	0	0	0	17	2	2	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	1	0	0	6	0	0	6	28
Buses %	1.1	0.0	0.0	0.0	0.0	1.1	1.1	0.9	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.8	0.0	0.0	0.8	0.8
Cars Enter Leg	1516	0	0	0	0	1516	179	218	0	0	1	398	63	16	6	0	0	85	0	910	2	5	0	917	0	0	738	10	0	748	3664

PDI File #: **175597 G**

Location: **N: I-90 Ramps S: Double Tree Driveway**

Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**

City, State: **Allston, MA**

Client: **VHB/ M. Baidy**

Site Code: **13581.03**

Count Date: **Wednesday, April 12, 2017**

Start Time: **4:00 PM**

End Time: **6:00 PM**

PRECISION
D A T A
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Cars, Heavy Vehicles, and Buses (Combined)**

	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
Heavy Enter Leg	14	0	0	0	0	14	2	0	0	0	0	2	0	0	0	0	0	0	0	7	0	0	0	7	0	0	4	0	0	4	27
Bus Enter Leg	17	0	0	0	0	17	2	2	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	1	0	0	6	0	0	6	28
Total Entering Leg	1547	0	0	0	0	1547	183	220	0	0	1	404	63	16	6	0	0	85	0	918	2	5	0	925	0	0	748	10	0	758	3719
Cars Exiting Leg						207						1712						0						0						1745	3664
Heavy Exiting Leg						2						11						0						0						14	27
Buses Exiting Leg						2						7						0						0						19	28
Total Exiting Leg						211						1730						0						0						1778	3719

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

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Cars

	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	244	0	0	0	0	244	59	54	0	0	0	113	7	4	1	0	0	12	0	275	0	1	0	276	0	0	119	3	1	123	768
4:15 PM	274	0	0	0	1	275	63	46	0	0	0	109	14	1	0	0	0	15	0	264	0	0	0	264	0	0	109	3	0	112	775
4:30 PM	376	0	0	0	0	376	46	64	0	0	0	110	10	0	0	0	0	10	0	234	0	0	0	234	0	0	162	2	0	164	894
4:45 PM	374	0	0	0	0	374	44	66	0	0	0	110	10	1	3	0	0	14	0	254	1	2	0	257	0	0	164	2	0	166	921
Total	1268	0	0	0	1	1269	212	230	0	0	0	442	41	6	4	0	0	51	0	1027	1	3	0	1031	0	0	554	10	1	565	3358
5:00 PM	378	0	0	0	0	378	45	57	0	0	1	103	14	6	2	0	0	22	0	227	0	1	0	228	0	0	169	3	0	172	903
5:15 PM	345	0	0	0	0	345	45	54	0	0	0	99	11	3	1	0	0	15	0	252	0	0	0	252	0	0	175	1	0	176	887
5:30 PM	413	0	0	0	0	413	43	55	0	0	0	98	14	2	2	0	0	18	0	240	0	2	0	242	0	0	163	2	0	165	936
5:45 PM	380	0	0	0	0	380	46	52	0	0	0	98	24	5	1	0	0	30	0	191	2	2	0	195	0	0	231	4	0	235	938
Total	1516	0	0	0	0	1516	179	218	0	0	1	398	63	16	6	0	0	85	0	910	2	5	0	917	0	0	738	10	0	748	3664
Grand Total	2784	0	0	0	1	2785	391	448	0	0	1	840	104	22	10	0	0	136	0	1937	3	8	0	1948	0	0	1292	20	1	1313	7022
Approach %	100.0	0.0	0.0	0.0	0.0		46.5	53.3	0.0	0.0	0.1		76.5	16.2	7.4	0.0	0.0		0.0	99.4	0.2	0.4	0.0		0.0	0.0	98.4	1.5	0.1		
Total %	39.6	0.0	0.0	0.0	0.0	39.7	5.6	6.4	0.0	0.0	0.0	12.0	1.5	0.3	0.1	0.0	0.0	1.9	0.0	27.6	0.0	0.1	0.0	27.7	0.0	0.0	18.4	0.3	0.0	18.7	
Exiting Leg Total						437						3334						0						0						3251	7022

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
5:00 PM	378	0	0	0	0	378	45	57	0	0	1	103	14	6	2	0	0	22	0	227	0	1	0	228	0	0	169	3	0	172	903
5:15 PM	345	0	0	0	0	345	45	54	0	0	0	99	11	3	1	0	0	15	0	252	0	0	0	252	0	0	175	1	0	176	887
5:30 PM	413	0	0	0	0	413	43	55	0	0	0	98	14	2	2	0	0	18	0	240	0	2	0	242	0	0	163	2	0	165	936
5:45 PM	380	0	0	0	0	380	46	52	0	0	0	98	24	5	1	0	0	30	0	191	2	2	0	195	0	0	231	4	0	235	938
Total Volume	1516	0	0	0	0	1516	179	218	0	0	1	398	63	16	6	0	0	85	0	910	2	5	0	917	0	0	738	10	0	748	3664
% Approach Total	100.0	0.0	0.0	0.0	0.0		45.0	54.8	0.0	0.0	0.3		74.1	18.8	7.1	0.0	0.0		0.0	99.2	0.2	0.5	0.0		0.0	0.0	98.7	1.3	0.0		
PHF	0.918	0.000	0.000	0.000	0.000	0.918	0.973	0.956	0.000	0.000	0.250	0.966	0.656	0.667	0.750	0.000	0.000	0.708	0.000	0.903	0.250	0.625	0.000	0.910	0.000	0.000	0.799	0.625	0.000	0.796	0.977
Entering Leg	1516	0	0	0	0	1516	179	218	0	0	1	398	63	16	6	0	0	85	0	910	2	5	0	917	0	0	738	10	0	748	3664
Exiting Leg						207						1712						0						0						1745	3664
Total						1723						2110						85						917						2493	7328

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
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Heavy Vehicles

	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	5	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	6
4:15 PM	6	0	0	0	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	1	0	0	1	11
4:30 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	3
4:45 PM	6	0	0	0	0	6	0	1	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	1	0	1	11
Total	18	0	0	0	1	19	0	1	0	0	0	1	0	0	0	0	0	0	0	7	0	0	0	7	0	0	2	2	0	4	31
5:00 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0	0	2	0	0	2	7
5:15 PM	4	0	0	0	0	4	1	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	7
5:30 PM	7	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	9
5:45 PM	2	0	0	0	0	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4
Total	14	0	0	0	0	14	2	0	0	0	0	2	0	0	0	0	0	0	0	7	0	0	0	7	0	0	4	0	0	4	27
Grand Total	32	0	0	0	1	33	2	1	0	0	0	3	0	0	0	0	0	0	0	14	0	0	0	14	0	0	6	2	0	8	58
Approach %	97.0	0.0	0.0	0.0	3.0		66.7	33.3	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		0.0	0.0	75.0	25.0	0.0		
Total %	55.2	0.0	0.0	0.0	1.7	56.9	3.4	1.7	0.0	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.1	0.0	0.0	0.0	24.1	0.0	0.0	10.3	3.4	0.0	13.8	
Exiting Leg Total						5						20						0						0						33	58

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	5	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	6
4:15 PM	6	0	0	0	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	1	0	0	1	11
4:30 PM	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	3
4:45 PM	6	0	0	0	0	6	0	1	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	1	0	1	11
Total Volume	18	0	0	0	1	19	0	1	0	0	0	1	0	0	0	0	0	0	0	7	0	0	0	7	0	0	2	2	0	4	31
% Approach Total	94.7	0.0	0.0	0.0	5.3		0.0	100.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		0.0	0.0	50.0	50.0	0.0		
PHF	0.750	0.000	0.000	0.000	0.250	0.679	0.000	0.250	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.583	0.000	0.000	0.000	0.583	0.000	0.000	0.500	0.500	0.000	0.500	0.705
Entering Leg	18	0	0	0	1	19	0	1	0	0	0	1	0	0	0	0	0	0	0	7	0	0	0	7	0	0	2	2	0	4	31
Exiting Leg						3						9						0						0						19	31
Total						22						10						0						7						23	62

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Buses

	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	4	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	5
4:15 PM	9	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	11
4:30 PM	5	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	3	0	0	3	10
4:45 PM	4	0	0	0	0	4	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	8
Total	22	0	0	0	0	22	0	3	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	3	0	0	6	0	0	6	34
5:00 PM	4	0	0	0	0	4	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	6
5:15 PM	4	0	0	0	0	4	2	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
5:30 PM	6	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2	0	0	2	9
5:45 PM	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	6
Total	17	0	0	0	0	17	2	2	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	1	0	0	6	0	0	6	28
Grand Total	39	0	0	0	0	39	2	5	0	0	0	7	0	0	0	0	0	0	0	4	0	0	0	4	0	0	12	0	0	12	62
Approach %	100.0	0.0	0.0	0.0	0.0		28.6	71.4	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		0.0	0.0	100.0	0.0	0.0		
Total %	62.9	0.0	0.0	0.0	0.0	62.9	3.2	8.1	0.0	0.0	0.0	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	0.0	0.0	6.5	0.0	0.0	19.4	0.0	0.0	19.4	
Exiting Leg Total						2						16						0						0						44	62

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	I-90 Ramps						Cambridge Street						Double Tree Driveway						I-90 Offramp						Cambridge Street						
	North						East						South						Southwest						West						
	Right	Bear Righ	Thru	Left	U-Turn	Total	Right	Thru	Bear Left	Left	U-Turn	Total	Right	Thru	Left	Hard Left	U-Turn	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	Total	Hard Righ	Right	Thru	Left	U-Turn	Total	Total
4:15 PM	9	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	11
4:30 PM	5	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	3	0	0	3	10
4:45 PM	4	0	0	0	0	4	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	8
5:00 PM	4	0	0	0	0	4	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	6
Total Volume	22	0	0	0	0	22	0	4	0	0	0	4	0	0	0	0	0	0	0	3	0	0	0	3	0	0	6	0	0	6	35
% Approach Total	100.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0		0.0	0.0	100.0	0.0	0.0		
PHF	0.611	0.000	0.000	0.000	0.000	0.611	0.000	0.333	0.000	0.000	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.000	0.375	0.000	0.000	0.500	0.000	0.000	0.500	0.795
Entering Leg	22	0	0	0	0	22	0	4	0	0	0	4	0	0	0	0	0	0	0	3	0	0	0	3	0	0	6	0	0	6	35
Exiting Leg						0						9						0						0						26	35
Total						22						13						0						3						32	70

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Bicycles (on Roadway and Crosswalks)

I-90 Ramps — North

	Right	Bear Righ	Thru	Left	U-Turn	CW-EB	CW-WB	Total
4:00 PM	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exiting Leg Total								3

Cambridge Street — East

	Right	Thru	Bear Left	Left	U-Turn	CW-SB	CW-NB	Total
4:00 PM	0	1	0	0	0	0	0	1
4:15 PM	0	1	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0
Total	0	2	0	0	0	0	0	2
5:00 PM	0	0	0	0	0	0	0	0
5:15 PM	1	0	0	0	0	0	0	1
5:30 PM	2	0	0	0	0	0	0	2
5:45 PM	0	0	0	0	0	0	0	0
Total	3	0	0	0	0	0	0	3
Grand Total	3	2	0	0	0	0	0	5
Approach %	60.0	40.0	0.0	0.0	0.0	0.0	0.0	
Total %	23.1	15.4	0.0	0.0	0.0	0.0	0.0	38.5
Exiting Leg Total								7

Double Tree Driveway — South

	Right	Thru	Left	Hard Left	U-Turn	CW-WB	CW-EB	Total
4:00 PM	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	1	1
5:45 PM	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	1
Grand Total	0	0	0	0	0	0	1	1
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	100.0	
Total %	0.0	0.0	0.0	0.0	0.0	0.0	7.7	7.7
Exiting Leg Total								1

I-90 Offramp — Southwest

	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	CW-NWB	CW-SEB	Total
4:00 PM	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0
4:45 PM	0	1	0	0	0	0	0	1
Total	0	1	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0
Grand Total	0	1	0	0	0	0	0	1
Approach %	0.0	100.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	7.7	0.0	0.0	0.0	0.0	0.0	7.7
Exiting Leg Total								0

Cambridge Street — West

	Hard Righ	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	1	0	0	0	0	1	2
4:15 PM	0	0	0	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	2	0	0	0	0	2	3
Total	0	0	3	0	0	0	0	3	6
5:00 PM	0	0	1	0	0	0	0	1	1
5:15 PM	0	0	1	0	0	0	0	1	2
5:30 PM	0	0	1	0	0	0	0	1	4
5:45 PM	0	0	0	0	0	0	0	0	0
Total	0	0	3	0	0	0	0	3	7
Grand Total	0	0	6	0	0	0	0	6	13
Approach %	0.0	0.0	100.0	0.0	0.0	0.0	0.0		
Total %	0.0	0.0	46.2	0.0	0.0	0.0	0.0	46.2	
Exiting Leg Total								2	13

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM

I-90 Ramps — North

	Right	Bear Righ	Thru	Left	U-Turn	CW-EB	CW-WB	Total
4:00 PM	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Entering Leg	0	0	0	0	0	0	0	0
Exiting Leg								0
Total								0

Cambridge Street — East

	Right	Thru	Bear Left	Left	U-Turn	CW-SB	CW-NB	Total
4:00 PM	0	1	0	0	0	0	0	1
4:15 PM	0	1	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0
Total Volume	0	2	0	0	0	0	0	2
% Approach Total	0.0	100.0	0.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.500
Entering Leg	0	2	0	0	0	0	0	2
Exiting Leg								4
Total								6

Double Tree Driveway — South

	Right	Thru	Left	Hard Left	U-Turn	CW-WB	CW-EB	Total
4:00 PM	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Entering Leg	0	0	0	0	0	0	0	0
Exiting Leg								0
Total								0

I-90 Offramp — Southwest

	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	CW-NWB	CW-SEB	Total
4:00 PM	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0
4:45 PM	0	1	0	0	0	0	0	1
Total Volume	0	1	0	0	0	0	0	1
% Approach Total	0.0	100.0	0.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.250
Entering Leg	0	1	0	0	0	0	0	1
Exiting Leg								0
Total								1

Cambridge Street — West

	Hard Righ	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	1	0	0	0	0	1	2
4:15 PM	0	0	0	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	2	0	0	0	0	2	3
Total Volume	0	0	3	0	0	0	0	3	6
% Approach Total	0.0	0.0	100.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.375	0.500
Entering Leg	0	0	3	0	0	0	0	3	6
Exiting Leg								2	6
Total								5	12

PDI File #: **175597 G**
Location: **N: I-90 Ramps S: Double Tree Driveway**
Location: **E: Cambridge Street W: Cambridge Street SW: I-90 Offramp**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	I-90 Ramps								Cambridge Street								Double Tree Driveway								I-90 Offramp								Cambridge Street								
	North								East								South								Southwest								West								
	Right	Bear Righ	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Bear Left	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	Hard Left	U-Turn	CW-WB	CW-EB	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	CW-NWB	CW-SEB	Total	Hard Righ	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	4
4:15 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	6
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	5	0	0	0	0	0	2	1	3	0	0	0	0	0	0	0	0	9
5:30 PM	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	7
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	7	0	0	0	0	0	4	2	6	0	0	0	0	0	0	2	2	15
Total	0	0	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	16	0	0	0	0	0	7	4	11	0	0	0	0	0	0	2	2	32
Grand Total	0	0	0	0	0	3	3	6	0	0	0	0	0	0	0	0	0	0	0	0	0	8	10	18	0	0	0	0	0	7	5	12	0	0	0	0	0	0	2	2	38
Approach %	0.0	0.0	0.0	0.0	0.0	50.0	50.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	44.4	55.6		0.0	0.0	0.0	0.0	0.0	58.3	41.7		0.0	0.0	0.0	0.0	0.0	0.0	100.0		
Total %	0.0	0.0	0.0	0.0	0.0	7.9	7.9	15.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.1	26.3	47.4	0.0	0.0	0.0	0.0	0.0	18.4	13.2	31.6	0.0	0.0	0.0	0.0	0.0	0.0	5.3	5.3	
Exiting Leg Total								6								0								18								12								2	38

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	I-90 Ramps								Cambridge Street								Double Tree Driveway								I-90 Offramp								Cambridge Street								
	North								East								South								Southwest								West								
	Right	Bear Righ	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Bear Left	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	Hard Left	U-Turn	CW-WB	CW-EB	Total	Hard Righ	Bear Righ	Bear Left	Hard Left	U-Turn	CW-NWB	CW-SEB	Total	Hard Righ	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	5	0	0	0	0	0	2	1	3	0	0	0	0	0	0	0	0	9
5:30 PM	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	7
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	7	0	0	0	0	0	4	2	6	0	0	0	0	0	0	2	2	15
Total Volume	0	0	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	16	0	0	0	0	0	7	4	11	0	0	0	0	0	0	2	2	32
% Approach Total	0.0	0.0	0.0	0.0	0.0	33.3	66.7		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	50.0	50.0		0.0	0.0	0.0	0.0	0.0	63.6	36.4		0.0	0.0	0.0	0.0	0.0	0.0	100.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.250	0.500	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.667	0.571	0.000	0.000	0.000	0.000	0.000	0.438	0.500	0.458	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.533
Entering Leg	0	0	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	16	0	0	0	0	0	7	4	11	0	0	0	0	0	0	2	2	32
Exiting Leg								3								0								16								11								2	32
Total								6								0								32								22								4	64

PDI File #:	**175597 H**
Location:	**N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location:	**E: River Street Bridge W: Cambridge Street**
City, State:	**Allston, MA**
Client:	**VHB/ M. Baidy**
Site Code:	**13581.03**
Count Date:	**Wednesday, April 12, 2017**
Start Time:	**7:00 AM**
End Time:	**9:00 AM**
Class:	

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars, Heavy Vehicles, and Buses (Combined)

	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	7	64	85	2	158	0	0	0	0	0	13	17	60	1	91	93	275	40	0	408	657
7:15 AM	8	44	89	0	141	0	0	0	0	0	26	29	101	7	163	104	219	49	0	372	676
7:30 AM	9	52	79	0	140	0	0	0	0	0	24	13	85	5	127	97	261	60	0	418	685
7:45 AM	20	46	100	1	167	0	0	0	0	0	18	22	86	3	129	100	232	40	0	372	668
Total	44	206	353	3	606	0	0	0	0	0	81	81	332	16	510	394	987	189	0	1570	2686
8:00 AM	9	53	56	2	120	0	0	0	0	0	23	17	92	1	133	85	272	44	0	401	654
8:15 AM	12	56	97	0	165	0	0	0	0	0	35	14	68	1	118	87	264	35	0	386	669
8:30 AM	17	56	64	0	137	0	0	0	0	0	36	29	59	1	125	69	226	32	0	327	589
8:45 AM	14	58	69	1	142	0	0	0	0	0	31	12	34	5	82	61	271	29	0	361	585
Total	52	223	286	3	564	0	0	0	0	0	125	72	253	8	458	302	1033	140	0	1475	2497
Grand Total	96	429	639	6	1170	0	0	0	0	0	206	153	585	24	968	696	2020	329	0	3045	5183
Approach %	8.2	36.7	54.6	0.5		0.0	0.0	0.0	0.0		21.3	15.8	60.4	2.5		22.9	66.3	10.8	0.0		
Total %	1.9	8.3	12.3	0.1	22.6	0.0	0.0	0.0	0.0	0.0	4.0	3.0	11.3	0.5	18.7	13.4	39.0	6.3	0.0	58.7	
Exiting Leg Total					488					2865					1149					681	5183
Cars	89	417	606	6	1118	0	0	0	0	0	206	153	582	24	965	686	1943	311	0	2940	5023
% Cars	92.7	97.2	94.8	100.0	95.6	0.0	0.0	0.0	0.0	0.0	100.0	100.0	99.5	100.0	99.7	98.6	96.2	94.5	0.0	96.6	96.9
Exiting Leg Total					470					2755					1127					671	5023
Heavy Vehicles	0	12	20	0	32	0	0	0	0	0	0	0	3	0	3	10	65	18	0	93	128
% Heavy Vehicles	0.0	2.8	3.1	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.3	1.4	3.2	5.5	0.0	3.1	2.5
Exiting Leg Total					18					85					22					3	128
Buses	7	0	13	0	20	0	0	0	0	0	0	0	0	0	0	0	12	0	0	12	32
% Buses	7.3	0.0	2.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.4	0.6
Exiting Leg Total					0					25					0					7	32

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	7	64	85	2	158	0	0	0	0	0	13	17	60	1	91	93	275	40	0	408	657
7:15 AM	8	44	89	0	141	0	0	0	0	0	26	29	101	7	163	104	219	49	0	372	676
7:30 AM	9	52	79	0	140	0	0	0	0	0	24	13	85	5	127	97	261	60	0	418	685
7:45 AM	20	46	100	1	167	0	0	0	0	0	18	22	86	3	129	100	232	40	0	372	668
Total Volume	44	206	353	3	606	0	0	0	0	0	81	81	332	16	510	394	987	189	0	1570	2686
% Approach Total	7.3	34.0	58.3	0.5		0.0	0.0	0.0	0.0		15.9	15.9	65.1	3.1		25.1	62.9	12.0	0.0		
PHF	0.550	0.805	0.883	0.375	0.907	0.000	0.000	0.000	0.000	0.000	0.779	0.698	0.822	0.571	0.782	0.947	0.897	0.788	0.000	0.939	0.980
Cars	41	201	334	3	579	0	0	0	0	0	81	81	329	16	507	388	950	183	0	1521	2607
Cars %	93.2	97.6	94.6	100.0	95.5	0.0	0.0	0.0	0.0	0.0	100.0	100.0	99.1	100.0	99.4	98.5	96.3	96.8	0.0	96.9	97.1
Heavy Vehicles	0	5	12	0	17	0	0	0	0	0	0	0	3	0	3	6	31	6	0	43	63
Heavy Vehicles %	0.0	2.4	3.4	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.6	1.5	3.1	3.2	0.0	2.7	2.3
Buses	3	0	7	0	10	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	16
Buses %	6.8	0.0	2.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.4	0.6
Cars Enter Leg	41	201	334	3	579	0	0	0	0	0	81	81	329	16	507	388	950	183	0	1521	2607
Heavy Enter Leg	0	5	12	0	17	0	0	0	0	0	0	0	3	0	3	6	31	6	0	43	63
Bus Enter Leg	3	0	7	0	10	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	16
Total Entering Leg	44	206	353	3	606	0	0	0	0	0	81	81	332	16	510	394	987	189	0	1570	2686
Cars Exiting Leg					267					1365					605					370	2607
Heavy Exiting Leg					6					43					11					3	63
Buses Exiting Leg					0					13					0					3	16
Total Exiting Leg					273					1421					616					376	2686

PDI File #: **175597 H**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: River Street Bridge W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class: **Cars**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
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	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	7	64	77	2	150	0	0	0	0	0	13	17	60	1	91	91	268	39	0	398	639
7:15 AM	7	41	86	0	134	0	0	0	0	0	26	29	98	7	160	102	209	49	0	360	654
7:30 AM	8	52	77	0	137	0	0	0	0	0	24	13	85	5	127	96	249	56	0	401	665
7:45 AM	19	44	94	1	158	0	0	0	0	0	18	22	86	3	129	99	224	39	0	362	649
Total	41	201	334	3	579	0	0	0	0	0	81	81	329	16	507	388	950	183	0	1521	2607
8:00 AM	8	51	54	2	115	0	0	0	0	0	23	17	92	1	133	83	265	44	0	392	640
8:15 AM	12	55	96	0	163	0	0	0	0	0	35	14	68	1	118	87	257	31	0	375	656
8:30 AM	16	54	57	0	127	0	0	0	0	0	36	29	59	1	125	68	218	28	0	314	566
8:45 AM	12	56	65	1	134	0	0	0	0	0	31	12	34	5	82	60	253	25	0	338	554
Total	48	216	272	3	539	0	0	0	0	0	125	72	253	8	458	298	993	128	0	1419	2416
Grand Total	89	417	606	6	1118	0	0	0	0	0	206	153	582	24	965	686	1943	311	0	2940	5023
Approach %	8.0	37.3	54.2	0.5		0.0	0.0	0.0	0.0		21.3	15.9	60.3	2.5		23.3	66.1	10.6	0.0		
Total %	1.8	8.3	12.1	0.1	22.3	0.0	0.0	0.0	0.0	0.0	4.1	3.0	11.6	0.5	19.2	13.7	38.7	6.2	0.0	58.5	
Exiting Leg Total					470					2755					1127					671	5023

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:30 AM	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:30 AM	8	52	77	0	137	0	0	0	0	0	24	13	85	5	127	96	249	56	0	401	665
7:45 AM	19	44	94	1	158	0	0	0	0	0	18	22	86	3	129	99	224	39	0	362	649
8:00 AM	8	51	54	2	115	0	0	0	0	0	23	17	92	1	133	83	265	44	0	392	640
8:15 AM	12	55	96	0	163	0	0	0	0	0	35	14	68	1	118	87	257	31	0	375	656
Total Volume	47	202	321	3	573	0	0	0	0	0	100	66	331	10	507	365	995	170	0	1530	2610
% Approach Total	8.2	35.3	56.0	0.5		0.0	0.0	0.0	0.0		19.7	13.0	65.3	2.0		23.9	65.0	11.1	0.0		
PHF	0.618	0.918	0.836	0.375	0.879	0.000	0.000	0.000	0.000	0.000	0.714	0.750	0.899	0.500	0.953	0.922	0.939	0.759	0.000	0.954	0.981
Entering Leg	47	202	321	3	573	0	0	0	0	0	100	66	331	10	507	365	995	170	0	1530	2610
Exiting Leg					239					1416					577					378	2610
Total					812					1416					1084					1908	5220

PDI File #: **175597 H**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: River Street Bridge W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION
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46 Morton Street, Framingham, MA 01702
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Heavy Vehicles

	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	2	5	1	0	8	13
7:15 AM	0	3	3	0	6	0	0	0	0	0	0	0	3	0	3	2	10	0	0	12	21
7:30 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	11	4	0	16	17
7:45 AM	0	2	3	0	5	0	0	0	0	0	0	0	0	0	0	1	5	1	0	7	12
Total	0	5	12	0	17	0	0	0	0	0	0	0	3	0	3	6	31	6	0	43	63
8:00 AM	0	2	1	0	3	0	0	0	0	0	0	0	0	0	0	2	6	0	0	8	11
8:15 AM	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	6	4	0	10	12
8:30 AM	0	2	5	0	7	0	0	0	0	0	0	0	0	0	0	1	6	4	0	11	18
8:45 AM	0	2	1	0	3	0	0	0	0	0	0	0	0	0	0	1	16	4	0	21	24
Total	0	7	8	0	15	0	0	0	0	0	0	0	0	0	0	4	34	12	0	50	65
Grand Total	0	12	20	0	32	0	0	0	0	0	0	0	3	0	3	10	65	18	0	93	128
Approach %	0.0	37.5	62.5	0.0		0.0	0.0	0.0	0.0		0.0	0.0	100.0	0.0		10.8	69.9	19.4	0.0		
Total %	0.0	9.4	15.6	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	2.3	7.8	50.8	14.1	0.0	72.7	
Exiting Leg Total					18					85					22					3	128

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	0	2	1	0	3	0	0	0	0	0	0	0	0	0	0	2	6	0	0	8	11
8:15 AM	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	6	4	0	10	12
8:30 AM	0	2	5	0	7	0	0	0	0	0	0	0	0	0	0	1	6	4	0	11	18
8:45 AM	0	2	1	0	3	0	0	0	0	0	0	0	0	0	0	1	16	4	0	21	24
Total Volume	0	7	8	0	15	0	0	0	0	0	0	0	0	0	0	4	34	12	0	50	65
% Approach Total	0.0	46.7	53.3	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		8.0	68.0	24.0	0.0		
PHF	0.000	0.875	0.400	0.000	0.536	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.531	0.750	0.000	0.595	0.677
Entering Leg	0	7	8	0	15	0	0	0	0	0	0	0	0	0	0	4	34	12	0	50	65
Exiting Leg					12					42					11					0	65
Total					27					42					11					50	130

PDI File #: **175597 H**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: River Street Bridge W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION
DATA
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Buses

	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	5
7:15 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30 AM	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3
7:45 AM	1	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	7
Total	3	0	7	0	10	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	16
8:00 AM	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
8:30 AM	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	5
8:45 AM	2	0	3	0	5	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	7
Total	4	0	6	0	10	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	16
Grand Total	7	0	13	0	20	0	0	0	0	0	0	0	0	0	0	0	12	0	0	12	32
Approach %	35.0	0.0	65.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
Total %	21.9	0.0	40.6	0.0	62.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.5	0.0	0.0	37.5	
Exiting Leg Total					0					25					0					7	32

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	5
7:15 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30 AM	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3
7:45 AM	1	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	7
Total Volume	3	0	7	0	10	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	16
% Approach Total	30.0	0.0	70.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.750	0.000	0.583	0.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.500	0.571
Entering Leg	3	0	7	0	10	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	16
Exiting Leg					0					13					0					3	16
Total					10					13					0					9	32

PDI File #: **175597 H**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: River Street Bridge W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Bicycles (on Roadway and Crosswalks)**

	Soldiers Field Road Ramps							River Street Bridge							Soldiers Field Road Ramps							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	6	2	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
7:30 AM	0	0	1	0	0	0	1	0	0	0	0	21	1	22	0	0	0	0	0	0	0	0	3	0	0	0	0	3	26
7:45 AM	0	0	0	0	2	1	3	0	0	0	0	14	7	21	0	1	0	0	0	0	1	0	4	0	0	0	0	4	29
Total	0	0	1	0	2	1	4	0	0	0	0	41	12	53	0	1	0	0	0	0	1	0	7	0	0	0	0	7	65
8:00 AM	0	0	1	0	0	0	1	0	0	0	0	5	1	6	0	1	0	0	0	0	1	0	2	0	0	0	0	2	10
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	5	0	0	0	0	5	7
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	5	1	6	1	0	0	0	0	1	2	0	4	0	0	0	0	4	12
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	4	4	8	2	0	0	0	0	0	2	0	0	0	0	0	0	0	10
Total	0	0	1	0	0	0	1	0	0	0	0	16	6	22	3	1	0	0	0	1	5	0	11	0	0	0	0	11	39
Grand Total	0	0	2	0	2	1	5	0	0	0	0	57	18	75	3	2	0	0	0	1	6	0	18	0	0	0	0	18	104
Approach %	0.0	0.0	40.0	0.0	40.0	20.0		0.0	0.0	0.0	0.0	76.0	24.0		50.0	33.3	0.0	0.0	0.0	16.7		0.0	100.0	0.0	0.0	0.0	0.0		
Total %	0.0	0.0	1.9	0.0	1.9	1.0	4.8	0.0	0.0	0.0	0.0	54.8	17.3	72.1	2.9	1.9	0.0	0.0	0.0	1.0	5.8	0.0	17.3	0.0	0.0	0.0	0.0	17.3	
Exiting Leg Total							5							98							1							0	104

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:15 AM	Soldiers Field Road Ramps							River Street Bridge							Soldiers Field Road Ramps							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	6	2	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
7:30 AM	0	0	1	0	0	0	1	0	0	0	0	21	1	22	0	0	0	0	0	0	0	0	3	0	0	0	0	3	26
7:45 AM	0	0	0	0	2	1	3	0	0	0	0	14	7	21	0	1	0	0	0	0	1	0	4	0	0	0	0	4	29
8:00 AM	0	0	1	0	0	0	1	0	0	0	0	5	1	6	0	1	0	0	0	0	1	0	2	0	0	0	0	2	10
Total Volume	0	0	2	0	2	1	5	0	0	0	0	46	11	57	0	2	0	0	0	0	2	0	9	0	0	0	0	9	73
% Approach Total	0.0	0.0	40.0	0.0	40.0	20.0		0.0	0.0	0.0	0.0	80.7	19.3		0.0	100.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.500	0.000	0.250	0.250	0.417	0.000	0.000	0.000	0.000	0.548	0.393	0.648	0.000	0.500	0.000	0.000	0.000	0.000	0.500	0.000	0.563	0.000	0.000	0.000	0.000	0.563	0.629
Entering Leg	0	0	2	0	2	1	5	0	0	0	0	46	11	57	0	2	0	0	0	0	2	0	9	0	0	0	0	9	73
Exiting Leg							5							68							0							0	73
Total							10							125							2							9	146

PDI File #: **175597 H**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: River Street Bridge W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	Soldiers Field Road Ramps							River Street Bridge							Soldiers Field Road Ramps							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	5	6	11	0	0	0	0	0	2	2	0	0	0	0	1	0	1	14
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	6	1	7	0	0	0	0	0	1	1	0	0	0	0	0	2	2	10
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	5	1	6	0	0	0	0	3	2	5	0	0	0	0	1	0	1	12
7:45 AM	0	0	0	0	2	1	3	0	0	0	0	3	3	6	0	0	0	0	0	7	7	0	0	0	0	0	0	0	16
Total	0	0	0	0	2	1	3	0	0	0	0	19	11	30	0	0	0	0	3	12	15	0	0	0	0	2	2	4	52
8:00 AM	0	0	0	0	4	1	5	0	0	0	0	21	8	29	0	0	0	0	2	4	6	0	0	0	0	2	1	3	43
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	29	2	31	0	0	0	0	3	8	11	0	0	0	0	0	0	0	42
8:30 AM	0	0	0	0	2	1	3	0	0	0	0	17	5	22	0	0	0	0	2	7	9	0	0	0	0	0	2	2	36
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	10	1	11	0	0	0	0	2	3	5	0	0	0	0	1	2	3	19
Total	0	0	0	0	6	2	8	0	0	0	0	77	16	93	0	0	0	0	9	22	31	0	0	0	0	3	5	8	140
Grand Total	0	0	0	0	8	3	11	0	0	0	0	96	27	123	0	0	0	0	12	34	46	0	0	0	0	5	7	12	192
Approach %	0.0	0.0	0.0	0.0	72.7	27.3		0.0	0.0	0.0	0.0	78.0	22.0		0.0	0.0	0.0	0.0	26.1	73.9		0.0	0.0	0.0	0.0	41.7	58.3		
Total %	0.0	0.0	0.0	0.0	4.2	1.6	5.7	0.0	0.0	0.0	0.0	50.0	14.1	64.1	0.0	0.0	0.0	0.0	6.3	17.7	24.0	0.0	0.0	0.0	0.0	2.6	3.6	6.3	
Exiting Leg Total							11							123							46							12	192

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Soldiers Field Road Ramps							River Street Bridge							Soldiers Field Road Ramps							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	0	0	0	0	4	1	5	0	0	0	0	21	8	29	0	0	0	0	2	4	6	0	0	0	0	2	1	3	43
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	29	2	31	0	0	0	0	3	8	11	0	0	0	0	0	0	0	42
8:30 AM	0	0	0	0	2	1	3	0	0	0	0	17	5	22	0	0	0	0	2	7	9	0	0	0	0	0	2	2	36
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	10	1	11	0	0	0	0	2	3	5	0	0	0	0	1	2	3	19
Total Volume	0	0	0	0	6	2	8	0	0	0	0	77	16	93	0	0	0	0	9	22	31	0	0	0	0	3	5	8	140
% Approach Total	0.0	0.0	0.0	0.0	75.0	25.0		0.0	0.0	0.0	0.0	82.8	17.2		0.0	0.0	0.0	0.0	29.0	71.0		0.0	0.0	0.0	0.0	37.5	62.5		
PHF	0.000	0.000	0.000	0.000	0.375	0.500	0.400	0.000	0.000	0.000	0.000	0.664	0.500	0.750	0.000	0.000	0.000	0.000	0.750	0.688	0.705	0.000	0.000	0.000	0.000	0.375	0.625	0.667	0.814
Entering Leg	0	0	0	0	6	2	8	0	0	0	0	77	16	93	0	0	0	0	9	22	31	0	0	0	0	3	5	8	140
Exiting Leg							8							93							31							8	140
Total							16							186							62							16	280

PDI File #: **175597 H**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: River Street Bridge W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Cars, Heavy Vehicles, and Buses (Combined)**

	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	36	59	57	4	156	0	0	0	0	0	29	13	77	2	121	112	233	73	0	418	695
4:15 PM	21	49	79	1	150	0	0	0	0	0	22	8	84	2	116	86	211	83	0	380	646
4:30 PM	36	79	63	2	180	0	0	0	0	0	27	13	72	8	120	99	248	62	1	410	710
4:45 PM	37	75	87	3	202	0	0	0	0	0	20	12	73	3	108	105	253	63	1	422	732
Total	130	262	286	10	688	0	0	0	0	0	98	46	306	15	465	402	945	281	2	1630	2783
5:00 PM	35	45	90	1	171	0	0	1	0	1	28	15	57	2	102	86	247	66	0	399	673
5:15 PM	31	60	87	4	182	0	0	0	0	0	32	15	56	0	103	98	273	82	0	453	738
5:30 PM	33	77	92	3	205	0	0	0	0	0	30	15	54	6	105	97	251	74	0	422	732
5:45 PM	20	53	75	3	151	0	0	0	0	0	22	12	64	0	98	99	248	75	0	422	671
Total	119	235	344	11	709	0	0	1	0	1	112	57	231	8	408	380	1019	297	0	1696	2814
Grand Total	249	497	630	21	1397	0	0	1	0	1	210	103	537	23	873	782	1964	578	2	3326	5597
Approach %	17.8	35.6	45.1	1.5		0.0	0.0	100.0	0.0		24.1	11.8	61.5	2.6		23.5	59.0	17.4	0.1		
Total %	4.4	8.9	11.3	0.4	25.0	0.0	0.0	0.0	0.0	0.0	3.8	1.8	9.6	0.4	15.6	14.0	35.1	10.3	0.0	59.4	
Exiting Leg Total					702					2804					1303					788	5597
Cars	241	496	615	21	1373	0	0	1	0	1	210	102	536	23	871	779	1936	576	2	3293	5538
% Cars	96.8	99.8	97.6	100.0	98.3	0.0	0.0	100.0	0.0	100.0	100.0	99.0	99.8	100.0	99.8	99.6	98.6	99.7	100.0	99.0	98.9
Exiting Leg Total					699					2761					1299					779	5538
Heavy Vehicles	2	0	4	0	6	0	0	0	0	0	0	1	1	0	2	2	14	1	0	17	25
% Heavy Vehicles	0.8	0.0	0.6	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.2	0.0	0.2	0.3	0.7	0.2	0.0	0.5	0.4
Exiting Leg Total					2					18					2					3	25
Buses	6	1	11	0	18	0	0	0	0	0	0	0	0	0	0	1	14	1	0	16	34
% Buses	2.4	0.2	1.7	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.2	0.0	0.5	0.6
Exiting Leg Total					1					25					2					6	34

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:45 PM	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:45 PM	37	75	87	3	202	0	0	0	0	0	20	12	73	3	108	105	253	63	1	422	732
5:00 PM	35	45	90	1	171	0	0	1	0	1	28	15	57	2	102	86	247	66	0	399	673
5:15 PM	31	60	87	4	182	0	0	0	0	0	32	15	56	0	103	98	273	82	0	453	738
5:30 PM	33	77	92	3	205	0	0	0	0	0	30	15	54	6	105	97	251	74	0	422	732
Total Volume	136	257	356	11	760	0	0	1	0	1	110	57	240	11	418	386	1024	285	1	1696	2875
% Approach Total	17.9	33.8	46.8	1.4		0.0	0.0	100.0	0.0		26.3	13.6	57.4	2.6		22.8	60.4	16.8	0.1		
PHF	0.919	0.834	0.967	0.688	0.927	0.000	0.000	0.250	0.000	0.250	0.859	0.950	0.822	0.458	0.968	0.919	0.938	0.869	0.250	0.936	0.974
Cars	130	257	350	11	748	0	0	1	0	1	110	56	239	11	416	384	1012	283	1	1680	2845
Cars %	95.6	100.0	98.3	100.0	98.4	0.0	0.0	100.0	0.0	100.0	100.0	98.2	99.6	100.0	99.5	99.5	98.8	99.3	100.0	99.1	99.0
Heavy Vehicles	1	0	1	0	2	0	0	0	0	0	0	1	1	0	2	1	9	1	0	11	15
Heavy Vehicles %	0.7	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.4	0.0	0.5	0.3	0.9	0.4	0.0	0.6	0.5
Buses	5	0	5	0	10	0	0	0	0	0	0	0	0	0	0	1	3	1	0	5	15
Buses %	3.7	0.0	1.4	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.4	0.0	0.3	0.5
Cars Enter Leg	130	257	350	11	748	0	0	1	0	1	110	56	239	11	416	384	1012	283	1	1680	2845
Heavy Enter Leg	1	0	1	0	2	0	0	0	0	0	0	1	1	0	2	1	9	1	0	11	15
Bus Enter Leg	5	0	5	0	10	0	0	0	0	0	0	0	0	0	0	1	3	1	0	5	15
Total Entering Leg	136	257	356	11	760	0	0	1	0	1	110	57	240	11	418	386	1024	285	1	1696	2875
Cars Exiting Leg					350					1472					653					370	2845
Heavy Exiting Leg					2					10					1					2	15
Buses Exiting Leg					1					8					1					5	15
Total Exiting Leg					353					1490					655					377	2875

PDI File #: **175597 H**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: River Street Bridge W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
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Cars

	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	35	59	54	4	152	0	0	0	0	0	29	13	77	2	121	112	231	73	0	416	689
4:15 PM	20	49	76	1	146	0	0	0	0	0	22	8	84	2	116	86	206	83	0	375	637
4:30 PM	36	79	62	2	179	0	0	0	0	0	27	13	72	8	120	98	242	62	1	403	702
4:45 PM	34	75	87	3	199	0	0	0	0	0	20	11	73	3	107	104	252	62	1	419	725
Total	125	262	279	10	676	0	0	0	0	0	98	45	306	15	464	400	931	280	2	1613	2753
5:00 PM	34	45	88	1	168	0	0	1	0	1	28	15	57	2	102	85	241	66	0	392	663
5:15 PM	29	60	87	4	180	0	0	0	0	0	32	15	55	0	102	98	270	82	0	450	732
5:30 PM	33	77	88	3	201	0	0	0	0	0	30	15	54	6	105	97	249	73	0	419	725
5:45 PM	20	52	73	3	148	0	0	0	0	0	22	12	64	0	98	99	245	75	0	419	665
Total	116	234	336	11	697	0	0	1	0	1	112	57	230	8	407	379	1005	296	0	1680	2785
Grand Total	241	496	615	21	1373	0	0	1	0	1	210	102	536	23	871	779	1936	576	2	3293	5538
Approach %	17.6	36.1	44.8	1.5		0.0	0.0	100.0	0.0		24.1	11.7	61.5	2.6		23.7	58.8	17.5	0.1		
Total %	4.4	9.0	11.1	0.4	24.8	0.0	0.0	0.0	0.0	0.0	3.8	1.8	9.7	0.4	15.7	14.1	35.0	10.4	0.0	59.5	
Exiting Leg Total					699					2761					1299					779	5538

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:45 PM	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:45 PM	34	75	87	3	199	0	0	0	0	0	20	11	73	3	107	104	252	62	1	419	725
5:00 PM	34	45	88	1	168	0	0	1	0	1	28	15	57	2	102	85	241	66	0	392	663
5:15 PM	29	60	87	4	180	0	0	0	0	0	32	15	55	0	102	98	270	82	0	450	732
5:30 PM	33	77	88	3	201	0	0	0	0	0	30	15	54	6	105	97	249	73	0	419	725
Total Volume	130	257	350	11	748	0	0	1	0	1	110	56	239	11	416	384	1012	283	1	1680	2845
% Approach Total	17.4	34.4	46.8	1.5		0.0	0.0	100.0	0.0		26.4	13.5	57.5	2.6		22.9	60.2	16.8	0.1		
PHF	0.956	0.834	0.994	0.688	0.930	0.000	0.000	0.250	0.000	0.250	0.859	0.933	0.818	0.458	0.972	0.923	0.937	0.863	0.250	0.933	0.972
Entering Leg	130	257	350	11	748	0	0	1	0	1	110	56	239	11	416	384	1012	283	1	1680	2845
Exiting Leg					350					1472					653					370	2845
Total					1098					1473					1069					2050	5690

PDI File #: **175597 H**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: River Street Bridge W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Heavy Vehicles

	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4
4:15 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	4
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	2
4:45 PM	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	1	1	0	2	4
Total	2	0	3	0	5	0	0	0	0	0	0	1	0	0	1	1	6	1	0	8	14
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	5	5
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	3	0	0	3	4
5:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	1	8	0	0	9	11
Grand Total	2	0	4	0	6	0	0	0	0	0	0	1	1	0	2	2	14	1	0	17	25
Approach %	33.3	0.0	66.7	0.0		0.0	0.0	0.0	0.0		0.0	50.0	50.0	0.0		11.8	82.4	5.9	0.0		
Total %	8.0	0.0	16.0	0.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	4.0	0.0	8.0	8.0	56.0	4.0	0.0	68.0	
Exiting Leg Total					2					18					2					3	25

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:15 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	4
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	2
4:45 PM	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	1	1	0	2	4
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	5	5
Total Volume	1	0	1	0	2	0	0	0	0	0	0	1	0	0	1	2	9	1	0	12	15
% Approach Total	50.0	0.0	50.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		16.7	75.0	8.3	0.0		
PHF	0.250	0.000	0.250	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.500	0.563	0.250	0.000	0.600	0.750
Entering Leg	1	0	1	0	2	0	0	0	0	0	0	1	0	0	1	2	9	1	0	12	15
Exiting Leg					2					10					2					1	15
Total					4					10					3					13	30

PDI File #: **175597 H**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: River Street Bridge W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Buses

	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
4:15 PM	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	5
4:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	6
4:45 PM	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3
Total	3	0	4	0	7	0	0	0	0	0	0	0	0	0	0	1	8	0	0	9	16
5:00 PM	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	5
5:15 PM	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:30 PM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	5
5:45 PM	0	1	2	0	3	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	6
Total	3	1	7	0	11	0	0	0	0	0	0	0	0	0	0	0	6	1	0	7	18
Grand Total	6	1	11	0	18	0	0	0	0	0	0	0	0	0	0	1	14	1	0	16	34
Approach %	33.3	5.6	61.1	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		6.3	87.5	6.3	0.0		
Total %	17.6	2.9	32.4	0.0	52.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	41.2	2.9	0.0	47.1	
Exiting Leg Total					1					25					2					6	34

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	Soldiers Field Road Ramps					River Street Bridge					Soldiers Field Road Ramps					Cambridge Street					
	North					East					South					West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:15 PM	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	5
4:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	6
4:45 PM	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3
5:00 PM	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	5
Total Volume	4	0	5	0	9	0	0	0	0	0	0	0	0	0	0	1	9	0	0	10	19
% Approach Total	44.4	0.0	55.6	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		10.0	90.0	0.0	0.0		
PHF	0.500	0.000	0.625	0.000	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.450	0.000	0.000	0.500	0.792
Entering Leg	4	0	5	0	9	0	0	0	0	0	0	0	0	0	0	1	9	0	0	10	19
Exiting Leg					0					14					1					4	19
Total					9					14					1					14	38

PDI File #: **175597 H**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: River Street Bridge W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Bicycles (on Roadway and Crosswalks)**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

	Soldiers Field Road Ramps							River Street Bridge							Soldiers Field Road Ramps							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	1	1	0	0	0	0	1	0	1	1	0	0	0	0	0	1	0	1	0	0	0	0	1	4
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:45 PM	1	1	0	0	0	0	2	0	0	0	0	1	3	4	1	1	0	0	0	0	2	0	3	0	0	0	0	3	11
Total	1	1	0	0	0	1	3	0	0	0	0	3	4	7	2	1	0	0	0	0	3	0	4	0	0	0	0	4	17
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	3	3	2	1	0	0	0	0	3	0	0	0	0	0	0	0	6
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	3	0	0	0	0	6	0	1	0	0	0	0	1	9
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	2	2	4	1	3	0	0	0	0	4	0	2	0	0	0	0	2	10
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	6	11	17	0	2	0	0	0	0	2	0	1	0	0	0	0	1	20
Total	0	0	0	0	0	0	0	0	0	0	0	8	18	26	6	9	0	0	0	0	15	0	4	0	0	0	0	4	45
Grand Total	1	1	0	0	0	1	3	0	0	0	0	11	22	33	8	10	0	0	0	0	18	0	8	0	0	0	0	8	62
Approach %	33.3	33.3	0.0	0.0	0.0	33.3		0.0	0.0	0.0	0.0	33.3	66.7		44.4	55.6	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0		
Total %	1.6	1.6	0.0	0.0	0.0	1.6	4.8	0.0	0.0	0.0	0.0	17.7	35.5	53.2	12.9	16.1	0.0	0.0	0.0	0.0	29.0	0.0	12.9	0.0	0.0	0.0	0.0	12.9	
Exiting Leg Total							11							49							1							1	62

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	Soldiers Field Road Ramps							River Street Bridge							Soldiers Field Road Ramps							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	3	3	2	1	0	0	0	0	3	0	0	0	0	0	0	0	6
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	3	0	0	0	0	6	0	1	0	0	0	0	1	9
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	2	2	4	1	3	0	0	0	0	4	0	2	0	0	0	0	2	10
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	6	11	17	0	2	0	0	0	0	2	0	1	0	0	0	0	1	20
Total Volume	0	0	0	0	0	0	0	0	0	0	0	8	18	26	6	9	0	0	0	0	15	0	4	0	0	0	0	4	45
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	30.8	69.2		40.0	60.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.409	0.382	0.500	0.750	0.000	0.000	0.000	0.000	0.625	0.000	0.500	0.000	0.000	0.000	0.000	0.500	0.563
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	8	18	26	6	9	0	0	0	0	15	0	4	0	0	0	0	4	45
Exiting Leg							9							36							0							0	45
Total							9							62							15							4	90

PDI File #: **175597 H**
Location: **N: Soldiers Field Road Ramps S: Soldiers Field Road Ramps**
Location: **E: River Street Bridge W: Cambridge Street**
City, State: **Allston, MA**
Client: **VHB/ M. Baidy**
Site Code: **13581.03**
Count Date: **Wednesday, April 12, 2017**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION
DATA
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	Soldiers Field Road Ramps							River Street Bridge							Soldiers Field Road Ramps							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	6	1	7	0	0	0	0	3	8	11	0	0	0	0	0	1	1	19
4:15 PM	0	0	0	0	1	0	1	0	0	0	0	7	1	8	0	0	0	0	3	1	4	0	0	0	0	0	1	1	14
4:30 PM	0	0	0	0	1	0	1	0	0	0	0	1	0	1	0	0	0	0	0	3	3	0	0	0	0	0	0	0	5
4:45 PM	0	0	0	0	0	1	1	0	0	0	0	3	0	3	0	0	0	0	2	2	4	0	0	0	0	0	1	1	9
Total	0	0	0	0	2	1	3	0	0	0	0	17	2	19	0	0	0	0	8	14	22	0	0	0	0	0	3	3	47
5:00 PM	0	0	0	0	1	0	1	0	0	0	0	2	1	3	0	0	0	0	3	1	4	0	0	0	0	0	2	2	10
5:15 PM	0	0	0	0	1	0	1	0	0	0	0	3	4	7	0	0	0	0	3	1	4	0	0	0	0	0	1	1	13
5:30 PM	0	0	0	0	1	0	1	0	0	0	0	4	5	9	0	0	0	0	0	2	2	0	0	0	0	1	1	2	14
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	2	3	5	0	0	0	0	3	3	6	0	0	0	0	1	1	2	13
Total	0	0	0	0	3	0	3	0	0	0	0	11	13	24	0	0	0	0	9	7	16	0	0	0	0	2	5	7	50
Grand Total	0	0	0	0	5	1	6	0	0	0	0	28	15	43	0	0	0	0	17	21	38	0	0	0	0	2	8	10	97
Approach %	0.0	0.0	0.0	0.0	83.3	16.7		0.0	0.0	0.0	0.0	65.1	34.9		0.0	0.0	0.0	0.0	44.7	55.3		0.0	0.0	0.0	0.0	20.0	80.0		
Total %	0.0	0.0	0.0	0.0	5.2	1.0	6.2	0.0	0.0	0.0	0.0	28.9	15.5	44.3	0.0	0.0	0.0	0.0	17.5	21.6	39.2	0.0	0.0	0.0	0.0	2.1	8.2	10.3	
Exiting Leg Total							6							43							38							10	97

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	Soldiers Field Road Ramps							River Street Bridge							Soldiers Field Road Ramps							Cambridge Street							
	North							East							South							West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	0	0	0	0	1	0	1	0	0	0	0	2	1	3	0	0	0	0	3	1	4	0	0	0	0	0	2	2	10
5:15 PM	0	0	0	0	1	0	1	0	0	0	0	3	4	7	0	0	0	0	3	1	4	0	0	0	0	0	1	1	13
5:30 PM	0	0	0	0	1	0	1	0	0	0	0	4	5	9	0	0	0	0	0	2	2	0	0	0	0	1	1	2	14
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	2	3	5	0	0	0	0	3	3	6	0	0	0	0	1	1	2	13
Total Volume	0	0	0	0	3	0	3	0	0	0	0	11	13	24	0	0	0	0	9	7	16	0	0	0	0	2	5	7	50
% Approach Total	0.0	0.0	0.0	0.0	100.0	0.0		0.0	0.0	0.0	0.0	45.8	54.2		0.0	0.0	0.0	0.0	56.3	43.8		0.0	0.0	0.0	0.0	28.6	71.4		
PHF	0.000	0.000	0.000	0.000	0.750	0.000	0.750	0.000	0.000	0.000	0.000	0.688	0.650	0.667	0.000	0.000	0.000	0.000	0.750	0.583	0.667	0.000	0.000	0.000	0.000	0.500	0.625	0.875	0.893
Entering Leg	0	0	0	0	3	0	3	0	0	0	0	11	13	24	0	0	0	0	9	7	16	0	0	0	0	2	5	7	50
Exiting Leg							3							24							16							7	50
Total							6							48							32							14	100

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class: **Cars and Heavy Vehicles (Combined)**

	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	5	70	0	0	75	0	0	0	0	0	0	55	5	0	60	11	0	10	0	21	156
7:15 AM	6	76	0	0	82	0	0	1	0	1	0	72	3	0	75	8	0	12	0	20	178
7:30 AM	7	78	0	0	85	0	0	2	0	2	0	82	1	0	83	11	0	16	0	27	197
7:45 AM	5	67	0	0	72	0	0	1	0	1	0	79	2	0	81	9	0	19	0	28	182
Total	23	291	0	0	314	0	0	4	0	4	0	288	11	0	299	39	0	57	0	96	713
8:00 AM	9	72	0	0	81	1	2	1	0	4	0	74	9	0	83	11	0	13	0	24	192
8:15 AM	10	107	0	0	117	2	3	2	0	7	0	71	7	0	78	19	0	15	0	34	236
8:30 AM	14	91	0	0	105	2	3	2	0	7	0	97	5	0	102	9	0	18	0	27	241
8:45 AM	13	75	0	0	88	0	1	1	0	2	0	95	6	0	101	1	0	19	0	20	211
Total	46	345	0	0	391	5	9	6	0	20	0	337	27	0	364	40	0	65	0	105	880
Grand Total	69	636	0	0	705	5	9	10	0	24	0	625	38	0	663	79	0	122	0	201	1593
Approach %	9.8	90.2	0.0	0.0		20.8	37.5	41.7	0.0		0.0	94.3	5.7	0.0		39.3	0.0	60.7	0.0		
Total %	4.3	39.9	0.0	0.0	44.3	0.3	0.6	0.6	0.0	1.5	0.0	39.2	2.4	0.0	41.6	5.0	0.0	7.7	0.0	12.6	
Exiting Leg Total					752					0					725					116	1593
Cars	57	539	0	0	596	5	8	10	0	23	0	530	33	0	563	74	0	117	0	191	1373
% Cars	82.6	84.7	0.0	0.0	84.5	100.0	88.9	100.0	0.0	95.8	0.0	84.8	86.8	0.0	84.9	93.7	0.0	95.9	0.0	95.0	86.2
Exiting Leg Total					652					0					623					98	1373
Heavy Vehicles	12	97	0	0	109	0	1	0	0	1	0	95	5	0	100	5	0	5	0	10	220
% Heavy Vehicles	17.4	15.3	0.0	0.0	15.5	0.0	11.1	0.0	0.0	4.2	0.0	15.2	13.2	0.0	15.1	6.3	0.0	4.1	0.0	5.0	13.8
Exiting Leg Total					100					0					102					18	220

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	9	72	0	0	81	1	2	1	0	4	0	74	9	0	83	11	0	13	0	24	192
8:15 AM	10	107	0	0	117	2	3	2	0	7	0	71	7	0	78	19	0	15	0	34	236
8:30 AM	14	91	0	0	105	2	3	2	0	7	0	97	5	0	102	9	0	18	0	27	241
8:45 AM	13	75	0	0	88	0	1	1	0	2	0	95	6	0	101	1	0	19	0	20	211
Total Volume	46	345	0	0	391	5	9	6	0	20	0	337	27	0	364	40	0	65	0	105	880
% Approach Total	11.8	88.2	0.0	0.0		25.0	45.0	30.0	0.0		0.0	92.6	7.4	0.0		38.1	0.0	61.9	0.0		
PHF	0.821	0.806	0.000	0.000	0.835	0.625	0.750	0.750	0.000	0.714	0.000	0.869	0.750	0.000	0.892	0.526	0.000	0.855	0.000	0.772	0.913
Cars	36	298	0	0	334	5	8	6	0	19	0	289	22	0	311	37	0	61	0	98	762
Cars %	78.3	86.4	0.0	0.0	85.4	100.0	88.9	100.0	0.0	95.0	0.0	85.8	81.5	0.0	85.4	92.5	0.0	93.8	0.0	93.3	86.6
Heavy Vehicles	10	47	0	0	57	0	1	0	0	1	0	48	5	0	53	3	0	4	0	7	118
Heavy Vehicles %	21.7	13.6	0.0	0.0	14.6	0.0	11.1	0.0	0.0	5.0	0.0	14.2	18.5	0.0	14.6	7.5	0.0	6.2	0.0	6.7	13.4
Cars Enter Leg	36	298	0	0	334	5	8	6	0	19	0	289	22	0	311	37	0	61	0	98	762
Heavy Enter Leg	10	47	0	0	57	0	1	0	0	1	0	48	5	0	53	3	0	4	0	7	118
Total Entering Leg	46	345	0	0	391	5	9	6	0	20	0	337	27	0	364	40	0	65	0	105	880
Cars Exiting Leg					355					0					341					66	762
Heavy Exiting Leg					52					0					50					16	118
Total Exiting Leg					407					0					391					82	880

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class: **Cars-Combined (Motorcycles, Cars, Light Goods)**

	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	5	63	0	0	68	0	0	0	0	0	0	44	5	0	49	11	0	9	0	20	137
7:15 AM	6	65	0	0	71	0	0	1	0	1	0	64	3	0	67	7	0	12	0	19	158
7:30 AM	5	56	0	0	61	0	0	2	0	2	0	65	1	0	66	11	0	16	0	27	156
7:45 AM	5	57	0	0	62	0	0	1	0	1	0	68	2	0	70	8	0	19	0	27	160
Total	21	241	0	0	262	0	0	4	0	4	0	241	11	0	252	37	0	56	0	93	611
8:00 AM	8	67	0	0	75	1	2	1	0	4	0	62	8	0	70	11	0	13	0	24	173
8:15 AM	5	93	0	0	98	2	3	2	0	7	0	64	5	0	69	17	0	15	0	32	206
8:30 AM	12	77	0	0	89	2	2	2	0	6	0	81	4	0	85	9	0	16	0	25	205
8:45 AM	11	61	0	0	72	0	1	1	0	2	0	82	5	0	87	0	0	17	0	17	178
Total	36	298	0	0	334	5	8	6	0	19	0	289	22	0	311	37	0	61	0	98	762
Grand Total	57	539	0	0	596	5	8	10	0	23	0	530	33	0	563	74	0	117	0	191	1373
Approach %	9.6	90.4	0.0	0.0		21.7	34.8	43.5	0.0		0.0	94.1	5.9	0.0		38.7	0.0	61.3	0.0		
Total %	4.2	39.3	0.0	0.0	43.4	0.4	0.6	0.7	0.0	1.7	0.0	38.6	2.4	0.0	41.0	5.4	0.0	8.5	0.0	13.9	
Exiting Leg Total					652					0					623					98	1373

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	8	67	0	0	75	1	2	1	0	4	0	62	8	0	70	11	0	13	0	24	173
8:15 AM	5	93	0	0	98	2	3	2	0	7	0	64	5	0	69	17	0	15	0	32	206
8:30 AM	12	77	0	0	89	2	2	2	0	6	0	81	4	0	85	9	0	16	0	25	205
8:45 AM	11	61	0	0	72	0	1	1	0	2	0	82	5	0	87	0	0	17	0	17	178
Total Volume	36	298	0	0	334	5	8	6	0	19	0	289	22	0	311	37	0	61	0	98	762
% Approach Total	10.8	89.2	0.0	0.0		26.3	42.1	31.6	0.0		0.0	92.9	7.1	0.0		37.8	0.0	62.2	0.0		
PHF	0.750	0.801	0.000	0.000	0.852	0.625	0.667	0.750	0.000	0.679	0.000	0.881	0.688	0.000	0.894	0.544	0.000	0.897	0.000	0.766	0.925
Entering Leg	36	298	0	0	334	5	8	6	0	19	0	289	22	0	311	37	0	61	0	98	762
Exiting Leg					355					0					341					66	762
Total					689					19					652					164	1524

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**

	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	7	0	0	7	0	0	0	0	0	0	11	0	0	11	0	0	1	0	1	19
7:15 AM	0	11	0	0	11	0	0	0	0	0	0	8	0	0	8	1	0	0	0	1	20
7:30 AM	2	22	0	0	24	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	41
7:45 AM	0	10	0	0	10	0	0	0	0	0	0	11	0	0	11	1	0	0	0	1	22
Total	2	50	0	0	52	0	0	0	0	0	0	47	0	0	47	2	0	1	0	3	102
8:00 AM	1	5	0	0	6	0	0	0	0	0	0	12	1	0	13	0	0	0	0	0	19
8:15 AM	5	14	0	0	19	0	0	0	0	0	0	7	2	0	9	2	0	0	0	2	30
8:30 AM	2	14	0	0	16	0	1	0	0	1	0	16	1	0	17	0	0	2	0	2	36
8:45 AM	2	14	0	0	16	0	0	0	0	0	0	13	1	0	14	1	0	2	0	3	33
Total	10	47	0	0	57	0	1	0	0	1	0	48	5	0	53	3	0	4	0	7	118
Grand Total	12	97	0	0	109	0	1	0	0	1	0	95	5	0	100	5	0	5	0	10	220
Approach %	11.0	89.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	95.0	5.0	0.0		50.0	0.0	50.0	0.0		
Total %	5.5	44.1	0.0	0.0	49.5	0.0	0.5	0.0	0.0	0.5	0.0	43.2	2.3	0.0	45.5	2.3	0.0	2.3	0.0	4.5	
Exiting Leg Total					100					0					102					18	220
Buses	7	33	0	0	40	0	0	0	0	0	0	27	5	0	32	3	0	3	0	6	78
% Buses	58.3	34.0	0.0	0.0	36.7	0.0	0.0	0.0	0.0	0.0	0.0	28.4	100.0	0.0	32.0	60.0	0.0	60.0	0.0	60.0	35.5
Exiting Leg Total					30					0					36					12	78
Single-Unit Trucks	5	52	0	0	57	0	0	0	0	0	0	57	0	0	57	2	0	2	0	4	118
% Single-Unit	41.7	53.6	0.0	0.0	52.3	0.0	0.0	0.0	0.0	0.0	0.0	60.0	0.0	0.0	57.0	40.0	0.0	40.0	0.0	40.0	53.6
Exiting Leg Total					59					0					54					5	118
Articulated Trucks	0	12	0	0	12	0	1	0	0	1	0	11	0	0	11	0	0	0	0	0	24
% Articulated	0.0	12.4	0.0	0.0	11.0	0.0	100.0	0.0	0.0	100.0	0.0	11.6	0.0	0.0	11.0	0.0	0.0	0.0	0.0	0.0	10.9
Exiting Leg Total					11					0					12					1	24

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	1	5	0	0	6	0	0	0	0	0	0	12	1	0	13	0	0	0	0	0	19
8:15 AM	5	14	0	0	19	0	0	0	0	0	0	7	2	0	9	2	0	0	0	2	30
8:30 AM	2	14	0	0	16	0	1	0	0	1	0	16	1	0	17	0	0	2	0	2	36
8:45 AM	2	14	0	0	16	0	0	0	0	0	0	13	1	0	14	1	0	2	0	3	33
Total Volume	10	47	0	0	57	0	1	0	0	1	0	48	5	0	53	3	0	4	0	7	118
% Approach Total	17.5	82.5	0.0	0.0		0.0	100.0	0.0	0.0		0.0	90.6	9.4	0.0		42.9	0.0	57.1	0.0		
PHF	0.500	0.839	0.000	0.000	0.750	0.000	0.250	0.000	0.000	0.250	0.000	0.750	0.625	0.000	0.779	0.375	0.000	0.500	0.000	0.583	0.819
Buses	7	16	0	0	23	0	0	0	0	0	0	14	5	0	19	3	0	2	0	5	47
Buses %	70.0	34.0	0.0	0.0	40.4	0.0	0.0	0.0	0.0	0.0	0.0	29.2	100.0	0.0	35.8	100.0	0.0	50.0	0.0	71.4	39.8
Single-Unit Trucks	3	22	0	0	25	0	0	0	0	0	0	32	0	0	32	0	0	2	0	2	59
Single-Unit %	30.0	46.8	0.0	0.0	43.9	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	0.0	60.4	0.0	0.0	50.0	0.0	28.6	50.0
Articulated Trucks	0	9	0	0	9	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	12
Articulated %	0.0	19.1	0.0	0.0	15.8	0.0	100.0	0.0	0.0	100.0	0.0	4.2	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	10.2
Buses	7	16	0	0	23	0	0	0	0	0	0	14	5	0	19	3	0	2	0	5	47
Single-Unit Trucks	3	22	0	0	25	0	0	0	0	0	0	32	0	0	32	0	0	2	0	2	59
Articulated Trucks	0	9	0	0	9	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	12
Total Entering Leg	10	47	0	0	57	0	1	0	0	1	0	48	5	0	53	3	0	4	0	7	118
Buses					16					0					19					12	47
Single-Unit Trucks					34					0					22					3	59
Articulated Trucks					2					0					9					1	12
Total Exiting Leg					52					0					50					16	118

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class: **Cars**

	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	4	49	0	0	53	0	0	0	0	0	0	35	5	0	40	10	0	7	0	17	110
7:15 AM	6	45	0	0	51	0	0	1	0	1	0	50	3	0	53	5	0	9	0	14	119
7:30 AM	3	43	0	0	46	0	0	2	0	2	0	56	1	0	57	10	0	15	0	25	130
7:45 AM	5	45	0	0	50	0	0	1	0	1	0	60	2	0	62	7	0	19	0	26	139
Total	18	182	0	0	200	0	0	4	0	4	0	201	11	0	212	32	0	50	0	82	498
8:00 AM	5	65	0	0	70	1	0	1	0	2	0	60	8	0	68	11	0	12	0	23	163
8:15 AM	5	84	0	0	89	2	3	2	0	7	0	60	5	0	65	16	0	15	0	31	192
8:30 AM	12	73	0	0	85	2	1	2	0	5	0	70	4	0	74	9	0	15	0	24	188
8:45 AM	10	55	0	0	65	0	1	1	0	2	0	70	5	0	75	0	0	15	0	15	157
Total	32	277	0	0	309	5	5	6	0	16	0	260	22	0	282	36	0	57	0	93	700
Grand Total	50	459	0	0	509	5	5	10	0	20	0	461	33	0	494	68	0	107	0	175	1198
Approach %	9.8	90.2	0.0	0.0		25.0	25.0	50.0	0.0		0.0	93.3	6.7	0.0		38.9	0.0	61.1	0.0		
Total %	4.2	38.3	0.0	0.0	42.5	0.4	0.4	0.8	0.0	1.7	0.0	38.5	2.8	0.0	41.2	5.7	0.0	8.9	0.0	14.6	
Exiting Leg Total					573					0					537					88	1198

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	5	65	0	0	70	1	0	1	0	2	0	60	8	0	68	11	0	12	0	23	163
8:15 AM	5	84	0	0	89	2	3	2	0	7	0	60	5	0	65	16	0	15	0	31	192
8:30 AM	12	73	0	0	85	2	1	2	0	5	0	70	4	0	74	9	0	15	0	24	188
8:45 AM	10	55	0	0	65	0	1	1	0	2	0	70	5	0	75	0	0	15	0	15	157
Total Volume	32	277	0	0	309	5	5	6	0	16	0	260	22	0	282	36	0	57	0	93	700
% Approach Total	10.4	89.6	0.0	0.0		31.3	31.3	37.5	0.0		0.0	92.2	7.8	0.0		38.7	0.0	61.3	0.0		
PHF	0.667	0.824	0.000	0.000	0.868	0.625	0.417	0.750	0.000	0.571	0.000	0.929	0.688	0.000	0.940	0.563	0.000	0.950	0.000	0.750	0.911
Entering Leg	32	277	0	0	309	5	5	6	0	16	0	260	22	0	282	36	0	57	0	93	700
Exiting Leg					322					0					319					59	700
Total					631					16					601					152	1400

PDI File #:	**186524 F**
Location:	**N: North Harvard Street S: North Harvard Street**
Location:	**E: Kingsley Street W: Franklin Street**
City, State:	**Allston, MA**
Client:	**VHB/ P. Dunford**
Site Code:	**14351.00**
Count Date:	**Thursday, October 25, 2018**
Start Time:	**7:00 AM**
End Time:	**9:00 AM**
Class:	**Light Goods Vehicle**

	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	1	13	0	0	14	0	0	0	0	0	0	9	0	0	9	1	0	2	0	3	26
7:15 AM	0	19	0	0	19	0	0	0	0	0	0	14	0	0	14	2	0	3	0	5	38
7:30 AM	2	13	0	0	15	0	0	0	0	0	0	9	0	0	9	1	0	1	0	2	26
7:45 AM	0	12	0	0	12	0	0	0	0	0	0	8	0	0	8	1	0	0	0	1	21
Total	3	57	0	0	60	0	0	0	0	0	0	40	0	0	40	5	0	6	0	11	111
8:00 AM	3	2	0	0	5	0	2	0	0	2	0	2	0	0	2	0	0	1	0	1	10
8:15 AM	0	9	0	0	9	0	0	0	0	0	0	4	0	0	4	1	0	0	0	1	14
8:30 AM	0	4	0	0	4	0	1	0	0	1	0	11	0	0	11	0	0	1	0	1	17
8:45 AM	1	6	0	0	7	0	0	0	0	0	0	12	0	0	12	0	0	2	0	2	21
Total	4	21	0	0	25	0	3	0	0	3	0	29	0	0	29	1	0	4	0	5	62
Grand Total	7	78	0	0	85	0	3	0	0	3	0	69	0	0	69	6	0	10	0	16	173
Approach %	8.2	91.8	0.0	0.0		0.0	100.0	0.0	0.0		0.0	100.0	0.0	0.0		37.5	0.0	62.5	0.0		
Total %	4.0	45.1	0.0	0.0	49.1	0.0	1.7	0.0	0.0	1.7	0.0	39.9	0.0	0.0	39.9	3.5	0.0	5.8	0.0	9.2	
Exiting Leg Total					79					0					84					10	173

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	1	13	0	0	14	0	0	0	0	0	0	9	0	0	9	1	0	2	0	3	26
7:15 AM	0	19	0	0	19	0	0	0	0	0	0	14	0	0	14	2	0	3	0	5	38
7:30 AM	2	13	0	0	15	0	0	0	0	0	0	9	0	0	9	1	0	1	0	2	26
7:45 AM	0	12	0	0	12	0	0	0	0	0	0	8	0	0	8	1	0	0	0	1	21
Total Volume	3	57	0	0	60	0	0	0	0	0	0	40	0	0	40	5	0	6	0	11	111
% Approach Total	5.0	95.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		45.5	0.0	54.5	0.0		
PHF	0.375	0.750	0.000	0.000	0.789	0.000	0.000	0.000	0.000	0.000	0.000	0.714	0.000	0.000	0.714	0.625	0.000	0.500	0.000	0.550	0.730
Entering Leg	3	57	0	0	60	0	0	0	0	0	0	40	0	0	40	5	0	6	0	11	111
Exiting Leg					46					0					62					3	111
Total					106					0					102					14	222

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class: **Buses**

	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	4	0	0	4	0	0	0	0	0	0	5	0	0	5	0	0	1	0	1	10
7:15 AM	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	6
7:30 AM	0	6	0	0	6	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	7
7:45 AM	0	4	0	0	4	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	8
Total	0	17	0	0	17	0	0	0	0	0	0	13	0	0	13	0	0	1	0	1	31
8:00 AM	1	2	0	0	3	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	8
8:15 AM	4	6	0	0	10	0	0	0	0	0	0	1	2	0	3	2	0	0	0	2	15
8:30 AM	1	3	0	0	4	0	0	0	0	0	0	1	1	0	2	0	0	1	0	1	7
8:45 AM	1	5	0	0	6	0	0	0	0	0	0	8	1	0	9	1	0	1	0	2	17
Total	7	16	0	0	23	0	0	0	0	0	0	14	5	0	19	3	0	2	0	5	47
Grand Total	7	33	0	0	40	0	0	0	0	0	0	27	5	0	32	3	0	3	0	6	78
Approach %	17.5	82.5	0.0	0.0		0.0	0.0	0.0	0.0		0.0	84.4	15.6	0.0		50.0	0.0	50.0	0.0		
Total %	9.0	42.3	0.0	0.0	51.3	0.0	0.0	0.0	0.0	0.0	0.0	34.6	6.4	0.0	41.0	3.8	0.0	3.8	0.0	7.7	
Exiting Leg Total					30					0					36					12	78

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	1	2	0	0	3	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	8
8:15 AM	4	6	0	0	10	0	0	0	0	0	0	1	2	0	3	2	0	0	0	2	15
8:30 AM	1	3	0	0	4	0	0	0	0	0	0	1	1	0	2	0	0	1	0	1	7
8:45 AM	1	5	0	0	6	0	0	0	0	0	0	8	1	0	9	1	0	1	0	2	17
Total Volume	7	16	0	0	23	0	0	0	0	0	0	14	5	0	19	3	0	2	0	5	47
% Approach Total	30.4	69.6	0.0	0.0		0.0	0.0	0.0	0.0		0.0	73.7	26.3	0.0		60.0	0.0	40.0	0.0		
PHF	0.438	0.667	0.000	0.000	0.575	0.000	0.000	0.000	0.000	0.000	0.000	0.438	0.625	0.000	0.528	0.375	0.000	0.500	0.000	0.625	0.691
Entering Leg	7	16	0	0	23	0	0	0	0	0	0	14	5	0	19	3	0	2	0	5	47
Exiting Leg					16					0					19					12	47
Total					39					0					38					17	94

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class: **Single-Unit Trucks**

	North Harvard Street from North					Kingsley Street from East					North Harvard Street from South					Franklin Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	3	0	0	3	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	8
7:15 AM	0	7	0	0	7	0	0	0	0	0	0	5	0	0	5	1	0	0	0	1	13
7:30 AM	2	15	0	0	17	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	27
7:45 AM	0	5	0	0	5	0	0	0	0	0	0	5	0	0	5	1	0	0	0	1	11
Total	2	30	0	0	32	0	0	0	0	0	0	25	0	0	25	2	0	0	0	2	59
8:00 AM	0	3	0	0	3	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	11
8:15 AM	1	7	0	0	8	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	13
8:30 AM	1	6	0	0	7	0	0	0	0	0	0	14	0	0	14	0	0	1	0	1	22
8:45 AM	1	6	0	0	7	0	0	0	0	0	0	5	0	0	5	0	0	1	0	1	13
Total	3	22	0	0	25	0	0	0	0	0	0	32	0	0	32	0	0	2	0	2	59
Grand Total	5	52	0	0	57	0	0	0	0	0	0	57	0	0	57	2	0	2	0	4	118
Approach %	8.8	91.2	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		50.0	0.0	50.0	0.0		
Total %	4.2	44.1	0.0	0.0	48.3	0.0	0.0	0.0	0.0	0.0	0.0	48.3	0.0	0.0	48.3	1.7	0.0	1.7	0.0	3.4	
Exiting Leg Total					59					0					54					5	118

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:15 AM	North Harvard Street from North					Kingsley Street from East					North Harvard Street from South					Franklin Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:15 AM	0	7	0	0	7	0	0	0	0	0	0	5	0	0	5	1	0	0	0	1	13
7:30 AM	2	15	0	0	17	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	27
7:45 AM	0	5	0	0	5	0	0	0	0	0	0	5	0	0	5	1	0	0	0	1	11
8:00 AM	0	3	0	0	3	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	11
Total Volume	2	30	0	0	32	0	0	0	0	0	0	28	0	0	28	2	0	0	0	2	62
% Approach Total	6.3	93.8	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		100.0	0.0	0.0	0.0		
PHF	0.250	0.500	0.000	0.000	0.471	0.000	0.000	0.000	0.000	0.000	0.000	0.700	0.000	0.000	0.700	0.500	0.000	0.000	0.000	0.500	0.574
Entering Leg	2	30	0	0	32	0	0	0	0	0	0	28	0	0	28	2	0	0	0	2	62
Exiting Leg					28					0					32					2	62
Total					60					0					60					4	124

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class: **Articulated Trucks**

	North Harvard Street from North					Kingsley Street from East					North Harvard Street from South					Franklin Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
7:15 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30 AM	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	7
7:45 AM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
Total	0	3	0	0	3	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	12
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
8:30 AM	0	5	0	0	5	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	7
8:45 AM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	9	0	0	9	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	12
Grand Total	0	12	0	0	12	0	1	0	0	1	0	11	0	0	11	0	0	0	0	0	24
Approach %	0.0	100.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	50.0	0.0	0.0	50.0	0.0	4.2	0.0	0.0	4.2	0.0	45.8	0.0	0.0	45.8	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total					11					0					12					1	24

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	North Harvard Street from North					Kingsley Street from East					North Harvard Street from South					Franklin Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
7:15 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:30 AM	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	7
7:45 AM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
Total Volume	0	3	0	0	3	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	12
% Approach Total	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	0.750	0.000	0.000	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.375	0.000	0.000	0.000	0.000	0.000	0.429
Entering Leg	0	3	0	0	3	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	12
Exiting Leg					9					0					3					0	12
Total					12					0					12					0	24

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class: **Bicycles (on Roadway and Crosswalks)**

	North Harvard Street							Kingsley Street							North Harvard Street							Franklin Street							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	6
7:15 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	6	0	0	0	0	6	0	0	3	0	0	0	3	10
7:30 AM	7	0	0	0	0	0	7	0	1	0	0	0	0	1	0	2	0	0	0	0	2	0	0	8	0	0	0	8	18
7:45 AM	9	0	0	0	0	0	9	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	11	0	0	0	11	22
Total	16	0	0	0	0	0	16	0	2	0	0	0	0	2	0	10	0	0	0	0	10	0	0	28	0	0	0	28	56
8:00 AM	7	0	0	0	0	0	7	0	0	0	0	0	0	0	0	3	0	0	0	0	3	2	0	6	0	0	0	8	18
8:15 AM	3	2	0	0	0	0	5	0	1	0	0	0	0	1	0	3	0	0	0	0	3	1	0	21	0	2	0	24	33
8:30 AM	7	2	0	0	0	0	9	0	0	0	0	0	0	0	0	7	0	0	0	0	7	0	0	24	0	0	0	24	40
8:45 AM	2	1	0	0	1	0	4	0	1	0	0	0	0	1	0	4	0	0	0	0	4	0	1	17	0	0	0	18	27
Total	19	5	0	0	1	0	25	0	2	0	0	0	0	2	0	17	0	0	0	0	17	3	1	68	0	2	0	74	118
Grand Total	35	5	0	0	1	0	41	0	4	0	0	0	0	4	0	27	0	0	0	0	27	3	1	96	0	2	0	102	174
Approach %	85.4	12.2	0.0	0.0	2.4	0.0		0.0	100.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0		2.9	1.0	94.1	0.0	2.0	0.0		
Total %	20.1	2.9	0.0	0.0	0.6	0.0	23.6	0.0	2.3	0.0	0.0	0.0	0.0	2.3	0.0	15.5	0.0	0.0	0.0	0.0	15.5	1.7	0.6	55.2	0.0	1.1	0.0	58.6	
Exiting Leg Total							124							1							8							41	174

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street							Kingsley Street							North Harvard Street							Franklin Street							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	7	0	0	0	0	0	7	0	0	0	0	0	0	0	0	3	0	0	0	0	3	2	0	6	0	0	0	8	18
8:15 AM	3	2	0	0	0	0	5	0	1	0	0	0	0	1	0	3	0	0	0	0	3	1	0	21	0	2	0	24	33
8:30 AM	7	2	0	0	0	0	9	0	0	0	0	0	0	0	0	7	0	0	0	0	7	0	0	24	0	0	0	24	40
8:45 AM	2	1	0	0	1	0	4	0	1	0	0	0	0	1	0	4	0	0	0	0	4	0	1	17	0	0	0	18	27
Total Volume	19	5	0	0	1	0	25	0	2	0	0	0	0	2	0	17	0	0	0	0	17	3	1	68	0	2	0	74	118
% Approach Total	76.0	20.0	0.0	0.0	4.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0		4.1	1.4	91.9	0.0	2.7	0.0		
PHF	0.679	0.625	0.000	0.000	0.250	0.000	0.694	0.000	0.500	0.000	0.000	0.000	0.000	0.500	0.000	0.607	0.000	0.000	0.000	0.000	0.607	0.375	0.250	0.708	0.000	0.250	0.000	0.771	0.738
Entering Leg	19	5	0	0	1	0	25	0	2	0	0	0	0	2	0	17	0	0	0	0	17	3	1	68	0	2	0	74	118
Exiting Leg							86							1							8							23	118
Total							111							3							25							97	236

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class: **Pedestrians**

	North Harvard Street							Kingsley Street							North Harvard Street							Franklin Street							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	2	2	0	0	0	0	1	1	2	0	0	0	0	0	2	2	0	0	0	0	3	3	6	12
7:15 AM	0	0	0	0	2	2	4	0	0	0	0	0	5	5	0	0	0	0	1	1	2	0	0	0	0	1	5	6	17
7:30 AM	0	0	0	0	4	1	5	0	0	0	0	0	2	2	0	0	0	0	0	1	1	0	0	0	0	8	3	11	19
7:45 AM	0	0	0	0	5	1	6	0	0	0	0	1	3	4	0	0	0	0	3	4	7	0	0	0	0	6	3	9	26
Total	0	0	0	0	11	6	17	0	0	0	0	2	11	13	0	0	0	0	4	8	12	0	0	0	0	18	14	32	74
8:00 AM	0	0	0	0	6	1	7	0	0	0	0	0	9	9	0	0	0	0	0	2	2	0	0	0	0	9	1	10	28
8:15 AM	0	0	0	0	2	1	3	0	0	0	0	0	5	5	0	0	0	0	0	3	3	0	0	0	0	14	6	20	31
8:30 AM	0	0	0	0	5	1	6	0	0	0	0	2	7	9	0	0	0	0	0	9	9	0	0	0	0	10	3	13	37
8:45 AM	0	0	0	0	8	5	13	0	0	0	0	0	9	9	0	0	0	0	0	2	2	0	0	0	0	7	4	11	35
Total	0	0	0	0	21	8	29	0	0	0	0	2	30	32	0	0	0	0	0	16	16	0	0	0	0	40	14	54	131
Grand Total	0	0	0	0	32	14	46	0	0	0	0	4	41	45	0	0	0	0	4	24	28	0	0	0	0	58	28	86	205
Approach %	0	0	0	0	69.6	30.4		0	0	0	0	8.89	91.1		0	0	0	0	14.3	85.7		0	0	0	0	67.4	32.6		
Total %	0	0	0	0	15.6	6.83	22.4	0	0	0	0	1.95	20	22	0	0	0	0	1.95	11.7	13.7	0	0	0	0	28.3	13.7	42	
Exiting Leg Total							46							45							28							86	205

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	North Harvard Street							Kingsley Street							North Harvard Street							Franklin Street							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	0	0	0	0	6	1	7	0	0	0	0	0	9	9	0	0	0	0	0	2	2	0	0	0	0	9	1	10	28
8:15 AM	0	0	0	0	2	1	3	0	0	0	0	0	5	5	0	0	0	0	0	3	3	0	0	0	0	14	6	20	31
8:30 AM	0	0	0	0	5	1	6	0	0	0	0	2	7	9	0	0	0	0	0	9	9	0	0	0	0	10	3	13	37
8:45 AM	0	0	0	0	8	5	13	0	0	0	0	0	9	9	0	0	0	0	0	2	2	0	0	0	0	7	4	11	35
Total Volume	0	0	0	0	21	8	29	0	0	0	0	2	30	32	0	0	0	0	0	16	16	0	0	0	0	40	14	54	131
% Approach Total	0.0	0.0	0.0	0.0	72.4	27.6		0.0	0.0	0.0	0.0	6.3	93.8		0.0	0.0	0.0	0.0	0.0	100.0		0.0	0.0	0.0	0.0	74.1	25.9		
PHF	0.000	0.000	0.000	0.000	0.656	0.400	0.558	0.000	0.000	0.000	0.000	0.250	0.833	0.889	0.000	0.000	0.000	0.000	0.000	0.444	0.444	0.000	0.000	0.000	0.000	0.714	0.583	0.675	0.885
Entering Leg	0	0	0	0	21	8	29	0	0	0	0	2	30	32	0	0	0	0	0	16	16	0	0	0	0	40	14	54	131
Exiting Leg							29							32							16							54	131
Total							58							64							32							108	262

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Cars and Heavy Vehicles (Combined)**

	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	13	106	0	0	119	1	2	5	0	8	0	79	3	0	82	6	0	16	0	22	231
4:15 PM	18	114	0	0	132	3	2	2	0	7	0	75	1	0	76	4	0	6	0	10	225
4:30 PM	18	121	0	0	139	3	3	6	0	12	0	61	7	0	68	7	0	19	0	26	245
4:45 PM	17	114	0	0	131	0	1	3	0	4	0	67	7	0	74	7	0	7	0	14	223
Total	66	455	0	0	521	7	8	16	0	31	0	282	18	0	300	24	0	48	0	72	924
5:00 PM	14	126	0	0	140	1	4	2	0	7	0	55	6	0	61	5	0	5	0	10	218
5:15 PM	11	105	0	0	116	1	1	8	0	10	0	58	2	0	60	7	0	9	1	17	203
5:30 PM	17	117	0	0	134	1	3	0	0	4	0	69	4	0	73	12	0	9	0	21	232
5:45 PM	17	139	0	0	156	1	4	3	0	8	0	63	4	0	67	5	0	8	0	13	244
Total	59	487	0	0	546	4	12	13	0	29	0	245	16	0	261	29	0	31	1	61	897
Grand Total	125	942	0	0	1067	11	20	29	0	60	0	527	34	0	561	53	0	79	1	133	1821
Approach %	11.7	88.3	0.0	0.0		18.3	33.3	48.3	0.0		0.0	93.9	6.1	0.0		39.8	0.0	59.4	0.8		
Total %	6.9	51.7	0.0	0.0	58.6	0.6	1.1	1.6	0.0	3.3	0.0	28.9	1.9	0.0	30.8	2.9	0.0	4.3	0.1	7.3	
Exiting Leg Total					617					0					1024					180	1821
Cars	123	875	0	0	998	11	20	28	0	59	0	487	34	0	521	49	0	77	1	127	1705
% Cars	98.4	92.9	0.0	0.0	93.5	100.0	100.0	96.6	0.0	98.3	0.0	92.4	100.0	0.0	92.9	92.5	0.0	97.5	100.0	95.5	93.6
Exiting Leg Total					575					0					952					178	1705
Heavy Vehicles	2	67	0	0	69	0	0	1	0	1	0	40	0	0	40	4	0	2	0	6	116
% Heavy Vehicles	1.6	7.1	0.0	0.0	6.5	0.0	0.0	3.4	0.0	1.7	0.0	7.6	0.0	0.0	7.1	7.5	0.0	2.5	0.0	4.5	6.4
Exiting Leg Total					42					0					72					2	116

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	13	106	0	0	119	1	2	5	0	8	0	79	3	0	82	6	0	16	0	22	231
4:15 PM	18	114	0	0	132	3	2	2	0	7	0	75	1	0	76	4	0	6	0	10	225
4:30 PM	18	121	0	0	139	3	3	6	0	12	0	61	7	0	68	7	0	19	0	26	245
4:45 PM	17	114	0	0	131	0	1	3	0	4	0	67	7	0	74	7	0	7	0	14	223
Total Volume	66	455	0	0	521	7	8	16	0	31	0	282	18	0	300	24	0	48	0	72	924
% Approach Total	12.7	87.3	0.0	0.0		22.6	25.8	51.6	0.0		0.0	94.0	6.0	0.0		33.3	0.0	66.7	0.0		
PHF	0.917	0.940	0.000	0.000	0.937	0.583	0.667	0.667	0.000	0.646	0.000	0.892	0.643	0.000	0.915	0.857	0.000	0.632	0.000	0.692	0.943
Cars	65	416	0	0	481	7	8	15	0	30	0	255	18	0	273	23	0	48	0	71	855
Cars %	98.5	91.4	0.0	0.0	92.3	100.0	100.0	93.8	0.0	96.8	0.0	90.4	100.0	0.0	91.0	95.8	0.0	100.0	0.0	98.6	92.5
Heavy Vehicles	1	39	0	0	40	0	0	1	0	1	0	27	0	0	27	1	0	0	0	1	69
Heavy Vehicles %	1.5	8.6	0.0	0.0	7.7	0.0	0.0	6.3	0.0	3.2	0.0	9.6	0.0	0.0	9.0	4.2	0.0	0.0	0.0	1.4	7.5
Cars Enter Leg	65	416	0	0	481	7	8	15	0	30	0	255	18	0	273	23	0	48	0	71	855
Heavy Enter Leg	1	39	0	0	40	0	0	1	0	1	0	27	0	0	27	1	0	0	0	1	69
Total Entering Leg	66	455	0	0	521	7	8	16	0	31	0	282	18	0	300	24	0	48	0	72	924
Cars Exiting Leg					310					0					454					91	855
Heavy Exiting Leg					27					0					41					1	69
Total Exiting Leg					337					0					495					92	924

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Cars-Combined (Motorcycles, Cars, Light Goods)**

	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	13	93	0	0	106	1	2	5	0	8	0	67	3	0	70	6	0	16	0	22	206
4:15 PM	18	104	0	0	122	3	2	2	0	7	0	72	1	0	73	4	0	6	0	10	212
4:30 PM	17	111	0	0	128	3	3	6	0	12	0	55	7	0	62	7	0	19	0	26	228
4:45 PM	17	108	0	0	125	0	1	2	0	3	0	61	7	0	68	6	0	7	0	13	209
Total	65	416	0	0	481	7	8	15	0	30	0	255	18	0	273	23	0	48	0	71	855
5:00 PM	14	119	0	0	133	1	4	2	0	7	0	52	6	0	58	4	0	4	0	8	206
5:15 PM	10	99	0	0	109	1	1	8	0	10	0	53	2	0	55	6	0	8	1	15	189
5:30 PM	17	110	0	0	127	1	3	0	0	4	0	65	4	0	69	12	0	9	0	21	221
5:45 PM	17	131	0	0	148	1	4	3	0	8	0	62	4	0	66	4	0	8	0	12	234
Total	58	459	0	0	517	4	12	13	0	29	0	232	16	0	248	26	0	29	1	56	850
Grand Total	123	875	0	0	998	11	20	28	0	59	0	487	34	0	521	49	0	77	1	127	1705
Approach %	12.3	87.7	0.0	0.0		18.6	33.9	47.5	0.0		0.0	93.5	6.5	0.0		38.6	0.0	60.6	0.8		
Total %	7.2	51.3	0.0	0.0	58.5	0.6	1.2	1.6	0.0	3.5	0.0	28.6	2.0	0.0	30.6	2.9	0.0	4.5	0.1	7.4	
Exiting Leg Total					575					0					952					178	1705

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	13	93	0	0	106	1	2	5	0	8	0	67	3	0	70	6	0	16	0	22	206
4:15 PM	18	104	0	0	122	3	2	2	0	7	0	72	1	0	73	4	0	6	0	10	212
4:30 PM	17	111	0	0	128	3	3	6	0	12	0	55	7	0	62	7	0	19	0	26	228
4:45 PM	17	108	0	0	125	0	1	2	0	3	0	61	7	0	68	6	0	7	0	13	209
Total Volume	65	416	0	0	481	7	8	15	0	30	0	255	18	0	273	23	0	48	0	71	855
% Approach Total	13.5	86.5	0.0	0.0		23.3	26.7	50.0	0.0		0.0	93.4	6.6	0.0		32.4	0.0	67.6	0.0		
PHF	0.903	0.937	0.000	0.000	0.939	0.583	0.667	0.625	0.000	0.625	0.000	0.885	0.643	0.000	0.935	0.821	0.000	0.632	0.000	0.683	0.938
Entering Leg	65	416	0	0	481	7	8	15	0	30	0	255	18	0	273	23	0	48	0	71	855
Exiting Leg					310					0					454					91	855
Total					791					30					727					162	1710

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**

	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	13	0	0	13	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	25
4:15 PM	0	10	0	0	10	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	13
4:30 PM	1	10	0	0	11	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	17
4:45 PM	0	6	0	0	6	0	0	1	0	1	0	6	0	0	6	1	0	0	0	1	14
Total	1	39	0	0	40	0	0	1	0	1	0	27	0	0	27	1	0	0	0	1	69
5:00 PM	0	7	0	0	7	0	0	0	0	0	0	3	0	0	3	1	0	1	0	2	12
5:15 PM	1	6	0	0	7	0	0	0	0	0	0	5	0	0	5	1	0	1	0	2	14
5:30 PM	0	7	0	0	7	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	11
5:45 PM	0	8	0	0	8	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	10
Total	1	28	0	0	29	0	0	0	0	0	0	13	0	0	13	3	0	2	0	5	47
Grand Total	2	67	0	0	69	0	0	1	0	1	0	40	0	0	40	4	0	2	0	6	116
Approach %	2.9	97.1	0.0	0.0		0.0	0.0	100.0	0.0		0.0	100.0	0.0	0.0		66.7	0.0	33.3	0.0		
Total %	1.7	57.8	0.0	0.0	59.5	0.0	0.0	0.9	0.0	0.9	0.0	34.5	0.0	0.0	34.5	3.4	0.0	1.7	0.0	5.2	
Exiting Leg Total					42					0					72					2	116
Buses	2	36	0	0	38	0	0	0	0	0	0	26	0	0	26	2	0	0	0	2	66
% Buses	100.0	53.7	0.0	0.0	55.1	0.0	0.0	0.0	0.0	0.0	0.0	65.0	0.0	0.0	65.0	50.0	0.0	0.0	0.0	33.3	56.9
Exiting Leg Total					26					0					38					2	66
Single-Unit Trucks	0	28	0	0	28	0	0	1	0	1	0	13	0	0	13	2	0	1	0	3	45
% Single-Unit	0.0	41.8	0.0	0.0	40.6	0.0	0.0	100.0	0.0	100.0	0.0	32.5	0.0	0.0	32.5	50.0	0.0	50.0	0.0	50.0	38.8
Exiting Leg Total					14					0					31					0	45
Articulated Trucks	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	5
% Articulated	0.0	4.5	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	2.5	0.0	0.0	50.0	0.0	16.7	4.3
Exiting Leg Total					2					0					3					0	5

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	13	0	0	13	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	25
4:15 PM	0	10	0	0	10	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	13
4:30 PM	1	10	0	0	11	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	17
4:45 PM	0	6	0	0	6	0	0	1	0	1	0	6	0	0	6	1	0	0	0	1	14
Total Volume	1	39	0	0	40	0	0	1	0	1	0	27	0	0	27	1	0	0	0	1	69
% Approach Total	2.5	97.5	0.0	0.0		0.0	0.0	100.0	0.0		0.0	100.0	0.0	0.0		100.0	0.0	0.0	0.0		
PHF	0.250	0.750	0.000	0.000	0.769	0.000	0.000	0.250	0.000	0.250	0.000	0.563	0.000	0.000	0.563	0.250	0.000	0.000	0.000	0.250	0.690
Buses	1	18	0	0	19	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	36
Buses %	100.0	46.2	0.0	0.0	47.5	0.0	0.0	0.0	0.0	0.0	0.0	63.0	0.0	0.0	63.0	0.0	0.0	0.0	0.0	0.0	52.2
Single-Unit Trucks	0	19	0	0	19	0	0	1	0	1	0	9	0	0	9	1	0	0	0	1	30
Single-Unit %	0.0	48.7	0.0	0.0	47.5	0.0	0.0	100.0	0.0	100.0	0.0	33.3	0.0	0.0	33.3	100.0	0.0	0.0	0.0	100.0	43.5
Articulated Trucks	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Articulated %	0.0	5.1	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	4.3
Buses	1	18	0	0	19	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	36
Single-Unit Trucks	0	19	0	0	19	0	0	1	0	1	0	9	0	0	9	1	0	0	0	1	30
Articulated Trucks	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Total Entering Leg	1	39	0	0	40	0	0	1	0	1	0	27	0	0	27	1	0	0	0	1	69
Buses					17					0					18					1	36
Single-Unit Trucks					9					0					21					0	30
Articulated Trucks					1					0					2					0	3
Total Exiting Leg					27					0					41					1	69

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Cars**

	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	10	80	0	0	90	1	2	3	0	6	0	66	3	0	69	6	0	11	0	17	182
4:15 PM	17	94	0	0	111	3	2	2	0	7	0	70	1	0	71	3	0	5	0	8	197
4:30 PM	16	103	0	0	119	2	3	5	0	10	0	50	5	0	55	6	0	18	0	24	208
4:45 PM	15	96	0	0	111	0	1	2	0	3	0	54	7	0	61	5	0	6	0	11	186
Total	58	373	0	0	431	6	8	12	0	26	0	240	16	0	256	20	0	40	0	60	773
5:00 PM	12	117	0	0	129	1	4	2	0	7	0	50	6	0	56	4	0	3	0	7	199
5:15 PM	10	96	0	0	106	1	1	8	0	10	0	51	2	0	53	6	0	7	1	14	183
5:30 PM	16	104	0	0	120	1	3	0	0	4	0	61	4	0	65	12	0	9	0	21	210
5:45 PM	17	117	0	0	134	1	4	2	0	7	0	62	4	0	66	4	0	8	0	12	219
Total	55	434	0	0	489	4	12	12	0	28	0	224	16	0	240	26	0	27	1	54	811
Grand Total	113	807	0	0	920	10	20	24	0	54	0	464	32	0	496	46	0	67	1	114	1584
Approach %	12.3	87.7	0.0	0.0		18.5	37.0	44.4	0.0		0.0	93.5	6.5	0.0		40.4	0.0	58.8	0.9		
Total %	7.1	50.9	0.0	0.0	58.1	0.6	1.3	1.5	0.0	3.4	0.0	29.3	2.0	0.0	31.3	2.9	0.0	4.2	0.1	7.2	
Exiting Leg Total					541					0					877					166	1584

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
5:00 PM	12	117	0	0	129	1	4	2	0	7	0	50	6	0	56	4	0	3	0	7	199
5:15 PM	10	96	0	0	106	1	1	8	0	10	0	51	2	0	53	6	0	7	1	14	183
5:30 PM	16	104	0	0	120	1	3	0	0	4	0	61	4	0	65	12	0	9	0	21	210
5:45 PM	17	117	0	0	134	1	4	2	0	7	0	62	4	0	66	4	0	8	0	12	219
Total Volume	55	434	0	0	489	4	12	12	0	28	0	224	16	0	240	26	0	27	1	54	811
% Approach Total	11.2	88.8	0.0	0.0		14.3	42.9	42.9	0.0		0.0	93.3	6.7	0.0		48.1	0.0	50.0	1.9		
PHF	0.809	0.927	0.000	0.000	0.912	1.000	0.750	0.375	0.000	0.700	0.000	0.903	0.667	0.000	0.909	0.542	0.000	0.750	0.250	0.643	0.926
Entering Leg	55	434	0	0	489	4	12	12	0	28	0	224	16	0	240	26	0	27	1	54	811
Exiting Leg					255					0					472					84	811
Total					744					28					712					138	1622

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Light Goods Vehicle**

	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	3	13	0	0	16	0	0	2	0	2	0	1	0	0	1	0	0	5	0	5	24
4:15 PM	1	10	0	0	11	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	15
4:30 PM	0	7	0	0	7	1	0	1	0	2	0	5	2	0	7	1	0	1	0	2	18
4:45 PM	2	12	0	0	14	0	0	0	0	0	0	7	0	0	7	1	0	1	0	2	23
Total	6	42	0	0	48	1	0	3	0	4	0	15	2	0	17	3	0	8	0	11	80
5:00 PM	2	2	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	7
5:15 PM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	6
5:30 PM	1	6	0	0	7	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	11
5:45 PM	0	14	0	0	14	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	15
Total	3	25	0	0	28	0	0	1	0	1	0	8	0	0	8	0	0	2	0	2	39
Grand Total	9	67	0	0	76	1	0	4	0	5	0	23	2	0	25	3	0	10	0	13	119
Approach %	11.8	88.2	0.0	0.0		20.0	0.0	80.0	0.0		0.0	92.0	8.0	0.0		23.1	0.0	76.9	0.0		
Total %	7.6	56.3	0.0	0.0	63.9	0.8	0.0	3.4	0.0	4.2	0.0	19.3	1.7	0.0	21.0	2.5	0.0	8.4	0.0	10.9	
Exiting Leg Total					34					0					74					11	119

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	3	13	0	0	16	0	0	2	0	2	0	1	0	0	1	0	0	5	0	5	24
4:15 PM	1	10	0	0	11	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	15
4:30 PM	0	7	0	0	7	1	0	1	0	2	0	5	2	0	7	1	0	1	0	2	18
4:45 PM	2	12	0	0	14	0	0	0	0	0	0	7	0	0	7	1	0	1	0	2	23
Total Volume	6	42	0	0	48	1	0	3	0	4	0	15	2	0	17	3	0	8	0	11	80
% Approach Total	12.5	87.5	0.0	0.0		25.0	0.0	75.0	0.0		0.0	88.2	11.8	0.0		27.3	0.0	72.7	0.0		
PHF	0.500	0.808	0.000	0.000	0.750	0.250	0.000	0.375	0.000	0.500	0.000	0.536	0.250	0.000	0.607	0.750	0.000	0.400	0.000	0.550	0.833
Entering Leg	6	42	0	0	48	1	0	3	0	4	0	15	2	0	17	3	0	8	0	11	80
Exiting Leg					24					0					48					8	80
Total					72					4					65					19	160

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Buses**

	North Harvard Street from North					Kingsley Street from East					North Harvard Street from South					Franklin Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	7	0	0	7	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	16
4:15 PM	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
4:30 PM	1	4	0	0	5	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	9
4:45 PM	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	7
Total	1	18	0	0	19	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	36
5:00 PM	0	5	0	0	5	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	9
5:15 PM	1	4	0	0	5	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	8
5:30 PM	0	6	0	0	6	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	9
5:45 PM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	4
Total	1	18	0	0	19	0	0	0	0	0	0	9	0	0	9	2	0	0	0	2	30
Grand Total	2	36	0	0	38	0	0	0	0	0	0	26	0	0	26	2	0	0	0	2	66
Approach %	5.3	94.7	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		100.0	0.0	0.0	0.0		
Total %	3.0	54.5	0.0	0.0	57.6	0.0	0.0	0.0	0.0	0.0	0.0	39.4	0.0	0.0	39.4	3.0	0.0	0.0	0.0	3.0	
Exiting Leg Total					26					0					38					2	66

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	North Harvard Street from North					Kingsley Street from East					North Harvard Street from South					Franklin Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	7	0	0	7	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	16
4:15 PM	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
4:30 PM	1	4	0	0	5	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	9
4:45 PM	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	7
Total Volume	1	18	0	0	19	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	36
% Approach Total	5.3	94.7	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.250	0.643	0.000	0.000	0.679	0.000	0.000	0.000	0.000	0.000	0.000	0.472	0.000	0.000	0.472	0.000	0.000	0.000	0.000	0.000	0.563
Entering Leg	1	18	0	0	19	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	36
Exiting Leg					17					0					18					1	36
Total					36					0					35					1	72

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Single-Unit Trucks**

	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	6	0	0	6	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	9
4:15 PM	0	6	0	0	6	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	8
4:30 PM	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	6
4:45 PM	0	3	0	0	3	0	0	1	0	1	0	2	0	0	2	1	0	0	0	1	7
Total	0	19	0	0	19	0	0	1	0	1	0	9	0	0	9	1	0	0	0	1	30
5:00 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3
5:15 PM	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	5
5:30 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
5:45 PM	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
Total	0	9	0	0	9	0	0	0	0	0	0	4	0	0	4	1	0	1	0	2	15
Grand Total	0	28	0	0	28	0	0	1	0	1	0	13	0	0	13	2	0	1	0	3	45
Approach %	0.0	100.0	0.0	0.0		0.0	0.0	100.0	0.0		0.0	100.0	0.0	0.0		66.7	0.0	33.3	0.0		
Total %	0.0	62.2	0.0	0.0	62.2	0.0	0.0	2.2	0.0	2.2	0.0	28.9	0.0	0.0	28.9	4.4	0.0	2.2	0.0	6.7	
Exiting Leg Total					14					0					31					0	45

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	North Harvard Street					Kingsley Street					North Harvard Street					Franklin Street					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	6	0	0	6	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	9
4:15 PM	0	6	0	0	6	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	8
4:30 PM	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	6
4:45 PM	0	3	0	0	3	0	0	1	0	1	0	2	0	0	2	1	0	0	0	1	7
Total Volume	0	19	0	0	19	0	0	1	0	1	0	9	0	0	9	1	0	0	0	1	30
% Approach Total	0.0	100.0	0.0	0.0		0.0	0.0	100.0	0.0		0.0	100.0	0.0	0.0		100.0	0.0	0.0	0.0		
PHF	0.000	0.792	0.000	0.000	0.792	0.000	0.000	0.250	0.000	0.250	0.000	0.750	0.000	0.000	0.750	0.250	0.000	0.000	0.000	0.250	0.833
Entering Leg	0	19	0	0	19	0	0	1	0	1	0	9	0	0	9	1	0	0	0	1	30
Exiting Leg					9					0					21					0	30
Total					28					1					30					1	60

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Articulated Trucks**

	North Harvard Street from North					Kingsley Street from East					North Harvard Street from South					Franklin Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
4:30 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
Grand Total	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	5
Approach %	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	100.0	0.0		
Total %	0.0	60.0	0.0	0.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	20.0	0.0	0.0	20.0	0.0	20.0	
Exiting Leg Total					2					0					3					0	5

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	North Harvard Street from North					Kingsley Street from East					North Harvard Street from South					Franklin Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
4:30 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
% Approach Total	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.375
Entering Leg	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Exiting Leg					1					0					2					0	3
Total					3					0					3					0	6

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Bicycles (on Roadway and Crosswalks)**

	North Harvard Street							Kingsley Street							North Harvard Street							Franklin Street							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	6	2	0	0	0	0	8	0	0	0	0	1	0	1	0	2	0	0	0	0	2	0	0	4	0	0	0	4	15
4:15 PM	7	1	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	13
4:30 PM	5	3	0	0	0	0	8	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	6	0	0	0	6	15
4:45 PM	8	5	0	0	0	0	13	0	0	0	0	0	3	3	0	1	0	0	0	0	1	0	1	6	0	0	0	7	24
Total	26	11	0	0	0	0	37	0	0	0	0	1	3	4	0	4	0	0	0	0	4	0	1	21	0	0	0	22	67
5:00 PM	9	2	0	0	0	0	11	0	1	0	0	0	0	1	0	1	0	0	0	2	3	0	0	3	0	0	1	4	19
5:15 PM	12	2	0	0	0	0	14	0	0	0	0	0	0	0	0	3	0	0	0	0	3	0	0	7	0	0	1	8	25
5:30 PM	5	3	0	0	0	0	8	0	1	0	0	0	0	1	0	5	0	0	0	0	5	1	0	7	0	0	0	8	22
5:45 PM	5	2	0	0	0	0	7	0	3	0	0	0	0	3	0	1	0	0	0	0	1	0	0	7	0	0	0	7	18
Total	31	9	0	0	0	0	40	0	5	0	0	0	0	5	0	10	0	0	0	2	12	1	0	24	0	0	2	27	84
Grand Total	57	20	0	0	0	0	77	0	5	0	0	1	3	9	0	14	0	0	0	2	16	1	1	45	0	0	2	49	151
Approach %	74.0	26.0	0.0	0.0	0.0	0.0		0.0	55.6	0.0	0.0	11.1	33.3		0.0	87.5	0.0	0.0	0.0	12.5		2.0	2.0	91.8	0.0	0.0	4.1		
Total %	37.7	13.2	0.0	0.0	0.0	0.0	51.0	0.0	3.3	0.0	0.0	0.7	2.0	6.0	0.0	9.3	0.0	0.0	0.0	1.3	10.6	0.7	0.7	29.8	0.0	0.0	1.3	32.5	
Exiting Leg Total							59							5							23							64	151

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:45 PM	North Harvard Street							Kingsley Street							North Harvard Street							Franklin Street							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:45 PM	8	5	0	0	0	0	13	0	0	0	0	0	3	3	0	1	0	0	0	0	1	0	1	6	0	0	0	7	24
5:00 PM	9	2	0	0	0	0	11	0	1	0	0	0	0	1	0	1	0	0	0	2	3	0	0	3	0	0	1	4	19
5:15 PM	12	2	0	0	0	0	14	0	0	0	0	0	0	0	0	3	0	0	0	0	3	0	0	7	0	0	1	8	25
5:30 PM	5	3	0	0	0	0	8	0	1	0	0	0	0	1	0	5	0	0	0	0	5	1	0	7	0	0	0	8	22
Total Volume	34	12	0	0	0	0	46	0	2	0	0	0	3	5	0	10	0	0	0	2	12	1	1	23	0	0	2	27	90
% Approach Total	73.9	26.1	0.0	0.0	0.0	0.0		0.0	40.0	0.0	0.0	0.0	60.0		0.0	83.3	0.0	0.0	0.0	16.7		3.7	3.7	85.2	0.0	0.0	7.4		
PHF	0.708	0.600	0.000	0.000	0.000	0.000	0.821	0.000	0.500	0.000	0.000	0.000	0.250	0.417	0.000	0.500	0.000	0.000	0.000	0.250	0.600	0.250	0.250	0.821	0.000	0.000	0.500	0.844	0.900
Entering Leg	34	12	0	0	0	0	46	0	2	0	0	0	3	5	0	10	0	0	0	2	12	1	1	23	0	0	2	27	90
Exiting Leg							33							4							15							38	90
Total							79							9							27							65	180

PDI File #: **186524 F**
Location: **N: North Harvard Street S: North Harvard Street**
Location: **E: Kingsley Street W: Franklin Street**
City, State: **Allston, MA**
Client: **VHB/ P. Dunford**
Site Code: **14351.00**
Count Date: **Thursday, October 25, 2018**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Pedestrians**

	North Harvard Street							Kingsley Street							North Harvard Street							Franklin Street							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	5	5	0	0	0	0	7	13	20	0	0	0	0	3	0	3	0	0	0	0	7	8	15	43
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	5	7	0	0	0	0	1	0	1	0	0	0	0	4	3	7	15
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	1	0	1	0	0	0	0	1	6	7	10
4:45 PM	0	0	0	0	0	2	2	0	0	0	0	1	4	5	0	0	0	0	0	1	1	0	0	0	0	3	14	17	25
Total	0	0	0	0	0	7	7	0	0	0	0	11	23	34	0	0	0	0	5	1	6	0	0	0	0	15	31	46	93
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	4	9	13	0	0	0	0	0	0	0	0	0	0	0	6	12	18	31
5:15 PM	0	0	0	0	2	0	2	0	0	0	0	12	5	17	0	0	0	0	1	1	2	0	0	0	0	3	9	12	33
5:30 PM	0	0	0	0	0	1	1	0	0	0	0	3	6	9	0	0	0	0	3	1	4	0	0	0	0	5	16	21	35
5:45 PM	0	0	0	0	0	4	4	0	0	0	0	4	6	10	0	0	0	0	4	4	8	0	0	0	0	4	20	24	46
Total	0	0	0	0	2	5	7	0	0	0	0	23	26	49	0	0	0	0	8	6	14	0	0	0	0	18	57	75	145
Grand Total	0	0	0	0	2	12	14	0	0	0	0	34	49	83	0	0	0	0	13	7	20	0	0	0	0	33	88	121	238
Approach %	0	0	0	0	14.3	85.7		0	0	0	0	41	59		0	0	0	0	65	35		0	0	0	0	27.3	72.7		
Total %	0	0	0	0	0.84	5.04	5.88	0	0	0	0	14.3	20.6	34.9	0	0	0	0	5.46	2.94	8.4	0	0	0	0	13.9	37	50.8	
Exiting Leg Total							14							83							20							121	238

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	North Harvard Street							Kingsley Street							North Harvard Street							Franklin Street							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	4	9	13	0	0	0	0	0	0	0	0	0	0	0	6	12	18	31
5:15 PM	0	0	0	0	2	0	2	0	0	0	0	12	5	17	0	0	0	0	1	1	2	0	0	0	0	3	9	12	33
5:30 PM	0	0	0	0	0	1	1	0	0	0	0	3	6	9	0	0	0	0	3	1	4	0	0	0	0	5	16	21	35
5:45 PM	0	0	0	0	0	4	4	0	0	0	0	4	6	10	0	0	0	0	4	4	8	0	0	0	0	4	20	24	46
Total Volume	0	0	0	0	2	5	7	0	0	0	0	23	26	49	0	0	0	0	8	6	14	0	0	0	0	18	57	75	145
% Approach Total	0.0	0.0	0.0	0.0	28.6	71.4		0.0	0.0	0.0	0.0	46.9	53.1		0.0	0.0	0.0	0.0	57.1	42.9		0.0	0.0	0.0	0.0	24.0	76.0		
PHF	0.000	0.000	0.000	0.000	0.250	0.313	0.438	0.000	0.000	0.000	0.000	0.479	0.722	0.721	0.000	0.000	0.000	0.000	0.500	0.375	0.438	0.000	0.000	0.000	0.000	0.750	0.713	0.781	0.788
Entering Leg	0	0	0	0	2	5	7	0	0	0	0	23	26	49	0	0	0	0	8	6	14	0	0	0	0	18	57	75	145
Exiting Leg							7							49							14							75	145
Total							14							98							28							150	290

File Name: C:\Users\PDI Dell\Desktop\PDI Folder\122864\122864 H.ppd
Start Date: 4/3/2012
Start Time: 7:00:00 AM
Site Code: 10463.00
Comment 1: N/S: Batten Way
Comment 2: E/W: Western Avenue
Comment 3: City, State: Boston, MA
Comment 4: Client: VHB/ K. Keen

	Batten Way From North				Western Avenue From East				Hague Street From South				Western Avenue From West			
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
07:00 AM	2	0	2	0	10	54	10	0	14	6	5	0	4	50	4	0
07:15 AM	0	0	0	0	6	77	9	0	20	12	8	0	5	56	1	0
07:30 AM	0	1	4	0	10	70	1	0	29	12	8	0	4	61	7	0
07:45 AM	1	0	3	0	17	67	1	0	22	16	8	0	4	78	12	0
08:00 AM	4	0	6	0	10	88	7	0	44	16	8	0	3	78	12	0
08:15 AM	7	1	3	0	11	100	3	0	43	16	5	0	8	91	14	0
08:30 AM	4	0	6	0	15	86	4	0	36	23	5	0	5	93	16	0
08:45 AM	5	3	6	0	19	84	5	0	27	15	4	0	2	66	14	0

File Name: C:\Users\PDI Dell\Desktop\PDI Folder\122864\122864 H.ppd
Start Date: 4/3/2012
Start Time: 7:00:00 AM
Site Code: 10463.00
Comment 1: N/S: Batten Way
Comment 2: E/W: Western Avenue
Comment 3: City, State: Boston, MA
Comment 4: Client: VHB/ K. Keen

	Batten Way From North				Western Avenue From East				Hague Street From South				Western Avenue From West			
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
07:00 AM	0	0	1	0	0	9	0	0	6	0	4	0	0	7	0	0
07:15 AM	0	0	0	0	2	11	3	0	1	0	0	0	1	5	0	0
07:30 AM	0	1	0	0	1	6	1	0	7	0	2	0	1	6	0	0
07:45 AM	0	0	1	0	1	8	3	0	0	0	1	0	2	11	1	0
08:00 AM	0	0	1	0	3	7	2	0	5	0	1	0	0	7	0	0
08:15 AM	0	0	1	0	1	6	5	0	3	0	0	0	0	7	1	0
08:30 AM	0	0	0	0	2	7	2	0	5	0	0	0	0	7	0	0
08:45 AM	0	0	0	0	1	7	4	0	1	0	0	0	3	10	1	0

File Name: C:\Users\PDI Dell\Desktop\PDI Folder\122864\122864 H.ppd
Start Date: 4/3/2012
Start Time: 7:00:00 AM
Site Code: 10463.00
Comment 1: N/S: Batten Way
Comment 2: E/W: Western Avenue
Comment 3: City, State: Boston, MA
Comment 4: Client: VHB/ K. Keen

	Batten Way From North				Western Avenue From East				Hague Street From South				Western Avenue From West			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
07:00 AM	0	0	0	2	0	1	0	0	0	0	0	1	0	2	0	0
07:15 AM	0	0	0	2	1	0	1	0	0	0	0	7	0	9	0	1
07:30 AM	0	0	0	4	0	3	0	0	0	0	0	2	0	8	0	2
07:45 AM	0	0	0	4	0	1	0	0	0	0	0	8	0	11	0	1
08:00 AM	0	0	0	4	1	3	0	0	1	0	0	11	0	8	1	1
08:15 AM	0	0	0	5	0	3	1	0	1	0	0	3	0	7	0	1
08:30 AM	0	0	0	1	0	2	0	0	1	0	0	3	0	10	0	1
08:45 AM	0	0	0	7	0	4	0	1	1	0	0	5	0	8	0	0

File Name: C:\Users\PDI Dell\Desktop\PDI Folder\122864\122864 HH.ppd
Start Date: 4/3/2012
Start Time: 4:00:00 PM
Site Code: 10463.00
Comment 1: N/S: Batten Way
Comment 2: E/W: Western Avenue
Comment 3: City, State: Boston, MA
Comment 4: Client: VHB/ K. Keen

	Batten Way From North				Western Avenue From East				Hague Street From South				Western Avenue From West			
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
04:00 PM	6	1	16	0	5	92	3	0	12	2	7	0	2	54	3	0
04:15 PM	4	1	4	0	8	95	6	0	6	0	5	0	0	60	2	0
04:30 PM	7	0	7	0	2	95	0	0	7	5	9	0	1	76	2	0
04:45 PM	5	0	8	0	3	96	4	0	13	3	6	0	1	83	1	0
05:00 PM	13	0	21	0	10	98	10	0	27	7	8	0	1	88	7	1
05:15 PM	14	1	10	0	7	94	8	0	11	7	12	0	3	83	6	0
05:30 PM	12	0	7	0	4	115	4	1	21	7	19	0	3	59	1	0
05:45 PM	11	0	12	0	8	116	3	0	15	3	17	0	0	77	5	0

File Name: C:\Users\PDI Dell\Desktop\PDI Folder\122864\122864 HH.ppd
Start Date: 4/3/2012
Start Time: 4:00:00 PM
Site Code: 10463.00
Comment 1: N/S: Batten Way
Comment 2: E/W: Western Avenue
Comment 3: City, State: Boston, MA
Comment 4: Client: VHB/ K. Keen

	Batten Way From North				Western Avenue From East				Hague Street From South				Western Avenue From West			
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
04:00 PM	0	0	0	0	1	3	2	0	5	0	0	0	0	5	1	0
04:15 PM	0	1	0	0	1	7	4	0	1	0	1	0	1	3	0	0
04:30 PM	0	0	0	0	1	4	2	0	3	0	0	0	2	2	0	0
04:45 PM	0	0	1	0	2	4	4	0	0	0	0	0	1	7	2	0
05:00 PM	0	0	0	0	1	2	3	0	3	0	0	0	2	4	0	0
05:15 PM	1	0	0	0	1	4	0	0	5	0	0	0	0	3	0	0
05:30 PM	0	0	0	0	1	5	1	0	3	0	0	0	0	2	0	0
05:45 PM	0	0	0	0	1	2	4	0	1	0	0	0	0	3	0	0

File Name: C:\Users\PDI Dell\Desktop\PDI Folder\122864\122864 HH.ppd
Start Date: 4/3/2012
Start Time: 4:00:00 PM
Site Code: 10463.00
Comment 1: N/S: Batten Way
Comment 2: E/W: Western Avenue
Comment 3: City, State: Boston, MA
Comment 4: Client: VHB/ K. Keen

	Batten Way From North				Western Avenue From East				Hague Street From South				Western Avenue From West			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
04:00 PM	1	0	1	5	0	7	0	0	0	0	0	6	0	2	1	1
04:15 PM	0	0	0	7	0	9	0	0	0	0	0	3	0	1	0	1
04:30 PM	0	0	0	5	0	6	0	0	0	0	0	9	0	0	0	3
04:45 PM	0	0	0	4	0	6	0	0	0	0	0	4	0	1	0	0
05:00 PM	0	0	0	7	1	4	0	0	1	0	0	5	0	2	0	0
05:15 PM	0	2	0	5	0	16	2	0	1	0	0	6	0	4	0	1
05:30 PM	0	0	1	6	0	16	2	0	0	0	0	9	0	8	0	1
05:45 PM	0	0	0	3	1	10	0	0	0	2	0	9	0	2	0	2

File Name: C:\Users\PDI Dell\Desktop\PDI Folder\122864\122864 J.ppd
Start Date: 4/3/2012
Start Time: 7:00:00 AM
Site Code: 10463.00
Comment 1: N/S: HBS East Driveway/ Genzyme Driveway
Comment 2: E/W: Western Avenue
Comment 3: City, State: Boston, MA
Comment 4: Client: VHB/ K. Keen

	HBS East Driveway From North				Western Avenue From East				Genzyme Driveway From South				Western Avenue From West			
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
07:00 AM	0	0	0	0	18	58	14	0	9	0	8	0	6	58	18	0
07:15 AM	0	0	0	0	18	79	10	0	12	0	7	0	14	56	12	0
07:30 AM	0	0	0	0	25	77	11	0	5	0	3	0	9	71	19	0
07:45 AM	0	0	0	0	28	74	15	0	11	0	2	0	8	86	20	0
08:00 AM	0	0	0	0	38	105	8	0	3	0	2	0	3	117	19	0
08:15 AM	0	0	0	0	25	93	10	0	5	0	2	0	9	129	22	0
08:30 AM	0	0	0	0	23	90	6	0	0	0	2	0	8	112	17	1
08:45 AM	0	0	0	0	28	94	7	2	5	0	2	0	2	77	21	1

File Name: C:\Users\PDI Dell\Desktop\PDI Folder\122864\122864 J.ppd
Start Date: 4/3/2012
Start Time: 7:00:00 AM
Site Code: 10463.00
Comment 1: N/S: HBS East Driveway/ Genzyme Driveway
Comment 2: E/W: Western Avenue
Comment 3: City, State: Boston, MA
Comment 4: Client: VHB/ K. Keen

	HBS East Driveway From North				Western Avenue From East				Genzyme Driveway From South				Western Avenue From West			
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
07:00 AM	0	0	0	0	0	9	0	0	0	0	0	0	0	9	4	0
07:15 AM	0	0	0	0	3	14	1	0	1	0	0	0	1	4	1	0
07:30 AM	0	0	0	0	1	5	0	0	0	0	0	0	1	11	2	0
07:45 AM	0	0	0	0	1	10	0	0	0	0	0	0	0	9	1	0
08:00 AM	0	0	0	0	3	9	0	0	0	0	1	0	1	13	1	0
08:15 AM	0	0	0	0	2	11	1	0	1	0	1	0	0	11	1	0
08:30 AM	0	0	0	0	2	9	1	0	0	0	0	0	2	9	3	0
08:45 AM	0	0	0	0	1	8	0	0	2	0	0	0	0	9	2	0

File Name: C:\Users\PDI Dell\Desktop\PDI Folder\122864\122864 J.ppd
Start Date: 4/3/2012
Start Time: 7:00:00 AM
Site Code: 10463.00
Comment 1: N/S: HBS East Driveway/ Genzyme Driveway
Comment 2: E/W: Western Avenue
Comment 3: City, State: Boston, MA
Comment 4: Client: VHB/ K. Keen

	HBS East Driveway From North				Western Avenue From East				Genzyme Driveway From South				Western Avenue From West			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
07:00 AM	0	0	0	1	0	1	1	1	0	0	0	17	0	3	0	17
07:15 AM	0	0	0	1	2	2	0	2	0	0	0	20	1	7	1	19
07:30 AM	0	0	0	4	1	3	0	1	0	0	0	19	0	8	0	18
07:45 AM	0	0	1	4	1	1	1	0	0	0	0	18	0	8	0	17
08:00 AM	0	0	0	2	4	5	0	0	0	0	0	12	0	10	0	10
08:15 AM	0	0	0	7	11	2	1	1	0	0	1	14	0	7	0	11
08:30 AM	0	0	0	3	4	2	0	1	1	0	0	10	1	11	0	9
08:45 AM	0	0	0	7	3	4	0	1	0	0	0	14	0	9	0	10

File Name: C:\Users\PDI Dell\Desktop\PDI Folder\122864\122864 JJ.ppd
Start Date: 4/3/2012
Start Time: 4:00:00 PM
Site Code: 10463.00
Comment 1: N/S: HBS East Driveway/ Genzyme Driveway
Comment 2: E/W: Western Avenue
Comment 3: City, State: Boston, MA
Comment 4: Client: VHB/ K. Keen

	HBS East Driveway From North				Western Avenue From East				Genzyme Driveway From South				Western Avenue From West			
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
04:00 PM	0	0	0	0	17	85	0	1	13	0	1	0	3	96	7	0
04:15 PM	0	0	0	0	8	93	3	1	9	0	2	0	3	98	3	0
04:30 PM	0	0	0	0	11	90	6	0	16	0	2	0	2	120	2	0
04:45 PM	0	0	0	0	10	88	2	2	8	0	2	0	2	129	8	0
05:00 PM	0	0	1	0	8	96	2	1	11	0	5	0	4	161	7	1
05:15 PM	0	0	0	0	12	90	5	1	9	0	3	0	3	116	7	0
05:30 PM	0	0	0	0	11	103	5	3	6	0	4	0	4	106	11	1
05:45 PM	0	0	0	0	19	97	6	2	13	0	4	0	5	118	6	0

File Name: C:\Users\PDI Dell\Desktop\PDI Folder\122864\122864 JJ.ppd
Start Date: 4/3/2012
Start Time: 4:00:00 PM
Site Code: 10463.00
Comment 1: N/S: HBS East Driveway/ Genzyme Driveway
Comment 2: E/W: Western Avenue
Comment 3: City, State: Boston, MA
Comment 4: Client: VHB/ K. Keen

	HBS East Driveway From North				Western Avenue From East				Genzyme Driveway From South				Western Avenue From West			
Start Time	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn
04:00 PM	0	0	0	0	0	5	0	0	1	0	0	0	0	11	0	0
04:15 PM	0	0	0	0	0	11	0	0	0	0	0	0	0	3	1	0
04:30 PM	0	0	0	0	2	7	0	0	0	0	0	0	0	5	0	0
04:45 PM	0	0	0	0	0	7	0	0	0	0	0	0	0	6	1	0
05:00 PM	0	0	0	0	1	5	0	0	1	0	0	0	1	6	1	0
05:15 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	8	0	0
05:30 PM	0	0	0	0	1	6	2	0	0	0	0	0	0	5	0	0
05:45 PM	0	0	0	0	1	5	0	0	0	0	1	0	0	4	0	0

File Name: C:\Users\PDI Dell\Desktop\PDI Folder\122864\122864 JJ.ppd
Start Date: 4/3/2012
Start Time: 4:00:00 PM
Site Code: 10463.00
Comment 1: N/S: HBS East Driveway/ Genzyme Driveway
Comment 2: E/W: Western Avenue
Comment 3: City, State: Boston, MA
Comment 4: Client: VHB/ K. Keen

	HBS East Driveway From North				Western Avenue From East				Genzyme Driveway From South				Western Avenue From West			
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
04:00 PM	0	0	0	5	0	8	0	0	0	1	0	19	0	3	0	17
04:15 PM	0	0	0	3	0	9	0	0	0	0	0	23	0	1	0	20
04:30 PM	0	0	0	5	0	5	0	0	0	0	0	26	0	1	0	19
04:45 PM	0	0	0	7	1	6	0	1	1	1	0	15	0	1	0	7
05:00 PM	0	0	0	2	2	1	0	1	1	0	0	18	0	3	0	14
05:15 PM	0	0	0	6	0	15	0	0	0	0	0	14	0	6	0	10
05:30 PM	0	0	0	0	0	16	0	0	0	0	0	24	0	5	0	20
05:45 PM	0	0	0	1	1	9	0	0	0	0	0	21	0	2	0	15

PDI File #: **186146 F**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **6:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars and Heavy Vehicles (Combined)

	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:00 AM	1	33	0	0	34	13	32	0	0	45	15	51	0	0	66	19	92	1	0	112	257
6:15 AM	0	46	0	0	46	9	42	0	0	51	8	88	0	0	96	27	102	0	0	129	322
6:30 AM	0	57	0	0	57	17	62	1	0	80	19	95	0	0	114	52	134	0	0	186	437
6:45 AM	3	66	0	0	69	18	82	0	0	100	24	120	0	0	144	52	141	0	0	193	506
Total	4	202	0	0	206	57	218	1	0	276	66	354	0	0	420	150	469	1	0	620	1522
7:00 AM	0	74	0	0	74	24	91	0	0	115	35	118	0	0	153	71	161	0	0	232	574
7:15 AM	0	55	0	0	55	12	118	0	0	130	33	134	0	0	167	76	183	0	0	259	611
7:30 AM	1	83	0	0	84	20	154	0	0	174	41	146	0	0	187	73	231	0	0	304	749
7:45 AM	0	68	0	0	68	24	163	0	0	187	38	161	0	0	199	86	237	1	0	324	778
Total	1	280	0	0	281	80	526	0	0	606	147	559	0	0	706	306	812	1	0	1119	2712
8:00 AM	1	57	0	0	58	24	158	0	0	182	49	186	0	0	235	85	241	0	0	326	801
8:15 AM	0	50	0	0	50	29	140	0	0	169	39	192	1	0	232	105	234	0	0	339	790
8:30 AM	0	48	0	0	48	25	121	0	0	146	65	157	0	0	222	103	239	0	0	342	758
8:45 AM	0	63	0	0	63	36	133	0	0	169	57	199	0	0	256	83	260	0	0	343	831
Total	1	218	0	0	219	114	552	0	0	666	210	734	1	0	945	376	974	0	0	1350	3180
Grand Total	6	700	0	0	706	251	1296	1	0	1548	423	1647	1	0	2071	832	2255	2	0	3089	7414
Approach %	0.8	99.2	0.0	0.0		16.2	83.7	0.1	0.0		20.4	79.5	0.0	0.0		26.9	73.0	0.1	0.0		
Total %	0.1	9.4	0.0	0.0	9.5	3.4	17.5	0.0	0.0	20.9	5.7	22.2	0.0	0.0	27.9	11.2	30.4	0.0	0.0	41.7	
Exiting Leg Total					1900					2678					1533					1303	7414
Cars	5	601	0	0	606	228	1282	1	0	1511	416	1522	1	0	1939	830	2245	0	0	3075	7131
% Cars	83.3	85.9	0.0	0.0	85.8	90.8	98.9	100.0	0.0	97.6	98.3	92.4	100.0	0.0	93.6	99.8	99.6	0.0	0.0	99.5	96.2
Exiting Leg Total					1750					2661					1432					1288	7131
Heavy Vehicles	1	99	0	0	100	23	14	0	0	37	7	125	0	0	132	2	10	2	0	14	283
% Heavy Vehicles	16.7	14.1	0.0	0.0	14.2	9.2	1.1	0.0	0.0	2.4	1.7	7.6	0.0	0.0	6.4	0.2	0.4	100.0	0.0	0.5	3.8
Exiting Leg Total					150					17					101					15	283

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

8:00 AM	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	1	57	0	0	58	24	158	0	0	182	49	186	0	0	235	85	241	0	0	326	801
8:15 AM	0	50	0	0	50	29	140	0	0	169	39	192	1	0	232	105	234	0	0	339	790
8:30 AM	0	48	0	0	48	25	121	0	0	146	65	157	0	0	222	103	239	0	0	342	758
8:45 AM	0	63	0	0	63	36	133	0	0	169	57	199	0	0	256	83	260	0	0	343	831
Total Volume	1	218	0	0	219	114	552	0	0	666	210	734	1	0	945	376	974	0	0	1350	3180
% Approach Total	0.5	99.5	0.0	0.0		17.1	82.9	0.0	0.0		22.2	77.7	0.1	0.0		27.9	72.1	0.0	0.0		
PHF	0.250	0.865	0.000	0.000	0.869	0.792	0.873	0.000	0.000	0.915	0.808	0.922	0.250	0.000	0.923	0.895	0.937	0.000	0.000	0.984	0.957
Cars	1	180	0	0	181	107	546	0	0	653	206	686	1	0	893	375	971	0	0	1346	3073
Cars %	100.0	82.6	0.0	0.0	82.6	93.9	98.9	0.0	0.0	98.0	98.1	93.5	100.0	0.0	94.5	99.7	99.7	0.0	0.0	99.7	96.6
Heavy Vehicles	0	38	0	0	38	7	6	0	0	13	4	48	0	0	52	1	3	0	0	4	107
Heavy Vehicles %	0.0	17.4	0.0	0.0	17.4	6.1	1.1	0.0	0.0	2.0	1.9	6.5	0.0	0.0	5.5	0.3	0.3	0.0	0.0	0.3	3.4
Cars Enter Leg	1	180	0	0	181	107	546	0	0	653	206	686	1	0	893	375	971	0	0	1346	3073
Heavy Enter Leg	0	38	0	0	38	7	6	0	0	13	4	48	0	0	52	1	3	0	0	4	107
Total Entering Leg	1	218	0	0	219	114	552	0	0	666	210	734	1	0	945	376	974	0	0	1350	3180
Cars Exiting Leg					793					1177					555					548	3073
Heavy Exiting Leg					55					7					39					6	107
Total Exiting Leg					848					1184					594					554	3180

PDI File #: **186146 F**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **6:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Cars-Combined (Motorcycles, Cars, Light Goods)**

	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:00 AM	1	29	0	0	30	13	32	0	0	45	15	48	0	0	63	19	92	0	0	111	249
6:15 AM	0	42	0	0	42	9	42	0	0	51	8	77	0	0	85	27	102	0	0	129	307
6:30 AM	0	48	0	0	48	16	62	1	0	79	18	88	0	0	106	52	134	0	0	186	419
6:45 AM	3	58	0	0	61	16	82	0	0	98	24	109	0	0	133	52	141	0	0	193	485
Total	4	177	0	0	181	54	218	1	0	273	65	322	0	0	387	150	469	0	0	619	1460
7:00 AM	0	68	0	0	68	21	90	0	0	111	34	104	0	0	138	71	161	0	0	232	549
7:15 AM	0	45	0	0	45	9	113	0	0	122	32	123	0	0	155	76	181	0	0	257	579
7:30 AM	0	72	0	0	72	17	153	0	0	170	41	135	0	0	176	72	228	0	0	300	718
7:45 AM	0	59	0	0	59	20	162	0	0	182	38	152	0	0	190	86	235	0	0	321	752
Total	0	244	0	0	244	67	518	0	0	585	145	514	0	0	659	305	805	0	0	1110	2598
8:00 AM	1	49	0	0	50	24	154	0	0	178	48	171	0	0	219	85	240	0	0	325	772
8:15 AM	0	43	0	0	43	26	139	0	0	165	39	184	1	0	224	105	232	0	0	337	769
8:30 AM	0	42	0	0	42	23	120	0	0	143	64	145	0	0	209	102	239	0	0	341	735
8:45 AM	0	46	0	0	46	34	133	0	0	167	55	186	0	0	241	83	260	0	0	343	797
Total	1	180	0	0	181	107	546	0	0	653	206	686	1	0	893	375	971	0	0	1346	3073
Grand Total	5	601	0	0	606	228	1282	1	0	1511	416	1522	1	0	1939	830	2245	0	0	3075	7131
Approach %	0.8	99.2	0.0	0.0		15.1	84.8	0.1	0.0		21.5	78.5	0.1	0.0		27.0	73.0	0.0	0.0		
Total %	0.1	8.4	0.0	0.0	8.5	3.2	18.0	0.0	0.0	21.2	5.8	21.3	0.0	0.0	27.2	11.6	31.5	0.0	0.0	43.1	
Exiting Leg Total					1750					2661					1432					1288	7131

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

8:00 AM	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	1	49	0	0	50	24	154	0	0	178	48	171	0	0	219	85	240	0	0	325	772
8:15 AM	0	43	0	0	43	26	139	0	0	165	39	184	1	0	224	105	232	0	0	337	769
8:30 AM	0	42	0	0	42	23	120	0	0	143	64	145	0	0	209	102	239	0	0	341	735
8:45 AM	0	46	0	0	46	34	133	0	0	167	55	186	0	0	241	83	260	0	0	343	797
Total Volume	1	180	0	0	181	107	546	0	0	653	206	686	1	0	893	375	971	0	0	1346	3073
% Approach Total	0.6	99.4	0.0	0.0		16.4	83.6	0.0	0.0		23.1	76.8	0.1	0.0		27.9	72.1	0.0	0.0		
PHF	0.250	0.918	0.000	0.000	0.905	0.787	0.886	0.000	0.000	0.917	0.805	0.922	0.250	0.000	0.926	0.893	0.934	0.000	0.000	0.981	0.964
Entering Leg	1	180	0	0	181	107	546	0	0	653	206	686	1	0	893	375	971	0	0	1346	3073
Exiting Leg					793					1177					555					548	3073
Total					974					1830					1448					1894	6146

PDI File #: **186146 F**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **6:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**

	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:00 AM	0	4	0	0	4	0	0	0	0	0	0	3	0	0	3	0	0	1	0	1	8
6:15 AM	0	4	0	0	4	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	15
6:30 AM	0	9	0	0	9	1	0	0	0	1	1	7	0	0	8	0	0	0	0	0	18
6:45 AM	0	8	0	0	8	2	0	0	0	2	0	11	0	0	11	0	0	0	0	0	21
Total	0	25	0	0	25	3	0	0	0	3	1	32	0	0	33	0	0	1	0	1	62
7:00 AM	0	6	0	0	6	3	1	0	0	4	1	14	0	0	15	0	0	0	0	0	25
7:15 AM	0	10	0	0	10	3	5	0	0	8	1	11	0	0	12	0	2	0	0	2	32
7:30 AM	1	11	0	0	12	3	1	0	0	4	0	11	0	0	11	1	3	0	0	4	31
7:45 AM	0	9	0	0	9	4	1	0	0	5	0	9	0	0	9	0	2	1	0	3	26
Total	1	36	0	0	37	13	8	0	0	21	2	45	0	0	47	1	7	1	0	9	114
8:00 AM	0	8	0	0	8	0	4	0	0	4	1	15	0	0	16	0	1	0	0	1	29
8:15 AM	0	7	0	0	7	3	1	0	0	4	0	8	0	0	8	0	2	0	0	2	21
8:30 AM	0	6	0	0	6	2	1	0	0	3	1	12	0	0	13	1	0	0	0	1	23
8:45 AM	0	17	0	0	17	2	0	0	0	2	2	13	0	0	15	0	0	0	0	0	34
Total	0	38	0	0	38	7	6	0	0	13	4	48	0	0	52	1	3	0	0	4	107
Grand Total	1	99	0	0	100	23	14	0	0	37	7	125	0	0	132	2	10	2	0	14	283
Approach %	1.0	99.0	0.0	0.0		62.2	37.8	0.0	0.0		5.3	94.7	0.0	0.0		14.3	71.4	14.3	0.0		
Total %	0.4	35.0	0.0	0.0	35.3	8.1	4.9	0.0	0.0	13.1	2.5	44.2	0.0	0.0	46.6	0.7	3.5	0.7	0.0	4.9	
Exiting Leg Total					150					17					101					15	283
Buses	0	48	0	0	48	12	8	0	0	20	1	56	0	0	57	0	10	0	0	10	135
% Buses	0.0	48.5	0.0	0.0	48.0	52.2	57.1	0.0	0.0	54.1	14.3	44.8	0.0	0.0	43.2	0.0	100.0	0.0	0.0	71.4	47.7
Exiting Leg Total					68					11					48					8	135
Single-Unit Trucks	1	50	0	0	51	11	6	0	0	17	6	62	0	0	68	2	0	2	0	4	140
% Single-Unit	100.0	50.5	0.0	0.0	51.0	47.8	42.9	0.0	0.0	45.9	85.7	49.6	0.0	0.0	51.5	100.0	0.0	100.0	0.0	28.6	49.5
Exiting Leg Total					75					6					52					7	140
Articulated Trucks	0	1	0	0	1	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	8
% Articulated	0.0	1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	2.8
Exiting Leg Total					7					0					1					0	8

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

7:15 AM	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:15 AM	0	10	0	0	10	3	5	0	0	8	1	11	0	0	12	0	2	0	0	2	32
7:30 AM	1	11	0	0	12	3	1	0	0	4	0	11	0	0	11	1	3	0	0	4	31
7:45 AM	0	9	0	0	9	4	1	0	0	5	0	9	0	0	9	0	2	1	0	3	26
8:00 AM	0	8	0	0	8	0	4	0	0	4	1	15	0	0	16	0	1	0	0	1	29
Total Volume	1	38	0	0	39	10	11	0	0	21	2	46	0	0	48	1	8	1	0	10	118
% Approach Total	2.6	97.4	0.0	0.0		47.6	52.4	0.0	0.0		4.2	95.8	0.0	0.0		10.0	80.0	10.0	0.0		
PHF	0.250	0.864	0.000	0.000	0.813	0.625	0.550	0.000	0.000	0.656	0.500	0.767	0.000	0.000	0.750	0.250	0.667	0.250	0.000	0.625	0.922
Buses	0	19	0	0	19	7	7	0	0	14	0	22	0	0	22	0	8	0	0	8	63
Buses %	0.0	50.0	0.0	0.0	48.7	70.0	63.6	0.0	0.0	66.7	0.0	47.8	0.0	0.0	45.8	0.0	100.0	0.0	0.0	80.0	53.4
Single-Unit Trucks	1	18	0	0	19	3	4	0	0	7	2	21	0	0	23	1	0	1	0	2	51
Single-Unit %	100.0	47.4	0.0	0.0	48.7	30.0	36.4	0.0	0.0	33.3	100.0	45.7	0.0	0.0	47.9	100.0	0.0	100.0	0.0	20.0	43.2
Articulated Trucks	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	4
Articulated %	0.0	2.6	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	0.0	6.3	0.0	0.0	0.0	0.0	0.0	3.4
Buses	0	19	0	0	19	7	7	0	0	14	0	22	0	0	22	0	8	0	0	8	63
Single-Unit Trucks	1	18	0	0	19	3	4	0	0	7	2	21	0	0	23	1	0	1	0	2	51
Articulated Trucks	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	4
Total Entering Leg	1	38	0	0	39	10	11	0	0	21	2	46	0	0	48	1	8	1	0	10	118
Buses					29					8					19					7	63
Single-Unit Trucks					25					2					19					5	51
Articulated Trucks					3					0					1					0	4
Total Exiting Leg					57					10					39					12	118

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
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PDI File #:	**186146 F**
Location:	**N: JFK Street S: JFK Street**
Location:	**E: Memorial Drive W: Memorial Drive**
City, State:	**Cambridge, MA**
Client:	**TetraTech/ S. Patangay**
Site Code:	**143-4522-14001.04**
Count Date:	**Thursday, May 3, 2018**
Start Time:	**6:00 AM**
End Time:	**9:00 AM**
Class:	**Cars**

	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:00 AM	1	25	0	0	26	9	27	0	0	36	13	32	0	0	45	19	81	0	0	100	207
6:15 AM	0	39	0	0	39	8	38	0	0	46	2	63	0	0	65	26	83	0	0	109	259
6:30 AM	0	44	0	0	44	14	54	1	0	69	15	67	0	0	82	47	116	0	0	163	358
6:45 AM	3	55	0	0	58	10	72	0	0	82	22	91	0	0	113	49	128	0	0	177	430
Total	4	163	0	0	167	41	191	1	0	233	52	253	0	0	305	141	408	0	0	549	1254
7:00 AM	0	60	0	0	60	17	84	0	0	101	31	92	0	0	123	70	154	0	0	224	508
7:15 AM	0	43	0	0	43	8	104	0	0	112	26	105	0	0	131	73	177	0	0	250	536
7:30 AM	0	66	0	0	66	16	145	0	0	161	39	127	0	0	166	70	219	0	0	289	682
7:45 AM	0	57	0	0	57	14	154	0	0	168	36	138	0	0	174	85	225	0	0	310	709
Total	0	226	0	0	226	55	487	0	0	542	132	462	0	0	594	298	775	0	0	1073	2435
8:00 AM	1	43	0	0	44	23	146	0	0	169	46	151	0	0	197	80	230	0	0	310	720
8:15 AM	0	39	0	0	39	24	127	0	0	151	38	171	1	0	210	99	223	0	0	322	722
8:30 AM	0	33	0	0	33	22	106	0	0	128	60	129	0	0	189	96	228	0	0	324	674
8:45 AM	0	43	0	0	43	32	124	0	0	156	50	174	0	0	224	79	242	0	0	321	744
Total	1	158	0	0	159	101	503	0	0	604	194	625	1	0	820	354	923	0	0	1277	2860
Grand Total	5	547	0	0	552	197	1181	1	0	1379	378	1340	1	0	1719	793	2106	0	0	2899	6549
Approach %	0.9	99.1	0.0	0.0		14.3	85.6	0.1	0.0		22.0	78.0	0.1	0.0		27.4	72.6	0.0	0.0		
Total %	0.1	8.4	0.0	0.0	8.4	3.0	18.0	0.0	0.0	21.1	5.8	20.5	0.0	0.0	26.2	12.1	32.2	0.0	0.0	44.3	
Exiting Leg Total					1537					2484					1341					1187	6549

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

8:00 AM	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	1	43	0	0	44	23	146	0	0	169	46	151	0	0	197	80	230	0	0	310	720
8:15 AM	0	39	0	0	39	24	127	0	0	151	38	171	1	0	210	99	223	0	0	322	722
8:30 AM	0	33	0	0	33	22	106	0	0	128	60	129	0	0	189	96	228	0	0	324	674
8:45 AM	0	43	0	0	43	32	124	0	0	156	50	174	0	0	224	79	242	0	0	321	744
Total Volume	1	158	0	0	159	101	503	0	0	604	194	625	1	0	820	354	923	0	0	1277	2860
% Approach Total	0.6	99.4	0.0	0.0		16.7	83.3	0.0	0.0		23.7	76.2	0.1	0.0		27.7	72.3	0.0	0.0		
PHF	0.250	0.919	0.000	0.000	0.903	0.789	0.861	0.000	0.000	0.893	0.808	0.898	0.250	0.000	0.915	0.894	0.954	0.000	0.000	0.985	0.961
Entering Leg	1	158	0	0	159	101	503	0	0	604	194	625	1	0	820	354	923	0	0	1277	2860
Exiting Leg					726					1117					512					505	2860
Total					885					1721					1332					1782	5720

PDI File #: **186146 F**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **6:00 AM**
End Time: **9:00 AM**
Class: **Light Goods Vehicle**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
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	JFK Street from North					Memorial Drive from East					JFK Street from South					Memorial Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:00 AM	0	4	0	0	4	4	5	0	0	9	2	15	0	0	17	0	11	0	0	11	41
6:15 AM	0	3	0	0	3	1	3	0	0	4	6	14	0	0	20	1	18	0	0	19	46
6:30 AM	0	4	0	0	4	2	8	0	0	10	3	21	0	0	24	5	16	0	0	21	59
6:45 AM	0	3	0	0	3	6	10	0	0	16	1	18	0	0	19	3	11	0	0	14	52
Total	0	14	0	0	14	13	26	0	0	39	12	68	0	0	80	9	56	0	0	65	198
7:00 AM	0	8	0	0	8	4	6	0	0	10	3	12	0	0	15	1	5	0	0	6	39
7:15 AM	0	2	0	0	2	1	9	0	0	10	6	18	0	0	24	3	4	0	0	7	43
7:30 AM	0	6	0	0	6	1	8	0	0	9	2	8	0	0	10	2	9	0	0	11	36
7:45 AM	0	2	0	0	2	6	8	0	0	14	2	14	0	0	16	1	10	0	0	11	43
Total	0	18	0	0	18	12	31	0	0	43	13	52	0	0	65	7	28	0	0	35	161
8:00 AM	0	6	0	0	6	1	7	0	0	8	2	20	0	0	22	5	9	0	0	14	50
8:15 AM	0	4	0	0	4	2	12	0	0	14	1	12	0	0	13	6	9	0	0	15	46
8:30 AM	0	8	0	0	8	1	14	0	0	15	4	15	0	0	19	6	11	0	0	17	59
8:45 AM	0	3	0	0	3	2	7	0	0	9	5	9	0	0	14	4	17	0	0	21	47
Total	0	21	0	0	21	6	40	0	0	46	12	56	0	0	68	21	46	0	0	67	202
Grand Total	0	53	0	0	53	31	97	0	0	128	37	176	0	0	213	37	130	0	0	167	561
Approach %	0.0	100.0	0.0	0.0		24.2	75.8	0.0	0.0		17.4	82.6	0.0	0.0		22.2	77.8	0.0	0.0		
Total %	0.0	9.4	0.0	0.0	9.4	5.5	17.3	0.0	0.0	22.8	6.6	31.4	0.0	0.0	38.0	6.6	23.2	0.0	0.0	29.8	
Exiting Leg Total					207					167					90					97	561

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

8:00 AM	JFK Street from North					Memorial Drive from East					JFK Street from South					Memorial Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
8:00 AM	0	6	0	0	6	1	7	0	0	8	2	20	0	0	22	5	9	0	0	14	50
8:15 AM	0	4	0	0	4	2	12	0	0	14	1	12	0	0	13	6	9	0	0	15	46
8:30 AM	0	8	0	0	8	1	14	0	0	15	4	15	0	0	19	6	11	0	0	17	59
8:45 AM	0	3	0	0	3	2	7	0	0	9	5	9	0	0	14	4	17	0	0	21	47
Total Volume	0	21	0	0	21	6	40	0	0	46	12	56	0	0	68	21	46	0	0	67	202
% Approach Total	0.0	100.0	0.0	0.0		13.0	87.0	0.0	0.0		17.6	82.4	0.0	0.0		31.3	68.7	0.0	0.0		
PHF	0.000	0.656	0.000	0.000	0.656	0.750	0.714	0.000	0.000	0.767	0.600	0.700	0.000	0.000	0.773	0.875	0.676	0.000	0.000	0.798	0.856
Entering Leg	0	21	0	0	21	6	40	0	0	46	12	56	0	0	68	21	46	0	0	67	202
Exiting Leg					62					58					42					40	202
Total					83					104					110					107	404

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
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PDI File #: **186146 F**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **6:00 AM**
End Time: **9:00 AM**
Class: **Buses**

	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:00 AM	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
6:15 AM	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	4
6:30 AM	0	3	0	0	3	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	6
6:45 AM	0	3	0	0	3	2	0	0	0	2	0	3	0	0	3	0	0	0	0	0	8
Total	0	11	0	0	11	2	0	0	0	2	0	10	0	0	10	0	0	0	0	0	23
7:00 AM	0	4	0	0	4	2	1	0	0	3	0	5	0	0	5	0	0	0	0	0	12
7:15 AM	0	5	0	0	5	2	5	0	0	7	0	6	0	0	6	0	2	0	0	2	20
7:30 AM	0	4	0	0	4	2	0	0	0	2	0	6	0	0	6	0	3	0	0	3	15
7:45 AM	0	5	0	0	5	3	0	0	0	3	0	3	0	0	3	0	2	0	0	2	13
Total	0	18	0	0	18	9	6	0	0	15	0	20	0	0	20	0	7	0	0	7	60
8:00 AM	0	5	0	0	5	0	2	0	0	2	0	7	0	0	7	0	1	0	0	1	15
8:15 AM	0	5	0	0	5	1	0	0	0	1	0	6	0	0	6	0	2	0	0	2	14
8:30 AM	0	2	0	0	2	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	8
8:45 AM	0	7	0	0	7	0	0	0	0	0	1	7	0	0	8	0	0	0	0	0	15
Total	0	19	0	0	19	1	2	0	0	3	1	26	0	0	27	0	3	0	0	3	52
Grand Total	0	48	0	0	48	12	8	0	0	20	1	56	0	0	57	0	10	0	0	10	135
Approach %	0.0	100.0	0.0	0.0		60.0	40.0	0.0	0.0		1.8	98.2	0.0	0.0		0.0	100.0	0.0	0.0		
Total %	0.0	35.6	0.0	0.0	35.6	8.9	5.9	0.0	0.0	14.8	0.7	41.5	0.0	0.0	42.2	0.0	7.4	0.0	0.0	7.4	
Exiting Leg Total					68					11					48					8	135

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

7:15 AM	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:15 AM	0	5	0	0	5	2	5	0	0	7	0	6	0	0	6	0	2	0	0	2	20
7:30 AM	0	4	0	0	4	2	0	0	0	2	0	6	0	0	6	0	3	0	0	3	15
7:45 AM	0	5	0	0	5	3	0	0	0	3	0	3	0	0	3	0	2	0	0	2	13
8:00 AM	0	5	0	0	5	0	2	0	0	2	0	7	0	0	7	0	1	0	0	1	15
Total Volume	0	19	0	0	19	7	7	0	0	14	0	22	0	0	22	0	8	0	0	8	63
% Approach Total	0.0	100.0	0.0	0.0		50.0	50.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.000	0.950	0.000	0.000	0.950	0.583	0.350	0.000	0.000	0.500	0.000	0.786	0.000	0.000	0.786	0.000	0.667	0.000	0.000	0.667	0.788
Entering Leg	0	19	0	0	19	7	7	0	0	14	0	22	0	0	22	0	8	0	0	8	63
Exiting Leg					29					8					19					7	63
Total					48					22					41					15	126

PDI File #:	**186146 F**
Location:	**N: JFK Street S: JFK Street**
Location:	**E: Memorial Drive W: Memorial Drive**
City, State:	**Cambridge, MA**
Client:	**TetraTech/ S. Patangay**
Site Code:	**143-4522-14001.04**
Count Date:	**Thursday, May 3, 2018**
Start Time:	**6:00 AM**
End Time:	**9:00 AM**
Class:	**Single-Unit Trucks**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
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Single-Unit Trucks

	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:00 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	3
6:15 AM	0	3	0	0	3	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	8
6:30 AM	0	6	0	0	6	1	0	0	0	1	1	4	0	0	5	0	0	0	0	0	12
6:45 AM	0	5	0	0	5	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	12
Total	0	14	0	0	14	1	0	0	0	1	1	18	0	0	19	0	0	1	0	1	35
7:00 AM	0	2	0	0	2	1	0	0	0	1	1	9	0	0	10	0	0	0	0	0	13
7:15 AM	0	5	0	0	5	1	0	0	0	1	1	5	0	0	6	0	0	0	0	0	12
7:30 AM	1	7	0	0	8	1	1	0	0	2	0	5	0	0	5	1	0	0	0	1	16
7:45 AM	0	4	0	0	4	1	1	0	0	2	0	6	0	0	6	0	0	1	0	1	13
Total	1	18	0	0	19	4	2	0	0	6	2	25	0	0	27	1	0	1	0	2	54
8:00 AM	0	2	0	0	2	0	2	0	0	2	1	5	0	0	6	0	0	0	0	0	10
8:15 AM	0	2	0	0	2	2	1	0	0	3	0	2	0	0	2	0	0	0	0	0	7
8:30 AM	0	4	0	0	4	2	1	0	0	3	1	6	0	0	7	1	0	0	0	1	15
8:45 AM	0	10	0	0	10	2	0	0	0	2	1	6	0	0	7	0	0	0	0	0	19
Total	0	18	0	0	18	6	4	0	0	10	3	19	0	0	22	1	0	0	0	1	51
Grand Total	1	50	0	0	51	11	6	0	0	17	6	62	0	0	68	2	0	2	0	4	140
Approach %	2.0	98.0	0.0	0.0		64.7	35.3	0.0	0.0		8.8	91.2	0.0	0.0		50.0	0.0	50.0	0.0		
Total %	0.7	35.7	0.0	0.0	36.4	7.9	4.3	0.0	0.0	12.1	4.3	44.3	0.0	0.0	48.6	1.4	0.0	1.4	0.0	2.9	
Exiting Leg Total					75					6					52					7	140

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

7:00 AM	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	2	0	0	2	1	0	0	0	1	1	9	0	0	10	0	0	0	0	0	13
7:15 AM	0	5	0	0	5	1	0	0	0	1	1	5	0	0	6	0	0	0	0	0	12
7:30 AM	1	7	0	0	8	1	1	0	0	2	0	5	0	0	5	1	0	0	0	1	16
7:45 AM	0	4	0	0	4	1	1	0	0	2	0	6	0	0	6	0	0	1	0	1	13
Total Volume	1	18	0	0	19	4	2	0	0	6	2	25	0	0	27	1	0	1	0	2	54
% Approach Total	5.3	94.7	0.0	0.0		66.7	33.3	0.0	0.0		7.4	92.6	0.0	0.0		50.0	0.0	50.0	0.0		
PHF	0.250	0.643	0.000	0.000	0.594	1.000	0.500	0.000	0.000	0.750	0.500	0.694	0.000	0.000	0.675	0.250	0.000	0.250	0.000	0.500	0.844
Entering Leg	1	18	0	0	19	4	2	0	0	6	2	25	0	0	27	1	0	1	0	2	54
Exiting Leg					30					2					19					3	54
Total					49					8					46					5	108

PDI File #:	**186146 F**
Location:	**N: JFK Street S: JFK Street**
Location:	**E: Memorial Drive W: Memorial Drive**
City, State:	**Cambridge, MA**
Client:	**TetraTech/ S. Patangay**
Site Code:	**143-4522-14001.04**
Count Date:	**Thursday, May 3, 2018**
Start Time:	**6:00 AM**
End Time:	**9:00 AM**
Class:	

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Articulated Trucks

	JFK Street from North					Memorial Drive from East					JFK Street from South					Memorial Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	4
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	4
Grand Total	0	1	0	0	1	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	8
Approach %	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	12.5	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	87.5	0.0	0.0	87.5	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total					7					0					1					0	8

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

6:00 AM	JFK Street from North					Memorial Drive from East					JFK Street from South					Memorial Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
6:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
% Approach Total	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.000	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.333
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
Exiting Leg					4					0					0					0	4
Total					4					0					4					0	8

PDI File #: **186146 F**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **6:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Bicycles (on Roadway and Crosswalks)

	JFK Street							Memorial Drive							JFK Street							Memorial Drive							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
6:00 AM	0	3	0	0	0	0	3	0	0	0	0	1	1	2	0	4	0	0	0	2	6	0	0	0	0	1	0	1	12
6:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	4	0	0	0	2	6	0	0	0	0	0	1	1	8
6:30 AM	1	4	0	0	0	0	5	0	0	0	0	3	1	4	0	8	0	0	1	3	12	0	0	0	0	2	2	4	25
6:45 AM	0	5	0	0	0	0	5	0	0	0	0	2	0	2	0	10	0	0	1	8	19	0	0	0	0	2	4	6	32
Total	1	12	0	0	0	0	13	0	0	0	0	7	2	9	0	26	0	0	2	15	43	0	0	0	0	5	7	12	77
7:00 AM	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	3	0	0	0	0	3	0	1	0	0	3	1	5	10
7:15 AM	0	6	0	0	0	0	6	0	0	0	0	2	1	3	0	7	1	0	0	6	14	0	0	0	0	0	0	0	23
7:30 AM	0	7	0	0	0	0	7	0	0	0	0	0	0	0	0	13	0	0	0	10	23	0	0	0	0	3	1	4	34
7:45 AM	0	5	0	0	0	0	5	0	0	0	0	0	0	0	0	12	0	0	2	6	20	0	0	0	0	2	5	7	32
Total	0	20	0	0	0	0	20	0	0	0	0	2	1	3	0	35	1	0	2	22	60	0	1	0	0	8	7	16	99
8:00 AM	0	9	0	0	0	0	9	0	0	0	0	7	3	10	0	15	0	0	8	24	47	3	0	0	0	1	2	6	72
8:15 AM	0	12	0	0	0	0	12	0	0	1	0	5	1	7	0	11	0	0	4	20	35	1	0	0	0	5	4	10	64
8:30 AM	0	13	0	0	0	0	13	1	0	0	0	4	6	11	0	14	0	0	3	18	35	1	0	0	0	3	1	5	64
8:45 AM	0	9	0	0	0	0	9	0	0	0	0	4	3	7	0	23	0	0	4	23	50	1	0	0	0	11	0	12	78
Total	0	43	0	0	0	0	43	1	0	1	0	20	13	35	0	63	0	0	19	85	167	6	0	0	0	20	7	33	278
Grand Total	1	75	0	0	0	0	76	1	0	1	0	29	16	47	0	124	1	0	23	122	270	6	1	0	0	33	21	61	454
Approach %	1.3	98.7	0.0	0.0	0.0	0.0		2.1	0.0	2.1	0.0	61.7	34.0		0.0	45.9	0.4	0.0	8.5	45.2		9.8	1.6	0.0	0.0	54.1	34.4		
Total %	0.2	16.5	0.0	0.0	0.0	0.0	16.7	0.2	0.0	0.2	0.0	6.4	3.5	10.4	0.0	27.3	0.2	0.0	5.1	26.9	59.5	1.3	0.2	0.0	0.0	7.3	4.6	13.4	
Exiting Leg Total							125							46							227							56	454

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

8:00 AM	JFK Street							Memorial Drive							JFK Street							Memorial Drive							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	0	9	0	0	0	0	9	0	0	0	0	7	3	10	0	15	0	0	8	24	47	3	0	0	0	1	2	6	72
8:15 AM	0	12	0	0	0	0	12	0	0	1	0	5	1	7	0	11	0	0	4	20	35	1	0	0	0	5	4	10	64
8:30 AM	0	13	0	0	0	0	13	1	0	0	0	4	6	11	0	14	0	0	3	18	35	1	0	0	0	3	1	5	64
8:45 AM	0	9	0	0	0	0	9	0	0	0	0	4	3	7	0	23	0	0	4	23	50	1	0	0	0	11	0	12	78
Total Volume	0	43	0	0	0	0	43	1	0	1	0	20	13	35	0	63	0	0	19	85	167	6	0	0	0	20	7	33	278
% Approach Total	0.0	100.0	0.0	0.0	0.0	0.0		2.9	0.0	2.9	0.0	57.1	37.1		0.0	37.7	0.0	0.0	11.4	50.9		18.2	0.0	0.0	0.0	60.6	21.2		
PHF	0.000	0.827	0.000	0.000	0.000	0.000	0.827	0.250	0.000	0.250	0.000	0.714	0.542	0.795	0.000	0.685	0.000	0.000	0.594	0.885	0.835	0.500	0.000	0.000	0.000	0.455	0.438	0.688	0.891
Entering Leg	0	43	0	0	0	0	43	1	0	1	0	20	13	35	0	63	0	0	19	85	167	6	0	0	0	20	7	33	278
Exiting Leg							64							33							154							27	278
Total							107							68							321							60	556

PDI File #: **186146 F**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **6:00 AM**
End Time: **9:00 AM**
Class:

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	JFK Street							Memorial Drive							JFK Street							Memorial Drive							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
6:00 AM	0	0	0	0	0	0	0	0	0	0	0	5	1	6	0	0	0	0	14	8	22	0	0	0	0	5	7	12	40
6:15 AM	0	0	0	0	0	0	0	0	0	0	0	8	7	15	0	0	0	0	5	11	16	0	0	0	0	2	4	6	37
6:30 AM	0	0	0	0	0	0	0	0	0	0	0	9	6	15	0	0	0	0	14	10	24	0	0	0	0	5	14	19	58
6:45 AM	0	0	0	0	0	0	0	0	0	0	0	19	7	26	0	0	0	0	19	12	31	0	0	0	0	10	8	18	75
Total	0	0	0	0	0	0	0	0	0	0	0	41	21	62	0	0	0	0	52	41	93	0	0	0	0	22	33	55	210
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	9	15	24	0	0	0	0	14	14	28	0	0	0	0	6	25	31	83
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	16	10	26	0	0	0	0	17	13	30	0	0	0	0	18	8	26	82
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	25	20	45	0	0	0	0	19	19	38	0	0	0	0	20	14	34	117
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	17	15	32	0	0	0	0	7	9	16	0	0	0	0	16	9	25	73
Total	0	0	0	0	0	0	0	0	0	0	0	67	60	127	0	0	0	0	57	55	112	0	0	0	0	60	56	116	355
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	27	13	40	0	0	0	0	7	8	15	0	0	0	0	18	13	31	86
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	37	17	54	0	0	0	0	7	12	19	0	0	0	0	26	15	41	114
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	27	12	39	0	0	0	0	11	5	16	0	0	0	0	27	20	47	102
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	40	39	79	0	0	0	0	20	12	32	0	0	0	0	24	23	47	158
Total	0	0	0	0	0	0	0	0	0	0	0	131	81	212	0	0	0	0	45	37	82	0	0	0	0	95	71	166	460
Grand Total	0	0	0	0	0	0	0	0	0	0	0	239	162	401	0	0	0	0	154	133	287	0	0	0	0	177	160	337	1025
Approach %	0	0	0	0	0	0		0	0	0	0	59.6	40.4		0	0	0	0	53.7	46.3		0	0	0	0	52.5	47.5		
Total %	0	0	0	0	0	0	0	0	0	0	0	23.3	15.8	39.1	0	0	0	0	15	13	28	0	0	0	0	17.3	15.6	32.9	
Exiting Leg Total							0							401							287							337	1025

Peak Hour Analysis from 06:00 AM to 09:00 AM begins at:

8:00 AM	JFK Street							Memorial Drive							JFK Street							Memorial Drive							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	27	13	40	0	0	0	0	7	8	15	0	0	0	0	18	13	31	86
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	37	17	54	0	0	0	0	7	12	19	0	0	0	0	26	15	41	114
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	27	12	39	0	0	0	0	11	5	16	0	0	0	0	27	20	47	102
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	40	39	79	0	0	0	0	20	12	32	0	0	0	0	24	23	47	158
Total Volume	0	0	0	0	0	0	0	0	0	0	0	131	81	212	0	0	0	0	45	37	82	0	0	0	0	95	71	166	460
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	61.8	38.2		0.0	0.0	0.0	0.0	54.9	45.1		0.0	0.0	0.0	0.0	57.2	42.8		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.819	0.519	0.671	0.000	0.000	0.000	0.000	0.563	0.771	0.641	0.000	0.000	0.000	0.000	0.880	0.772	0.883	0.728
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	131	81	212	0	0	0	0	45	37	82	0	0	0	0	95	71	166	460
Exiting Leg							0							212							82							166	460
Total							0							424							164							332	920

PDI File #:	**186146 FF**
Location:	**N: JFK Street S: JFK Street**
Location:	**E: Memorial Drive W: Memorial Drive**
City, State:	**Cambridge, MA**
Client:	**TetraTech/ S. Patangay**
Site Code:	**143-4522-14001.04**
Count Date:	**Thursday, May 3, 2018**
Start Time:	**4:00 PM**
End Time:	**7:00 PM**
Class:	

PRECISION
DATA
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars and Heavy Vehicles (Combined)

	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	1	54	0	0	55	19	209	0	0	228	63	143	0	0	206	76	131	2	0	209	698
4:15 PM	5	83	1	0	89	19	217	0	0	236	63	147	2	0	212	50	120	0	0	170	707
4:30 PM	8	60	0	0	68	23	232	0	0	255	60	161	3	0	224	63	163	0	0	226	773
4:45 PM	2	43	0	0	45	22	220	0	0	242	77	172	1	0	250	73	166	0	0	239	776
Total	16	240	1	0	257	83	878	0	0	961	263	623	6	0	892	262	580	2	0	844	2954
5:00 PM	3	60	0	0	63	27	236	0	0	263	83	139	2	0	224	69	195	0	0	264	814
5:15 PM	3	52	1	0	56	31	208	0	0	239	85	171	1	0	257	91	190	0	0	281	833
5:30 PM	2	63	1	0	66	32	210	0	0	242	93	116	3	0	212	71	207	0	0	278	798
5:45 PM	3	55	0	0	58	21	188	0	0	209	87	135	1	0	223	78	180	0	0	258	748
Total	11	230	2	0	243	111	842	0	0	953	348	561	7	0	916	309	772	0	0	1081	3193
6:00 PM	3	68	0	0	71	25	216	0	0	241	66	147	0	0	213	70	170	0	0	240	765
6:15 PM	7	58	0	0	65	25	212	0	0	237	63	146	0	0	209	69	185	0	0	254	765
6:30 PM	5	75	1	0	81	24	188	0	0	212	68	147	0	0	215	71	150	0	0	221	729
6:45 PM	4	72	1	0	77	28	157	0	0	185	53	142	0	0	195	62	126	1	0	189	646
Total	19	273	2	0	294	102	773	0	0	875	250	582	0	0	832	272	631	1	0	904	2905
Grand Total	46	743	5	0	794	296	2493	0	0	2789	861	1766	13	0	2640	843	1983	3	0	2829	9052
Approach %	5.8	93.6	0.6	0.0		10.6	89.4	0.0	0.0		32.6	66.9	0.5	0.0		29.8	70.1	0.1	0.0		
Total %	0.5	8.2	0.1	0.0	8.8	3.3	27.5	0.0	0.0	30.8	9.5	19.5	0.1	0.0	29.2	9.3	21.9	0.0	0.0	31.3	
Exiting Leg Total					2065					2849					1586					2552	9052
Cars	46	692	5	0	743	288	2478	0	0	2766	861	1688	13	0	2562	841	1975	3	0	2819	8890
% Cars	100.0	93.1	100.0	0.0	93.6	97.3	99.4	0.0	0.0	99.2	100.0	95.6	100.0	0.0	97.0	99.8	99.6	100.0	0.0	99.6	98.2
Exiting Leg Total					1979					2841					1533					2537	8890
Heavy Vehicles	0	51	0	0	51	8	15	0	0	23	0	78	0	0	78	2	8	0	0	10	162
% Heavy Vehicles	0.0	6.9	0.0	0.0	6.4	2.7	0.6	0.0	0.0	0.8	0.0	4.4	0.0	0.0	3.0	0.2	0.4	0.0	0.0	0.4	1.8
Exiting Leg Total					86					8					53					15	162

Peak Hour Analysis from 04:00 PM to 07:00 PM begins at:

4:45 PM	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:45 PM	2	43	0	0	45	22	220	0	0	242	77	172	1	0	250	73	166	0	0	239	776
5:00 PM	3	60	0	0	63	27	236	0	0	263	83	139	2	0	224	69	195	0	0	264	814
5:15 PM	3	52	1	0	56	31	208	0	0	239	85	171	1	0	257	91	190	0	0	281	833
5:30 PM	2	63	1	0	66	32	210	0	0	242	93	116	3	0	212	71	207	0	0	278	798
Total Volume	10	218	2	0	230	112	874	0	0	986	338	598	7	0	943	304	758	0	0	1062	3221
% Approach Total	4.3	94.8	0.9	0.0		11.4	88.6	0.0	0.0		35.8	63.4	0.7	0.0		28.6	71.4	0.0	0.0		
PHF	0.833	0.865	0.500	0.000	0.871	0.875	0.926	0.000	0.000	0.937	0.909	0.869	0.583	0.000	0.917	0.835	0.915	0.000	0.000	0.945	0.967
Cars	10	203	2	0	215	110	871	0	0	981	338	569	7	0	914	303	755	0	0	1058	3168
Cars %	100.0	93.1	100.0	0.0	93.5	98.2	99.7	0.0	0.0	99.5	100.0	95.2	100.0	0.0	96.9	99.7	99.6	0.0	0.0	99.6	98.4
Heavy Vehicles	0	15	0	0	15	2	3	0	0	5	0	29	0	0	29	1	3	0	0	4	53
Heavy Vehicles %	0.0	6.9	0.0	0.0	6.5	1.8	0.3	0.0	0.0	0.5	0.0	4.8	0.0	0.0	3.1	0.3	0.4	0.0	0.0	0.4	1.6
Cars Enter Leg	10	203	2	0	215	110	871	0	0	981	338	569	7	0	914	303	755	0	0	1058	3168
Heavy Enter Leg	0	15	0	0	15	2	3	0	0	5	0	29	0	0	29	1	3	0	0	4	53
Total Entering Leg	10	218	2	0	230	112	874	0	0	986	338	598	7	0	943	304	758	0	0	1062	3221
Cars Exiting Leg					679					1095					506					888	3168
Heavy Exiting Leg					31					3					16					3	53
Total Exiting Leg					710					1098					522					891	3221

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #:	**186146 FF**
Location:	**N: JFK Street S: JFK Street**
Location:	**E: Memorial Drive W: Memorial Drive**
City, State:	**Cambridge, MA**
Client:	**TetraTech/ S. Patangay**
Site Code:	**143-4522-14001.04**
Count Date:	**Thursday, May 3, 2018**
Start Time:	**4:00 PM**
End Time:	**7:00 PM**
Class:	

Cars-Combined (Motorcycles, Cars, Light Goods)

	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	1	49	0	0	50	17	205	0	0	222	63	136	0	0	199	76	131	2	0	209	680
4:15 PM	5	77	1	0	83	18	213	0	0	231	63	134	2	0	199	50	118	0	0	168	681
4:30 PM	8	56	0	0	64	23	232	0	0	255	60	155	3	0	218	63	161	0	0	224	761
4:45 PM	2	42	0	0	44	21	219	0	0	240	77	160	1	0	238	73	165	0	0	238	760
Total	16	224	1	0	241	79	869	0	0	948	263	585	6	0	854	262	575	2	0	839	2882
5:00 PM	3	55	0	0	58	27	236	0	0	263	83	134	2	0	219	69	194	0	0	263	803
5:15 PM	3	48	1	0	52	31	207	0	0	238	85	165	1	0	251	90	189	0	0	279	820
5:30 PM	2	58	1	0	61	31	209	0	0	240	93	110	3	0	206	71	207	0	0	278	785
5:45 PM	3	49	0	0	52	21	187	0	0	208	87	132	1	0	220	77	179	0	0	256	736
Total	11	210	2	0	223	110	839	0	0	949	348	541	7	0	896	307	769	0	0	1076	3144
6:00 PM	3	65	0	0	68	24	213	0	0	237	66	144	0	0	210	70	170	0	0	240	755
6:15 PM	7	54	0	0	61	24	212	0	0	236	63	139	0	0	202	69	185	0	0	254	753
6:30 PM	5	72	1	0	78	24	188	0	0	212	68	140	0	0	208	71	150	0	0	221	719
6:45 PM	4	67	1	0	72	27	157	0	0	184	53	139	0	0	192	62	126	1	0	189	637
Total	19	258	2	0	279	99	770	0	0	869	250	562	0	0	812	272	631	1	0	904	2864
Grand Total	46	692	5	0	743	288	2478	0	0	2766	861	1688	13	0	2562	841	1975	3	0	2819	8890
Approach %	6.2	93.1	0.7	0.0		10.4	89.6	0.0	0.0		33.6	65.9	0.5	0.0		29.8	70.1	0.1	0.0		
Total %	0.5	7.8	0.1	0.0	8.4	3.2	27.9	0.0	0.0	31.1	9.7	19.0	0.1	0.0	28.8	9.5	22.2	0.0	0.0	31.7	
Exiting Leg Total					1979					2841					1533					2537	8890

Peak Hour Analysis from 04:00 PM to 07:00 PM begins at:

4:45 PM	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:45 PM	2	42	0	0	44	21	219	0	0	240	77	160	1	0	238	73	165	0	0	238	760
5:00 PM	3	55	0	0	58	27	236	0	0	263	83	134	2	0	219	69	194	0	0	263	803
5:15 PM	3	48	1	0	52	31	207	0	0	238	85	165	1	0	251	90	189	0	0	279	820
5:30 PM	2	58	1	0	61	31	209	0	0	240	93	110	3	0	206	71	207	0	0	278	785
Total Volume	10	203	2	0	215	110	871	0	0	981	338	569	7	0	914	303	755	0	0	1058	3168
% Approach Total	4.7	94.4	0.9	0.0		11.2	88.8	0.0	0.0		37.0	62.3	0.8	0.0		28.6	71.4	0.0	0.0		
PHF	0.833	0.875	0.500	0.000	0.881	0.887	0.923	0.000	0.000	0.933	0.909	0.862	0.583	0.000	0.910	0.842	0.912	0.000	0.000	0.948	0.966
Entering Leg	10	203	2	0	215	110	871	0	0	981	338	569	7	0	914	303	755	0	0	1058	3168
Exiting Leg					679					1095					506					888	3168
Total					894					2076					1420					1946	6336

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: **186146 FF**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **4:00 PM**
End Time: **7:00 PM**
Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**

	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	5	0	0	5	2	4	0	0	6	0	7	0	0	7	0	0	0	0	0	18
4:15 PM	0	6	0	0	6	1	4	0	0	5	0	13	0	0	13	0	2	0	0	2	26
4:30 PM	0	4	0	0	4	0	0	0	0	0	0	6	0	0	6	0	2	0	0	2	12
4:45 PM	0	1	0	0	1	1	1	0	0	2	0	12	0	0	12	0	1	0	0	1	16
Total	0	16	0	0	16	4	9	0	0	13	0	38	0	0	38	0	5	0	0	5	72
5:00 PM	0	5	0	0	5	0	0	0	0	0	0	5	0	0	5	0	1	0	0	1	11
5:15 PM	0	4	0	0	4	0	1	0	0	1	0	6	0	0	6	1	1	0	0	2	13
5:30 PM	0	5	0	0	5	1	1	0	0	2	0	6	0	0	6	0	0	0	0	0	13
5:45 PM	0	6	0	0	6	0	1	0	0	1	0	3	0	0	3	1	1	0	0	2	12
Total	0	20	0	0	20	1	3	0	0	4	0	20	0	0	20	2	3	0	0	5	49
6:00 PM	0	3	0	0	3	1	3	0	0	4	0	3	0	0	3	0	0	0	0	0	10
6:15 PM	0	4	0	0	4	1	0	0	0	1	0	7	0	0	7	0	0	0	0	0	12
6:30 PM	0	3	0	0	3	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	10
6:45 PM	0	5	0	0	5	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	9
Total	0	15	0	0	15	3	3	0	0	6	0	20	0	0	20	0	0	0	0	0	41
Grand Total	0	51	0	0	51	8	15	0	0	23	0	78	0	0	78	2	8	0	0	10	162
Approach %	0.0	100.0	0.0	0.0		34.8	65.2	0.0	0.0		0.0	100.0	0.0	0.0		20.0	80.0	0.0	0.0		
Total %	0.0	31.5	0.0	0.0	31.5	4.9	9.3	0.0	0.0	14.2	0.0	48.1	0.0	0.0	48.1	1.2	4.9	0.0	0.0	6.2	
Exiting Leg Total					86					8					53					15	162
Buses	0	40	0	0	40	6	9	0	0	15	0	62	0	0	62	1	6	0	0	7	124
% Buses	0.0	78.4	0.0	0.0	78.4	75.0	60.0	0.0	0.0	65.2	0.0	79.5	0.0	0.0	79.5	50.0	75.0	0.0	0.0	70.0	76.5
Exiting Leg Total					68					6					41					9	124
Single-Unit Trucks	0	8	0	0	8	2	6	0	0	8	0	15	0	0	15	1	2	0	0	3	34
% Single-Unit	0.0	15.7	0.0	0.0	15.7	25.0	40.0	0.0	0.0	34.8	0.0	19.2	0.0	0.0	19.2	50.0	25.0	0.0	0.0	30.0	21.0
Exiting Leg Total					17					2					9					6	34
Articulated Trucks	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
% Articulated	0.0	5.9	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	2.5
Exiting Leg Total					1					0					3					0	4

Peak Hour Analysis from 04:00 PM to 07:00 PM begins at:

4:00 PM	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	5	0	0	5	2	4	0	0	6	0	7	0	0	7	0	0	0	0	0	18
4:15 PM	0	6	0	0	6	1	4	0	0	5	0	13	0	0	13	0	2	0	0	2	26
4:30 PM	0	4	0	0	4	0	0	0	0	0	0	6	0	0	6	0	2	0	0	2	12
4:45 PM	0	1	0	0	1	1	1	0	0	2	0	12	0	0	12	0	1	0	0	1	16
Total Volume	0	16	0	0	16	4	9	0	0	13	0	38	0	0	38	0	5	0	0	5	72
% Approach Total	0.0	100.0	0.0	0.0		30.8	69.2	0.0	0.0		0.0	100.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.000	0.667	0.000	0.000	0.667	0.500	0.563	0.000	0.000	0.542	0.000	0.731	0.000	0.000	0.731	0.000	0.625	0.000	0.000	0.625	0.692
Buses	0	12	0	0	12	3	6	0	0	9	0	27	0	0	27	0	4	0	0	4	52
Buses %	0.0	75.0	0.0	0.0	75.0	75.0	66.7	0.0	0.0	69.2	0.0	71.1	0.0	0.0	71.1	0.0	80.0	0.0	0.0	80.0	72.2
Single-Unit Trucks	0	3	0	0	3	1	3	0	0	4	0	11	0	0	11	0	1	0	0	1	19
Single-Unit %	0.0	18.8	0.0	0.0	18.8	25.0	33.3	0.0	0.0	30.8	0.0	28.9	0.0	0.0	28.9	0.0	20.0	0.0	0.0	20.0	26.4
Articulated Trucks	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Articulated %	0.0	6.3	0.0	0.0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4
Buses	0	12	0	0	12	3	6	0	0	9	0	27	0	0	27	0	4	0	0	4	52
Single-Unit Trucks	0	3	0	0	3	1	3	0	0	4	0	11	0	0	11	0	1	0	0	1	19
Articulated Trucks	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Entering Leg	0	16	0	0	16	4	9	0	0	13	0	38	0	0	38	0	5	0	0	5	72
Buses					30					4					12					6	52
Single-Unit Trucks					12					1					3					3	19
Articulated Trucks					0					0					1					0	1
Total Exiting Leg					42					5					16					9	72

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
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PDI File #: **186146 FF**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **4:00 PM**
End Time: **7:00 PM**
Class: **Cars**

	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	1	42	0	0	43	16	194	0	0	210	54	125	0	0	179	71	120	2	0	193	625
4:15 PM	5	74	1	0	80	15	197	0	0	212	60	126	2	0	188	48	113	0	0	161	641
4:30 PM	8	52	0	0	60	23	223	0	0	246	53	147	3	0	203	58	150	0	0	208	717
4:45 PM	2	40	0	0	42	21	213	0	0	234	72	157	1	0	230	69	163	0	0	232	738
Total	16	208	1	0	225	75	827	0	0	902	239	555	6	0	800	246	546	2	0	794	2721
5:00 PM	3	53	0	0	56	27	232	0	0	259	80	131	2	0	213	67	190	0	0	257	785
5:15 PM	3	43	1	0	47	30	204	0	0	234	84	158	1	0	243	86	182	0	0	268	792
5:30 PM	2	57	1	0	60	30	206	0	0	236	92	108	3	0	203	69	200	0	0	269	768
5:45 PM	3	49	0	0	52	20	180	0	0	200	85	129	1	0	215	77	173	0	0	250	717
Total	11	202	2	0	215	107	822	0	0	929	341	526	7	0	874	299	745	0	0	1044	3062
6:00 PM	3	62	0	0	65	22	211	0	0	233	65	139	0	0	204	68	167	0	0	235	737
6:15 PM	7	53	0	0	60	24	209	0	0	233	62	137	0	0	199	68	180	0	0	248	740
6:30 PM	5	68	1	0	74	24	178	0	0	202	68	133	0	0	201	68	147	0	0	215	692
6:45 PM	4	62	1	0	67	26	150	0	0	176	53	136	0	0	189	61	126	1	0	188	620
Total	19	245	2	0	266	96	748	0	0	844	248	545	0	0	793	265	620	1	0	886	2789
Grand Total	46	655	5	0	706	278	2397	0	0	2675	828	1626	13	0	2467	810	1911	3	0	2724	8572
Approach %	6.5	92.8	0.7	0.0		10.4	89.6	0.0	0.0		33.6	65.9	0.5	0.0		29.7	70.2	0.1	0.0		
Total %	0.5	7.6	0.1	0.0	8.2	3.2	28.0	0.0	0.0	31.2	9.7	19.0	0.2	0.0	28.8	9.4	22.3	0.0	0.0	31.8	
Exiting Leg Total					1907					2744					1465					2456	8572

Peak Hour Analysis from 04:00 PM to 07:00 PM begins at:

4:45 PM	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:45 PM	2	40	0	0	42	21	213	0	0	234	72	157	1	0	230	69	163	0	0	232	738
5:00 PM	3	53	0	0	56	27	232	0	0	259	80	131	2	0	213	67	190	0	0	257	785
5:15 PM	3	43	1	0	47	30	204	0	0	234	84	158	1	0	243	86	182	0	0	268	792
5:30 PM	2	57	1	0	60	30	206	0	0	236	92	108	3	0	203	69	200	0	0	269	768
Total Volume	10	193	2	0	205	108	855	0	0	963	328	554	7	0	889	291	735	0	0	1026	3083
% Approach Total	4.9	94.1	1.0	0.0		11.2	88.8	0.0	0.0		36.9	62.3	0.8	0.0		28.4	71.6	0.0	0.0		
PHF	0.833	0.846	0.500	0.000	0.854	0.900	0.921	0.000	0.000	0.930	0.891	0.877	0.583	0.000	0.915	0.846	0.919	0.000	0.000	0.954	0.973
Entering Leg	10	193	2	0	205	108	855	0	0	963	328	554	7	0	889	291	735	0	0	1026	3083
Exiting Leg					662					1065					484					872	3083
Total					867					2028					1373					1898	6166

PDI File #: **186146 FF**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **4:00 PM**
End Time: **7:00 PM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Light Goods Vehicle**

	JFK Street from North					Memorial Drive from East					JFK Street from South					Memorial Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	6	0	0	6	1	11	0	0	12	9	10	0	0	19	5	10	0	0	15	52
4:15 PM	0	2	0	0	2	3	15	0	0	18	3	8	0	0	11	2	5	0	0	7	38
4:30 PM	0	4	0	0	4	0	7	0	0	7	5	8	0	0	13	5	11	0	0	16	40
4:45 PM	0	2	0	0	2	0	4	0	0	4	5	3	0	0	8	4	2	0	0	6	20
Total	0	14	0	0	14	4	37	0	0	41	22	29	0	0	51	16	28	0	0	44	150
5:00 PM	0	1	0	0	1	0	4	0	0	4	3	3	0	0	6	2	4	0	0	6	17
5:15 PM	0	4	0	0	4	1	3	0	0	4	1	7	0	0	8	4	5	0	0	9	25
5:30 PM	0	1	0	0	1	1	2	0	0	3	1	2	0	0	3	2	6	0	0	8	15
5:45 PM	0	0	0	0	0	1	7	0	0	8	2	3	0	0	5	0	6	0	0	6	19
Total	0	6	0	0	6	3	16	0	0	19	7	15	0	0	22	8	21	0	0	29	76
6:00 PM	0	1	0	0	1	2	2	0	0	4	1	5	0	0	6	2	3	0	0	5	16
6:15 PM	0	1	0	0	1	0	2	0	0	2	1	1	0	0	2	1	4	0	0	5	10
6:30 PM	0	4	0	0	4	0	8	0	0	8	0	4	0	0	4	3	3	0	0	6	22
6:45 PM	0	4	0	0	4	1	6	0	0	7	0	2	0	0	2	1	0	0	0	1	14
Total	0	10	0	0	10	3	18	0	0	21	2	12	0	0	14	7	10	0	0	17	62
Grand Total	0	30	0	0	30	10	71	0	0	81	31	56	0	0	87	31	59	0	0	90	288
Approach %	0.0	100.0	0.0	0.0		12.3	87.7	0.0	0.0		35.6	64.4	0.0	0.0		34.4	65.6	0.0	0.0		
Total %	0.0	10.4	0.0	0.0	10.4	3.5	24.7	0.0	0.0	28.1	10.8	19.4	0.0	0.0	30.2	10.8	20.5	0.0	0.0	31.3	
Exiting Leg Total					66					90					61					71	288

Peak Hour Analysis from 04:00 PM to 07:00 PM begins at:

4:00 PM	JFK Street from North					Memorial Drive from East					JFK Street from South					Memorial Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	6	0	0	6	1	11	0	0	12	9	10	0	0	19	5	10	0	0	15	52
4:15 PM	0	2	0	0	2	3	15	0	0	18	3	8	0	0	11	2	5	0	0	7	38
4:30 PM	0	4	0	0	4	0	7	0	0	7	5	8	0	0	13	5	11	0	0	16	40
4:45 PM	0	2	0	0	2	0	4	0	0	4	5	3	0	0	8	4	2	0	0	6	20
Total Volume	0	14	0	0	14	4	37	0	0	41	22	29	0	0	51	16	28	0	0	44	150
% Approach Total	0.0	100.0	0.0	0.0		9.8	90.2	0.0	0.0		43.1	56.9	0.0	0.0		36.4	63.6	0.0	0.0		
PHF	0.000	0.583	0.000	0.000	0.583	0.333	0.617	0.000	0.000	0.569	0.611	0.725	0.000	0.000	0.671	0.800	0.636	0.000	0.000	0.688	0.721
Entering Leg	0	14	0	0	14	4	37	0	0	41	22	29	0	0	51	16	28	0	0	44	150
Exiting Leg					33					50					30					37	150
Total					47					91					81					81	300

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

PDI File #: **186146 FF**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **4:00 PM**
End Time: **7:00 PM**
Class: **Buses**

	JFK Street from North					Memorial Drive from East					JFK Street from South					Memorial Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	3	0	0	3	2	3	0	0	5	0	5	0	0	5	0	0	0	0	0	13
4:15 PM	0	4	0	0	4	1	2	0	0	3	0	11	0	0	11	0	1	0	0	1	19
4:30 PM	0	4	0	0	4	0	0	0	0	0	0	4	0	0	4	0	2	0	0	2	10
4:45 PM	0	1	0	0	1	0	1	0	0	1	0	7	0	0	7	0	1	0	0	1	10
Total	0	12	0	0	12	3	6	0	0	9	0	27	0	0	27	0	4	0	0	4	52
5:00 PM	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	0	1	0	0	1	8
5:15 PM	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	0	1	0	0	1	8
5:30 PM	0	3	0	0	3	0	1	0	0	1	0	6	0	0	6	0	0	0	0	0	10
5:45 PM	0	6	0	0	6	0	1	0	0	1	0	3	0	0	3	1	0	0	0	1	11
Total	0	15	0	0	15	0	2	0	0	2	0	17	0	0	17	1	2	0	0	3	37
6:00 PM	0	3	0	0	3	1	1	0	0	2	0	2	0	0	2	0	0	0	0	0	7
6:15 PM	0	2	0	0	2	1	0	0	0	1	0	7	0	0	7	0	0	0	0	0	10
6:30 PM	0	3	0	0	3	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	9
6:45 PM	0	5	0	0	5	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	9
Total	0	13	0	0	13	3	1	0	0	4	0	18	0	0	18	0	0	0	0	0	35
Grand Total	0	40	0	0	40	6	9	0	0	15	0	62	0	0	62	1	6	0	0	7	124
Approach %	0.0	100.0	0.0	0.0		40.0	60.0	0.0	0.0		0.0	100.0	0.0	0.0		14.3	85.7	0.0	0.0		
Total %	0.0	32.3	0.0	0.0	32.3	4.8	7.3	0.0	0.0	12.1	0.0	50.0	0.0	0.0	50.0	0.8	4.8	0.0	0.0	5.6	
Exiting Leg Total					68					6					41					9	124

Peak Hour Analysis from 04:00 PM to 07:00 PM begins at:

4:00 PM

	JFK Street from North					Memorial Drive from East					JFK Street from South					Memorial Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	3	0	0	3	2	3	0	0	5	0	5	0	0	5	0	0	0	0	0	13
4:15 PM	0	4	0	0	4	1	2	0	0	3	0	11	0	0	11	0	1	0	0	1	19
4:30 PM	0	4	0	0	4	0	0	0	0	0	0	4	0	0	4	0	2	0	0	2	10
4:45 PM	0	1	0	0	1	0	1	0	0	1	0	7	0	0	7	0	1	0	0	1	10
Total Volume	0	12	0	0	12	3	6	0	0	9	0	27	0	0	27	0	4	0	0	4	52
% Approach Total	0.0	100.0	0.0	0.0		33.3	66.7	0.0	0.0		0.0	100.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.000	0.750	0.000	0.000	0.750	0.375	0.500	0.000	0.000	0.450	0.000	0.614	0.000	0.000	0.614	0.000	0.500	0.000	0.000	0.500	0.684
Entering Leg	0	12	0	0	12	3	6	0	0	9	0	27	0	0	27	0	4	0	0	4	52
Exiting Leg					30					4					12					6	52
Total					42					13					39					10	104

PDI File #:	**186146 FF**
Location:	**N: JFK Street S: JFK Street**
Location:	**E: Memorial Drive W: Memorial Drive**
City, State:	**Cambridge, MA**
Client:	**TetraTech/ S. Patangay**
Site Code:	**143-4522-14001.04**
Count Date:	**Thursday, May 3, 2018**
Start Time:	**4:00 PM**
End Time:	**7:00 PM**
Class:	

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Single-Unit Trucks

	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	1	0	0	1	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	4
4:15 PM	0	2	0	0	2	0	2	0	0	2	0	2	0	0	2	0	1	0	0	1	7
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
4:45 PM	0	0	0	0	0	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	6
Total	0	3	0	0	3	1	3	0	0	4	0	11	0	0	11	0	1	0	0	1	19
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	1	0	0	1	0	1	0	0	1	0	2	0	0	2	1	0	0	0	1	5
5:30 PM	0	2	0	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	4	0	0	4	1	1	0	0	2	0	2	0	0	2	1	1	0	0	2	10
6:00 PM	0	0	0	0	0	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	3
6:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	2	0	0	2	0	2	0	0	2	0	0	0	0	0	5
Grand Total	0	8	0	0	8	2	6	0	0	8	0	15	0	0	15	1	2	0	0	3	34
Approach %	0.0	100.0	0.0	0.0		25.0	75.0	0.0	0.0		0.0	100.0	0.0	0.0		33.3	66.7	0.0	0.0		
Total %	0.0	23.5	0.0	0.0	23.5	5.9	17.6	0.0	0.0	23.5	0.0	44.1	0.0	0.0	44.1	2.9	5.9	0.0	0.0	8.8	
Exiting Leg Total					17					2					9					6	34

Peak Hour Analysis from 04:00 PM to 07:00 PM begins at:

4:00 PM	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	1	0	0	1	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	4
4:15 PM	0	2	0	0	2	0	2	0	0	2	0	2	0	0	2	0	1	0	0	1	7
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
4:45 PM	0	0	0	0	0	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	6
Total Volume	0	3	0	0	3	1	3	0	0	4	0	11	0	0	11	0	1	0	0	1	19
% Approach Total	0.0	100.0	0.0	0.0		25.0	75.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	100.0	0.0	0.0		
PHF	0.000	0.375	0.000	0.000	0.375	0.250	0.375	0.000	0.000	0.500	0.000	0.550	0.000	0.000	0.550	0.000	0.250	0.000	0.000	0.250	0.679
Entering Leg	0	3	0	0	3	1	3	0	0	4	0	11	0	0	11	0	1	0	0	1	19
Exiting Leg					12					1					3					3	19
Total					15					5					14					4	38

PDI File #: **186146 FF**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **4:00 PM**
End Time: **7:00 PM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Articulated Trucks**

	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Grand Total	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
Approach %	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	75.0	0.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total					1					0					3					0	4

Peak Hour Analysis from 04:00 PM to 07:00 PM begins at:

4:15 PM	JFK Street					Memorial Drive					JFK Street					Memorial Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Total Volume	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
% Approach Total	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.250
Entering Leg	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Exiting Leg					1					0					1					0	2
Total					2					0					2					0	4

PDI File #: **186146 FF**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **4:00 PM**
End Time: **7:00 PM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Bicycles (on Roadway and Crosswalks)**

	JFK Street							Memorial Drive							JFK Street							Memorial Drive							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	3	0	0	0	0	3	0	0	0	0	1	2	3	0	2	0	0	2	1	5	2	0	0	0	5	1	8	19
4:15 PM	0	4	0	0	0	0	4	0	0	0	0	1	0	1	0	7	1	0	6	1	15	0	0	0	0	2	4	6	26
4:30 PM	0	12	0	0	0	0	12	0	0	0	0	1	3	4	0	11	0	0	5	3	19	1	0	0	0	1	0	2	37
4:45 PM	1	8	0	0	0	0	9	0	0	0	0	0	5	5	0	8	1	0	11	1	21	6	0	0	0	3	0	9	44
Total	1	27	0	0	0	0	28	0	0	0	0	3	10	13	0	28	2	0	24	6	60	9	0	0	0	11	5	25	126
5:00 PM	0	13	0	0	0	0	13	0	0	0	0	2	0	2	0	17	0	0	13	3	33	0	0	0	0	2	3	5	53
5:15 PM	0	16	0	0	0	0	16	0	0	0	0	2	4	6	0	18	0	0	15	6	39	0	0	0	0	5	4	9	70
5:30 PM	0	16	0	0	0	0	16	0	0	0	0	1	1	2	0	10	1	0	9	8	28	0	0	0	0	2	1	3	49
5:45 PM	0	12	0	0	0	0	12	0	0	0	0	3	2	5	0	16	0	0	22	12	50	0	0	0	0	7	6	13	80
Total	0	57	0	0	0	0	57	0	0	0	0	8	7	15	0	61	1	0	59	29	150	0	0	0	0	16	14	30	252
6:00 PM	1	12	0	0	0	0	13	0	1	0	0	0	2	3	0	13	0	0	20	6	39	0	0	0	0	1	3	4	59
6:15 PM	0	7	0	0	0	0	7	0	1	0	0	0	0	1	0	13	0	0	11	6	30	0	0	0	0	3	0	3	41
6:30 PM	0	12	0	0	0	0	12	0	0	0	0	0	3	3	0	17	0	0	14	5	36	0	0	0	0	4	3	7	58
6:45 PM	0	8	0	0	0	0	8	0	0	0	0	1	1	2	0	16	0	0	8	8	32	0	0	0	0	4	2	6	48
Total	1	39	0	0	0	0	40	0	2	0	0	1	6	9	0	59	0	0	53	25	137	0	0	0	0	12	8	20	206
Grand Total	2	123	0	0	0	0	125	0	2	0	0	12	23	37	0	148	3	0	136	60	347	9	0	0	0	39	27	75	584
Approach %	1.6	98.4	0.0	0.0	0.0	0.0		0.0	5.4	0.0	0.0	32.4	62.2		0.0	42.7	0.9	0.0	39.2	17.3		12.0	0.0	0.0	0.0	52.0	36.0		
Total %	0.3	21.1	0.0	0.0	0.0	0.0	21.4	0.0	0.3	0.0	0.0	2.1	3.9	6.3	0.0	25.3	0.5	0.0	23.3	10.3	59.4	1.5	0.0	0.0	0.0	6.7	4.6	12.8	
Exiting Leg Total							148							35							328							73	584

Peak Hour Analysis from 04:00 PM to 07:00 PM begins at:

5:15 PM	JFK Street							Memorial Drive							JFK Street							Memorial Drive							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:15 PM	0	16	0	0	0	0	16	0	0	0	0	2	4	6	0	18	0	0	15	6	39	0	0	0	0	5	4	9	70
5:30 PM	0	16	0	0	0	0	16	0	0	0	0	1	1	2	0	10	1	0	9	8	28	0	0	0	0	2	1	3	49
5:45 PM	0	12	0	0	0	0	12	0	0	0	0	3	2	5	0	16	0	0	22	12	50	0	0	0	0	7	6	13	80
6:00 PM	1	12	0	0	0	0	13	0	1	0	0	0	2	3	0	13	0	0	20	6	39	0	0	0	0	1	3	4	59
Total Volume	1	56	0	0	0	0	57	0	1	0	0	6	9	16	0	57	1	0	66	32	156	0	0	0	0	15	14	29	258
% Approach Total	1.8	98.2	0.0	0.0	0.0	0.0		0.0	6.3	0.0	0.0	37.5	56.3		0.0	36.5	0.6	0.0	42.3	20.5		0.0	0.0	0.0	0.0	51.7	48.3		
PHF	0.250	0.875	0.000	0.000	0.000	0.000	0.891	0.000	0.250	0.000	0.000	0.500	0.563	0.667	0.000	0.792	0.250	0.000	0.750	0.667	0.780	0.000	0.000	0.000	0.000	0.536	0.583	0.558	0.806
Entering Leg	1	56	0	0	0	0	57	0	1	0	0	6	9	16	0	57	1	0	66	32	156	0	0	0	0	15	14	29	258
Exiting Leg							57							15							154							32	258
Total							114							31							310							61	516

PDI File #: **186146 FF**
Location: **N: JFK Street S: JFK Street**
Location: **E: Memorial Drive W: Memorial Drive**
City, State: **Cambridge, MA**
Client: **TetraTech/ S. Patangay**
Site Code: **143-4522-14001.04**
Count Date: **Thursday, May 3, 2018**
Start Time: **4:00 PM**
End Time: **7:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Pedestrians

	JFK Street							Memorial Drive							JFK Street							Memorial Drive							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	19	22	41	0	0	0	0	13	10	23	0	0	0	0	14	22	36	100
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	22	37	59	0	0	0	0	11	7	18	0	0	0	0	12	30	42	119
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	31	37	68	0	0	0	0	12	8	20	0	0	0	0	16	21	37	125
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	30	36	66	0	0	0	0	13	16	29	0	0	0	0	22	32	54	149
Total	0	0	0	0	0	0	0	0	0	0	0	102	132	234	0	0	0	0	49	41	90	0	0	0	0	64	105	169	493
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	42	69	111	0	0	0	0	14	9	23	0	0	0	0	26	51	77	211
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	27	51	78	0	0	0	0	19	18	37	0	0	0	0	31	44	75	190
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	34	50	84	0	0	0	0	6	17	23	0	0	0	0	36	39	75	182
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	35	42	77	0	0	0	0	26	8	34	0	0	0	0	44	60	104	215
Total	0	0	0	0	0	0	0	0	0	0	0	138	212	350	0	0	0	0	65	52	117	0	0	0	0	137	194	331	798
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	37	46	83	0	0	0	0	12	12	24	0	0	0	0	14	36	50	157
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	40	52	92	0	0	0	0	17	17	34	0	0	0	0	28	49	77	203
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	44	52	96	0	0	0	0	25	30	55	0	0	0	0	30	36	66	217
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	47	53	100	0	0	0	0	19	21	40	0	0	0	0	24	34	58	198
Total	0	0	0	0	0	0	0	0	0	0	0	168	203	371	0	0	0	0	73	80	153	0	0	0	0	96	155	251	775
Grand Total	0	0	0	0	0	0	0	0	0	0	0	408	547	955	0	0	0	0	187	173	360	0	0	0	0	297	454	751	2066
Approach %	0	0	0	0	0	0		0	0	0	0	42.7	57.3		0	0	0	0	51.9	48.1		0	0	0	0	39.5	60.5		
Total %	0	0	0	0	0	0	0	0	0	0	0	19.7	26.5	46.2	0	0	0	0	9.05	8.37	17.4	0	0	0	0	14.4	22	36.4	
Exiting Leg Total							0							955							360							751	2066

Peak Hour Analysis from 04:00 PM to 07:00 PM begins at:

5:00 PM

	JFK Street							Memorial Drive							JFK Street							Memorial Drive							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	42	69	111	0	0	0	0	14	9	23	0	0	0	0	26	51	77	211
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	27	51	78	0	0	0	0	19	18	37	0	0	0	0	31	44	75	190
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	34	50	84	0	0	0	0	6	17	23	0	0	0	0	36	39	75	182
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	35	42	77	0	0	0	0	26	8	34	0	0	0	0	44	60	104	215
Total Volume	0	0	0	0	0	0	0	0	0	0	0	138	212	350	0	0	0	0	65	52	117	0	0	0	0	137	194	331	798
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	39.4	60.6		0.0	0.0	0.0	0.0	55.6	44.4		0.0	0.0	0.0	0.0	41.4	58.6		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.821	0.768	0.788	0.000	0.000	0.000	0.000	0.625	0.722	0.791	0.000	0.000	0.000	0.000	0.778	0.808	0.796	0.928
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	138	212	350	0	0	0	0	65	52	117	0	0	0	0	137	194	331	798
Exiting Leg							0							350							117							331	798
Total							0							700							234							662	1596

Accurate Counts

978-664-2565

N/S Street : Memorial Drive
E/W Street: River Street
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260013
Site Code : 17260013
Start Date : 4/11/2018
Page No : 1

Groups Printed- Cars - Trucks

	Memorial Dr From North			River St From East			Memorial Dr From South			River St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	21	195	0	0	0	0	0	137	12	42	182	158	747
07:15 AM	10	183	0	0	0	0	0	176	12	28	190	155	754
07:30 AM	14	234	0	0	0	0	0	165	15	42	233	163	866
07:45 AM	23	222	0	0	0	0	0	183	16	50	233	173	900
Total	68	834	0	0	0	0	0	661	55	162	838	649	3267
08:00 AM	19	199	0	0	0	0	0	176	14	53	222	191	874
08:15 AM	15	224	0	0	0	0	0	186	25	38	190	194	872
08:30 AM	18	202	0	0	0	0	0	140	24	44	185	203	816
08:45 AM	24	240	0	0	0	0	0	151	27	38	163	141	784
Total	76	865	0	0	0	0	0	653	90	173	760	729	3346
Grand Total	144	1699	0	0	0	0	0	1314	145	335	1598	1378	6613
Apprch %	7.8	92.2	0	0	0	0	0	90.1	9.9	10.1	48.3	41.6	
Total %	2.2	25.7	0	0	0	0	0	19.9	2.2	5.1	24.2	20.8	
Cars	144	1696	0	0	0	0	0	1314	145	332	1552	1378	6561
% Cars	100	99.8	0	0	0	0	0	100	100	99.1	97.1	100	99.2
Trucks	0	3	0	0	0	0	0	0	0	3	46	0	52
% Trucks	0	0.2	0	0	0	0	0	0	0	0.9	2.9	0	0.8

Accurate Counts

978-664-2565

N/S Street : Memorial Drive
E/W Street: River Street
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260013
Site Code : 17260013
Start Date : 4/11/2018

	Memorial Dr From North				River St From East				Memorial Dr From South				River St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	14	**234**	0	**248**	0	0	0	0	0	165	15	180	42	**233**	163	438	866
07:45 AM	**23**	222	0	245	0	0	0	0	0	183	16	199	50	233	173	456	**900**
08:00 AM	19	199	0	218	0	0	0	0	0	176	14	190	**53**	222	191	**466**	874
08:15 AM	15	224	0	239	0	0	0	0	0	**186**	**25**	**211**	38	190	**194**	422	872
Total Volume	71	879	0	950	0	0	0	0	0	710	70	780	183	878	721	1782	3512
% App. Total	7.5	92.5	0		0	0	0		0	91	9		10.3	49.3	40.5		
PHF	.772	.939	.000	.958	.000	.000	.000	.000	.000	.954	.700	.924	.863	.942	.929	.956	.976
Cars	71	877	0	948	0	0	0	0	0	710	70	780	182	853	721	1756	3484
% Cars	100	99.8	0	99.8	0	0	0	0	0	100	100	100	99.5	97.2	100	98.5	99.2
Trucks	0	2	0	2	0	0	0	0	0	0	0	0	1	25	0	26	28
% Trucks	0	0.2	0	0.2	0	0	0	0	0	0	0	0	0.5	2.8	0	1.5	0.8

Accurate Counts

978-664-2565

N/S Street : Memorial Drive
E/W Street: River Street
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260013
Site Code : 17260013
Start Date : 4/11/2018
Page No : 13

Groups Printed- Bikes Peds

	Memorial Dr From North				River St From East				Memorial Dr From South				River St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	6	0	1	0	0	0	0	0	2	0	2	0	0	0	23	26	8	34
07:15 AM	0	5	0	2	0	0	0	1	0	3	0	3	0	5	0	15	21	13	34
07:30 AM	0	8	0	1	0	2	0	1	0	4	0	7	0	4	0	21	30	18	48
07:45 AM	1	11	0	1	0	0	0	0	0	1	0	6	0	2	0	12	19	15	34
Total	1	30	0	5	0	2	0	2	0	10	0	18	0	11	0	71	96	54	150
08:00 AM	0	16	0	2	0	1	0	2	0	6	0	3	1	2	0	28	35	26	61
08:15 AM	0	13	0	2	0	0	0	2	0	5	0	1	0	7	0	14	19	25	44
08:30 AM	0	12	0	3	0	0	0	4	0	2	0	6	2	6	0	22	35	22	57
08:45 AM	0	10	0	4	0	1	0	0	0	0	0	11	0	3	0	16	31	14	45
Total	0	51	0	11	0	2	0	8	0	13	0	21	3	18	0	80	120	87	207
Grand Total	1	81	0	16	0	4	0	10	0	23	0	39	3	29	0	151	216	141	357
Apprch %	1.2	98.8	0		0	100	0		0	100	0		9.4	90.6	0				
Total %	0.7	57.4	0		0	2.8	0		0	16.3	0		2.1	20.6	0		60.5	39.5	

Accurate Counts

978-664-2565

N/S Street : Memorial Drive
E/W Street: River Street
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260013
Site Code : 17260013
Start Date : 4/11/2018

	Memorial Dr From North				River St From East				Memorial Dr From South				River St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	**1**	11	0	12	0	0	0	0	0	1	0	1	0	2	0	2	15
08:00 AM	0	**16**	0	**16**	0	**1**	0	**1**	0	**6**	0	**6**	1	2	0	3	**26**
08:15 AM	0	13	0	13	0	0	0	0	0	5	0	5	0	**7**	0	7	25
08:30 AM	0	12	0	12	0	0	0	0	0	2	0	2	**2**	6	0	**8**	22
Total Volume	1	52	0	53	0	1	0	1	0	14	0	14	3	17	0	20	88
% App. Total	1.9	98.1	0		0	100	0		0	100	0		15	85	0		
PHF	.250	.813	.000	.828	.000	.250	.000	.250	.000	.583	.000	.583	.375	.607	.000	.625	.846

Accurate Counts
978-664-2565

N/S Street : Memorial Drive
E/W Street: River Street
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260013
Site Code : 17260013
Start Date : 4/11/2018
Page No : 1

Groups Printed- Cars - Trucks

	Memorial Dr From North			River St From East			Memorial Dr From South			River St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	11	137	0	0	0	0	0	217	18	59	164	119	725
04:15 PM	14	133	0	0	0	0	0	213	7	72	184	141	764
04:30 PM	21	170	0	0	0	0	0	226	6	75	144	111	753
04:45 PM	19	166	0	0	0	0	0	221	10	54	200	126	796
Total	65	606	0	0	0	0	0	877	41	260	692	497	3038
05:00 PM	20	189	0	0	0	0	0	196	10	56	199	111	781
05:15 PM	19	160	0	0	0	0	0	210	8	63	172	100	732
05:30 PM	15	113	0	0	0	0	0	169	12	70	183	116	678
05:45 PM	15	173	1	0	0	0	0	197	12	35	139	121	693
Total	69	635	1	0	0	0	0	772	42	224	693	448	2884
Grand Total	134	1241	1	0	0	0	0	1649	83	484	1385	945	5922
Apprch %	9.7	90.2	0.1	0	0	0	0	95.2	4.8	17.2	49.2	33.6	
Total %	2.3	21	0	0	0	0	0	27.8	1.4	8.2	23.4	16	
Cars	134	1240	1	0	0	0	0	1649	83	484	1358	943	5892
% Cars	100	99.9	100	0	0	0	0	100	100	100	98.1	99.8	99.5
Trucks	0	1	0	0	0	0	0	0	0	0	27	2	30
% Trucks	0	0.1	0	0	0	0	0	0	0	0	1.9	0.2	0.5

Accurate Counts

978-664-2565

N/S Street : Memorial Drive
E/W Street: River Street
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260013
Site Code : 17260013
Start Date : 4/11/2018
Page No : 2

	Memorial Dr From North				River St From East				Memorial Dr From South				River St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	14	133	0	147	0	0	0	0	0	213	7	220	72	184	**141**	**397**	764
04:30 PM	**21**	170	0	191	0	0	0	0	0	**226**	6	**232**	**75**	144	111	330	753
04:45 PM	19	166	0	185	0	0	0	0	0	221	**10**	231	54	**200**	126	380	**796**
05:00 PM	20	**189**	0	**209**	0	0	0	0	0	196	10	206	56	199	111	366	781
Total Volume	74	658	0	732	0	0	0	0	0	856	33	889	257	727	489	1473	3094
% App. Total	10.1	89.9	0		0	0	0		0	96.3	3.7		17.4	49.4	33.2		
PHF	.881	.870	.000	.876	.000	.000	.000	.000	.000	.947	.825	.958	.857	.909	.867	.928	.972
Cars	74	657	0	731	0	0	0	0	0	856	33	889	257	713	489	1459	3079
% Cars	100	99.8	0	99.9	0	0	0	0	0	100	100	100	100	98.1	100	99.0	99.5
Trucks	0	1	0	1	0	0	0	0	0	0	0	0	0	14	0	14	15
% Trucks	0	0.2	0	0.1	0	0	0	0	0	0	0	0	0	1.9	0	1.0	0.5

Accurate Counts

978-664-2565

N/S Street : Memorial Drive
E/W Street: River Street
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260013
Site Code : 17260013
Start Date : 4/11/2018
Page No : 13

Groups Printed- Bikes Peds

	Memorial Dr From North				River St From East				Memorial Dr From South				River St From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	4	0	2	0	0	0	2	0	1	0	8	0	3	0	12	24	8	32
04:15 PM	0	4	0	4	0	0	0	3	0	1	0	3	0	1	0	13	23	6	29
04:30 PM	0	5	0	0	0	2	0	0	0	7	0	3	0	5	0	19	22	19	41
04:45 PM	0	0	0	4	0	0	1	3	0	4	0	2	0	2	0	24	33	7	40
Total	0	13	0	10	0	2	1	8	0	13	0	16	0	11	0	68	102	40	142
05:00 PM	0	2	0	2	0	1	0	0	0	4	0	11	0	2	0	27	40	9	49
05:15 PM	0	2	0	5	0	0	0	0	0	6	0	12	0	0	0	28	45	8	53
05:30 PM	0	4	0	4	0	0	0	2	0	6	0	10	0	4	0	50	66	14	80
05:45 PM	0	3	0	9	0	0	0	8	0	4	0	10	0	6	0	57	84	13	97
Total	0	11	0	20	0	1	0	10	0	20	0	43	0	12	0	162	235	44	279
Grand Total	0	24	0	30	0	3	1	18	0	33	0	59	0	23	0	230	337	84	421
Apprch %	0	100	0		0	75	25		0	100	0		0	100	0				
Total %	0	28.6	0		0	3.6	1.2		0	39.3	0		0	27.4	0		80	20	

Accurate Counts
978-664-2565

N/S Street : Memorial Drive
E/W Street: River Street
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260013
Site Code : 17260013
Start Date : 4/11/2018

	Memorial Dr From North				River St From East				Memorial Dr From South				River St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	2	0	2	0	**1**	0	**1**	0	4	0	4	0	2	0	2	9
05:15 PM	0	2	0	2	0	0	0	0	0	**6**	0	**6**	0	0	0	0	8
05:30 PM	0	**4**	0	**4**	0	0	0	0	0	6	0	6	0	4	0	4	**14**
05:45 PM	0	3	0	3	0	0	0	0	0	4	0	4	0	**6**	0	**6**	13
Total Volume	0	11	0	11	0	1	0	1	0	20	0	20	0	12	0	12	44
% App. Total	0	100	0		0	100	0		0	100	0		0	100	0		
PHF	.000	.688	.000	.688	.000	.250	.000	.250	.000	.833	.000	.833	.000	.500	.000	.500	.786

Accurate Counts
978-664-2565

N/S Street : Memorial Drive
E/W Street: Western Avenue
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260011
Site Code : 17260011
Start Date : 4/11/2018
Page No : 1

Groups Printed- Cars - Trucks

	Memorial Dr From North			Western Ave From East			Memorial Dr From South			Western Ave From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	177	66	24	180	25	46	127	0	0	0	0	645
07:15 AM	0	190	57	17	218	26	72	112	0	0	0	0	692
07:30 AM	0	240	78	22	207	26	74	150	0	0	0	0	797
07:45 AM	0	216	68	29	221	28	74	138	0	0	0	0	774
Total	0	823	269	92	826	105	266	527	0	0	0	0	2908
08:00 AM	0	228	52	28	221	25	96	151	0	0	0	0	801
08:15 AM	0	198	45	25	241	24	80	136	0	0	0	0	749
08:30 AM	0	208	56	29	236	30	75	115	0	0	0	0	749
08:45 AM	0	251	53	25	177	25	64	116	0	0	0	0	711
Total	0	885	206	107	875	104	315	518	0	0	0	0	3010
Grand Total	0	1708	475	199	1701	209	581	1045	0	0	0	0	5918
Apprch %	0	78.2	21.8	9.4	80.7	9.9	35.7	64.3	0	0	0	0	
Total %	0	28.9	8	3.4	28.7	3.5	9.8	17.7	0	0	0	0	
Cars	0	1707	466	197	1656	209	581	1041	0	0	0	0	5857
% Cars	0	99.9	98.1	99	97.4	100	100	99.6	0	0	0	0	99
Trucks	0	1	9	2	45	0	0	4	0	0	0	0	61
% Trucks	0	0.1	1.9	1	2.6	0	0	0.4	0	0	0	0	1

Accurate Counts

978-664-2565

N/S Street : Memorial Drive
E/W Street: Western Avenue
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260011
Site Code : 17260011
Start Date : 4/11/2018
Page No : 2

	Memorial Dr From North				Western Ave From East				Memorial Dr From South				Western Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	**240**	**78**	**318**	22	207	26	255	74	150	0	224	0	0	0	0	797
07:45 AM	0	216	68	284	**29**	221	**28**	278	74	138	0	212	0	0	0	0	774
08:00 AM	0	228	52	280	28	221	25	274	**96**	**151**	0	**247**	0	0	0	0	**801**
08:15 AM	0	198	45	243	25	**241**	24	**290**	80	136	0	216	0	0	0	0	749
Total Volume	0	882	243	1125	104	890	103	1097	324	575	0	899	0	0	0	0	3121
% App. Total	0	78.4	21.6		9.5	81.1	9.4		36	64	0		0	0	0		
PHF	.000	.919	.779	.884	.897	.923	.920	.946	.844	.952	.000	.910	.000	.000	.000	.000	.974
Cars	0	881	240	1121	103	859	103	1065	324	573	0	897	0	0	0	0	3083
% Cars	0	99.9	98.8	99.6	99.0	96.5	100	97.1	100	99.7	0	99.8	0	0	0	0	98.8
Trucks	0	1	3	4	1	31	0	32	0	2	0	2	0	0	0	0	38
% Trucks	0	0.1	1.2	0.4	1.0	3.5	0	2.9	0	0.3	0	0.2	0	0	0	0	1.2

Accurate Counts

978-664-2565

N/S Street : Memorial Drive
E/W Street: Western Avenue
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260011
Site Code : 17260011
Start Date : 4/11/2018
Page No : 13

Groups Printed- Bikes Peds

	Memorial Dr From North				Western Ave From East				Memorial Dr From South				Western Ave From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	5	0	12	0	4	0	1	0	3	0	1	0	0	0	19	33	12	45
07:15 AM	0	6	0	9	0	3	0	3	0	3	0	0	0	0	0	16	28	12	40
07:30 AM	0	9	0	9	1	3	0	5	0	4	0	2	0	1	0	18	34	18	52
07:45 AM	0	11	0	20	0	5	0	1	0	2	0	1	0	0	0	23	45	18	63
Total	0	31	0	50	1	15	0	10	0	12	0	4	0	1	0	76	140	60	200
08:00 AM	0	14	0	19	0	9	0	7	0	7	1	2	0	1	0	11	39	32	71
08:15 AM	0	14	0	21	0	8	0	11	0	4	0	0	0	1	0	13	45	27	72
08:30 AM	0	24	0	19	0	9	0	6	1	7	0	0	0	0	0	20	45	41	86
08:45 AM	0	17	0	27	0	9	0	8	0	10	0	1	0	1	0	13	49	37	86
Total	0	69	0	86	0	35	0	32	1	28	1	3	0	3	0	57	178	137	315
Grand Total	0	100	0	136	1	50	0	42	1	40	1	7	0	4	0	133	318	197	515
Apprch %	0	100	0		2	98	0		2.4	95.2	2.4		0	100	0				
Total %	0	50.8	0		0.5	25.4	0		0.5	20.3	0.5		0	2	0		61.7	38.3	

Accurate Counts
978-664-2565

N/S Street : Memorial Drive
E/W Street: Western Avenue
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260011
Site Code : 17260011
Start Date : 4/11/2018
Page No : 14

	Memorial Dr From North				Western Ave From East				Memorial Dr From South				Western Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	14	0	14	0	**9**	0	**9**	0	7	**1**	8	0	**1**	0	**1**	32
08:15 AM	0	14	0	14	0	8	0	8	0	4	0	4	0	1	0	1	27
08:30 AM	0	**24**	0	**24**	0	9	0	9	**1**	7	0	8	0	0	0	0	**41**
08:45 AM	0	17	0	17	0	9	0	9	0	**10**	0	**10**	0	1	0	1	37
Total Volume	0	69	0	69	0	35	0	35	1	28	1	30	0	3	0	3	137
% App. Total	0	100	0		0	100	0		3.3	93.3	3.3		0	100	0		
PHF	.000	.719	.000	.719	.000	.972	.000	.972	.250	.700	.250	.750	.000	.750	.000	.750	.835

Accurate Counts

978-664-2565

N/S Street : Memorial Drive
E/W Street: Western Avenue
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260011
Site Code : 17260011
Start Date : 4/11/2018
Page No : 1

Groups Printed- Cars - Trucks

	Memorial Dr From North			Western Ave From East			Memorial Dr From South			Western Ave From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	0	135	90	17	243	26	111	158	0	0	0	0	780
04:15 PM	0	152	83	21	286	31	97	183	0	0	0	0	853
04:30 PM	0	142	63	28	265	25	124	171	0	0	0	0	818
04:45 PM	0	179	88	23	237	38	116	173	0	0	0	0	854
Total	0	608	324	89	1031	120	448	685	0	0	0	0	3305
05:00 PM	0	197	78	18	255	27	92	155	0	0	0	0	822
05:15 PM	0	166	106	26	250	20	111	167	0	0	0	0	846
05:30 PM	0	113	105	23	296	35	102	143	0	0	0	0	817
05:45 PM	0	173	93	23	243	24	105	141	0	0	0	0	802
Total	0	649	382	90	1044	106	410	606	0	0	0	0	3287
Grand Total	0	1257	706	179	2075	226	858	1291	0	0	0	0	6592
Apprch %	0	64	36	7.2	83.7	9.1	39.9	60.1	0	0	0	0	
Total %	0	19.1	10.7	2.7	31.5	3.4	13	19.6	0	0	0	0	
Cars	0	1256	696	179	2048	226	858	1291	0	0	0	0	6554
% Cars	0	99.9	98.6	100	98.7	100	100	100	0	0	0	0	99.4
Trucks	0	1	10	0	27	0	0	0	0	0	0	0	38
% Trucks	0	0.1	1.4	0	1.3	0	0	0	0	0	0	0	0.6

Accurate Counts

978-664-2565

N/S Street : Memorial Drive
E/W Street: Western Avenue
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260011
Site Code : 17260011
Start Date : 4/11/2018
Page No : 2

	Memorial Dr From North				Western Ave From East				Memorial Dr From South				Western Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	0	152	83	235	21	**286**	31	**338**	97	**183**	0	280	0	0	0	0	853
04:30 PM	0	142	63	205	**28**	265	25	318	**124**	171	0	**295**	0	0	0	0	818
04:45 PM	0	179	**88**	267	23	237	**38**	298	116	173	0	289	0	0	0	0	**854**
05:00 PM	0	**197**	78	**275**	18	255	27	300	92	155	0	247	0	0	0	0	822
Total Volume	0	670	312	982	90	1043	121	1254	429	682	0	1111	0	0	0	0	3347
% App. Total	0	68.2	31.8		7.2	83.2	9.6		38.6	61.4	0		0	0	0		
PHF	.000	.850	.886	.893	.804	.912	.796	.928	.865	.932	.000	.942	.000	.000	.000	.000	.980
Cars	0	669	307	976	90	1028	121	1239	429	682	0	1111	0	0	0	0	3326
% Cars	0	99.9	98.4	99.4	100	98.6	100	98.8	100	100	0	100	0	0	0	0	99.4
Trucks	0	1	5	6	0	15	0	15	0	0	0	0	0	0	0	0	21
% Trucks	0	0.1	1.6	0.6	0	1.4	0	1.2	0	0	0	0	0	0	0	0	0.6

Accurate Counts

978-664-2565

N/S Street : Memorial Drive
E/W Street: Western Avenue
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260011
Site Code : 17260011
Start Date : 4/11/2018
Page No : 13

Groups Printed- Bikes Peds

	Memorial Dr From North				Western Ave From East				Memorial Dr From South				Western Ave From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	6	0	17	0	2	0	6	0	0	0	1	0	0	0	9	33	8	41
04:15 PM	0	4	2	14	0	1	0	1	0	1	0	0	0	2	0	14	29	10	39
04:30 PM	0	9	0	9	0	0	0	7	0	6	0	0	0	0	0	13	29	15	44
04:45 PM	0	0	0	11	0	2	0	6	0	7	0	0	0	1	0	15	32	10	42
Total	0	19	2	51	0	5	0	20	0	14	0	1	0	3	0	51	123	43	166
05:00 PM	0	4	0	19	0	5	0	6	0	8	0	2	0	2	0	27	54	19	73
05:15 PM	0	4	0	15	0	10	0	8	0	20	0	1	0	2	0	18	42	36	78
05:30 PM	0	8	0	11	0	6	0	12	1	14	0	2	0	2	0	47	72	31	103
05:45 PM	0	5	0	25	0	2	0	10	0	12	0	3	0	1	0	39	77	20	97
Total	0	21	0	70	0	23	0	36	1	54	0	8	0	7	0	131	245	106	351
Grand Total	0	40	2	121	0	28	0	56	1	68	0	9	0	10	0	182	368	149	517
Apprch %	0	95.2	4.8		0	100	0		1.4	98.6	0		0	100	0				
Total %	0	26.8	1.3		0	18.8	0		0.7	45.6	0		0	6.7	0		71.2	28.8	

Accurate Counts

978-664-2565

N/S Street : Memorial Drive
E/W Street: Western Avenue
City/State : Cambridge, MA
Weather : Cloudy

File Name : 17260011
Site Code : 17260011
Start Date : 4/11/2018

	Memorial Dr From North				Western Ave From East				Memorial Dr From South				Western Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	4	0	4	0	5	0	5	0	8	0	8	0	**2**	0	**2**	19
05:15 PM	0	4	0	4	0	**10**	0	**10**	0	**20**	0	**20**	0	2	0	2	**36**
05:30 PM	0	**8**	0	**8**	0	6	0	6	**1**	14	0	15	0	2	0	2	31
05:45 PM	0	5	0	5	0	2	0	2	0	12	0	12	0	1	0	1	20
Total Volume	0	21	0	21	0	23	0	23	1	54	0	55	0	7	0	7	106
% App. Total	0	100	0		0	100	0		1.8	98.2	0		0	100	0		
PHF	.000	.656	.000	.656	.000	.575	.000	.575	.250	.675	.000	.688	.000	.875	.000	.875	.736

Volume
File Name: Y:\PDI 2016 Jobs\165257-Boston (Toole)\165257 (9) Volume.tf2
Start Date: 9/27/2016
Start Time: 12:00:00 AM
Site Code:
Location 1: North Harvard Street
Location 2: south of Soldiers Field Road

Date	Time	SB	NB	Total	Date	Time	SB	NB	Total
9/27/2016	12:00 AM	24	20	44	9/27/2016	12:00 PM	72	63	135
9/27/2016	12:15 AM	22	19	41	9/27/2016	12:15 PM	69	69	138
9/27/2016	12:30 AM	11	6	17	9/27/2016	12:30 PM	62	79	141
9/27/2016	12:45 AM	9	12	21	9/27/2016	12:45 PM	63	64	127
9/27/2016	1:00 AM	8	5	13	9/27/2016	1:00 PM	71	65	136
9/27/2016	1:15 AM	10	10	20	9/27/2016	1:15 PM	95	81	176
9/27/2016	1:30 AM	14	3	17	9/27/2016	1:30 PM	76	80	156
9/27/2016	1:45 AM	7	7	14	9/27/2016	1:45 PM	74	97	171
9/27/2016	2:00 AM	3	4	7	9/27/2016	2:00 PM	74	75	149
9/27/2016	2:15 AM	10	5	15	9/27/2016	2:15 PM	74	82	156
9/27/2016	2:30 AM	7	4	11	9/27/2016	2:30 PM	73	76	149
9/27/2016	2:45 AM	7	5	12	9/27/2016	2:45 PM	85	88	173
9/27/2016	3:00 AM	2	2	4	9/27/2016	3:00 PM	67	70	137
9/27/2016	3:15 AM	5	3	8	9/27/2016	3:15 PM	55	70	125
9/27/2016	3:30 AM	3	3	6	9/27/2016	3:30 PM	75	90	165
9/27/2016	3:45 AM	2	3	5	9/27/2016	3:45 PM	75	91	166
9/27/2016	4:00 AM	4	4	8	9/27/2016	4:00 PM	82	101	183
9/27/2016	4:15 AM	7	5	12	9/27/2016	4:15 PM	73	103	176
9/27/2016	4:30 AM	5	2	7	9/27/2016	4:30 PM	77	118	195
9/27/2016	4:45 AM	13	4	17	9/27/2016	4:45 PM	76	143	219
9/27/2016	5:00 AM	25	13	38	9/27/2016	5:00 PM	94	139	233
9/27/2016	5:15 AM	40	16	56	9/27/2016	5:15 PM	108	147	255
9/27/2016	5:30 AM	38	16	54	9/27/2016	5:30 PM	103	113	216
9/27/2016	5:45 AM	33	34	67	9/27/2016	5:45 PM	119	118	237
9/27/2016	6:00 AM	43	29	72	9/27/2016	6:00 PM	107	121	228
9/27/2016	6:15 AM	52	43	95	9/27/2016	6:15 PM	108	120	228
9/27/2016	6:30 AM	61	66	127	9/27/2016	6:30 PM	100	115	215
9/27/2016	6:45 AM	74	84	158	9/27/2016	6:45 PM	101	95	196
9/27/2016	7:00 AM	79	76	155	9/27/2016	7:00 PM	82	100	182
9/27/2016	7:15 AM	72	68	140	9/27/2016	7:15 PM	81	111	192
9/27/2016	7:30 AM	65	91	156	9/27/2016	7:30 PM	73	88	161
9/27/2016	7:45 AM	74	101	175	9/27/2016	7:45 PM	83	87	170
9/27/2016	8:00 AM	88	99	187	9/27/2016	8:00 PM	72	71	143
9/27/2016	8:15 AM	82	122	204	9/27/2016	8:15 PM	57	71	128
9/27/2016	8:30 AM	79	125	204	9/27/2016	8:30 PM	52	83	135
9/27/2016	8:45 AM	95	142	237	9/27/2016	8:45 PM	52	77	129
9/27/2016	9:00 AM	101	123	224	9/27/2016	9:00 PM	56	70	126
9/27/2016	9:15 AM	96	120	216	9/27/2016	9:15 PM	53	63	116
9/27/2016	9:30 AM	90	114	204	9/27/2016	9:30 PM	42	71	113
9/27/2016	9:45 AM	89	120	209	9/27/2016	9:45 PM	57	52	109
9/27/2016	10:00 AM	79	109	188	9/27/2016	10:00 PM	50	36	86
9/27/2016	10:15 AM	97	94	191	9/27/2016	10:15 PM	83	58	141
9/27/2016	10:30 AM	69	91	160	9/27/2016	10:30 PM	57	32	89
9/27/2016	10:45 AM	65	72	137	9/27/2016	10:45 PM	38	39	77
9/27/2016	11:00 AM	74	69	143	9/27/2016	11:00 PM	48	41	89
9/27/2016	11:15 AM	65	77	142	9/27/2016	11:15 PM	36	32	68
9/27/2016	11:30 AM	78	79	157	9/27/2016	11:30 PM	38	27	65
9/27/2016	11:45 AM	79	57	136	9/27/2016	11:45 PM	27	17	44

Volume
File Name: Y:\PDI 2016 Jobs\165257-Boston (Toole)\165257 (9) Volume.tf2
Start Date: 9/28/2016
Start Time: 12:00:00 AM
Site Code:
Location 1: North Harvard Street
Location 2: south of Soldiers Field Road

Date	Time	SB	NB	Total	Date	Time	SB	NB	Total
9/28/2016	12:00 AM	25	19	44	9/28/2016	12:00 PM	80	67	147
9/28/2016	12:15 AM	18	23	41	9/28/2016	12:15 PM	91	62	153
9/28/2016	12:30 AM	17	10	27	9/28/2016	12:30 PM	70	91	161
9/28/2016	12:45 AM	17	12	29	9/28/2016	12:45 PM	84	87	171
9/28/2016	1:00 AM	11	10	21	9/28/2016	1:00 PM	90	89	179
9/28/2016	1:15 AM	8	16	24	9/28/2016	1:15 PM	71	75	146
9/28/2016	1:30 AM	8	5	13	9/28/2016	1:30 PM	58	83	141
9/28/2016	1:45 AM	11	7	18	9/28/2016	1:45 PM	72	62	134
9/28/2016	2:00 AM	5	7	12	9/28/2016	2:00 PM	60	83	143
9/28/2016	2:15 AM	6	14	20	9/28/2016	2:15 PM	75	79	154
9/28/2016	2:30 AM	5	7	12	9/28/2016	2:30 PM	76	80	156
9/28/2016	2:45 AM	7	4	11	9/28/2016	2:45 PM	84	81	165
9/28/2016	3:00 AM	6	3	9	9/28/2016	3:00 PM	90	91	181
9/28/2016	3:15 AM	3	5	8	9/28/2016	3:15 PM	75	91	166
9/28/2016	3:30 AM	3	2	5	9/28/2016	3:30 PM	78	104	182
9/28/2016	3:45 AM	4	1	5	9/28/2016	3:45 PM	86	104	190
9/28/2016	4:00 AM	7	3	10	9/28/2016	4:00 PM	81	116	197
9/28/2016	4:15 AM	4	6	10	9/28/2016	4:15 PM	71	110	181
9/28/2016	4:30 AM	4	9	13	9/28/2016	4:30 PM	81	102	183
9/28/2016	4:45 AM	14	5	19	9/28/2016	4:45 PM	68	148	216
9/28/2016	5:00 AM	33	8	41	9/28/2016	5:00 PM	92	153	245
9/28/2016	5:15 AM	67	19	86	9/28/2016	5:15 PM	108	123	231
9/28/2016	5:30 AM	37	20	57	9/28/2016	5:30 PM	93	118	211
9/28/2016	5:45 AM	59	31	90	9/28/2016	5:45 PM	116	109	225
9/28/2016	6:00 AM	74	41	115	9/28/2016	6:00 PM	69	131	200
9/28/2016	6:15 AM	125	55	180	9/28/2016	6:15 PM	117	101	218
9/28/2016	6:30 AM	97	96	193	9/28/2016	6:30 PM	92	120	212
9/28/2016	6:45 AM	62	71	133	9/28/2016	6:45 PM	104	91	195
9/28/2016	7:00 AM	65	102	167	9/28/2016	7:00 PM	84	93	177
9/28/2016	7:15 AM	90	100	190	9/28/2016	7:15 PM	82	109	191
9/28/2016	7:30 AM	83	141	224	9/28/2016	7:30 PM	92	85	177
9/28/2016	7:45 AM	91	132	223	9/28/2016	7:45 PM	63	72	135
9/28/2016	8:00 AM	96	127	223	9/28/2016	8:00 PM	77	79	156
9/28/2016	8:15 AM	102	141	243	9/28/2016	8:15 PM	61	78	139
9/28/2016	8:30 AM	90	146	236	9/28/2016	8:30 PM	72	76	148
9/28/2016	8:45 AM	114	138	252	9/28/2016	8:45 PM	70	79	149
9/28/2016	9:00 AM	95	117	212	9/28/2016	9:00 PM	60	60	120
9/28/2016	9:15 AM	82	103	185	9/28/2016	9:15 PM	49	80	129
9/28/2016	9:30 AM	88	97	185	9/28/2016	9:30 PM	63	54	117
9/28/2016	9:45 AM	91	98	189	9/28/2016	9:45 PM	57	59	116
9/28/2016	10:00 AM	65	96	161	9/28/2016	10:00 PM	68	53	121
9/28/2016	10:15 AM	86	79	165	9/28/2016	10:15 PM	48	50	98
9/28/2016	10:30 AM	74	83	157	9/28/2016	10:30 PM	60	36	96
9/28/2016	10:45 AM	74	64	138	9/28/2016	10:45 PM	49	43	92
9/28/2016	11:00 AM	61	58	119	9/28/2016	11:00 PM	50	39	89
9/28/2016	11:15 AM	52	67	119	9/28/2016	11:15 PM	40	37	77
9/28/2016	11:30 AM	71	80	151	9/28/2016	11:30 PM	20	19	39
9/28/2016	11:45 AM	79	77	156	9/28/2016	11:45 PM	38	19	57

Volume
File Name: Y:\PDI 2016 Jobs\165257-Boston (Toole)\165257 (9) Volume.tf2
Start Date: 9/29/2016
Start Time: 12:00:00 AM
Site Code:
Location 1: North Harvard Street
Location 2: south of Soldiers Field Road

Date	Time	SB	NB	Total
9/29/2016	12:00 AM	35	20	55
9/29/2016	12:15 AM	21	14	35
9/29/2016	12:30 AM	18	16	34
9/29/2016	12:45 AM	12	10	22
9/29/2016	1:00 AM	14	13	27
9/29/2016	1:15 AM	10	11	21
9/29/2016	1:30 AM	14	4	18
9/29/2016	1:45 AM	4	8	12
9/29/2016	2:00 AM	11	10	21
9/29/2016	2:15 AM	7	5	12
9/29/2016	2:30 AM	7	5	12
9/29/2016	2:45 AM	5	4	9
9/29/2016	3:00 AM	2	1	3
9/29/2016	3:15 AM	6	3	9
9/29/2016	3:30 AM	0	1	1
9/29/2016	3:45 AM	3	6	9
9/29/2016	4:00 AM	1	6	7
9/29/2016	4:15 AM	4	2	6
9/29/2016	4:30 AM	7	3	10
9/29/2016	4:45 AM	10	2	12
9/29/2016	5:00 AM	27	18	45
9/29/2016	5:15 AM	39	14	53
9/29/2016	5:30 AM	47	17	64
9/29/2016	5:45 AM	46	30	76
9/29/2016	6:00 AM	51	40	91
9/29/2016	6:15 AM	53	47	100
9/29/2016	6:30 AM	57	73	130
9/29/2016	6:45 AM	75	76	151
9/29/2016	7:00 AM	76	88	164
9/29/2016	7:15 AM	65	82	147
9/29/2016	7:30 AM	92	102	194
9/29/2016	7:45 AM	99	100	199
9/29/2016	8:00 AM	91	109	200
9/29/2016	8:15 AM	103	150	253
9/29/2016	8:30 AM	97	130	227
9/29/2016	8:45 AM	105	129	234
9/29/2016	9:00 AM	73	87	160
9/29/2016	9:15 AM	94	95	189
9/29/2016	9:30 AM	82	124	206
9/29/2016	9:45 AM	84	100	184
9/29/2016	10:00 AM	87	78	165
9/29/2016	10:15 AM	80	85	165
9/29/2016	10:30 AM	62	97	159
9/29/2016	10:45 AM	65	72	137
9/29/2016	11:00 AM	70	82	152
9/29/2016	11:15 AM	77	69	146
9/29/2016	11:30 AM	68	78	146
9/29/2016	11:45 AM	72	63	135

Date	Time	SB	NB	Total
9/29/2016	12:00 PM	70	83	153
9/29/2016	12:15 PM	77	81	158
9/29/2016	12:30 PM	60	82	142
9/29/2016	12:45 PM	76	74	150
9/29/2016	1:00 PM	62	88	150
9/29/2016	1:15 PM	59	55	114
9/29/2016	1:30 PM	60	98	158
9/29/2016	1:45 PM	75	82	157
9/29/2016	2:00 PM	80	74	154
9/29/2016	2:15 PM	65	85	150
9/29/2016	2:30 PM	82	85	167
9/29/2016	2:45 PM	89	77	166
9/29/2016	3:00 PM	67	100	167
9/29/2016	3:15 PM	74	96	170
9/29/2016	3:30 PM	72	85	157
9/29/2016	3:45 PM	62	98	160
9/29/2016	4:00 PM	79	89	168
9/29/2016	4:15 PM	73	117	190
9/29/2016	4:30 PM	56	117	173
9/29/2016	4:45 PM	90	121	211
9/29/2016	5:00 PM	80	142	222
9/29/2016	5:15 PM	97	147	244
9/29/2016	5:30 PM	116	130	246
9/29/2016	5:45 PM	122	126	248
9/29/2016	6:00 PM	91	132	223
9/29/2016	6:15 PM	124	133	257
9/29/2016	6:30 PM	107	145	252
9/29/2016	6:45 PM	107	141	248
9/29/2016	7:00 PM	93	126	219
9/29/2016	7:15 PM	104	95	199
9/29/2016	7:30 PM	92	92	184
9/29/2016	7:45 PM	73	72	145
9/29/2016	8:00 PM	67	77	144
9/29/2016	8:15 PM	73	64	137
9/29/2016	8:30 PM	71	104	175
9/29/2016	8:45 PM	67	95	162
9/29/2016	9:00 PM	71	78	149
9/29/2016	9:15 PM	57	80	137
9/29/2016	9:30 PM	68	80	148
9/29/2016	9:45 PM	69	65	134
9/29/2016	10:00 PM	68	58	126
9/29/2016	10:15 PM	62	71	133
9/29/2016	10:30 PM	56	35	91
9/29/2016	10:45 PM	52	60	112
9/29/2016	11:00 PM	54	45	99
9/29/2016	11:15 PM	43	41	84
9/29/2016	11:30 PM	55	51	106
9/29/2016	11:45 PM	37	37	74

File Name: Y:\PDI 2018 Jobs\186397-Boston (HSH)\186397 (61) Volume.tf2
Start Date: 9/27/2018
Start Time: 12:00:00 AM
Site Code: TBA
Location 1: Western Avenue
Location 2: east of Hague Street

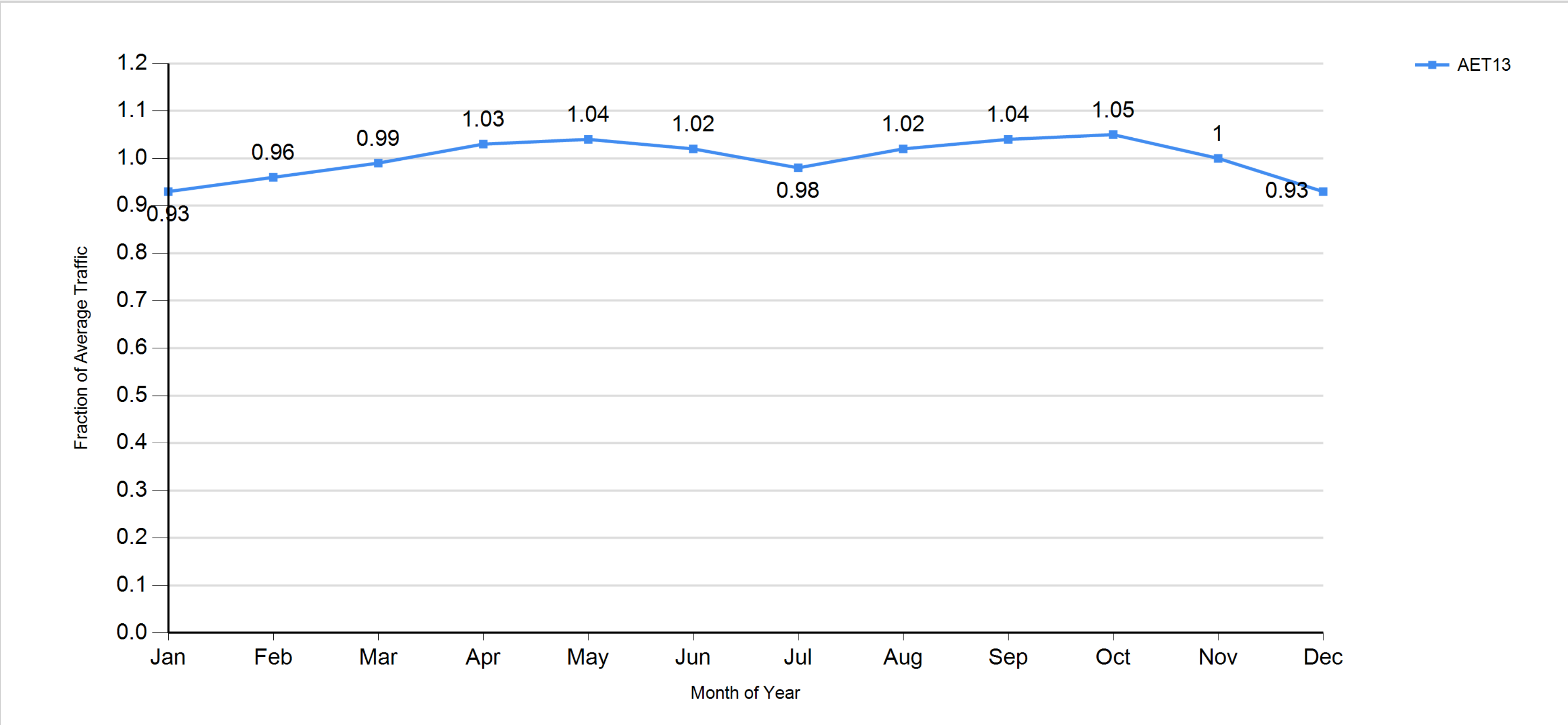
Date	Time	WB	EB	Date	Time	WB	EB
9/27/2018	12:00 AM	25	14	9/27/2018	12:00 PM	92	71
9/27/2018	12:15 AM	23	14	9/27/2018	12:15 PM	73	61
9/27/2018	12:30 AM	22	8	9/27/2018	12:30 PM	76	70
9/27/2018	12:45 AM	15	12	9/27/2018	12:45 PM	82	66
9/27/2018	01:00 AM	13	8	9/27/2018	01:00 PM	89	65
9/27/2018	01:15 AM	13	3	9/27/2018	01:15 PM	86	76
9/27/2018	01:30 AM	9	5	9/27/2018	01:30 PM	81	94
9/27/2018	01:45 AM	8	9	9/27/2018	01:45 PM	94	64
9/27/2018	02:00 AM	3	5	9/27/2018	02:00 PM	96	81
9/27/2018	02:15 AM	6	2	9/27/2018	02:15 PM	87	90
9/27/2018	02:30 AM	8	2	9/27/2018	02:30 PM	84	164
9/27/2018	02:45 AM	6	7	9/27/2018	02:45 PM	88	142
9/27/2018	03:00 AM	10	0	9/27/2018	03:00 PM	98	119
9/27/2018	03:15 AM	5	3	9/27/2018	03:15 PM	78	99
9/27/2018	03:30 AM	5	1	9/27/2018	03:30 PM	84	90
9/27/2018	03:45 AM	4	4	9/27/2018	03:45 PM	106	60
9/27/2018	04:00 AM	7	2	9/27/2018	04:00 PM	99	91
9/27/2018	04:15 AM	10	3	9/27/2018	04:15 PM	107	81
9/27/2018	04:30 AM	17	5	9/27/2018	04:30 PM	131	108
9/27/2018	04:45 AM	15	2	9/27/2018	04:45 PM	139	109
9/27/2018	05:00 AM	19	8	9/27/2018	05:00 PM	107	119
9/27/2018	05:15 AM	52	17	9/27/2018	05:15 PM	110	86
9/27/2018	05:30 AM	62	14	9/27/2018	05:30 PM	114	102
9/27/2018	05:45 AM	82	40	9/27/2018	05:45 PM	106	113
9/27/2018	06:00 AM	91	29	9/27/2018	06:00 PM	129	110
9/27/2018	06:15 AM	81	37	9/27/2018	06:15 PM	124	66
9/27/2018	06:30 AM	94	84	9/27/2018	06:30 PM	123	59
9/27/2018	06:45 AM	87	92	9/27/2018	06:45 PM	118	51
9/27/2018	07:00 AM	82	74	9/27/2018	07:00 PM	95	63
9/27/2018	07:15 AM	65	114	9/27/2018	07:15 PM	88	62
9/27/2018	07:30 AM	84	108	9/27/2018	07:30 PM	88	44
9/27/2018	07:45 AM	90	142	9/27/2018	07:45 PM	82	49
9/27/2018	08:00 AM	93	135	9/27/2018	08:00 PM	82	52
9/27/2018	08:15 AM	105	156	9/27/2018	08:15 PM	71	43
9/27/2018	08:30 AM	83	133	9/27/2018	08:30 PM	75	46
9/27/2018	08:45 AM	109	128	9/27/2018	08:45 PM	83	31
9/27/2018	09:00 AM	91	135	9/27/2018	09:00 PM	91	38
9/27/2018	09:15 AM	91	118	9/27/2018	09:15 PM	64	28
9/27/2018	09:30 AM	72	103	9/27/2018	09:30 PM	79	34
9/27/2018	09:45 AM	93	98	9/27/2018	09:45 PM	53	28
9/27/2018	10:00 AM	83	69	9/27/2018	10:00 PM	60	37
9/27/2018	10:15 AM	66	87	9/27/2018	10:15 PM	59	33
9/27/2018	10:30 AM	81	76	9/27/2018	10:30 PM	50	25
9/27/2018	10:45 AM	73	74	9/27/2018	10:45 PM	56	26
9/27/2018	11:00 AM	83	79	9/27/2018	11:00 PM	50	24
9/27/2018	11:15 AM	78	72	9/27/2018	11:15 PM	33	18
9/27/2018	11:30 AM	89	61	9/27/2018	11:30 PM	40	15
9/27/2018	11:45 AM	95	74	9/27/2018	11:45 PM	42	21

File Name: Y:\PDI 2018 Jobs\186397-Boston (HSH)\186397 (61) Volume.tf2
Start Date: 9/28/2018
Start Time: 12:00:00 AM
Site Code: TBA
Location 1: Western Avenue
Location 2: east of Hague Street

Date	Time	WB	EB	Date	Time	WB	EB
9/28/2018	12:00 AM	26	20	9/28/2018	12:00 PM	83	68
9/28/2018	12:15 AM	32	12	9/28/2018	12:15 PM	79	58
9/28/2018	12:30 AM	26	12	9/28/2018	12:30 PM	95	62
9/28/2018	12:45 AM	17	5	9/28/2018	12:45 PM	86	61
9/28/2018	01:00 AM	16	4	9/28/2018	01:00 PM	93	99
9/28/2018	01:15 AM	25	9	9/28/2018	01:15 PM	91	88
9/28/2018	01:30 AM	17	4	9/28/2018	01:30 PM	85	72
9/28/2018	01:45 AM	21	5	9/28/2018	01:45 PM	86	86
9/28/2018	02:00 AM	21	7	9/28/2018	02:00 PM	93	106
9/28/2018	02:15 AM	26	7	9/28/2018	02:15 PM	95	111
9/28/2018	02:30 AM	13	5	9/28/2018	02:30 PM	80	176
9/28/2018	02:45 AM	14	7	9/28/2018	02:45 PM	98	120
9/28/2018	03:00 AM	9	5	9/28/2018	03:00 PM	122	134
9/28/2018	03:15 AM	8	1	9/28/2018	03:15 PM	122	112
9/28/2018	03:30 AM	5	1	9/28/2018	03:30 PM	101	99
9/28/2018	03:45 AM	9	3	9/28/2018	03:45 PM	118	97
9/28/2018	04:00 AM	2	2	9/28/2018	04:00 PM	118	75
9/28/2018	04:15 AM	9	6	9/28/2018	04:15 PM	91	97
9/28/2018	04:30 AM	14	3	9/28/2018	04:30 PM	98	87
9/28/2018	04:45 AM	17	10	9/28/2018	04:45 PM	96	105
9/28/2018	05:00 AM	23	6	9/28/2018	05:00 PM	108	88
9/28/2018	05:15 AM	48	12	9/28/2018	05:15 PM	104	110
9/28/2018	05:30 AM	79	14	9/28/2018	05:30 PM	110	94
9/28/2018	05:45 AM	88	38	9/28/2018	05:45 PM	99	93
9/28/2018	06:00 AM	81	45	9/28/2018	06:00 PM	105	85
9/28/2018	06:15 AM	86	44	9/28/2018	06:15 PM	132	71
9/28/2018	06:30 AM	81	60	9/28/2018	06:30 PM	120	65
9/28/2018	06:45 AM	79	53	9/28/2018	06:45 PM	135	81
9/28/2018	07:00 AM	65	83	9/28/2018	07:00 PM	132	70
9/28/2018	07:15 AM	67	94	9/28/2018	07:15 PM	94	42
9/28/2018	07:30 AM	74	95	9/28/2018	07:30 PM	84	49
9/28/2018	07:45 AM	93	109	9/28/2018	07:45 PM	77	48
9/28/2018	08:00 AM	99	132	9/28/2018	08:00 PM	62	45
9/28/2018	08:15 AM	101	127	9/28/2018	08:15 PM	65	40
9/28/2018	08:30 AM	87	119	9/28/2018	08:30 PM	61	39
9/28/2018	08:45 AM	105	76	9/28/2018	08:45 PM	75	44
9/28/2018	09:00 AM	85	81	9/28/2018	09:00 PM	61	39
9/28/2018	09:15 AM	80	71	9/28/2018	09:15 PM	56	39
9/28/2018	09:30 AM	85	83	9/28/2018	09:30 PM	51	35
9/28/2018	09:45 AM	79	75	9/28/2018	09:45 PM	61	17
9/28/2018	10:00 AM	81	69	9/28/2018	10:00 PM	57	32
9/28/2018	10:15 AM	82	47	9/28/2018	10:15 PM	73	29
9/28/2018	10:30 AM	68	69	9/28/2018	10:30 PM	70	53
9/28/2018	10:45 AM	83	80	9/28/2018	10:45 PM	47	46
9/28/2018	11:00 AM	63	72	9/28/2018	11:00 PM	48	33
9/28/2018	11:15 AM	95	81	9/28/2018	11:15 PM	32	29
9/28/2018	11:30 AM	96	78	9/28/2018	11:30 PM	49	26
9/28/2018	11:45 AM	86	85	9/28/2018	11:45 PM	43	23

Massachusetts Highway Department

Traffic Pattern by Month for 1/1/2019 - 12/31/2019
Criteria: From 1/1/1900 To 12/31/2049 12:00:00 AM



Massachusetts Highway Department

Traffic Pattern by Month for 1/1/2019 - 12/31/2019
Criteria: From 1/1/1900 To 12/31/2049 12:00:00 AM

Factor Group	Station	Weight	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
U1-Boston	AET13	0	0.931	0.961	0.993	1.030	1.038	1.020	0.980	1.023	1.038	1.052	1.000	0.934
	Average of Weighted Factors		**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
Memorial Drive at JFK Street													
3716883	BOSTON	01/12/2014	Property damage only (none injured)	11:20 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Cloudy
3743356	BOSTON	02/11/2014	Property damage only (none injured)	1:25 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Head-on		Dry	V1: Travelling straight ahead / V2: Turning left	Clear
3795752	BOSTON	04/27/2014	Property damage only (none injured)	6:50 AM	1	State police	Collision with median barrier	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Rain
3796069	BOSTON	04/22/2014	Property damage only (none injured)	1:30 PM	1	State police	Collision with other light pole or other post/support	Daylight	Single vehicle crash		Dry	V1: Making U-turn	Clear
3797500	BOSTON	04/27/2014	Property damage only (none injured)	2:24 AM	2	State police	Collision with other movable object	Dark - lighted roadway	Rear-end		Wet	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Not Reported
3799769	BOSTON	04/16/2014	Non-fatal injury	3:27 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Walking, running or cycling	Dry	V1: Turning left	Not Reported
3802093	BOSTON	04/28/2014	Non-fatal injury	1:57 AM	1	State police	Collision with guardrail	Dark - lighted roadway	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3818265	BOSTON	04/19/2014	Property damage only (none injured)	2:35 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Not reported		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	Clear
3818431	BOSTON	05/03/2014	Property damage only (none injured)	6:01 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
3828017	BOSTON	06/05/2014	Property damage only (none injured)	8:11 AM	1	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Rain
3828018	BOSTON	06/07/2014	Property damage only (none injured)	6:00 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
3845552	BOSTON	06/05/2014	Property damage only (none injured)	10:07 AM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3845635	BOSTON	06/05/2014	Property damage only (none injured)	11:13 AM	1	State police	Collision with median barrier	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3868080	BOSTON	06/23/2014	Non-fatal injury	3:35 PM	1	State police	Collision with motor vehicle in traffic	Daylight	Angle	P2: Entering or crossing specified	Dry	V1: Turning left	Clear
3871543	BOSTON	06/26/2014	Non-fatal injury	7:53 AM	1	State police	Collision with median barrier	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3878656	BOSTON	07/05/2014	Property damage only (none injured)	6:48 AM	1	State police	Collision with guardrail	Dawn	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy
3882046	BOSTON	07/16/2014	Non-fatal injury	12:05 PM	1	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Wet	V1: Turning left	Rain
3882057	BOSTON	07/15/2014	Property damage only (none injured)	12:22 AM	1	State police	Collision with guardrail	Dark - lighted roadway	Single vehicle crash		Wet	V1: Travelling straight ahead	Rain
3901160	BOSTON	08/05/2014	Property damage only (none injured)	2:25 PM	4	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead / V3:	Clear
3909148	BOSTON	08/13/2014	Property damage only (none injured)	4:12 PM	1	State police	Collision with animal - other	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Rain
3962300	BOSTON	10/04/2014	Property damage only (none injured)	10:25 AM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy
3962781	BOSTON	09/26/2014	Property damage only (none injured)	4:49 PM	3	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead / V3:	Clear
3962784	BOSTON	09/30/2014	Property damage only (none injured)	5:04 PM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Changing lanes	Cloudy/Rain

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
Memorial Drive at JFK Street (cont.)													
3962786	BOSTON	10/01/2014	Property damage only (none injured)	4:58 PM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3962789	BOSTON	10/04/2014	Property damage only (none injured)	4:45 PM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3971980	BOSTON	10/02/2014	Property damage only (none injured)	8:36 AM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy
3971985	BOSTON	10/11/2014	Property damage only (none injured)	8:56 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Rain
3971995	BOSTON	10/16/2014	Property damage only (none injured)	7:32 PM	1	State police	Collision with guardrail	Dark - lighted roadway	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3972020	BOSTON	10/24/2014	Property damage only (none injured)	7:01 AM	1	State police	Collision with guardrail	Dawn	Single vehicle crash		Wet	V1: Travelling straight ahead	Rain
3972021	BOSTON	10/24/2014	Property damage only (none injured)	8:36 AM	1	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy
3972030	BOSTON	10/29/2014	Property damage only (none injured)	7:24 PM	1	State police	Collision with curb	Dark - lighted roadway	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
3972044	BOSTON	11/06/2014	Property damage only (none injured)	3:09 PM	1	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Rain
3972046	BOSTON	11/07/2014	Property damage only (none injured)	3:41 AM	1	State police	Collision with curb	Dark - lighted roadway	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
3973021	BOSTON	10/02/2014	Property damage only (none injured)	6:40 AM	1	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Wet	V1: Turning left	Rain
3973615	BOSTON	10/16/2014	Property damage only (none injured)	10:05 AM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Turning right	Rain
3976302	BOSTON	11/06/2014	Property damage only (none injured)	2:08 PM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3988037	BOSTON	12/17/2014	Property damage only (none injured)	10:35 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Wet	V1: Travelling straight ahead / V2: Changing lanes	Cloudy/Rain
3988039	BOSTON	12/24/2014	Non-fatal injury	2:09 PM	1	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3988818	BOSTON	11/27/2014	Property damage only (none injured)	9:15 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Backing / V2: Travelling straight ahead	Clear
3991774	BOSTON	12/24/2014	Property damage only (none injured)	8:08 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Wet	V1: Travelling straight ahead / V2: Changing lanes	Cloudy
4001858	BOSTON	01/16/2015	Non-fatal injury	5:09 AM	1	State police	Collision with guardrail	Dark - lighted roadway	Single vehicle crash		Wet	V1: Travelling straight ahead	Not Reported
4018315	BOSTON	03/02/2015	Property damage only (none injured)	7:55 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Changing lanes	Cloudy
4019144	BOSTON	03/09/2015	Property damage only (none injured)	4:40 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	Clear
4044471	BOSTON	05/08/2015	Property damage only (none injured)	12:05 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
4060290	BOSTON	06/09/2015	Property damage only (none injured)	6:40 PM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Cloudy
4086396	BOSTON	08/29/2015	Non-fatal injury	9:24 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning right / V2: Slowing or stopped in traffic	Clear

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
Memorial Drive at JFK Street (cont.)													
4108519	BOSTON	10/29/2015	Property damage only (none injured)	8:25 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Turning left	Clear
4120943	BOSTON	12/10/2015	Property damage only (none injured)	9:46 AM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Cloudy
4176803	BOSTON	04/06/2016	Non-fatal injury	11:05 AM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Head-on	P1: Walking, running or cycling	Dry	V1: Turning left	Clear
4202728	BOSTON	04/27/2016	Property damage only (none injured)	12:27 PM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4204376	BOSTON	06/13/2016	Non-fatal injury	11:00 AM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Walking, running or cycling	Dry	V1: Travelling straight ahead	Clear
4220912	BOSTON	07/02/2016	Property damage only (none injured)	8:43 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Not reported / V2: Not reported	Clear
4222899	BOSTON	06/30/2016	Property damage only (none injured)	9:25 AM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4226626	BOSTON	07/20/2016	Non-fatal injury	10:30 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Dark - lighted roadway	Angle	P1: Entering or crossing specified	Dry	V1: Not reported	Clear
4238021	BOSTON	08/15/2016	Non-fatal injury	10:49 PM	2	State police	Collision with motor vehicle in traffic	Dark - roadway not lighted	Sideswipe, same direction		Dry	V1: Turning right / V2: Travelling straight ahead	Clear
4242584	BOSTON	08/15/2016	Non-fatal injury	8:40 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Dark - lighted roadway	Angle	P1: Walking, running or cycling	Dry	V1: Turning left	Clear
4245882	BOSTON	09/02/2016	Property damage only (none injured)	12:18 PM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4246398	BOSTON	08/25/2016	Property damage only (none injured)	4:17 PM	1	State police	Not reported	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4270751	BOSTON	10/22/2016	Non-fatal injury	6:05 PM	1	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Single vehicle crash	P2: Entering or crossing specified	Dry	V1: Turning left	Clear
4282140	BOSTON	10/27/2016	Non-fatal injury	10:30 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4327431	BOSTON	02/05/2017	Property damage only (none injured)	1:10 PM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Cloudy
4327740	BOSTON	01/18/2017	Property damage only (none injured)	9:18 PM	1	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, opposite		Wet	V1: Turning left	Rain
4366836	BOSTON	05/06/2017	Property damage only (none injured)	9:25 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4409109	BOSTON	07/21/2017	Non-fatal injury	7:28 AM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Walking, running or cycling	Dry	V1: Travelling straight ahead	Clear
4446797	BOSTON	09/21/2017	Property damage only (none injured)	8:39 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	Clear
4446909	BOSTON	09/20/2017	Property damage only (none injured)	8:48 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Rain
4449414	BOSTON	10/15/2017	Property damage only (none injured)	12:28 AM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Dark - lighted roadway	Angle	P3: Entering or crossing specified	Dry	V1: Turning left	Clear
4511102	BOSTON	02/14/2018	Property damage only (none injured)	8:55 AM	1	State police	Collision with bridge	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4514528	BOSTON	12/23/2017	Property damage only (none injured)	2:11 AM	3	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Snow	V1: Travelling straight ahead / V2: Not reported / V3: Travelling	Snow/Sleet, hail (freezing

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
Memorial Drive at JFK Street (cont.)													
4531465	BOSTON	04/24/2018	Property damage only (none injured)	2:46 PM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4558224	BOSTON	06/10/2018	Non-fatal injury	9:38 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
4570078	BOSTON	07/10/2018	Property damage only (none injured)	2:01 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Slowing or stopped in traffic	Clear
4582575	BOSTON	08/07/2018	Property damage only (none injured)	10:15 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Turning left / V2: Turning left	Clear/Cloudy
4596126	BOSTON	09/17/2018	Non-fatal injury	3:15 PM	1	State police	Not reported	Daylight	Sideswipe, opposite		Dry	V1: Turning left	Clear
4617656	BOSTON	10/31/2018	Non-fatal injury	12:26 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Walking, running or cycling	Dry	V1: Turning left	Clear
4621600	BOSTON	11/10/2018	Property damage only (none injured)	2:28 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	Clear
4630572	BOSTON	11/30/2018	Non-fatal injury	11:09 AM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Walking, running or cycling	Dry	V1: Turning right	Clear

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
North Harvard Street at Soldiers Field Road													
3972044	BOSTON	11/06/2014	Property damage only (none injured)	3:09 PM	1	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Rain
3972046	BOSTON	11/07/2014	Property damage only (none injured)	3:41 AM	1	State police	Collision with curb	Dark - lighted roadway	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4630572	BOSTON	11/30/2018	Non-fatal injury	11:09 AM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Walking, running or cycling	Dry	V1: Turning right	Clear
4621600	BOSTON	11/10/2018	Property damage only (none injured)	2:28 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	Clear
4617656	BOSTON	10/31/2018	Non-fatal injury	12:26 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Walking, running or cycling	Dry	V1: Turning left	Clear
4596126	BOSTON	09/17/2018	Non-fatal injury	3:15 PM	1	State police	Not reported	Daylight	Sideswipe, opposite		Dry	V1: Turning left	Clear
4582575	BOSTON	08/07/2018	Property damage only (none injured)	10:15 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Turning left / V2: Turning left	Clear/Cloudy
4570078	BOSTON	07/10/2018	Property damage only (none injured)	2:01 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Slowing or stopped in traffic	Clear
4558224	BOSTON	06/10/2018	Non-fatal injury	9:38 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
4531465	BOSTON	04/24/2018	Property damage only (none injured)	2:46 PM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4514528	BOSTON	12/23/2017	Property damage only (none injured)	2:11 AM	3	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Snow	V1: Travelling straight ahead / V2: Not reported / V3: Travelling	Snow/Sleet, hail (freezing
4511102	BOSTON	02/14/2018	Property damage only (none injured)	8:55 AM	1	State police	Collision with bridge	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4510011	BOSTON	03/02/2018	Property damage only (none injured)	2:30 PM	3	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Wet	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic /	Rain/Severe crosswinds
4449414	BOSTON	10/15/2017	Property damage only (none injured)	12:28 AM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Dark - lighted roadway	Angle	P3: Entering or crossing specified	Dry	V1: Turning left	Clear
4446909	BOSTON	09/20/2017	Property damage only (none injured)	8:48 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Rain
4446797	BOSTON	09/21/2017	Property damage only (none injured)	8:39 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	Clear
4444309	BOSTON	09/11/2017	Property damage only (none injured)	7:24 PM	2	State police	Not reported	Dark - lighted roadway	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
4409109	BOSTON	07/21/2017	Non-fatal injury	7:28 AM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Walking, running or cycling	Dry	V1: Travelling straight ahead	Clear
4366836	BOSTON	05/06/2017	Property damage only (none injured)	9:25 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4327740	BOSTON	01/18/2017	Property damage only (none injured)	9:18 PM	1	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, opposite		Wet	V1: Turning left	Rain
4327431	BOSTON	02/05/2017	Property damage only (none injured)	1:10 PM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Cloudy
4282140	BOSTON	10/27/2016	Non-fatal injury	10:30 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4270751	BOSTON	10/22/2016	Non-fatal injury	6:05 PM	1	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Single vehicle crash	P2: Entering or crossing specified	Dry	V1: Turning left	Clear

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
North Harvard Street at Soldiers Field Road (cont.)													
4246398	BOSTON	08/25/2016	Property damage only (none injured)	4:17 PM	1	State police	Not reported	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4245882	BOSTON	09/02/2016	Property damage only (none injured)	12:18 PM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4242584	BOSTON	08/15/2016	Non-fatal injury	8:40 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Dark - lighted roadway	Angle	P1: Walking, running or cycling	Dry	V1: Turning left	Clear
4238021	BOSTON	08/15/2016	Non-fatal injury	10:49 PM	2	State police	Collision with motor vehicle in traffic	Dark - roadway not lighted	Sideswipe, same direction		Dry	V1: Turning right / V2: Travelling straight ahead	Clear
4226626	BOSTON	07/20/2016	Non-fatal injury	10:30 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Dark - lighted roadway	Angle	P1: Entering or crossing specified	Dry	V1: Not reported	Clear
4222899	BOSTON	06/30/2016	Property damage only (none injured)	9:25 AM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4220912	BOSTON	07/02/2016	Property damage only (none injured)	8:43 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Not reported / V2: Not reported	Clear
4204376	BOSTON	06/13/2016	Non-fatal injury	11:00 AM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Walking, running or cycling	Dry	V1: Travelling straight ahead	Clear
4202728	BOSTON	04/27/2016	Property damage only (none injured)	12:27 PM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4176803	BOSTON	04/06/2016	Non-fatal injury	11:05 AM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Head-on	P1: Walking, running or cycling	Dry	V1: Turning left	Clear
4120943	BOSTON	12/10/2015	Property damage only (none injured)	9:46 AM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Cloudy
4108519	BOSTON	10/29/2015	Property damage only (none injured)	8:25 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Turning left	Clear
4086396	BOSTON	08/29/2015	Non-fatal injury	9:24 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning right / V2: Slowing or stopped in traffic	Clear
4060290	BOSTON	06/09/2015	Property damage only (none injured)	6:40 PM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Cloudy
4044471	BOSTON	05/08/2015	Property damage only (none injured)	12:05 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
4019144	BOSTON	03/09/2015	Property damage only (none injured)	4:40 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	Clear
4018315	BOSTON	03/02/2015	Property damage only (none injured)	7:55 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Changing lanes	Cloudy
4001858	BOSTON	01/16/2015	Non-fatal injury	5:09 AM	1	State police	Collision with guardrail	Dark - lighted roadway	Single vehicle crash		Wet	V1: Travelling straight ahead	Not Reported
3991774	BOSTON	12/24/2014	Property damage only (none injured)	8:08 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Wet	V1: Travelling straight ahead / V2: Changing lanes	Cloudy
3988818	BOSTON	11/27/2014	Property damage only (none injured)	9:15 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Backing / V2: Travelling straight ahead	Clear
3988039	BOSTON	12/24/2014	Non-fatal injury	2:09 PM	1	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3988037	BOSTON	12/17/2014	Property damage only (none injured)	10:35 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Wet	V1: Travelling straight ahead / V2: Changing lanes	Cloudy/Rain
3976302	BOSTON	11/06/2014	Property damage only (none injured)	2:08 PM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
North Harvard Street at Soldiers Field Road (cont.)													
3973615	BOSTON	10/16/2014	Property damage only (none injured)	10:05 AM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Turning right	Rain
3973021	BOSTON	10/02/2014	Property damage only (none injured)	6:40 AM	1	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Wet	V1: Turning left	Rain
3972030	BOSTON	10/29/2014	Property damage only (none injured)	7:24 PM	1	State police	Collision with curb	Dark - lighted roadway	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
3972021	BOSTON	10/24/2014	Property damage only (none injured)	8:36 AM	1	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy
3972020	BOSTON	10/24/2014	Property damage only (none injured)	7:01 AM	1	State police	Collision with guardrail	Dawn	Single vehicle crash		Wet	V1: Travelling straight ahead	Rain
3971995	BOSTON	10/16/2014	Property damage only (none injured)	7:32 PM	1	State police	Collision with guardrail	Dark - lighted roadway	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3971985	BOSTON	10/11/2014	Property damage only (none injured)	8:56 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Rain
3971980	BOSTON	10/02/2014	Property damage only (none injured)	8:36 AM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy
3962789	BOSTON	10/04/2014	Property damage only (none injured)	4:45 PM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3962786	BOSTON	10/01/2014	Property damage only (none injured)	4:58 PM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3962784	BOSTON	09/30/2014	Property damage only (none injured)	5:04 PM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Changing lanes	Cloudy/Rain
3962781	BOSTON	09/26/2014	Property damage only (none injured)	4:49 PM	3	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead / V3:	Clear
3962300	BOSTON	10/04/2014	Property damage only (none injured)	10:25 AM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy
3909148	BOSTON	08/13/2014	Property damage only (none injured)	4:12 PM	1	State police	Collision with animal - other	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Rain
3901160	BOSTON	08/05/2014	Property damage only (none injured)	2:25 PM	4	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead / V3:	Clear
3882057	BOSTON	07/15/2014	Property damage only (none injured)	12:22 AM	1	State police	Collision with guardrail	Dark - lighted roadway	Single vehicle crash		Wet	V1: Travelling straight ahead	Rain
3882046	BOSTON	07/16/2014	Non-fatal injury	12:05 PM	1	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Wet	V1: Turning left	Rain
3878656	BOSTON	07/05/2014	Property damage only (none injured)	6:48 AM	1	State police	Collision with guardrail	Dawn	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy
3871543	BOSTON	06/26/2014	Non-fatal injury	7:53 AM	1	State police	Collision with median barrier	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3868080	BOSTON	06/23/2014	Non-fatal injury	3:35 PM	1	State police	Collision with motor vehicle in traffic	Daylight	Angle	P2: Entering or crossing specified	Dry	V1: Turning left	Clear
3845635	BOSTON	06/05/2014	Property damage only (none injured)	11:13 AM	1	State police	Collision with median barrier	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3845552	BOSTON	06/05/2014	Property damage only (none injured)	10:07 AM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3828018	BOSTON	06/07/2014	Property damage only (none injured)	6:00 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
North Harvard Street at Soldiers Field Road (cont.)													
3828017	BOSTON	06/05/2014	Property damage only (none injured)	8:11 AM	1	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Rain
3818431	BOSTON	05/03/2014	Property damage only (none injured)	6:01 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
3818265	BOSTON	04/19/2014	Property damage only (none injured)	2:35 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Not reported		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	Clear
3802093	BOSTON	04/28/2014	Non-fatal injury	1:57 AM	1	State police	Collision with guardrail	Dark - lighted roadway	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3799769	BOSTON	04/16/2014	Non-fatal injury	3:27 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Walking, running or cycling	Dry	V1: Turning left	Not Reported
3797500	BOSTON	04/27/2014	Property damage only (none injured)	2:24 AM	2	State police	Collision with other movable object	Dark - lighted roadway	Rear-end		Wet	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Not Reported
3796069	BOSTON	04/22/2014	Property damage only (none injured)	1:30 PM	1	State police	Collision with other light pole or other post/support	Daylight	Single vehicle crash		Dry	V1: Making U-turn	Clear
3795752	BOSTON	04/27/2014	Property damage only (none injured)	6:50 AM	1	State police	Collision with median barrier	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Rain
3743356	BOSTON	02/11/2014	Property damage only (none injured)	1:25 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Head-on		Dry	V1: Travelling straight ahead / V2: Turning left	Clear
3716883	BOSTON	01/12/2014	Property damage only (none injured)	11:20 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Cloudy

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
North Harvard Street at Western Avenue													
4003079	BOSTON	11/06/2014	Not Reported	8:08 PM	3	Local police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Wet	V1: Travelling straight ahead / V2: Not reported / V3: Not reported	Rain
4118326	BOSTON	08/16/2015	Non-fatal injury	4:59 PM	1	Local police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Entering or crossing specified	Dry	V1: Travelling straight ahead	Clear
Cambridge Street at North Harvard Street													
3826250	BOSTON	01/30/2014	Property damage only (none injured)	9:46 AM	1	Local police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Single vehicle crash	P2: Walking, running or cycling	Dry	V1: Turning left	Clear/Clear
3928352	BOSTON	08/19/2014	Property damage only (none injured)	9:10 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Turning left	Clear
4341112	BOSTON	01/28/2017	Property damage only (none injured)	3:00 PM	2	Local police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Making U-turn	Clear
4436986	BOSTON	09/28/2017	Property damage only (none injured)	12:55 AM	1	State police	Collision with guardrail	Dark - roadway not lighted	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4454601	BOSTON	10/17/2017	Not Reported	10:15 PM	2	Local police	Collision with parked motor vehicle	Dark - lighted roadway	Sideswipe, opposite		Wet	V1: Turning right / V2: Parked	Clear
4554331	BOSTON	05/02/2018	Unknown	9:59 PM	2	Local police	Collision with motor vehicle in traffic	Dark - lighted roadway	Front to Front		Unknown	V1: Turning left / V2: Travelling straight ahead	Unknown
4649687	BOSTON	12/02/2018	Property damage only (none injured)	8:00 AM	2	Local police	Collision with motor vehicle in traffic	Daylight	Angle		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Rain
Cambridge Street at Windom Street													
4109648	BOSTON	08/21/2015	Non-fatal injury	10:00 AM	3	Local police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead / V3:	Clear
4628497	BOSTON	10/27/2018	Property damage only (none injured)	8:19 PM	2	Local police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Wet	V1: Changing lanes / V2: Travelling straight ahead	Rain/Rain
Cambridge Street at I-90 Ramps													
3718321	BOSTON	01/07/2014	Non-fatal injury	3:00 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
3723419	BOSTON	01/18/2014	Property damage only (none injured)	4:47 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Turning left	Cloudy
4139846	BOSTON	01/21/2016	Property damage only (none injured)	5:55 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Entering traffic lane / V2: Entering traffic lane	Clear
4224442	BOSTON	07/03/2016	Property damage only (none injured)	12:10 PM	2	Local police	Collision with other light pole or other post/support	Daylight	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear/Clear

Allston ERC Crash Data

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
Cambridge Street at Soldiers Field Road													
3795740	BOSTON	04/10/2014	Property damage only (none injured)	7:39 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
3813108	BOSTON	05/25/2014	Property damage only (none injured)	2:30 AM	1	State police	Collision with guardrail	Dark - lighted roadway	Single vehicle crash		Dry	V1: Turning right	Clear
3828015	BOSTON	06/03/2014	Property damage only (none injured)	3:47 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Turning left / V2: Turning left	Clear
3828019	BOSTON	06/08/2014	Not Reported	11:20 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Leaving traffic lane / V2: Turning left	Clear
3845590	BOSTON	06/12/2014	Property damage only (none injured)	7:52 AM	1	State police	Collision with bridge overhead structure	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
3901161	BOSTON	08/07/2014	Property damage only (none injured)	3:03 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Changing lanes	Clear
3908973	BOSTON	08/13/2014	Property damage only (none injured)	12:25 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Wet	V1: Turning left / V2: Turning left	Cloudy/Rain
3910034	BOSTON	07/31/2014	Property damage only (none injured)	8:00 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Changing lanes / V2: Travelling straight ahead	Clear
3962293	BOSTON	09/27/2014	Property damage only (none injured)	12:15 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Turning left / V2: Turning left	Clear
3962297	BOSTON	10/01/2014	Property damage only (none injured)	3:29 PM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Wet	V1: Travelling straight ahead	Cloudy/Rain
3962298	BOSTON	10/01/2014	Non-fatal injury	5:32 PM	2	State police	Collision with motor vehicle in traffic	Dusk	Angle		Wet	V1: Turning left / V2: Turning left	Cloudy/Rain
3971984	BOSTON	10/10/2014	Property damage only (none injured)	4:45 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Changing lanes / V2: Travelling straight ahead	Clear
3972002	BOSTON	10/18/2014	Property damage only (none injured)	2:10 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Changing lanes	Cloudy
3976303	BOSTON	11/15/2014	Non-fatal injury	1:40 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Changing lanes / V2: Travelling straight ahead	Clear
4045034	BOSTON	05/13/2015	Property damage only (none injured)	10:49 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4098935	BOSTON	10/04/2015	Property damage only (none injured)	2:34 AM	1	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Travelling straight ahead	Clear
4114906	BOSTON	11/27/2015	Property damage only (none injured)	5:10 PM	2	State police	Not reported	Dark - roadway not lighted	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
4220906	BOSTON	06/24/2016	Property damage only (none injured)	2:45 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, opposite		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4221196	BOSTON	06/26/2016	Property damage only (none injured)	9:05 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4239121	BOSTON	08/18/2016	Property damage only (none injured)	1:15 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4241506	BOSTON	08/13/2016	Property damage only (none injured)	9:25 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4246793	BOSTON	08/31/2016	Property damage only (none injured)	7:52 AM	3	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Turning left / V2: Turning left / V3: Not reported	Not Reported
4271182	BOSTON	10/02/2016	Property damage only (none injured)	6:40 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear

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Cambridge Street at Soldiers Field Road (cont.)													
4326563	BOSTON	01/29/2017	Non-fatal injury	9:55 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Changing lanes / V2: Travelling straight ahead	Clear
4366377	BOSTON	05/17/2017	Property damage only (none injured)	10:38 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4437230	BOSTON	10/05/2017	Property damage only (none injured)	7:10 PM	2	State police	Collision with motor vehicle in traffic	Dusk	Sideswipe, same direction		Dry	V1: Changing lanes / V2: Slowing or stopped in traffic	Clear
4497481	BOSTON	02/06/2018	Property damage only (none injured)	2:45 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4504715	BOSTON	02/09/2018	Property damage only (none injured)	7:35 PM	3	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Entering traffic lane / V2: Travelling straight ahead / V3:	Clear
4531907	BOSTON	04/23/2018	Non-fatal injury	12:03 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Single vehicle crash	P2: Walking, running or cycling	Dry	V1: Turning right	Clear
4531908	BOSTON	04/25/2018	Non-fatal injury	7:35 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Cloudy/Rain
4541596	BOSTON	05/11/2018	Property damage only (none injured)	8:19 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Changing lanes	Clear
4542234	BOSTON	05/14/2018	Property damage only (none injured)	6:30 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Turning left	Not Reported
4546430	BOSTON	05/15/2018	Property damage only (none injured)	10:35 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4546432	BOSTON	05/24/2018	Property damage only (none injured)	2:16 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4558261	BOSTON	06/18/2018	Property damage only (none injured)	11:47 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4571369	BOSTON	07/20/2018	Property damage only (none injured)	1:05 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4578240	BOSTON	07/17/2018	Property damage only (none injured)	3:08 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Rain
4578556	BOSTON	08/04/2018	Property damage only (none injured)	2:00 AM	1	State police	Collision with curb	Dark - lighted roadway	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4587762	BOSTON	08/27/2018	Property damage only (none injured)	2:22 PM	1	State police	Other non-collision	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4593485	BOSTON	09/08/2018	Property damage only (none injured)	7:05 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4594353	BOSTON	09/16/2018	Property damage only (none injured)	2:50 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Backing / V2: Slowing or stopped in traffic	Clear
4599944	BOSTON	09/05/2018	Property damage only (none injured)	3:04 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4599976	BOSTON	08/09/2018	Property damage only (none injured)	5:20 PM	2	State police	Not reported	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Not reported	Clear
4611241	BOSTON	10/10/2018	Property damage only (none injured)	2:43 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear/Cloudy
4617562	BOSTON	10/23/2018	Property damage only (none injured)	7:11 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear/Rain
4617651	BOSTON	10/27/2018	Property damage only (none injured)	5:10 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Wet	V1: Turning left / V2: Travelling straight ahead	Rain

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Cambridge Street at Soldiers Field Road (cont.)													
4626921	BOSTON	11/15/2018	Property damage only (none injured)	9:03 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear/Cloudy
4606139	BOSTON	10/02/2018	Property damage only (none injured)	8:52 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Wet	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	Clear
4507591	BOSTON	01/23/2018	Non-fatal injury	3:00 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4473748	BOSTON	12/26/2017	Non-fatal injury	8:25 PM	2	State police	Collision with motor vehicle in traffic	Dark - roadway not lighted	Sideswipe, same direction		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4470527	BOSTON	11/15/2017	Property damage only (none injured)	6:30 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Turning left	Clear
4469963	BOSTON	12/13/2017	Property damage only (none injured)	1:30 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Turning left	Clear
4438961	BOSTON	09/30/2017	Non-fatal injury	3:50 PM	2	State police	Not reported	Daylight	Sideswipe, same direction		Wet	V1: Turning left / V2: Turning left	Rain
4438959	BOSTON	09/25/2017	Property damage only (none injured)	9:50 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Turning left	Cloudy
4414209	BOSTON	08/25/2017	Non-fatal injury	6:25 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	Clear
4389830	BOSTON	07/14/2017	Property damage only (none injured)	9:15 PM	2	State police	Not reported	Dark - lighted roadway	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4387037	BOSTON	06/19/2017	Property damage only (none injured)	6:30 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Turning left / V2: Turning left	Clear
4369117	BOSTON	05/19/2017	Property damage only (none injured)	8:50 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Turning left	Clear
4365609	BOSTON	04/21/2017	Property damage only (none injured)	11:45 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4361914	BOSTON	05/06/2017	Property damage only (none injured)	11:51 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Cloudy/Rain
4359646	BOSTON	04/28/2017	Non-fatal injury	11:18 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4345849	BOSTON	03/31/2017	Property damage only (none injured)	6:50 PM	2	State police	Collision with motor vehicle in traffic	Dusk	Rear-end		Wet	V1: Turning left / V2: Travelling straight ahead	Rain
4331236	BOSTON	01/29/2017	Property damage only (none injured)	1:45 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4312697	BOSTON	12/05/2016	Property damage only (none injured)	3:50 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
4293467	BOSTON	11/20/2016	Property damage only (none injured)	8:10 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Cloudy
4276280	BOSTON	10/29/2016	Property damage only (none injured)	2:40 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4259958	BOSTON	10/09/2016	Non-fatal injury	4:40 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Wet	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Rain
4258036	BOSTON	09/23/2016	Property damage only (none injured)	7:11 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Changing lanes / V2: Travelling straight ahead	Clear
4253537	BOSTON	08/29/2016	Non-fatal injury	1:12 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Entering traffic lane	Clear

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
Cambridge Street at Soldiers Field Road (cont.)													
4205742	BOSTON	05/20/2016	Property damage only (none injured)	9:30 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Turning left	Cloudy
4180840	BOSTON	04/12/2016	Property damage only (none injured)	6:15 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Single vehicle crash		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
4179406	BOSTON	04/09/2016	Property damage only (none injured)	2:45 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Changing lanes	Clear
4174407	BOSTON	04/04/2016	Property damage only (none injured)	12:20 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Snow	V1: Travelling straight ahead / V2: Travelling straight ahead	Snow
4165135	BOSTON	03/04/2016	Property damage only (none injured)	8:25 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Turning left	Cloudy
4164654	BOSTON	02/17/2016	Property damage only (none injured)	2:37 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning right / V2: Travelling straight ahead	Clear
4162497	BOSTON	03/11/2016	Property damage only (none injured)	2:45 AM	3	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Wet	V1: Slowing or stopped in traffic / V2: Travelling straight ahead / V3:	Rain
4125780	BOSTON	12/17/2015	Property damage only (none injured)	3:15 PM	2	State police	Collision with motor vehicle in traffic	Dusk	Angle		Wet	V1: Turning left / V2: Travelling straight ahead	Rain
4114302	BOSTON	11/13/2015	Property damage only (none injured)	12:01 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Travelling straight ahead / V2: Changing lanes	Clear
4110802	BOSTON	11/07/2015	Property damage only (none injured)	2:31 PM	1	State police	Collision with other light pole or other post/support	Daylight	Single vehicle crash		Dry	V1: Changing lanes	Cloudy
4106821	BOSTON	10/30/2015	Property damage only (none injured)	2:00 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4106820	BOSTON	10/27/2015	Property damage only (none injured)	12:23 PM	1	State police	Collision with other light pole or other post/support	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead	Clear
4104886	BOSTON	10/23/2015	Non-fatal injury	2:20 AM	1	State police	Collision with median barrier	Dark - lighted roadway	Single vehicle crash		Dry	V1: Turning right	Clear
4102398	BOSTON	10/16/2015	Property damage only (none injured)	4:57 PM	3	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3:	Clear
4090171	BOSTON	08/26/2015	Property damage only (none injured)	11:50 PM	3	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Turning left / V3: Slowing or	Clear
4084246	BOSTON	08/22/2015	Property damage only (none injured)	9:23 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Turning left	Clear
4070592	BOSTON	07/25/2015	Property damage only (none injured)	1:28 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Leaving traffic lane	Clear
4065874	BOSTON	07/21/2015	Property damage only (none injured)	4:20 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4049529	BOSTON	05/28/2015	Property damage only (none injured)	10:29 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4049042	BOSTON	05/31/2015	Property damage only (none injured)	10:45 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Rain
4048079	BOSTON	05/20/2015	Property damage only (none injured)	10:40 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Turning left	Clear
4035895	BOSTON	04/17/2015	Property damage only (none injured)	9:45 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Wet	V1: Turning left / V2: Travelling straight ahead	Rain
4029204	BOSTON	03/29/2015	Property damage only (none injured)	9:39 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
Cambridge Street at Soldiers Field Road (cont.)													
4005282	BOSTON	01/16/2015	Non-fatal injury	7:45 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Ice	V1: Travelling straight ahead / V2: Travelling straight ahead	Snow/Sleet, hail (freezing
3992654	BOSTON	01/07/2015	Property damage only (none injured)	7:03 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Ice	V1: Slowing or stopped in traffic / V2: Entering traffic lane	Cloudy
3984888	BOSTON	12/07/2014	Property damage only (none injured)	1:45 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Turning left	Clear
3980724	BOSTON	11/29/2014	Property damage only (none injured)	12:50 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
3980011	BOSTON	12/03/2014	Property damage only (none injured)	11:15 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Wet	V1: Travelling straight ahead / V2: Turning left	Rain
3977862	BOSTON	10/27/2014	Non-fatal injury	7:25 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
3933733	BOSTON	09/04/2014	Non-fatal injury	7:45 PM	2	State police	Collision with motor vehicle in traffic	Dusk	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
3922607	BOSTON	08/21/2014	Non-fatal injury	10:36 PM	1	State police	Not reported	Dark - lighted roadway	Single vehicle crash		Dry	V1: Turning right	Clear
3876700	BOSTON	06/19/2014	Property damage only (none injured)	12:07 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Turning left	Clear
3783317	BOSTON	02/26/2014	Non-fatal injury	3:25 PM	4	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3:	Clear
3778783	BOSTON	02/26/2014	Property damage only (none injured)	3:15 PM	3	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic /	Not Reported
3748808	BOSTON	02/26/2014	Non-fatal injury	3:17 PM	1	State police	Collision with guardrail	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
3714091	BOSTON	01/02/2014	Non-fatal injury	10:15 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Snow	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	Snow
4623574	BOSTON	11/11/2018	Property damage only (none injured)	8:22 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Entering traffic lane	Clear

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
Memorial Drive at River Street													
3714988	CAMBRIDGE	01/02/2014	Property damage only (none injured)	1:53 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Head-on		Snow	V1: Travelling straight ahead / V2: Travelling straight ahead	Snow
3735105	CAMBRIDGE	01/21/2014	Property damage only (none injured)	12:30 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Wet	V1: Travelling straight ahead / V2: Changing lanes	Clear
3738718	CAMBRIDGE	02/09/2014	Property damage only (none injured)	1:48 PM	2	State police	Not reported	Daylight	Not reported		Snow	V1: Travelling straight ahead / V2: Travelling straight ahead	Cloudy/Sleet, hail (freezing
3776244	CAMBRIDGE	02/18/2014	Non-fatal injury	2:49 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Snow	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Snow
3793929	CAMBRIDGE	04/25/2014	Non-fatal injury	1:02 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Rear-end	P2: Approaching or leaving vehicle	Dry	V1: Slowing or stopped in traffic	Clear
3912840	CAMBRIDGE	07/16/2014	Not Reported	10:28 PM	1	Local police	Not reported	Dark - lighted roadway	Angle	P2: Entering or crossing specified	Dry	V1: Turning left	Clear
3926192	CAMBRIDGE	09/03/2014	Property damage only (none injured)	12:29 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
3928461	CAMBRIDGE	08/04/2014	Property damage only (none injured)	11:23 AM	2	Local police	Not reported	Daylight	Sideswipe, same direction		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
3962280	CAMBRIDGE	10/05/2014	Property damage only (none injured)	3:17 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
3971963	CAMBRIDGE	10/30/2014	Property damage only (none injured)	6:26 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Turning right / V2: Turning right	Cloudy
3971992	CAMBRIDGE	10/15/2014	Property damage only (none injured)	12:41 PM	1	State police	Collision with bridge	Daylight	Single vehicle crash		Dry	V1: Slowing or stopped in traffic	Clear
3980006	CAMBRIDGE	11/25/2014	Property damage only (none injured)	9:10 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Overtaking/passing / V2: Travelling straight ahead	Clear
3993168	CAMBRIDGE	01/11/2015	Property damage only (none injured)	6:40 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Changing lanes	Cloudy
4021249	CAMBRIDGE	03/13/2015	Property damage only (none injured)	12:31 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4022803	CAMBRIDGE	03/15/2015	Non-fatal injury	8:20 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4044480	CAMBRIDGE	05/19/2015	Property damage only (none injured)	11:00 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	Clear
4045723	CAMBRIDGE	05/20/2015	Property damage only (none injured)	10:00 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Cloudy
4060256	CAMBRIDGE	06/02/2015	Non-fatal injury	11:08 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, opposite		Dry	V1: Turning right / V2: Slowing or stopped in traffic	Clear
4060291	CAMBRIDGE	06/13/2015	Property damage only (none injured)	12:42 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4073578	CAMBRIDGE	08/07/2015	Non-fatal injury	4:43 PM	3	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic /	Clear
4082999	CAMBRIDGE	09/09/2015	Non-fatal injury	9:58 PM	3	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Slowing or stopped in traffic / V2: Turning right / V3: Turning	Clear
4084567	CAMBRIDGE	09/12/2015	Property damage only (none injured)	11:15 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Leaving traffic lane	Rain
4089424	CAMBRIDGE	08/28/2015	Property damage only (none injured)	2:45 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Changing lanes	Clear

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Memorial Drive at River Street (cont.)													
4094892	CAMBRIDGE	10/06/2015	Non-fatal injury	6:36 PM	3	State police	Not reported	Dusk	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic /	Clear
4099212	CAMBRIDGE	07/04/2015	Property damage only (none injured)	11:38 PM	2	Local police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4102135	CAMBRIDGE	10/23/2015	Non-fatal injury	2:45 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	Clear
4104883	CAMBRIDGE	10/24/2015	Property damage only (none injured)	10:15 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Changing lanes / V2: Travelling straight ahead	Not Reported
4140635	CAMBRIDGE	01/02/2016	Property damage only (none injured)	12:33 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4157187	CAMBRIDGE	11/20/2015	Non-fatal injury	3:32 AM	2	Local police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Rain/Rain
4186719	CAMBRIDGE	05/03/2016	Unknown	6:40 PM	2	Local police	Not reported	Daylight	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Rain
4200473	CAMBRIDGE	06/04/2016	Not Reported	12:19 PM	2	Local police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Turning right / V2: Other	Clear/Clear
4220889	CAMBRIDGE	05/26/2016	Non-fatal injury	1:10 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Not reported / V2: Not reported	Not Reported
4220899	CAMBRIDGE	06/13/2016	Non-fatal injury	12:53 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4222418	CAMBRIDGE	07/12/2016	Property damage only (none injured)	9:40 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4226728	CAMBRIDGE	07/21/2016	Property damage only (none injured)	2:50 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4262528	CAMBRIDGE	10/12/2016	Not Reported	10:06 PM	2	Local police	Not reported	Dusk	Sideswipe, opposite		Not reported	V1: Parked / V2: Travelling straight ahead	Clear
4266838	CAMBRIDGE	10/14/2016	Non-fatal injury	2:15 AM	1	State police	Collision with curb	Dark - lighted roadway	Single vehicle crash		Dry	V1: Turning left	Not Reported
4277464	CAMBRIDGE	11/02/2016	Unknown	10:47 PM	2	Local police	Not reported	Dusk	Angle		Dry	V1: Turning right / V2: Travelling straight ahead	Cloudy
4281527	CAMBRIDGE	11/07/2016	Non-fatal injury	12:50 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4290129	CAMBRIDGE	11/12/2016	Non-fatal injury	3:10 AM	2	State police	Collision with other movable object	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Not Reported
4291876	CAMBRIDGE	11/07/2016	Non-fatal injury	3:20 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Walking, running or cycling	Dry	V1: Travelling straight ahead	Clear
4313028	CAMBRIDGE	12/29/2016	Property damage only (none injured)	1:15 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Wet	V1: Not reported / V2: Not reported	Rain
4317769	CAMBRIDGE	11/22/2016	Property damage only (none injured)	7:17 AM	3	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead / V3:	Cloudy
4335483	CAMBRIDGE	02/23/2017	Property damage only (none injured)	5:31 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Changing lanes / V2: Travelling straight ahead	Clear
4338452	CAMBRIDGE	03/05/2017	Property damage only (none injured)	12:01 PM	1	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead	Clear
4350017	CAMBRIDGE	04/08/2017	Property damage only (none injured)	9:35 AM	2	Local police	Unknown	Unknown	Sideswipe, same direction		Unknown	V1: Unknown / V2: Travelling straight ahead	Unknown/Unknown

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Memorial Drive at River Street (cont.)													
4384979	CAMBRIDGE	05/28/2017	Property damage only (none injured)	7:05 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Changing lanes	Clear
4397830	CAMBRIDGE	07/24/2017	Property damage only (none injured)	4:30 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Wet	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	Rain
4423813	CAMBRIDGE	08/19/2017	Property damage only (none injured)	3:30 PM	2	State police	Not reported	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4426868	CAMBRIDGE	06/02/2017	Property damage only (none injured)	1:05 PM	1	State police	Collision with tree	Daylight	Rear-end		Dry	V1: Backing	Clear
4433614	CAMBRIDGE	10/01/2017	Property damage only (none injured)	10:43 PM	2	Local police	Collision with motor vehicle in traffic	Dark - lighted roadway	Single vehicle crash		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4452825	CAMBRIDGE	11/02/2017	Property damage only (none injured)	8:30 PM	2	Local police	Collision with motor vehicle in traffic	Daylight	Unknown		Dry	V1: Parked / V2: Unknown	Cloudy
4457273	CAMBRIDGE	11/21/2017	Non-fatal injury	9:10 AM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Entering or crossing specified	Dry	V1: Turning right	Clear
4492683	CAMBRIDGE	01/20/2018	Property damage only (none injured)	2:37 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4503770	CAMBRIDGE	02/01/2018	Property damage only (none injured)	8:29 PM	2	State police	Not reported	Dark - lighted roadway	Angle		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Snow
4571501	CAMBRIDGE	07/17/2018	Non-fatal injury	10:15 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Changing lanes / V2: Travelling straight ahead	Clear
4617645	CAMBRIDGE	10/23/2018	Non-fatal injury	4:25 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Sideswipe, same direction	P2: Walking, running or cycling	Dry	V1: Travelling straight ahead	Cloudy
4626925	CAMBRIDGE	11/23/2018	Non-fatal injury	2:18 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4636237	CAMBRIDGE	12/10/2018	Property damage only (none injured)	3:10 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
4639495	CAMBRIDGE	12/12/2018	Property damage only (none injured)	4:37 PM	2	State police	Collision with motor vehicle in traffic	Dark - roadway not lighted	Rear-end		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4641249	CAMBRIDGE	12/24/2018	Non-fatal injury	4:00 PM	7	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, opposite		Wet	V6: Slowing or stopped in traffic / V1: Travelling straight ahead / V2:	Clear/Snow
4644292	CAMBRIDGE	12/30/2018	Non-fatal injury	1:05 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
Memorial Drive at Western Avenue													
3714989	CAMBRIDGE	01/03/2014	Property damage only (none injured)	1:54 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Head-on		Ice	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	Not Reported
3714990	CAMBRIDGE	01/07/2014	Property damage only (none injured)	9:18 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
3718322	CAMBRIDGE	01/17/2014	Property damage only (none injured)	11:43 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Cloudy
3772676	CAMBRIDGE	03/15/2014	Non-fatal injury	4:33 PM	3	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead / V3:	Clear
3778782	CAMBRIDGE	02/15/2014	Property damage only (none injured)	11:17 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, opposite		Snow	V1: Travelling straight ahead / V2: Travelling straight ahead	Snow
3793939	CAMBRIDGE	04/08/2014	Non-fatal injury	6:55 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Wet	V1: Travelling straight ahead / V2: Turning left	Cloudy/Rain
3799212	CAMBRIDGE	05/02/2014	Property damage only (none injured)	10:35 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Turning right	Clear
3802094	CAMBRIDGE	05/02/2014	Property damage only (none injured)	9:07 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Turning left / V2: Turning left	Clear
3829999	CAMBRIDGE	06/09/2014	Non-fatal injury	1:21 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
3899695	CAMBRIDGE	08/05/2014	Property damage only (none injured)	4:48 PM	4	State police	Collision with motor vehicle in traffic	Daylight	Rear-to-rear		Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic /	Clear
3926183	CAMBRIDGE	08/22/2014	Property damage only (none injured)	1:00 PM	3	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead / V3:	Clear
3926191	CAMBRIDGE	08/29/2014	Non-fatal injury	11:21 AM	1	State police	Collision with embankment	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
3935854	CAMBRIDGE	09/11/2014	Property damage only (none injured)	3:35 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
3971999	CAMBRIDGE	10/17/2014	Property damage only (none injured)	9:08 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	Cloudy
3973618	CAMBRIDGE	10/21/2014	Property damage only (none injured)	4:41 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Changing lanes	Not Reported
3989841	CAMBRIDGE	11/29/2014	Non-fatal injury	4:48 PM	3	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3:	Clear
3991993	CAMBRIDGE	12/16/2014	Property damage only (none injured)	11:40 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Cloudy
4016326	CAMBRIDGE	02/04/2015	Property damage only (none injured)	11:10 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Cloudy
4029353	CAMBRIDGE	04/06/2015	Non-fatal injury	3:15 AM	1	State police	Collision with other	Dark - lighted roadway	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4066067	CAMBRIDGE	07/08/2015	Non-fatal injury	11:38 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4076583	CAMBRIDGE	08/10/2015	Property damage only (none injured)	12:55 AM	2	State police	Not reported	Dark - lighted roadway	Head-on		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4081573	CAMBRIDGE	09/01/2015	Property damage only (none injured)	6:58 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4083938	CAMBRIDGE	09/12/2015	Non-fatal injury	12:51 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Head-on		Dry	V1: Turning left / V2: Travelling straight ahead	Clear

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
Memorial Drive at Western Avenue (cont.)													
4093594	CAMBRIDGE	09/10/2015	Non-fatal injury	11:22 AM	1	State police	Collision with utility pole	Daylight	Single vehicle crash		Dry	V1: Travelling straight ahead	Not Reported
4135199	CAMBRIDGE	09/28/2015	Property damage only (none injured)	6:21 PM	2	Local police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Turning right	Clear
4135521	CAMBRIDGE	12/25/2015	Non-fatal injury	6:35 PM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Angle	P2: Walking, running or cycling	Dry	V1: Travelling straight ahead	Clear
4148293	CAMBRIDGE	01/16/2016	Property damage only (none injured)	2:30 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	Rain
4168876	CAMBRIDGE	12/16/2015	Property damage only (none injured)	2:06 PM	2	Local police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Slowing or stopped in traffic / V2: Changing lanes	Clear
4170116	CAMBRIDGE	03/31/2016	Property damage only (none injured)	10:50 PM	1	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Single vehicle crash		Dry	V1: Travelling straight ahead	Clear
4176743	CAMBRIDGE	04/12/2016	Property damage only (none injured)	3:30 PM	3	Local police	Collision with motor vehicle in traffic	Daylight	Rear-end		Wet	V1: Travelling straight ahead / V2: Travelling straight ahead / V3:	Rain
4202741	CAMBRIDGE	05/30/2016	Property damage only (none injured)	4:36 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4204904	CAMBRIDGE	05/27/2016	Non-fatal injury	5:43 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4220895	CAMBRIDGE	06/09/2016	Property damage only (none injured)	7:16 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Turning left	Not Reported
4222420	CAMBRIDGE	07/15/2016	Non-fatal injury	3:10 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4229010	CAMBRIDGE	07/25/2016	Property damage only (none injured)	8:55 AM	1	State police	Collision with pedalcycle (bicycle, tricycle, unicycle,	Daylight	Single vehicle crash	P2: Walking, running or cycling	Dry	V1: Turning right	Clear
4239124	CAMBRIDGE	08/22/2016	Property damage only (none injured)	3:30 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4245562	CAMBRIDGE	09/07/2016	Non-fatal injury	8:30 PM	1	State police	Collision with pedestrian	Dark - lighted roadway	Single vehicle crash	P2: Entering or crossing specified	Dry	V1: Turning left	Clear
4249257	CAMBRIDGE	09/13/2016	Non-fatal injury	1:37 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4255742	CAMBRIDGE	09/29/2016	Non-fatal injury	12:32 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Not Reported
4262314	CAMBRIDGE	09/21/2016	Property damage only (none injured)	1:15 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4268992	CAMBRIDGE	10/23/2016	Property damage only (none injured)	1:30 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Not reported / V2: Not reported	Clear
4281056	CAMBRIDGE	11/07/2016	Property damage only (none injured)	10:38 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Turning left / V2: Turning left	Clear
4313009	CAMBRIDGE	11/17/2016	Property damage only (none injured)	8:30 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction		Dry	V1: Changing lanes / V2: Travelling straight ahead	Clear
4331239	CAMBRIDGE	02/25/2017	Non-fatal injury	11:48 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Wet	V1: Leaving traffic lane / V2: Turning left	Cloudy
4333515	CAMBRIDGE	02/25/2017	Non-fatal injury	8:36 PM	2	Local police	Not reported	Dark - lighted roadway	Sideswipe, same direction		Wet	V1: Travelling straight ahead / V2: Turning left	Rain
4335486	CAMBRIDGE	02/28/2017	Non-fatal injury	1:58 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
Memorial Drive at Western Avenue (cont.)													
4338831	CAMBRIDGE	03/14/2017	Property damage only (none injured)	1:39 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Snow	V1: Travelling straight ahead / V2: Travelling straight ahead	Snow
4370780	CAMBRIDGE	02/08/2017	Not Reported	3:39 PM	2	Local police	Collision with motor vehicle in traffic	Dawn	Rear-end		Ice	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Cloudy
4373077	CAMBRIDGE	05/19/2017	Non-fatal injury	2:15 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4416269	CAMBRIDGE	08/26/2017	Property damage only (none injured)	9:15 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	Clear
4449413	CAMBRIDGE	09/24/2017	Non-fatal injury	1:50 AM	2	State police	Collision with other movable object	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4453771	CAMBRIDGE	11/09/2017	Property damage only (none injured)	12:15 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4486879	CAMBRIDGE	12/29/2017	Property damage only (none injured)	12:35 AM	3	State police	Collision with other movable object	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead / V3:	Not Reported
4492682	CAMBRIDGE	01/19/2018	Property damage only (none injured)	9:47 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Head-on		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4522877	CAMBRIDGE	02/23/2018	Property damage only (none injured)	9:04 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4524041	CAMBRIDGE	03/28/2018	Property damage only (none injured)	2:01 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Cloudy
4551521	CAMBRIDGE	06/04/2018	Non-fatal injury	12:06 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4559124	CAMBRIDGE	06/30/2018	Non-fatal injury	10:16 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Not Reported
4560578	CAMBRIDGE	06/25/2018	Property damage only (none injured)	12:49 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Turning left / V2: Travelling straight ahead	Clear
4586591	CAMBRIDGE	07/12/2018	Property damage only (none injured)	6:10 AM	1	State police	Collision with motor vehicle in traffic	Dawn	Angle	P2: Walking, running or cycling	Dry	V1: Turning right	Not Reported
4602101	CAMBRIDGE	09/17/2018	Non-fatal injury	1:50 AM	3	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead / V3:	Cloudy
4638396	CAMBRIDGE	12/07/2018	Property damage only (none injured)	8:08 AM	3	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Slowing or stopped in traffic / V2: Changing lanes / V3:	Clear
4648652	CAMBRIDGE	12/21/2018	Non-fatal injury	1:24 AM	2	State police	Collision with other movable object	Dark - lighted roadway	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Cloudy

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	# of Vehicles	Police Agency Type	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Road Surface	Vehicle Actions Prior to Crash (All Vehicles)	Weather Conditions
Western Avenue at Soldiers Field Road													
3784005	BOSTON	03/05/2014	Property damage only (none injured)	7:00 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Cloudy
3793932	BOSTON	04/01/2014	Property damage only (none injured)	9:43 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
3871545	BOSTON	07/03/2014	Property damage only (none injured)	2:19 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Cloudy
3949497	BOSTON	09/17/2014	Property damage only (none injured)	6:44 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Turning right	Clear
3963745	BOSTON	09/12/2014	Property damage only (none injured)	6:00 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Turning left	Clear
3972029	BOSTON	10/29/2014	Property damage only (none injured)	11:30 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	Clear
3973125	BOSTON	11/08/2014	Property damage only (none injured)	6:32 PM	3	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead / V3:	Clear
4004457	BOSTON	02/06/2015	Property damage only (none injured)	8:13 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	Clear
4025387	BOSTON	03/17/2015	Property damage only (none injured)	5:59 PM	2	State police	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction		Dry	V1: Changing lanes / V2: Changing lanes	Clear
4031127	BOSTON	03/24/2015	Property damage only (none injured)	11:16 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Not Reported
4445703	BOSTON	10/03/2017	Property damage only (none injured)	8:59 AM	2	State police	Collision with motor vehicle in traffic	Daylight	Angle		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
4503774	BOSTON	02/10/2018	Property damage only (none injured)	6:16 PM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle		Dry	V1: Turning right / V2: Travelling straight ahead	Cloudy
4614967	BOSTON	10/13/2018	Non-fatal injury	4:15 AM	2	State police	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear
Western Avenue at Batten Way / Hague Street													
3791068	BOSTON	04/06/2014	Non-fatal injury	6:36 AM	5	Local police	Collision with parked motor vehicle	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Parked / V3: Parked / V4: Slowing	Clear
4344813	BOSTON	03/12/2017	Non-fatal injury	10:10 AM	2	Local police	Collision with motor vehicle in traffic	Daylight	Rear-end		Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	Clear

CRASH RATE WORKSHEET

CITY/TOWN : Boston

COUNT DATE : May 2018

DISTRICT : 6

UNSIGNALIZED :

SIGNALIZED : X

~ INTERSECTION DATA ~

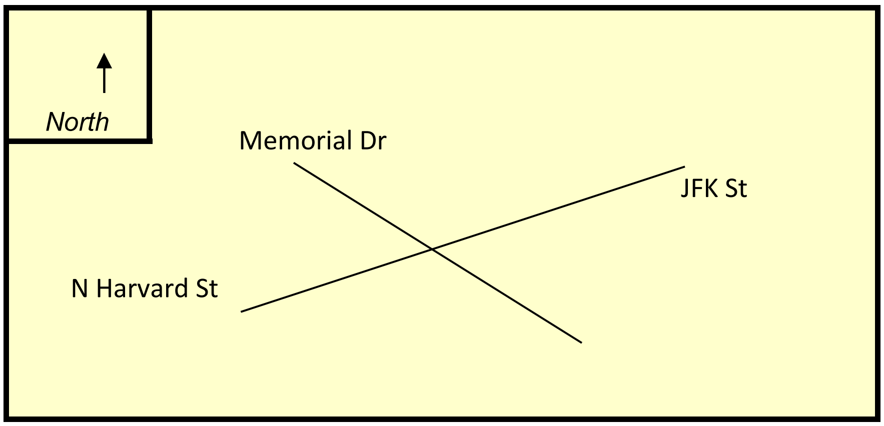
MAJOR STREET : N Harvard Street

MINOR STREET(S) : Memorial Drive

JFK Street

INTERSECTION DIAGRAM

(Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	6
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	960	285	1010	1005		

" K " FACTOR : 0.09

APPROACH ADT : 36222.222

ADT = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 77

OF YEARS : 5

AVERAGE # OF CRASHES (**A**) : 15.40

CRASH RATE CALCULATION : 1.16

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(ADT * 365)}$$

Source (optional):

Comments:

last updated: 11/06/01

CRASH RATE WORKSHEET

CITY/TOWN : Boston

COUNT DATE : April 2017

DISTRICT : 6

UNSIGNALIZED :

SIGNALIZED : X

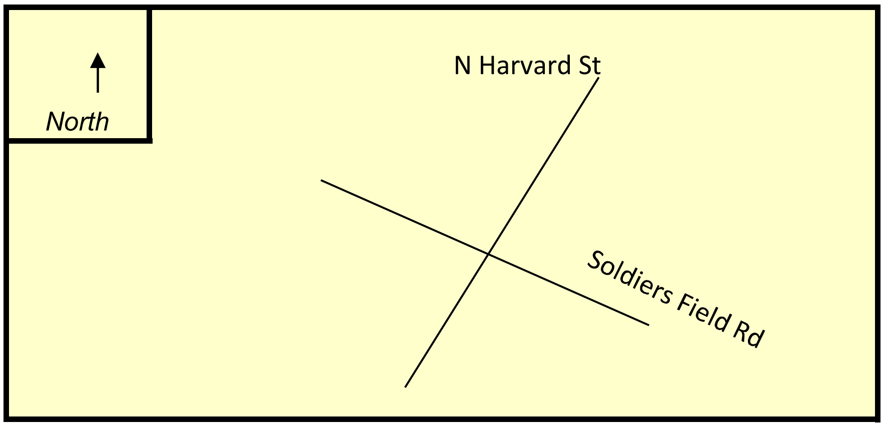
~ INTERSECTION DATA ~

MAJOR STREET : North Harvard Street

MINOR STREET(S) : Soldiers Field Road

INTERSECTION DIAGRAM

(Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	6
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	470	565	441	457		

" K " FACTOR : 0.09

APPROACH ADT : 21477.778

ADT = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 79

OF YEARS : 5

AVERAGE # OF CRASHES (**A**) : 15.80

CRASH RATE CALCULATION : 2.02

$$\text{RATE} = \frac{(A * 1,000,000)}{(ADT * 365)}$$

Source (optional):

Comments:

last updated: 11/06/01

CRASH RATE WORKSHEET

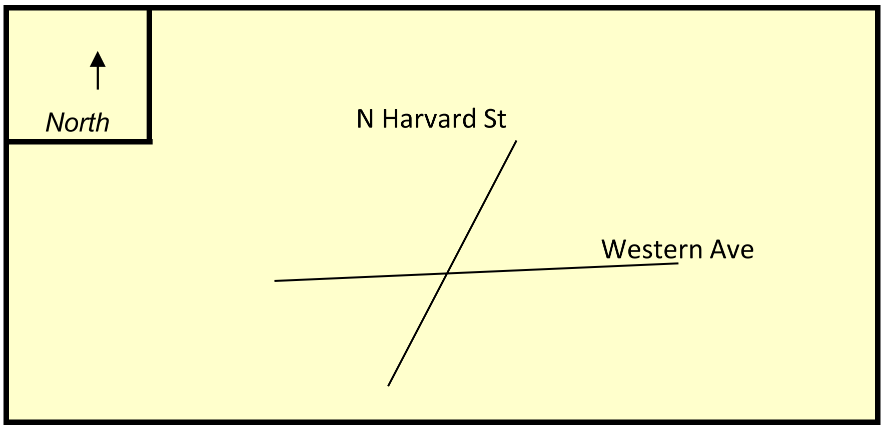
CITY/TOWN :	Boston	COUNT DATE :	April 2017
DISTRICT :	6	UNSIGNALIZED :	
		SIGNALIZED :	X

~ INTERSECTION DATA ~

MAJOR STREET : N Harvard Street

MINOR STREET(S) : Western Avenue

INTERSECTION DIAGRAM
(Label Approaches)



Peak Hour Volumes

APPROACH :	**1**	**2**	**3**	**4**	**5**	**6**
DIRECTION :	NB	SB	EB	WB	Total	
VOLUMES (PM) :	380	485	285	640		

" K " FACTOR : 0.09 APPROACH ADT : 19888.889 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 2 # OF YEARS : 5 AVERAGE # OF CRASHES (**A**) : 0.40

CRASH RATE CALCULATION : 0.06 RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Source (optional):

Comments:

last updated: 11/06/01

CRASH RATE WORKSHEET

CITY/TOWN : Boston

COUNT DATE : April 2017

DISTRICT : 6

UNSIGNALIZED :

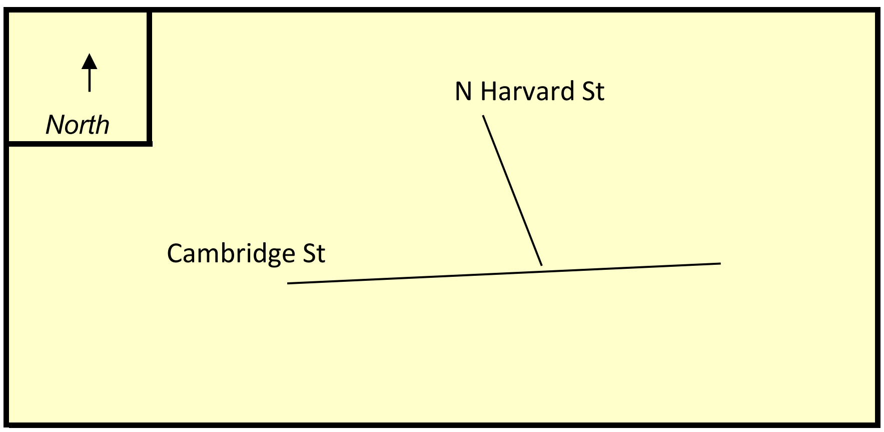
SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : N Harvard Street

MINOR STREET(S) : Cambridge Street

INTERSECTION DIAGRAM
(Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	6
DIRECTION :		SB	EB	WB	Total	
VOLUMES (PM) :		565	1337	1497		

" K " FACTOR : 0.09

APPROACH ADT : 37766.667

ADT = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 7

OF YEARS : 5

AVERAGE # OF CRASHES (**A**) : 1.40

CRASH RATE CALCULATION : 0.10

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(ADT * 365)}$$

Source (optional):

Comments:

last updated: 11/06/01

Moving Massachusetts Forward. massDOT Highway

CRASH RATE WORKSHEET

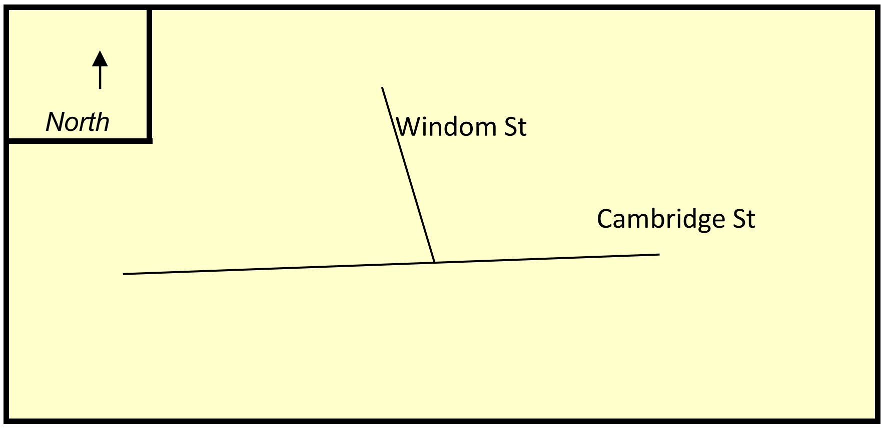
CITY/TOWN :	Boston			COUNT DATE :	April 2017
DISTRICT :	6	UNSIGNALIZED :		SIGNALIZED :	X

~ INTERSECTION DATA ~

MAJOR STREET : Cambridge Street

MINOR STREET(S) : Windsom Street

INTERSECTION DIAGRAM
(Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	6
DIRECTION :		SB	EB	WB		
VOLUMES (PM) :		160	701	1845		

" K " FACTOR : 0.09 APPROACH ADT : 30066.667 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES :	2	# OF YEARS :	5	AVERAGE # OF CRASHES (**A**) :	0.40

CRASH RATE CALCULATION : 0.04 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Source (optional):

Comments:

last updated: 11/06/01

CRASH RATE WORKSHEET

CITY/TOWN : Boston | COUNT DATE : April 2017

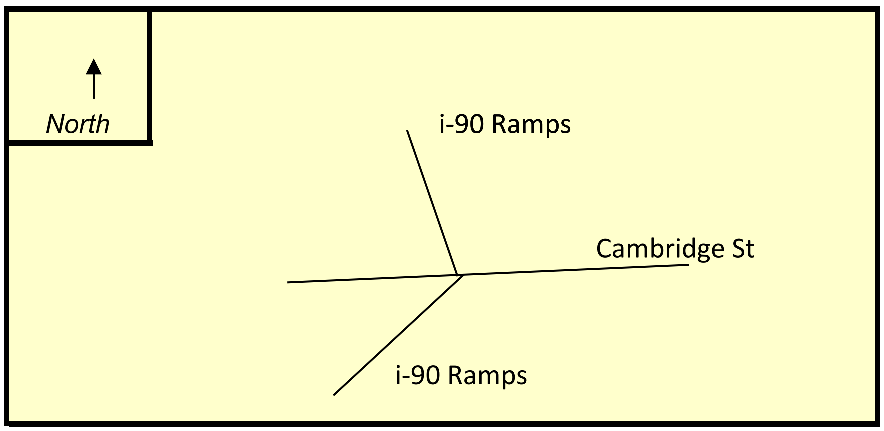
DISTRICT : 6 | UNSIGNALIZED : | SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Cambridge Street

MINOR STREET(S) : I-90 Rampps

INTERSECTION DIAGRAM
(Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	6
DIRECTION :	NB	SB	EB	WB	NEB	
VOLUMES (PM) :	85	1595	780	416	942	

" K " FACTOR : 0.09 | APPROACH ADT : 42422.623 | **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 4 | # OF YEARS : 5 | AVERAGE # OF CRASHES (**A**) : 0.80

CRASH RATE CALCULATION : 0.05 | RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Source (optional):

Comments:

last updated: 11/06/01

CRASH RATE WORKSHEET

CITY/TOWN : Boston

COUNT DATE : April 2017

DISTRICT : 6

UNSIGNALIZED :

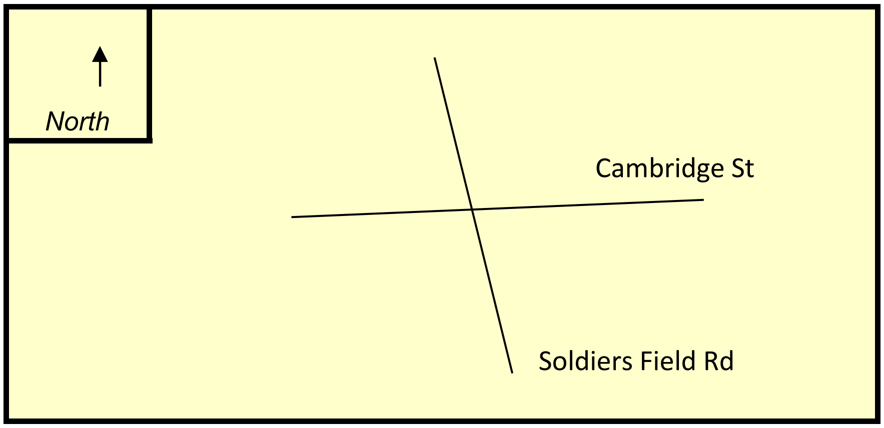
SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Cambridge Street

MINOR STREET(S) : Soldiers Field Road

INTERSECTION DIAGRAM
(Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	6
DIRECTION :	NB	SB	EB			
VOLUMES (PM) :	455	745	1770			

" K " FACTOR : 0.09

APPROACH ADT : 33000

ADT = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 106

OF YEARS : 5

AVERAGE # OF CRASHES (**A**) : 21.20

CRASH RATE CALCULATION : 1.76

RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Source (optional):

Comments:

CRASH RATE WORKSHEET

CITY/TOWN :	Boston	COUNT DATE :	April 2018
DISTRICT :	6	UNSIGNALIZED :	
		SIGNALIZED :	X

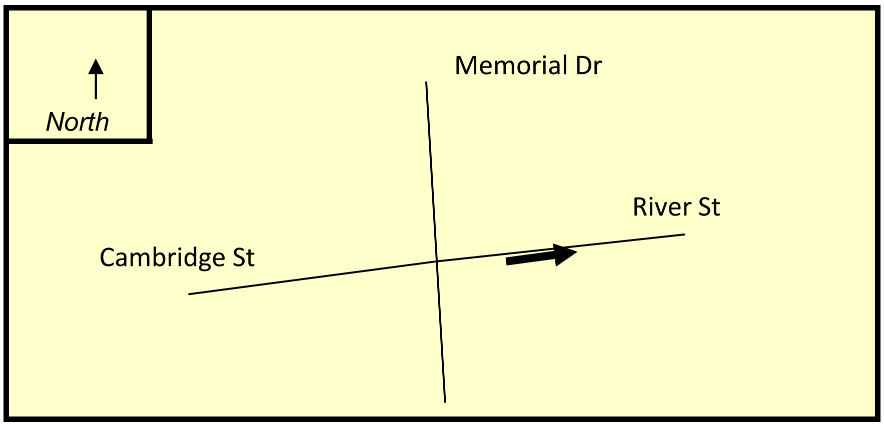
~ INTERSECTION DATA ~

MAJOR STREET : Cambridge Street

MINOR STREET(S) : Memorial Drive

River Street

INTERSECTION DIAGRAM
(Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	6
DIRECTION :	NB	SB	EB			
VOLUMES (PM) :	455	745	1770			

" K " FACTOR : 0.09 APPROACH ADT : 33000 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 62 # OF YEARS : 5 AVERAGE # OF CRASHES (**A**) : 12.40

CRASH RATE CALCULATION : 1.03 RATE = $\frac{(A * 1,000,000)}{(ADT * 365)}$

Source (optional):

Comments:

last updated: 11/06/01

CRASH RATE WORKSHEET

CITY/TOWN : Boston | COUNT DATE : April 2018

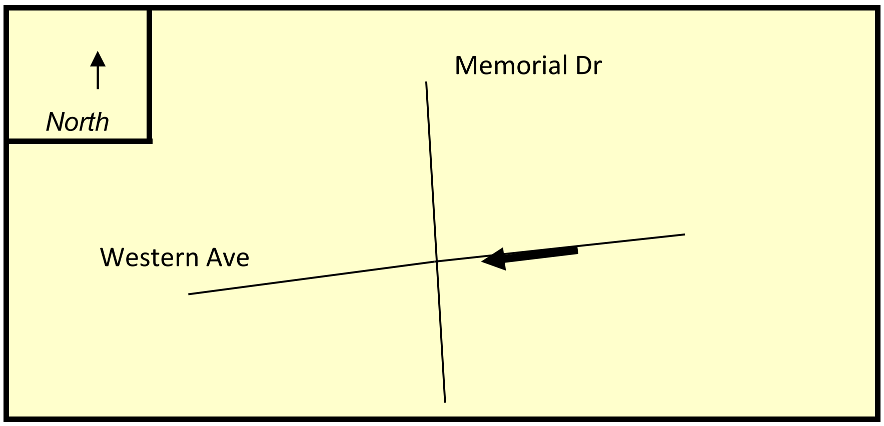
DISTRICT : 6 | UNSIGNALIZED : | SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : Western Avenue

MINOR STREET(S) : Memorial Drive

INTERSECTION DIAGRAM (Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	6
DIRECTION :	NB	SB		WB		
VOLUMES (PM) :	1145	1040		1255		

" K " FACTOR : 0.09 | APPROACH ADT : 38222.222 | **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 63 | # OF YEARS : 5 | AVERAGE # OF CRASHES (**A**) : 12.60

CRASH RATE CALCULATION : 0.90 | RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Source (optional):

Comments:

last updated: 11/06/01

CRASH RATE WORKSHEET

CITY/TOWN : Boston

COUNT DATE : April 2017

DISTRICT : 6

UNSIGNALIZED :

SIGNALIZED : X

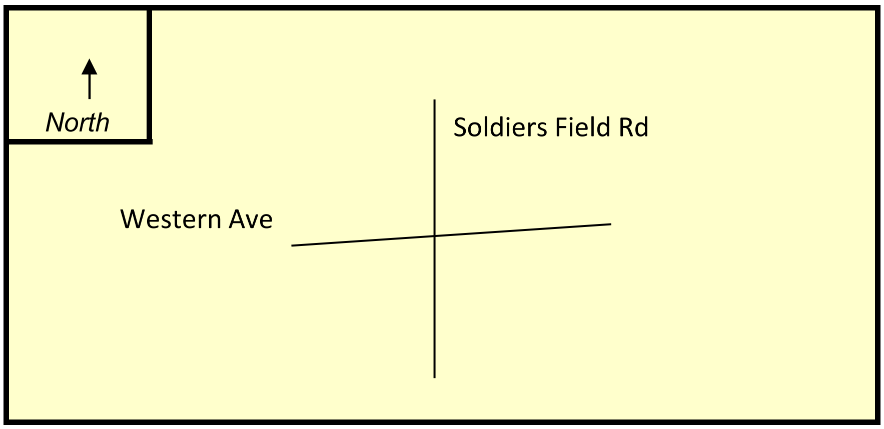
~ INTERSECTION DATA ~

MAJOR STREET : Western Avenue

MINOR STREET(S) : Soldiers Field Road

INTERSECTION DIAGRAM

(Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	6
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	375	660	470	1860		

" K " FACTOR : 0.09

APPROACH ADT : 37388.889

ADT = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 13

OF YEARS : 5

AVERAGE # OF CRASHES (**A**) : 2.60

CRASH RATE CALCULATION : 0.19

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(ADT * 365)}$$

Source (optional):

Comments:

last updated: 11/06/01

CRASH RATE WORKSHEET

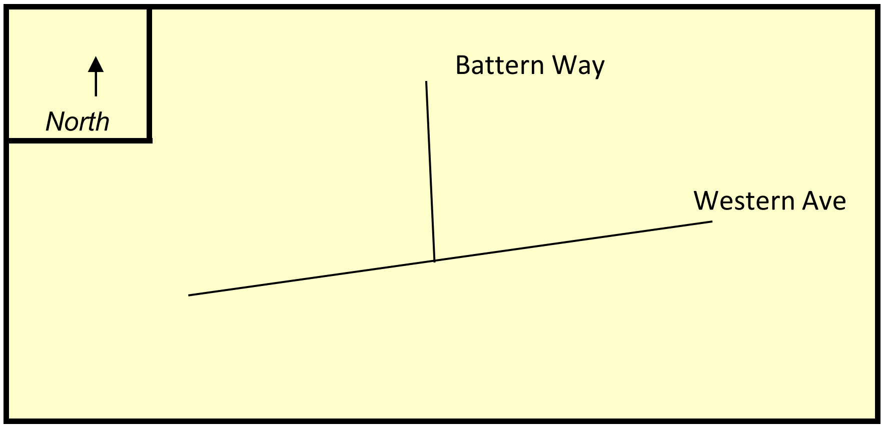
CITY/TOWN :	Boston	COUNT DATE :	April 2017
DISTRICT :	6	UNSIGNALIZED :	
		SIGNALIZED :	X

~ INTERSECTION DATA ~

MAJOR STREET : Western Avenue

MINOR STREET(S) : Batten Way

INTERSECTION DIAGRAM
(Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	6
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	165	101	360	530		

" K " FACTOR : 0.09 APPROACH ADT : 12844.444 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 2 # OF YEARS : 5 AVERAGE # OF CRASHES (**A**) : 0.40

CRASH RATE CALCULATION : 0.09 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Source (optional):

Comments:

last updated: 11/06/01

TRANSPORTATION INFRASTRUCTURE PROJECT VOLUME REDISTRIBUTION

		No Build Conditions (2025 and 2030)								2025 Build Conditions (Phase A)		2030 Build Conditions (Full Build)	
		Academic Way [1]		Stadium Road [2]		Harvard Shuttle Re-Routing [3]		Windom Street One-Way SB [4] / Restriction of Windom St U-Turn [5]		Cattle Drive Connection [6]		Hague Street Closure / Science Drive Extension [7]	
INTERSECTION	MOVEMENT	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1:: Memorial Drive at JFK Street/Anderson Bridge													
Memorial Drive	EB T												
	EB R												
Memorial Drive	WB T												
	WB R												
Anderson Bridge	NB T												
	NB R												
JFK Street	SB T												
	SB R												
2:: Anderson Bridge/N. Harvard St at SFR													
SFR	EB U												
	EB L												
	EB T												
	EB R												
SFR	WB U												
	WB L												
	WB T												
	WB R												
North Harvard St	NB L												
	NB T												
	NB R												
Anderson Bridge	SB L												
	SB T												
	SB R												
3:: N. Harvard St at Western Ave													
Western Ave	EB L												
	EB T												
	EB R												
Western Ave	WB L												
	WB T							-15	-30	15	30		
	WB R	-75	-65										
North Harvard St	NB L							15	30	-15	-30		
	NB T							5	15	-5	-15		
	NB R							55	20	-55	-20		
North Harvard St	SB L	-15	-15										
	SB T												
	SB R												

TRANSPORTATION INFRASTRUCTURE PROJECT VOLUME REDISTRIBUTION

		No Build Conditions (2025 and 2030)								2025 Build Conditions (Phase A)		2030 Build Conditions (Full Build)	
		Academic Way [1]		Stadium Road [2]		Harvard Shuttle Re-Routing [3]		Windom Street One-Way SB [4] / Restriction of Windom St U-Turn [5]		Cattle Drive Connection [6]		Hague Street Closure / Science Drive Extension [7]	
INTERSECTION	MOVEMENT	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
4:: N. Harvard St at Franklin St/Kingsley St													
Franklin St	EB L												
	EB R												
Kingsley St	WB L												
	WB T												
	WB R												
North Harvard St	NB L												
	NB T							75	65	-75	-65		
North Harvard St	SB T												
	SB R												
5:: N. Harvard St at Cambridge St													
Cambridge St	EB U												
	EB L												
	EB T												
Cambridge St	WB U												
	WB T												
	WB R							180	120	-75	-65		
N. Harvard St	SB L												
	SB R												
6A:: Cambridge Street EB at I-90 On-Ramp													
Cambridge St	EB T												
	EB R												
6:: Windom St at Cambridge St													
Cambridge St	EB U												
	EB L												
	EB T												
Cambridge St	WB U												
	WB T							205	135	-75	-65		
	WB R							-490	-315	130	85		
Windom St	SB L							-155	-55				
	SB R												

TRANSPORTATION INFRASTRUCTURE PROJECT VOLUME REDISTRIBUTION

INTERSECTION	MOVEMENT	No Build Conditions (2025 and 2030)								2025 Build Conditions (Phase A)		2030 Build Conditions (Full Build)	
		Academic Way [1]		Stadium Road [2]		Harvard Shuttle Re-Routing [3]		Windom Street One-Way SB [4] / Restriction of Windom St U-Turn [5]		Cattle Drive Connection [6]		Hague Street Closure / Science Drive Extension [7]	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
7:: I-90 ramps/Double Tree Driveway at Cambridge St													
Cambridge St	EB L												
	EB T							-155	-55				
	EB R												
Cambridge St	WB U												
	WB T												
	WB R												
Double Tree Driveway	NB L												
	NB T												
	NB R												
I-90 Ramps	SB R							-285	-180	55	20		
I-90 Off Ramp	NEB HL												
	NEB BL												
	NEB BR							285	180	-55	-20		
8:: SFR at River St/Cambridge St													
Cambridge St	EB U												
	EB L							55	20	-55	-20		
	EB T							50	70				
	EB R							25	35				
SFR	NB U												
	NB L												
	NB T												
	NB R												
SFR	SB U												
	SB L							-50	-70				
	SB T							-25	-35				
	SB R												
9:: Memorial Drive at River Street													
River Street Bridge	EB L												
	EB T												
	EB R												
Memorial Drive	NB T												
	NB R												
Memorial Drive	SB L												
	SB T												

TRANSPORTATION INFRASTRUCTURE PROJECT VOLUME REDISTRIBUTION

		No Build Conditions (2025 and 2030)								2025 Build Conditions (Phase A)		2030 Build Conditions (Full Build)	
		Academic Way [1]		Stadium Road [2]		Harvard Shuttle Re-Routing [3]		Windom Street One-Way SB [4] / Restriction of Windom St U-Turn [5]		Cattle Drive Connection [6]		Hague Street Closure / Science Drive Extension [7]	
INTERSECTION	MOVEMENT	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
10:: Memorial Drive at Western Ave													
Western Ave	WB L												
	WB T												
	WB R												
Memorial Drive	NB L												
	NB T												
Memorial Drive	SB T												
	SB R												
11:: SFR at Western Ave													
Western Ave	EB R							-75	-50				
Western Ave Bridge	WB L												
	WB T												
	WB R												
SFR	NB U												
	NB L							55	20	-55	-20		
	NB T												
SFR	SB T												
	SB R												
12:: Western Ave at Kresge Way / East Dr / Genzyme Driveway													
Western Ave	EB L							-30	-10	15	5		
	EB T							-75	-50				
	EB R												
Western Ave	WB L									5	6		
	WB T							25	10	-30	-16		
	WB R							30	10	-30	-10		
East Dr / Genzyme Driveway	NB L												
	NB T									15	5		
	NB R												

TRANSPORTATION INFRASTRUCTURE PROJECT VOLUME REDISTRIBUTION

		No Build Conditions (2025 and 2030)								2025 Build Conditions (Phase A)		2030 Build Conditions (Full Build)	
		Academic Way [1]		Stadium Road [2]		Harvard Shuttle Re-Routing [3]		Windom Street One-Way SB [4] / Restriction of Windom St U-Turn [5]		Cattle Drive Connection [6]		Hague Street Closure / Science Drive Extension [7]	
INTERSECTION	MOVEMENT	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
13:: Western Ave at Batten Way/ Hague St													
Western Ave	EB L							30	10	-30	-10		
	EB T							25	10	-20	-8	14	6
	EB R			-15	-8							-5	-3
Western Ave	WB L			-8	-9	6	6			-15	-18	-14	-15
	WB T			8	9	-6	-6			20	45	-20	-45
	WB R							25	10	41	14	4	1
Hague St	NB L							-20	-45			-5	-10
	NB T							-55	-20	-11	-4	-4	-1
	NB R							-130	-70			-35	-15
Batten Way	SB L									4	1	1	
	SB T									-4	-1	-1	
	SB R												
14:: Western Ave at Academic Way													
Western Ave	EB L												
	EB T	-15	-15					55	20	-55	-20		
	EB R												
Western Ave	WB L												
	WB T	-75	-65					-15	-30	15	30		
	WB R	75	65			6	6	-5	-15	5	15		
Academic Way	NB L												
	NB T												
	NB R												
Academic Way	SB L	15	15										
	SB T					6	6						
	SB R												
15:: Western Ave at Stadium Road													
Western Ave	EB T			-15	-8			55	20	-50	-18	-5	-3
	EB R			15	8					-5	-3	5	3
Western Ave	WB L			8	9								
	WB T					-6	-6	-20	-45	20	45	-25	-55
Stadium Road	NB L					12	12					25	55
	NB R											14	6

TRANSPORTATION INFRASTRUCTURE PROJECT VOLUME REDISTRIBUTION

		No Build Conditions (2025 and 2030)								2025 Build Conditions (Phase A)		2030 Build Conditions (Full Build)	
		Academic Way [1]		Stadium Road [2]		Harvard Shuttle Re-Routing [3]		Windom Street One-Way SB [4] / Restriction of Windom St U-Turn [5]		Cattle Drive Connection [6]		Hague Street Closure / Science Drive Extension [7]	
INTERSECTION	MOVEMENT	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
16:: N Harvard St at Academic Way													
N Harvard St	NB L												
	NB T	-75	-65					5	15	-5	-15		
	NB R												
N Harvard Street	SB L	15	15			6	6						
	SB T	-15	-15										
	SB R												
Driveway	EB L												
	EB T												
	EB R												
Academic Way	WB L												
	WB T												
	WB R	75	65			6	6	-5	-15	5	15		
17:: Western Ave at Cattle Dr													
Western Ave	EB T							-105	-60	-25	-10	-21	-9
	EB R									9	4	1	
Western Ave	WB L									10	12	14	15
	WB T							25	10	-40	-28	-14	-15
Cattle Dr	NB L									86	69	-16	-44
	NB R									40	15	21	9
18:: Cattle Dr at DEF Drive													
DEF Drive	WB L									5	6		
	WB R												
Cattle Drive	NB T									126	84		
	NB R									15	5		
Cattle Drive	SB L												
	SB T									19	15		

TRANSPORTATION INFRASTRUCTURE PROJECT VOLUME REDISTRIBUTION

		No Build Conditions (2025 and 2030)								2025 Build Conditions (Phase A)		2030 Build Conditions (Full Build)	
		Academic Way [1]		Stadium Road [2]		Harvard Shuttle Re-Routing [3]		Windom Street One-Way SB [4] / Restriction of Windom St U-Turn [5]		Cattle Drive Connection [6]		Hague Street Closure / Science Drive Extension [7]	
INTERSECTION	MOVEMENT	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
19:: Windom St at Almy St													
Almy St	WB L									24	21		
	WB R												
Windom St	NB T							-490	-315	-11	-4		
	NB R									141	89		
Windom St	SB L												
	SB T							-155	-55	-24	-21		

1 - Existing volumes redistributed due to opening of Academic Way between North Harvard Street and Western Avenue.
2 - Existing volumes redistributed due to opening of Stadium Road between Western Avenue and Windom Street (assume 75% of left-turning traffic and 25% of right-turning traffic from Western Avenue to Hague Street rerouted to Stadium Roac
3 - Additional trip generated by rerouting of Harvard shuttles to serve mobility hub on Stadium Road (assume 6 trips per hour per route).
4 - Existing volumes redistributed due to Windom St being converted to one-way SB. Assume approx. 1/3 of NB trips rerouted to North Harvard St, 1/3 rerouted to Soldiers Field Road Service Road, and 1/3 remain to access local neighborhood.
5 - Existing volumes redistributed due to U-turn movement being prohibited at Windom St. Assume approx. 60% of existing SB left movements at Windom St at Cambridge St are U-turn movements that will be rerouted to I-90 Cambridge Street I
6 - No Build volumes redistributed due to opening of Cattle Dr between Cambridge Str and Western Ave. Assume existing NB traffic rerouted from Windom Street due to one-way SB conversion will route back to Cattle Drive. Assume approx. 50% Hague Street / Windom Street traffic will reroute to Cattle Drive.
7 - 2030 No Build volumes redistrubted due to closure of Hague Street and opening of Science Drive. Assume all Hauge Street traffic rerouted to Stadium Road or Science Drive/Cattle Drive.

Project Mode Shares by Use

Residential Mode Shares

	BTD Zone 17 (Allston) [1]				Allston Census Data [2]				2025 Expected Mode Shares [3]				2030 Expected Mode Shares [4]			
	Auto	Transit	Walk [5]	Bike [5]	Auto	Transit	Walk	Bike	Auto	Transit	Walk	Bike	Auto	Transit	Walk	Bike
Daily																
	47%	22%	23%	8%	34.2%	35.6%	23.5%	6.7%	30.8%	37.5%	24.7%	7.0%	27.8%	39.1%	25.8%	7.3%
AM Peak																
IN	37%	30%	25%	8%	26.9%	48.6%	19.1%	5.4%	24.2%	50.4%	19.8%	5.6%	21.9%	51.9%	20.4%	5.8%
OUT	**43%**	**21%**	**27%**	**9%**	**31.3%**	**34.0%**	**27.0%**	**7.7%**	**28.1%**	**35.6%**	**28.3%**	**8.1%**	**25.4%**	**36.9%**	**29.3%**	**8.4%**
PM Peak																
IN	**43%**	**21%**	**27%**	**9%**	**31.3%**	**34.0%**	**27.0%**	**7.7%**	**28.1%**	**35.6%**	**28.3%**	**8.1%**	**25.4%**	**36.9%**	**29.3%**	**8.4%**
OUT	37%	30%	25%	8%	26.9%	48.6%	19.1%	5.4%	24.2%	50.4%	19.8%	5.6%	21.9%	51.9%	20.4%	5.8%

Note: Rows in **BOLD** represent peak direction mode shares.

1 - Based on Access Boston mode share data for Zone 17 (Allston) for Home based trips

2 - Based on American Community Survey (ACS) 2012-2016 five-year estimates for Census Tracts 1, 8.02, and 8.03 (auto mode share includes carpools). Peak hour mode shares adjusted proportionally based on Access Boston data.

3 - 2025 Expected mode shares with 10% reduction in auto share from ACS census data to account for aspirational GoBoston 2030 mode share goals (transit, walk, and bike mode shares increased proportionally).

4 - 2030 expected mode shares with a 2% annual reduction in vehicle mode shares between 2025 and 2030 to account for continued shifts in travel modes (transit, walk, and bike mode shares increased proportionally).

5 - Access Boston mode shares do not separate walk and bike. Based on assumed split of 75% walk/25% bike.

Office / R&D Mode Shares

	BTD Zone 17 (Allston) [1]				Allston Census Data [2]				2025 Expected Mode Shares [3]				2030 Expected Mode Shares [4]			
	Auto	Transit	Walk [5]	Bike [5]	Auto	Transit	Walk	Bike	Auto	Transit	Walk	Bike	Auto	Transit	Walk	Bike
Daily																
	69%	**12%**	**14%**	**5%**	**61.7%**	**20.0%**	**15.7%**	**2.7%**	**55.5%**	**23.2%**	**18.3%**	**3.1%**	**50.2%**	**25.9%**	**20.5%**	**3.5%**
AM Peak																
IN	**59%**	**18%**	**17%**	**6%**	**52.7%**	**29.9%**	**14.9%**	**2.5%**	**47.4%**	**33.3%**	**16.5%**	**2.8%**	**42.9%**	**36.1%**	**17.9%**	**3.0%**
OUT	65%	12%	17%	6%	58.1%	20.0%	18.8%	3.2%	52.3%	22.7%	21.4%	3.6%	47.2%	25.1%	23.7%	4.0%
PM Peak																
IN	65%	12%	17%	6%	58.1%	20.0%	18.8%	3.2%	52.3%	22.7%	21.4%	3.6%	47.2%	25.1%	23.7%	4.0%
OUT	**59%**	**18%**	**17%**	**6%**	**52.7%**	**29.9%**	**14.9%**	**2.5%**	**47.4%**	**33.3%**	**16.5%**	**2.8%**	**42.9%**	**36.1%**	**17.9%**	**3.0%**

Note: Rows in **BOLD** represent peak direction mode shares.

1 - Based on Access Boston mode share data for Zone 17 (Allston) for Work based trips.

2 - Based on American Community Survey (ACS) 2012-2016 five-year estimates for Census Tracts 1, 8.02, and 8.03 (auto mode share includes carpools). Peak hour mode shares adjusted proportionally based on Access Boston data.

3 - 2025 Expected mode shares with 10% reduction in auto share from ACS census data to account for aspirational GoBoston 2030 mode share goals (transit, walk, and bike mode shares increased proportionally).

4 - 2030 expected mode shares with a 2% annual reduction in vehicle mode shares between 2025 and 2030 to account for continued shifts in travel modes (transit, walk, and bike mode shares increased proportionally).

5 - Access Boston mode shares do not separate walk and bike. Based on assumed split of 75% walk/25% bike.

Hotel / Restaurant / Retail Mode Shares

	BTD Zone 17 (Allston) [1]				Allston Census Data [2]				2025 Expected Mode Shares [3]				2030 Expected Mode Shares [4]			
	Auto	Transit	Walk [5]	Bike [5]	Auto	Transit	Walk	Bike	Auto	Transit	Walk	Bike	Auto	Transit	Walk	Bike
Daily																
	52%	**8%**	**30%**	**10%**	**n/a**	**n/a**	**n/a**	**n/a**	**46.8%**	**8.9%**	**33.3%**	**11.1%**	**42.3%**	**9.6%**	**36.1%**	**12.0%**
AM Peak																
IN	**43%**	**11%**	**35%**	**11%**	**n/a**	**n/a**	**n/a**	**n/a**	**38.7%**	**12.2%**	**42.0%**	**7.1%**	**35.0%**	**12.9%**	**44.6%**	**7.5%**
OUT	47%	7%	35%	11%	n/a	n/a	n/a	n/a	42.3%	7.8%	42.7%	7.2%	38.2%	8.3%	45.7%	7.7%
PM Peak																
IN	47%	7%	35%	11%	n/a	n/a	n/a	n/a	42.3%	7.8%	42.7%	7.2%	38.2%	8.3%	45.7%	7.7%
OUT	**43%**	**11%**	**35%**	**11%**	**n/a**	**n/a**	**n/a**	**n/a**	**38.7%**	**12.2%**	**42.0%**	**7.1%**	**35.0%**	**12.9%**	**44.6%**	**7.5%**

Note: Rows in **BOLD** represent peak direction mode shares.

1 - Based on Access Boston mode share data for Zone 17 (Allston) for Other based trips.

2 - American Community Survey (ACS) 2012-2016 five-year estimates mode shares not provided for hotel, restaurant, or retail land uses.

3 - 2025 Expected mode shares with 10% reduction in auto share from Access Boston data to account for aspirational GoBoston 2030 mode share goals (transit, walk, and bike mode shares increased proportionally).

4 - 2030 expected mode shares with a 2% annual reduction in vehicle mode shares between 2025 and 2030 to account for continued shifts in travel modes (transit, walk, and bike mode shares increased proportionally).

5 - Access Boston mode shares do not separate walk and bike. Based on assumed split of 75% walk/25% bike.

Trip Generation Data – Phase A (2025)

Unadjusted ITE Worksheets

ITE TRIP GENERATION WORKSHEET

(10th Edition, Updated 2017)

Phase A (2025)

LANDUSE: Multifamily Housing - Mid-Rise Residential (3-10 levels/floors)
LANDUSE CODE: 221 Independent Variable --- Number of Units
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC** 115 units
JOB NUMBER: **15021.00**

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends: Average	Low	High	Independent Variable Range: Average	Low	High	Directional Distribution: Enter	Exit
DAILY	27	0.77	5.44	1.27	12.50	205	21	494	50%	50%
AM PEAK OF GENERATOR	48	0.69	0.32	0.06	0.77	225	21	1,168	27%	73%
PM PEAK OF GENERATOR	47	0.66	0.41	0.09	1.26	211	21	1,168	60%	40%
AM PEAK (ADJACENT ST)	53	0.67	0.36	0.06	1.61	207	26	703	26%	74%
PM PEAK (ADJACENT ST)	60	0.72	0.44	0.15	1.11	208	26	703	61%	39%

TRIPS:

	BY AVERAGE: Total	Enter	Exit	BY REGRESSION: Total	Enter	Exit
DAILY	626	313	313	625	313	313
AM PEAK OF GENERATOR	37	10	27	39	11	29
PM PEAK OF GENERATOR	47	28	19	49	29	20
AM PEAK (ADJACENT ST)	41	11	31	**39**	**10**	**29**
PM PEAK (ADJACENT ST)	51	31	20	**51**	**31**	**20**

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends: Average	Low	High	Independent Variable Range: Average	Low	High	Directional Distribution: Enter	Exit
DAILY	6	0.73	4.91	4.03	8.51	224	111	336	50%	50%
PEAK OF GENERATOR	8	0.89	0.44	0.34	0.73	264	111	462	49%	51%

TRIPS:

	BY AVERAGE: Total	Enter	Exit	BY REGRESSION: Total	Enter	Exit
DAILY	565	282	282	767	383	383
PEAK OF GENERATOR	51	25	26	55	27	28

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends: Average	Low	High	Independent Variable Range: Average	Low	High	Directional Distribution: Enter	Exit
DAILY	6	--	4.09	3.06	8.41	224	111	336	50%	50%
PEAK OF GENERATOR	6	--	0.39	0.26	1.07	224	111	336	62%	38%

TRIPS:

	BY AVERAGE: Total	Enter	Exit	BY REGRESSION: Total	Enter	Exit
DAILY	470	235	235	N/A	N/A	N/A
PEAK OF GENERATOR	45	28	17	N/A	N/A	N/A

ITE TRIP GENERATION WORKSHEET

(10th Edition, Updated 2017)

Phase A (2025)

LANDUSE: Multifamily Housing - High-Rise Residential (10+ levels/floors)
LANDUSE CODE: 222 Independent Variable --- Number of Units
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC** 230 units
JOB NUMBER: **15021.00**

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Low	High	Independent Variable Range Average	Low	High	Directional Distribution Enter	Exit
DAILY	11	0.96	4.45	2.77	6.45	414	128	1,456	50%	50%
AM PEAK OF GENERATOR	24	0.93	0.34	0.21	0.55	405	54	1,456	21%	79%
PM PEAK OF GENERATOR	26	0.96	0.39	0.29	0.59	385	54	1,456	62%	38%
AM PEAK (ADJACENT ST)	25	0.90	0.31	0.18	0.48	372	54	1,456	24%	76%
PM PEAK (ADJACENT ST)	25	0.96	0.36	0.23	0.53	372	54	1,456	61%	39%

TRIPS:

	BY AVERAGE Total	Enter	Exit	BY REGRESSION Total	Enter	Exit
DAILY	1,024	512	512	1,118	559	559
AM PEAK OF GENERATOR	78	16	62	84	18	67
PM PEAK OF GENERATOR	90	56	34	96	59	36
AM PEAK (ADJACENT ST)	71	17	54	**77**	**19**	**59**
PM PEAK (ADJACENT ST)	83	51	32	**87**	**53**	**34**

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Low	High	Independent Variable Range Average	Low	High	Directional Distribution Enter	Exit
DAILY	9	0.96	4.53	2.84	6.00	411	128	1,456	50%	50%
PEAK OF GENERATOR	9	0.98	0.36	0.32	0.46	411	128	1,456	55%	45%

TRIPS:

	BY AVERAGE Total	Enter	Exit	BY REGRESSION Total	Enter	Exit
DAILY	1,042	521	521	1,124	562	562
PEAK OF GENERATOR	83	46	37	95	52	43

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Low	High	Independent Variable Range Average	Low	High	Directional Distribution Enter	Exit
DAILY	9	0.96	3.59	2.70	5.40	411	128	1,456	50%	50%
PEAK OF GENERATOR	9	0.98	0.31	0.27	0.45	411	128	1,456	51%	49%

TRIPS:

	BY AVERAGE Total	Enter	Exit	BY REGRESSION Total	Enter	Exit
DAILY	826	413	413	895	448	448
PEAK OF GENERATOR	71	36	35	80	41	39

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

Phase A (2025)

LANDUSE: Hotel
LANDUSE CODE: 310
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC**
JOB NUMBER: **15021.00**

Independent Variable --- Number of Rooms

250 rooms

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	6	0.92	8.36	5.31	9.53	146	100	260	50%	50%
AM PEAK OF GENERATOR	30	0.64	0.54	0.25	1.42	288	86	575	54%	46%
PM PEAK OF GENERATOR	29	0.71	0.61	0.22	0.97	292	86	575	58%	42%
AM PEAK (ADJACENT ST)	25	0.85	0.47	0.20	0.84	178	74	426	59%	41%
PM PEAK (ADJACENT ST)	28	0.8	0.60	0.26	1.06	183	74	426	51%	49%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	2,090	1,045	1,045	2,396	1,198	1,198
AM PEAK OF GENERATOR	135	73	62	133	72	61
PM PEAK OF GENERATOR	153	88	64	148	86	62
AM PEAK (ADJACENT ST)	118	69	48	120	71	49
PM PEAK (ADJACENT ST)	150	77	74	161	82	79

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	8	0.93	8.19	6.35	9.79	206	100	355	50%	50%
PEAK OF GENERATOR	9	0.8	0.72	0.49	1.23	194	100	355	56%	44%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	2,048	1,024	1,024	2,110	1,055	1,055
PEAK OF GENERATOR	180	101	79	177	99	78

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	8	0.9	5.95	4.01	8.48	206	100	355	50%	50%
PEAK OF GENERATOR	8	0.87	0.56	0.39	0.72	206	100	355	46%	54%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	1,488	744	744	1602	801	801
PEAK OF GENERATOR	140	64	76	145	67	78

ITE TRIP GENERATION WORKSHEET

(10th Edition, Updated 2017)

Phase A (2025)

LANDUSE: General Office Building
LANDUSE CODE: 710
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC**
JOB NUMBER: **15021.00**

Independent Variable --- 1,000 Sq. Feet Gross Floor Area

FLOOR AREA (KSF): 168

WEEKDAY

RATES:

			Total Trip Ends			Independent Variable Range			Directional Distribution	
	# Studies	R^2	Average	Low	High	Average	Low	High	Enter	Exit
DAILY	66	0.83	9.74	2.71	27.56	171	6	1,300	50%	50%
AM PEAK OF GENERATOR	228	0.84	1.47	0.57	4.93	209	6	2,408	88%	12%
PM PEAK OF GENERATOR	243	0.82	1.42	0.49	6.20	205	6	2,408	18%	82%
AM PEAK (ADJACENT ST)	35	0.85	1.16	0.37	4.23	117	5	511	86%	14%
PM PEAK (ADJACENT ST)	32	0.88	1.15	0.47	3.23	114	6	511	16%	84%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	1,636	818	818	1,755	878	878
AM PEAK OF GENERATOR	247	217	30	262	231	31
PM PEAK OF GENERATOR	239	43	196	250	45	205
AM PEAK (ADJACENT ST)	195	168	27	184	159	26
PM PEAK (ADJACENT ST)	193	31	162	186	30	157

SATURDAY

RATES:

			Total Trip Ends			Independent Variable Range			Directional Distribution	
	# Studies	R^2	Average	Low	High	Average	Low	High	Enter	Exit
DAILY	5	--	2.21	1.24	7.46	94	28	183	50%	50%
PEAK OF GENERATOR	3	--	0.53	0.30	1.57	82	28	183	54%	46%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	371	186	186	N/A	N/A	N/A
PEAK OF GENERATOR	89	48	41	N/A	N/A	N/A

SUNDAY

RATES:

			Total Trip Ends			Independent Variable Range			Directional Distribution	
	# Studies	R^2	Average	Low	High	Average	Low	High	Enter	Exit
DAILY	5	--	0.70	0.19	3.05	94	28	183	50%	50%
PEAK OF GENERATOR	3	--	0.21	0.11	0.68	82	28	183	58%	42%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	118	59	59	N/A	N/A	N/A
PEAK OF GENERATOR	35	20	15	N/A	N/A	N/A

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

Phase A (2025)

LANDUSE: Research & Development Center
LANDUSE CODE: 760
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC**
JOB NUMBER: **15021.00**

Independent Variable --- Employees

EMPLOYEES: 630
Floor Area (sf) = 252.00
**Assume 2.5 employees per sf*

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	21	0.87	3.29	1.60	10.63	658	0	2,500	50%	50%
AM PEAK OF GENERATOR	31	0.90	0.41	0.20	0.88	518	0	2,500	85%	15%
PM PEAK OF GENERATOR	31	0.91	0.38	0.18	1.11	518	0	2,500	11%	89%
AM PEAK (ADJACENT ST)	9	0.58	0.51	0.28	0.88	92	25	200	72%	28%
PM PEAK (ADJACENT ST)	3	--	0.52	0.36	1.07	122	0	200	14%	86%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	2,073	1,036	1,036	2,084	1,042	1,042
AM PEAK OF GENERATOR	258	220	39	272	231	41
PM PEAK OF GENERATOR	239	26	213	246	27	219
AM PEAK (ADJACENT ST)	321	231	90	177	128	50
PM PEAK (ADJACENT ST) #	328	46	282	N/A	N/A	N/A

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	19	0.55	0.56	0.03	2.97	600	0	2,500	50%	50%
PEAK OF GENERATOR	12	0.55	0.06	0.01	0.30	558	0	2,500	*Peak Distribution Not Availble*	

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	353	176	176	347	174	174
PEAK OF GENERATOR	38	N/A	N/A	39	N/A	N/A

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	19	--	0.33	0.02	1.78	600	0	2,500	50%	50%
PEAK OF GENERATOR	12	--	0.04	0.01	0.23	558	0	2,100	*Peak Distribution Not Availble*	

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	208	104	104	N/A	N/A	N/A
PEAK OF GENERATOR	N/A	N/A	N/A	N/A	N/A	N/A

ITE TRIP GENERATION WORKSHEET

(10th Edition, Updated 2017)

Phase A (2025)

LANDUSE: Shopping Center
LANDUSE CODE: 820
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC**
JOB NUMBER: **15021.00**

Independent Variable --- 1,000 Sq. Feet Gross Floor Area

FLOOR AREA (KSF): 23.0

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	147	0.76	37.75	7.42	207.98	453	9	1,510	50%	50%
AM PEAK OF GENERATOR	47	0.71	3.00	0.70	23.74	323	8	1,320	54%	46%
PM PEAK OF GENERATOR	53	0.76	4.21	0.78	27.27	298	7	1,320	50%	50%
AM PEAK (ADJACENT ST)	84	0.9	0.94	0.18	23.74	351	9	1,510	62%	38%
PM PEAK (ADJACENT ST)	261	0.82	3.81	0.74	18.69	327	2	2,200	48%	52%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	868	434	434	2,213	1,107	1,107
AM PEAK OF GENERATOR	69	37	32	141	76	65
PM PEAK OF GENERATOR	97	48	48	196	98	98
AM PEAK (ADJACENT ST)	22	13	8	163	101	62
PM PEAK (ADJACENT ST)	88	42	46	183	88	95

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	58	0.71	46.12	13.07	167.89	602	56	1,510	50%	50%
PEAK OF GENERATOR	119	0.87	4.50	1.42	15.10	416	4	1,510	52%	48%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	1,061	530	530	3,583	1,792	1,792
PEAK OF GENERATOR	104	54	50	194	101	93

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	30	--	21.10	4.15	148.15	509	47	1,510	50%	50%
PEAK OF GENERATOR	24	--	2.79	0.39	12.40	382	47	1,268	49%	51%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	485	243	243	N/A	N/A	N/A
PEAK OF GENERATOR	64	31	33	N/A	N/A	N/A

ITE TRIP GENERATION WORKSHEET

(10th Edition, Updated 2017) **Phase A (2025)**

LANDUSE: High-Turnover (Sit-Down) Restaurant
LANDUSE CODE: 932 Independent Variable --- 1,000 Sq. Feet Gross Floor Area
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC** **FLOOR AREA (KSF):** 23.0
JOB NUMBER: **15021.00**

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	50	--	112.18	13.04	742.41	5	2	13	50%	50%
AM PEAK OF GENERATOR	60	--	14.04	1.74	112.49	6	2	13	57%	43%
PM PEAK OF GENERATOR	61	--	17.41	3.04	89.99	5	2	13	52%	48%
AM PEAK (ADJACENT ST)	39	--	9.94	0.76	102.39	5	2	13	55%	45%
PM PEAK (ADJACENT ST)	107	--	9.77	0.92	62.00	6	2	14	62%	38%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	2,580	1,290	1,290	N/A	N/A	N/A
AM PEAK OF GENERATOR	323	184	139	N/A	N/A	N/A
PM PEAK OF GENERATOR	400	208	192	N/A	N/A	N/A
AM PEAK (ADJACENT ST)	229	126	103	N/A	N/A	N/A
PM PEAK (ADJACENT ST)	225	139	85	N/A	N/A	N/A

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	3	--	122.40	101.99	173.07	6	5	9	50%	50%
PEAK OF GENERATOR	22	--	11.19	1.63	50.40	5	2	13	51%	49%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	2,815	1,408	1,408	N/A	N/A	N/A
PEAK OF GENERATOR	257	131	126	N/A	N/A	N/A

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	2	--	142.64	119.62	164.43	5	4.8	5.1	50%	50%
PEAK OF GENERATOR	3	--	25.83	9.81	43.20	4	2.5	5.1	55%	45%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	3,281	1,640	1,640	N/A	N/A	N/A
PEAK OF GENERATOR	594	327	267	N/A	N/A	N/A

Trip Generation Data – Phase A (2025)

Internal Capture Worksheets

Phase A (2025) Trip Generation
Shared Trip Calculations [1]

RETAIL - OFFICE

WEEKDAY DAILY

RETAIL	%	#	BALANCED	#	%	OFFICE
EXIT ->	3%	790	**24**	2,266	15%	-> ENTER
ENTER <-	4%	790	**32**	2,266	22%	<- EXIT

WEEKDAY MORNING

RETAIL	%	#	BALANCED	#	%	OFFICE
EXIT ->	29%	15	**4**	461	4%	-> ENTER
ENTER <-	32%	24	**8**	137	28%	<- EXIT

WEEKDAY EVENING

RETAIL	%	#	BALANCED	#	%	OFFICE
EXIT ->	2%	84	**2**	89	31%	-> ENTER
ENTER <-	8%	76	**6**	518	20%	<- EXIT

RETAIL - HOTEL

WEEKDAY DAILY

RETAIL	%	#	BALANCED	#	%	HOTEL
EXIT ->	11%	790	**87**	2,001	33%	-> ENTER
ENTER <-	9%	790	**71**	2,001	38%	<- EXIT

WEEKDAY MORNING

RETAIL	%	#	BALANCED	#	%	HOTEL
EXIT ->	0%	15	**0**	119	0%	-> ENTER
ENTER <-	4%	24	**1**	82	14%	<- EXIT

WEEKDAY EVENING

RETAIL	%	#	BALANCED	#	%	HOTEL
EXIT ->	5%	84	**4**	137	17%	-> ENTER
ENTER <-	2%	76	**2**	132	16%	<- EXIT

RETAIL - RESIDENTIAL

WEEKDAY DAILY

RETAIL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	11%	790	**87**	1,029	33%	-> ENTER
ENTER <-	9%	790	**71**	1,029	38%	<- EXIT

WEEKDAY MORNING

RETAIL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	14%	15	**1**	34	2%	-> ENTER
ENTER <-	17%	24	**1**	104	1%	<- EXIT

WEEKDAY EVENING

RETAIL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	26%	84	**22**	99	46%	-> ENTER
ENTER <-	10%	76	**8**	64	42%	<- EXIT

OFFICE - HOTEL

WEEKDAY DAILY

OFFICE	%	#	BALANCED	#	%	HOTEL
EXIT ->	2%	2,266	**45**	2,001	3%	-> ENTER
ENTER <-	0%	2,266	**0**	2,001	0%	<- EXIT

WEEKDAY MORNING

OFFICE	%	#	BALANCED	#	%	HOTEL
EXIT ->	0%	137	**0**	119	0%	-> ENTER
ENTER <-	3%	461	**14**	82	75%	<- EXIT

WEEKDAY EVENING

OFFICE	%	#	BALANCED	#	%	HOTEL
EXIT ->	0%	518	**0**	137	0%	-> ENTER
ENTER <-	0%	89	**0**	132	0%	<- EXIT

OFFICE - RESIDENTIAL

WEEKDAY DAILY

OFFICE	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	2%	2,266	**31**	1,029	3%	-> ENTER
ENTER <-	0%	2,266	**0**	1,029	0%	<- EXIT

WEEKDAY MORNING

OFFICE	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	1%	137	**0**	34	0%	-> ENTER
ENTER <-	3%	461	**2**	104	2%	<- EXIT

WEEKDAY EVENING

OFFICE	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	2%	518	**4**	99	4%	-> ENTER
ENTER <-	57%	89	**3**	64	4%	<- EXIT

HOTEL - RESIDENTIAL

WEEKDAY DAILY

HOTEL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	0%	2,001	**0**	1,029	0%	-> ENTER
ENTER <-	0%	2,001	**0**	1,029	0%	<- EXIT

WEEKDAY MORNING

HOTEL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	0%	82	**0**	34	0%	-> ENTER
ENTER <-	0%	119	**0**	104	0%	<- EXIT

WEEKDAY EVENING

HOTEL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	2%	132	**0**	99	0%	-> ENTER
ENTER <-	12%	137	**2**	64	3%	<- EXIT

RESTAURANT - RETAIL

WEEKDAY DAILY

RESTAURANT	%	#	BALANCED	#	%	RETAIL
EXIT ->	30%	2,348	**221**	790	28%	-> ENTER
ENTER <-	28%	2,348	**237**	790	30%	<- EXIT

WEEKDAY MORNING

RESTAURANT	%	#	BALANCED	#	%	RETAIL
EXIT ->	14%	187	**2**	24	8%	-> ENTER
ENTER <-	50%	229	**2**	15	13%	<- EXIT

WEEKDAY EVENING

RESTAURANT	%	#	BALANCED	#	%	RETAIL
EXIT ->	41%	155	**38**	76	50%	-> ENTER
ENTER <-	29%	253	**24**	84	29%	<- EXIT

Phase A (2025) Trip Generation

Shared Trip Calculations [1]

RESTAURANT - OFFICE

WEEKDAY DAILY						
RESTAURANT	%	#	BALANCED	#	%	OFFICE
EXIT ->	3%	2,348	**70**	2,266	15%	-> ENTER
ENTER <-	4%	2,348	**94**	2,266	22%	<- EXIT

WEEKDAY MORNING						
RESTAURANT	%	#	BALANCED	#	%	OFFICE
EXIT ->	31%	187	**58**	461	14%	-> ENTER
ENTER <-	23%	229	**53**	137	63%	<- EXIT

WEEKDAY EVENING						
RESTAURANT	%	#	BALANCED	#	%	OFFICE
EXIT ->	3%	155	**5**	89	30%	-> ENTER
ENTER <-	2%	253	**5**	518	4%	<- EXIT

RESTAURANT - HOTEL

WEEKDAY DAILY						
RESTAURANT	%	#	BALANCED	#	%	HOTEL
EXIT ->	11%	2,348	**258**	2,001	33%	-> ENTER
ENTER <-	9%	2,348	**211**	2,001	38%	<- EXIT

WEEKDAY MORNING						
RESTAURANT	%	#	BALANCED	#	%	HOTEL
EXIT ->	3%	187	**5**	119	4%	-> ENTER
ENTER <-	6%	229	**7**	82	9%	<- EXIT

WEEKDAY EVENING						
RESTAURANT	%	#	BALANCED	#	%	HOTEL
EXIT ->	7%	155	**11**	137	71%	-> ENTER
ENTER <-	5%	253	**13**	132	68%	<- EXIT

RESTAURANT - RESIDENTIAL

WEEKDAY DAILY						
RESTAURANT	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	11%	2,348	**258**	1,029	33%	-> ENTER
ENTER <-	9%	2,348	**211**	1,029	38%	<- EXIT

WEEKDAY MORNING						
RESTAURANT	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	4%	187	**2**	34	5%	-> ENTER
ENTER <-	20%	229	**21**	104	20%	<- EXIT

WEEKDAY EVENING						
RESTAURANT	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	18%	155	**16**	99	16%	-> ENTER
ENTER <-	14%	253	**13**	64	21%	<- EXIT

TOTAL SHARED TRIPS - WEEKDAY DAILY			
	ENTER	EXIT	TOTAL
RETAIL	395	435	830
OFFICE	43	92	135
R&D	51	110	161
HOTEL	390	282	672
RESID.	376	282	658
RESTAUR.	753	807	1560
TOTAL	2,008	2,008	4016

TOTAL SHARED TRIPS - WEEKDAY MORNING			
	ENTER	EXIT	TOTAL
RETAIL	12	7	19
OFFICE	9	12	21
R&D	69	49	118
HOTEL	5	22	27
RESID.	3	24	27
RESTAUR.	83	67	150
TOTAL	181	181	362

TOTAL SHARED TRIPS - WEEKDAY EVENING			
	ENTER	EXIT	TOTAL
RETAIL	54	52	106
OFFICE	1	2	3
R&D	9	13	22
HOTEL	17	15	32
RESID.	42	26	68
RESTAUR.	55	70	125
TOTAL	178	178	356

1 Weekday morning and evening internal capture rates based on NCHRP Report 684. Weekday daily internal capture rates based on ITE Trip Generation Handbook, 2nd Edition.

Trip Generation Data – Phase A (2025)

TNC Trip Generation Calculations

Allston ERC
15021.00

2025 Phase A Condition
TNC Trip Calculations

	Residential							Office						
	Net Person Trips [1]	All People in Vehicles [2]	People in TNCs [3]	TNC Passenger Trips [4]	People in Private Vehicles [5]	Private Vehicle Trips [4]	All Vehicle Trips	Net Person Trips [1]	All People in Vehicles [2]	People in TNCs [3]	TNC Passenger Trips [4]	People in Private Vehicles [5]	Private Vehicle Trips [4]	All Vehicle Trips
			19%	1.27	81%	1.27				5%	1.19	95%	1.19	
Weekday Morning Peak Hour														
Enter	31	8	1	1	6	5	6	179	85	4	4	81	68	72
Exit	80	23	4	3	18	14	17	19	10	0	-	9	8	8
Total	111	30	6	4	24	19	23	198	95	5	4	90	76	80
Weekday Evening Peak Hour														
Enter	57	16	3	2	13	10	12	34	18	1	1	17	14	15
Exit	38	9	2	1	7	6	7	183	87	4	4	82	69	73
Total	95	25	5	3	20	16	19	217	105	5	5	99	83	88

1 Net Person Trips based on ITE for each land use converted to person trips and with internal capture trips removed
2 All People in Vehicles based on Vehicular Mode Shares approved by the City of Boston
3 TNC shares based on proportion of total arriving and departing TNC rides in the City of Boston in 2019 (as documented by Mass. Department of Public Utilities), total number of residents and employees within the City of Boston from 2019 ACS 5-Year Census Data, and TNC Trip Purpose from MAPC survey. Assume Hotel uses to follow residential patterns, Retail uses to follow patterns averaged between Residential and Office.
4 VOR based on 2010 Census data, 2009 NHTS rates assumed for Hotel and Retail uses
5 Assume all non-TNC vehicle trips are by private vehicle
6 Pass-by rates based on ITE LUC 820 (Shopping Center), 25-percent pass-by rate assumed for time periods with no available data
7 Pass-by rates based on ITE LUC 932 (High-Turnover Sit Down Restaurant), 25-percent pass-by rate assumed for time periods with no available data
8 Assume that difference in TNC in/out trips equates to the deadhead trips.

Allston ERC
15021.00

2025 Phase A Condition
TNC Trip Calculations

	R&D							Hotel						
	Net Person Trips [1]	All People in Vehicles [2]	People in TNCs [3]	TNC Passenger Trips [4]	People in Private Vehicles [5]	Private Vehicle Trips [4]	All Vehicle Trips	Net Person Trips [1]	All People in Vehicles [2]	People in TNCs [3]	TNC Passenger Trips [4]	People in Private Vehicles [5]	Private Vehicle Trips [4]	All Vehicle Trips
			5%	1.19	95%	1.19				19%	1.67	81%	1.67	
Weekday Morning Peak Hour														
Enter	204	97	5	4	92	77	81	114	44	8	5	36	21	26
Exit	57	30	1	1	28	24	25	60	25	5	3	21	12	15
Total	261	127	6	5	120	101	106	174	69	13	8	56	33	41
Weekday Evening Peak Hour														
Enter	45	24	1	1	22	19	20	120	51	10	6	41	25	31
Exit	320	152	8	6	144	121	127	117	45	9	5	37	22	27
Total	365	175	9	7	167	140	147	237	96	18	11	78	47	58

1 Net Person Trips based on ITE for each land use converted to person trips and with internal capture trips removed
2 All People in Vehicles based on Vehicular Mode Shares approved by the City of Boston
3 TNC shares based on proportion of total arriving and departing TNC rides in the City of Boston in 2019 (as documented by Mass. Department of Public Utilities), total number of residents and employees within the City of Boston from 2019 ACS 5-Year Census Data, and TNC Trip Purpose from MAPC survey. Assume Hotel uses to follow residential patterns, Retail uses to follow patterns averaged between Residential and Office.
4 VOR based on 2010 Census data, 2009 NHTS rates assumed for Hotel and Retail uses
5 Assume all non-TNC vehicle trips are by private vehicle
6 Pass-by rates based on ITE LUC 820 (Shopping Center), 25-percent pass-by rate assumed for time periods with no available data
7 Pass-by rates based on ITE LUC 932 (High-Turnover Sit Down Restaurant), 25-percent pass-by rate assumed for time periods with no available data
8 Assume that difference in TNC in/out trips equates to the deadhead trips.

2025 Phase A Condition
TNC Trip Calculations

	Retail								
	Net Person Trips [1]	All People in Vehicles [2]	People in TNCs [3]	TNC Passenger Trips [4]	People in Private Vehicles [5]	Private Vehicle Trips [4]	Pass-By [6]	New Prvt. Vehicle Trips	All New Vehicle Trips
			12%	1.82	88%	1.82			
Weekday Morning Peak Hour							25%		
Enter	12	5	1	1	4	2	1	1	2
Exit	8	3	0	-	3	2	1	1	1
Total	20	8	1	1	7	4	2	2	3
Weekday Evening Peak Hour							34%		
Enter	22	9	1	1	8	4	2	2	3
Exit	32	12	1	1	11	6	2	4	5
Total	54	22	3	2	19	10	4	6	8

1 Net Person Trips based on ITE for each land use converted to person trips and with internal capture trips removed
2 All People in Vehicles based on Vehicular Mode Shares approved by the City of Boston
3 TNC shares based on proportion of total arriving and departing TNC rides in the City of Boston in 2019 (as documented by Mass. Department of Public Utilities), total number of residents and employees within the City of Boston from 2019 ACS 5-Year Census Data, and TNC Trip Purpose from MAPC survey. Assume Hotel uses to follow residential patterns, Retail uses to follow patterns averaged between Residential and Office.
4 VOR based on 2010 Census data, 2009 NHTS rates assumed for Hotel and Retail uses
5 Assume all non-TNC vehicle trips are by private vehicle
6 Pass-by rates based on ITE LUC 820 (Shopping Center), 25-percent pass-by rate assumed for time periods with no available data
7 Pass-by rates based on ITE LUC 932 (High-Turnover Sit Down Restaurant), 25-percent pass-by rate assumed for time periods with no available data
8 Assume that difference in TNC in/out trips equates to the deadhead trips.

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2025 Phase A Condition
TNC Trip Calculations

	Restaurant								
	Net Person Trips [1]	All People in Vehicles [2]	People in TNCs [3]	TNC Passenger Trips [4]	People in Private Vehicles [5]	Private Vehicle Trips [4]	Pass-By [7]	New Prvt. Vehicle Trips	All New Vehicle Trips
			12%	1.82	88%	1.82			
Weekday Morning Peak Hour							25%		
Enter	146	57	7	4	50	27	7	20	24
Exit	120	51	6	3	45	25	7	18	21
Total	266	107	13	7	94	52	14	38	45
Weekday Evening Peak Hour							34%		
Enter	198	84	10	6	74	40	10	30	36
Exit	85	33	4	2	29	16	10	6	8
Total	283	117	14	8	103	56	20	36	44

1 Net Person Trips based on ITE for each land use converted to person trips and with internal capture trips removed
2 All People in Vehicles based on Vehicular Mode Shares approved by the City of Boston
3 TNC shares based on proportion of total arriving and departing TNC rides in the City of Boston in 2019 (as documented by Mass. Department of Public Utilities), total number of residents and employees within the City of Boston from 2019 ACS 5-Year Census Data, and TNC Trip Purpose from MAPC survey. Assume Hotel uses to follow residential patterns, Retail uses to follow patterns averaged between Residential and Office.
4 VOR based on 2010 Census data, 2009 NHTS rates assumed for Hotel and Retail uses
5 Assume all non-TNC vehicle trips are by private vehicle
6 Pass-by rates based on ITE LUC 820 (Shopping Center), 25-percent pass-by rate assumed for time periods with no available data
7 Pass-by rates based on ITE LUC 932 (High-Turnover Sit Down Restaurant), 25-percent pass-by rate assumed for time periods with no available data
8 Assume that difference in TNC in/out trips equates to the deadhead trips.

2025 Phase A Condition
TNC Trip Calculations

	Total Site					
	TNC Passenger Trips	TNC Deadhead Trips [8]	Total TNC Trips	Private Vehicle Trips	Total Vehicle Trips	Total Pass-By Trips
Weekday Morning Peak Hour						
Enter	19	-	19	192	211	8
Exit	10	9	19	77	96	8
Total	29	9	38	269	307	16
Weekday Evening Peak Hour						
Enter	17	2	19	100	119	12
Exit	19	-	19	228	247	12
Total	36	2	38	328	366	24

1 Net Person Trips based on ITE for each land use converted to person trips and with internal capture trips removed
2 All People in Vehicles based on Vehicular Mode Shares approved by the City of Boston
3 TNC shares based on proportion of total arriving and departing TNC rides in the City of Boston in 2019 (as documented by Mass. Department of Public Utilities), total number of residents and employees within the City of Boston from 2019 ACS 5-Year Census Data, and TNC Trip Purpose from MAPC survey. Assume Hotel uses to follow residential patterns, Retail uses to follow patterns averaged between Residential and Office.
4 VOR based on 2010 Census data, 2009 NHTS rates assumed for Hotel and Retail uses
5 Assume all non-TNC vehicle trips are by private vehicle
6 Pass-by rates based on ITE LUC 820 (Shopping Center), 25-percent pass-by rate assumed for time periods with no available data
7 Pass-by rates based on ITE LUC 932 (High-Turnover Sit Down Restaurant), 25-percent pass-by rate assumed for time periods with no available data
8 Assume that difference in TNC in/out trips equates to the deadhead trips.

Trip Generation Data – Full Build (2030)

Unadjusted ITE Worksheets

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

Full Build (2030) Trip Generation

LANDUSE: Multifamily Housing - Mid-Rise Residential (3-10 levels/floors)
LANDUSE CODE: 221 — Independent Variable --- Number of Units
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC** — 115 units
JOB NUMBER: **15021.00**

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	27	0.77	5.44	1.27	12.50	205	21	494	50%	50%
AM PEAK OF GENERATOR	48	0.69	0.32	0.06	0.77	225	21	1,168	27%	73%
PM PEAK OF GENERATOR	47	0.66	0.41	0.09	1.26	211	21	1,168	60%	40%
AM PEAK (ADJACENT ST)	53	0.67	0.36	0.06	1.61	207	26	703	26%	74%
PM PEAK (ADJACENT ST)	60	0.72	0.44	0.15	1.11	208	26	703	61%	39%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	626	313	313	625	313	313
AM PEAK OF GENERATOR	37	10	27	39	11	29
PM PEAK OF GENERATOR	47	28	19	49	29	20
AM PEAK (ADJACENT ST)	41	11	31	39	10	29
PM PEAK (ADJACENT ST)	51	31	20	51	31	20

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	6	0.73	4.91	4.03	8.51	224	111	336	50%	50%
PEAK OF GENERATOR	8	0.89	0.44	0.34	0.73	264	111	462	49%	51%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	565	282	282	767	383	383
PEAK OF GENERATOR	51	25	26	55	27	28

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	6	--	4.09	3.06	8.41	224	111	336	50%	50%
PEAK OF GENERATOR	6	--	0.39	0.26	1.07	224	111	336	62%	38%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	470	235	235	N/A	N/A	N/A
PEAK OF GENERATOR	45	28	17	N/A	N/A	N/A

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

Full Build (2030) Trip Generation

LANDUSE: Multifamily Housing - High-Rise Residential (10+ levels/floors)
LANDUSE CODE: 222 Independent Variable --- Number of Units
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC** 650 units
JOB NUMBER: **15021.00**

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Low	High	Independent Variable Range Average	Low	High	Directional Distribution Enter	Exit
DAILY	11	0.96	4.45	2.77	6.45	414	128	1,456	50%	50%
AM PEAK OF GENERATOR	24	0.93	0.34	0.21	0.55	405	54	1,456	21%	79%
PM PEAK OF GENERATOR	26	0.96	0.39	0.29	0.59	385	54	1,456	62%	38%
AM PEAK (ADJACENT ST)	25	0.90	0.31	0.18	0.48	372	54	1,456	24%	76%
PM PEAK (ADJACENT ST)	25	0.96	0.36	0.23	0.53	372	54	1,456	61%	39%

TRIPS:

	BY AVERAGE Total	Enter	Exit	BY REGRESSION Total	Enter	Exit
DAILY	2,893	1,446	1,446	2,773	1,386	1,386
AM PEAK OF GENERATOR	221	46	175	214	45	169
PM PEAK OF GENERATOR	254	157	96	243	151	92
AM PEAK (ADJACENT ST)	202	48	153	195	47	148
PM PEAK (ADJACENT ST)	234	143	91	230	140	90

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Low	High	Independent Variable Range Average	Low	High	Directional Distribution Enter	Exit
DAILY	9	0.96	4.53	2.84	6.00	411	128	1,456	50%	50%
PEAK OF GENERATOR	9	0.98	0.36	0.32	0.46	411	128	1,456	55%	45%

TRIPS:

	BY AVERAGE Total	Enter	Exit	BY REGRESSION Total	Enter	Exit
DAILY	2,945	1,472	1,472	2,838	1,419	1,419
PEAK OF GENERATOR	234	129	105	226	124	101

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Low	High	Independent Variable Range Average	Low	High	Directional Distribution Enter	Exit
DAILY	9	0.96	3.59	2.70	5.40	411	128	1,456	50%	50%
PEAK OF GENERATOR	9	0.98	0.31	0.27	0.45	411	128	1,456	51%	49%

TRIPS:

	BY AVERAGE Total	Enter	Exit	BY REGRESSION Total	Enter	Exit
DAILY	2,334	1,167	1,167	2,243	1,122	1,122
PEAK OF GENERATOR	202	103	99	198	101	97

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

Full Build (2030) Trip Generation

LANDUSE: Hotel
LANDUSE CODE: 310
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC**
JOB NUMBER: **15021.00**

Independent Variable --- Number of Rooms

250 rooms

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	6	0.92	8.36	5.31	9.53	146	100	260	50%	50%
AM PEAK OF GENERATOR	30	0.64	0.54	0.25	1.42	288	86	575	54%	46%
PM PEAK OF GENERATOR	29	0.71	0.61	0.22	0.97	292	86	575	58%	42%
AM PEAK (ADJACENT ST)	25	0.85	0.47	0.20	0.84	178	74	426	59%	41%
PM PEAK (ADJACENT ST)	28	0.8	0.60	0.26	1.06	183	74	426	51%	49%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	2,090	1,045	1,045	2,396	1,198	1,198
AM PEAK OF GENERATOR	135	73	62	133	72	61
PM PEAK OF GENERATOR	153	88	64	148	86	62
AM PEAK (ADJACENT ST)	118	69	48	120	71	49
PM PEAK (ADJACENT ST)	150	77	74	161	82	79

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	8	0.93	8.19	6.35	9.79	206	100	355	50%	50%
PEAK OF GENERATOR	9	0.8	0.72	0.49	1.23	194	100	355	56%	44%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	2,048	1,024	1,024	2,110	1,055	1,055
PEAK OF GENERATOR	180	101	79	177	99	78

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	8	0.9	5.95	4.01	8.48	206	100	355	50%	50%
PEAK OF GENERATOR	8	0.87	0.56	0.39	0.72	206	100	355	46%	54%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	1,488	744	744	1602	801	801
PEAK OF GENERATOR	140	64	76	145	67	78

ITE TRIP GENERATION WORKSHEET

(10th Edition, Updated 2017)

Full Build (2030) Trip Generation

LANDUSE: General Office Building
LANDUSE CODE: 710
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC**
JOB NUMBER: **15021.00**

Independent Variable --- 1,000 Sq. Feet Gross Floor Area

FLOOR AREA (KSF): 422

WEEKDAY

RATES:

			Total Trip Ends			Independent Variable Range			Directional Distribution	
	# Studies	R^2	Average	Low	High	Average	Low	High	Enter	Exit
DAILY	66	0.83	9.74	2.71	27.56	171	6	1,300	50%	50%
AM PEAK OF GENERATOR	228	0.84	1.47	0.57	4.93	209	6	2,408	88%	12%
PM PEAK OF GENERATOR	243	0.82	1.42	0.49	6.20	205	6	2,408	18%	82%
AM PEAK (ADJACENT ST)	35	0.85	1.16	0.37	4.23	117	5	511	86%	14%
PM PEAK (ADJACENT ST)	32	0.88	1.15	0.47	3.23	114	6	511	16%	84%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	4,106	2,053	2,053	4,284	2,142	2,142
AM PEAK OF GENERATOR	620	545	74	589	518	71
PM PEAK OF GENERATOR	599	108	491	529	95	434
AM PEAK (ADJACENT ST)	489	421	68	423	364	59
PM PEAK (ADJACENT ST)	485	78	407	447	71	375

SATURDAY

RATES:

			Total Trip Ends			Independent Variable Range			Directional Distribution	
	# Studies	R^2	Average	Low	High	Average	Low	High	Enter	Exit
DAILY	5	--	2.21	1.24	7.46	94	28	183	50%	50%
PEAK OF GENERATOR	3	--	0.53	0.30	1.57	82	28	183	54%	46%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	932	466	466	N/A	N/A	N/A
PEAK OF GENERATOR	223	121	103	N/A	N/A	N/A

SUNDAY

RATES:

			Total Trip Ends			Independent Variable Range			Directional Distribution	
	# Studies	R^2	Average	Low	High	Average	Low	High	Enter	Exit
DAILY	5	--	0.70	0.19	3.05	94	28	183	50%	50%
PEAK OF GENERATOR	3	--	0.21	0.11	0.68	82	28	183	58%	42%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	295	148	148	N/A	N/A	N/A
PEAK OF GENERATOR	89	51	37	N/A	N/A	N/A

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

Full Build (2030) Trip Generation

LANDUSE: Research & Development Center
LANDUSE CODE: 760
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC**
JOB NUMBER: **15021.00**

Independent Variable --- Employees

EMPLOYEES: 1581
Floor Area (sf) = 632.40
**Assume 2.5 employees per sf*

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	21	0.87	3.29	1.60	10.63	658	0	2,500	50%	50%
AM PEAK OF GENERATOR	31	0.90	0.41	0.20	0.88	518	0	2,500	85%	15%
PM PEAK OF GENERATOR	31	0.91	0.38	0.18	1.11	518	0	2,500	11%	89%
AM PEAK (ADJACENT ST)	9	0.58	0.51	0.28	0.88	92	25	200	72%	28%
PM PEAK (ADJACENT ST)	3	--	0.52	0.36	1.07	122	0	200	14%	86%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	5,201	2,601	2,601	4,708	2,354	2,354
AM PEAK OF GENERATOR	648	551	97	588	500	88
PM PEAK OF GENERATOR	601	66	535	532	59	474
AM PEAK (ADJACENT ST)	806	581	226	334	241	94
PM PEAK (ADJACENT ST)	822	115	707	N/A	N/A	N/A

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	19	0.55	0.56	0.03	2.97	600	0	2,500	50%	50%
PEAK OF GENERATOR	12	0.55	0.06	0.01	0.30	558	0	2,500	*Peak Distribution Not Availble*	

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	885	443	443	642	321	321
PEAK OF GENERATOR	95	N/A	N/A	77	N/A	N/A

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	19	--	0.33	0.02	1.78	600	0	2,500	50%	50%
PEAK OF GENERATOR	12	--	0.04	0.01	0.23	558	0	2,100	*Peak Distribution Not Availble*	

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	522	261	261	N/A	N/A	N/A
PEAK OF GENERATOR	N/A	N/A	N/A	N/A	N/A	N/A

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

Full Build (2030) Trip Generation

LANDUSE: Shopping Center
LANDUSE CODE: 820
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC**
JOB NUMBER: **15021.00**

Independent Variable --- 1,000 Sq. Feet Gross Floor Area

FLOOR AREA (KSF): 57.9

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	147	0.76	37.75	7.42	207.98	453	9	1,510	50%	50%
AM PEAK OF GENERATOR	47	0.71	3.00	0.70	23.74	323	8	1,320	54%	46%
PM PEAK OF GENERATOR	53	0.76	4.21	0.78	27.27	298	7	1,320	50%	50%
AM PEAK (ADJACENT ST)	84	0.9	0.94	0.18	23.74	351	9	1,510	62%	38%
PM PEAK (ADJACENT ST)	261	0.82	3.81	0.74	18.69	327	2	2,200	48%	52%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	2,184	1,092	1,092	4,144	2,072	2,072
AM PEAK OF GENERATOR	174	94	80	237	128	109
PM PEAK OF GENERATOR	244	122	122	381	190	190
AM PEAK (ADJACENT ST)	54	34	21	181	112	69
PM PEAK (ADJACENT ST)	220	106	115	362	174	188

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	58	0.71	46.12	13.07	167.89	602	56	1,510	50%	50%
PEAK OF GENERATOR	119	0.87	4.50	1.42	15.10	416	4	1,510	52%	48%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	2,668	1,334	1,334	6,348	3,174	3,174
PEAK OF GENERATOR	260	135	125	402	209	193

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	30	--	21.10	4.15	148.15	509	47	1,510	50%	50%
PEAK OF GENERATOR	24	--	2.79	0.39	12.40	382	47	1,268	49%	51%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	1,221	610	610	N/A	N/A	N/A
PEAK OF GENERATOR	161	79	82	N/A	N/A	N/A

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

Full Build (2030) Trip Generation

LANDUSE: High-Turnover (Sit-Down) Restaurant
LANDUSE CODE: 932 Independent Variable --- 1,000 Sq. Feet Gross Floor Area
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **Allston ERC** **FLOOR AREA (KSF):** 57.9
JOB NUMBER: **15021.00**

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	50	--	112.18	13.04	742.41	5	2	13	50%	50%
AM PEAK OF GENERATOR	60	--	14.04	1.74	112.49	6	2	13	57%	43%
PM PEAK OF GENERATOR	61	--	17.41	3.04	89.99	5	2	13	52%	48%
AM PEAK (ADJACENT ST)	39	--	9.94	0.76	102.39	5	2	13	55%	45%
PM PEAK (ADJACENT ST)	107	--	9.77	0.92	62.00	6	2	14	62%	38%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	6,490	3,245	3,245	N/A	N/A	N/A
AM PEAK OF GENERATOR	812	463	349	N/A	N/A	N/A
PM PEAK OF GENERATOR	1,007	524	483	N/A	N/A	N/A
AM PEAK (ADJACENT ST)	575	316	259	N/A	N/A	N/A
PM PEAK (ADJACENT ST)	565	350	215	N/A	N/A	N/A

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	3	--	122.40	101.99	173.07	6	5	9	50%	50%
PEAK OF GENERATOR	22	--	11.19	1.63	50.40	5	2	13	51%	49%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	7,081	3,540	3,540	N/A	N/A	N/A
PEAK OF GENERATOR	647	330	317	N/A	N/A	N/A

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	2	--	142.64	119.62	164.43	5	4.8	5.1	50%	50%
PEAK OF GENERATOR	3	--	25.83	9.81	43.20	4	2.5	5.1	55%	45%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	8,252	4,126	4,126	N/A	N/A	N/A
PEAK OF GENERATOR	1,494	822	672	N/A	N/A	N/A

Trip Generation Data – Full Build (2030)

Internal Capture Worksheets

Full Build (2030) Trip Generation

Shared Trip Calculations [1]

RETAIL - OFFICE

WEEKDAY DAILY						
RETAIL	%	#	BALANCED	#	%	OFFICE
EXIT ->	3%	1,987	**60**	5,306	15%	-> ENTER
ENTER <-	4%	1,987	**79**	5,306	22%	<- EXIT

WEEKDAY MORNING						
RETAIL	%	#	BALANCED	#	%	OFFICE
EXIT ->	29%	38	**11**	1,116	4%	-> ENTER
ENTER <-	32%	62	**20**	337	28%	<- EXIT

WEEKDAY EVENING						
RETAIL	%	#	BALANCED	#	%	OFFICE
EXIT ->	2%	209	**4**	220	31%	-> ENTER
ENTER <-	8%	193	**15**	1,277	20%	<- EXIT

RETAIL - HOTEL

WEEKDAY DAILY						
RETAIL	%	#	BALANCED	#	%	HOTEL
EXIT ->	11%	1,987	**219**	2,001	33%	-> ENTER
ENTER <-	9%	1,987	**179**	2,001	38%	<- EXIT

WEEKDAY MORNING						
RETAIL	%	#	BALANCED	#	%	HOTEL
EXIT ->	0%	38	**0**	119	0%	-> ENTER
ENTER <-	4%	62	**2**	82	14%	<- EXIT

WEEKDAY EVENING						
RETAIL	%	#	BALANCED	#	%	HOTEL
EXIT ->	5%	209	**10**	137	17%	-> ENTER
ENTER <-	2%	193	**4**	132	16%	<- EXIT

RETAIL - RESIDENTIAL

WEEKDAY DAILY						
RETAIL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	11%	1,987	**219**	2,005	33%	-> ENTER
ENTER <-	9%	1,987	**179**	2,005	38%	<- EXIT

WEEKDAY MORNING						
RETAIL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	14%	38	**1**	67	2%	-> ENTER
ENTER <-	17%	62	**2**	209	1%	<- EXIT

WEEKDAY EVENING						
RETAIL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	26%	209	**54**	202	46%	-> ENTER
ENTER <-	10%	193	**19**	129	42%	<- EXIT

OFFICE - HOTEL

WEEKDAY DAILY						
OFFICE	%	#	BALANCED	#	%	HOTEL
EXIT ->	2%	5,306	**60**	2,001	3%	-> ENTER
ENTER <-	0%	5,306	**0**	2,001	0%	<- EXIT

WEEKDAY MORNING						
OFFICE	%	#	BALANCED	#	%	HOTEL
EXIT ->	0%	337	**0**	119	0%	-> ENTER
ENTER <-	3%	1,116	**33**	82	75%	<- EXIT

WEEKDAY EVENING						
OFFICE	%	#	BALANCED	#	%	HOTEL
EXIT ->	0%	1,277	**0**	137	0%	-> ENTER
ENTER <-	0%	220	**0**	132	0%	<- EXIT

OFFICE - RESIDENTIAL

WEEKDAY DAILY						
OFFICE	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	2%	5,306	**60**	2,005	3%	-> ENTER
ENTER <-	0%	5,306	**0**	2,005	0%	<- EXIT

WEEKDAY MORNING						
OFFICE	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	1%	337	**0**	67	0%	-> ENTER
ENTER <-	3%	1,116	**4**	209	2%	<- EXIT

WEEKDAY EVENING						
OFFICE	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	2%	1,277	**8**	202	4%	-> ENTER
ENTER <-	57%	220	**5**	129	4%	<- EXIT

HOTEL - RESIDENTIAL

WEEKDAY DAILY						
HOTEL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	0%	2,001	**0**	2,005	0%	-> ENTER
ENTER <-	0%	2,001	**0**	2,005	0%	<- EXIT

WEEKDAY MORNING						
HOTEL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	0%	82	**0**	67	0%	-> ENTER
ENTER <-	0%	119	**0**	209	0%	<- EXIT

WEEKDAY EVENING						
HOTEL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	2%	132	**0**	202	0%	-> ENTER
ENTER <-	12%	137	**4**	129	3%	<- EXIT

RESTAURANT - RETAIL

WEEKDAY DAILY						
RESTAURANT	%	#	BALANCED	#	%	RETAIL
EXIT ->	30%	5,906	**556**	1,987	28%	-> ENTER
ENTER <-	28%	5,906	**596**	1,987	30%	<- EXIT

WEEKDAY MORNING						
RESTAURANT	%	#	BALANCED	#	%	RETAIL
EXIT ->	14%	471	**5**	62	8%	-> ENTER
ENTER <-	50%	575	**5**	38	13%	<- EXIT

WEEKDAY EVENING						
RESTAURANT	%	#	BALANCED	#	%	RETAIL
EXIT ->	41%	391	**97**	193	50%	-> ENTER
ENTER <-	29%	637	**61**	209	29%	<- EXIT

Full Build (2030) Trip Generation

Shared Trip Calculations [1]

RESTAURANT - OFFICE

WEEKDAY DAILY						
RESTAURANT	%	#	BALANCED	#	%	OFFICE
EXIT ->	3%	5,906	**177**	5,306	15%	-> ENTER
ENTER <-	4%	5,906	**236**	5,306	22%	<- EXIT

WEEKDAY MORNING						
RESTAURANT	%	#	BALANCED	#	%	OFFICE
EXIT ->	31%	471	**146**	1,116	14%	-> ENTER
ENTER <-	23%	575	**132**	337	63%	<- EXIT

WEEKDAY EVENING						
RESTAURANT	%	#	BALANCED	#	%	OFFICE
EXIT ->	3%	391	**12**	220	30%	-> ENTER
ENTER <-	2%	637	**13**	1,277	4%	<- EXIT

RESTAURANT - HOTEL

WEEKDAY DAILY						
RESTAURANT	%	#	BALANCED	#	%	HOTEL
EXIT ->	11%	5,906	**650**	2,001	33%	-> ENTER
ENTER <-	9%	5,906	**532**	2,001	38%	<- EXIT

WEEKDAY MORNING						
RESTAURANT	%	#	BALANCED	#	%	HOTEL
EXIT ->	3%	471	**5**	119	4%	-> ENTER
ENTER <-	6%	575	**7**	82	9%	<- EXIT

WEEKDAY EVENING						
RESTAURANT	%	#	BALANCED	#	%	HOTEL
EXIT ->	7%	391	**27**	137	71%	-> ENTER
ENTER <-	5%	637	**32**	132	68%	<- EXIT

RESTAURANT - RESIDENTIAL

WEEKDAY DAILY						
RESTAURANT	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	11%	5,906	**650**	2,005	33%	-> ENTER
ENTER <-	9%	5,906	**532**	2,005	38%	<- EXIT

WEEKDAY MORNING						
RESTAURANT	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	4%	471	**3**	67	5%	-> ENTER
ENTER <-	20%	575	**42**	209	20%	<- EXIT

WEEKDAY EVENING						
RESTAURANT	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	18%	391	**32**	202	16%	-> ENTER
ENTER <-	14%	637	**27**	129	21%	<- EXIT

TOTAL SHARED TRIPS - WEEKDAY DAILY			
	ENTER	EXIT	TOTAL
RETAIL	993	1,094	2087
OFFICE	113	207	320
R&D	124	228	352
HOTEL	929	711	1640
RESID.	929	711	1640
RESTAUR.	1,896	2,033	3929
TOTAL	4,984	4,984	9968

TOTAL SHARED TRIPS - WEEKDAY MORNING			
	ENTER	EXIT	TOTAL
RETAIL	29	17	46
OFFICE	22	26	48
R&D	172	126	298
HOTEL	5	42	47
RESID.	4	48	52
RESTAUR.	186	159	345
TOTAL	418	418	836

TOTAL SHARED TRIPS - WEEKDAY EVENING			
	ENTER	EXIT	TOTAL
RETAIL	135	129	264
OFFICE	3	5	8
R&D	18	31	49
HOTEL	41	36	77
RESID.	94	55	149
RESTAUR.	133	168	301
TOTAL	424	424	848

1 Weekday morning and evening internal capture rates based on NCHRP Report 684. Weekday daily internal capture rates based on ITE Trip Generation Handbook, 2nd Edition.

Trip Generation Data – Full Build (2030)

TNC Trip Generation Calculations

2030 Full Build Conditions
TNC Trip Calculations

	Residential: Net Person Trips [1]	Residential: All People in Vehicles [2]	Residential: People in TNCs [3]	Residential: TNC Passenger Trips [4]	Residential: People in Private Vehicles [5]	Residential: Private Vehicle Trips [4]	Residential: All Vehicle Trips	Office: Net Person Trips [1]	Office: All People in Vehicles [2]	Office: People in TNCs [3]	Office: TNC Passenger Trips [4]	Office: People in Private Vehicles [5]	Office: Private Vehicle Trips [4]	Office: All Vehicle Trips
			28%	1.27	72%	1.27				6%	1.19	94%	1.19	
Weekday Morning Peak Hour														
Enter	63	14	4	3	10	8	11	408	175	10	9	164	138	147
Exit	161	41	11	9	29	23	32	44	21	1	1	20	16	17
Total	224	55	15	12	39	31	43	452	196	12	10	184	154	164
Weekday Evening Peak Hour														
Enter	108	27	8	6	20	16	22	81	38	2	2	36	30	32
Exit	74	16	5	4	12	9	13	438	188	11	9	177	148	157
Total	182	44	12	10	31	25	35	519	226	14	11	213	178	189

1 Net Person Trips based on ITE for each land use converted to person trips and with internal capture trips removed
2 All People in Vehicles based on Vehicular Mode Shares approved by the City of Boston
3 TNC shares based on proportion of total arriving and departing TNC rides in the City of Boston in 2019 (as documented by Mass. Department of Public Utilities), total number of residents and employees within the City of Boston from 2019 ACS 5-Year Census Data, and TNC Trip Purpose from MAPC survey. Assume Hotel uses to follow residential patterns, Retail uses to follow patterns averaged between Residential and Office.
4 VOR based on 2010 Census data, 2009 NHTS rates assumed for Hotel and Retail uses
5 Assume all non-TNC vehicle trips are by private vehicle
6 Pass-by rates based on ITE LUC 820 (Shopping Center), 25-percent pass-by rate assumed for time periods with no available data
7 Pass-by rates based on ITE LUC 932 (High-Turnover Sit Down Restaurant), 25-percent pass-by rate assumed for time periods with no available data
8 Assume that difference in TNC in/out trips equates to the deadhead trips.

2030 Full Build Conditions
TNC Trip Calculations

	R&D							Hotel						
	Net Person Trips [1]	All People in Vehicles [2]	People in TNCs [3]	TNC Passenger Trips [4]	People in Private Vehicles [5]	Private Vehicle Trips [4]	All Vehicle Trips	Net Person Trips [1]	All People in Vehicles [2]	People in TNCs [3]	TNC Passenger Trips [4]	People in Private Vehicles [5]	Private Vehicle Trips [4]	All Vehicle Trips
			6%	1.19	94%	1.19				28%	1.67	72%	1.67	
Weekday Morning Peak Hour														
Enter	514	220	13	11	207	174	185	114	40	11	7	29	17	24
Exit	141	67	4	3	63	53	56	40	15	4	3	11	7	10
Total	655	287	17	14	270	227	241	154	55	15	10	40	24	34
Weekday Evening Peak Hour														
Enter	118	56	3	3	52	44	47	96	37	10	6	26	16	22
Exit	803	344	21	17	324	272	289	96	34	9	6	24	14	20
Total	921	400	24	20	376	316	336	192	70	20	12	51	30	42

1 Net Person Trips based on ITE for each land use converted to person trips and with internal capture trips removed
2 All People in Vehicles based on Vehicular Mode Shares approved by the City of Boston
3 TNC shares based on proportion of total arriving and departing TNC rides in the City of Boston in 2019 (as documented by Mass. Department of Public Utilities), total number of residents and employees within the City of Boston from 2019 ACS 5-Year Census Data, and TNC Trip Purpose from MAPC survey. Assume Hotel uses to follow residential patterns, Retail uses to follow patterns averaged between Residential and Office.
4 VOR based on 2010 Census data, 2009 NHTS rates assumed for Hotel and Retail uses
5 Assume all non-TNC vehicle trips are by private vehicle
6 Pass-by rates based on ITE LUC 820 (Shopping Center), 25-percent pass-by rate assumed for time periods with no available data
7 Pass-by rates based on ITE LUC 932 (High-Turnover Sit Down Restaurant), 25-percent pass-by rate assumed for time periods with no available data
8 Assume that difference in TNC in/out trips equates to the deadhead trips.

2030 Full Build Conditions
TNC Trip Calculations

	Net Person Trips [1]	All People in Vehicles [2]	People in TNCs [3]	TNC Passenger Trips [4]	Retail People in Private Vehicles [5]	Private Vehicle Trips [4]	Pass-By [6]	New Prvt. Vehicle Trips	All New Vehicle Trips
			17%	1.82	83%	1.82			
Weekday Morning Peak Hour							25%		
Enter	33	12	2	1	10	5	1	4	5
Exit	21	8	1	1	7	4	1	3	4
Total	54	20	3	2	16	9	2	7	9
Weekday Evening Peak Hour							34%		
Enter	58	22	4	2	18	10	4	6	8
Exit	80	28	5	3	23	13	4	9	12
Total	138	50	9	5	42	23	8	15	20

1 Net Person Trips based on ITE for each land use converted to person trips and with internal capture trips removed
2 All People in Vehicles based on Vehicular Mode Shares approved by the City of Boston
3 TNC shares based on proportion of total arriving and departing TNC rides in the City of Boston in 2019 (as documented by Mass. Department of Public Utilities), total number of residents and employees within the City of Boston from 2019 ACS 5-Year Census Data, and TNC Trip Purpose from MAPC survey. Assume Hotel uses to follow residential patterns, Retail uses to follow patterns averaged between Residential and Office.
4 VOR based on 2010 Census data, 2009 NHTS rates assumed for Hotel and Retail uses
5 Assume all non-TNC vehicle trips are by private vehicle
6 Pass-by rates based on ITE LUC 820 (Shopping Center), 25-percent pass-by rate assumed for time periods with no available data
7 Pass-by rates based on ITE LUC 932 (High-Turnover Sit Down Restaurant), 25-percent pass-by rate assumed for time periods with no available data
8 Assume that difference in TNC in/out trips equates to the deadhead trips.

2030 Full Build Conditions
TNC Trip Calculations

	Net Person Trips [1]	All People in Vehicles [2]	People in TNCs [3]	TNC Passenger Trips [4]	Restaurant People in Private Vehicles [5]	Private Vehicle Trips [4]	Pass-By [7]	New Prvt. Vehicle Trips	All New Vehicle Trips
			17%	1.82	83%	1.82			
Weekday Morning Peak Hour							25%		
Enter	389	136	23	13	113	62	15	47	60
Exit	312	119	20	11	99	54	15	39	50
Total	701	255	43	24	212	116	30	86	110
Weekday Evening Peak Hour							34%		
Enter	504	193	33	18	160	88	21	67	85
Exit	223	78	13	7	65	36	21	15	22
Total	727	271	46	25	225	124	42	82	107

1 Net Person Trips based on ITE for each land use converted to person trips and with internal capture trips removed
2 All People in Vehicles based on Vehicular Mode Shares approved by the City of Boston
3 TNC shares based on proportion of total arriving and departing TNC rides in the City of Boston in 2019 (as documented by Mass. Department of Public Utilities), total number of residents and employees within the City of Boston from 2019 ACS 5-Year Census Data, and TNC Trip Purpose from MAPC survey. Assume Hotel uses to follow residential patterns, Retail uses to follow patterns averaged between Residential and Office.
4 VOR based on 2010 Census data, 2009 NHTS rates assumed for Hotel and Retail uses
5 Assume all non-TNC vehicle trips are by private vehicle
6 Pass-by rates based on ITE LUC 820 (Shopping Center), 25-percent pass-by rate assumed for time periods with no available data
7 Pass-by rates based on ITE LUC 932 (High-Turnover Sit Down Restaurant), 25-percent pass-by rate assumed for time periods with no available data
8 Assume that difference in TNC in/out trips equates to the deadhead trips.

2030 Full Build Conditions
TNC Trip Calculations

	Total Site					
	TNC Passenger Trips	TNC Deadhead Trips [8]	Total TNC Trips	Private Vehicle Trips	Total Vehicle Trips	Total Pass-By Trips
Weekday Morning Peak Hour						
Enter	44	-	44	388	432	16
Exit	28	16	44	141	185	16
Total	72	16	88	529	617	32
Weekday Evening Peak Hour						
Enter	37	9	46	179	225	25
Exit	46	-	46	467	513	25
Total	83	9	92	646	738	50

1 Net Person Trips based on ITE for each land use converted to person trips and with internal capture trips removed
2 All People in Vehicles based on Vehicular Mode Shares approved by the City of Boston
3 TNC shares based on proportion of total arriving and departing TNC rides in the City of Boston in 2019 (as documented by Mass. Department of Public Utilities), total number of residents and employees within the City of Boston from 2019 ACS 5-Year Census Data, and TNC Trip Purpose from MAPC survey. Assume Hotel uses to follow residential patterns, Retail uses to follow patterns averaged between Residential and Office.
4 VOR based on 2010 Census data, 2009 NHTS rates assumed for Hotel and Retail uses
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7 Pass-by rates based on ITE LUC 932 (High-Turnover Sit Down Restaurant), 25-percent pass-by rate assumed for time periods with no available data
8 Assume that difference in TNC in/out trips equates to the deadhead trips.

Intersection Queue Diagrams

2025 Conditions

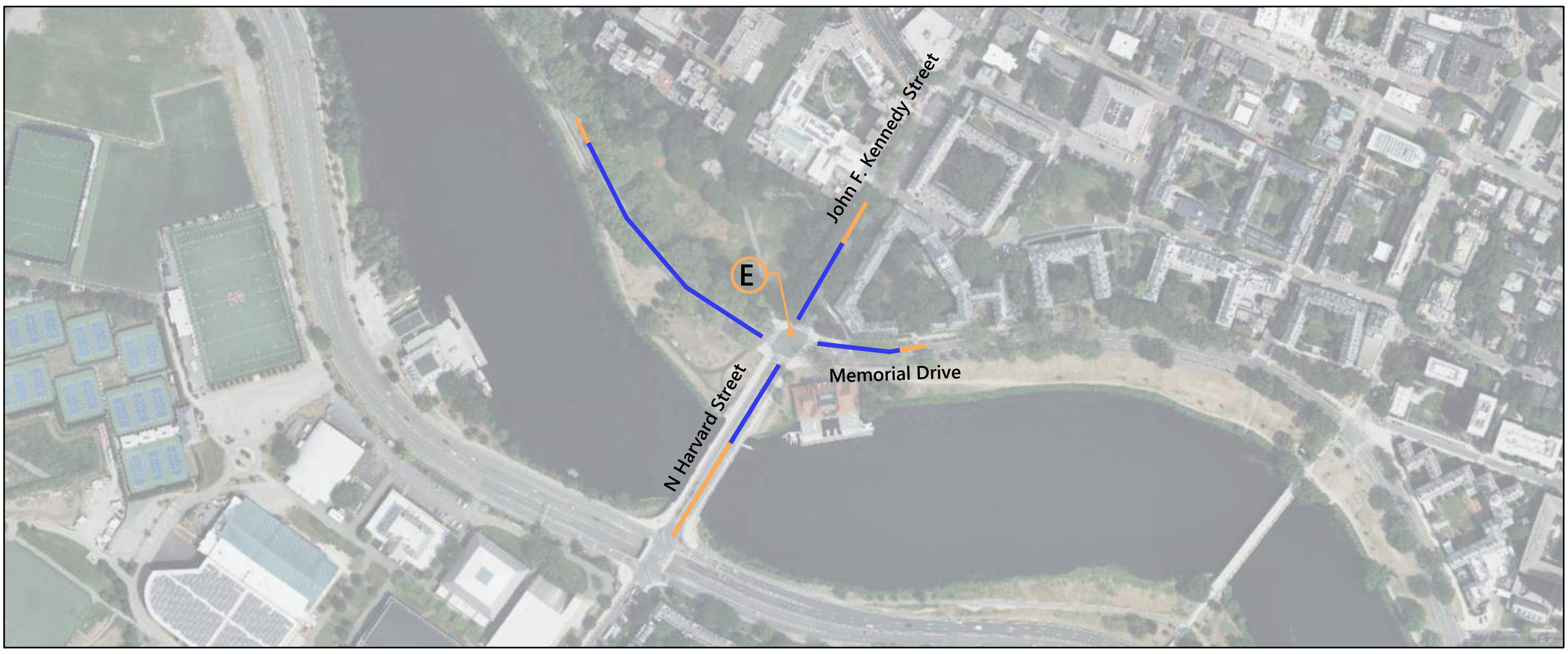
John F. Kennedy Street at Memorial Drive

X Overall Intersection Level of Service

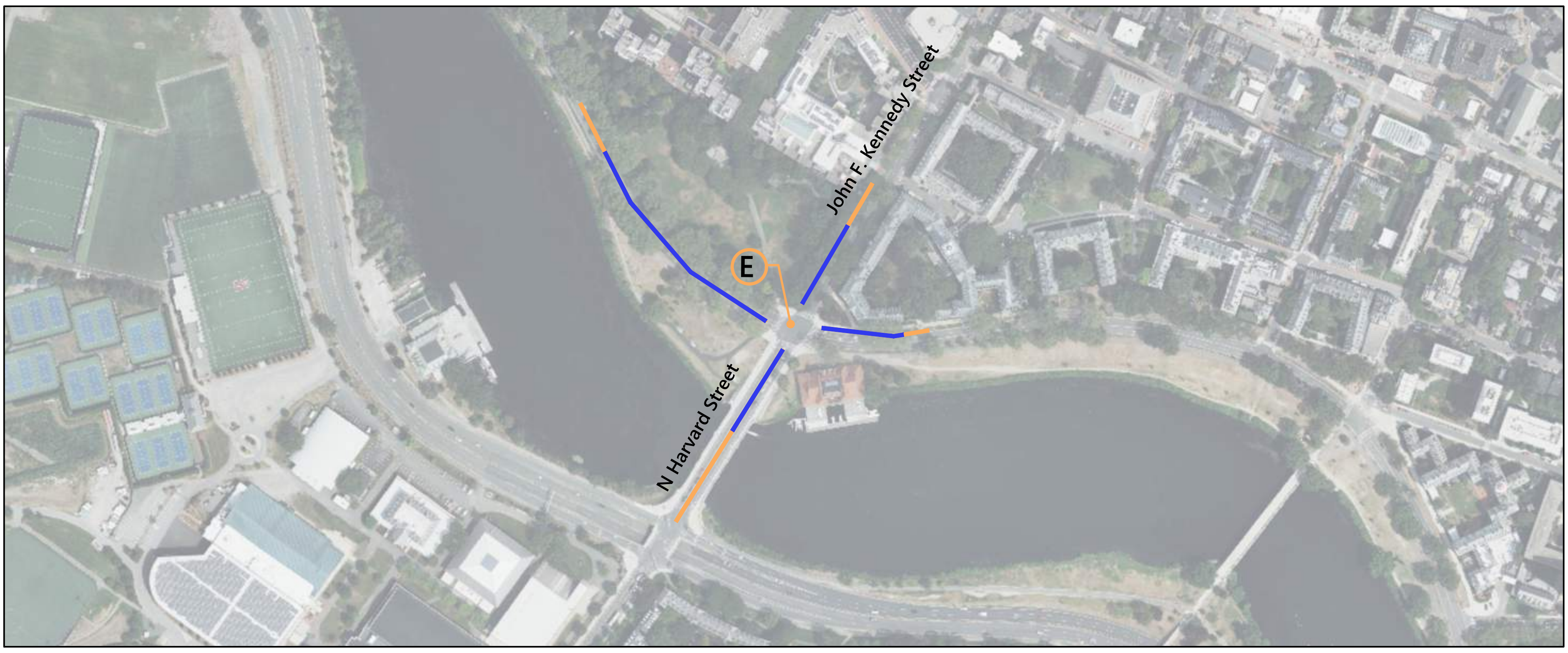
50th Percentile Queue

95th Percentile Queue

Existing



No-Build (2025)



Build (2025)

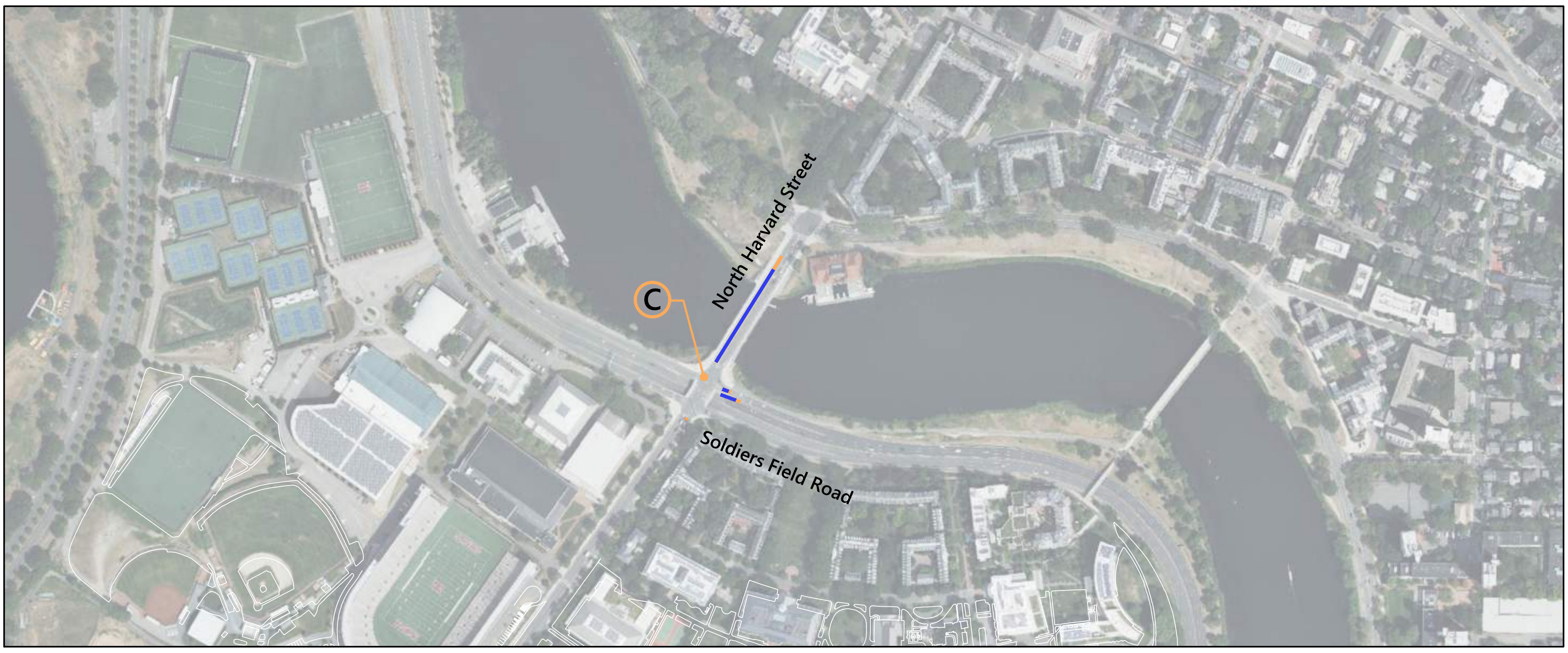
2025 Conditions: Morning Peak Hour Queue Diagrams

0 200 400 Feet

Enterprise Research Campus Project
Boston, MA

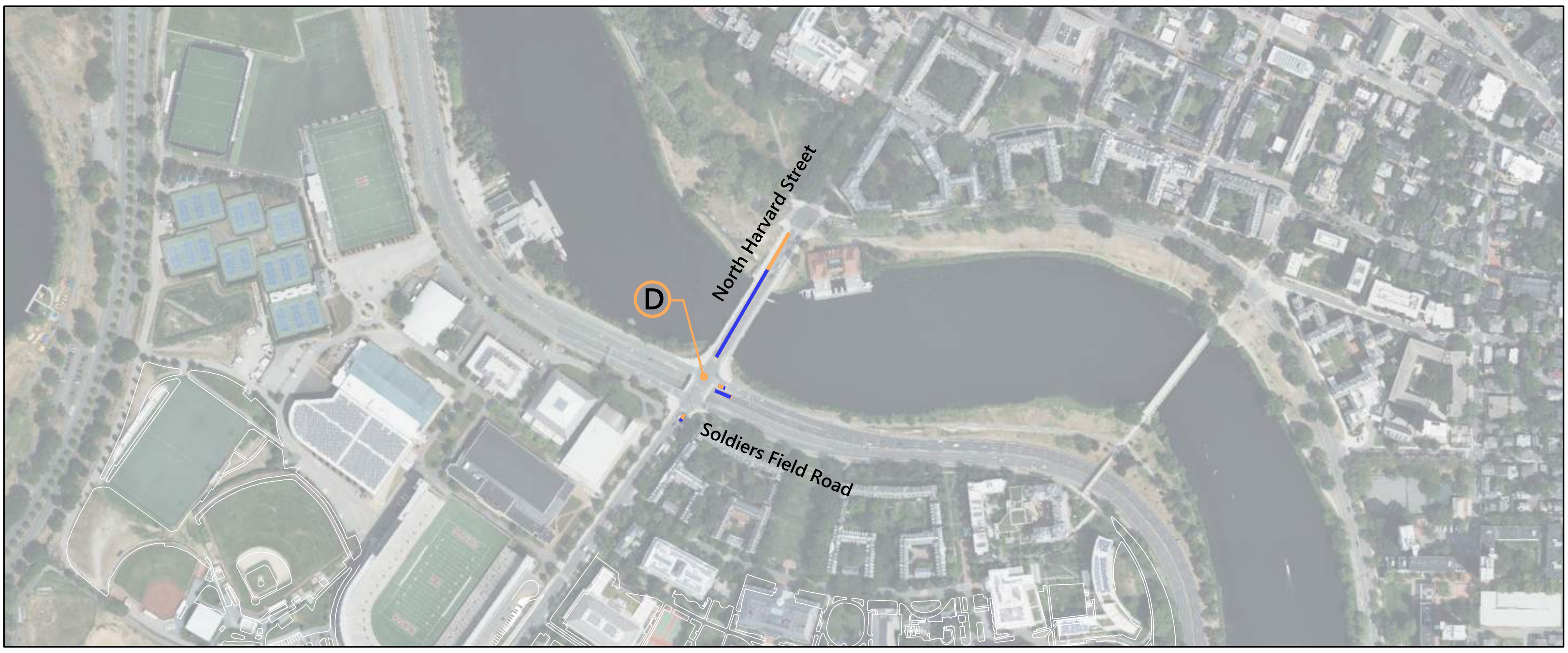
North Harvard Street at Soldiers Field Road WB

X Overall Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



Existing

No-Build (2025)



Build (2025)

2025 Conditions: Morning Peak Hour Queue Diagrams

0 250 500 Feet

Enterprise Research Campus Project
Boston, MA

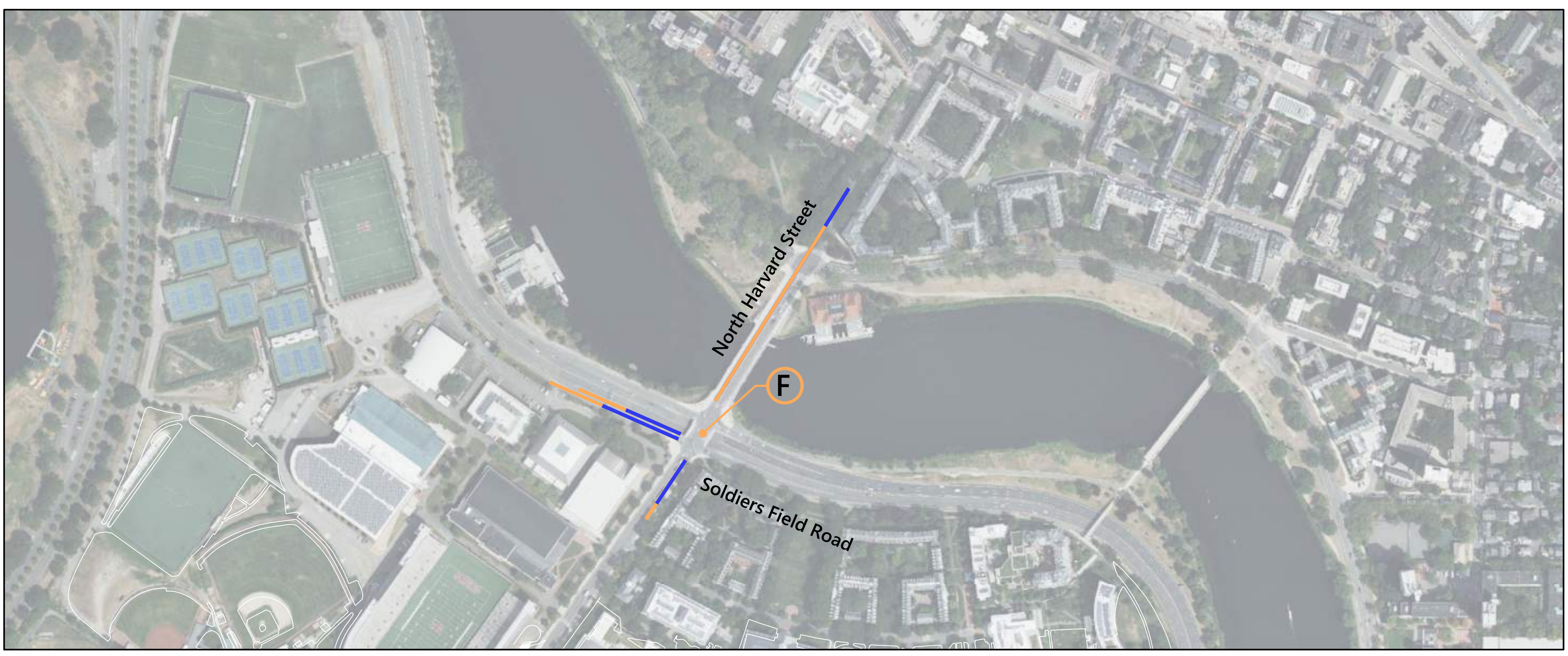
North Harvard Street at Soldiers Field Road EB

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing



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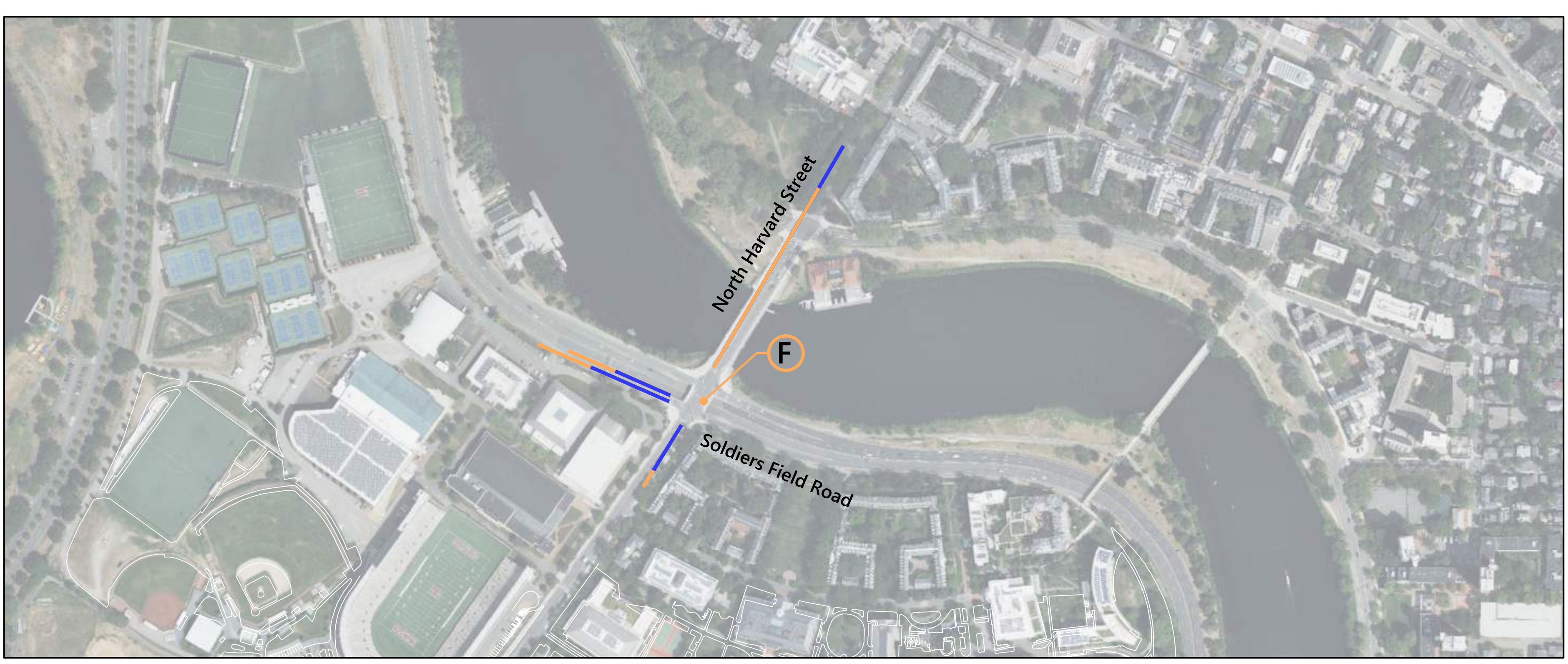

Build (2025)

2025 Conditions: Morning Peak Hour Queue Diagrams

0 250 500 Feet

Enterprise Research Campus Project
Boston, MA

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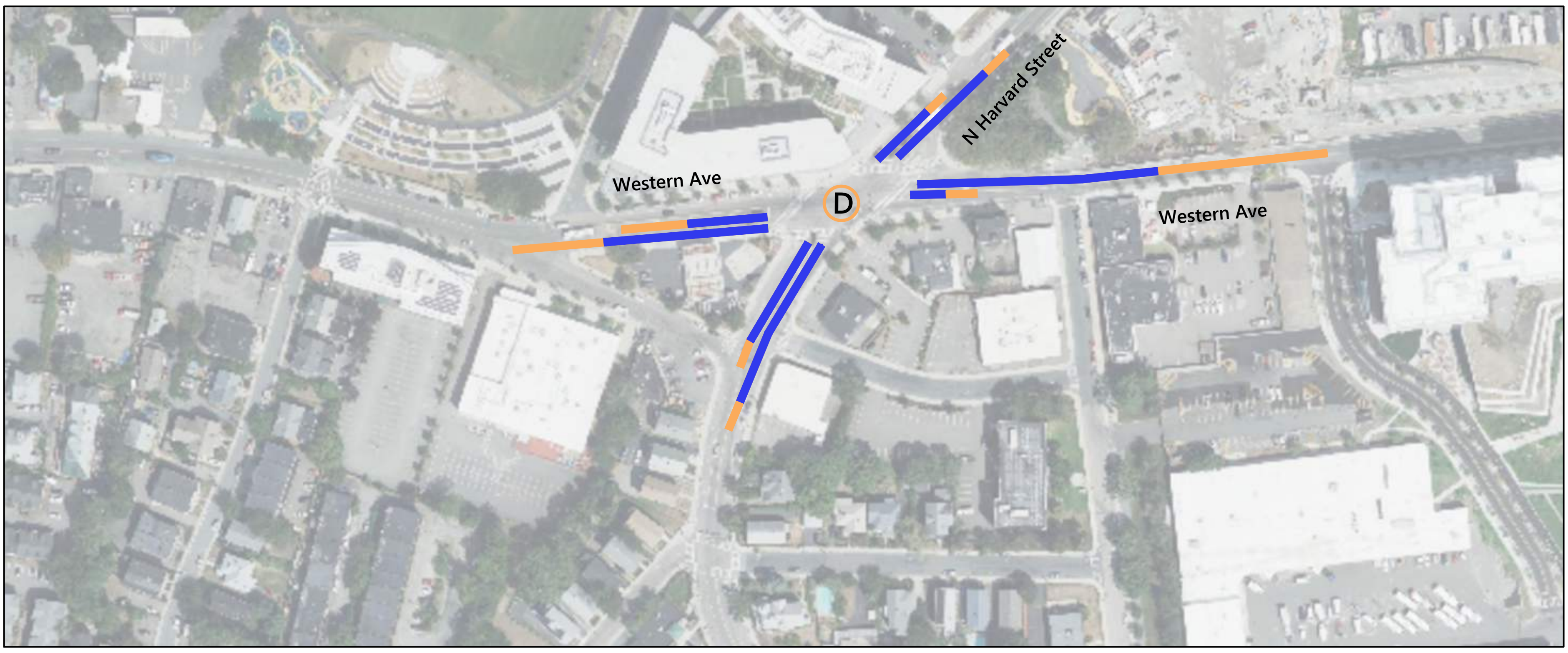
North Harvard Street at Western Ave

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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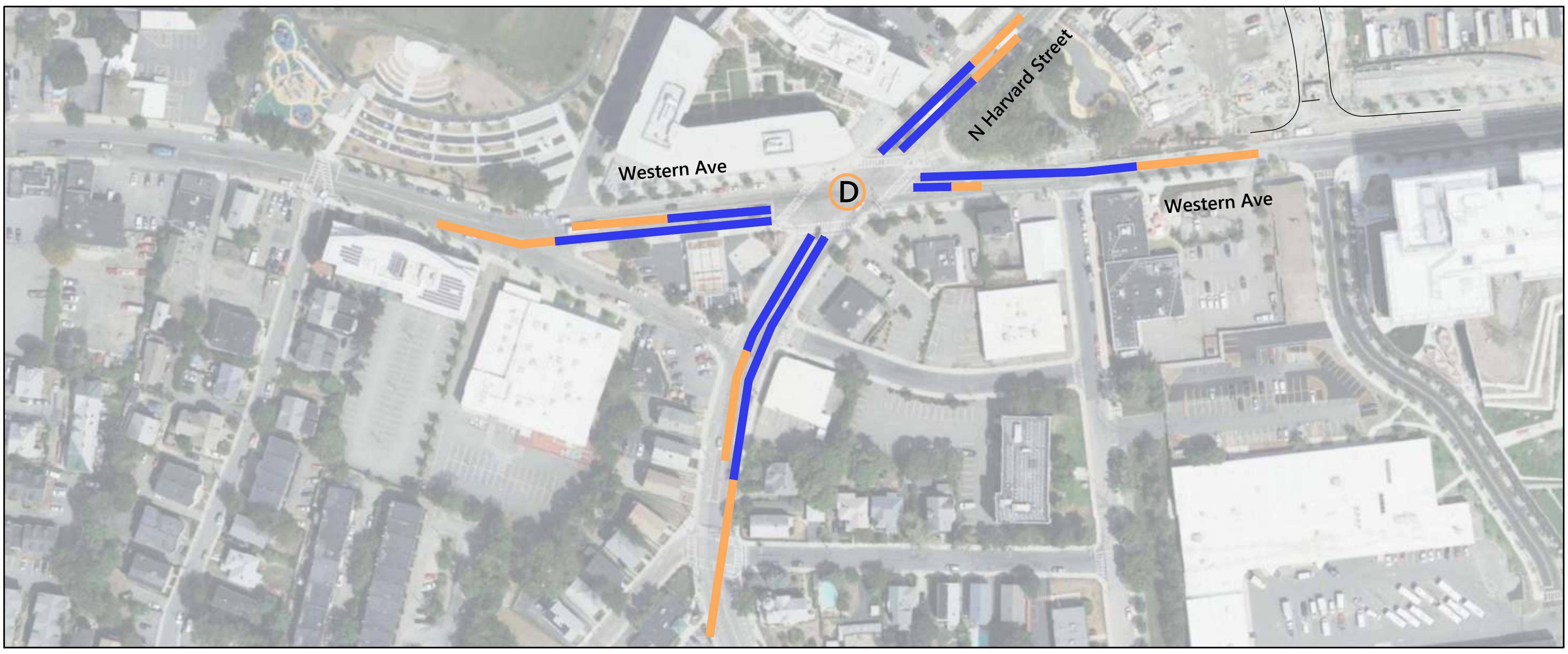

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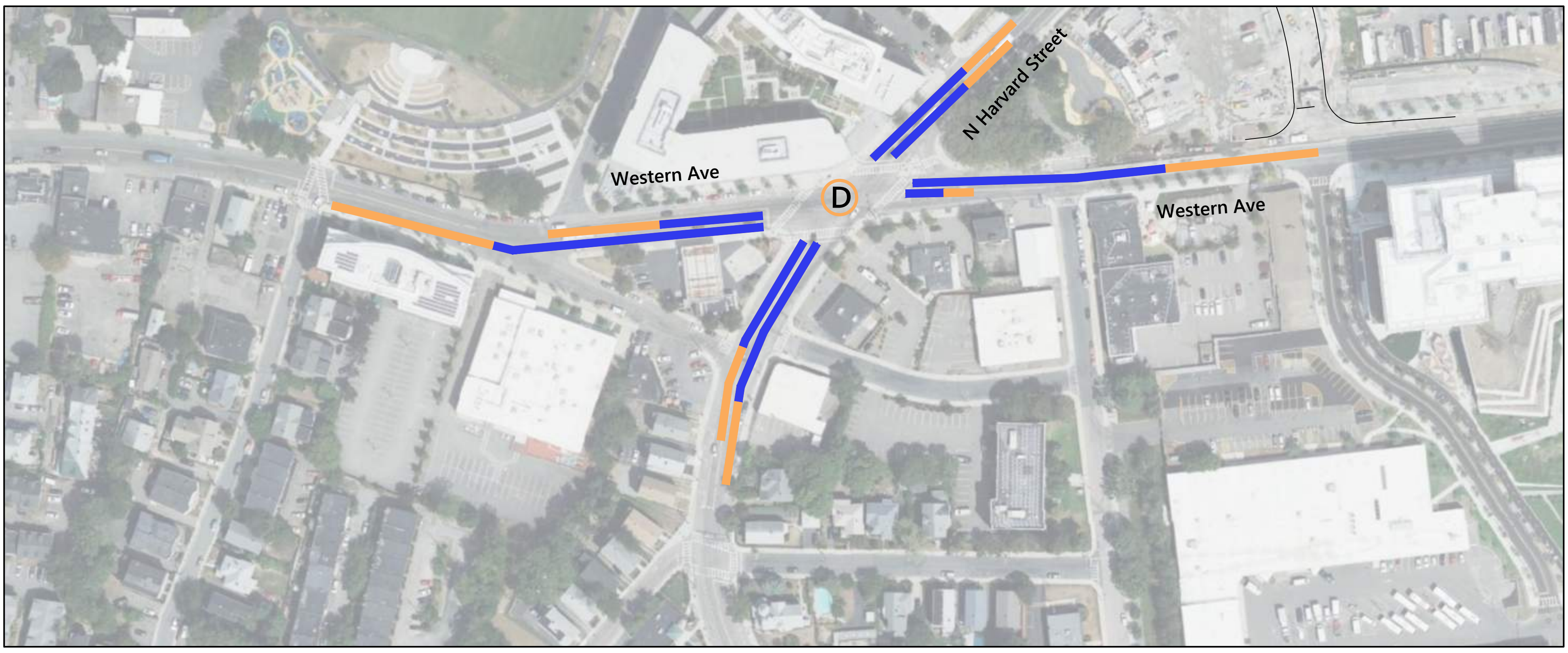


Build (2025)

2025 Conditions: Morning Peak Hour Queue Diagrams

0 100 200 Feet

Enterprise Research Campus
Boston, Massachusetts

North Harvard Street at Franklin St/ Kingsley St

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2025)

Build (2025)

2025 Conditions: Morning Peak Hour Queue Diagrams

0 150 300 Feet

Enterprise Research Campus Project
Boston, MA

Cambridge Street at North Harvard Street

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2025)

Build (2025)

2025 Conditions: Morning Peak Hour Queue Diagrams

0 125 250 Feet

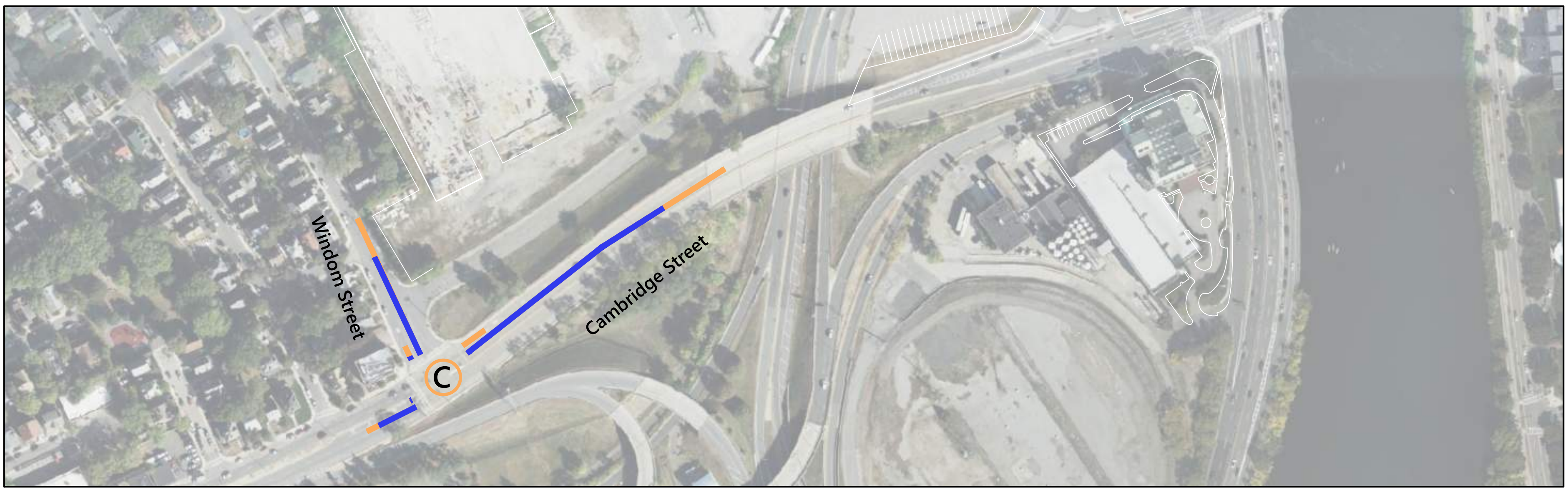
Enterprise Research Campus Project
Boston, MA

Cambridge Street at Windom Street

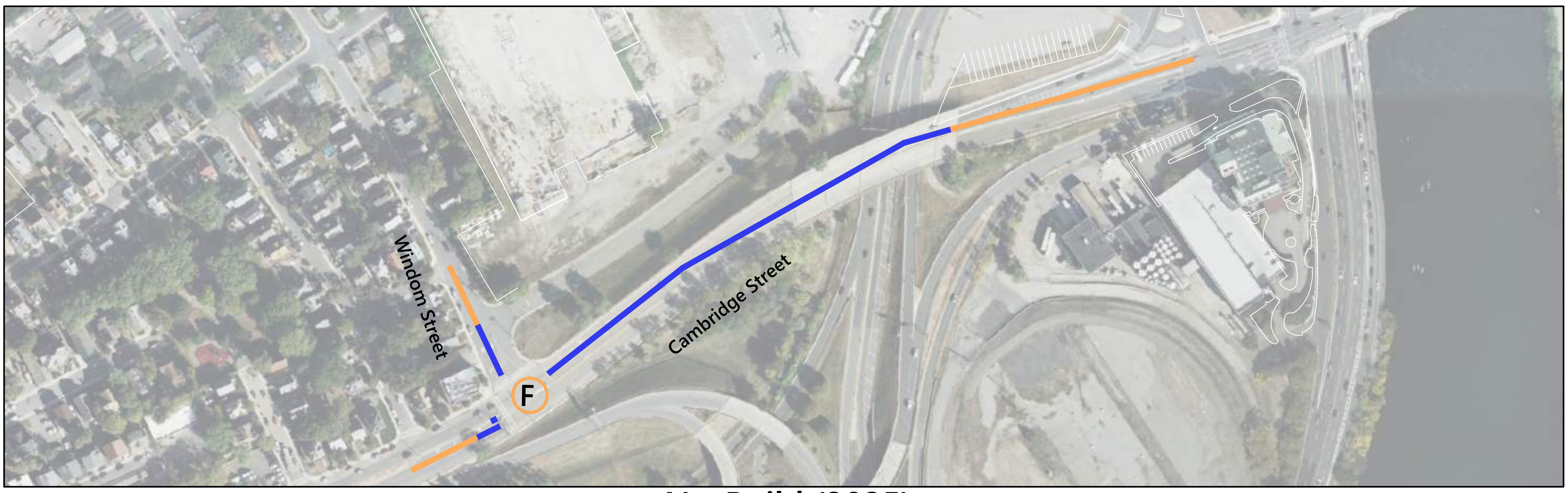
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



Existing



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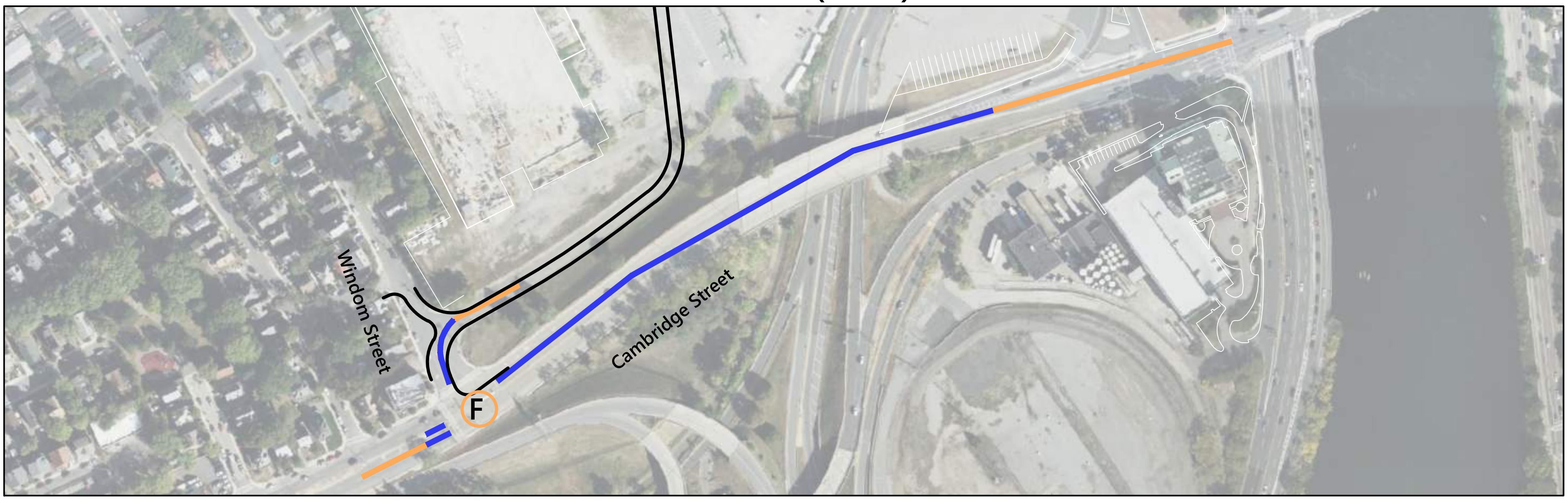
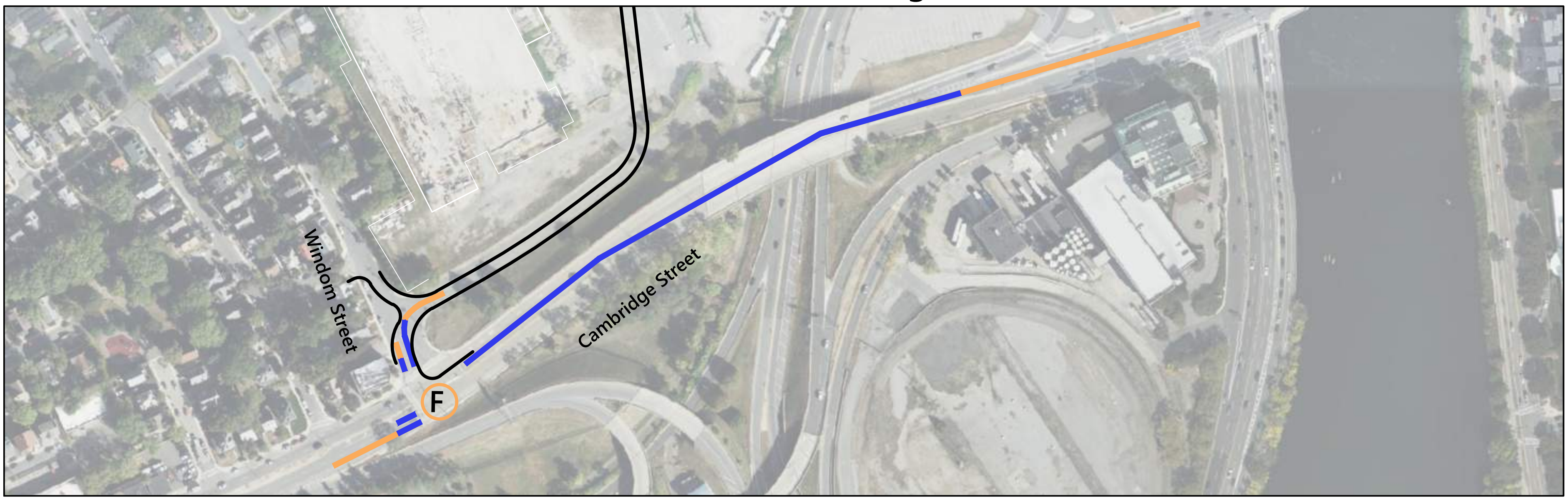


Build (2025) - No Mitigation



Build (2025) - With Mitigation

2025 Conditions: Morning Peak Hour
Queue Diagrams

0 125 250 Feet

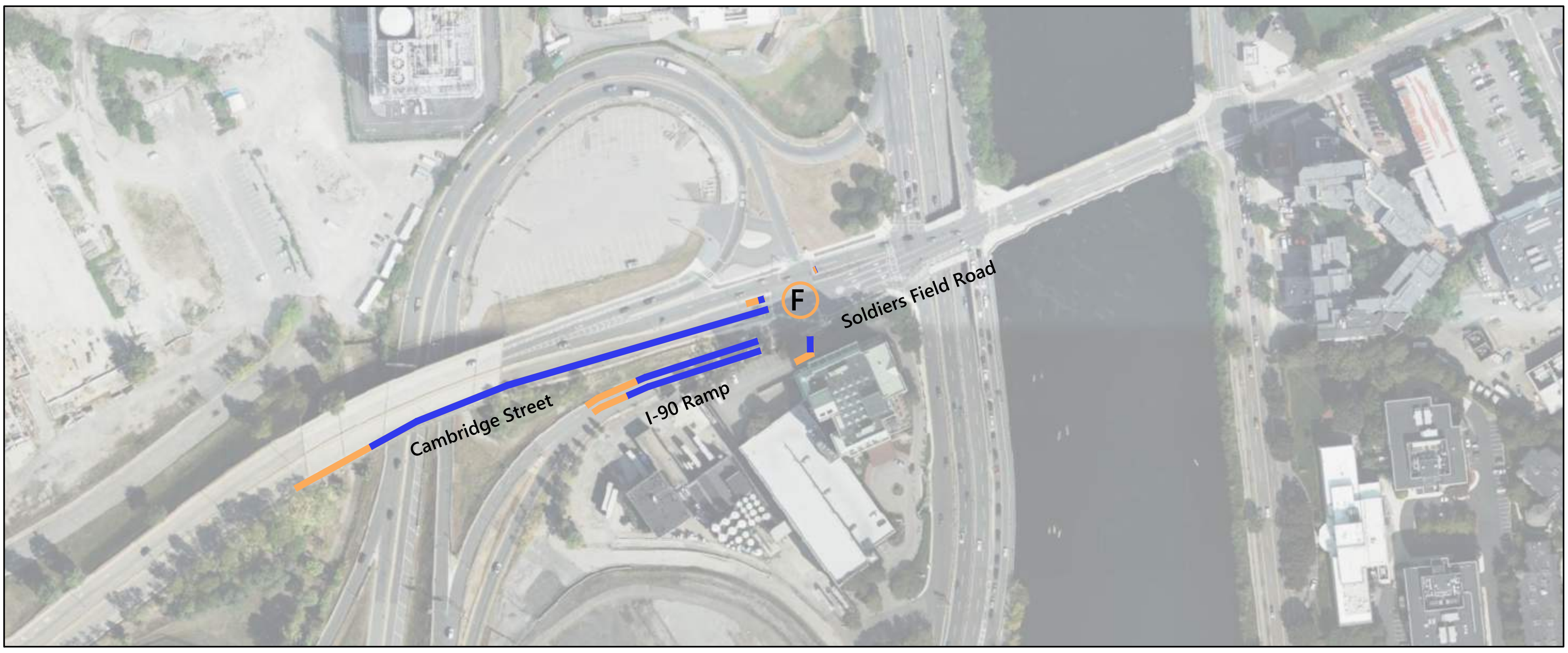
Enterprise Research Campus Project
Boston, MA

Cambridge Street at I-90 Ramps/ Double Tree Hotel

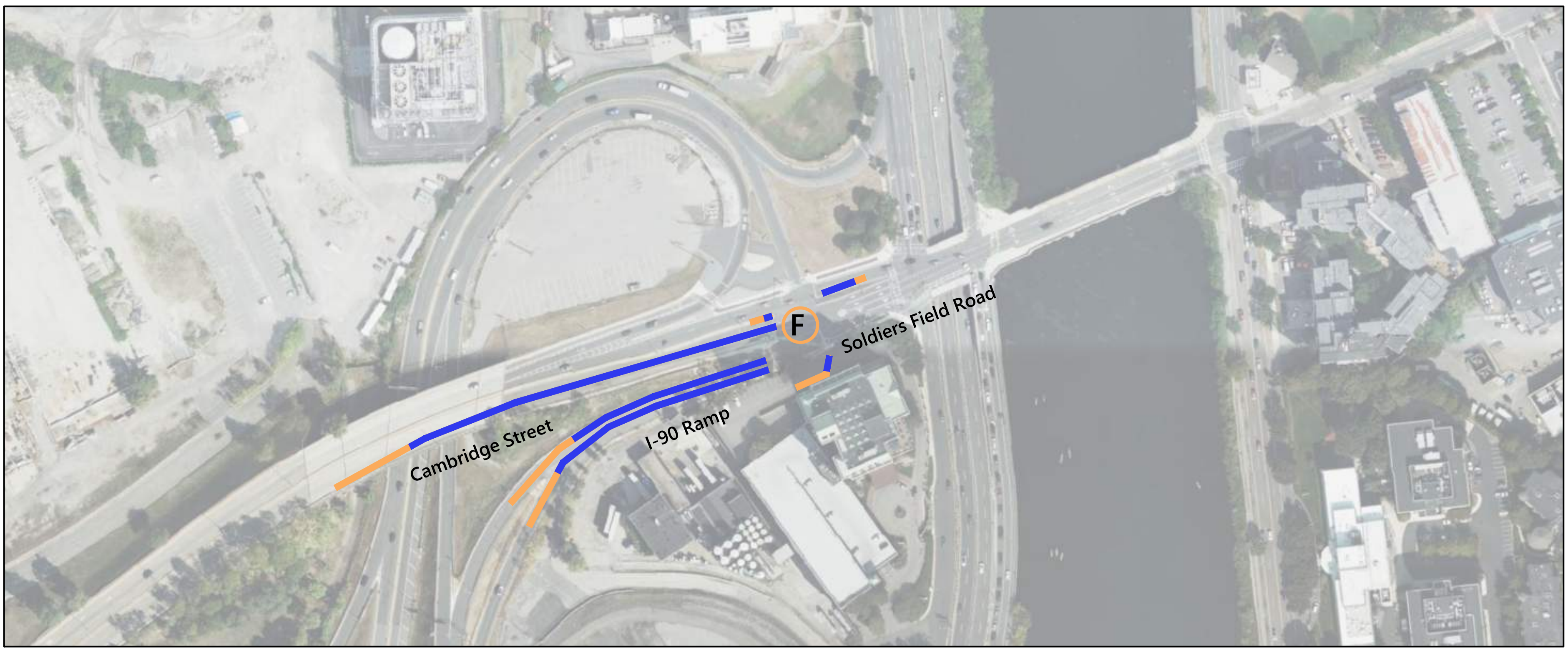
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



Existing



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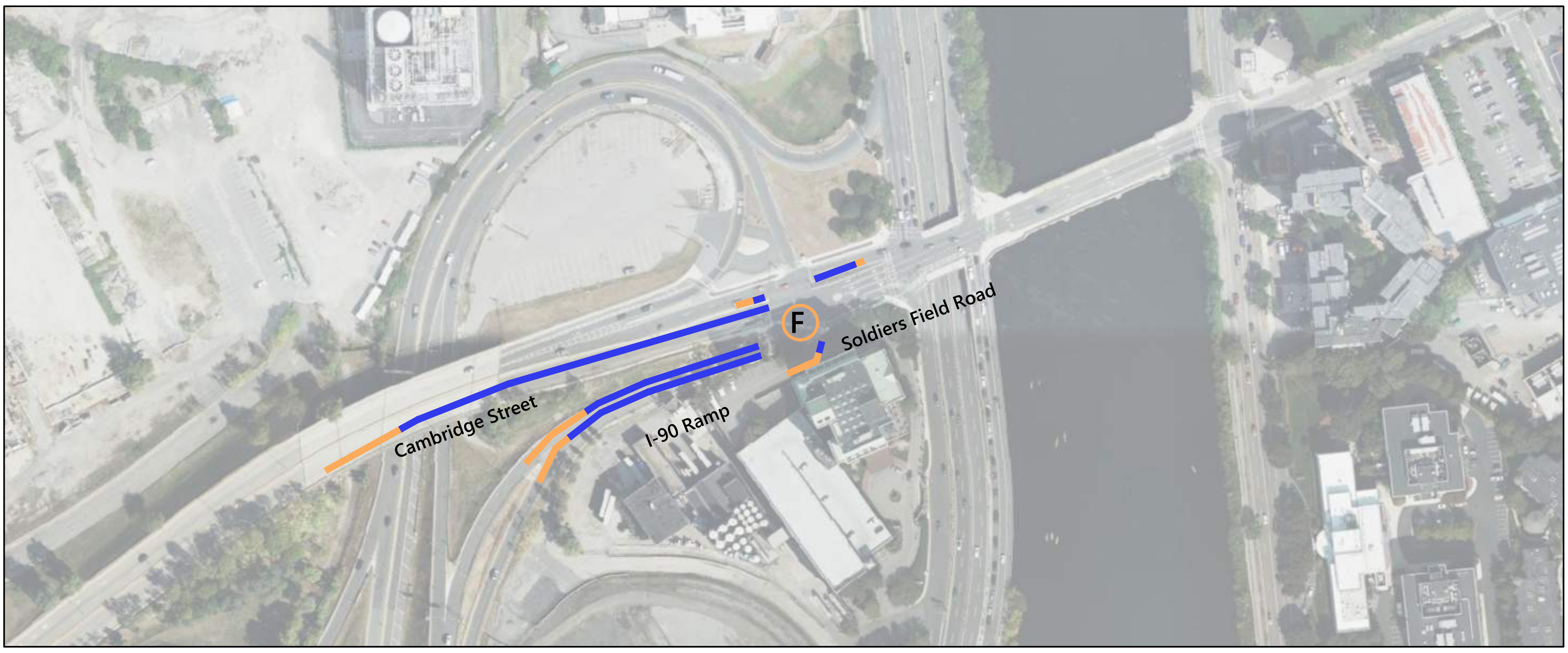

Build (2025)

2025 Conditions: Morning Peak Hour Queue Diagrams

0 125 250 Feet

Enterprise Research Campus Project
Boston, MA

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Cambridge Street at Soldiers Field Road

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2025)

Build (2025)

vhb

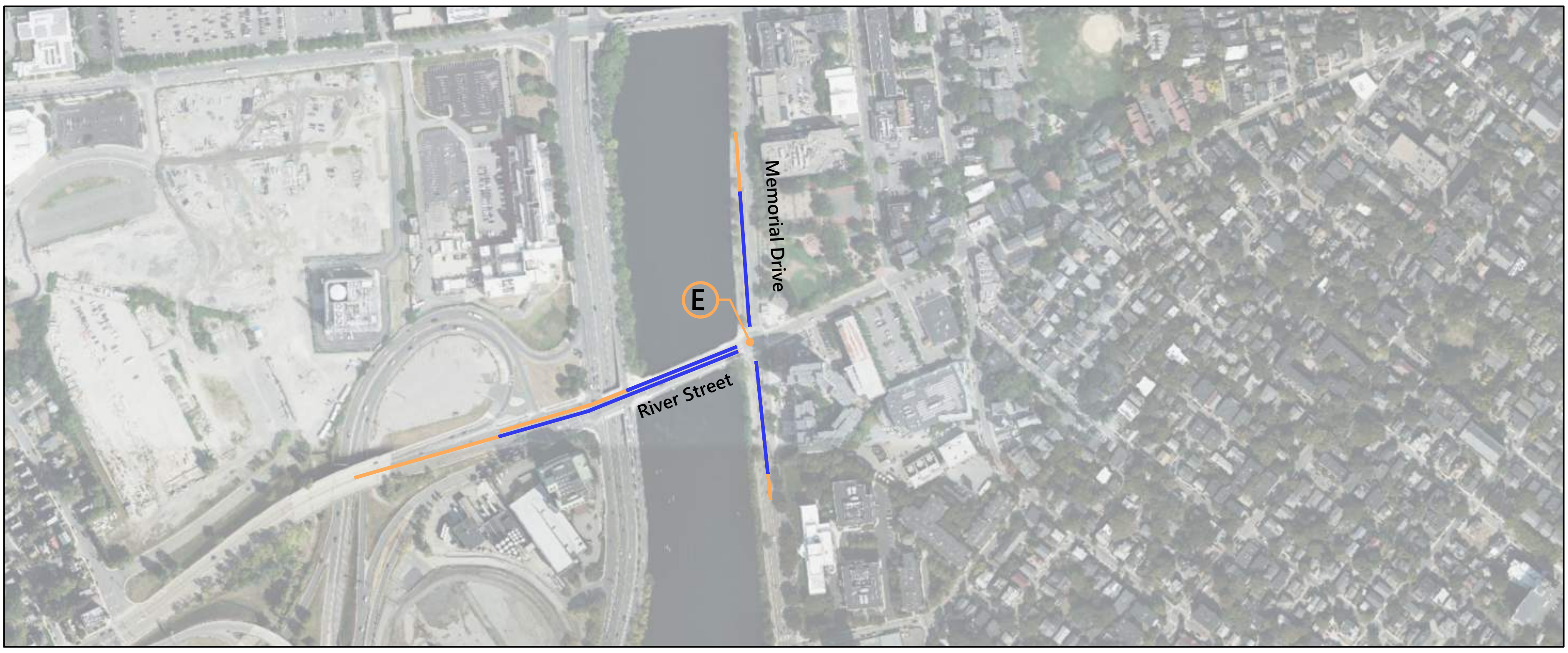
2025 Conditions: Morning Peak Hour Queue Diagrams

0 200 400 Feet

Enterprise Research Campus Project
Boston, MA

Memorial Drive at River Street

X Overall Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



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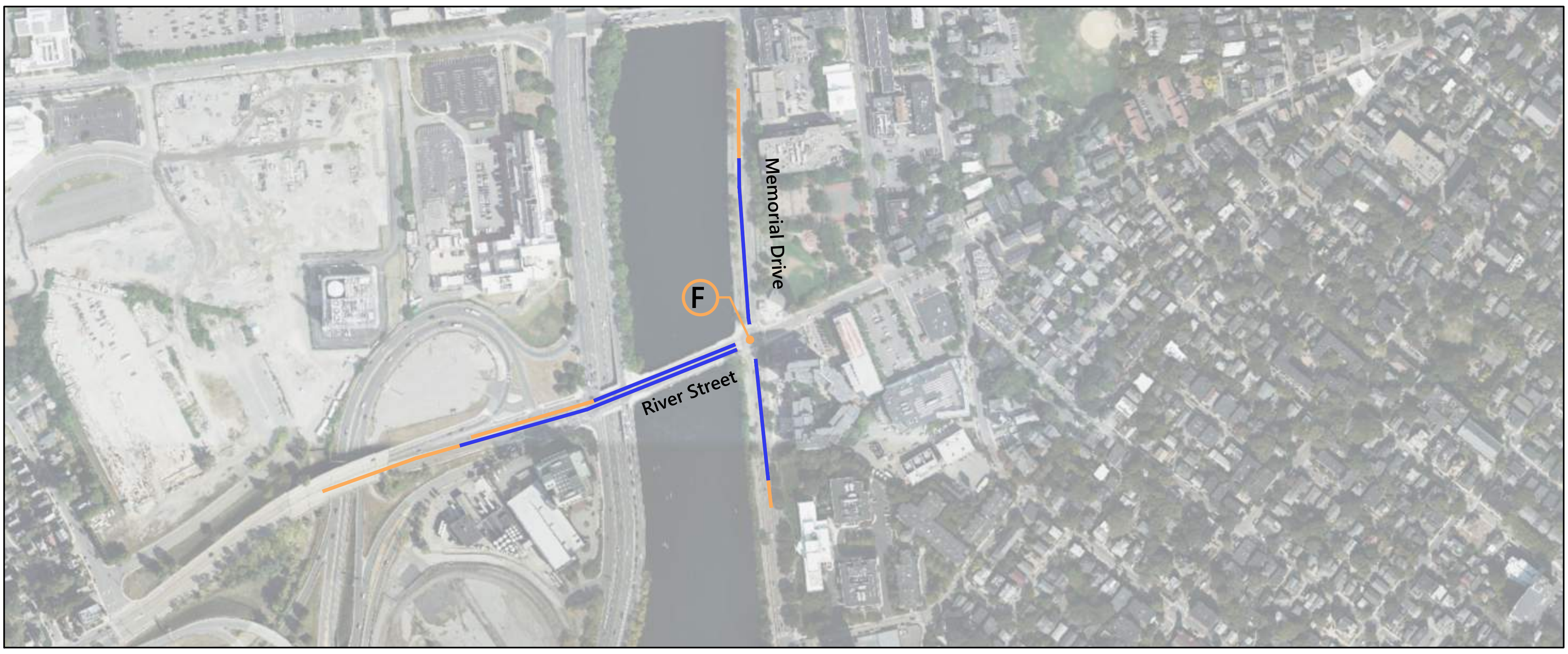

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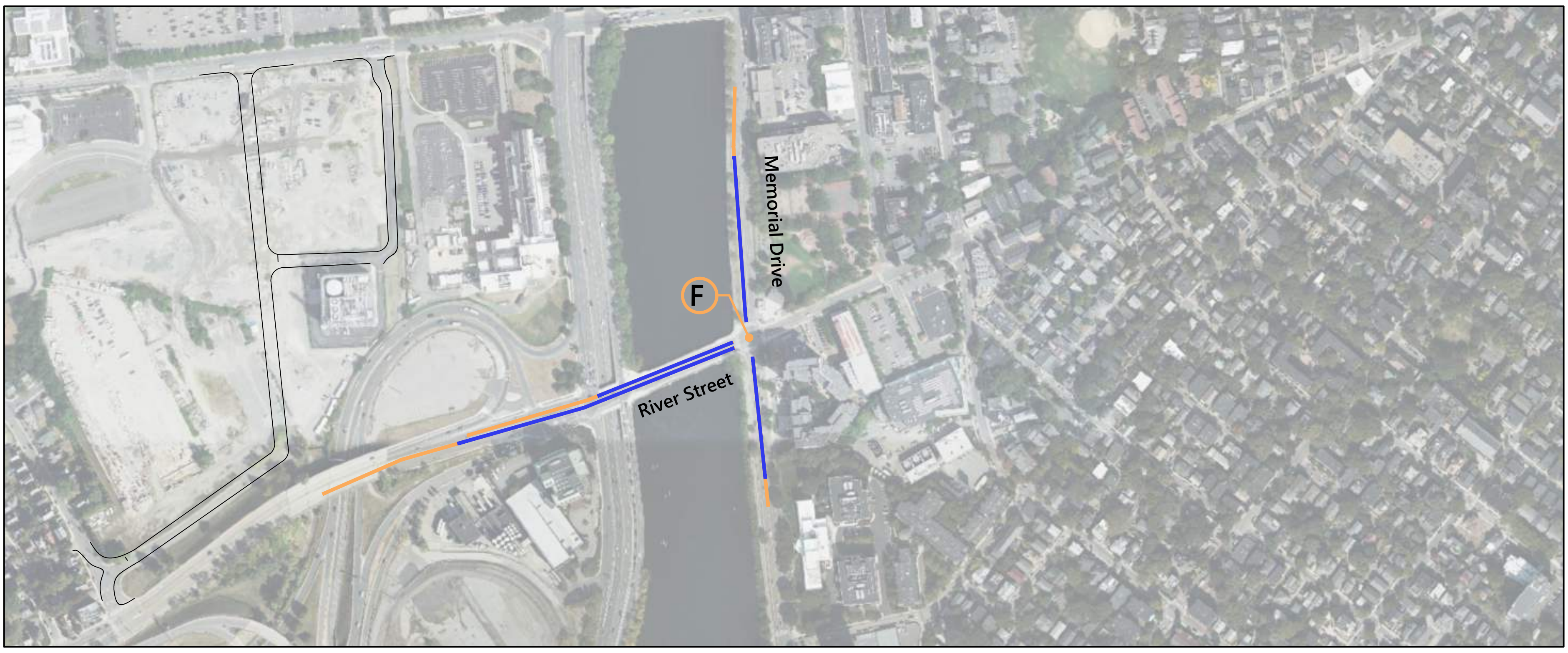


Build (2025)

2025 Conditions: Morning Peak Hour
Queue Diagrams

0 250 500 Feet

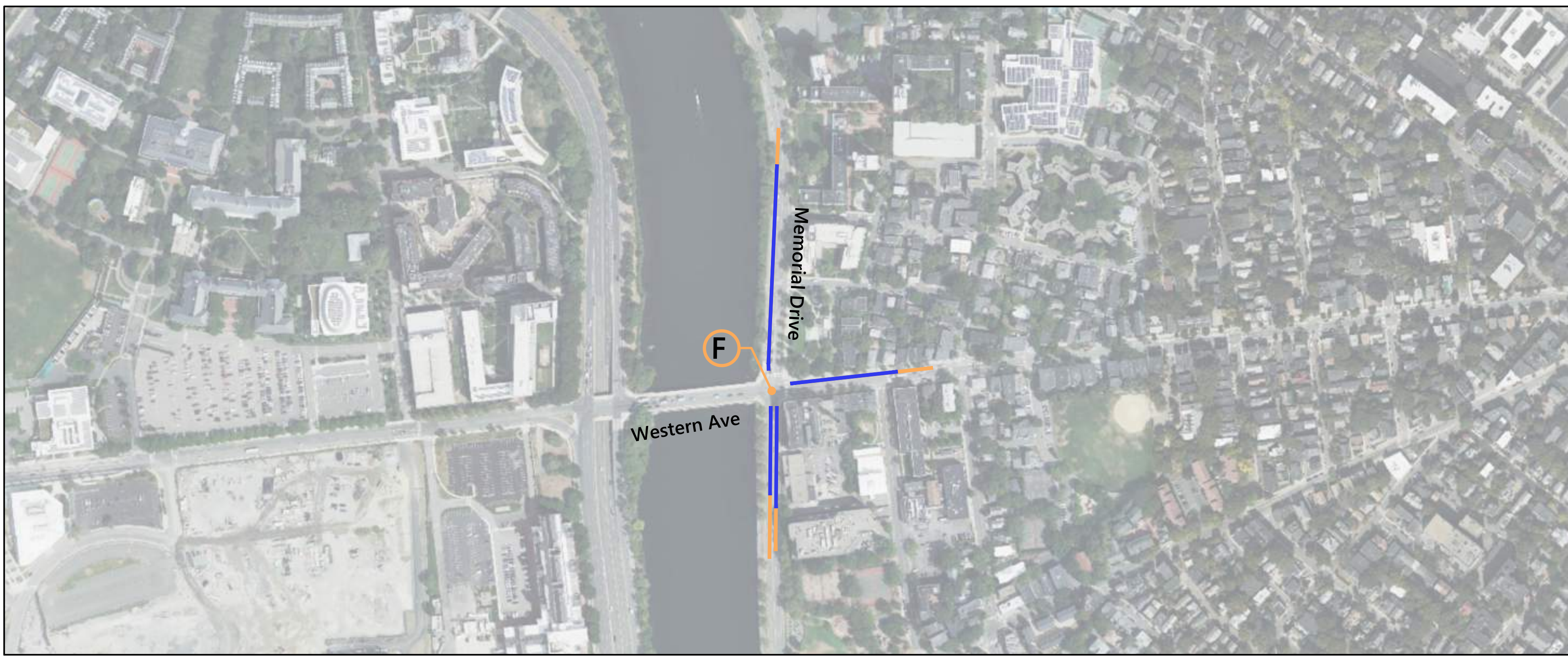
Enterprise Research Campus Project
Boston, MA

Western Ave at Memorial Drive

(X) Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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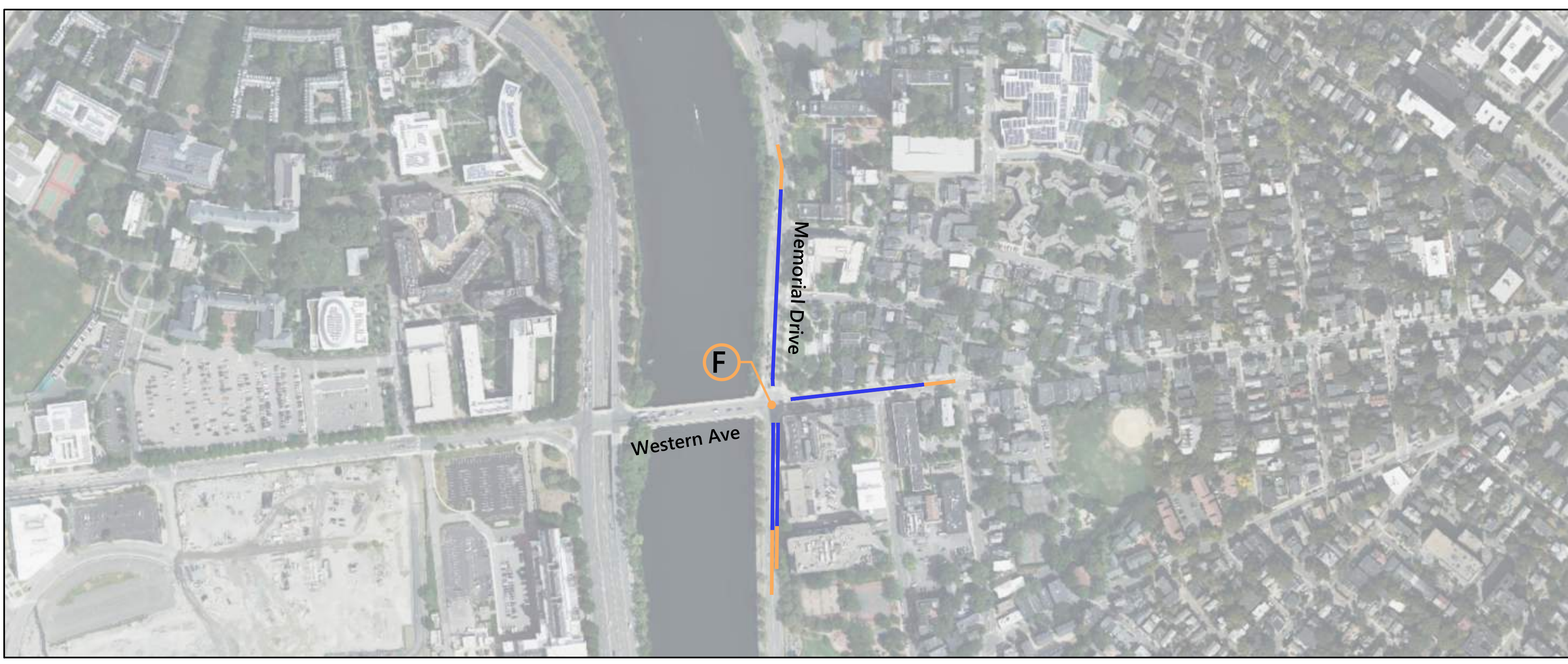

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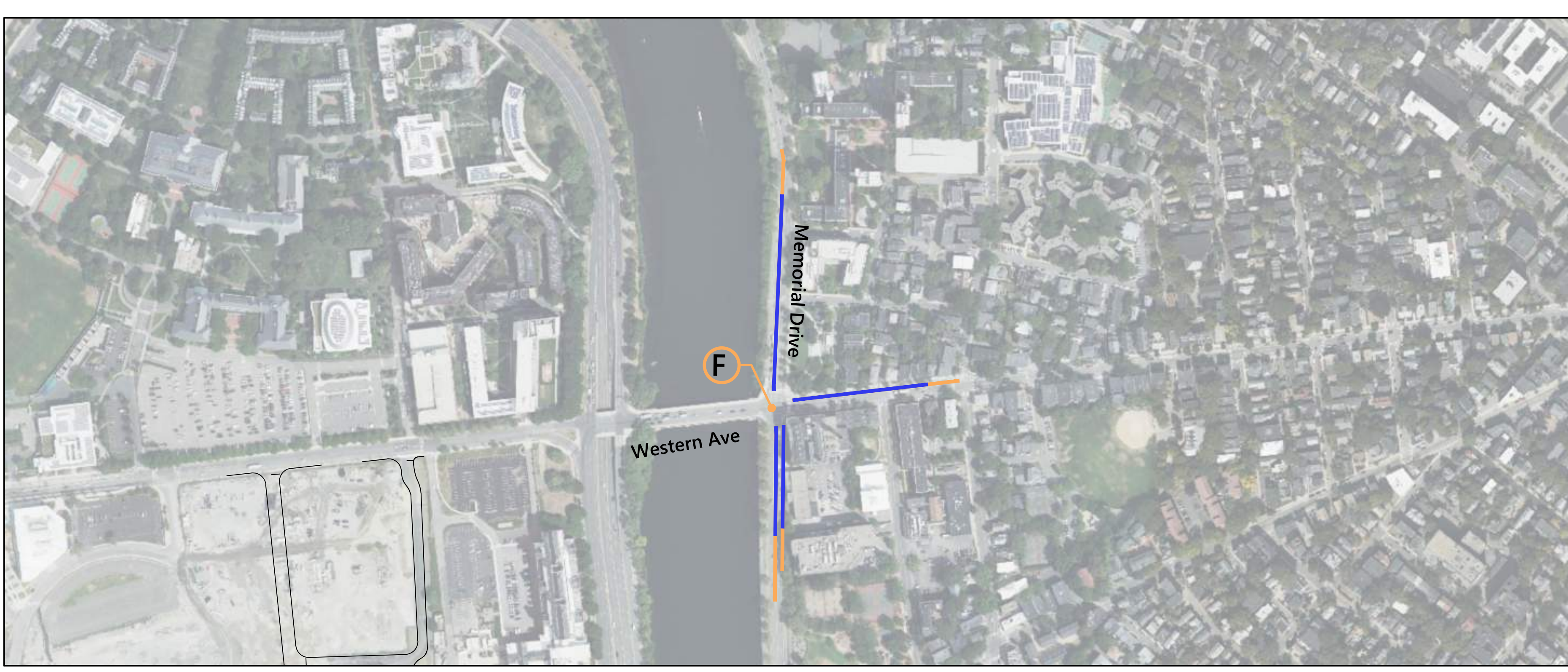


Build (2025)

2025 Conditions: Morning Peak Hour
Queue Diagrams

0 250 500 Feet

Enterprise Research Campus Project
Boston, MA

Western Ave at Soldiers Field Road WB

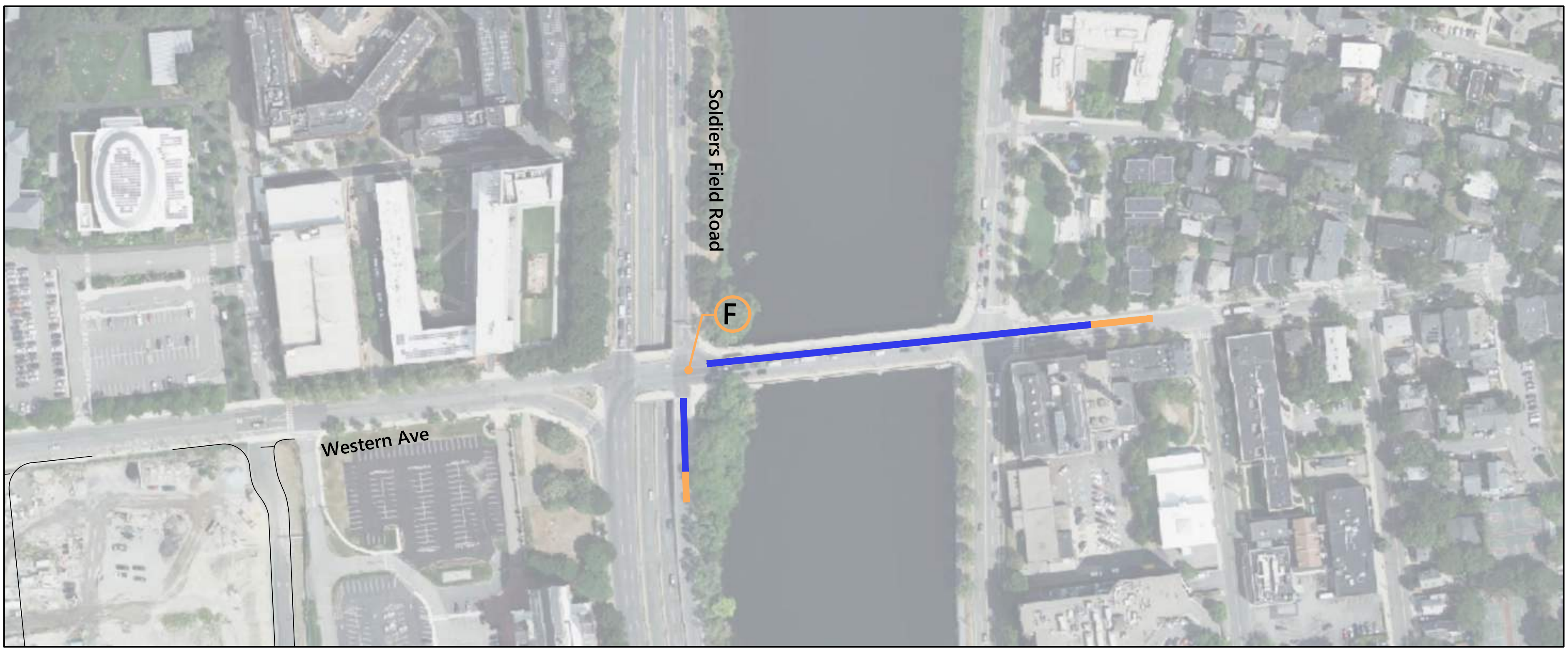
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2025)



Build (2025)

2025 Conditions: Morning Peak Hour Queue Diagrams

0 125 250 Feet

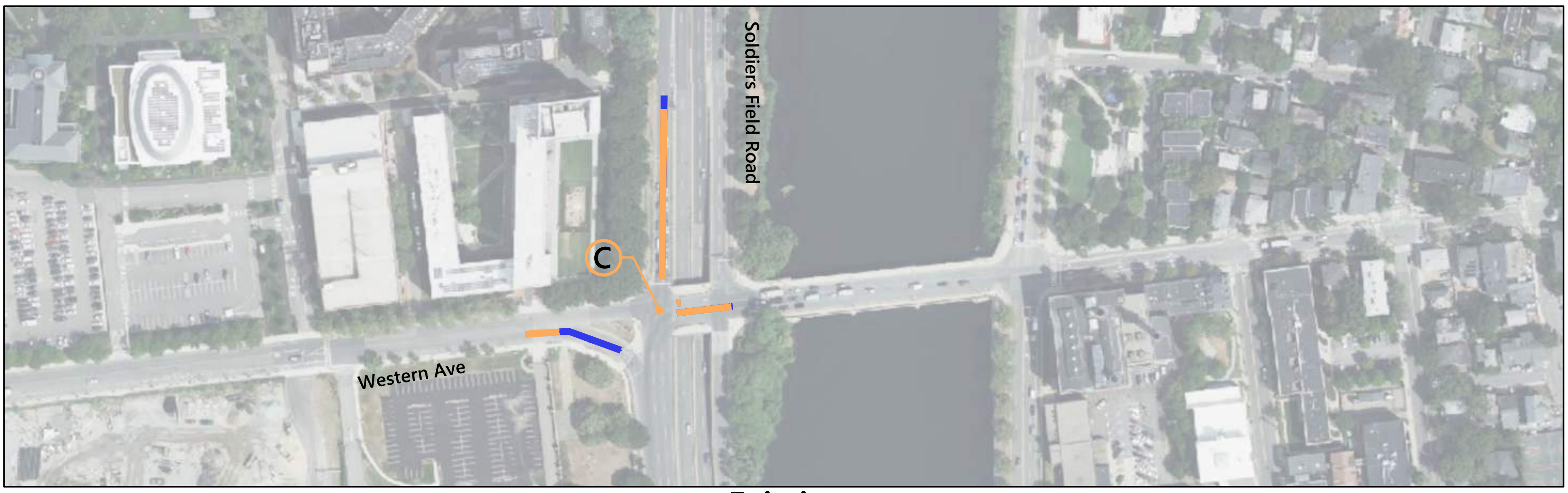
Enterprise Research Campus Project
Boston, MA

Western Ave at Soldiers Field Road EB

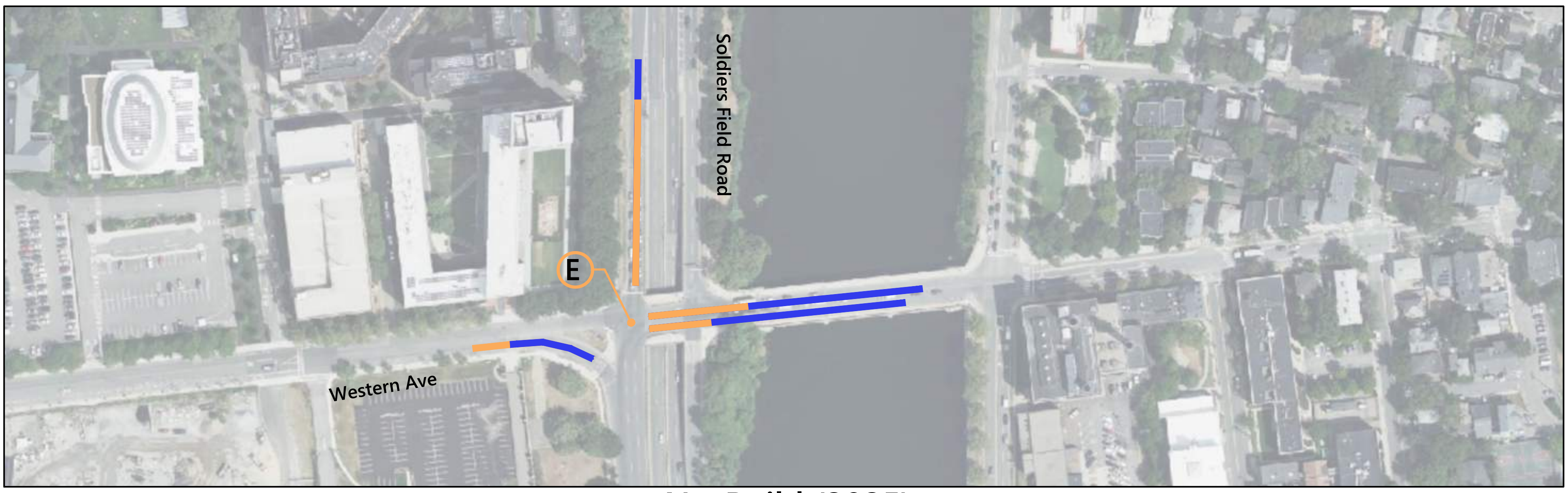
X Overall Intersection Level of Service

50th Percentile Queue

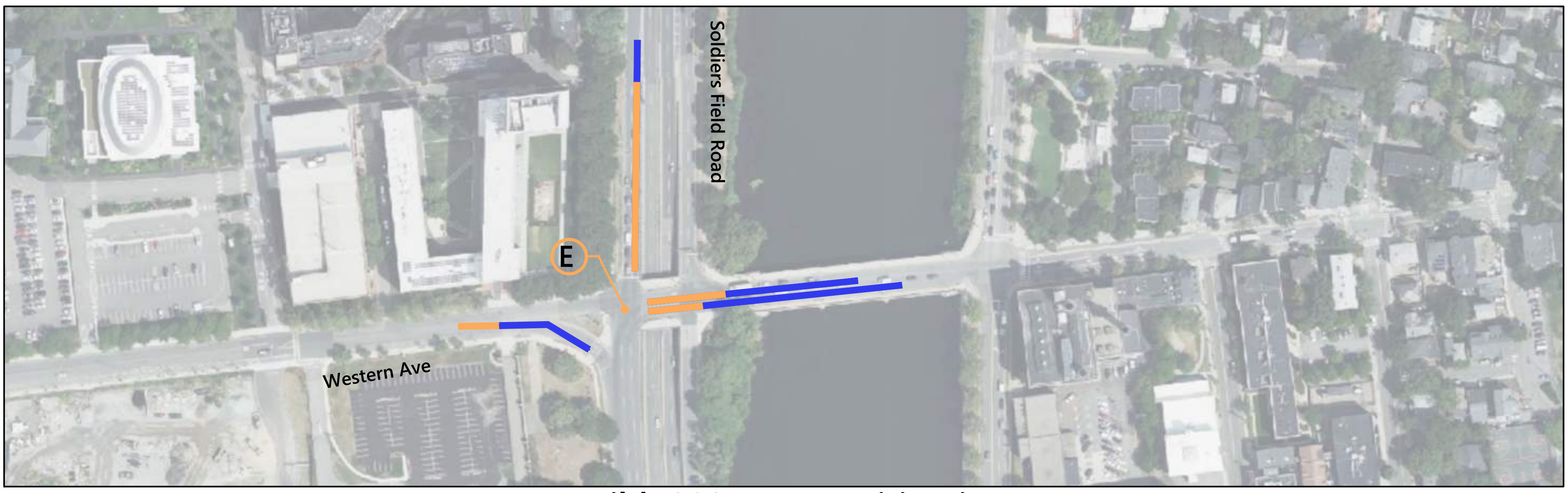
95th Percentile Queue



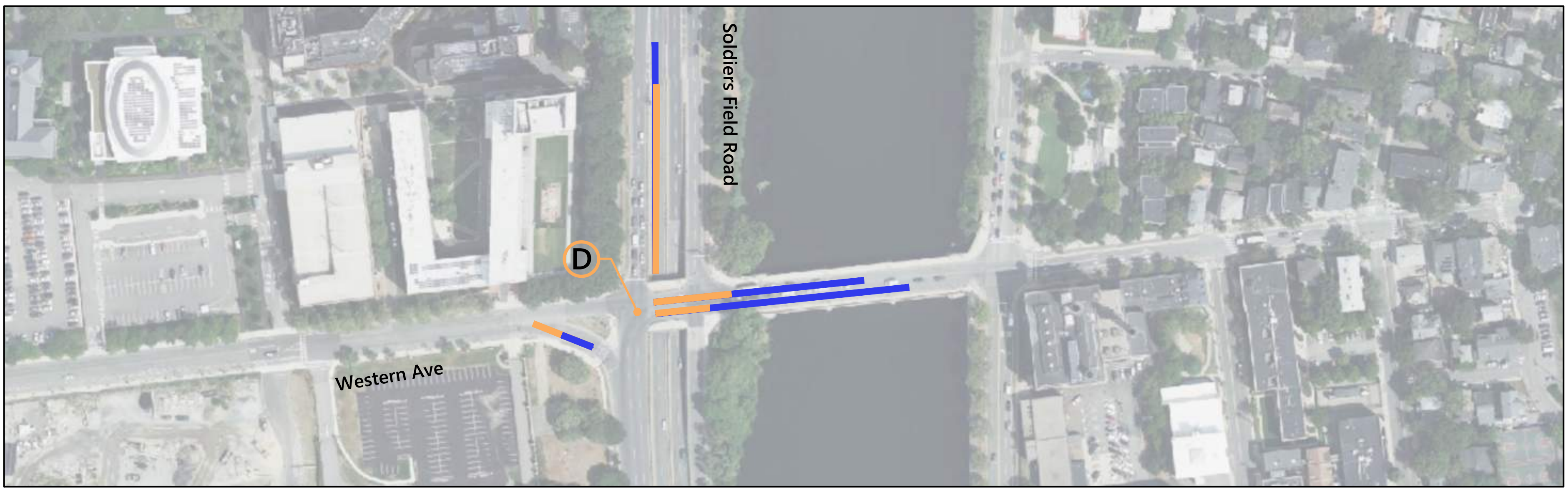
Existing



No-Build (2025)



Build (2025) - No Mitigation



Build (2025) - With Mitigation

2025 Conditions: Morning Peak Hour
Queue Diagrams

0 125 250 Feet

Enterprise Research Campus Project
Boston, MA

Western Ave at Kresge Way/ East Drive

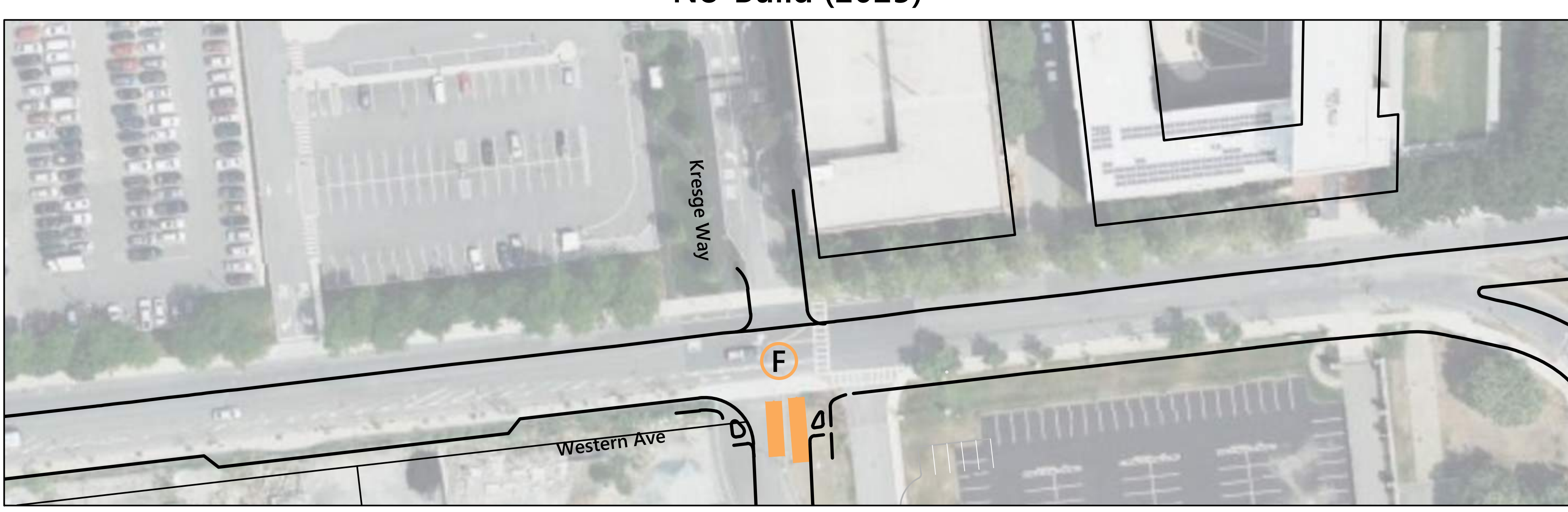
X Overall Intersection Level of Service

50th Percentile Queue

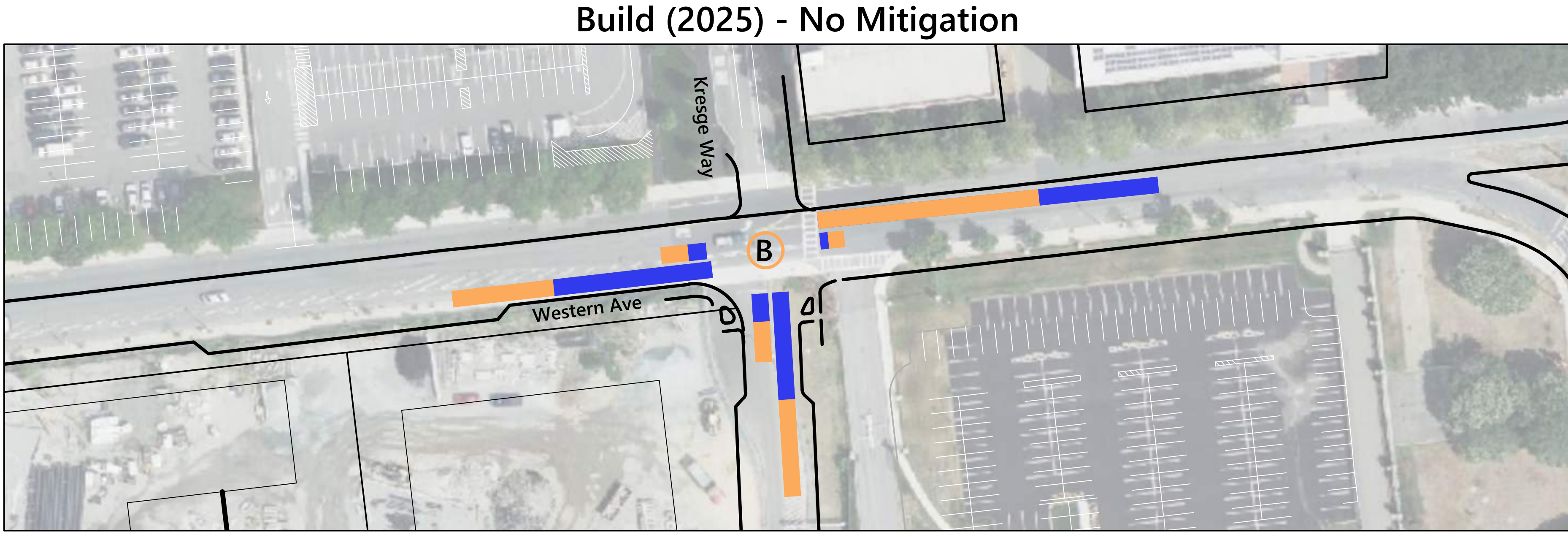
95th Percentile Queue

Existing

No-Build (2025)



Build (2025) - No Mitigation



Build (2025) - With Mitigation

2025 Conditions: Morning Peak Hour Queue Diagrams

0 50 100 Feet

Enterprise Research Campus Project
Boston, MA

Cattle Drive at Western Ave

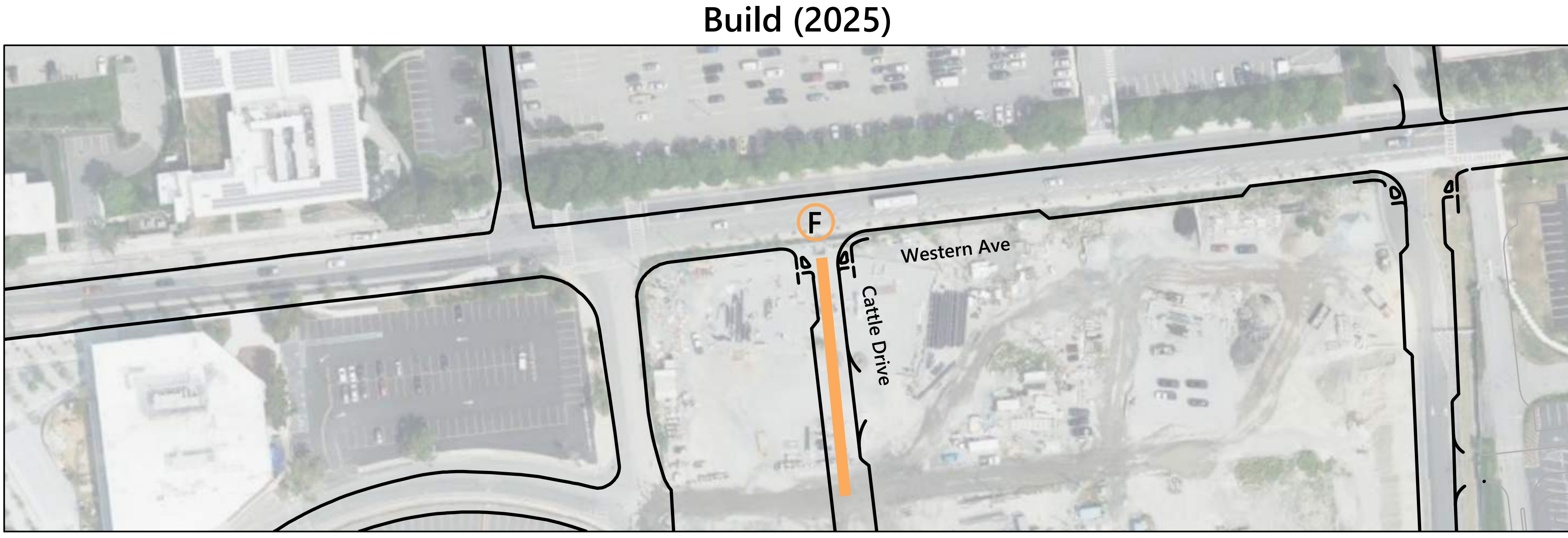
X Overall Intersection Level of Service

50th Percentile Queue

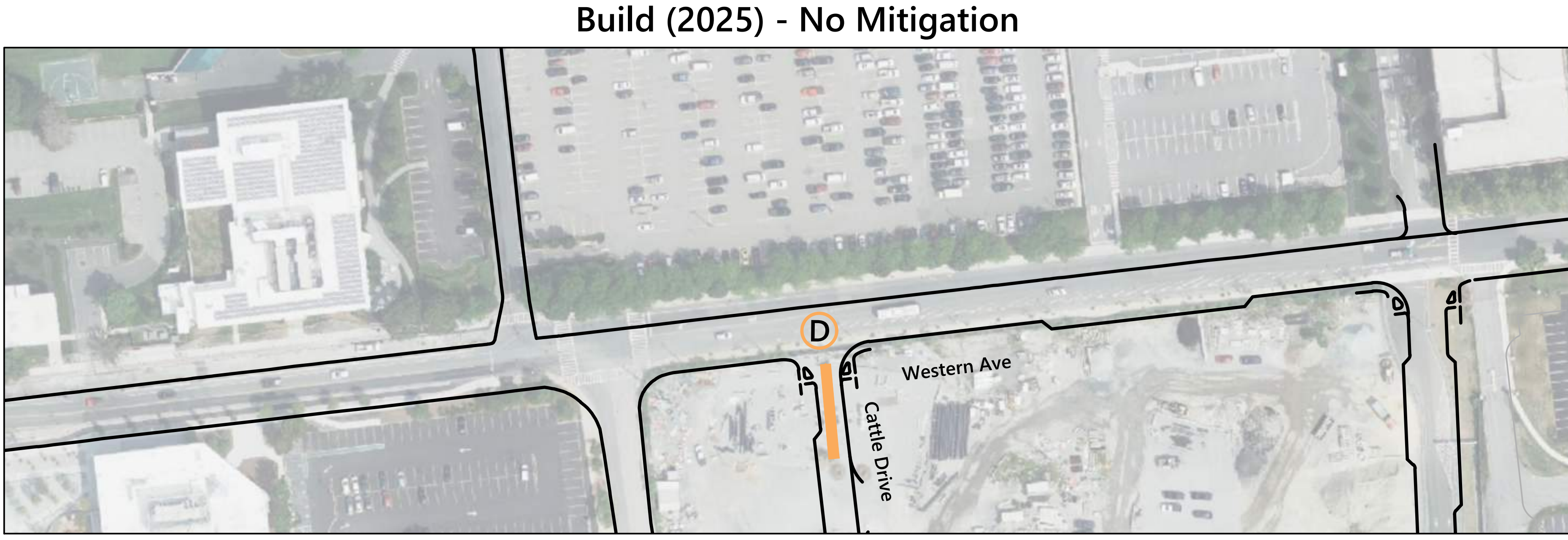
95th Percentile Queue

Existing

Build (2025)



Build (2025) - No Mitigation



Build (2025) - With Mitigation

Intersection does not exist under 2021 Existing and 2025 No-Build Conditions

2025 Conditions: Morning Peak Hour Queue Diagrams

0 75 150 Feet

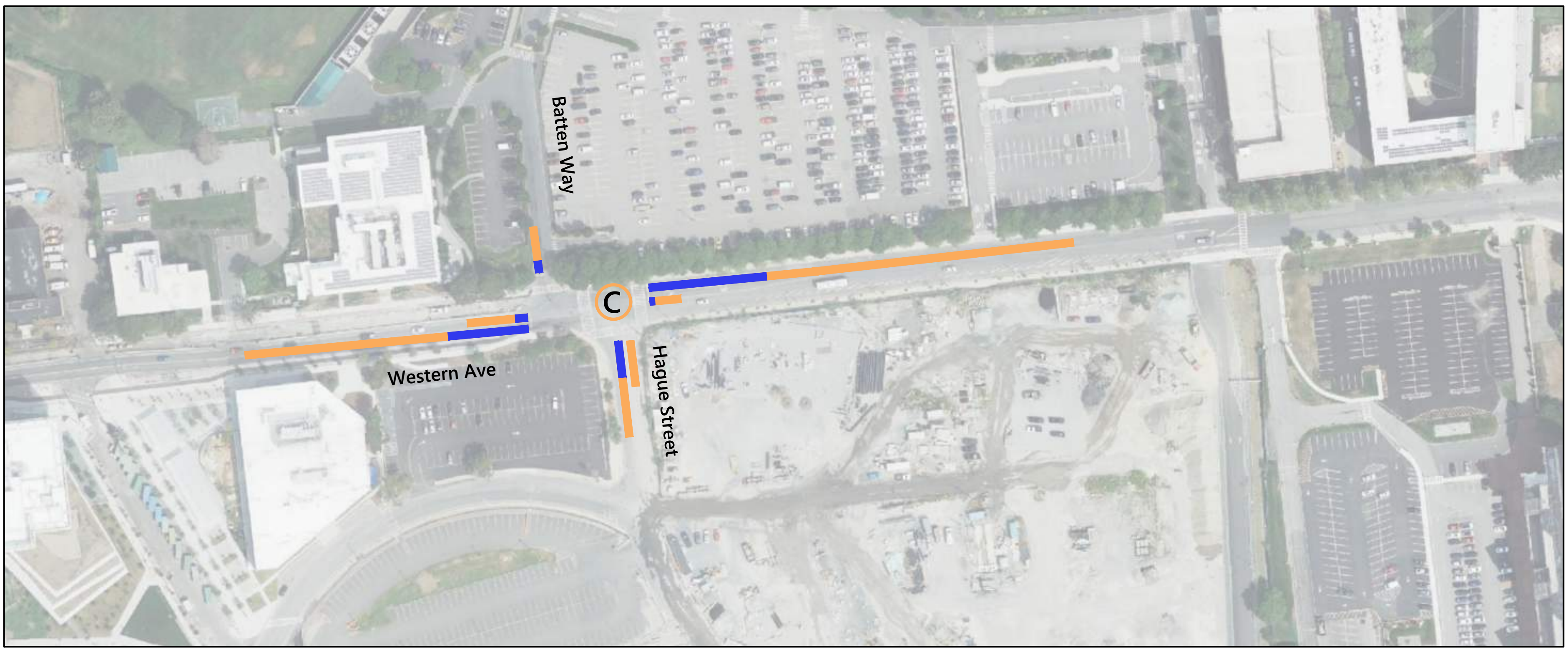
Enterprise Research Campus Project
Boston, MA

Western Ave at Batten Way/ Hague Street

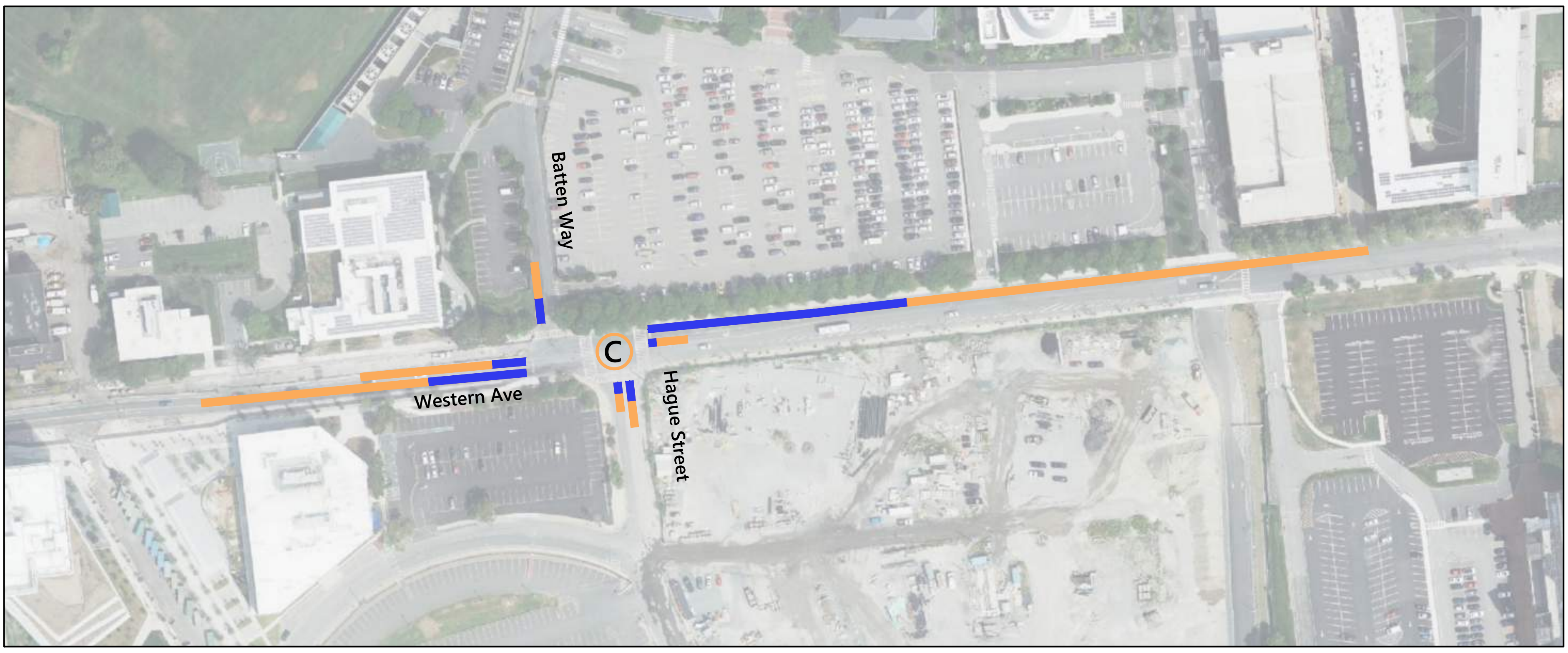
X Overall Intersection Level of Service

50th Percentile Queue

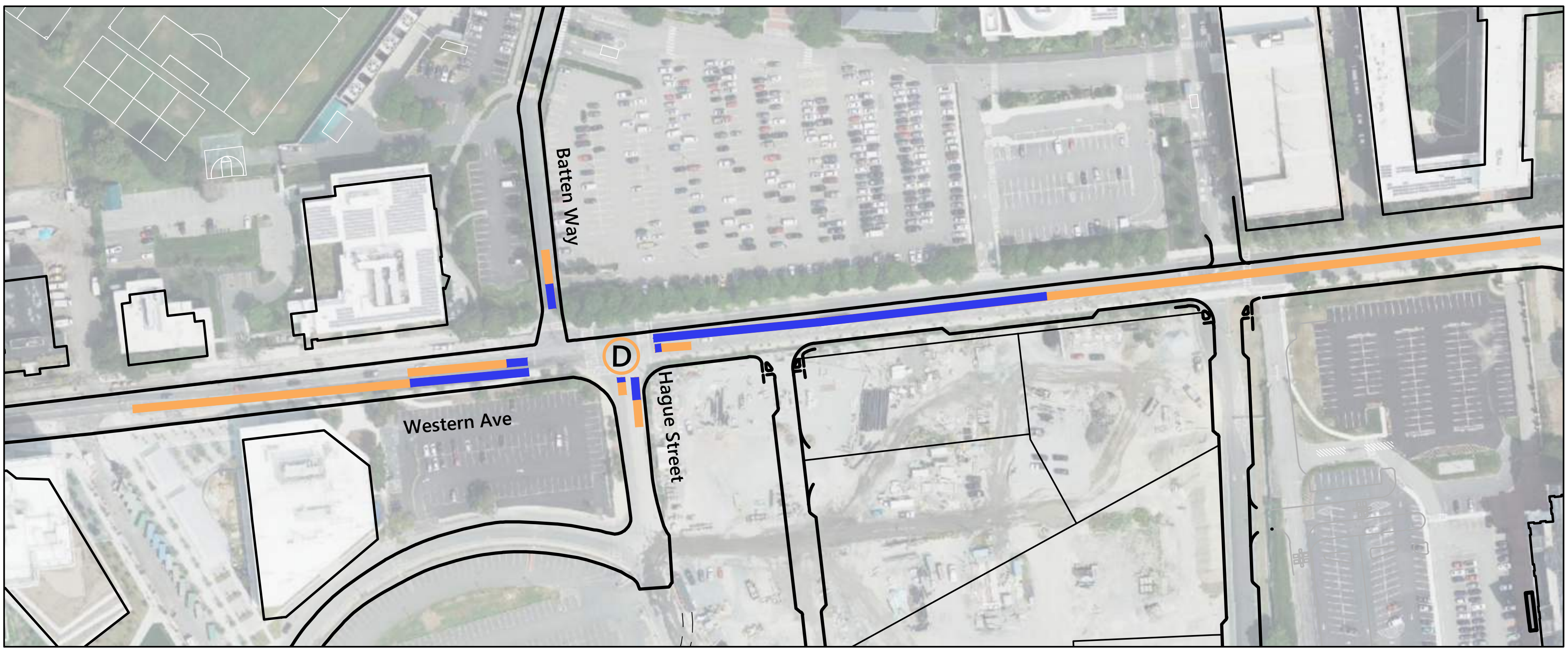
95th Percentile Queue



Existing



No-Build (2025)



Build (2025)

2025 Conditions: Morning Peak Hour Queue Diagrams

0 100 200 Feet

Enterprise Research Campus Project
Boston, MA

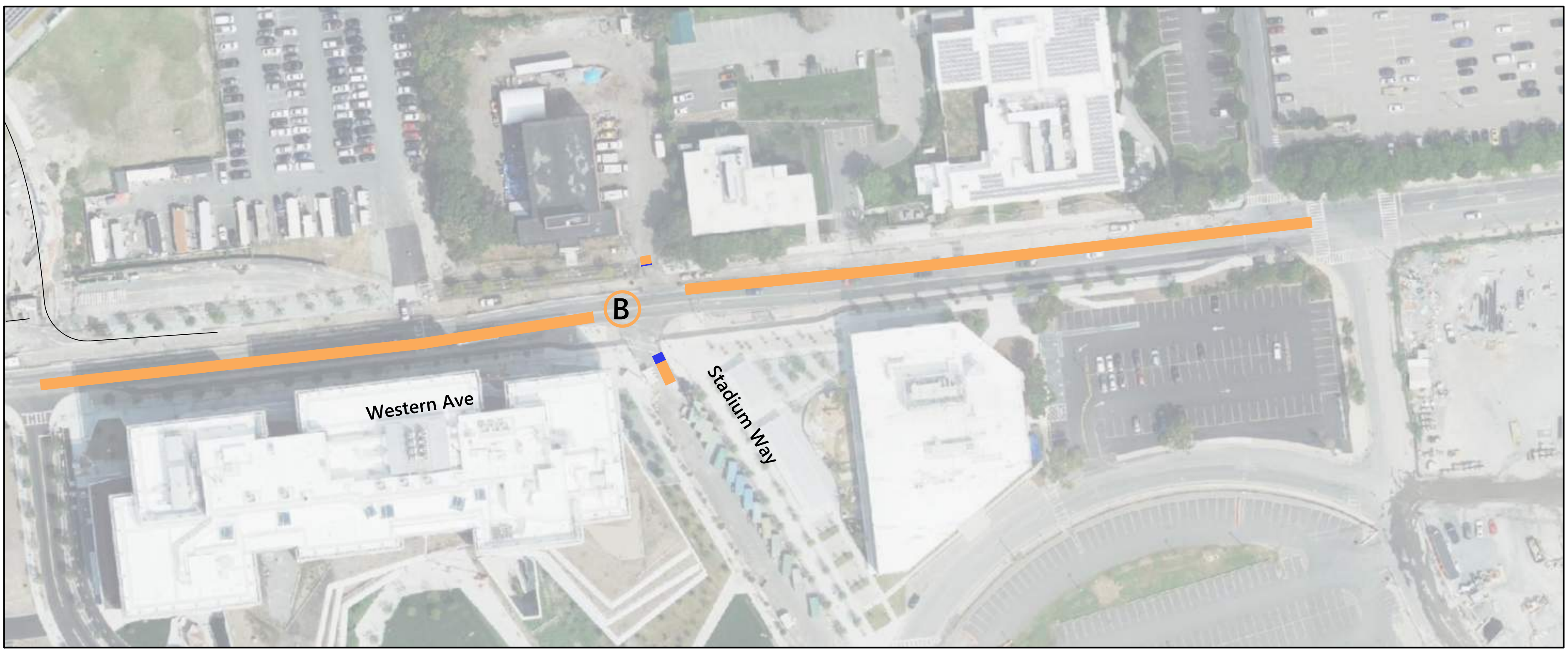
Western Ave at Stadium Way

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing



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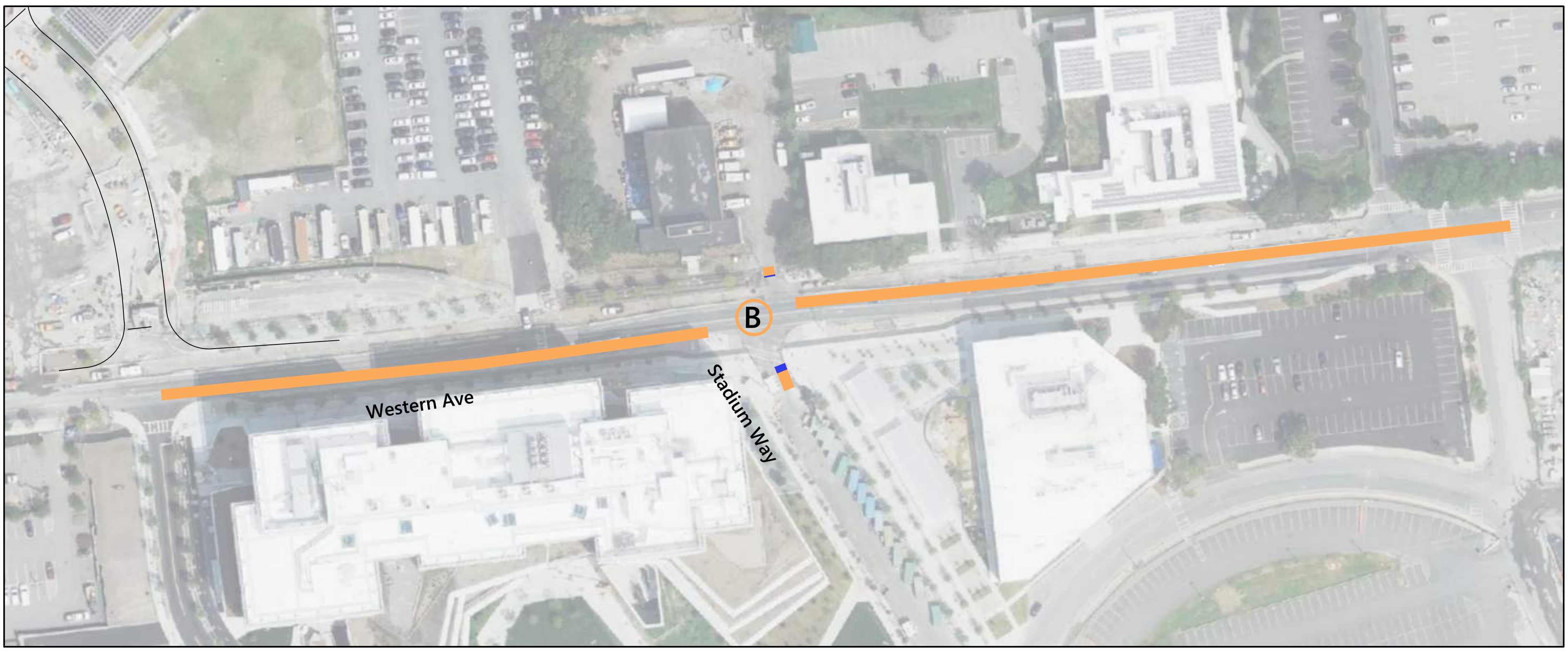


Intersection does not exist under 2021 Existing Conditions

Build (2025)

2025 Conditions: Morning Peak Hour Queue Diagrams

0 75 150 Feet

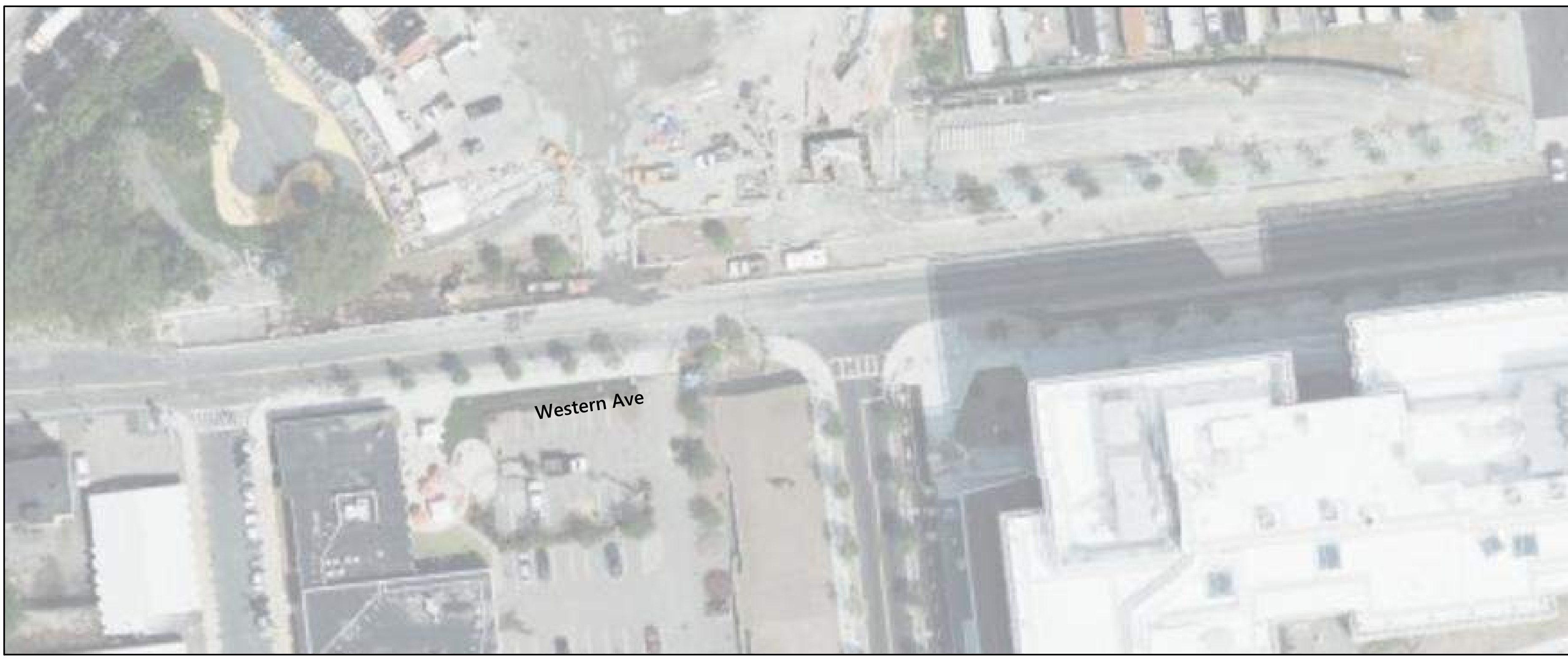
Enterprise Research Campus Project
Boston, MA

Western Ave at Academic Way

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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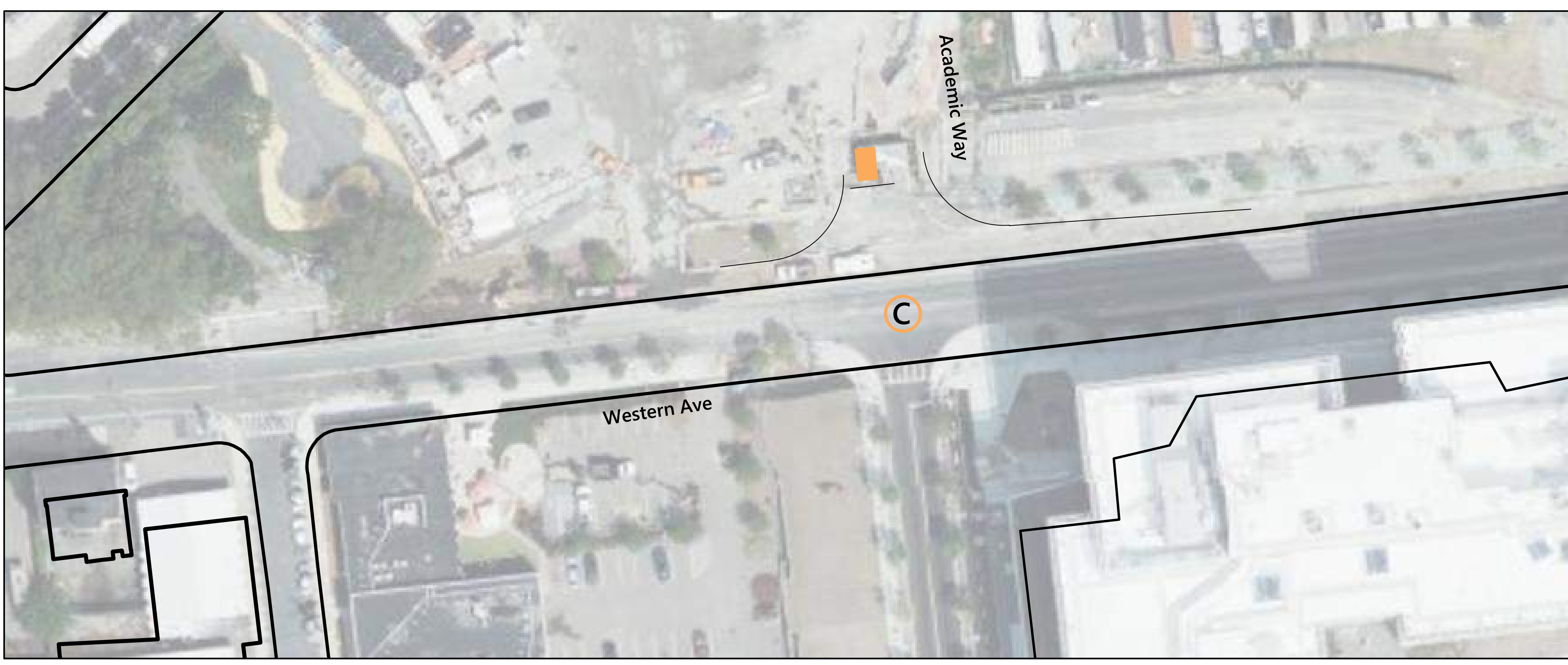
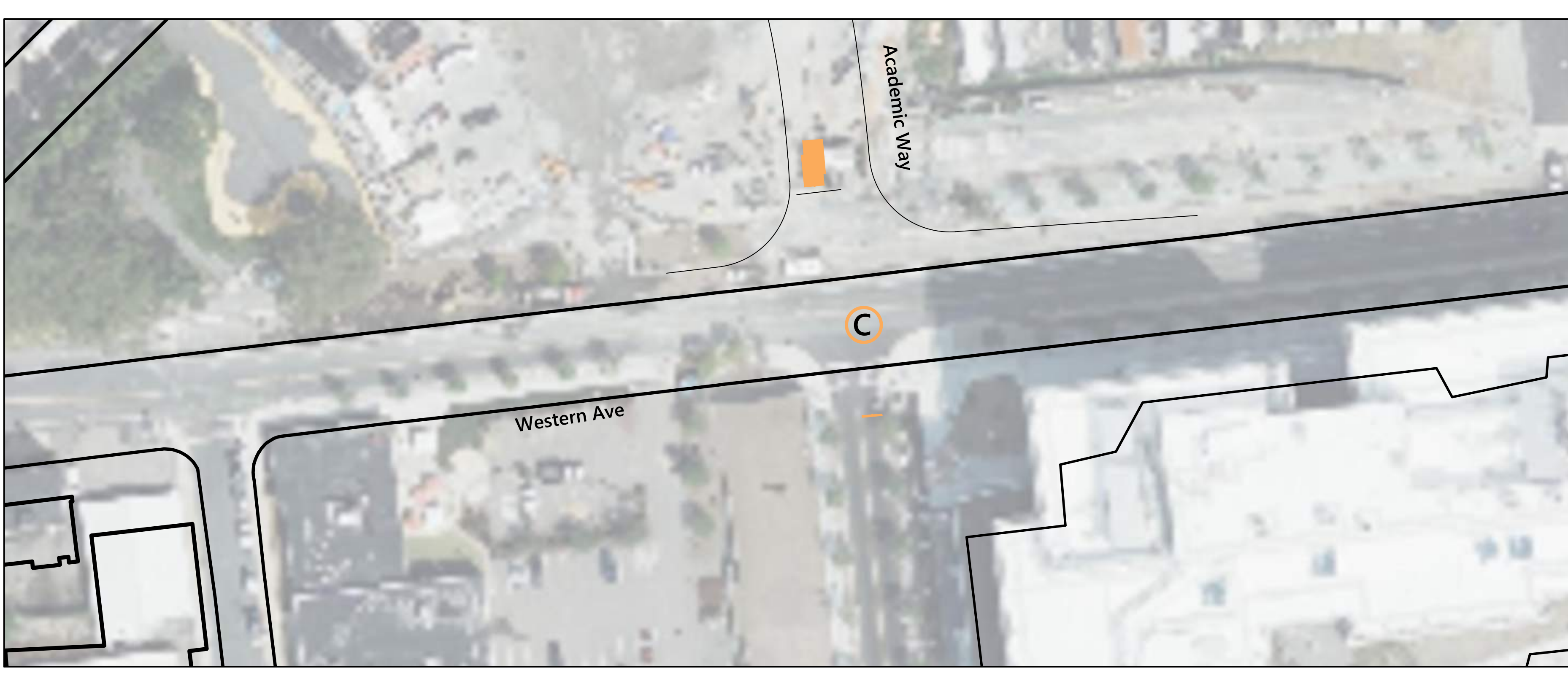


No-Build (2025)



Intersection does not exist under 2021 Existing Conditions

Build (2025)

2025 Conditions: Morning Peak Hour Queue Diagrams

0 40 80 Feet

Enterprise Research Campus Project
Boston, MA

North Harvard Street at Academic Way

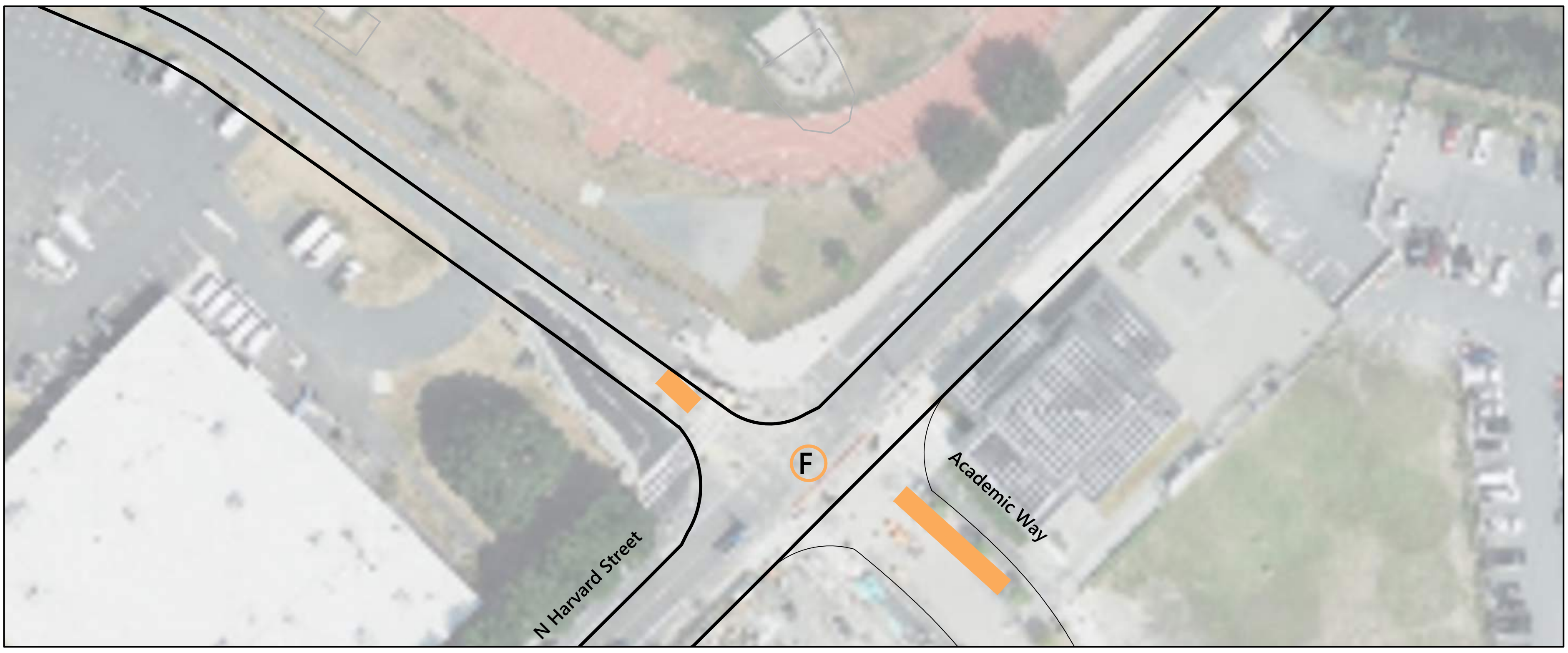
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2025)



Intersection does not exist under 2021 Existing Conditions

Build (2025)

2025 Conditions: Morning Peak Hour Queue Diagrams

0 40 80 Feet

Enterprise Research Campus Project
Boston, MA

Cattle Drive at DEF Drive

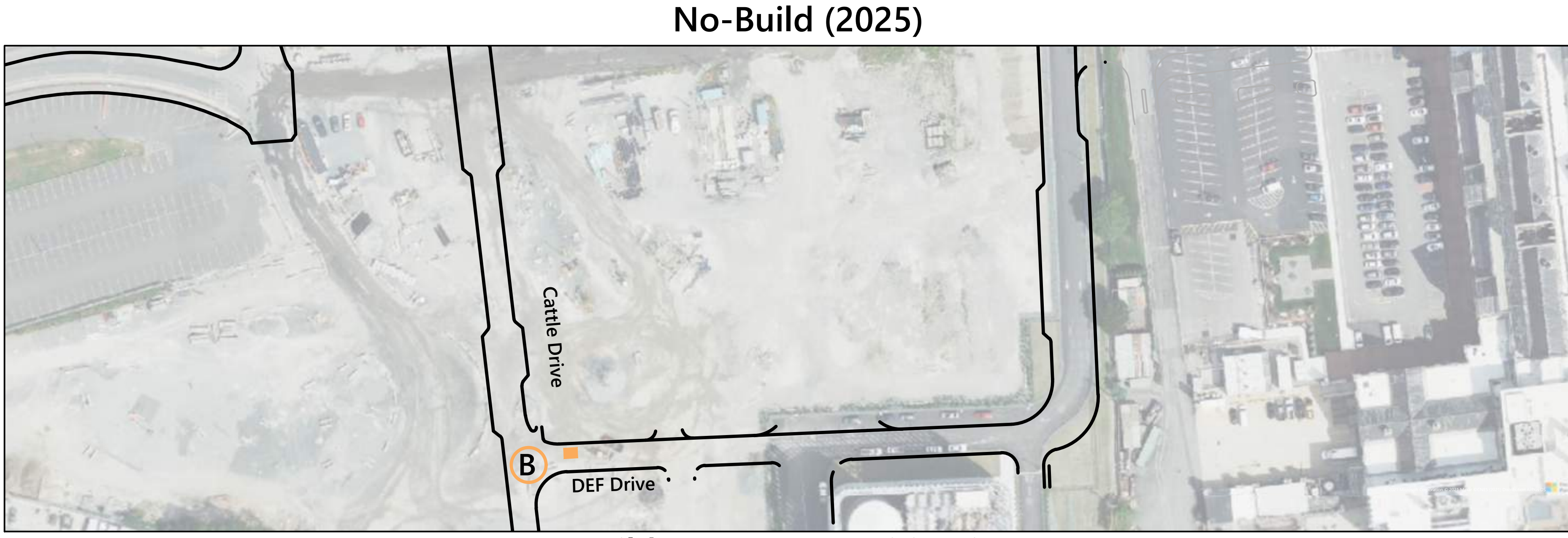
X Overall Intersection Level of Service

50th Percentile Queue

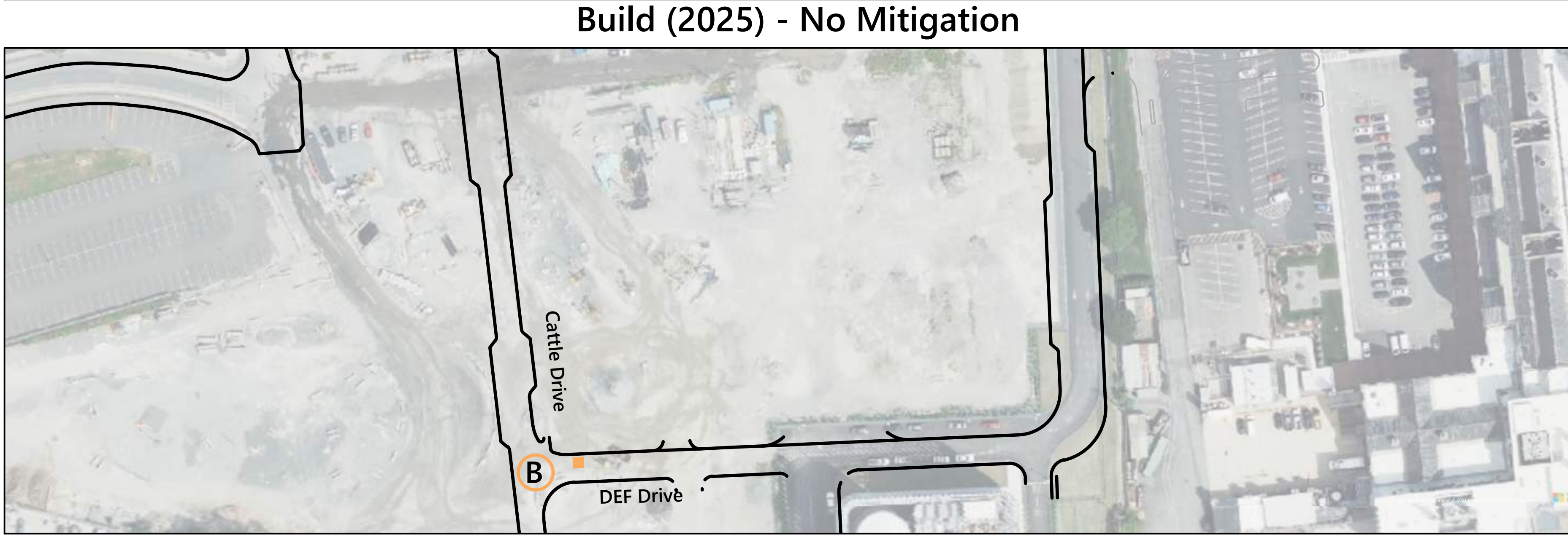
95th Percentile Queue

Existing

No-Build (2025)



Build (2025) - No Mitigation



Build (2025) - With Mitigation

Intersection does not exist under 2021 Existing and 2025 No-Build Conditions

2025 Conditions: Morning Peak Hour Queue Diagrams

0 50 100 Feet

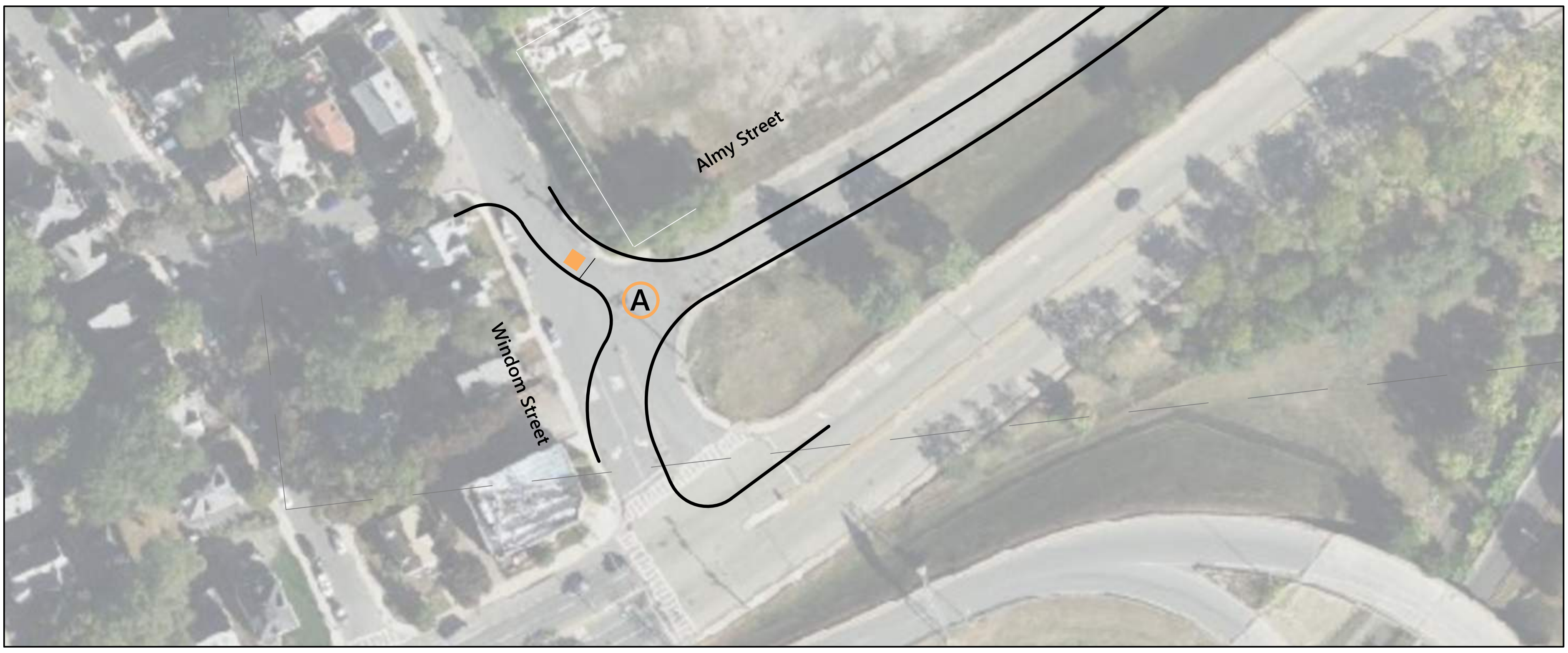
Enterprise Research Campus Project
Boston, MA

Cattle Drive/ Almy Street at Windom Street

X Overall Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

Existing

No-Build (2025)



Intersection does not exist under 2021 Existing and 2025 No-Build Conditions

Build (2025)

2025 Conditions: Morning Peak Hour Queue Diagrams

0 50 100 Feet

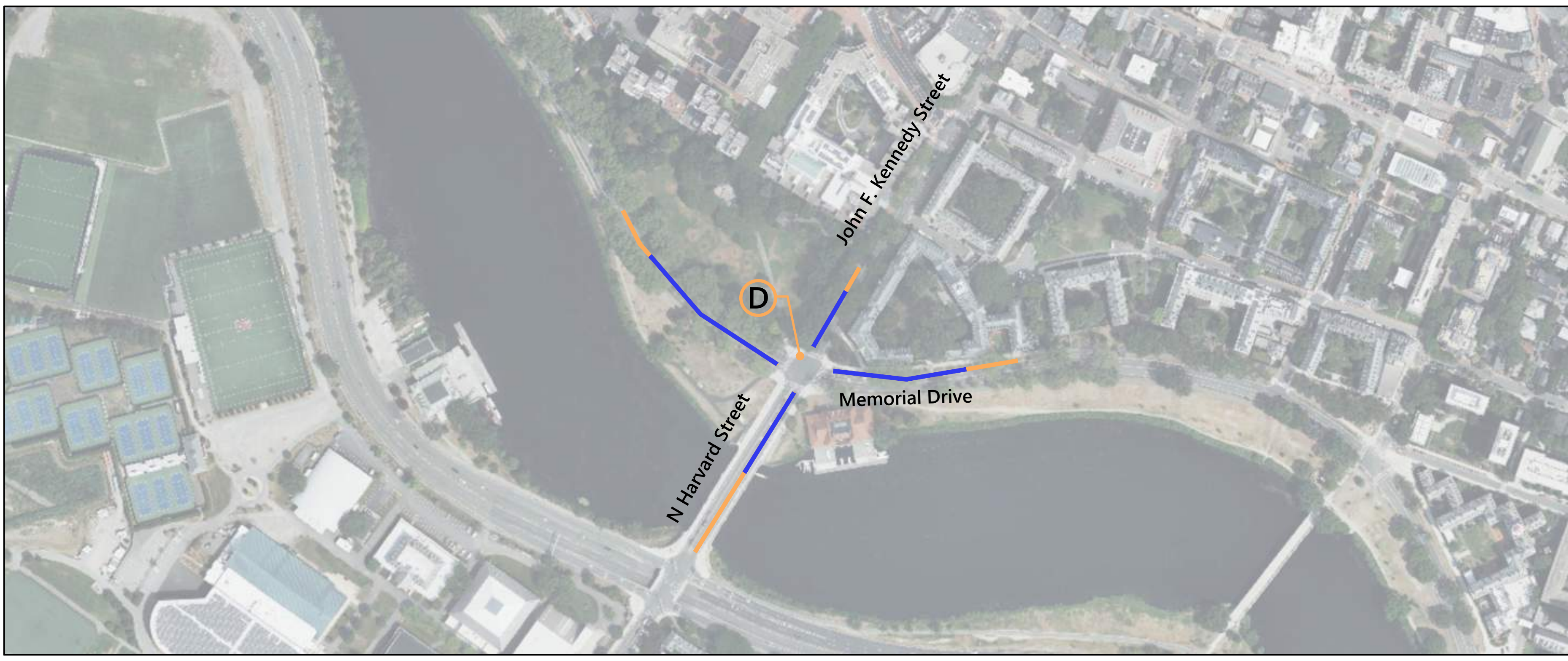
Enterprise Research Campus Project
Boston, MA

John F. Kennedy Street at Memorial Drive

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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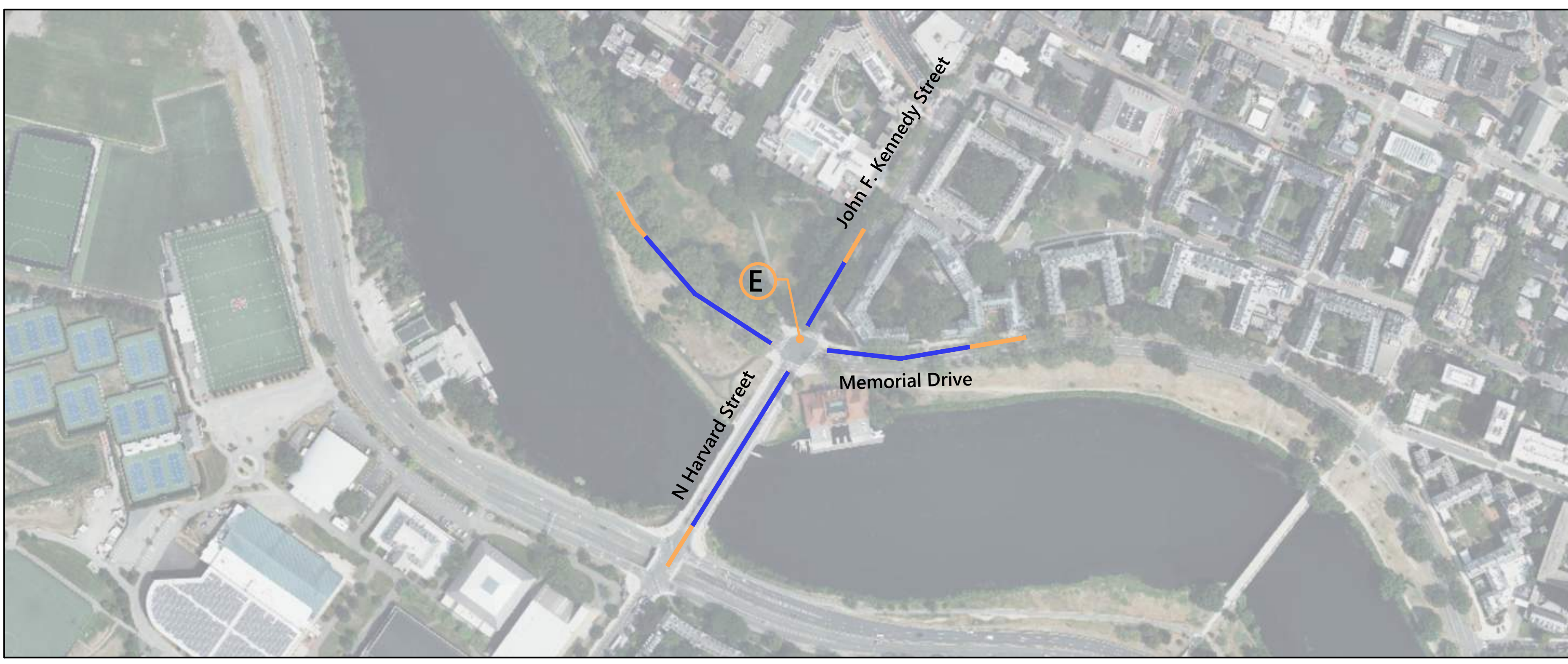
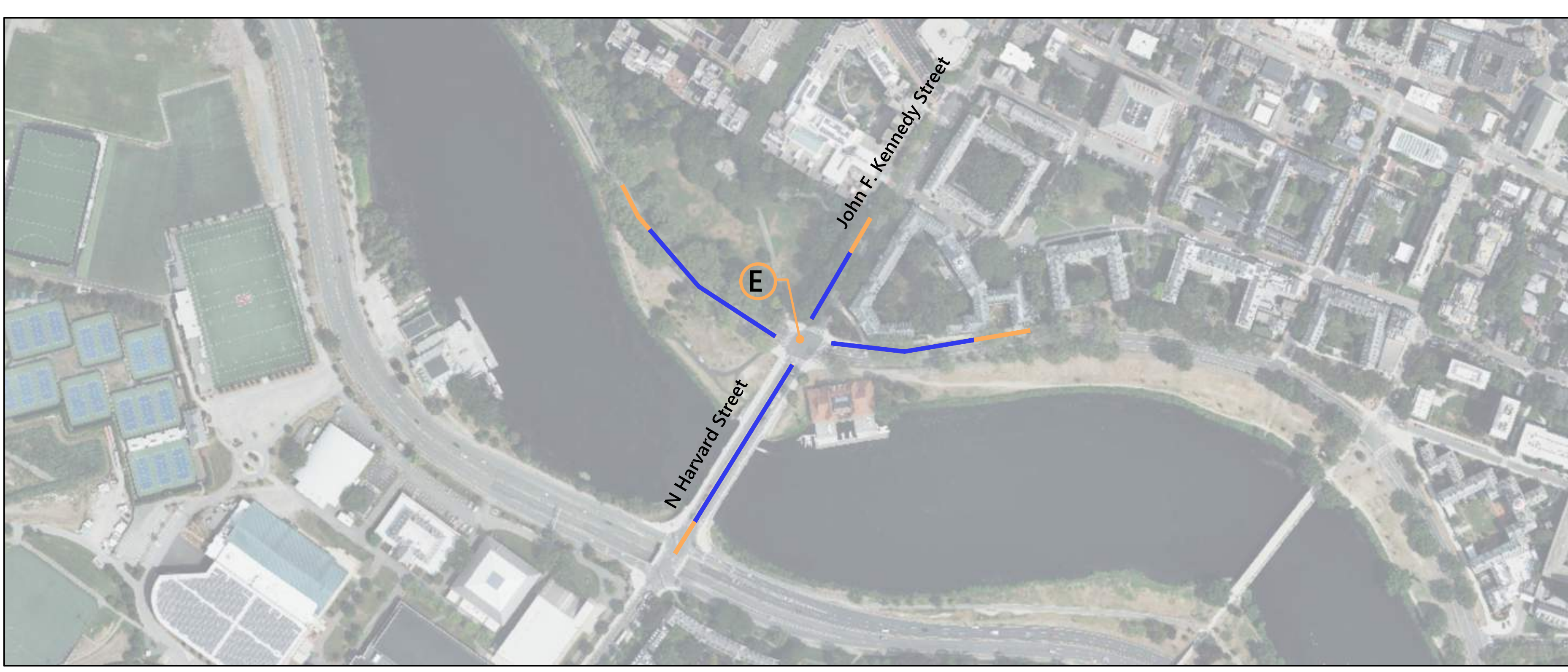


No-Build (2025)



Build (2025)

2025 Conditions: Evening Peak Hour
Queue Diagrams

0 200 400 Feet

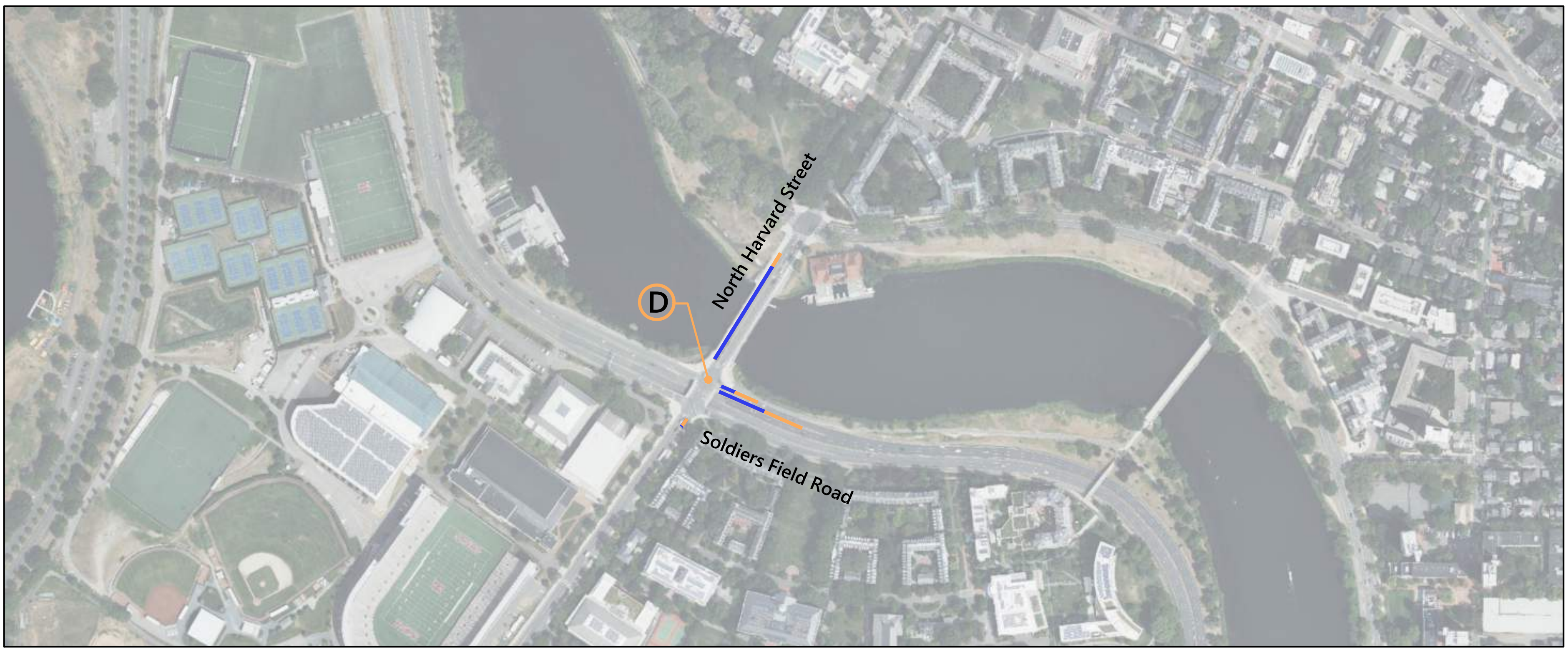
Enterprise Research Campus Project
Boston, MA

North Harvard Street at Soldiers Field Road WB

X Overall Intersection Level of Service

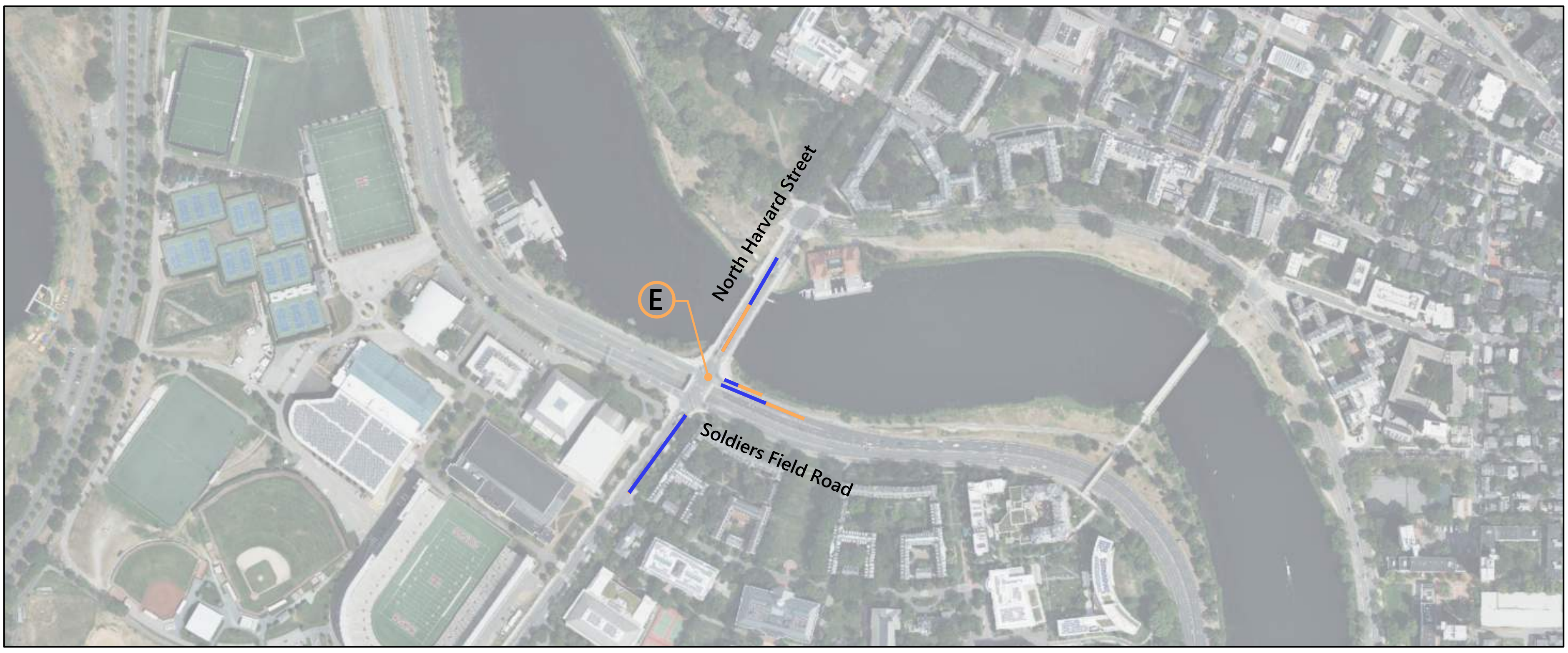
50th Percentile Queue

95th Percentile Queue



Existing

No-Build (2025)



Build (2025)

2025 Conditions: Evening Peak Hour Queue Diagrams

0 250 500 Feet

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2025 Conditions - PM.dwg

North Harvard Street at Soldiers Field Road EB

X Overall Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

Existing

No-Build (2025)

Build (2025)

2025 Conditions: Evening Peak Hour
Queue Diagrams

0 250 500 Feet

Enterprise Research Campus Project
Boston, MA

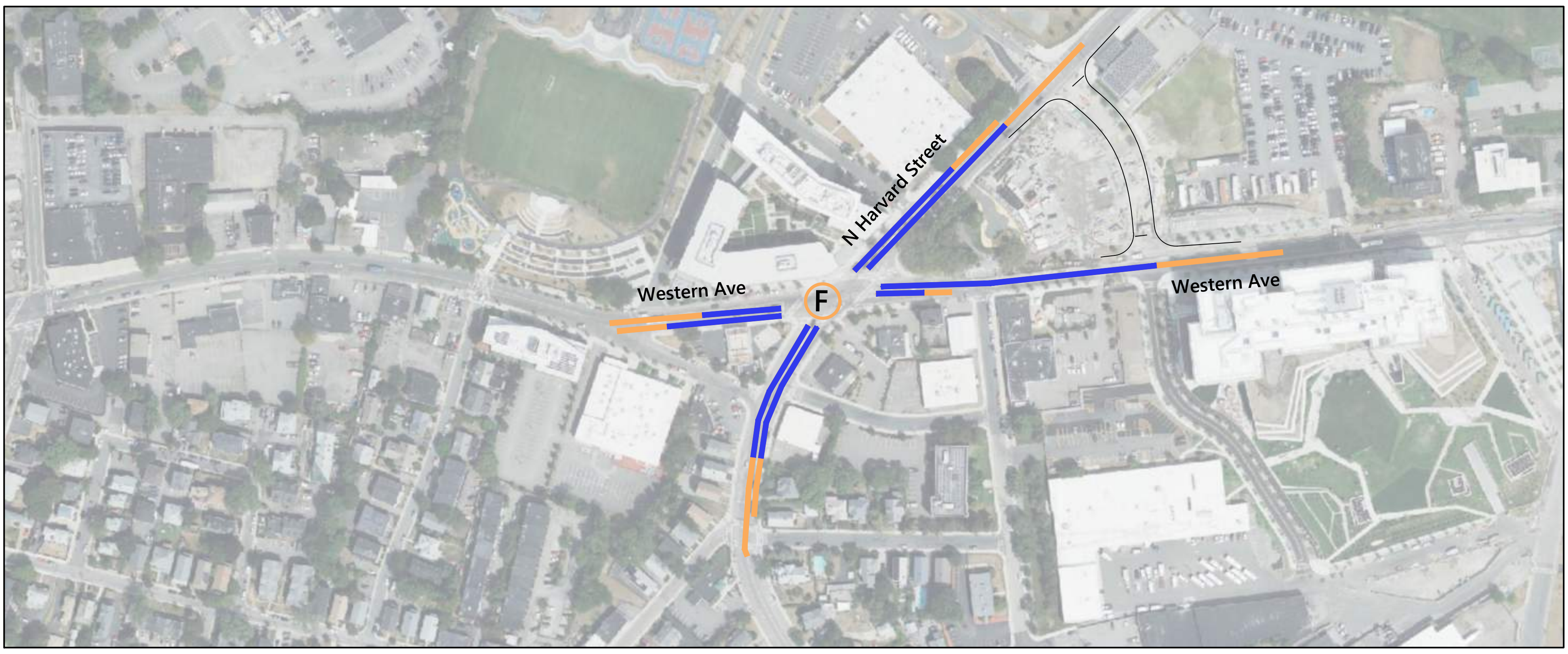
North Harvard Street at Western Ave

X Overall Intersection Level of Service

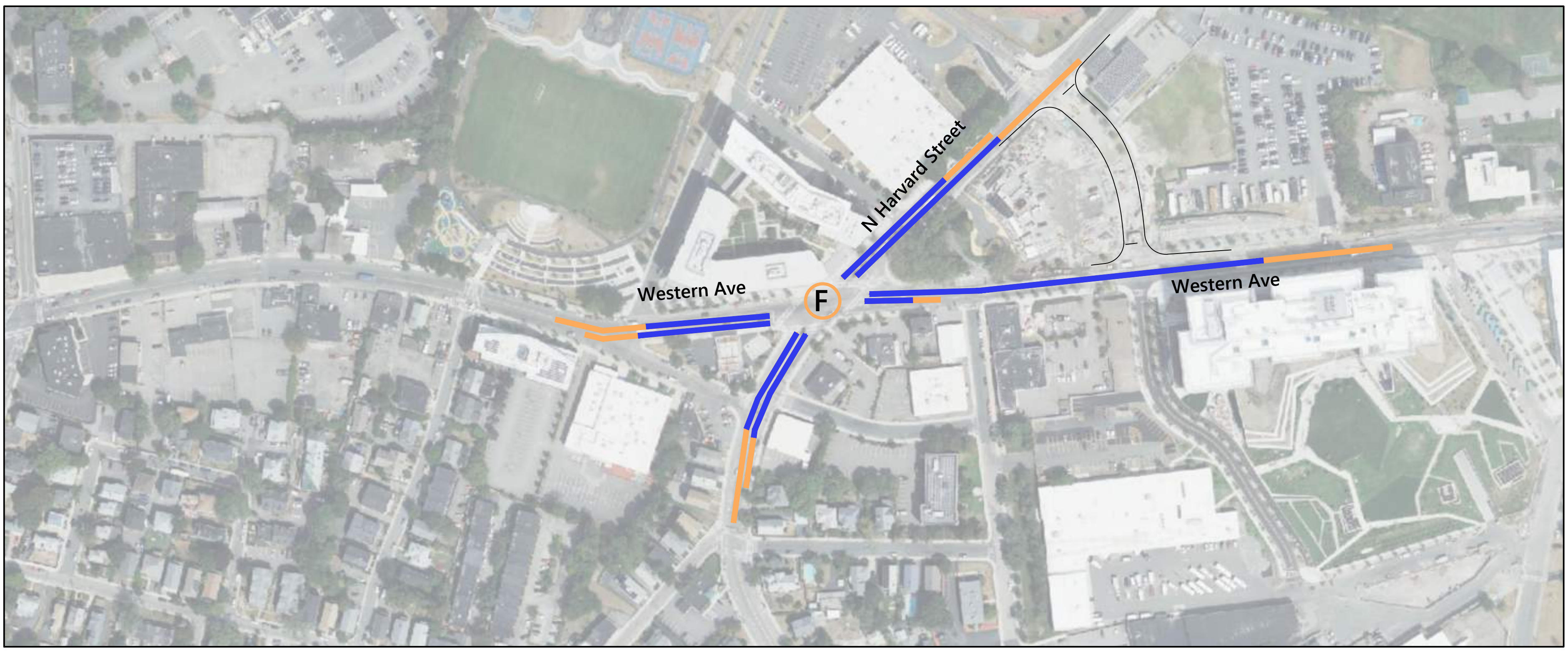
50th Percentile Queue

95th Percentile Queue

Existing



No-Build (2025)



Build (2025)

2025 Conditions: Evening Peak Hour
Queue Diagrams

0 150 300 Feet

Enterprise Research Campus Project
Boston, MA

North Harvard Street at Franklin St/ Kingsley St

X Overall Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

Existing

No-Build (2025)

Build (2025)

2025 Conditions: Evening Peak Hour Queue Diagrams

0 150 300 Feet

Enterprise Research Campus Project
Boston, MA

Cambridge Street at North Harvard Street

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2025)

Build (2025)

2025 Conditions: Evening Peak Hour Queue Diagrams

0 125 250 Feet

Enterprise Research Campus Project
Boston, MA

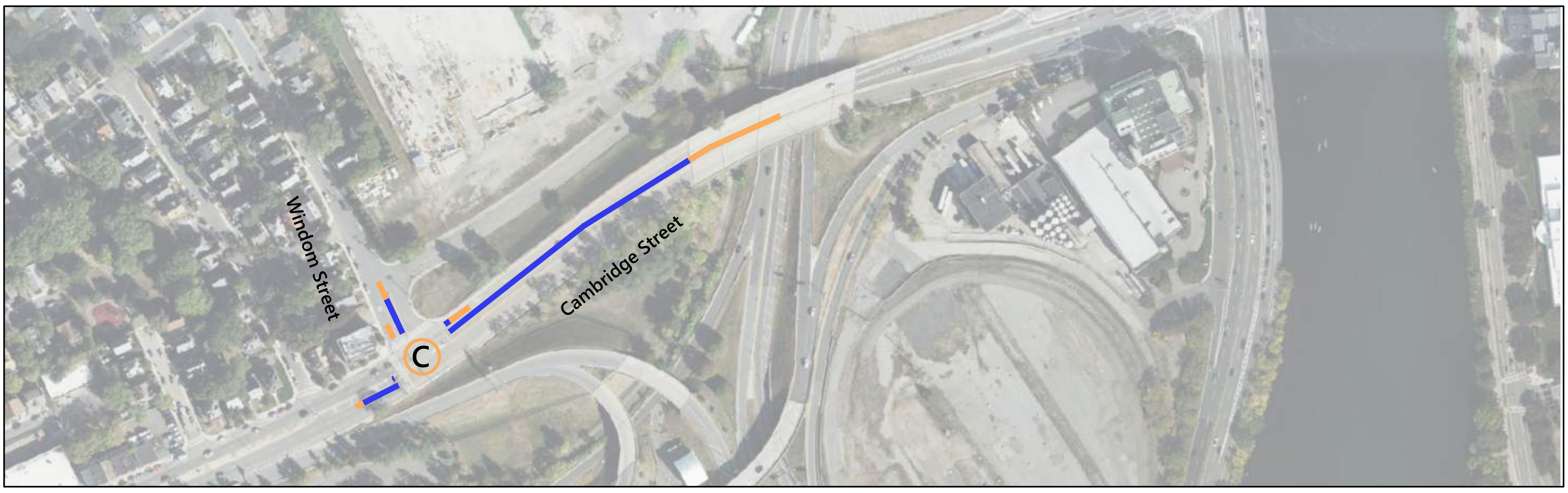
\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2025 Conditions - PM.dwg

Cambridge Street at Windom Street

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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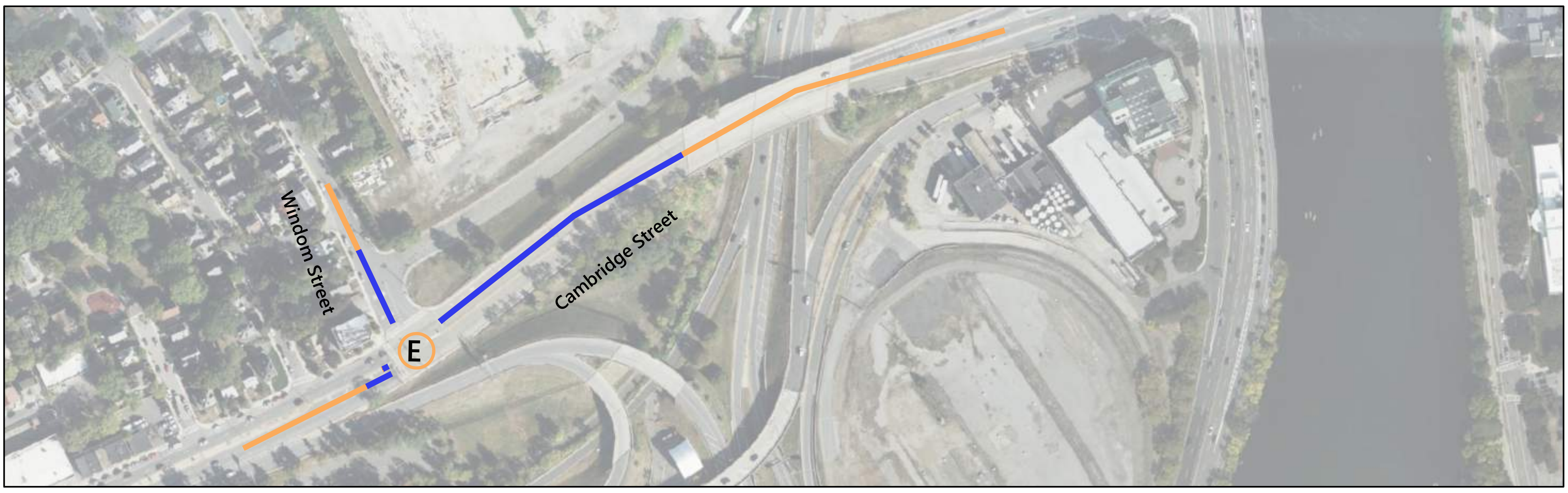
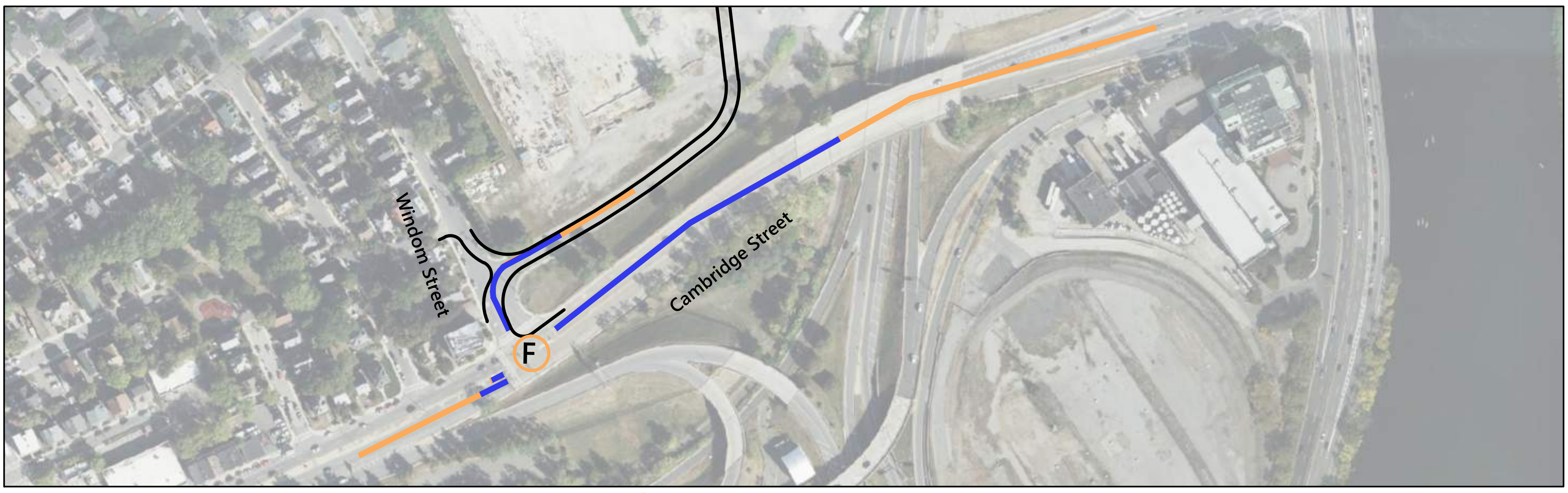
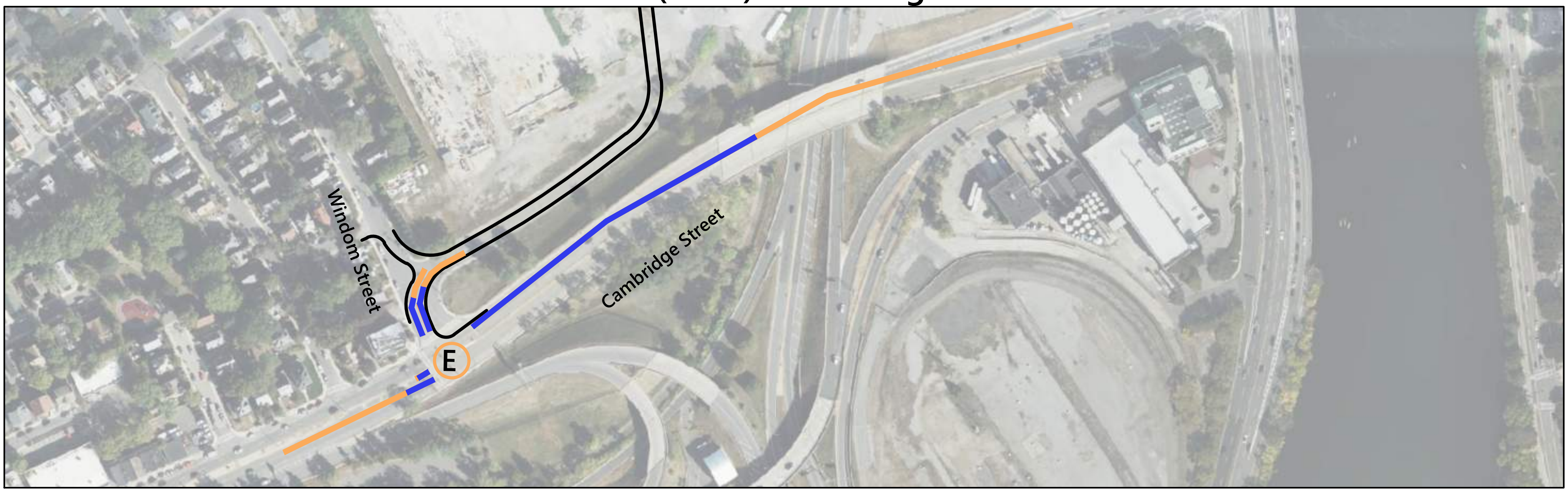


No-Build (2025)



Build (2025) - No Mitigation



Build (2025) - With Mitigation

2025 Conditions: Evening Peak Hour
Queue Diagrams

0 125 250 Feet

Enterprise Research Campus Project
Boston, MA

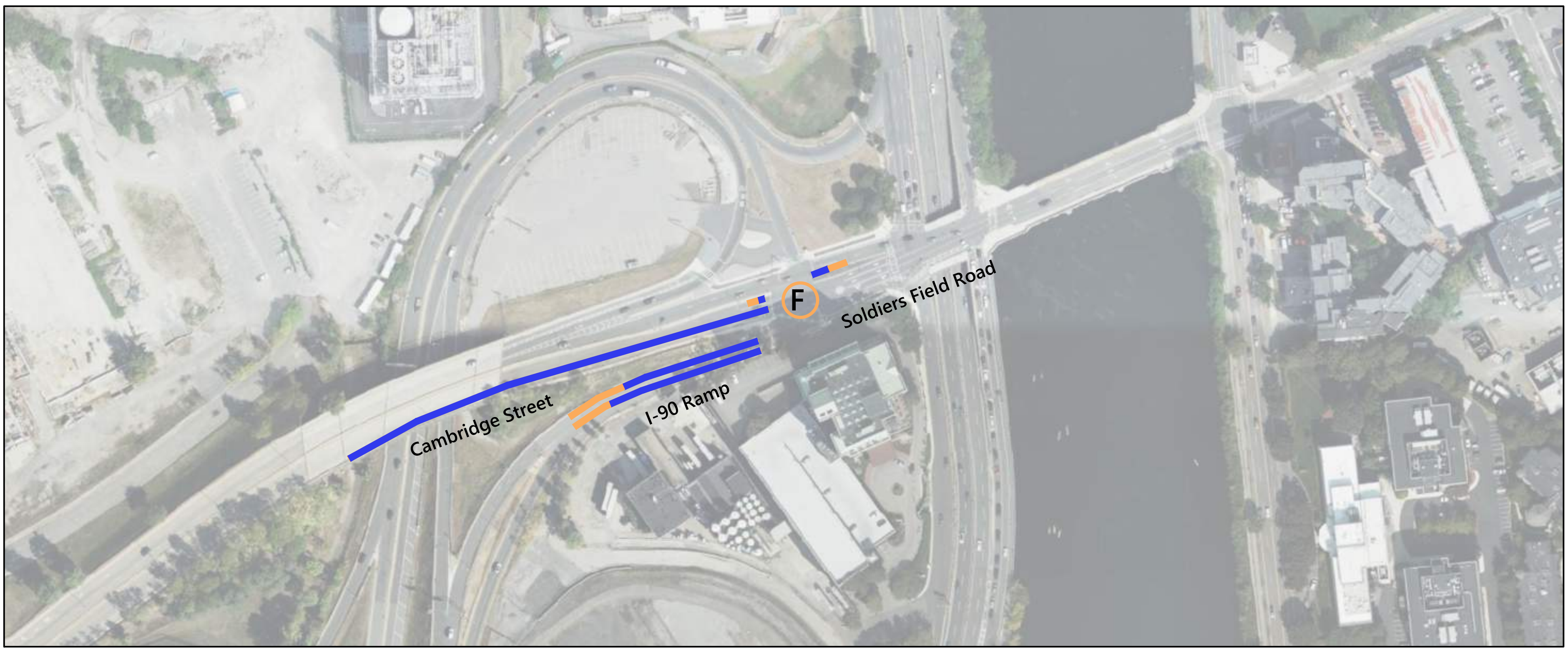
\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2025 Conditions - PM.dwg

Cambridge Street at I-90 Ramps/ Double Tree Hotel

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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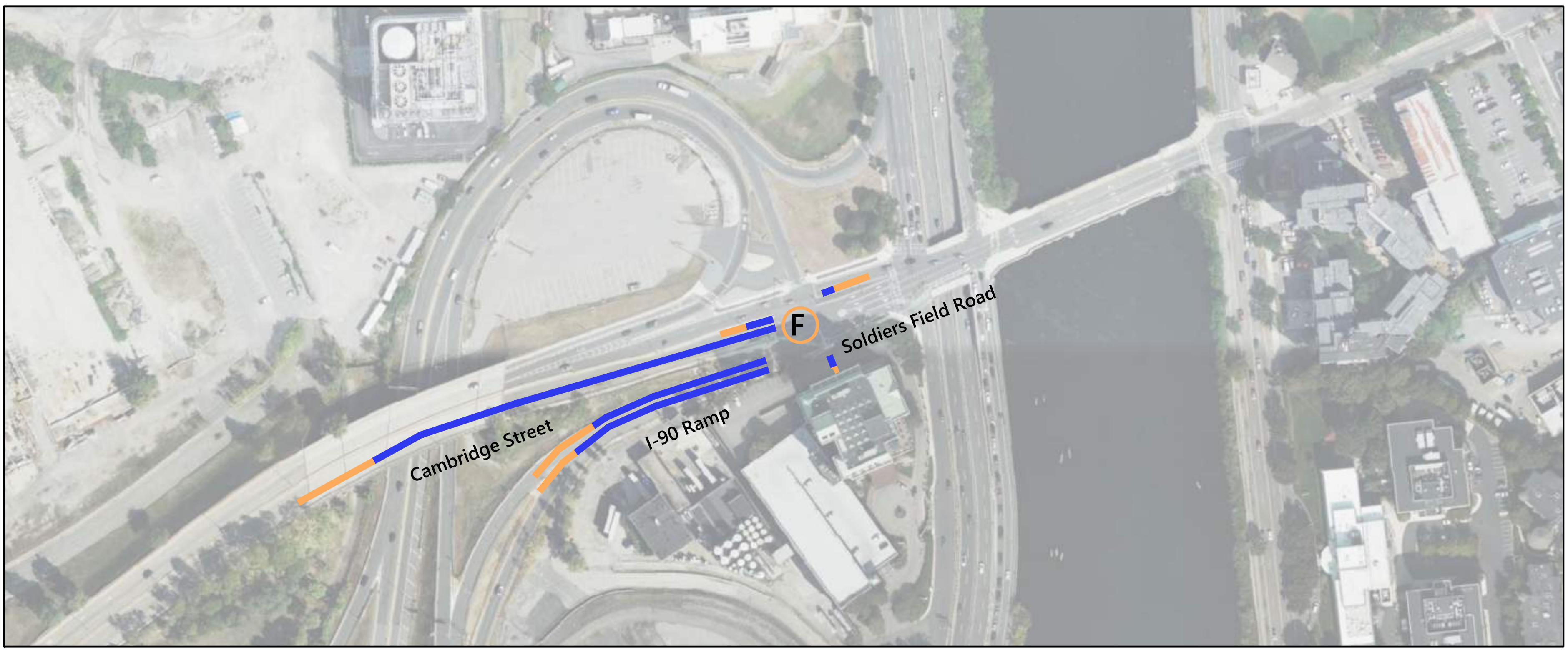

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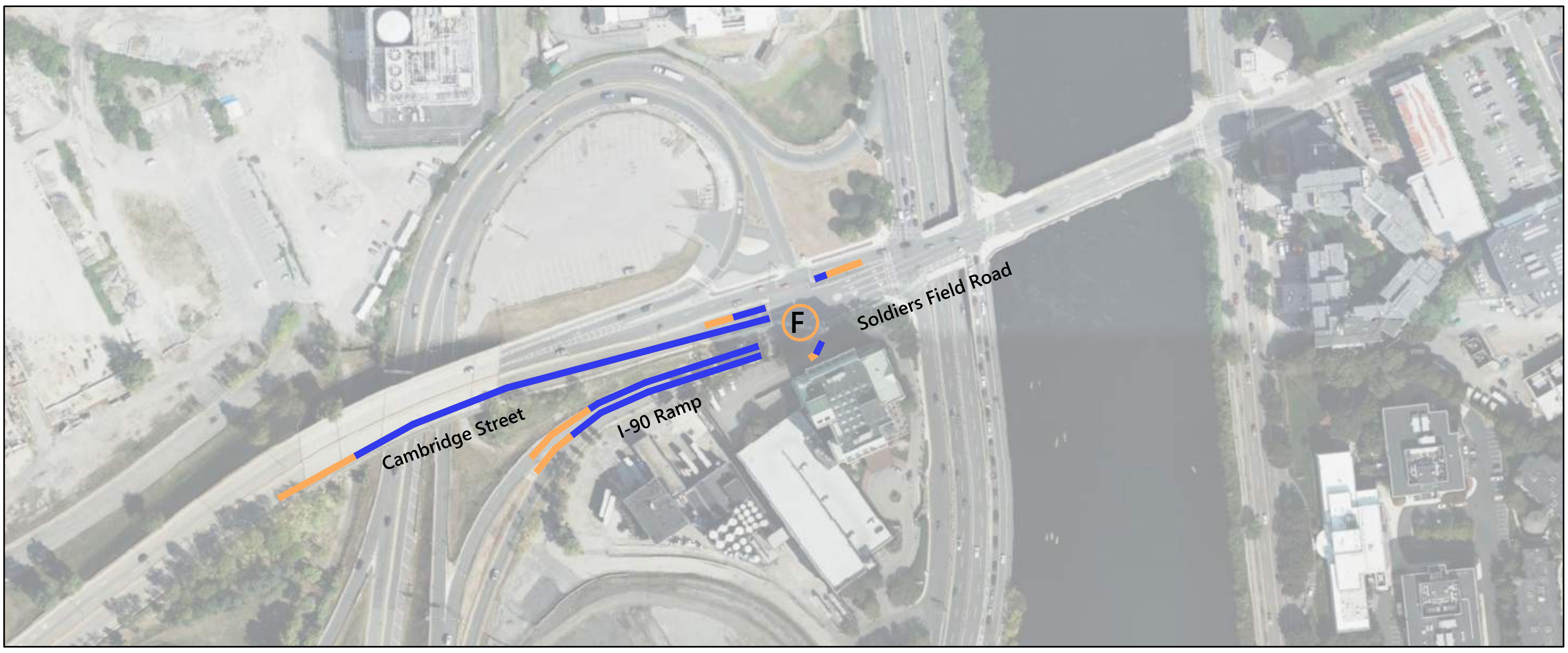


Build (2025)

2025 Conditions: Evening Peak Hour
Queue Diagrams

0 125 250 Feet

Enterprise Research Campus Project
Boston, MA

Cambridge Street at Soldiers Field Road

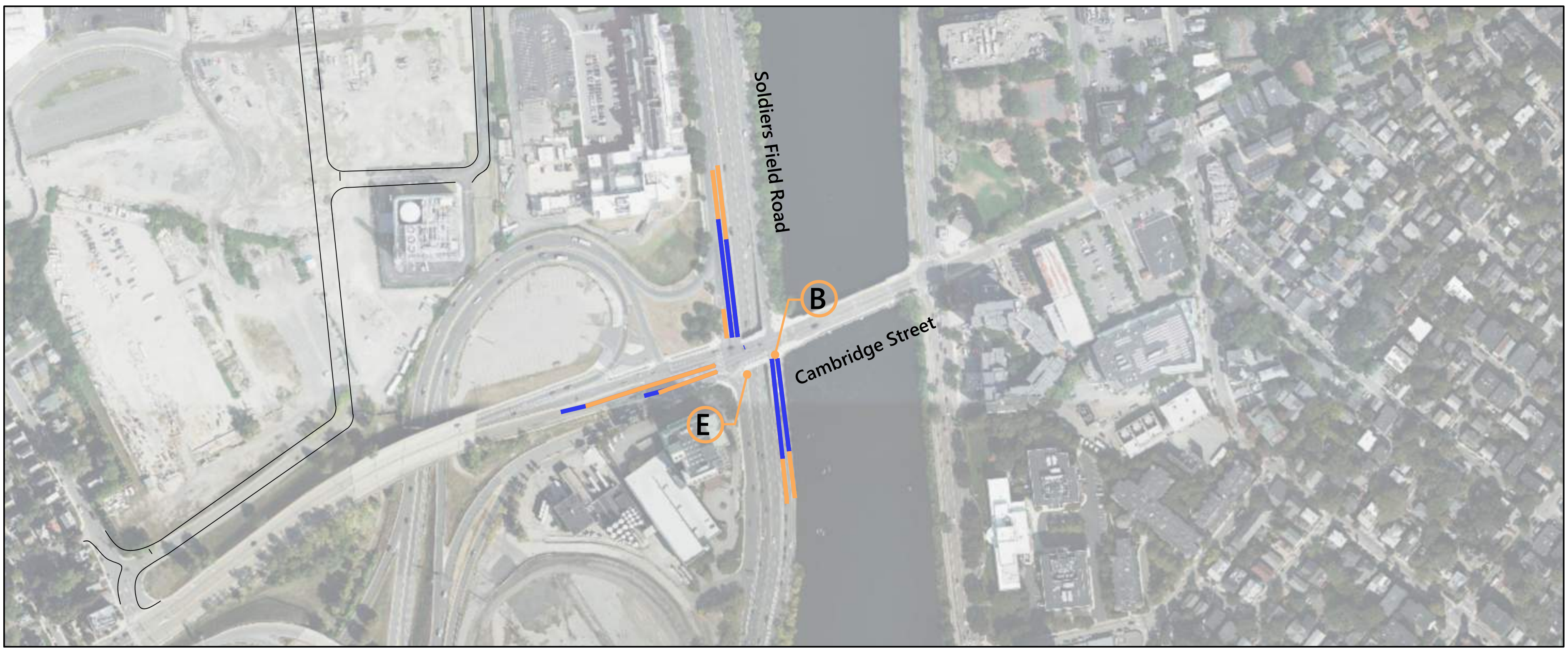
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2025)



Build (2025)

2025 Conditions: Evening Peak Hour
Queue Diagrams

0 200 400 Feet

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2025 Conditions - PM.dwg

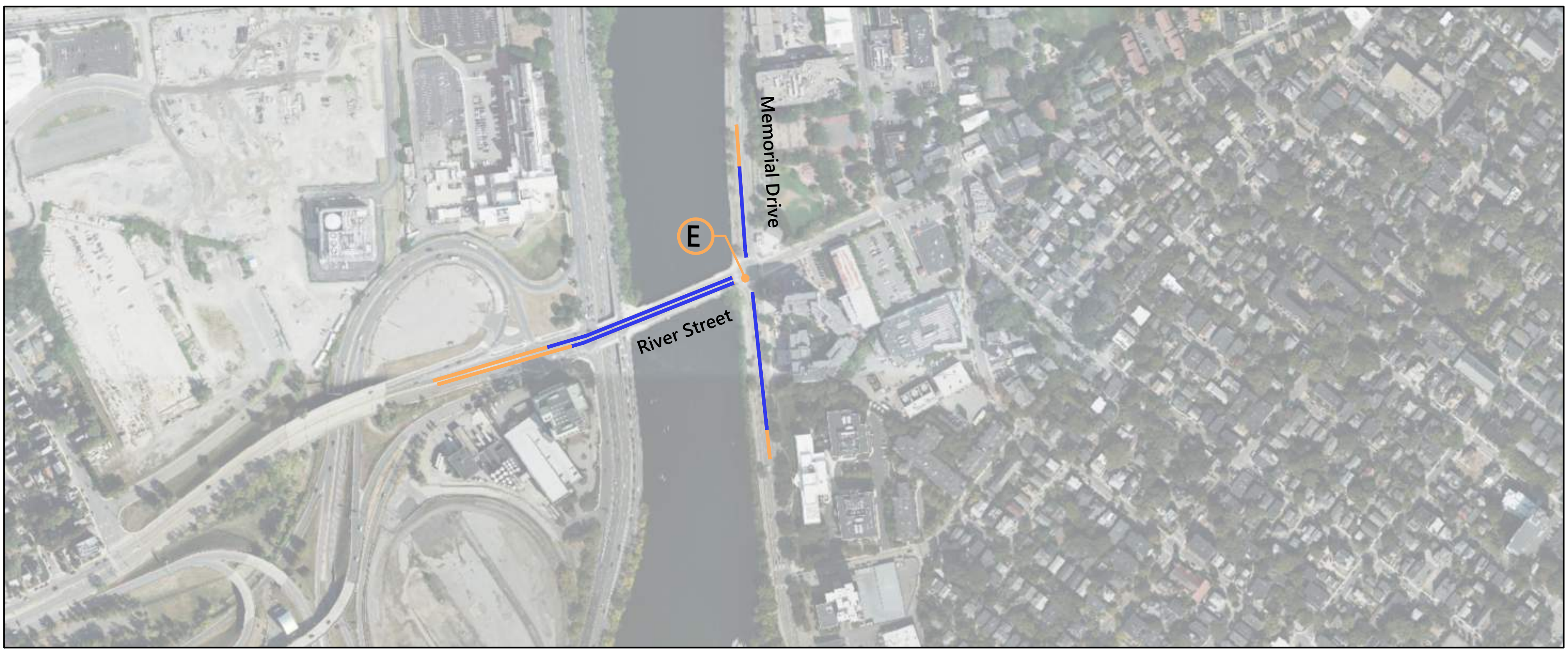
Memorial Drive at River Street

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing



No-Build (2025)

Build (2025)

2025 Conditions: Evening Peak Hour
Queue Diagrams

0 250 500 Feet

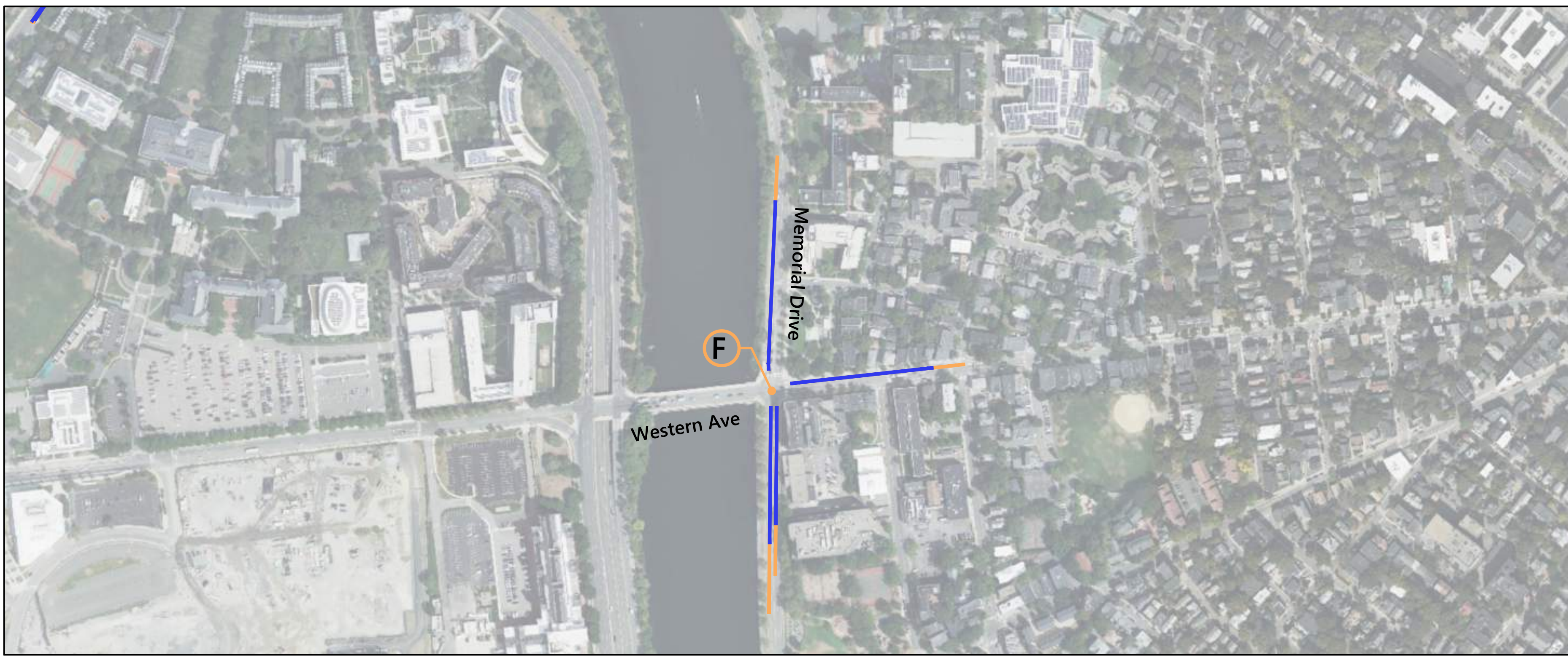
Enterprise Research Campus Project
Boston, MA

Western Ave at Memorial Drive

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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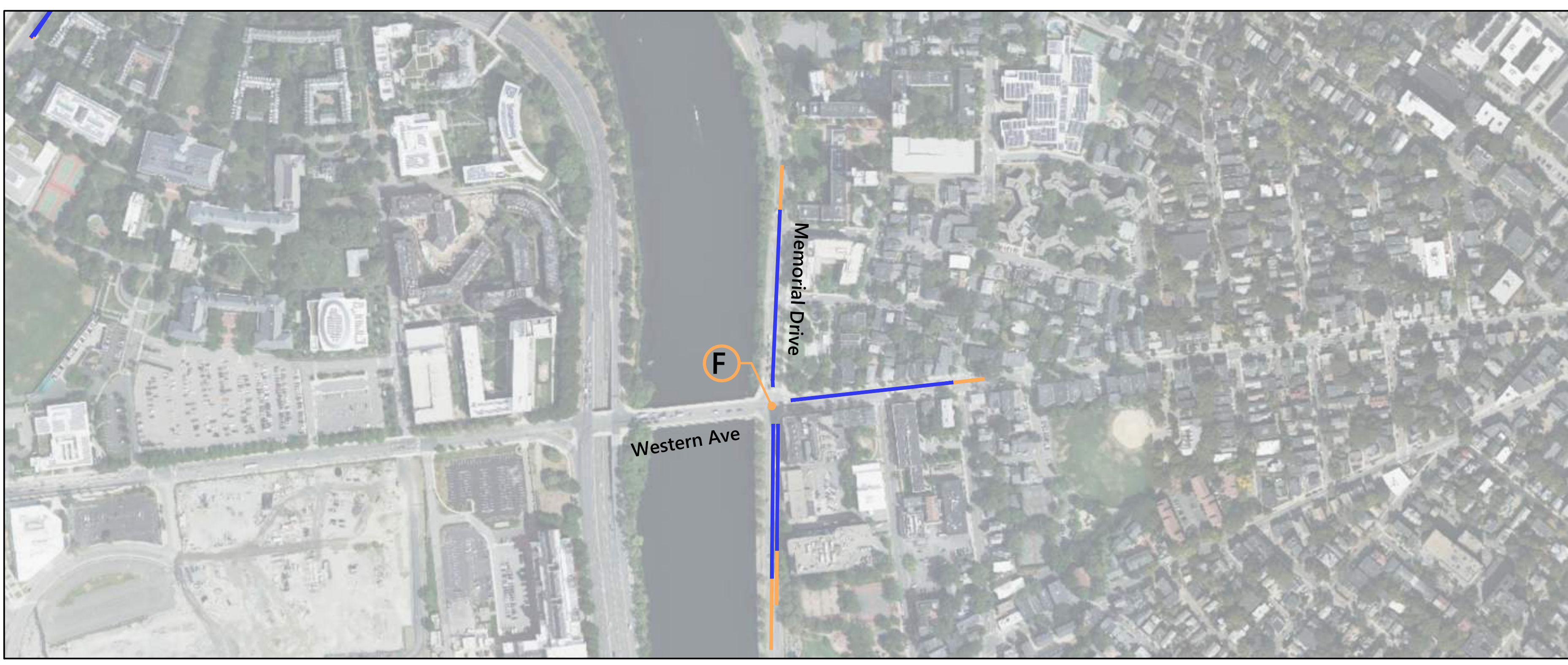

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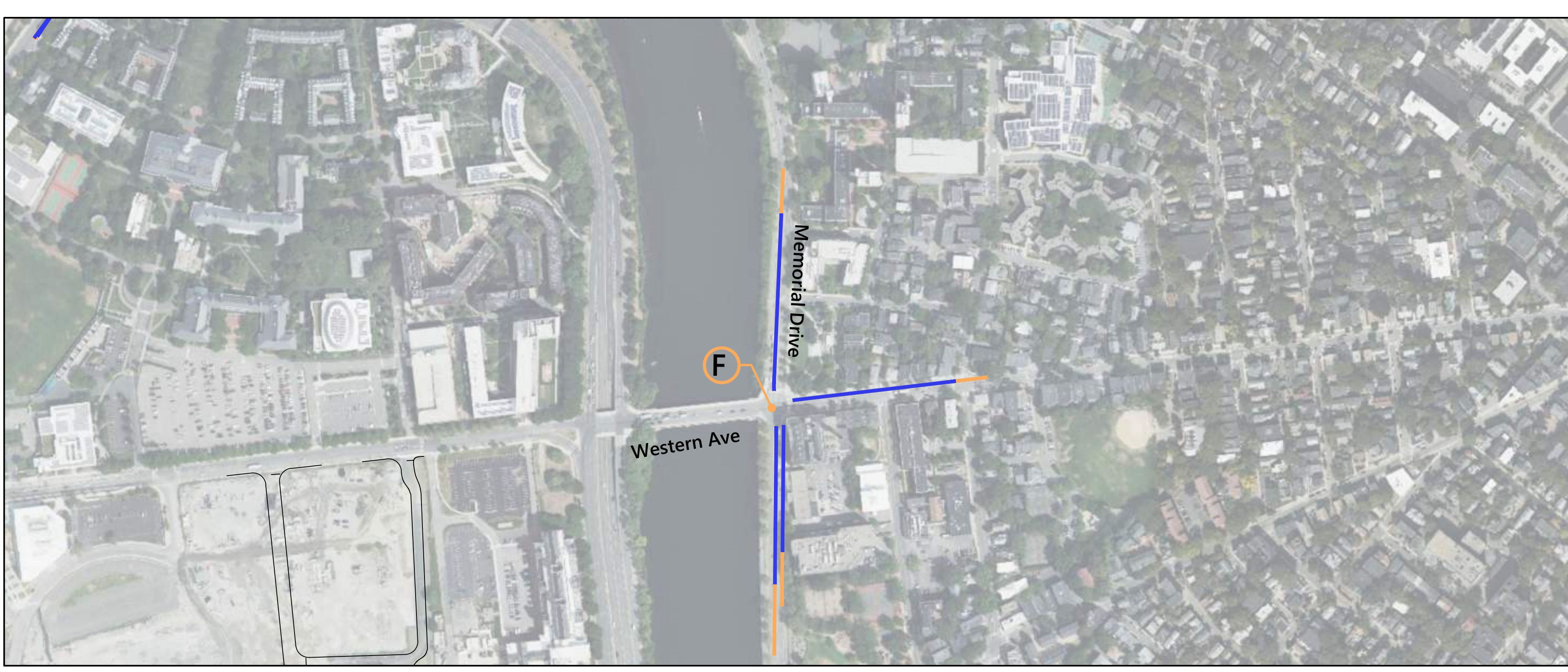


Build (2025)

2025 Conditions: Evening Peak Hour Queue Diagrams

0 250 500 Feet

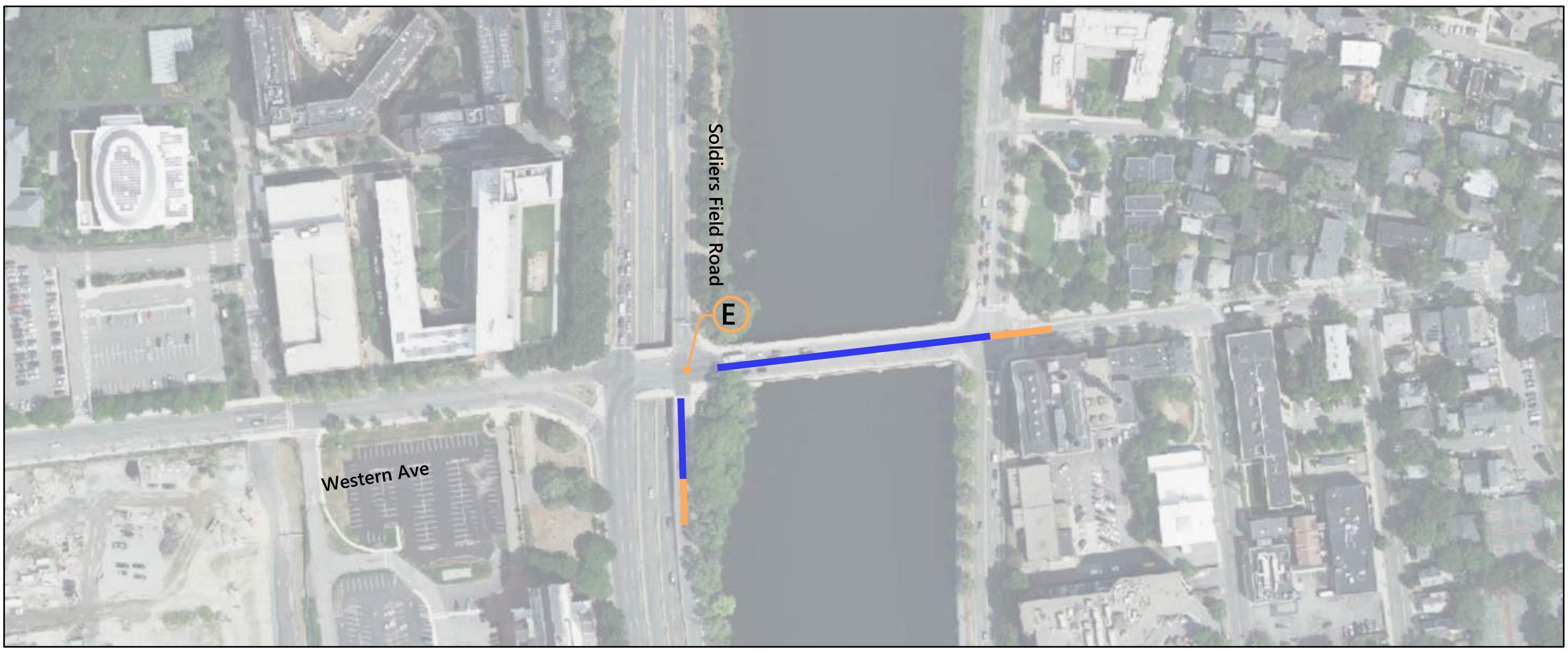
Enterprise Research Campus Project
Boston, MA

Western Ave at Soldiers Field Road WB

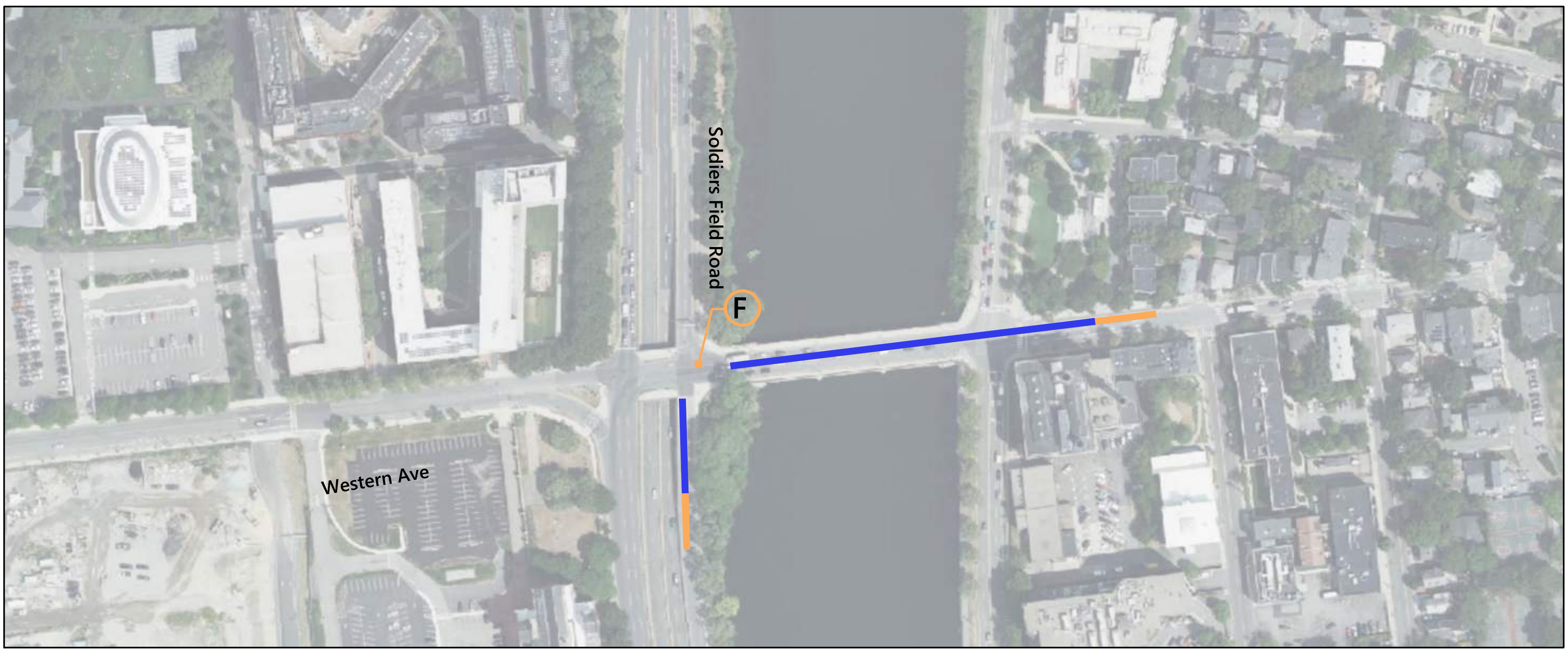
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



Existing



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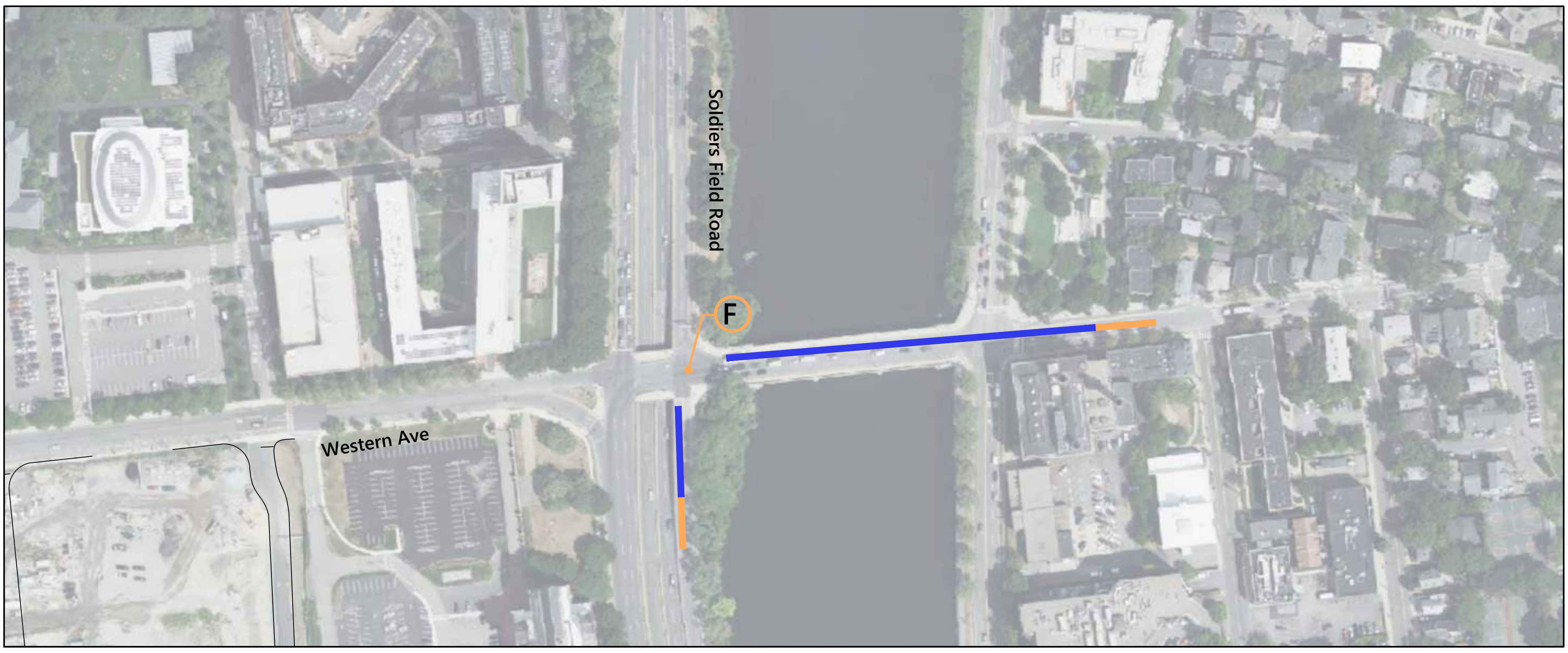


Build (2025)

2025 Conditions: Evening Peak Hour Queue Diagrams

0 125 250 Feet

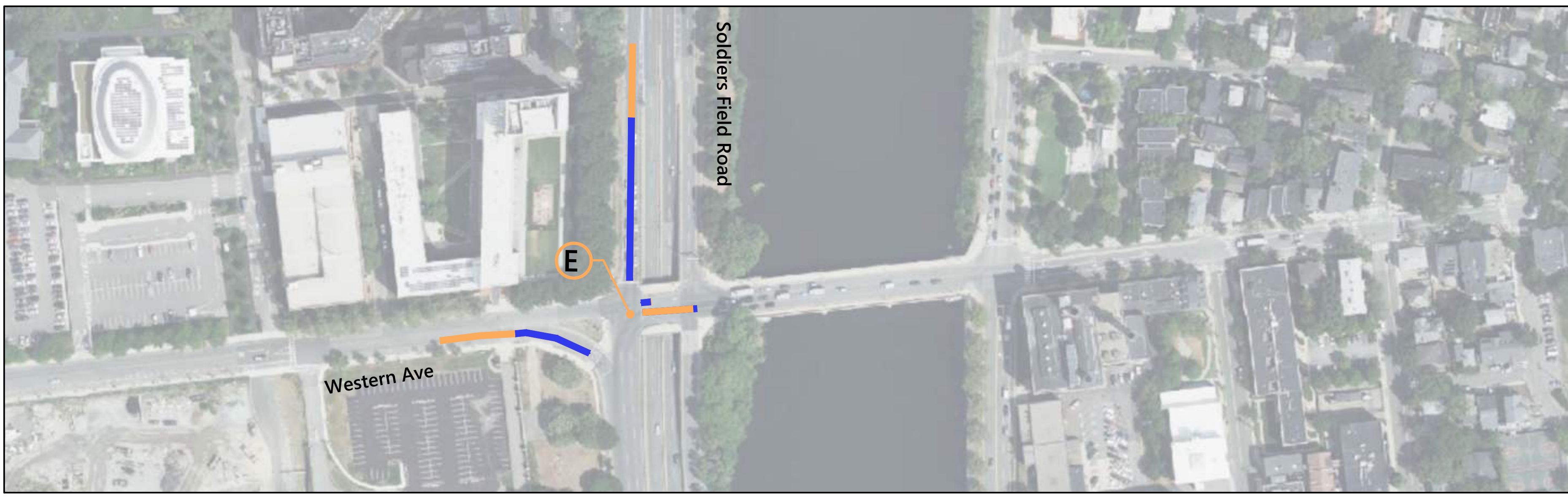
Enterprise Research Campus Project
Boston, MA

Western Ave at Soldiers Field Road EB

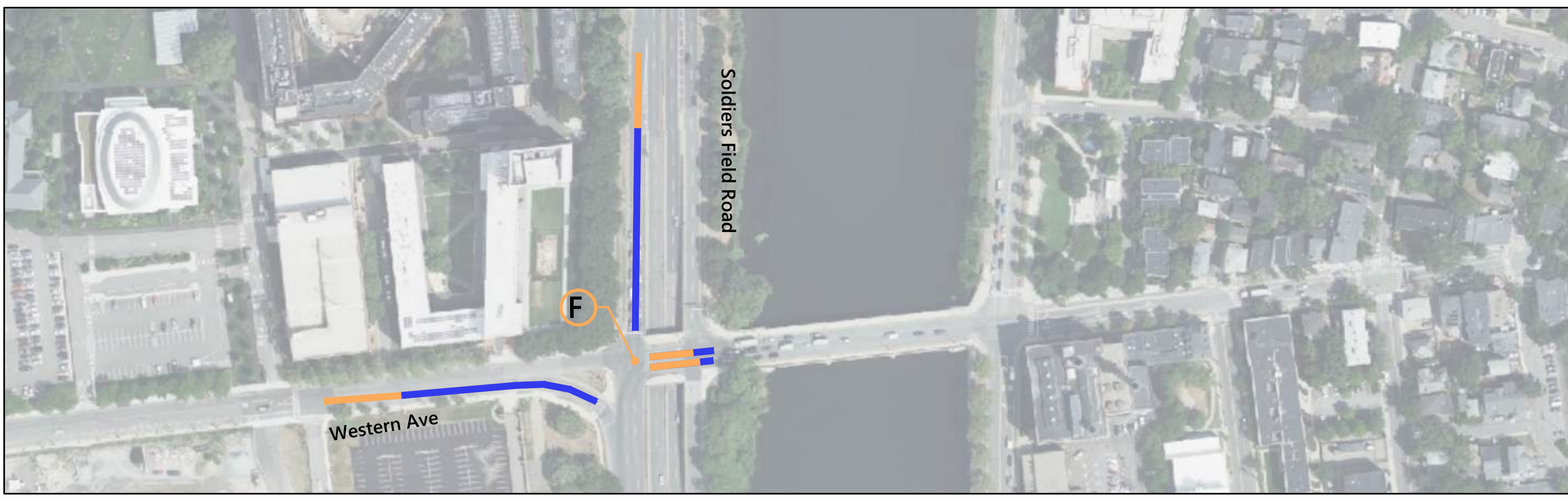
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



Existing



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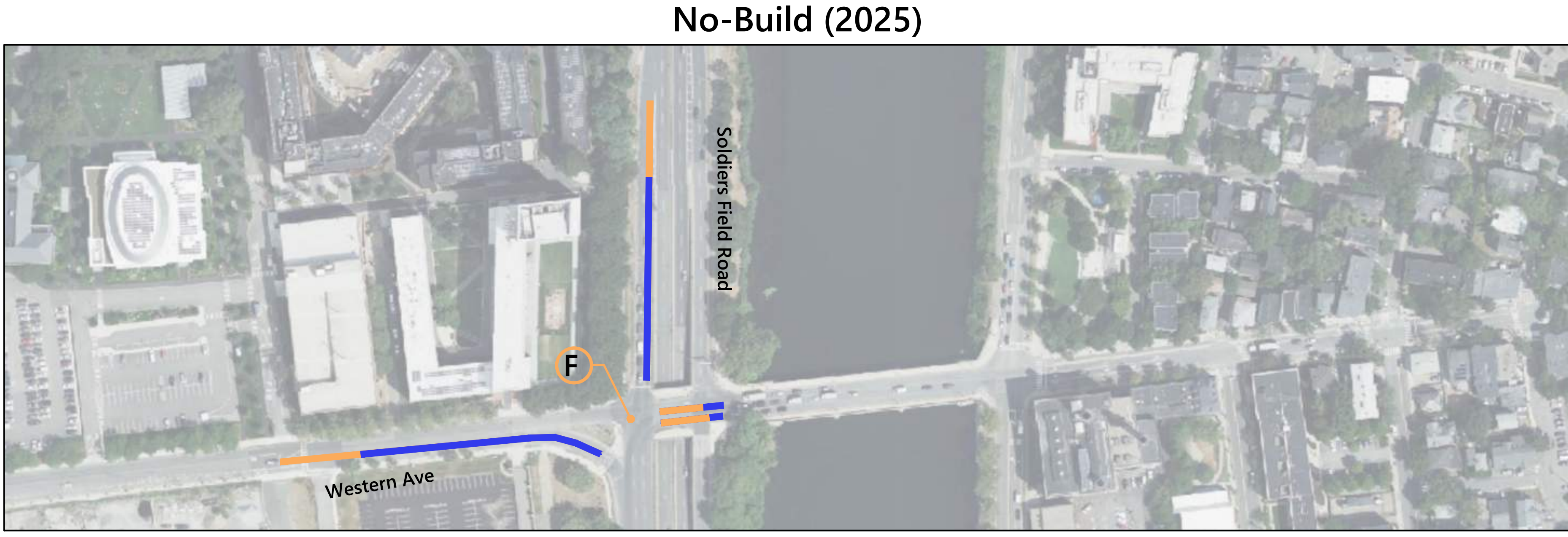
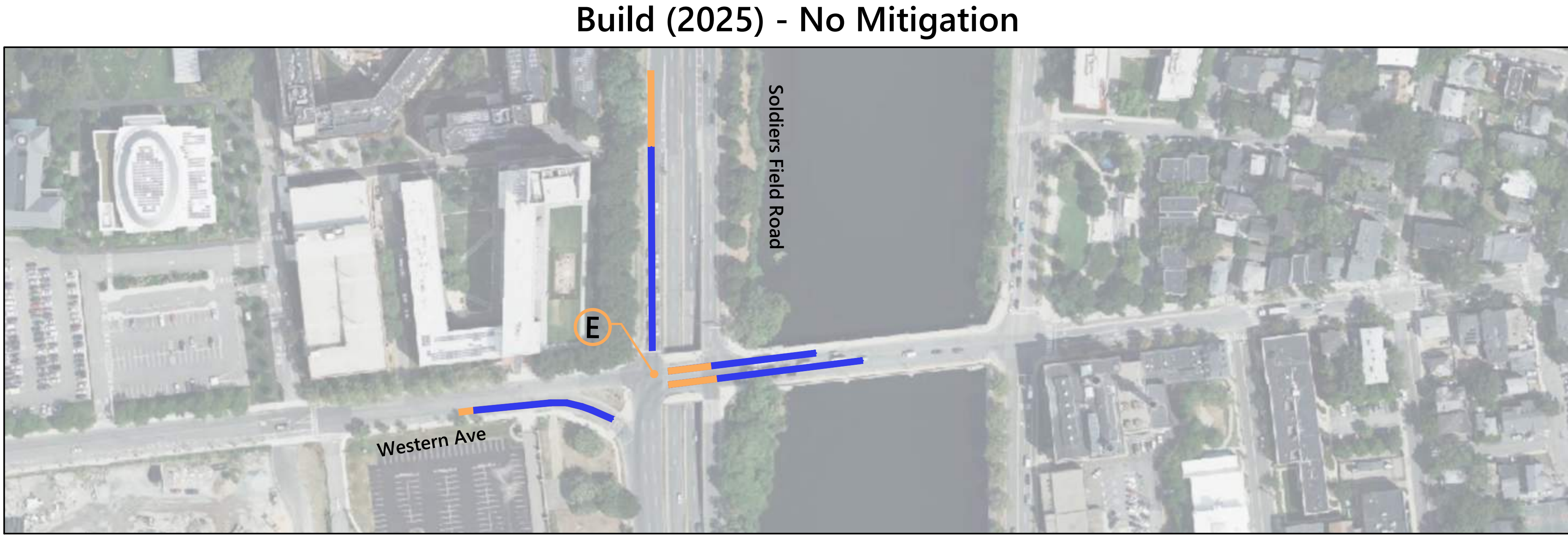


Build (2025) - No Mitigation



Build (2025) - With Mitigation

2025 Conditions: Evening Peak Hour
Queue Diagrams

0 125 250 Feet

Enterprise Research Campus Project
Boston, MA

Western Ave at Kresge Way/ East Drive

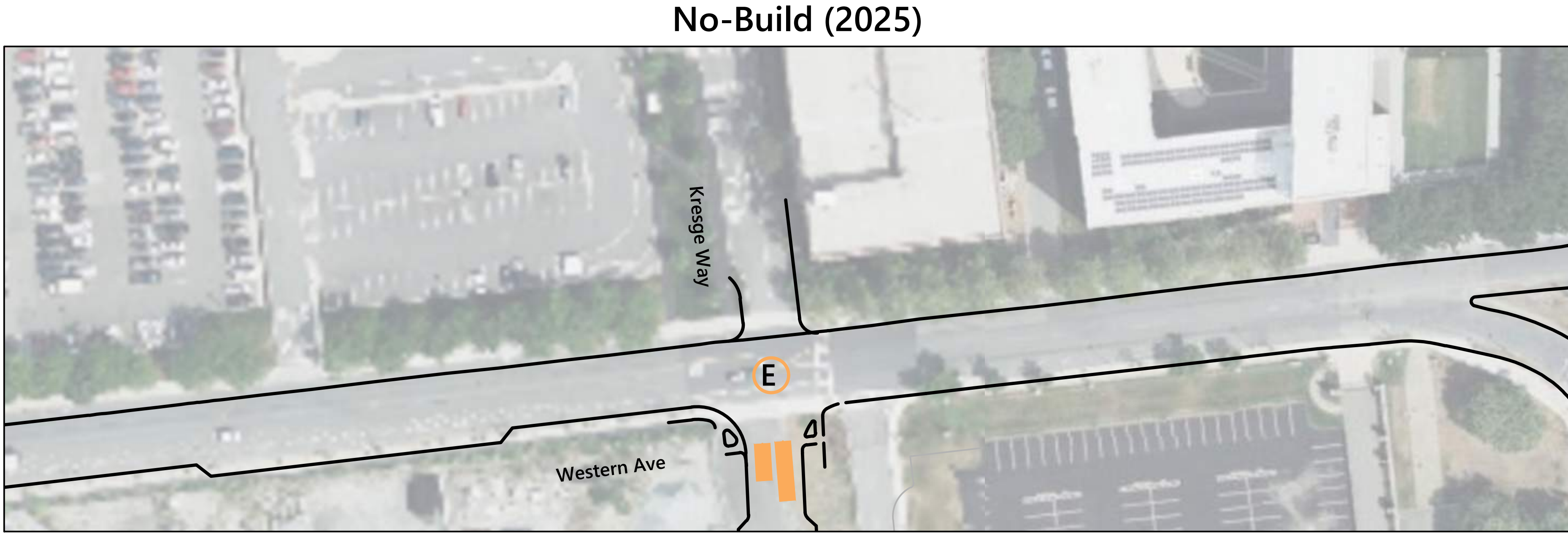
X Overall Intersection Level of Service

50th Percentile Queue

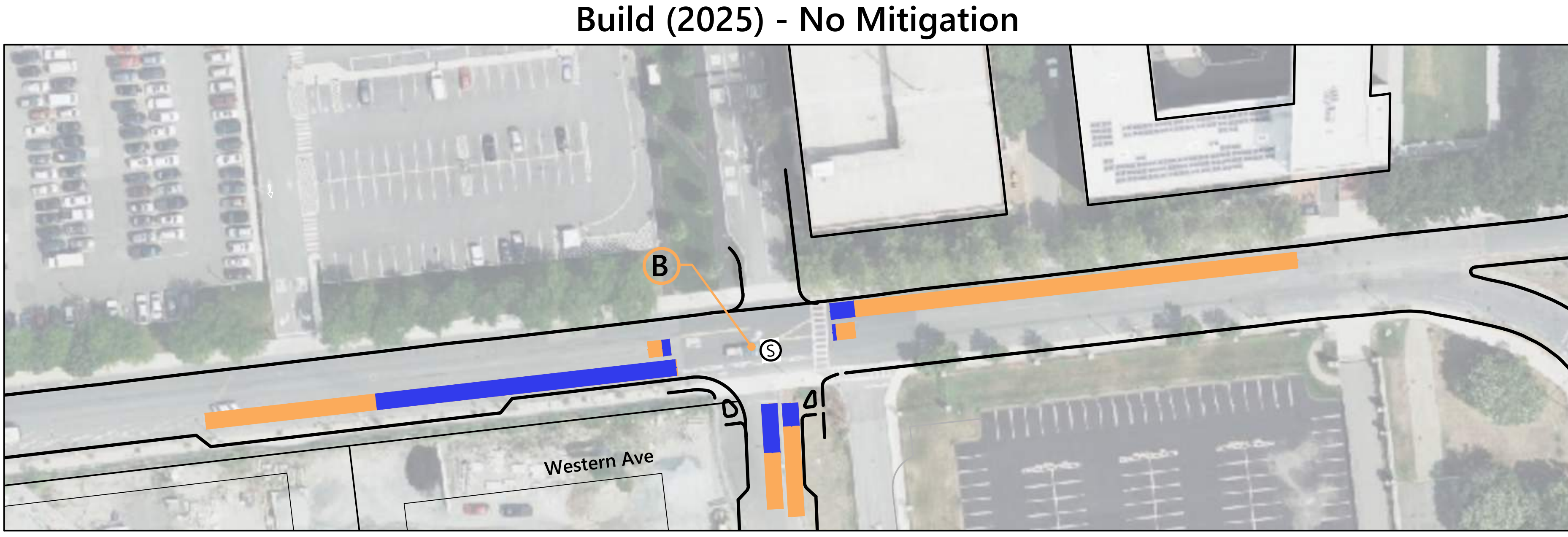
95th Percentile Queue

Existing

No-Build (2025)



Build (2025) - No Mitigation



Build (2025) - With Mitigation

2025 Conditions: Evening Peak Hour
Queue Diagrams

0 50 100 Feet

Enterprise Research Campus Project
Boston, MA

Cattle Drive at Western Ave

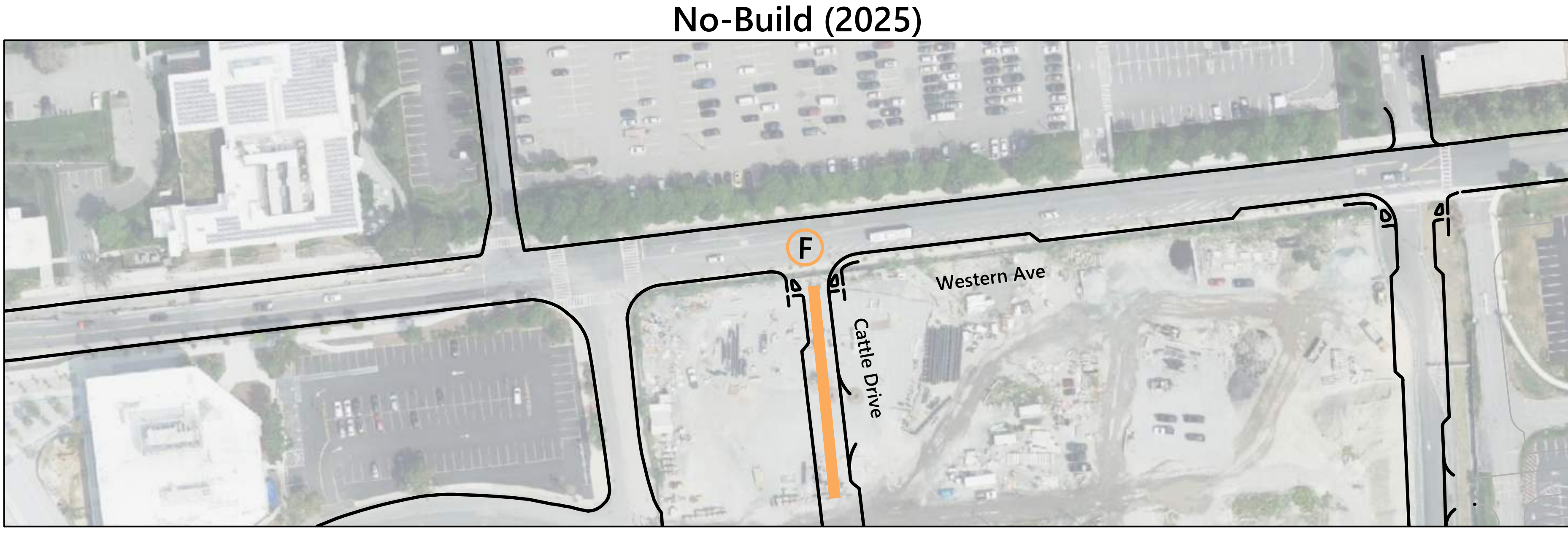
X Overall Intersection Level of Service

50th Percentile Queue

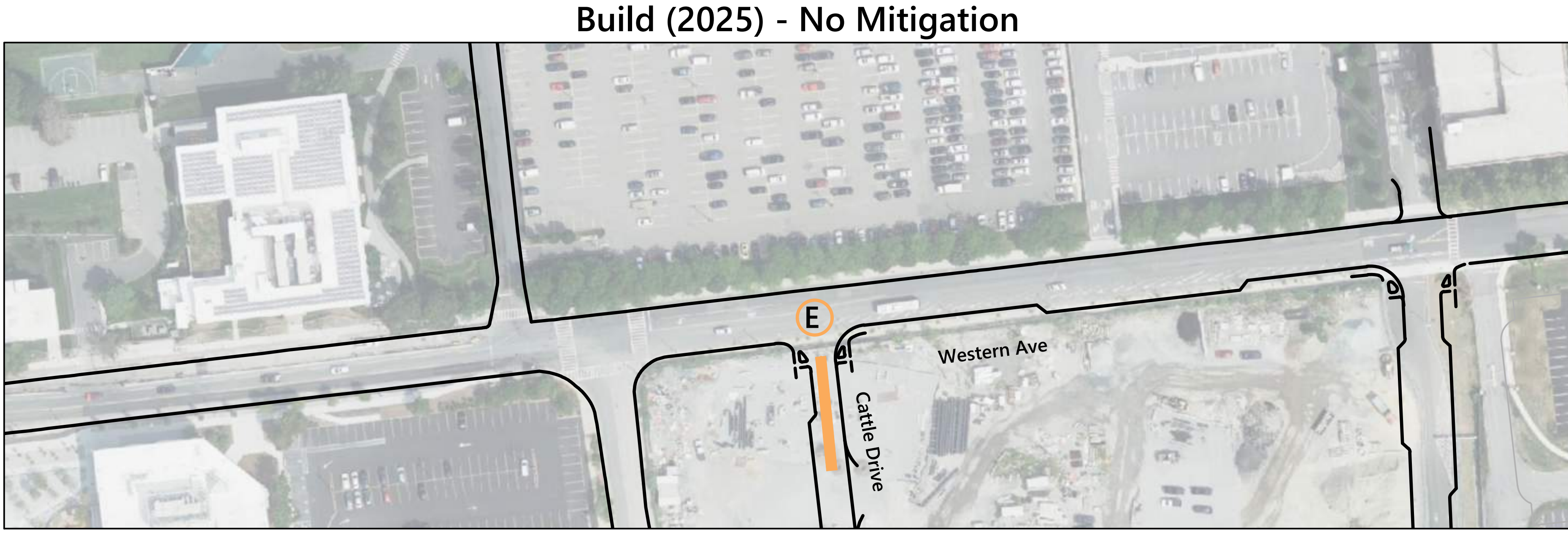
95th Percentile Queue

Existing

No-Build (2025)



Build (2025) - No Mitigation



Build (2025) - With Mitigation

Intersection does not exist under 2021 Existing and 2025 No-Build Conditions

2025 Conditions: Evening Peak Hour
Queue Diagrams

0 75 150 Feet

Enterprise Research Campus Project
Boston, MA

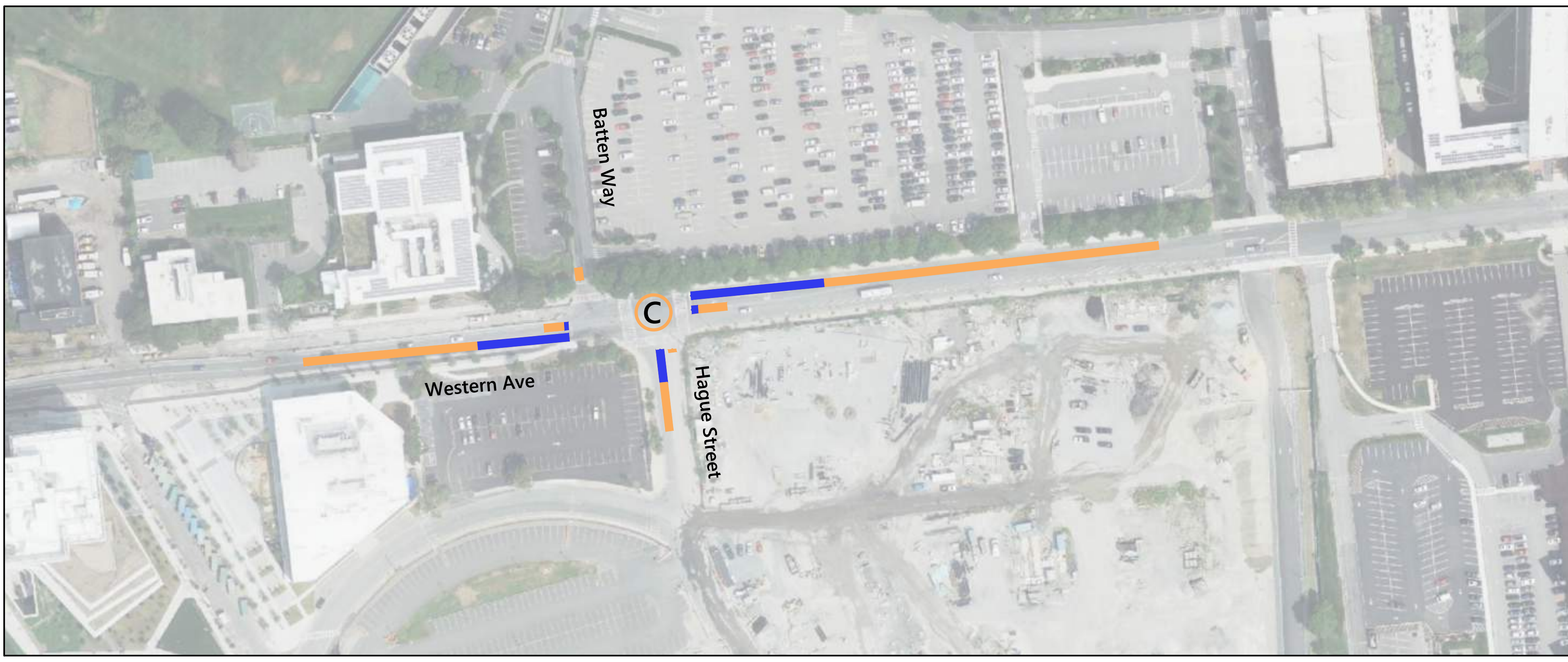
\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2025 Conditions - PM.dwg

Western Ave at Batten Way/ Hague Street

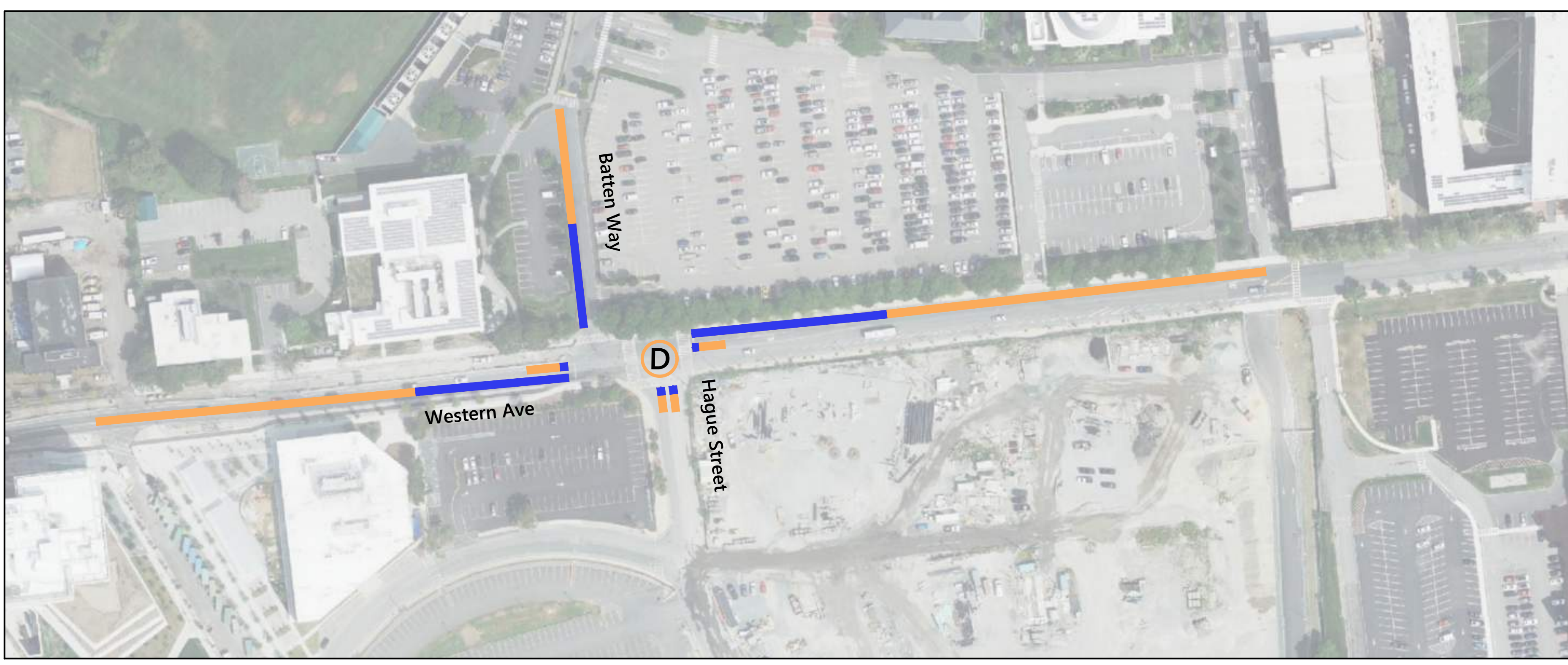
X Overall Intersection Level of Service

50th Percentile Queue

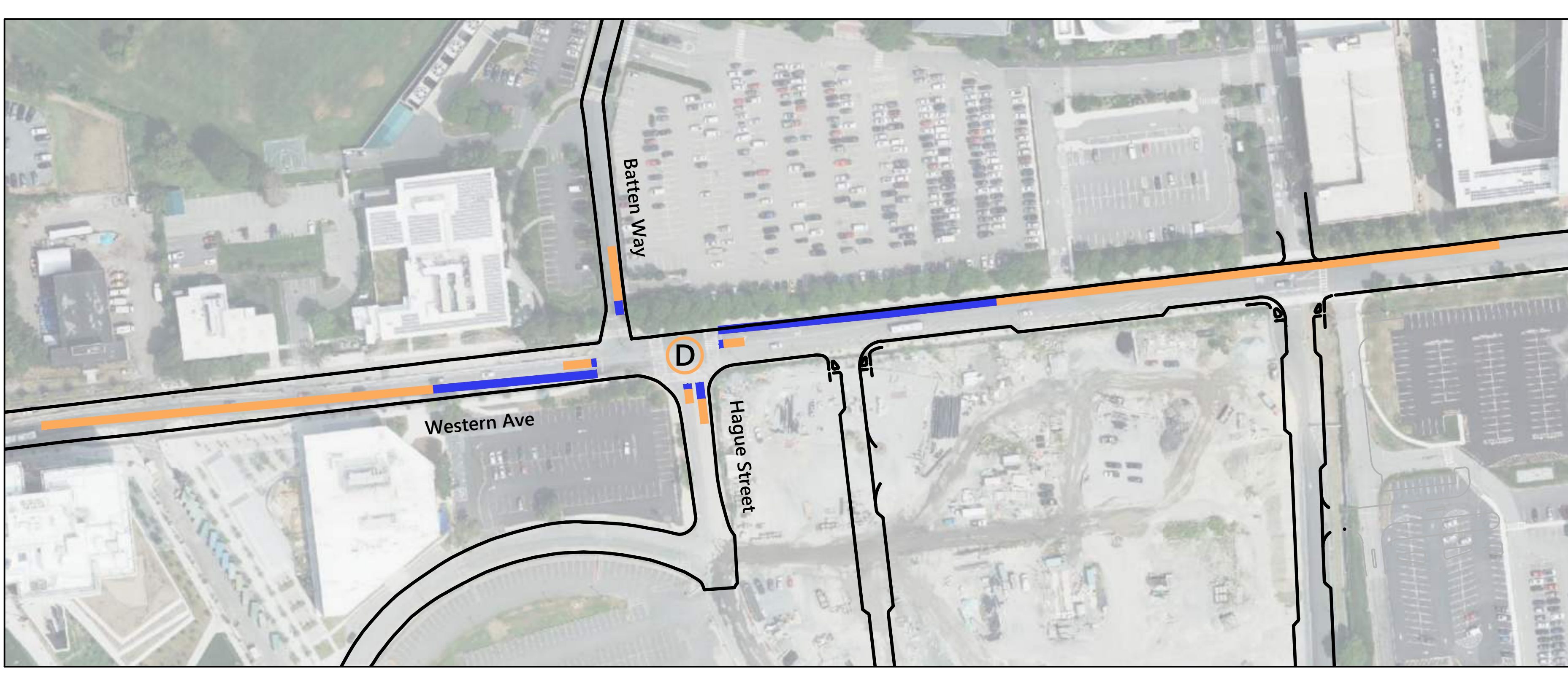
95th Percentile Queue



Existing



No-Build (2025)



Build (2025)

2025 Conditions: Evening Peak Hour Queue Diagrams

0 100 200 Feet

Enterprise Research Campus Project
Boston, MA

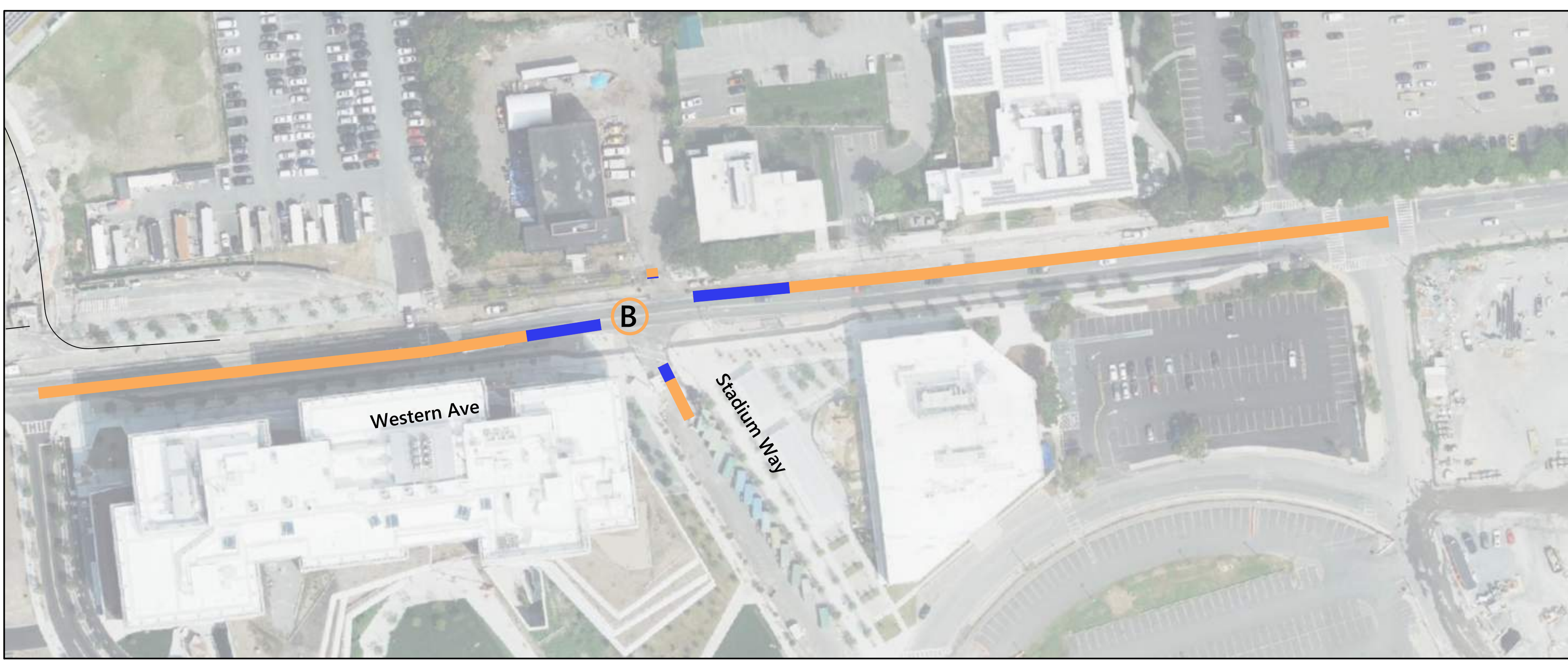
Western Ave at Stadium Way

X Overall Intersection Level of Service

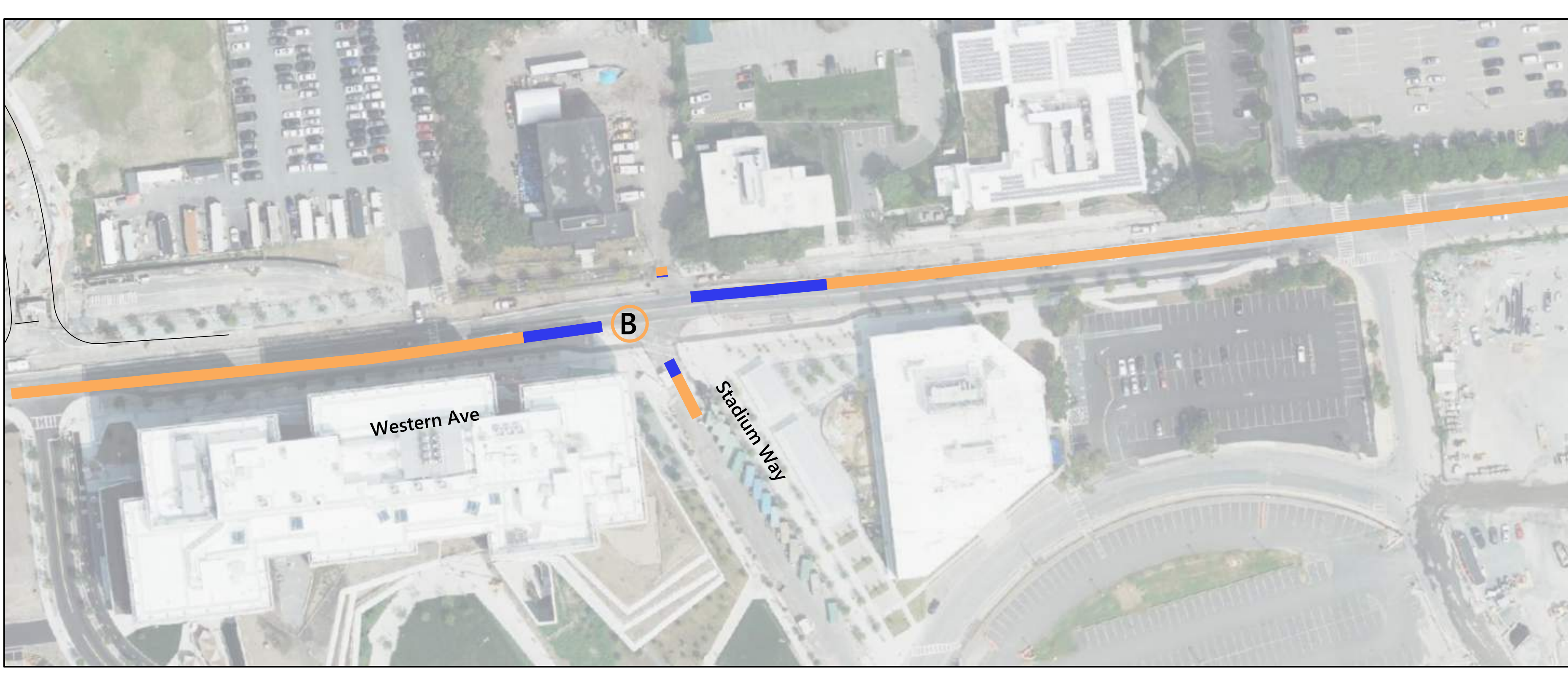
50th Percentile Queue

95th Percentile Queue

Existing



No-Build (2025)



Intersection does not exist under 2021 Existing Conditions

Build (2025)

2025 Conditions: Evening Peak Hour Queue Diagrams

0 75 150 Feet

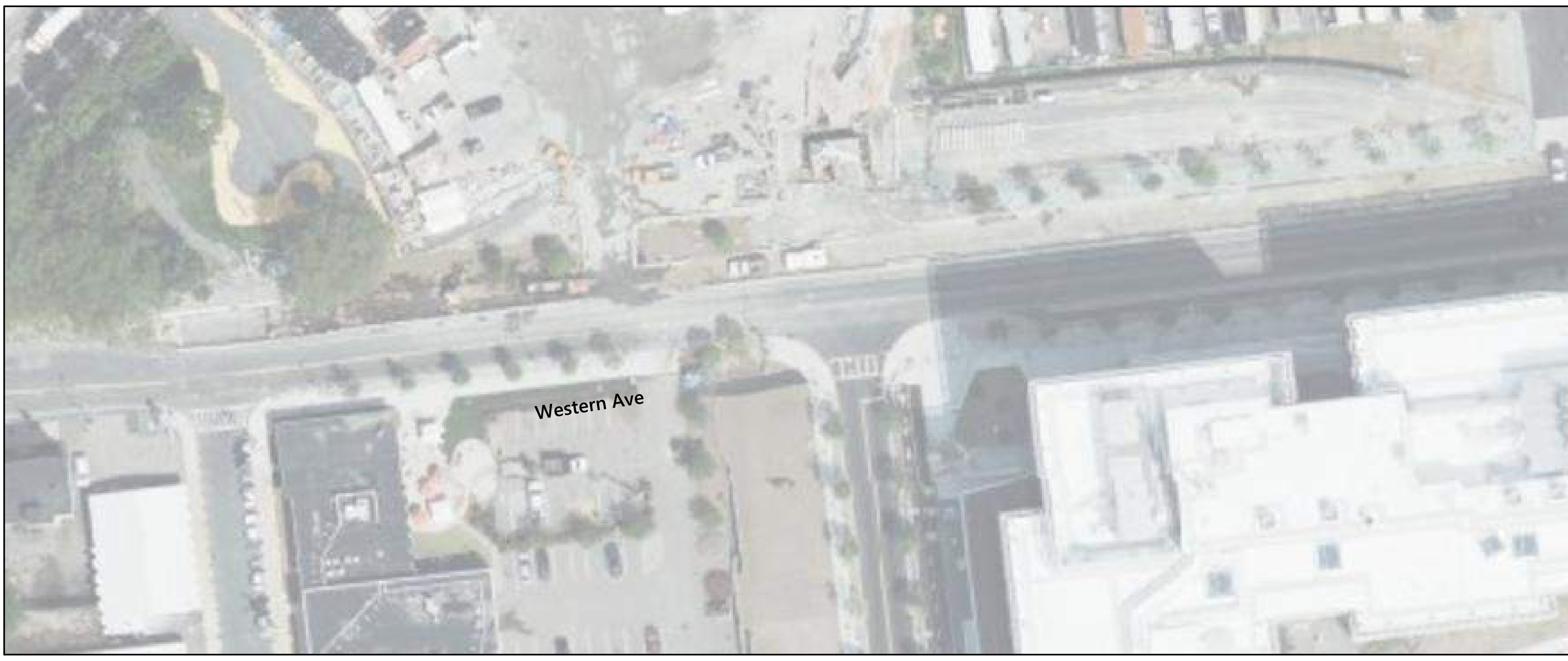
Enterprise Research Campus Project
Boston, MA

Western Ave at Academic Way

X Overall Intersection Level of Service

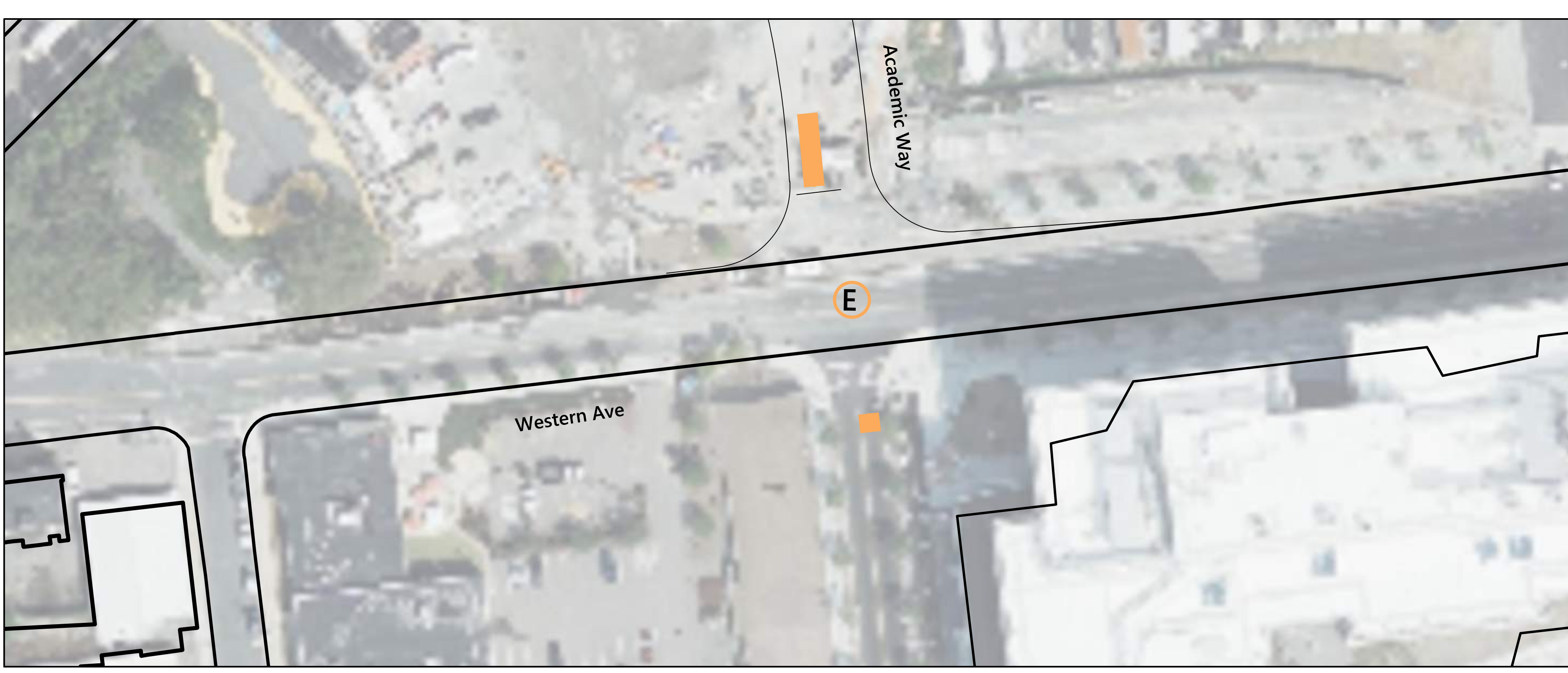
50th Percentile Queue

95th Percentile Queue



Existing

No-Build (2025)



Intersection does not exist under 2021 Existing Conditions

Build (2025)

2025 Conditions: Evening Peak Hour Queue Diagrams

0 40 80 Feet

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2025 Conditions - PM.dwg

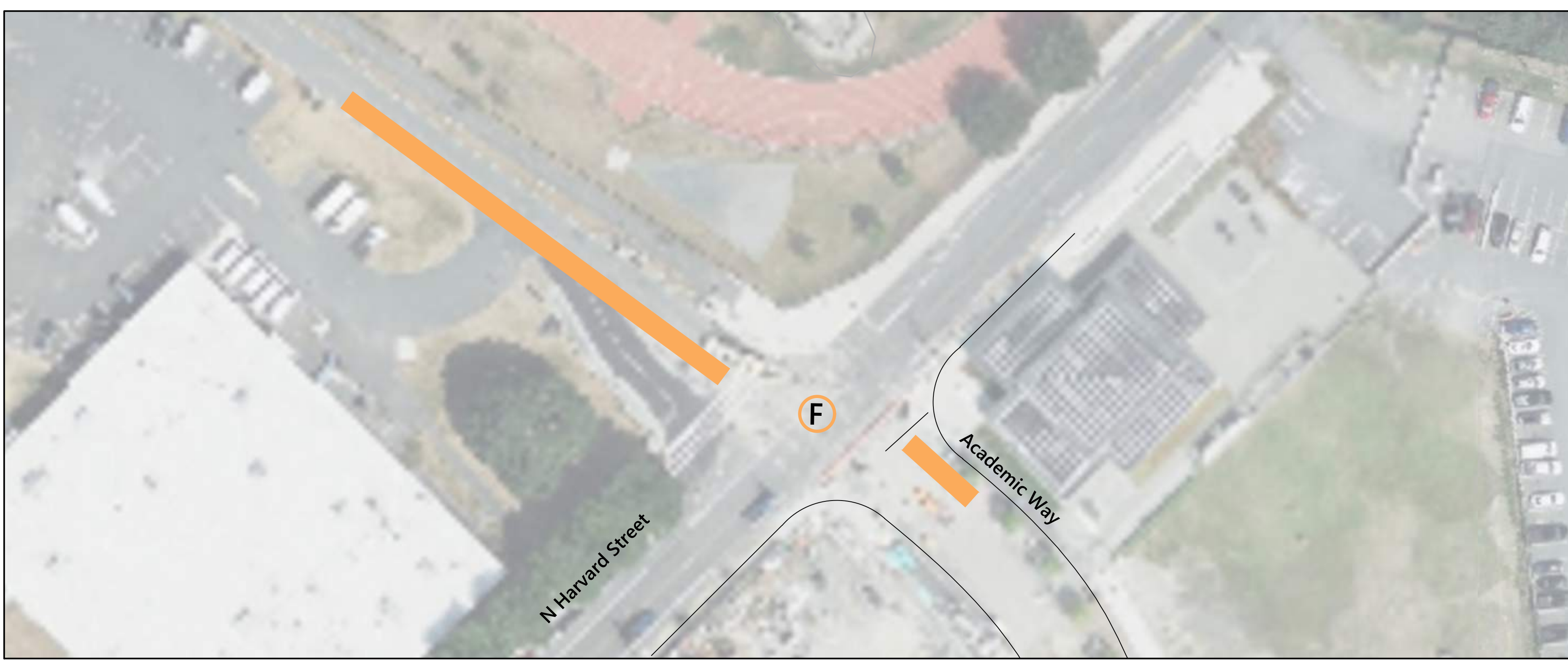
North Harvard Street at Academic Way

X Overall Intersection Level of Service

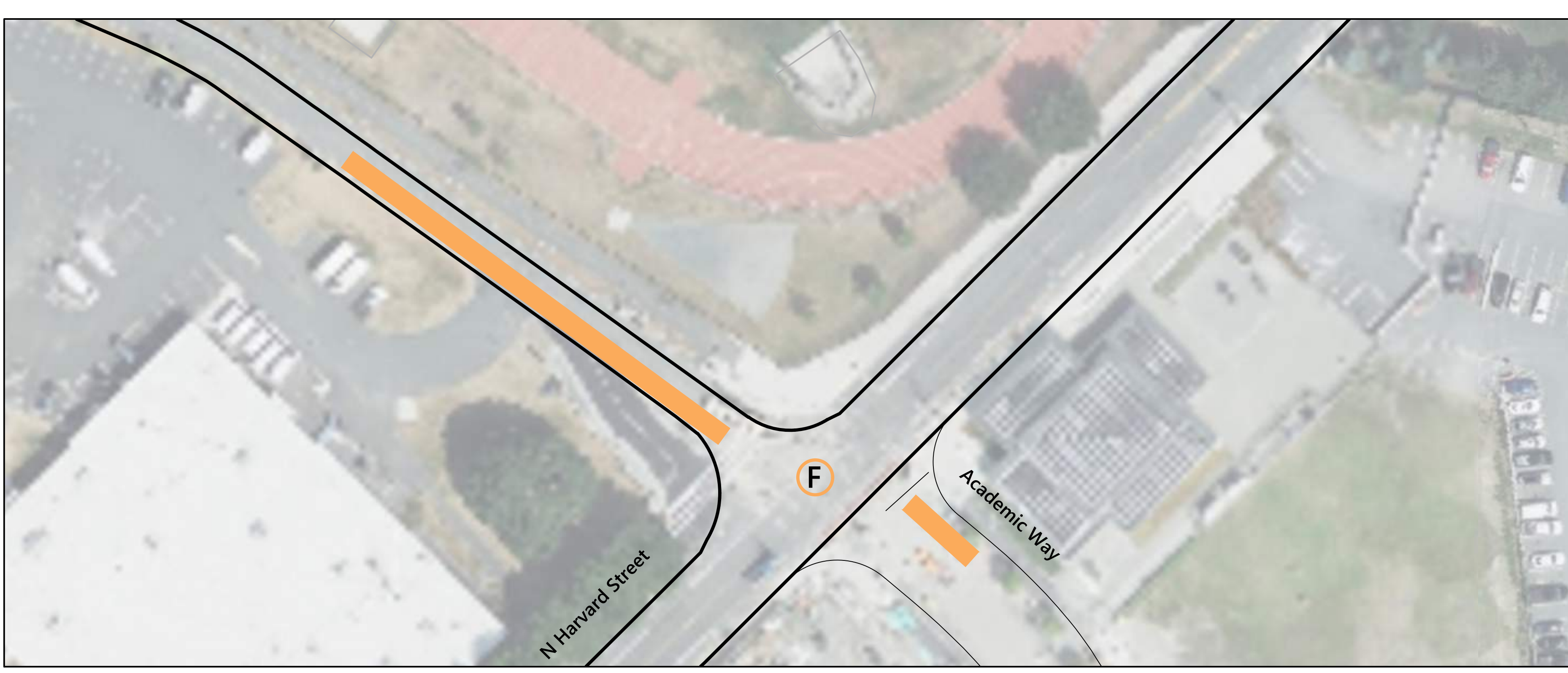
50th Percentile Queue

95th Percentile Queue

Existing



No-Build (2025)



Intersection does not exist under 2021 Existing Conditions

Build (2025)

2025 Conditions: Evening Peak Hour Queue Diagrams

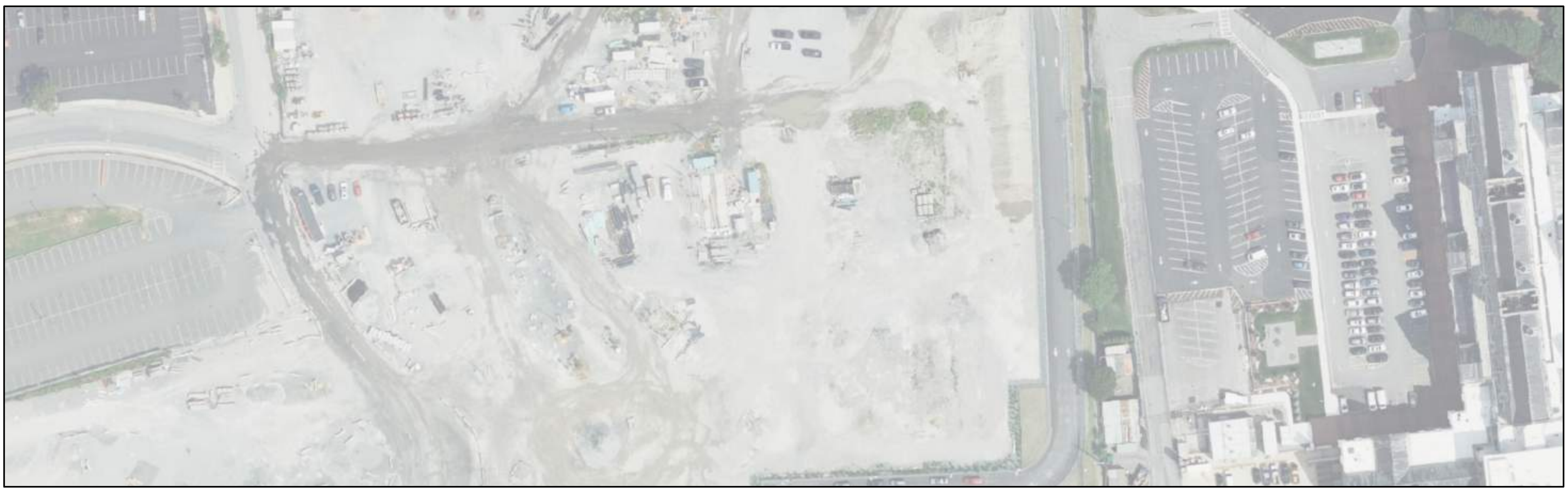
0 40 80 Feet

Enterprise Research Campus Project
Boston, MA

Cattle Drive at DEF Drive

X Overall Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

Existing



No-Build (2025)

Build (2025) - No Mitigation

Build (2025) - With Mitigation

Intersection does not exist under 2021 Existing and 2025 No-Build Conditions

2025 Conditions: Evening Peak Hour Queue Diagrams

0 50 100 Feet

Enterprise Research Campus Project
Boston, MA

Cattle Drive/ Almy Street at Windom Street

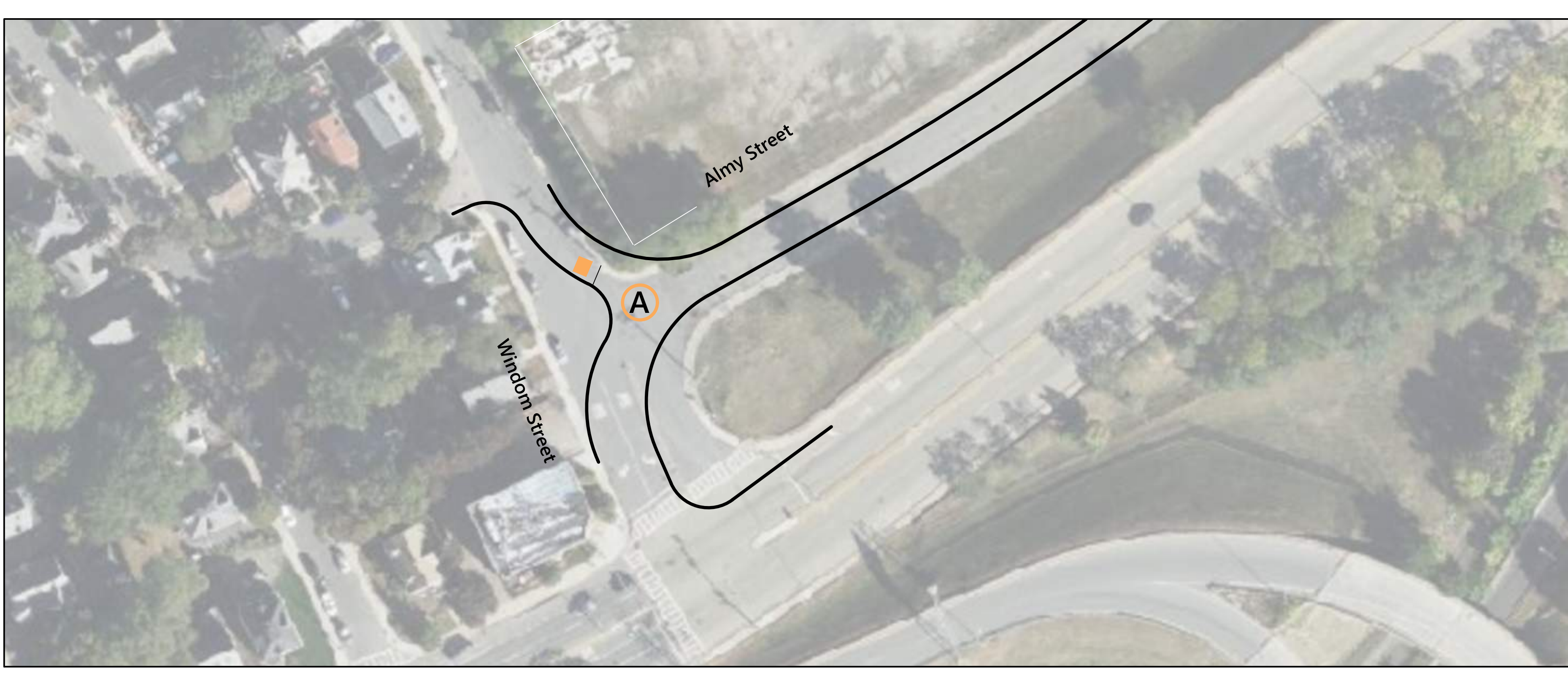
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2025)



Build (2025)

Intersection does not exist under 2021 Existing and 2025 No-Build Conditions

2025 Conditions: Evening Peak Hour Queue Diagrams

0 50 100 Feet

Enterprise Research Campus Project
Boston, MA

Intersection Queue Diagrams

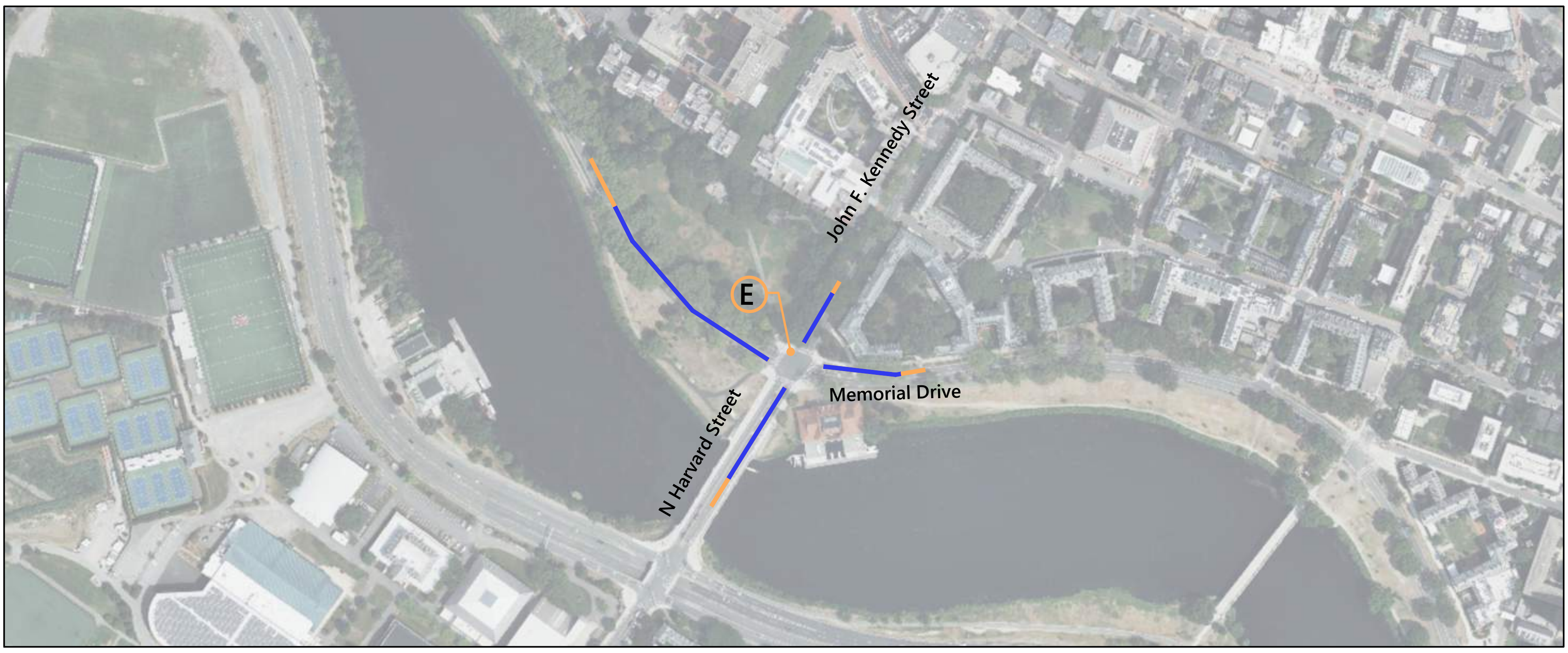
2030 Conditions

John F. Kennedy Street at Memorial Drive

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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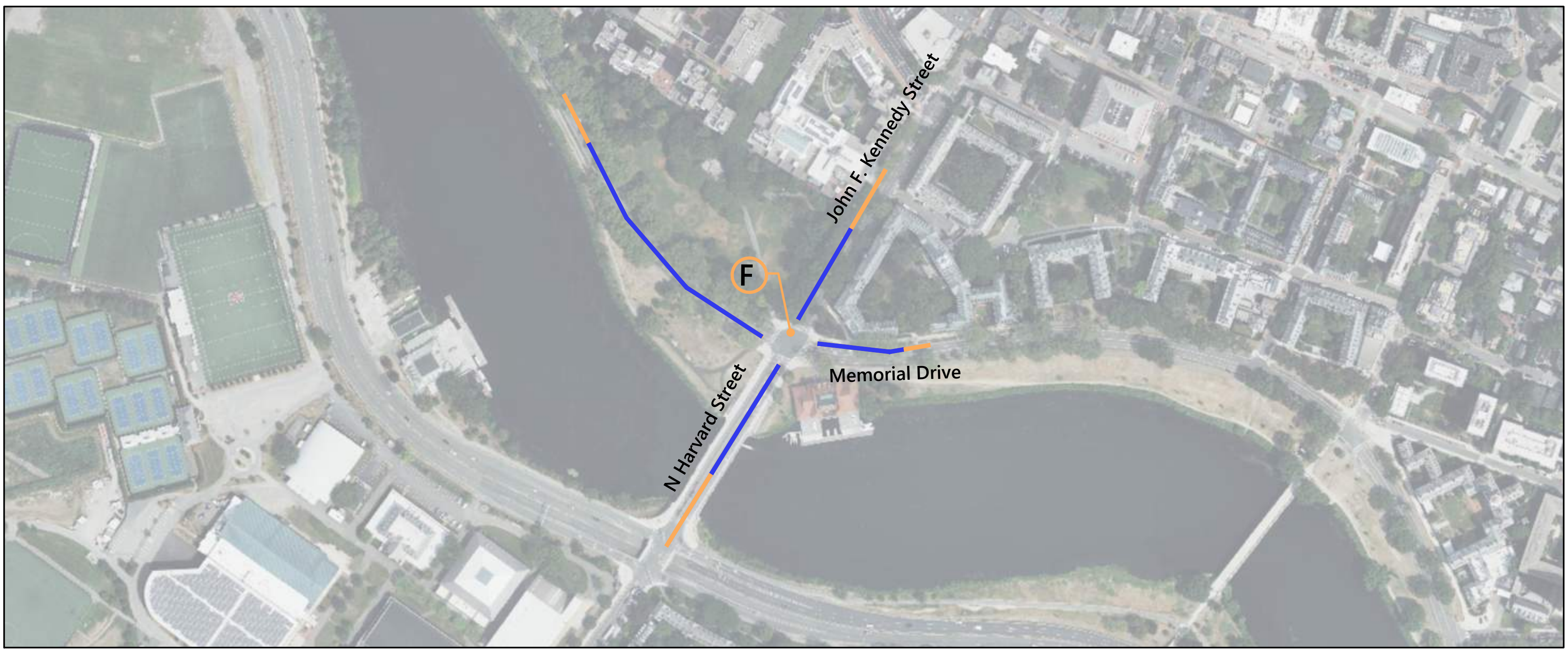
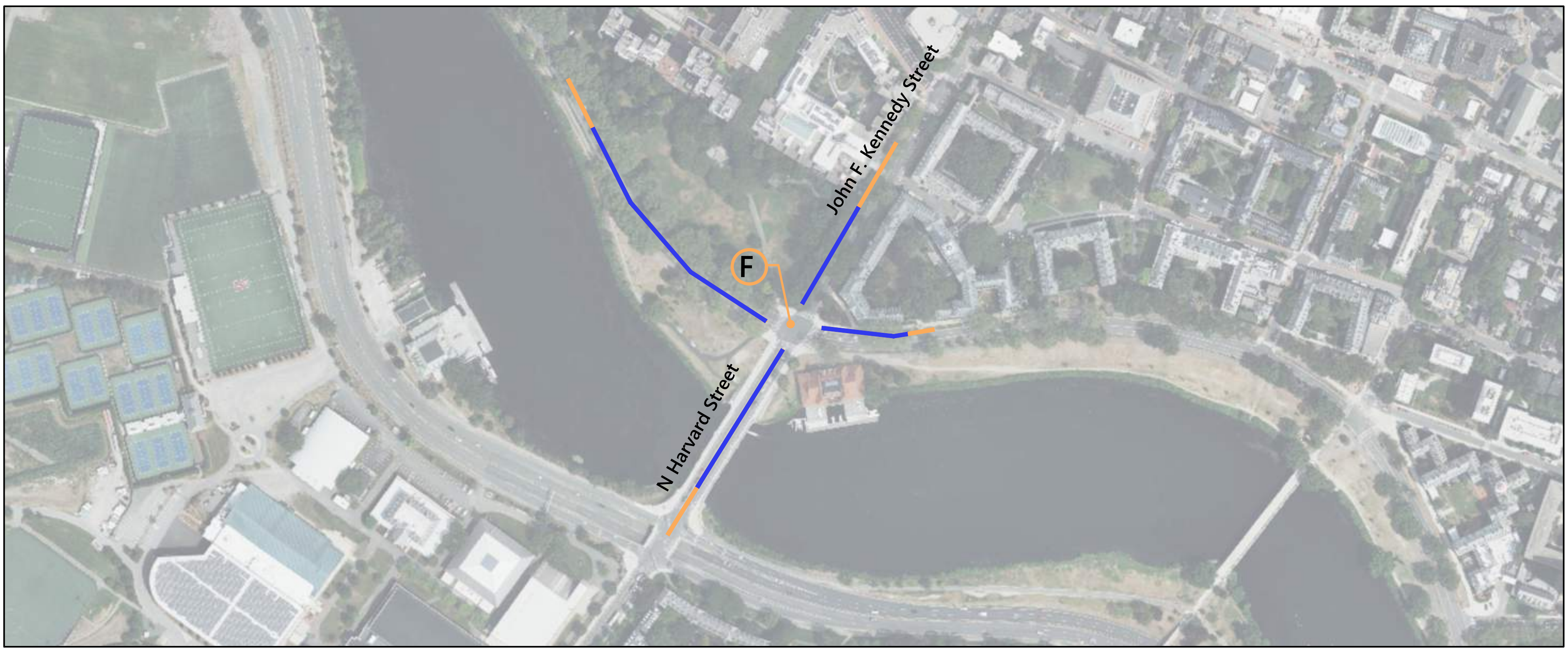


No-Build (2030)



Build (2030)

2030 Conditions: Morning Peak Hour Queue Diagrams

0 200 400 Feet

Enterprise Research Campus Project
Boston, MA

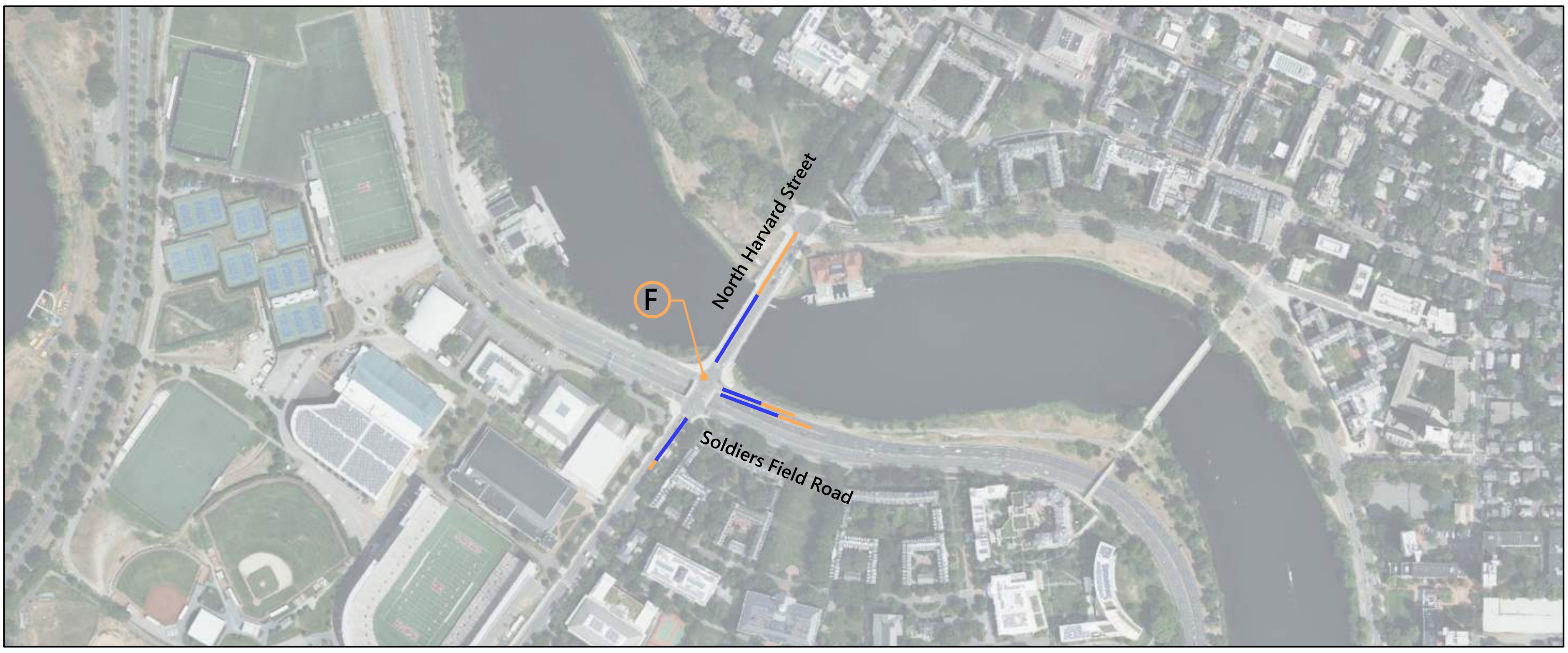
\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2030 Conditions - AM.dwg

North Harvard Street at Soldiers Field Road WB

X Overall Intersection Level of Service

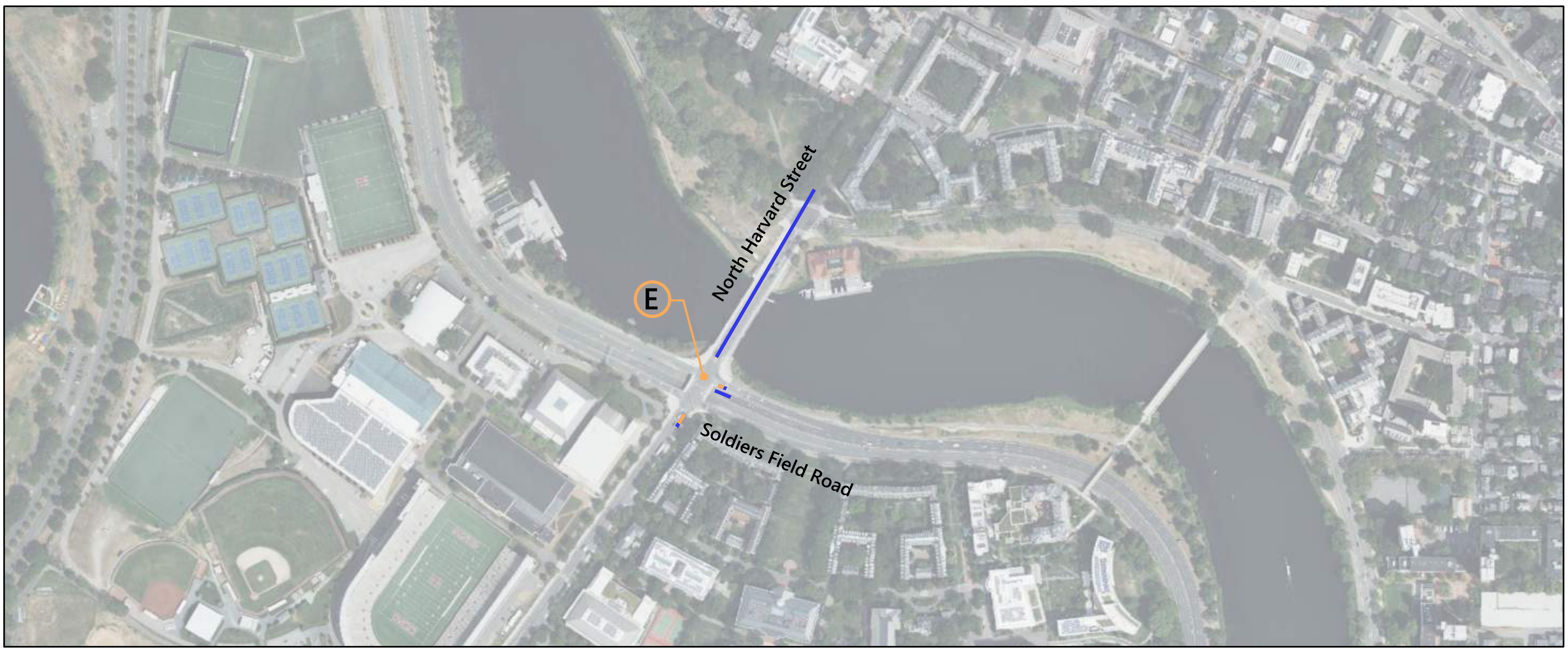
50th Percentile Queue

95th Percentile Queue



Existing

No-Build (2030)



Build (2030)

2030 Conditions: Morning Peak Hour Queue Diagrams

0 250 500 Feet

Enterprise Research Campus Project
Boston, MA

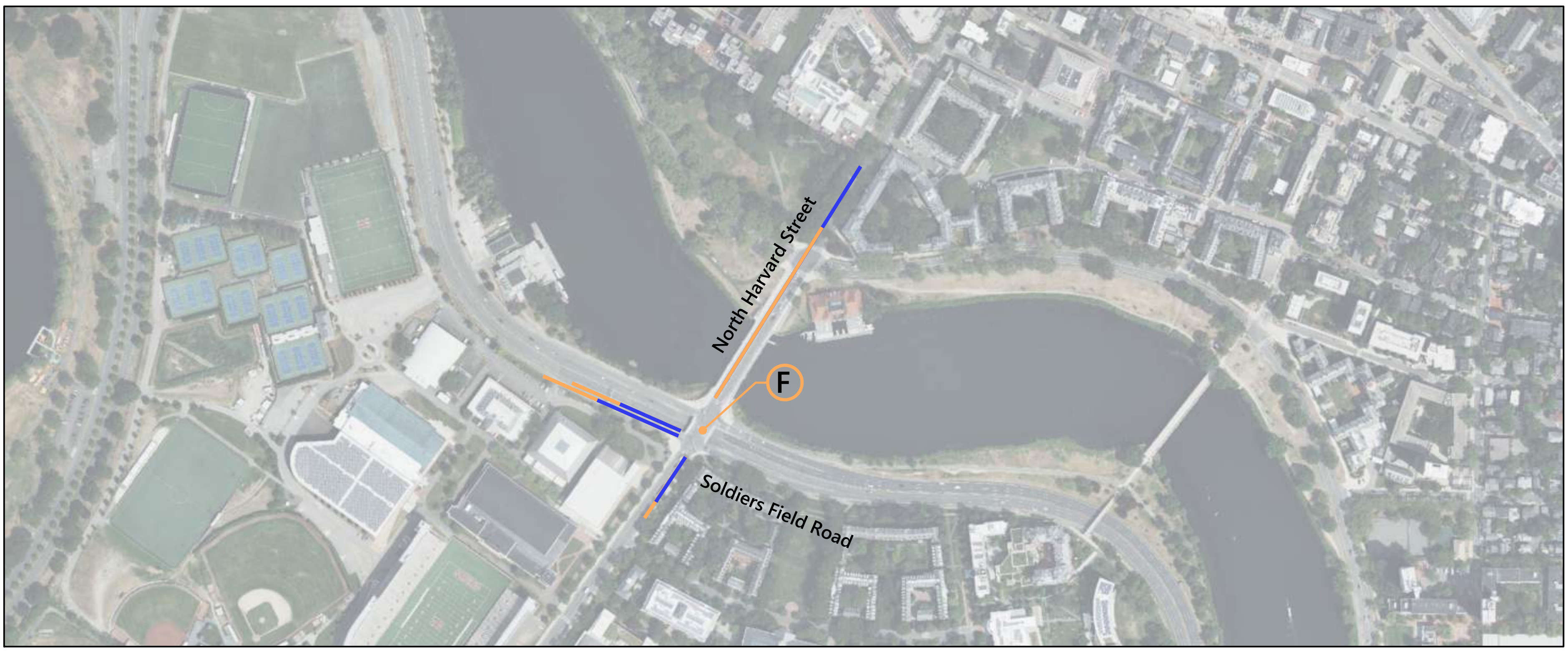
North Harvard Street at Soldiers Field Road EB

X Overall Intersection Level of Service

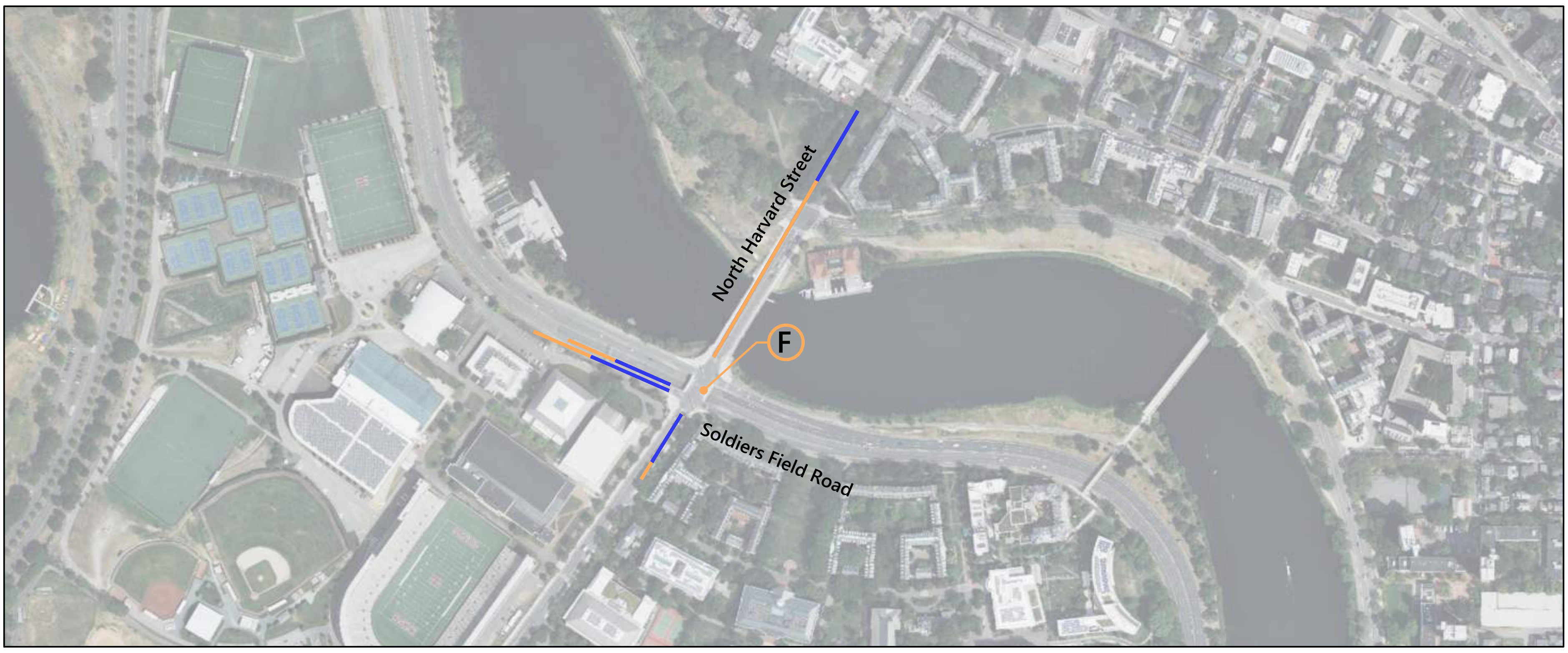
50th Percentile Queue

95th Percentile Queue

Existing



No-Build (2030)



Build (2030)

2030 Conditions: Morning Peak Hour Queue Diagrams

0 250 500 Feet

Enterprise Research Campus Project
Boston, MA

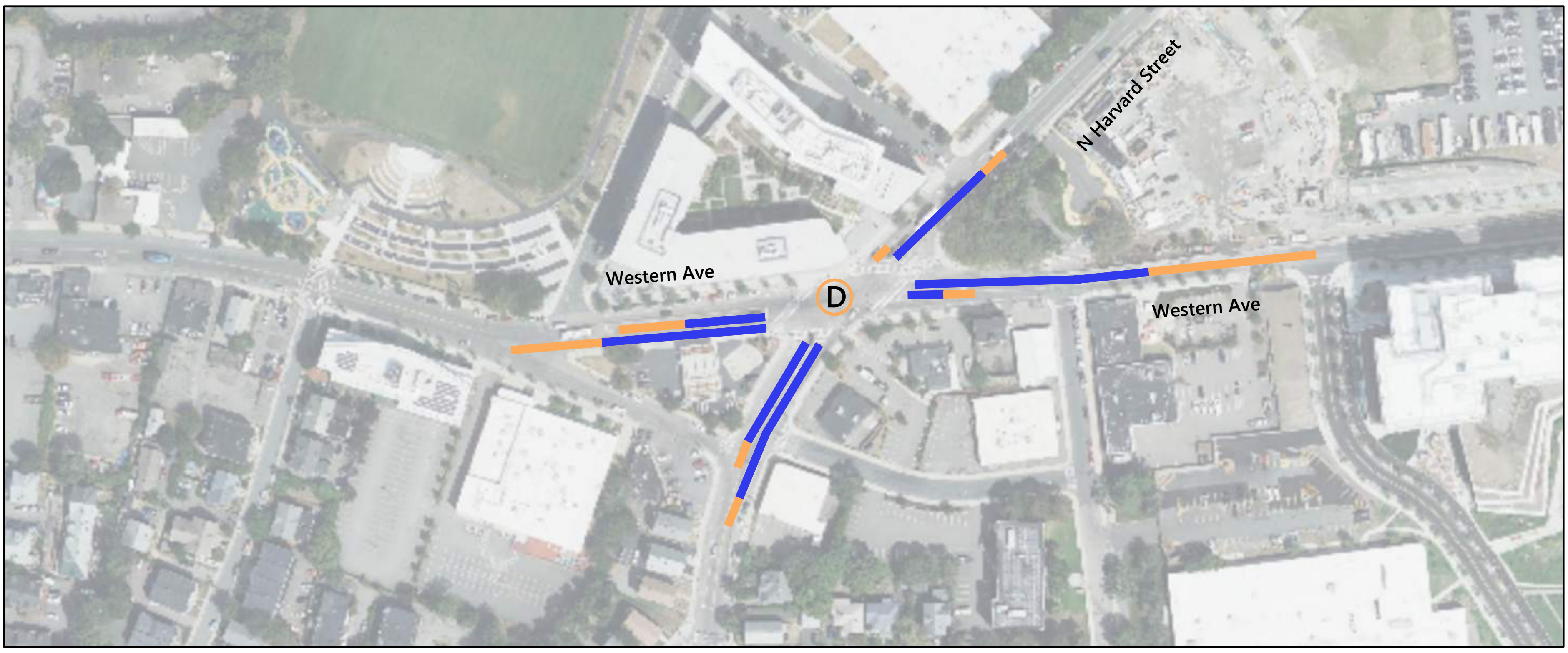
\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2030 Conditions - AM.dwg

North Harvard Street at Western Ave

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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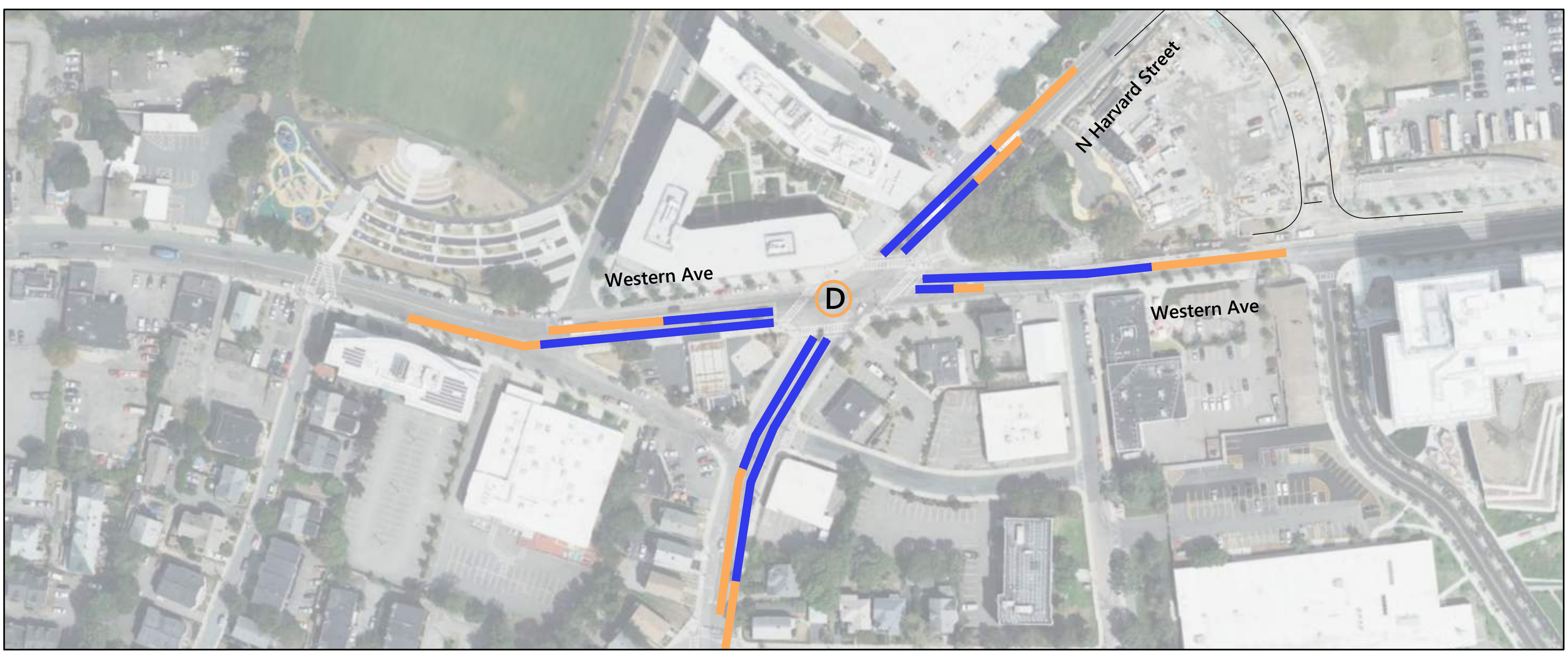
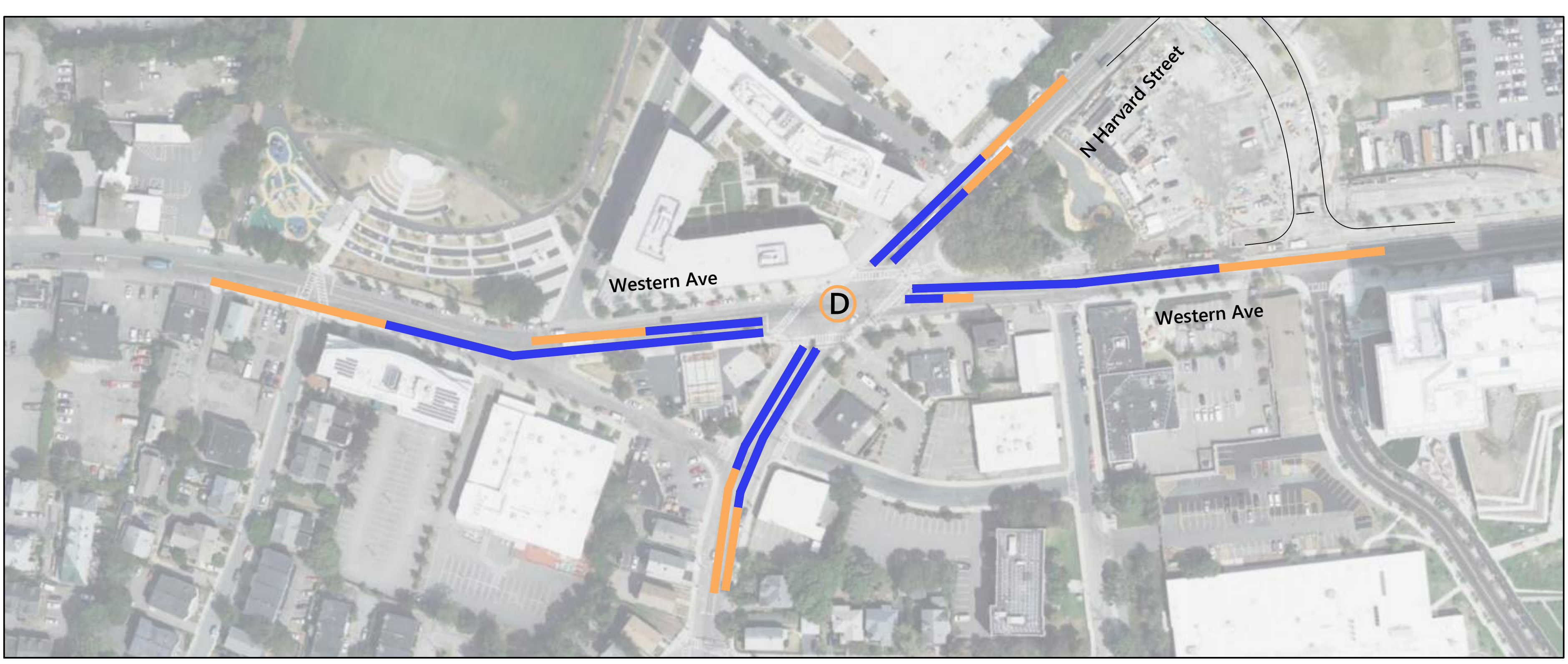


No-Build (2030)



Build (2030)

2030 Conditions: Morning Peak Hour Queue Diagrams

0 100 200 Feet

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2030 Conditions - AM.dwg

North Harvard Street at Franklin St/ Kingsley St

(X) Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2030)

Build (2030)

vhb

2030 Conditions: Morning Peak Hour Queue Diagrams

0 150 300 Feet

Enterprise Research Campus Project
Boston, MA

Cambridge Street at North Harvard Street

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2030)

Build (2030)

2030 Conditions: Morning Peak Hour Queue Diagrams

0 125 250 Feet

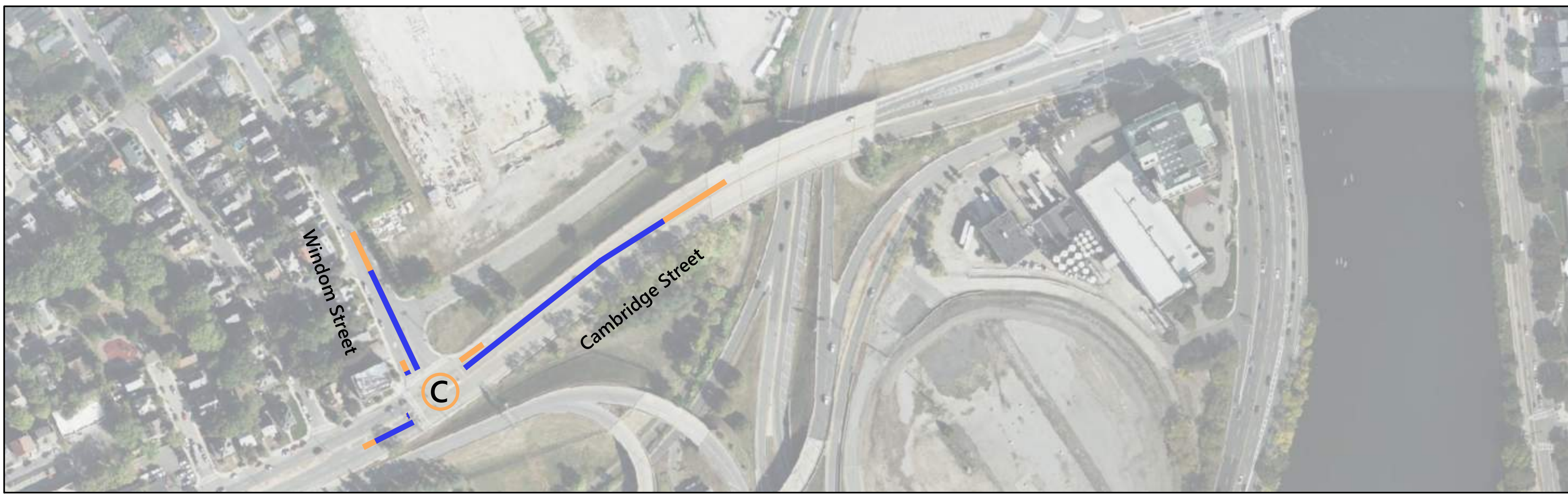
Enterprise Research Campus Project
Boston, MA

Cambridge Street at Windom Street

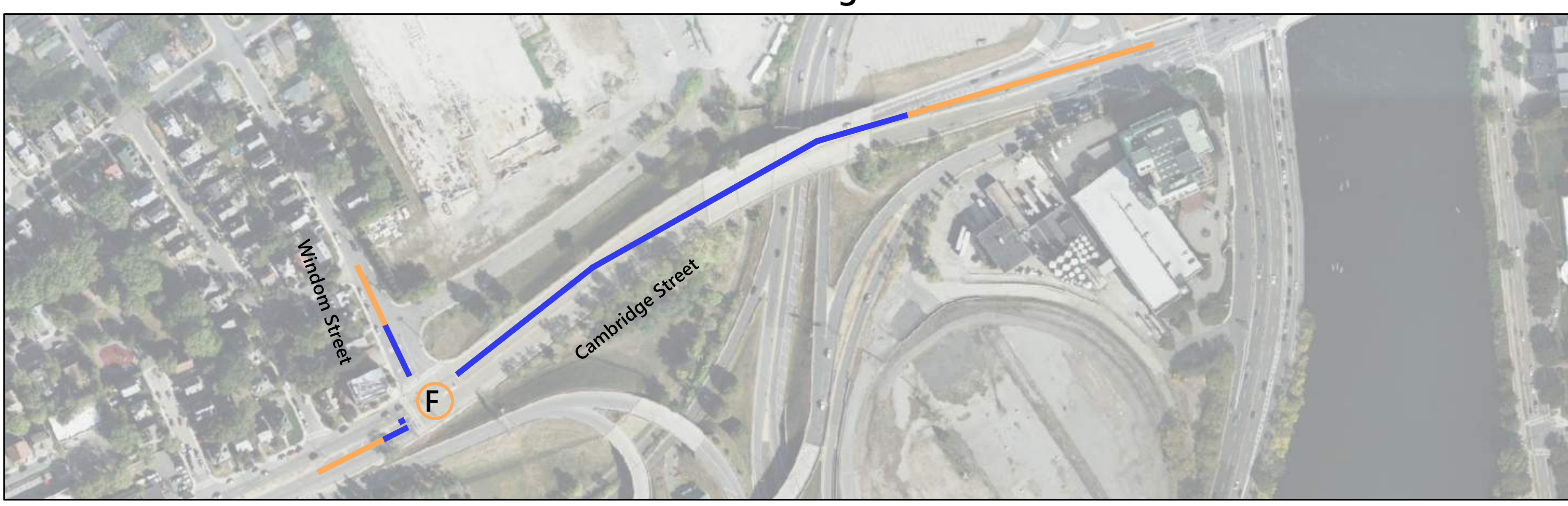
X Overall Intersection Level of Service

50th Percentile Queue

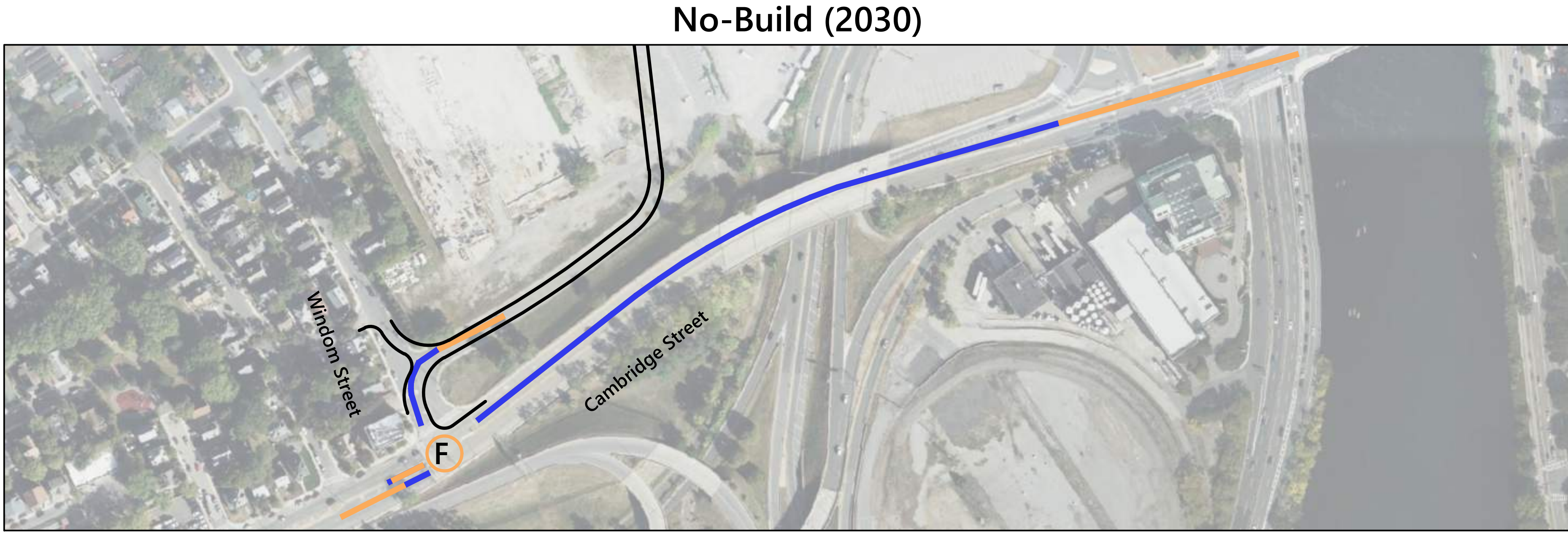
95th Percentile Queue



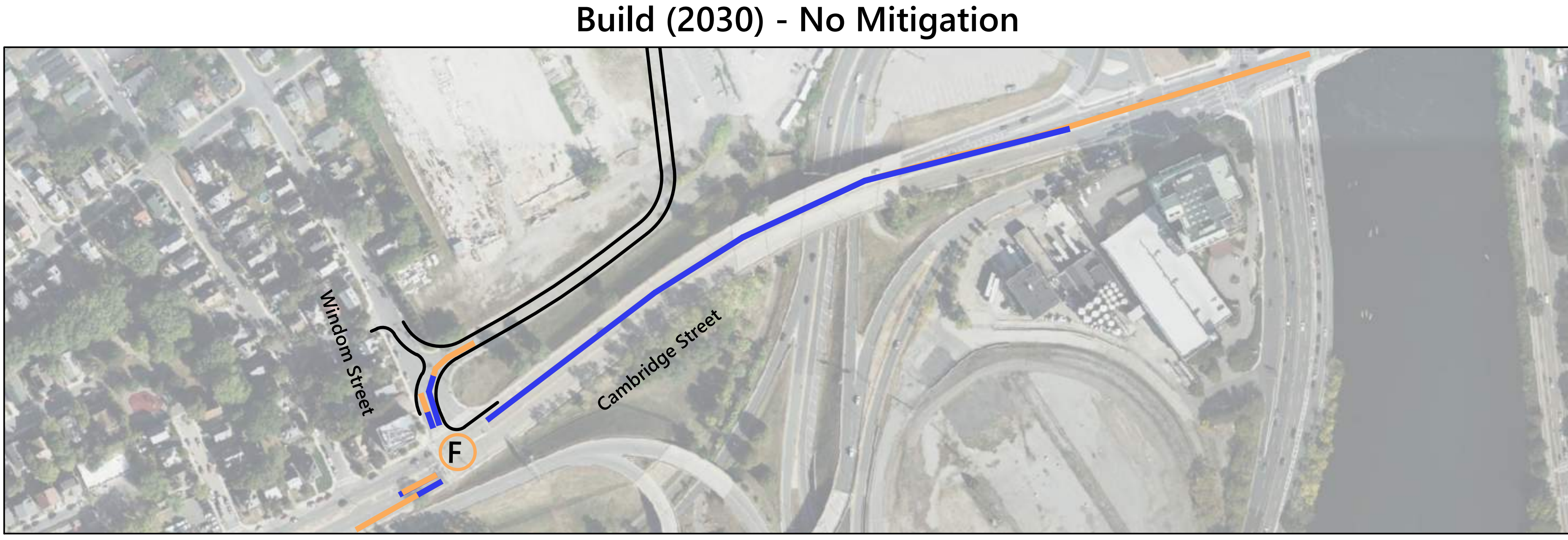
Existing



No-Build (2030)



Build (2030) - No Mitigation



Build (2030) - With Mitigation

vhb

2030 Conditions: Morning Peak Hour
Queue Diagrams

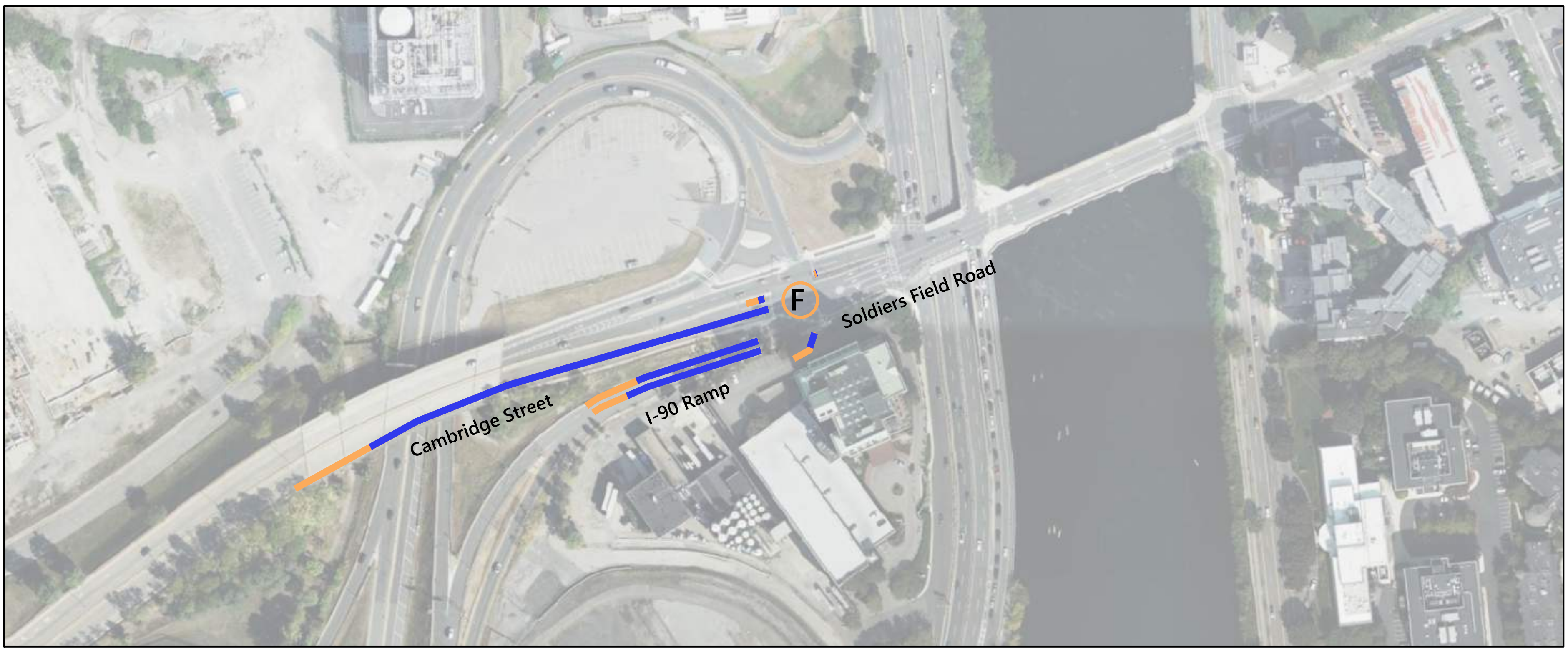
0 125 250 Feet

Enterprise Research Campus Project
Boston, MA

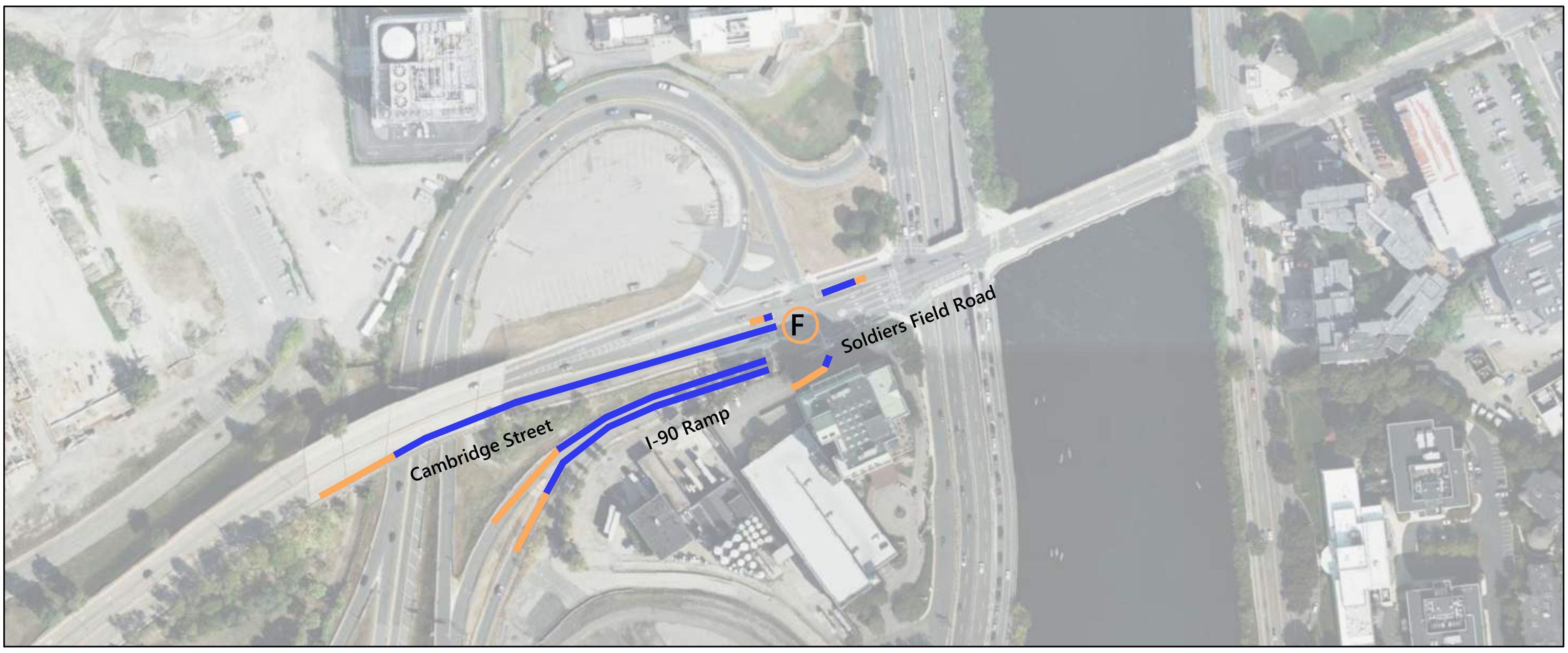
\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2030 Conditions - AM.dwg

Cambridge Street at I-90 Ramps/ Double Tree Hotel

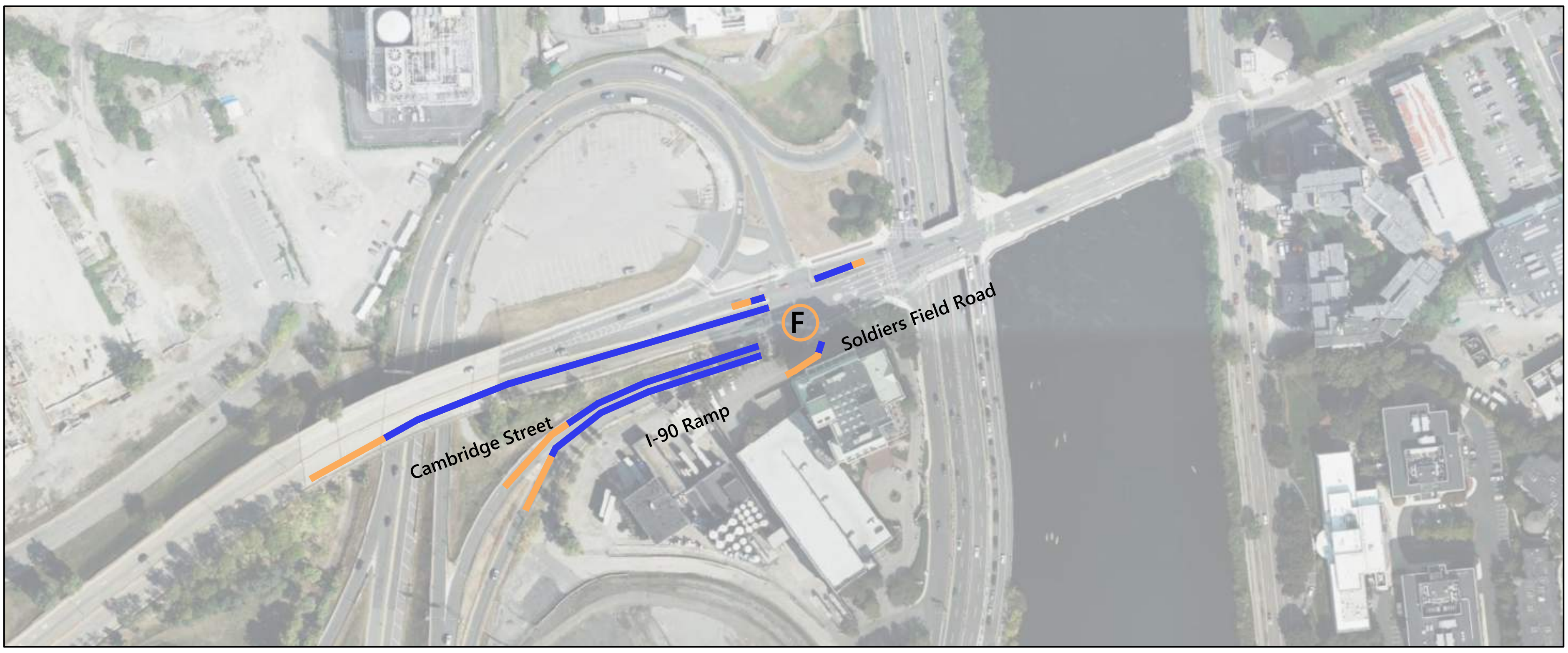
(X) Overall Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



Existing



No-Build (2030)



Build (2030)

2030 Conditions: Morning Peak Hour Queue Diagrams

0 125 250 Feet

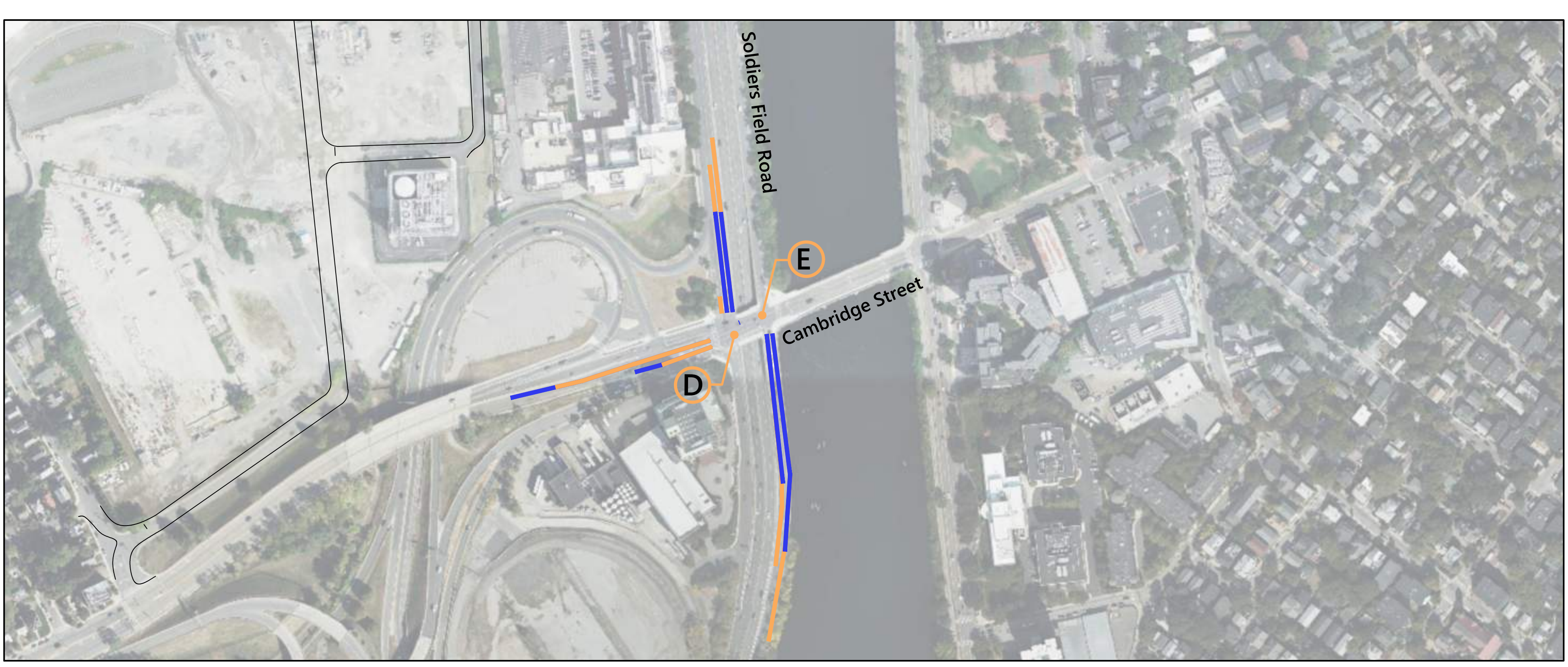
Enterprise Research Campus Project
Boston, MA

Cambridge Street at Soldiers Field Road

X Overall Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

Existing

No-Build (2030)



Build (2030)

2030 Conditions: Morning Peak Hour Queue Diagrams

0 200 400 Feet

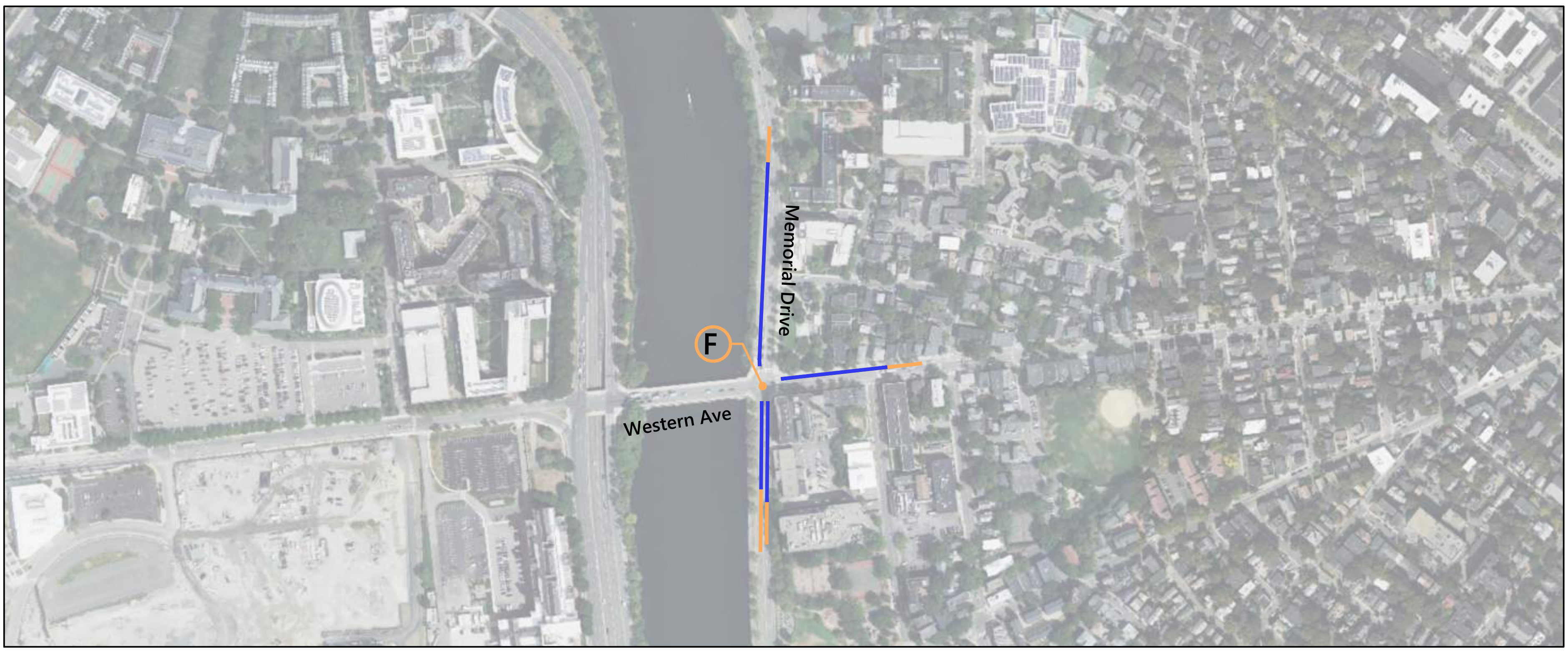
Enterprise Research Campus Project
Boston, MA

Western Ave at Memorial Drive

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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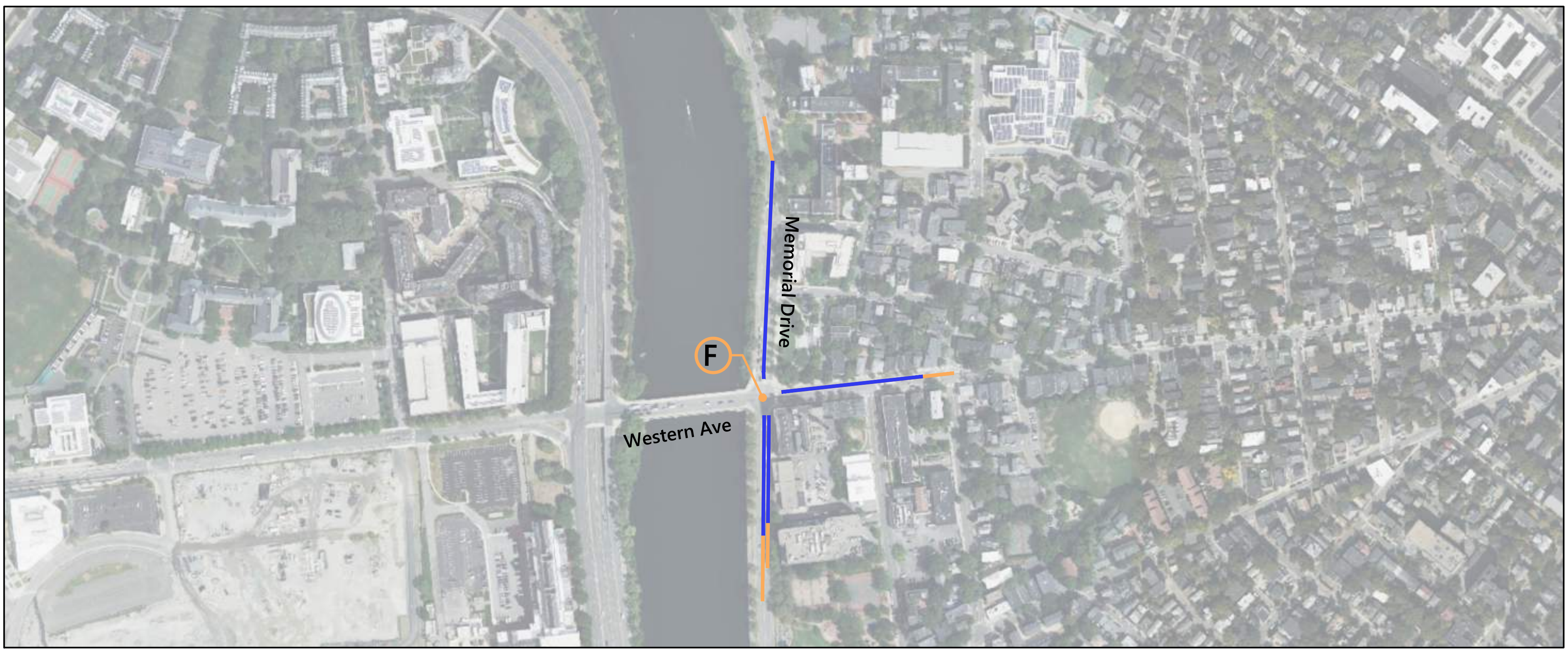

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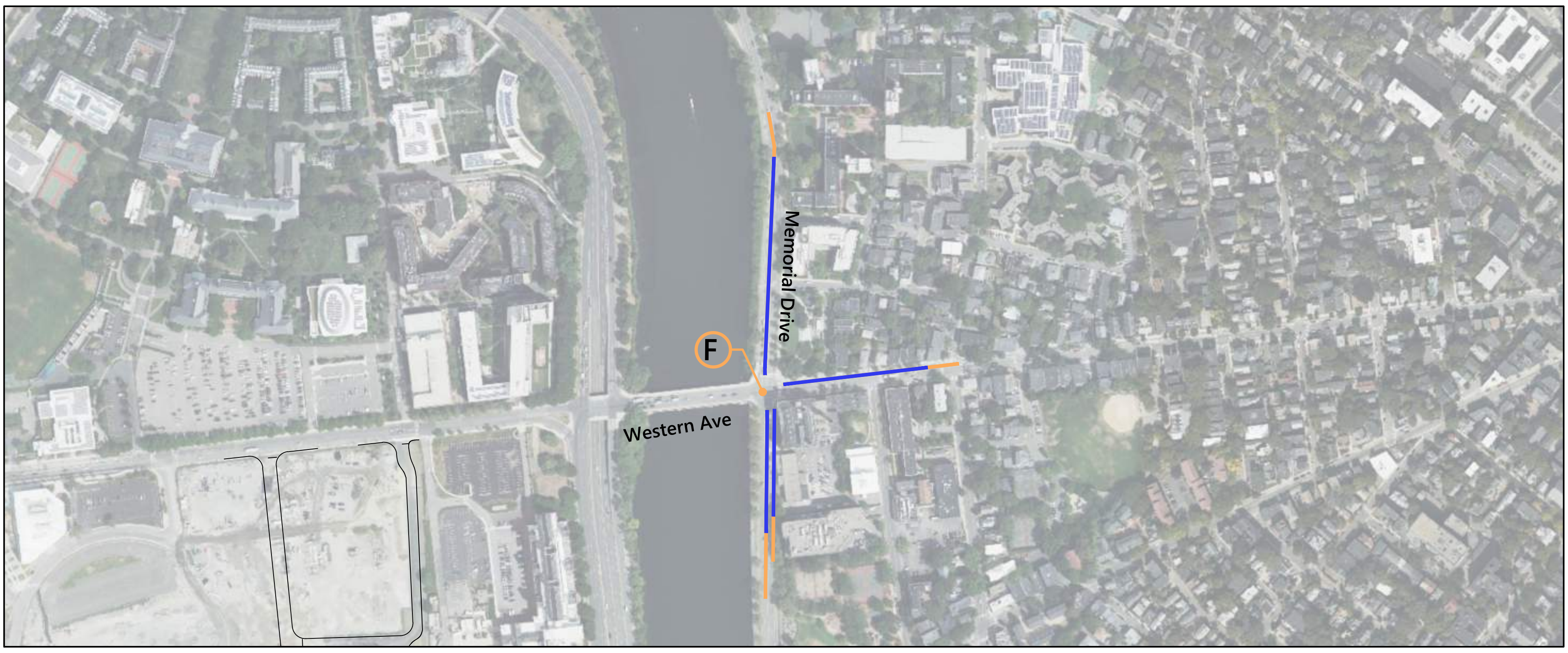


Build (2030)

2030 Conditions: Morning Peak Hour Queue Diagrams

0 250 500 Feet

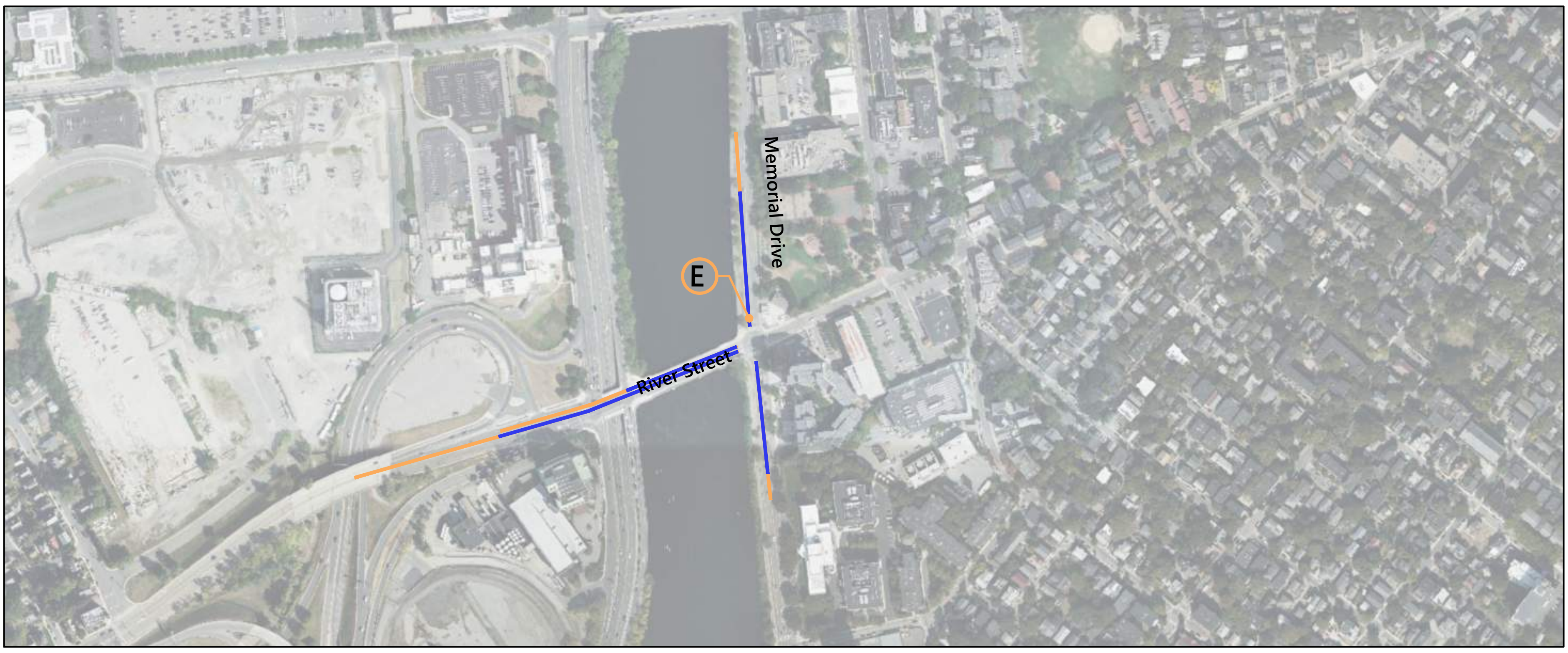
Enterprise Research Campus
Boston, Massachusetts

Memorial Drive at River Street

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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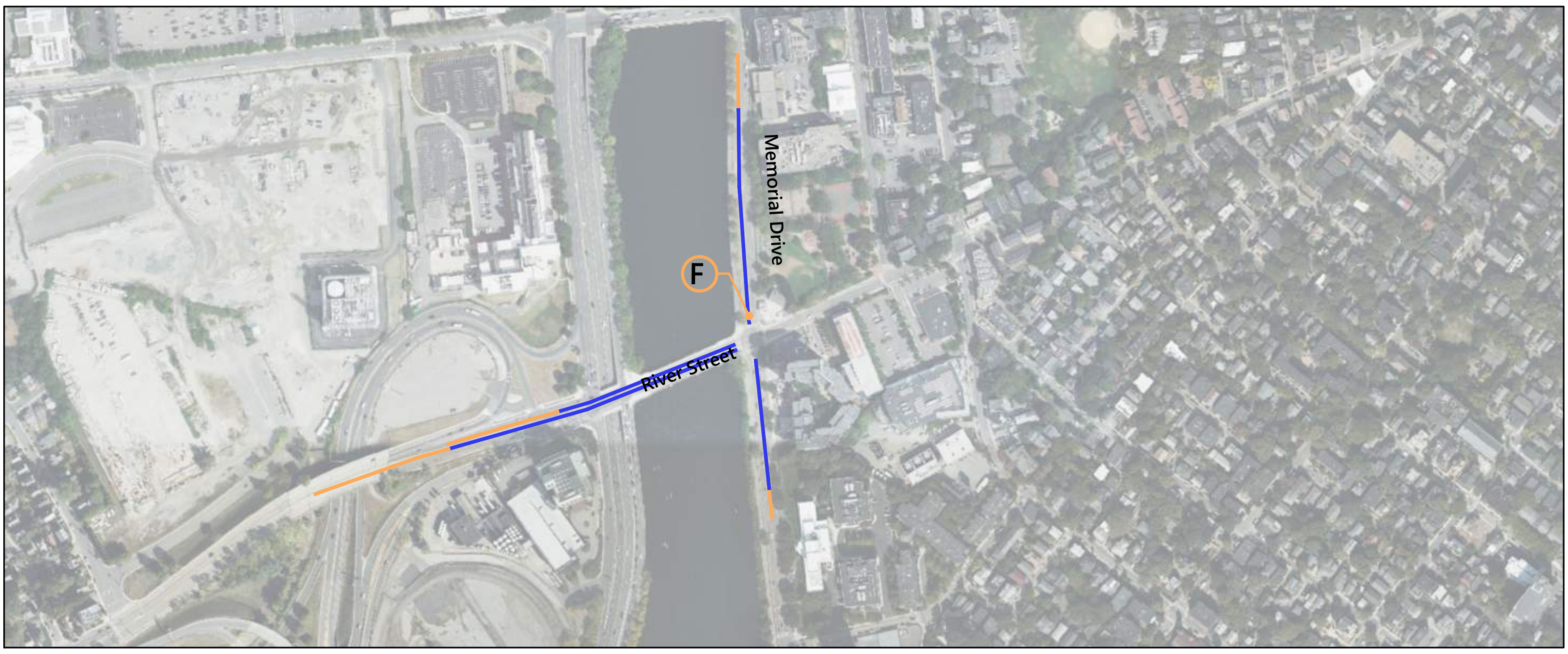
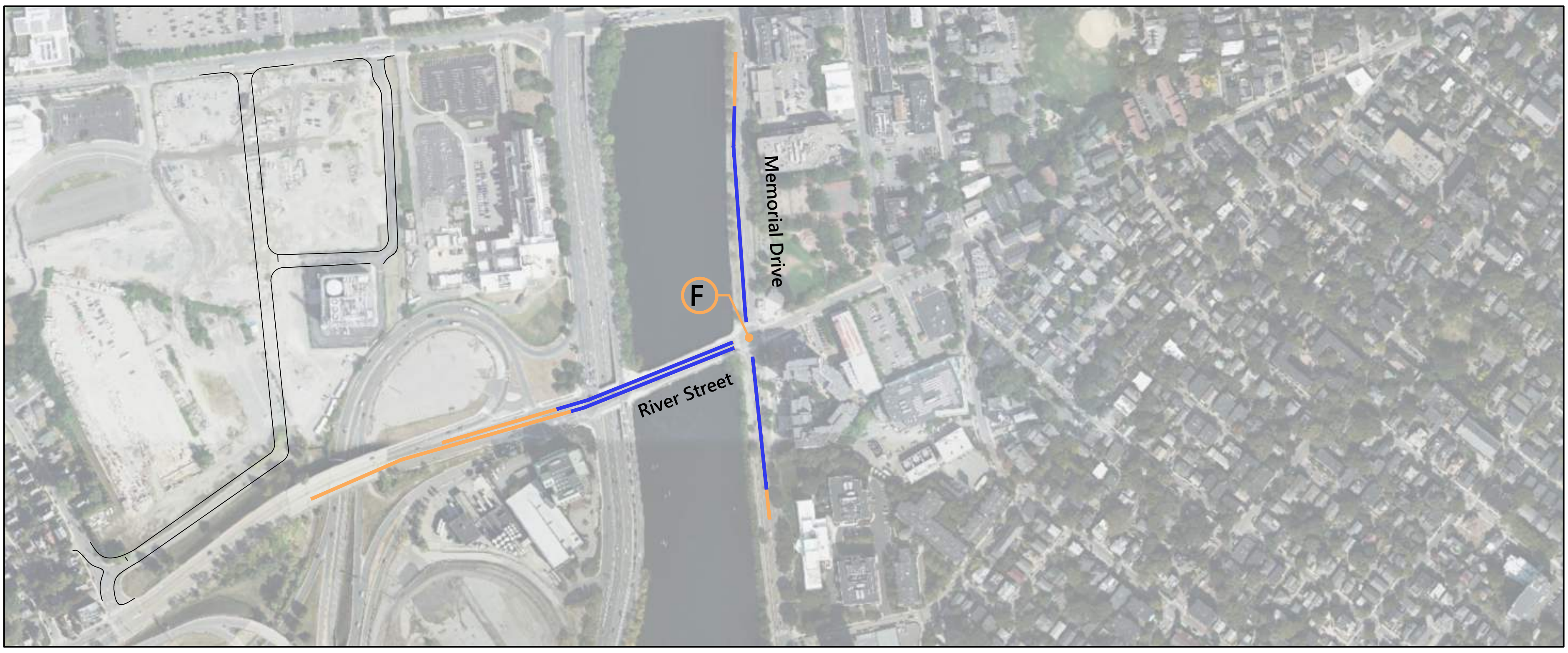


No-Build (2030)



Build (2030)

2030 Conditions: Morning Peak Hour Queue Diagrams

0 250 500 Feet

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2030 Conditions - AM.dwg

Western Ave at Soldiers Field Road WB

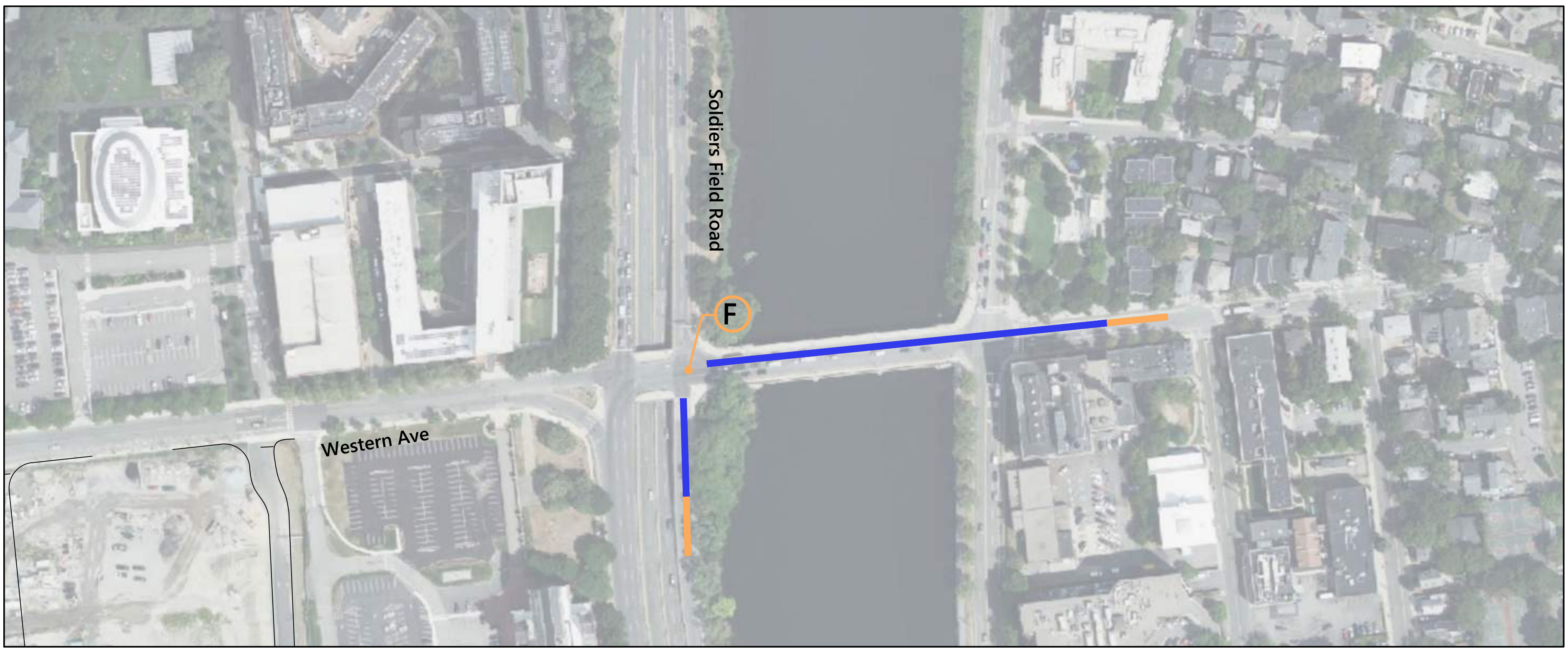
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2030)



Build (2030)

2030 Conditions: Morning Peak Hour Queue Diagrams

0 125 250 Feet

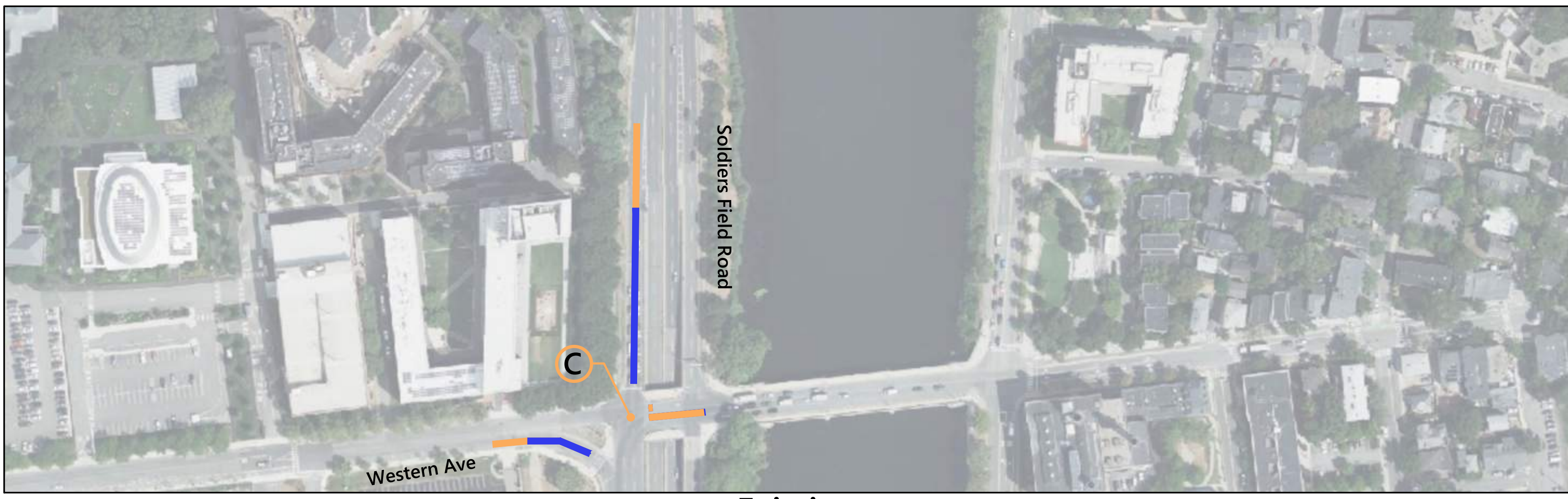
Enterprise Research Campus Project
Boston, MA

Western Ave at Soldiers Field Road EB

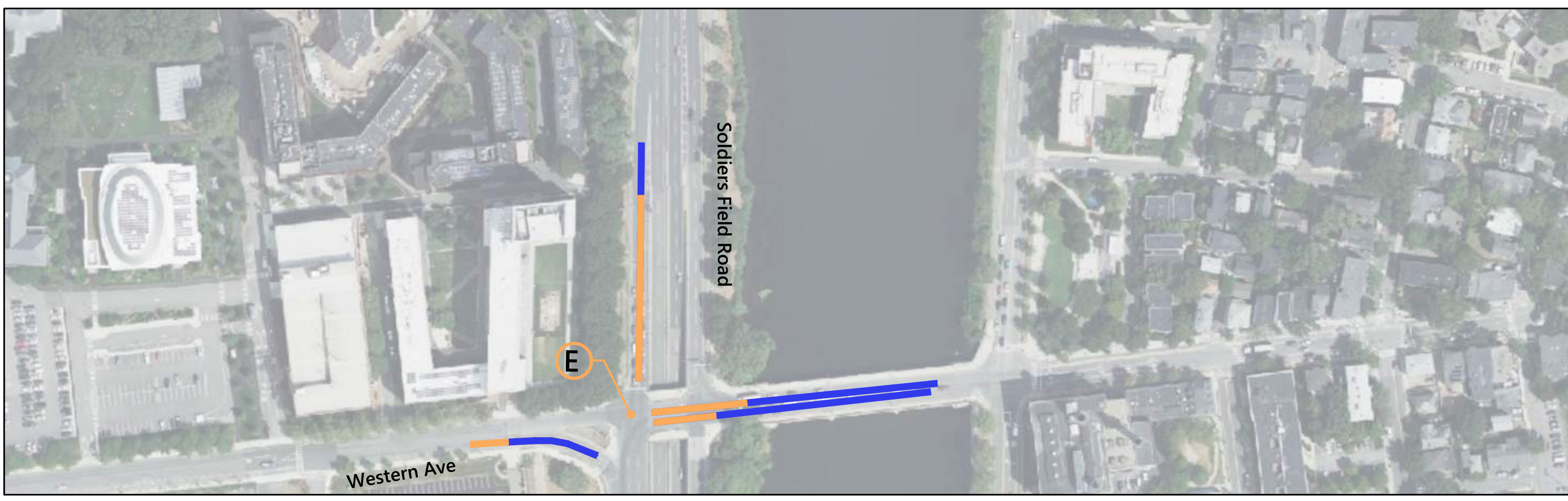
X Overall Intersection Level of Service

50th Percentile Queue

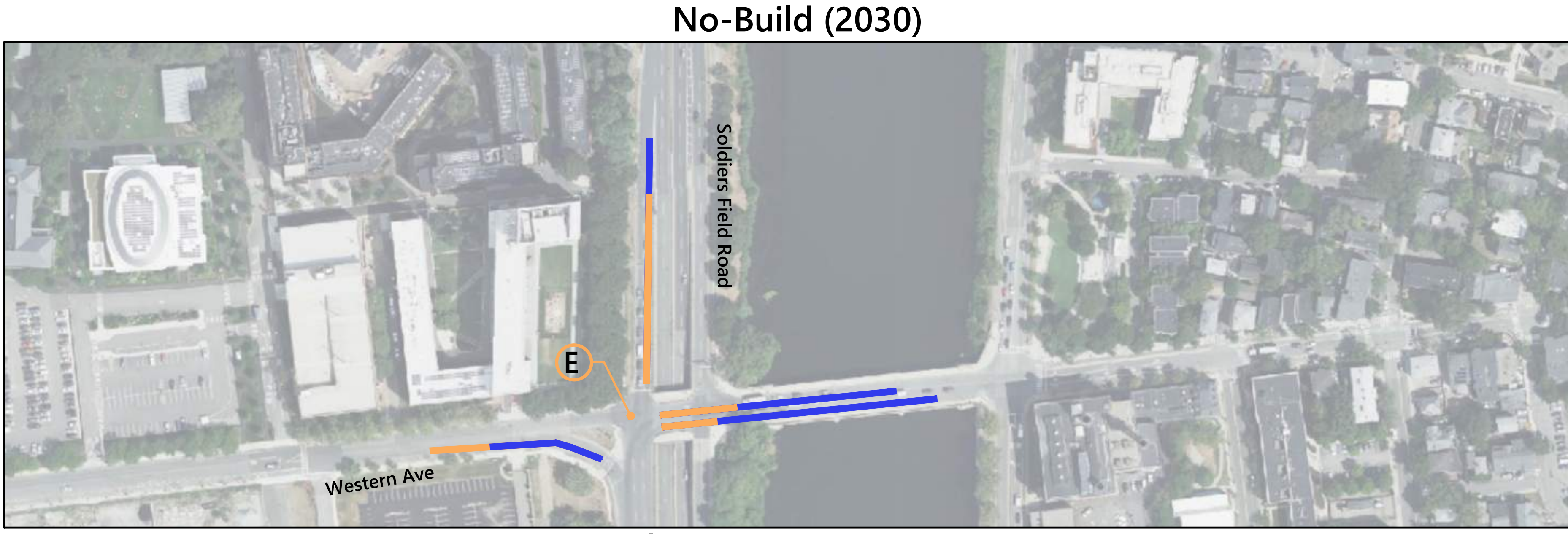
95th Percentile Queue



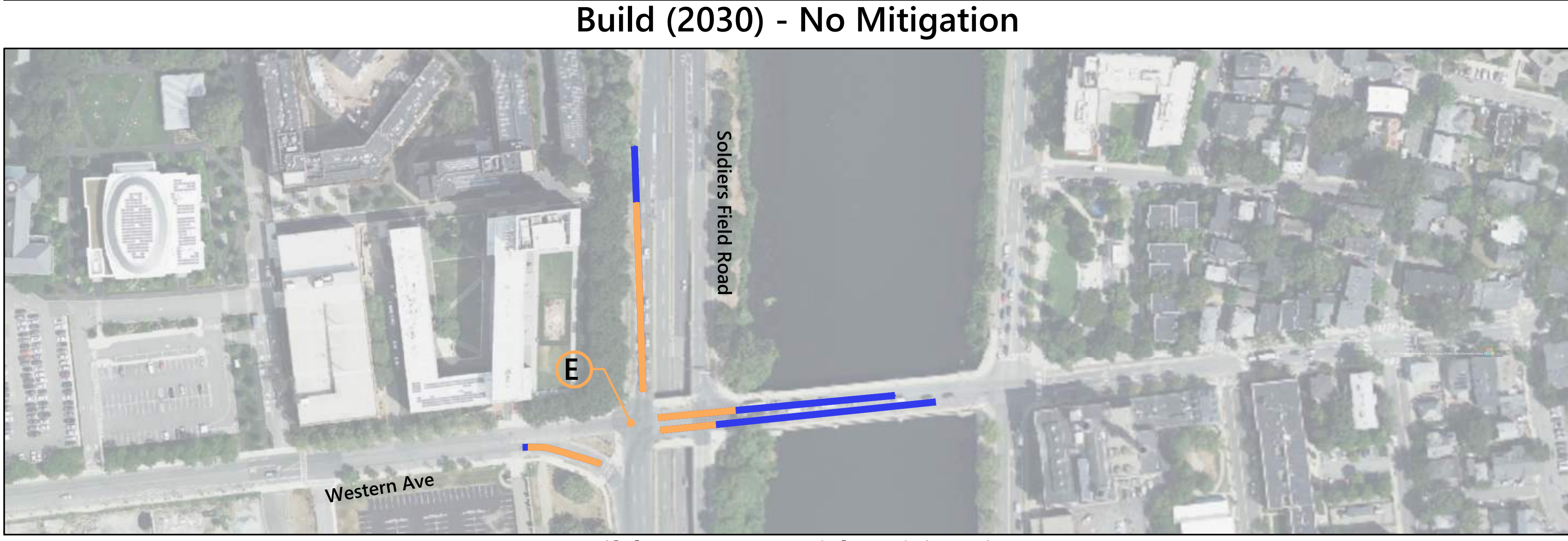
Existing



No-Build (2030)



Build (2030) - No Mitigation



Build (2030) - With Mitigation

2030 Conditions: Morning Peak Hour
Queue Diagrams

0 125 250 Feet

Western Ave at Kresge Way/ East Drive

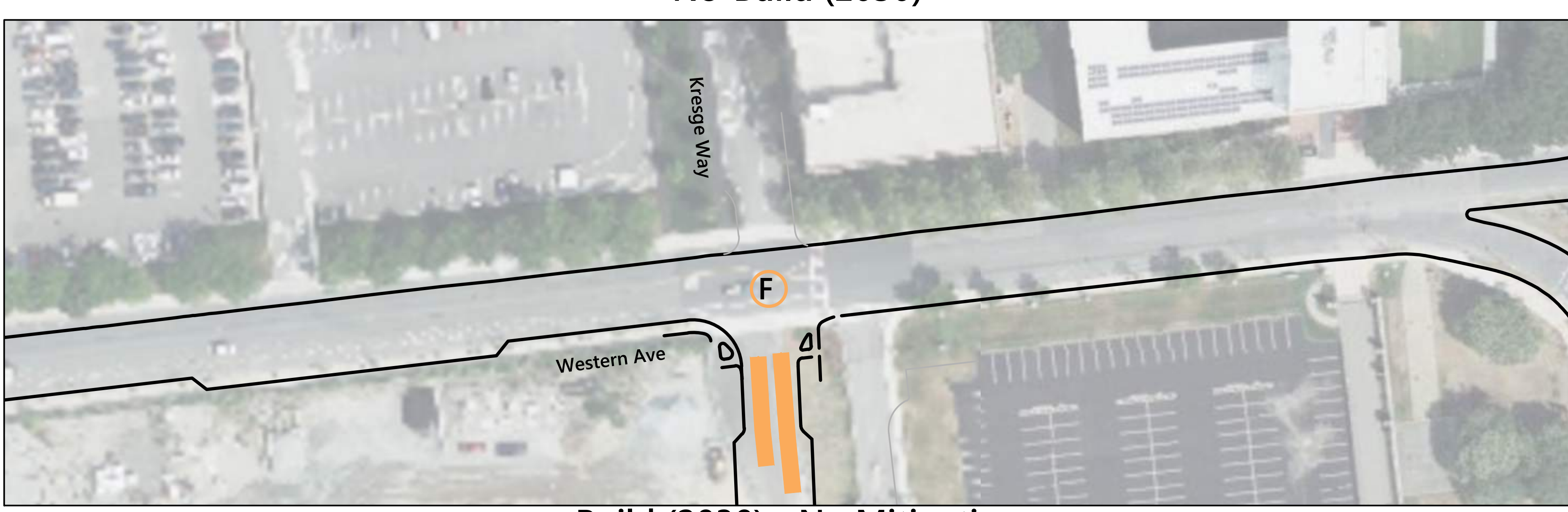
X Overall Intersection Level of Service

50th Percentile Queue

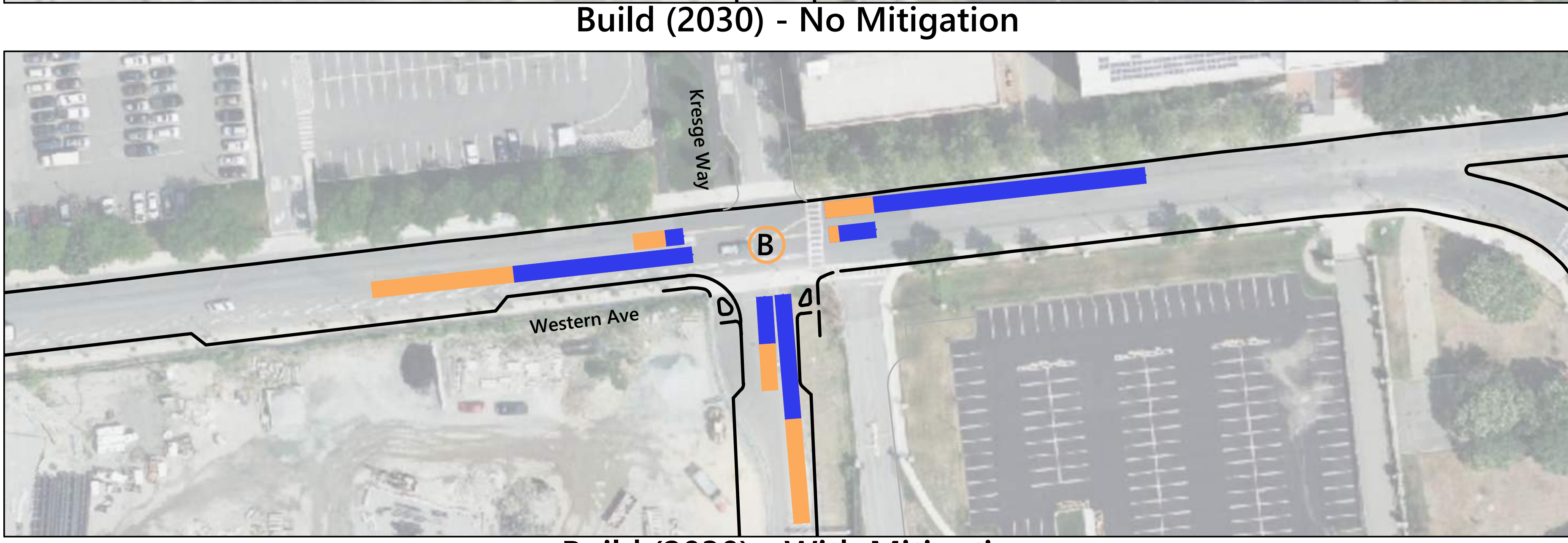
95th Percentile Queue

Existing

No-Build (2030)



Build (2030) - No Mitigation



Build (2030) - With Mitigation

2030 Conditions: Morning Peak Hour
Queue Diagrams

Enterprise Research Campus Project
Boston, MA

Cattle Drive at Western Ave

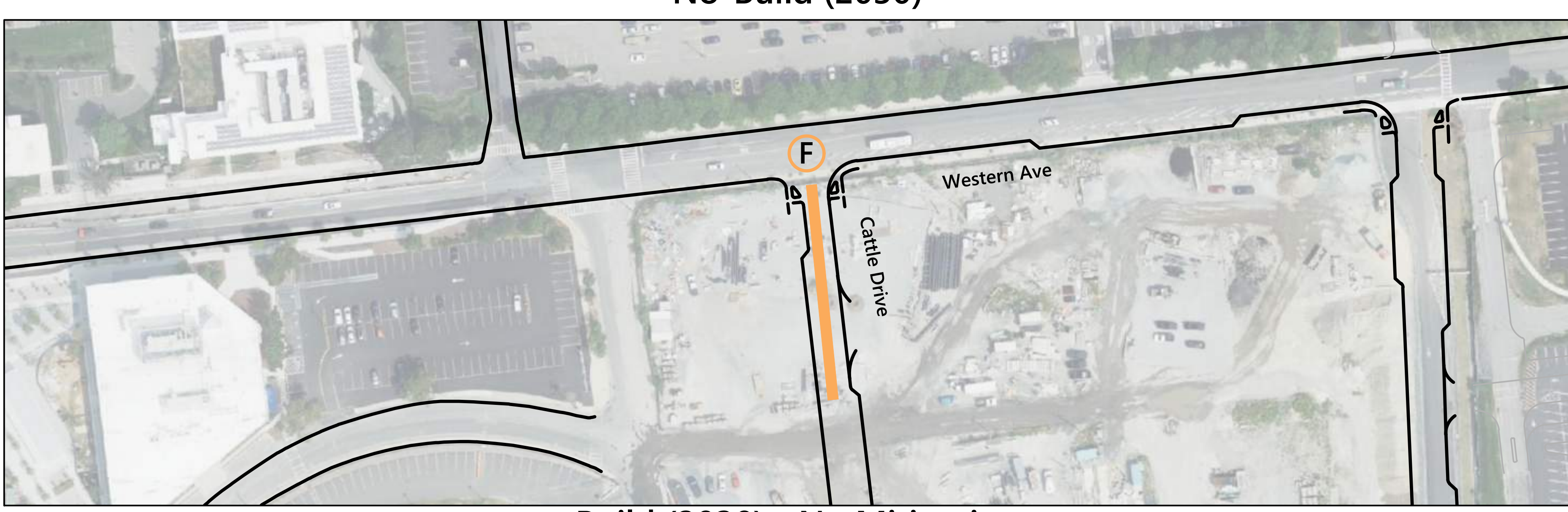
X Overall Intersection Level of Service

50th Percentile Queue

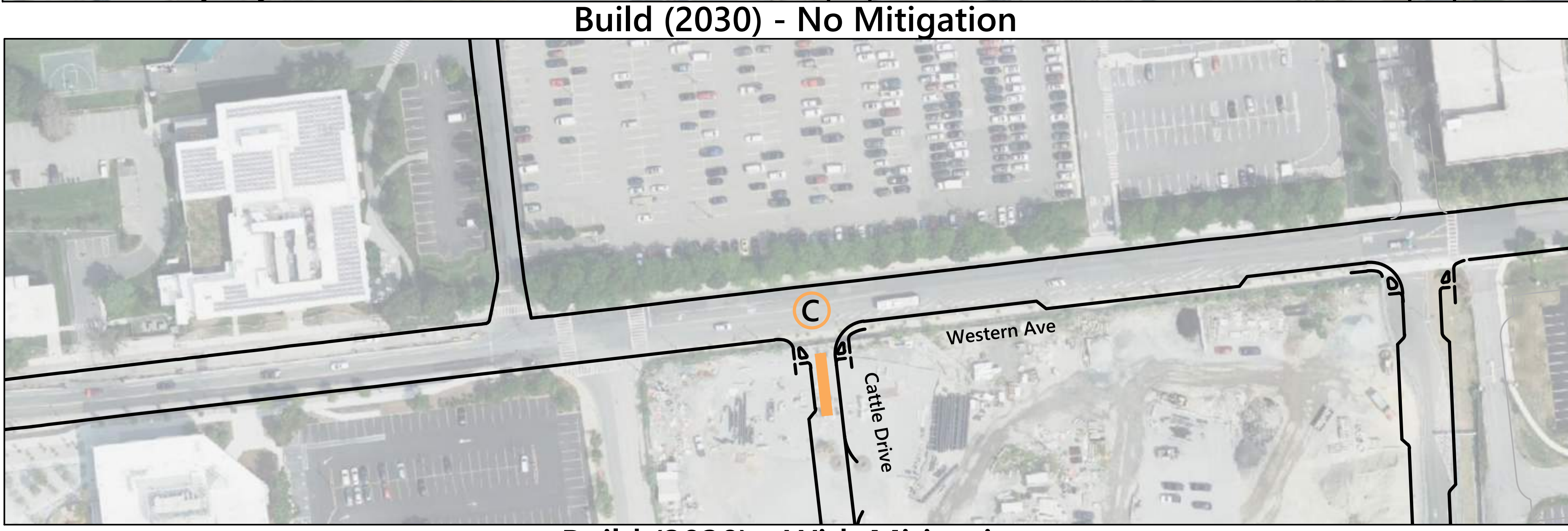
95th Percentile Queue

Existing

No-Build (2030)



Build (2030) - No Mitigation



Build (2030) - With Mitigation

Intersection does not exist under 2021 Existing and 2030 No-Build Conditions

2030 Conditions: Morning Peak Hour Queue Diagrams

0 75 150 Feet

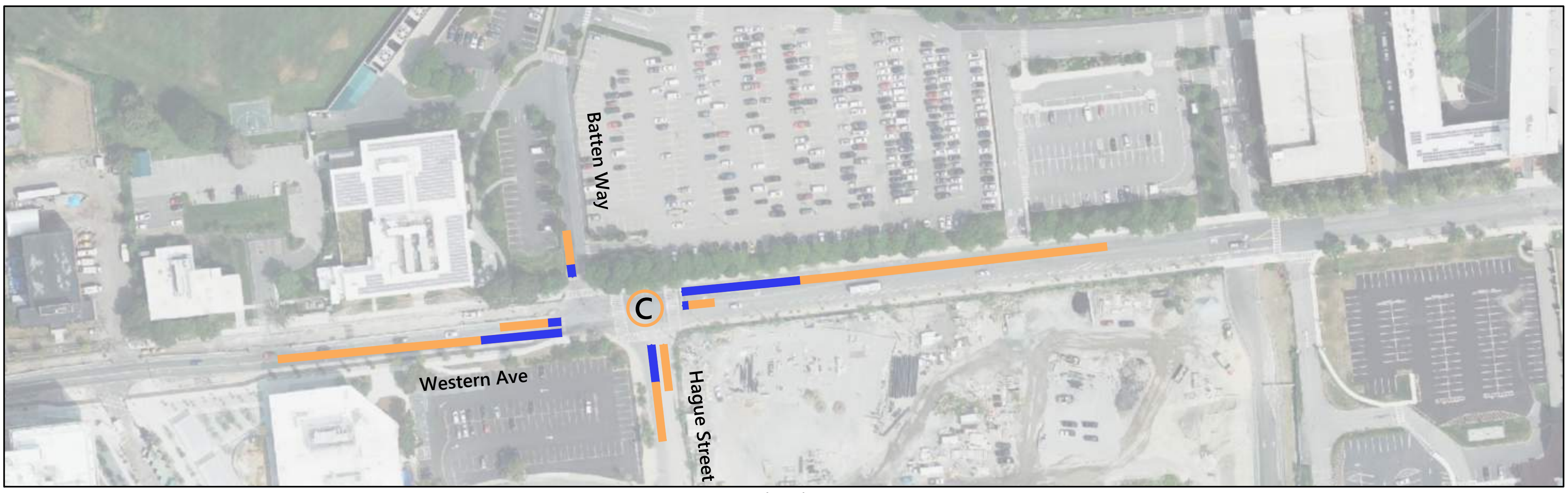
Enterprise Research Campus Project
Boston, MA

Western Ave at Batten Way/ Hague Street

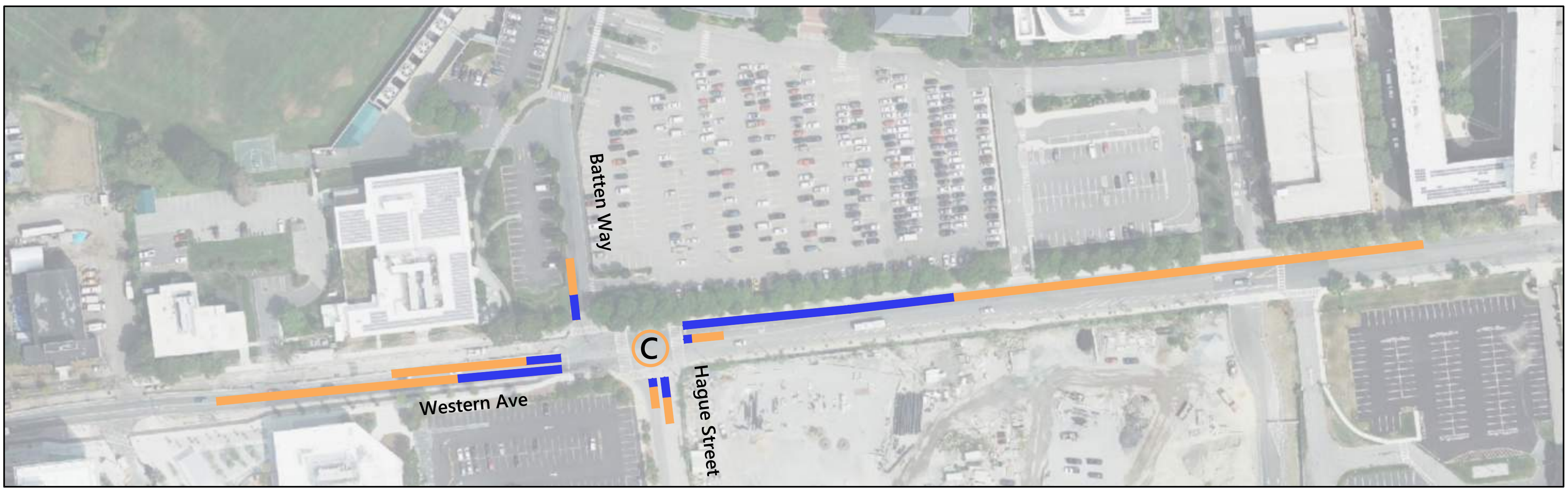
X Overall Intersection Level of Service

50th Percentile Queue

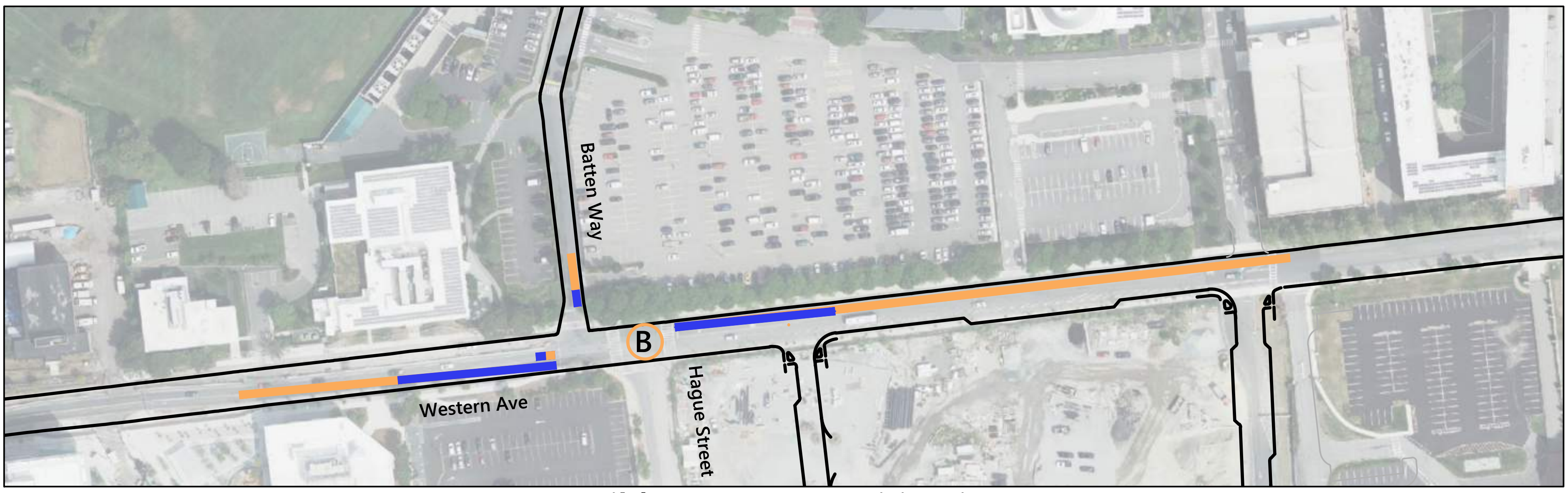
95th Percentile Queue



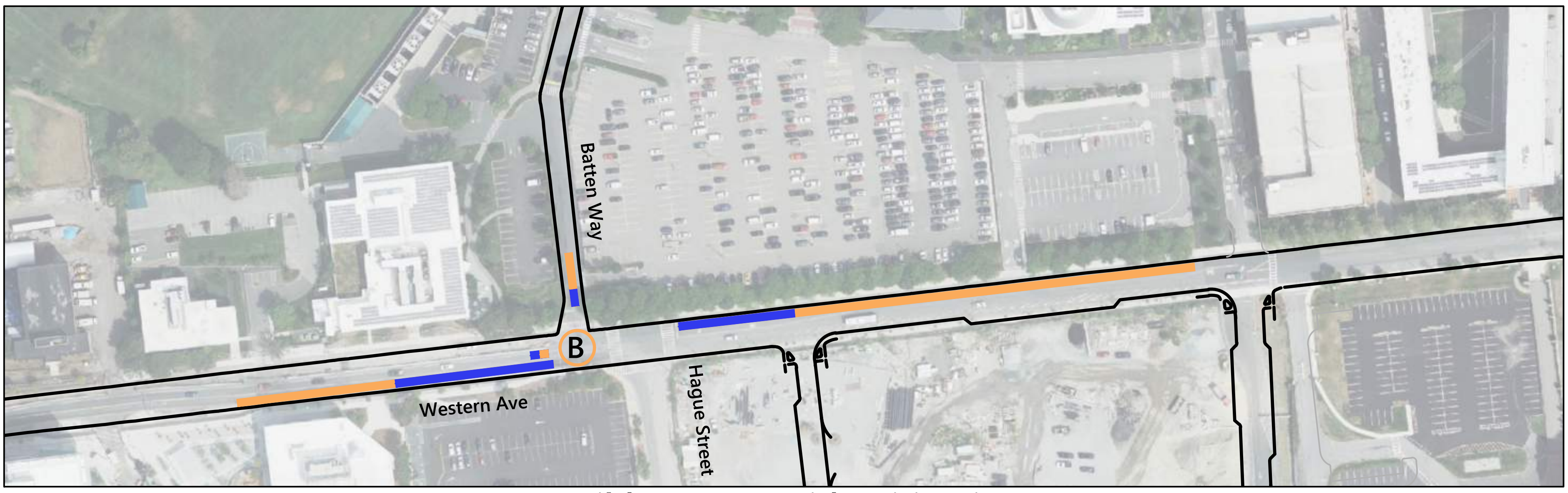
Existing



No-Build (2030)



Build (2030) - No Mitigation



Build (2030) - With Mitigation

2030 Conditions: Morning Peak Hour Queue Diagrams

0 100 200 Feet

Enterprise Research Campus Project
Boston, MA

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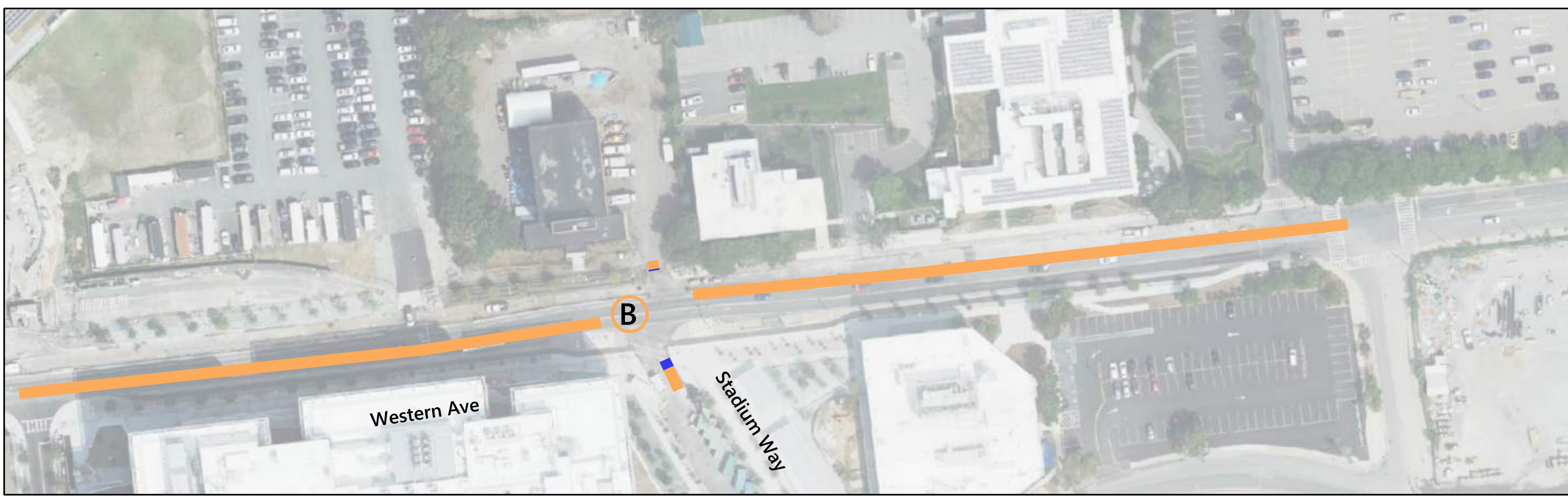
Western Ave at Stadium Way

X Overall Intersection Level of Service

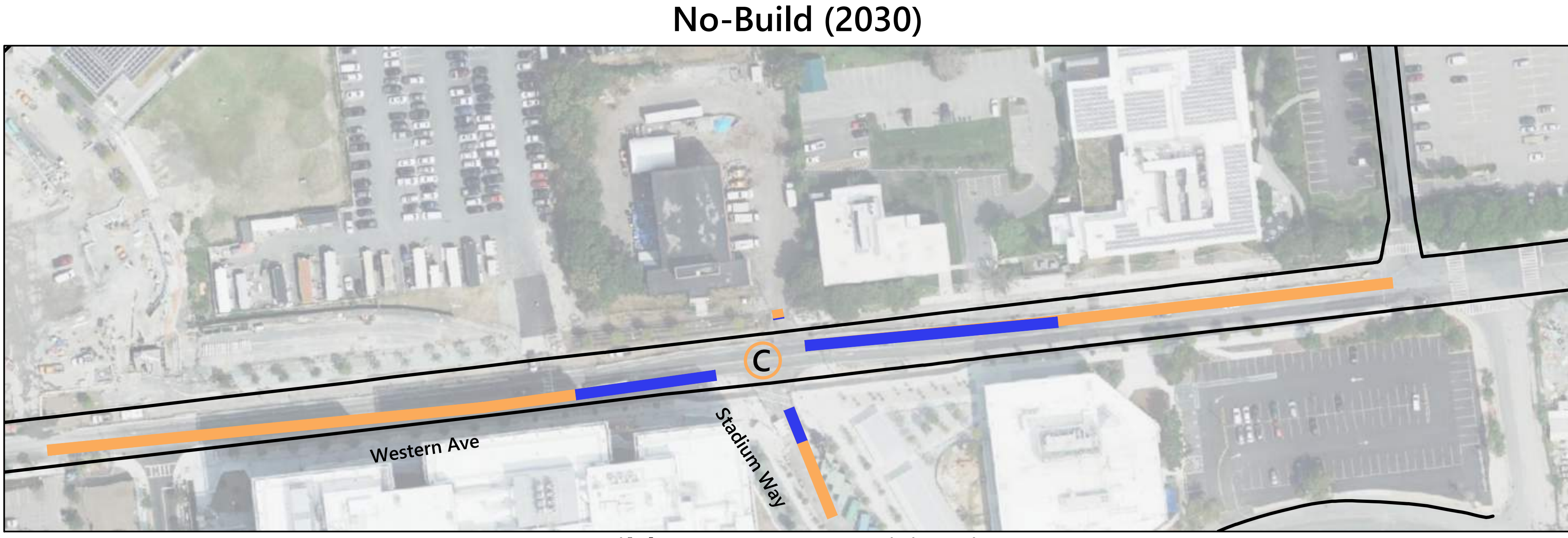
50th Percentile Queue

95th Percentile Queue

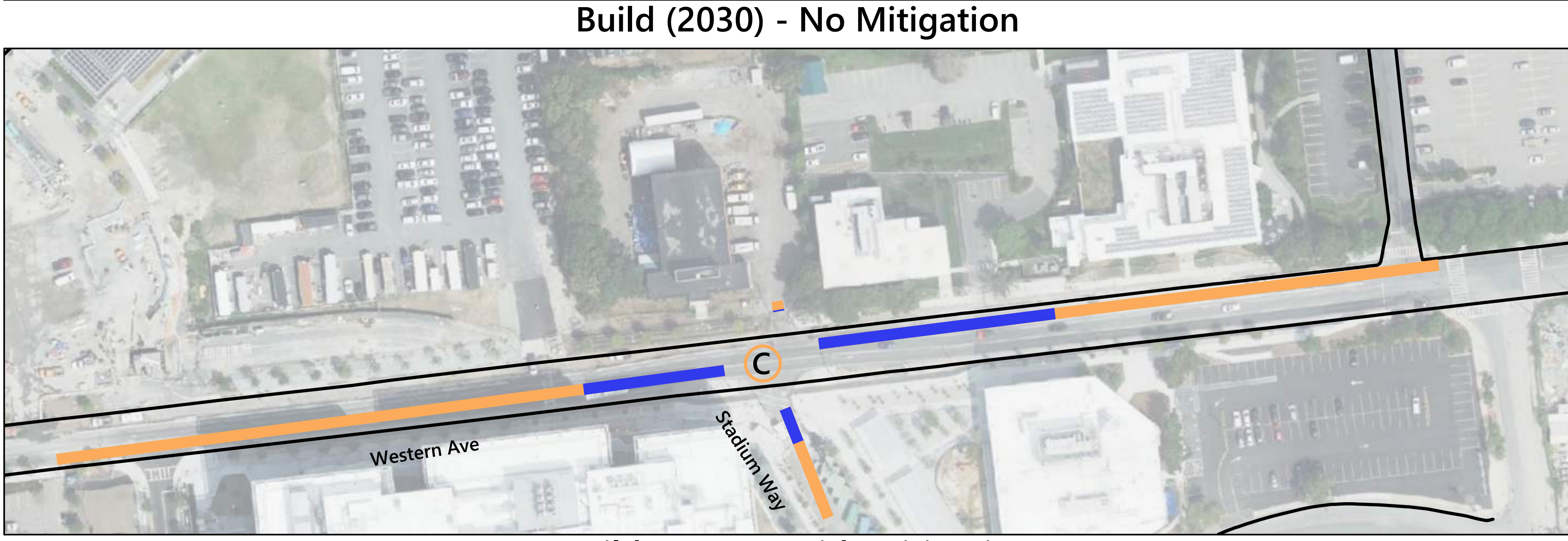
Existing



No-Build (2030)



Build (2030) - No Mitigation



Build (2030) - With Mitigation

Intersection does not exist under 2021 Existing Conditions

2030 Conditions: Morning Peak Hour
Queue Diagrams

0 75 150 Feet

Enterprise Research Campus Project
Boston, MA

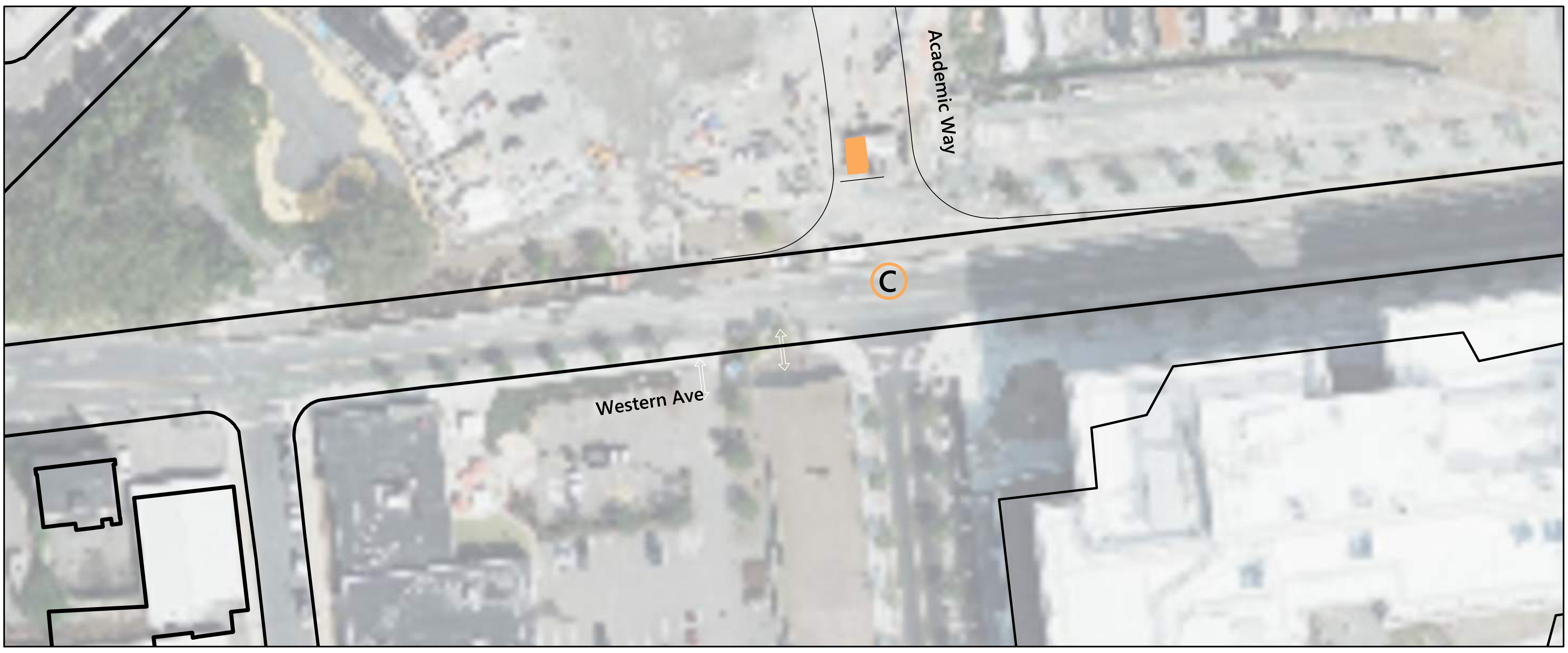
Western Ave at Academic Way

Ⓧ Overall Intersection Level of Service

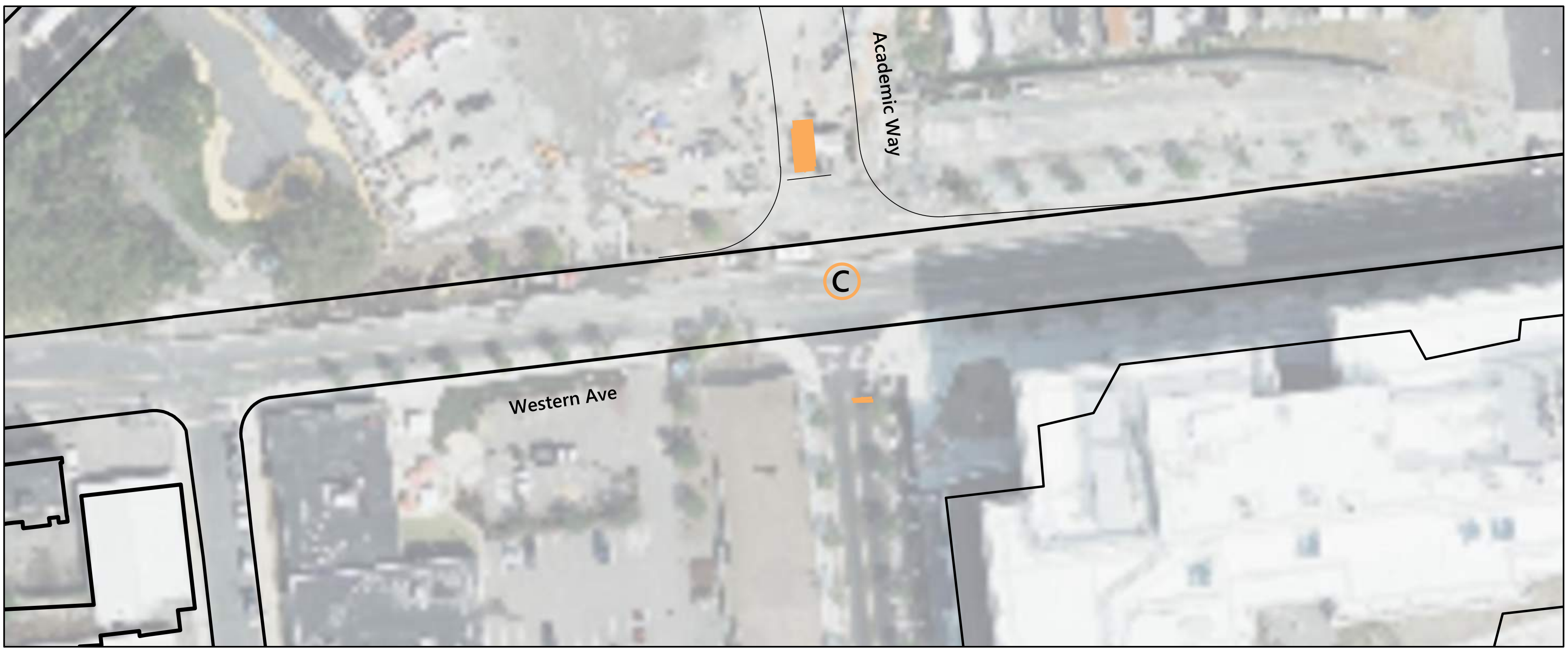
50th Percentile Queue

95th Percentile Queue

Existing



No-Build (2030)



Intersection does not exist under 2021 Existing Conditions

Build (2030)

2030 Conditions: Morning Peak Hour Queue Diagrams

0 40 80 Feet

Enterprise Research Campus Project
Boston, MA

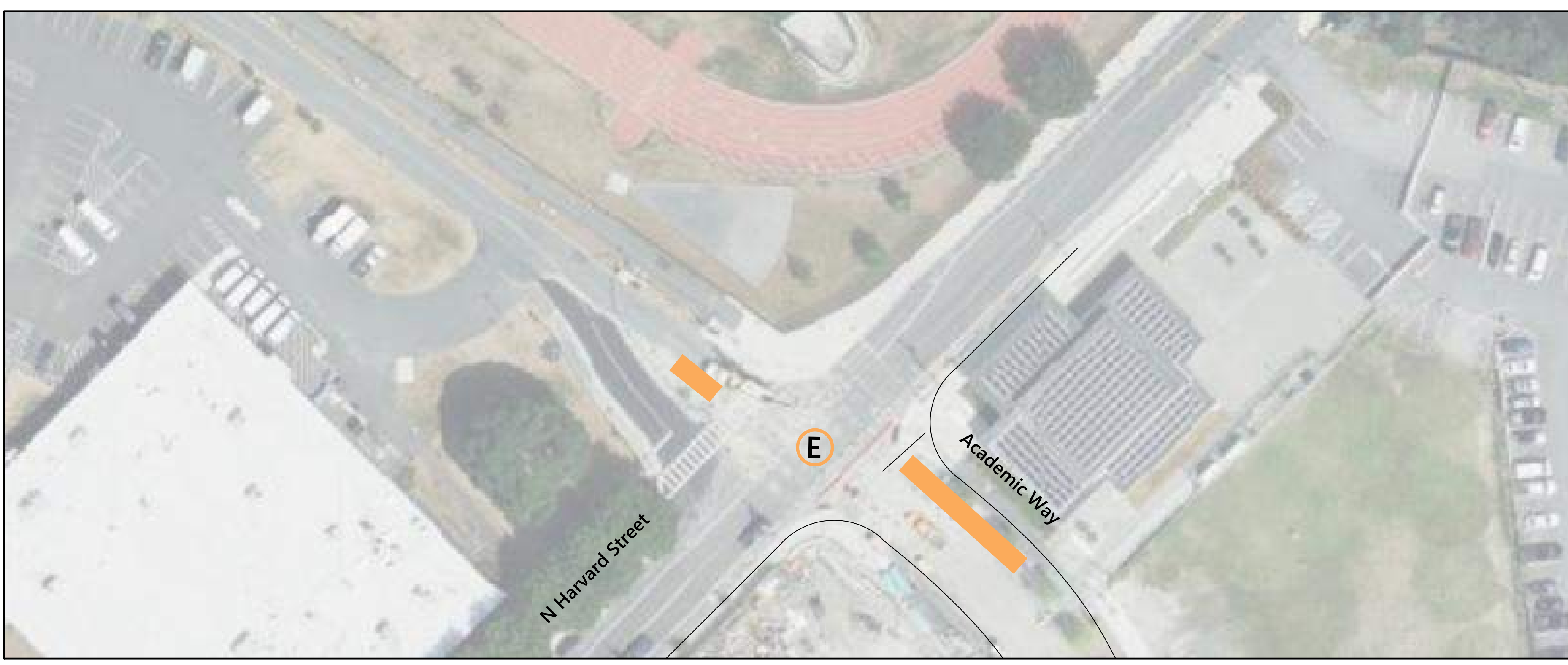
North Harvard Street at Academic Way

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing



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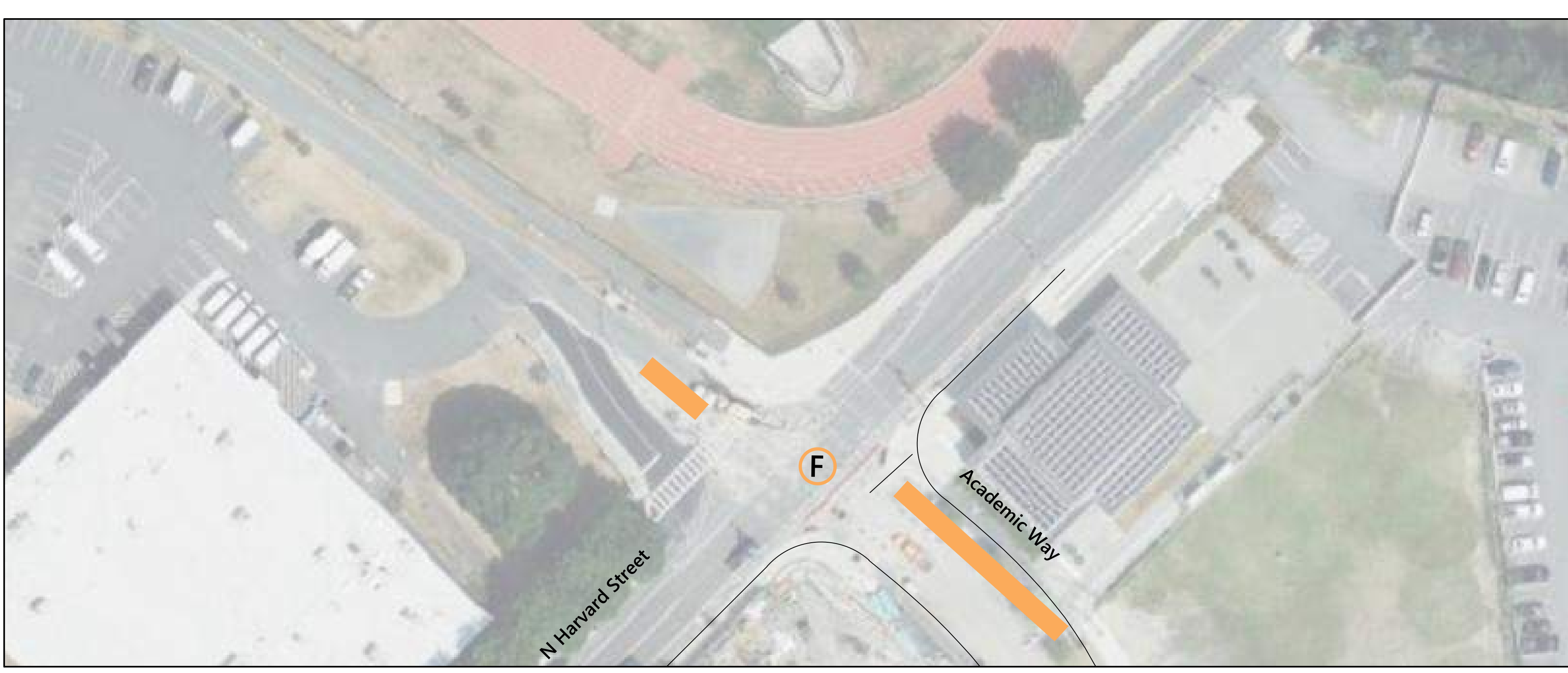


Intersection does not exist under 2021 Existing Conditions

Build (2030)

2030 Conditions: Morning Peak Hour Queue Diagrams

0 40 80 Feet

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2030 Conditions - AM.dwg

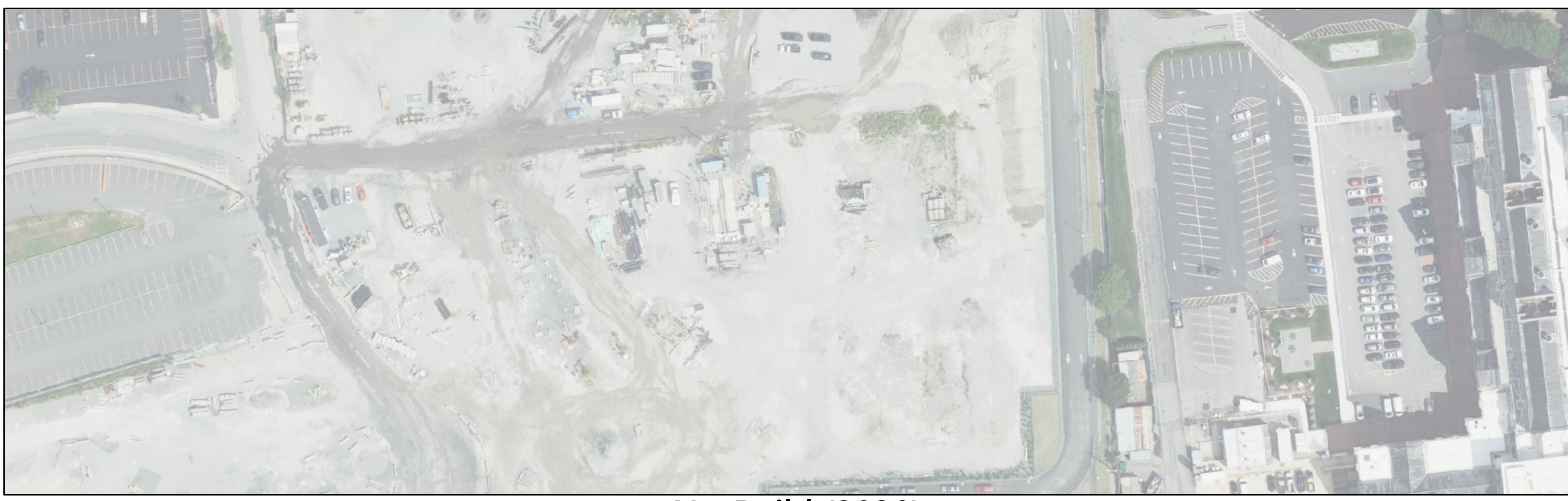
Cattle Drive at DEF Drive

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing



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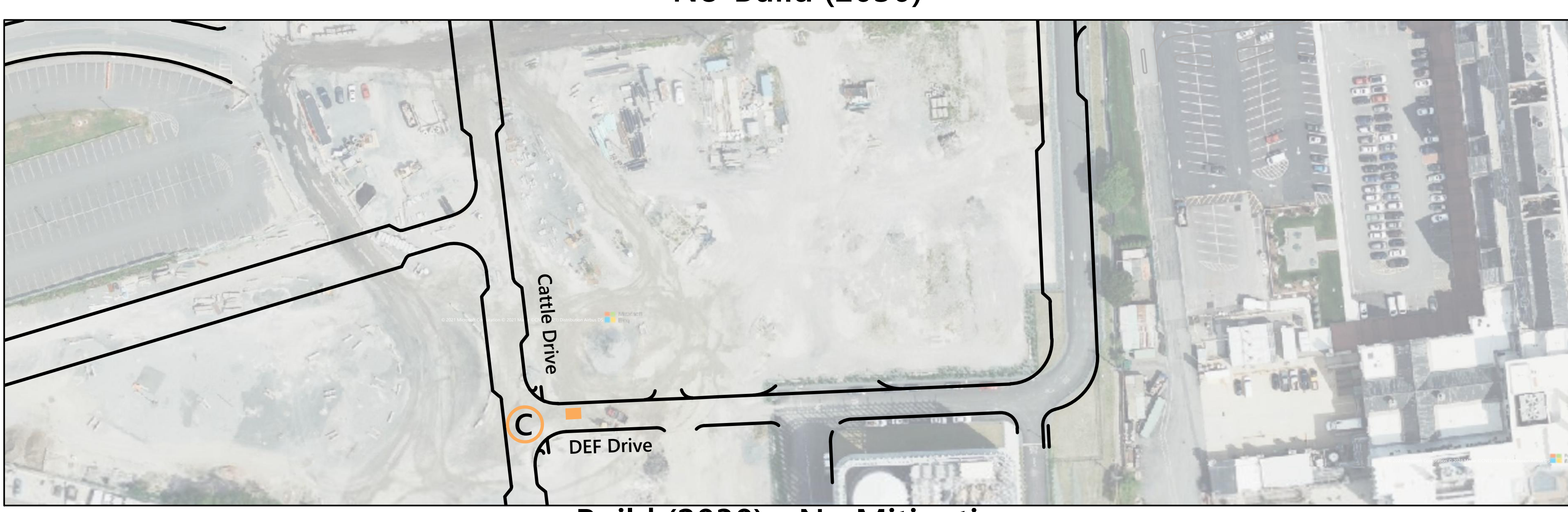
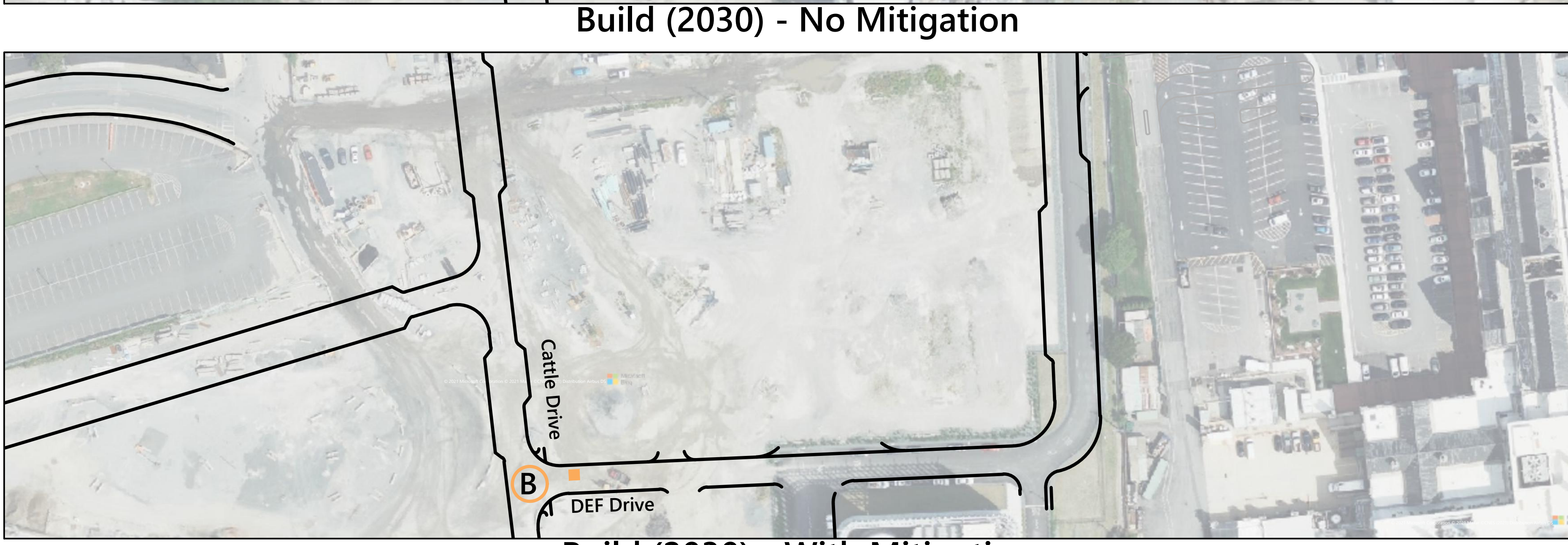


Build (2030) - No Mitigation



Build (2030) - With Mitigation

Intersection does not exist under 2021 Existing and 2030 No-Build Conditions

2030 Conditions: Morning Peak Hour Queue Diagrams

0 50 100 Feet

Enterprise Research Campus Project
Boston, MA

Cattle Drive/ Almy Street at Windom Street

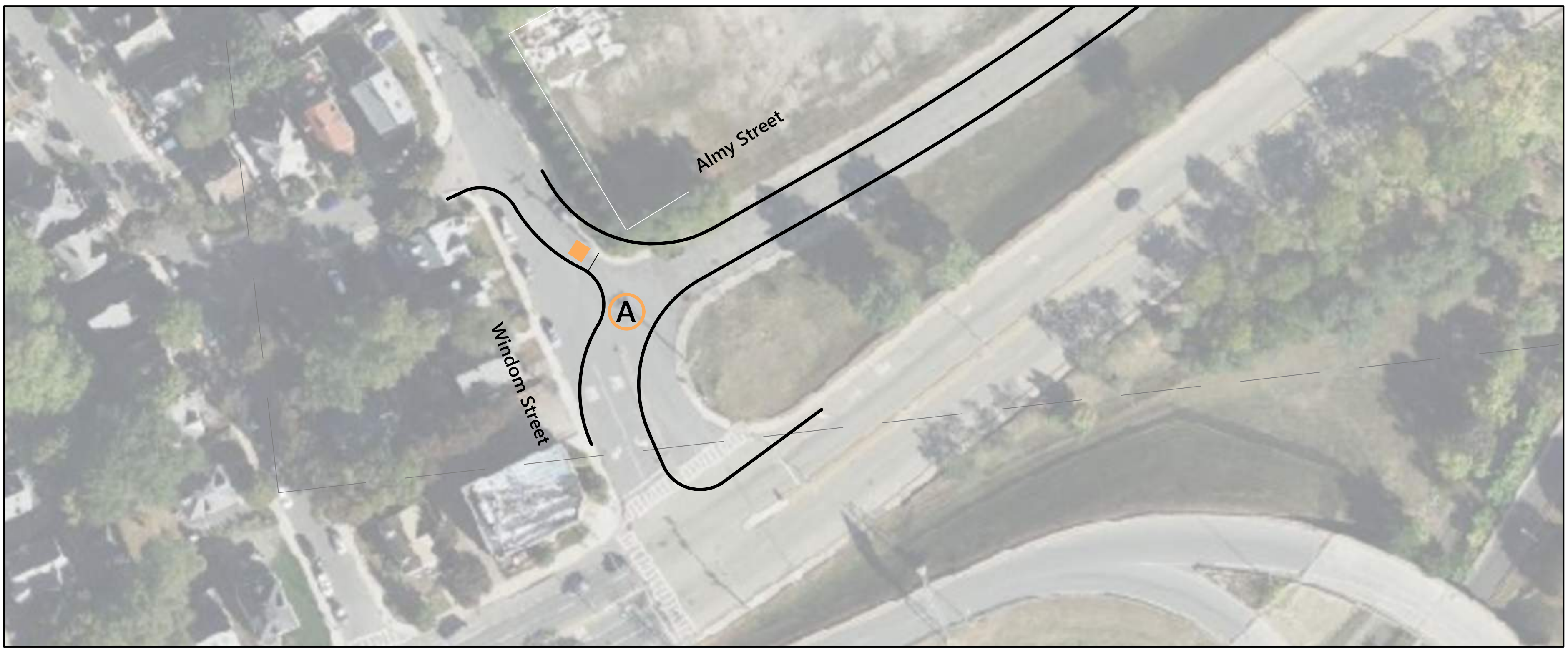
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2030)



Build (2030)

Intersection does not exist under 2021 Existing and 2030 No-Build Conditions

2030 Conditions: Morning Peak Hour Queue Diagrams

0 50 100 Feet

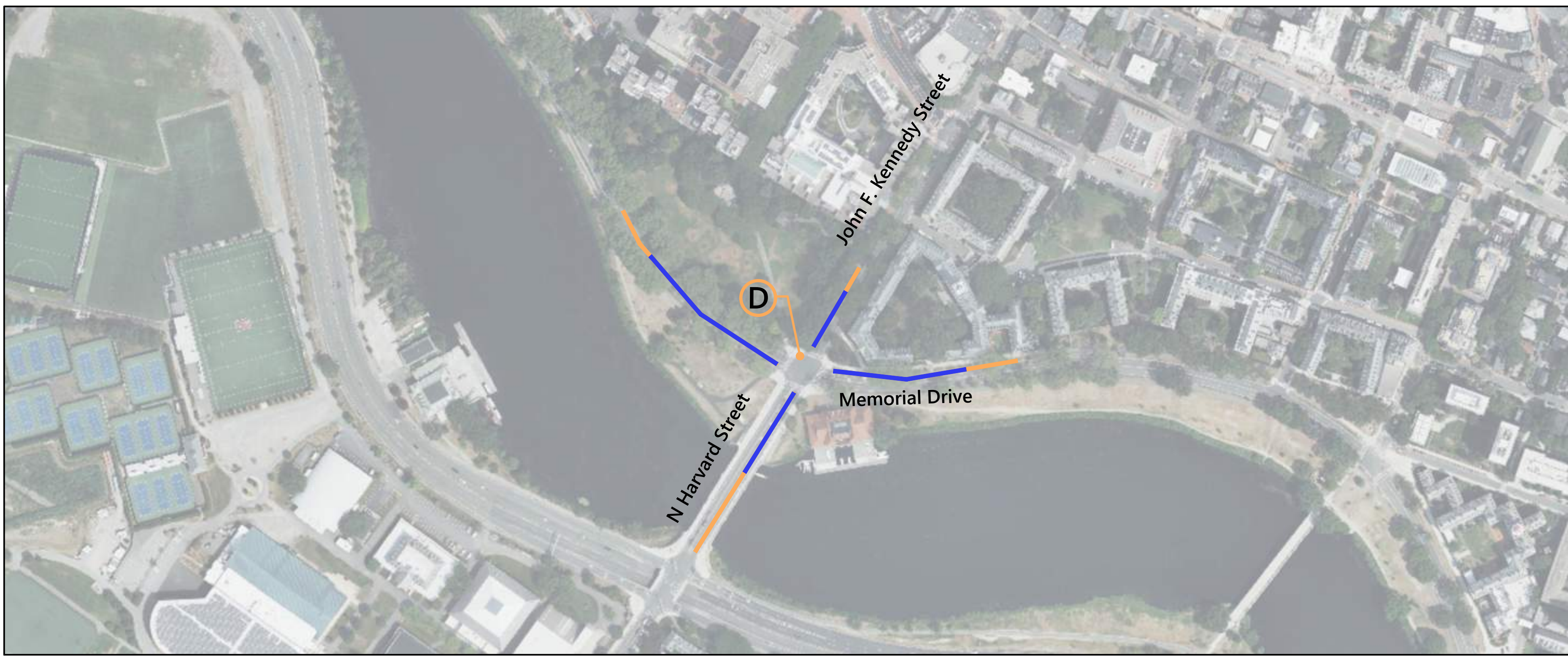
Enterprise Research Campus Project
Boston, MA

John F. Kennedy Street at Memorial Drive

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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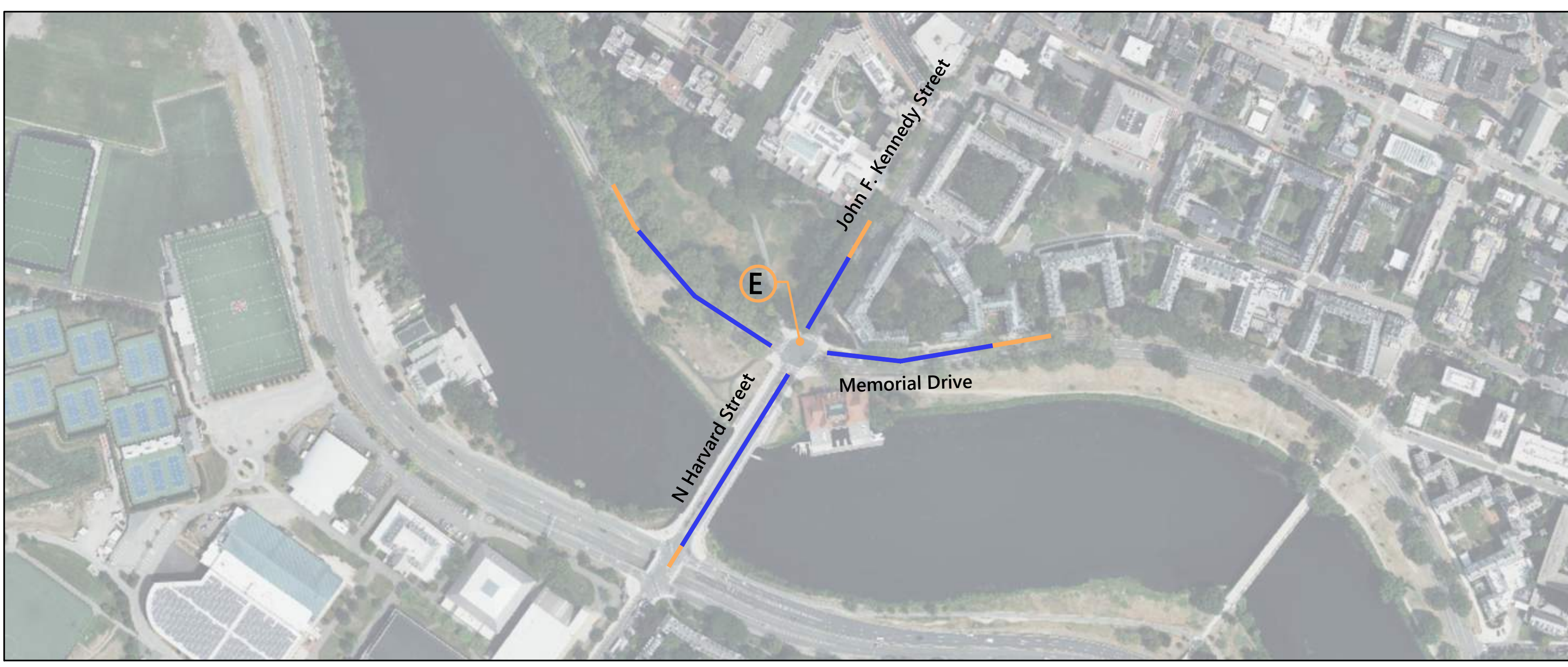
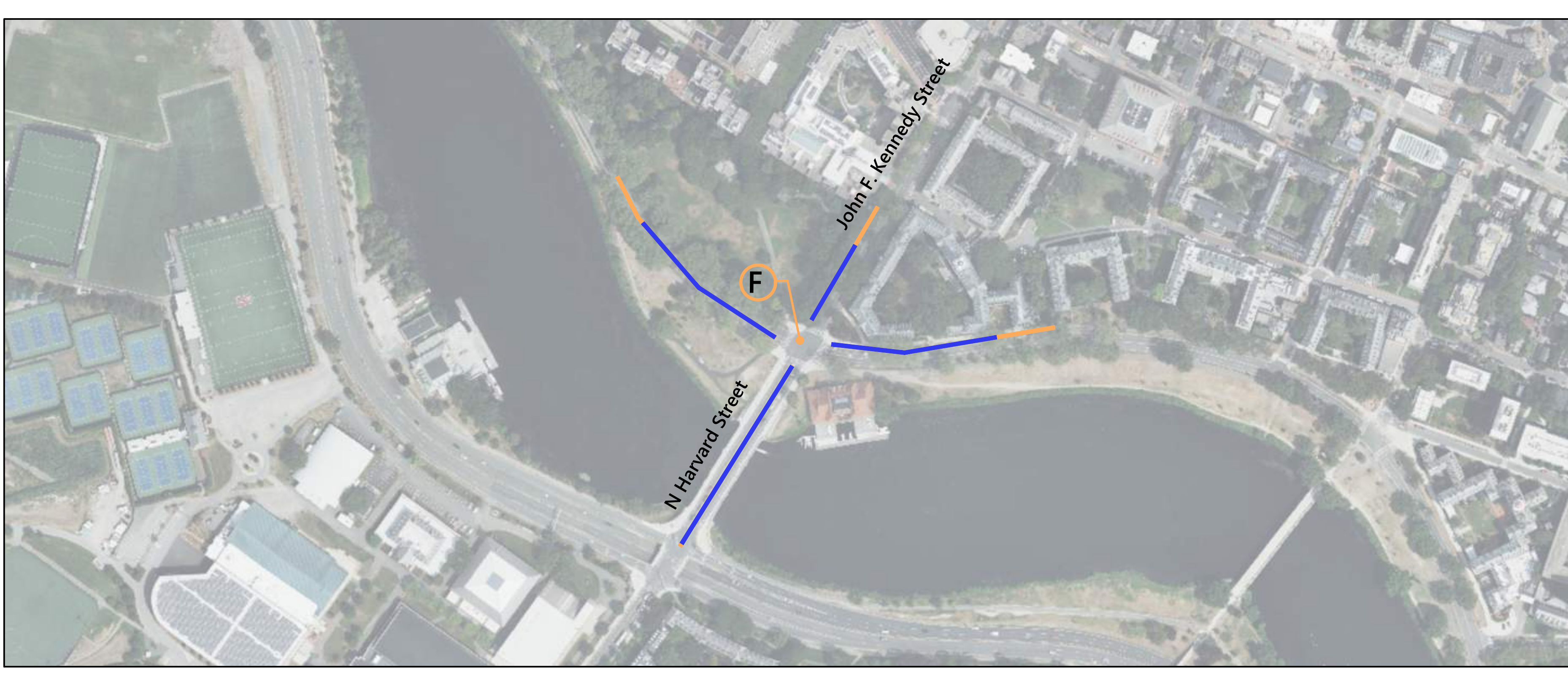


No-Build (2030)



Build (2030)

2030 Conditions: Evening Peak Hour Queue Diagrams

0 200 400 Feet

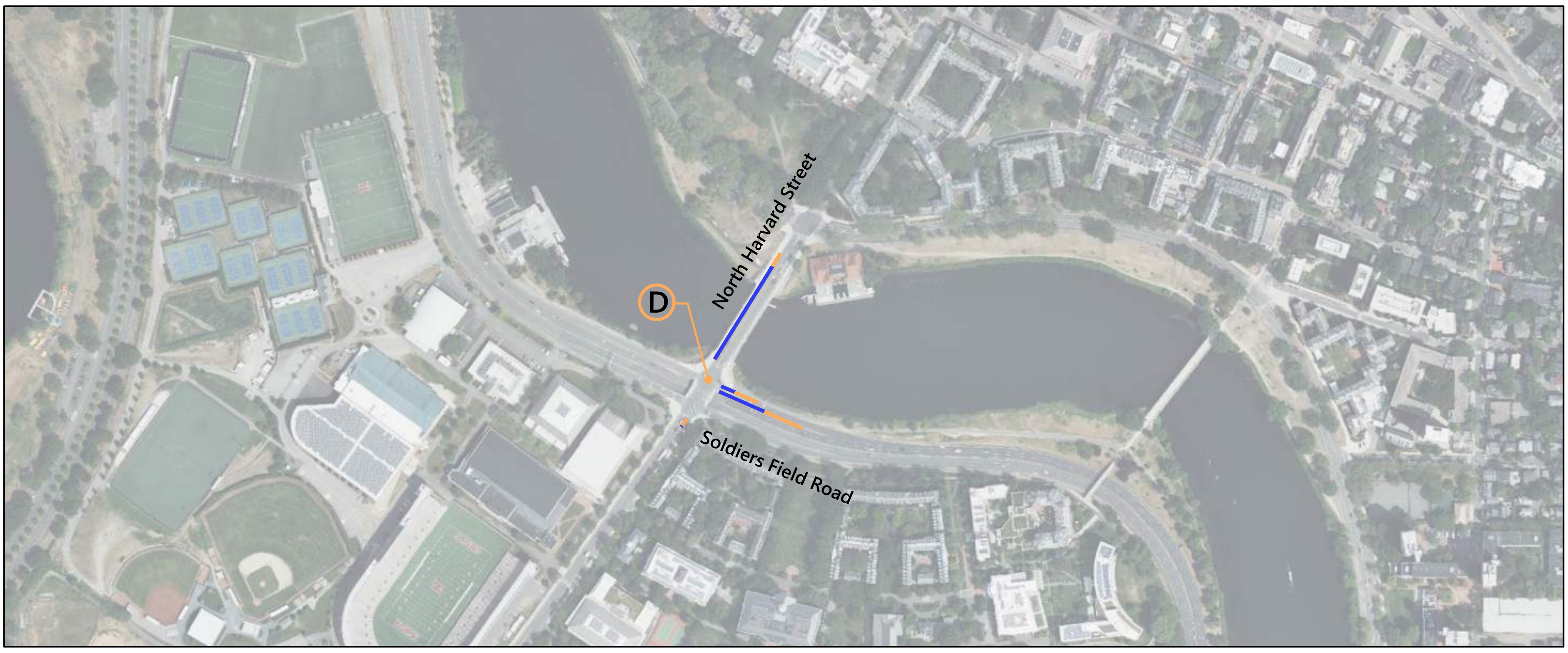
Enterprise Research Campus Project
Boston, MA

North Harvard Street at Soldiers Field Road WB

X Overall Intersection Level of Service

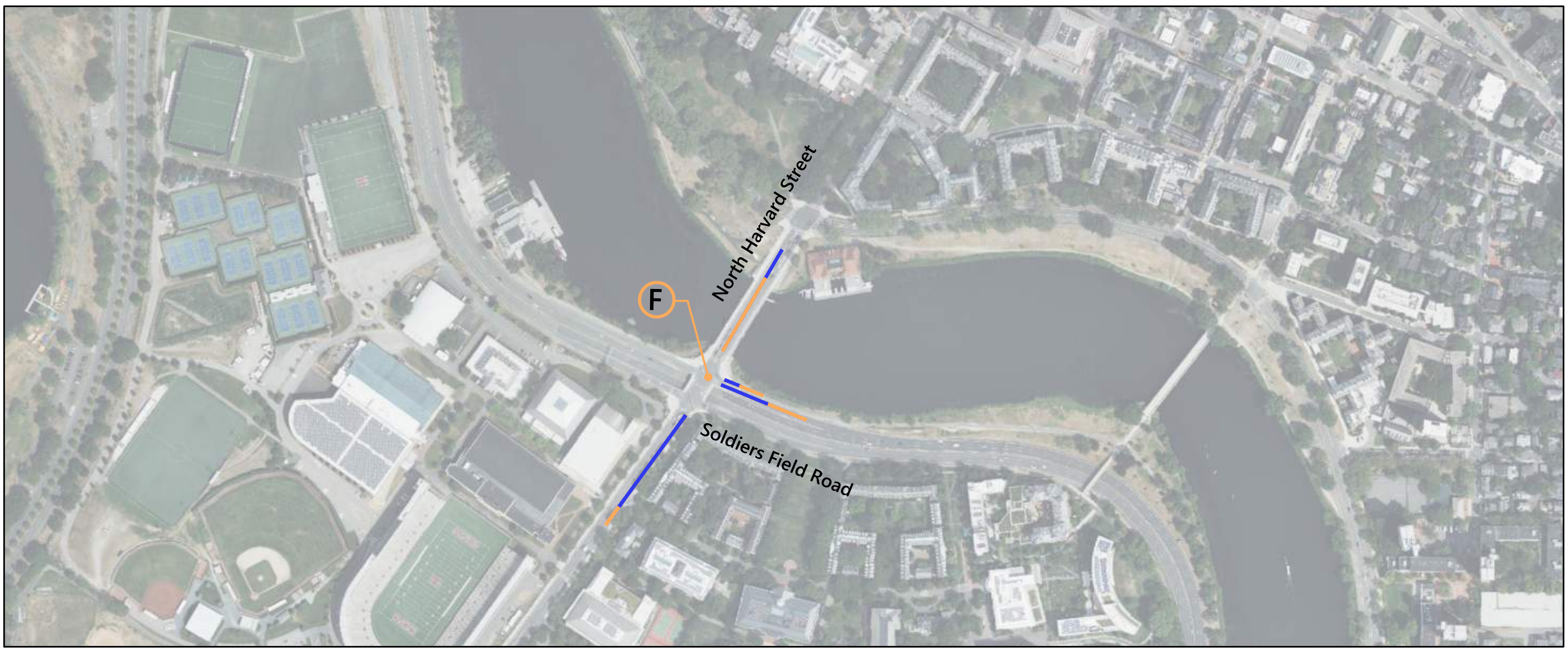
50th Percentile Queue

95th Percentile Queue



Existing

No-Build (2030)



Build (2030)

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 250 500 Feet

Enterprise Research Campus Project
Boston, MA

North Harvard Street at Soldiers Field Road EB

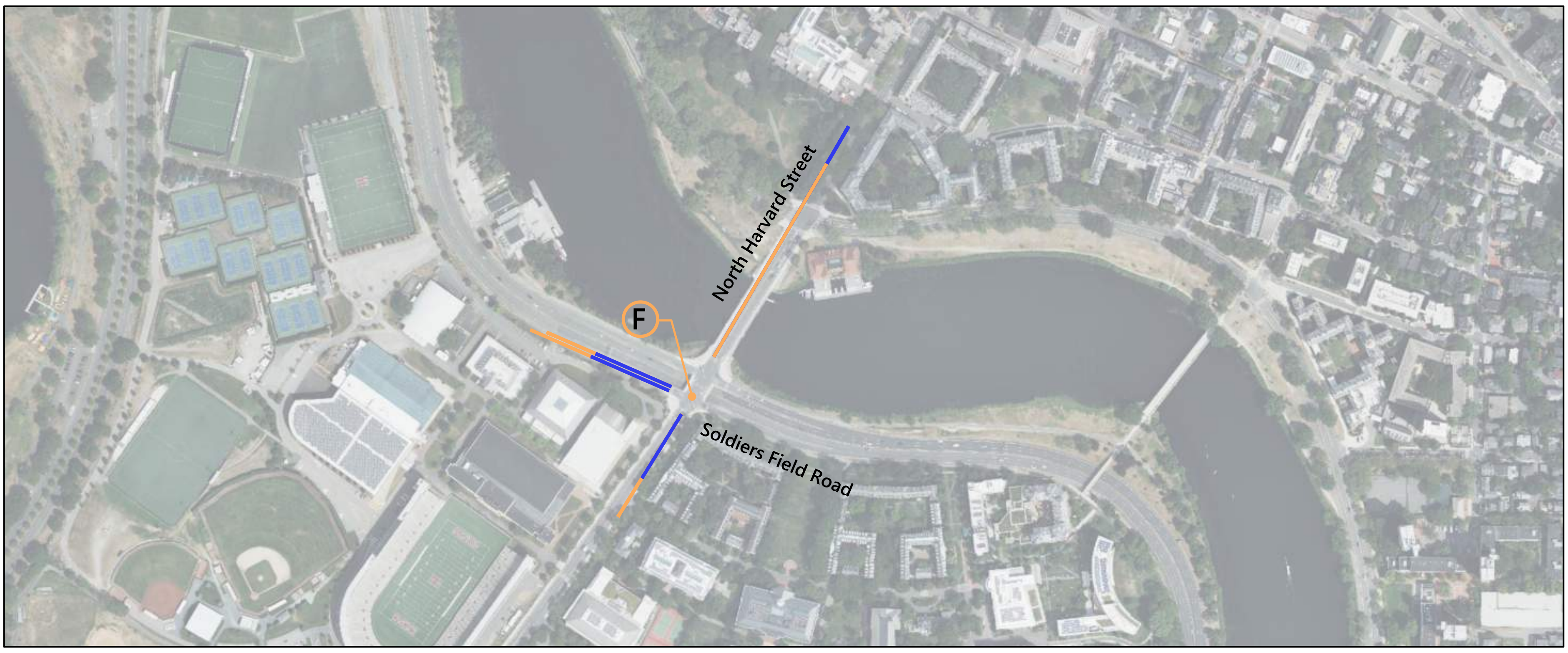
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2030)



Build (2030)

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 250 500 Feet

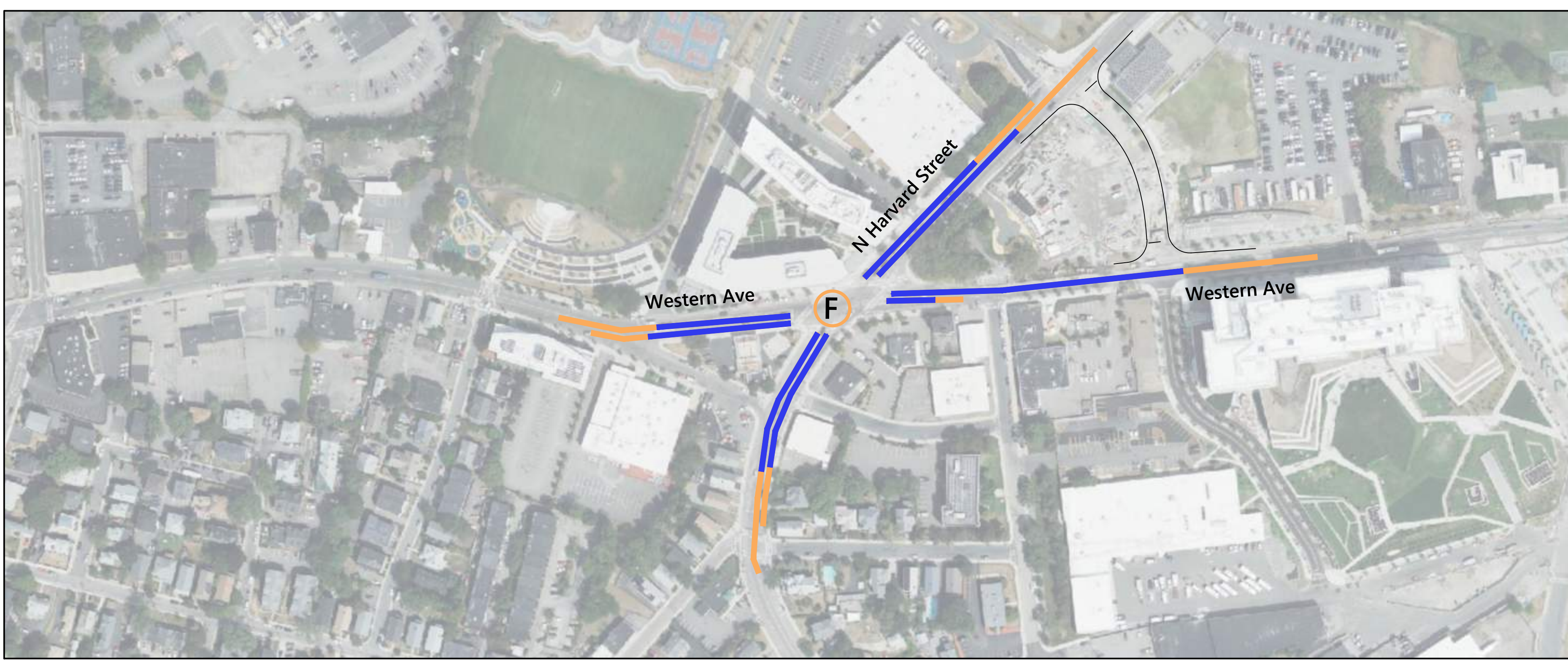
North Harvard Street at Western Ave

X Overall Intersection Level of Service

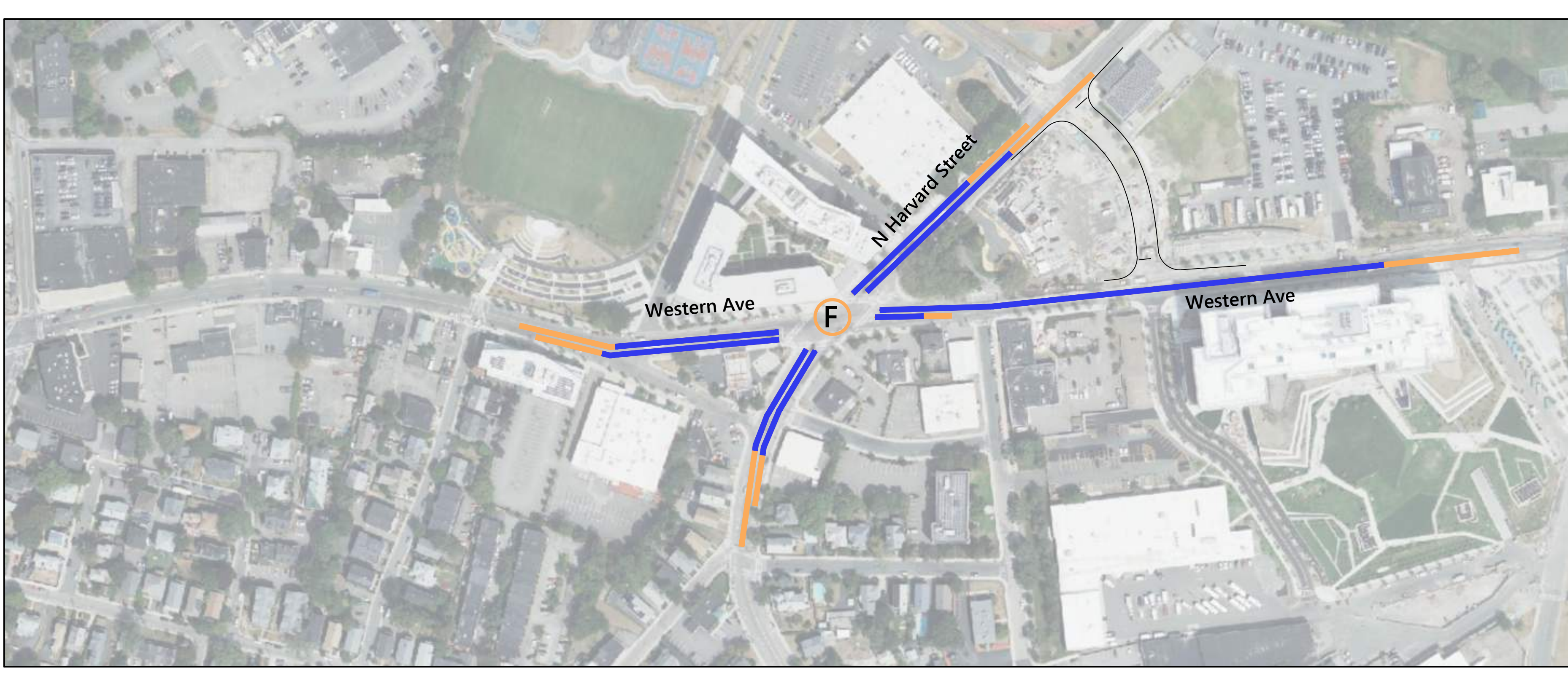
50th Percentile Queue

95th Percentile Queue

Existing



No-Build (2030)



Build (2030)

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 150 300 Feet

Enterprise Research Campus Project
Boston, MA

North Harvard Street at Franklin St/ Kingsley St

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2030)

Build (2030)

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 150 300 Feet

Enterprise Research Campus Project
Boston, MA

Cambridge Street at North Harvard Street

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2030)

Build (2030)

2030 Conditions: Evening Peak Hour Queue Diagrams

0 125 250 Feet

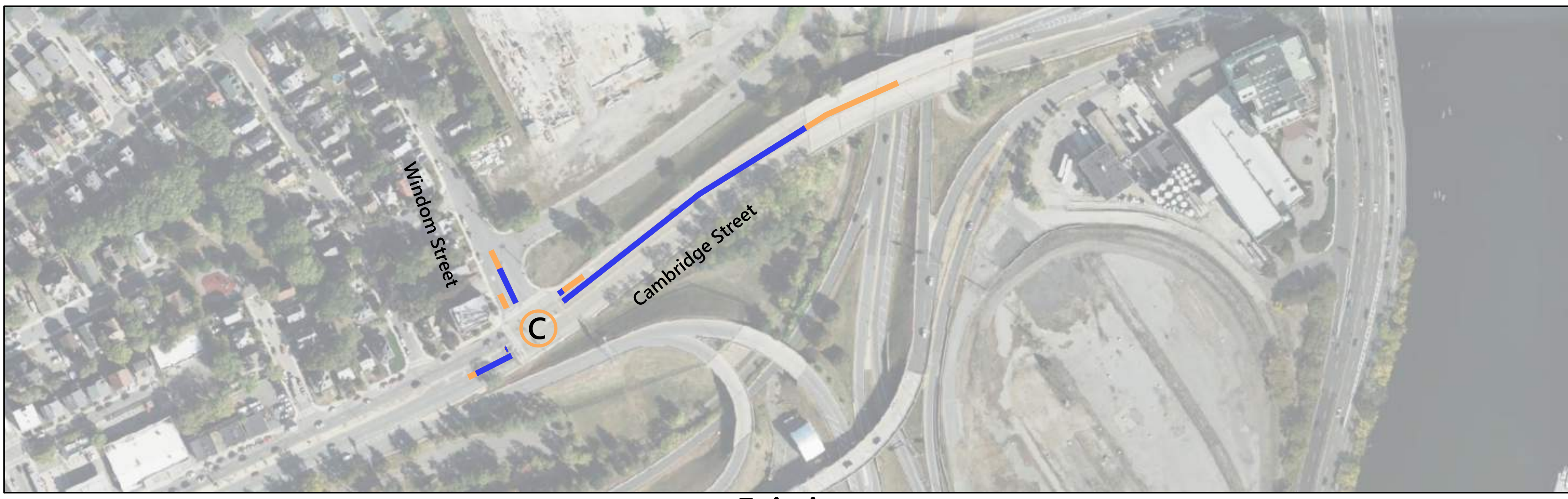
Enterprise Research Campus Project
Boston, MA

Cambridge Street at Windom Street

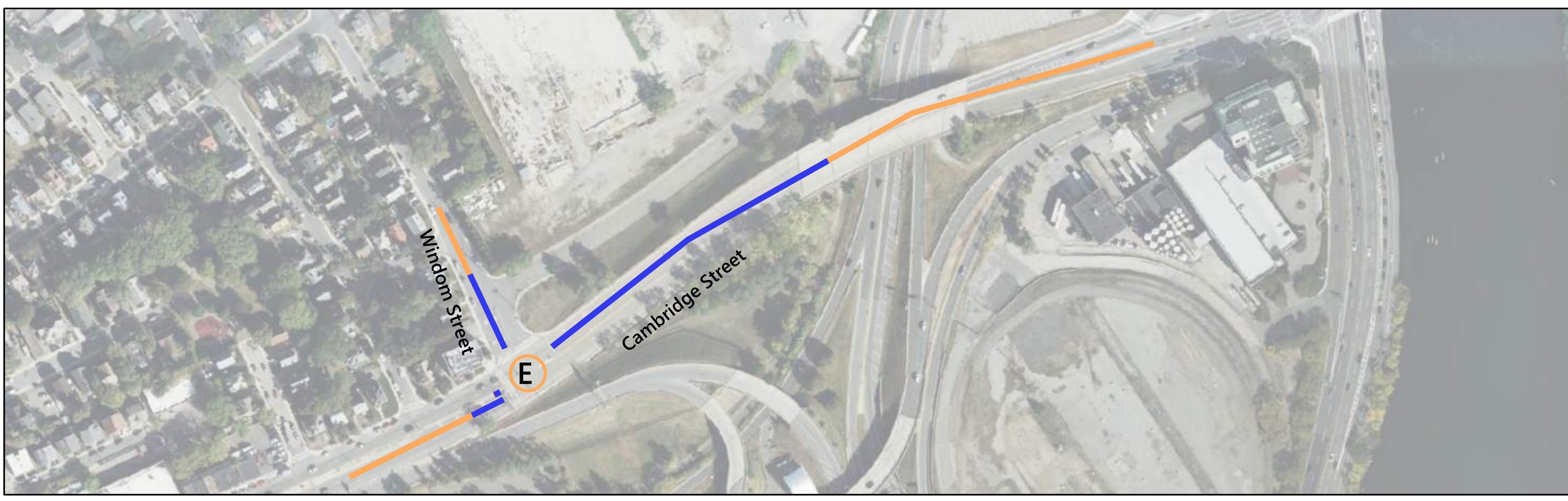
X Overall Intersection Level of Service

50th Percentile Queue

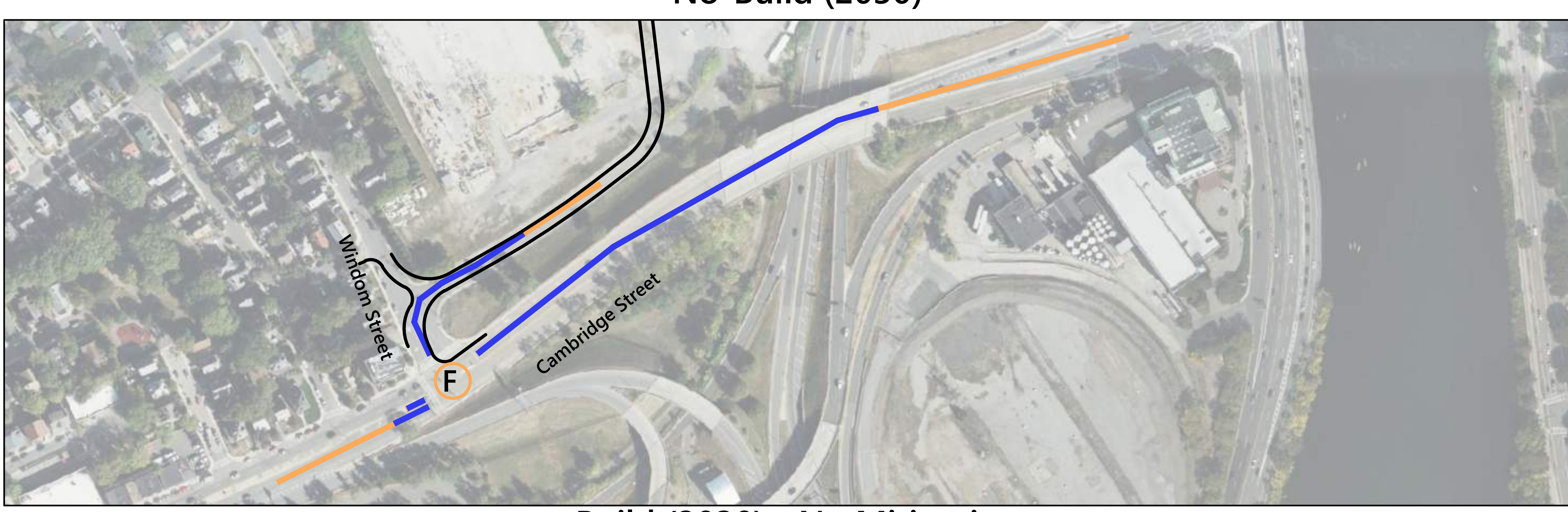
95th Percentile Queue



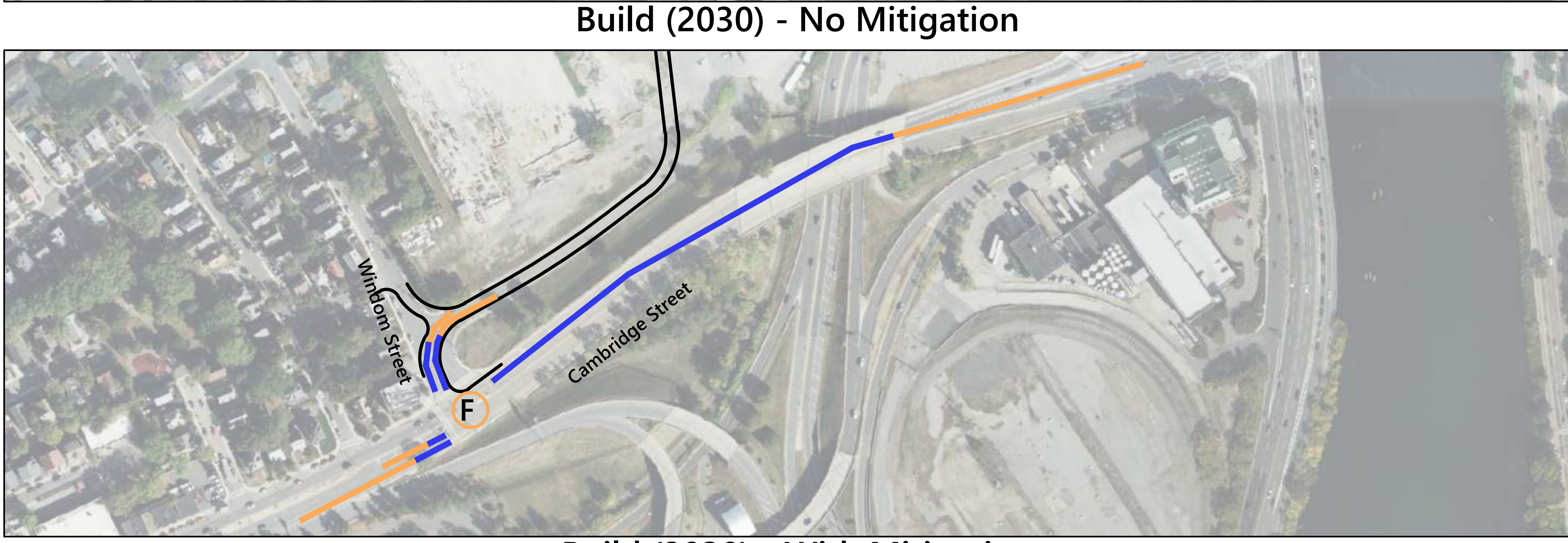
Existing



No-Build (2030)



Build (2030) - No Mitigation



Build (2030) - With Mitigation

vhb

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 125 250 Feet

Enterprise Research Campus Project
Boston, MA

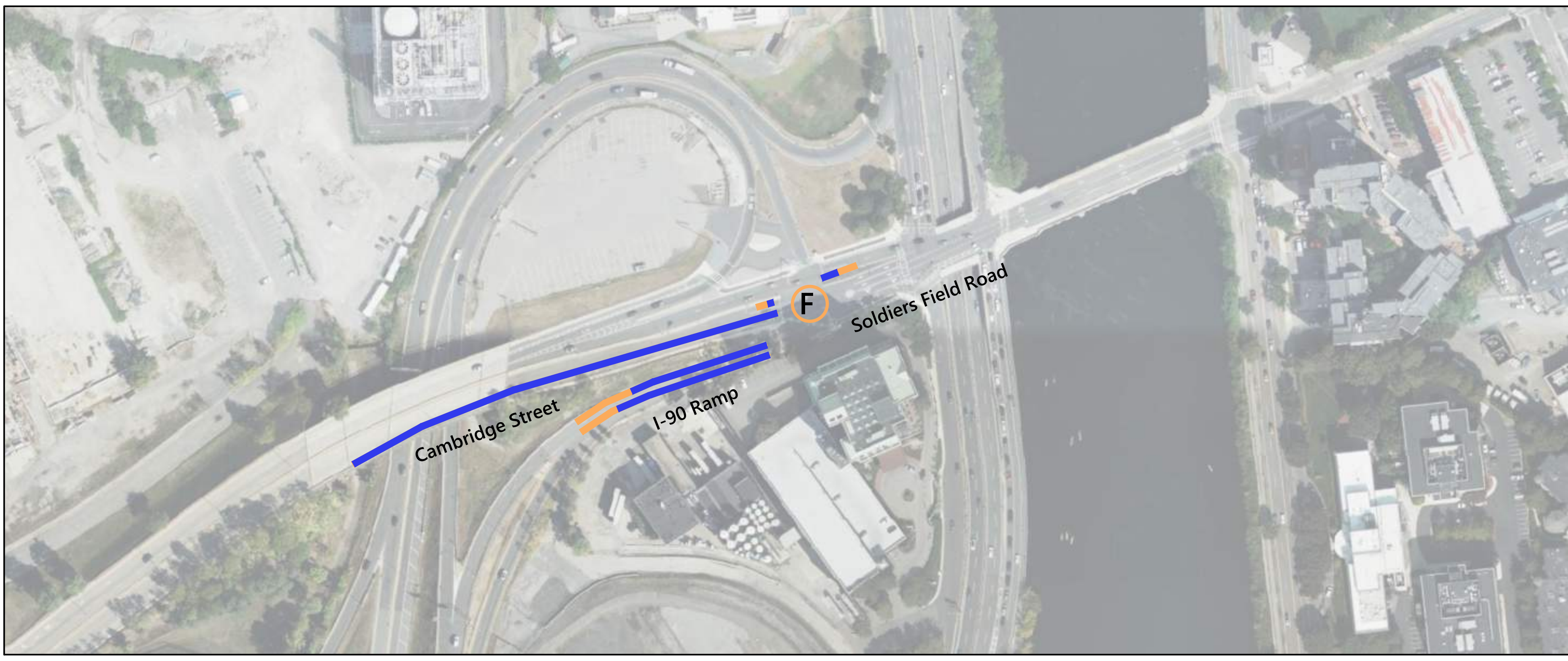
\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2030 Conditions - PM.dwg

Cambridge Street at I-90 Ramps/ Double Tree Hotel

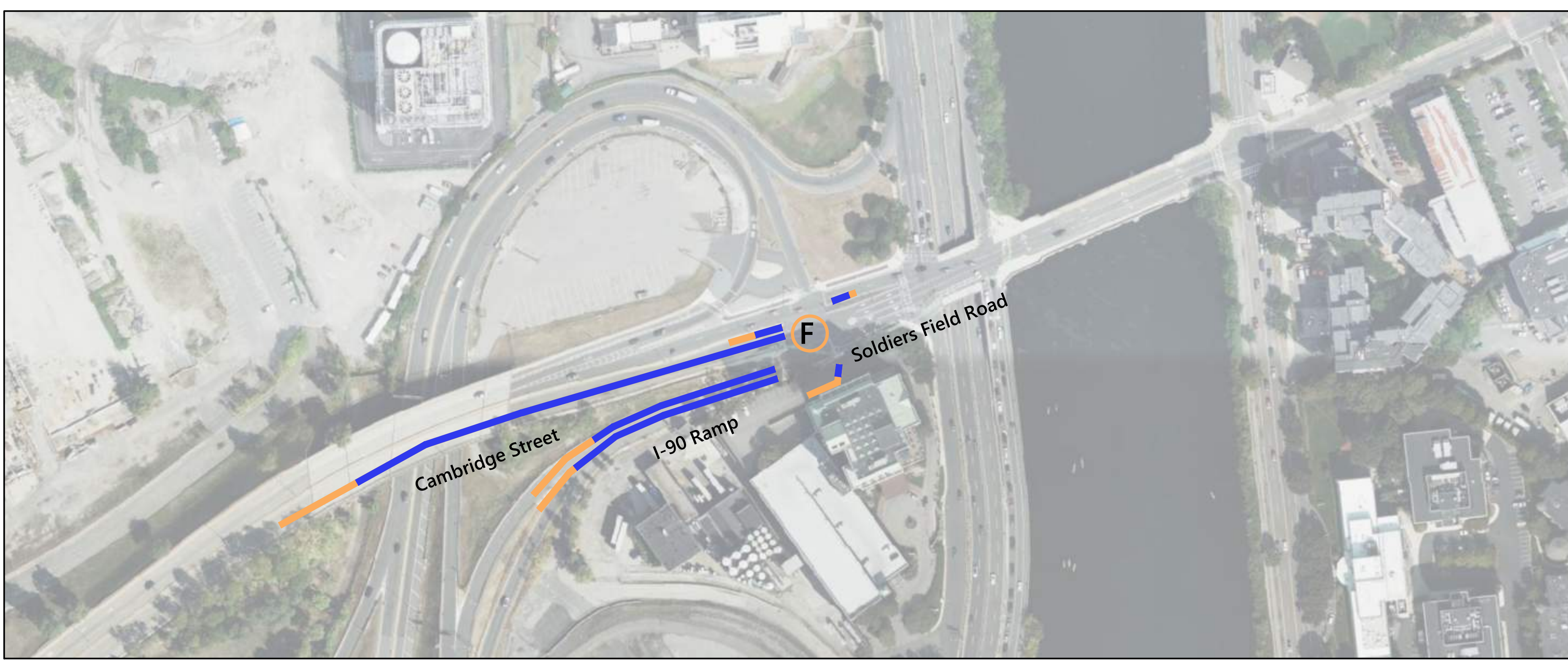
X Overall Intersection Level of Service

50th Percentile Queue

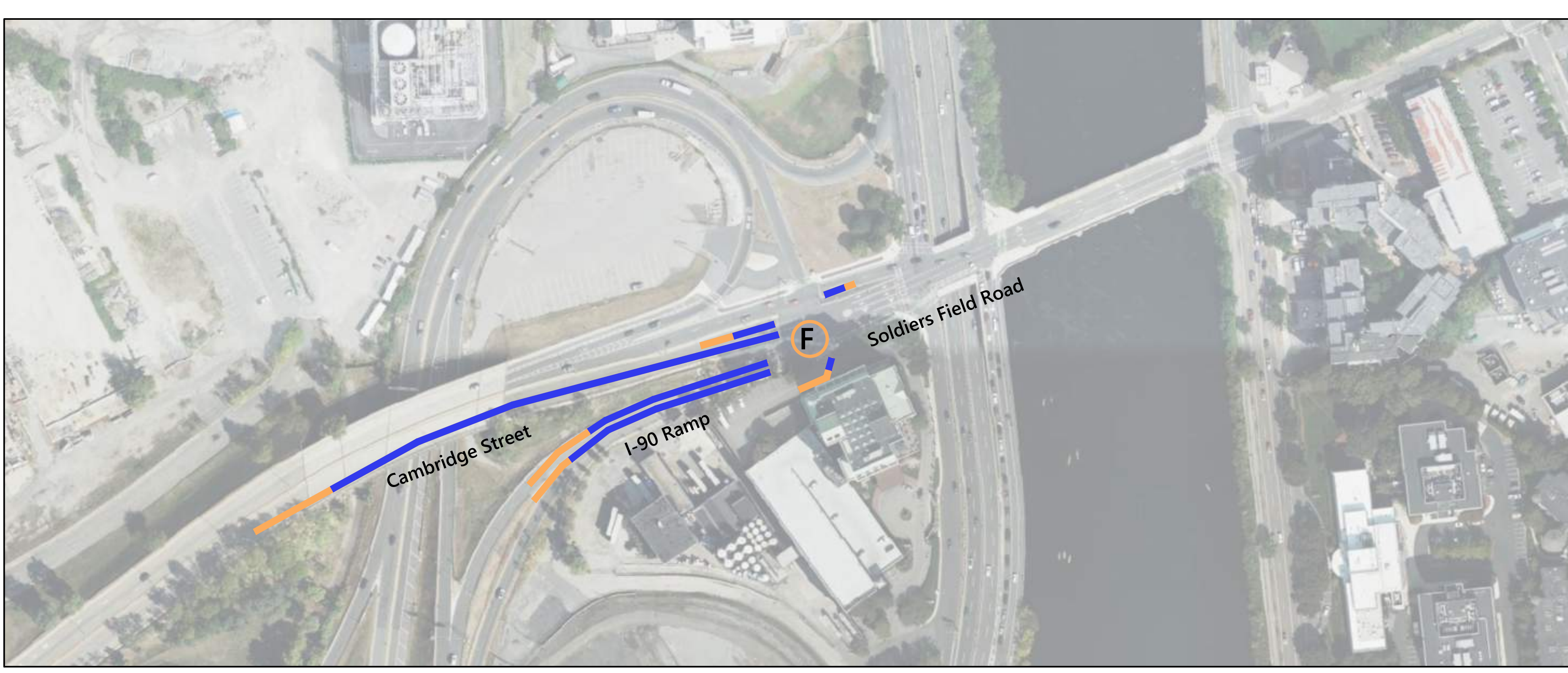
95th Percentile Queue



Existing



No-Build (2030)



Build (2030)

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 125 250 Feet

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2030 Conditions - PM.dwg

Cambridge Street at Soldiers Field Road

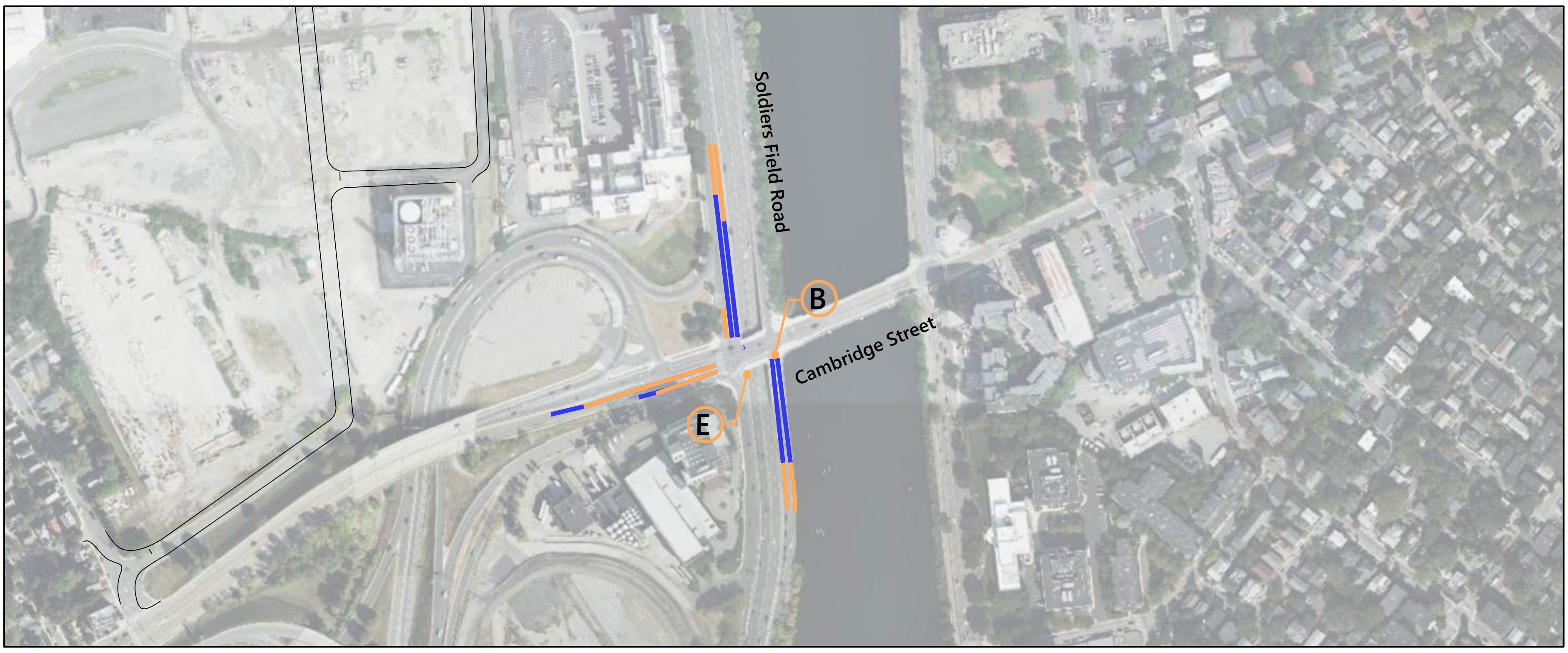
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2030)



Build (2030)

vhb

2030 Conditions: Evening Peak Hour
Queue Diagrams

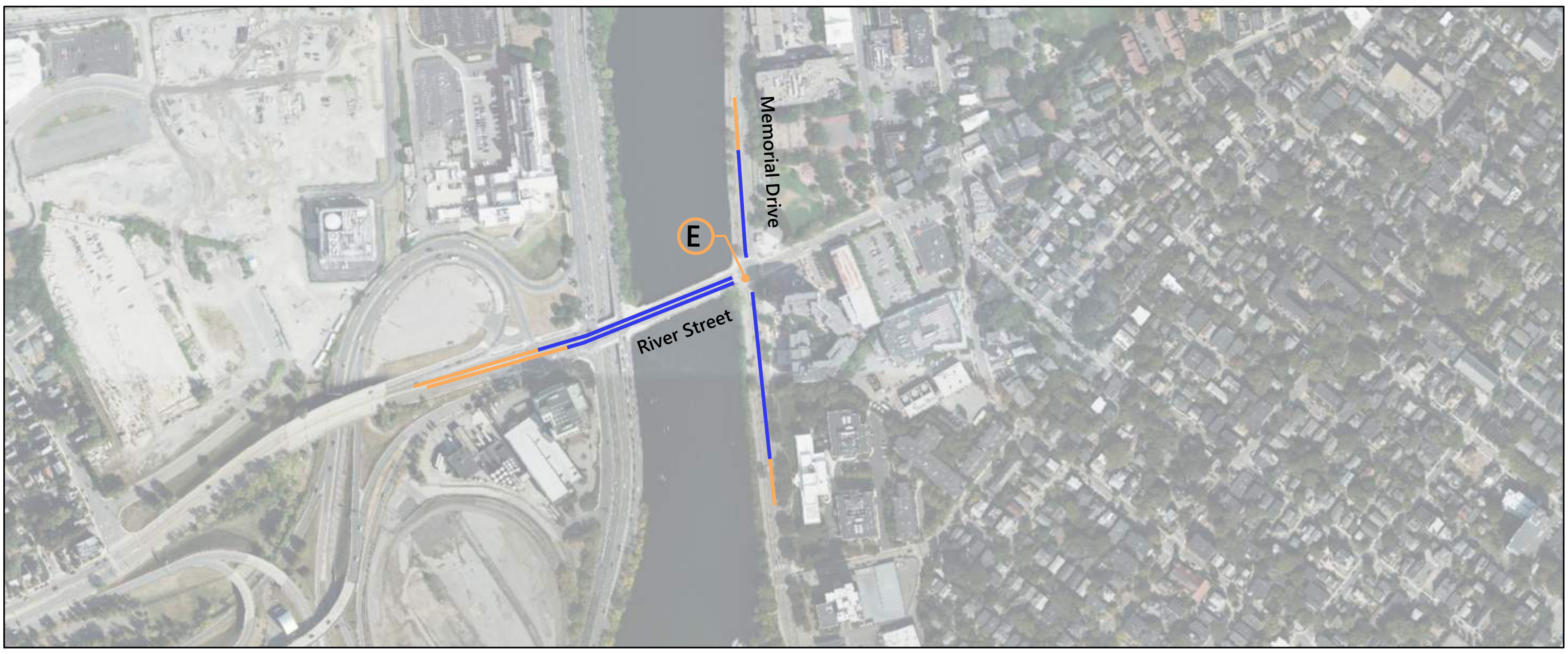
0 200 400 Feet

Enterprise Research Campus Project
Boston, MA

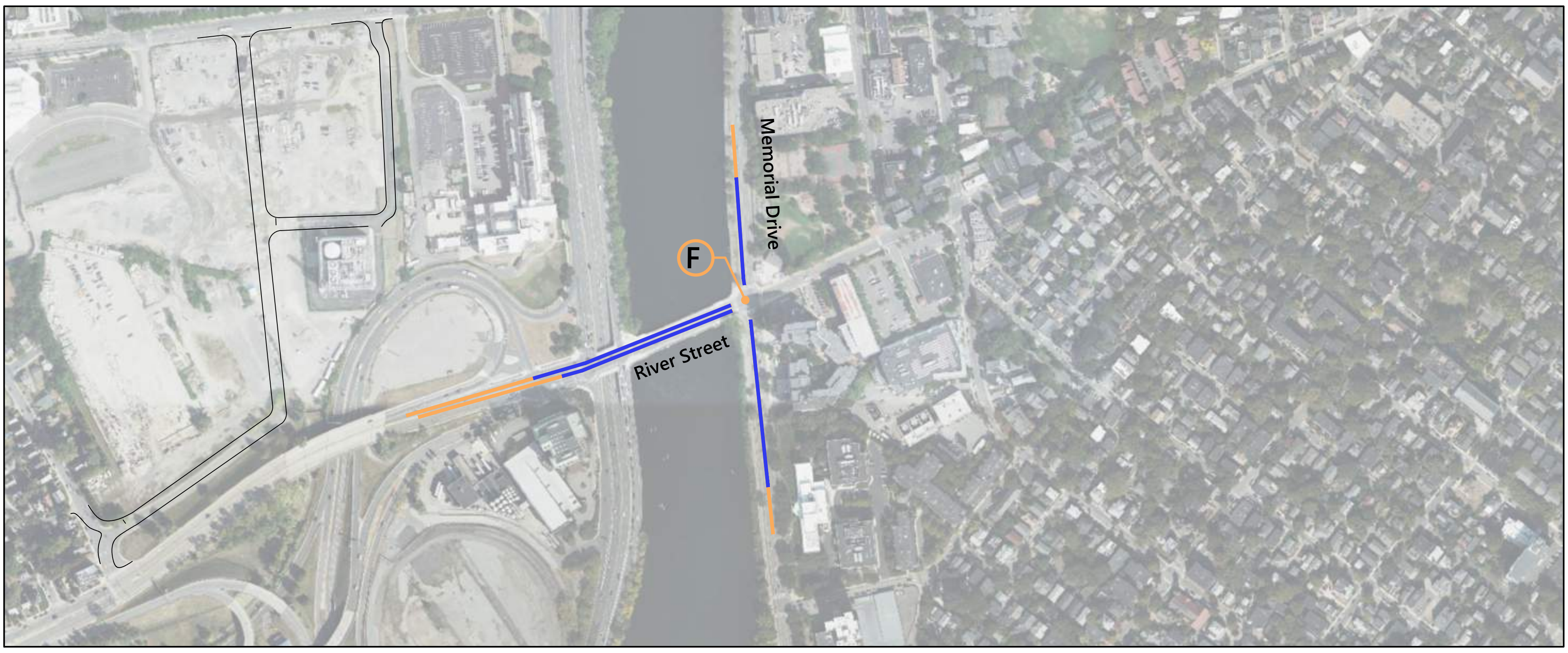
Memorial Drive at River Street

X Overall Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

Existing



No-Build (2030)



Build (2030)

vhb

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 250 500 Feet

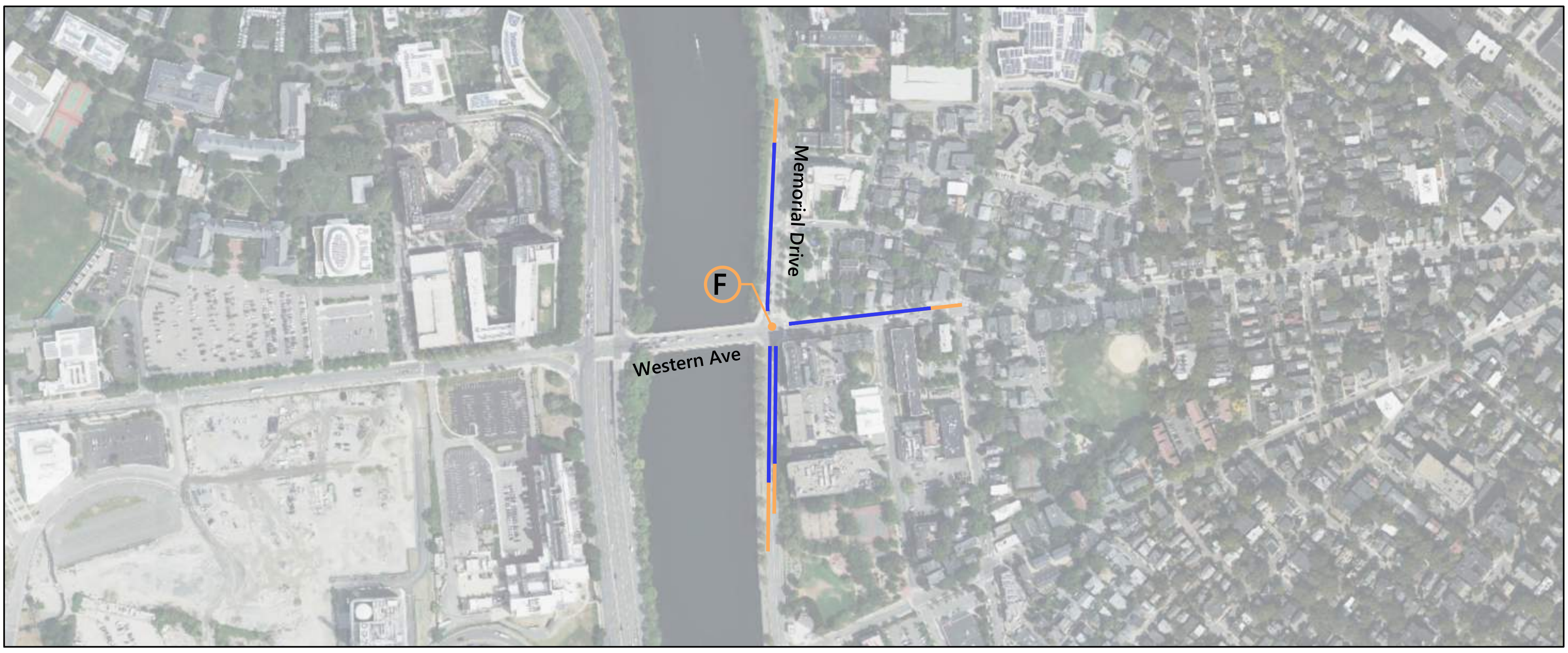
Enterprise Research Campus Project
Boston, MA

Western Ave at Memorial Drive

X Overall Intersection Level of Service

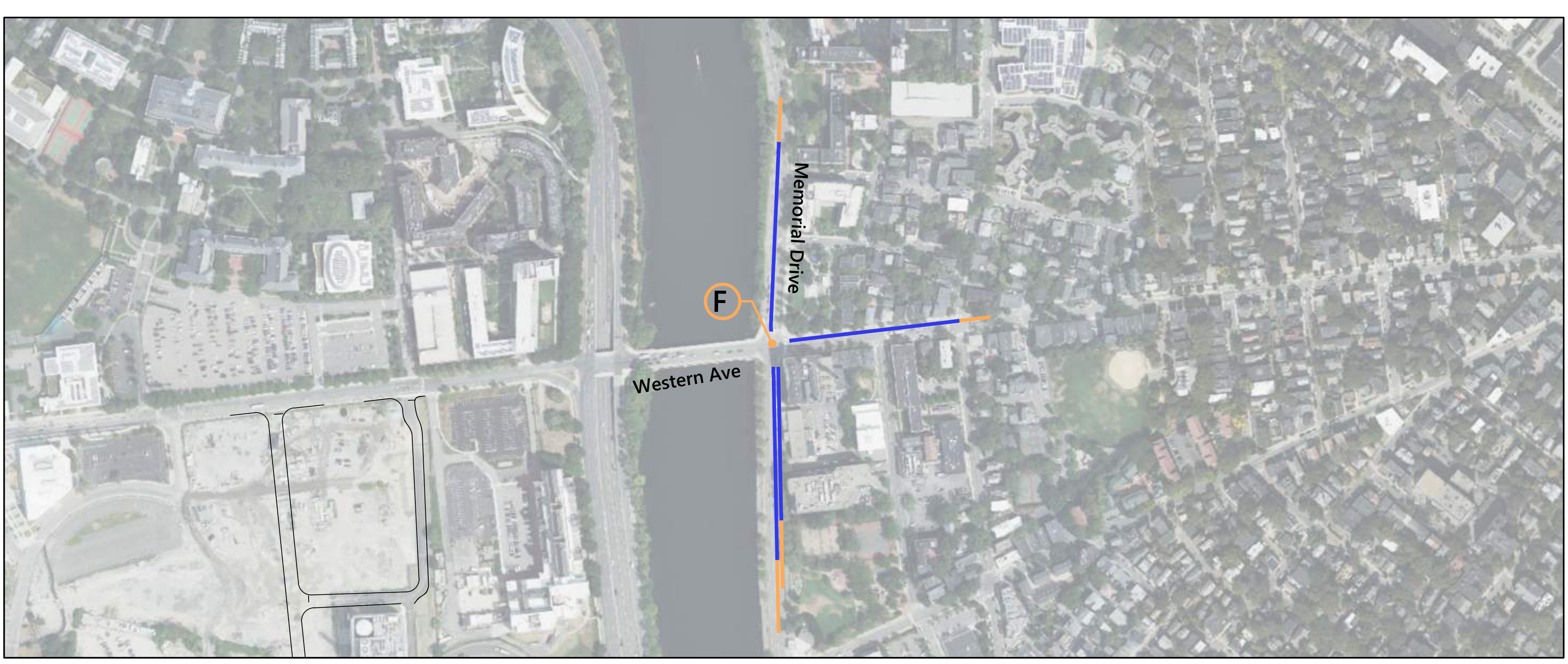
50th Percentile Queue

95th Percentile Queue



Existing

No-Build (2030)



Build (2030)

2030 Conditions: Evening Peak Hour Queue Diagrams

0 250 500 Feet

Enterprise Research Campus Project
Boston, MA

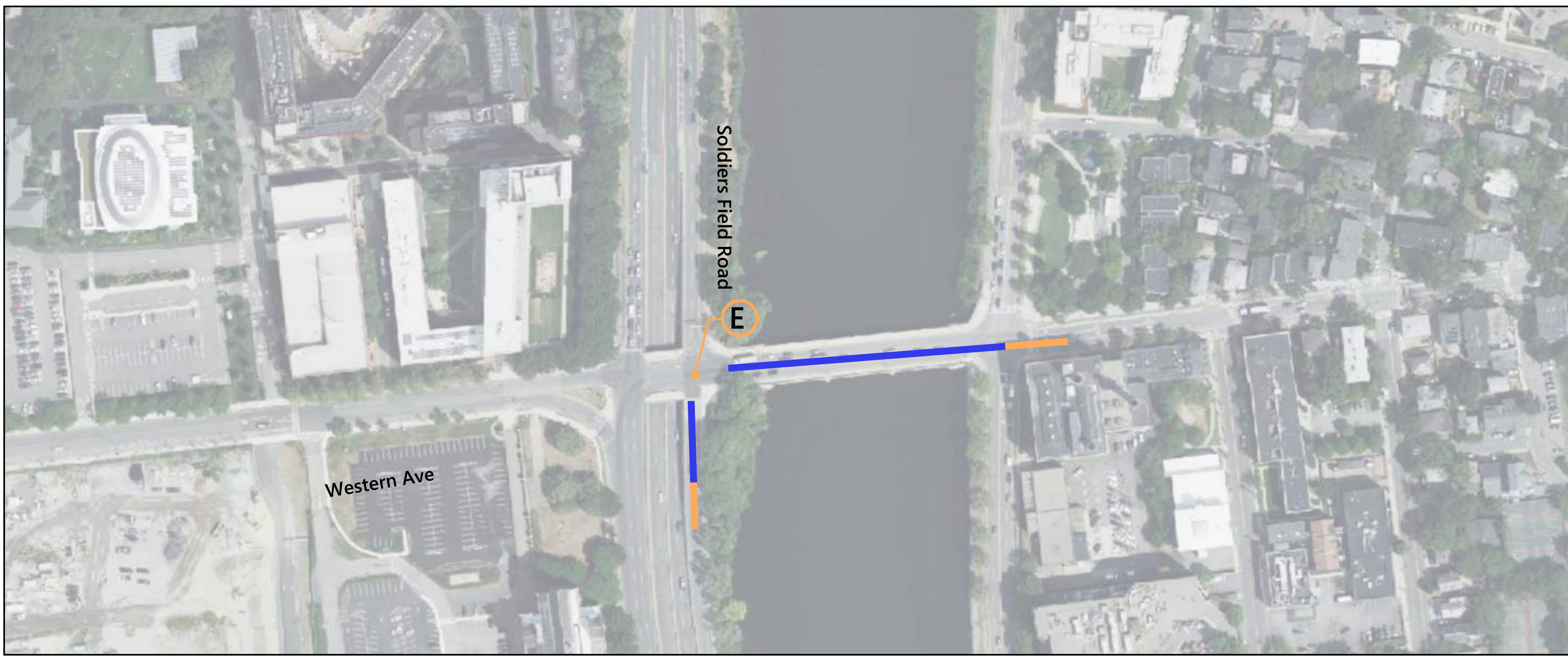
\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2030 Conditions - PM.dwg

Western Ave at Soldiers Field Road WB

X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue



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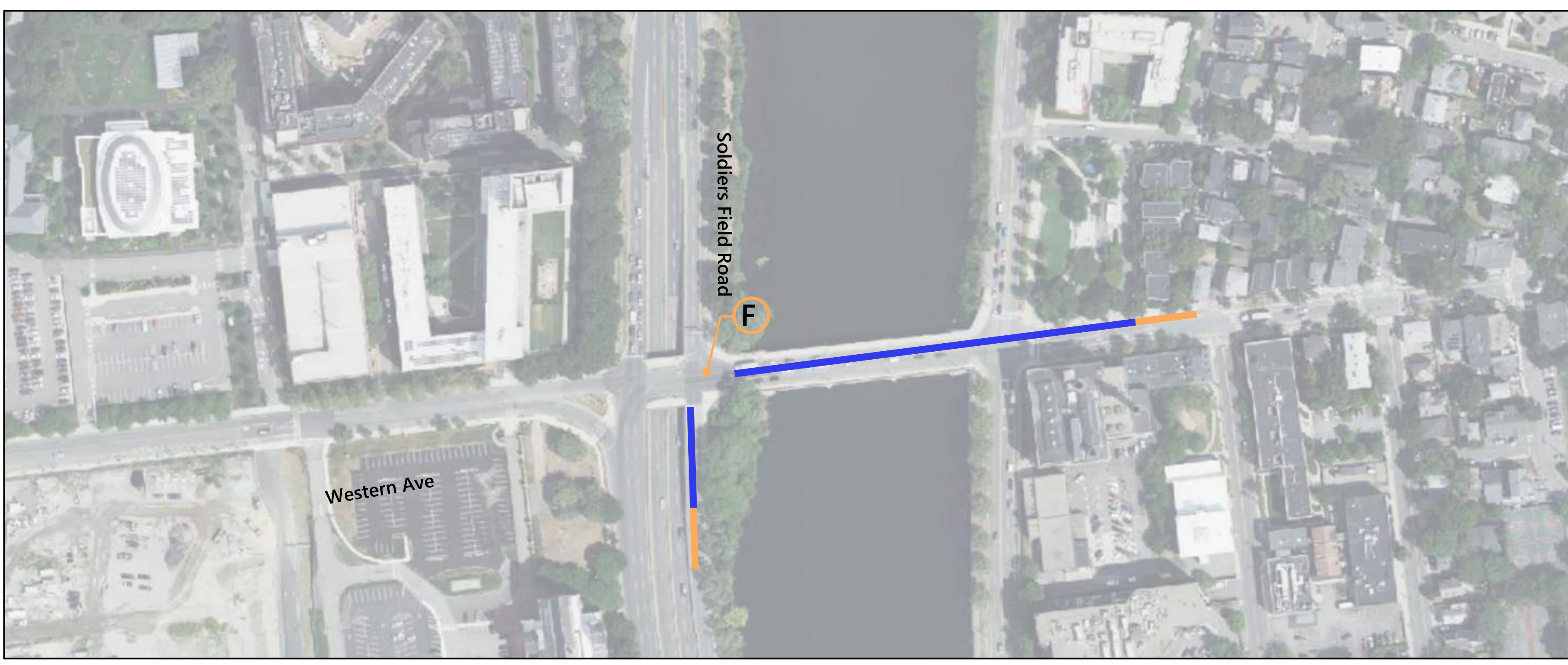

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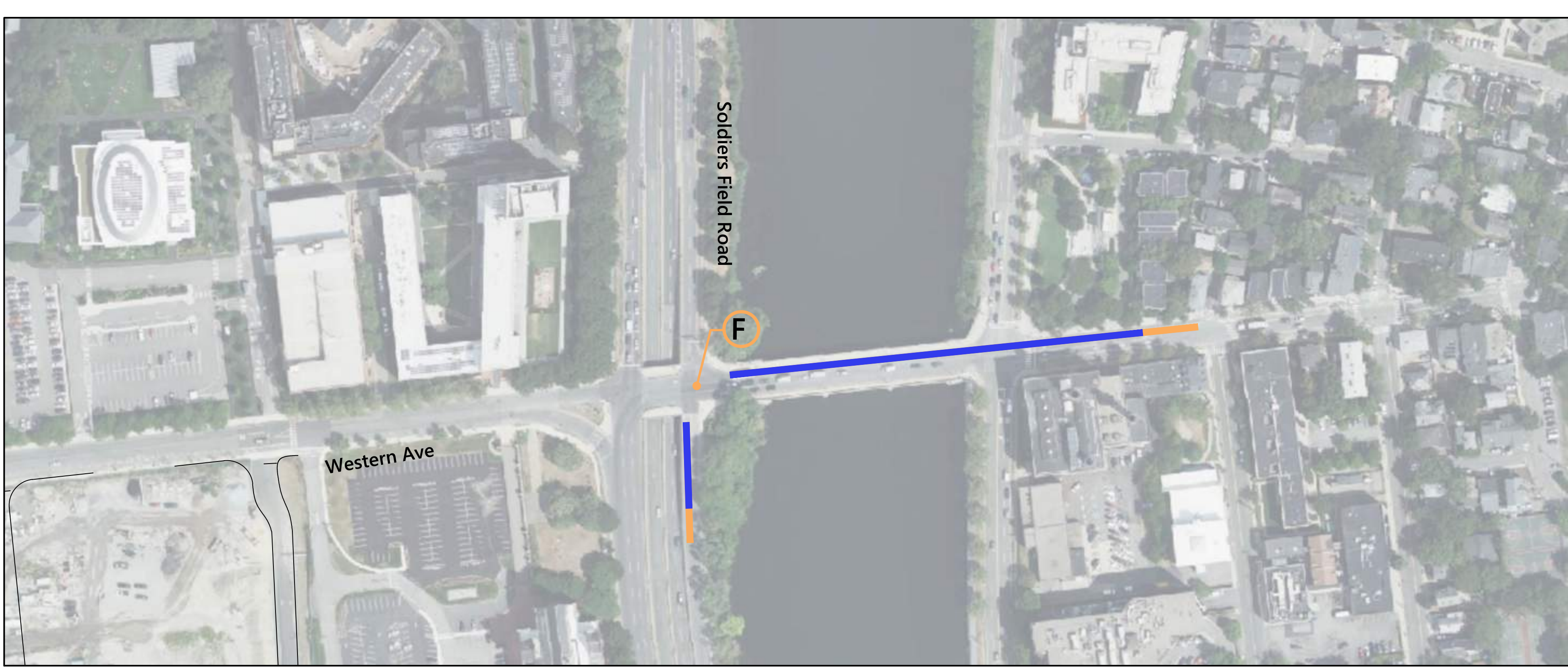


Build (2030)

vhb

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 125 250 Feet

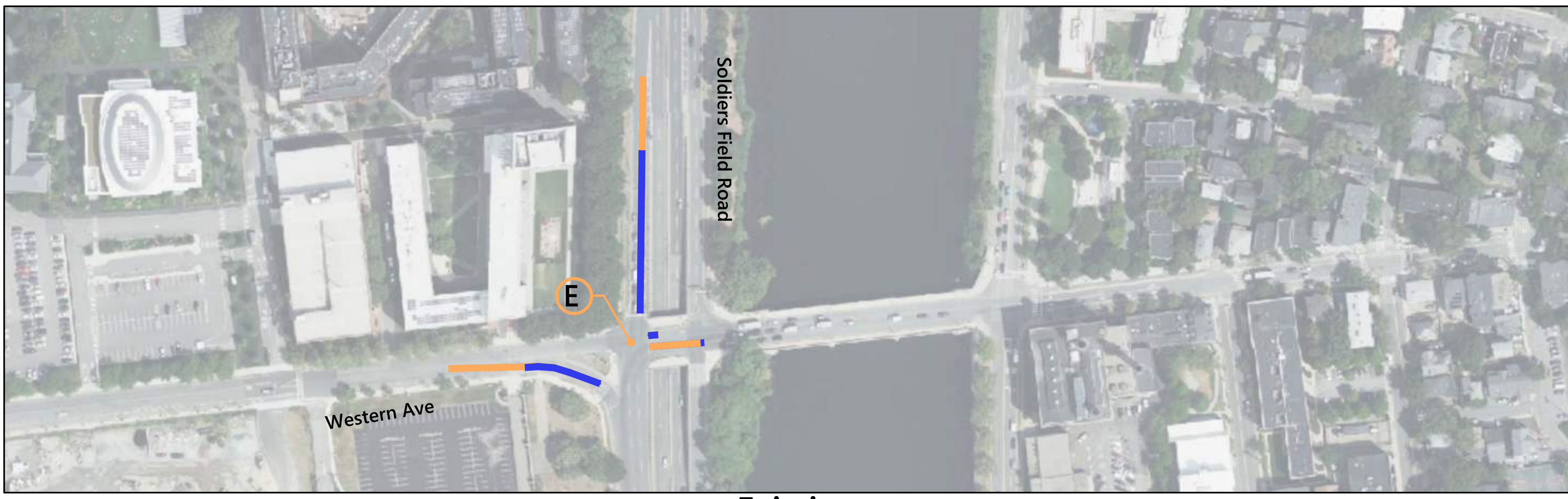
Enterprise Research Campus Project
Boston, MA

Western Ave at Soldiers Field Road EB

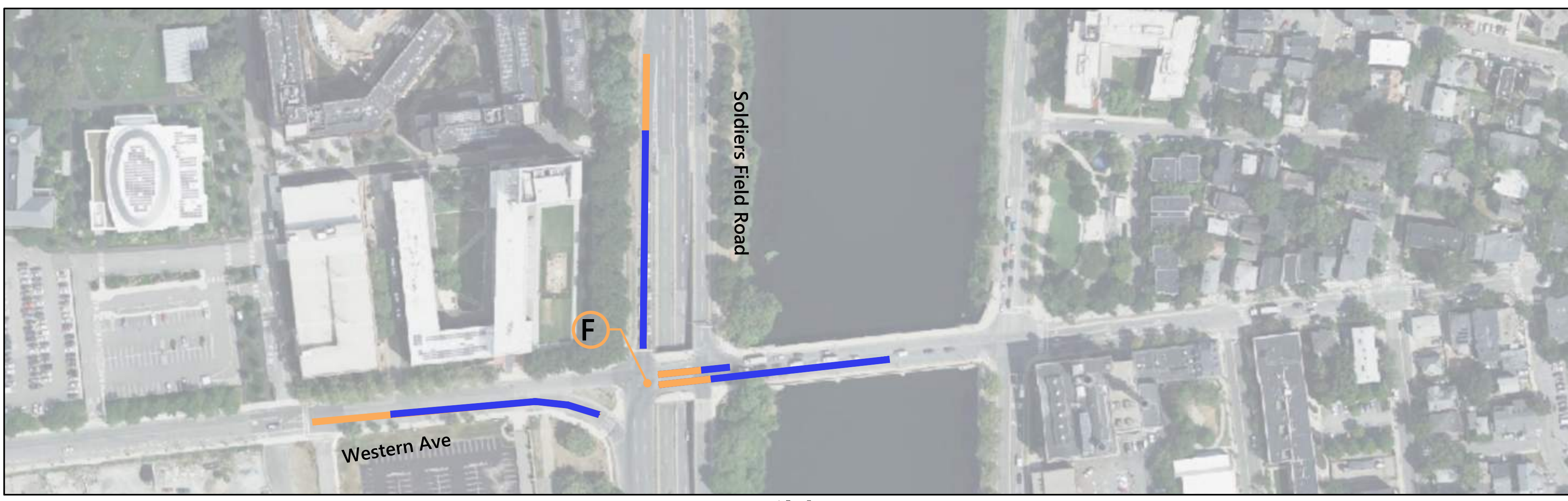
X Overall Intersection Level of Service

50th Percentile Queue

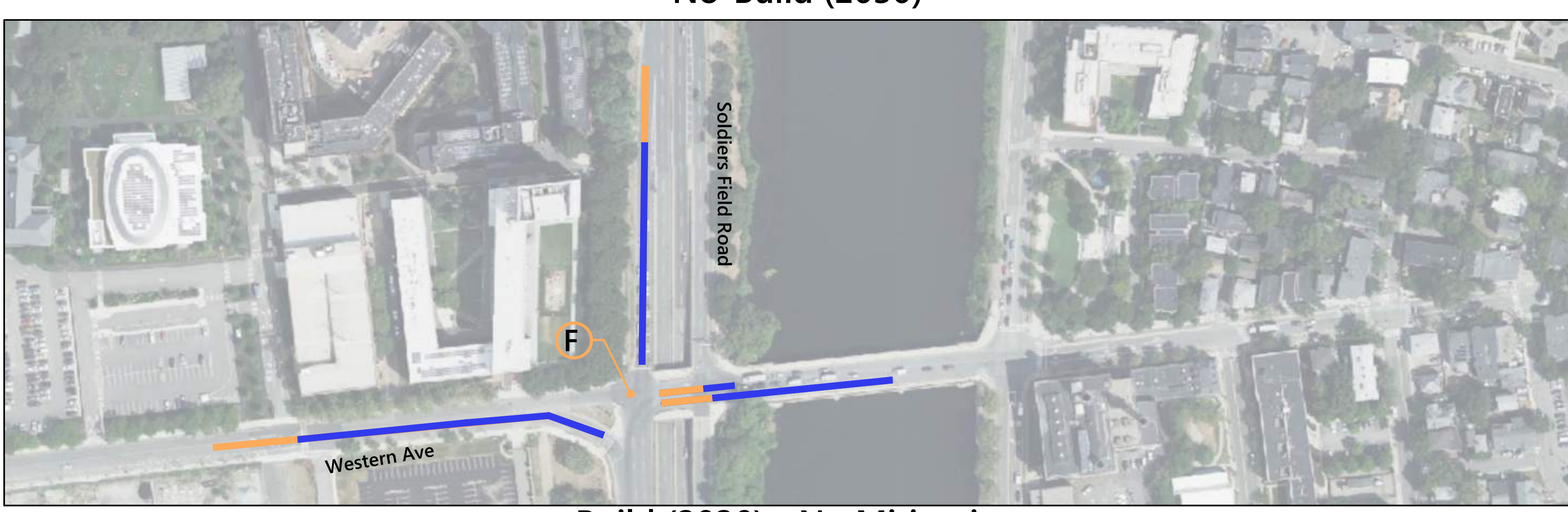
95th Percentile Queue



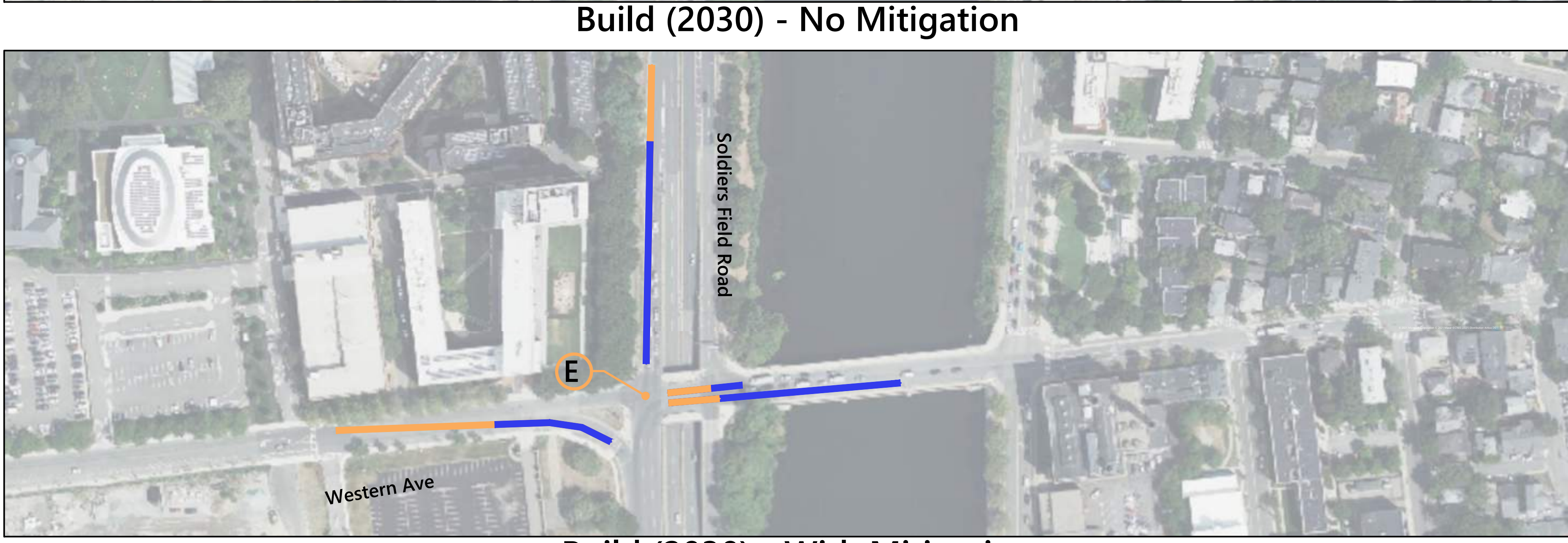
Existing



No-Build (2030)



Build (2030) - No Mitigation



Build (2030) - With Mitigation

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 125 250 Feet

Enterprise Research Campus Project
Boston, MA

Western Ave at Kresge Way/ East Drive

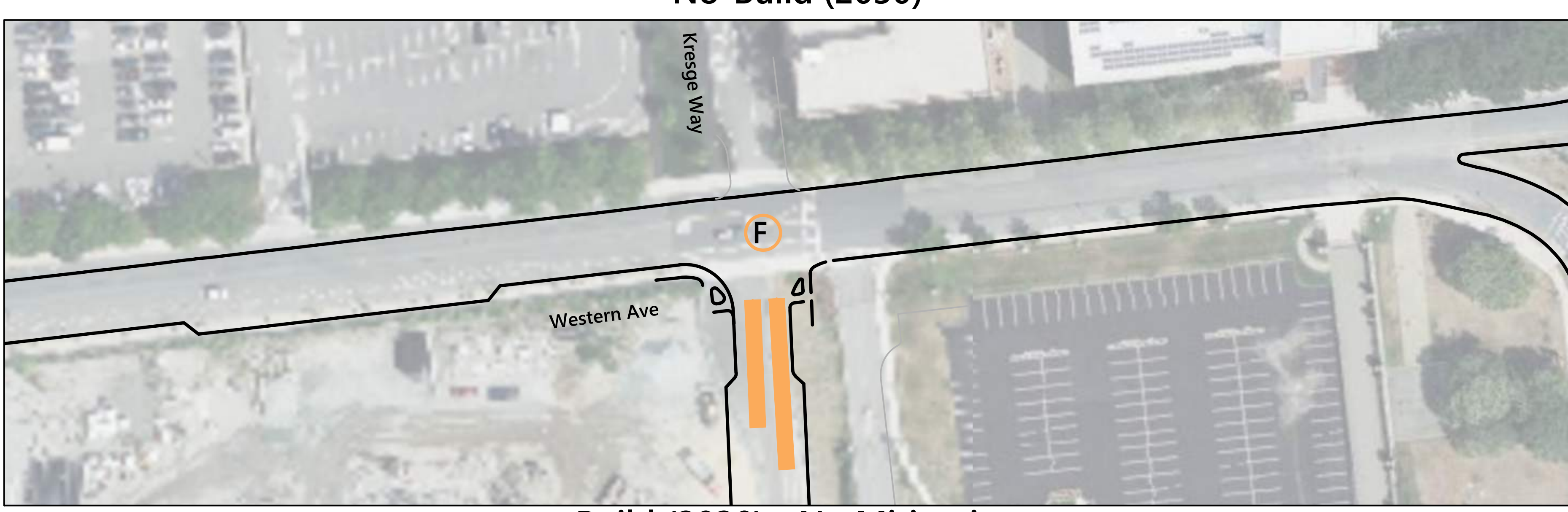
X Overall Intersection Level of Service

50th Percentile Queue

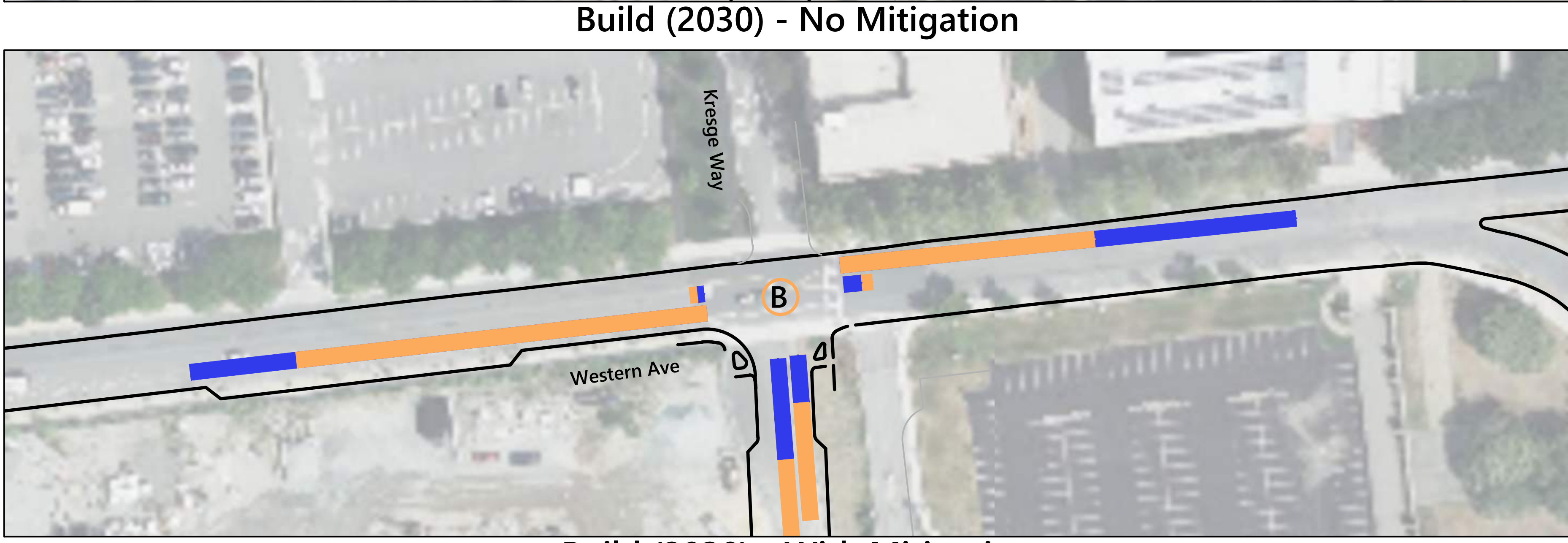
95th Percentile Queue

Existing

No-Build (2030)



Build (2030) - No Mitigation



Build (2030) - With Mitigation

vhb

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 50 100 Feet

Enterprise Research Campus Project
Boston, MA

Cattle Drive at Western Ave

X Overall Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

Existing

No-Build (2030)

Build (2030) - No Mitigation

Build (2030) - With Mitigation

Intersection does not exist under 2021 Existing and 2030 No-Build Conditions

2030 Conditions: Evening Peak Hour Queue Diagrams

0 100 200 Feet

Enterprise Research Campus Project
Boston, MA

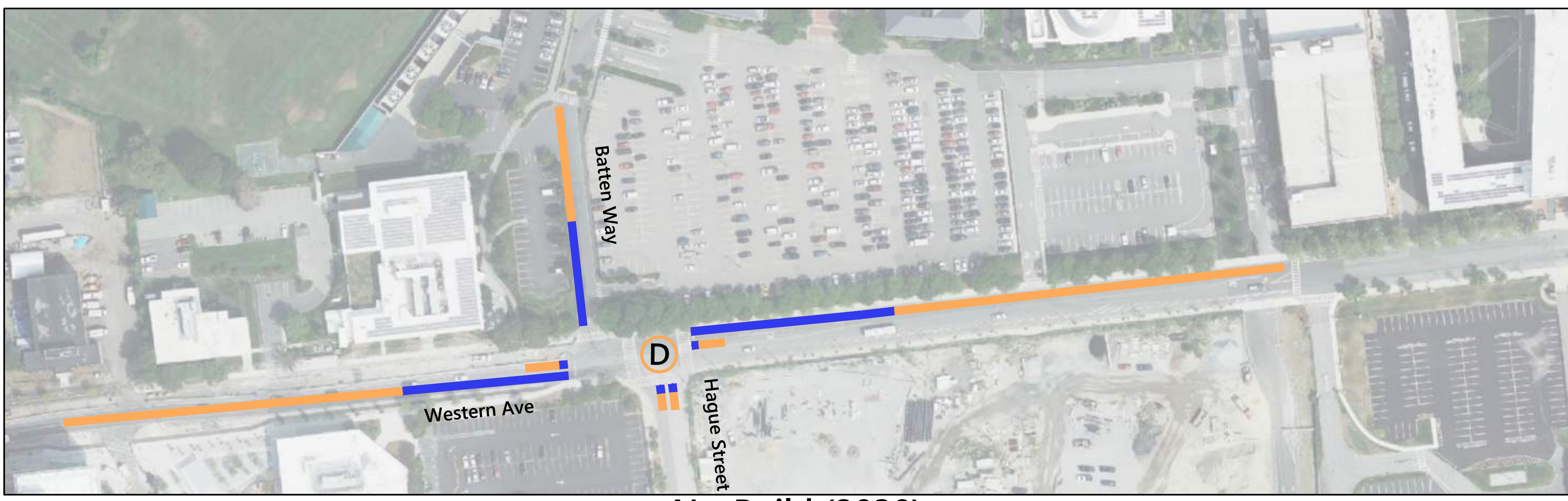
Western Ave at Batten Way/ Hague Street

X Overall Intersection Level of Service

50th Percentile Queue

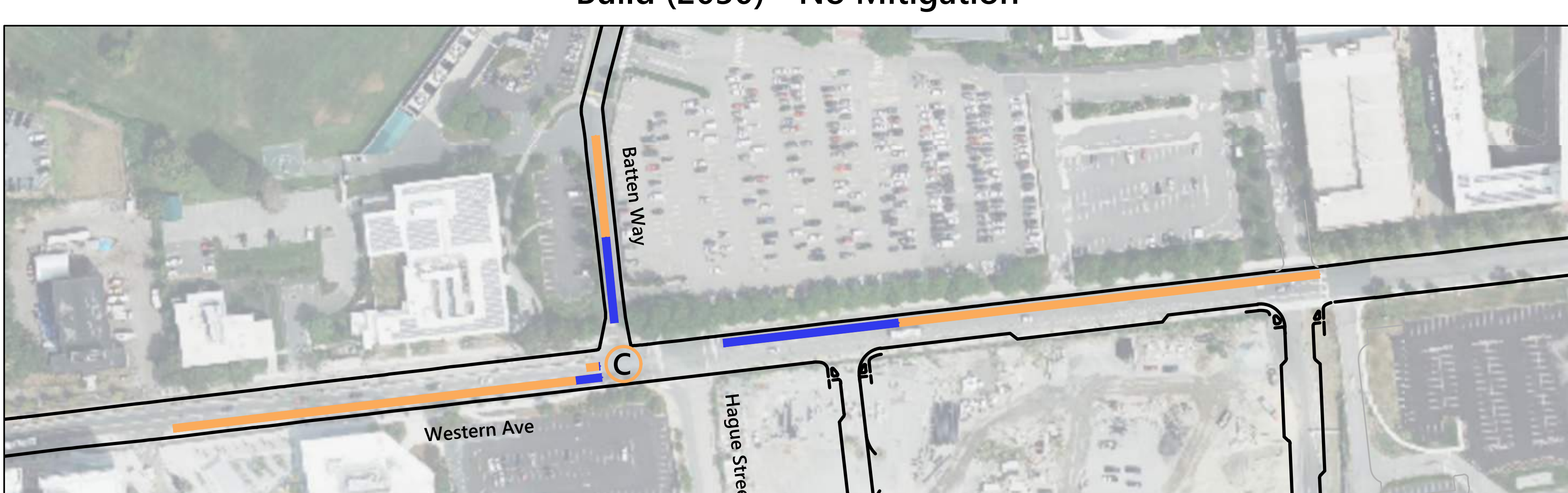
95th Percentile Queue

Existing



No-Build (2030)

Build (2030) - No Mitigation



Build (2030) - With Mitigation

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 100 200 Feet

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Queues\Harvard ERC_2030 Conditions - PM.dwg

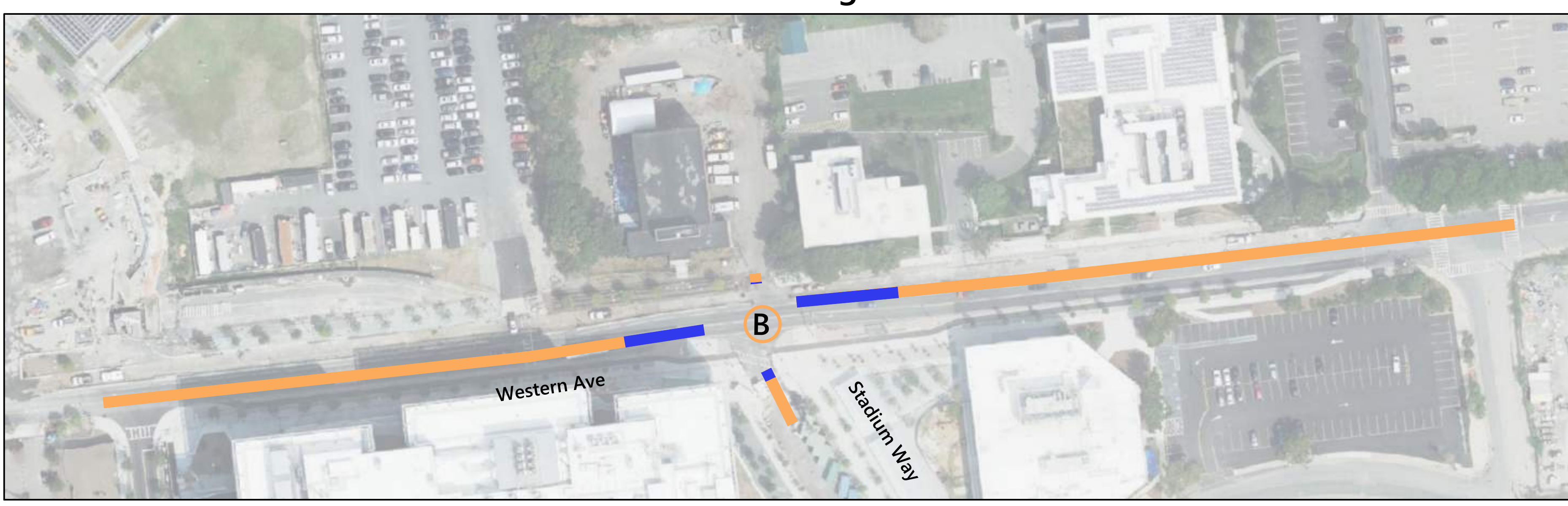
Western Ave at Stadium Way

X Overall Intersection Level of Service

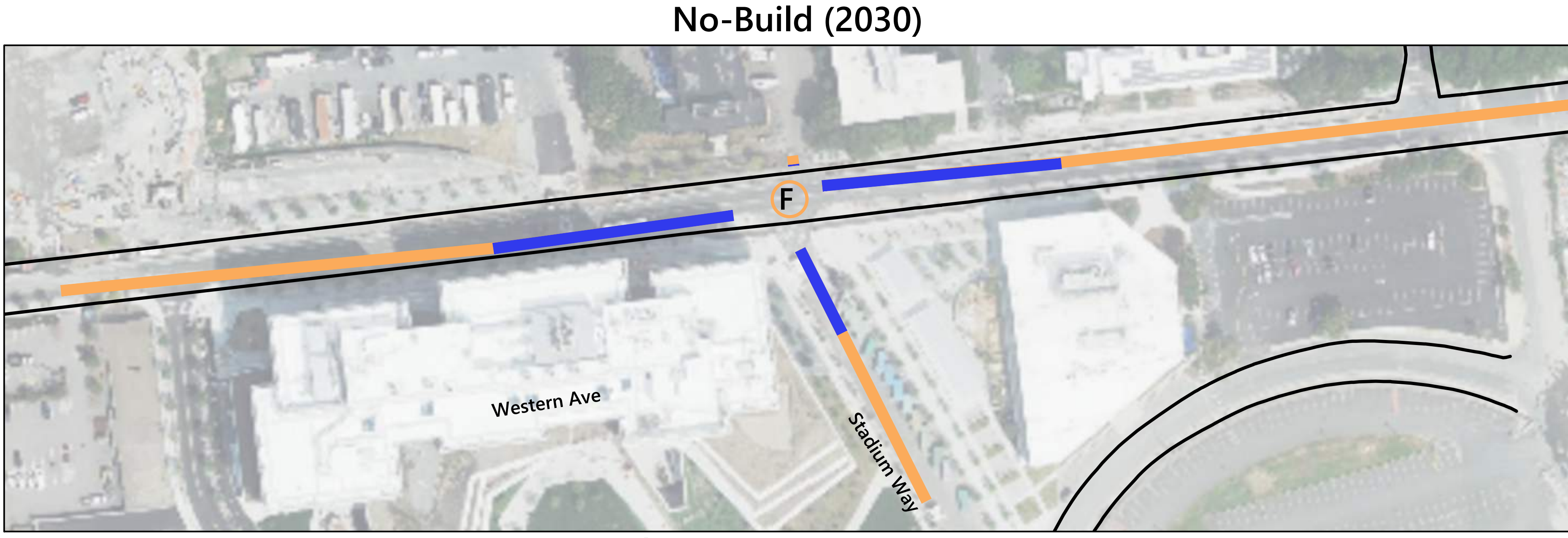
50th Percentile Queue

95th Percentile Queue

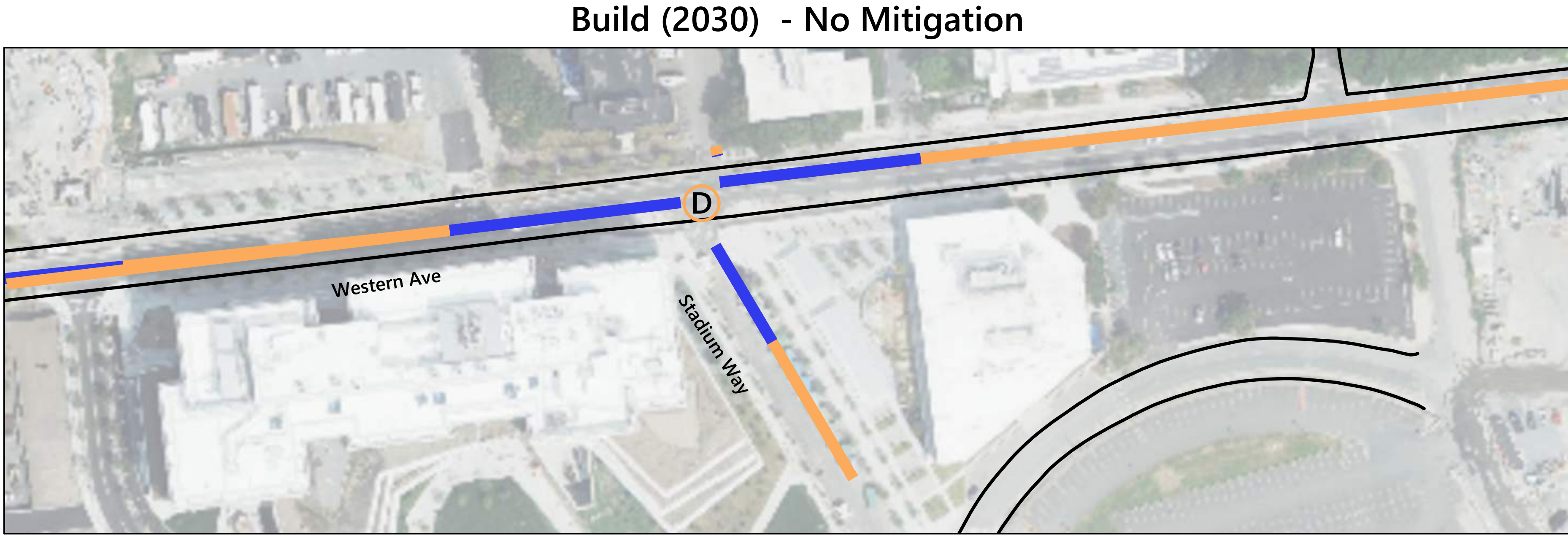
Existing



No-Build (2030)



Build (2030) - No Mitigation



Build (2030) - With Mitigation

Intersection does not exist under 2021 Existing Conditions

vhb

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 75 150 Feet

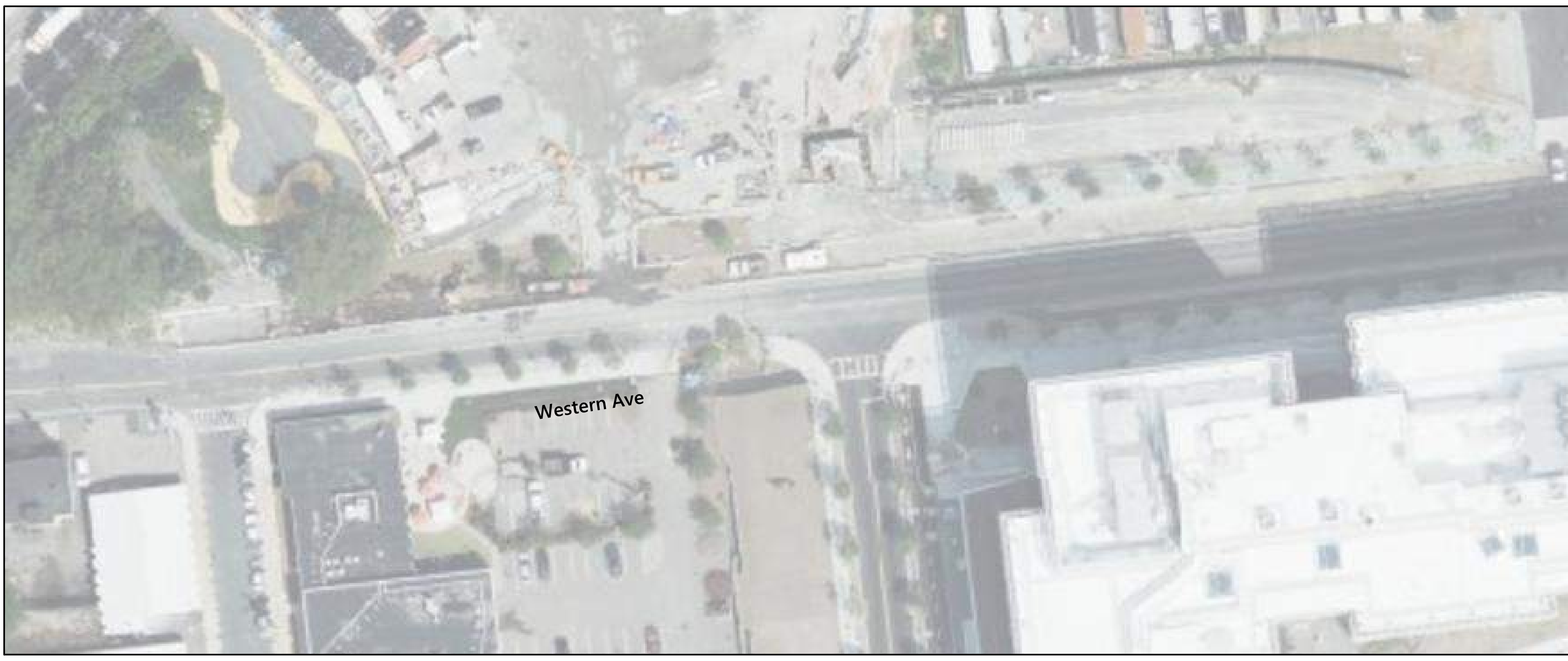
Enterprise Research Campus Project
Boston, MA

Western Ave at Academic Way

X Overall Intersection Level of Service

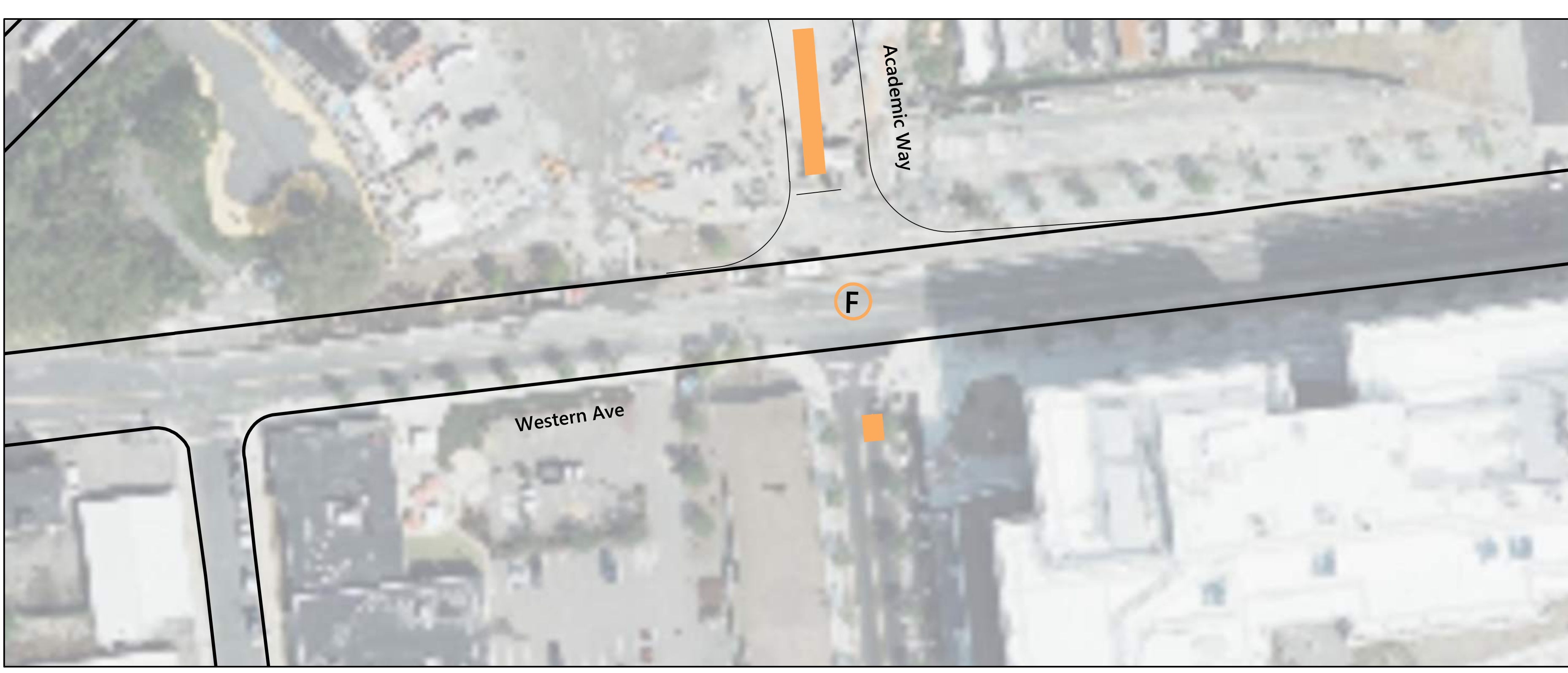
50th Percentile Queue

95th Percentile Queue



Existing

No-Build (2030)



Intersection does not exist under 2021 Existing Conditions

Build (2030)

2030 Conditions: Evening Peak Hour Queue Diagrams

0 40 80 Feet

Enterprise Research Campus Project
Boston, MA

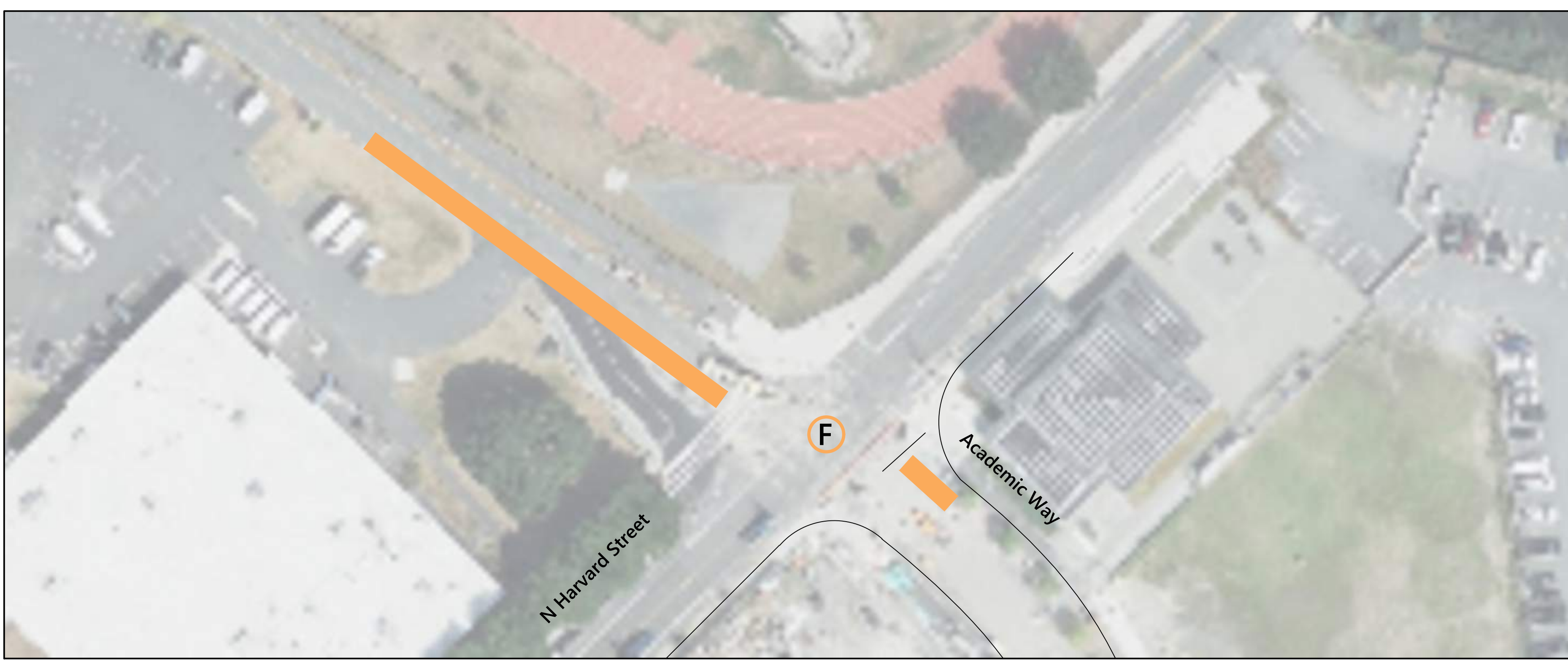
North Harvard Street at Academic Way

X Overall Intersection Level of Service

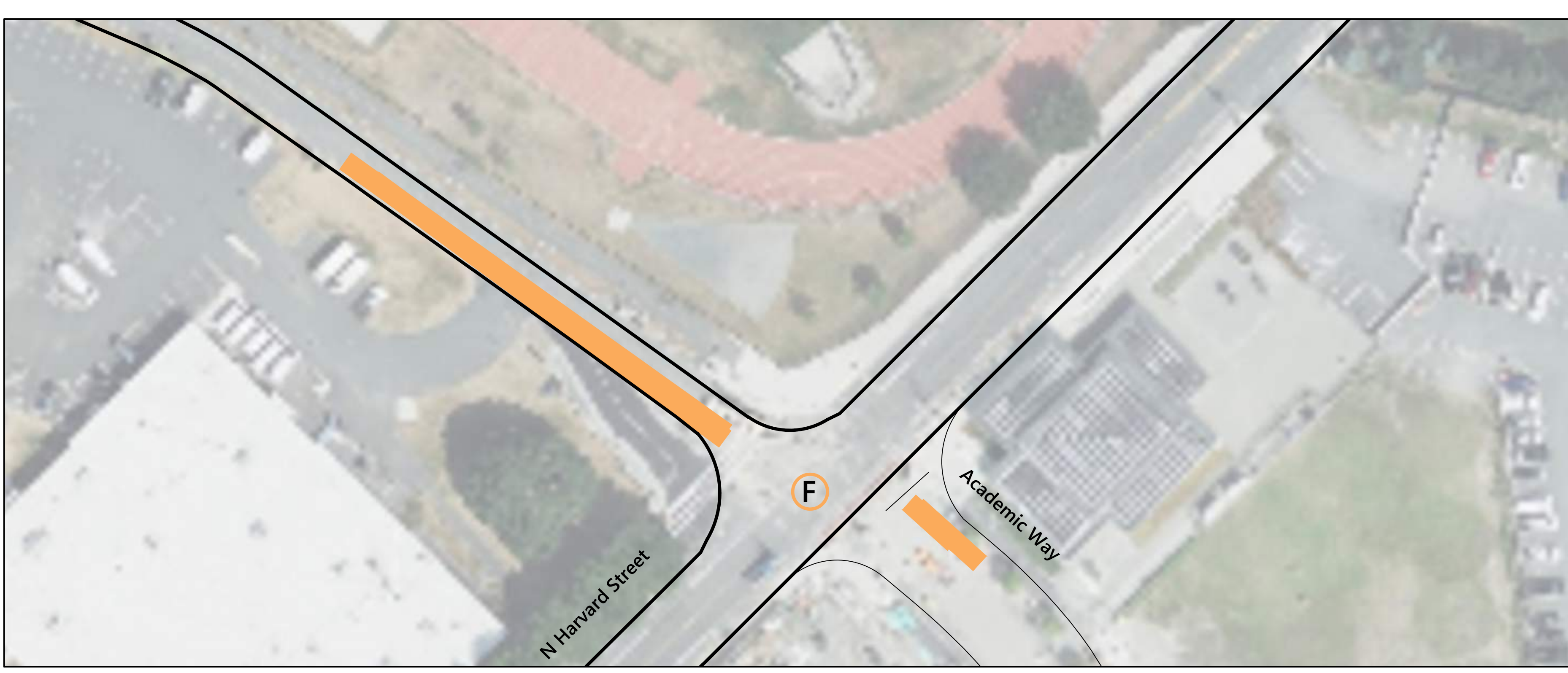
50th Percentile Queue

95th Percentile Queue

Existing



No-Build (2030)



Intersection does not exist under 2021 Existing Conditions

Build (2030)

vhb

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 40 80 Feet

Enterprise Research Campus Project
Boston, MA

Cattle Drive at DEF Drive

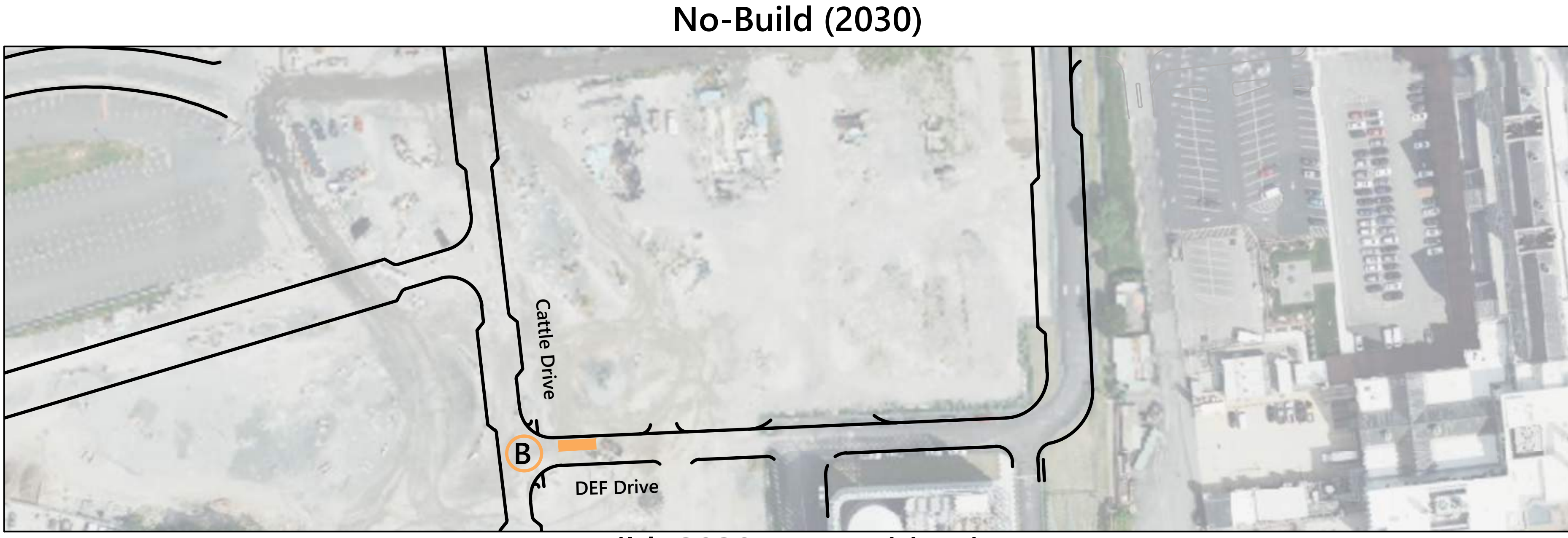
X Overall Intersection Level of Service

50th Percentile Queue

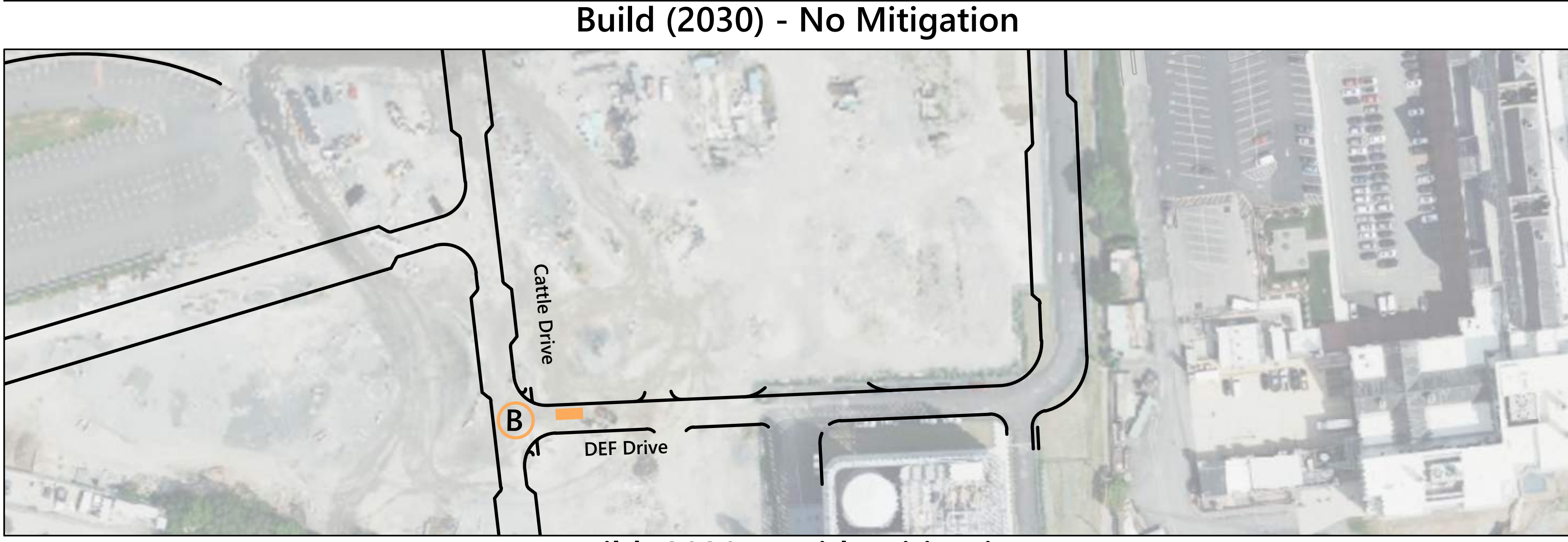
95th Percentile Queue

Existing

No-Build (2030)



Build (2030) - No Mitigation



Build (2030) - With Mitigation

Intersection does not exist under 2021 Existing and 2030 No-Build Conditions

2030 Conditions: Evening Peak Hour
Queue Diagrams

0 50 100 Feet

Enterprise Research Campus Project
Boston, MA

Cattle Drive/ Almy Street at Windom Street

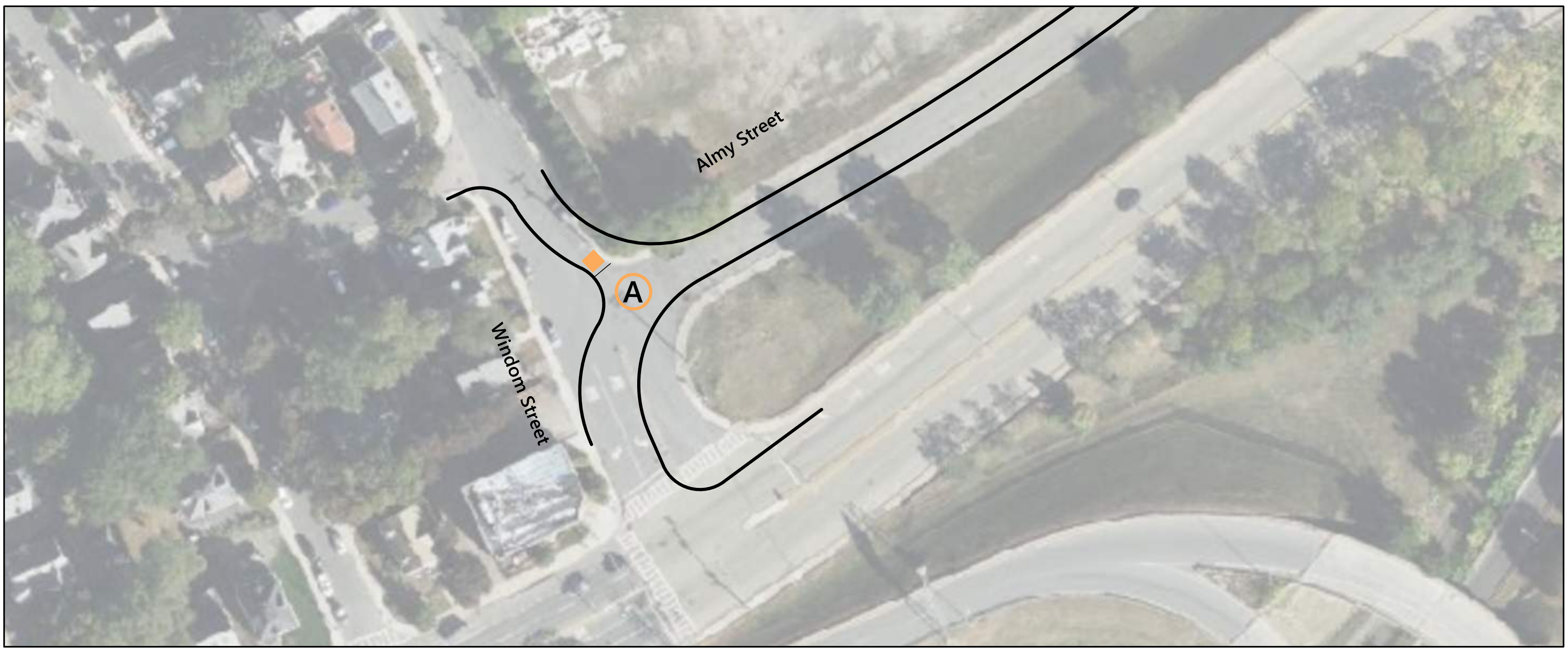
X Overall Intersection Level of Service

50th Percentile Queue

95th Percentile Queue

Existing

No-Build (2030)



Intersection does not exist under 2021 Existing and 2030 No-Build Conditions

Build (2030)

2030 Conditions: Evening Peak Hour Queue Diagrams

0 50 100 Feet

Enterprise Research Campus Project
Boston, MA

Intersection Capacity Analysis Worksheets

2021 Existing Conditions

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1363	747	1017	341
v/c Ratio	1.18	0.60	0.94	0.60
Control Delay	119.2	26.3	39.4	30.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	119.2	26.3	39.4	30.4
Queue Length 50th (ft)	~551	194	210	172
Queue Length 95th (ft)	#685	256	#452	215
Internal Link Dist (ft)	630	2587	542	544
Turn Bay Length (ft)				
Base Capacity (vph)	1156	1236	1078	566
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.18	0.60	0.94	0.60

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	945	350	0	615	95	0	745	180	0	260	2
Future Volume (vph)	0	945	350	0	615	95	0	745	180	0	260	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		11.0			11.0			11.0			11.0	
Lane Util. Factor		0.95			0.95			0.95			1.00	
Frpb, ped/bikes		0.93			0.99			0.95			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.98			0.97			1.00	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		2890			3091			2838			1491	
Flt Permitted		1.00			1.00			1.00			1.00	
Satd. Flow (perm)		2890			3091			2838			1491	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.91	0.91	0.91	0.77	0.77	0.77
Adj. Flow (vph)	0	995	368	0	647	100	0	819	198	0	338	3
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1363	0	0	747	0	0	1017	0	0	341	0
Confl. Peds. (#/hr)			88			37			171			131
Confl. Bikes (#/hr)			60						55			45
Heavy Vehicles (%)	0%	1%	0%	0%	1%	10%	0%	6%	1%	0%	14%	50%
Turn Type		NA			NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases												
Actuated Green, G (s)		40.0			40.0			38.0			38.0	
Effective Green, g (s)		40.0			40.0			38.0			38.0	
Actuated g/C Ratio		0.40			0.40			0.38			0.38	
Clearance Time (s)		11.0			11.0			11.0			11.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		1156			1236			1078			566	
v/s Ratio Prot		c0.47			0.24			c0.36			0.23	
v/s Ratio Perm												
v/c Ratio		1.18			0.60			0.94			0.60	
Uniform Delay, d1		30.0			23.7			30.0			24.9	
Progression Factor		1.00			1.00			0.77			1.00	
Incremental Delay, d2		89.8			0.6			15.1			4.7	
Delay (s)		119.8			24.3			38.1			29.6	
Level of Service		F			C			D			C	
Approach Delay (s)		119.8			24.3			38.1			29.6	
Approach LOS		F			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	66.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	SBT
Lane Group Flow (vph)	257	219	580	707
v/c Ratio	1.19	1.05	0.64	1.45
Control Delay	161.1	116.7	32.2	228.3
Queue Delay	0.0	0.0	0.0	0.2
Total Delay	161.1	116.7	32.2	228.5
Queue Length 50th (ft)	~209	~149	163	~573
Queue Length 95th (ft)	#320	#260	194	m#679
Internal Link Dist (ft)		515	2371	98
Turn Bay Length (ft)				
Base Capacity (vph)	216	208	912	488
Starvation Cap Reductn	0	0	0	14
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.19	1.05	0.64	1.49

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	321	10	55	0	0	0	0	430	40	397	260	0
Future Volume (vph)	321	10	55	0	0	0	0	430	40	397	260	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	10	10	10	10	12
Total Lost time (s)	4.0	4.0						4.0			4.0	
Lane Util. Factor	0.95	0.95						0.95			1.00	
Frpb, ped/bikes	1.00	0.93						0.97			1.00	
Flpb, ped/bikes	1.00	1.00						1.00			0.98	
Frt	1.00	0.95						0.99			1.00	
Flt Protected	0.95	0.97						1.00			0.97	
Satd. Flow (prot)	1543	1373						2772			1481	
Flt Permitted	0.95	0.97						1.00			0.38	
Satd. Flow (perm)	1543	1373						2772			582	
Peak-hour factor, PHF	0.81	0.81	0.81	0.25	0.25	0.25	0.81	0.81	0.81	0.93	0.93	0.93
Adj. Flow (vph)	396	12	68	0	0	0	0	531	49	427	280	0
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	257	203	0	0	0	0	0	580	0	0	707	0
Confl. Peds. (#/hr)			42						266	266		
Confl. Bikes (#/hr)			2						82			
Heavy Vehicles (%)	0%	0%	7%	0%	0%	0%	0%	5%	0%	0%	7%	0%
Turn Type	Split	NA						NA		custom	NA	
Protected Phases	4	4						2		1	6 8 10 7	
Permitted Phases										6 8		
Actuated Green, G (s)	14.0	14.0						33.0			63.0	
Effective Green, g (s)	14.0	14.0						33.0			63.0	
Actuated g/C Ratio	0.14	0.14						0.33			0.63	
Clearance Time (s)	4.0	4.0						4.0				
Vehicle Extension (s)	2.0	2.0						2.0				
Lane Grp Cap (vph)	216	192						914			456	
v/s Ratio Prot	c0.17	0.15						0.21			c0.15	
v/s Ratio Perm											c0.82	
v/c Ratio	1.19	1.06						0.63			1.55	
Uniform Delay, d1	43.0	43.0						28.4			18.5	
Progression Factor	1.00	1.00						1.00			1.42	
Incremental Delay, d2	122.0	80.4						3.4			252.2	
Delay (s)	165.0	123.4						31.7			278.4	
Level of Service	F	F						C			F	
Approach Delay (s)		145.8			0.0			31.7			278.4	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	161.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	181	285	84	373	211	303	189	135
v/c Ratio	0.59	0.49	0.23	0.80	0.80	0.65	0.81	0.43
Control Delay	34.6	38.9	25.1	54.3	59.4	43.2	74.3	38.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	38.9	25.1	54.3	59.4	43.3	74.3	38.0
Queue Length 50th (ft)	100	206	44	301	143	222	152	87
Queue Length 95th (ft)	#183	320	84	#514	178	260	189	116
Internal Link Dist (ft)		468		1050		175	2371	
Turn Bay Length (ft)	250		175		125			160
Base Capacity (vph)	307	584	397	464	263	561	317	354
Starvation Cap Reductn	0	0	0	0	0	7	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.49	0.21	0.80	0.80	0.55	0.60	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	255	5	80	275	80	160	195	35	20	120	100
Future Volume (vph)	165	255	5	80	275	80	160	195	35	20	120	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	4.0			6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	0.97			1.00	0.89
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.96	1.00			0.98	1.00
Frt	1.00	1.00		1.00	0.97		1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.99	1.00
Satd. Flow (prot)	1567	1608		1526	1462		1484	1501			1531	1228
Flt Permitted	0.30	1.00		0.51	1.00		0.45	1.00			0.90	1.00
Satd. Flow (perm)	494	1608		818	1462		702	1501			1391	1228
Peak-hour factor, PHF	0.91	0.91	0.91	0.95	0.95	0.95	0.76	0.76	0.76	0.74	0.74	0.74
Adj. Flow (vph)	181	280	5	84	289	84	211	257	46	27	162	135
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	181	285	0	84	373	0	211	303	0	0	189	135
Confl. Peds. (#/hr)	42		34	34		42	69		64	64		69
Confl. Bikes (#/hr)			26			16			48			13
Heavy Vehicles (%)	3%	6%	0%	5%	8%	11%	5%	8%	9%	20%	7%	5%
Bus Blockages (#/hr)	0	0	0	0	4	4	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		D.P+P	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6		7	7 8			8	5
Permitted Phases	2			6			8			8		8
Actuated Green, G (s)	51.5	41.3		44.5	37.8		29.2	33.2			18.9	29.1
Effective Green, g (s)	51.5	41.3		44.5	37.8		29.2	33.2			18.9	29.1
Actuated g/C Ratio	0.44	0.35		0.38	0.32		0.25	0.28			0.16	0.25
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0				6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0				2.0	2.0
Lane Grp Cap (vph)	308	563		349	469		242	423			223	365
v/s Ratio Prot	c0.05	0.18		0.01	c0.26		c0.08	0.20				0.03
v/s Ratio Perm	c0.21			0.08			c0.14				0.14	0.08
v/c Ratio	0.59	0.51		0.24	0.80		0.87	0.72			0.85	0.37
Uniform Delay, d1	22.9	30.2		24.2	36.5		40.9	38.1			48.0	36.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.8	3.2		0.1	13.1		26.6	4.8			23.7	0.2
Delay (s)	24.7	33.4		24.4	49.5		67.5	42.8			71.8	37.0
Level of Service	C	C		C	D		E	D			E	D
Approach Delay (s)		30.1			44.9			52.9			57.3	
Approach LOS		C			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	45.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	117.8	Sum of lost time (s)	29.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	136	28	421	477
v/c Ratio	0.58	0.14	0.50	0.60
Control Delay	27.3	24.3	13.2	16.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	27.3	24.3	13.2	16.2
Queue Length 50th (ft)	27	7	64	81
Queue Length 95th (ft)	77	27	331	#415
Internal Link Dist (ft)	423	223	1753	102
Turn Bay Length (ft)				
Base Capacity (vph)	406	393	849	790
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.33	0.07	0.50	0.60

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	0	40	5	10	5	25	350	0	0	355	45
Future Volume (vph)	65	0	40	5	10	5	25	350	0	0	355	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	10	12	12	10	10
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.97			0.97			1.00			0.99	
Flpb, ped/bikes		0.95			0.99			1.00			1.00	
Frt		0.95			0.97			1.00			0.98	
Flt Protected		0.97			0.99			1.00			1.00	
Satd. Flow (prot)		1311			1252			1354			1213	
Flt Permitted		0.80			0.92			0.96			1.00	
Satd. Flow (perm)		1075			1166			1299			1213	
Peak-hour factor, PHF	0.77	0.77	0.77	0.71	0.71	0.71	0.89	0.89	0.89	0.84	0.84	0.84
Adj. Flow (vph)	84	0	52	7	14	7	28	393	0	0	423	54
RTOR Reduction (vph)	0	53	0	0	6	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	83	0	0	22	0	0	421	0	0	477	0
Confl. Peds. (#/hr)	29		16	16		29	54		32	32		54
Confl. Bikes (#/hr)			1			2			17			5
Heavy Vehicles (%)	6%	0%	8%	0%	11%	0%	19%	14%	0%	0%	14%	22%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		5			5			1			1	
Permitted Phases	5			5			1					
Actuated Green, G (s)		12.9			12.9			50.6			50.6	
Effective Green, g (s)		12.9			12.9			50.6			50.6	
Actuated g/C Ratio		0.16			0.16			0.63			0.63	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		172			186			815			761	
v/s Ratio Prot											c0.39	
v/s Ratio Perm		c0.08			0.02			0.32				
v/c Ratio		0.48			0.12			0.52			0.63	
Uniform Delay, d1		30.8			29.0			8.3			9.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.9			0.4			2.3			3.9	
Delay (s)		33.7			29.4			10.6			13.1	
Level of Service		C			C			B			B	
Approach Delay (s)		33.7			29.4			10.6			13.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	151	1615	989	364	382	169
v/c Ratio	0.79	0.91	0.84	0.53	0.81	0.25
Control Delay	73.7	29.5	13.1	4.1	50.5	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.7	29.5	13.1	4.1	50.5	13.8
Queue Length 50th (ft)	103	501	258	45	248	53
Queue Length 95th (ft)	#188	#654	m301	m51	#395	92
Internal Link Dist (ft)		431	869		1753	
Turn Bay Length (ft)	200			200		85
Base Capacity (vph)	225	1773	1184	692	471	711
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.91	0.84	0.53	0.81	0.24

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	145	1550	910	335	340	150
Future Volume (vph)	145	1550	910	335	340	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	11
Total Lost time (s)	6.5	5.5	5.5	5.5	6.5	6.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.94	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1417	3025	3020	1260	1547	1338
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1417	3025	3020	1260	1547	1338
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.89	0.89
Adj. Flow (vph)	151	1615	989	364	382	169
RTOR Reduction (vph)	0	0	0	198	0	13
Lane Group Flow (vph)	151	1615	989	166	382	156
Confl. Peds. (#/hr)	17			17		11
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	7%	3%	4%	8%	5%	5%
Bus Blockages (#/hr)	0	4	0	0	0	0
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	1	6	2		4	1 4
Permitted Phases				2		
Actuated Green, G (s)	14.8	64.5	43.2	43.2	33.5	54.8
Effective Green, g (s)	14.8	64.5	43.2	43.2	33.5	54.8
Actuated g/C Ratio	0.13	0.59	0.39	0.39	0.30	0.50
Clearance Time (s)	6.5	5.5	5.5	5.5	6.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	3.0	
Lane Grp Cap (vph)	190	1773	1186	494	471	666
v/s Ratio Prot	0.11	c0.53	0.33		c0.25	0.12
v/s Ratio Perm				0.13		
v/c Ratio	0.79	0.91	0.83	0.34	0.81	0.23
Uniform Delay, d1	46.1	20.2	30.2	23.4	35.3	15.7
Progression Factor	1.00	1.00	0.28	0.65	1.00	1.00
Incremental Delay, d2	18.9	8.6	3.2	0.8	14.1	0.1
Delay (s)	65.0	28.8	11.7	16.0	49.4	15.8
Level of Service	E	C	B	B	D	B
Approach Delay (s)		31.9	12.9		39.1	
Approach LOS		C	B		D	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	16	654	1443	568	306	29
v/c Ratio	0.10	0.33	0.90	0.57	0.74	0.08
Control Delay	10.3	8.0	32.0	3.7	51.5	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	8.0	32.0	3.7	51.5	20.2
Queue Length 50th (ft)	3	78	458	0	202	7
Queue Length 95th (ft)	m4	m103	#594	51	281	29
Internal Link Dist (ft)		869	980		202	
Turn Bay Length (ft)	170			250		80
Base Capacity (vph)	155	1972	1604	988	414	356
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.33	0.90	0.57	0.74	0.08

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	595	1385	545	260	25
Future Volume (vph)	15	595	1385	545	260	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	16	16
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.96	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1285	2973	2991	1352	1823	1511
Flt Permitted	0.09	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	117	2973	2991	1352	1823	1511
Peak-hour factor, PHF	0.91	0.91	0.96	0.96	0.85	0.85
Adj. Flow (vph)	16	654	1443	568	306	29
RTOR Reduction (vph)	0	0	0	263	0	13
Lane Group Flow (vph)	16	654	1443	305	306	16
Confl. Peds. (#/hr)	9			9		8
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	18%	2%	5%	0%	1%	9%
Turn Type	pm+pt	NA	NA	Perm	Prot	Prot
Protected Phases	6	1 6	1		5	5
Permitted Phases	1 6			1		
Actuated Green, G (s)	67.0	73.0	59.0	59.0	25.0	25.0
Effective Green, g (s)	67.0	73.0	59.0	59.0	25.0	25.0
Actuated g/C Ratio	0.61	0.66	0.54	0.54	0.23	0.23
Clearance Time (s)	6.0		6.0	6.0	6.0	6.0
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	156	1972	1604	725	414	343
v/s Ratio Prot	0.01	c0.22	c0.48		c0.17	0.01
v/s Ratio Perm	0.05			0.23		
v/c Ratio	0.10	0.33	0.90	0.42	0.74	0.05
Uniform Delay, d1	26.8	8.0	22.8	15.3	39.5	33.2
Progression Factor	1.07	0.97	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.2	8.5	1.8	11.2	0.3
Delay (s)	29.3	7.9	31.3	17.0	50.7	33.4
Level of Service	C	A	C	B	D	C
Approach Delay (s)		8.4	27.3		49.2	
Approach LOS		A	C		D	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	NBT	NEL	NER
Lane Group Flow (vph)	11	889	404	142	312	617
v/c Ratio	0.07	1.97	0.33	0.56	0.55	0.54
Control Delay	53.2	475.4	9.2	24.9	32.1	30.1
Queue Delay	0.0	0.7	1.3	4.4	61.0	54.9
Total Delay	53.2	476.1	10.5	29.4	93.1	85.1
Queue Length 50th (ft)	9	~659	4	23	199	220
Queue Length 95th (ft)	29	#793	3	55	287	279
Internal Link Dist (ft)		199	90	45	468	
Turn Bay Length (ft)	100					
Base Capacity (vph)	168	451	1233	252	571	1144
Starvation Cap Reductn	0	0	600	0	0	0
Spillback Cap Reductn	0	31	0	58	320	683
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	2.12	0.64	0.73	1.24	1.34

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	10	845	170	145	5	15	85	2	5	820
Future Volume (vph)	10	845	170	145	5	15	85	2	5	820
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	8.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95	0.95			1.00			1.00	0.91
Frpb, ped/bikes	1.00	1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.93			0.89			0.85	0.85
Flt Protected	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1177	3160	2964			1490			1378	2544
Flt Permitted	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1177	3160	2964			1490			1378	2544
Peak-hour factor, PHF	0.95	0.95	0.78	0.78	0.74	0.74	0.74	0.89	0.89	0.89
Adj. Flow (vph)	11	889	218	186	7	20	115	2	6	921
RTOR Reduction (vph)	0	0	107	0	0	104	0	0	0	0
Lane Group Flow (vph)	11	889	297	0	0	39	0	0	312	617
Confl. Peds. (#/hr)	9			9					9	
Confl. Bikes (#/hr)				1						
Heavy Vehicles (%)	38%	2%	1%	0%	0%	8%	1%	0%	100%	4%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Turn Type	Split	NA	NA		Split	NA		Perm	pm+pt	custom
Protected Phases	3	3	4 5		2	2			1	1 5
Permitted Phases								1 5	5	1 5
Actuated Green, G (s)	20.0	20.0	56.0			14.0			58.0	63.0
Effective Green, g (s)	20.0	20.0	56.0			14.0			58.0	63.0
Actuated g/C Ratio	0.14	0.14	0.40			0.10			0.41	0.45
Clearance Time (s)	5.0	5.0				5.0			5.0	
Vehicle Extension (s)	2.0	2.0				2.0			2.0	
Lane Grp Cap (vph)	168	451	1185			149			620	1144
v/s Ratio Prot	0.01	c0.28	c0.10			c0.03			0.11	c0.24
v/s Ratio Perm									0.12	
v/c Ratio	0.07	1.97	0.25			0.26			0.50	0.54
Uniform Delay, d1	51.9	60.0	28.0			58.2			31.0	28.0
Progression Factor	1.00	1.00	0.51			1.00			1.00	1.00
Incremental Delay, d2	0.7	445.0	0.0			0.3			0.9	0.6
Delay (s)	52.7	505.0	14.4			58.5			31.9	28.6
Level of Service	D	F	B			E			C	C
Approach Delay (s)		499.5	14.4			58.5			29.7	
Approach LOS		F	B			E			C	

Intersection Summary			
HCM 2000 Control Delay	206.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1571	332	285	242	447	65
v/c Ratio	0.72	0.46	0.31	1.22	1.10	0.21
Control Delay	28.0	9.3	1.1	185.4	127.2	1.6
Queue Delay	48.8	29.6	0.0	0.0	0.0	0.0
Total Delay	76.8	38.9	1.1	185.4	127.2	1.6
Queue Length 50th (ft)	386	109	1	~296	~251	0
Queue Length 95th (ft)	m257	m89	m2	#450	#337	0
Internal Link Dist (ft)	90		6		182	
Turn Bay Length (ft)		100				
Base Capacity (vph)	2167	723	927	198	408	308
Starvation Cap Reductn	961	395	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.30	1.01	0.31	1.22	1.10	0.21

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1445	305	10	260	0	0	0	0	360	225	55
Future Volume (vph)	0	1445	305	10	260	0	0	0	0	360	225	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	13	12	12	12	12	12	12	11	11	11
Total Lost time (s)		5.0	5.0		5.0					8.0	8.0	8.0
Lane Util. Factor		0.86	0.86		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.97		1.00					1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		4101	1236		3243					1387	2863	1365
Flt Permitted		1.00	1.00		0.95					0.95	0.98	1.00
Satd. Flow (perm)		4101	1236		3103					1387	2863	1365
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.95	0.95	0.25	0.25	0.25	0.85	0.85	0.85
Adj. Flow (vph)	0	1571	332	11	274	0	0	0	0	424	265	65
RTOR Reduction (vph)	0	0	70	0	0	0	0	0	0	0	0	56
Lane Group Flow (vph)	0	1571	262	0	285	0	0	0	0	242	447	9
Confl. Peds. (#/hr)			31	31								8
Confl. Bikes (#/hr)			11									
Heavy Vehicles (%)	0%	4%	1%	0%	0%	0%	0%	0%	0%	3%	3%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		1 2 3		5	1 5					4	4	
Permitted Phases			1 2 3									4
Actuated Green, G (s)		74.0	74.0		58.0					20.0	20.0	20.0
Effective Green, g (s)		74.0	74.0		58.0					20.0	20.0	20.0
Actuated g/C Ratio		0.53	0.53		0.41					0.14	0.14	0.14
Clearance Time (s)										8.0	8.0	8.0
Vehicle Extension (s)										2.0	2.0	2.0
Lane Grp Cap (vph)		2167	653		1313					198	409	195
v/s Ratio Prot		c0.38			c0.04					c0.17	0.16	
v/s Ratio Perm			0.21		0.05							0.01
v/c Ratio		0.72	0.40		0.22					1.22	1.09	0.05
Uniform Delay, d1		25.2	19.7		26.4					60.0	60.0	51.8
Progression Factor		1.09	0.84		0.03					1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0		0.1					136.6	71.9	0.0
Delay (s)		27.5	16.6		0.8					196.6	131.9	51.8
Level of Service		C	B		A					F	F	D
Approach Delay (s)		25.6			0.8			0.0			145.8	
Approach LOS		C			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	54.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	NBT	SBT
Lane Group Flow (vph)	1120	760	853	995
v/c Ratio	0.84	1.22	0.75	1.07
Control Delay	33.1	138.7	43.7	84.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	33.1	138.7	43.7	84.9
Queue Length 50th (ft)	371	~794	353	~422
Queue Length 95th (ft)	m#785	m#1262	435	#608
Internal Link Dist (ft)	704		451	909
Turn Bay Length (ft)				
Base Capacity (vph)	1339	623	1131	932
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.84	1.22	0.75	1.07

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	890	730	0	0	0	0	715	70	70	885	0
Future Volume (vph)	185	890	730	0	0	0	0	715	70	70	885	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	11	11	12	11	11
Total Lost time (s)		6.0	6.0					5.0			6.0	
Lane Util. Factor		0.95	1.00					0.95			0.95	
Frpb, ped/bikes		1.00	1.00					1.00			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		1.00	0.85					0.99			1.00	
Flt Protected		0.99	1.00					1.00			1.00	
Satd. Flow (prot)		3128	1454					3092			3129	
Flt Permitted		0.99	1.00					1.00			0.62	
Satd. Flow (perm)		3128	1454					3092			1941	
Peak-hour factor, PHF	0.96	0.96	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	193	927	760	0	0	0	0	777	76	73	922	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	1120	760	0	0	0	0	848	0	0	995	0
Confl. Peds. (#/hr)	6		17						5	5		
Confl. Bikes (#/hr)			15									
Heavy Vehicles (%)	1%	3%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Prot					NA		pm+pt	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4									6		
Actuated Green, G (s)		56.8	56.8					51.0			63.0	
Effective Green, g (s)		56.8	56.8					51.0			63.0	
Actuated g/C Ratio		0.41	0.41					0.36			0.45	
Clearance Time (s)		6.0	6.0					5.0			6.0	
Vehicle Extension (s)		2.0	2.0					2.0			2.0	
Lane Grp Cap (vph)		1269	589					1126			941	
v/s Ratio Prot			c0.52					0.27			c0.06	
v/s Ratio Perm		0.36									c0.42	
v/c Ratio		0.88	1.29					0.75			1.06	
Uniform Delay, d1		38.5	41.6					39.0			38.5	
Progression Factor		0.75	0.75					1.00			1.00	
Incremental Delay, d2		7.0	140.1					2.6			45.7	
Delay (s)		35.9	171.4					41.6			84.2	
Level of Service		D	F					D			F	
Approach Delay (s)		90.7			0.0			41.6			84.2	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	77.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	101.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1180	363	643	1301
v/c Ratio	1.00	1.10	0.66	1.20
Control Delay	69.9	121.4	20.4	131.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	69.9	121.4	20.4	131.2
Queue Length 50th (ft)	~333	~274	314	~636
Queue Length 95th (ft)	#442	#470	446	#748
Internal Link Dist (ft)	706		909	547
Turn Bay Length (ft)				
Base Capacity (vph)	1177	329	978	1088
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.00	1.10	0.66	1.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	105	910	105	330	585	0	0	900	245
Future Volume (vph)	0	0	0	105	910	105	330	585	0	0	900	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	12	11	11	12	12	11	11
Total Lost time (s)					10.0		6.0	6.0			6.0	
Lane Util. Factor					0.91		1.00	1.00			0.95	
Frpb, ped/bikes					0.98		1.00	1.00			0.96	
Flpb, ped/bikes					1.00		1.00	1.00			1.00	
Frt					0.99		1.00	1.00			0.97	
Flt Protected					1.00		0.95	1.00			1.00	
Satd. Flow (prot)					4246		1570	1653			2914	
Flt Permitted					1.00		0.08	1.00			1.00	
Satd. Flow (perm)					4246		132	1653			2914	
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.95	0.95	0.91	0.91	0.91	0.88	0.88	0.88
Adj. Flow (vph)	0	0	0	111	958	111	363	643	0	0	1023	278
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	20	0
Lane Group Flow (vph)	0	0	0	0	1170	0	363	643	0	0	1281	0
Confl. Peds. (#/hr)						69	65					65
Confl. Bikes (#/hr)						25						82
Heavy Vehicles (%)	2%	2%	2%	1%	3%	0%	0%	0%	0%	0%	0%	1%
Turn Type				Split	NA		pm+pt	NA			NA	
Protected Phases				4	4		1	6			2	
Permitted Phases							6					
Actuated Green, G (s)					33.0		71.0	71.0			44.0	
Effective Green, g (s)					33.0		71.0	71.0			44.0	
Actuated g/C Ratio					0.28		0.59	0.59			0.37	
Clearance Time (s)					10.0		6.0	6.0			6.0	
Vehicle Extension (s)					2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)					1167		329	978			1068	
v/s Ratio Prot					c0.28		c0.19	0.39			c0.44	
v/s Ratio Perm							0.46					
v/c Ratio					1.00		1.10	0.66			1.20	
Uniform Delay, d1					43.5		43.9	16.4			38.0	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					26.9		80.3	3.5			98.8	
Delay (s)					70.4		124.2	19.8			136.8	
Level of Service					E		F	B			F	
Approach Delay (s)		0.0			70.4			57.5			136.8	
Approach LOS		A			E			E			F	

Intersection Summary			
HCM 2000 Control Delay	91.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	SBT
Lane Group Flow (vph)	430	899	559	819
v/c Ratio	0.78	0.86	0.54	0.97
Control Delay	35.7	21.0	2.5	55.5
Queue Delay	0.0	38.4	3.1	0.0
Total Delay	35.7	59.3	5.6	55.5
Queue Length 50th (ft)	100	87	6	286
Queue Length 95th (ft)	154	m85	m6	m265
Internal Link Dist (ft)			129	1760
Turn Bay Length (ft)	100			
Base Capacity (vph)	656	1043	1122	840
Starvation Cap Reductn	0	207	444	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.66	1.08	0.82	0.97

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	400	845	525	0	0	0	0	0	750	45
Future Volume (vph)	0	0	400	845	525	0	0	0	0	0	750	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	15	15	15	12	12	12	12	12	12
Total Lost time (s)			9.0	10.0	10.0						6.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2378	3399	1791						3216	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2378	3399	1791						3216	
Peak-hour factor, PHF	0.93	0.93	0.93	0.94	0.94	0.94	0.25	0.25	0.25	0.97	0.97	0.97
Adj. Flow (vph)	0	0	430	899	559	0	0	0	0	0	773	46
RTOR Reduction (vph)	0	0	116	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	314	899	559	0	0	0	0	0	815	0
Confl. Peds. (#/hr)			4	17								4
Confl. Bikes (#/hr)			35									2
Heavy Vehicles (%)	0%	0%	4%	2%	5%	0%	0%	0%	0%	0%	0%	0%
Turn Type			Prot	Prot	NA						NA	
Protected Phases			2	1	1 2						3	
Permitted Phases												
Actuated Green, G (s)			18.3	30.7	59.0						26.0	
Effective Green, g (s)			18.3	30.7	59.0						26.0	
Actuated g/C Ratio			0.18	0.31	0.59						0.26	
Clearance Time (s)			9.0	10.0							6.0	
Vehicle Extension (s)			2.0	2.0							2.0	
Lane Grp Cap (vph)			435	1043	1056						836	
v/s Ratio Prot			c0.13	c0.26	0.31						c0.25	
v/s Ratio Perm												
v/c Ratio			0.72	0.86	0.53						0.97	
Uniform Delay, d1			38.5	32.7	12.2						36.7	
Progression Factor			1.00	0.51	0.17						1.00	
Incremental Delay, d2			5.0	1.0	0.0						17.4	
Delay (s)			43.4	17.8	2.1						54.1	
Level of Service			D	B	A						D	
Approach Delay (s)		43.4			11.8			0.0			54.1	
Approach LOS		D			B			A			D	

Intersection Summary			
HCM 2000 Control Delay	29.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	101.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	385	25	35	415	120	10	0	15	0	0	0
Future Volume (Veh/h)	85	385	25	35	415	120	10	0	15	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.88	0.88	0.88	0.72	0.72	0.72	0.92	0.92	0.92
Hourly flow rate (vph)	99	448	29	40	472	136	14	0	21	0	0	0
Pedestrians		40						50			19	
Lane Width (ft)		11.0						12.0			0.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		3						4			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		1047			746							
pX, platoon unblocked	0.81						0.81	0.81		0.81	0.81	0.81
vC, conflicting volume	627			527			1370	1418	512	1306	1364	599
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	416			527			1339	1398	512	1259	1331	382
tC, single (s)	4.2			4.2			7.3	6.7	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.7	4.2	3.5	3.5	4.0	3.3
p0 queue free %	89			96			82	100	96	100	100	100
cM capacity (veh/h)	895			977			76	85	507	99	103	523

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	99	477	648	35
Volume Left	99	0	40	14
Volume Right	0	29	136	21
cSH	895	1700	977	156
Volume to Capacity	0.11	0.28	0.04	0.22
Queue Length 95th (ft)	9	0	3	21
Control Delay (s)	9.5	0.0	1.1	34.7
Lane LOS	A		A	D
Approach Delay (s)	1.6		1.1	34.7
Approach LOS				D

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	67	361	32	474	109	190	60
v/c Ratio	0.22	0.49	0.12	0.64	0.50	0.57	0.35
Control Delay	19.9	20.4	18.7	24.2	41.8	13.3	30.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	20.4	18.7	24.2	41.8	13.3	30.8
Queue Length 50th (ft)	16	101	7	148	46	0	15
Queue Length 95th (ft)	76	#356	40	#534	121	58	58
Internal Link Dist (ft)		1050		967	51		70
Turn Bay Length (ft)	110		140				
Base Capacity (vph)	300	733	278	735	364	433	344
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.49	0.12	0.64	0.30	0.44	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	305	20	30	390	60	25	70	165	25	5	20
Future Volume (vph)	60	305	20	30	390	60	25	70	165	25	5	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.98		0.98	
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	0.99		1.00	0.98			1.00	0.85		0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.98	
Satd. Flow (prot)	1460	1441		1061	1445			1670	1301		1481	
Flt Permitted	0.38	1.00		0.49	1.00			0.99	1.00		0.98	
Satd. Flow (perm)	590	1441		550	1445			1670	1301		1481	
Peak-hour factor, PHF	0.90	0.90	0.90	0.95	0.95	0.95	0.87	0.87	0.87	0.84	0.84	0.84
Adj. Flow (vph)	67	339	22	32	411	63	29	80	190	30	6	24
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	167	0	23	0
Lane Group Flow (vph)	67	361	0	32	474	0	0	109	23	0	37	0
Confl. Peds. (#/hr)	17		22	22		17	3		1	1		3
Confl. Bikes (#/hr)			33			12						
Heavy Vehicles (%)	3%	9%	14%	41%	7%	11%	4%	0%	9%	9%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA	Perm	Split	NA	
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6			2					8			
Actuated Green, G (s)	37.0	37.0		37.0	37.0			9.5	9.5		4.2	
Effective Green, g (s)	37.0	37.0		37.0	37.0			9.5	9.5		4.2	
Actuated g/C Ratio	0.47	0.47		0.47	0.47			0.12	0.12		0.05	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0		1.0	1.0			2.0	2.0		2.0	
Lane Grp Cap (vph)	275	672		256	674			200	155		78	
v/s Ratio Prot		0.25			c0.33			c0.07			c0.03	
v/s Ratio Perm	0.11			0.06					0.02			
v/c Ratio	0.24	0.54		0.12	0.70			0.55	0.15		0.48	
Uniform Delay, d1	12.7	15.1		12.0	16.8			32.9	31.3		36.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	2.1	3.1		1.0	6.1			1.6	0.2		1.7	
Delay (s)	14.8	18.1		13.0	22.8			34.5	31.4		38.2	
Level of Service	B	B		B	C			C	C		D	
Approach Delay (s)		17.6			22.2			32.5			38.2	
Approach LOS		B			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	79.3	Sum of lost time (s)	26.0
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑	↑↑			↱
Traffic Volume (veh/h)	0	855	175	0	0	1755
Future Volume (Veh/h)	0	855	175	0	0	1755
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	929	190	0	0	1908
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1190	279			
pX, platoon unblocked					0.96	
vC, conflicting volume	190				654	95
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	190				565	95
tC, single (s)	4.1				6.9	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	1389				436	940

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	464	464	95	95	1908
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	1908
cSH	1700	1700	1700	1700	940
Volume to Capacity	0.27	0.27	0.06	0.06	2.03
Queue Length 95th (ft)	0	0	0	0	3167
Control Delay (s)	0.0	0.0	0.0	0.0	479.9
Lane LOS					F
Approach Delay (s)	0.0		0.0		479.9
Approach LOS					F

Intersection Summary			
Average Delay	302.5		
Intersection Capacity Utilization	120.2%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBT	NBL	NBT
Lane Group Flow (vph)	1962	254	321
v/c Ratio	0.62	0.82	1.10
Control Delay	0.5	75.7	126.8
Queue Delay	0.0	0.0	0.0
Total Delay	0.5	75.7	126.8
Queue Length 50th (ft)	0	235	~317
Queue Length 95th (ft)	m0	#355	#485
Internal Link Dist (ft)	6		224
Turn Bay Length (ft)			
Base Capacity (vph)	3166	308	292
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.62	0.82	1.10

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	1655	0	0	0	0	270	75	150	0	0	0
Future Volume (vph)	150	1655	0	0	0	0	270	75	150	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	12	11	11	12	12	12
Total Lost time (s)		5.0					5.0	5.0				
Lane Util. Factor		0.91					0.95	0.95				
Frpb, ped/bikes		1.00					1.00	0.92				
Flpb, ped/bikes		1.00					1.00	1.00				
Frt		1.00					1.00	0.92				
Flt Protected		1.00					0.95	0.99				
Satd. Flow (prot)		4346					1543	1309				
Flt Permitted		1.00					0.95	0.99				
Satd. Flow (perm)		4346					1543	1309				
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.25	0.25	0.86	0.86	0.86	0.25	0.25	0.25
Adj. Flow (vph)	163	1799	0	0	0	0	314	87	174	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	30	0	0	0	0
Lane Group Flow (vph)	0	1962	0	0	0	0	254	291	0	0	0	0
Confl. Peds. (#/hr)	8								93			
Confl. Bikes (#/hr)									7			
Heavy Vehicles (%)	8%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Split	NA					Split	NA				
Protected Phases	1 2 3 4	1 2 3 4					5	5				
Permitted Phases												
Actuated Green, G (s)		99.0					28.0	28.0				
Effective Green, g (s)		99.0					28.0	28.0				
Actuated g/C Ratio		0.71					0.20	0.20				
Clearance Time (s)							5.0	5.0				
Vehicle Extension (s)							4.0	4.0				
Lane Grp Cap (vph)		3073					308	261				
v/s Ratio Prot		c0.45					0.16	c0.22				
v/s Ratio Perm												
v/c Ratio		0.64					0.82	1.11				
Uniform Delay, d1		10.9					53.6	56.0				
Progression Factor		0.00					1.00	1.00				
Incremental Delay, d2		0.2					16.9	89.6				
Delay (s)		0.2					70.6	145.6				
Level of Service		A					E	F				
Approach Delay (s)		0.2			0.0			112.5			0.0	
Approach LOS		A			A			F			A	

Intersection Summary			
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	77	247	927	656
v/c Ratio	0.82	0.57	0.56	0.91
Control Delay	95.3	10.8	2.2	31.0
Queue Delay	73.3	0.0	0.7	49.8
Total Delay	168.6	10.8	2.9	80.7
Queue Length 50th (ft)	50	20	7	340
Queue Length 95th (ft)	m65	m28	m6	m389
Internal Link Dist (ft)	273		98	542
Turn Bay Length (ft)				
Base Capacity (vph)	94	631	1647	718
Starvation Cap Reductn	0	0	377	0
Spillback Cap Reductn	36	0	0	308
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.33	0.39	0.73	1.60

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	67	2	220	46	705	0	0	590	20
Future Volume (vph)	0	0	0	67	2	220	46	705	0	0	590	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	12	12	10	10
Total Lost time (s)					4.0	4.0		4.0			4.0	
Lane Util. Factor					1.00	1.00		0.95			1.00	
Frpb, ped/bikes					1.00	1.00		1.00			0.99	
Flpb, ped/bikes					1.00	1.00		1.00			1.00	
Frt					1.00	0.85		1.00			1.00	
Flt Protected					0.95	1.00		1.00			1.00	
Satd. Flow (prot)					1576	1405		2897			1527	
Flt Permitted					0.95	1.00		0.87			1.00	
Satd. Flow (perm)					1576	1405		2542			1527	
Peak-hour factor, PHF	0.25	0.25	0.25	0.89	0.89	0.89	0.81	0.81	0.81	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	75	2	247	57	870	0	0	634	22
RTOR Reduction (vph)	0	0	0	0	0	207	0	0	0	0	1	0
Lane Group Flow (vph)	0	0	0	0	77	40	0	927	0	0	655	0
Confl. Peds. (#/hr)						56	196					196
Confl. Bikes (#/hr)						9						34
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	4%	0%	0%	3%	0%
Turn Type				Split	NA	custom	custom	NA			NA	
Protected Phases				8	8	1 8		2 4 9 11			6	
Permitted Phases							2 4					
Actuated Green, G (s)					6.0	16.0		63.0			47.0	
Effective Green, g (s)					6.0	16.0		57.0			47.0	
Actuated g/C Ratio					0.06	0.16		0.57			0.47	
Clearance Time (s)					4.0						4.0	
Vehicle Extension (s)					2.0						2.0	
Lane Grp Cap (vph)					94	224		1448			717	
v/s Ratio Prot					c0.05	0.03					c0.43	
v/s Ratio Perm								c0.36				
v/c Ratio					0.82	0.18		0.64			0.91	
Uniform Delay, d1					46.5	36.3		14.6			24.6	
Progression Factor					1.48	2.03		0.15			0.83	
Incremental Delay, d2					19.7	0.1		0.4			8.9	
Delay (s)					88.6	73.8		2.5			29.3	
Level of Service					F	E		A			C	
Approach Delay (s)		0.0			77.3			2.5			29.3	
Approach LOS		A			E			A			C	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBT	NBT
Lane Group Flow (vph)	1579	262
v/c Ratio	1.18	0.47
Control Delay	121.7	38.5
Queue Delay	0.2	0.0
Total Delay	121.9	38.5
Queue Length 50th (ft)	~447	78
Queue Length 95th (ft)	#588	106
Internal Link Dist (ft)	682	1076
Turn Bay Length (ft)		
Base Capacity (vph)	1337	696
Starvation Cap Reductn	0	0
Spillback Cap Reductn	53	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.23	0.38

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1260	225	110	115	0	0	0	0
Future Volume (vph)	0	0	0	0	1260	225	110	115	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					10.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.96			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.98			1.00				
Flt Protected					1.00			0.98				
Satd. Flow (prot)					4284			3029				
Flt Permitted					1.00			0.98				
Satd. Flow (perm)					4284			3029				
Peak-hour factor, PHF	0.25	0.25	0.25	0.94	0.94	0.94	0.86	0.86	0.86	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	1340	239	128	134	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	24	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1555	0	0	262	0	0	0	0
Confl. Peds. (#/hr)						170	4					
Confl. Bikes (#/hr)						33						
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	9%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					30.7			18.3				
Effective Green, g (s)					30.7			18.3				
Actuated g/C Ratio					0.31			0.18				
Clearance Time (s)					10.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1315			554				
v/s Ratio Prot					c0.36							
v/s Ratio Perm								0.09				
v/c Ratio					1.18			0.47				
Uniform Delay, d1					34.6			36.5				
Progression Factor					1.00			1.00				
Incremental Delay, d2					90.3			0.2				
Delay (s)					125.0			36.8				
Level of Service					F			D				
Approach Delay (s)		0.0			125.0			36.8			0.0	
Approach LOS		A			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	112.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	101.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1122	1058	1032	336
v/c Ratio	1.06	0.90	0.95	0.52
Control Delay	77.6	41.9	41.5	25.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	77.6	41.9	41.5	25.8
Queue Length 50th (ft)	~416	331	232	158
Queue Length 95th (ft)	#547	#460	#463	225
Internal Link Dist (ft)	561	2687	694	566
Turn Bay Length (ft)				
Base Capacity (vph)	1056	1171	1086	641
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.06	0.90	0.95	0.52

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	715	295	0	900	105	0	655	305	0	270	15
Future Volume (vph)	0	715	295	0	900	105	0	655	305	0	270	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		11.0			11.0			11.0			11.0	
Lane Util. Factor		0.95			0.95			0.95			1.00	
Frpb, ped/bikes		0.93			0.99			0.89			0.98	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.98			0.95			0.99	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		2857			3168			2652			1564	
Flt Permitted		1.00			1.00			1.00			1.00	
Satd. Flow (perm)		2857			3168			2652			1564	
Peak-hour factor, PHF	0.90	0.90	0.90	0.95	0.95	0.95	0.93	0.93	0.93	0.85	0.85	0.85
Adj. Flow (vph)	0	794	328	0	947	111	0	704	328	0	318	18
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1122	0	0	1058	0	0	1032	0	0	336	0
Confl. Peds. (#/hr)			109			54			323			243
Confl. Bikes (#/hr)			13						66			56
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	5%	0%	0%	7%	0%
Turn Type		NA			NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases												
Actuated Green, G (s)		37.0			37.0			41.0			41.0	
Effective Green, g (s)		37.0			37.0			41.0			41.0	
Actuated g/C Ratio		0.37			0.37			0.41			0.41	
Clearance Time (s)		11.0			11.0			11.0			11.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		1057			1172			1087			641	
v/s Ratio Prot		c0.39			0.33			c0.39			0.21	
v/s Ratio Perm												
v/c Ratio		1.06			0.90			0.95			0.52	
Uniform Delay, d1		31.5			29.8			28.5			22.2	
Progression Factor		1.00			1.00			0.90			1.00	
Incremental Delay, d2		45.5			9.6			14.5			3.1	
Delay (s)		77.0			39.4			40.1			25.2	
Level of Service		E			D			D			C	
Approach Delay (s)		77.0			39.4			40.1			25.2	
Approach LOS		E			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	50.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	SBT
Lane Group Flow (vph)	235	255	540	720
v/c Ratio	1.39	1.49	0.58	1.16
Control Delay	243.3	279.5	30.9	90.3
Queue Delay	0.0	0.0	0.1	0.2
Total Delay	243.3	279.5	30.9	90.6
Queue Length 50th (ft)	~210	~221	141	~141
Queue Length 95th (ft)	#368	#389	203	m#222
Internal Link Dist (ft)		515	2371	98
Turn Bay Length (ft)				
Base Capacity (vph)	169	171	952	623
Starvation Cap Reductn	0	0	0	21
Spillback Cap Reductn	0	0	27	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.39	1.49	0.58	1.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	326	20	95	0	0	0	0	435	35	252	425	0
Future Volume (vph)	326	20	95	0	0	0	0	435	35	252	425	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	10	10	10	10	12
Total Lost time (s)	4.0	4.0						4.0			4.0	
Lane Util. Factor	0.95	0.95						0.95			1.00	
Frpb, ped/bikes	1.00	0.89						0.97			1.00	
Flpb, ped/bikes	1.00	1.00						1.00			0.98	
Frt	1.00	0.94						0.99			1.00	
Flt Protected	0.95	0.98						1.00			0.98	
Satd. Flow (prot)	1543	1320						2887			1530	
Flt Permitted	0.95	0.98						1.00			0.50	
Satd. Flow (perm)	1543	1320						2887			776	
Peak-hour factor, PHF	0.90	0.90	0.90	0.25	0.25	0.25	0.87	0.87	0.87	0.94	0.94	0.94
Adj. Flow (vph)	362	22	106	0	0	0	0	500	40	268	452	0
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	235	229	0	0	0	0	0	540	0	0	720	0
Confl. Peds. (#/hr)			56						310	310		
Confl. Bikes (#/hr)									50			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Split	NA						NA		custom	NA	
Protected Phases	4	4						2		1	6 8 10 7	
Permitted Phases										6 8		
Actuated Green, G (s)	11.0	11.0						32.5			66.0	
Effective Green, g (s)	11.0	11.0						32.5			66.0	
Actuated g/C Ratio	0.11	0.11						0.32			0.66	
Clearance Time (s)	4.0	4.0						4.0				
Vehicle Extension (s)	2.0	2.0						2.0				
Lane Grp Cap (vph)	169	145						938			598	
v/s Ratio Prot	0.15	c0.17						0.19			c0.14	
v/s Ratio Perm											c0.66	
v/c Ratio	1.39	1.58						0.58			1.20	
Uniform Delay, d1	44.5	44.5						28.0			17.0	
Progression Factor	1.00	1.00						1.00			0.78	
Incremental Delay, d2	207.8	291.6						2.6			96.6	
Delay (s)	252.3	336.1						30.6			109.9	
Level of Service	F	F						C			F	
Approach Delay (s)		295.9			0.0			30.6			109.9	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	137.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.45		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	120	190	140	579	191	236	330	222
v/c Ratio	0.78	0.33	0.34	1.04	1.04	0.44	0.93	0.66
Control Delay	63.7	40.8	30.5	96.2	120.0	43.3	91.2	54.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.7	40.8	30.5	96.2	120.0	43.3	91.2	54.8
Queue Length 50th (ft)	76	149	89	~674	~165	190	332	180
Queue Length 95th (ft)	#186	223	139	#896	#293	272	#501	259
Internal Link Dist (ft)		468		1050		175	2371	
Turn Bay Length (ft)	250		175		125			160
Base Capacity (vph)	159	577	419	558	184	570	386	345
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.33	0.33	1.04	1.04	0.41	0.85	0.64

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	165	10	125	445	70	170	185	25	20	270	195
Future Volume (vph)	110	165	10	125	445	70	170	185	25	20	270	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	4.0			6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.98			1.00	0.81
Flpb, ped/bikes	1.00	1.00		0.96	1.00		0.98	1.00			0.99	1.00
Frt	1.00	0.99		1.00	0.98		1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1576	1665		1543	1620		1551	1624			1660	1163
Flt Permitted	0.09	1.00		0.57	1.00		0.21	1.00			0.96	1.00
Satd. Flow (perm)	149	1665		932	1620		350	1624			1603	1163
Peak-hour factor, PHF	0.92	0.92	0.92	0.89	0.89	0.89	0.89	0.89	0.89	0.88	0.88	0.88
Adj. Flow (vph)	120	179	11	140	500	79	191	208	28	23	307	222
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	120	190	0	140	579	0	191	236	0	0	330	222
Confl. Peds. (#/hr)	37		81	81		37	113		85	85		113
Confl. Bikes (#/hr)			9			23			17			32
Heavy Vehicles (%)	3%	1%	0%	1%	0%	0%	3%	1%	4%	10%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	5	5	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		D.P+P	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6		7	7 8			8	5
Permitted Phases	2			6			8			8		8
Actuated Green, G (s)	60.9	51.2		60.1	50.8		42.7	46.7			32.5	42.2
Effective Green, g (s)	60.9	51.2		60.1	50.8		42.7	46.7			32.5	42.2
Actuated g/C Ratio	0.41	0.34		0.40	0.34		0.29	0.31			0.22	0.28
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0				6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0				2.0	2.0
Lane Grp Cap (vph)	154	572		414	553		182	509			350	376
v/s Ratio Prot	c0.05	0.11		0.02	c0.36		c0.07	0.15				0.04
v/s Ratio Perm	0.27			0.12			c0.23				0.21	0.15
v/c Ratio	0.78	0.33		0.34	1.05		1.05	0.46			0.94	0.59
Uniform Delay, d1	34.8	36.1		29.2	49.0		49.8	41.0			57.2	45.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	19.9	1.6		0.2	51.1		80.4	0.2			33.1	1.7
Delay (s)	54.7	37.7		29.4	100.1		130.2	41.2			90.3	47.5
Level of Service	D	D		C	F		F	D			F	D
Approach Delay (s)		44.3			86.4			81.0			73.1	
Approach LOS		D			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	75.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	148.8	Sum of lost time (s)	29.0
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	82	42	332	665
v/c Ratio	0.61	0.16	0.28	0.62
Control Delay	22.3	23.2	7.6	14.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	22.3	23.2	7.6	14.2
Queue Length 50th (ft)	0	7	0	0
Queue Length 95th (ft)	0	36	194	#586
Internal Link Dist (ft)	373	179	1731	122
Turn Bay Length (ft)				
Base Capacity (vph)	135	776	1179	1081
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.61	0.05	0.28	0.62

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	0	30	15	10	5	15	280	0	0	525	60
Future Volume (vph)	30	0	30	15	10	5	15	280	0	0	525	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	10	12	12	10	10
Total Lost time (s)		4.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.76			0.98			1.00			0.99	
Flpb, ped/bikes		0.90			0.94			1.00			1.00	
Frt		0.93			0.98			1.00			0.99	
Flt Protected		0.98			0.98			1.00			1.00	
Satd. Flow (prot)		955			1267			1480			1323	
Flt Permitted		0.98			0.98			0.96			1.00	
Satd. Flow (perm)		955			1267			1431			1323	
Peak-hour factor, PHF	0.73	0.73	0.73	0.73	0.73	0.73	0.89	0.89	0.89	0.88	0.88	0.88
Adj. Flow (vph)	41	0	41	21	14	7	17	315	0	0	597	68
RTOR Reduction (vph)	0	82	0	0	7	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	35	0	0	332	0	0	665	0
Confl. Peds. (#/hr)	7		14	14		7	75					75
Confl. Bikes (#/hr)			2			5			10			9
Heavy Vehicles (%)	6%	0%	10%	0%	0%	0%	0%	5%	0%	0%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Turn Type	D.Pm	NA		Perm	NA		Perm	NA			NA	
Protected Phases					5			1			1	
Permitted Phases	5			5			1					
Actuated Green, G (s)		0.0			3.4			41.9			41.9	
Effective Green, g (s)		0.0			3.4			41.9			41.9	
Actuated g/C Ratio		0.00			0.05			0.68			0.68	
Clearance Time (s)					5.0			5.0			5.0	
Vehicle Extension (s)					4.0			4.0			4.0	
Lane Grp Cap (vph)		0			69			967			894	
v/s Ratio Prot											c0.50	
v/s Ratio Perm					0.03			0.23				
v/c Ratio		0.00			0.51			0.34			0.74	
Uniform Delay, d1		31.0			28.5			4.2			6.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.0			8.3			1.0			5.6	
Delay (s)		31.0			36.8			5.2			12.1	
Level of Service		C			D			A			B	
Approach Delay (s)		31.0			36.8			5.2			12.1	
Approach LOS		C			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	233	1270	1344	317	343	292
v/c Ratio	0.98	0.65	1.05	0.47	0.83	0.44
Control Delay	100.4	14.7	44.5	3.8	57.1	20.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	100.4	14.7	44.5	3.8	57.1	20.8
Queue Length 50th (ft)	166	272	~563	42	229	127
Queue Length 95th (ft)	#319	335	m#604	m42	#374	197
Internal Link Dist (ft)		431	869		1731	
Turn Bay Length (ft)	200			200		85
Base Capacity (vph)	238	1949	1286	670	412	669
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.65	1.05	0.47	0.83	0.44

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↑	↱	↰	↱
Traffic Volume (vph)	207	1130	1210	285	305	260
Future Volume (vph)	207	1130	1210	285	305	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	11
Total Lost time (s)	6.5	5.5	5.5	5.5	6.5	6.5
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.92	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1501	3085	3110	1303	1593	1391
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1501	3085	3110	1303	1593	1391
Peak-hour factor, PHF	0.89	0.89	0.90	0.90	0.89	0.89
Adj. Flow (vph)	233	1270	1344	317	343	292
RTOR Reduction (vph)	0	0	0	132	0	6
Lane Group Flow (vph)	233	1270	1344	185	343	286
Confl. Peds. (#/hr)	21			21		9
Confl. Bikes (#/hr)				6		
Heavy Vehicles (%)	1%	1%	1%	3%	2%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	1	6	2		4	1 4
Permitted Phases				2		
Actuated Green, G (s)	17.5	69.5	45.5	45.5	28.5	52.5
Effective Green, g (s)	17.5	69.5	45.5	45.5	28.5	52.5
Actuated g/C Ratio	0.16	0.63	0.41	0.41	0.26	0.48
Clearance Time (s)	6.5	5.5	5.5	5.5	6.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	3.0	
Lane Grp Cap (vph)	238	1949	1286	538	412	663
v/s Ratio Prot	c0.16	0.41	c0.43		c0.22	0.21
v/s Ratio Perm				0.14		
v/c Ratio	0.98	0.65	1.05	0.34	0.83	0.43
Uniform Delay, d1	46.1	12.7	32.2	22.0	38.5	18.9
Progression Factor	1.00	1.00	0.41	0.41	1.00	1.00
Incremental Delay, d2	51.6	1.7	28.6	0.6	17.6	0.2
Delay (s)	97.7	14.4	41.7	9.7	56.1	19.1
Level of Service	F	B	D	A	E	B
Approach Delay (s)		27.3	35.6		39.1	
Approach LOS		C	D		D	

Intersection Summary			
HCM 2000 Control Delay	32.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	18	761	1614	380	120	82
v/c Ratio	0.11	0.38	0.97	0.43	0.29	0.19
Control Delay	7.4	6.1	40.9	3.7	37.4	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.4	6.1	40.9	3.7	37.4	8.7
Queue Length 50th (ft)	3	73	552	10	70	0
Queue Length 95th (ft)	m4	m89	#743	56	107	28
Internal Link Dist (ft)		869	980		202	
Turn Bay Length (ft)	170			250		80
Base Capacity (vph)	168	2012	1668	887	418	437
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.38	0.97	0.43	0.29	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↑	↱	↰	↱
Traffic Volume (vph)	16	685	1485	350	95	65
Future Volume (vph)	16	685	1485	350	95	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	16	16
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.96	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1516	3032	3110	1354	1841	1647
Flt Permitted	0.07	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	108	3032	3110	1354	1841	1647
Peak-hour factor, PHF	0.90	0.90	0.92	0.92	0.79	0.79
Adj. Flow (vph)	18	761	1614	380	120	82
RTOR Reduction (vph)	0	0	0	161	0	63
Lane Group Flow (vph)	18	761	1614	219	120	19
Confl. Peds. (#/hr)	7			7		3
Confl. Bikes (#/hr)				4		
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt	NA	NA	Perm	Prot	Prot
Protected Phases	6	1 6	1		5	5
Permitted Phases	1 6			1		
Actuated Green, G (s)	67.0	73.0	59.0	59.0	25.0	25.0
Effective Green, g (s)	67.0	73.0	59.0	59.0	25.0	25.0
Actuated g/C Ratio	0.61	0.66	0.54	0.54	0.23	0.23
Clearance Time (s)	6.0		6.0	6.0	6.0	6.0
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	168	2012	1668	726	418	374
v/s Ratio Prot	0.01	c0.25	c0.52		c0.07	0.01
v/s Ratio Perm	0.06			0.16		
v/c Ratio	0.11	0.38	0.97	0.30	0.29	0.05
Uniform Delay, d1	32.8	8.3	24.6	14.1	35.1	33.2
Progression Factor	0.66	0.68	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.4	15.6	1.1	1.7	0.3
Delay (s)	22.5	6.0	40.2	15.2	36.9	33.5
Level of Service	C	A	D	B	D	C
Approach Delay (s)		6.4	35.4		35.5	
Approach LOS		A	D		D	

Intersection Summary			
HCM 2000 Control Delay	27.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	NBT	NEL	NER
Lane Group Flow (vph)	13	975	428	120	346	688
v/c Ratio	0.05	1.78	0.29	0.66	0.53	0.57
Control Delay	49.2	392.5	1.3	37.7	30.8	30.4
Queue Delay	0.0	0.0	0.6	5.6	64.4	57.1
Total Delay	49.2	392.5	1.9	43.2	95.2	87.4
Queue Length 50th (ft)	10	~697	0	27	221	249
Queue Length 95th (ft)	27	#698	0	54	319	316
Internal Link Dist (ft)		199	90	45	468	
Turn Bay Length (ft)	100					
Base Capacity (vph)	278	547	1487	182	659	1197
Starvation Cap Reductn	0	0	689	0	0	0
Spillback Cap Reductn	0	0	0	28	458	832
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	1.78	0.54	0.78	1.72	1.88

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	10	770	230	185	5	15	65	5	2	935
Future Volume (vph)	10	770	230	185	5	15	65	5	2	935
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	8.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95	0.95			1.00			1.00	0.91
Frpb, ped/bikes	1.00	1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.93			0.90			0.85	0.85
Flt Protected	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1624	3191	2984			1529			1443	2619
Flt Permitted	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1624	3191	2984			1529			1443	2619
Peak-hour factor, PHF	0.79	0.79	0.97	0.97	0.71	0.71	0.71	0.91	0.91	0.91
Adj. Flow (vph)	13	975	237	191	7	21	92	5	2	1027
RTOR Reduction (vph)	0	0	100	0	0	84	0	0	0	0
Lane Group Flow (vph)	13	975	328	0	0	36	0	0	346	688
Confl. Peds. (#/hr)	3			3					3	
Confl. Bikes (#/hr)				3						
Heavy Vehicles (%)	0%	1%	0%	1%	0%	0%	0%	0%	0%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Turn Type	Split	NA	NA		Split	NA		Perm	pm+pt	custom
Protected Phases	3	3	4 5		2	2			1	1 5
Permitted Phases								1 5	5	1 5
Actuated Green, G (s)	24.0	24.0	66.4			9.0			59.0	64.0
Effective Green, g (s)	24.0	24.0	66.4			9.0			59.0	64.0
Actuated g/C Ratio	0.17	0.17	0.47			0.06			0.42	0.46
Clearance Time (s)	5.0	5.0				5.0			5.0	
Vehicle Extension (s)	2.0	2.0				2.0			2.0	
Lane Grp Cap (vph)	278	547	1415			98			659	1197
v/s Ratio Prot	0.01	c0.31	c0.11			c0.02			0.08	c0.26
v/s Ratio Perm									0.16	
v/c Ratio	0.05	1.78	0.23			0.37			0.53	0.57
Uniform Delay, d1	48.4	58.0	21.7			62.8			30.8	28.0
Progression Factor	1.00	1.00	0.06			1.00			1.00	1.00
Incremental Delay, d2	0.3	359.4	0.0			0.8			1.0	0.8
Delay (s)	48.8	417.4	1.4			63.6			31.8	28.8
Level of Service	D	F	A			E			C	C
Approach Delay (s)		412.6	1.4			63.6			29.8	
Approach LOS		F	A			E			C	

Intersection Summary			
HCM 2000 Control Delay	173.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1463	420	288	239	459	169
v/c Ratio	0.76	0.63	0.27	1.17	1.09	0.51
Control Delay	24.2	13.8	1.2	167.8	125.0	13.2
Queue Delay	49.6	57.0	0.0	0.0	0.0	0.0
Total Delay	73.8	70.8	1.2	167.8	125.0	13.2
Queue Length 50th (ft)	317	160	2	~284	~257	0
Queue Length 95th (ft)	m255	m143	2	#443	#351	58
Internal Link Dist (ft)	90		6		182	
Turn Bay Length (ft)		100				
Base Capacity (vph)	1918	665	1112	204	421	333
Starvation Cap Reductn	964	322	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.53	1.22	0.26	1.17	1.09	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1375	395	10	270	0	0	0	0	360	240	145
Future Volume (vph)	0	1375	395	10	270	0	0	0	0	360	240	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	13	12	12	12	12	12	12	11	11	11
Total Lost time (s)		5.0	5.0		5.0					8.0	8.0	8.0
Lane Util. Factor		0.86	0.86		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	0.94
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		4223	1260		3243					1429	2951	1319
Flt Permitted		1.00	1.00		0.95					0.95	0.98	1.00
Satd. Flow (perm)		4223	1260		3103					1429	2951	1319
Peak-hour factor, PHF	0.94	0.94	0.94	0.97	0.97	0.97	0.25	0.25	0.25	0.86	0.86	0.86
Adj. Flow (vph)	0	1463	420	10	278	0	0	0	0	419	279	169
RTOR Reduction (vph)	0	0	93	0	0	0	0	0	0	0	0	145
Lane Group Flow (vph)	0	1463	327	0	288	0	0	0	0	239	459	24
Confl. Peds. (#/hr)			16	16								24
Confl. Bikes (#/hr)			4									
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		1 2 3		5	1 5					4	4	
Permitted Phases			1 2 3									4
Actuated Green, G (s)		63.6	63.6		59.0					20.0	20.0	20.0
Effective Green, g (s)		63.6	63.6		59.0					20.0	20.0	20.0
Actuated g/C Ratio		0.45	0.45		0.42					0.14	0.14	0.14
Clearance Time (s)										8.0	8.0	8.0
Vehicle Extension (s)										2.0	2.0	2.0
Lane Grp Cap (vph)		1918	572		1346					204	421	188
v/s Ratio Prot		c0.35			c0.06					c0.17	0.16	
v/s Ratio Perm			0.26		0.03							0.02
v/c Ratio		0.76	0.57		0.21					1.17	1.09	0.13
Uniform Delay, d1		31.9	28.1		25.8					60.0	60.0	52.4
Progression Factor		0.73	0.77		0.03					1.00	1.00	1.00
Incremental Delay, d2		0.2	0.1		0.1					117.0	70.4	0.1
Delay (s)		23.6	21.8		0.8					177.0	130.4	52.5
Level of Service		C	C		A					F	F	D
Approach Delay (s)		23.2			0.8			0.0			128.1	
Approach LOS		C			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	51.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	NBT	SBT
Lane Group Flow (vph)	1123	527	937	846
v/c Ratio	0.88	0.89	0.78	0.94
Control Delay	40.1	48.7	42.7	52.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	40.1	48.7	42.7	52.3
Queue Length 50th (ft)	531	480	385	284
Queue Length 95th (ft)	#874	#887	471	#398
Internal Link Dist (ft)	871		483	927
Turn Bay Length (ft)				
Base Capacity (vph)	1274	591	1227	908
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.88	0.89	0.76	0.93

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱					↑↱			↰↑	
Traffic Volume (vph)	270	775	490	0	0	0	0	865	35	80	690	0
Future Volume (vph)	270	775	490	0	0	0	0	865	35	80	690	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	11	11	12	11	11
Total Lost time (s)		6.0	6.0					5.0			6.0	
Lane Util. Factor		0.95	1.00					0.95			0.95	
Frpb, ped/bikes		1.00	1.00					1.00			1.00	
Flpb, ped/bikes		0.99	1.00					1.00			1.00	
Frt		1.00	0.85					0.99			1.00	
Flt Protected		0.99	1.00					1.00			0.99	
Satd. Flow (prot)		3134	1454					3120			3124	
Flt Permitted		0.99	1.00					1.00			0.56	
Satd. Flow (perm)		3134	1454					3120			1754	
Peak-hour factor, PHF	0.93	0.93	0.93	0.92	0.92	0.92	0.96	0.96	0.96	0.91	0.91	0.91
Adj. Flow (vph)	290	833	527	0	0	0	0	901	36	88	758	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	1123	527	0	0	0	0	935	0	0	846	0
Confl. Peds. (#/hr)	11		28						3	3		
Confl. Bikes (#/hr)			9									9
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Prot					NA		pm+pt	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4									6		
Actuated Green, G (s)		53.7	53.7					54.1			66.1	
Effective Green, g (s)		53.7	53.7					54.1			66.1	
Actuated g/C Ratio		0.38	0.38					0.39			0.47	
Clearance Time (s)		6.0	6.0					5.0			6.0	
Vehicle Extension (s)		2.0	2.0					2.0			2.0	
Lane Grp Cap (vph)		1202	557					1205			906	
v/s Ratio Prot			c0.36					0.30			c0.05	
v/s Ratio Perm		0.36									c0.39	
v/c Ratio		0.93	0.95					0.78			0.93	
Uniform Delay, d1		41.5	41.8					37.6			34.9	
Progression Factor		0.83	0.83					1.00			1.00	
Incremental Delay, d2		11.9	22.9					2.9			15.9	
Delay (s)		46.1	57.4					40.6			50.8	
Level of Service		D	E					D			D	
Approach Delay (s)		49.7			0.0			40.6			50.8	
Approach LOS		D			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	47.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	98.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1321	495	723	1118
v/c Ratio	1.17	1.21	0.72	1.15
Control Delay	125.0	153.6	21.5	114.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	125.0	153.6	21.5	114.6
Queue Length 50th (ft)	~444	~425	366	~525
Queue Length 95th (ft)	#542	#640	522	#663
Internal Link Dist (ft)	994		927	733
Turn Bay Length (ft)				
Base Capacity (vph)	1131	408	1005	973
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.17	1.21	0.72	1.15

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	95	1050	110	465	680	0	0	695	345
Future Volume (vph)	0	0	0	95	1050	110	465	680	0	0	695	345
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	12	11	11	12	12	11	11
Total Lost time (s)					10.0		5.0	6.0			6.0	
Lane Util. Factor					0.91		1.00	1.00			0.95	
Frpb, ped/bikes					0.99		1.00	1.00			0.93	
Flpb, ped/bikes					1.00		1.00	1.00			1.00	
Frt					0.99		1.00	1.00			0.95	
Flt Protected					1.00		0.95	1.00			1.00	
Satd. Flow (prot)					4345		1570	1653			2774	
Flt Permitted					1.00		0.09	1.00			1.00	
Satd. Flow (perm)					4345		141	1653			2774	
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.95	0.95	0.94	0.94	0.94	0.93	0.93	0.93
Adj. Flow (vph)	0	0	0	100	1105	116	495	723	0	0	747	371
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	26	0
Lane Group Flow (vph)	0	0	0	0	1311	0	495	723	0	0	1092	0
Confl. Peds. (#/hr)						54	73		27			73
Confl. Bikes (#/hr)						17						82
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Turn Type				Split	NA		pm+pt	NA			NA	
Protected Phases				4	4		1	6			2	
Permitted Phases							6					
Actuated Green, G (s)					31.0		74.0	73.0			41.0	
Effective Green, g (s)					31.0		74.0	73.0			41.0	
Actuated g/C Ratio					0.26		0.62	0.61			0.34	
Clearance Time (s)					10.0		5.0	6.0			6.0	
Vehicle Extension (s)					2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)					1122		408	1005			947	
v/s Ratio Prot					c0.30		c0.27	0.44			0.39	
v/s Ratio Perm							c0.48					
v/c Ratio					1.17		1.21	0.72			1.15	
Uniform Delay, d1					44.5		39.1	16.4			39.5	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					85.8		116.6	4.4			80.9	
Delay (s)					130.3		155.7	20.8			120.4	
Level of Service					F		F	C			F	
Approach Delay (s)		0.0			130.3			75.6			120.4	
Approach LOS		A			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	109.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	109.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	SBT
Lane Group Flow (vph)	516	970	545	687
v/c Ratio	1.00	0.73	0.45	1.20
Control Delay	66.7	12.4	1.2	138.9
Queue Delay	0.0	4.6	2.4	0.0
Total Delay	66.7	17.0	3.6	138.9
Queue Length 50th (ft)	120	84	15	~251
Queue Length 95th (ft)	#238	m78	m16	#365
Internal Link Dist (ft)			180	1744
Turn Bay Length (ft)	100			
Base Capacity (vph)	518	1334	1212	574
Starvation Cap Reductn	0	289	518	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.00	0.93	0.79	1.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	470	960	540	0	0	0	0	0	625	35
Future Volume (vph)	0	0	470	960	540	0	0	0	0	0	625	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	15	15	15	12	12	12	12	12	12
Total Lost time (s)			9.0	10.0	10.0						6.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2473	3432	1881						3212	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2473	3432	1881						3212	
Peak-hour factor, PHF	0.91	0.91	0.91	0.99	0.99	0.99	0.88	0.88	0.88	0.96	0.96	0.96
Adj. Flow (vph)	0	0	516	970	545	0	0	0	0	0	651	36
RTOR Reduction (vph)	0	0	133	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	383	970	545	0	0	0	0	0	683	0
Confl. Peds. (#/hr)			21	21								7
Confl. Bikes (#/hr)			16									
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	3%
Turn Type			Prot	Prot	NA						NA	
Protected Phases			2	1	1 2						3	
Permitted Phases												
Actuated Green, G (s)			14.0	35.0	59.0						16.0	
Effective Green, g (s)			14.0	35.0	59.0						16.0	
Actuated g/C Ratio			0.16	0.39	0.66						0.18	
Clearance Time (s)			9.0	10.0							6.0	
Vehicle Extension (s)			2.0	2.0							2.0	
Lane Grp Cap (vph)			384	1334	1233						571	
v/s Ratio Prot			c0.15	c0.28	0.29						c0.21	
v/s Ratio Perm												
v/c Ratio			1.00	0.73	0.44						1.20	
Uniform Delay, d1			38.0	23.4	7.5						37.0	
Progression Factor			1.00	0.51	0.13						1.00	
Incremental Delay, d2			44.6	0.3	0.0						104.4	
Delay (s)			82.6	12.2	1.0						141.4	
Level of Service			F	B	A						F	
Approach Delay (s)		82.6			8.2			0.0			141.4	
Approach LOS		F			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	56.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	430	15	20	500	55	15	0	40	0	0	0
Future Volume (Veh/h)	30	430	15	20	500	55	15	0	40	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.92	0.92	0.92	0.79	0.79	0.79	0.92	0.92	0.92
Hourly flow rate (vph)	38	544	19	22	543	60	19	0	51	0	0	0
Pedestrians		59						77			19	
Lane Width (ft)		11.0						12.0			0.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		5						6			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		1047			695							
pX, platoon unblocked	0.85			0.91			0.89	0.89	0.91	0.89	0.89	0.85
vC, conflicting volume	622			640			1382	1372	630	1307	1352	651
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	468			556			1145	1134	546	1061	1111	502
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			97			85	100	89	100	100	100
cM capacity (veh/h)	926			832			125	160	457	146	165	466

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	38	563	625	70
Volume Left	38	0	22	19
Volume Right	0	19	60	51
cSH	926	1700	832	266
Volume to Capacity	0.04	0.33	0.03	0.26
Queue Length 95th (ft)	3	0	2	26
Control Delay (s)	9.1	0.0	0.7	23.3
Lane LOS	A		A	C
Approach Delay (s)	0.6		0.7	23.3
Approach LOS				C

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	24	405	37	526	96	102	134
v/c Ratio	0.10	0.57	0.14	0.75	0.48	0.35	0.49
Control Delay	18.4	22.4	18.7	28.3	41.5	4.8	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	22.4	18.7	28.3	41.5	4.8	11.3
Queue Length 50th (ft)	5	113	8	165	40	0	0
Queue Length 95th (ft)	30	329	44	#580	101	4	16
Internal Link Dist (ft)		1050		967	51		70
Turn Bay Length (ft)	110		140				
Base Capacity (vph)	234	706	256	704	330	375	428
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.57	0.14	0.75	0.29	0.27	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	330	10	35	460	35	55	25	85	50	0	50
Future Volume (vph)	20	330	10	35	460	35	55	25	85	50	0	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.97		0.97	
Flpb, ped/bikes	0.99	1.00		0.98	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.99			1.00	0.85		0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.98	
Satd. Flow (prot)	1502	1517		1202	1515			1653	1241		1500	
Flt Permitted	0.32	1.00		0.44	1.00			0.97	1.00		0.98	
Satd. Flow (perm)	504	1517		552	1515			1653	1241		1500	
Peak-hour factor, PHF	0.84	0.84	0.84	0.94	0.94	0.94	0.83	0.83	0.83	0.75	0.75	0.75
Adj. Flow (vph)	24	393	12	37	489	37	66	30	102	67	0	67
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	90	0	123	0
Lane Group Flow (vph)	24	405	0	37	526	0	0	96	12	0	11	0
Confl. Peds. (#/hr)	21		29	29		21	4					4
Confl. Bikes (#/hr)			16			46			2			2
Heavy Vehicles (%)	0%	4%	22%	24%	3%	12%	0%	0%	14%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Split	NA	Perm	Split	NA	
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6			2					8			
Actuated Green, G (s)	35.9	35.9		35.9	35.9			9.4	9.4		6.6	
Effective Green, g (s)	35.9	35.9		35.9	35.9			9.4	9.4		6.6	
Actuated g/C Ratio	0.44	0.44		0.44	0.44			0.12	0.12		0.08	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0		1.0	1.0			2.0	2.0		2.0	
Lane Grp Cap (vph)	224	674		245	673			192	144		122	
v/s Ratio Prot		0.27			c0.35			c0.06			c0.01	
v/s Ratio Perm	0.05			0.07					0.01			
v/c Ratio	0.11	0.60		0.15	0.78			0.50	0.08		0.09	
Uniform Delay, d1	13.1	17.0		13.3	19.1			33.4	31.8		34.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	1.0	3.9		1.3	8.8			0.7	0.1		0.1	
Delay (s)	14.0	20.9		14.6	27.8			34.2	31.9		34.4	
Level of Service	B	C		B	C			C	C		C	
Approach Delay (s)		20.5			27.0			33.0			34.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.7	Sum of lost time (s)	26.0
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	780	240	0	0	1595
Future Volume (Veh/h)	0	780	240	0	0	1595
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.91	0.91
Hourly flow rate (vph)	0	848	261	0	0	1753
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1190	279			
pX, platoon unblocked					0.94	
vC, conflicting volume	261				685	130
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	261				527	130
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	1308				450	895

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	424	424	130	130	1753
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	1753
cSH	1700	1700	1700	1700	895
Volume to Capacity	0.25	0.25	0.08	0.08	1.96
Queue Length 95th (ft)	0	0	0	0	2827
Control Delay (s)	0.0	0.0	0.0	0.0	448.6
Lane LOS					F
Approach Delay (s)	0.0		0.0		448.6
Approach LOS					F

Intersection Summary			
Average Delay	274.8		
Intersection Capacity Utilization	112.1%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBT	NBL	NBT
Lane Group Flow (vph)	1846	234	232
v/c Ratio	0.64	0.55	0.56
Control Delay	0.5	48.7	42.3
Queue Delay	0.0	0.0	0.0
Total Delay	0.5	48.7	42.3
Queue Length 50th (ft)	0	189	160
Queue Length 95th (ft)	m0	284	254
Internal Link Dist (ft)	6		224
Turn Bay Length (ft)			
Base Capacity (vph)	2901	440	426
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.64	0.53	0.54

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	315	1420	0	0	0	0	280	60	115	0	0	0
Future Volume (vph)	315	1420	0	0	0	0	280	60	115	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	12	11	11	12	12	12
Total Lost time (s)		5.0					5.0	5.0				
Lane Util. Factor		0.91					0.95	0.95				
Frpb, ped/bikes		1.00					1.00	0.98				
Flpb, ped/bikes		1.00					1.00	1.00				
Frt		1.00					1.00	0.93				
Flt Protected		0.99					0.95	0.99				
Satd. Flow (prot)		4436					1543	1405				
Flt Permitted		0.99					0.95	0.99				
Satd. Flow (perm)		4436					1543	1405				
Peak-hour factor, PHF	0.94	0.94	0.94	0.25	0.25	0.25	0.97	0.97	1.00	0.86	0.86	0.86
Adj. Flow (vph)	335	1511	0	0	0	0	289	62	115	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	25	0	0	0	0
Lane Group Flow (vph)	0	1846	0	0	0	0	234	207	0	0	0	0
Confl. Peds. (#/hr)	3								24			
Confl. Bikes (#/hr)									9			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Split	NA					Split	NA				
Protected Phases	1 2 3 4	1 2 3 4					5	5				
Permitted Phases												
Actuated Green, G (s)		88.6					38.4	38.4				
Effective Green, g (s)		88.6					38.4	38.4				
Actuated g/C Ratio		0.63					0.27	0.27				
Clearance Time (s)							5.0	5.0				
Vehicle Extension (s)							4.0	4.0				
Lane Grp Cap (vph)		2807					423	385				
v/s Ratio Prot		c0.42					c0.15	0.15				
v/s Ratio Perm												
v/c Ratio		0.66					0.55	0.54				
Uniform Delay, d1		16.2					43.5	43.2				
Progression Factor		0.00					1.00	1.00				
Incremental Delay, d2		0.2					1.9	1.8				
Delay (s)		0.2					45.4	45.1				
Level of Service		A					D	D				
Approach Delay (s)		0.2			0.0			45.2			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	162	341	875	601
v/c Ratio	1.72	0.76	0.62	0.78
Control Delay	396.8	21.0	6.3	19.8
Queue Delay	14.2	0.0	1.2	8.9
Total Delay	411.0	21.0	7.5	28.7
Queue Length 50th (ft)	~153	45	28	226
Queue Length 95th (ft)	#282	124	m24	m355
Internal Link Dist (ft)	273		98	694
Turn Bay Length (ft)				
Base Capacity (vph)	94	504	1401	775
Starvation Cap Reductn	0	0	300	0
Spillback Cap Reductn	37	0	0	144
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	2.84	0.68	0.79	0.95

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	137	10	310	111	650	0	0	540	25
Future Volume (vph)	0	0	0	137	10	310	111	650	0	0	540	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	12	12	10	10
Total Lost time (s)					4.0	4.0		4.0			4.0	
Lane Util. Factor					1.00	1.00		0.95			1.00	
Frpb, ped/bikes					1.00	1.00		1.00			0.98	
Flpb, ped/bikes					1.00	1.00		0.98			1.00	
Frt					1.00	0.85		1.00			0.99	
Flt Protected					0.96	1.00		0.99			1.00	
Satd. Flow (prot)					1579	1405		2959			1547	
Flt Permitted					0.96	1.00		0.75			1.00	
Satd. Flow (perm)					1579	1405		2225			1547	
Peak-hour factor, PHF	0.25	0.25	0.25	0.91	0.91	0.91	0.87	0.87	0.87	0.94	0.94	0.94
Adj. Flow (vph)	0	0	0	151	11	341	128	747	0	0	574	27
RTOR Reduction (vph)	0	0	0	0	0	207	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	162	134	0	875	0	0	600	0
Confl. Peds. (#/hr)						56	224					224
Confl. Bikes (#/hr)						32						39
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Turn Type				Split	NA	custom	custom	NA			NA	
Protected Phases				8	8	1 8		2 4 9 11			6	
Permitted Phases							2 4					
Actuated Green, G (s)					6.0	17.4		61.6			50.0	
Effective Green, g (s)					6.0	17.4		55.6			50.0	
Actuated g/C Ratio					0.06	0.17		0.56			0.50	
Clearance Time (s)					4.0						4.0	
Vehicle Extension (s)					2.0						2.0	
Lane Grp Cap (vph)					94	244		1237			773	
v/s Ratio Prot					c0.10	0.10					c0.39	
v/s Ratio Perm								c0.39				
v/c Ratio					1.72	0.55		0.71			0.78	
Uniform Delay, d1					47.0	37.7		16.2			20.4	
Progression Factor					1.00	1.00		0.46			0.71	
Incremental Delay, d2					366.1	1.3		0.6			4.4	
Delay (s)					413.1	39.1		8.1			19.0	
Level of Service					F	D		A			B	
Approach Delay (s)		0.0			159.5			8.1			19.0	
Approach LOS		A			F			A			B	

Intersection Summary			
HCM 2000 Control Delay	49.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

	←	↑
Lane Group	WBT	NBT
Lane Group Flow (vph)	1878	426
v/c Ratio	1.08	0.85
Control Delay	72.7	54.6
Queue Delay	1.3	0.0
Total Delay	74.0	54.6
Queue Length 50th (ft)	~428	125
Queue Length 95th (ft)	#525	#197
Internal Link Dist (ft)	904	1076
Turn Bay Length (ft)		
Base Capacity (vph)	1742	500
Starvation Cap Reductn	0	0
Spillback Cap Reductn	5	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.08	0.85

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1425	435	75	300	0	0	0	0
Future Volume (vph)	0	0	0	0	1425	435	75	300	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					10.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.97			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.96			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					4323			3217				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					4323			3217				
Peak-hour factor, PHF	0.25	0.25	0.25	0.99	0.99	0.99	0.88	0.88	0.88	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	1439	439	85	341	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	61	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1817	0	0	426	0	0	0	0
Confl. Peds. (#/hr)						83						
Confl. Bikes (#/hr)						30						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					35.0			14.0				
Effective Green, g (s)					35.0			14.0				
Actuated g/C Ratio					0.39			0.16				
Clearance Time (s)					10.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1681			500				
v/s Ratio Prot					c0.42							
v/s Ratio Perm								0.13				
v/c Ratio					1.08			0.85				
Uniform Delay, d1					27.5			37.0				
Progression Factor					1.00			1.00				
Incremental Delay, d2					47.4			12.7				
Delay (s)					74.9			49.7				
Level of Service					E			D				
Approach Delay (s)		0.0			74.9			49.7			0.0	
Approach LOS		A			E			D			A	

Intersection Summary			
HCM 2000 Control Delay	70.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Intersection Capacity Analysis Worksheets

2025 No Build Conditions

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1429	782	1087	410
v/c Ratio	1.24	0.63	1.00	0.72
Control Delay	143.2	26.9	51.5	35.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	143.2	26.9	51.5	35.2
Queue Length 50th (ft)	~597	206	~229	220
Queue Length 95th (ft)	#733	271	#503	338
Internal Link Dist (ft)	630	2587	542	544
Turn Bay Length (ft)				
Base Capacity (vph)	1155	1236	1082	568
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.24	0.63	1.00	0.72

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	960	355	0	625	95	0	815	185	0	375	2
Future Volume (vph)	0	960	355	0	625	95	0	815	185	0	375	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		11.0			11.0			11.0			11.0	
Lane Util. Factor		0.95			0.95			0.95			1.00	
Frpb, ped/bikes		0.93			0.99			0.95			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.98			0.97			1.00	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		2890			3093			2850			1495	
Flt Permitted		1.00			1.00			1.00			1.00	
Satd. Flow (perm)		2890			3093			2850			1495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1043	386	0	679	103	0	886	201	0	408	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1429	0	0	782	0	0	1087	0	0	410	0
Confl. Peds. (#/hr)			88			37			171			131
Confl. Bikes (#/hr)			60						55			45
Heavy Vehicles (%)	0%	1%	0%	0%	1%	10%	0%	6%	1%	0%	14%	50%
Turn Type		NA			NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases												
Actuated Green, G (s)		40.0			40.0			38.0			38.0	
Effective Green, g (s)		40.0			40.0			38.0			38.0	
Actuated g/C Ratio		0.40			0.40			0.38			0.38	
Clearance Time (s)		11.0			11.0			11.0			11.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		1156			1237			1083			568	
v/s Ratio Prot		c0.49			0.25			c0.38			0.27	
v/s Ratio Perm												
v/c Ratio		1.24			0.63			1.00			0.72	
Uniform Delay, d1		30.0			24.1			31.0			26.5	
Progression Factor		1.00			1.00			0.77			1.00	
Incremental Delay, d2		113.9			0.8			25.8			7.7	
Delay (s)		143.9			24.9			49.6			34.2	
Level of Service		F			C			D			C	
Approach Delay (s)		143.9			24.9			49.6			34.2	
Approach LOS		F			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	79.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	SBT
Lane Group Flow (vph)	241	315	576	834
v/c Ratio	1.12	1.44	0.63	1.63
Control Delay	137.0	252.8	32.0	306.6
Queue Delay	0.0	0.0	0.0	0.2
Total Delay	137.0	252.8	32.0	306.8
Queue Length 50th (ft)	~186	~258	162	~783
Queue Length 95th (ft)	#347	#440	221	m#644
Internal Link Dist (ft)		515	1850	98
Turn Bay Length (ft)				
Base Capacity (vph)	216	218	917	511
Starvation Cap Reductn	0	0	0	14
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.12	1.44	0.63	1.68

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	341	10	160	0	0	0	0	490	40	402	365	0
Future Volume (vph)	341	10	160	0	0	0	0	490	40	402	365	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	10	10	10	10	12
Total Lost time (s)	4.0	4.0						4.0			4.0	
Lane Util. Factor	0.95	0.95						0.95			1.00	
Frpb, ped/bikes	1.00	0.88						0.97			1.00	
Flpb, ped/bikes	1.00	1.00						1.00			0.98	
Frt	1.00	0.92						0.99			1.00	
Flt Protected	0.95	0.98						1.00			0.97	
Satd. Flow (prot)	1543	1241						2786			1480	
Flt Permitted	0.95	0.98						1.00			0.41	
Satd. Flow (perm)	1543	1241						2786			623	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	371	11	174	0	0	0	0	533	43	437	397	0
RTOR Reduction (vph)	0	45	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	241	270	0	0	0	0	0	576	0	0	834	0
Confl. Peds. (#/hr)			42						266	266		
Confl. Bikes (#/hr)			2						82			
Heavy Vehicles (%)	0%	0%	7%	0%	0%	0%	0%	5%	0%	0%	7%	0%
Turn Type	Split	NA						NA		custom	NA	
Protected Phases	4	4						2		1	6 8 10 7	
Permitted Phases										6 8		
Actuated Green, G (s)	14.0	14.0						33.0			63.0	
Effective Green, g (s)	14.0	14.0						33.0			63.0	
Actuated g/C Ratio	0.14	0.14						0.33			0.63	
Clearance Time (s)	4.0	4.0						4.0				
Vehicle Extension (s)	2.0	2.0						2.0				
Lane Grp Cap (vph)	216	173						919			478	
v/s Ratio Prot	0.16	c0.22						0.21			c0.17	
v/s Ratio Perm											c0.92	
v/c Ratio	1.12	1.56						0.63			1.74	
Uniform Delay, d1	43.0	43.0						28.3			18.5	
Progression Factor	1.00	1.00						1.00			1.42	
Incremental Delay, d2	95.8	279.2						3.2			335.9	
Delay (s)	138.8	322.2						31.5			362.2	
Level of Service	F	F						C			F	
Approach Delay (s)		242.7			0.0			31.5			362.2	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	231.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.97		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	217	343	87	337	239	402	163	228
v/c Ratio	0.70	0.61	0.28	0.71	0.79	0.86	0.55	0.66
Control Delay	41.5	43.4	26.5	49.2	56.1	58.0	52.7	46.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.5	43.4	26.5	49.2	56.1	58.0	52.7	46.5
Queue Length 50th (ft)	129	271	47	270	165	328	126	159
Queue Length 95th (ft)	#249	#422	85	#423	#306	#526	203	245
Internal Link Dist (ft)		468		512		175	441	
Turn Bay Length (ft)	250		175		125			160
Base Capacity (vph)	311	561	338	474	302	506	342	366
Starvation Cap Reductn	0	0	0	0	0	1	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.61	0.26	0.71	0.79	0.80	0.48	0.62

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	305	10	80	300	10	220	245	125	5	145	210
Future Volume (vph)	200	305	10	80	300	10	220	245	125	5	145	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	4.0			6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.94			1.00	0.89
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.95	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00		1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1565	1603		1532	1544		1470	1409			1586	1231
Flt Permitted	0.33	1.00		0.42	1.00		0.54	1.00			0.98	1.00
Satd. Flow (perm)	542	1603		671	1544		839	1409			1562	1231
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	332	11	87	326	11	239	266	136	5	158	228
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	217	343	0	87	337	0	239	402	0	0	163	228
Confl. Peds. (#/hr)	42		34	34		42	69		64	64		69
Confl. Bikes (#/hr)			26			16			48			13
Heavy Vehicles (%)	3%	6%	0%	5%	8%	11%	5%	8%	9%	20%	7%	5%
Bus Blockages (#/hr)	0	0	0	0	4	4	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		D.P+P	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6		7	7 8			8	5
Permitted Phases	2			6			8			8		8
Actuated Green, G (s)	51.1	40.9		44.1	37.4		32.6	36.6			22.4	32.6
Effective Green, g (s)	51.1	40.9		44.1	37.4		32.6	36.6			22.4	32.6
Actuated g/C Ratio	0.42	0.34		0.36	0.31		0.27	0.30			0.19	0.27
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0				6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0				2.0	2.0
Lane Grp Cap (vph)	315	541		292	477		279	426			289	392
v/s Ratio Prot	0.06	0.21		0.02	0.22		0.07	c0.29				c0.05
v/s Ratio Perm	c0.23			0.09			0.16				0.10	0.14
v/c Ratio	0.69	0.63		0.30	0.71		0.86	0.94			0.56	0.58
Uniform Delay, d1	26.2	33.7		26.3	36.9		40.7	41.2			44.9	38.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	4.9	5.6		0.2	8.5		21.2	29.3			1.5	1.4
Delay (s)	31.1	39.3		26.5	45.5		61.9	70.5			46.4	39.7
Level of Service	C	D		C	D		E	E			D	D
Approach Delay (s)		36.1			41.6			67.3			42.5	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	48.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	121.0	Sum of lost time (s)	29.0
Intersection Capacity Utilization	82.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	125	21	614	483
v/c Ratio	0.55	0.11	0.70	0.61
Control Delay	26.1	25.0	18.2	16.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	26.1	25.0	18.2	16.0
Queue Length 50th (ft)	23	6	114	80
Queue Length 95th (ft)	90	29	#623	#471
Internal Link Dist (ft)	423	223	1753	102
Turn Bay Length (ft)				
Base Capacity (vph)	402	392	874	794
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.31	0.05	0.70	0.61

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	0	40	5	10	5	25	540	0	0	385	60
Future Volume (vph)	75	0	40	5	10	5	25	540	0	0	385	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	10	12	12	10	10
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.97			0.97			1.00			0.98	
Flpb, ped/bikes		0.94			0.99			1.00			1.00	
Frt		0.95			0.97			1.00			0.98	
Flt Protected		0.97			0.99			1.00			1.00	
Satd. Flow (prot)		1309			1251			1358			1204	
Flt Permitted		0.79			0.93			0.97			1.00	
Satd. Flow (perm)		1067			1175			1321			1204	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	0	43	5	11	5	27	587	0	0	418	65
RTOR Reduction (vph)	0	53	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	72	0	0	17	0	0	614	0	0	483	0
Confl. Peds. (#/hr)	29		16	16		29	54		32	32		54
Confl. Bikes (#/hr)			1			2			17			5
Heavy Vehicles (%)	6%	0%	8%	0%	11%	0%	19%	14%	0%	0%	14%	22%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		5			5			1			1	
Permitted Phases	5			5			1					
Actuated Green, G (s)		12.3			12.3			51.6			51.6	
Effective Green, g (s)		12.3			12.3			51.6			51.6	
Actuated g/C Ratio		0.15			0.15			0.64			0.64	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		161			178			840			766	
v/s Ratio Prot											0.40	
v/s Ratio Perm		c0.07			0.01			c0.46				
v/c Ratio		0.44			0.09			0.73			0.63	
Uniform Delay, d1		31.3			29.6			10.0			9.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.7			0.3			5.6			3.9	
Delay (s)		33.9			29.9			15.6			12.9	
Level of Service		C			C			B			B	
Approach Delay (s)		33.9			29.9			15.6			12.9	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	81.1	Sum of lost time (s)	14.0
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	190	1842	1261	658	397	174
v/c Ratio	0.84	1.04	1.14	1.42	0.83	0.25
Control Delay	76.4	55.9	87.3	212.5	51.8	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.4	55.9	87.3	212.5	51.8	14.5
Queue Length 50th (ft)	132	~740	~541	~625	260	60
Queue Length 95th (ft)	#258	#879	m401	m#520	#424	103
Internal Link Dist (ft)		431	869		1753	
Turn Bay Length (ft)	200			200		85
Base Capacity (vph)	225	1773	1111	465	478	709
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.84	1.04	1.14	1.42	0.83	0.25

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	175	1695	1160	605	365	160
Future Volume (vph)	175	1695	1160	605	365	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	11
Total Lost time (s)	6.5	5.5	5.5	5.5	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.94	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1417	3025	3020	1263	1547	1338
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1417	3025	3020	1263	1547	1338
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	190	1842	1261	658	397	174
RTOR Reduction (vph)	0	0	0	0	0	4
Lane Group Flow (vph)	190	1842	1261	658	397	170
Confl. Peds. (#/hr)	17			17		11
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	7%	3%	4%	8%	5%	5%
Bus Blockages (#/hr)	0	4	0	0	0	0
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	6	1 6	1		5	5 6
Permitted Phases				1		
Actuated Green, G (s)	17.5	64.5	40.5	40.5	34.0	57.5
Effective Green, g (s)	17.5	58.0	40.5	40.5	34.0	57.5
Actuated g/C Ratio	0.16	0.53	0.37	0.37	0.31	0.52
Clearance Time (s)	6.5		5.5	5.5	6.0	
Vehicle Extension (s)	2.0		3.0	3.0	2.0	
Lane Grp Cap (vph)	225	1595	1111	465	478	699
v/s Ratio Prot	0.13	c0.61	0.42		c0.26	0.13
v/s Ratio Perm				c0.52		
v/c Ratio	0.84	1.15	1.14	1.42	0.83	0.24
Uniform Delay, d1	44.9	26.0	34.8	34.8	35.3	14.3
Progression Factor	1.00	1.00	0.69	0.70	1.00	1.00
Incremental Delay, d2	30.3	77.3	62.0	188.0	15.4	0.8
Delay (s)	75.2	103.3	86.1	212.2	50.7	15.2
Level of Service	E	F	F	F	D	B
Approach Delay (s)		100.7	129.3		39.9	
Approach LOS		F	F		D	

Intersection Summary			
HCM 2000 Control Delay	105.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	86.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	16	723	2174	147
v/c Ratio	0.21	0.33	1.15	0.91
Control Delay	49.3	8.3	96.8	100.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	49.3	8.3	96.8	100.4
Queue Length 50th (ft)	11	47	~887	104
Queue Length 95th (ft)	m11	m185	#1361	#227
Internal Link Dist (ft)		869	980	202
Turn Bay Length (ft)	170			
Base Capacity (vph)	75	2206	1886	162
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.21	0.33	1.15	0.91

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	665	1945	55	110	25
Future Volume (vph)	15	665	1945	55	110	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	12	12
Total Lost time (s)	5.5	6.0	6.0		4.5	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		0.99	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	1.00		0.98	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1285	2973	2980		1554	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1285	2973	2980		1554	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	723	2114	60	120	27
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	16	723	2174	0	147	0
Confl. Peds. (#/hr)	9			9		8
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	18%	2%	5%	0%	1%	9%
Turn Type	Prot	NA	NA		Prot	
Protected Phases	6	1 6	1		5	
Permitted Phases						
Actuated Green, G (s)	6.5	76.0	64.0		11.5	
Effective Green, g (s)	6.5	70.5	64.0		11.5	
Actuated g/C Ratio	0.06	0.64	0.58		0.10	
Clearance Time (s)	5.5		6.0		4.5	
Vehicle Extension (s)	2.0		3.0		2.0	
Lane Grp Cap (vph)	75	1905	1733		162	
v/s Ratio Prot	0.01	c0.24	c0.73		c0.09	
v/s Ratio Perm						
v/c Ratio	0.21	0.38	1.25		0.91	
Uniform Delay, d1	49.3	9.4	23.0		48.7	
Progression Factor	0.98	1.17	1.00		1.00	
Incremental Delay, d2	0.0	0.0	119.4		43.6	
Delay (s)	48.2	11.0	142.4		92.3	
Level of Service	D	B	F		F	
Approach Delay (s)		11.8	142.4		92.3	
Approach LOS		B	F		F	

Intersection Summary			
HCM 2000 Control Delay	108.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	NBT	NEL	NER
Lane Group Flow (vph)	16	832	457	113	448	896
v/c Ratio	0.10	1.84	0.38	0.49	0.72	0.78
Control Delay	53.9	421.2	17.1	24.1	39.3	38.7
Queue Delay	0.0	0.3	1.2	1.2	59.8	53.7
Total Delay	53.9	421.5	18.3	25.3	99.1	92.3
Queue Length 50th (ft)	13	~603	54	18	327	374
Queue Length 95th (ft)	36	#736	72	81	468	469
Internal Link Dist (ft)		199	90	45	468	
Turn Bay Length (ft)	100					
Base Capacity (vph)	168	451	1194	231	623	1144
Starvation Cap Reductn	0	0	498	0	0	0
Spillback Cap Reductn	0	15	0	31	369	677
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	1.91	0.66	0.56	1.76	1.92

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	15	765	275	145	5	15	85	2	5	1230
Future Volume (vph)	15	765	275	145	5	15	85	2	5	1230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	8.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95	0.95			1.00			1.00	0.91
Frpb, ped/bikes	1.00	1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.95			0.89			0.85	0.85
Flt Protected	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1177	3160	3027			1490			1386	2544
Flt Permitted	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1177	3160	3027			1490			1386	2544
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	832	299	158	5	16	92	2	5	1337
RTOR Reduction (vph)	0	0	47	0	0	83	0	0	0	0
Lane Group Flow (vph)	16	832	410	0	0	30	0	0	448	896
Confl. Peds. (#/hr)	9			9					9	
Confl. Bikes (#/hr)				1						
Heavy Vehicles (%)	38%	2%	1%	0%	0%	8%	1%	0%	100%	4%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Turn Type	Split	NA	NA		Split	NA		Perm	pm+pt	custom
Protected Phases	3	3	4 5		2	2			1	1 5
Permitted Phases								1 5	5	1 5
Actuated Green, G (s)	20.0	20.0	56.0			14.0			58.0	63.0
Effective Green, g (s)	20.0	20.0	56.0			14.0			58.0	63.0
Actuated g/C Ratio	0.14	0.14	0.40			0.10			0.41	0.45
Clearance Time (s)	5.0	5.0				5.0			5.0	
Vehicle Extension (s)	2.0	2.0				2.0			2.0	
Lane Grp Cap (vph)	168	451	1210			149			623	1144
v/s Ratio Prot	0.01	c0.26	c0.14			c0.02			0.15	c0.35
v/s Ratio Perm									0.17	
v/c Ratio	0.10	1.84	0.34			0.20			0.72	0.78
Uniform Delay, d1	52.1	60.0	29.1			57.9			33.2	32.7
Progression Factor	1.00	1.00	0.63			1.00			1.00	1.00
Incremental Delay, d2	1.1	388.7	0.1			0.2			4.3	3.8
Delay (s)	53.3	448.7	18.3			58.1			37.5	36.5
Level of Service	D	F	B			E			D	D
Approach Delay (s)		441.2	18.3			58.1			36.8	
Approach LOS		F	B			E			D	

Intersection Summary			
HCM 2000 Control Delay	158.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1864	397	364	205	399	103
v/c Ratio	0.86	0.55	0.39	1.04	0.98	0.33
Control Delay	27.8	9.5	0.6	130.8	98.0	6.7
Queue Delay	48.0	57.9	0.0	0.0	0.0	0.1
Total Delay	75.7	67.3	0.6	130.8	98.0	6.8
Queue Length 50th (ft)	515	197	1	~219	201	0
Queue Length 95th (ft)	m413	m132	m1	#401	#315	30
Internal Link Dist (ft)	90		6		182	
Turn Bay Length (ft)		100				
Base Capacity (vph)	2167	724	927	198	409	308
Starvation Cap Reductn	954	394	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	11
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.54	1.20	0.39	1.04	0.98	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1715	365	10	325	0	0	0	0	330	225	95
Future Volume (vph)	0	1715	365	10	325	0	0	0	0	330	225	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	13	12	12	12	12	12	12	11	11	11
Total Lost time (s)		5.0	5.0		5.0					8.0	8.0	8.0
Lane Util. Factor		0.86	0.86		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.97		1.00					1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		4101	1236		3244					1387	2866	1365
Flt Permitted		1.00	1.00		0.95					0.95	0.98	1.00
Satd. Flow (perm)		4101	1236		3103					1387	2866	1365
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1864	397	11	353	0	0	0	0	359	245	103
RTOR Reduction (vph)	0	0	71	0	0	0	0	0	0	0	0	88
Lane Group Flow (vph)	0	1864	326	0	364	0	0	0	0	205	399	15
Confl. Peds. (#/hr)			31	31								8
Confl. Bikes (#/hr)			11									
Heavy Vehicles (%)	0%	4%	1%	0%	0%	0%	0%	0%	0%	3%	3%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		1 2 3		5	1 5					4	4	
Permitted Phases			1 2 3									4
Actuated Green, G (s)		74.0	74.0		58.0					20.0	20.0	20.0
Effective Green, g (s)		74.0	74.0		58.0					20.0	20.0	20.0
Actuated g/C Ratio		0.53	0.53		0.41					0.14	0.14	0.14
Clearance Time (s)										8.0	8.0	8.0
Vehicle Extension (s)										2.0	2.0	2.0
Lane Grp Cap (vph)		2167	653		1313					198	409	195
v/s Ratio Prot		c0.45			c0.06					c0.15	0.14	
v/s Ratio Perm			0.26		0.06							0.01
v/c Ratio		0.86	0.50		0.28					1.04	0.98	0.08
Uniform Delay, d1		28.5	21.1		27.1					60.0	59.8	52.0
Progression Factor		0.94	0.70		0.02					1.00	1.00	1.00
Incremental Delay, d2		0.3	0.0		0.0					73.5	37.6	0.1
Delay (s)		27.2	14.8		0.6					133.5	97.4	52.0
Level of Service		C	B		A					F	F	D
Approach Delay (s)		25.1			0.6			0.0			101.2	
Approach LOS		C			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	38.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	NBT	SBT
Lane Group Flow (vph)	1218	821	897	1054
v/c Ratio	0.91	1.32	0.79	1.16
Control Delay	34.9	177.5	45.6	120.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	34.9	177.5	45.6	120.3
Queue Length 50th (ft)	474	~916	380	~518
Queue Length 95th (ft)	m#875	m#1368	466	#736
Internal Link Dist (ft)	704		451	909
Turn Bay Length (ft)				
Base Capacity (vph)	1341	623	1131	905
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.91	1.32	0.79	1.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	930	755	0	0	0	0	755	70	70	900	0
Future Volume (vph)	190	930	755	0	0	0	0	755	70	70	900	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	11	11	12	11	11
Total Lost time (s)		6.0	6.0					5.0			6.0	
Lane Util. Factor		0.95	1.00					0.95			0.95	
Frpb, ped/bikes		1.00	1.00					1.00			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		1.00	0.85					0.99			1.00	
Flt Protected		0.99	1.00					1.00			1.00	
Satd. Flow (prot)		3129	1454					3094			3129	
Flt Permitted		0.99	1.00					1.00			0.60	
Satd. Flow (perm)		3129	1454					3094			1873	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	1011	821	0	0	0	0	821	76	76	978	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	1218	821	0	0	0	0	892	0	0	1054	0
Confl. Peds. (#/hr)	6		17						5	5		
Confl. Bikes (#/hr)			15									
Heavy Vehicles (%)	1%	3%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Prot					NA		pm+pt	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4									6		
Actuated Green, G (s)		56.8	56.8					51.0			63.0	
Effective Green, g (s)		56.8	56.8					51.0			63.0	
Actuated g/C Ratio		0.41	0.41					0.36			0.45	
Clearance Time (s)		6.0	6.0					5.0			6.0	
Vehicle Extension (s)		2.0	2.0					2.0			2.0	
Lane Grp Cap (vph)		1269	589					1127			914	
v/s Ratio Prot			c0.56					0.29			c0.07	
v/s Ratio Perm		0.39									c0.45	
v/c Ratio		0.96	1.39					0.79			1.15	
Uniform Delay, d1		40.5	41.6					39.7			38.5	
Progression Factor		0.70	0.72					1.00			1.00	
Incremental Delay, d2		12.6	183.8					3.6			81.5	
Delay (s)		40.9	213.7					43.4			120.0	
Level of Service		D	F					D			F	
Approach Delay (s)		110.5			0.0			43.4			120.0	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	97.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	104.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1293	397	647	1267
v/c Ratio	1.10	1.21	0.66	1.16
Control Delay	97.1	156.7	20.6	118.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	97.1	156.7	20.6	118.4
Queue Length 50th (ft)	~413	~330	318	~606
Queue Length 95th (ft)	#510	#530	450	#746
Internal Link Dist (ft)	706		909	547
Turn Bay Length (ft)				
Base Capacity (vph)	1180	329	978	1089
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.10	1.21	0.66	1.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	105	980	105	365	595	0	0	915	250
Future Volume (vph)	0	0	0	105	980	105	365	595	0	0	915	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	12	11	11	12	12	11	11
Total Lost time (s)					10.0		6.0	6.0			6.0	
Lane Util. Factor					0.91		1.00	1.00			0.95	
Frpb, ped/bikes					0.98		1.00	1.00			0.96	
Flpb, ped/bikes					1.00		1.00	1.00			1.00	
Frt					0.99		1.00	1.00			0.97	
Flt Protected					1.00		0.95	1.00			1.00	
Satd. Flow (prot)					4255		1570	1653			2912	
Flt Permitted					1.00		0.08	1.00			1.00	
Satd. Flow (perm)					4255		132	1653			2912	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	114	1065	114	397	647	0	0	995	272
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	21	0
Lane Group Flow (vph)	0	0	0	0	1284	0	397	647	0	0	1246	0
Confl. Peds. (#/hr)						69	65					65
Confl. Bikes (#/hr)						25						82
Heavy Vehicles (%)	2%	2%	2%	1%	3%	0%	0%	0%	0%	0%	0%	1%
Turn Type				Split	NA		pm+pt	NA			NA	
Protected Phases				4	4		1	6			2	
Permitted Phases							6					
Actuated Green, G (s)					33.0		71.0	71.0			44.0	
Effective Green, g (s)					33.0		71.0	71.0			44.0	
Actuated g/C Ratio					0.28		0.59	0.59			0.37	
Clearance Time (s)					10.0		6.0	6.0			6.0	
Vehicle Extension (s)					2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)					1170		329	978			1067	
v/s Ratio Prot					c0.30		c0.21	0.39			0.43	
v/s Ratio Perm							c0.50					
v/c Ratio					1.10		1.21	0.66			1.17	
Uniform Delay, d1					43.5		43.1	16.4			38.0	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					57.0		118.2	3.5			85.9	
Delay (s)					100.5		161.3	20.0			123.9	
Level of Service					F		F	B			F	
Approach Delay (s)		0.0			100.5			73.7			123.9	
Approach LOS		A			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	100.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	105.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	SBT
Lane Group Flow (vph)	413	984	870	881
v/c Ratio	0.67	1.37	1.04	1.14
Control Delay	39.3	195.2	43.5	107.2
Queue Delay	0.0	1.2	22.4	0.0
Total Delay	39.3	196.5	65.9	107.2
Queue Length 50th (ft)	134	~402	~430	~353
Queue Length 95th (ft)	193	m97	m156	m#290
Internal Link Dist (ft)			129	1760
Turn Bay Length (ft)	100			
Base Capacity (vph)	618	716	834	776
Starvation Cap Reductn	0	119	111	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.67	1.65	1.20	1.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	380	905	800	0	0	0	0	0	765	45
Future Volume (vph)	0	0	380	905	800	0	0	0	0	0	765	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)			9.0	6.0	6.0						5.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2378	2987	1574						3216	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2378	2987	1574						3216	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	413	984	870	0	0	0	0	0	832	49
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	413	984	870	0	0	0	0	0	876	0
Confl. Peds. (#/hr)			4	17								4
Confl. Bikes (#/hr)			35									2
Heavy Vehicles (%)	0%	0%	4%	2%	5%	0%	0%	0%	0%	0%	0%	0%
Turn Type			Prot	Prot	NA						NA	
Protected Phases			2	1 4	1 2 4						3	
Permitted Phases												
Actuated Green, G (s)			26.0	31.0	62.0						24.0	
Effective Green, g (s)			26.0	31.0	57.0						24.0	
Actuated g/C Ratio			0.26	0.31	0.57						0.24	
Clearance Time (s)			9.0								5.0	
Vehicle Extension (s)			2.0								2.0	
Lane Grp Cap (vph)			618	925	897						771	
v/s Ratio Prot			0.17	c0.33	c0.55						c0.27	
v/s Ratio Perm												
v/c Ratio			0.67	1.06	0.97						1.14	
Uniform Delay, d1			33.1	34.5	20.7						38.0	
Progression Factor			1.00	0.70	1.01						1.08	
Incremental Delay, d2			2.1	31.4	4.1						69.8	
Delay (s)			35.3	55.6	25.1						110.7	
Level of Service			D	E	C						F	
Approach Delay (s)		35.3			41.3			0.0			110.7	
Approach LOS		D			D			A			F	

Intersection Summary			
HCM 2000 Control Delay	59.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	106.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	365	25	35	660	150	10	0	15	0	0	0
Future Volume (Veh/h)	55	365	25	35	660	150	10	0	15	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	397	27	38	717	163	11	0	16	0	0	0
Pedestrians		40						50			19	
Lane Width (ft)		11.0						12.0			0.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		3						4			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		745			513							
pX, platoon unblocked	0.47			0.92			0.51	0.51	0.92	0.51	0.51	0.47
vC, conflicting volume	899			474			1495	1556	460	1426	1488	858
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	217			380			1121	1239	365	987	1106	128
tC, single (s)	4.2			4.2			7.3	6.7	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.7	4.2	3.5	3.5	4.0	3.3
p0 queue free %	90			96			84	100	97	100	100	100
cM capacity (veh/h)	617			1016			70	69	565	99	90	421

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	60	424	918	27
Volume Left	60	0	38	11
Volume Right	0	27	163	16
cSH	617	1700	1016	146
Volume to Capacity	0.10	0.25	0.04	0.19
Queue Length 95th (ft)	8	0	3	16
Control Delay (s)	11.5	0.0	1.0	35.3
Lane LOS	B		A	E
Approach Delay (s)	1.4		1.0	35.3
Approach LOS				E

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	130	418	43	739	21	38	71
v/c Ratio	0.52	0.43	0.12	0.78	0.17	0.39	0.53
Control Delay	28.1	16.6	15.9	26.4	47.3	56.9	47.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.1	16.6	15.9	26.4	47.3	56.9	47.6
Queue Length 50th (ft)	42	123	10	325	14	25	31
Queue Length 95th (ft)	#207	#408	49	#905	37	57	77
Internal Link Dist (ft)		525		665	51		70
Turn Bay Length (ft)	110		140				
Base Capacity (vph)	251	969	347	943	239	186	163
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.43	0.12	0.78	0.09	0.20	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	380	5	40	545	135	5	15	35	30	10	25
Future Volume (vph)	120	380	5	40	545	135	5	15	35	30	10	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.97		0.98	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.97			1.00	0.85		0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.98	
Satd. Flow (prot)	1466	1460		1065	1425			1674	1297		1497	
Flt Permitted	0.24	1.00		0.47	1.00			0.99	1.00		0.98	
Satd. Flow (perm)	378	1460		526	1425			1674	1297		1497	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	413	5	43	592	147	5	16	38	33	11	27
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	22	0
Lane Group Flow (vph)	130	418	0	43	739	0	0	21	38	0	49	0
Confl. Peds. (#/hr)	17		22	22		17	3		1	1		3
Confl. Bikes (#/hr)			33			12						
Heavy Vehicles (%)	3%	9%	14%	41%	7%	11%	4%	0%	9%	9%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA	Perm	Split	NA	
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6			2					8			
Actuated Green, G (s)	62.4	62.4		62.4	62.4			6.7	6.7		6.7	
Effective Green, g (s)	62.4	62.4		62.4	62.4			6.7	6.7		6.7	
Actuated g/C Ratio	0.59	0.59		0.59	0.59			0.06	0.06		0.06	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0		1.0	1.0			2.0	2.0		2.0	
Lane Grp Cap (vph)	224	867		312	846			106	82		95	
v/s Ratio Prot		0.29			c0.52			0.01			c0.03	
v/s Ratio Perm	0.34			0.08					c0.03			
v/c Ratio	0.58	0.48		0.14	0.87			0.20	0.46		0.52	
Uniform Delay, d1	13.2	12.1		9.4	18.0			46.6	47.4		47.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	10.5	1.9		0.9	12.1			0.3	1.5		2.4	
Delay (s)	23.7	14.0		10.3	30.1			46.9	48.9		50.0	
Level of Service	C	B		B	C			D	D		D	
Approach Delay (s)		16.3			29.0			48.2			50.0	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	495	25	1	380	130	1	1	0	30	25	0
Future Volume (Veh/h)	1	495	25	1	380	130	1	1	0	30	25	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	538	27	1	413	141	1	1	0	33	27	0
Pedestrians					22			22			17	
Lane Width (ft)					11.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					2			2			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		592			467							
pX, platoon unblocked	0.80			0.84			0.88	0.88	0.84	0.88	0.88	0.80
vC, conflicting volume	571			587			1074	1148	596	1078	1092	500
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	331			411			599	684	421	604	619	243
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	90	92	100
cM capacity (veh/h)	962			945			325	314	512	338	342	624

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	566	555	2	60
Volume Left	1	1	1	33
Volume Right	27	141	0	0
cSH	962	945	319	340
Volume to Capacity	0.00	0.00	0.01	0.18
Queue Length 95th (ft)	0	0	0	16
Control Delay (s)	0.0	0.0	16.3	17.8
Lane LOS	A	A	C	C
Approach Delay (s)	0.0	0.0	16.3	17.8
Approach LOS			C	C

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	47.5%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	577	626	22	3
v/c Ratio	0.49	0.56	0.18	0.03
Control Delay	13.9	15.5	32.1	30.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.9	15.5	32.1	30.7
Queue Length 50th (ft)	0	0	8	1
Queue Length 95th (ft)	#522	#590	30	9
Internal Link Dist (ft)	387	525	202	64
Turn Bay Length (ft)				
Base Capacity (vph)	1189	1126	121	108
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.49	0.56	0.18	0.03

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	500	30	50	525	1	15	1	5	1	1	1
Future Volume (vph)	1	500	30	50	525	1	15	1	5	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	13	13	13	12	12	12
Total Lost time (s)		5.5			5.5			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.93			0.89	
Flpb, ped/bikes		1.00			1.00			0.78			0.90	
Frt		0.99			1.00			0.97			0.95	
Flt Protected		1.00			1.00			0.96			0.98	
Satd. Flow (prot)		1506			1543			1173			1270	
Flt Permitted		1.00			0.92			1.00			0.92	
Satd. Flow (perm)		1505			1422			1216			1187	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	543	33	54	571	1	16	1	5	1	1	1
RTOR Reduction (vph)	0	1	0	0	0	0	0	5	0	0	1	0
Lane Group Flow (vph)	0	576	0	0	626	0	0	17	0	0	2	0
Confl. Peds. (#/hr)	17		22	22		17	22		22	22		22
Confl. Bikes (#/hr)			33			12						
Heavy Vehicles (%)	2%	9%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			5			5	
Permitted Phases	1			1			5			5		
Actuated Green, G (s)		50.7			50.7			2.9			2.9	
Effective Green, g (s)		50.7			50.7			2.9			2.9	
Actuated g/C Ratio		0.63			0.63			0.04			0.04	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		953			901			44			43	
v/s Ratio Prot												
v/s Ratio Perm		0.38			c0.44			c0.01			0.00	
v/c Ratio		0.60			0.69			0.39			0.05	
Uniform Delay, d1		8.7			9.6			37.7			37.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.8			4.4			2.1			0.2	
Delay (s)		11.5			14.0			39.8			37.4	
Level of Service		B			B			D			D	
Approach Delay (s)		11.5			14.0			39.8			37.4	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	10	10	10	0	50	80	15	440	0	45	350	20
Future Volume (Veh/h)	10	10	10	0	50	80	15	440	0	45	350	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	11	11	0	54	87	16	478	0	49	380	22
Pedestrians		69			64						42	
Lane Width (ft)		12.0			13.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		6			6						4	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								521				
pX, platoon unblocked	0.91	0.91		0.91	0.91	0.91				0.91		
vC, conflicting volume	1224	1132	460	1080	1143	584	471			542		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1198	1097	460	1040	1109	498	471			452		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	93	98	100	66	82	98			95		
cM capacity (veh/h)	71	161	567	145	159	476	1028			955		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	33	141	494	451
Volume Left	11	0	16	49
Volume Right	11	87	0	22
cSH	136	270	1028	955
Volume to Capacity	0.24	0.52	0.02	0.05
Queue Length 95th (ft)	22	70	1	4
Control Delay (s)	39.6	32.1	0.5	1.5
Lane LOS	E	D	A	A
Approach Delay (s)	39.6	32.1	0.5	1.5
Approach LOS	E	D		

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	780	280	0	0	1720
Future Volume (Veh/h)	0	780	280	0	0	1720
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	848	304	0	0	1870
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1190	279			
pX, platoon unblocked					0.93	
vC, conflicting volume	304				728	152
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	304				555	152
tC, single (s)	4.1				6.9	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	1261				427	864

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	424	424	152	152	1870
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	1870
cSH	1700	1700	1700	1700	864
Volume to Capacity	0.25	0.25	0.09	0.09	2.16
Queue Length 95th (ft)	0	0	0	0	3278
Control Delay (s)	0.0	0.0	0.0	0.0	541.0
Lane LOS					F
Approach Delay (s)	0.0		0.0		541.0
Approach LOS					F

Intersection Summary			
Average Delay	334.8		
Intersection Capacity Utilization	120.9%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBT	NBL	NBT
Lane Group Flow (vph)	2223	295	395
v/c Ratio	0.71	0.96	1.36
Control Delay	0.6	96.7	221.1
Queue Delay	0.0	0.0	0.0
Total Delay	0.6	96.7	221.1
Queue Length 50th (ft)	0	283	~480
Queue Length 95th (ft)	m0	#476	#702
Internal Link Dist (ft)	6		224
Turn Bay Length (ft)			
Base Capacity (vph)	3142	308	291
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.71	0.96	1.36

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	320	1725	0	0	0	0	335	150	150	0	0	0
Future Volume (vph)	320	1725	0	0	0	0	335	150	150	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	12	11	11	12	12	12
Total Lost time (s)		5.0					5.0	5.0				
Lane Util. Factor		0.91					0.95	0.95				
Frpb, ped/bikes		1.00					1.00	0.94				
Flpb, ped/bikes		1.00					1.00	1.00				
Frt		1.00					1.00	0.94				
Flt Protected		0.99					0.95	0.99				
Satd. Flow (prot)		4314					1543	1367				
Flt Permitted		0.99					0.95	0.99				
Satd. Flow (perm)		4314					1543	1367				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	348	1875	0	0	0	0	364	163	163	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	18	0	0	0	0
Lane Group Flow (vph)	0	2223	0	0	0	0	295	377	0	0	0	0
Confl. Peds. (#/hr)	8								93			
Confl. Bikes (#/hr)									7			
Heavy Vehicles (%)	8%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Split	NA					Split	NA				
Protected Phases	1 2 3 4	1 2 3 4					5	5				
Permitted Phases												
Actuated Green, G (s)		99.0					28.0	28.0				
Effective Green, g (s)		99.0					28.0	28.0				
Actuated g/C Ratio		0.71					0.20	0.20				
Clearance Time (s)							5.0	5.0				
Vehicle Extension (s)							4.0	4.0				
Lane Grp Cap (vph)		3050					308	273				
v/s Ratio Prot		c0.52					0.19	c0.28				
v/s Ratio Perm												
v/c Ratio		0.73					0.96	1.38				
Uniform Delay, d1		12.4					55.4	56.0				
Progression Factor		0.00					1.00	1.00				
Incremental Delay, d2		0.3					39.8	192.1				
Delay (s)		0.3					95.2	248.1				
Level of Service		A					F	F				
Approach Delay (s)		0.3			0.0			182.7			0.0	
Approach LOS		A			A			F			A	

Intersection Summary			
HCM 2000 Control Delay	43.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	75	245	903	794
v/c Ratio	0.80	0.56	0.62	1.11
Control Delay	76.3	7.6	3.0	81.5
Queue Delay	75.2	0.0	1.3	5.6
Total Delay	151.5	7.6	4.3	87.1
Queue Length 50th (ft)	52	21	17	~273
Queue Length 95th (ft)	m47	m13	m11	m#410
Internal Link Dist (ft)	273		98	542
Turn Bay Length (ft)				
Base Capacity (vph)	94	631	1468	716
Starvation Cap Reductn	0	0	336	0
Spillback Cap Reductn	36	0	0	352
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.29	0.39	0.80	2.18

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	67	2	225	56	775	0	0	700	30
Future Volume (vph)	0	0	0	67	2	225	56	775	0	0	700	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	12	12	10	10
Total Lost time (s)					4.0	4.0		4.0			4.0	
Lane Util. Factor					1.00	1.00		0.95			1.00	
Frpb, ped/bikes					1.00	1.00		1.00			0.99	
Flpb, ped/bikes					1.00	1.00		1.00			1.00	
Frt					1.00	0.85		1.00			0.99	
Flt Protected					0.95	1.00		1.00			1.00	
Satd. Flow (prot)					1576	1405		2910			1521	
Flt Permitted					0.95	1.00		0.78			1.00	
Satd. Flow (perm)					1576	1405		2270			1521	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	73	2	245	61	842	0	0	761	33
RTOR Reduction (vph)	0	0	0	0	0	206	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	75	39	0	903	0	0	792	0
Confl. Peds. (#/hr)						56	196					196
Confl. Bikes (#/hr)						9						34
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	4%	0%	0%	3%	0%
Turn Type				Split	NA	custom	custom	NA			NA	
Protected Phases				8	8	1 8		2 4 9 11			6	
Permitted Phases							2 4					
Actuated Green, G (s)					6.0	16.0		63.0			47.0	
Effective Green, g (s)					6.0	16.0		57.0			47.0	
Actuated g/C Ratio					0.06	0.16		0.57			0.47	
Clearance Time (s)					4.0						4.0	
Vehicle Extension (s)					2.0						2.0	
Lane Grp Cap (vph)					94	224		1293			714	
v/s Ratio Prot					c0.05	0.03					c0.52	
v/s Ratio Perm								c0.40				
v/c Ratio					0.80	0.17		0.70			1.11	
Uniform Delay, d1					46.4	36.3		15.4			26.5	
Progression Factor					1.54	1.77		0.20			0.94	
Incremental Delay, d2					4.0	0.0		0.6			55.7	
Delay (s)					75.5	64.2		3.7			80.7	
Level of Service					E	E		A			F	
Approach Delay (s)		0.0			66.8			3.7			80.7	
Approach LOS		A			E			A			F	

Intersection Summary			
HCM 2000 Control Delay	44.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	86.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBT	NBT
Lane Group Flow (vph)	1734	511
v/c Ratio	1.68	0.99dl
Control Delay	339.7	39.2
Queue Delay	1.0	4.8
Total Delay	340.7	44.0
Queue Length 50th (ft)	~595	154
Queue Length 95th (ft)	#691	214
Internal Link Dist (ft)	682	1076
Turn Bay Length (ft)		
Base Capacity (vph)	1030	736
Starvation Cap Reductn	0	0
Spillback Cap Reductn	183	159
Storage Cap Reductn	0	0
Reduced v/c Ratio	2.05	0.89

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1365	230	340	130	0	0	0	0
Future Volume (vph)	0	0	0	0	1365	230	340	130	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)					6.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.96			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.98			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					4295			2833				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					4295			2833				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1484	250	370	141	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1734	0	0	511	0	0	0	0
Confl. Peds. (#/hr)						170	4					
Confl. Bikes (#/hr)						33						
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	9%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					24.0			26.0				
Effective Green, g (s)					24.0			26.0				
Actuated g/C Ratio					0.24			0.26				
Clearance Time (s)					6.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1030			736				
v/s Ratio Prot					c0.40							
v/s Ratio Perm								0.18				
v/c Ratio					1.68			0.99dl				
Uniform Delay, d1					38.0			33.4				
Progression Factor					1.00			1.00				
Incremental Delay, d2					311.8			2.3				
Delay (s)					349.8			35.7				
Level of Service					F			D				
Approach Delay (s)		0.0			349.8			35.7			0.0	
Approach LOS		A			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	278.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	106.1%	ICU Level of Service	G
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1114	1109	1201	375
v/c Ratio	1.05	0.95	1.08	0.58
Control Delay	75.2	47.4	78.6	27.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	75.2	47.4	78.6	27.4
Queue Length 50th (ft)	~411	355	~447	181
Queue Length 95th (ft)	#541	#496	m#565	277
Internal Link Dist (ft)	561	2687	694	566
Turn Bay Length (ft)				
Base Capacity (vph)	1056	1173	1108	643
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.05	0.95	1.08	0.58

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	725	300	0	915	105	0	795	310	0	330	15
Future Volume (vph)	0	725	300	0	915	105	0	795	310	0	330	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		11.0			11.0			11.0			11.0	
Lane Util. Factor		0.95			0.95			0.95			1.00	
Frpb, ped/bikes		0.93			0.99			0.90			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.98			0.96			0.99	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		2857			3170			2703			1571	
Flt Permitted		1.00			1.00			1.00			1.00	
Satd. Flow (perm)		2857			3170			2703			1571	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	788	326	0	995	114	0	864	337	0	359	16
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1114	0	0	1109	0	0	1201	0	0	375	0
Confl. Peds. (#/hr)			109			54			323			243
Confl. Bikes (#/hr)			13						66			56
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	5%	0%	0%	7%	0%
Turn Type		NA			NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases												
Actuated Green, G (s)		37.0			37.0			41.0			41.0	
Effective Green, g (s)		37.0			37.0			41.0			41.0	
Actuated g/C Ratio		0.37			0.37			0.41			0.41	
Clearance Time (s)		11.0			11.0			11.0			11.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		1057			1172			1108			644	
v/s Ratio Prot		c0.39			0.35			c0.44			0.24	
v/s Ratio Perm												
v/c Ratio		1.05			0.95			1.08			0.58	
Uniform Delay, d1		31.5			30.5			29.5			22.9	
Progression Factor		1.00			1.00			1.08			1.00	
Incremental Delay, d2		43.0			14.9			46.8			3.8	
Delay (s)		74.5			45.5			78.8			26.7	
Level of Service		E			D			E			C	
Approach Delay (s)		74.5			45.5			78.8			26.7	
Approach LOS		E			D			E			C	

Intersection Summary			
HCM 2000 Control Delay	62.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	91.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	NBT	SBT
Lane Group Flow (vph)	248	292	717	801
v/c Ratio	1.47	1.69	0.71	1.44
Control Delay	273.6	360.2	33.7	219.1
Queue Delay	0.2	0.6	1.0	0.3
Total Delay	273.8	360.8	34.7	219.3
Queue Length 50th (ft)	~229	~269	201	~662
Queue Length 95th (ft)	#390	#445	#300	m#660
Internal Link Dist (ft)		515	1880	98
Turn Bay Length (ft)				
Base Capacity (vph)	169	173	1008	555
Starvation Cap Reductn	0	0	0	19
Spillback Cap Reductn	2	6	107	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.49	1.75	0.80	1.49

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	351	20	125	0	0	0	0	625	35	257	480	0
Future Volume (vph)	351	20	125	0	0	0	0	625	35	257	480	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	10	10	10	10	12
Total Lost time (s)	4.0	4.0						4.0			4.0	
Lane Util. Factor	0.95	0.95						0.95			1.00	
Frpb, ped/bikes	1.00	0.87						0.98			1.00	
Flpb, ped/bikes	1.00	1.00						1.00			1.00	
Frt	1.00	0.93						0.99			1.00	
Flt Protected	0.95	0.98						1.00			0.98	
Satd. Flow (prot)	1543	1292						2920			1559	
Flt Permitted	0.95	0.98						1.00			0.41	
Satd. Flow (perm)	1543	1292						2920			644	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	382	22	136	0	0	0	0	679	38	279	522	0
RTOR Reduction (vph)	0	31	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	248	261	0	0	0	0	0	717	0	0	801	0
Confl. Peds. (#/hr)			56						310	310		
Confl. Bikes (#/hr)									50			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Split	NA						NA		custom	NA	
Protected Phases	4	4						2		1	6 8 10 7	
Permitted Phases										6 8		
Actuated Green, G (s)	11.0	11.0						34.6			66.0	
Effective Green, g (s)	11.0	11.0						34.6			66.0	
Actuated g/C Ratio	0.11	0.11						0.35			0.66	
Clearance Time (s)	4.0	4.0						4.0				
Vehicle Extension (s)	2.0	2.0						2.0				
Lane Grp Cap (vph)	169	142						1010			529	
v/s Ratio Prot	0.16	c0.20						0.25			c0.17	
v/s Ratio Perm											c0.83	
v/c Ratio	1.47	1.84						0.71			1.51	
Uniform Delay, d1	44.5	44.5						28.3			17.0	
Progression Factor	1.00	1.00						1.00			1.12	
Incremental Delay, d2	239.7	402.7						4.2			232.3	
Delay (s)	284.2	447.2						32.6			251.3	
Level of Service	F	F						C			F	
Approach Delay (s)		372.3			0.0			32.6			251.3	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	206.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	201	261	141	516	239	315	364	304
v/c Ratio	1.05	0.46	0.39	0.91	1.43	0.59	0.96	0.88
Control Delay	111.6	43.9	31.7	70.0	258.8	48.1	94.3	74.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0
Total Delay	111.6	43.9	31.7	70.0	258.8	49.5	94.3	74.9
Queue Length 50th (ft)	~148	215	90	518	~271	271	372	265
Queue Length 95th (ft)	#322	309	142	#756	#458	381	#582	#387
Internal Link Dist (ft)		468		467		175	411	
Turn Bay Length (ft)	250		175		125			160
Base Capacity (vph)	192	568	366	567	167	548	398	355
Starvation Cap Reductn	0	0	0	0	0	97	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.05	0.46	0.39	0.91	1.43	0.70	0.91	0.86

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	220	20	130	470	5	220	235	55	5	330	280
Future Volume (vph)	185	220	20	130	470	5	220	235	55	5	330	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	4.0			6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.97			1.00	0.81
Flpb, ped/bikes	1.00	1.00		0.97	1.00		0.99	1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00		1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1574	1653		1561	1672		1561	1583			1687	1170
Flt Permitted	0.15	1.00		0.48	1.00		0.16	1.00			0.99	1.00
Satd. Flow (perm)	253	1653		787	1672		269	1583			1679	1170
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	201	239	22	141	511	5	239	255	60	5	359	304
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	201	261	0	141	516	0	239	315	0	0	364	304
Confl. Peds. (#/hr)	37		81	81		37	113		85	85		113
Confl. Bikes (#/hr)			9			23			17			32
Heavy Vehicles (%)	3%	1%	0%	1%	0%	0%	3%	1%	4%	10%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	5	5	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		D.P+P	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6		7	7 8			8	5
Permitted Phases	2			6			8			8		8
Actuated Green, G (s)	61.4	51.3		60.0	50.6		43.8	47.8			33.7	43.8
Effective Green, g (s)	61.4	51.3		60.0	50.6		43.8	47.8			33.7	43.8
Actuated g/C Ratio	0.41	0.34		0.40	0.34		0.29	0.32			0.22	0.29
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0				6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0				2.0	2.0
Lane Grp Cap (vph)	192	564		362	562		165	503			376	387
v/s Ratio Prot	c0.07	0.16		0.02	0.31		c0.10	0.20				0.05
v/s Ratio Perm	c0.36			0.13			c0.32				0.22	0.21
v/c Ratio	1.05	0.46		0.39	0.92		1.45	0.63			0.97	0.79
Uniform Delay, d1	40.4	38.7		30.2	47.9		48.7	43.6			57.8	48.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	77.8	2.7		0.3	22.4		232.4	1.8			37.4	9.3
Delay (s)	118.2	41.4		30.5	70.2		281.1	45.4			95.2	58.3
Level of Service	F	D		C	E		F	D			F	E
Approach Delay (s)		74.8			61.7			147.1			78.4	
Approach LOS		E			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	89.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	150.3	Sum of lost time (s)	29.0
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	82	32	451	750
v/c Ratio	0.61	0.12	0.38	0.69
Control Delay	22.1	24.2	8.3	15.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	22.1	24.2	8.3	15.5
Queue Length 50th (ft)	0	6	0	0
Queue Length 95th (ft)	#29	40	285	#706
Internal Link Dist (ft)	373	179	1731	122
Turn Bay Length (ft)				
Base Capacity (vph)	135	774	1195	1091
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.61	0.04	0.38	0.69

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	0	30	15	10	5	15	400	0	0	625	65
Future Volume (vph)	45	0	30	15	10	5	15	400	0	0	625	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	10	12	12	10	10
Total Lost time (s)		4.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.81			0.98			1.00			0.99	
Flpb, ped/bikes		0.87			0.94			1.00			1.00	
Frt		0.95			0.98			1.00			0.99	
Flt Protected		0.97			0.98			1.00			1.00	
Satd. Flow (prot)		998			1267			1482			1325	
Flt Permitted		0.97			0.98			0.97			1.00	
Satd. Flow (perm)		998			1267			1443			1325	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	0	33	16	11	5	16	435	0	0	679	71
RTOR Reduction (vph)	0	82	0	0	5	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	27	0	0	451	0	0	750	0
Confl. Peds. (#/hr)	7		14	14		7	75					75
Confl. Bikes (#/hr)			2			5			10			9
Heavy Vehicles (%)	6%	0%	10%	0%	0%	0%	0%	5%	0%	0%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Turn Type	D.Pm	NA		Perm	NA		Perm	NA			NA	
Protected Phases					5			1			1	
Permitted Phases	5			5			1					
Actuated Green, G (s)		0.0			3.3			42.6			42.6	
Effective Green, g (s)		0.0			3.3			42.6			42.6	
Actuated g/C Ratio		0.00			0.05			0.68			0.68	
Clearance Time (s)					5.0			5.0			5.0	
Vehicle Extension (s)					4.0			4.0			4.0	
Lane Grp Cap (vph)		0			66			983			903	
v/s Ratio Prot											c0.57	
v/s Ratio Perm					0.02			0.31				
v/c Ratio		0.00			0.41			0.46			0.83	
Uniform Delay, d1		31.2			28.7			4.6			7.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.0			5.6			1.5			8.8	
Delay (s)		31.2			34.3			6.2			16.1	
Level of Service		C			C			A			B	
Approach Delay (s)		31.2			34.3			6.2			16.1	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	62.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	247	1571	1491	484	413	315
v/c Ratio	1.17	0.82	1.13	0.88	0.95	0.48
Control Delay	158.1	20.5	85.1	22.9	73.0	22.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	158.1	20.5	85.1	22.9	73.0	22.3
Queue Length 50th (ft)	~208	415	~650	273	287	144
Queue Length 95th (ft)	#369	525	m#658	m366	#481	224
Internal Link Dist (ft)		431	869		1731	
Turn Bay Length (ft)	200			200		85
Base Capacity (vph)	211	1921	1314	552	434	661
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.17	0.82	1.13	0.88	0.95	0.48

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	227	1445	1372	445	380	290
Future Volume (vph)	227	1445	1372	445	380	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	11
Total Lost time (s)	6.5	5.5	5.5	5.5	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.93	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1501	3085	3110	1306	1593	1391
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1501	3085	3110	1306	1593	1391
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	247	1571	1491	484	413	315
RTOR Reduction (vph)	0	0	0	0	0	4
Lane Group Flow (vph)	247	1571	1491	484	413	311
Confl. Peds. (#/hr)	21			21		9
Confl. Bikes (#/hr)				6		
Heavy Vehicles (%)	1%	1%	1%	3%	2%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	6	1 6	1		5	5 6
Permitted Phases				1		
Actuated Green, G (s)	15.5	68.5	46.5	46.5	30.0	51.5
Effective Green, g (s)	15.5	62.0	46.5	46.5	30.0	51.5
Actuated g/C Ratio	0.14	0.56	0.42	0.42	0.27	0.47
Clearance Time (s)	6.5		5.5	5.5	6.0	
Vehicle Extension (s)	2.0		3.0	3.0	2.0	
Lane Grp Cap (vph)	211	1738	1314	552	434	651
v/s Ratio Prot	c0.16	0.51	c0.48		c0.26	0.22
v/s Ratio Perm				0.37		
v/c Ratio	1.17	0.90	1.13	0.88	0.95	0.48
Uniform Delay, d1	47.2	21.4	31.8	29.1	39.3	20.0
Progression Factor	1.00	1.00	0.69	0.66	1.00	1.00
Incremental Delay, d2	115.6	8.2	61.6	2.0	32.6	2.5
Delay (s)	162.9	29.5	83.4	21.2	71.9	22.5
Level of Service	F	C	F	C	E	C
Approach Delay (s)		47.7	68.2		50.6	
Approach LOS		D	E		D	

Intersection Summary			
HCM 2000 Control Delay	57.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	SBL
Lane Group Flow (vph)	17	897	2022	169
v/c Ratio	0.19	0.39	1.00	1.27
Control Delay	46.3	8.5	40.9	209.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	46.3	8.5	40.9	209.5
Queue Length 50th (ft)	12	52	553	~151
Queue Length 95th (ft)	m13	m310	#1204	#288
Internal Link Dist (ft)		869	980	202
Turn Bay Length (ft)	170			
Base Capacity (vph)	89	2304	2017	133
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.19	0.39	1.00	1.27

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	16	825	1825	35	80	75
Future Volume (vph)	16	825	1825	35	80	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	12	12
Total Lost time (s)	5.5	6.0	6.0		4.5	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		0.99	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	1.00		0.93	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1516	3032	3100		1541	
Flt Permitted	0.95	1.00	1.00		0.97	
Satd. Flow (perm)	1516	3032	3100		1541	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	897	1984	38	87	82
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	17	897	2022	0	169	0
Confl. Peds. (#/hr)	7			7		3
Confl. Bikes (#/hr)				4		
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Turn Type	Prot	NA	NA		Prot	
Protected Phases	6	1 6	1		5	
Permitted Phases						
Actuated Green, G (s)	6.5	78.0	66.0		9.5	
Effective Green, g (s)	6.5	72.5	66.0		9.5	
Actuated g/C Ratio	0.06	0.66	0.60		0.09	
Clearance Time (s)	5.5		6.0		4.5	
Vehicle Extension (s)	2.0		3.0		2.0	
Lane Grp Cap (vph)	89	1998	1860		133	
v/s Ratio Prot	0.01	c0.30	c0.65		c0.11	
v/s Ratio Perm						
v/c Ratio	0.19	0.45	1.09		1.27	
Uniform Delay, d1	49.2	9.1	22.0		50.2	
Progression Factor	0.88	1.23	1.00		1.00	
Incremental Delay, d2	0.2	0.0	48.9		167.9	
Delay (s)	43.6	11.2	70.9		218.1	
Level of Service	D	B	E		F	
Approach Delay (s)		11.8	70.9		218.1	
Approach LOS		B	E		F	

Intersection Summary			
HCM 2000 Control Delay	61.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	NBT	NEL	NER
Lane Group Flow (vph)	54	940	522	92	421	841
v/c Ratio	0.19	1.72	0.35	0.56	0.64	0.70
Control Delay	51.9	365.2	4.6	34.2	34.7	34.3
Queue Delay	0.0	0.0	0.6	1.7	57.6	52.5
Total Delay	51.9	365.3	5.2	35.8	92.3	86.8
Queue Length 50th (ft)	43	~662	18	19	289	330
Queue Length 95th (ft)	85	#797	26	78	411	414
Internal Link Dist (ft)		199	90	45	468	
Turn Bay Length (ft)	100					
Base Capacity (vph)	278	547	1478	164	658	1197
Starvation Cap Reductn	0	0	571	0	0	0
Spillback Cap Reductn	0	3	0	16	337	613
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.19	1.73	0.58	0.62	1.31	1.44

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	50	865	290	190	5	15	65	5	2	1155
Future Volume (vph)	50	865	290	190	5	15	65	5	2	1155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	8.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95	0.95			1.00			1.00	0.91
Frpb, ped/bikes	1.00	1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.94			0.90			0.85	0.85
Flt Protected	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1624	3191	3013			1528			1442	2619
Flt Permitted	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1624	3191	3013			1528			1442	2619
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	940	315	207	5	16	71	5	2	1255
RTOR Reduction (vph)	0	0	75	0	0	66	0	0	0	0
Lane Group Flow (vph)	54	940	447	0	0	26	0	0	421	841
Confl. Peds. (#/hr)	3			3					3	
Confl. Bikes (#/hr)				3						
Heavy Vehicles (%)	0%	1%	0%	1%	0%	0%	0%	0%	0%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Turn Type	Split	NA	NA		Split	NA		Perm	pm+pt	custom
Protected Phases	3	3	4 5		2	2			1	1 5
Permitted Phases								1 5	5	1 5
Actuated Green, G (s)	24.0	24.0	68.0			9.0			59.0	64.0
Effective Green, g (s)	24.0	24.0	68.0			9.0			59.0	64.0
Actuated g/C Ratio	0.17	0.17	0.49			0.06			0.42	0.46
Clearance Time (s)	5.0	5.0				5.0			5.0	
Vehicle Extension (s)	2.0	2.0				2.0			2.0	
Lane Grp Cap (vph)	278	547	1463			98			659	1197
v/s Ratio Prot	0.03	c0.29	c0.15			c0.02			0.09	c0.32
v/s Ratio Perm									0.21	
v/c Ratio	0.19	1.72	0.31			0.26			0.64	0.70
Uniform Delay, d1	49.7	58.0	21.7			62.3			33.1	30.4
Progression Factor	1.00	1.00	0.23			1.00			1.00	1.00
Incremental Delay, d2	1.6	331.0	0.0			0.5			2.3	2.0
Delay (s)	51.3	389.0	5.1			62.9			35.4	32.4
Level of Service	D	F	A			E			D	C
Approach Delay (s)		370.6	5.1			62.9			33.4	
Approach LOS		F	A			E			C	

Intersection Summary			
HCM 2000 Control Delay	146.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBT	SBL	SBT	SBR
Lane Group Flow (vph)	1712	554	353	214	476	179
v/c Ratio	0.92	0.70	0.32	1.05	1.13	0.52
Control Delay	28.1	10.8	1.0	133.0	136.4	13.2
Queue Delay	47.6	54.1	0.0	0.0	0.0	0.0
Total Delay	75.8	64.9	1.0	133.0	136.4	13.2
Queue Length 50th (ft)	410	191	1	~232	~274	0
Queue Length 95th (ft)	m350	m161	1	#415	#395	73
Internal Link Dist (ft)	90		6		182	
Turn Bay Length (ft)						
Base Capacity (vph)	1870	794	1103	204	422	341
Starvation Cap Reductn	913	342	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.79	1.23	0.32	1.05	1.13	0.52

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1575	510	10	315	0	0	0	0	345	290	165
Future Volume (vph)	0	1575	510	10	315	0	0	0	0	345	290	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	13	12	12	12	12	12	12	11	11	11
Total Lost time (s)		5.0	5.0		5.0					8.0	8.0	8.0
Lane Util. Factor		0.86	0.86		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	0.94
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		4223	1260		3244					1429	2958	1319
Flt Permitted		1.00	1.00		0.95					0.95	0.98	1.00
Satd. Flow (perm)		4223	1260		3103					1429	2958	1319
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1712	554	11	342	0	0	0	0	375	315	179
RTOR Reduction (vph)	0	0	236	0	0	0	0	0	0	0	0	153
Lane Group Flow (vph)	0	1712	318	0	353	0	0	0	0	214	476	26
Confl. Peds. (#/hr)			16	16								24
Confl. Bikes (#/hr)			4									
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		1 2 3		5	1 5					4	4	
Permitted Phases			1 2 3									4
Actuated Green, G (s)		62.0	62.0		59.0					20.0	20.0	20.0
Effective Green, g (s)		62.0	62.0		59.0					20.0	20.0	20.0
Actuated g/C Ratio		0.44	0.44		0.42					0.14	0.14	0.14
Clearance Time (s)										8.0	8.0	8.0
Vehicle Extension (s)										2.0	2.0	2.0
Lane Grp Cap (vph)		1870	558		1347					204	422	188
v/s Ratio Prot		c0.41			c0.07					0.15	c0.16	
v/s Ratio Perm			0.25		0.04							0.02
v/c Ratio		0.92	0.57		0.26					1.05	1.13	0.14
Uniform Delay, d1		36.5	29.1		26.3					60.0	60.0	52.4
Progression Factor		0.73	1.46		0.02					1.00	1.00	1.00
Incremental Delay, d2		0.8	0.1		0.1					76.5	83.5	0.1
Delay (s)		27.6	42.4		0.6					136.5	143.5	52.6
Level of Service		C	D		A					F	F	D
Approach Delay (s)		31.2			0.6			0.0			123.1	
Approach LOS		C			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	51.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	NBT	SBT
Lane Group Flow (vph)	1234	571	1011	848
v/c Ratio	0.98	0.98	0.83	0.96
Control Delay	52.7	62.1	45.3	55.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	52.7	62.1	45.3	55.5
Queue Length 50th (ft)	616	542	431	284
Queue Length 95th (ft)	#988	#979	523	#415
Internal Link Dist (ft)	871		483	927
Turn Bay Length (ft)				
Base Capacity (vph)	1261	584	1227	886
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.98	0.98	0.82	0.96

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	860	525	0	0	0	0	895	35	80	700	0
Future Volume (vph)	275	860	525	0	0	0	0	895	35	80	700	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	11	11	12	11	11
Total Lost time (s)		6.0	6.0					5.0			6.0	
Lane Util. Factor		0.95	1.00					0.95			0.95	
Frpb, ped/bikes		1.00	1.00					1.00			1.00	
Flpb, ped/bikes		0.99	1.00					1.00			1.00	
Frt		1.00	0.85					0.99			1.00	
Flt Protected		0.99	1.00					1.00			0.99	
Satd. Flow (prot)		3137	1454					3121			3125	
Flt Permitted		0.99	1.00					1.00			0.54	
Satd. Flow (perm)		3137	1454					3121			1704	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	299	935	571	0	0	0	0	973	38	87	761	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	1234	571	0	0	0	0	1009	0	0	848	0
Confl. Peds. (#/hr)	11		28						3	3		
Confl. Bikes (#/hr)			9									9
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Prot					NA		pm+pt	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4									6		
Actuated Green, G (s)		53.1	53.1					54.7			66.7	
Effective Green, g (s)		53.1	53.1					54.7			66.7	
Actuated g/C Ratio		0.38	0.38					0.39			0.48	
Clearance Time (s)		6.0	6.0					5.0			6.0	
Vehicle Extension (s)		2.0	2.0					2.0			2.0	
Lane Grp Cap (vph)		1189	551					1219			893	
v/s Ratio Prot			0.39					0.32			c0.05	
v/s Ratio Perm		0.39									c0.40	
v/c Ratio		1.04	1.04					0.83			0.95	
Uniform Delay, d1		43.4	43.4					38.4			35.0	
Progression Factor		0.88	0.88					1.00			1.00	
Incremental Delay, d2		31.9	41.1					4.5			18.6	
Delay (s)		70.3	79.4					42.9			53.7	
Level of Service		E	E					D			D	
Approach Delay (s)		73.2			0.0			42.9			53.7	
Approach LOS		E			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	60.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	102.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	1419	527	750	1146
v/c Ratio	1.25	1.29	0.75	1.17
Control Delay	159.6	183.9	22.7	121.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	159.6	183.9	22.7	121.2
Queue Length 50th (ft)	~504	~477	391	~547
Queue Length 95th (ft)	#601	#697	559	#685
Internal Link Dist (ft)	994		927	733
Turn Bay Length (ft)				
Base Capacity (vph)	1131	408	1005	983
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.25	1.29	0.75	1.17

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	95	1100	110	485	690	0	0	705	350
Future Volume (vph)	0	0	0	95	1100	110	485	690	0	0	705	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	12	11	11	12	12	11	11
Total Lost time (s)					10.0		5.0	6.0			6.0	
Lane Util. Factor					0.91		1.00	1.00			0.95	
Frpb, ped/bikes					0.99		1.00	1.00			0.95	
Flpb, ped/bikes					1.00		1.00	1.00			1.00	
Frt					0.99		1.00	1.00			0.95	
Flt Protected					1.00		0.95	1.00			1.00	
Satd. Flow (prot)					4349		1570	1653			2813	
Flt Permitted					1.00		0.09	1.00			1.00	
Satd. Flow (perm)					4349		141	1653			2813	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	103	1196	120	527	750	0	0	766	380
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	22	0
Lane Group Flow (vph)	0	0	0	0	1410	0	527	750	0	0	1124	0
Confl. Peds. (#/hr)						54	73		27			73
Confl. Bikes (#/hr)						17						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Turn Type				Split	NA		pm+pt	NA			NA	
Protected Phases				4	4		1	6			2	
Permitted Phases							6					
Actuated Green, G (s)					31.0		74.0	73.0			41.0	
Effective Green, g (s)					31.0		74.0	73.0			41.0	
Actuated g/C Ratio					0.26		0.62	0.61			0.34	
Clearance Time (s)					10.0		5.0	6.0			6.0	
Vehicle Extension (s)					2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)					1123		408	1005			961	
v/s Ratio Prot					c0.32		c0.29	0.45			0.40	
v/s Ratio Perm							c0.51					
v/c Ratio					1.26		1.29	0.75			1.17	
Uniform Delay, d1					44.5		39.6	16.9			39.5	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					122.4		148.5	5.0			87.4	
Delay (s)					166.9		188.1	21.9			126.9	
Level of Service					F		F	C			F	
Approach Delay (s)		0.0			166.9			90.5			126.9	
Approach LOS		A			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	129.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	112.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBR	WBL	WBT	SBT
Lane Group Flow (vph)	685	1082	696	745
v/c Ratio	1.47	0.98	0.72	1.48
Control Delay	251.5	22.2	6.8	256.0
Queue Delay	0.0	39.9	1.5	0.0
Total Delay	251.5	62.2	8.3	256.0
Queue Length 50th (ft)	~306	98	99	~312
Queue Length 95th (ft)	#426	m77	m67	#428
Internal Link Dist (ft)			180	1744
Turn Bay Length (ft)	100			
Base Capacity (vph)	467	1105	973	504
Starvation Cap Reductn	0	172	128	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.47	1.16	0.82	1.48

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	630	995	640	0	0	0	0	0	650	35
Future Volume (vph)	0	0	630	995	640	0	0	0	0	0	650	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)			9.0	6.0	6.0						5.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2473	3016	1653						3218	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2473	3016	1653						3218	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	685	1082	696	0	0	0	0	0	707	38
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	685	1082	696	0	0	0	0	0	741	0
Confl. Peds. (#/hr)			21	21								7
Confl. Bikes (#/hr)			16									
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type			Prot	Prot	NA						NA	
Protected Phases			2	1 4	1 2 4						3	
Permitted Phases												
Actuated Green, G (s)			17.0	40.0	62.0						14.0	
Effective Green, g (s)			17.0	40.0	57.0						14.0	
Actuated g/C Ratio			0.19	0.44	0.63						0.16	
Clearance Time (s)			9.0								5.0	
Vehicle Extension (s)			2.0								2.0	
Lane Grp Cap (vph)			467	1340	1046						500	
v/s Ratio Prot			c0.28	c0.36	0.42						c0.23	
v/s Ratio Perm												
v/c Ratio			1.47	0.81	0.67						1.48	
Uniform Delay, d1			36.5	21.7	10.5						38.0	
Progression Factor			1.00	0.54	0.81						1.00	
Incremental Delay, d2			221.5	0.3	0.1						227.3	
Delay (s)			258.0	12.1	8.6						265.3	
Level of Service			F	B	A						F	
Approach Delay (s)		258.0			10.7			0.0			265.3	
Approach LOS		F			B			A			F	

Intersection Summary			
HCM 2000 Control Delay	122.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	118.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	590	15	20	590	65	15	0	40	0	0	0
Future Volume (Veh/h)	20	590	15	20	590	65	15	0	40	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	641	16	22	641	71	16	0	43	0	0	0
Pedestrians		59						77			19	
Lane Width (ft)		11.0						12.0			0.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		5						6			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		740			515							
pX, platoon unblocked	0.72			0.76			0.85	0.85	0.76	0.85	0.85	0.72
vC, conflicting volume	731			734			1550	1545	726	1468	1518	754
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	436			486			907	902	475	810	869	469
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			97			91	100	90	100	100	100
cM capacity (veh/h)	808			733			174	209	415	207	218	413

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	22	657	734	59
Volume Left	22	0	22	16
Volume Right	0	16	71	43
cSH	808	1700	733	301
Volume to Capacity	0.03	0.39	0.03	0.20
Queue Length 95th (ft)	2	0	2	18
Control Delay (s)	9.6	0.0	0.8	19.8
Lane LOS	A		A	C
Approach Delay (s)	0.3		0.8	19.8
Approach LOS				C

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	67.6%	ICU Level of Service		C
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	43	559	33	642	16	16	196
v/c Ratio	0.18	0.63	0.14	0.74	0.15	0.20	1.11
Control Delay	21.1	25.1	20.4	29.0	46.7	49.5	139.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.1	25.1	20.4	29.0	46.7	49.5	139.5
Queue Length 50th (ft)	10	190	8	242	10	10	~129
Queue Length 95th (ft)	51	#586	41	#713	31	31	#272
Internal Link Dist (ft)		526		660	51		70
Turn Bay Length (ft)	110		140				
Base Capacity (vph)	242	881	240	864	231	174	176
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.63	0.14	0.74	0.07	0.09	1.11

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	510	5	30	535	55	10	5	15	90	20	70
Future Volume (vph)	40	510	5	30	535	55	10	5	15	90	20	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.96		0.98	
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.99			1.00	0.85		0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.98	
Satd. Flow (prot)	1506	1529		1209	1505			1653	1227		1540	
Flt Permitted	0.27	1.00		0.33	1.00			0.97	1.00		0.98	
Satd. Flow (perm)	420	1529		419	1505			1653	1227		1540	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	554	5	33	582	60	11	5	16	98	22	76
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	23	0
Lane Group Flow (vph)	43	559	0	33	642	0	0	16	16	0	174	0
Confl. Peds. (#/hr)	21		29	29		21	4					4
Confl. Bikes (#/hr)			16			46			2			2
Heavy Vehicles (%)	0%	4%	22%	24%	3%	12%	0%	0%	14%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Split	NA	Perm	Split	NA	
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6			2					8			
Actuated Green, G (s)	52.4	52.4		52.4	52.4			4.2	4.2		10.0	
Effective Green, g (s)	52.4	52.4		52.4	52.4			4.2	4.2		10.0	
Actuated g/C Ratio	0.52	0.52		0.52	0.52			0.04	0.04		0.10	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0		1.0	1.0			2.0	2.0		2.0	
Lane Grp Cap (vph)	220	801		219	788			69	51		154	
v/s Ratio Prot		0.37			c0.43			0.01			c0.11	
v/s Ratio Perm	0.10			0.08					c0.01			
v/c Ratio	0.20	0.70		0.15	0.81			0.23	0.31		1.13	
Uniform Delay, d1	12.6	17.9		12.3	19.8			46.3	46.5		45.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	2.0	5.0		1.5	9.1			0.6	1.3		110.6	
Delay (s)	14.6	22.9		13.8	28.8			47.0	47.8		155.6	
Level of Service	B	C		B	C			D	D		F	
Approach Delay (s)		22.3			28.1			47.4			155.6	
Approach LOS		C			C			D			F	

Intersection Summary			
HCM 2000 Control Delay	42.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	1	425	5	1	535	75	5	20	0	60	10	0
Future Volume (Veh/h)	1	425	5	1	535	75	5	20	0	60	10	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	462	5	1	582	82	5	22	0	65	11	0
Pedestrians					29			29			21	
Lane Width (ft)					11.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					2			2			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		547			464							
pX, platoon unblocked	0.73			0.90			0.78	0.78	0.90	0.78	0.78	0.73
vC, conflicting volume	685			496			1126	1182	522	1152	1144	644
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	387			378			722	794	408	756	745	331
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	91	100	70	96	100
cM capacity (veh/h)	843			1031			245	241	549	220	257	511

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	468	665	27	76
Volume Left	1	1	5	65
Volume Right	5	82	0	0
cSH	843	1031	241	225
Volume to Capacity	0.00	0.00	0.11	0.34
Queue Length 95th (ft)	0	0	9	36
Control Delay (s)	0.0	0.0	21.8	29.0
Lane LOS	A	A	C	D
Approach Delay (s)	0.0	0.0	21.8	29.0
Approach LOS			C	D

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	55.0%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	572	669	71	3
v/c Ratio	0.50	0.59	0.50	0.03
Control Delay	14.8	16.7	31.1	32.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.8	16.7	31.1	32.3
Queue Length 50th (ft)	69	89	15	1
Queue Length 95th (ft)	#524	#647	55	9
Internal Link Dist (ft)	384	526	214	74
Turn Bay Length (ft)				
Base Capacity (vph)	1134	1132	175	157
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.50	0.59	0.41	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	515	10	15	600	1	25	1	40	1	1	1
Future Volume (vph)	1	515	10	15	600	1	25	1	40	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	13	13	13	12	12	12
Total Lost time (s)		5.5			5.5			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.87			0.93	
Flpb, ped/bikes		1.00			1.00			0.93			0.95	
Frt		1.00			1.00			0.92			0.95	
Flt Protected		1.00			1.00			0.98			0.98	
Satd. Flow (prot)		1584			1602			1257			1389	
Flt Permitted		1.00			0.98			0.87			0.93	
Satd. Flow (perm)		1583			1578			1120			1314	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	560	11	16	652	1	27	1	43	1	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	40	0	0	1	0
Lane Group Flow (vph)	0	572	0	0	669	0	0	31	0	0	2	0
Confl. Peds. (#/hr)	21		29	29		21	29		29	29		29
Confl. Bikes (#/hr)			16			46						
Heavy Vehicles (%)	2%	4%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			5			5	
Permitted Phases	1			1			5			5		
Actuated Green, G (s)		55.4			55.4			6.6			6.6	
Effective Green, g (s)		55.4			55.4			6.6			6.6	
Actuated g/C Ratio		0.62			0.62			0.07			0.07	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		974			971			82			96	
v/s Ratio Prot												
v/s Ratio Perm		0.36			c0.42			c0.03			0.00	
v/c Ratio		0.59			0.69			0.38			0.02	
Uniform Delay, d1		10.4			11.5			39.7			38.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.6			4.0			1.1			0.0	
Delay (s)		13.0			15.5			40.8			38.7	
Level of Service		B			B			D			D	
Approach Delay (s)		13.0			15.5			40.8			38.7	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	45	45	0	10	85	5	420	0	25	575	5
Future Volume (Veh/h)	30	45	45	0	10	85	5	420	0	25	575	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	49	49	0	11	92	5	457	0	27	625	5
Pedestrians		113			85						37	
Lane Width (ft)		12.0			13.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		9			8						3	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								491				
pX, platoon unblocked	0.78	0.78		0.78	0.78	0.78				0.78		
vC, conflicting volume	1396	1346	740	1307	1349	579	743			542		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1367	1304	740	1254	1307	324	743			277		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	40	52	87	100	89	82	99			97		
cM capacity (veh/h)	55	101	377	50	101	502	783			930		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	131	103	462	657
Volume Left	33	0	5	27
Volume Right	49	92	0	5
cSH	108	353	783	930
Volume to Capacity	1.22	0.29	0.01	0.03
Queue Length 95th (ft)	216	30	0	2
Control Delay (s)	231.7	19.4	0.2	0.8
Lane LOS	F	C	A	A
Approach Delay (s)	231.7	19.4	0.2	0.8
Approach LOS	F	C		

Intersection Summary			
Average Delay	24.3		
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	915	300	0	0	1560
Future Volume (Veh/h)	0	915	300	0	0	1560
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	995	326	0	0	1696
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1190	279			
pX, platoon unblocked					0.89	
vC, conflicting volume	326				824	163
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	326				552	163
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	1238				412	853

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	498	498	163	163	1696
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	1696
cSH	1700	1700	1700	1700	853
Volume to Capacity	0.29	0.29	0.10	0.10	1.99
Queue Length 95th (ft)	0	0	0	0	2778
Control Delay (s)	0.0	0.0	0.0	0.0	462.3
Lane LOS					F
Approach Delay (s)	0.0		0.0		462.3
Approach LOS					F

Intersection Summary			
Average Delay	259.9		
Intersection Capacity Utilization	111.6%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBT	NBL	NBT
Lane Group Flow (vph)	2087	286	290
v/c Ratio	0.73	0.65	0.68
Control Delay	0.6	51.9	49.3
Queue Delay	0.0	0.0	0.0
Total Delay	0.6	51.9	49.3
Queue Length 50th (ft)	0	241	225
Queue Length 95th (ft)	m0	351	341
Internal Link Dist (ft)	6		224
Turn Bay Length (ft)			
Base Capacity (vph)	2849	440	426
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.73	0.65	0.68

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	375	1545	0	0	0	0	325	90	115	0	0	0
Future Volume (vph)	375	1545	0	0	0	0	325	90	115	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	12	11	11	12	12	12
Total Lost time (s)		5.0					5.0	5.0				
Lane Util. Factor		0.91					0.95	0.95				
Frpb, ped/bikes		1.00					1.00	0.98				
Flpb, ped/bikes		1.00					1.00	1.00				
Frt		1.00					1.00	0.94				
Flt Protected		0.99					0.95	0.99				
Satd. Flow (prot)		4433					1543	1425				
Flt Permitted		0.99					0.95	0.99				
Satd. Flow (perm)		4433					1543	1425				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	408	1679	0	0	0	0	353	98	125	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	2087	0	0	0	0	286	271	0	0	0	0
Confl. Peds. (#/hr)	3								24			
Confl. Bikes (#/hr)									9			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Split	NA					Split	NA				
Protected Phases	1 2 3 4	1 2 3 4					5	5				
Permitted Phases												
Actuated Green, G (s)		87.0					40.0	40.0				
Effective Green, g (s)		87.0					40.0	40.0				
Actuated g/C Ratio		0.62					0.29	0.29				
Clearance Time (s)							5.0	5.0				
Vehicle Extension (s)							4.0	4.0				
Lane Grp Cap (vph)		2754					440	407				
v/s Ratio Prot		c0.47					0.19	c0.19				
v/s Ratio Perm												
v/c Ratio		0.76					0.65	0.67				
Uniform Delay, d1		19.0					43.9	44.1				
Progression Factor		0.00					1.00	1.00				
Incremental Delay, d2		0.4					3.8	4.5				
Delay (s)		0.4					47.6	48.6				
Level of Service		A					D	D				
Approach Delay (s)		0.4			0.0			48.1			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	160	342	1061	685
v/c Ratio	1.70	0.76	0.89	0.89
Control Delay	388.0	21.1	12.4	27.5
Queue Delay	16.0	0.0	47.2	48.4
Total Delay	404.0	21.1	59.6	75.9
Queue Length 50th (ft)	~150	45	282	324
Queue Length 95th (ft)	#280	126	m291	m408
Internal Link Dist (ft)	273		98	694
Turn Bay Length (ft)				
Base Capacity (vph)	94	504	1195	774
Starvation Cap Reductn	0	0	247	0
Spillback Cap Reductn	40	0	0	174
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	2.96	0.68	1.12	1.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	137	10	315	186	790	0	0	600	30
Future Volume (vph)	0	0	0	137	10	315	186	790	0	0	600	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	12	12	10	10
Total Lost time (s)					4.0	4.0		4.0			4.0	
Lane Util. Factor					1.00	1.00		0.95			1.00	
Frpb, ped/bikes					1.00	1.00		1.00			0.98	
Flpb, ped/bikes					1.00	1.00		0.98			1.00	
Frt					1.00	0.85		1.00			0.99	
Flt Protected					0.96	1.00		0.99			1.00	
Satd. Flow (prot)					1579	1405		2958			1545	
Flt Permitted					0.96	1.00		0.63			1.00	
Satd. Flow (perm)					1579	1405		1887			1545	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	149	11	342	202	859	0	0	652	33
RTOR Reduction (vph)	0	0	0	0	0	207	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	160	135	0	1061	0	0	683	0
Confl. Peds. (#/hr)						56	224					224
Confl. Bikes (#/hr)						32						39
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Turn Type				Split	NA	custom	custom	NA			NA	
Protected Phases				8	8	1 8		2 4 9 11			6	
Permitted Phases							2 4					
Actuated Green, G (s)					6.0	17.4		61.6			50.0	
Effective Green, g (s)					6.0	17.4		55.6			50.0	
Actuated g/C Ratio					0.06	0.17		0.56			0.50	
Clearance Time (s)					4.0						4.0	
Vehicle Extension (s)					2.0						2.0	
Lane Grp Cap (vph)					94	244		1049			772	
v/s Ratio Prot					c0.10	0.10					c0.44	
v/s Ratio Perm								c0.56				
v/c Ratio					1.70	0.55		1.01			0.88	
Uniform Delay, d1					47.0	37.7		22.2			22.4	
Progression Factor					1.00	1.00		0.61			0.78	
Incremental Delay, d2					357.0	1.5		11.3			8.6	
Delay (s)					404.0	39.3		24.9			26.1	
Level of Service					F	D		C			C	
Approach Delay (s)		0.0			155.5			24.9			26.1	
Approach LOS		A			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	54.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	86.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBT	NBT
Lane Group Flow (vph)	2104	506
v/c Ratio	1.33	0.87
Control Delay	179.1	52.2
Queue Delay	0.2	3.0
Total Delay	179.3	55.2
Queue Length 50th (ft)	~573	147
Queue Length 95th (ft)	#669	#235
Internal Link Dist (ft)	904	1076
Turn Bay Length (ft)		
Base Capacity (vph)	1585	584
Starvation Cap Reductn	0	0
Spillback Cap Reductn	75	30
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.39	0.91

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1490	445	145	320	0	0	0	0
Future Volume (vph)	0	0	0	0	1490	445	145	320	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)					6.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.97			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.97			1.00				
Flt Protected					1.00			0.98				
Satd. Flow (prot)					4326			3092				
Flt Permitted					1.00			0.98				
Satd. Flow (perm)					4326			3092				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1620	484	158	348	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2104	0	0	506	0	0	0	0
Confl. Peds. (#/hr)						83						
Confl. Bikes (#/hr)						30						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					33.0			17.0				
Effective Green, g (s)					33.0			17.0				
Actuated g/C Ratio					0.37			0.19				
Clearance Time (s)					6.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1586			584				
v/s Ratio Prot					c0.49							
v/s Ratio Perm								0.16				
v/c Ratio					1.33			0.87				
Uniform Delay, d1					28.5			35.4				
Progression Factor					1.00			1.00				
Incremental Delay, d2					151.4			12.4				
Delay (s)					179.9			47.8				
Level of Service					F			D				
Approach Delay (s)		0.0			179.9			47.8			0.0	
Approach LOS		A			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	154.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	118.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Intersection Capacity Analysis Worksheets

2025 Build Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	960	355	0	625	95	0	820	185	0	385	2
Future Volume (vph)	0	960	355	0	625	95	0	820	185	0	385	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Right Turn on Red			No			No			No			No
Link Speed (mph)		35			35			25			20	
Link Distance (ft)		710			2667			622			624	
Travel Time (s)		13.8			52.0			17.0			21.3	
Confl. Peds. (#/hr)			88			37			171			131
Confl. Bikes (#/hr)			60						55			45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	10%	0%	6%	1%	0%	14%	50%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1429	0	0	782	0	0	1092	0	0	420	0
v/c Ratio		1.24			0.63			1.01			0.74	
Control Delay		143.2			26.9			53.0			36.1	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		143.2			26.9			53.0			36.1	
Queue Length 50th (ft)		~597			206			~240			227	
Queue Length 95th (ft)		#733			271			#507			349	
Internal Link Dist (ft)		630			2587			542			544	
Turn Bay Length (ft)												
Base Capacity (vph)		1155			1236			1082			568	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.24			0.63			1.01			0.74	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	960	355	0	625	95	0	820	185	0	385	2
Future Volume (vph)	0	960	355	0	625	95	0	820	185	0	385	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		11.0			11.0			11.0			11.0	
Lane Util. Factor		0.95			0.95			0.95			1.00	
Frpb, ped/bikes		0.93			0.99			0.95			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.98			0.97			1.00	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		2890			3093			2851			1495	
Flt Permitted		1.00			1.00			1.00			1.00	
Satd. Flow (perm)		2890			3093			2851			1495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1043	386	0	679	103	0	891	201	0	418	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1429	0	0	782	0	0	1092	0	0	420	0
Confl. Peds. (#/hr)			88			37			171			131
Confl. Bikes (#/hr)			60						55			45
Heavy Vehicles (%)	0%	1%	0%	0%	1%	10%	0%	6%	1%	0%	14%	50%
Turn Type		NA			NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases												
Actuated Green, G (s)		40.0			40.0			38.0			38.0	
Effective Green, g (s)		40.0			40.0			38.0			38.0	
Actuated g/C Ratio		0.40			0.40			0.38			0.38	
Clearance Time (s)		11.0			11.0			11.0			11.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		1156			1237			1083			568	
v/s Ratio Prot		c0.49			0.25			c0.38			0.28	
v/s Ratio Perm												
v/c Ratio		1.24			0.63			1.01			0.74	
Uniform Delay, d1		30.0			24.1			31.0			26.7	
Progression Factor		1.00			1.00			0.79			1.00	
Incremental Delay, d2		113.9			0.8			26.7			8.4	
Delay (s)		143.9			24.9			51.2			35.1	
Level of Service		F			C			D			D	
Approach Delay (s)		143.9			24.9			51.2			35.1	
Approach LOS		F			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	79.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	341	10	165	0	0	0	0	500	40	402	375	0
Future Volume (vph)	341	10	165	0	0	0	0	500	40	402	375	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	10	10	10	10	12
Storage Length (ft)	0		0	0		0	0		300	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		595			501			1930			178	
Travel Time (s)		13.5			11.4			52.6			4.9	
Confl. Peds. (#/hr)			42						266	266		
Confl. Bikes (#/hr)			2						82			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	7%	0%	0%	0%	0%	5%	0%	0%	7%	0%
Shared Lane Traffic (%)	35%											
Lane Group Flow (vph)	241	320	0	0	0	0	0	586	0	0	845	0
v/c Ratio	1.12	1.47						0.64			1.66	
Control Delay	137.0	262.2						32.3			320.6	
Queue Delay	0.0	0.0						0.0			0.2	
Total Delay	137.0	262.2						32.3			320.8	
Queue Length 50th (ft)	~186	~265						165			~800	
Queue Length 95th (ft)	#347	#447						226			m#647	
Internal Link Dist (ft)		515			421			1850			98	
Turn Bay Length (ft)												
Base Capacity (vph)	216	218						918			508	
Starvation Cap Reductn	0	0						0			14	
Spillback Cap Reductn	0	0						0			0	
Storage Cap Reductn	0	0						0			0	
Reduced v/c Ratio	1.12	1.47						0.64			1.71	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	341	10	165	0	0	0	0	500	40	402	375	0
Future Volume (vph)	341	10	165	0	0	0	0	500	40	402	375	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	10	10	10	10	12
Total Lost time (s)	4.0	4.0						4.0			4.0	
Lane Util. Factor	0.95	0.95						0.95			1.00	
Frpb, ped/bikes	1.00	0.88						0.97			1.00	
Flpb, ped/bikes	1.00	1.00						1.00			0.98	
Frt	1.00	0.92						0.99			1.00	
Flt Protected	0.95	0.98						1.00			0.97	
Satd. Flow (prot)	1543	1238						2787			1481	
Flt Permitted	0.95	0.98						1.00			0.41	
Satd. Flow (perm)	1543	1238						2787			618	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	371	11	179	0	0	0	0	543	43	437	408	0
RTOR Reduction (vph)	0	46	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	241	274	0	0	0	0	0	586	0	0	845	0
Confl. Peds. (#/hr)			42						266	266		
Confl. Bikes (#/hr)			2						82			
Heavy Vehicles (%)	0%	0%	7%	0%	0%	0%	0%	5%	0%	0%	7%	0%
Turn Type	Split	NA						NA		custom	NA	
Protected Phases	4	4						2		1	6 8 10 7	
Permitted Phases										6 8		
Actuated Green, G (s)	14.0	14.0						33.0			63.0	
Effective Green, g (s)	14.0	14.0						33.0			63.0	
Actuated g/C Ratio	0.14	0.14						0.33			0.63	
Clearance Time (s)	4.0	4.0						4.0				
Vehicle Extension (s)	2.0	2.0						2.0				
Lane Grp Cap (vph)	216	173						919			475	
v/s Ratio Prot	0.16	c0.22						0.21			c0.18	
v/s Ratio Perm											c0.94	
v/c Ratio	1.12	1.59						0.64			1.78	
Uniform Delay, d1	43.0	43.0						28.4			18.5	
Progression Factor	1.00	1.00						1.00			1.44	
Incremental Delay, d2	95.8	289.5						3.4			351.3	
Delay (s)	138.8	332.5						31.8			378.0	
Level of Service	F	F						C			F	
Approach Delay (s)		249.3			0.0			31.8			378.0	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	239.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.01		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	365	10	80	340	10	205	240	40	5	145	210
Future Volume (vph)	200	365	10	80	340	10	205	240	40	5	145	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	175		0	125		0	0		160
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		548			592			255			521	
Travel Time (s)		14.9			16.1			7.0			14.2	
Confl. Peds. (#/hr)	42		34	34		42	69		64	64		69
Confl. Bikes (#/hr)			26			16			48			13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	6%	0%	5%	8%	11%	5%	8%	9%	20%	7%	5%
Bus Blockages (#/hr)	0	0	0	0	4	4	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	217	408	0	87	381	0	223	304	0	0	163	228
v/c Ratio	0.74	0.71		0.31	0.79		0.77	0.63			0.59	0.70
Control Delay	44.5	46.4		26.9	52.9		54.7	42.3			55.1	48.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.2			0.0	0.0
Total Delay	44.5	46.4		26.9	52.9		54.7	42.5			55.1	48.6
Queue Length 50th (ft)	129	339		47	316		152	222			126	159
Queue Length 95th (ft)	#269	#547		85	#508		#273	327			203	245
Internal Link Dist (ft)		468			512			175			441	
Turn Bay Length (ft)	250			175			125					160
Base Capacity (vph)	295	575		308	485		290	555			350	359
Starvation Cap Reductn	0	0		0	0		0	25			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.74	0.71		0.28	0.79		0.77	0.57			0.47	0.64

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	365	10	80	340	10	205	240	40	5	145	210
Future Volume (vph)	200	365	10	80	340	10	205	240	40	5	145	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	4.0			6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.97			1.00	0.89
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.95	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00		1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1568	1605		1537	1545		1469	1508			1584	1230
Flt Permitted	0.28	1.00		0.34	1.00		0.53	1.00			0.99	1.00
Satd. Flow (perm)	467	1605		549	1545		819	1508			1564	1230
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	397	11	87	370	11	223	261	43	5	158	228
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	217	408	0	87	381	0	223	304	0	0	163	228
Confl. Peds. (#/hr)	42		34	34		42	69		64	64		69
Confl. Bikes (#/hr)			26			16			48			13
Heavy Vehicles (%)	3%	6%	0%	5%	8%	11%	5%	8%	9%	20%	7%	5%
Bus Blockages (#/hr)	0	0	0	0	4	4	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		D.P+P	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6		7	7 8			8	5
Permitted Phases	2			6			8			8		8
Actuated Green, G (s)	51.6	41.3		44.4	37.7		30.6	34.6			20.3	30.6
Effective Green, g (s)	51.6	41.3		44.4	37.7		30.6	34.6			20.3	30.6
Actuated g/C Ratio	0.43	0.35		0.37	0.32		0.26	0.29			0.17	0.26
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0				6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0				2.0	2.0
Lane Grp Cap (vph)	297	556		260	488		266	437			266	377
v/s Ratio Prot	0.06	c0.25		0.02	0.25		c0.07	0.20				c0.05
v/s Ratio Perm	0.25			0.11			c0.14				0.10	0.13
v/c Ratio	0.73	0.73		0.33	0.78		0.84	0.70			0.61	0.60
Uniform Delay, d1	25.1	34.1		25.7	37.0		40.6	37.6			45.8	39.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	7.7	8.3		0.3	11.7		19.3	3.9			2.9	1.9
Delay (s)	32.8	42.5		26.0	48.7		59.9	41.5			48.7	40.9
Level of Service	C	D		C	D		E	D			D	D
Approach Delay (s)		39.1			44.5			49.3			44.1	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	44.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	119.2	Sum of lost time (s)	29.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	0	40	5	10	5	25	435	0	0	380	60
Future Volume (vph)	75	0	40	5	10	5	25	435	0	0	380	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	10	10	10	10	10	12	12	10	10
Right Turn on Red			Yes			Yes			Yes			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		503			303			1833			182	
Travel Time (s)		13.7			8.3			50.0			5.0	
Confl. Peds. (#/hr)	29		16	16		29	54		32	32		54
Confl. Bikes (#/hr)			1			2			17			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	0%	8%	0%	11%	0%	19%	14%	0%	0%	14%	22%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	125	0	0	21	0	0	500	0	0	478	0
v/c Ratio		0.55			0.11			0.58			0.60	
Control Delay		26.1			25.0			14.7			15.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		26.1			25.0			14.7			15.8	
Queue Length 50th (ft)		23			6			80			79	
Queue Length 95th (ft)		90			29			#462			#464	
Internal Link Dist (ft)		423			223			1753			102	
Turn Bay Length (ft)												
Base Capacity (vph)		402			392			868			794	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.31			0.05			0.58			0.60	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	0	40	5	10	5	25	435	0	0	380	60
Future Volume (vph)	75	0	40	5	10	5	25	435	0	0	380	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	10	12	12	10	10
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.97			0.97			1.00			0.98	
Flpb, ped/bikes		0.94			0.99			1.00			1.00	
Frt		0.95			0.97			1.00			0.98	
Flt Protected		0.97			0.99			1.00			1.00	
Satd. Flow (prot)		1309			1251			1356			1204	
Flt Permitted		0.79			0.93			0.96			1.00	
Satd. Flow (perm)		1067			1175			1311			1204	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	0	43	5	11	5	27	473	0	0	413	65
RTOR Reduction (vph)	0	53	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	72	0	0	17	0	0	500	0	0	478	0
Confl. Peds. (#/hr)	29		16	16		29	54		32	32		54
Confl. Bikes (#/hr)			1			2			17			5
Heavy Vehicles (%)	6%	0%	8%	0%	11%	0%	19%	14%	0%	0%	14%	22%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		5			5			1			1	
Permitted Phases	5			5			1					
Actuated Green, G (s)		12.3			12.3			51.6			51.6	
Effective Green, g (s)		12.3			12.3			51.6			51.6	
Actuated g/C Ratio		0.15			0.15			0.64			0.64	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		161			178			834			766	
v/s Ratio Prot											c0.40	
v/s Ratio Perm		c0.07			0.01			0.38				
v/c Ratio		0.44			0.09			0.60			0.62	
Uniform Delay, d1		31.3			29.6			8.7			8.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.7			0.3			3.2			3.8	
Delay (s)		33.9			29.9			11.8			12.7	
Level of Service		C			C			B			B	
Approach Delay (s)		33.9			29.9			11.8			12.7	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	81.1	Sum of lost time (s)	14.0
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	165	1730	1175	510	365	155
Future Volume (vph)	165	1730	1175	510	365	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	11
Storage Length (ft)	200			200	0	85
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Right Turn on Red				No		Yes
Link Speed (mph)		35	35		25	
Link Distance (ft)		511	949		1833	
Travel Time (s)		10.0	18.5		50.0	
Confl. Peds. (#/hr)	17			17		11
Confl. Bikes (#/hr)				2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	7%	3%	4%	8%	5%	5%
Bus Blockages (#/hr)	0	4	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	1880	1277	554	397	168
v/c Ratio	0.80	1.06	1.15	1.19	0.83	0.24
Control Delay	70.2	63.2	94.7	114.8	51.8	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.2	63.2	94.7	114.8	51.8	14.4
Queue Length 50th (ft)	123	~770	~554	~470	260	58
Queue Length 95th (ft)	#239	#908	m204	m199	#424	100
Internal Link Dist (ft)		431	869		1753	
Turn Bay Length (ft)	200			200		85
Base Capacity (vph)	225	1773	1111	465	478	709
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.80	1.06	1.15	1.19	0.83	0.24

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↑	↱	↰	↱
Traffic Volume (vph)	165	1730	1175	510	365	155
Future Volume (vph)	165	1730	1175	510	365	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	11
Total Lost time (s)	6.5	5.5	5.5	5.5	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.94	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1417	3025	3020	1263	1547	1338
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1417	3025	3020	1263	1547	1338
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	1880	1277	554	397	168
RTOR Reduction (vph)	0	0	0	0	0	4
Lane Group Flow (vph)	179	1880	1277	554	397	164
Confl. Peds. (#/hr)	17			17		11
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	7%	3%	4%	8%	5%	5%
Bus Blockages (#/hr)	0	4	0	0	0	0
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	6	1 6	1		5	5 6
Permitted Phases				1		
Actuated Green, G (s)	17.5	64.5	40.5	40.5	34.0	57.5
Effective Green, g (s)	17.5	58.0	40.5	40.5	34.0	57.5
Actuated g/C Ratio	0.16	0.53	0.37	0.37	0.31	0.52
Clearance Time (s)	6.5		5.5	5.5	6.0	
Vehicle Extension (s)	2.0		3.0	3.0	2.0	
Lane Grp Cap (vph)	225	1595	1111	465	478	699
v/s Ratio Prot	0.13	c0.62	0.42		c0.26	0.12
v/s Ratio Perm				c0.44		
v/c Ratio	0.80	1.18	1.15	1.19	0.83	0.23
Uniform Delay, d1	44.5	26.0	34.8	34.8	35.3	14.3
Progression Factor	1.00	1.00	0.73	0.73	1.00	1.00
Incremental Delay, d2	24.6	87.3	68.3	88.2	15.4	0.8
Delay (s)	69.1	113.3	93.8	113.6	50.7	15.1
Level of Service	E	F	F	F	D	B
Approach Delay (s)		109.4	99.8		40.1	
Approach LOS		F	F		D	

Intersection Summary			
HCM 2000 Control Delay	96.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	50	665	1845	355	120	40
Future Volume (vph)	50	665	1845	355	120	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	11	11	12	12
Storage Length (ft)	170			250	0	80
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Right Turn on Red				No		No
Link Speed (mph)		35	35		25	
Link Distance (ft)		949	1060		165	
Travel Time (s)		18.5	20.6		4.5	
Confl. Peds. (#/hr)	9			9		8
Confl. Bikes (#/hr)				1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	18%	2%	5%	0%	1%	9%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	723	2391	0	173	0
v/c Ratio	0.72	0.33	1.29		1.08	
Control Delay	55.4	8.3	157.1		141.7	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	55.4	8.3	157.1		141.7	
Queue Length 50th (ft)	39	47	~1069		~137	
Queue Length 95th (ft)	m39	m182	#1535		#275	
Internal Link Dist (ft)		869	980		85	
Turn Bay Length (ft)	170					
Base Capacity (vph)	75	2205	1852		160	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.72	0.33	1.29		1.08	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	50	665	1845	355	120	40
Future Volume (vph)	50	665	1845	355	120	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	12	12
Total Lost time (s)	5.5	6.0	6.0		4.5	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		0.99	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.97	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1285	2973	2928		1533	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1285	2973	2928		1533	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	723	2005	386	130	43
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	54	723	2391	0	173	0
Confl. Peds. (#/hr)	9			9		8
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	18%	2%	5%	0%	1%	9%
Turn Type	Prot	NA	NA		Prot	
Protected Phases	6	1 6	1		5	
Permitted Phases						
Actuated Green, G (s)	6.5	76.0	64.0		11.5	
Effective Green, g (s)	6.5	70.5	64.0		11.5	
Actuated g/C Ratio	0.06	0.64	0.58		0.10	
Clearance Time (s)	5.5		6.0		4.5	
Vehicle Extension (s)	2.0		3.0		2.0	
Lane Grp Cap (vph)	75	1905	1703		160	
v/s Ratio Prot	c0.04	0.24	c0.82		c0.11	
v/s Ratio Perm						
v/c Ratio	0.72	0.38	1.40		1.08	
Uniform Delay, d1	50.9	9.4	23.0		49.2	
Progression Factor	0.95	1.18	1.00		1.00	
Incremental Delay, d2	2.5	0.0	185.4		94.5	
Delay (s)	50.8	11.1	208.4		143.7	
Level of Service	D	B	F		F	
Approach Delay (s)		13.9	208.4		143.7	
Approach LOS		B	F		F	

Intersection Summary			
HCM 2000 Control Delay	159.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	88.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	20	770	305	145	5	15	85	2	5	1130
Future Volume (vph)	20	770	305	145	5	15	85	2	5	1130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100			0	0		0		0	0
Storage Lanes	1			0	0		0		1	2
Taper Length (ft)	25				25				25	
Right Turn on Red				Yes			Yes			
Link Speed (mph)		35	35			25			30	
Link Distance (ft)		279	170			125			548	
Travel Time (s)		5.4	3.3			3.4			12.5	
Confl. Peds. (#/hr)	9			9					9	
Confl. Bikes (#/hr)				1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	38%	2%	1%	0%	0%	8%	1%	0%	100%	4%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)										33%
Lane Group Flow (vph)	22	837	490	0	0	113	0	0	412	823
v/c Ratio	0.13	1.86	0.41			0.49			0.66	0.72
Control Delay	54.8	425.9	19.4			24.1			36.5	35.7
Queue Delay	0.0	0.3	1.2			1.2			60.2	54.1
Total Delay	54.8	426.2	20.6			25.3			96.7	89.8
Queue Length 50th (ft)	18	~607	68			18			289	329
Queue Length 95th (ft)	46	#740	82			81			414	414
Internal Link Dist (ft)		199	90			45			468	
Turn Bay Length (ft)	100									
Base Capacity (vph)	168	451	1191			231			623	1144
Starvation Cap Reductn	0	0	466			0			0	0
Spillback Cap Reductn	0	14	0			31			367	674
Storage Cap Reductn	0	0	0			0			0	0
Reduced v/c Ratio	0.13	1.92	0.68			0.56			1.61	1.75

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	20	770	305	145	5	15	85	2	5	1130
Future Volume (vph)	20	770	305	145	5	15	85	2	5	1130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	8.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95	0.95			1.00			1.00	0.91
Frpb, ped/bikes	1.00	1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.95			0.89			0.85	0.85
Flt Protected	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1177	3160	3039			1490			1385	2544
Flt Permitted	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1177	3160	3039			1490			1385	2544
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	837	332	158	5	16	92	2	5	1228
RTOR Reduction (vph)	0	0	39	0	0	83	0	0	0	0
Lane Group Flow (vph)	22	837	451	0	0	30	0	0	412	823
Confl. Peds. (#/hr)	9			9					9	
Confl. Bikes (#/hr)				1						
Heavy Vehicles (%)	38%	2%	1%	0%	0%	8%	1%	0%	100%	4%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Turn Type	Split	NA	NA		Split	NA		Perm	pm+pt	custom
Protected Phases	3	3	4 5		2	2			1	1 5
Permitted Phases								1 5	5	1 5
Actuated Green, G (s)	20.0	20.0	56.0			14.0			58.0	63.0
Effective Green, g (s)	20.0	20.0	56.0			14.0			58.0	63.0
Actuated g/C Ratio	0.14	0.14	0.40			0.10			0.41	0.45
Clearance Time (s)	5.0	5.0				5.0			5.0	
Vehicle Extension (s)	2.0	2.0				2.0			2.0	
Lane Grp Cap (vph)	168	451	1215			149			623	1144
v/s Ratio Prot	0.02	c0.26	c0.15			c0.02			0.14	c0.32
v/s Ratio Perm									0.16	
v/c Ratio	0.13	1.86	0.37			0.20			0.66	0.72
Uniform Delay, d1	52.4	60.0	29.6			57.9			32.7	31.3
Progression Factor	1.00	1.00	0.67			1.00			1.00	1.00
Incremental Delay, d2	1.6	393.6	0.1			0.2			2.9	2.4
Delay (s)	54.0	453.6	19.8			58.1			35.6	33.7
Level of Service	D	F	B			E			D	C
Approach Delay (s)		443.4	19.8			58.1			34.3	
Approach LOS		F	B			E			C	

Intersection Summary			
HCM 2000 Control Delay	163.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1615	370	10	355	0	0	0	0	335	235	95
Future Volume (vph)	0	1615	370	10	355	0	0	0	0	335	235	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	13	12	12	12	12	12	12	11	11	11
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		170			86			306			262	
Travel Time (s)		3.3			1.7			7.0			6.0	
Confl. Peds. (#/hr)			31	31								8
Confl. Bikes (#/hr)			11									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	1%	0%	0%	0%	0%	0%	0%	3%	3%	0%
Shared Lane Traffic (%)			0%							43%		
Lane Group Flow (vph)	0	1755	402	0	397	0	0	0	0	207	412	103
v/c Ratio		0.81	0.55		0.43					1.05	1.01	0.33
Control Delay		26.9	10.2		0.7					133.1	105.3	6.7
Queue Delay		48.4	57.4		0.0					0.0	0.0	0.2
Total Delay		75.3	67.6		0.7					133.1	105.3	6.9
Queue Length 50th (ft)		469	187		1					~224	~210	0
Queue Length 95th (ft)		m361	m137		m1					#404	#330	30
Internal Link Dist (ft)		90			6			226			182	
Turn Bay Length (ft)			100									
Base Capacity (vph)		2167	729		928					198	409	308
Starvation Cap Reductn		966	383		0					0	0	0
Spillback Cap Reductn		0	0		4					0	0	19
Storage Cap Reductn		0	0		0					0	0	0
Reduced v/c Ratio		1.46	1.16		0.43					1.05	1.01	0.36

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1615	370	10	355	0	0	0	0	335	235	95
Future Volume (vph)	0	1615	370	10	355	0	0	0	0	335	235	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	13	12	12	12	12	12	12	11	11	11
Total Lost time (s)		5.0	5.0		5.0					8.0	8.0	8.0
Lane Util. Factor		0.86	0.86		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.97		1.00					1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		4101	1236		3244					1387	2866	1365
Flt Permitted		1.00	1.00		0.95					0.95	0.98	1.00
Satd. Flow (perm)		4101	1236		3103					1387	2866	1365
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1755	402	11	386	0	0	0	0	364	255	103
RTOR Reduction (vph)	0	0	76	0	0	0	0	0	0	0	0	88
Lane Group Flow (vph)	0	1755	326	0	397	0	0	0	0	207	412	15
Confl. Peds. (#/hr)			31	31								8
Confl. Bikes (#/hr)			11									
Heavy Vehicles (%)	0%	4%	1%	0%	0%	0%	0%	0%	0%	3%	3%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		1 2 3		5	1 5					4	4	
Permitted Phases			1 2 3									4
Actuated Green, G (s)		74.0	74.0		58.0					20.0	20.0	20.0
Effective Green, g (s)		74.0	74.0		58.0					20.0	20.0	20.0
Actuated g/C Ratio		0.53	0.53		0.41					0.14	0.14	0.14
Clearance Time (s)										8.0	8.0	8.0
Vehicle Extension (s)										2.0	2.0	2.0
Lane Grp Cap (vph)		2167	653		1313					198	409	195
v/s Ratio Prot		c0.43			c0.06					c0.15	0.14	
v/s Ratio Perm			0.26		0.06							0.01
v/c Ratio		0.81	0.50		0.30					1.05	1.01	0.08
Uniform Delay, d1		27.2	21.1		27.5					60.0	60.0	52.0
Progression Factor		0.96	0.79		0.02					1.00	1.00	1.00
Incremental Delay, d2		0.2	0.0		0.0					76.4	46.3	0.1
Delay (s)		26.4	16.6		0.7					136.4	106.3	52.0
Level of Service		C	B		A					F	F	D
Approach Delay (s)		24.6			0.7			0.0			107.2	
Approach LOS		C			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	39.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	935	755	0	0	0	0	760	70	70	900	0
Future Volume (vph)	190	935	755	0	0	0	0	760	70	70	900	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	11	11	12	11	11
Right Turn on Red			No			No			Yes			No
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		784			617			531			989	
Travel Time (s)		21.4			21.0			10.3			19.3	
Confl. Peds. (#/hr)	6		17						5	5		
Confl. Bikes (#/hr)			15									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1223	821	0	0	0	0	902	0	0	1054	0
v/c Ratio		0.91	1.32					0.80			1.17	
Control Delay		36.1	178.1					45.9			120.9	
Queue Delay		0.0	0.0					0.0			0.0	
Total Delay		36.1	178.1					45.9			120.9	
Queue Length 50th (ft)		454	~915					382			~519	
Queue Length 95th (ft)		m#880	m#1366					470			#736	
Internal Link Dist (ft)		704			537			451			909	
Turn Bay Length (ft)												
Base Capacity (vph)		1341	623					1131			904	
Starvation Cap Reductn		0	0					0			0	
Spillback Cap Reductn		0	0					0			0	
Storage Cap Reductn		0	0					0			0	
Reduced v/c Ratio		0.91	1.32					0.80			1.17	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	935	755	0	0	0	0	760	70	70	900	0
Future Volume (vph)	190	935	755	0	0	0	0	760	70	70	900	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	11	11	12	11	11
Total Lost time (s)		6.0	6.0					5.0			6.0	
Lane Util. Factor		0.95	1.00					0.95			0.95	
Frpb, ped/bikes		1.00	1.00					1.00			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		1.00	0.85					0.99			1.00	
Flt Protected		0.99	1.00					1.00			1.00	
Satd. Flow (prot)		3129	1454					3095			3129	
Flt Permitted		0.99	1.00					1.00			0.59	
Satd. Flow (perm)		3129	1454					3095			1868	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	1016	821	0	0	0	0	826	76	76	978	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	1223	821	0	0	0	0	897	0	0	1054	0
Confl. Peds. (#/hr)	6		17						5	5		
Confl. Bikes (#/hr)			15									
Heavy Vehicles (%)	1%	3%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Prot					NA		pm+pt	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4									6		
Actuated Green, G (s)		56.8	56.8					51.0			63.0	
Effective Green, g (s)		56.8	56.8					51.0			63.0	
Actuated g/C Ratio		0.41	0.41					0.36			0.45	
Clearance Time (s)		6.0	6.0					5.0			6.0	
Vehicle Extension (s)		2.0	2.0					2.0			2.0	
Lane Grp Cap (vph)		1269	589					1127			912	
v/s Ratio Prot			c0.56					0.29			c0.07	
v/s Ratio Perm		0.39									c0.45	
v/c Ratio		0.96	1.39					0.80			1.16	
Uniform Delay, d1		40.6	41.6					39.8			38.5	
Progression Factor		0.72	0.73					1.00			1.00	
Incremental Delay, d2		13.7	184.2					3.7			82.5	
Delay (s)		42.8	214.5					43.5			121.0	
Level of Service		D	F					D			F	
Approach Delay (s)		111.8			0.0			43.5			121.0	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	98.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	104.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	105	990	105	370	595	0	0	915	250
Future Volume (vph)	0	0	0	105	990	105	370	595	0	0	915	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	12	11	11	12	12	11	11
Storage Length (ft)	0		0	0		280	0		0	0		0
Storage Lanes	0		0	0		1	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			Yes
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		762			786			989			627	
Travel Time (s)		20.8			21.4			19.3			12.2	
Confl. Peds. (#/hr)						69	65					65
Confl. Bikes (#/hr)						25						82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	1%	3%	0%	0%	0%	0%	0%	0%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1304	0	402	647	0	0	1267	0
v/c Ratio					1.11		1.22	0.66			1.16	
Control Delay					100.4		162.3	20.6			118.4	
Queue Delay					0.0		0.0	0.0			0.0	
Total Delay					100.4		162.3	20.6			118.4	
Queue Length 50th (ft)					~419		~338	318			~606	
Queue Length 95th (ft)					#517		#540	450			#746	
Internal Link Dist (ft)		682			706			909			547	
Turn Bay Length (ft)												
Base Capacity (vph)					1180		329	978			1089	
Starvation Cap Reductn					0		0	0			0	
Spillback Cap Reductn					0		0	0			0	
Storage Cap Reductn					0		0	0			0	
Reduced v/c Ratio					1.11		1.22	0.66			1.16	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	105	990	105	370	595	0	0	915	250
Future Volume (vph)	0	0	0	105	990	105	370	595	0	0	915	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	12	11	11	12	12	11	11
Total Lost time (s)					10.0		6.0	6.0			6.0	
Lane Util. Factor					0.91		1.00	1.00			0.95	
Frpb, ped/bikes					0.98		1.00	1.00			0.96	
Flpb, ped/bikes					1.00		1.00	1.00			1.00	
Frt					0.99		1.00	1.00			0.97	
Flt Protected					1.00		0.95	1.00			1.00	
Satd. Flow (prot)					4256		1570	1653			2912	
Flt Permitted					1.00		0.08	1.00			1.00	
Satd. Flow (perm)					4256		132	1653			2912	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	114	1076	114	402	647	0	0	995	272
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	21	0
Lane Group Flow (vph)	0	0	0	0	1295	0	402	647	0	0	1246	0
Confl. Peds. (#/hr)						69	65					65
Confl. Bikes (#/hr)						25						82
Heavy Vehicles (%)	2%	2%	2%	1%	3%	0%	0%	0%	0%	0%	0%	1%
Turn Type				Split	NA		pm+pt	NA			NA	
Protected Phases				4	4		1	6			2	
Permitted Phases							6					
Actuated Green, G (s)					33.0		71.0	71.0			44.0	
Effective Green, g (s)					33.0		71.0	71.0			44.0	
Actuated g/C Ratio					0.28		0.59	0.59			0.37	
Clearance Time (s)					10.0		6.0	6.0			6.0	
Vehicle Extension (s)					2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)					1170		329	978			1067	
v/s Ratio Prot					c0.30		c0.21	0.39			0.43	
v/s Ratio Perm							c0.51					
v/c Ratio					1.11		1.22	0.66			1.17	
Uniform Delay, d1					43.5		43.1	16.4			38.0	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					60.6		124.1	3.5			85.9	
Delay (s)					104.1		167.2	20.0			123.9	
Level of Service					F		F	B			F	
Approach Delay (s)		0.0			104.1			76.4			123.9	
Approach LOS		A			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	103.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	105.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	420	905	710	0	0	0	0	0	765	55
Future Volume (vph)	0	0	420	905	710	0	0	0	0	0	765	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No	No		No			No			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		513			209			926			1840	
Travel Time (s)		14.0			5.7			21.0			41.8	
Confl. Peds. (#/hr)			4	17								4
Confl. Bikes (#/hr)			35									2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	4%	2%	5%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	457	984	772	0	0	0	0	0	892	0
v/c Ratio			0.77	1.32	0.93						1.15	
Control Delay			44.3	169.7	20.2						112.7	
Queue Delay			0.0	1.0	40.4						0.0	
Total Delay			44.3	170.7	60.6						112.7	
Queue Length 50th (ft)			151	~398	330						~361	
Queue Length 95th (ft)			215	m85	m122						m#295	
Internal Link Dist (ft)		433			129			846			1760	
Turn Bay Length (ft)			100									
Base Capacity (vph)			618	746	850						775	
Starvation Cap Reductn			0	105	138						0	
Spillback Cap Reductn			0	0	0						0	
Storage Cap Reductn			0	0	0						0	
Reduced v/c Ratio			0.74	1.54	1.08						1.15	

Intersection Summary	
Area Type:	CBD
~	Volume exceeds capacity, queue is theoretically infinite.
	Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer.
	Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	420	905	710	0	0	0	0	0	765	55
Future Volume (vph)	0	0	420	905	710	0	0	0	0	0	765	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)			9.0	6.0	6.0						5.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2378	2987	1574						3209	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2378	2987	1574						3209	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	457	984	772	0	0	0	0	0	832	60
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	457	984	772	0	0	0	0	0	887	0
Confl. Peds. (#/hr)			4	17								4
Confl. Bikes (#/hr)			35									2
Heavy Vehicles (%)	0%	0%	4%	2%	5%	0%	0%	0%	0%	0%	0%	0%
Turn Type			Prot	Prot	NA						NA	
Protected Phases			2	1 4	1 2 4						3	
Permitted Phases												
Actuated Green, G (s)			25.0	32.0	62.0						24.0	
Effective Green, g (s)			25.0	32.0	57.0						24.0	
Actuated g/C Ratio			0.25	0.32	0.57						0.24	
Clearance Time (s)			9.0								5.0	
Vehicle Extension (s)			2.0								2.0	
Lane Grp Cap (vph)			594	955	897						770	
v/s Ratio Prot			0.19	c0.33	c0.49						c0.28	
v/s Ratio Perm												
v/c Ratio			0.77	1.03	0.86						1.15	
Uniform Delay, d1			34.8	34.0	18.1						38.0	
Progression Factor			1.00	0.64	1.03						1.06	
Incremental Delay, d2			5.4	18.0	0.8						75.8	
Delay (s)			40.2	39.6	19.4						116.2	
Level of Service			D	D	B						F	
Approach Delay (s)		40.2			30.8			0.0			116.2	
Approach LOS		D			C			A			F	

Intersection Summary			
HCM 2000 Control Delay	56.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	104.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	375	40	70	575	120	20	15	45	0	0	0
Future Volume (Veh/h)	70	375	40	70	575	120	20	15	45	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	408	43	76	625	130	22	16	49	0	0	0
Pedestrians		40						50			19	
Lane Width (ft)		11.0						11.5			0.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		3						4			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		746			513							
pX, platoon unblocked	0.60			0.98			0.61	0.61	0.98	0.61	0.61	0.60
vC, conflicting volume	774			501			1448	1558	480	1478	1514	749
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	291			486			1360	1539	464	1408	1467	249
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			93			63	71	91	100	100	100
cM capacity (veh/h)	743			1019			60	56	566	43	63	462

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	76	451	76	755	22	65
Volume Left	76	0	76	0	22	0
Volume Right	0	43	0	130	0	49
cSH	743	1700	1019	1700	60	175
Volume to Capacity	0.10	0.27	0.07	0.44	0.37	0.37
Queue Length 95th (ft)	9	0	6	0	34	40
Control Delay (s)	10.4	0.0	8.8	0.0	96.3	37.4
Lane LOS	B		A		F	E
Approach Delay (s)	1.5		0.8		52.3	
Approach LOS					F	

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	430	5	30	615	190	5	5	40	40	1	20
Future Volume (vph)	75	430	5	30	615	190	5	5	40	40	1	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	12	12	12	12	12
Storage Length (ft)	110		0	140		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			No			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		605			253			131			150	
Travel Time (s)		16.5			6.9			3.6			4.1	
Confl. Peds. (#/hr)	17		22	22		17	3		1	1		3
Confl. Bikes (#/hr)			33			12						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	9%	14%	41%	7%	11%	4%	0%	9%	9%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	472	0	33	875	0	0	10	43	0	66	0
v/c Ratio	0.47	0.47		0.10	0.91			0.08	0.42		0.52	
Control Delay	30.7	17.1		15.8	35.0			44.4	57.8		49.1	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	30.7	17.1		15.8	35.0			44.4	57.8		49.1	
Queue Length 50th (ft)	26	149		8	494			6	28		31	
Queue Length 95th (ft)	#150	#497		40	#1114			22	62		74	
Internal Link Dist (ft)		525			173			51			70	
Turn Bay Length (ft)	110			140								
Base Capacity (vph)	175	1002		332	966			233	186		157	
Starvation Cap Reductn	0	0		0	0			0	0		0	
Spillback Cap Reductn	0	0		0	0			0	0		0	
Storage Cap Reductn	0	0		0	0			0	0		0	
Reduced v/c Ratio	0.47	0.47		0.10	0.91			0.04	0.23		0.42	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	430	5	30	615	190	5	5	40	40	1	20
Future Volume (vph)	75	430	5	30	615	190	5	5	40	40	1	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.97		0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.96			1.00	0.85		0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.98	1.00		0.97	
Satd. Flow (prot)	1467	1460		1066	1412			1636	1295		1473	
Flt Permitted	0.17	1.00		0.43	1.00			0.98	1.00		0.97	
Satd. Flow (perm)	255	1460		484	1412			1636	1295		1473	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	467	5	33	668	207	5	5	43	43	1	22
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	18	0
Lane Group Flow (vph)	82	472	0	33	875	0	0	10	43	0	48	0
Confl. Peds. (#/hr)	17		22	22		17	3		1	1		3
Confl. Bikes (#/hr)			33			12						
Heavy Vehicles (%)	3%	9%	14%	41%	7%	11%	4%	0%	9%	9%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA	Perm	Split	NA	
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6			2					8			
Actuated Green, G (s)	63.3	63.3		63.3	63.3			5.8	5.8		6.7	
Effective Green, g (s)	63.3	63.3		63.3	63.3			5.8	5.8		6.7	
Actuated g/C Ratio	0.60	0.60		0.60	0.60			0.06	0.06		0.06	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0		1.0	1.0			2.0	2.0		2.0	
Lane Grp Cap (vph)	153	880		291	851			90	71		93	
v/s Ratio Prot		0.32			c0.62			0.01			c0.03	
v/s Ratio Perm	0.32			0.07					c0.03			
v/c Ratio	0.54	0.54		0.11	1.03			0.11	0.61		0.52	
Uniform Delay, d1	12.2	12.2		8.9	20.9			47.1	48.5		47.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	12.8	2.3		0.8	38.3			0.2	9.6		2.0	
Delay (s)	25.0	14.6		9.7	59.1			47.3	58.1		49.6	
Level of Service	C	B		A	E			D	E		D	
Approach Delay (s)		16.1			57.3			56.1			49.6	
Approach LOS		B			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	42.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	475	10	1	420	140	1	2	0	45	25	0
Future Volume (Veh/h)	1	475	10	1	420	140	1	2	0	45	25	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	516	11	1	457	152	1	2	0	49	27	0
Pedestrians		22			22			22			17	
Lane Width (ft)		12.0			11.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		2			2			2			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		592			467							
pX, platoon unblocked	0.74			0.79			0.85	0.85	0.79	0.85	0.85	0.74
vC, conflicting volume	626			549			1116	1174	566	1098	1103	572
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	322			301			495	563	322	474	479	249
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	100	88	93	100
cM capacity (veh/h)	905			981			365	355	551	398	396	567

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	528	610	3	76
Volume Left	1	1	1	49
Volume Right	11	152	0	0
cSH	905	981	359	397
Volume to Capacity	0.00	0.00	0.01	0.19
Queue Length 95th (ft)	0	0	1	17
Control Delay (s)	0.0	0.0	15.1	16.2
Lane LOS	A	A	C	C
Approach Delay (s)	0.0	0.0	15.1	16.2
Approach LOS			C	C

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	505	20	60	580	1	10	1	5	1	1	1
Future Volume (vph)	1	505	20	60	580	1	10	1	5	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	13	13	13	12	12	12
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		467			605			282			144	
Travel Time (s)		12.7			16.5			7.7			3.9	
Confl. Peds. (#/hr)	17		22	22		17	22		22	22		22
Confl. Bikes (#/hr)			33			12						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	9%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	572	0	0	696	0	0	17	0	0	3	0
v/c Ratio		0.48			0.62			0.14			0.03	
Control Delay		13.7			16.8			31.1			30.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		13.7			16.8			31.1			30.7	
Queue Length 50th (ft)		0			0			6			1	
Queue Length 95th (ft)		#515			#673			24			9	
Internal Link Dist (ft)		387			525			202			64	
Turn Bay Length (ft)												
Base Capacity (vph)		1195			1115			118			109	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.48			0.62			0.14			0.03	

Intersection Summary	
Area Type:	CBD

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	505	20	60	580	1	10	1	5	1	1	1
Future Volume (vph)	1	505	20	60	580	1	10	1	5	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	13	13	13	12	12	12
Total Lost time (s)		5.5			5.5			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.90			0.89	
Flpb, ped/bikes		1.00			1.00			0.80			0.90	
Frt		0.99			1.00			0.96			0.95	
Flt Protected		1.00			1.00			0.97			0.98	
Satd. Flow (prot)		1509			1543			1161			1259	
Flt Permitted		1.00			0.91			1.00			0.95	
Satd. Flow (perm)		1508			1406			1199			1219	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	549	22	65	630	1	11	1	5	1	1	1
RTOR Reduction (vph)	0	1	0	0	0	0	0	5	0	0	1	0
Lane Group Flow (vph)	0	571	0	0	696	0	0	12	0	0	2	0
Confl. Peds. (#/hr)	17		22	22		17	22		22	22		22
Confl. Bikes (#/hr)			33			12						
Heavy Vehicles (%)	2%	9%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			5			5	
Permitted Phases	1			1			5			5		
Actuated Green, G (s)		50.8			50.8			2.8			2.8	
Effective Green, g (s)		50.8			50.8			2.8			2.8	
Actuated g/C Ratio		0.63			0.63			0.03			0.03	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		957			892			41			42	
v/s Ratio Prot												
v/s Ratio Perm		0.38			c0.49			c0.01			0.00	
v/c Ratio		0.60			0.78			0.30			0.05	
Uniform Delay, d1		8.6			10.6			37.6			37.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.7			6.7			1.5			0.2	
Delay (s)		11.3			17.3			39.1			37.5	
Level of Service		B			B			D			D	
Approach Delay (s)		11.3			17.3			39.1			37.5	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	10	10	0	50	95	15	435	0	60	350	20
Future Volume (Veh/h)	10	10	10	0	50	95	15	435	0	60	350	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	11	11	0	54	103	16	473	0	65	380	22
Pedestrians		69			64						42	
Lane Width (ft)		12.0			13.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		6			6						4	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								521				
pX, platoon unblocked	0.78	0.78		0.78	0.78	0.78				0.78		
vC, conflicting volume	1267	1159	460	1106	1170	579	471			537		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1202	1063	460	996	1077	320	471			267		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	80	92	98	100	61	80	98			93		
cM capacity (veh/h)	55	142	567	130	139	511	1028			954		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	33	157	489	467
Volume Left	11	0	16	65
Volume Right	11	103	0	22
cSH	112	266	1028	954
Volume to Capacity	0.30	0.59	0.02	0.07
Queue Length 95th (ft)	28	86	1	5
Control Delay (s)	50.2	36.2	0.5	2.0
Lane LOS	F	E	A	A
Approach Delay (s)	50.2	36.2	0.5	2.0
Approach LOS	F	E		

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	440	70	20	620	215	50
Future Volume (Veh/h)	440	70	20	620	215	50
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	478	76	22	674	234	54
Pedestrians	3			1	50	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	4	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	253			1006		
pX, platoon unblocked			0.82		0.80	0.82
vC, conflicting volume			604		1287	567
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			412		738	367
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		19	90
cM capacity (veh/h)			905		288	535

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	554	696	288
Volume Left	0	22	234
Volume Right	76	0	54
cSH	1700	905	315
Volume to Capacity	0.33	0.02	0.91
Queue Length 95th (ft)	0	2	221
Control Delay (s)	0.0	0.6	68.4
Lane LOS		A	F
Approach Delay (s)	0.0	0.6	68.4
Approach LOS			F

Intersection Summary			
Average Delay	13.1		
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	30	40	225	120	65	25
Future Volume (Veh/h)	30	40	225	120	65	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	43	245	130	71	27
Pedestrians	50		50			50
Lane Width (ft)	13.0		12.0			11.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		4			4
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	579	410			425	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	579	410			425	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	93			93	
cM capacity (veh/h)	408	589			1083	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	76	375	98
Volume Left	33	0	71
Volume Right	43	130	0
cSH	494	1700	1083
Volume to Capacity	0.15	0.22	0.07
Queue Length 95th (ft)	13	0	5
Control Delay (s)	13.6	0.0	6.4
Lane LOS	B		A
Approach Delay (s)	13.6	0.0	6.4
Approach LOS	B		

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	60	345	55	1	1	105
Future Volume (Veh/h)	60	345	55	1	1	105
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	375	60	1	1	114
Pedestrians		8	8		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		1	1		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		165				
pX, platoon unblocked						
vC, conflicting volume	69				582	76
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	69				582	76
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				100	88
cM capacity (veh/h)	1528				449	974

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	440	61	115
Volume Left	65	0	1
Volume Right	0	1	114
cSH	1528	1700	964
Volume to Capacity	0.04	0.04	0.12
Queue Length 95th (ft)	3	0	10
Control Delay (s)	1.4	0.0	9.2
Lane LOS	A		A
Approach Delay (s)	1.4	0.0	9.2
Approach LOS			A

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	790	310	0	0	1890
Future Volume (Veh/h)	0	790	310	0	0	1890
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	859	337	0	0	2054
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1190	279			
pX, platoon unblocked	0.93				0.96	0.93
vC, conflicting volume	337				766	168
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	149				370	0
tC, single (s)	4.1				6.9	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	1343				578	1010

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	430	430	168	168	2054
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	2054
cSH	1700	1700	1700	1700	1010
Volume to Capacity	0.25	0.25	0.10	0.10	2.03
Queue Length 95th (ft)	0	0	0	0	3405
Control Delay (s)	0.0	0.0	0.0	0.0	480.9
Lane LOS					F
Approach Delay (s)	0.0		0.0		480.9
Approach LOS					F

Intersection Summary			
Average Delay	303.9		
Intersection Capacity Utilization	132.3%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	1730	0	0	0	0	365	145	150	0	0	0
Future Volume (vph)	220	1730	0	0	0	0	365	145	150	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	12	11	11	12	12	12
Right Turn on Red			No			No			Yes			No
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		86			784			304			1156	
Travel Time (s)		1.7			15.3			6.9			26.3	
Confl. Peds. (#/hr)	8								93			
Confl. Bikes (#/hr)									7			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)							19%					
Lane Group Flow (vph)	0	2119	0	0	0	0	322	396	0	0	0	0
v/c Ratio		0.67					1.05	1.36				
Control Delay		0.6					116.9	222.6				
Queue Delay		0.0					0.0	0.0				
Total Delay		0.6					116.9	222.6				
Queue Length 50th (ft)		0					~333	~483				
Queue Length 95th (ft)		m0					#538	#705				
Internal Link Dist (ft)		6			704			224			1076	
Turn Bay Length (ft)												
Base Capacity (vph)		3155					308	291				
Starvation Cap Reductn		0					0	0				
Spillback Cap Reductn		0					0	0				
Storage Cap Reductn		0					0	0				
Reduced v/c Ratio		0.67					1.05	1.36				

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	1730	0	0	0	0	365	145	150	0	0	0
Future Volume (vph)	220	1730	0	0	0	0	365	145	150	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	12	11	11	12	12	12
Total Lost time (s)		5.0					5.0	5.0				
Lane Util. Factor		0.91					0.95	0.95				
Frpb, ped/bikes		1.00					1.00	0.94				
Flpb, ped/bikes		1.00					1.00	1.00				
Frt		1.00					1.00	0.94				
Flt Protected		0.99					0.95	0.99				
Satd. Flow (prot)		4333					1543	1367				
Flt Permitted		0.99					0.95	0.99				
Satd. Flow (perm)		4333					1543	1367				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	1880	0	0	0	0	397	158	163	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	18	0	0	0	0
Lane Group Flow (vph)	0	2119	0	0	0	0	322	378	0	0	0	0
Confl. Peds. (#/hr)	8								93			
Confl. Bikes (#/hr)									7			
Heavy Vehicles (%)	8%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Split	NA					Split	NA				
Protected Phases	1 2 3 4	1 2 3 4					5	5				
Permitted Phases												
Actuated Green, G (s)		99.0					28.0	28.0				
Effective Green, g (s)		99.0					28.0	28.0				
Actuated g/C Ratio		0.71					0.20	0.20				
Clearance Time (s)							5.0	5.0				
Vehicle Extension (s)							4.0	4.0				
Lane Grp Cap (vph)		3064					308	273				
v/s Ratio Prot		c0.49					0.21	c0.28				
v/s Ratio Perm												
v/c Ratio		0.69					1.05	1.39				
Uniform Delay, d1		11.7					56.0	56.0				
Progression Factor		0.00					1.00	1.00				
Incremental Delay, d2		0.3					63.7	194.8				
Delay (s)		0.3					119.7	250.8				
Level of Service		A					F	F				
Approach Delay (s)		0.3			0.0			192.0			0.0	
Approach LOS		A			A			F			A	

Intersection Summary			
HCM 2000 Control Delay	48.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	67	2	225	61	780	0	0	710	30
Future Volume (vph)	0	0	0	67	2	225	61	780	0	0	710	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	10	12	12	10	10
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		590			353			178			622	
Travel Time (s)		13.4			8.0			4.9			17.0	
Confl. Peds. (#/hr)						56	196					196
Confl. Bikes (#/hr)						9						34
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	4%	0%	0%	3%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	75	245	0	914	0	0	805	0
v/c Ratio					0.80	0.56		0.64			1.12	
Control Delay					76.9	8.2		3.7			87.9	
Queue Delay					75.2	0.0		1.6			5.8	
Total Delay					152.1	8.2		5.3			93.7	
Queue Length 50th (ft)					52	22		23			~315	
Queue Length 95th (ft)					m56	m16		m14			m#449	
Internal Link Dist (ft)		510			273			98			542	
Turn Bay Length (ft)												
Base Capacity (vph)					94	631		1420			716	
Starvation Cap Reductn					0	0		317			0	
Spillback Cap Reductn					36	0		0			359	
Storage Cap Reductn					0	0		0			0	
Reduced v/c Ratio					1.29	0.39		0.83			2.25	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	67	2	225	61	780	0	0	710	30
Future Volume (vph)	0	0	0	67	2	225	61	780	0	0	710	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	12	12	10	10
Total Lost time (s)					4.0	4.0		4.0			4.0	
Lane Util. Factor					1.00	1.00		0.95			1.00	
Frpb, ped/bikes					1.00	1.00		1.00			0.99	
Flpb, ped/bikes					1.00	1.00		1.00			1.00	
Frt					1.00	0.85		1.00			0.99	
Flt Protected					0.95	1.00		1.00			1.00	
Satd. Flow (prot)					1576	1405		2909			1522	
Flt Permitted					0.95	1.00		0.75			1.00	
Satd. Flow (perm)					1576	1405		2198			1522	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	73	2	245	66	848	0	0	772	33
RTOR Reduction (vph)	0	0	0	0	0	206	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	75	39	0	914	0	0	803	0
Confl. Peds. (#/hr)						56	196					196
Confl. Bikes (#/hr)						9						34
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	4%	0%	0%	3%	0%
Turn Type				Split	NA	custom	custom	NA			NA	
Protected Phases				8	8	1 8		2 4 9 11			6	
Permitted Phases							2 4					
Actuated Green, G (s)					6.0	16.0		63.0			47.0	
Effective Green, g (s)					6.0	16.0		57.0			47.0	
Actuated g/C Ratio					0.06	0.16		0.57			0.47	
Clearance Time (s)					4.0						4.0	
Vehicle Extension (s)					2.0						2.0	
Lane Grp Cap (vph)					94	224		1252			715	
v/s Ratio Prot					c0.05	0.03					c0.53	
v/s Ratio Perm								c0.42				
v/c Ratio					0.80	0.17		0.73			1.12	
Uniform Delay, d1					46.4	36.3		15.8			26.5	
Progression Factor					1.55	1.92		0.24			0.96	
Incremental Delay, d2					4.0	0.0		0.9			61.3	
Delay (s)					76.1	69.7		4.7			86.6	
Level of Service					E	E		A			F	
Approach Delay (s)		0.0			71.2			4.7			86.6	
Approach LOS		A			E			A			F	

Intersection Summary			
HCM 2000 Control Delay	47.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1380	230	235	130	0	0	0	0
Future Volume (vph)	0	0	0	0	1380	230	235	130	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	11	11	11	12	12	12
Right Turn on Red			No			No	No		Yes			No
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		209			762			1156			2190	
Travel Time (s)		5.7			20.8			26.3			49.8	
Confl. Peds. (#/hr)						170	4					
Confl. Bikes (#/hr)						33						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	9%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1750	0	0	396	0	0	0	0
v/c Ratio					1.63			0.55				
Control Delay					315.2			35.8				
Queue Delay					0.9			0.3				
Total Delay					316.0			36.0				
Queue Length 50th (ft)					~602			114				
Queue Length 95th (ft)					#699			162				
Internal Link Dist (ft)		129			682			1076			2110	
Turn Bay Length (ft)												
Base Capacity (vph)					1075			744				
Starvation Cap Reductn					0			0				
Spillback Cap Reductn					173			66				
Storage Cap Reductn					0			0				
Reduced v/c Ratio					1.94			0.58				

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1380	230	235	130	0	0	0	0
Future Volume (vph)	0	0	0	0	1380	230	235	130	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)					6.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.96			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.98			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					4298			2864				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					4298			2864				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1500	250	255	141	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1750	0	0	396	0	0	0	0
Confl. Peds. (#/hr)						170	4					
Confl. Bikes (#/hr)						33						
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	9%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					25.0			25.0				
Effective Green, g (s)					25.0			25.0				
Actuated g/C Ratio					0.25			0.25				
Clearance Time (s)					6.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1074			716				
v/s Ratio Prot					c0.41							
v/s Ratio Perm								0.14				
v/c Ratio					1.63			0.55				
Uniform Delay, d1					37.5			32.6				
Progression Factor					1.00			1.00				
Incremental Delay, d2					287.5			0.5				
Delay (s)					325.0			33.2				
Level of Service					F			C				
Approach Delay (s)		0.0			325.0			33.2			0.0	
Approach LOS		A			F			C			A	

Intersection Summary			
HCM 2000 Control Delay	271.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	104.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	725	300	0	915	105	0	805	310	0	340	15
Future Volume (vph)	0	725	300	0	915	105	0	805	310	0	340	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Right Turn on Red			No			No			No			No
Link Speed (mph)		35			35			25			20	
Link Distance (ft)		641			2767			774			646	
Travel Time (s)		12.5			53.9			21.1			22.0	
Confl. Peds. (#/hr)			109			54			323			243
Confl. Bikes (#/hr)			13						66			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	5%	0%	0%	7%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1114	0	0	1109	0	0	1212	0	0	386	0
v/c Ratio		1.05			0.95			1.09			0.60	
Control Delay		75.2			47.4			81.8			27.9	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		75.2			47.4			81.8			27.9	
Queue Length 50th (ft)		~411			355			~455			189	
Queue Length 95th (ft)		#541			#496			m#548			288	
Internal Link Dist (ft)		561			2687			694			566	
Turn Bay Length (ft)												
Base Capacity (vph)		1056			1173			1109			644	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.05			0.95			1.09			0.60	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	725	300	0	915	105	0	805	310	0	340	15
Future Volume (vph)	0	725	300	0	915	105	0	805	310	0	340	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		11.0			11.0			11.0			11.0	
Lane Util. Factor		0.95			0.95			0.95			1.00	
Frpb, ped/bikes		0.93			0.99			0.90			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.98			0.96			0.99	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		2857			3170			2706			1572	
Flt Permitted		1.00			1.00			1.00			1.00	
Satd. Flow (perm)		2857			3170			2706			1572	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	788	326	0	995	114	0	875	337	0	370	16
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1114	0	0	1109	0	0	1212	0	0	386	0
Confl. Peds. (#/hr)			109			54			323			243
Confl. Bikes (#/hr)			13						66			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	5%	0%	0%	7%	0%
Turn Type		NA			NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases												
Actuated Green, G (s)		37.0			37.0			41.0			41.0	
Effective Green, g (s)		37.0			37.0			41.0			41.0	
Actuated g/C Ratio		0.37			0.37			0.41			0.41	
Clearance Time (s)		11.0			11.0			11.0			11.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		1057			1172			1109			644	
v/s Ratio Prot		c0.39			0.35			c0.45			0.25	
v/s Ratio Perm												
v/c Ratio		1.05			0.95			1.09			0.60	
Uniform Delay, d1		31.5			30.5			29.5			23.1	
Progression Factor		1.00			1.00			1.10			1.00	
Incremental Delay, d2		43.0			14.9			49.7			4.1	
Delay (s)		74.5			45.5			82.2			27.2	
Level of Service		E			D			F			C	
Approach Delay (s)		74.5			45.5			82.2			27.2	
Approach LOS		E			D			F			C	

Intersection Summary			
HCM 2000 Control Delay	63.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	351	20	125	0	0	0	0	645	35	257	490	0
Future Volume (vph)	351	20	125	0	0	0	0	645	35	257	490	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	10	10	10	10	12
Storage Length (ft)	0		0	0		0	0		300	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		595			501			1960			178	
Travel Time (s)		13.5			11.4			53.5			4.9	
Confl. Peds. (#/hr)			56						310	310		
Confl. Bikes (#/hr)									50			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)	35%											
Lane Group Flow (vph)	248	292	0	0	0	0	0	739	0	0	812	0
v/c Ratio	1.47	1.69						0.73			1.49	
Control Delay	273.6	360.2						34.5			240.0	
Queue Delay	0.3	0.7						1.6			0.3	
Total Delay	273.9	361.0						36.1			240.3	
Queue Length 50th (ft)	~229	~269						210			~686	
Queue Length 95th (ft)	#390	#445						#328			m#667	
Internal Link Dist (ft)		515			421			1880			98	
Turn Bay Length (ft)												
Base Capacity (vph)	169	173						1009			545	
Starvation Cap Reductn	0	0						0			18	
Spillback Cap Reductn	3	7						127			0	
Storage Cap Reductn	0	0						0			0	
Reduced v/c Ratio	1.49	1.76						0.84			1.54	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	351	20	125	0	0	0	0	645	35	257	490	0
Future Volume (vph)	351	20	125	0	0	0	0	645	35	257	490	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	10	10	10	10	12
Total Lost time (s)	4.0	4.0						4.0			4.0	
Lane Util. Factor	0.95	0.95						0.95			1.00	
Frpb, ped/bikes	1.00	0.87						0.98			1.00	
Flpb, ped/bikes	1.00	1.00						1.00			1.00	
Frt	1.00	0.93						0.99			1.00	
Flt Protected	0.95	0.98						1.00			0.98	
Satd. Flow (prot)	1543	1292						2922			1559	
Flt Permitted	0.95	0.98						1.00			0.40	
Satd. Flow (perm)	1543	1292						2922			627	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	382	22	136	0	0	0	0	701	38	279	533	0
RTOR Reduction (vph)	0	31	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	248	261	0	0	0	0	0	739	0	0	812	0
Confl. Peds. (#/hr)			56						310	310		
Confl. Bikes (#/hr)									50			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Split	NA						NA		custom	NA	
Protected Phases	4	4						2		1	6 8 10 7	
Permitted Phases										6 8		
Actuated Green, G (s)	11.0	11.0						34.6			66.0	
Effective Green, g (s)	11.0	11.0						34.6			66.0	
Actuated g/C Ratio	0.11	0.11						0.35			0.66	
Clearance Time (s)	4.0	4.0						4.0				
Vehicle Extension (s)	2.0	2.0						2.0				
Lane Grp Cap (vph)	169	142						1011			520	
v/s Ratio Prot	0.16	c0.20						0.25			c0.18	
v/s Ratio Perm											c0.85	
v/c Ratio	1.47	1.84						0.73			1.56	
Uniform Delay, d1	44.5	44.5						28.6			17.0	
Progression Factor	1.00	1.00						1.00			1.17	
Incremental Delay, d2	239.7	402.7						4.7			253.6	
Delay (s)	284.2	447.2						33.3			273.4	
Level of Service	F	F						C			F	
Approach Delay (s)		372.3			0.0			33.3			273.4	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	214.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.85		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	250	20	130	565	5	190	220	25	5	330	280
Future Volume (vph)	185	250	20	130	565	5	190	220	25	5	330	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	175		0	125		0	0		160
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		548			547			255			491	
Travel Time (s)		14.9			14.9			7.0			13.4	
Confl. Peds. (#/hr)	37		81	81		37	113		85	85		113
Confl. Bikes (#/hr)			9			23			17			32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	1%	0%	1%	0%	0%	3%	1%	4%	10%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	5	5	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	201	294	0	141	619	0	207	266	0	0	364	304
v/c Ratio	1.33	0.52		0.42	1.09		1.24	0.49			0.96	0.88
Control Delay	219.3	45.5		32.3	110.9		186.0	44.5			94.1	74.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	219.3	45.5		32.3	110.9		186.0	44.5			94.1	74.9
Queue Length 50th (ft)	~232	248		90	~741		~204	218			371	265
Queue Length 95th (ft)	#405	349		142	#984		#381	313			#582	#387
Internal Link Dist (ft)		468			467			175			411	
Turn Bay Length (ft)	250			175			125					160
Base Capacity (vph)	151	570		343	568		167	566			398	355
Starvation Cap Reductn	0	0		0	0		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	1.33	0.52		0.41	1.09		1.24	0.47			0.91	0.86

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	250	20	130	565	5	190	220	25	5	330	280
Future Volume (vph)	185	250	20	130	565	5	190	220	25	5	330	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	4.0			6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98			1.00	0.81
Flpb, ped/bikes	1.00	1.00		0.98	1.00		0.99	1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00		1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1577	1657		1569	1672		1561	1634			1687	1170
Flt Permitted	0.08	1.00		0.44	1.00		0.16	1.00			0.99	1.00
Satd. Flow (perm)	129	1657		719	1672		269	1634			1679	1170
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	201	272	22	141	614	5	207	239	27	5	359	304
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	201	294	0	141	619	0	207	266	0	0	364	304
Confl. Peds. (#/hr)	37		81	81		37	113		85	85		113
Confl. Bikes (#/hr)			9			23			17			32
Heavy Vehicles (%)	3%	1%	0%	1%	0%	0%	3%	1%	4%	10%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	5	5	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		D.P+P	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6		7	7 8			8	5
Permitted Phases	2			6			8			8		8
Actuated Green, G (s)	61.4	51.3		60.0	50.6		43.8	47.8			33.7	43.8
Effective Green, g (s)	61.4	51.3		60.0	50.6		43.8	47.8			33.7	43.8
Actuated g/C Ratio	0.41	0.34		0.40	0.34		0.29	0.32			0.22	0.29
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0				6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0				2.0	2.0
Lane Grp Cap (vph)	150	565		340	562		165	519			376	387
v/s Ratio Prot	c0.09	0.18		0.03	0.37		c0.08	0.16				0.05
v/s Ratio Perm	c0.46			0.14			c0.28				0.22	0.21
v/c Ratio	1.34	0.52		0.41	1.10		1.25	0.51			0.97	0.79
Uniform Delay, d1	41.8	39.6		30.4	49.9		48.7	41.8			57.8	48.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	190.9	3.4		0.3	68.7		154.4	0.4			37.4	9.3
Delay (s)	232.7	43.0		30.7	118.6		203.1	42.1			95.2	58.3
Level of Service	F	D		C	F		F	D			F	E
Approach Delay (s)		120.1			102.3			112.6			78.4	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	101.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	150.3	Sum of lost time (s)	29.0
Intersection Capacity Utilization	97.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	0	30	15	10	5	15	325	0	0	620	65
Future Volume (vph)	45	0	30	15	10	5	15	325	0	0	620	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	10	10	10	10	10	12	12	10	10
Right Turn on Red			Yes			Yes			Yes			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		453			259			1811			202	
Travel Time (s)		12.4			7.1			49.4			5.5	
Confl. Peds. (#/hr)	7		14	14		7	75					75
Confl. Bikes (#/hr)			2			5			10			9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	0%	10%	0%	0%	0%	0%	5%	0%	0%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	82	0	0	32	0	0	369	0	0	745	0
v/c Ratio		0.61			0.12			0.31			0.68	
Control Delay		22.1			24.2			7.5			15.4	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		22.1			24.2			7.5			15.4	
Queue Length 50th (ft)		0			6			0			0	
Queue Length 95th (ft)		#29			40			219			#700	
Internal Link Dist (ft)		373			179			1731			122	
Turn Bay Length (ft)												
Base Capacity (vph)		135			774			1188			1091	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.61			0.04			0.31			0.68	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	0	30	15	10	5	15	325	0	0	620	65
Future Volume (vph)	45	0	30	15	10	5	15	325	0	0	620	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	10	12	12	10	10
Total Lost time (s)		4.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.81			0.98			1.00			0.99	
Flpb, ped/bikes		0.87			0.94			1.00			1.00	
Frt		0.95			0.98			1.00			0.99	
Flt Protected		0.97			0.98			1.00			1.00	
Satd. Flow (prot)		998			1267			1481			1325	
Flt Permitted		0.97			0.98			0.97			1.00	
Satd. Flow (perm)		998			1267			1435			1325	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	0	33	16	11	5	16	353	0	0	674	71
RTOR Reduction (vph)	0	82	0	0	5	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	27	0	0	369	0	0	745	0
Confl. Peds. (#/hr)	7		14	14		7	75					75
Confl. Bikes (#/hr)			2			5			10			9
Heavy Vehicles (%)	6%	0%	10%	0%	0%	0%	0%	5%	0%	0%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Turn Type	D.Pm	NA		Perm	NA		Perm	NA			NA	
Protected Phases					5			1			1	
Permitted Phases	5			5			1					
Actuated Green, G (s)		0.0			3.3			42.6			42.6	
Effective Green, g (s)		0.0			3.3			42.6			42.6	
Actuated g/C Ratio		0.00			0.05			0.68			0.68	
Clearance Time (s)					5.0			5.0			5.0	
Vehicle Extension (s)					4.0			4.0			4.0	
Lane Grp Cap (vph)		0			66			978			903	
v/s Ratio Prot											c0.56	
v/s Ratio Perm					0.02			0.26				
v/c Ratio		0.00			0.41			0.38			0.83	
Uniform Delay, d1		31.2			28.7			4.3			7.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.0			5.6			1.1			8.5	
Delay (s)		31.2			34.3			5.4			15.7	
Level of Service		C			C			A			B	
Approach Delay (s)		31.2			34.3			5.4			15.7	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	62.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	222	1465	1402	375	380	285
Future Volume (vph)	222	1465	1402	375	380	285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	11
Storage Length (ft)	200			200	0	85
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Right Turn on Red				No		Yes
Link Speed (mph)		35	35		30	
Link Distance (ft)		511	949		1811	
Travel Time (s)		10.0	18.5		41.2	
Confl. Peds. (#/hr)	21			21		9
Confl. Bikes (#/hr)				6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	3%	2%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	241	1592	1524	408	413	310
v/c Ratio	1.14	0.83	1.16	0.74	0.95	0.47
Control Delay	148.8	21.0	96.8	19.7	73.0	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	148.8	21.0	96.8	19.7	73.0	22.2
Queue Length 50th (ft)	~199	427	~667	190	287	141
Queue Length 95th (ft)	#357	539	m#603	m287	#481	220
Internal Link Dist (ft)		431	869		1731	
Turn Bay Length (ft)	200			200		85
Base Capacity (vph)	211	1921	1314	552	434	660
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.14	0.83	1.16	0.74	0.95	0.47

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	222	1465	1402	375	380	285
Future Volume (vph)	222	1465	1402	375	380	285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	11
Total Lost time (s)	6.5	5.5	5.5	5.5	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.93	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1501	3085	3110	1306	1593	1391
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1501	3085	3110	1306	1593	1391
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	241	1592	1524	408	413	310
RTOR Reduction (vph)	0	0	0	0	0	3
Lane Group Flow (vph)	241	1592	1524	408	413	307
Confl. Peds. (#/hr)	21			21		9
Confl. Bikes (#/hr)				6		
Heavy Vehicles (%)	1%	1%	1%	3%	2%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	6	1 6	1		5	5 6
Permitted Phases				1		
Actuated Green, G (s)	15.5	68.5	46.5	46.5	30.0	51.5
Effective Green, g (s)	15.5	62.0	46.5	46.5	30.0	51.5
Actuated g/C Ratio	0.14	0.56	0.42	0.42	0.27	0.47
Clearance Time (s)	6.5		5.5	5.5	6.0	
Vehicle Extension (s)	2.0		3.0	3.0	2.0	
Lane Grp Cap (vph)	211	1738	1314	552	434	651
v/s Ratio Prot	c0.16	0.52	c0.49		c0.26	0.22
v/s Ratio Perm				0.31		
v/c Ratio	1.14	0.92	1.16	0.74	0.95	0.47
Uniform Delay, d1	47.2	21.7	31.8	26.7	39.3	20.0
Progression Factor	1.00	1.00	0.71	0.68	1.00	1.00
Incremental Delay, d2	105.5	9.1	72.8	0.8	32.6	2.4
Delay (s)	152.8	30.8	95.3	19.0	71.9	22.4
Level of Service	F	C	F	B	E	C
Approach Delay (s)		46.8	79.2		50.7	
Approach LOS		D	E		D	

Intersection Summary			
HCM 2000 Control Delay	61.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	31	825	1755	180	110	110
Future Volume (vph)	31	825	1755	180	110	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	11	11	12	12
Storage Length (ft)	170			250	0	80
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Right Turn on Red				No		No
Link Speed (mph)		35	35		25	
Link Distance (ft)		949	1060		181	
Travel Time (s)		18.5	20.6		4.9	
Confl. Peds. (#/hr)	7			7		3
Confl. Bikes (#/hr)				4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	34	897	2104	0	240	0
v/c Ratio	0.38	0.39	1.06		1.82	
Control Delay	49.8	8.6	57.4		426.4	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	49.8	8.6	57.4		426.4	
Queue Length 50th (ft)	24	56	641		~256	
Queue Length 95th (ft)	m27	m311	#1273		#413	
Internal Link Dist (ft)		869	980		101	
Turn Bay Length (ft)	170					
Base Capacity (vph)	89	2304	1991		132	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.38	0.39	1.06		1.82	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	31	825	1755	180	110	110
Future Volume (vph)	31	825	1755	180	110	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	12	12
Total Lost time (s)	5.5	6.0	6.0		4.5	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		0.99	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.93	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1516	3032	3061		1538	
Flt Permitted	0.95	1.00	1.00		0.98	
Satd. Flow (perm)	1516	3032	3061		1538	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	897	1908	196	120	120
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	34	897	2104	0	240	0
Confl. Peds. (#/hr)	7			7		3
Confl. Bikes (#/hr)				4		
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Turn Type	Prot	NA	NA		Prot	
Protected Phases	6	1 6	1		5	
Permitted Phases						
Actuated Green, G (s)	6.5	78.0	66.0		9.5	
Effective Green, g (s)	6.5	72.5	66.0		9.5	
Actuated g/C Ratio	0.06	0.66	0.60		0.09	
Clearance Time (s)	5.5		6.0		4.5	
Vehicle Extension (s)	2.0		3.0		2.0	
Lane Grp Cap (vph)	89	1998	1836		132	
v/s Ratio Prot	0.02	c0.30	c0.69		c0.16	
v/s Ratio Perm						
v/c Ratio	0.38	0.45	1.15		1.82	
Uniform Delay, d1	49.8	9.1	22.0		50.2	
Progression Factor	0.87	1.23	1.00		1.00	
Incremental Delay, d2	0.5	0.0	72.6		396.3	
Delay (s)	43.6	11.2	94.6		446.6	
Level of Service	D	B	F		F	
Approach Delay (s)		12.4	94.6		446.6	
Approach LOS		B	F		F	

Intersection Summary			
HCM 2000 Control Delay	97.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	60	885	300	190	5	15	65	5	2	1135
Future Volume (vph)	60	885	300	190	5	15	65	5	2	1135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100			0	0		0		0	0
Storage Lanes	1			0	0		0		1	2
Taper Length (ft)	25				25				25	
Right Turn on Red				Yes			Yes			
Link Speed (mph)		35	35			25			30	
Link Distance (ft)		279	170			125			548	
Travel Time (s)		5.4	3.3			3.4			12.5	
Confl. Peds. (#/hr)	3			3					3	
Confl. Bikes (#/hr)				3						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	1%	0%	0%	0%	0%	0%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)										33%
Lane Group Flow (vph)	65	962	533	0	0	92	0	0	414	827
v/c Ratio	0.23	1.76	0.36			0.56			0.63	0.69
Control Delay	52.7	382.3	5.4			34.2			34.2	33.9
Queue Delay	0.0	0.1	0.6			1.7			58.2	52.9
Total Delay	52.7	382.4	6.0			35.8			92.4	86.8
Queue Length 50th (ft)	52	~684	22			19			282	323
Queue Length 95th (ft)	98	#821	34			78			402	404
Internal Link Dist (ft)		199	90			45			468	
Turn Bay Length (ft)	100									
Base Capacity (vph)	278	547	1473			164			659	1197
Starvation Cap Reductn	0	0	558			0			0	0
Spillback Cap Reductn	0	5	0			16			351	638
Storage Cap Reductn	0	0	0			0			0	0
Reduced v/c Ratio	0.23	1.77	0.58			0.62			1.34	1.48

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	60	885	300	190	5	15	65	5	2	1135
Future Volume (vph)	60	885	300	190	5	15	65	5	2	1135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	8.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95	0.95			1.00			1.00	0.91
Frpb, ped/bikes	1.00	1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.94			0.90			0.85	0.85
Flt Protected	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1624	3191	3018			1528			1442	2619
Flt Permitted	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1624	3191	3018			1528			1442	2619
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	962	326	207	5	16	71	5	2	1234
RTOR Reduction (vph)	0	0	69	0	0	66	0	0	0	0
Lane Group Flow (vph)	65	962	464	0	0	26	0	0	414	827
Confl. Peds. (#/hr)	3			3					3	
Confl. Bikes (#/hr)				3						
Heavy Vehicles (%)	0%	1%	0%	1%	0%	0%	0%	0%	0%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Turn Type	Split	NA	NA		Split	NA		Perm	pm+pt	custom
Protected Phases	3	3	4 5		2	2			1	1 5
Permitted Phases								1 5	5	1 5
Actuated Green, G (s)	24.0	24.0	68.0			9.0			59.0	64.0
Effective Green, g (s)	24.0	24.0	68.0			9.0			59.0	64.0
Actuated g/C Ratio	0.17	0.17	0.49			0.06			0.42	0.46
Clearance Time (s)	5.0	5.0				5.0			5.0	
Vehicle Extension (s)	2.0	2.0				2.0			2.0	
Lane Grp Cap (vph)	278	547	1465			98			659	1197
v/s Ratio Prot	0.04	c0.30	c0.15			c0.02			0.09	c0.32
v/s Ratio Perm									0.20	
v/c Ratio	0.23	1.76	0.32			0.26			0.63	0.69
Uniform Delay, d1	50.1	58.0	21.9			62.3			32.9	30.2
Progression Factor	1.00	1.00	0.27			1.00			1.00	1.00
Incremental Delay, d2	2.0	348.9	0.0			0.5			2.1	1.9
Delay (s)	52.0	406.9	5.9			62.9			35.0	32.0
Level of Service	D	F	A			E			C	C
Approach Delay (s)		384.4	5.9			62.9			33.0	
Approach LOS		F	A			E			C	

Intersection Summary			
HCM 2000 Control Delay	153.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1560	525	10	325	0	0	0	0	355	305	165
Future Volume (vph)	0	1560	525	10	325	0	0	0	0	355	305	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	13	12	12	12	12	12	12	11	11	11
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		170			86			306			262	
Travel Time (s)		3.3			1.7			7.0			6.0	
Confl. Peds. (#/hr)			16	16								24
Confl. Bikes (#/hr)			4									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)			0%							43%		
Lane Group Flow (vph)	0	1696	571	0	364	0	0	0	0	220	498	179
v/c Ratio		0.91	0.71		0.33					1.08	1.18	0.52
Control Delay		28.1	11.3		1.0					140.5	153.7	13.2
Queue Delay		47.9	53.8		0.0					0.0	0.0	0.0
Total Delay		76.0	65.1		1.0					140.5	153.7	13.2
Queue Length 50th (ft)		402	191		1					~245	~297	0
Queue Length 95th (ft)		m338	m154		1					#431	#420	73
Internal Link Dist (ft)		90			6			226			182	
Turn Bay Length (ft)												
Base Capacity (vph)		1870	803		1103					204	422	341
Starvation Cap Reductn		920	339		0					0	0	0
Spillback Cap Reductn		0	0		0					0	0	0
Storage Cap Reductn		0	0		0					0	0	0
Reduced v/c Ratio		1.79	1.23		0.33					1.08	1.18	0.52

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1560	525	10	325	0	0	0	0	355	305	165
Future Volume (vph)	0	1560	525	10	325	0	0	0	0	355	305	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	13	12	12	12	12	12	12	11	11	11
Total Lost time (s)		5.0	5.0		5.0					8.0	8.0	8.0
Lane Util. Factor		0.86	0.86		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	0.94
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		4223	1260		3244					1429	2959	1319
Flt Permitted		1.00	1.00		0.95					0.95	0.98	1.00
Satd. Flow (perm)		4223	1260		3103					1429	2959	1319
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1696	571	11	353	0	0	0	0	386	332	179
RTOR Reduction (vph)	0	0	246	0	0	0	0	0	0	0	0	153
Lane Group Flow (vph)	0	1696	325	0	364	0	0	0	0	220	498	26
Confl. Peds. (#/hr)			16	16								24
Confl. Bikes (#/hr)			4									
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		1 2 3		5	1 5					4	4	
Permitted Phases			1 2 3									4
Actuated Green, G (s)		62.0	62.0		59.0					20.0	20.0	20.0
Effective Green, g (s)		62.0	62.0		59.0					20.0	20.0	20.0
Actuated g/C Ratio		0.44	0.44		0.42					0.14	0.14	0.14
Clearance Time (s)										8.0	8.0	8.0
Vehicle Extension (s)										2.0	2.0	2.0
Lane Grp Cap (vph)		1870	558		1347					204	422	188
v/s Ratio Prot		c0.40			c0.08					0.15	c0.17	
v/s Ratio Perm			0.26		0.04							0.02
v/c Ratio		0.91	0.58		0.27					1.08	1.18	0.14
Uniform Delay, d1		36.3	29.3		26.4					60.0	60.0	52.4
Progression Factor		0.74	1.55		0.02					1.00	1.00	1.00
Incremental Delay, d2		0.7	0.1		0.1					85.4	103.0	0.1
Delay (s)		27.6	45.6		0.6					145.4	163.0	52.6
Level of Service		C	D		A					F	F	D
Approach Delay (s)		32.1			0.6			0.0			136.7	
Approach LOS		C			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	55.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	870	530	0	0	0	0	895	35	80	700	0
Future Volume (vph)	275	870	530	0	0	0	0	895	35	80	700	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	11	11	12	11	11
Right Turn on Red			No			No			Yes			No
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		951			939			563			1007	
Travel Time (s)		25.9			32.0			11.0			19.6	
Confl. Peds. (#/hr)	11		28						3	3		
Confl. Bikes (#/hr)			9									9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1245	576	0	0	0	0	1011	0	0	848	0
v/c Ratio		0.99	0.99					0.83			0.96	
Control Delay		54.4	64.0					45.3			55.5	
Queue Delay		0.0	0.0					0.0			0.0	
Total Delay		54.4	64.0					45.3			55.5	
Queue Length 50th (ft)		622	546					431			284	
Queue Length 95th (ft)		#1000	#990					523			#415	
Internal Link Dist (ft)		871			859			483			927	
Turn Bay Length (ft)												
Base Capacity (vph)		1261	584					1227			886	
Starvation Cap Reductn		0	0					0			0	
Spillback Cap Reductn		0	0					0			0	
Storage Cap Reductn		0	0					0			0	
Reduced v/c Ratio		0.99	0.99					0.82			0.96	

Intersection Summary

Area Type: CBD

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	870	530	0	0	0	0	895	35	80	700	0
Future Volume (vph)	275	870	530	0	0	0	0	895	35	80	700	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	11	11	12	11	11
Total Lost time (s)		6.0	6.0					5.0			6.0	
Lane Util. Factor		0.95	1.00					0.95			0.95	
Frpb, ped/bikes		1.00	1.00					1.00			1.00	
Flpb, ped/bikes		0.99	1.00					1.00			1.00	
Frt		1.00	0.85					0.99			1.00	
Flt Protected		0.99	1.00					1.00			0.99	
Satd. Flow (prot)		3137	1454					3121			3125	
Flt Permitted		0.99	1.00					1.00			0.54	
Satd. Flow (perm)		3137	1454					3121			1704	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	299	946	576	0	0	0	0	973	38	87	761	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	1245	576	0	0	0	0	1009	0	0	848	0
Confl. Peds. (#/hr)	11		28						3	3		
Confl. Bikes (#/hr)			9									9
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Prot					NA		pm+pt	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4									6		
Actuated Green, G (s)		53.1	53.1					54.7			66.7	
Effective Green, g (s)		53.1	53.1					54.7			66.7	
Actuated g/C Ratio		0.38	0.38					0.39			0.48	
Clearance Time (s)		6.0	6.0					5.0			6.0	
Vehicle Extension (s)		2.0	2.0					2.0			2.0	
Lane Grp Cap (vph)		1189	551					1219			893	
v/s Ratio Prot			0.40					0.32			c0.05	
v/s Ratio Perm		0.40									c0.40	
v/c Ratio		1.05	1.05					0.83			0.95	
Uniform Delay, d1		43.4	43.4					38.4			35.0	
Progression Factor		0.88	0.88					1.00			1.00	
Incremental Delay, d2		34.9	43.9					4.5			18.6	
Delay (s)		73.1	82.0					42.9			53.7	
Level of Service		E	F					D			D	
Approach Delay (s)		75.9			0.0			42.9			53.7	
Approach LOS		E			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	61.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	102.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	95	1105	110	490	690	0	0	705	350
Future Volume (vph)	0	0	0	95	1105	110	490	690	0	0	705	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	12	11	11	12	12	11	11
Storage Length (ft)	0		0	0		280	0		0	0		0
Storage Lanes	0		0	0		1	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			Yes
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		984			1074			1007			813	
Travel Time (s)		26.8			29.3			19.6			15.8	
Confl. Peds. (#/hr)						54	73		27			73
Confl. Bikes (#/hr)						17						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1424	0	533	750	0	0	1146	0
v/c Ratio					1.26		1.31	0.75			1.17	
Control Delay					161.4		189.7	22.7			121.7	
Queue Delay					0.0		0.0	0.0			0.0	
Total Delay					161.4		189.7	22.7			121.7	
Queue Length 50th (ft)					~506		~487	391			~547	
Queue Length 95th (ft)					#605		#707	559			#686	
Internal Link Dist (ft)		904			994			927			733	
Turn Bay Length (ft)												
Base Capacity (vph)					1131		408	1005			982	
Starvation Cap Reductn					0		0	0			0	
Spillback Cap Reductn					0		0	0			0	
Storage Cap Reductn					0		0	0			0	
Reduced v/c Ratio					1.26		1.31	0.75			1.17	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	95	1105	110	490	690	0	0	705	350
Future Volume (vph)	0	0	0	95	1105	110	490	690	0	0	705	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	12	11	11	12	12	11	11
Total Lost time (s)					10.0		5.0	6.0			6.0	
Lane Util. Factor					0.91		1.00	1.00			0.95	
Frpb, ped/bikes					0.99		1.00	1.00			0.95	
Flpb, ped/bikes					1.00		1.00	1.00			1.00	
Frt					0.99		1.00	1.00			0.95	
Flt Protected					1.00		0.95	1.00			1.00	
Satd. Flow (prot)					4350		1570	1653			2813	
Flt Permitted					1.00		0.09	1.00			1.00	
Satd. Flow (perm)					4350		141	1653			2813	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	103	1201	120	533	750	0	0	766	380
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	22	0
Lane Group Flow (vph)	0	0	0	0	1415	0	533	750	0	0	1124	0
Confl. Peds. (#/hr)						54	73		27			73
Confl. Bikes (#/hr)						17						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Turn Type				Split	NA		pm+pt	NA			NA	
Protected Phases				4	4		1	6			2	
Permitted Phases							6					
Actuated Green, G (s)					31.0		74.0	73.0			41.0	
Effective Green, g (s)					31.0		74.0	73.0			41.0	
Actuated g/C Ratio					0.26		0.62	0.61			0.34	
Clearance Time (s)					10.0		5.0	6.0			6.0	
Lane Grp Cap (vph)					1123		408	1005			961	
v/s Ratio Prot					c0.33		c0.29	0.45			0.40	
v/s Ratio Perm							c0.51					
v/c Ratio					1.26		1.31	0.75			1.17	
Uniform Delay, d1					44.5		39.6	16.9			39.5	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					124.4		154.6	5.0			87.7	
Delay (s)					168.9		194.2	21.9			127.2	
Level of Service					F		F	C			F	
Approach Delay (s)		0.0			168.9			93.5			127.2	
Approach LOS		A			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	131.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	112.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	725	995	635	0	0	0	0	0	650	40
Future Volume (vph)	0	0	725	995	635	0	0	0	0	0	650	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No	No		No			No			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		515			260			938			1824	
Travel Time (s)		14.0			7.1			21.3			41.5	
Confl. Peds. (#/hr)			21	21								7
Confl. Bikes (#/hr)			16									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	788	1082	690	0	0	0	0	0	750	0
v/c Ratio			1.69	0.98	0.71						1.49	
Control Delay			345.8	22.0	6.7						260.2	
Queue Delay			0.0	39.9	1.5						0.0	
Total Delay			345.8	61.9	8.2						260.2	
Queue Length 50th (ft)			~376	96	100						~314	
Queue Length 95th (ft)			#501	m75	m67						#432	
Internal Link Dist (ft)		435			180			858			1744	
Turn Bay Length (ft)			100									
Base Capacity (vph)			467	1105	973						504	
Starvation Cap Reductn			0	169	130						0	
Spillback Cap Reductn			0	0	0						0	
Storage Cap Reductn			0	0	0						0	
Reduced v/c Ratio			1.69	1.16	0.82						1.49	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	725	995	635	0	0	0	0	0	650	40
Future Volume (vph)	0	0	725	995	635	0	0	0	0	0	650	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)			9.0	6.0	6.0						5.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2473	3016	1653						3214	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2473	3016	1653						3214	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	788	1082	690	0	0	0	0	0	707	43
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	788	1082	690	0	0	0	0	0	745	0
Confl. Peds. (#/hr)			21	21								7
Confl. Bikes (#/hr)			16									
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type			Prot	Prot	NA						NA	
Protected Phases			2	1 4	1 2 4						3	
Permitted Phases												
Actuated Green, G (s)			17.0	40.0	62.0						14.0	
Effective Green, g (s)			17.0	40.0	57.0						14.0	
Actuated g/C Ratio			0.19	0.44	0.63						0.16	
Clearance Time (s)			9.0								5.0	
Vehicle Extension (s)			2.0								2.0	
Lane Grp Cap (vph)			467	1340	1046						499	
v/s Ratio Prot			c0.32	c0.36	0.42						c0.23	
v/s Ratio Perm												
v/c Ratio			1.69	0.81	0.66						1.49	
Uniform Delay, d1			36.5	21.7	10.4						38.0	
Progression Factor			1.00	0.53	0.82						1.00	
Incremental Delay, d2			318.5	0.3	0.1						232.2	
Delay (s)			355.0	11.9	8.6						270.2	
Level of Service			F	B	A						F	
Approach Delay (s)		355.0			10.6			0.0			270.2	
Approach LOS		F			B			A			F	

Intersection Summary			
HCM 2000 Control Delay	151.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	99.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	610	25	45	575	55	35	5	115	0	0	0
Future Volume (Veh/h)	25	610	25	45	575	55	35	5	115	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	663	27	49	625	60	38	5	125	0	0	0
Pedestrians		59						77			19	
Lane Width (ft)		11.0						11.5			0.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		5						6			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		740			515							
pX, platoon unblocked	0.74			0.76			0.86	0.86	0.76	0.86	0.86	0.74
vC, conflicting volume	704			767			1590	1610	754	1616	1593	733
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	430			536			979	1002	518	1010	983	469
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			93			76	97	69	100	100	100
cM capacity (veh/h)	836			708			156	177	398	112	182	422

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	27	690	49	685	38	130
Volume Left	27	0	49	0	38	0
Volume Right	0	27	0	60	0	125
cSH	836	1700	708	1700	156	380
Volume to Capacity	0.03	0.41	0.07	0.40	0.24	0.34
Queue Length 95th (ft)	2	0	6	0	23	37
Control Delay (s)	9.4	0.0	10.5	0.0	35.3	19.3
Lane LOS	A		B		E	C
Approach Delay (s)	0.4		0.7		22.9	
Approach LOS					C	

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	560	5	20	665	75	10	1	30	110	0	65
Future Volume (vph)	25	560	5	20	665	75	10	1	30	110	0	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	12	12	12	12	12
Storage Length (ft)	110		0	140		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			No			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		606			253			131			150	
Travel Time (s)		16.5			6.9			3.6			4.1	
Confl. Peds. (#/hr)	21		29	29		21	4					4
Confl. Bikes (#/hr)			16			46			2			2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	22%	24%	3%	12%	0%	0%	14%	0%	0%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	614	0	22	805	0	0	12	33	0	191	0
v/c Ratio	0.18	0.68		0.10	0.91			0.10	0.35		0.71	
Control Delay	25.0	26.8		21.1	40.6			43.5	53.4		25.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	25.0	26.8		21.1	40.6			43.5	53.4		25.7	
Queue Length 50th (ft)	6	203		5	345			7	20		17	
Queue Length 95th (ft)	41	#689		31	#969			24	50		85	
Internal Link Dist (ft)		526			173			51			70	
Turn Bay Length (ft)	110			140								
Base Capacity (vph)	147	902		222	882			228	174		301	
Starvation Cap Reductn	0	0		0	0			0	0		0	
Spillback Cap Reductn	0	0		0	0			0	0		0	
Storage Cap Reductn	0	0		0	0			0	0		0	
Reduced v/c Ratio	0.18	0.68		0.10	0.91			0.05	0.19		0.63	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	560	5	20	665	75	10	1	30	110	0	65
Future Volume (vph)	25	560	5	20	665	75	10	1	30	110	0	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.97		0.98	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.98			1.00	0.85		0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.96	1.00		0.97	
Satd. Flow (prot)	1509	1530		1211	1502			1635	1231		1531	
Flt Permitted	0.16	1.00		0.30	1.00			0.96	1.00		0.97	
Satd. Flow (perm)	250	1530		378	1502			1635	1231		1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	609	5	22	723	82	11	1	33	120	0	71
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	152	0
Lane Group Flow (vph)	27	614	0	22	805	0	0	12	33	0	39	0
Confl. Peds. (#/hr)	21		29	29		21	4					4
Confl. Bikes (#/hr)			16			46			2			2
Heavy Vehicles (%)	0%	4%	22%	24%	3%	12%	0%	0%	14%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Split	NA	Perm	Split	NA	
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6			2					8			
Actuated Green, G (s)	53.8	53.8		53.8	53.8			5.2	5.2		7.6	
Effective Green, g (s)	53.8	53.8		53.8	53.8			5.2	5.2		7.6	
Actuated g/C Ratio	0.54	0.54		0.54	0.54			0.05	0.05		0.08	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0		1.0	1.0			2.0	2.0		2.0	
Lane Grp Cap (vph)	134	823		203	808			85	64		116	
v/s Ratio Prot		0.40			c0.54			0.01			c0.03	
v/s Ratio Perm	0.11			0.06					c0.03			
v/c Ratio	0.20	0.75		0.11	1.00			0.14	0.52		0.34	
Uniform Delay, d1	12.0	17.8		11.3	23.0			45.3	46.2		43.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	3.4	6.1		1.1	30.8			0.3	2.9		0.6	
Delay (s)	15.3	23.9		12.4	53.8			45.5	49.1		44.5	
Level of Service	B	C		B	D			D	D		D	
Approach Delay (s)		23.6			52.7			48.1			44.5	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	40.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	430	1	1	625	115	5	20	0	65	10	0
Future Volume (Veh/h)	1	430	1	1	625	115	5	20	0	65	10	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	467	1	1	679	125	5	22	0	71	11	0
Pedestrians					29			29			21	
Lane Width (ft)					11.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					2			2			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		547			464							
pX, platoon unblocked	0.60			0.87			0.67	0.67	0.87	0.67	0.67	0.60
vC, conflicting volume	825			497			1248	1326	526	1274	1264	762
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	380			353			696	813	385	736	720	277
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	89	100	63	95	100
cM capacity (veh/h)	698			1029			215	199	553	190	225	451

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	469	805	27	82
Volume Left	1	1	5	71
Volume Right	1	125	0	0
cSH	698	1029	202	194
Volume to Capacity	0.00	0.00	0.13	0.42
Queue Length 95th (ft)	0	0	11	48
Control Delay (s)	0.0	0.0	25.6	36.6
Lane LOS	A	A	D	E
Approach Delay (s)	0.0	0.0	25.6	36.6
Approach LOS			D	E

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	540	5	10	730	1	25	1	50	1	1	1
Future Volume (vph)	1	540	5	10	730	1	25	1	50	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	13	13	13	12	12	12
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		464			606			294			154	
Travel Time (s)		12.7			16.5			8.0			4.2	
Confl. Peds. (#/hr)	21		29	29		21	29		29	29		29
Confl. Bikes (#/hr)			16			46						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	593	0	0	805	0	0	82	0	0	3	0
v/c Ratio		0.52			0.71			0.53			0.03	
Control Delay		15.2			19.6			30.0			32.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		15.2			19.6			30.0			32.3	
Queue Length 50th (ft)		73			126			15			1	
Queue Length 95th (ft)		#550			#819			58			9	
Internal Link Dist (ft)		384			526			214			74	
Turn Bay Length (ft)												
Base Capacity (vph)		1136			1141			186			157	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.52			0.71			0.44			0.02	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	540	5	10	730	1	25	1	50	1	1	1
Future Volume (vph)	1	540	5	10	730	1	25	1	50	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	13	13	13	12	12	12
Total Lost time (s)		5.5			5.5			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.86			0.93	
Flpb, ped/bikes		1.00			1.00			0.94			0.95	
Frt		1.00			1.00			0.91			0.95	
Flt Protected		1.00			1.00			0.98			0.98	
Satd. Flow (prot)		1587			1603			1248			1395	
Flt Permitted		1.00			0.99			0.89			0.93	
Satd. Flow (perm)		1586			1591			1127			1314	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	587	5	11	793	1	27	1	54	1	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	50	0	0	1	0
Lane Group Flow (vph)	0	593	0	0	805	0	0	32	0	0	2	0
Confl. Peds. (#/hr)	21		29	29		21	29		29	29		29
Confl. Bikes (#/hr)			16			46						
Heavy Vehicles (%)	2%	4%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			5			5	
Permitted Phases	1			1			5			5		
Actuated Green, G (s)		55.4			55.4			6.6			6.6	
Effective Green, g (s)		55.4			55.4			6.6			6.6	
Actuated g/C Ratio		0.62			0.62			0.07			0.07	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		976			979			82			96	
v/s Ratio Prot												
v/s Ratio Perm		0.37			c0.51			c0.03			0.00	
v/c Ratio		0.61			0.82			0.39			0.02	
Uniform Delay, d1		10.6			13.5			39.8			38.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.8			7.8			1.1			0.0	
Delay (s)		13.4			21.2			40.9			38.7	
Level of Service		B			C			D			D	
Approach Delay (s)		13.4			21.2			40.9			38.7	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	45	45	0	10	125	5	405	0	30	575	5
Future Volume (Veh/h)	30	45	45	0	10	125	5	405	0	30	575	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	49	49	0	11	136	5	440	0	33	625	5
Pedestrians		113			85						37	
Lane Width (ft)		12.0			13.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		9			8						3	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								491				
pX, platoon unblocked	0.80	0.80		0.80	0.80	0.80				0.80		
vC, conflicting volume	1435	1342	740	1302	1344	562	743			525		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1419	1303	740	1254	1306	335	743			289		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	29	53	87	100	89	73	99			97		
cM capacity (veh/h)	46	104	377	52	103	509	783			946		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	131	147	445	663
Volume Left	33	0	5	33
Volume Right	49	136	0	5
cSH	99	393	783	946
Volume to Capacity	1.32	0.37	0.01	0.03
Queue Length 95th (ft)	231	42	0	3
Control Delay (s)	275.4	19.5	0.2	0.9
Lane LOS	F	C	A	A
Approach Delay (s)	275.4	19.5	0.2	0.9
Approach LOS	F	C		

Intersection Summary			
Average Delay	28.6		
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	610	90	20	600	160	45
Future Volume (Veh/h)	610	90	20	600	160	45
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	663	98	22	652	174	49
Pedestrians	2			2	71	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	6	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	253			1002		
pX, platoon unblocked			0.70		0.80	0.70
vC, conflicting volume			832		1481	785
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			540		905	473
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		22	87
cM capacity (veh/h)			673		222	387

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	761	674	223
Volume Left	0	22	174
Volume Right	98	0	49
cSH	1700	673	245
Volume to Capacity	0.45	0.03	0.91
Queue Length 95th (ft)	0	3	197
Control Delay (s)	0.0	0.9	79.5
Lane LOS		A	F
Approach Delay (s)	0.0	0.9	79.5
Approach LOS			F

Intersection Summary			
Average Delay	11.1		
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	65	105	100	65	40	70
Future Volume (Veh/h)	65	105	100	65	40	70
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	71	114	109	71	43	76
Pedestrians	50		50			50
Lane Width (ft)	13.0		12.0			11.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		4			4
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	406	244			230	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	406	244			230	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	84			97	
cM capacity (veh/h)	531	729			1278	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	185	180	119
Volume Left	71	0	43
Volume Right	114	71	0
cSH	638	1700	1278
Volume to Capacity	0.29	0.11	0.03
Queue Length 95th (ft)	30	0	3
Control Delay (s)	12.9	0.0	3.0
Lane LOS	B		A
Approach Delay (s)	12.9	0.0	3.0
Approach LOS	B		

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	45	165	135	1	1	85
Future Volume (Veh/h)	45	165	135	1	1	85
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	179	147	1	1	92
Pedestrians		3	3		3	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		181				
pX, platoon unblocked						
vC, conflicting volume	151				430	154
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	151				430	154
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	90
cM capacity (veh/h)	1426				559	888

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	228	148	93
Volume Left	49	0	1
Volume Right	0	1	92
cSH	1426	1700	882
Volume to Capacity	0.03	0.09	0.11
Queue Length 95th (ft)	3	0	9
Control Delay (s)	1.9	0.0	9.6
Lane LOS	A		A
Approach Delay (s)	1.9	0.0	9.6
Approach LOS			A

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	0	945	310	0	0	1625
Future Volume (Veh/h)	0	945	310	0	0	1625
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1027	337	0	0	1766
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1190	279			
pX, platoon unblocked					0.89	
vC, conflicting volume	337				850	168
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	337				583	168
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	1226				394	846

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	514	514	168	168	1766
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	1766
cSH	1700	1700	1700	1700	846
Volume to Capacity	0.30	0.30	0.10	0.10	2.09
Queue Length 95th (ft)	0	0	0	0	3012
Control Delay (s)	0.0	0.0	0.0	0.0	506.6
Lane LOS					F
Approach Delay (s)	0.0		0.0		506.6
Approach LOS					F

Intersection Summary			
Average Delay	285.8		
Intersection Capacity Utilization	115.9%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	355	1560	0	0	0	0	335	95	115	0	0	0
Future Volume (vph)	355	1560	0	0	0	0	335	95	115	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	12	11	11	12	12	12
Right Turn on Red			No			No			Yes			No
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		86			951			304			1156	
Travel Time (s)		1.7			18.5			6.9			26.3	
Confl. Peds. (#/hr)	3								24			
Confl. Bikes (#/hr)									9			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)							19%					
Lane Group Flow (vph)	0	2082	0	0	0	0	295	297	0	0	0	0
v/c Ratio		0.73					0.67	0.70				
Control Delay		0.6					52.9	50.5				
Queue Delay		0.0					0.0	0.0				
Total Delay		0.6					52.9	50.5				
Queue Length 50th (ft)		0					250	233				
Queue Length 95th (ft)		m0					363	351				
Internal Link Dist (ft)		6			871			224			1076	
Turn Bay Length (ft)												
Base Capacity (vph)		2851					440	426				
Starvation Cap Reductn		0					0	0				
Spillback Cap Reductn		0					0	0				
Storage Cap Reductn		0					0	0				
Reduced v/c Ratio		0.73					0.67	0.70				

Intersection Summary	
Area Type:	CBD

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	355	1560	0	0	0	0	335	95	115	0	0	0
Future Volume (vph)	355	1560	0	0	0	0	335	95	115	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	12	11	11	12	12	12
Total Lost time (s)		5.0					5.0	5.0				
Lane Util. Factor		0.91					0.95	0.95				
Frpb, ped/bikes		1.00					1.00	0.98				
Flpb, ped/bikes		1.00					1.00	1.00				
Frt		1.00					1.00	0.94				
Flt Protected		0.99					0.95	0.99				
Satd. Flow (prot)		4435					1543	1428				
Flt Permitted		0.99					0.95	0.99				
Satd. Flow (perm)		4435					1543	1428				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	386	1696	0	0	0	0	364	103	125	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	2082	0	0	0	0	295	278	0	0	0	0
Confl. Peds. (#/hr)	3								24			
Confl. Bikes (#/hr)									9			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Split	NA					Split	NA				
Protected Phases	1 2 3 4	1 2 3 4					5	5				
Permitted Phases												
Actuated Green, G (s)		87.0					40.0	40.0				
Effective Green, g (s)		87.0					40.0	40.0				
Actuated g/C Ratio		0.62					0.29	0.29				
Clearance Time (s)							5.0	5.0				
Vehicle Extension (s)							4.0	4.0				
Lane Grp Cap (vph)		2756					440	408				
v/s Ratio Prot		c0.47					0.19	c0.20				
v/s Ratio Perm												
v/c Ratio		0.76					0.67	0.68				
Uniform Delay, d1		18.9					44.2	44.4				
Progression Factor		0.00					1.00	1.00				
Incremental Delay, d2		0.4					4.4	5.1				
Delay (s)		0.4					48.5	49.4				
Level of Service		A					D	D				
Approach Delay (s)		0.4			0.0			49.0			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	137	10	315	196	800	0	0	610	30
Future Volume (vph)	0	0	0	137	10	315	196	800	0	0	610	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	10	12	12	10	10
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		590			353			178			774	
Travel Time (s)		13.4			8.0			4.9			21.1	
Confl. Peds. (#/hr)						56	224					224
Confl. Bikes (#/hr)						32						39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	160	342	0	1083	0	0	696	0
v/c Ratio					1.70	0.76		0.92			0.90	
Control Delay					388.0	21.1		13.6			29.1	
Queue Delay					16.6	0.0		45.9			48.0	
Total Delay					404.7	21.1		59.5			77.0	
Queue Length 50th (ft)					~150	45		299			337	
Queue Length 95th (ft)					#280	126		m302			m167	
Internal Link Dist (ft)		510			273			98			694	
Turn Bay Length (ft)												
Base Capacity (vph)					94	504		1176			775	
Starvation Cap Reductn					0	0		242			0	
Spillback Cap Reductn					41	0		0			183	
Storage Cap Reductn					0	0		0			0	
Reduced v/c Ratio					3.02	0.68		1.16			1.18	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	137	10	315	196	800	0	0	610	30
Future Volume (vph)	0	0	0	137	10	315	196	800	0	0	610	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	12	12	10	10
Total Lost time (s)					4.0	4.0		4.0			4.0	
Lane Util. Factor					1.00	1.00		0.95			1.00	
Frpb, ped/bikes					1.00	1.00		1.00			0.98	
Flpb, ped/bikes					1.00	1.00		0.99			1.00	
Frt					1.00	0.85		1.00			0.99	
Flt Protected					0.96	1.00		0.99			1.00	
Satd. Flow (prot)					1579	1405		2959			1545	
Flt Permitted					0.96	1.00		0.62			1.00	
Satd. Flow (perm)					1579	1405		1860			1545	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	149	11	342	213	870	0	0	663	33
RTOR Reduction (vph)	0	0	0	0	0	207	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	160	135	0	1083	0	0	694	0
Confl. Peds. (#/hr)						56	224					224
Confl. Bikes (#/hr)						32						39
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Turn Type				Split	NA	custom	custom	NA			NA	
Protected Phases				8	8	1 8		2 4 9 11			6	
Permitted Phases							2 4					
Actuated Green, G (s)					6.0	17.4		61.6			50.0	
Effective Green, g (s)					6.0	17.4		55.6			50.0	
Actuated g/C Ratio					0.06	0.17		0.56			0.50	
Clearance Time (s)					4.0						4.0	
Vehicle Extension (s)					2.0						2.0	
Lane Grp Cap (vph)					94	244		1034			772	
v/s Ratio Prot					c0.10	0.10					c0.45	
v/s Ratio Perm								c0.58				
v/c Ratio					1.70	0.55		1.05			0.90	
Uniform Delay, d1					47.0	37.7		22.2			22.7	
Progression Factor					1.00	1.00		0.61			0.80	
Incremental Delay, d2					357.0	1.5		24.4			9.5	
Delay (s)					404.0	39.3		38.0			27.7	
Level of Service					F	D		D			C	
Approach Delay (s)		0.0			155.5			38.0			27.7	
Approach LOS		A			F			D			C	

Intersection Summary			
HCM 2000 Control Delay	60.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	88.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1500	445	130	320	0	0	0	0
Future Volume (vph)	0	0	0	0	1500	445	130	320	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	11	11	11	12	12	12
Right Turn on Red			No			No	No		Yes			No
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		260			984			1156			2190	
Travel Time (s)		7.1			26.8			26.3			49.8	
Confl. Peds. (#/hr)						83						
Confl. Bikes (#/hr)						30						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2114	0	0	489	0	0	0	0
v/c Ratio					1.33			0.84				
Control Delay					181.1			49.5				
Queue Delay					0.1			2.0				
Total Delay					181.3			51.5				
Queue Length 50th (ft)					~578			142				
Queue Length 95th (ft)					#673			#223				
Internal Link Dist (ft)		180			904			1076			2110	
Turn Bay Length (ft)												
Base Capacity (vph)					1587			584				
Starvation Cap Reductn					0			0				
Spillback Cap Reductn					70			30				
Storage Cap Reductn					0			0				
Reduced v/c Ratio					1.39			0.88				

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1500	445	130	320	0	0	0	0
Future Volume (vph)	0	0	0	0	1500	445	130	320	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)					6.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.97			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.97			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					4328			3096				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					4328			3096				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1630	484	141	348	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2114	0	0	489	0	0	0	0
Confl. Peds. (#/hr)						83						
Confl. Bikes (#/hr)						30						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					33.0			17.0				
Effective Green, g (s)					33.0			17.0				
Actuated g/C Ratio					0.37			0.19				
Clearance Time (s)					6.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1586			584				
v/s Ratio Prot					c0.49							
v/s Ratio Perm								0.16				
v/c Ratio					1.33			0.84				
Uniform Delay, d1					28.5			35.2				
Progression Factor					1.00			1.00				
Incremental Delay, d2					154.2			9.7				
Delay (s)					182.7			44.9				
Level of Service					F			D				
Approach Delay (s)		0.0			182.7			44.9			0.0	
Approach LOS		A			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	156.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	99.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection Capacity Analysis Worksheets

2030 No Build Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↱			↑↱			↑↱			↱	
Traffic Volume (vph)	0	1040	365	0	645	100	0	850	185	0	425	2
Future Volume (vph)	0	1040	365	0	645	100	0	850	185	0	425	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Right Turn on Red			No			No			No			No
Link Speed (mph)		35			35			25			20	
Link Distance (ft)		710			2667			622			624	
Travel Time (s)		13.8			52.0			17.0			21.3	
Confl. Peds. (#/hr)			88			37			171			131
Confl. Bikes (#/hr)			60						55			45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	10%	0%	6%	1%	0%	14%	50%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1527	0	0	810	0	0	1125	0	0	464	0
v/c Ratio		1.32			0.66			1.04			0.82	
Control Delay		176.8			27.5			61.2			41.4	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		176.8			27.5			61.2			41.4	
Queue Length 50th (ft)		~664			216			~320			262	
Queue Length 95th (ft)		#801			284			#533			#434	
Internal Link Dist (ft)		630			2587			542			544	
Turn Bay Length (ft)												
Base Capacity (vph)		1160			1236			1085			568	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.32			0.66			1.04			0.82	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↱			↑↱			↑↱			↱	
Traffic Volume (vph)	0	1040	365	0	645	100	0	850	185	0	425	2
Future Volume (vph)	0	1040	365	0	645	100	0	850	185	0	425	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		11.0			11.0			11.0			11.0	
Lane Util. Factor		0.95			0.95			0.95			1.00	
Frpb, ped/bikes		0.94			0.99			0.95			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.98			0.97			1.00	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		2902			3091			2857			1496	
Flt Permitted		1.00			1.00			1.00			1.00	
Satd. Flow (perm)		2902			3091			2857			1496	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1130	397	0	701	109	0	924	201	0	462	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1527	0	0	810	0	0	1125	0	0	464	0
Confl. Peds. (#/hr)			88			37			171			131
Confl. Bikes (#/hr)			60						55			45
Heavy Vehicles (%)	0%	1%	0%	0%	1%	10%	0%	6%	1%	0%	14%	50%
Turn Type		NA			NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases												
Actuated Green, G (s)		40.0			40.0			38.0			38.0	
Effective Green, g (s)		40.0			40.0			38.0			38.0	
Actuated g/C Ratio		0.40			0.40			0.38			0.38	
Clearance Time (s)		11.0			11.0			11.0			11.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		1160			1236			1085			568	
v/s Ratio Prot		c0.53			0.26			c0.39			0.31	
v/s Ratio Perm												
v/c Ratio		1.32			0.66			1.04			0.82	
Uniform Delay, d1		30.0			24.4			31.0			27.9	
Progression Factor		1.00			1.00			0.83			1.00	
Incremental Delay, d2		148.6			1.0			34.2			12.3	
Delay (s)		178.6			25.4			59.8			40.2	
Level of Service		F			C			E			D	
Approach Delay (s)		178.6			25.4			59.8			40.2	
Approach LOS		F			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	96.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	98.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	361	10	165	0	0	0	0	505	40	417	395	0
Future Volume (vph)	361	10	165	0	0	0	0	505	40	417	395	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	10	10	10	10	12
Storage Length (ft)	0		0	0		0	0		300	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		595			501			1930			178	
Travel Time (s)		13.5			11.4			52.6			4.9	
Confl. Peds. (#/hr)			42						266	266		
Confl. Bikes (#/hr)			2						82			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	7%	0%	0%	0%	0%	5%	0%	0%	7%	0%
Shared Lane Traffic (%)	35%											
Lane Group Flow (vph)	255	327	0	0	0	0	0	592	0	0	882	0
v/c Ratio	1.18	1.51						0.64			1.74	
Control Delay	158.0	278.6						32.4			356.2	
Queue Delay	0.0	0.0						0.1			0.3	
Total Delay	158.0	278.6						32.6			356.4	
Queue Length 50th (ft)	~206	~276						167			~852	
Queue Length 95th (ft)	#370	#461						228			m#627	
Internal Link Dist (ft)		515			421			1850			98	
Turn Bay Length (ft)												
Base Capacity (vph)	216	217						918			506	
Starvation Cap Reductn	0	0						0			15	
Spillback Cap Reductn	0	0						23			0	
Storage Cap Reductn	0	0						0			0	
Reduced v/c Ratio	1.18	1.51						0.66			1.80	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	361	10	165	0	0	0	0	505	40	417	395	0
Future Volume (vph)	361	10	165	0	0	0	0	505	40	417	395	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	10	10	10	10	12
Total Lost time (s)	4.0	4.0						4.0			4.0	
Lane Util. Factor	0.95	0.95						0.95			1.00	
Frpb, ped/bikes	1.00	0.88						0.97			1.00	
Flpb, ped/bikes	1.00	1.00						1.00			0.98	
Frt	1.00	0.92						0.99			1.00	
Flt Protected	0.95	0.98						1.00			0.97	
Satd. Flow (prot)	1543	1244						2788			1481	
Flt Permitted	0.95	0.98						1.00			0.40	
Satd. Flow (perm)	1543	1244						2788			614	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	392	11	179	0	0	0	0	549	43	453	429	0
RTOR Reduction (vph)	0	44	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	255	283	0	0	0	0	0	592	0	0	882	0
Confl. Peds. (#/hr)			42						266	266		
Confl. Bikes (#/hr)			2						82			
Heavy Vehicles (%)	0%	0%	7%	0%	0%	0%	0%	5%	0%	0%	7%	0%
Turn Type	Split	NA						NA		custom	NA	
Protected Phases	4	4						2		1	6 8 10 7	
Permitted Phases										6 8		
Actuated Green, G (s)	14.0	14.0						33.0			63.0	
Effective Green, g (s)	14.0	14.0						33.0			63.0	
Actuated g/C Ratio	0.14	0.14						0.33			0.63	
Clearance Time (s)	4.0	4.0						4.0				
Vehicle Extension (s)	2.0	2.0						2.0				
Lane Grp Cap (vph)	216	174						920			473	
v/s Ratio Prot	0.17	c0.23						0.21			c0.19	
v/s Ratio Perm											c0.99	
v/c Ratio	1.18	1.63						0.64			1.86	
Uniform Delay, d1	43.0	43.0						28.5			18.5	
Progression Factor	1.00	1.00						1.00			1.46	
Incremental Delay, d2	118.6	306.9						3.5			389.8	
Delay (s)	161.6	349.9						32.0			416.9	
Level of Service	F	F						C			F	
Approach Delay (s)		267.4			0.0			32.0			416.9	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	263.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.10		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	320	15	80	315	10	245	245	125	5	145	245
Future Volume (vph)	210	320	15	80	315	10	245	245	125	5	145	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	175		0	125		0	0		160
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		548			592			255			521	
Travel Time (s)		14.9			16.1			7.0			14.2	
Confl. Peds. (#/hr)	42		34	34		42	69		64	64		69
Confl. Bikes (#/hr)			26			16			48			13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	6%	0%	5%	8%	11%	5%	8%	9%	20%	7%	5%
Bus Blockages (#/hr)	0	0	0	0	4	4	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	228	364	0	87	353	0	266	402	0	0	163	266
v/c Ratio	0.76	0.65		0.29	0.75		0.88	0.86			0.54	0.77
Control Delay	46.3	44.8		26.8	51.1		66.8	57.8			52.5	53.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	46.3	44.8		26.8	51.1		66.8	57.8			52.5	53.8
Queue Length 50th (ft)	137	292		47	286		187	328			126	192
Queue Length 95th (ft)	#281	#463		85	#455		#372	#526			203	#335
Internal Link Dist (ft)		468			512			175			441	
Turn Bay Length (ft)	250			175			125					160
Base Capacity (vph)	301	558		324	473		303	505			342	367
Starvation Cap Reductn	0	0		0	0		0	1			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.76	0.65		0.27	0.75		0.88	0.80			0.48	0.72

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	320	15	80	315	10	245	245	125	5	145	245
Future Volume (vph)	210	320	15	80	315	10	245	245	125	5	145	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	4.0			6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.94			1.00	0.89
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.95	1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00		1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1566	1600		1534	1544		1470	1409			1586	1231
Flt Permitted	0.31	1.00		0.39	1.00		0.54	1.00			0.98	1.00
Satd. Flow (perm)	509	1600		624	1544		840	1409			1562	1231
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	348	16	87	342	11	266	266	136	5	158	266
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	228	364	0	87	353	0	266	402	0	0	163	266
Confl. Peds. (#/hr)	42		34	34		42	69		64	64		69
Confl. Bikes (#/hr)			26			16			48			13
Heavy Vehicles (%)	3%	6%	0%	5%	8%	11%	5%	8%	9%	20%	7%	5%
Bus Blockages (#/hr)	0	0	0	0	4	4	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		D.P+P	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6		7	7 8			8	5
Permitted Phases	2			6			8			8		8
Actuated Green, G (s)	51.1	40.9		44.1	37.4		32.7	36.7			22.5	32.7
Effective Green, g (s)	51.1	40.9		44.1	37.4		32.7	36.7			22.5	32.7
Actuated g/C Ratio	0.42	0.34		0.36	0.31		0.27	0.30			0.19	0.27
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0				6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0				2.0	2.0
Lane Grp Cap (vph)	303	540		277	476		279	427			290	393
v/s Ratio Prot	0.06	0.23		0.02	0.23		0.08	c0.29				c0.06
v/s Ratio Perm	c0.25			0.10			0.18				0.10	0.16
v/c Ratio	0.75	0.67		0.31	0.74		0.95	0.94			0.56	0.68
Uniform Delay, d1	27.5	34.4		26.5	37.5		42.3	41.2			44.8	39.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	9.0	6.6		0.2	10.0		40.8	28.9			1.5	3.6
Delay (s)	36.5	41.0		26.7	47.5		83.1	70.0			46.3	43.1
Level of Service	D	D		C	D		F	E			D	D
Approach Delay (s)		39.3			43.4			75.2			44.3	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	52.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	121.1	Sum of lost time (s)	29.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	0	40	5	10	5	25	570	0	0	395	60
Future Volume (vph)	75	0	40	5	10	5	25	570	0	0	395	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	10	10	10	10	10	12	12	10	10
Right Turn on Red			Yes			Yes			Yes			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		503			303			1833			182	
Travel Time (s)		13.7			8.3			50.0			5.0	
Confl. Peds. (#/hr)	29		16	16		29	54		32	32		54
Confl. Bikes (#/hr)			1			2			17			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	0%	8%	0%	11%	0%	19%	14%	0%	0%	14%	22%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	125	0	0	21	0	0	647	0	0	494	0
v/c Ratio		0.55			0.11			0.74			0.62	
Control Delay		26.1			25.0			19.5			16.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		26.1			25.0			19.5			16.3	
Queue Length 50th (ft)		23			6			125			83	
Queue Length 95th (ft)		90			29			#669			#488	
Internal Link Dist (ft)		423			223			1753			102	
Turn Bay Length (ft)												
Base Capacity (vph)		402			392			875			794	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.31			0.05			0.74			0.62	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	0	40	5	10	5	25	570	0	0	395	60
Future Volume (vph)	75	0	40	5	10	5	25	570	0	0	395	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	10	12	12	10	10
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.97			0.97			1.00			0.98	
Flpb, ped/bikes		0.94			0.99			1.00			1.00	
Frt		0.95			0.97			1.00			0.98	
Flt Protected		0.97			0.99			1.00			1.00	
Satd. Flow (prot)		1309			1251			1358			1205	
Flt Permitted		0.79			0.93			0.97			1.00	
Satd. Flow (perm)		1067			1175			1322			1205	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	0	43	5	11	5	27	620	0	0	429	65
RTOR Reduction (vph)	0	53	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	72	0	0	17	0	0	647	0	0	494	0
Confl. Peds. (#/hr)	29		16	16		29	54		32	32		54
Confl. Bikes (#/hr)			1			2			17			5
Heavy Vehicles (%)	6%	0%	8%	0%	11%	0%	19%	14%	0%	0%	14%	22%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		5			5			1			1	
Permitted Phases	5			5			1					
Actuated Green, G (s)		12.3			12.3			51.6			51.6	
Effective Green, g (s)		12.3			12.3			51.6			51.6	
Actuated g/C Ratio		0.15			0.15			0.64			0.64	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		161			178			841			766	
v/s Ratio Prot											0.41	
v/s Ratio Perm		c0.07			0.01			c0.49				
v/c Ratio		0.44			0.09			0.77			0.64	
Uniform Delay, d1		31.3			29.6			10.5			9.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.7			0.3			6.7			4.2	
Delay (s)		33.9			29.9			17.2			13.3	
Level of Service		C			C			B			B	
Approach Delay (s)		33.9			29.9			17.2			13.3	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	81.1	Sum of lost time (s)	14.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	175	1750	1215	630	375	160
Future Volume (vph)	175	1750	1215	630	375	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	11
Storage Length (ft)	200			200	0	85
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Right Turn on Red				No		Yes
Link Speed (mph)		35	35		25	
Link Distance (ft)		511	949		1833	
Travel Time (s)		10.0	18.5		50.0	
Confl. Peds. (#/hr)	17			17		11
Confl. Bikes (#/hr)				2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	7%	3%	4%	8%	5%	5%
Bus Blockages (#/hr)	0	4	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	190	1902	1321	685	408	174
v/c Ratio	0.84	1.07	1.19	1.47	0.85	0.25
Control Delay	76.4	67.7	111.7	238.5	54.1	14.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.4	67.7	111.7	238.5	54.1	14.7
Queue Length 50th (ft)	132	~786	~588	~665	270	61
Queue Length 95th (ft)	#258	#925	m391	m#513	#440	104
Internal Link Dist (ft)		431	869		1753	
Turn Bay Length (ft)	200			200		85
Base Capacity (vph)	225	1773	1111	465	478	708
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.84	1.07	1.19	1.47	0.85	0.25

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	175	1750	1215	630	375	160
Future Volume (vph)	175	1750	1215	630	375	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	11
Total Lost time (s)	6.5	5.5	5.5	5.5	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.94	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1417	3025	3020	1263	1547	1338
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1417	3025	3020	1263	1547	1338
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	190	1902	1321	685	408	174
RTOR Reduction (vph)	0	0	0	0	0	3
Lane Group Flow (vph)	190	1902	1321	685	408	171
Confl. Peds. (#/hr)	17			17		11
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	7%	3%	4%	8%	5%	5%
Bus Blockages (#/hr)	0	4	0	0	0	0
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	6	1 6	1		5	5 6
Permitted Phases				1		
Actuated Green, G (s)	17.5	64.5	40.5	40.5	34.0	57.5
Effective Green, g (s)	17.5	58.0	40.5	40.5	34.0	57.5
Actuated g/C Ratio	0.16	0.53	0.37	0.37	0.31	0.52
Clearance Time (s)	6.5		5.5	5.5	6.0	
Vehicle Extension (s)	2.0		3.0	3.0	2.0	
Lane Grp Cap (vph)	225	1595	1111	465	478	699
v/s Ratio Prot	0.13	c0.63	0.44		c0.26	0.13
v/s Ratio Perm				c0.54		
v/c Ratio	0.84	1.19	1.19	1.47	0.85	0.24
Uniform Delay, d1	44.9	26.0	34.8	34.8	35.7	14.4
Progression Factor	1.00	1.00	0.71	0.72	1.00	1.00
Incremental Delay, d2	30.3	93.1	86.0	214.0	17.4	0.8
Delay (s)	75.2	119.1	110.8	238.9	53.0	15.2
Level of Service	E	F	F	F	D	B
Approach Delay (s)		115.1	154.5		41.7	
Approach LOS		F	F		D	

Intersection Summary			
HCM 2000 Control Delay	122.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	690	2045	55	110	25
Future Volume (vph)	15	690	2045	55	110	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	11	11	12	12
Storage Length (ft)	170			250	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Right Turn on Red				No		No
Link Speed (mph)		35	35		25	
Link Distance (ft)		949	1060		282	
Travel Time (s)		18.5	20.6		7.7	
Confl. Peds. (#/hr)	9			9		8
Confl. Bikes (#/hr)				1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	18%	2%	5%	0%	1%	9%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	16	750	2283	0	147	0
v/c Ratio	0.21	0.34	1.21		0.91	
Control Delay	49.4	8.4	121.6		100.4	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	49.4	8.4	121.6		100.4	
Queue Length 50th (ft)	11	50	~971		104	
Queue Length 95th (ft)	m11	m186	#1445		#227	
Internal Link Dist (ft)		869	980		202	
Turn Bay Length (ft)	170					
Base Capacity (vph)	75	2206	1886		162	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.21	0.34	1.21		0.91	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	690	2045	55	110	25
Future Volume (vph)	15	690	2045	55	110	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	12	12
Total Lost time (s)	5.5	6.0	6.0		4.5	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		0.99	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	1.00		0.98	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1285	2973	2981		1554	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1285	2973	2981		1554	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	750	2223	60	120	27
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	16	750	2283	0	147	0
Confl. Peds. (#/hr)	9			9		8
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	18%	2%	5%	0%	1%	9%
Turn Type	Prot	NA	NA		Prot	
Protected Phases	6	1 6	1		5	
Permitted Phases						
Actuated Green, G (s)	6.5	76.0	64.0		11.5	
Effective Green, g (s)	6.5	70.5	64.0		11.5	
Actuated g/C Ratio	0.06	0.64	0.58		0.10	
Clearance Time (s)	5.5		6.0		4.5	
Vehicle Extension (s)	2.0		3.0		2.0	
Lane Grp Cap (vph)	75	1905	1734		162	
v/s Ratio Prot	0.01	c0.25	c0.77		c0.09	
v/s Ratio Perm						
v/c Ratio	0.21	0.39	1.32		0.91	
Uniform Delay, d1	49.3	9.5	23.0		48.7	
Progression Factor	0.98	1.18	1.00		1.00	
Incremental Delay, d2	0.0	0.0	146.7		43.6	
Delay (s)	48.2	11.2	169.7		92.3	
Level of Service	D	B	F		F	
Approach Delay (s)		12.0	169.7		92.3	
Approach LOS		B	F		F	

Intersection Summary			
HCM 2000 Control Delay	128.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	82.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	15	790	295	150	5	15	85	2	5	1305
Future Volume (vph)	15	790	295	150	5	15	85	2	5	1305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100			0	0		0		0	0
Storage Lanes	1			0	0		0		1	2
Taper Length (ft)	25				25				25	
Right Turn on Red				Yes			Yes			
Link Speed (mph)		35	35			25			30	
Link Distance (ft)		279	170			125			548	
Travel Time (s)		5.4	3.3			3.4			12.5	
Confl. Peds. (#/hr)	9			9					9	
Confl. Bikes (#/hr)				1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	38%	2%	1%	0%	0%	8%	1%	0%	100%	4%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)										33%
Lane Group Flow (vph)	16	859	484	0	0	113	0	0	475	950
v/c Ratio	0.10	1.90	0.41			0.49			0.76	0.83
Control Delay	53.9	446.8	18.5			24.1			41.9	41.5
Queue Delay	0.0	0.4	1.2			2.2			59.4	53.2
Total Delay	53.9	447.2	19.6			26.4			101.3	94.7
Queue Length 50th (ft)	13	~630	66			18			356	410
Queue Length 95th (ft)	36	#763	77			81			508	513
Internal Link Dist (ft)		199	90			45			468	
Turn Bay Length (ft)	100									
Base Capacity (vph)	168	451	1192			231			623	1144
Starvation Cap Reductn	0	0	466			0			0	0
Spillback Cap Reductn	0	20	0			46			372	683
Storage Cap Reductn	0	0	0			0			0	0
Reduced v/c Ratio	0.10	1.99	0.67			0.61			1.89	2.06

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	15	790	295	150	5	15	85	2	5	1305
Future Volume (vph)	15	790	295	150	5	15	85	2	5	1305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	8.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95	0.95			1.00			1.00	0.91
Frpb, ped/bikes	1.00	1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.95			0.89			0.85	0.85
Flt Protected	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1177	3160	3032			1490			1387	2544
Flt Permitted	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1177	3160	3032			1490			1387	2544
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	859	321	163	5	16	92	2	5	1418
RTOR Reduction (vph)	0	0	44	0	0	83	0	0	0	0
Lane Group Flow (vph)	16	859	440	0	0	30	0	0	475	950
Confl. Peds. (#/hr)	9			9					9	
Confl. Bikes (#/hr)				1						
Heavy Vehicles (%)	38%	2%	1%	0%	0%	8%	1%	0%	100%	4%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Turn Type	Split	NA	NA		Split	NA		Perm	pm+pt	custom
Protected Phases	3	3	4 5		2	2			1	1 5
Permitted Phases								1 5	5	1 5
Actuated Green, G (s)	20.0	20.0	56.0			14.0			58.0	63.0
Effective Green, g (s)	20.0	20.0	56.0			14.0			58.0	63.0
Actuated g/C Ratio	0.14	0.14	0.40			0.10			0.41	0.45
Clearance Time (s)	5.0	5.0				5.0			5.0	
Vehicle Extension (s)	2.0	2.0				2.0			2.0	
Lane Grp Cap (vph)	168	451	1212			149			624	1144
v/s Ratio Prot	0.01	c0.27	c0.15			c0.02			0.16	c0.37
v/s Ratio Perm									0.18	
v/c Ratio	0.10	1.90	0.36			0.20			0.76	0.83
Uniform Delay, d1	52.1	60.0	29.5			57.9			33.8	33.8
Progression Factor	1.00	1.00	0.65			1.00			1.00	1.00
Incremental Delay, d2	1.1	415.3	0.1			0.2			5.8	5.5
Delay (s)	53.3	475.3	19.2			58.1			39.6	39.3
Level of Service	D	F	B			E			D	D
Approach Delay (s)		467.6	19.2			58.1			39.4	
Approach LOS		F	B			E			D	

Intersection Summary			
HCM 2000 Control Delay	166.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↱	↱		↰↑					↰	↰↑	↱
Traffic Volume (vph)	0	1805	375	10	340	0	0	0	0	345	240	105
Future Volume (vph)	0	1805	375	10	340	0	0	0	0	345	240	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	13	12	12	12	12	12	12	11	11	11
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		170			86			306			262	
Travel Time (s)		3.3			1.7			7.0			6.0	
Confl. Peds. (#/hr)			31	31								8
Confl. Bikes (#/hr)			11									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	1%	0%	0%	0%	0%	0%	0%	3%	3%	0%
Shared Lane Traffic (%)			0%							43%		
Lane Group Flow (vph)	0	1962	408	0	381	0	0	0	0	214	422	114
v/c Ratio		0.91	0.57		0.41					1.08	1.03	0.37
Control Delay		29.3	9.4		0.7					142.0	110.5	9.1
Queue Delay		47.2	58.0		0.0					0.0	0.0	0.1
Total Delay		76.5	67.4		0.7					142.0	110.5	9.2
Queue Length 50th (ft)		553	206		1					~238	~225	0
Queue Length 95th (ft)		m446	m119		m1					#420	#341	42
Internal Link Dist (ft)		90			6			226			182	
Turn Bay Length (ft)			100									
Base Capacity (vph)		2167	722		928					198	409	308
Starvation Cap Reductn		948	397		0					0	0	0
Spillback Cap Reductn		0	0		0					0	0	15
Storage Cap Reductn		0	0		0					0	0	0
Reduced v/c Ratio		1.61	1.26		0.41					1.08	1.03	0.39

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1805	375	10	340	0	0	0	0	345	240	105
Future Volume (vph)	0	1805	375	10	340	0	0	0	0	345	240	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	13	12	12	12	12	12	12	11	11	11
Total Lost time (s)		5.0	5.0		5.0					8.0	8.0	8.0
Lane Util. Factor		0.86	0.86		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.97		1.00					1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		4101	1236		3244					1387	2866	1365
Flt Permitted		1.00	1.00		0.95					0.95	0.98	1.00
Satd. Flow (perm)		4101	1236		3103					1387	2866	1365
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1962	408	11	370	0	0	0	0	375	261	114
RTOR Reduction (vph)	0	0	69	0	0	0	0	0	0	0	0	98
Lane Group Flow (vph)	0	1962	339	0	381	0	0	0	0	214	422	16
Confl. Peds. (#/hr)			31	31								8
Confl. Bikes (#/hr)			11									
Heavy Vehicles (%)	0%	4%	1%	0%	0%	0%	0%	0%	0%	3%	3%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		1 2 3		5	1 5					4	4	
Permitted Phases			1 2 3									4
Actuated Green, G (s)		74.0	74.0		58.0					20.0	20.0	20.0
Effective Green, g (s)		74.0	74.0		58.0					20.0	20.0	20.0
Actuated g/C Ratio		0.53	0.53		0.41					0.14	0.14	0.14
Clearance Time (s)										8.0	8.0	8.0
Vehicle Extension (s)										2.0	2.0	2.0
Lane Grp Cap (vph)		2167	653		1313					198	409	195
v/s Ratio Prot		c0.48			c0.06					c0.15	0.15	
v/s Ratio Perm			0.27		0.06							0.01
v/c Ratio		0.91	0.52		0.29					1.08	1.03	0.08
Uniform Delay, d1		29.8	21.4		27.3					60.0	60.0	52.0
Progression Factor		0.95	0.66		0.03					1.00	1.00	1.00
Incremental Delay, d2		0.6	0.0		0.0					87.1	52.9	0.1
Delay (s)		28.8	14.2		0.7					147.1	112.9	52.1
Level of Service		C	B		A					F	F	D
Approach Delay (s)		26.3			0.7			0.0			113.4	
Approach LOS		C			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	42.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	1005	770	0	0	0	0	795	75	75	975	0
Future Volume (vph)	190	1005	770	0	0	0	0	795	75	75	975	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	11	11	12	11	11
Right Turn on Red			No			No			Yes			No
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		784			617			531			989	
Travel Time (s)		21.4			21.0			10.3			19.3	
Confl. Peds. (#/hr)	6		17						5	5		
Confl. Bikes (#/hr)			15									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1299	837	0	0	0	0	946	0	0	1142	0
v/c Ratio		0.97	1.34					0.84			1.31	
Control Delay		41.3	187.8					48.2			180.9	
Queue Delay		0.0	0.0					0.0			0.0	
Total Delay		41.3	187.8					48.2			180.9	
Queue Length 50th (ft)		587	~947					410			~670	
Queue Length 95th (ft)		m#954	m#1397					501			#842	
Internal Link Dist (ft)		704			537			451			909	
Turn Bay Length (ft)												
Base Capacity (vph)		1341	623					1131			870	
Starvation Cap Reductn		0	0					0			0	
Spillback Cap Reductn		0	0					0			0	
Storage Cap Reductn		0	0					0			0	
Reduced v/c Ratio		0.97	1.34					0.84			1.31	

Intersection Summary	
Area Type:	CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	1005	770	0	0	0	0	795	75	75	975	0
Future Volume (vph)	190	1005	770	0	0	0	0	795	75	75	975	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	11	11	12	11	11
Total Lost time (s)		6.0	6.0					5.0			6.0	
Lane Util. Factor		0.95	1.00					0.95			0.95	
Frpb, ped/bikes		1.00	1.00					1.00			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		1.00	0.85					0.99			1.00	
Flt Protected		0.99	1.00					1.00			1.00	
Satd. Flow (prot)		3130	1454					3093			3129	
Flt Permitted		0.99	1.00					1.00			0.57	
Satd. Flow (perm)		3130	1454					3093			1783	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	1092	837	0	0	0	0	864	82	82	1060	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	1299	837	0	0	0	0	941	0	0	1142	0
Confl. Peds. (#/hr)	6		17						5	5		
Confl. Bikes (#/hr)			15									
Heavy Vehicles (%)	1%	3%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Prot					NA		pm+pt	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4									6		
Actuated Green, G (s)		56.8	56.8					51.0			63.0	
Effective Green, g (s)		56.8	56.8					51.0			63.0	
Actuated g/C Ratio		0.41	0.41					0.36			0.45	
Clearance Time (s)		6.0	6.0					5.0			6.0	
Vehicle Extension (s)		2.0	2.0					2.0			2.0	
Lane Grp Cap (vph)		1269	589					1126			879	
v/s Ratio Prot			c0.58					0.30			c0.07	
v/s Ratio Perm		0.41									c0.51	
v/c Ratio		1.02	1.42					0.84			1.30	
Uniform Delay, d1		41.6	41.6					40.7			38.5	
Progression Factor		0.70	0.71					1.00			1.00	
Incremental Delay, d2		25.5	195.3					5.3			143.0	
Delay (s)		54.5	224.9					45.9			181.5	
Level of Service		D	F					D			F	
Approach Delay (s)		121.3			0.0			45.9			181.5	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	120.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	110.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	110	1015	110	390	615	0	0	990	255
Future Volume (vph)	0	0	0	110	1015	110	390	615	0	0	990	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	12	11	11	12	12	11	11
Storage Length (ft)	0		0	0		280	0		0	0		0
Storage Lanes	0		0	0		1	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			Yes
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		762			786			989			627	
Travel Time (s)		20.8			21.4			19.3			12.2	
Confl. Peds. (#/hr)						69	65					65
Confl. Bikes (#/hr)						25						82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	1%	3%	0%	0%	0%	0%	0%	0%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1343	0	424	668	0	0	1353	0
v/c Ratio					1.14		1.29	0.68			1.24	
Control Delay					112.5		187.6	21.3			149.9	
Queue Delay					0.0		0.0	0.0			0.0	
Total Delay					112.5		187.6	21.3			149.9	
Queue Length 50th (ft)					~443		~374	335			~680	
Queue Length 95th (ft)					#541		#579	476			#821	
Internal Link Dist (ft)		682			706			909			547	
Turn Bay Length (ft)												
Base Capacity (vph)					1180		329	978			1090	
Starvation Cap Reductn					0		0	0			0	
Spillback Cap Reductn					0		0	0			0	
Storage Cap Reductn					0		0	0			0	
Reduced v/c Ratio					1.14		1.29	0.68			1.24	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	110	1015	110	390	615	0	0	990	255
Future Volume (vph)	0	0	0	110	1015	110	390	615	0	0	990	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	12	11	11	12	12	11	11
Total Lost time (s)					10.0		6.0	6.0			6.0	
Lane Util. Factor					0.91		1.00	1.00			0.95	
Frpb, ped/bikes					0.98		1.00	1.00			0.96	
Flpb, ped/bikes					1.00		1.00	1.00			1.00	
Frt					0.99		1.00	1.00			0.97	
Flt Protected					1.00		0.95	1.00			1.00	
Satd. Flow (prot)					4253		1570	1653			2923	
Flt Permitted					1.00		0.08	1.00			1.00	
Satd. Flow (perm)					4253		132	1653			2923	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	120	1103	120	424	668	0	0	1076	277
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	19	0
Lane Group Flow (vph)	0	0	0	0	1334	0	424	668	0	0	1334	0
Confl. Peds. (#/hr)						69	65					65
Confl. Bikes (#/hr)						25						82
Heavy Vehicles (%)	2%	2%	2%	1%	3%	0%	0%	0%	0%	0%	0%	1%
Turn Type				Split	NA		pm+pt	NA			NA	
Protected Phases				4	4		1	6			2	
Permitted Phases							6					
Actuated Green, G (s)					33.0		71.0	71.0			44.0	
Effective Green, g (s)					33.0		71.0	71.0			44.0	
Actuated g/C Ratio					0.28		0.59	0.59			0.37	
Clearance Time (s)					10.0		6.0	6.0			6.0	
Vehicle Extension (s)					2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)					1169		329	978			1071	
v/s Ratio Prot					c0.31		c0.22	0.40			0.46	
v/s Ratio Perm							c0.53					
v/c Ratio					1.14		1.29	0.68			1.25	
Uniform Delay, d1					43.5		45.2	16.8			38.0	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					74.0		151.0	3.9			118.5	
Delay (s)					117.5		196.1	20.7			156.5	
Level of Service					F		F	C			F	
Approach Delay (s)		0.0			117.5			88.8			156.5	
Approach LOS		A			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	123.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	110.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	395	945	810	0	0	0	0	0	785	45
Future Volume (vph)	0	0	395	945	810	0	0	0	0	0	785	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No	No		No			No			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		513			209			926			1840	
Travel Time (s)		14.0			5.7			21.0			41.8	
Confl. Peds. (#/hr)			4	17								4
Confl. Bikes (#/hr)			35									2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	4%	2%	5%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	429	1027	880	0	0	0	0	0	902	0
v/c Ratio			0.69	1.43	1.06						1.16	
Control Delay			40.3	221.6	48.6						116.8	
Queue Delay			0.0	1.2	18.3						0.0	
Total Delay			40.3	222.9	66.9						116.8	
Queue Length 50th (ft)			140	~430	~443						~368	
Queue Length 95th (ft)			201	m97	m148						m#287	
Internal Link Dist (ft)		433			129			846			1760	
Turn Bay Length (ft)			100									
Base Capacity (vph)			618	716	834						775	
Starvation Cap Reductn			0	117	121						0	
Spillback Cap Reductn			0	0	0						0	
Storage Cap Reductn			0	0	0						0	
Reduced v/c Ratio			0.69	1.71	1.23						1.16	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	395	945	810	0	0	0	0	0	785	45
Future Volume (vph)	0	0	395	945	810	0	0	0	0	0	785	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)			9.0	6.0	6.0						5.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2378	2987	1574						3217	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2378	2987	1574						3217	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	429	1027	880	0	0	0	0	0	853	49
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	429	1027	880	0	0	0	0	0	898	0
Confl. Peds. (#/hr)			4	17								4
Confl. Bikes (#/hr)			35									2
Heavy Vehicles (%)	0%	0%	4%	2%	5%	0%	0%	0%	0%	0%	0%	0%
Turn Type			Prot	Prot	NA						NA	
Protected Phases			2	1 4	1 2 4						3	
Permitted Phases												
Actuated Green, G (s)			26.0	31.0	62.0						24.0	
Effective Green, g (s)			26.0	31.0	57.0						24.0	
Actuated g/C Ratio			0.26	0.31	0.57						0.24	
Clearance Time (s)			9.0								5.0	
Vehicle Extension (s)			2.0								2.0	
Lane Grp Cap (vph)			618	925	897						772	
v/s Ratio Prot			0.18	c0.34	c0.56						c0.28	
v/s Ratio Perm												
v/c Ratio			0.69	1.11	0.98						1.16	
Uniform Delay, d1			33.4	34.5	21.0						38.0	
Progression Factor			1.00	0.69	1.03						1.08	
Incremental Delay, d2			2.7	51.3	5.5						79.3	
Delay (s)			36.1	75.2	27.0						120.2	
Level of Service			D	E	C						F	
Approach Delay (s)		36.1			53.0			0.0			120.2	
Approach LOS		D			D			A			F	

Intersection Summary			
HCM 2000 Control Delay	69.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	109.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	380	25	35	670	150	10	0	15	0	0	0
Future Volume (Veh/h)	55	380	25	35	670	150	10	0	15	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	413	27	38	728	163	11	0	16	0	0	0
Pedestrians		40						50			19	
Lane Width (ft)		11.0						12.0			0.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		3						4			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		745			513							
pX, platoon unblocked	0.46			0.90			0.51	0.51	0.90	0.51	0.51	0.46
vC, conflicting volume	910			490			1522	1582	476	1454	1514	868
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	229			383			1124	1242	369	990	1109	139
tC, single (s)	4.2			4.2			7.3	6.7	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.7	4.2	3.5	3.5	4.0	3.3
p0 queue free %	90			96			84	100	97	100	100	100
cM capacity (veh/h)	606			1000			70	69	555	98	90	411

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	60	440	929	27
Volume Left	60	0	38	11
Volume Right	0	27	163	16
cSH	606	1700	1000	145
Volume to Capacity	0.10	0.26	0.04	0.19
Queue Length 95th (ft)	8	0	3	16
Control Delay (s)	11.6	0.0	1.0	35.5
Lane LOS	B		A	E
Approach Delay (s)	1.4		1.0	35.5
Approach LOS				E

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	395	5	40	560	135	5	15	35	30	10	25
Future Volume (vph)	120	395	5	40	560	135	5	15	35	30	10	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	12	12	12	12	12
Storage Length (ft)	110		0	140		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			No			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		605			745			131			150	
Travel Time (s)		16.5			20.3			3.6			4.1	
Confl. Peds. (#/hr)	17		22	22		17	3		1	1		3
Confl. Bikes (#/hr)			33			12						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	9%	14%	41%	7%	11%	4%	0%	9%	9%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	130	434	0	43	756	0	0	21	38	0	71	0
v/c Ratio	0.54	0.45		0.13	0.80			0.17	0.39		0.53	
Control Delay	29.7	17.0		16.0	27.3			47.3	56.9		47.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	29.7	17.0		16.0	27.3			47.3	56.9		47.6	
Queue Length 50th (ft)	43	130		10	340			14	25		31	
Queue Length 95th (ft)	#212	#433		50	#930			37	57		77	
Internal Link Dist (ft)		525			665			51			70	
Turn Bay Length (ft)	110			140								
Base Capacity (vph)	240	969		339	944			239	186		163	
Starvation Cap Reductn	0	0		0	0			0	0		0	
Spillback Cap Reductn	0	0		0	0			0	0		0	
Storage Cap Reductn	0	0		0	0			0	0		0	
Reduced v/c Ratio	0.54	0.45		0.13	0.80			0.09	0.20		0.44	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	395	5	40	560	135	5	15	35	30	10	25
Future Volume (vph)	120	395	5	40	560	135	5	15	35	30	10	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.97		0.98	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.97			1.00	0.85		0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.98	
Satd. Flow (prot)	1466	1460		1065	1426			1674	1297		1497	
Flt Permitted	0.23	1.00		0.46	1.00			0.99	1.00		0.98	
Satd. Flow (perm)	361	1460		512	1426			1674	1297		1497	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	429	5	43	609	147	5	16	38	33	11	27
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	22	0
Lane Group Flow (vph)	130	434	0	43	756	0	0	21	38	0	49	0
Confl. Peds. (#/hr)	17		22	22		17	3		1	1		3
Confl. Bikes (#/hr)			33			12						
Heavy Vehicles (%)	3%	9%	14%	41%	7%	11%	4%	0%	9%	9%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA	Perm	Split	NA	
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6			2					8			
Actuated Green, G (s)	62.4	62.4		62.4	62.4			6.7	6.7		6.7	
Effective Green, g (s)	62.4	62.4		62.4	62.4			6.7	6.7		6.7	
Actuated g/C Ratio	0.59	0.59		0.59	0.59			0.06	0.06		0.06	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0		1.0	1.0			2.0	2.0		2.0	
Lane Grp Cap (vph)	214	867		304	847			106	82		95	
v/s Ratio Prot		0.30			c0.53			0.01			c0.03	
v/s Ratio Perm	0.36			0.08					c0.03			
v/c Ratio	0.61	0.50		0.14	0.89			0.20	0.46		0.52	
Uniform Delay, d1	13.5	12.3		9.4	18.4			46.6	47.4		47.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	12.2	2.1		1.0	13.7			0.3	1.5		2.4	
Delay (s)	25.7	14.4		10.4	32.2			46.9	48.9		50.0	
Level of Service	C	B		B	C			D	D		D	
Approach Delay (s)		17.0			31.0			48.2			50.0	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	510	25	1	400	130	1	1	0	30	25	0
Future Volume (Veh/h)	1	510	25	1	400	130	1	1	0	30	25	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	554	27	1	435	141	1	1	0	33	27	0
Pedestrians					22			22			17	
Lane Width (ft)					11.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					2			2			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		592			467							
pX, platoon unblocked	0.78			0.82			0.87	0.87	0.82	0.87	0.87	0.78
vC, conflicting volume	593			603			1112	1186	612	1116	1130	522
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	336			413			599	684	423	603	618	246
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	90	92	100
cM capacity (veh/h)	940			928			322	311	502	335	339	609

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	582	577	2	60
Volume Left	1	1	1	33
Volume Right	27	141	0	0
cSH	940	928	316	337
Volume to Capacity	0.00	0.00	0.01	0.18
Queue Length 95th (ft)	0	0	0	16
Control Delay (s)	0.0	0.0	16.5	18.0
Lane LOS	A	A	C	C
Approach Delay (s)	0.0	0.0	16.5	18.0
Approach LOS			C	C

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	515	30	50	540	1	15	1	5	1	1	1
Future Volume (vph)	1	515	30	50	540	1	15	1	5	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	13	13	13	12	12	12
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		467			605			282			144	
Travel Time (s)		12.7			16.5			7.7			3.9	
Confl. Peds. (#/hr)	17		22	22		17	22		22	22		22
Confl. Bikes (#/hr)			33			12						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	9%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	594	0	0	642	0	0	22	0	0	3	0
v/c Ratio		0.50			0.57			0.18			0.03	
Control Delay		14.1			15.7			32.1			30.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		14.1			15.7			32.1			30.7	
Queue Length 50th (ft)		0			0			8			1	
Queue Length 95th (ft)		#542			#609			30			9	
Internal Link Dist (ft)		387			525			202			64	
Turn Bay Length (ft)												
Base Capacity (vph)		1189			1125			121			108	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.50			0.57			0.18			0.03	

Intersection Summary	
Area Type:	CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	515	30	50	540	1	15	1	5	1	1	1
Future Volume (vph)	1	515	30	50	540	1	15	1	5	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	13	13	13	12	12	12
Total Lost time (s)		5.5			5.5			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.93			0.89	
Flpb, ped/bikes		1.00			1.00			0.78			0.90	
Frt		0.99			1.00			0.97			0.95	
Flt Protected		1.00			1.00			0.96			0.98	
Satd. Flow (prot)		1506			1543			1173			1270	
Flt Permitted		1.00			0.92			1.00			0.92	
Satd. Flow (perm)		1505			1422			1216			1187	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	560	33	54	587	1	16	1	5	1	1	1
RTOR Reduction (vph)	0	1	0	0	0	0	0	5	0	0	1	0
Lane Group Flow (vph)	0	593	0	0	642	0	0	17	0	0	2	0
Confl. Peds. (#/hr)	17		22	22		17	22		22	22		22
Confl. Bikes (#/hr)			33			12						
Heavy Vehicles (%)	2%	9%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			5			5	
Permitted Phases	1			1			5			5		
Actuated Green, G (s)		50.7			50.7			2.9			2.9	
Effective Green, g (s)		50.7			50.7			2.9			2.9	
Actuated g/C Ratio		0.63			0.63			0.04			0.04	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		953			901			44			43	
v/s Ratio Prot												
v/s Ratio Perm		0.39			c0.45			c0.01			0.00	
v/c Ratio		0.62			0.71			0.39			0.05	
Uniform Delay, d1		8.9			9.8			37.7			37.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.1			4.8			2.1			0.2	
Delay (s)		11.9			14.6			39.8			37.4	
Level of Service		B			B			D			D	
Approach Delay (s)		11.9			14.6			39.8			37.4	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	10	10	0	50	80	15	450	0	45	380	20
Future Volume (Veh/h)	10	10	10	0	50	80	15	450	0	45	380	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	11	11	0	54	87	16	489	0	49	413	22
Pedestrians		69			64						42	
Lane Width (ft)		12.0			13.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		6			6						4	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								521				
pX, platoon unblocked	0.91	0.91		0.91	0.91	0.91				0.91		
vC, conflicting volume	1268	1176	493	1124	1187	595	504			553		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1244	1143	493	1085	1155	502	504			456		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	93	98	100	63	81	98			95		
cM capacity (veh/h)	64	150	543	134	148	469	1000			944		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	33	141	505	484
Volume Left	11	0	16	49
Volume Right	11	87	0	22
cSH	124	256	1000	944
Volume to Capacity	0.27	0.55	0.02	0.05
Queue Length 95th (ft)	25	76	1	4
Control Delay (s)	44.2	35.0	0.5	1.5
Lane LOS	E	D	A	A
Approach Delay (s)	44.2	35.0	0.5	1.5
Approach LOS	E	D		

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑	↑↑			↱
Traffic Volume (veh/h)	0	805	300	0	0	1800
Future Volume (Veh/h)	0	805	300	0	0	1800
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	875	326	0	0	1957
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1190	279			
pX, platoon unblocked					0.92	
vC, conflicting volume	326				764	163
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	326				574	163
tC, single (s)	4.1				6.9	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	1238				412	850

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	438	438	163	163	1957
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	1957
cSH	1700	1700	1700	1700	850
Volume to Capacity	0.26	0.26	0.10	0.10	2.30
Queue Length 95th (ft)	0	0	0	0	3588
Control Delay (s)	0.0	0.0	0.0	0.0	602.9
Lane LOS					F
Approach Delay (s)	0.0		0.0		602.9
Approach LOS					F

Intersection Summary			
Average Delay	373.6		
Intersection Capacity Utilization	126.4%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	1810	0	0	0	0	350	155	155	0	0	0
Future Volume (vph)	340	1810	0	0	0	0	350	155	155	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	12	11	11	12	12	12
Right Turn on Red			No			No			Yes			No
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		86			784			304			1156	
Travel Time (s)		1.7			15.3			6.9			26.3	
Confl. Peds. (#/hr)	8								93			
Confl. Bikes (#/hr)									7			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)							19%					
Lane Group Flow (vph)	0	2337	0	0	0	0	308	408	0	0	0	0
v/c Ratio		0.74					1.00	1.40				
Control Delay		0.6					106.7	239.0				
Queue Delay		0.0					0.0	0.0				
Total Delay		0.6					106.7	239.0				
Queue Length 50th (ft)		0					297	~507				
Queue Length 95th (ft)		m0					#506	#729				
Internal Link Dist (ft)		6			704			224			1076	
Turn Bay Length (ft)												
Base Capacity (vph)		3142					308	291				
Starvation Cap Reductn		0					0	0				
Spillback Cap Reductn		0					0	0				
Storage Cap Reductn		0					0	0				
Reduced v/c Ratio		0.74					1.00	1.40				

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	1810	0	0	0	0	350	155	155	0	0	0
Future Volume (vph)	340	1810	0	0	0	0	350	155	155	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	12	11	11	12	12	12
Total Lost time (s)		5.0					5.0	5.0				
Lane Util. Factor		0.91					0.95	0.95				
Frpb, ped/bikes		1.00					1.00	0.94				
Flpb, ped/bikes		1.00					1.00	1.00				
Frt		1.00					1.00	0.94				
Flt Protected		0.99					0.95	0.99				
Satd. Flow (prot)		4314					1543	1367				
Flt Permitted		0.99					0.95	0.99				
Satd. Flow (perm)		4314					1543	1367				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	370	1967	0	0	0	0	380	168	168	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	18	0	0	0	0
Lane Group Flow (vph)	0	2337	0	0	0	0	308	390	0	0	0	0
Confl. Peds. (#/hr)	8								93			
Confl. Bikes (#/hr)									7			
Heavy Vehicles (%)	8%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Split	NA					Split	NA				
Protected Phases	1 2 3 4	1 2 3 4					5	5				
Permitted Phases												
Actuated Green, G (s)		99.0					28.0	28.0				
Effective Green, g (s)		99.0					28.0	28.0				
Actuated g/C Ratio		0.71					0.20	0.20				
Clearance Time (s)							5.0	5.0				
Vehicle Extension (s)							4.0	4.0				
Lane Grp Cap (vph)		3050					308	273				
v/s Ratio Prot		c0.54					0.20	c0.29				
v/s Ratio Perm												
v/c Ratio		0.77					1.00	1.43				
Uniform Delay, d1		13.1					56.0	56.0				
Progression Factor		0.00					1.00	1.00				
Incremental Delay, d2		0.4					51.3	213.4				
Delay (s)		0.4					107.3	269.4				
Level of Service		A					F	F				
Approach Delay (s)		0.4			0.0			199.7			0.0	
Approach LOS		A			A			F			A	

Intersection Summary			
HCM 2000 Control Delay	47.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	67	2	230	61	805	0	0	745	45
Future Volume (vph)	0	0	0	67	2	230	61	805	0	0	745	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	10	12	12	10	10
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		590			353			178			622	
Travel Time (s)		13.4			8.0			4.9			17.0	
Confl. Peds. (#/hr)						56	196					196
Confl. Bikes (#/hr)						9						34
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	4%	0%	0%	3%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	75	250	0	941	0	0	859	0
v/c Ratio					0.80	0.57		0.70			1.21	
Control Delay					75.4	8.0		5.7			121.2	
Queue Delay					75.2	0.0		2.7			6.4	
Total Delay					150.6	8.0		8.4			127.6	
Queue Length 50th (ft)					52	25		32			~532	
Queue Length 95th (ft)					m46	m12		m24			m#591	
Internal Link Dist (ft)		510			273			98			542	
Turn Bay Length (ft)												
Base Capacity (vph)					94	631		1350			712	
Starvation Cap Reductn					0	0		286			0	
Spillback Cap Reductn					36	0		0			375	
Storage Cap Reductn					0	0		0			0	
Reduced v/c Ratio					1.29	0.40		0.88			2.55	

Intersection Summary	
Area Type:	CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	67	2	230	61	805	0	0	745	45
Future Volume (vph)	0	0	0	67	2	230	61	805	0	0	745	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	12	12	10	10
Total Lost time (s)					4.0	4.0		4.0			4.0	
Lane Util. Factor					1.00	1.00		0.95			1.00	
Frpb, ped/bikes					1.00	1.00		1.00			0.98	
Flpb, ped/bikes					1.00	1.00		1.00			1.00	
Frt					1.00	0.85		1.00			0.99	
Flt Protected					0.95	1.00		1.00			1.00	
Satd. Flow (prot)					1576	1405		2910			1511	
Flt Permitted					0.95	1.00		0.71			1.00	
Satd. Flow (perm)					1576	1405		2086			1511	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	73	2	250	66	875	0	0	810	49
RTOR Reduction (vph)	0	0	0	0	0	210	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	75	40	0	941	0	0	857	0
Confl. Peds. (#/hr)						56	196					196
Confl. Bikes (#/hr)						9						34
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	4%	0%	0%	3%	0%
Turn Type				Split	NA	custom	custom	NA			NA	
Protected Phases				8	8	1 8		2 4 9 11			6	
Permitted Phases							2 4					
Actuated Green, G (s)					6.0	16.0		63.0			47.0	
Effective Green, g (s)					6.0	16.0		57.0			47.0	
Actuated g/C Ratio					0.06	0.16		0.57			0.47	
Clearance Time (s)					4.0						4.0	
Vehicle Extension (s)					2.0						2.0	
Lane Grp Cap (vph)					94	224		1189			710	
v/s Ratio Prot					c0.05	0.03					c0.57	
v/s Ratio Perm								c0.45				
v/c Ratio					0.80	0.18		0.79			1.21	
Uniform Delay, d1					46.4	36.3		16.8			26.5	
Progression Factor					1.52	1.73		0.38			1.01	
Incremental Delay, d2					4.0	0.0		1.4			94.4	
Delay (s)					74.5	62.7		7.8			121.2	
Level of Service					E	E		A			F	
Approach Delay (s)		0.0			65.4			7.8			121.2	
Approach LOS		A			E			A			F	

Intersection Summary			
HCM 2000 Control Delay	62.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1415	245	340	155	0	0	0	0
Future Volume (vph)	0	0	0	0	1415	245	340	155	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	11	11	11	12	12	12
Right Turn on Red			No			No	No		Yes			No
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		209			762			1156			2190	
Travel Time (s)		5.7			20.8			26.3			49.8	
Confl. Peds. (#/hr)						170	4					
Confl. Bikes (#/hr)						33						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	9%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1804	0	0	538	0	0	0	0
v/c Ratio					1.75			0.99dl				
Control Delay					370.0			40.4				
Queue Delay					1.0			8.4				
Total Delay					371.0			48.8				
Queue Length 50th (ft)					~630			164				
Queue Length 95th (ft)					#726			226				
Internal Link Dist (ft)		129			682			1076			2110	
Turn Bay Length (ft)												
Base Capacity (vph)					1029			740				
Starvation Cap Reductn					0			0				
Spillback Cap Reductn					183			166				
Storage Cap Reductn					0			0				
Reduced v/c Ratio					2.13			0.94				

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1415	245	340	155	0	0	0	0
Future Volume (vph)	0	0	0	0	1415	245	340	155	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)					6.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.96			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.98			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					4289			2847				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					4289			2847				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1538	266	370	168	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1804	0	0	538	0	0	0	0
Confl. Peds. (#/hr)						170	4					
Confl. Bikes (#/hr)						33						
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	9%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					24.0			26.0				
Effective Green, g (s)					24.0			26.0				
Actuated g/C Ratio					0.24			0.26				
Clearance Time (s)					6.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1029			740				
v/s Ratio Prot					c0.42							
v/s Ratio Perm								0.19				
v/c Ratio					1.75			0.99dl				
Uniform Delay, d1					38.0			33.8				
Progression Factor					1.00			1.00				
Incremental Delay, d2					342.9			3.0				
Delay (s)					380.9			36.8				
Level of Service					F			D				
Approach Delay (s)		0.0			380.9			36.8			0.0	
Approach LOS		A			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	301.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	109.5%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	755	305	0	990	110	0	855	315	0	360	15
Future Volume (vph)	0	755	305	0	990	110	0	855	315	0	360	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Right Turn on Red			No			No			No			No
Link Speed (mph)		35			35			25			20	
Link Distance (ft)		641			2767			774			646	
Travel Time (s)		12.5			53.9			21.1			22.0	
Confl. Peds. (#/hr)			109			54			323			243
Confl. Bikes (#/hr)			13						66			56
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	5%	0%	0%	7%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1153	0	0	1196	0	0	1271	0	0	407	0
v/c Ratio		1.09			1.02			1.14			0.63	
Control Delay		86.5			63.5			100.3			28.9	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		86.5			63.5			100.3			28.9	
Queue Length 50th (ft)		~437			~412			~497			202	
Queue Length 95th (ft)		#568			#558			m#558			307	
Internal Link Dist (ft)		561			2687			694			566	
Turn Bay Length (ft)												
Base Capacity (vph)		1059			1173			1114			644	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.09			1.02			1.14			0.63	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	755	305	0	990	110	0	855	315	0	360	15
Future Volume (vph)	0	755	305	0	990	110	0	855	315	0	360	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		11.0			11.0			11.0			11.0	
Lane Util. Factor		0.95			0.95			0.95			1.00	
Frpb, ped/bikes		0.93			0.99			0.90			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.98			0.96			0.99	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		2862			3172			2718			1573	
Flt Permitted		1.00			1.00			1.00			1.00	
Satd. Flow (perm)		2862			3172			2718			1573	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	821	332	0	1076	120	0	929	342	0	391	16
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1153	0	0	1196	0	0	1271	0	0	407	0
Confl. Peds. (#/hr)			109			54			323			243
Confl. Bikes (#/hr)			13						66			56
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	5%	0%	0%	7%	0%
Turn Type		NA			NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases												
Actuated Green, G (s)		37.0			37.0			41.0			41.0	
Effective Green, g (s)		37.0			37.0			41.0			41.0	
Actuated g/C Ratio		0.37			0.37			0.41			0.41	
Clearance Time (s)		11.0			11.0			11.0			11.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		1058			1173			1114			644	
v/s Ratio Prot		c0.40			0.38			c0.47			0.26	
v/s Ratio Perm												
v/c Ratio		1.09			1.02			1.14			0.63	
Uniform Delay, d1		31.5			31.5			29.5			23.5	
Progression Factor		1.00			1.00			1.11			1.00	
Incremental Delay, d2		55.5			31.3			68.6			4.7	
Delay (s)		87.0			62.8			101.3			28.2	
Level of Service		F			E			F			C	
Approach Delay (s)		87.0			62.8			101.3			28.2	
Approach LOS		F			E			F			C	

Intersection Summary			
HCM 2000 Control Delay	78.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	94.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	381	20	130	0	0	0	0	655	35	267	510	0
Future Volume (vph)	381	20	130	0	0	0	0	655	35	267	510	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	10	10	10	10	12
Storage Length (ft)	0		0	0		0	0		300	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		595			501			1960			178	
Travel Time (s)		13.5			11.4			53.5			4.9	
Confl. Peds. (#/hr)			56						310	310		
Confl. Bikes (#/hr)									50			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)	35%											
Lane Group Flow (vph)	269	308	0	0	0	0	0	750	0	0	844	0
v/c Ratio	1.59	1.79						0.75			1.57	
Control Delay	324.1	404.0						35.1			275.1	
Queue Delay	0.3	0.7						2.7			0.3	
Total Delay	324.4	404.8						37.8			275.4	
Queue Length 50th (ft)	~258	~292						214			~735	
Queue Length 95th (ft)	#425	#472						#336			m#677	
Internal Link Dist (ft)		515			421			1880			98	
Turn Bay Length (ft)												
Base Capacity (vph)	169	172						1006			539	
Starvation Cap Reductn	0	0						0			18	
Spillback Cap Reductn	3	7						153			0	
Storage Cap Reductn	0	0						0			0	
Reduced v/c Ratio	1.62	1.87						0.88			1.62	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	381	20	130	0	0	0	0	655	35	267	510	0
Future Volume (vph)	381	20	130	0	0	0	0	655	35	267	510	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	10	10	10	10	12
Total Lost time (s)	4.0	4.0						4.0			4.0	
Lane Util. Factor	0.95	0.95						0.95			1.00	
Frpb, ped/bikes	1.00	0.88						0.98			1.00	
Flpb, ped/bikes	1.00	1.00						1.00			1.00	
Frt	1.00	0.93						0.99			1.00	
Flt Protected	0.95	0.98						1.00			0.98	
Satd. Flow (prot)	1543	1296						2923			1559	
Flt Permitted	0.95	0.98						1.00			0.39	
Satd. Flow (perm)	1543	1296						2923			615	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	414	22	141	0	0	0	0	712	38	290	554	0
RTOR Reduction (vph)	0	30	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	269	278	0	0	0	0	0	750	0	0	844	0
Confl. Peds. (#/hr)			56						310	310		
Confl. Bikes (#/hr)									50			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Split	NA						NA		custom	NA	
Protected Phases	4	4						2		1	6 8 10 7	
Permitted Phases										6 8		
Actuated Green, G (s)	11.0	11.0						34.4			66.0	
Effective Green, g (s)	11.0	11.0						34.4			66.0	
Actuated g/C Ratio	0.11	0.11						0.34			0.66	
Clearance Time (s)	4.0	4.0						4.0				
Vehicle Extension (s)	2.0	2.0						2.0				
Lane Grp Cap (vph)	169	142						1005			515	
v/s Ratio Prot	0.17	c0.21						0.26			c0.19	
v/s Ratio Perm											c0.89	
v/c Ratio	1.59	1.96						0.75			1.64	
Uniform Delay, d1	44.5	44.5						28.9			17.0	
Progression Factor	1.00	1.00						1.00			1.22	
Incremental Delay, d2	292.4	454.7						5.0			288.3	
Delay (s)	336.9	499.2						34.0			309.0	
Level of Service	F	F						C			F	
Approach Delay (s)		423.5			0.0			34.0			309.0	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	244.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.94		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	245	40	130	485	5	230	235	55	5	330	305
Future Volume (vph)	215	245	40	130	485	5	230	235	55	5	330	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	175		0	125		0	0		160
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		548			547			255			491	
Travel Time (s)		14.9			14.9			7.0			13.4	
Confl. Peds. (#/hr)	37		81	81		37	113		85	85		113
Confl. Bikes (#/hr)			9			23			17			32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	1%	0%	1%	0%	0%	3%	1%	4%	10%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	5	5	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	234	309	0	141	532	0	250	315	0	0	364	332
v/c Ratio	1.34	0.56		0.44	0.95		1.44	0.58			0.93	0.95
Control Delay	212.7	47.3		33.1	77.1		260.0	47.6			87.1	85.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	1.5			0.0	0.0
Total Delay	212.7	47.3		33.1	77.1		260.0	49.2			87.1	85.2
Queue Length 50th (ft)	~248	265		90	542		~281	271			372	297
Queue Length 95th (ft)	#432	372		142	#792		#472	381			#582	#450
Internal Link Dist (ft)		468			467			175			411	
Turn Bay Length (ft)	250			175			125					160
Base Capacity (vph)	175	551		326	560		174	541			393	351
Starvation Cap Reductn	0	0		0	0		0	97			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	1.34	0.56		0.43	0.95		1.44	0.71			0.93	0.95

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	245	40	130	485	5	230	235	55	5	330	305
Future Volume (vph)	215	245	40	130	485	5	230	235	55	5	330	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	4.0			6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.97			1.00	0.82
Flpb, ped/bikes	1.00	1.00		0.98	1.00		0.99	1.00			1.00	1.00
Frt	1.00	0.98		1.00	1.00		1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1575	1626		1572	1672		1559	1584			1687	1174
Flt Permitted	0.13	1.00		0.41	1.00		0.18	1.00			0.99	1.00
Satd. Flow (perm)	209	1626		681	1672		297	1584			1679	1174
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	234	266	43	141	527	5	250	255	60	5	359	332
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	234	309	0	141	532	0	250	315	0	0	364	332
Confl. Peds. (#/hr)	37		81	81		37	113		85	85		113
Confl. Bikes (#/hr)			9			23			17			32
Heavy Vehicles (%)	3%	1%	0%	1%	0%	0%	3%	1%	4%	10%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	5	5	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		D.P+P	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6		7	7 8			8	5
Permitted Phases	2			6			8			8		8
Actuated Green, G (s)	61.1	51.0		59.7	50.3		45.3	49.3			35.2	45.3
Effective Green, g (s)	61.1	51.0		59.7	50.3		45.3	49.3			35.2	45.3
Actuated g/C Ratio	0.40	0.34		0.39	0.33		0.30	0.33			0.23	0.30
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0				6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0				2.0	2.0
Lane Grp Cap (vph)	175	547		323	554		172	515			389	397
v/s Ratio Prot	c0.09	0.19		0.03	0.32		c0.10	0.20				0.06
v/s Ratio Perm	c0.45			0.14			c0.34				0.22	0.23
v/c Ratio	1.34	0.56		0.44	0.96		1.45	0.61			0.94	0.84
Uniform Delay, d1	39.4	41.2		31.4	49.7		49.2	43.1			57.1	49.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	185.1	4.2		0.3	29.6		233.4	1.5			29.3	13.6
Delay (s)	224.6	45.4		31.7	79.3		282.6	44.6			86.4	63.3
Level of Service	F	D		C	E		F	D			F	E
Approach Delay (s)		122.6			69.3			149.9			75.3	
Approach LOS		F			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	101.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	151.6	Sum of lost time (s)	29.0
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	0	30	15	10	5	15	410	0	0	660	65
Future Volume (vph)	45	0	30	15	10	5	15	410	0	0	660	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	10	10	10	10	10	12	12	10	10
Right Turn on Red			Yes			Yes			Yes			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		453			259			1811			202	
Travel Time (s)		12.4			7.1			49.4			5.5	
Confl. Peds. (#/hr)	7		14	14		7	75					75
Confl. Bikes (#/hr)			2			5			10			9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	0%	10%	0%	0%	0%	0%	5%	0%	0%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	82	0	0	32	0	0	462	0	0	788	0
v/c Ratio		0.61			0.12			0.39			0.72	
Control Delay		22.1			24.2			8.4			16.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		22.1			24.2			8.4			16.7	
Queue Length 50th (ft)		0			6			0			0	
Queue Length 95th (ft)		#29			40			296			#751	
Internal Link Dist (ft)		373			179			1731			122	
Turn Bay Length (ft)												
Base Capacity (vph)		135			774			1194			1092	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.61			0.04			0.39			0.72	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	0	30	15	10	5	15	410	0	0	660	65
Future Volume (vph)	45	0	30	15	10	5	15	410	0	0	660	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	10	12	12	10	10
Total Lost time (s)		4.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.81			0.98			1.00			0.99	
Flpb, ped/bikes		0.87			0.94			1.00			1.00	
Frt		0.95			0.98			1.00			0.99	
Flt Protected		0.97			0.98			1.00			1.00	
Satd. Flow (prot)		998			1267			1482			1326	
Flt Permitted		0.97			0.98			0.97			1.00	
Satd. Flow (perm)		998			1267			1442			1326	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	0	33	16	11	5	16	446	0	0	717	71
RTOR Reduction (vph)	0	82	0	0	5	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	27	0	0	462	0	0	788	0
Confl. Peds. (#/hr)	7		14	14		7	75					75
Confl. Bikes (#/hr)			2			5			10			9
Heavy Vehicles (%)	6%	0%	10%	0%	0%	0%	0%	5%	0%	0%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Turn Type	D.Pm	NA		Perm	NA		Perm	NA			NA	
Protected Phases					5			1			1	
Permitted Phases	5			5			1					
Actuated Green, G (s)		0.0			3.3			42.6			42.6	
Effective Green, g (s)		0.0			3.3			42.6			42.6	
Actuated g/C Ratio		0.00			0.05			0.68			0.68	
Clearance Time (s)					5.0			5.0			5.0	
Vehicle Extension (s)					4.0			4.0			4.0	
Lane Grp Cap (vph)		0			66			982			903	
v/s Ratio Prot											c0.59	
v/s Ratio Perm					0.02			0.32				
v/c Ratio		0.00			0.41			0.47			0.87	
Uniform Delay, d1		31.2			28.7			4.7			7.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.0			5.6			1.6			11.4	
Delay (s)		31.2			34.3			6.3			19.2	
Level of Service		C			C			A			B	
Approach Delay (s)		31.2			34.3			6.3			19.2	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	62.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑	↑↑	↱	↰	↱
Traffic Volume (vph)	227	1500	1417	460	415	290
Future Volume (vph)	227	1500	1417	460	415	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	11
Storage Length (ft)	200			200	0	85
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Right Turn on Red				No		Yes
Link Speed (mph)		35	35		25	
Link Distance (ft)		511	949		1811	
Travel Time (s)		10.0	18.5		49.4	
Confl. Peds. (#/hr)	21			21		9
Confl. Bikes (#/hr)				6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	3%	2%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	247	1630	1540	500	451	315
v/c Ratio	1.17	0.85	1.17	0.91	1.04	0.48
Control Delay	158.1	22.1	101.6	24.1	93.7	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	158.1	22.1	101.6	24.1	93.7	22.4
Queue Length 50th (ft)	~208	448	~681	274	~344	144
Queue Length 95th (ft)	#369	568	m#654	m365	#543	224
Internal Link Dist (ft)		431	869		1731	
Turn Bay Length (ft)	200			200		85
Base Capacity (vph)	211	1921	1314	552	434	660
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.17	0.85	1.17	0.91	1.04	0.48

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	227	1500	1417	460	415	290
Future Volume (vph)	227	1500	1417	460	415	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	11
Total Lost time (s)	6.5	5.5	5.5	5.5	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.93	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1501	3085	3110	1306	1593	1391
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1501	3085	3110	1306	1593	1391
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	247	1630	1540	500	451	315
RTOR Reduction (vph)	0	0	0	0	0	3
Lane Group Flow (vph)	247	1630	1540	500	451	312
Confl. Peds. (#/hr)	21			21		9
Confl. Bikes (#/hr)				6		
Heavy Vehicles (%)	1%	1%	1%	3%	2%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	6	1 6	1		5	5 6
Permitted Phases				1		
Actuated Green, G (s)	15.5	68.5	46.5	46.5	30.0	51.5
Effective Green, g (s)	15.5	62.0	46.5	46.5	30.0	51.5
Actuated g/C Ratio	0.14	0.56	0.42	0.42	0.27	0.47
Clearance Time (s)	6.5		5.5	5.5	6.0	
Vehicle Extension (s)	2.0		3.0	3.0	2.0	
Lane Grp Cap (vph)	211	1738	1314	552	434	651
v/s Ratio Prot	c0.16	0.53	c0.50		c0.28	0.22
v/s Ratio Perm				0.38		
v/c Ratio	1.17	0.94	1.17	0.91	1.04	0.48
Uniform Delay, d1	47.2	22.2	31.8	29.7	40.0	20.1
Progression Factor	1.00	1.00	0.68	0.66	1.00	1.00
Incremental Delay, d2	115.6	11.2	78.2	2.7	53.7	2.5
Delay (s)	162.9	33.4	99.7	22.1	93.7	22.6
Level of Service	F	C	F	C	F	C
Approach Delay (s)		50.4	80.7		64.5	
Approach LOS		D	F		E	

Intersection Summary			
HCM 2000 Control Delay	65.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	98.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	16	860	1895	35	80	75
Future Volume (vph)	16	860	1895	35	80	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	11	11	12	12
Storage Length (ft)	170			250	0	80
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Right Turn on Red				No		No
Link Speed (mph)		35	35		25	
Link Distance (ft)		949	1060		282	
Travel Time (s)		18.5	20.6		7.7	
Confl. Peds. (#/hr)	7			7		3
Confl. Bikes (#/hr)				4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	17	935	2098	0	169	0
v/c Ratio	0.19	0.41	1.04		1.27	
Control Delay	46.1	8.6	51.7		209.5	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	46.1	8.6	51.7		209.5	
Queue Length 50th (ft)	12	64	617		~151	
Queue Length 95th (ft)	m13	m318	#1262		#288	
Internal Link Dist (ft)		869	980		202	
Turn Bay Length (ft)	170					
Base Capacity (vph)	89	2304	2017		133	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.19	0.41	1.04		1.27	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	16	860	1895	35	80	75
Future Volume (vph)	16	860	1895	35	80	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	12	12
Total Lost time (s)	5.5	6.0	6.0		4.5	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		0.99	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	1.00		0.93	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1516	3032	3100		1541	
Flt Permitted	0.95	1.00	1.00		0.97	
Satd. Flow (perm)	1516	3032	3100		1541	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	935	2060	38	87	82
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	17	935	2098	0	169	0
Confl. Peds. (#/hr)	7			7		3
Confl. Bikes (#/hr)				4		
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Turn Type	Prot	NA	NA		Prot	
Protected Phases	6	1 6	1		5	
Permitted Phases						
Actuated Green, G (s)	6.5	78.0	66.0		9.5	
Effective Green, g (s)	6.5	72.5	66.0		9.5	
Actuated g/C Ratio	0.06	0.66	0.60		0.09	
Clearance Time (s)	5.5		6.0		4.5	
Vehicle Extension (s)	2.0		3.0		2.0	
Lane Grp Cap (vph)	89	1998	1860		133	
v/s Ratio Prot	0.01	c0.31	c0.68		c0.11	
v/s Ratio Perm						
v/c Ratio	0.19	0.47	1.13		1.27	
Uniform Delay, d1	49.2	9.2	22.0		50.2	
Progression Factor	0.88	1.22	1.00		1.00	
Incremental Delay, d2	0.2	0.0	65.1		167.9	
Delay (s)	43.7	11.3	87.1		218.1	
Level of Service	D	B	F		F	
Approach Delay (s)		11.8	87.1		218.1	
Approach LOS		B	F		F	

Intersection Summary			
HCM 2000 Control Delay	71.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	50	900	310	190	5	15	65	5	2	1190
Future Volume (vph)	50	900	310	190	5	15	65	5	2	1190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100			0	0		0		0	0
Storage Lanes	1			0	0		0		1	2
Taper Length (ft)	25				25				25	
Right Turn on Red				Yes			Yes			
Link Speed (mph)		35	35			25			30	
Link Distance (ft)		279	170			125			548	
Travel Time (s)		5.4	3.3			3.4			12.5	
Confl. Peds. (#/hr)	3			3					3	
Confl. Bikes (#/hr)				3						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	1%	0%	0%	0%	0%	0%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)										33%
Lane Group Flow (vph)	54	978	544	0	0	92	0	0	434	866
v/c Ratio	0.19	1.79	0.37			0.56			0.66	0.72
Control Delay	51.9	394.8	6.1			34.2			35.5	35.1
Queue Delay	0.0	0.1	0.7			1.7			57.7	52.5
Total Delay	51.9	394.9	6.8			35.8			93.2	87.7
Queue Length 50th (ft)	43	~700	28			19			302	345
Queue Length 95th (ft)	85	#836	39			78			429	431
Internal Link Dist (ft)		199	90			45			468	
Turn Bay Length (ft)	100									
Base Capacity (vph)	278	547	1471			164			658	1197
Starvation Cap Reductn	0	0	562			0			0	0
Spillback Cap Reductn	0	5	0			16			343	624
Storage Cap Reductn	0	0	0			0			0	0
Reduced v/c Ratio	0.19	1.80	0.60			0.62			1.38	1.51

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	50	900	310	190	5	15	65	5	2	1190
Future Volume (vph)	50	900	310	190	5	15	65	5	2	1190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	8.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95	0.95			1.00			1.00	0.91
Frpb, ped/bikes	1.00	1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.94			0.90			0.85	0.85
Flt Protected	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1624	3191	3023			1528			1442	2619
Flt Permitted	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1624	3191	3023			1528			1442	2619
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	978	337	207	5	16	71	5	2	1293
RTOR Reduction (vph)	0	0	65	0	0	66	0	0	0	0
Lane Group Flow (vph)	54	978	479	0	0	26	0	0	434	866
Confl. Peds. (#/hr)	3			3					3	
Confl. Bikes (#/hr)				3						
Heavy Vehicles (%)	0%	1%	0%	1%	0%	0%	0%	0%	0%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Turn Type	Split	NA	NA		Split	NA		Perm	pm+pt	custom
Protected Phases	3	3	4 5		2	2			1	1 5
Permitted Phases								1 5	5	1 5
Actuated Green, G (s)	24.0	24.0	68.0			9.0			59.0	64.0
Effective Green, g (s)	24.0	24.0	68.0			9.0			59.0	64.0
Actuated g/C Ratio	0.17	0.17	0.49			0.06			0.42	0.46
Clearance Time (s)	5.0	5.0				5.0			5.0	
Vehicle Extension (s)	2.0	2.0				2.0			2.0	
Lane Grp Cap (vph)	278	547	1468			98			659	1197
v/s Ratio Prot	0.03	c0.31	c0.16			c0.02			0.09	c0.33
v/s Ratio Perm									0.21	
v/c Ratio	0.19	1.79	0.33			0.26			0.66	0.72
Uniform Delay, d1	49.7	58.0	22.0			62.3			33.5	30.8
Progression Factor	1.00	1.00	0.30			1.00			1.00	1.00
Incremental Delay, d2	1.6	361.9	0.0			0.5			2.6	2.3
Delay (s)	51.3	419.9	6.6			62.9			36.2	33.2
Level of Service	D	F	A			E			D	C
Approach Delay (s)		400.6	6.6			62.9			34.2	
Approach LOS		F	A			E			C	

Intersection Summary			
HCM 2000 Control Delay	157.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1625	530	10	320	0	0	0	0	370	305	180
Future Volume (vph)	0	1625	530	10	320	0	0	0	0	370	305	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	13	12	12	12	12	12	12	11	11	11
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		170			86			306			262	
Travel Time (s)		3.3			1.7			7.0			6.0	
Confl. Peds. (#/hr)			16	16								24
Confl. Bikes (#/hr)			4									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)			0%							43%		
Lane Group Flow (vph)	0	1766	576	0	359	0	0	0	0	229	505	196
v/c Ratio		0.94	0.72		0.33					1.12	1.20	0.55
Control Delay		29.5	11.6		1.0					152.8	159.4	13.2
Queue Delay		46.3	53.8		0.0					0.0	0.0	0.0
Total Delay		75.8	65.5		1.0					152.8	159.4	13.2
Queue Length 50th (ft)		429	203		1					~263	~304	0
Queue Length 95th (ft)		m354	m168		1					#452	#427	76
Internal Link Dist (ft)		90			6			226			182	
Turn Bay Length (ft)												
Base Capacity (vph)		1870	796		1103					204	422	356
Starvation Cap Reductn		914	342		0					0	0	0
Spillback Cap Reductn		0	0		0					0	0	0
Storage Cap Reductn		0	0		0					0	0	0
Reduced v/c Ratio		1.85	1.27		0.33					1.12	1.20	0.55

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1625	530	10	320	0	0	0	0	370	305	180
Future Volume (vph)	0	1625	530	10	320	0	0	0	0	370	305	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	13	12	12	12	12	12	12	11	11	11
Total Lost time (s)		5.0	5.0		5.0					8.0	8.0	8.0
Lane Util. Factor		0.86	0.86		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	0.94
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		4223	1260		3244					1429	2958	1319
Flt Permitted		1.00	1.00		0.95					0.95	0.98	1.00
Satd. Flow (perm)		4223	1260		3103					1429	2958	1319
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1766	576	11	348	0	0	0	0	402	332	196
RTOR Reduction (vph)	0	0	238	0	0	0	0	0	0	0	0	168
Lane Group Flow (vph)	0	1766	338	0	359	0	0	0	0	229	505	28
Confl. Peds. (#/hr)			16	16								24
Confl. Bikes (#/hr)			4									
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		1 2 3		5	1 5					4	4	
Permitted Phases			1 2 3									4
Actuated Green, G (s)		62.0	62.0		59.0					20.0	20.0	20.0
Effective Green, g (s)		62.0	62.0		59.0					20.0	20.0	20.0
Actuated g/C Ratio		0.44	0.44		0.42					0.14	0.14	0.14
Clearance Time (s)										8.0	8.0	8.0
Vehicle Extension (s)										2.0	2.0	2.0
Lane Grp Cap (vph)		1870	558		1347					204	422	188
v/s Ratio Prot		c0.42			c0.08					0.16	c0.17	
v/s Ratio Perm			0.27		0.04							0.02
v/c Ratio		0.94	0.60		0.27					1.12	1.20	0.15
Uniform Delay, d1		37.3	29.7		26.4					60.0	60.0	52.5
Progression Factor		0.74	1.42		0.02					1.00	1.00	1.00
Incremental Delay, d2		1.2	0.1		0.1					99.8	109.5	0.1
Delay (s)		28.8	42.2		0.6					159.8	169.5	52.7
Level of Service		C	D		A					F	F	D
Approach Delay (s)		32.1			0.6			0.0			142.5	
Approach LOS		C			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	57.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	910	540	0	0	0	0	1020	35	85	730	0
Future Volume (vph)	280	910	540	0	0	0	0	1020	35	85	730	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	11	11	12	11	11
Right Turn on Red			No			No			Yes			No
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		951			939			563			1007	
Travel Time (s)		25.9			32.0			11.0			19.6	
Confl. Peds. (#/hr)	11		28						3	3		
Confl. Bikes (#/hr)			9									9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1293	587	0	0	0	0	1147	0	0	885	0
v/c Ratio		1.03	1.01					0.93			1.06	
Control Delay		64.9	69.1					55.0			81.9	
Queue Delay		0.0	0.0					0.0			0.0	
Total Delay		64.9	69.1					55.0			81.9	
Queue Length 50th (ft)		646	557					522			~335	
Queue Length 95th (ft)		#1050	#1013					#668			#500	
Internal Link Dist (ft)		871			859			483			927	
Turn Bay Length (ft)												
Base Capacity (vph)		1254	581					1228			834	
Starvation Cap Reductn		0	0					0			0	
Spillback Cap Reductn		0	0					0			0	
Storage Cap Reductn		0	0					0			0	
Reduced v/c Ratio		1.03	1.01					0.93			1.06	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	910	540	0	0	0	0	1020	35	85	730	0
Future Volume (vph)	280	910	540	0	0	0	0	1020	35	85	730	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	11	11	12	11	11
Total Lost time (s)		6.0	6.0					5.0			6.0	
Lane Util. Factor		0.95	1.00					0.95			0.95	
Frpb, ped/bikes		1.00	1.00					1.00			1.00	
Flpb, ped/bikes		0.99	1.00					1.00			1.00	
Frt		1.00	0.85					1.00			1.00	
Flt Protected		0.99	1.00					1.00			0.99	
Satd. Flow (prot)		3138	1454					3123			3124	
Flt Permitted		0.99	1.00					1.00			0.50	
Satd. Flow (perm)		3138	1454					3123			1582	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	989	587	0	0	0	0	1109	38	92	793	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	1293	587	0	0	0	0	1145	0	0	885	0
Confl. Peds. (#/hr)	11		28						3	3		
Confl. Bikes (#/hr)			9									9
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Prot					NA		pm+pt	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4									6		
Actuated Green, G (s)		52.8	52.8					55.0			67.0	
Effective Green, g (s)		52.8	52.8					55.0			67.0	
Actuated g/C Ratio		0.38	0.38					0.39			0.48	
Clearance Time (s)		6.0	6.0					5.0			6.0	
Vehicle Extension (s)		2.0	2.0					2.0			2.0	
Lane Grp Cap (vph)		1183	548					1226			845	
v/s Ratio Prot			0.40					0.37			c0.06	
v/s Ratio Perm		0.41									c0.44	
v/c Ratio		1.09	1.07					0.93			1.05	
Uniform Delay, d1		43.6	43.6					40.8			36.5	
Progression Factor		0.88	0.88					1.00			1.00	
Incremental Delay, d2		51.1	51.4					12.7			44.1	
Delay (s)		89.5	89.7					53.5			80.6	
Level of Service		F	F					D			F	
Approach Delay (s)		89.6			0.0			53.5			80.6	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	77.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	108.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	1130	115	550	765	0	0	735	360
Future Volume (vph)	0	0	0	100	1130	115	550	765	0	0	735	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	12	11	11	12	12	11	11
Storage Length (ft)	0		0	0		280	0		0	0		0
Storage Lanes	0		0	0		1	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			Yes
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		984			1074			1007			813	
Travel Time (s)		26.8			29.3			19.6			15.8	
Confl. Peds. (#/hr)						54	73		27			73
Confl. Bikes (#/hr)						17						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1462	0	598	832	0	0	1190	0
v/c Ratio					1.29		1.47	0.83			1.22	
Control Delay					175.2		254.9	27.4			142.3	
Queue Delay					0.0		0.0	0.0			0.0	
Total Delay					175.2		254.9	27.4			142.3	
Queue Length 50th (ft)					~529		~594	478			~591	
Queue Length 95th (ft)					#628		#820	691			#730	
Internal Link Dist (ft)		904			994			927			733	
Turn Bay Length (ft)												
Base Capacity (vph)					1131		408	1005			977	
Starvation Cap Reductn					0		0	0			0	
Spillback Cap Reductn					0		0	0			0	
Storage Cap Reductn					0		0	0			0	
Reduced v/c Ratio					1.29		1.47	0.83			1.22	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	1130	115	550	765	0	0	735	360
Future Volume (vph)	0	0	0	100	1130	115	550	765	0	0	735	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	12	11	11	12	12	11	11
Total Lost time (s)					10.0		5.0	6.0			6.0	
Lane Util. Factor					0.91		1.00	1.00			0.95	
Frpb, ped/bikes					0.99		1.00	1.00			0.95	
Flpb, ped/bikes					1.00		1.00	1.00			1.00	
Frt					0.99		1.00	1.00			0.95	
Flt Protected					1.00		0.95	1.00			1.00	
Satd. Flow (prot)					4348		1570	1653			2816	
Flt Permitted					1.00		0.09	1.00			1.00	
Satd. Flow (perm)					4348		141	1653			2816	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	109	1228	125	598	832	0	0	799	391
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	15	0
Lane Group Flow (vph)	0	0	0	0	1453	0	598	832	0	0	1175	0
Confl. Peds. (#/hr)						54	73		27			73
Confl. Bikes (#/hr)						17						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Turn Type				Split	NA		pm+pt	NA			NA	
Protected Phases				4	4		1	6			2	
Permitted Phases							6					
Actuated Green, G (s)					31.0		74.0	73.0			41.0	
Effective Green, g (s)					31.0		74.0	73.0			41.0	
Actuated g/C Ratio					0.26		0.62	0.61			0.34	
Clearance Time (s)					10.0		5.0	6.0			6.0	
Vehicle Extension (s)					2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)					1123		408	1005			962	
v/s Ratio Prot					c0.33		c0.33	0.50			0.42	
v/s Ratio Perm							c0.57					
v/c Ratio					1.29		1.47	0.83			1.22	
Uniform Delay, d1					44.5		40.5	18.5			39.5	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					139.0		222.6	7.8			109.0	
Delay (s)					183.5		263.1	26.4			148.5	
Level of Service					F		F	C			F	
Approach Delay (s)		0.0			183.5			125.4			148.5	
Approach LOS		A			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	152.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	118.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	655	1080	660	0	0	0	0	0	685	35
Future Volume (vph)	0	0	655	1080	660	0	0	0	0	0	685	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No	No		No			No			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		515			260			938			1824	
Travel Time (s)		14.0			7.1			21.3			41.5	
Confl. Peds. (#/hr)			21	21								7
Confl. Bikes (#/hr)			16									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	712	1174	717	0	0	0	0	0	783	0
v/c Ratio			1.52	1.06	0.74						1.55	
Control Delay			276.0	48.8	7.5						286.8	
Queue Delay			0.0	15.8	2.1						0.0	
Total Delay			276.0	64.6	9.5						286.8	
Queue Length 50th (ft)			~325	~358	111						~336	
Queue Length 95th (ft)			#446	m80	m66						#454	
Internal Link Dist (ft)		435			180			858			1744	
Turn Bay Length (ft)			100									
Base Capacity (vph)			467	1105	973						505	
Starvation Cap Reductn			0	161	134						0	
Spillback Cap Reductn			0	0	0						0	
Storage Cap Reductn			0	0	0						0	
Reduced v/c Ratio			1.52	1.24	0.85						1.55	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	655	1080	660	0	0	0	0	0	685	35
Future Volume (vph)	0	0	655	1080	660	0	0	0	0	0	685	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)			9.0	6.0	6.0						5.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2473	3016	1653						3220	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2473	3016	1653						3220	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	712	1174	717	0	0	0	0	0	745	38
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	712	1174	717	0	0	0	0	0	779	0
Confl. Peds. (#/hr)			21	21								7
Confl. Bikes (#/hr)			16									
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type			Prot	Prot	NA						NA	
Protected Phases			2	1 4	1 2 4						3	
Permitted Phases												
Actuated Green, G (s)			17.0	40.0	62.0						14.0	
Effective Green, g (s)			17.0	40.0	57.0						14.0	
Actuated g/C Ratio			0.19	0.44	0.63						0.16	
Clearance Time (s)			9.0								5.0	
Vehicle Extension (s)			2.0								2.0	
Lane Grp Cap (vph)			467	1340	1046						500	
v/s Ratio Prot			c0.29	c0.39	0.43						c0.24	
v/s Ratio Perm												
v/c Ratio			1.52	0.88	0.69						1.56	
Uniform Delay, d1			36.5	22.7	10.7						38.0	
Progression Factor			1.00	0.54	0.88						1.00	
Incremental Delay, d2			246.8	0.7	0.1						260.6	
Delay (s)			283.3	12.9	9.5						298.6	
Level of Service			F	B	A						F	
Approach Delay (s)		283.3			11.6			0.0			298.6	
Approach LOS		F			B			A			F	

Intersection Summary			
HCM 2000 Control Delay	135.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	123.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	615	15	20	610	65	15	0	40	0	0	0
Future Volume (Veh/h)	20	615	15	20	610	65	15	0	40	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	668	16	22	663	71	16	0	43	0	0	0
Pedestrians		59						77			19	
Lane Width (ft)		11.0						12.0			0.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		5						6			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		740			515							
pX, platoon unblocked	0.71			0.73			0.84	0.84	0.73	0.84	0.84	0.71
vC, conflicting volume	753			761			1598	1594	753	1516	1566	776
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	442			488			895	890	477	798	857	475
tC, single (s)	4.1			4.2			7.2	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.6	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			97			91	100	89	100	100	100
cM capacity (veh/h)	786			707			176	211	400	209	220	400

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	22	684	756	59
Volume Left	22	0	22	16
Volume Right	0	16	71	43
cSH	786	1700	707	297
Volume to Capacity	0.03	0.40	0.03	0.20
Queue Length 95th (ft)	2	0	2	18
Control Delay (s)	9.7	0.0	0.8	20.1
Lane LOS	A		A	C
Approach Delay (s)	0.3		0.8	20.1
Approach LOS				C

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	68.7%	ICU Level of Service		C
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	535	5	30	550	55	10	5	15	90	20	70
Future Volume (vph)	40	535	5	30	550	55	10	5	15	90	20	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	12	12	12	12	12
Storage Length (ft)	110		0	140		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			No			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		606			740			131			150	
Travel Time (s)		16.5			20.2			3.6			4.1	
Confl. Peds. (#/hr)	21		29	29		21	4					4
Confl. Bikes (#/hr)			16			46			2			2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	22%	24%	3%	12%	0%	0%	14%	0%	0%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	43	587	0	33	658	0	0	16	16	0	196	0
v/c Ratio	0.19	0.67		0.15	0.76			0.15	0.20		1.11	
Control Delay	21.6	26.1		20.8	29.8			46.7	49.5		139.5	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	21.6	26.1		20.8	29.8			46.7	49.5		139.5	
Queue Length 50th (ft)	10	205		8	252			10	10		~129	
Queue Length 95th (ft)	52	#626		41	#736			31	31		#272	
Internal Link Dist (ft)		526			660			51			70	
Turn Bay Length (ft)	110			140								
Base Capacity (vph)	230	881		224	864			231	174		176	
Starvation Cap Reductn	0	0		0	0			0	0		0	
Spillback Cap Reductn	0	0		0	0			0	0		0	
Storage Cap Reductn	0	0		0	0			0	0		0	
Reduced v/c Ratio	0.19	0.67		0.15	0.76			0.07	0.09		1.11	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	535	5	30	550	55	10	5	15	90	20	70
Future Volume (vph)	40	535	5	30	550	55	10	5	15	90	20	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.96		0.98	
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.99			1.00	0.85		0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.98	
Satd. Flow (prot)	1506	1530		1210	1506			1653	1227		1540	
Flt Permitted	0.25	1.00		0.31	1.00			0.97	1.00		0.98	
Satd. Flow (perm)	401	1530		392	1506			1653	1227		1540	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	582	5	33	598	60	11	5	16	98	22	76
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	23	0
Lane Group Flow (vph)	43	587	0	33	658	0	0	16	16	0	174	0
Confl. Peds. (#/hr)	21		29	29		21	4					4
Confl. Bikes (#/hr)			16			46			2			2
Heavy Vehicles (%)	0%	4%	22%	24%	3%	12%	0%	0%	14%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Split	NA	Perm	Split	NA	
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6			2					8			
Actuated Green, G (s)	52.4	52.4		52.4	52.4			4.2	4.2		10.0	
Effective Green, g (s)	52.4	52.4		52.4	52.4			4.2	4.2		10.0	
Actuated g/C Ratio	0.52	0.52		0.52	0.52			0.04	0.04		0.10	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0		1.0	1.0			2.0	2.0		2.0	
Lane Grp Cap (vph)	210	801		205	789			69	51		154	
v/s Ratio Prot		0.38			c0.44			0.01			c0.11	
v/s Ratio Perm	0.11			0.08					c0.01			
v/c Ratio	0.20	0.73		0.16	0.83			0.23	0.31		1.13	
Uniform Delay, d1	12.7	18.4		12.4	20.1			46.3	46.5		45.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	2.2	5.9		1.7	10.1			0.6	1.3		110.6	
Delay (s)	14.9	24.3		14.0	30.2			47.0	47.8		155.6	
Level of Service	B	C		B	C			D	D		F	
Approach Delay (s)		23.6			29.4			47.4			155.6	
Approach LOS		C			C			D			F	

Intersection Summary			
HCM 2000 Control Delay	43.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	450	5	1	550	75	5	20	0	60	10	0
Future Volume (Veh/h)	1	450	5	1	550	75	5	20	0	60	10	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	489	5	1	598	82	5	22	0	65	11	0
Pedestrians					29			29			21	
Lane Width (ft)					11.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					2			2			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		547			464							
pX, platoon unblocked	0.72			0.87			0.78	0.78	0.87	0.78	0.78	0.72
vC, conflicting volume	701			523			1169	1226	550	1196	1187	660
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	389			377			705	777	408	739	728	332
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	91	100	71	96	100
cM capacity (veh/h)	826			1003			252	246	534	226	263	501

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	495	681	27	76
Volume Left	1	1	5	65
Volume Right	5	82	0	0
cSH	826	1003	247	231
Volume to Capacity	0.00	0.00	0.11	0.33
Queue Length 95th (ft)	0	0	9	34
Control Delay (s)	0.0	0.0	21.4	28.1
Lane LOS	A	A	C	D
Approach Delay (s)	0.0	0.0	21.4	28.1
Approach LOS			C	D

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	540	10	15	615	1	25	1	40	1	1	1
Future Volume (vph)	1	540	10	15	615	1	25	1	40	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	13	13	13	12	12	12
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		464			606			294			154	
Travel Time (s)		12.7			16.5			8.0			4.2	
Confl. Peds. (#/hr)	21		29	29		21	29		29	29		29
Confl. Bikes (#/hr)			16			46						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	599	0	0	685	0	0	71	0	0	3	0
v/c Ratio		0.53			0.61			0.50			0.03	
Control Delay		15.3			17.0			31.1			32.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		15.3			17.0			31.1			32.3	
Queue Length 50th (ft)		74			94			15			1	
Queue Length 95th (ft)		#560			#668			55			9	
Internal Link Dist (ft)		384			526			214			74	
Turn Bay Length (ft)												
Base Capacity (vph)		1135			1130			175			157	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.53			0.61			0.41			0.02	

Intersection Summary	
Area Type:	CBD

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	540	10	15	615	1	25	1	40	1	1	1
Future Volume (vph)	1	540	10	15	615	1	25	1	40	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	13	13	13	12	12	12
Total Lost time (s)		5.5			5.5			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.87			0.93	
Flpb, ped/bikes		1.00			1.00			0.93			0.95	
Frt		1.00			1.00			0.92			0.95	
Flt Protected		1.00			1.00			0.98			0.98	
Satd. Flow (prot)		1584			1603			1257			1389	
Flt Permitted		1.00			0.98			0.87			0.93	
Satd. Flow (perm)		1584			1578			1120			1314	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	587	11	16	668	1	27	1	43	1	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	40	0	0	1	0
Lane Group Flow (vph)	0	599	0	0	685	0	0	31	0	0	2	0
Confl. Peds. (#/hr)	21		29	29		21	29		29	29		29
Confl. Bikes (#/hr)			16			46						
Heavy Vehicles (%)	2%	4%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			5			5	
Permitted Phases	1			1			5			5		
Actuated Green, G (s)		55.4			55.4			6.6			6.6	
Effective Green, g (s)		55.4			55.4			6.6			6.6	
Actuated g/C Ratio		0.62			0.62			0.07			0.07	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		975			971			82			96	
v/s Ratio Prot												
v/s Ratio Perm		0.38			c0.43			c0.03			0.00	
v/c Ratio		0.61			0.71			0.38			0.02	
Uniform Delay, d1		10.7			11.8			39.7			38.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.9			4.3			1.1			0.0	
Delay (s)		13.6			16.1			40.8			38.7	
Level of Service		B			B			D			D	
Approach Delay (s)		13.6			16.1			40.8			38.7	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	45	45	0	10	85	5	450	0	25	600	5
Future Volume (Veh/h)	30	45	45	0	10	85	5	450	0	25	600	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	49	49	0	11	92	5	489	0	27	652	5
Pedestrians		113			85						37	
Lane Width (ft)		12.0			13.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		9			8						3	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								491				
pX, platoon unblocked	0.76	0.76		0.76	0.76	0.76				0.76		
vC, conflicting volume	1455	1406	768	1366	1408	611	770			574		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1441	1376	768	1325	1380	336	770			288		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	29	45	87	100	88	81	99			97		
cM capacity (veh/h)	46	89	364	40	89	482	765			899		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	131	103	494	684
Volume Left	33	0	5	27
Volume Right	49	92	0	5
cSH	94	328	765	899
Volume to Capacity	1.40	0.31	0.01	0.03
Queue Length 95th (ft)	243	33	0	2
Control Delay (s)	311.7	21.0	0.2	0.8
Lane LOS	F	C	A	A
Approach Delay (s)	311.7	21.0	0.2	0.8
Approach LOS	F	C		

Intersection Summary			
Average Delay	30.9		
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑	↑↑			↱
Traffic Volume (veh/h)	0	950	320	0	0	1610
Future Volume (Veh/h)	0	950	320	0	0	1610
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1033	348	0	0	1750
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1190	279			
pX, platoon unblocked					0.88	
vC, conflicting volume	348				864	174
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	348				569	174
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	1215				397	839

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	516	516	174	174	1750
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	1750
cSH	1700	1700	1700	1700	839
Volume to Capacity	0.30	0.30	0.10	0.10	2.09
Queue Length 95th (ft)	0	0	0	0	2984
Control Delay (s)	0.0	0.0	0.0	0.0	505.8
Lane LOS					F
Approach Delay (s)	0.0		0.0		505.8
Approach LOS					F

Intersection Summary			
Average Delay	282.7		
Intersection Capacity Utilization	115.2%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	385	1610	0	0	0	0	330	100	120	0	0	0
Future Volume (vph)	385	1610	0	0	0	0	330	100	120	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	12	11	11	12	12	12
Right Turn on Red			No			No			Yes			No
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		86			951			304			1156	
Travel Time (s)		1.7			18.5			6.9			26.3	
Confl. Peds. (#/hr)	3								24			
Confl. Bikes (#/hr)									9			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)							19%					
Lane Group Flow (vph)	0	2168	0	0	0	0	291	307	0	0	0	0
v/c Ratio		0.76					0.66	0.72				
Control Delay		0.7					52.5	52.0				
Queue Delay		0.0					0.0	0.0				
Total Delay		0.7					52.5	52.0				
Queue Length 50th (ft)		0					246	244				
Queue Length 95th (ft)		m0					358	366				
Internal Link Dist (ft)		6			871			224			1076	
Turn Bay Length (ft)												
Base Capacity (vph)		2849					440	426				
Starvation Cap Reductn		0					0	0				
Spillback Cap Reductn		0					0	0				
Storage Cap Reductn		0					0	0				
Reduced v/c Ratio		0.76					0.66	0.72				

Intersection Summary	
Area Type:	CBD

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	385	1610	0	0	0	0	330	100	120	0	0	0
Future Volume (vph)	385	1610	0	0	0	0	330	100	120	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	12	11	11	12	12	12
Total Lost time (s)		5.0					5.0	5.0				
Lane Util. Factor		0.91					0.95	0.95				
Frpb, ped/bikes		1.00					1.00	0.98				
Flpb, ped/bikes		1.00					1.00	1.00				
Frt		1.00					1.00	0.94				
Flt Protected		0.99					0.95	0.99				
Satd. Flow (prot)		4434					1543	1428				
Flt Permitted		0.99					0.95	0.99				
Satd. Flow (perm)		4434					1543	1428				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	418	1750	0	0	0	0	359	109	130	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	2168	0	0	0	0	291	288	0	0	0	0
Confl. Peds. (#/hr)	3								24			
Confl. Bikes (#/hr)									9			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Split	NA					Split	NA				
Protected Phases	1 2 3 4	1 2 3 4					5	5				
Permitted Phases												
Actuated Green, G (s)		87.0					40.0	40.0				
Effective Green, g (s)		87.0					40.0	40.0				
Actuated g/C Ratio		0.62					0.29	0.29				
Clearance Time (s)							5.0	5.0				
Vehicle Extension (s)							4.0	4.0				
Lane Grp Cap (vph)		2755					440	408				
v/s Ratio Prot		c0.49					0.19	c0.20				
v/s Ratio Perm												
v/c Ratio		0.79					0.66	0.71				
Uniform Delay, d1		19.6					44.0	44.8				
Progression Factor		0.01					1.00	1.00				
Incremental Delay, d2		0.4					4.1	5.9				
Delay (s)		0.5					48.1	50.7				
Level of Service		A					D	D				
Approach Delay (s)		0.5			0.0			49.4			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	142	10	320	186	850	0	0	635	30
Future Volume (vph)	0	0	0	142	10	320	186	850	0	0	635	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	10	12	12	10	10
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		590			353			178			774	
Travel Time (s)		13.4			8.0			4.9			21.1	
Confl. Peds. (#/hr)						56	224					224
Confl. Bikes (#/hr)						32						39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	165	348	0	1126	0	0	723	0
v/c Ratio					1.76	0.77		0.96			0.93	
Control Delay					409.9	22.1		17.6			33.0	
Queue Delay					17.9	0.0		42.4			26.7	
Total Delay					427.8	22.1		60.0			59.7	
Queue Length 50th (ft)					~157	49		323			355	
Queue Length 95th (ft)					#288	131		m306			m#197	
Internal Link Dist (ft)		510			273			98			694	
Turn Bay Length (ft)												
Base Capacity (vph)					94	504		1167			775	
Starvation Cap Reductn					0	0		240			0	
Spillback Cap Reductn					43	0		0			88	
Storage Cap Reductn					0	0		0			0	
Reduced v/c Ratio					3.24	0.69		1.21			1.05	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	142	10	320	186	850	0	0	635	30
Future Volume (vph)	0	0	0	142	10	320	186	850	0	0	635	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	12	12	10	10
Total Lost time (s)					4.0	4.0		4.0			4.0	
Lane Util. Factor					1.00	1.00		0.95			1.00	
Frpb, ped/bikes					1.00	1.00		1.00			0.98	
Flpb, ped/bikes					1.00	1.00		0.99			1.00	
Frt					1.00	0.85		1.00			0.99	
Flt Protected					0.96	1.00		0.99			1.00	
Satd. Flow (prot)					1579	1405		2971			1547	
Flt Permitted					0.96	1.00		0.62			1.00	
Satd. Flow (perm)					1579	1405		1847			1547	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	154	11	348	202	924	0	0	690	33
RTOR Reduction (vph)	0	0	0	0	0	207	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	165	141	0	1126	0	0	722	0
Confl. Peds. (#/hr)						56	224					224
Confl. Bikes (#/hr)						32						39
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Turn Type				Split	NA	custom	custom	NA			NA	
Protected Phases				8	8	1 8		2 4 9 11			6	
Permitted Phases							2 4					
Actuated Green, G (s)					6.0	17.6		61.4			50.0	
Effective Green, g (s)					6.0	17.6		55.4			50.0	
Actuated g/C Ratio					0.06	0.18		0.55			0.50	
Clearance Time (s)					4.0						4.0	
Vehicle Extension (s)					2.0						2.0	
Lane Grp Cap (vph)					94	247		1023			773	
v/s Ratio Prot					c0.10	0.10					c0.47	
v/s Ratio Perm								c0.61				
v/c Ratio					1.76	0.57		1.10			0.93	
Uniform Delay, d1					47.0	37.7		22.3			23.4	
Progression Factor					1.00	1.00		0.69			0.83	
Incremental Delay, d2					379.7	2.0		47.0			11.9	
Delay (s)					426.7	39.7		62.4			31.4	
Level of Service					F	D		E			C	
Approach Delay (s)		0.0			164.2			62.4			31.4	
Approach LOS		A			F			E			C	

Intersection Summary			
HCM 2000 Control Delay	75.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	90.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1585	455	155	330	0	0	0	0
Future Volume (vph)	0	0	0	0	1585	455	155	330	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	11	11	11	12	12	12
Right Turn on Red			No			No	No		Yes			No
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		260			984			1156			2190	
Travel Time (s)		7.1			26.8			26.3			49.8	
Confl. Peds. (#/hr)						83						
Confl. Bikes (#/hr)						30						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2218	0	0	527	0	0	0	0
v/c Ratio					1.39			0.90				
Control Delay					208.5			56.8				
Queue Delay					0.3			5.0				
Total Delay					208.7			61.8				
Queue Length 50th (ft)					~623			155				
Queue Length 95th (ft)					#718			#250				
Internal Link Dist (ft)		180			904			1076			2110	
Turn Bay Length (ft)												
Base Capacity (vph)					1590			583				
Starvation Cap Reductn					0			0				
Spillback Cap Reductn					118			30				
Storage Cap Reductn					0			0				
Reduced v/c Ratio					1.51			0.95				

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1585	455	155	330	0	0	0	0
Future Volume (vph)	0	0	0	0	1585	455	155	330	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)					6.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.97			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.97			1.00				
Flt Protected					1.00			0.98				
Satd. Flow (prot)					4335			3091				
Flt Permitted					1.00			0.98				
Satd. Flow (perm)					4335			3091				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1723	495	168	359	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2218	0	0	527	0	0	0	0
Confl. Peds. (#/hr)						83						
Confl. Bikes (#/hr)						30						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					33.0			17.0				
Effective Green, g (s)					33.0			17.0				
Actuated g/C Ratio					0.37			0.19				
Clearance Time (s)					6.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1589			583				
v/s Ratio Prot					c0.51							
v/s Ratio Perm								0.17				
v/c Ratio					1.40			0.90				
Uniform Delay, d1					28.5			35.7				
Progression Factor					1.00			1.00				
Incremental Delay, d2					182.0			17.1				
Delay (s)					210.5			52.8				
Level of Service					F			D				
Approach Delay (s)		0.0			210.5			52.8			0.0	
Approach LOS		A			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	180.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	123.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Intersection Capacity Analysis Worksheets

2030 Build Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1040	365	0	645	100	0	865	185	0	445	2
Future Volume (vph)	0	1040	365	0	645	100	0	865	185	0	445	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Right Turn on Red			No			No			No			No
Link Speed (mph)		35			35			25			20	
Link Distance (ft)		710			2667			622			624	
Travel Time (s)		13.8			52.0			17.0			21.3	
Confl. Peds. (#/hr)			88			37			171			131
Confl. Bikes (#/hr)			60						55			45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	1%	10%	0%	6%	1%	0%	14%	50%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1527	0	0	810	0	0	1141	0	0	486	0
v/c Ratio		1.32			0.66			1.05			0.86	
Control Delay		176.8			27.5			65.6			45.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		176.8			27.5			65.6			45.0	
Queue Length 50th (ft)		~664			216			~406			280	
Queue Length 95th (ft)		#801			284			#546			#467	
Internal Link Dist (ft)		630			2587			542			544	
Turn Bay Length (ft)												
Base Capacity (vph)		1160			1236			1087			568	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.32			0.66			1.05			0.86	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1040	365	0	645	100	0	865	185	0	445	2
Future Volume (vph)	0	1040	365	0	645	100	0	865	185	0	445	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		11.0			11.0			11.0			11.0	
Lane Util. Factor		0.95			0.95			0.95			1.00	
Frpb, ped/bikes		0.94			0.99			0.95			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.98			0.97			1.00	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		2902			3091			2860			1496	
Flt Permitted		1.00			1.00			1.00			1.00	
Satd. Flow (perm)		2902			3091			2860			1496	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1130	397	0	701	109	0	940	201	0	484	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1527	0	0	810	0	0	1141	0	0	486	0
Confl. Peds. (#/hr)			88			37			171			131
Confl. Bikes (#/hr)			60						55			45
Heavy Vehicles (%)	0%	1%	0%	0%	1%	10%	0%	6%	1%	0%	14%	50%
Turn Type		NA			NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases												
Actuated Green, G (s)		40.0			40.0			38.0			38.0	
Effective Green, g (s)		40.0			40.0			38.0			38.0	
Actuated g/C Ratio		0.40			0.40			0.38			0.38	
Clearance Time (s)		11.0			11.0			11.0			11.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		1160			1236			1086			568	
v/s Ratio Prot		c0.53			0.26			c0.40			0.32	
v/s Ratio Perm												
v/c Ratio		1.32			0.66			1.05			0.86	
Uniform Delay, d1		30.0			24.4			31.0			28.5	
Progression Factor		1.00			1.00			0.87			1.00	
Incremental Delay, d2		148.6			1.0			38.0			15.2	
Delay (s)		178.6			25.4			64.8			43.7	
Level of Service		F			C			E			D	
Approach Delay (s)		178.6			25.4			64.8			43.7	
Approach LOS		F			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	98.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	99.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	361	10	165	0	0	0	0	525	40	417	415	0
Future Volume (vph)	361	10	165	0	0	0	0	525	40	417	415	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	10	10	10	10	12
Storage Length (ft)	0		0	0		0	0		300	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		595			501			1930			178	
Travel Time (s)		13.5			11.4			52.6			4.9	
Confl. Peds. (#/hr)			42						266	266		
Confl. Bikes (#/hr)			2						82			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	7%	0%	0%	0%	0%	5%	0%	0%	7%	0%
Shared Lane Traffic (%)	35%											
Lane Group Flow (vph)	255	327	0	0	0	0	0	614	0	0	904	0
v/c Ratio	1.18	1.51						0.67			1.82	
Control Delay	158.0	278.6						33.1			390.0	
Queue Delay	0.0	0.0						0.2			0.3	
Total Delay	158.0	278.6						33.3			390.3	
Queue Length 50th (ft)	~206	~276						175			~889	
Queue Length 95th (ft)	#370	#461						238			m#635	
Internal Link Dist (ft)		515			421			1850			98	
Turn Bay Length (ft)												
Base Capacity (vph)	216	217						919			497	
Starvation Cap Reductn	0	0						0			15	
Spillback Cap Reductn	0	0						31			0	
Storage Cap Reductn	0	0						0			0	
Reduced v/c Ratio	1.18	1.51						0.69			1.88	

Intersection Summary	
Area Type:	CBD
~	Volume exceeds capacity, queue is theoretically infinite.
	Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer.
	Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	361	10	165	0	0	0	0	525	40	417	415	0
Future Volume (vph)	361	10	165	0	0	0	0	525	40	417	415	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	10	10	10	10	12
Total Lost time (s)	4.0	4.0						4.0			4.0	
Lane Util. Factor	0.95	0.95						0.95			1.00	
Frpb, ped/bikes	1.00	0.88						0.97			1.00	
Flpb, ped/bikes	1.00	1.00						1.00			0.99	
Frt	1.00	0.92						0.99			1.00	
Flt Protected	0.95	0.98						1.00			0.98	
Satd. Flow (prot)	1543	1244						2792			1484	
Flt Permitted	0.95	0.98						1.00			0.40	
Satd. Flow (perm)	1543	1244						2792			601	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	392	11	179	0	0	0	0	571	43	453	451	0
RTOR Reduction (vph)	0	44	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	255	283	0	0	0	0	0	614	0	0	904	0
Confl. Peds. (#/hr)			42						266	266		
Confl. Bikes (#/hr)			2						82			
Heavy Vehicles (%)	0%	0%	7%	0%	0%	0%	0%	5%	0%	0%	7%	0%
Turn Type	Split	NA						NA		custom	NA	
Protected Phases	4	4						2		1	6 8 10 7	
Permitted Phases										6 8		
Actuated Green, G (s)	14.0	14.0						33.0			63.0	
Effective Green, g (s)	14.0	14.0						33.0			63.0	
Actuated g/C Ratio	0.14	0.14						0.33			0.63	
Clearance Time (s)	4.0	4.0						4.0				
Vehicle Extension (s)	2.0	2.0						2.0				
Lane Grp Cap (vph)	216	174						921			466	
v/s Ratio Prot	0.17	c0.23						0.22			c0.19	
v/s Ratio Perm											c1.03	
v/c Ratio	1.18	1.63						0.67			1.94	
Uniform Delay, d1	43.0	43.0						28.8			18.5	
Progression Factor	1.00	1.00						1.00			1.51	
Incremental Delay, d2	118.6	306.9						3.8			423.7	
Delay (s)	161.6	349.9						32.6			451.6	
Level of Service	F	F						C			F	
Approach Delay (s)		267.4			0.0			32.6			451.6	
Approach LOS		F			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	278.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.17		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	435	15	80	380	10	230	240	40	5	145	245
Future Volume (vph)	210	435	15	80	380	10	230	240	40	5	145	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	175		0	125		0	0		160
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		548			592			255			521	
Travel Time (s)		14.9			16.1			7.0			14.2	
Confl. Peds. (#/hr)	42		34	34		42	69		64	64		69
Confl. Bikes (#/hr)			26			16			48			13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	6%	0%	5%	8%	11%	5%	8%	9%	20%	7%	5%
Bus Blockages (#/hr)	0	0	0	0	4	4	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	228	489	0	87	424	0	250	304	0	0	163	266
v/c Ratio	0.89	0.87		0.40	0.89		0.83	0.61			0.55	0.78
Control Delay	64.9	57.7		29.8	63.8		60.5	41.3			52.9	54.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.2			0.0	0.0
Total Delay	64.9	57.7		29.8	63.8		60.5	41.5			52.9	54.3
Queue Length 50th (ft)	~146	~477		47	~384		174	222			126	192
Queue Length 95th (ft)	#289	#702		85	#592		#332	327			203	#335
Internal Link Dist (ft)		468			512			175			441	
Turn Bay Length (ft)	250			175			125					160
Base Capacity (vph)	256	562		244	475		301	544			343	368
Starvation Cap Reductn	0	0		0	0		0	25			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.89	0.87		0.36	0.89		0.83	0.59			0.48	0.72

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	435	15	80	380	10	230	240	40	5	145	245
Future Volume (vph)	210	435	15	80	380	10	230	240	40	5	145	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	4.0			6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98			1.00	0.89
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.95	1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00		1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1571	1603		1542	1547		1470	1509			1584	1232
Flt Permitted	0.22	1.00		0.22	1.00		0.54	1.00			0.99	1.00
Satd. Flow (perm)	368	1603		359	1547		837	1509			1565	1232
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	473	16	87	413	11	250	261	43	5	158	266
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	228	489	0	87	424	0	250	304	0	0	163	266
Confl. Peds. (#/hr)	42		34	34		42	69		64	64		69
Confl. Bikes (#/hr)			26			16			48			13
Heavy Vehicles (%)	3%	6%	0%	5%	8%	11%	5%	8%	9%	20%	7%	5%
Bus Blockages (#/hr)	0	0	0	0	4	4	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		D.P+P	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6		7	7 8			8	5
Permitted Phases	2			6			8			8		8
Actuated Green, G (s)	51.2	40.9		44.2	37.4		32.5	36.5			22.2	32.5
Effective Green, g (s)	51.2	40.9		44.2	37.4		32.5	36.5			22.2	32.5
Actuated g/C Ratio	0.42	0.34		0.37	0.31		0.27	0.30			0.18	0.27
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0				6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0				2.0	2.0
Lane Grp Cap (vph)	258	542		197	478		278	455			287	392
v/s Ratio Prot	c0.08	c0.31		0.02	0.27		c0.08	0.20				0.06
v/s Ratio Perm	0.30			0.14			c0.16				0.10	0.16
v/c Ratio	0.88	0.90		0.44	0.89		0.90	0.67			0.57	0.68
Uniform Delay, d1	29.0	38.1		27.7	39.7		41.4	36.9			45.0	39.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	27.3	20.8		0.6	20.9		28.5	2.9			1.5	3.6
Delay (s)	56.3	58.9		28.3	60.7		69.8	39.8			46.5	43.2
Level of Service	E	E		C	E		E	D			D	D
Approach Delay (s)		58.1			55.2			53.3			44.4	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	53.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.9	Sum of lost time (s)	29.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	0	40	5	10	5	25	465	0	0	390	60
Future Volume (vph)	75	0	40	5	10	5	25	465	0	0	390	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	10	10	10	10	10	12	12	10	10
Right Turn on Red			Yes			Yes			Yes			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		503			303			1833			182	
Travel Time (s)		13.7			8.3			50.0			5.0	
Confl. Peds. (#/hr)	29		16	16		29	54		32	32		54
Confl. Bikes (#/hr)			1			2			17			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	0%	8%	0%	11%	0%	19%	14%	0%	0%	14%	22%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	125	0	0	21	0	0	532	0	0	489	0
v/c Ratio		0.55			0.11			0.61			0.62	
Control Delay		26.1			25.0			15.6			16.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		26.1			25.0			15.6			16.2	
Queue Length 50th (ft)		23			6			88			81	
Queue Length 95th (ft)		90			29			#507			#480	
Internal Link Dist (ft)		423			223			1753			102	
Turn Bay Length (ft)												
Base Capacity (vph)		402			392			870			794	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.31			0.05			0.61			0.62	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	0	40	5	10	5	25	465	0	0	390	60
Future Volume (vph)	75	0	40	5	10	5	25	465	0	0	390	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	10	12	12	10	10
Total Lost time (s)		5.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.97			0.97			1.00			0.98	
Flpb, ped/bikes		0.94			0.99			1.00			1.00	
Frt		0.95			0.97			1.00			0.98	
Flt Protected		0.97			0.99			1.00			1.00	
Satd. Flow (prot)		1309			1251			1357			1205	
Flt Permitted		0.79			0.93			0.97			1.00	
Satd. Flow (perm)		1067			1175			1314			1205	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	0	43	5	11	5	27	505	0	0	424	65
RTOR Reduction (vph)	0	53	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	72	0	0	17	0	0	532	0	0	489	0
Confl. Peds. (#/hr)	29		16	16		29	54		32	32		54
Confl. Bikes (#/hr)			1			2			17			5
Heavy Vehicles (%)	6%	0%	8%	0%	11%	0%	19%	14%	0%	0%	14%	22%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		5			5			1			1	
Permitted Phases	5			5			1					
Actuated Green, G (s)		12.3			12.3			51.6			51.6	
Effective Green, g (s)		12.3			12.3			51.6			51.6	
Actuated g/C Ratio		0.15			0.15			0.64			0.64	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		161			178			836			766	
v/s Ratio Prot											c0.41	
v/s Ratio Perm		c0.07			0.01			0.41				
v/c Ratio		0.44			0.09			0.64			0.64	
Uniform Delay, d1		31.3			29.6			9.0			9.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.7			0.3			3.7			4.0	
Delay (s)		33.9			29.9			12.7			13.1	
Level of Service		C			C			B			B	
Approach Delay (s)		33.9			29.9			12.7			13.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	81.1	Sum of lost time (s)	14.0
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	165	1815	1235	535	375	155
Future Volume (vph)	165	1815	1235	535	375	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	11
Storage Length (ft)	200			200	0	85
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Right Turn on Red				No		Yes
Link Speed (mph)		35	35		25	
Link Distance (ft)		511	949		1833	
Travel Time (s)		10.0	18.5		50.0	
Confl. Peds. (#/hr)	17			17		11
Confl. Bikes (#/hr)				2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	7%	3%	4%	8%	5%	5%
Bus Blockages (#/hr)	0	4	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	1973	1342	582	408	168
v/c Ratio	0.80	1.11	1.21	1.25	0.85	0.24
Control Delay	70.2	83.3	120.6	141.3	54.1	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.2	83.3	120.6	141.3	54.1	14.6
Queue Length 50th (ft)	123	~842	~605	~512	270	59
Queue Length 95th (ft)	#239	#980	m178	m169	#440	101
Internal Link Dist (ft)		431	869		1753	
Turn Bay Length (ft)	200			200		85
Base Capacity (vph)	225	1773	1111	465	478	708
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.80	1.11	1.21	1.25	0.85	0.24

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	165	1815	1235	535	375	155
Future Volume (vph)	165	1815	1235	535	375	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	11
Total Lost time (s)	6.5	5.5	5.5	5.5	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.94	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1417	3025	3020	1263	1547	1338
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1417	3025	3020	1263	1547	1338
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	1973	1342	582	408	168
RTOR Reduction (vph)	0	0	0	0	0	3
Lane Group Flow (vph)	179	1973	1342	582	408	165
Confl. Peds. (#/hr)	17			17		11
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	7%	3%	4%	8%	5%	5%
Bus Blockages (#/hr)	0	4	0	0	0	0
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	6	1 6	1		5	5 6
Permitted Phases				1		
Actuated Green, G (s)	17.5	64.5	40.5	40.5	34.0	57.5
Effective Green, g (s)	17.5	58.0	40.5	40.5	34.0	57.5
Actuated g/C Ratio	0.16	0.53	0.37	0.37	0.31	0.52
Clearance Time (s)	6.5		5.5	5.5	6.0	
Vehicle Extension (s)	2.0		3.0	3.0	2.0	
Lane Grp Cap (vph)	225	1595	1111	465	478	699
v/s Ratio Prot	0.13	c0.65	0.44		c0.26	0.12
v/s Ratio Perm				c0.46		
v/c Ratio	0.80	1.24	1.21	1.25	0.85	0.24
Uniform Delay, d1	44.5	26.0	34.8	34.8	35.7	14.3
Progression Factor	1.00	1.00	0.74	0.74	1.00	1.00
Incremental Delay, d2	24.6	112.2	94.4	114.9	17.4	0.8
Delay (s)	69.1	138.2	120.1	140.5	53.0	15.1
Level of Service	E	F	F	F	D	B
Approach Delay (s)		132.5	126.3		42.0	
Approach LOS		F	F		D	

Intersection Summary			
HCM 2000 Control Delay	118.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	90.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	80	690	1950	430	125	50
Future Volume (vph)	80	690	1950	430	125	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	11	11	12	12
Storage Length (ft)	170			250	0	80
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Right Turn on Red				No		No
Link Speed (mph)		35	35		25	
Link Distance (ft)		949	1060		165	
Travel Time (s)		18.5	20.6		4.5	
Confl. Peds. (#/hr)	9			9		8
Confl. Bikes (#/hr)				1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	18%	2%	5%	0%	1%	9%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	87	750	2587	0	190	0
v/c Ratio	1.16	0.34	1.40		1.19	
Control Delay	130.1	8.5	205.8		176.6	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	130.1	8.5	205.8		176.6	
Queue Length 50th (ft)	~74	50	~1223		~163	
Queue Length 95th (ft)	m#66	m181	#1686		#307	
Internal Link Dist (ft)		869	980		85	
Turn Bay Length (ft)	170					
Base Capacity (vph)	75	2205	1846		159	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	1.16	0.34	1.40		1.19	

Intersection Summary	
Area Type:	CBD
~ Volume exceeds capacity, queue is theoretically infinite.	
Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	80	690	1950	430	125	50
Future Volume (vph)	80	690	1950	430	125	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	12	12
Total Lost time (s)	5.5	6.0	6.0		4.5	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	0.99		0.99	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.97		0.96	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1285	2973	2920		1522	
Flt Permitted	0.95	1.00	1.00		0.97	
Satd. Flow (perm)	1285	2973	2920		1522	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	750	2120	467	136	54
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	87	750	2587	0	190	0
Confl. Peds. (#/hr)	9			9		8
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	18%	2%	5%	0%	1%	9%
Turn Type	Prot	NA	NA		Prot	
Protected Phases	6	1 6	1		5	
Permitted Phases						
Actuated Green, G (s)	6.5	76.0	64.0		11.5	
Effective Green, g (s)	6.5	70.5	64.0		11.5	
Actuated g/C Ratio	0.06	0.64	0.58		0.10	
Clearance Time (s)	5.5		6.0		4.5	
Vehicle Extension (s)	2.0		3.0		2.0	
Lane Grp Cap (vph)	75	1905	1698		159	
v/s Ratio Prot	c0.07	0.25	c0.89		c0.12	
v/s Ratio Perm						
v/c Ratio	1.16	0.39	1.52		1.19	
Uniform Delay, d1	51.8	9.5	23.0		49.2	
Progression Factor	0.95	1.19	1.00		1.00	
Incremental Delay, d2	85.2	0.0	238.6		133.4	
Delay (s)	134.1	11.3	261.6		182.6	
Level of Service	F	B	F		F	
Approach Delay (s)		24.0	261.6		182.6	
Approach LOS		C	F		F	

Intersection Summary			
HCM 2000 Control Delay	202.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.36		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	95.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	25	795	335	150	5	15	85	2	5	1220
Future Volume (vph)	25	795	335	150	5	15	85	2	5	1220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100			0	0		0		0	0
Storage Lanes	1			0	0		0		1	2
Taper Length (ft)	25				25				25	
Right Turn on Red				Yes			Yes			
Link Speed (mph)		35	35			25			30	
Link Distance (ft)		279	170			125			548	
Travel Time (s)		5.4	3.3			3.4			12.5	
Confl. Peds. (#/hr)	9			9					9	
Confl. Bikes (#/hr)				1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	38%	2%	1%	0%	0%	8%	1%	0%	100%	4%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)										33%
Lane Group Flow (vph)	27	864	527	0	0	113	0	0	445	888
v/c Ratio	0.16	1.92	0.44			0.49			0.71	0.78
Control Delay	55.5	451.6	20.7			24.1			39.0	38.3
Queue Delay	0.0	0.4	1.2			2.0			60.0	53.8
Total Delay	55.5	451.9	21.9			26.1			99.0	92.2
Queue Length 50th (ft)	22	~634	78			18			323	369
Queue Length 95th (ft)	53	#767	88			81			463	463
Internal Link Dist (ft)		199	90			45			468	
Turn Bay Length (ft)	100									
Base Capacity (vph)	168	451	1190			231			623	1144
Starvation Cap Reductn	0	0	426			0			0	0
Spillback Cap Reductn	0	18	0			43			371	683
Storage Cap Reductn	0	0	0			0			0	0
Reduced v/c Ratio	0.16	2.00	0.69			0.60			1.77	1.93

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	25	795	335	150	5	15	85	2	5	1220
Future Volume (vph)	25	795	335	150	5	15	85	2	5	1220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	8.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95	0.95			1.00			1.00	0.91
Frpb, ped/bikes	1.00	1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.95			0.89			0.85	0.85
Flt Protected	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1177	3160	3047			1490			1386	2544
Flt Permitted	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1177	3160	3047			1490			1386	2544
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	864	364	163	5	16	92	2	5	1326
RTOR Reduction (vph)	0	0	35	0	0	83	0	0	0	0
Lane Group Flow (vph)	27	864	492	0	0	30	0	0	445	888
Confl. Peds. (#/hr)	9			9					9	
Confl. Bikes (#/hr)				1						
Heavy Vehicles (%)	38%	2%	1%	0%	0%	8%	1%	0%	100%	4%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Turn Type	Split	NA	NA		Split	NA		Perm	pm+pt	custom
Protected Phases	3	3	4 5		2	2			1	1 5
Permitted Phases								1 5	5	1 5
Actuated Green, G (s)	20.0	20.0	56.0			14.0			58.0	63.0
Effective Green, g (s)	20.0	20.0	56.0			14.0			58.0	63.0
Actuated g/C Ratio	0.14	0.14	0.40			0.10			0.41	0.45
Clearance Time (s)	5.0	5.0				5.0			5.0	
Vehicle Extension (s)	2.0	2.0				2.0			2.0	
Lane Grp Cap (vph)	168	451	1218			149			623	1144
v/s Ratio Prot	0.02	c0.27	c0.16			c0.02			0.15	c0.35
v/s Ratio Perm									0.17	
v/c Ratio	0.16	1.92	0.40			0.20			0.71	0.78
Uniform Delay, d1	52.6	60.0	30.1			57.9			33.2	32.5
Progression Factor	1.00	1.00	0.68			1.00			1.00	1.00
Incremental Delay, d2	2.0	420.3	0.1			0.2			4.2	3.6
Delay (s)	54.7	480.3	20.5			58.1			37.3	36.1
Level of Service	D	F	C			E			D	D
Approach Delay (s)		467.4	20.5			58.1			36.5	
Approach LOS		F	C			E			D	

Intersection Summary			
HCM 2000 Control Delay	168.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1720	380	10	380	0	0	0	0	355	260	105
Future Volume (vph)	0	1720	380	10	380	0	0	0	0	355	260	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	13	12	12	12	12	12	12	11	11	11
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	0		0	0		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		170			86			306			262	
Travel Time (s)		3.3			1.7			7.0			6.0	
Confl. Peds. (#/hr)			31	31								8
Confl. Bikes (#/hr)			11									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	1%	0%	0%	0%	0%	0%	0%	3%	3%	0%
Shared Lane Traffic (%)			0%							43%		
Lane Group Flow (vph)	0	1870	413	0	424	0	0	0	0	220	449	114
v/c Ratio		0.86	0.57		0.46					1.11	1.10	0.37
Control Delay		28.8	10.2		0.7					150.4	127.8	9.1
Queue Delay		47.9	57.5		0.1					0.0	0.0	0.6
Total Delay		76.7	67.7		0.8					150.4	127.8	9.7
Queue Length 50th (ft)		518	202		1					~251	~253	0
Queue Length 95th (ft)		m403	m132		m1					#438	#371	42
Internal Link Dist (ft)		90			6			226			182	
Turn Bay Length (ft)			100									
Base Capacity (vph)		2167	726		928					198	409	308
Starvation Cap Reductn		959	388		0					0	0	0
Spillback Cap Reductn		0	0		39					0	0	47
Storage Cap Reductn		0	0		0					0	0	0
Reduced v/c Ratio		1.55	1.22		0.48					1.11	1.10	0.44

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1720	380	10	380	0	0	0	0	355	260	105
Future Volume (vph)	0	1720	380	10	380	0	0	0	0	355	260	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	13	12	12	12	12	12	12	11	11	11
Total Lost time (s)		5.0	5.0		5.0					8.0	8.0	8.0
Lane Util. Factor		0.86	0.86		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.97		1.00					1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		4101	1236		3245					1387	2868	1365
Flt Permitted		1.00	1.00		0.95					0.95	0.98	1.00
Satd. Flow (perm)		4101	1236		3103					1387	2868	1365
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1870	413	11	413	0	0	0	0	386	283	114
RTOR Reduction (vph)	0	0	73	0	0	0	0	0	0	0	0	98
Lane Group Flow (vph)	0	1870	340	0	424	0	0	0	0	220	449	16
Confl. Peds. (#/hr)			31	31								8
Confl. Bikes (#/hr)			11									
Heavy Vehicles (%)	0%	4%	1%	0%	0%	0%	0%	0%	0%	3%	3%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		1 2 3		5	1 5					4	4	
Permitted Phases			1 2 3									4
Actuated Green, G (s)		74.0	74.0		58.0					20.0	20.0	20.0
Effective Green, g (s)		74.0	74.0		58.0					20.0	20.0	20.0
Actuated g/C Ratio		0.53	0.53		0.41					0.14	0.14	0.14
Clearance Time (s)										8.0	8.0	8.0
Vehicle Extension (s)										2.0	2.0	2.0
Lane Grp Cap (vph)		2167	653		1313					198	409	195
v/s Ratio Prot		c0.46			c0.06					c0.16	0.16	
v/s Ratio Perm			0.28		0.07							0.01
v/c Ratio		0.86	0.52		0.32					1.11	1.10	0.08
Uniform Delay, d1		28.6	21.5		27.7					60.0	60.0	52.0
Progression Factor		0.97	0.73		0.02					1.00	1.00	1.00
Incremental Delay, d2		0.4	0.0		0.0					96.9	73.6	0.1
Delay (s)		28.2	15.8		0.7					156.9	133.6	52.1
Level of Service		C	B		A					F	F	D
Approach Delay (s)		26.0			0.7			0.0			128.3	
Approach LOS		C			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	45.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	1015	775	0	0	0	0	805	75	75	975	0
Future Volume (vph)	190	1015	775	0	0	0	0	805	75	75	975	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	11	11	12	11	11
Right Turn on Red			No			No			Yes			No
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		784			617			531			989	
Travel Time (s)		21.4			21.0			10.3			19.3	
Confl. Peds. (#/hr)	6		17						5	5		
Confl. Bikes (#/hr)			15									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1310	842	0	0	0	0	957	0	0	1142	0
v/c Ratio		0.98	1.35					0.85			1.32	
Control Delay		43.7	191.8					48.8			184.7	
Queue Delay		0.0	0.0					0.0			0.0	
Total Delay		43.7	191.8					48.8			184.7	
Queue Length 50th (ft)		588	~956					416			~674	
Queue Length 95th (ft)		m#961	m#1405					510			#844	
Internal Link Dist (ft)		704			537			451			909	
Turn Bay Length (ft)												
Base Capacity (vph)		1341	623					1131			864	
Starvation Cap Reductn		0	0					0			0	
Spillback Cap Reductn		0	0					0			0	
Storage Cap Reductn		0	0					0			0	
Reduced v/c Ratio		0.98	1.35					0.85			1.32	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	1015	775	0	0	0	0	805	75	75	975	0
Future Volume (vph)	190	1015	775	0	0	0	0	805	75	75	975	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	11	11	12	11	11
Total Lost time (s)		6.0	6.0					5.0			6.0	
Lane Util. Factor		0.95	1.00					0.95			0.95	
Frpb, ped/bikes		1.00	1.00					1.00			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		1.00	0.85					0.99			1.00	
Flt Protected		0.99	1.00					1.00			1.00	
Satd. Flow (prot)		3130	1454					3094			3129	
Flt Permitted		0.99	1.00					1.00			0.56	
Satd. Flow (perm)		3130	1454					3094			1772	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	1103	842	0	0	0	0	875	82	82	1060	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	0	0
Lane Group Flow (vph)	0	1310	842	0	0	0	0	952	0	0	1142	0
Confl. Peds. (#/hr)	6		17						5	5		
Confl. Bikes (#/hr)			15									
Heavy Vehicles (%)	1%	3%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Prot					NA		pm+pt	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4									6		
Actuated Green, G (s)		56.8	56.8					51.0			63.0	
Effective Green, g (s)		56.8	56.8					51.0			63.0	
Actuated g/C Ratio		0.41	0.41					0.36			0.45	
Clearance Time (s)		6.0	6.0					5.0			6.0	
Vehicle Extension (s)		2.0	2.0					2.0			2.0	
Lane Grp Cap (vph)		1269	589					1127			874	
v/s Ratio Prot			c0.58					0.31			c0.07	
v/s Ratio Perm		0.42									c0.51	
v/c Ratio		1.03	1.43					0.84			1.31	
Uniform Delay, d1		41.6	41.6					40.9			38.5	
Progression Factor		0.71	0.73					1.00			1.00	
Incremental Delay, d2		28.6	199.3					5.7			146.3	
Delay (s)		58.3	229.5					46.6			184.8	
Level of Service		E	F					D			F	
Approach Delay (s)		125.3			0.0			46.6			184.8	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	123.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	111.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	110	1030	110	395	615	0	0	990	255
Future Volume (vph)	0	0	0	110	1030	110	395	615	0	0	990	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	12	11	11	12	12	11	11
Storage Length (ft)	0		0	0		280	0		0	0		0
Storage Lanes	0		0	0		1	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			Yes
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		762			786			989			627	
Travel Time (s)		20.8			21.4			19.3			12.2	
Confl. Peds. (#/hr)						69	65					65
Confl. Bikes (#/hr)						25						82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	1%	3%	0%	0%	0%	0%	0%	0%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1360	0	429	668	0	0	1353	0
v/c Ratio					1.15		1.30	0.68			1.24	
Control Delay					118.0		193.6	21.3			150.4	
Queue Delay					0.0		0.0	0.0			0.0	
Total Delay					118.0		193.6	21.3			150.4	
Queue Length 50th (ft)					~453		~383	335			~681	
Queue Length 95th (ft)					#551		#588	476			#822	
Internal Link Dist (ft)		682			706			909			547	
Turn Bay Length (ft)												
Base Capacity (vph)					1180		329	978			1089	
Starvation Cap Reductn					0		0	0			0	
Spillback Cap Reductn					0		0	0			0	
Storage Cap Reductn					0		0	0			0	
Reduced v/c Ratio					1.15		1.30	0.68			1.24	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	110	1030	110	395	615	0	0	990	255
Future Volume (vph)	0	0	0	110	1030	110	395	615	0	0	990	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	12	11	11	12	12	11	11
Total Lost time (s)					10.0		6.0	6.0			6.0	
Lane Util. Factor					0.91		1.00	1.00			0.95	
Frpb, ped/bikes					0.98		1.00	1.00			0.96	
Flpb, ped/bikes					1.00		1.00	1.00			1.00	
Frt					0.99		1.00	1.00			0.97	
Flt Protected					1.00		0.95	1.00			1.00	
Satd. Flow (prot)					4254		1570	1653			2923	
Flt Permitted					1.00		0.08	1.00			1.00	
Satd. Flow (perm)					4254		132	1653			2923	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	120	1120	120	429	668	0	0	1076	277
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	18	0
Lane Group Flow (vph)	0	0	0	0	1351	0	429	668	0	0	1335	0
Confl. Peds. (#/hr)						69	65					65
Confl. Bikes (#/hr)						25						82
Heavy Vehicles (%)	2%	2%	2%	1%	3%	0%	0%	0%	0%	0%	0%	1%
Turn Type				Split	NA		pm+pt	NA			NA	
Protected Phases				4	4		1	6			2	
Permitted Phases							6					
Actuated Green, G (s)					33.0		71.0	71.0			44.0	
Effective Green, g (s)					33.0		71.0	71.0			44.0	
Actuated g/C Ratio					0.28		0.59	0.59			0.37	
Clearance Time (s)					10.0		6.0	6.0			6.0	
Vehicle Extension (s)					2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)					1169		329	978			1071	
v/s Ratio Prot					c0.32		c0.23	0.40			0.46	
v/s Ratio Perm							c0.54					
v/c Ratio					1.16		1.30	0.68			1.25	
Uniform Delay, d1					43.5		45.2	16.8			38.0	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					79.9		157.2	3.9			118.7	
Delay (s)					123.4		202.4	20.7			156.7	
Level of Service					F		F	C			F	
Approach Delay (s)		0.0			123.4			91.7			156.7	
Approach LOS		A			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	126.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	110.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	475	945	755	0	0	0	0	0	785	60
Future Volume (vph)	0	0	475	945	755	0	0	0	0	0	785	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No	No		No			No			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		513			209			926			1840	
Travel Time (s)		14.0			5.7			21.0			41.8	
Confl. Peds. (#/hr)			4	17								4
Confl. Bikes (#/hr)			35									2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	4%	2%	5%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	516	1027	821	0	0	0	0	0	918	0
v/c Ratio			0.83	1.43	0.98						1.19	
Control Delay			48.4	220.9	26.8						125.3	
Queue Delay			0.0	1.1	38.5						0.0	
Total Delay			48.4	222.0	65.4						125.3	
Queue Length 50th (ft)			177	~427	367						~380	
Queue Length 95th (ft)			#270	m86	m120						m#292	
Internal Link Dist (ft)		433			129			846			1760	
Turn Bay Length (ft)			100									
Base Capacity (vph)			618	716	834						774	
Starvation Cap Reductn			0	109	137						0	
Spillback Cap Reductn			0	0	0						0	
Storage Cap Reductn			0	0	0						0	
Reduced v/c Ratio			0.83	1.69	1.18						1.19	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	475	945	755	0	0	0	0	0	785	60
Future Volume (vph)	0	0	475	945	755	0	0	0	0	0	785	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)			9.0	6.0	6.0						5.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2378	2987	1574						3207	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2378	2987	1574						3207	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	516	1027	821	0	0	0	0	0	853	65
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	516	1027	821	0	0	0	0	0	913	0
Confl. Peds. (#/hr)			4	17								4
Confl. Bikes (#/hr)			35									2
Heavy Vehicles (%)	0%	0%	4%	2%	5%	0%	0%	0%	0%	0%	0%	0%
Turn Type			Prot	Prot	NA						NA	
Protected Phases			2	1 4	1 2 4						3	
Permitted Phases												
Actuated Green, G (s)			26.0	31.0	62.0						24.0	
Effective Green, g (s)			26.0	31.0	57.0						24.0	
Actuated g/C Ratio			0.26	0.31	0.57						0.24	
Clearance Time (s)			9.0								5.0	
Vehicle Extension (s)			2.0								2.0	
Lane Grp Cap (vph)			618	925	897						769	
v/s Ratio Prot			0.22	c0.34	c0.52						c0.28	
v/s Ratio Perm												
v/c Ratio			0.83	1.11	0.92						1.19	
Uniform Delay, d1			35.0	34.5	19.3						38.0	
Progression Factor			1.00	0.65	1.08						1.08	
Incremental Delay, d2			9.1	51.3	1.6						88.8	
Delay (s)			44.1	73.8	22.5						129.7	
Level of Service			D	E	C						F	
Approach Delay (s)		44.1			51.0			0.0			129.7	
Approach LOS		D			D			A			F	

Intersection Summary			
HCM 2000 Control Delay	71.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	110.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	400	50	105	590	120	25	15	75	0	0	0
Future Volume (Veh/h)	70	400	50	105	590	120	25	15	75	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	435	54	114	641	130	27	16	82	0	0	0
Pedestrians		40						50			19	
Lane Width (ft)		11.0						11.5			0.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		3						4			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		746			513							
pX, platoon unblocked	0.55						0.55	0.55		0.55	0.55	0.55
vC, conflicting volume	790			539			1573	1682	512	1630	1644	765
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	215			539			1632	1829	512	1735	1761	170
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			88			21	50	85	100	100	100
cM capacity (veh/h)	729			988			34	32	539	17	36	471

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	76	489	114	771	27	98
Volume Left	76	0	114	0	27	0
Volume Right	0	54	0	130	0	82
cSH	729	1700	988	1700	34	151
Volume to Capacity	0.10	0.29	0.12	0.45	0.79	0.65
Queue Length 95th (ft)	9	0	10	0	69	90
Control Delay (s)	10.5	0.0	9.1	0.0	263.9	64.8
Lane LOS	B		A		F	F
Approach Delay (s)	1.4		1.2		107.8	
Approach LOS					F	

Intersection Summary			
Average Delay	9.7		
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	75	505	575	195	40	20
Future Volume (vph)	75	505	575	195	40	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	12	12
Storage Length (ft)	110			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Right Turn on Red				No		Yes
Link Speed (mph)		25	25		25	
Link Distance (ft)		605	253		150	
Travel Time (s)		16.5	6.9		4.1	
Confl. Peds. (#/hr)	17			17	1	3
Confl. Bikes (#/hr)				12		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	9%	7%	11%	9%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	82	549	837	0	65	0
v/c Ratio	0.30	0.51	0.81		0.50	
Control Delay	10.4	11.4	20.5		39.9	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	10.4	11.4	20.5		39.9	
Queue Length 50th (ft)	24	199	201		21	
Queue Length 95th (ft)	m11	#398	#773		#67	
Internal Link Dist (ft)		525	173		70	
Turn Bay Length (ft)	110					
Base Capacity (vph)	275	1080	1039		130	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.30	0.51	0.81		0.50	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	75	505	575	195	40	20
Future Volume (vph)	75	505	575	195	40	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	12	12
Total Lost time (s)	7.0	7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99		0.98	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.97		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1467	1464	1413		1468	
Flt Permitted	0.24	1.00	1.00		0.97	
Satd. Flow (perm)	374	1464	1413		1468	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	549	625	212	43	22
RTOR Reduction (vph)	0	0	0	0	21	0
Lane Group Flow (vph)	82	549	837	0	44	0
Confl. Peds. (#/hr)	17			17	1	3
Confl. Bikes (#/hr)				12		
Heavy Vehicles (%)	3%	9%	7%	11%	9%	0%
Turn Type	Perm	NA	NA		Prot	
Protected Phases		6	2		4	
Permitted Phases	6					
Actuated Green, G (s)	53.0	53.0	53.0		4.8	
Effective Green, g (s)	53.0	53.0	53.0		4.8	
Actuated g/C Ratio	0.66	0.66	0.66		0.06	
Clearance Time (s)	7.0	7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0	1.0		2.0	
Lane Grp Cap (vph)	247	969	936		88	
v/s Ratio Prot		0.37	c0.59		c0.03	
v/s Ratio Perm	0.22					
v/c Ratio	0.33	0.57	0.89		0.50	
Uniform Delay, d1	5.8	7.3	11.2		36.4	
Progression Factor	0.80	1.01	1.00		1.00	
Incremental Delay, d2	2.5	1.7	12.8		1.6	
Delay (s)	7.2	9.1	24.0		38.1	
Level of Service	A	A	C		D	
Approach Delay (s)		8.8	24.0		38.1	
Approach LOS		A	C		D	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	1	550	10	1	460	150	1	2	0	55	25	0
Future Volume (Veh/h)	1	550	10	1	460	150	1	2	0	55	25	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	598	11	1	500	163	1	2	0	60	27	0
Pedestrians		22			22			22			17	
Lane Width (ft)		12.0			11.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		2			2			2			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		592			467							
pX, platoon unblocked	0.70			0.72			0.84	0.84	0.72	0.84	0.84	0.70
vC, conflicting volume	680			631			1246	1310	648	1229	1234	620
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	326			298			452	527	321	431	437	241
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	100	86	93	100
cM capacity (veh/h)	849			897			386	369	502	420	415	539

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	610	664	3	87
Volume Left	1	1	1	60
Volume Right	11	163	0	0
cSH	849	897	374	419
Volume to Capacity	0.00	0.00	0.01	0.21
Queue Length 95th (ft)	0	0	1	19
Control Delay (s)	0.0	0.0	14.7	15.8
Lane LOS	A	A	B	C
Approach Delay (s)	0.0	0.0	14.7	15.8
Approach LOS			B	C

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	565	45	15	580	1	60	1	15	1	1	1
Future Volume (vph)	1	565	45	15	580	1	60	1	15	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	13	13	13	12	12	12
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		467			605			282			144	
Travel Time (s)		12.7			16.5			7.7			3.9	
Confl. Peds. (#/hr)	17		22	22		17	22		22	22		22
Confl. Bikes (#/hr)			33			12						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	9%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	664	0	0	647	0	0	82	0	0	3	0
v/c Ratio		0.70			0.68			0.57			0.02	
Control Delay		21.0			24.6			46.7			28.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		21.0			24.6			46.7			28.7	
Queue Length 50th (ft)		131			235			33			1	
Queue Length 95th (ft)		#623			m#547			#108			9	
Internal Link Dist (ft)		387			525			202			64	
Turn Bay Length (ft)												
Base Capacity (vph)		942			949			145			163	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.70			0.68			0.57			0.02	

Intersection Summary

Area Type: CBD

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	565	45	15	580	1	60	1	15	1	1	1
Future Volume (vph)	1	565	45	15	580	1	60	1	15	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	13	13	13	12	12	12
Total Lost time (s)		5.5			5.5			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.98			0.96	
Flpb, ped/bikes		1.00			1.00			0.93			0.98	
Frt		0.99			1.00			0.97			0.95	
Flt Protected		1.00			1.00			0.96			0.98	
Satd. Flow (prot)		1502			1544			1474			1480	
Flt Permitted		1.00			0.98			0.77			0.92	
Satd. Flow (perm)		1501			1516			1178			1378	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	614	49	16	630	1	65	1	16	1	1	1
RTOR Reduction (vph)	0	3	0	0	0	0	0	11	0	0	1	0
Lane Group Flow (vph)	0	661	0	0	647	0	0	71	0	0	2	0
Confl. Peds. (#/hr)	17		22	22		17	22		22	22		22
Confl. Bikes (#/hr)			33			12						
Heavy Vehicles (%)	2%	9%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			5			5	
Permitted Phases	1			1			5			5		
Actuated Green, G (s)		43.9			43.9			9.7			9.7	
Effective Green, g (s)		43.9			43.9			9.7			9.7	
Actuated g/C Ratio		0.55			0.55			0.12			0.12	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		823			831			142			167	
v/s Ratio Prot												
v/s Ratio Perm		c0.44			0.43			c0.06			0.00	
v/c Ratio		0.80			0.78			0.50			0.01	
Uniform Delay, d1		14.6			14.2			32.9			30.9	
Progression Factor		1.00			1.57			1.00			1.00	
Incremental Delay, d2		8.2			4.2			1.0			0.0	
Delay (s)		22.8			26.5			33.9			30.9	
Level of Service		C			C			C			C	
Approach Delay (s)		22.8			26.5			33.9			30.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	10	10	0	50	105	15	445	0	70	380	20
Future Volume (Veh/h)	10	10	10	0	50	105	15	445	0	70	380	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	11	11	0	54	114	16	484	0	76	413	22
Pedestrians		69			64						42	
Lane Width (ft)		12.0			13.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		6			6						4	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								521				
pX, platoon unblocked	0.77	0.77		0.77	0.77	0.77				0.77		
vC, conflicting volume	1344	1225	493	1172	1236	590	504			548		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1299	1145	493	1077	1159	325	504			271		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	74	91	98	100	56	77	98			92		
cM capacity (veh/h)	42	124	543	111	122	504	1000			943		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	33	168	500	511
Volume Left	11	0	16	76
Volume Right	11	114	0	22
cSH	90	251	1000	943
Volume to Capacity	0.37	0.67	0.02	0.08
Queue Length 95th (ft)	36	107	1	7
Control Delay (s)	66.9	44.2	0.5	2.2
Lane LOS	F	E	A	A
Approach Delay (s)	66.9	44.2	0.5	2.2
Approach LOS	F	E		

Intersection Summary			
Average Delay	9.1		
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	435	110	60	615	155	90
Future Volume (Veh/h)	435	110	60	615	155	90
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	473	120	65	668	168	98
Pedestrians	3			1	50	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	4	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	253			1006		
pX, platoon unblocked			0.81		0.78	0.81
vC, conflicting volume			643		1384	584
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			443		803	371
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		31	81
cM capacity (veh/h)			868		242	524

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	593	733	266
Volume Left	0	65	168
Volume Right	120	0	98
cSH	1700	868	302
Volume to Capacity	0.35	0.07	0.88
Queue Length 95th (ft)	0	6	200
Control Delay (s)	0.0	1.9	63.8
Lane LOS		A	F
Approach Delay (s)	0.0	1.9	63.8
Approach LOS			F

Intersection Summary			
Average Delay	11.5		
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	25	35	330	120	70	45
Future Volume (Veh/h)	25	35	330	120	70	45
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	38	359	130	76	49
Pedestrians	50		50			50
Lane Width (ft)	13.0		12.0			11.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		4			4
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	725	524			539	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	725	524			539	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	93			92	
cM capacity (veh/h)	331	508			983	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	65	489	125
Volume Left	27	0	76
Volume Right	38	130	0
cSH	416	1700	983
Volume to Capacity	0.16	0.29	0.08
Queue Length 95th (ft)	14	0	6
Control Delay (s)	15.3	0.0	5.7
Lane LOS	C		A
Approach Delay (s)	15.3	0.0	5.7
Approach LOS	C		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	60	450	70	1	1	105
Future Volume (Veh/h)	60	450	70	1	1	105
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	489	76	1	1	114
Pedestrians		8	8		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		1	1		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		165				
pX, platoon unblocked						
vC, conflicting volume	85				712	92
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	85				712	92
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				100	88
cM capacity (veh/h)	1508				377	955

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	554	77	115
Volume Left	65	0	1
Volume Right	0	1	114
cSH	1508	1700	942
Volume to Capacity	0.04	0.05	0.12
Queue Length 95th (ft)	3	0	10
Control Delay (s)	1.3	0.0	9.4
Lane LOS	A		A
Approach Delay (s)	1.3	0.0	9.4
Approach LOS			A

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑	↑↑			↱
Traffic Volume (veh/h)	0	820	340	0	0	2040
Future Volume (Veh/h)	0	820	340	0	0	2040
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	891	370	0	0	2217
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1190	279			
pX, platoon unblocked	0.91				0.95	0.91
vC, conflicting volume	370				816	185
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	123				339	0
tC, single (s)	4.1				6.9	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	1343				599	988

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	446	446	185	185	2217
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	2217
cSH	1700	1700	1700	1700	988
Volume to Capacity	0.26	0.26	0.11	0.11	2.24
Queue Length 95th (ft)	0	0	0	0	3970
Control Delay (s)	0.0	0.0	0.0	0.0	574.6
Lane LOS					F
Approach Delay (s)	0.0		0.0		574.6
Approach LOS					F

Intersection Summary			
Average Delay	366.3		
Intersection Capacity Utilization	142.4%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	1825	0	0	0	0	390	165	155	0	0	0
Future Volume (vph)	250	1825	0	0	0	0	390	165	155	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	12	11	11	12	12	12
Right Turn on Red			No			No			Yes			No
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		86			784			304			1156	
Travel Time (s)		1.7			15.3			6.9			26.3	
Confl. Peds. (#/hr)	8								93			
Confl. Bikes (#/hr)									7			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)							19%					
Lane Group Flow (vph)	0	2256	0	0	0	0	343	428	0	0	0	0
v/c Ratio		0.72					1.11	1.47				
Control Delay		0.6					135.7	266.7				
Queue Delay		0.0					0.0	0.0				
Total Delay		0.6					135.7	266.7				
Queue Length 50th (ft)		0					~375	~547				
Queue Length 95th (ft)		m0					#582	#775				
Internal Link Dist (ft)		6			704			224			1076	
Turn Bay Length (ft)												
Base Capacity (vph)		3154					308	291				
Starvation Cap Reductn		0					0	0				
Spillback Cap Reductn		0					0	0				
Storage Cap Reductn		0					0	0				
Reduced v/c Ratio		0.72					1.11	1.47				

Intersection Summary	
Area Type:	CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	250	1825	0	0	0	0	390	165	155	0	0	0
Future Volume (vph)	250	1825	0	0	0	0	390	165	155	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	12	11	11	12	12	12
Total Lost time (s)		5.0					5.0	5.0				
Lane Util. Factor		0.91					0.95	0.95				
Frpb, ped/bikes		1.00					1.00	0.94				
Flpb, ped/bikes		1.00					1.00	1.00				
Frt		1.00					1.00	0.94				
Flt Protected		0.99					0.95	0.99				
Satd. Flow (prot)		4330					1543	1375				
Flt Permitted		0.99					0.95	0.99				
Satd. Flow (perm)		4330					1543	1375				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	272	1984	0	0	0	0	424	179	168	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	17	0	0	0	0
Lane Group Flow (vph)	0	2256	0	0	0	0	343	411	0	0	0	0
Confl. Peds. (#/hr)	8								93			
Confl. Bikes (#/hr)									7			
Heavy Vehicles (%)	8%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Split	NA					Split	NA				
Protected Phases	1 2 3 4	1 2 3 4					5	5				
Permitted Phases												
Actuated Green, G (s)		99.0					28.0	28.0				
Effective Green, g (s)		99.0					28.0	28.0				
Actuated g/C Ratio		0.71					0.20	0.20				
Clearance Time (s)							5.0	5.0				
Vehicle Extension (s)							4.0	4.0				
Lane Grp Cap (vph)		3061					308	275				
v/s Ratio Prot		c0.52					0.22	c0.30				
v/s Ratio Perm												
v/c Ratio		0.74					1.11	1.50				
Uniform Delay, d1		12.5					56.0	56.0				
Progression Factor		0.00					1.00	1.00				
Incremental Delay, d2		0.3					85.4	241.1				
Delay (s)		0.3					141.4	297.1				
Level of Service		A					F	F				
Approach Delay (s)		0.3			0.0			227.9			0.0	
Approach LOS		A			A			F			A	

Intersection Summary			
HCM 2000 Control Delay	58.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	67	2	230	66	820	0	0	765	45
Future Volume (vph)	0	0	0	67	2	230	66	820	0	0	765	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	10	12	12	10	10
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		590			353			178			622	
Travel Time (s)		13.4			8.0			4.9			17.0	
Confl. Peds. (#/hr)						56	196					196
Confl. Bikes (#/hr)						9						34
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	4%	0%	0%	3%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	75	250	0	963	0	0	881	0
v/c Ratio					0.80	0.57		0.75			1.24	
Control Delay					76.1	8.5		7.1			135.2	
Queue Delay					75.2	0.0		5.5			6.9	
Total Delay					151.3	8.5		12.6			142.1	
Queue Length 50th (ft)					52	26		44			~605	
Queue Length 95th (ft)					m51	m17		m31			m#606	
Internal Link Dist (ft)		510			273			98			542	
Turn Bay Length (ft)												
Base Capacity (vph)					94	631		1292			712	
Starvation Cap Reductn					0	0		269			0	
Spillback Cap Reductn					36	0		0			390	
Storage Cap Reductn					0	0		0			0	
Reduced v/c Ratio					1.29	0.40		0.94			2.74	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	67	2	230	66	820	0	0	765	45
Future Volume (vph)	0	0	0	67	2	230	66	820	0	0	765	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	12	12	10	10
Total Lost time (s)					4.0	4.0		4.0			4.0	
Lane Util. Factor					1.00	1.00		0.95			1.00	
Frpb, ped/bikes					1.00	1.00		1.00			0.98	
Flpb, ped/bikes					1.00	1.00		1.00			1.00	
Frt					1.00	0.85		1.00			0.99	
Flt Protected					0.95	1.00		1.00			1.00	
Satd. Flow (prot)					1576	1405		2909			1512	
Flt Permitted					0.95	1.00		0.68			1.00	
Satd. Flow (perm)					1576	1405		1987			1512	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	73	2	250	72	891	0	0	832	49
RTOR Reduction (vph)	0	0	0	0	0	210	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	75	40	0	963	0	0	879	0
Confl. Peds. (#/hr)						56	196					196
Confl. Bikes (#/hr)						9						34
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	4%	0%	0%	3%	0%
Turn Type				Split	NA	custom	custom	NA			NA	
Protected Phases				8	8	1 8		2 4 9 11			6	
Permitted Phases							2 4					
Actuated Green, G (s)					6.0	16.0		63.0			47.0	
Effective Green, g (s)					6.0	16.0		57.0			47.0	
Actuated g/C Ratio					0.06	0.16		0.57			0.47	
Clearance Time (s)					4.0						4.0	
Vehicle Extension (s)					2.0						2.0	
Lane Grp Cap (vph)					94	224		1132			710	
v/s Ratio Prot					c0.05	0.03					c0.58	
v/s Ratio Perm								c0.48				
v/c Ratio					0.80	0.18		0.85			1.24	
Uniform Delay, d1					46.4	36.3		17.9			26.5	
Progression Factor					1.53	1.84		0.45			1.04	
Incremental Delay, d2					4.0	0.0		2.4			108.2	
Delay (s)					75.3	67.0		10.4			135.7	
Level of Service					E	E		B			F	
Approach Delay (s)		0.0			68.9			10.4			135.7	
Approach LOS		A			E			B			F	

Intersection Summary			
HCM 2000 Control Delay	70.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	94.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1435	245	265	150	0	0	0	0
Future Volume (vph)	0	0	0	0	1435	245	265	150	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	11	11	11	12	12	12
Right Turn on Red			No			No	No		Yes			No
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		209			762			1156			2190	
Travel Time (s)		5.7			20.8			26.3			49.8	
Confl. Peds. (#/hr)						170	4					
Confl. Bikes (#/hr)						33						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	9%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1826	0	0	451	0	0	0	0
v/c Ratio					1.77			0.61				
Control Delay					378.6			36.5				
Queue Delay					1.0			0.7				
Total Delay					379.6			37.3				
Queue Length 50th (ft)					~640			133				
Queue Length 95th (ft)					#736			186				
Internal Link Dist (ft)		129			682			1076			2110	
Turn Bay Length (ft)												
Base Capacity (vph)					1030			745				
Starvation Cap Reductn					0			0				
Spillback Cap Reductn					183			93				
Storage Cap Reductn					0			0				
Reduced v/c Ratio					2.16			0.69				

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1435	245	265	150	0	0	0	0
Future Volume (vph)	0	0	0	0	1435	245	265	150	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)					6.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.96			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.98			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					4293			2867				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					4293			2867				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1560	266	288	163	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1826	0	0	451	0	0	0	0
Confl. Peds. (#/hr)						170	4					
Confl. Bikes (#/hr)						33						
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	9%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					24.0			26.0				
Effective Green, g (s)					24.0			26.0				
Actuated g/C Ratio					0.24			0.26				
Clearance Time (s)					6.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1030			745				
v/s Ratio Prot					c0.43							
v/s Ratio Perm								0.16				
v/c Ratio					1.77			0.61				
Uniform Delay, d1					38.0			32.5				
Progression Factor					1.00			1.00				
Incremental Delay, d2					351.7			1.0				
Delay (s)					389.7			33.5				
Level of Service					F			C				
Approach Delay (s)		0.0			389.7			33.5			0.0	
Approach LOS		A			F			C			A	

Intersection Summary			
HCM 2000 Control Delay	319.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	110.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	755	305	0	990	110	0	880	315	0	375	15
Future Volume (vph)	0	755	305	0	990	110	0	880	315	0	375	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Right Turn on Red			No			No			No			No
Link Speed (mph)		35			35			25			20	
Link Distance (ft)		641			2767			774			646	
Travel Time (s)		12.5			53.9			21.1			22.0	
Confl. Peds. (#/hr)			109			54			323			243
Confl. Bikes (#/hr)			13						66			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	5%	0%	0%	7%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1153	0	0	1196	0	0	1299	0	0	424	0
v/c Ratio		1.09			1.02			1.16			0.66	
Control Delay		86.5			63.5			108.5			29.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		86.5			63.5			108.5			29.8	
Queue Length 50th (ft)		~437			~412			~517			214	
Queue Length 95th (ft)		#568			#558			m#525			324	
Internal Link Dist (ft)		561			2687			694			566	
Turn Bay Length (ft)												
Base Capacity (vph)		1059			1173			1118			645	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.09			1.02			1.16			0.66	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	755	305	0	990	110	0	880	315	0	375	15
Future Volume (vph)	0	755	305	0	990	110	0	880	315	0	375	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		11.0			11.0			11.0			11.0	
Lane Util. Factor		0.95			0.95			0.95			1.00	
Frpb, ped/bikes		0.93			0.99			0.91			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.96			0.98			0.96			0.99	
Flt Protected		1.00			1.00			1.00			1.00	
Satd. Flow (prot)		2862			3172			2726			1575	
Flt Permitted		1.00			1.00			1.00			1.00	
Satd. Flow (perm)		2862			3172			2726			1575	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	821	332	0	1076	120	0	957	342	0	408	16
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1153	0	0	1196	0	0	1299	0	0	424	0
Confl. Peds. (#/hr)			109			54			323			243
Confl. Bikes (#/hr)			13						66			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	5%	0%	0%	7%	0%
Turn Type		NA			NA			NA			NA	
Protected Phases		4			8			2			6	
Permitted Phases												
Actuated Green, G (s)		37.0			37.0			41.0			41.0	
Effective Green, g (s)		37.0			37.0			41.0			41.0	
Actuated g/C Ratio		0.37			0.37			0.41			0.41	
Clearance Time (s)		11.0			11.0			11.0			11.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		1058			1173			1117			645	
v/s Ratio Prot		c0.40			0.38			c0.48			0.27	
v/s Ratio Perm												
v/c Ratio		1.09			1.02			1.16			0.66	
Uniform Delay, d1		31.5			31.5			29.5			23.8	
Progression Factor		1.00			1.00			1.13			1.00	
Incremental Delay, d2		55.5			31.3			77.0			5.2	
Delay (s)		87.0			62.8			110.3			29.0	
Level of Service		F			E			F			C	
Approach Delay (s)		87.0			62.8			110.3			29.0	
Approach LOS		F			E			F			C	

Intersection Summary			
HCM 2000 Control Delay	81.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	94.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	381	20	130	0	0	0	0	705	35	267	525	0
Future Volume (vph)	381	20	130	0	0	0	0	705	35	267	525	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	10	10	10	10	10	12
Storage Length (ft)	0		0	0		0	0		300	0		0
Storage Lanes	1		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		595			501			1960			178	
Travel Time (s)		13.5			11.4			53.5			4.9	
Confl. Peds. (#/hr)			56						310	310		
Confl. Bikes (#/hr)									50			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Shared Lane Traffic (%)	35%											
Lane Group Flow (vph)	269	308	0	0	0	0	0	804	0	0	861	0
v/c Ratio	1.59	1.79						0.80			1.68	
Control Delay	324.1	404.0						37.4			325.2	
Queue Delay	0.5	1.0						10.9			0.3	
Total Delay	324.6	405.1						48.4			325.4	
Queue Length 50th (ft)	~258	~292						234			~833	
Queue Length 95th (ft)	#425	#472						#376			m#698	
Internal Link Dist (ft)		515			421			1880			98	
Turn Bay Length (ft)												
Base Capacity (vph)	169	172						1008			513	
Starvation Cap Reductn	0	0						0			16	
Spillback Cap Reductn	5	10						187			0	
Storage Cap Reductn	0	0						0			0	
Reduced v/c Ratio	1.64	1.90						0.98			1.73	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	381	20	130	0	0	0	0	705	35	267	525	0
Future Volume (vph)	381	20	130	0	0	0	0	705	35	267	525	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	10	10	10	10	10	12
Total Lost time (s)	4.0	4.0						4.0			4.0	
Lane Util. Factor	0.95	0.95						0.95			1.00	
Frpb, ped/bikes	1.00	0.88						0.98			1.00	
Flpb, ped/bikes	1.00	1.00						1.00			1.00	
Frt	1.00	0.93						0.99			1.00	
Flt Protected	0.95	0.98						1.00			0.98	
Satd. Flow (prot)	1543	1296						2929			1559	
Flt Permitted	0.95	0.98						1.00			0.36	
Satd. Flow (perm)	1543	1296						2929			571	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	414	22	141	0	0	0	0	766	38	290	571	0
RTOR Reduction (vph)	0	30	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	269	278	0	0	0	0	0	804	0	0	861	0
Confl. Peds. (#/hr)			56						310	310		
Confl. Bikes (#/hr)									50			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Split	NA						NA		custom	NA	
Protected Phases	4	4						2		1	6 8 10 7	
Permitted Phases										6 8		
Actuated Green, G (s)	11.0	11.0						34.4			66.0	
Effective Green, g (s)	11.0	11.0						34.4			66.0	
Actuated g/C Ratio	0.11	0.11						0.34			0.66	
Clearance Time (s)	4.0	4.0						4.0				
Vehicle Extension (s)	2.0	2.0						2.0				
Lane Grp Cap (vph)	169	142						1007			491	
v/s Ratio Prot	0.17	c0.21						0.27			c0.20	
v/s Ratio Perm											c0.95	
v/c Ratio	1.59	1.96						0.80			1.75	
Uniform Delay, d1	44.5	44.5						29.7			17.0	
Progression Factor	1.00	1.00						1.00			1.36	
Incremental Delay, d2	292.4	454.7						6.6			339.9	
Delay (s)	336.9	499.2						36.3			363.1	
Level of Service	F	F						D			F	
Approach Delay (s)		423.5			0.0			36.3			363.1	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	261.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.05		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	300	40	130	650	5	200	220	25	5	330	305
Future Volume (vph)	215	300	40	130	650	5	200	220	25	5	330	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	175		0	125		0	0		160
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			No			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		548			547			255			491	
Travel Time (s)		14.9			14.9			7.0			13.4	
Confl. Peds. (#/hr)	37		81	81		37	113		85	85		113
Confl. Bikes (#/hr)			9			23			17			32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	1%	0%	1%	0%	0%	3%	1%	4%	10%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	5	5	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	234	369	0	141	712	0	217	266	0	0	364	332
v/c Ratio	1.57	0.66		0.51	1.27		1.25	0.48			0.93	0.95
Control Delay	315.1	51.3		35.3	176.1		187.5	44.1			87.1	85.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	315.1	51.3		35.3	176.1		187.5	44.1			87.1	85.2
Queue Length 50th (ft)	~302	331		90	~937		~212	218			371	297
Queue Length 95th (ft)	#486	456		142	#1189		#391	313			#582	#450
Internal Link Dist (ft)		468			467			175			411	
Turn Bay Length (ft)	250			175			125					160
Base Capacity (vph)	149	555		287	560		174	558			393	351
Starvation Cap Reductn	0	0		0	0		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	1.57	0.66		0.49	1.27		1.25	0.48			0.93	0.95

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	300	40	130	650	5	200	220	25	5	330	305
Future Volume (vph)	215	300	40	130	650	5	200	220	25	5	330	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	4.0			6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.98			1.00	0.82
Flpb, ped/bikes	1.00	1.00		0.98	1.00		0.99	1.00			1.00	1.00
Frt	1.00	0.98		1.00	1.00		1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1577	1637		1584	1673		1559	1634			1687	1174
Flt Permitted	0.08	1.00		0.33	1.00		0.18	1.00			1.00	1.00
Satd. Flow (perm)	130	1637		558	1673		297	1634			1680	1174
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	234	326	43	141	707	5	217	239	27	5	359	332
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	234	369	0	141	712	0	217	266	0	0	364	332
Confl. Peds. (#/hr)	37		81	81		37	113		85	85		113
Confl. Bikes (#/hr)			9			23			17			32
Heavy Vehicles (%)	3%	1%	0%	1%	0%	0%	3%	1%	4%	10%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	5	5	0	0	0	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA		D.P+P	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6		7	7 8			8	5
Permitted Phases	2			6			8			8		8
Actuated Green, G (s)	61.1	51.0		59.7	50.3		45.3	49.3			35.2	45.3
Effective Green, g (s)	61.1	51.0		59.7	50.3		45.3	49.3			35.2	45.3
Actuated g/C Ratio	0.40	0.34		0.39	0.33		0.30	0.33			0.23	0.30
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0				6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0				2.0	2.0
Lane Grp Cap (vph)	148	550		283	555		172	531			390	397
v/s Ratio Prot	c0.10	0.23		0.03	0.43		c0.08	0.16				0.06
v/s Ratio Perm	c0.53			0.17			c0.29				0.22	0.23
v/c Ratio	1.58	0.67		0.50	1.28		1.26	0.50			0.93	0.84
Uniform Delay, d1	41.9	43.1		32.0	50.6		49.2	41.2			57.0	49.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	291.2	6.4		0.5	140.6		155.9	0.3			28.8	13.6
Delay (s)	333.1	49.5		32.5	191.3		205.0	41.5			85.9	63.3
Level of Service	F	D		C	F		F	D			F	E
Approach Delay (s)		159.5			165.0			115.0			75.1	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	130.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	151.6	Sum of lost time (s)	29.0
Intersection Capacity Utilization	104.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	0	30	15	10	5	15	335	0	0	655	65
Future Volume (vph)	45	0	30	15	10	5	15	335	0	0	655	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	10	10	10	10	10	12	12	10	10
Right Turn on Red			Yes			Yes			Yes			No
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		453			259			1811			202	
Travel Time (s)		12.4			7.1			49.4			5.5	
Confl. Peds. (#/hr)	7		14	14		7	75					75
Confl. Bikes (#/hr)			2			5			10			9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	0%	10%	0%	0%	0%	0%	5%	0%	0%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	82	0	0	32	0	0	380	0	0	783	0
v/c Ratio		0.61			0.12			0.32			0.72	
Control Delay		22.1			24.2			7.6			16.5	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		22.1			24.2			7.6			16.5	
Queue Length 50th (ft)		0			6			0			0	
Queue Length 95th (ft)		#29			40			227			#745	
Internal Link Dist (ft)		373			179			1731			122	
Turn Bay Length (ft)												
Base Capacity (vph)		135			774			1188			1092	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.61			0.04			0.32			0.72	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	0	30	15	10	5	15	335	0	0	655	65
Future Volume (vph)	45	0	30	15	10	5	15	335	0	0	655	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	10	10	10	10	10	12	12	10	10
Total Lost time (s)		4.0			5.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		0.81			0.98			1.00			0.99	
Flpb, ped/bikes		0.87			0.94			1.00			1.00	
Frt		0.95			0.98			1.00			0.99	
Flt Protected		0.97			0.98			1.00			1.00	
Satd. Flow (prot)		998			1267			1482			1326	
Flt Permitted		0.97			0.98			0.97			1.00	
Satd. Flow (perm)		998			1267			1434			1326	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	0	33	16	11	5	16	364	0	0	712	71
RTOR Reduction (vph)	0	82	0	0	5	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	27	0	0	380	0	0	783	0
Confl. Peds. (#/hr)	7		14	14		7	75					75
Confl. Bikes (#/hr)			2			5			10			9
Heavy Vehicles (%)	6%	0%	10%	0%	0%	0%	0%	5%	0%	0%	6%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	6	6	6	0	0	0
Parking (#/hr)				0	0	0					0	0
Turn Type	D.Pm	NA		Perm	NA		Perm	NA			NA	
Protected Phases					5			1			1	
Permitted Phases	5			5			1					
Actuated Green, G (s)		0.0			3.3			42.6			42.6	
Effective Green, g (s)		0.0			3.3			42.6			42.6	
Actuated g/C Ratio		0.00			0.05			0.68			0.68	
Clearance Time (s)					5.0			5.0			5.0	
Vehicle Extension (s)					4.0			4.0			4.0	
Lane Grp Cap (vph)		0			66			977			903	
v/s Ratio Prot											c0.59	
v/s Ratio Perm					0.02			0.27				
v/c Ratio		0.00			0.41			0.39			0.87	
Uniform Delay, d1		31.2			28.7			4.3			7.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.0			5.6			1.2			11.0	
Delay (s)		31.2			34.3			5.5			18.7	
Level of Service		C			C			A			B	
Approach Delay (s)		31.2			34.3			5.5			18.7	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	62.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	222	1530	1487	385	415	285
Future Volume (vph)	222	1530	1487	385	415	285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	12	12	11
Storage Length (ft)	200			200	0	85
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Right Turn on Red				No		Yes
Link Speed (mph)		35	35		30	
Link Distance (ft)		511	949		1811	
Travel Time (s)		10.0	18.5		41.2	
Confl. Peds. (#/hr)	21			21		9
Confl. Bikes (#/hr)				6		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	3%	2%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	241	1663	1616	418	451	310
v/c Ratio	1.14	0.87	1.23	0.76	1.04	0.47
Control Delay	148.8	23.2	128.4	20.9	93.7	22.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	148.8	23.2	128.4	20.9	93.7	22.3
Queue Length 50th (ft)	~199	468	~741	207	~344	141
Queue Length 95th (ft)	#357	594	m#597	m277	#543	220
Internal Link Dist (ft)		431	869		1731	
Turn Bay Length (ft)	200			200		85
Base Capacity (vph)	211	1921	1314	552	434	660
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.14	0.87	1.23	0.76	1.04	0.47

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	222	1530	1487	385	415	285
Future Volume (vph)	222	1530	1487	385	415	285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	12	12	11
Total Lost time (s)	6.5	5.5	5.5	5.5	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.93	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1501	3085	3110	1306	1593	1391
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1501	3085	3110	1306	1593	1391
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	241	1663	1616	418	451	310
RTOR Reduction (vph)	0	0	0	0	0	3
Lane Group Flow (vph)	241	1663	1616	418	451	307
Confl. Peds. (#/hr)	21			21		9
Confl. Bikes (#/hr)				6		
Heavy Vehicles (%)	1%	1%	1%	3%	2%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	6	1 6	1		5	5 6
Permitted Phases				1		
Actuated Green, G (s)	15.5	68.5	46.5	46.5	30.0	51.5
Effective Green, g (s)	15.5	62.0	46.5	46.5	30.0	51.5
Actuated g/C Ratio	0.14	0.56	0.42	0.42	0.27	0.47
Clearance Time (s)	6.5		5.5	5.5	6.0	
Vehicle Extension (s)	2.0		3.0	3.0	2.0	
Lane Grp Cap (vph)	211	1738	1314	552	434	651
v/s Ratio Prot	c0.16	0.54	c0.52		c0.28	0.22
v/s Ratio Perm				0.32		
v/c Ratio	1.14	0.96	1.23	0.76	1.04	0.47
Uniform Delay, d1	47.2	22.7	31.8	27.0	40.0	20.0
Progression Factor	1.00	1.00	0.73	0.71	1.00	1.00
Incremental Delay, d2	105.5	13.5	104.1	0.9	53.7	2.4
Delay (s)	152.8	36.3	127.1	20.0	93.7	22.4
Level of Service	F	D	F	B	F	C
Approach Delay (s)		51.0	105.1		64.7	
Approach LOS		D	F		E	

Intersection Summary			
HCM 2000 Control Delay	76.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	46	860	1820	215	135	140
Future Volume (vph)	46	860	1820	215	135	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	11	11	12	12
Storage Length (ft)	170			250	0	80
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Right Turn on Red				No		No
Link Speed (mph)		35	35		25	
Link Distance (ft)		949	1060		181	
Travel Time (s)		18.5	20.6		4.9	
Confl. Peds. (#/hr)	7			7		3
Confl. Bikes (#/hr)				4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	935	2212	0	299	0
v/c Ratio	0.56	0.41	1.11		2.27	
Control Delay	54.9	8.7	79.4		617.3	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	54.9	8.7	79.4		617.3	
Queue Length 50th (ft)	36	71	~875		~343	
Queue Length 95th (ft)	m38	m313	#1357		#515	
Internal Link Dist (ft)		869	980		101	
Turn Bay Length (ft)	170					
Base Capacity (vph)	89	2304	1986		132	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.56	0.41	1.11		2.27	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	46	860	1820	215	135	140
Future Volume (vph)	46	860	1820	215	135	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	12	12
Total Lost time (s)	5.5	6.0	6.0		4.5	
Lane Util. Factor	1.00	0.95	0.95		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		0.99	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.93	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1516	3032	3054		1537	
Flt Permitted	0.95	1.00	1.00		0.98	
Satd. Flow (perm)	1516	3032	3054		1537	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	935	1978	234	147	152
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	50	935	2212	0	299	0
Confl. Peds. (#/hr)	7			7		3
Confl. Bikes (#/hr)				4		
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Turn Type	Prot	NA	NA		Prot	
Protected Phases	6	1 6	1		5	
Permitted Phases						
Actuated Green, G (s)	6.5	78.0	66.0		9.5	
Effective Green, g (s)	6.5	72.5	66.0		9.5	
Actuated g/C Ratio	0.06	0.66	0.60		0.09	
Clearance Time (s)	5.5		6.0		4.5	
Vehicle Extension (s)	2.0		3.0		2.0	
Lane Grp Cap (vph)	89	1998	1832		132	
v/s Ratio Prot	c0.03	0.31	c0.72		c0.19	
v/s Ratio Perm						
v/c Ratio	0.56	0.47	1.21		2.27	
Uniform Delay, d1	50.4	9.2	22.0		50.2	
Progression Factor	0.86	1.23	1.00		1.00	
Incremental Delay, d2	2.0	0.0	98.7		592.8	
Delay (s)	45.5	11.4	120.7		643.0	
Level of Service	D	B	F		F	
Approach Delay (s)		13.1	120.7		643.0	
Approach LOS		B	F		F	

Intersection Summary			
HCM 2000 Control Delay	135.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	75	930	325	190	5	15	65	5	2	1175
Future Volume (vph)	75	930	325	190	5	15	65	5	2	1175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100			0	0		0		0	0
Storage Lanes	1			0	0		0		1	2
Taper Length (ft)	25				25				25	
Right Turn on Red				Yes			Yes			
Link Speed (mph)		35	35			25			30	
Link Distance (ft)		279	170			125			548	
Travel Time (s)		5.4	3.3			3.4			12.5	
Confl. Peds. (#/hr)	3			3					3	
Confl. Bikes (#/hr)				3						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	1%	0%	0%	0%	0%	0%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)										33%
Lane Group Flow (vph)	82	1011	560	0	0	92	0	0	428	856
v/c Ratio	0.29	1.85	0.38			0.56			0.65	0.72
Control Delay	54.0	420.6	7.0			34.2			35.1	34.8
Queue Delay	0.0	0.1	0.7			1.7			57.9	52.7
Total Delay	54.0	420.7	7.7			35.8			93.0	87.5
Queue Length 50th (ft)	66	~733	33			19			296	340
Queue Length 95th (ft)	119	#869	50			78			421	425
Internal Link Dist (ft)		199	90			45			468	
Turn Bay Length (ft)	100									
Base Capacity (vph)	278	547	1467			164			658	1197
Starvation Cap Reductn	0	0	543			0			0	0
Spillback Cap Reductn	0	7	0			16			347	631
Storage Cap Reductn	0	0	0			0			0	0
Reduced v/c Ratio	0.29	1.87	0.61			0.62			1.38	1.51

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	NEL2	NEL	NER
Lane Configurations										
Traffic Volume (vph)	75	930	325	190	5	15	65	5	2	1175
Future Volume (vph)	75	930	325	190	5	15	65	5	2	1175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	8.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95	0.95			1.00			1.00	0.91
Frpb, ped/bikes	1.00	1.00	0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00	0.94			0.90			0.85	0.85
Flt Protected	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1624	3191	3029			1528			1442	2619
Flt Permitted	0.95	1.00	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1624	3191	3029			1528			1442	2619
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	1011	353	207	5	16	71	5	2	1277
RTOR Reduction (vph)	0	0	58	0	0	66	0	0	0	0
Lane Group Flow (vph)	82	1011	502	0	0	26	0	0	428	856
Confl. Peds. (#/hr)	3			3					3	
Confl. Bikes (#/hr)				3						
Heavy Vehicles (%)	0%	1%	0%	1%	0%	0%	0%	0%	0%	1%
Bus Blockages (#/hr)	0	4	0	0	0	0	0	0	0	0
Turn Type	Split	NA	NA		Split	NA		Perm	pm+pt	custom
Protected Phases	3	3	4 5		2	2			1	1 5
Permitted Phases								1 5	5	1 5
Actuated Green, G (s)	24.0	24.0	68.0			9.0			59.0	64.0
Effective Green, g (s)	24.0	24.0	68.0			9.0			59.0	64.0
Actuated g/C Ratio	0.17	0.17	0.49			0.06			0.42	0.46
Clearance Time (s)	5.0	5.0				5.0			5.0	
Vehicle Extension (s)	2.0	2.0				2.0			2.0	
Lane Grp Cap (vph)	278	547	1471			98			659	1197
v/s Ratio Prot	0.05	c0.32	c0.17			c0.02			0.09	c0.33
v/s Ratio Perm									0.21	
v/c Ratio	0.29	1.85	0.34			0.26			0.65	0.72
Uniform Delay, d1	50.6	58.0	22.2			62.3			33.3	30.6
Progression Factor	1.00	1.00	0.33			1.00			1.00	1.00
Incremental Delay, d2	2.7	388.8	0.0			0.5			2.5	2.2
Delay (s)	53.3	446.8	7.3			62.9			35.8	32.9
Level of Service	D	F	A			E			D	C
Approach Delay (s)		417.2	7.3			62.9			33.8	
Approach LOS		F	A			E			C	

Intersection Summary			
HCM 2000 Control Delay	168.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↱	↱		↰↑					↰	↰↑	↱
Traffic Volume (vph)	0	1620	550	10	335	0	0	0	0	390	345	180
Future Volume (vph)	0	1620	550	10	335	0	0	0	0	390	345	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	13	12	12	12	12	12	12	11	11	11
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		170			86			306			262	
Travel Time (s)		3.3			1.7			7.0			6.0	
Confl. Peds. (#/hr)			16	16								24
Confl. Bikes (#/hr)			4									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)			0%							43%		
Lane Group Flow (vph)	0	1761	598	0	375	0	0	0	0	242	557	196
v/c Ratio		0.94	0.74		0.34					1.19	1.32	0.55
Control Delay		29.8	12.5		1.0					172.6	205.2	13.2
Queue Delay		46.5	53.4		0.0					0.0	0.0	0.0
Total Delay		76.3	65.9		1.0					172.6	205.2	13.2
Queue Length 50th (ft)		427	205		1					~290	~358	0
Queue Length 95th (ft)		m343	m161		1					#483	#485	76
Internal Link Dist (ft)		90			6			226			182	
Turn Bay Length (ft)												
Base Capacity (vph)		1870	805		1104					204	422	356
Starvation Cap Reductn		921	338		0					0	0	0
Spillback Cap Reductn		0	0		0					0	0	0
Storage Cap Reductn		0	0		0					0	0	0
Reduced v/c Ratio		1.86	1.28		0.34					1.19	1.32	0.55

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1620	550	10	335	0	0	0	0	390	345	180
Future Volume (vph)	0	1620	550	10	335	0	0	0	0	390	345	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	13	12	12	12	12	12	12	11	11	11
Total Lost time (s)		5.0	5.0		5.0					8.0	8.0	8.0
Lane Util. Factor		0.86	0.86		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	0.94
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		4223	1260		3244					1429	2960	1319
Flt Permitted		1.00	1.00		0.95					0.95	0.98	1.00
Satd. Flow (perm)		4223	1260		3103					1429	2960	1319
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1761	598	11	364	0	0	0	0	424	375	196
RTOR Reduction (vph)	0	0	248	0	0	0	0	0	0	0	0	168
Lane Group Flow (vph)	0	1761	350	0	375	0	0	0	0	242	557	28
Confl. Peds. (#/hr)			16	16								24
Confl. Bikes (#/hr)			4									
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		1 2 3		5	1 5					4	4	
Permitted Phases			1 2 3									4
Actuated Green, G (s)		62.0	62.0		59.0					20.0	20.0	20.0
Effective Green, g (s)		62.0	62.0		59.0					20.0	20.0	20.0
Actuated g/C Ratio		0.44	0.44		0.42					0.14	0.14	0.14
Clearance Time (s)										8.0	8.0	8.0
Vehicle Extension (s)										2.0	2.0	2.0
Lane Grp Cap (vph)		1870	558		1347					204	422	188
v/s Ratio Prot		c0.42			c0.08					0.17	c0.19	
v/s Ratio Perm			0.28		0.04							0.02
v/c Ratio		0.94	0.63		0.28					1.19	1.32	0.15
Uniform Delay, d1		37.3	30.1		26.5					60.0	60.0	52.5
Progression Factor		0.75	1.50		0.02					1.00	1.00	1.00
Incremental Delay, d2		1.2	0.1		0.1					122.3	159.8	0.1
Delay (s)		29.2	45.4		0.5					182.3	219.8	52.7
Level of Service		C	D		A					F	F	D
Approach Delay (s)		33.3			0.5			0.0			177.8	
Approach LOS		C			A			A			F	

Intersection Summary			
HCM 2000 Control Delay	68.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	930	550	0	0	0	0	1025	35	85	730	0
Future Volume (vph)	280	930	550	0	0	0	0	1025	35	85	730	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	11	11	12	11	11
Right Turn on Red			No			No			Yes			No
Link Speed (mph)		25			20			35			35	
Link Distance (ft)		951			939			563			1007	
Travel Time (s)		25.9			32.0			11.0			19.6	
Confl. Peds. (#/hr)	11		28						3	3		
Confl. Bikes (#/hr)			9									9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1315	598	0	0	0	0	1152	0	0	885	0
v/c Ratio		1.05	1.03					0.94			1.06	
Control Delay		69.4	73.4					55.5			82.3	
Queue Delay		0.0	0.0					0.0			0.0	
Total Delay		69.4	73.4					55.5			82.3	
Queue Length 50th (ft)		658	569					525			~336	
Queue Length 95th (ft)		#1071	#1036					#673			#501	
Internal Link Dist (ft)		871			859			483			927	
Turn Bay Length (ft)												
Base Capacity (vph)		1256	581					1228			833	
Starvation Cap Reductn		0	0					0			0	
Spillback Cap Reductn		0	0					0			0	
Storage Cap Reductn		0	0					0			0	
Reduced v/c Ratio		1.05	1.03					0.94			1.06	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	930	550	0	0	0	0	1025	35	85	730	0
Future Volume (vph)	280	930	550	0	0	0	0	1025	35	85	730	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	11	11	12	11	11
Total Lost time (s)		6.0	6.0					5.0			6.0	
Lane Util. Factor		0.95	1.00					0.95			0.95	
Frpb, ped/bikes		1.00	1.00					1.00			1.00	
Flpb, ped/bikes		0.99	1.00					1.00			1.00	
Frt		1.00	0.85					1.00			1.00	
Flt Protected		0.99	1.00					1.00			0.99	
Satd. Flow (prot)		3139	1454					3123			3124	
Flt Permitted		0.99	1.00					1.00			0.50	
Satd. Flow (perm)		3139	1454					3123			1579	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	1011	598	0	0	0	0	1114	38	92	793	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	1315	598	0	0	0	0	1150	0	0	885	0
Confl. Peds. (#/hr)	11		28						3	3		
Confl. Bikes (#/hr)			9									9
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Prot					NA		pm+pt	NA	
Protected Phases		4	4					2		1	6	
Permitted Phases	4									6		
Actuated Green, G (s)		52.8	52.8					55.0			67.0	
Effective Green, g (s)		52.8	52.8					55.0			67.0	
Actuated g/C Ratio		0.38	0.38					0.39			0.48	
Clearance Time (s)		6.0	6.0					5.0			6.0	
Vehicle Extension (s)		2.0	2.0					2.0			2.0	
Lane Grp Cap (vph)		1183	548					1226			843	
v/s Ratio Prot			0.41					0.37			c0.06	
v/s Ratio Perm		0.42									c0.44	
v/c Ratio		1.11	1.09					0.94			1.05	
Uniform Delay, d1		43.6	43.6					40.9			36.5	
Progression Factor		0.87	0.87					1.00			1.00	
Incremental Delay, d2		58.3	58.3					13.2			44.9	
Delay (s)		96.5	96.2					54.1			81.4	
Level of Service		F	F					D			F	
Approach Delay (s)		96.4			0.0			54.1			81.4	
Approach LOS		F			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	80.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	109.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	1135	115	555	765	0	0	735	360
Future Volume (vph)	0	0	0	100	1135	115	555	765	0	0	735	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	12	11	11	12	12	11	11
Storage Length (ft)	0		0	0		280	0		0	0		0
Storage Lanes	0		0	0		1	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			Yes
Link Speed (mph)		25			25			35			35	
Link Distance (ft)		984			1074			1007			813	
Travel Time (s)		26.8			29.3			19.6			15.8	
Confl. Peds. (#/hr)						54	73		27			73
Confl. Bikes (#/hr)						17						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1468	0	603	832	0	0	1190	0
v/c Ratio					1.30		1.48	0.83			1.22	
Control Delay					177.4		260.1	27.4			142.8	
Queue Delay					0.0		0.0	0.0			0.0	
Total Delay					177.4		260.1	27.4			142.8	
Queue Length 50th (ft)					~533		~602	478			~591	
Queue Length 95th (ft)					#631		#830	691			#730	
Internal Link Dist (ft)		904			994			927			733	
Turn Bay Length (ft)												
Base Capacity (vph)					1131		408	1005			976	
Starvation Cap Reductn					0		0	0			0	
Spillback Cap Reductn					0		0	0			0	
Storage Cap Reductn					0		0	0			0	
Reduced v/c Ratio					1.30		1.48	0.83			1.22	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	1135	115	555	765	0	0	735	360
Future Volume (vph)	0	0	0	100	1135	115	555	765	0	0	735	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	12	11	11	12	12	11	11
Total Lost time (s)					10.0		5.0	6.0			6.0	
Lane Util. Factor					0.91		1.00	1.00			0.95	
Frpb, ped/bikes					0.99		1.00	1.00			0.95	
Flpb, ped/bikes					1.00		1.00	1.00			1.00	
Frt					0.99		1.00	1.00			0.95	
Flt Protected					1.00		0.95	1.00			1.00	
Satd. Flow (prot)					4348		1570	1653			2816	
Flt Permitted					1.00		0.09	1.00			1.00	
Satd. Flow (perm)					4348		141	1653			2816	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	109	1234	125	603	832	0	0	799	391
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	14	0
Lane Group Flow (vph)	0	0	0	0	1459	0	603	832	0	0	1176	0
Confl. Peds. (#/hr)						54	73		27			73
Confl. Bikes (#/hr)						17						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Turn Type				Split	NA		pm+pt	NA			NA	
Protected Phases				4	4		1	6			2	
Permitted Phases							6					
Actuated Green, G (s)					31.0		74.0	73.0			41.0	
Effective Green, g (s)					31.0		74.0	73.0			41.0	
Actuated g/C Ratio					0.26		0.62	0.61			0.34	
Clearance Time (s)					10.0		5.0	6.0			6.0	
Lane Grp Cap (vph)					1123		408	1005			962	
v/s Ratio Prot					c0.34		c0.33	0.50			0.42	
v/s Ratio Perm							c0.58					
v/c Ratio					1.30		1.48	0.83			1.22	
Uniform Delay, d1					44.5		40.5	18.5			39.5	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					141.3		227.9	7.8			109.3	
Delay (s)					185.8		268.5	26.4			148.8	
Level of Service					F		F	C			F	
Approach Delay (s)		0.0			185.8			128.1			148.8	
Approach LOS		A			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	154.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.48		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	118.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	865	1080	665	0	0	0	0	0	685	45
Future Volume (vph)	0	0	865	1080	665	0	0	0	0	0	685	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No	No		No			No			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		515			260			938			1824	
Travel Time (s)		14.0			7.1			21.3			41.5	
Confl. Peds. (#/hr)			21	21								7
Confl. Bikes (#/hr)			16									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	940	1174	723	0	0	0	0	0	794	0
v/c Ratio			2.01	1.06	0.74						1.58	
Control Delay			484.4	48.8	7.7						297.4	
Queue Delay			0.0	15.8	2.1						0.0	
Total Delay			484.4	64.6	9.9						297.4	
Queue Length 50th (ft)			~489	~359	116						~343	
Queue Length 95th (ft)			m#610	m79	m67						#461	
Internal Link Dist (ft)		435			180			858			1744	
Turn Bay Length (ft)			100									
Base Capacity (vph)			467	1105	973						504	
Starvation Cap Reductn			0	161	132						0	
Spillback Cap Reductn			0	0	0						0	
Storage Cap Reductn			0	0	0						0	
Reduced v/c Ratio			2.01	1.24	0.86						1.58	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	865	1080	665	0	0	0	0	0	685	45
Future Volume (vph)	0	0	865	1080	665	0	0	0	0	0	685	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)			9.0	6.0	6.0						5.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2473	3016	1653						3212	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2473	3016	1653						3212	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	940	1174	723	0	0	0	0	0	745	49
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	940	1174	723	0	0	0	0	0	789	0
Confl. Peds. (#/hr)			21	21								7
Confl. Bikes (#/hr)			16									
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type			Prot	Prot	NA						NA	
Protected Phases			2	1 4	1 2 4						3	
Permitted Phases												
Actuated Green, G (s)			17.0	40.0	62.0						14.0	
Effective Green, g (s)			17.0	40.0	57.0						14.0	
Actuated g/C Ratio			0.19	0.44	0.63						0.16	
Clearance Time (s)			9.0								5.0	
Vehicle Extension (s)			2.0								2.0	
Lane Grp Cap (vph)			467	1340	1046						499	
v/s Ratio Prot			c0.38	c0.39	0.44						c0.25	
v/s Ratio Perm												
v/c Ratio			2.01	0.88	0.69						1.58	
Uniform Delay, d1			36.5	22.7	10.8						38.0	
Progression Factor			0.76	0.54	0.90						1.00	
Incremental Delay, d2			462.6	0.7	0.1						270.9	
Delay (s)			490.2	12.9	9.9						308.9	
Level of Service			F	B	A						F	
Approach Delay (s)		490.2			11.7			0.0			308.9	
Approach LOS		F			B			A			F	

Intersection Summary			
HCM 2000 Control Delay	200.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.41		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	132.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	670	30	65	590	55	60	5	195	0	0	0
Future Volume (Veh/h)	25	670	30	65	590	55	60	5	195	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	728	33	71	641	60	65	5	212	0	0	0
Pedestrians		59						77			19	
Lane Width (ft)		11.0						11.5			0.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		5						6			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		740			515							
pX, platoon unblocked	0.73			0.77			0.84	0.84	0.77	0.84	0.84	0.73
vC, conflicting volume	720			838			1718	1738	822	1828	1724	749
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	424			645			1152	1176	623	1285	1160	464
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			89			42	96	40	100	100	100
cM capacity (veh/h)	819			656			112	130	353	39	133	414

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	27	761	71	701	65	217
Volume Left	27	0	71	0	65	0
Volume Right	0	33	0	60	0	212
cSH	819	1700	656	1700	112	339
Volume to Capacity	0.03	0.45	0.11	0.41	0.58	0.64
Queue Length 95th (ft)	3	0	9	0	70	104
Control Delay (s)	9.5	0.0	11.2	0.0	74.4	32.6
Lane LOS	A		B		F	D
Approach Delay (s)	0.3		1.0		42.2	
Approach LOS					E	

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	580	670	75	110	65
Future Volume (vph)	25	580	670	75	110	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	12	12
Storage Length (ft)	110			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Right Turn on Red				No		Yes
Link Speed (mph)		25	25		25	
Link Distance (ft)		606	253		150	
Travel Time (s)		16.5	6.9		4.1	
Confl. Peds. (#/hr)	21			21		4
Confl. Bikes (#/hr)				46		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	3%	12%	0%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	630	810	0	191	0
v/c Ratio	0.14	0.68	0.89		0.88	
Control Delay	21.8	20.4	35.2		70.1	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	21.8	20.4	35.2		70.1	
Queue Length 50th (ft)	1	18	305		92	
Queue Length 95th (ft)	m13	m#480	m#794		#212	
Internal Link Dist (ft)		526	173		70	
Turn Bay Length (ft)	110					
Base Capacity (vph)	188	931	910		228	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.14	0.68	0.89		0.84	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	580	670	75	110	65
Future Volume (vph)	25	580	670	75	110	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	12	12
Total Lost time (s)	7.0	7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99		0.98	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1509	1535	1505		1539	
Flt Permitted	0.19	1.00	1.00		0.97	
Satd. Flow (perm)	310	1535	1505		1539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	630	728	82	120	71
RTOR Reduction (vph)	0	0	0	0	24	0
Lane Group Flow (vph)	27	630	810	0	167	0
Confl. Peds. (#/hr)	21			21		4
Confl. Bikes (#/hr)				46		2
Heavy Vehicles (%)	0%	4%	3%	12%	0%	2%
Turn Type	Perm	NA	NA		Prot	
Protected Phases		6	2		4	
Permitted Phases	6					
Actuated Green, G (s)	52.2	52.2	52.2		11.4	
Effective Green, g (s)	52.2	52.2	52.2		11.4	
Actuated g/C Ratio	0.58	0.58	0.58		0.13	
Clearance Time (s)	7.0	7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0	1.0		2.0	
Lane Grp Cap (vph)	179	890	872		194	
v/s Ratio Prot		0.41	c0.54		c0.11	
v/s Ratio Perm	0.09					
v/c Ratio	0.15	0.71	0.93		0.86	
Uniform Delay, d1	8.7	13.5	17.2		38.5	
Progression Factor	1.44	1.04	1.27		1.00	
Incremental Delay, d2	1.0	2.6	15.0		29.6	
Delay (s)	13.5	16.6	36.9		68.1	
Level of Service	B	B	D		E	
Approach Delay (s)		16.5	36.9		68.1	
Approach LOS		B	D		E	

Intersection Summary			
HCM 2000 Control Delay	32.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	480	1	1	710	140	5	20	0	75	10	0
Future Volume (Veh/h)	1	480	1	1	710	140	5	20	0	75	10	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	522	1	1	772	152	5	22	0	82	11	0
Pedestrians					29			29			21	
Lane Width (ft)					11.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					2			2			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		547			464							
pX, platoon unblocked	0.61			0.83			0.69	0.69	0.83	0.69	0.69	0.61
vC, conflicting volume	945			552			1409	1500	580	1436	1425	869
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	588			355			811	943	389	850	835	463
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	87	100	50	95	100
cM capacity (veh/h)	590			973			187	174	521	164	202	358

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	524	925	27	93
Volume Left	1	1	5	82
Volume Right	1	152	0	0
cSH	590	973	177	167
Volume to Capacity	0.00	0.00	0.15	0.56
Queue Length 95th (ft)	0	0	13	72
Control Delay (s)	0.0	0.0	29.0	50.5
Lane LOS	A	A	D	F
Approach Delay (s)	0.0	0.0	29.0	50.5
Approach LOS			D	F

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	575	20	10	725	1	140	1	30	1	1	1
Future Volume (vph)	1	575	20	10	725	1	140	1	30	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	13	13	13	12	12	12
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		464			606			294			154	
Travel Time (s)		12.7			16.5			8.0			4.2	
Confl. Peds. (#/hr)	21		29	29		21	29		29	29		29
Confl. Bikes (#/hr)			16			46						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	648	0	0	800	0	0	186	0	0	3	0
v/c Ratio		0.83			1.02			0.59			0.01	
Control Delay		33.8			47.5			40.3			27.3	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		33.8			47.5			40.3			27.3	
Queue Length 50th (ft)		224			222			86			1	
Queue Length 95th (ft)		#626			m#700			#260			9	
Internal Link Dist (ft)		384			526			214			74	
Turn Bay Length (ft)												
Base Capacity (vph)		777			782			315			389	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.83			1.02			0.59			0.01	

Intersection Summary	
Area Type:	CBD

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	575	20	10	725	1	140	1	30	1	1	1
Future Volume (vph)	1	575	20	10	725	1	140	1	30	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	13	13	13	12	12	12
Total Lost time (s)		5.5			5.5			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			0.98	
Flpb, ped/bikes		1.00			1.00			0.96			0.99	
Frt		1.00			1.00			0.98			0.95	
Flt Protected		1.00			1.00			0.96			0.98	
Satd. Flow (prot)		1579			1603			1535			1519	
Flt Permitted		1.00			0.99			0.76			0.95	
Satd. Flow (perm)		1578			1588			1219			1464	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	625	22	11	788	1	152	1	33	1	1	1
RTOR Reduction (vph)	0	1	0	0	0	0	0	7	0	0	1	0
Lane Group Flow (vph)	0	647	0	0	800	0	0	179	0	0	2	0
Confl. Peds. (#/hr)	21		29	29		21	29		29	29		29
Confl. Bikes (#/hr)			16			46						
Heavy Vehicles (%)	2%	4%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			5			5	
Permitted Phases	1			1			5			5		
Actuated Green, G (s)		37.3			37.3			24.7			24.7	
Effective Green, g (s)		37.3			37.3			24.7			24.7	
Actuated g/C Ratio		0.41			0.41			0.27			0.27	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		653			658			334			401	
v/s Ratio Prot												
v/s Ratio Perm		0.41			c0.50			c0.15			0.00	
v/c Ratio		0.99			1.22			0.54			0.01	
Uniform Delay, d1		26.2			26.4			27.8			23.7	
Progression Factor		1.00			0.62			1.00			1.00	
Incremental Delay, d2		33.0			103.5			0.8			0.0	
Delay (s)		59.2			119.9			28.6			23.7	
Level of Service		E			F			C			C	
Approach Delay (s)		59.2			119.9			28.6			23.7	
Approach LOS		E			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	85.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	45	45	0	10	150	5	435	0	40	600	5
Future Volume (Veh/h)	30	45	45	0	10	150	5	435	0	40	600	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	49	49	0	11	163	5	473	0	43	652	5
Pedestrians		113			85						37	
Lane Width (ft)		12.0			13.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		9			8						3	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								491				
pX, platoon unblocked	0.79	0.79		0.79	0.79	0.79				0.79		
vC, conflicting volume	1542	1422	768	1382	1424	595	770			558		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1553	1400	768	1350	1403	348	770			301		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	44	87	100	87	67	99			95		
cM capacity (veh/h)	32	87	364	38	87	489	765			914		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	131	174	478	700
Volume Left	33	0	5	43
Volume Right	49	163	0	5
cSH	76	378	765	914
Volume to Capacity	1.72	0.46	0.01	0.05
Queue Length 95th (ft)	281	59	0	4
Control Delay (s)	465.0	22.4	0.2	1.2
Lane LOS	F	C	A	A
Approach Delay (s)	465.0	22.4	0.2	1.2
Approach LOS	F	C		

Intersection Summary			
Average Delay	44.3		
Intersection Capacity Utilization	94.5%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	610	80	45	615	130	105
Future Volume (Veh/h)	610	80	45	615	130	105
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	663	87	49	668	141	114
Pedestrians	2			2	71	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	6	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	253			1002		
pX, platoon unblocked			0.71		0.82	0.71
vC, conflicting volume			821		1546	780
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			546		958	488
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		31	71
cM capacity (veh/h)			685		204	388

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	750	717	255
Volume Left	0	49	141
Volume Right	87	0	114
cSH	1700	685	259
Volume to Capacity	0.44	0.07	0.98
Queue Length 95th (ft)	0	6	238
Control Delay (s)	0.0	1.9	93.9
Lane LOS		A	F
Approach Delay (s)	0.0	1.9	93.9
Approach LOS			F

Intersection Summary			
Average Delay	14.7		
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	70	100	155	60	35	120
Future Volume (Veh/h)	70	100	155	60	35	120
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	109	168	65	38	130
Pedestrians	50		50			50
Lane Width (ft)	13.0		12.0			11.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		4			4
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	506	300			283	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	506	300			283	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	84			97	
cM capacity (veh/h)	466	679			1222	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	185	233	168
Volume Left	76	0	38
Volume Right	109	65	0
cSH	572	1700	1222
Volume to Capacity	0.32	0.14	0.03
Queue Length 95th (ft)	35	0	2
Control Delay (s)	14.3	0.0	2.0
Lane LOS	B		A
Approach Delay (s)	14.3	0.0	2.0
Approach LOS	B		

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	45	215	190	1	1	85
Future Volume (Veh/h)	45	215	190	1	1	85
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	234	207	1	1	92
Pedestrians		3	3		3	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		181				
pX, platoon unblocked						
vC, conflicting volume	211				546	214
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	211				546	214
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				100	89
cM capacity (veh/h)	1356				479	822

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	283	208	93
Volume Left	49	0	1
Volume Right	0	1	92
cSH	1356	1700	816
Volume to Capacity	0.04	0.12	0.11
Queue Length 95th (ft)	3	0	10
Control Delay (s)	1.6	0.0	10.0
Lane LOS	A		A
Approach Delay (s)	1.6	0.0	10.0
Approach LOS			A

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations		↑↑	↑↑			↱
Traffic Volume (veh/h)	0	1005	335	0	0	1700
Future Volume (Veh/h)	0	1005	335	0	0	1700
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1092	364	0	0	1848
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		1190	279			
pX, platoon unblocked					0.88	
vC, conflicting volume	364				910	182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	364				621	182
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	0
cM capacity (veh/h)	1198				369	829

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	546	546	182	182	1848
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	1848
cSH	1700	1700	1700	1700	829
Volume to Capacity	0.32	0.32	0.11	0.11	2.23
Queue Length 95th (ft)	0	0	0	0	3314
Control Delay (s)	0.0	0.0	0.0	0.0	569.8
Lane LOS					F
Approach Delay (s)	0.0		0.0		569.8
Approach LOS					F

Intersection Summary			
Average Delay	318.7		
Intersection Capacity Utilization	121.2%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	370	1640	0	0	0	0	345	110	120	0	0	0
Future Volume (vph)	370	1640	0	0	0	0	345	110	120	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	12	11	11	12	12	12
Right Turn on Red			No			No			Yes			No
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		86			951			304			1156	
Travel Time (s)		1.7			18.5			6.9			26.3	
Confl. Peds. (#/hr)	3								24			
Confl. Bikes (#/hr)									9			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)							19%					
Lane Group Flow (vph)	0	2185	0	0	0	0	304	321	0	0	0	0
v/c Ratio		0.77					0.69	0.75				
Control Delay		0.3					54.0	54.2				
Queue Delay		0.0					0.0	0.0				
Total Delay		0.3					54.0	54.2				
Queue Length 50th (ft)		0					260	261				
Queue Length 95th (ft)		m0					375	386				
Internal Link Dist (ft)		6			871			224			1076	
Turn Bay Length (ft)												
Base Capacity (vph)		2851					440	427				
Starvation Cap Reductn		0					0	0				
Spillback Cap Reductn		0					0	0				
Storage Cap Reductn		0					0	0				
Reduced v/c Ratio		0.77					0.69	0.75				

Intersection Summary

Area Type: CBD

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	370	1640	0	0	0	0	345	110	120	0	0	0
Future Volume (vph)	370	1640	0	0	0	0	345	110	120	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	12	11	11	12	12	12
Total Lost time (s)		5.0					5.0	5.0				
Lane Util. Factor		0.91					0.95	0.95				
Frpb, ped/bikes		1.00					1.00	0.98				
Flpb, ped/bikes		1.00					1.00	1.00				
Frt		1.00					1.00	0.94				
Flt Protected		0.99					0.95	0.99				
Satd. Flow (prot)		4435					1543	1433				
Flt Permitted		0.99					0.95	0.99				
Satd. Flow (perm)		4435					1543	1433				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	402	1783	0	0	0	0	375	120	130	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	18	0	0	0	0
Lane Group Flow (vph)	0	2185	0	0	0	0	304	303	0	0	0	0
Confl. Peds. (#/hr)	3								24			
Confl. Bikes (#/hr)									9			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Split	NA					Split	NA				
Protected Phases	1 2 3 4	1 2 3 4					5	5				
Permitted Phases												
Actuated Green, G (s)		87.0					40.0	40.0				
Effective Green, g (s)		87.0					40.0	40.0				
Actuated g/C Ratio		0.62					0.29	0.29				
Clearance Time (s)							5.0	5.0				
Vehicle Extension (s)							4.0	4.0				
Lane Grp Cap (vph)		2756					440	409				
v/s Ratio Prot		c0.49					0.20	c0.21				
v/s Ratio Perm												
v/c Ratio		0.79					0.69	0.74				
Uniform Delay, d1		19.8					44.5	45.3				
Progression Factor		0.01					1.00	1.00				
Incremental Delay, d2		0.1					5.0	7.5				
Delay (s)		0.3					49.5	52.8				
Level of Service		A					D	D				
Approach Delay (s)		0.3			0.0			51.2			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	142	10	320	211	875	0	0	650	30
Future Volume (vph)	0	0	0	142	10	320	211	875	0	0	650	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	10	10	12	12	10	10
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		590			353			178			774	
Travel Time (s)		13.4			8.0			4.9			21.1	
Confl. Peds. (#/hr)						56	224					224
Confl. Bikes (#/hr)						32						39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	165	348	0	1180	0	0	740	0
v/c Ratio					1.76	0.77		1.04			0.95	
Control Delay					409.9	22.1		36.3			36.6	
Queue Delay					19.3	0.0		24.5			37.9	
Total Delay					429.2	22.1		60.8			74.6	
Queue Length 50th (ft)					~157	49		~353			367	
Queue Length 95th (ft)					#288	131		m#424			m#265	
Internal Link Dist (ft)		510			273			98			694	
Turn Bay Length (ft)												
Base Capacity (vph)					94	504		1135			775	
Starvation Cap Reductn					0	0		232			0	
Spillback Cap Reductn					45	0		0			95	
Storage Cap Reductn					0	0		0			0	
Reduced v/c Ratio					3.37	0.69		1.31			1.09	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	142	10	320	211	875	0	0	650	30
Future Volume (vph)	0	0	0	142	10	320	211	875	0	0	650	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	10	10	12	12	10	10
Total Lost time (s)					4.0	4.0		4.0			4.0	
Lane Util. Factor					1.00	1.00		0.95			1.00	
Frpb, ped/bikes					1.00	1.00		1.00			0.98	
Flpb, ped/bikes					1.00	1.00		1.00			1.00	
Frt					1.00	0.85		1.00			0.99	
Flt Protected					0.96	1.00		0.99			1.00	
Satd. Flow (prot)					1579	1405		3003			1547	
Flt Permitted					0.96	1.00		0.60			1.00	
Satd. Flow (perm)					1579	1405		1817			1547	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	154	11	348	229	951	0	0	707	33
RTOR Reduction (vph)	0	0	0	0	0	207	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	165	141	0	1180	0	0	739	0
Confl. Peds. (#/hr)						56	224					224
Confl. Bikes (#/hr)						32						39
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Turn Type				Split	NA	custom	custom	NA			NA	
Protected Phases				8	8	1 8		2 4 9 11			6	
Permitted Phases							2 4					
Actuated Green, G (s)					6.0	17.6		61.4			50.0	
Effective Green, g (s)					6.0	17.6		55.4			50.0	
Actuated g/C Ratio					0.06	0.18		0.55			0.50	
Clearance Time (s)					4.0						4.0	
Vehicle Extension (s)					2.0						2.0	
Lane Grp Cap (vph)					94	247		1006			773	
v/s Ratio Prot					c0.10	0.10					c0.48	
v/s Ratio Perm								c0.65				
v/c Ratio					1.76	0.57		1.17			0.96	
Uniform Delay, d1					47.0	37.7		22.3			23.9	
Progression Factor					1.00	1.00		0.66			0.86	
Incremental Delay, d2					379.7	2.0		78.9			14.4	
Delay (s)					426.7	39.7		93.7			35.0	
Level of Service					F	D		F			C	
Approach Delay (s)		0.0			164.2			93.7			35.0	
Approach LOS		A			F			F			C	

Intersection Summary			
HCM 2000 Control Delay	90.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	34.0
Intersection Capacity Utilization	93.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1595	455	150	330	0	0	0	0
Future Volume (vph)	0	0	0	0	1595	455	150	330	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	11	11	11	12	12	12
Right Turn on Red			No			No	No		Yes			No
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		260			984			1156			2190	
Travel Time (s)		7.1			26.8			26.3			49.8	
Confl. Peds. (#/hr)						83						
Confl. Bikes (#/hr)						30						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2229	0	0	522	0	0	0	0
v/c Ratio					1.40			0.89				
Control Delay					211.5			55.4				
Queue Delay					0.3			4.3				
Total Delay					211.7			59.8				
Queue Length 50th (ft)					~627			153				
Queue Length 95th (ft)					#723			#246				
Internal Link Dist (ft)		180			904			1076			2110	
Turn Bay Length (ft)												
Base Capacity (vph)					1590			584				
Starvation Cap Reductn					0			0				
Spillback Cap Reductn					118			30				
Storage Cap Reductn					0			0				
Reduced v/c Ratio					1.51			0.94				

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1595	455	150	330	0	0	0	0
Future Volume (vph)	0	0	0	0	1595	455	150	330	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)					6.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.97			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.97			1.00				
Flt Protected					1.00			0.98				
Satd. Flow (prot)					4337			3092				
Flt Permitted					1.00			0.98				
Satd. Flow (perm)					4337			3092				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1734	495	163	359	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2229	0	0	522	0	0	0	0
Confl. Peds. (#/hr)						83						
Confl. Bikes (#/hr)						30						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					33.0			17.0				
Effective Green, g (s)					33.0			17.0				
Actuated g/C Ratio					0.37			0.19				
Clearance Time (s)					6.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1590			584				
v/s Ratio Prot					c0.51							
v/s Ratio Perm								0.17				
v/c Ratio					1.40			0.89				
Uniform Delay, d1					28.5			35.6				
Progression Factor					1.00			1.00				
Incremental Delay, d2					184.7			15.7				
Delay (s)					213.2			51.3				
Level of Service					F			D				
Approach Delay (s)		0.0			213.2			51.3			0.0	
Approach LOS		A			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	182.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	132.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Intersection Capacity Analysis Worksheets

2025 Build Conditions with Mitigation

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	50	665	1845	355	120	40
Future Volume (vph)	50	665	1845	355	120	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	11	11	12	12
Storage Length (ft)	170			250	0	80
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				No		No
Link Speed (mph)		35	35		25	
Link Distance (ft)		949	1060		165	
Travel Time (s)		18.5	20.6		4.5	
Confl. Peds. (#/hr)	9			9		8
Confl. Bikes (#/hr)				1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	18%	2%	5%	0%	1%	9%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	723	2391	0	130	43
v/c Ratio	0.77	0.33	1.28		0.80	0.16
Control Delay	57.9	8.4	150.1		81.3	37.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	57.9	8.4	150.1		81.3	37.0
Queue Length 50th (ft)	39	48	~1069		90	25
Queue Length 95th (ft)	m39	m183	#1535		#185	57
Internal Link Dist (ft)		869	980		85	
Turn Bay Length (ft)	170					80
Base Capacity (vph)	70	2214	1874		175	262
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.77	0.33	1.28		0.74	0.16

Intersection Summary	
Area Type:	CBD
~	Volume exceeds capacity, queue is theoretically infinite.
	Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer.
	Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	50	665	1845	355	120	40
Future Volume (vph)	50	665	1845	355	120	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	12	12
Total Lost time (s)	5.5	6.0	6.0		4.5	4.5
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1285	2973	2928		1608	1333
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1285	2973	2928		1608	1333
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	723	2005	386	130	43
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	54	723	2391	0	130	43
Confl. Peds. (#/hr)	9			9		8
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	18%	2%	5%	0%	1%	9%
Turn Type	Prot	NA	NA		Prot	pt+ov
Protected Phases	6	1 6	1		5	5 6
Permitted Phases						
Actuated Green, G (s)	6.0	76.3	64.8		11.2	21.7
Effective Green, g (s)	6.0	70.8	64.8		11.2	21.7
Actuated g/C Ratio	0.05	0.64	0.59		0.10	0.20
Clearance Time (s)	5.5		6.0		4.5	
Vehicle Extension (s)	2.0		3.0		2.0	
Lane Grp Cap (vph)	70	1913	1724		163	262
v/s Ratio Prot	c0.04	0.24	c0.82		c0.08	0.03
v/s Ratio Perm						
v/c Ratio	0.77	0.38	1.39		0.80	0.16
Uniform Delay, d1	51.3	9.2	22.6		48.3	36.6
Progression Factor	0.95	1.18	1.00		1.00	1.00
Incremental Delay, d2	4.3	0.0	177.8		21.8	0.1
Delay (s)	53.0	10.9	200.4		70.1	36.7
Level of Service	D	B	F		E	D
Approach Delay (s)		13.9	200.4		61.8	
Approach LOS		B	F		E	

Intersection Summary			
HCM 2000 Control Delay	149.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	420	905	710	0	0	0	0	0	765	55
Future Volume (vph)	0	0	420	905	710	0	0	0	0	0	765	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No	No		No			No			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		513			209			926			1840	
Travel Time (s)		14.0			5.7			21.0			41.8	
Confl. Peds. (#/hr)			4	17								4
Confl. Bikes (#/hr)			35									2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	4%	2%	5%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	457	984	772	0	0	0	0	0	892	0
v/c Ratio			0.36	1.32	0.93						1.15	
Control Delay			11.3	169.7	20.2						112.7	
Queue Delay			0.0	1.0	40.4						0.0	
Total Delay			11.3	170.7	60.6						112.7	
Queue Length 50th (ft)			52	~398	330						~361	
Queue Length 95th (ft)			100	m85	m122						m#295	
Internal Link Dist (ft)		433			129			846			1760	
Turn Bay Length (ft)			100									
Base Capacity (vph)			1264	746	850						775	
Starvation Cap Reductn			0	105	138						0	
Spillback Cap Reductn			0	0	40						0	
Storage Cap Reductn			0	0	0						0	
Reduced v/c Ratio			0.36	1.54	1.08						1.15	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	420	905	710	0	0	0	0	0	765	55
Future Volume (vph)	0	0	420	905	710	0	0	0	0	0	765	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)			9.0	6.0	6.0						5.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2378	2987	1574						3209	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2378	2987	1574						3209	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	457	984	772	0	0	0	0	0	832	60
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	457	984	772	0	0	0	0	0	887	0
Confl. Peds. (#/hr)			4	17								4
Confl. Bikes (#/hr)			35									2
Heavy Vehicles (%)	0%	0%	4%	2%	5%	0%	0%	0%	0%	0%	0%	0%
Turn Type			custom	Prot	NA						NA	
Protected Phases			2 3!	1 4	1 2 4						3!	
Permitted Phases												
Actuated Green, G (s)			58.0	32.0	62.0						24.0	
Effective Green, g (s)			58.0	32.0	57.0						24.0	
Actuated g/C Ratio			0.58	0.32	0.57						0.24	
Clearance Time (s)											5.0	
Vehicle Extension (s)											2.0	
Lane Grp Cap (vph)			1379	955	897						770	
v/s Ratio Prot			0.19	c0.33	c0.49						c0.28	
v/s Ratio Perm												
v/c Ratio			0.33	1.03	0.86						1.15	
Uniform Delay, d1			10.9	34.0	18.1						38.0	
Progression Factor			0.81	0.64	1.03						1.06	
Incremental Delay, d2			0.0	18.0	0.8						75.8	
Delay (s)			8.9	39.6	19.4						116.2	
Level of Service			A	D	B						F	
Approach Delay (s)		8.9			30.8			0.0			116.2	
Approach LOS		A			C			A			F	

Intersection Summary			
HCM 2000 Control Delay	52.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	104.9%	ICU Level of Service	G
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	370	40	70	535	160	30	85	50	0	0	0
Future Volume (vph)	55	370	40	70	535	160	30	85	50	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	11	12	12	12	12	12
Storage Length (ft)	80		0	100		0	150		0	0		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		493			513			533			149	
Travel Time (s)		13.4			14.0			14.5			4.1	
Confl. Peds. (#/hr)	19		50	50		19	75					
Confl. Bikes (#/hr)			37			13						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	9%	2%	2%	9%	7%	2%	2%	2%	0%	0%	0%
Parking (#/hr)								0	0			
Shared Lane Traffic (%)												
Lane Group Flow (vph)	60	445	0	76	756	0	33	146	0	0	0	0
v/c Ratio	0.18	0.41		0.14	0.69		0.13	0.55				
Control Delay	6.5	7.0		5.0	10.8		34.7	37.6				
Queue Delay	0.0	0.0		0.0	4.1		0.0	0.0				
Total Delay	6.5	7.0		5.0	14.9		34.7	37.6				
Queue Length 50th (ft)	11	98		5	211		17	66				
Queue Length 95th (ft)	28	161		m15	m137		m42	m126				
Internal Link Dist (ft)		413			433			453			69	
Turn Bay Length (ft)	80			100			150					
Base Capacity (vph)	340	1084		552	1100		385	377				
Starvation Cap Reductn	0	0		0	260		0	0				
Spillback Cap Reductn	0	0		0	0		0	0				
Storage Cap Reductn	0	0		0	0		0	0				
Reduced v/c Ratio	0.18	0.41		0.14	0.90		0.09	0.39				

Intersection Summary	
Area Type:	CBD

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	370	40	70	535	160	30	85	50	0	0	0
Future Volume (vph)	55	370	40	70	535	160	30	85	50	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	11	12	12	12	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0				
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00				
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00				
Flpb, ped/bikes	0.99	1.00		0.94	1.00		1.00	1.00				
Frt	1.00	0.99		1.00	0.97		1.00	0.94				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1438	1480		1491	1495		1540	1425				
Flt Permitted	0.30	1.00		0.48	1.00		0.95	1.00				
Satd. Flow (perm)	460	1480		751	1495		1540	1425				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	402	43	76	582	174	33	92	54	0	0	0
RTOR Reduction (vph)	0	3	0	0	8	0	0	23	0	0	0	0
Lane Group Flow (vph)	60	442	0	76	748	0	33	123	0	0	0	0
Confl. Peds. (#/hr)	19		50	50		19	75					
Confl. Bikes (#/hr)			37			13						
Heavy Vehicles (%)	8%	9%	2%	2%	9%	7%	2%	2%	2%	0%	0%	0%
Parking (#/hr)								0	0			
Turn Type	Perm	NA		Perm	NA		Split	NA				
Protected Phases		2			6		8	8				
Permitted Phases	2			6								
Actuated Green, G (s)	73.1	73.1		73.1	73.1		16.9	16.9				
Effective Green, g (s)	73.1	73.1		73.1	73.1		16.9	16.9				
Actuated g/C Ratio	0.73	0.73		0.73	0.73		0.17	0.17				
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	336	1081		548	1092		260	240				
v/s Ratio Prot		0.30			c0.50		0.02	c0.09				
v/s Ratio Perm	0.13			0.10								
v/c Ratio	0.18	0.41		0.14	0.68		0.13	0.51				
Uniform Delay, d1	4.2	5.2		4.0	7.2		35.3	37.8				
Progression Factor	1.00	1.00		0.96	1.13		1.00	0.99				
Incremental Delay, d2	1.2	1.1		0.0	0.7		0.2	1.8				
Delay (s)	5.3	6.3		3.9	8.9		35.7	39.3				
Level of Service	A	A		A	A		D	D				
Approach Delay (s)		6.2			8.4			38.6			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	430	5	30	615	95	5	5	40	40	1	20
Future Volume (vph)	75	430	5	30	615	95	5	5	40	40	1	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	12	12	12	12	12
Storage Length (ft)	110		0	140		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			No			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		605			253			131			150	
Travel Time (s)		16.5			6.9			3.6			4.1	
Confl. Peds. (#/hr)	17		22	22		17	3		1	1		3
Confl. Bikes (#/hr)			33			12						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	9%	14%	41%	7%	11%	4%	0%	9%	9%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	472	0	33	771	0	0	10	43	0	66	0
v/c Ratio	0.34	0.47		0.10	0.78			0.08	0.42		0.52	
Control Delay	22.5	17.1		15.8	25.3			44.4	57.8		49.1	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	22.5	17.1		15.8	25.3			44.4	57.8		49.1	
Queue Length 50th (ft)	23	149		8	354			6	28		31	
Queue Length 95th (ft)	#125	#497		40	#951			22	62		74	
Internal Link Dist (ft)		525			173			51			70	
Turn Bay Length (ft)	110			140								
Base Capacity (vph)	244	1002		332	991			233	186		157	
Starvation Cap Reductn	0	0		0	0			0	0		0	
Spillback Cap Reductn	0	0		0	0			0	0		0	
Storage Cap Reductn	0	0		0	0			0	0		0	
Reduced v/c Ratio	0.34	0.47		0.10	0.78			0.04	0.23		0.42	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	430	5	30	615	95	5	5	40	40	1	20
Future Volume (vph)	75	430	5	30	615	95	5	5	40	40	1	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.97		0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.98			1.00	0.85		0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.98	1.00		0.97	
Satd. Flow (prot)	1466	1460		1066	1446			1636	1295		1473	
Flt Permitted	0.23	1.00		0.43	1.00			0.98	1.00		0.97	
Satd. Flow (perm)	356	1460		484	1446			1636	1295		1473	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	467	5	33	668	103	5	5	43	43	1	22
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	18	0
Lane Group Flow (vph)	82	472	0	33	771	0	0	10	43	0	48	0
Confl. Peds. (#/hr)	17		22	22		17	3		1	1		3
Confl. Bikes (#/hr)			33			12						
Heavy Vehicles (%)	3%	9%	14%	41%	7%	11%	4%	0%	9%	9%	0%	0%
Turn Type	Perm	NA		Perm	NA		Split	NA	Perm	Split	NA	
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6			2					8			
Actuated Green, G (s)	63.3	63.3		63.3	63.3			5.8	5.8		6.7	
Effective Green, g (s)	63.3	63.3		63.3	63.3			5.8	5.8		6.7	
Actuated g/C Ratio	0.60	0.60		0.60	0.60			0.06	0.06		0.06	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0		1.0	1.0			2.0	2.0		2.0	
Lane Grp Cap (vph)	214	880		291	871			90	71		93	
v/s Ratio Prot		0.32			c0.53			0.01			c0.03	
v/s Ratio Perm	0.23			0.07					c0.03			
v/c Ratio	0.38	0.54		0.11	0.89			0.11	0.61		0.52	
Uniform Delay, d1	10.8	12.2		8.9	17.8			47.1	48.5		47.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	5.1	2.3		0.8	12.8			0.2	9.6		2.0	
Delay (s)	15.9	14.6		9.7	30.5			47.3	58.1		49.6	
Level of Service	B	B		A	C			D	E		D	
Approach Delay (s)		14.8			29.7			56.1			49.6	
Approach LOS		B			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1380	230	235	130	0	0	0	0
Future Volume (vph)	0	0	0	0	1380	230	235	130	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	11	11	11	12	12	12
Right Turn on Red			No			No	No		Yes			No
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		209			762			1156			2190	
Travel Time (s)		5.7			20.8			26.3			49.8	
Confl. Peds. (#/hr)						170	4					
Confl. Bikes (#/hr)						33						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	9%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1750	0	0	396	0	0	0	0
v/c Ratio					1.63			0.55				
Control Delay					315.2			35.8				
Queue Delay					0.9			0.3				
Total Delay					316.0			36.0				
Queue Length 50th (ft)					~602			114				
Queue Length 95th (ft)					#699			162				
Internal Link Dist (ft)		129			682			1076			2110	
Turn Bay Length (ft)												
Base Capacity (vph)					1075			744				
Starvation Cap Reductn					0			0				
Spillback Cap Reductn					173			66				
Storage Cap Reductn					0			0				
Reduced v/c Ratio					1.94			0.58				

Intersection Summary	
Area Type:	CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1380	230	235	130	0	0	0	0
Future Volume (vph)	0	0	0	0	1380	230	235	130	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)					6.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.96			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.98			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					4298			2864				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					4298			2864				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1500	250	255	141	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1750	0	0	396	0	0	0	0
Confl. Peds. (#/hr)						170	4					
Confl. Bikes (#/hr)						33						
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	9%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					25.0			25.0				
Effective Green, g (s)					25.0			25.0				
Actuated g/C Ratio					0.25			0.25				
Clearance Time (s)					6.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1074			716				
v/s Ratio Prot					c0.41							
v/s Ratio Perm								0.14				
v/c Ratio					1.63			0.55				
Uniform Delay, d1					37.5			32.6				
Progression Factor					1.00			1.00				
Incremental Delay, d2					287.5			0.5				
Delay (s)					325.0			33.2				
Level of Service					F			C				
Approach Delay (s)		0.0			325.0			33.2			0.0	
Approach LOS		A			F			C			A	

Intersection Summary			
HCM 2000 Control Delay	271.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	104.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	440	70	20	595	145	30
Future Volume (Veh/h)	440	70	20	595	145	30
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	478	76	22	647	158	33
Pedestrians	3			1	50	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	4	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	253			493		
pX, platoon unblocked			0.82		0.89	0.82
vC, conflicting volume			604		1260	567
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			412		782	367
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		47	94
cM capacity (veh/h)			905		300	535

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	554	669	191
Volume Left	0	22	158
Volume Right	76	0	33
cSH	1700	905	325
Volume to Capacity	0.33	0.02	0.59
Queue Length 95th (ft)	0	2	88
Control Delay (s)	0.0	0.6	30.7
Lane LOS		A	D
Approach Delay (s)	0.0	0.6	30.7
Approach LOS			D

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	30	25	150	195	65	25
Future Volume (Veh/h)	30	25	150	195	65	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	27	163	212	71	27
Pedestrians	50		50			50
Lane Width (ft)	13.0		12.0			11.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		4			4
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	538	369			425	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	538	369			425	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	96			93	
cM capacity (veh/h)	431	621			1083	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	60	375	98
Volume Left	33	0	71
Volume Right	27	212	0
cSH	500	1700	1083
Volume to Capacity	0.12	0.22	0.07
Queue Length 95th (ft)	10	0	5
Control Delay (s)	13.2	0.0	6.4
Lane LOS	B		A
Approach Delay (s)	13.2	0.0	6.4
Approach LOS	B		

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	31	825	1755	180	110	110
Future Volume (vph)	31	825	1755	180	110	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	11	11	12	12
Storage Length (ft)	170			250	0	80
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				No		No
Link Speed (mph)		35	35		25	
Link Distance (ft)		949	1060		181	
Travel Time (s)		18.5	20.6		4.9	
Confl. Peds. (#/hr)	7			7		3
Confl. Bikes (#/hr)				4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	34	897	2104	0	120	120
v/c Ratio	0.41	0.39	1.05		0.85	0.43
Control Delay	51.7	8.7	55.7		92.7	44.4
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	51.7	8.7	55.7		92.7	44.4
Queue Length 50th (ft)	24	57	641		85	75
Queue Length 95th (ft)	m28	m313	#1273		#187	134
Internal Link Dist (ft)		869	980		101	
Turn Bay Length (ft)	170					80
Base Capacity (vph)	82	2299	2000		147	272
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.41	0.39	1.05		0.82	0.44

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	31	825	1755	180	110	110
Future Volume (vph)	31	825	1755	180	110	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	12	12
Total Lost time (s)	5.5	6.0	6.0		4.5	4.5
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1516	3032	3061		1624	1454
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1516	3032	3061		1624	1454
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	897	1908	196	120	120
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	34	897	2104	0	120	120
Confl. Peds. (#/hr)	7			7		3
Confl. Bikes (#/hr)				4		
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Turn Type	Prot	NA	NA		Prot	pt+ov
Protected Phases	6	1 6	1		5	5 6
Permitted Phases						
Actuated Green, G (s)	6.0	77.8	66.3		9.7	20.2
Effective Green, g (s)	6.0	72.3	66.3		9.7	20.2
Actuated g/C Ratio	0.05	0.66	0.60		0.09	0.18
Clearance Time (s)	5.5		6.0		4.5	
Vehicle Extension (s)	2.0		3.0		2.0	
Lane Grp Cap (vph)	82	1992	1844		143	267
v/s Ratio Prot	0.02	0.30	c0.69		c0.07	c0.08
v/s Ratio Perm						
v/c Ratio	0.41	0.45	1.14		0.84	0.45
Uniform Delay, d1	50.3	9.2	21.9		49.4	40.0
Progression Factor	0.87	1.23	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.0	70.6		31.7	0.4
Delay (s)	44.3	11.3	92.4		81.1	40.4
Level of Service	D	B	F		F	D
Approach Delay (s)		12.5	92.4		60.7	
Approach LOS		B	F		E	

Intersection Summary			
HCM 2000 Control Delay	67.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	725	995	635	0	0	0	0	0	650	40
Future Volume (vph)	0	0	725	995	635	0	0	0	0	0	650	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No	No		No			No			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		515			260			938			1824	
Travel Time (s)		14.0			7.1			21.3			41.5	
Confl. Peds. (#/hr)			21	21								7
Confl. Bikes (#/hr)			16									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	788	1082	690	0	0	0	0	0	750	0
v/c Ratio			0.80	0.98	0.71						1.49	
Control Delay			25.6	22.0	6.7						260.2	
Queue Delay			0.0	39.9	1.5						0.0	
Total Delay			25.6	61.9	8.2						260.2	
Queue Length 50th (ft)			222	96	100						~314	
Queue Length 95th (ft)			243	m75	m67						#432	
Internal Link Dist (ft)		435			180			858			1744	
Turn Bay Length (ft)			100									
Base Capacity (vph)			989	1105	973						504	
Starvation Cap Reductn			0	169	130						0	
Spillback Cap Reductn			0	0	37						0	
Storage Cap Reductn			0	0	0						0	
Reduced v/c Ratio			0.80	1.16	0.82						1.49	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	725	995	635	0	0	0	0	0	650	40
Future Volume (vph)	0	0	725	995	635	0	0	0	0	0	650	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)			9.0	6.0	6.0						5.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2473	3016	1653						3214	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2473	3016	1653						3214	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	788	1082	690	0	0	0	0	0	707	43
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	788	1082	690	0	0	0	0	0	745	0
Confl. Peds. (#/hr)			21	21								7
Confl. Bikes (#/hr)			16									
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type			custom	Prot	NA						NA	
Protected Phases			2 3!	1 4	1 2 4						3!	
Permitted Phases												
Actuated Green, G (s)			40.0	40.0	62.0						14.0	
Effective Green, g (s)			40.0	40.0	57.0						14.0	
Actuated g/C Ratio			0.44	0.44	0.63						0.16	
Clearance Time (s)											5.0	
Vehicle Extension (s)											2.0	
Lane Grp Cap (vph)			1099	1340	1046						499	
v/s Ratio Prot			c0.32	c0.36	0.42						c0.23	
v/s Ratio Perm												
v/c Ratio			0.72	0.81	0.66						1.49	
Uniform Delay, d1			20.4	21.7	10.4						38.0	
Progression Factor			0.81	0.53	0.82						1.00	
Incremental Delay, d2			1.6	0.3	0.1						232.2	
Delay (s)			18.1	11.9	8.6						270.2	
Level of Service			B	B	A						F	
Approach Delay (s)		18.1			10.6			0.0			270.2	
Approach LOS		B			B			A			F	

Intersection Summary			
HCM 2000 Control Delay	71.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	99.8%	ICU Level of Service	F
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	600	25	45	545	85	60	30	125	0	0	0
Future Volume (vph)	25	600	25	45	545	85	60	30	125	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	11	12	12	12	12	12
Storage Length (ft)	80		0	100		0	150		0	0		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		487			515			528			149	
Travel Time (s)		13.3			14.0			14.4			4.1	
Confl. Peds. (#/hr)	19		77	77		19	59					
Confl. Bikes (#/hr)			16			41						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	6%	10%	4%	6%	2%	2%	2%	2%	2%	2%
Parking (#/hr)								0	0			
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	679	0	49	684	0	65	169	0	0	0	0
v/c Ratio	0.07	0.60		0.14	0.61		0.23	0.48				
Control Delay	5.6	10.3		3.9	6.7		31.8	13.5				
Queue Delay	0.0	0.0		0.0	0.5		0.0	0.0				
Total Delay	5.6	10.3		3.9	7.2		31.8	13.5				
Queue Length 50th (ft)	5	187		2	15		30	14				
Queue Length 95th (ft)	14	293		m14	m290		m65	70				
Internal Link Dist (ft)		407			435			448			69	
Turn Bay Length (ft)	80			100			150					
Base Capacity (vph)	374	1128		350	1128		325	387				
Starvation Cap Reductn	0	0		0	144		0	0				
Spillback Cap Reductn	0	0		0	0		0	0				
Storage Cap Reductn	0	0		0	0		0	0				
Reduced v/c Ratio	0.07	0.60		0.14	0.70		0.20	0.44				

Intersection Summary	
Area Type:	CBD

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	600	25	45	545	85	60	30	125	0	0	0
Future Volume (vph)	25	600	25	45	545	85	60	30	125	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	11	12	12	12	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0				
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00				
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00				
Flpb, ped/bikes	0.99	1.00		0.95	1.00		1.00	1.00				
Frt	1.00	0.99		1.00	0.98		1.00	0.88				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1506	1595		1402	1589		1540	1327				
Flt Permitted	0.33	1.00		0.34	1.00		0.95	1.00				
Satd. Flow (perm)	529	1595		497	1589		1540	1327				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	652	27	49	592	92	65	33	136	0	0	0
RTOR Reduction (vph)	0	1	0	0	6	0	0	111	0	0	0	0
Lane Group Flow (vph)	27	678	0	49	678	0	65	58	0	0	0	0
Confl. Peds. (#/hr)	19		77	77		19	59					
Confl. Bikes (#/hr)			16			41						
Heavy Vehicles (%)	3%	2%	6%	10%	4%	6%	2%	2%	2%	2%	2%	2%
Parking (#/hr)								0	0			
Turn Type	Perm	NA		Perm	NA		Split	NA				
Protected Phases		2			6		8	8				
Permitted Phases	2			6								
Actuated Green, G (s)	63.6	63.6		63.6	63.6		16.4	16.4				
Effective Green, g (s)	63.6	63.6		63.6	63.6		16.4	16.4				
Actuated g/C Ratio	0.71	0.71		0.71	0.71		0.18	0.18				
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	373	1127		351	1122		280	241				
v/s Ratio Prot		0.42			c0.43		0.04	c0.04				
v/s Ratio Perm	0.05			0.10								
v/c Ratio	0.07	0.60		0.14	0.60		0.23	0.24				
Uniform Delay, d1	4.1	6.7		4.3	6.8		31.4	31.5				
Progression Factor	1.00	1.00		0.61	0.66		1.00	0.99				
Incremental Delay, d2	0.4	2.4		0.1	0.6		0.4	0.5				
Delay (s)	4.5	9.1		2.7	5.1		31.9	31.6				
Level of Service	A	A		A	A		C	C				
Approach Delay (s)		8.9			4.9			31.7			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	560	5	20	665	25	10	1	30	110	0	65
Future Volume (vph)	25	560	5	20	665	25	10	1	30	110	0	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	10	10	12	12	12	12	12	12
Storage Length (ft)	110		0	140		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			No			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		606			253			131			150	
Travel Time (s)		16.5			6.9			3.6			4.1	
Confl. Peds. (#/hr)	21		29	29		21	4					4
Confl. Bikes (#/hr)			16			46			2			2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	22%	24%	3%	12%	0%	0%	14%	0%	0%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	614	0	22	750	0	0	12	33	0	191	0
v/c Ratio	0.15	0.68		0.10	0.83			0.10	0.35		0.71	
Control Delay	22.7	26.8		21.1	33.2			43.5	53.4		25.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	22.7	26.8		21.1	33.2			43.5	53.4		25.7	
Queue Length 50th (ft)	6	203		5	291			7	20		17	
Queue Length 95th (ft)	38	#689		31	#883			24	50		85	
Internal Link Dist (ft)		526			173			51			70	
Turn Bay Length (ft)	110			140								
Base Capacity (vph)	184	902		222	903			228	174		301	
Starvation Cap Reductn	0	0		0	0			0	0		0	
Spillback Cap Reductn	0	0		0	0			0	0		0	
Storage Cap Reductn	0	0		0	0			0	0		0	
Reduced v/c Ratio	0.15	0.68		0.10	0.83			0.05	0.19		0.63	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	560	5	20	665	25	10	1	30	110	0	65
Future Volume (vph)	25	560	5	20	665	25	10	1	30	110	0	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	10	10	12	12	12	12	12	12
Total Lost time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.97		0.98	
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.99			1.00	0.85		0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.96	1.00		0.97	
Satd. Flow (prot)	1508	1530		1211	1532			1635	1231		1531	
Flt Permitted	0.20	1.00		0.30	1.00			0.96	1.00		0.97	
Satd. Flow (perm)	312	1530		378	1532			1635	1231		1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	609	5	22	723	27	11	1	33	120	0	71
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	152	0
Lane Group Flow (vph)	27	614	0	22	750	0	0	12	33	0	39	0
Confl. Peds. (#/hr)	21		29	29		21	4					4
Confl. Bikes (#/hr)			16			46			2			2
Heavy Vehicles (%)	0%	4%	22%	24%	3%	12%	0%	0%	14%	0%	0%	2%
Turn Type	Perm	NA		Perm	NA		Split	NA	Perm	Split	NA	
Protected Phases		6			2		8	8		4	4	
Permitted Phases	6			2					8			
Actuated Green, G (s)	53.8	53.8		53.8	53.8			5.2	5.2		7.6	
Effective Green, g (s)	53.8	53.8		53.8	53.8			5.2	5.2		7.6	
Actuated g/C Ratio	0.54	0.54		0.54	0.54			0.05	0.05		0.08	
Clearance Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0		1.0	1.0			2.0	2.0		2.0	
Lane Grp Cap (vph)	167	823		203	824			85	64		116	
v/s Ratio Prot		0.40			c0.49			0.01			c0.03	
v/s Ratio Perm	0.09			0.06					c0.03			
v/c Ratio	0.16	0.75		0.11	0.91			0.14	0.52		0.34	
Uniform Delay, d1	11.7	17.8		11.3	20.9			45.3	46.2		43.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	2.1	6.1		1.1	15.9			0.3	2.9		0.6	
Delay (s)	13.8	23.9		12.4	36.8			45.5	49.1		44.5	
Level of Service	B	C		B	D			D	D		D	
Approach Delay (s)		23.5			36.1			48.1			44.5	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1500	445	130	320	0	0	0	0
Future Volume (vph)	0	0	0	0	1500	445	130	320	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	11	11	11	12	12	12
Right Turn on Red			No			No	No		Yes			No
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		260			984			1156			2190	
Travel Time (s)		7.1			26.8			26.3			49.8	
Confl. Peds. (#/hr)						83						
Confl. Bikes (#/hr)						30						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2114	0	0	489	0	0	0	0
v/c Ratio					1.33			0.84				
Control Delay					181.1			49.5				
Queue Delay					0.1			2.0				
Total Delay					181.3			51.5				
Queue Length 50th (ft)					~578			142				
Queue Length 95th (ft)					#673			#223				
Internal Link Dist (ft)		180			904			1076			2110	
Turn Bay Length (ft)												
Base Capacity (vph)					1587			584				
Starvation Cap Reductn					0			0				
Spillback Cap Reductn					70			30				
Storage Cap Reductn					0			0				
Reduced v/c Ratio					1.39			0.88				

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1500	445	130	320	0	0	0	0
Future Volume (vph)	0	0	0	0	1500	445	130	320	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)					6.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.97			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.97			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					4328			3096				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					4328			3096				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1630	484	141	348	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2114	0	0	489	0	0	0	0
Confl. Peds. (#/hr)						83						
Confl. Bikes (#/hr)						30						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					33.0			17.0				
Effective Green, g (s)					33.0			17.0				
Actuated g/C Ratio					0.37			0.19				
Clearance Time (s)					6.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1586			584				
v/s Ratio Prot					c0.49							
v/s Ratio Perm								0.16				
v/c Ratio					1.33			0.84				
Uniform Delay, d1					28.5			35.2				
Progression Factor					1.00			1.00				
Incremental Delay, d2					154.2			9.7				
Delay (s)					182.7			44.9				
Level of Service					F			D				
Approach Delay (s)		0.0			182.7			44.9			0.0	
Approach LOS		A			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	156.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	99.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	610	90	20	595	115	30
Future Volume (Veh/h)	610	90	20	595	115	30
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	663	98	22	647	125	33
Pedestrians	2			2	71	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	6	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	253			487		
pX, platoon unblocked			0.70		0.79	0.70
vC, conflicting volume			832		1476	785
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			540		929	473
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		41	91
cM capacity (veh/h)			673		214	387

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	761	669	158
Volume Left	0	22	125
Volume Right	98	0	33
cSH	1700	673	236
Volume to Capacity	0.45	0.03	0.67
Queue Length 95th (ft)	0	3	106
Control Delay (s)	0.0	0.9	46.7
Lane LOS		A	E
Approach Delay (s)	0.0	0.9	46.7
Approach LOS			E

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	65	65	80	85	40	70
Future Volume (Veh/h)	65	65	80	85	40	70
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	71	71	87	92	43	76
Pedestrians	50		50			50
Lane Width (ft)	13.0		12.0			11.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		4			4
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	395	233			229	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	395	233			229	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	90			97	
cM capacity (veh/h)	539	740			1279	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	142	179	119
Volume Left	71	0	43
Volume Right	71	92	0
cSH	624	1700	1279
Volume to Capacity	0.23	0.11	0.03
Queue Length 95th (ft)	22	0	3
Control Delay (s)	12.5	0.0	3.0
Lane LOS	B		A
Approach Delay (s)	12.5	0.0	3.0
Approach LOS	B		

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection Capacity Analysis Worksheets

2030 Build Conditions with Mitigation

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	80	690	1950	430	125	50
Future Volume (vph)	80	690	1950	430	125	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	11	11	12	12
Storage Length (ft)	170			250	0	80
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				No		No
Link Speed (mph)		35	35		25	
Link Distance (ft)		949	1060		165	
Travel Time (s)		18.5	20.6		4.5	
Confl. Peds. (#/hr)	9			9		8
Confl. Bikes (#/hr)				1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	18%	2%	5%	0%	1%	9%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	87	750	2587	0	136	54
v/c Ratio	1.24	0.34	1.39		0.82	0.20
Control Delay	162.5	8.5	200.0		83.8	37.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	162.5	8.5	200.0		83.8	37.7
Queue Length 50th (ft)	~78	51	~1223		95	31
Queue Length 95th (ft)	m#71	m182	#1686		#196	68
Internal Link Dist (ft)		869	980		85	
Turn Bay Length (ft)	170					80
Base Capacity (vph)	70	2209	1863		175	273
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	1.24	0.34	1.39		0.78	0.20

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	80	690	1950	430	125	50
Future Volume (vph)	80	690	1950	430	125	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	12	12
Total Lost time (s)	5.5	6.0	6.0		4.5	4.5
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1285	2973	2920		1608	1333
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1285	2973	2920		1608	1333
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	750	2120	467	136	54
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	87	750	2587	0	136	54
Confl. Peds. (#/hr)	9			9		8
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	18%	2%	5%	0%	1%	9%
Turn Type	Prot	NA	NA		Prot	pt+ov
Protected Phases	6	1 6	1		5	5 6
Permitted Phases						
Actuated Green, G (s)	6.0	76.1	64.6		11.4	21.9
Effective Green, g (s)	6.0	70.6	64.6		11.4	21.9
Actuated g/C Ratio	0.05	0.64	0.59		0.10	0.20
Clearance Time (s)	5.5		6.0		4.5	
Vehicle Extension (s)	2.0		3.0		2.0	
Lane Grp Cap (vph)	70	1908	1714		166	265
v/s Ratio Prot	c0.07	0.25	c0.89		c0.08	0.04
v/s Ratio Perm						
v/c Ratio	1.24	0.39	1.51		0.82	0.20
Uniform Delay, d1	52.0	9.4	22.7		48.3	36.8
Progression Factor	0.95	1.18	1.00		1.00	1.00
Incremental Delay, d2	120.1	0.0	232.3		24.8	0.1
Delay (s)	169.3	11.2	255.0		73.1	36.9
Level of Service	F	B	F		E	D
Approach Delay (s)		27.6	255.0		62.8	
Approach LOS		C	F		E	

Intersection Summary			
HCM 2000 Control Delay	192.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	475	945	755	0	0	0	0	0	785	60
Future Volume (vph)	0	0	475	945	755	0	0	0	0	0	785	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No	No		No			No			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		513			209			926			1840	
Travel Time (s)		14.0			5.7			21.0			41.8	
Confl. Peds. (#/hr)			4	17								4
Confl. Bikes (#/hr)			35									2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	4%	2%	5%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	516	1027	821	0	0	0	0	0	918	0
v/c Ratio			0.39	1.43	0.98						1.19	
Control Delay			15.2	220.9	26.8						125.3	
Queue Delay			0.0	1.1	38.5						0.0	
Total Delay			15.2	222.0	65.4						125.3	
Queue Length 50th (ft)			124	~427	367						~380	
Queue Length 95th (ft)			116	m86	m120						m#292	
Internal Link Dist (ft)		433			129			846			1760	
Turn Bay Length (ft)			100									
Base Capacity (vph)			1307	716	834						774	
Starvation Cap Reductn			0	109	137						0	
Spillback Cap Reductn			0	0	0						0	
Storage Cap Reductn			0	0	0						0	
Reduced v/c Ratio			0.39	1.69	1.18						1.19	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	475	945	755	0	0	0	0	0	785	60
Future Volume (vph)	0	0	475	945	755	0	0	0	0	0	785	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)			9.0	6.0	6.0						5.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2378	2987	1574						3207	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2378	2987	1574						3207	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	516	1027	821	0	0	0	0	0	853	65
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	516	1027	821	0	0	0	0	0	913	0
Confl. Peds. (#/hr)			4	17								4
Confl. Bikes (#/hr)			35									2
Heavy Vehicles (%)	0%	0%	4%	2%	5%	0%	0%	0%	0%	0%	0%	0%
Turn Type			custom	Prot	NA						NA	
Protected Phases			2 3!	1 4	1 2 4						3!	
Permitted Phases												
Actuated Green, G (s)			59.0	31.0	62.0						24.0	
Effective Green, g (s)			59.0	31.0	57.0						24.0	
Actuated g/C Ratio			0.59	0.31	0.57						0.24	
Clearance Time (s)											5.0	
Vehicle Extension (s)											2.0	
Lane Grp Cap (vph)			1403	925	897						769	
v/s Ratio Prot			0.22	c0.34	c0.52						c0.28	
v/s Ratio Perm												
v/c Ratio			0.37	1.11	0.92						1.19	
Uniform Delay, d1			10.7	34.5	19.3						38.0	
Progression Factor			1.09	0.65	1.08						1.08	
Incremental Delay, d2			0.1	51.3	1.6						88.8	
Delay (s)			11.8	73.8	22.5						129.7	
Level of Service			B	E	C						F	
Approach Delay (s)		11.8			51.0			0.0			129.7	
Approach LOS		B			D			A			F	

Intersection Summary			
HCM 2000 Control Delay	66.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	110.9%	ICU Level of Service	H
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	395	50	105	550	160	50	85	80	0	0	0
Future Volume (vph)	55	395	50	105	550	160	50	85	80	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	11	12	12	12	12	12
Storage Length (ft)	80		0	100		0	150		0	0		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		493			513			533			149	
Travel Time (s)		13.4			14.0			14.5			4.1	
Confl. Peds. (#/hr)	19		50	50		19	40					
Confl. Bikes (#/hr)			37			13						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	8%	9%	2%	2%	9%	7%	2%	2%	2%	0%	0%	0%
Parking (#/hr)								0	0			
Shared Lane Traffic (%)												
Lane Group Flow (vph)	60	483	0	114	772	0	54	179	0	0	0	0
v/c Ratio	0.19	0.45		0.22	0.71		0.20	0.64				
Control Delay	7.1	7.8		5.2	9.0		35.0	37.8				
Queue Delay	0.0	0.0		0.0	1.7		0.0	0.0				
Total Delay	7.1	7.8		5.2	10.6		35.0	37.8				
Queue Length 50th (ft)	11	111		29	199		29	77				
Queue Length 95th (ft)	31	199		m6	m30		m58	m142				
Internal Link Dist (ft)		413			433			453			69	
Turn Bay Length (ft)	80			100			150					
Base Capacity (vph)	324	1072		522	1093		385	383				
Starvation Cap Reductn	0	0		0	169		0	0				
Spillback Cap Reductn	0	0		0	0		0	0				
Storage Cap Reductn	0	0		0	0		0	0				
Reduced v/c Ratio	0.19	0.45		0.22	0.84		0.14	0.47				

Intersection Summary	
Area Type:	CBD

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	395	50	105	550	160	50	85	80	0	0	0
Future Volume (vph)	55	395	50	105	550	160	50	85	80	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	11	12	12	12	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0				
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00				
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00				
Flpb, ped/bikes	0.99	1.00		0.94	1.00		1.00	1.00				
Frt	1.00	0.98		1.00	0.97		1.00	0.93				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1439	1474		1500	1496		1540	1399				
Flt Permitted	0.29	1.00		0.45	1.00		0.95	1.00				
Satd. Flow (perm)	443	1474		716	1496		1540	1399				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	429	54	114	598	174	54	92	87	0	0	0
RTOR Reduction (vph)	0	4	0	0	8	0	0	37	0	0	0	0
Lane Group Flow (vph)	60	479	0	114	764	0	54	142	0	0	0	0
Confl. Peds. (#/hr)	19		50	50		19	40					
Confl. Bikes (#/hr)			37			13						
Heavy Vehicles (%)	8%	9%	2%	2%	9%	7%	2%	2%	2%	0%	0%	0%
Parking (#/hr)								0	0			
Turn Type	Perm	NA		Perm	NA		Split	NA				
Protected Phases		2			6		8	8				
Permitted Phases	2			6								
Actuated Green, G (s)	72.5	72.5		72.5	72.5		17.5	17.5				
Effective Green, g (s)	72.5	72.5		72.5	72.5		17.5	17.5				
Actuated g/C Ratio	0.72	0.72		0.72	0.72		0.18	0.18				
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	321	1068		519	1084		269	244				
v/s Ratio Prot		0.33			c0.51		0.04	c0.10				
v/s Ratio Perm	0.14			0.16								
v/c Ratio	0.19	0.45		0.22	0.70		0.20	0.58				
Uniform Delay, d1	4.4	5.6		4.5	7.7		35.3	37.9				
Progression Factor	1.00	1.00		0.89	0.88		1.00	0.99				
Incremental Delay, d2	1.3	1.4		0.0	0.5		0.4	3.5				
Delay (s)	5.7	7.0		4.0	7.3		35.5	40.9				
Level of Service	A	A		A	A		D	D				
Approach Delay (s)		6.8			6.9			39.7			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	75	505	575	100	40	20
Future Volume (vph)	75	505	575	100	40	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	12	12
Storage Length (ft)	110			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Right Turn on Red				No		Yes
Link Speed (mph)		25	25		25	
Link Distance (ft)		605	253		150	
Travel Time (s)		16.5	6.9		4.1	
Confl. Peds. (#/hr)	17			17	1	3
Confl. Bikes (#/hr)				12		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	9%	7%	11%	9%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	82	549	734	0	65	0
v/c Ratio	0.24	0.51	0.69		0.50	
Control Delay	6.5	11.4	16.1		39.9	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	6.5	11.4	16.1		39.9	
Queue Length 50th (ft)	23	199	146		21	
Queue Length 95th (ft)	m11	#398	#649		#67	
Internal Link Dist (ft)		525	173		70	
Turn Bay Length (ft)	110					
Base Capacity (vph)	343	1080	1064		130	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.24	0.51	0.69		0.50	

Intersection Summary	
Area Type:	CBD

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	75	505	575	100	40	20
Future Volume (vph)	75	505	575	100	40	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	12	12
Total Lost time (s)	7.0	7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99		0.98	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1466	1464	1445		1468	
Flt Permitted	0.30	1.00	1.00		0.97	
Satd. Flow (perm)	466	1464	1445		1468	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	549	625	109	43	22
RTOR Reduction (vph)	0	0	0	0	21	0
Lane Group Flow (vph)	82	549	734	0	44	0
Confl. Peds. (#/hr)	17			17	1	3
Confl. Bikes (#/hr)				12		
Heavy Vehicles (%)	3%	9%	7%	11%	9%	0%
Turn Type	Perm	NA	NA		Prot	
Protected Phases		6	2		4	
Permitted Phases	6					
Actuated Green, G (s)	53.0	53.0	53.0		4.8	
Effective Green, g (s)	53.0	53.0	53.0		4.8	
Actuated g/C Ratio	0.66	0.66	0.66		0.06	
Clearance Time (s)	7.0	7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0	1.0		2.0	
Lane Grp Cap (vph)	308	969	957		88	
v/s Ratio Prot		0.37	c0.51		c0.03	
v/s Ratio Perm	0.18					
v/c Ratio	0.27	0.57	0.77		0.50	
Uniform Delay, d1	5.5	7.3	9.3		36.4	
Progression Factor	0.57	1.01	1.00		1.00	
Incremental Delay, d2	1.5	1.7	5.9		1.6	
Delay (s)	4.7	9.1	15.1		38.1	
Level of Service	A	A	B		D	
Approach Delay (s)		8.5	15.1		38.1	
Approach LOS		A	B		D	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	565	45	15	580	1	60	1	15	1	1	1
Future Volume (vph)	1	565	45	15	580	1	60	1	15	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	13	13	13	12	12	12
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		467			605			282			144	
Travel Time (s)		12.7			16.5			7.7			3.9	
Confl. Peds. (#/hr)	17		22	22		17	22		22	22		22
Confl. Bikes (#/hr)			33			12						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	9%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	664	0	0	647	0	0	82	0	0	3	0
v/c Ratio		0.70			0.68			0.57			0.02	
Control Delay		21.0			25.1			46.7			28.7	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		21.0			25.1			46.7			28.7	
Queue Length 50th (ft)		131			220			33			1	
Queue Length 95th (ft)		#623			#578			#108			9	
Internal Link Dist (ft)		387			525			202			64	
Turn Bay Length (ft)												
Base Capacity (vph)		942			949			145			163	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.70			0.68			0.57			0.02	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	565	45	15	580	1	60	1	15	1	1	1
Future Volume (vph)	1	565	45	15	580	1	60	1	15	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	13	13	13	12	12	12
Total Lost time (s)		5.5			5.5			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.98			0.96	
Flpb, ped/bikes		1.00			1.00			0.93			0.98	
Frt		0.99			1.00			0.97			0.95	
Flt Protected		1.00			1.00			0.96			0.98	
Satd. Flow (prot)		1502			1544			1474			1480	
Flt Permitted		1.00			0.98			0.77			0.92	
Satd. Flow (perm)		1501			1516			1178			1378	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	614	49	16	630	1	65	1	16	1	1	1
RTOR Reduction (vph)	0	3	0	0	0	0	0	11	0	0	1	0
Lane Group Flow (vph)	0	661	0	0	647	0	0	71	0	0	2	0
Confl. Peds. (#/hr)	17		22	22		17	22		22	22		22
Confl. Bikes (#/hr)			33			12						
Heavy Vehicles (%)	2%	9%	2%	2%	7%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			5			5	
Permitted Phases	1			1			5			5		
Actuated Green, G (s)		43.9			43.9			9.7			9.7	
Effective Green, g (s)		43.9			43.9			9.7			9.7	
Actuated g/C Ratio		0.55			0.55			0.12			0.12	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		823			831			142			167	
v/s Ratio Prot												
v/s Ratio Perm		c0.44			0.43			c0.06			0.00	
v/c Ratio		0.80			0.78			0.50			0.01	
Uniform Delay, d1		14.6			14.2			32.9			30.9	
Progression Factor		1.00			1.56			1.00			1.00	
Incremental Delay, d2		8.2			5.2			1.0			0.0	
Delay (s)		22.8			27.4			33.9			30.9	
Level of Service		C			C			C			C	
Approach Delay (s)		22.8			27.4			33.9			30.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1435	245	265	150	0	0	0	0
Future Volume (vph)	0	0	0	0	1435	245	265	150	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	11	11	11	12	12	12
Right Turn on Red			No			No	No		Yes			No
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		209			762			1156			2190	
Travel Time (s)		5.7			20.8			26.3			49.8	
Confl. Peds. (#/hr)						170	4					
Confl. Bikes (#/hr)						33						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	9%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1826	0	0	451	0	0	0	0
v/c Ratio					1.77			0.61				
Control Delay					378.6			36.5				
Queue Delay					1.0			0.7				
Total Delay					379.6			37.3				
Queue Length 50th (ft)					~640			133				
Queue Length 95th (ft)					#736			186				
Internal Link Dist (ft)		129			682			1076			2110	
Turn Bay Length (ft)												
Base Capacity (vph)					1030			745				
Starvation Cap Reductn					0			0				
Spillback Cap Reductn					183			93				
Storage Cap Reductn					0			0				
Reduced v/c Ratio					2.16			0.69				

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1435	245	265	150	0	0	0	0
Future Volume (vph)	0	0	0	0	1435	245	265	150	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)					6.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.96			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.98			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					4293			2867				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					4293			2867				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1560	266	288	163	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1826	0	0	451	0	0	0	0
Confl. Peds. (#/hr)						170	4					
Confl. Bikes (#/hr)						33						
Heavy Vehicles (%)	0%	0%	0%	0%	2%	1%	9%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					24.0			26.0				
Effective Green, g (s)					24.0			26.0				
Actuated g/C Ratio					0.24			0.26				
Clearance Time (s)					6.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1030			745				
v/s Ratio Prot					c0.43							
v/s Ratio Perm								0.16				
v/c Ratio					1.77			0.61				
Uniform Delay, d1					38.0			32.5				
Progression Factor					1.00			1.00				
Incremental Delay, d2					351.7			1.0				
Delay (s)					389.7			33.5				
Level of Service					F			C				
Approach Delay (s)		0.0			389.7			33.5			0.0	
Approach LOS		A			F			C			A	

Intersection Summary			
HCM 2000 Control Delay	319.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	110.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	435	110	60	600	75	65
Future Volume (Veh/h)	435	110	60	600	75	65
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	473	120	65	652	82	71
Pedestrians	3			1	50	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	4	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	253			493		
pX, platoon unblocked			0.81		0.87	0.81
vC, conflicting volume			643		1368	584
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			443		861	371
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		67	86
cM capacity (veh/h)			868		251	524

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	593	717	153
Volume Left	0	65	82
Volume Right	120	0	71
cSH	1700	868	331
Volume to Capacity	0.35	0.07	0.46
Queue Length 95th (ft)	0	6	58
Control Delay (s)	0.0	1.9	24.8
Lane LOS		A	C
Approach Delay (s)	0.0	1.9	24.8
Approach LOS			C

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	25	20	255	195	70	45
Future Volume (Veh/h)	25	20	255	195	70	45
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	22	277	212	76	49
Pedestrians	50		50			50
Lane Width (ft)	13.0		12.0			11.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		4			4
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	684	483			539	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	684	483			539	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	96			92	
cM capacity (veh/h)	350	536			983	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	49	489	125
Volume Left	27	0	76
Volume Right	22	212	0
cSH	414	1700	983
Volume to Capacity	0.12	0.29	0.08
Queue Length 95th (ft)	10	0	6
Control Delay (s)	14.8	0.0	5.7
Lane LOS	B		A
Approach Delay (s)	14.8	0.0	5.7
Approach LOS	B		

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	46	860	1820	215	135	140
Future Volume (vph)	46	860	1820	215	135	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	11	11	12	12
Storage Length (ft)	170			250	0	80
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Right Turn on Red				No		No
Link Speed (mph)		35	35		25	
Link Distance (ft)		949	1060		181	
Travel Time (s)		18.5	20.6		4.9	
Confl. Peds. (#/hr)	7			7		3
Confl. Bikes (#/hr)				4		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	935	2212	0	147	152
v/c Ratio	0.61	0.41	1.11		1.00	0.54
Control Delay	58.7	8.9	79.4		125.5	47.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	58.7	8.9	79.4		125.5	47.7
Queue Length 50th (ft)	36	73	~875		106	97
Queue Length 95th (ft)	m38	m315	#1357		#237	165
Internal Link Dist (ft)		869	980		101	
Turn Bay Length (ft)	170					80
Base Capacity (vph)	82	2290	1986		147	284
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.61	0.41	1.11		1.00	0.54

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	46	860	1820	215	135	140
Future Volume (vph)	46	860	1820	215	135	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	11	12	12
Total Lost time (s)	5.5	6.0	6.0		4.5	4.5
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1516	3032	3054		1624	1454
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1516	3032	3054		1624	1454
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	935	1978	234	147	152
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	50	935	2212	0	147	152
Confl. Peds. (#/hr)	7			7		3
Confl. Bikes (#/hr)				4		
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%
Turn Type	Prot	NA	NA		Prot	pt+ov
Protected Phases	6	1 6	1		5	5 6
Permitted Phases						
Actuated Green, G (s)	6.0	77.5	66.0		10.0	20.5
Effective Green, g (s)	6.0	72.0	66.0		10.0	20.5
Actuated g/C Ratio	0.05	0.65	0.60		0.09	0.19
Clearance Time (s)	5.5		6.0		4.5	
Vehicle Extension (s)	2.0		3.0		2.0	
Lane Grp Cap (vph)	82	1984	1832		147	270
v/s Ratio Prot	0.03	0.31	c0.72		c0.09	c0.10
v/s Ratio Perm						
v/c Ratio	0.61	0.47	1.21		1.00	0.56
Uniform Delay, d1	50.9	9.5	22.0		50.0	40.7
Progression Factor	0.86	1.23	1.00		1.00	1.00
Incremental Delay, d2	3.6	0.0	98.7		74.2	1.6
Delay (s)	47.5	11.7	120.7		124.2	42.3
Level of Service	D	B	F		F	D
Approach Delay (s)		13.5	120.7		82.6	
Approach LOS		B	F		F	

Intersection Summary			
HCM 2000 Control Delay	87.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	865	1080	665	0	0	0	0	0	685	45
Future Volume (vph)	0	0	865	1080	665	0	0	0	0	0	685	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		100	0		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No	No		No			No			Yes
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		515			260			938			1824	
Travel Time (s)		14.0			7.1			21.3			41.5	
Confl. Peds. (#/hr)			21	21								7
Confl. Bikes (#/hr)			16									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	940	1174	723	0	0	0	0	0	794	0
v/c Ratio			0.95	1.06	0.74						1.58	
Control Delay			41.3	48.8	7.7						297.4	
Queue Delay			0.0	15.8	2.1						0.0	
Total Delay			41.3	64.6	9.9						297.4	
Queue Length 50th (ft)			264	~359	116						~343	
Queue Length 95th (ft)			#430	m79	m67						#461	
Internal Link Dist (ft)		435			180			858			1744	
Turn Bay Length (ft)			100									
Base Capacity (vph)			989	1105	973						504	
Starvation Cap Reductn			0	161	132						0	
Spillback Cap Reductn			0	0	0						0	
Storage Cap Reductn			0	0	0						0	
Reduced v/c Ratio			0.95	1.24	0.86						1.58	

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	865	1080	665	0	0	0	0	0	685	45
Future Volume (vph)	0	0	865	1080	665	0	0	0	0	0	685	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	12	12	12	12	12	12
Total Lost time (s)			9.0	6.0	6.0						5.0	
Lane Util. Factor			0.88	0.97	1.00						0.95	
Frpb, ped/bikes			1.00	1.00	1.00						1.00	
Flpb, ped/bikes			1.00	1.00	1.00						1.00	
Frt			0.85	1.00	1.00						0.99	
Flt Protected			1.00	0.95	1.00						1.00	
Satd. Flow (prot)			2473	3016	1653						3212	
Flt Permitted			1.00	0.95	1.00						1.00	
Satd. Flow (perm)			2473	3016	1653						3212	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	940	1174	723	0	0	0	0	0	745	49
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	940	1174	723	0	0	0	0	0	789	0
Confl. Peds. (#/hr)			21	21								7
Confl. Bikes (#/hr)			16									
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type			custom	Prot	NA						NA	
Protected Phases			2 3!	1 4	1 2 4						3!	
Permitted Phases												
Actuated Green, G (s)			40.0	40.0	62.0						14.0	
Effective Green, g (s)			40.0	40.0	57.0						14.0	
Actuated g/C Ratio			0.44	0.44	0.63						0.16	
Clearance Time (s)											5.0	
Vehicle Extension (s)											2.0	
Lane Grp Cap (vph)			1099	1340	1046						499	
v/s Ratio Prot			c0.38	c0.39	0.44						c0.25	
v/s Ratio Perm												
v/c Ratio			0.86	0.88	0.69						1.58	
Uniform Delay, d1			22.4	22.7	10.8						38.0	
Progression Factor			0.93	0.54	0.90						1.00	
Incremental Delay, d2			5.0	0.7	0.1						270.9	
Delay (s)			25.7	12.9	9.9						308.9	
Level of Service			C	B	A						F	
Approach Delay (s)		25.7			11.7			0.0			308.9	
Approach LOS		C			B			A			F	

Intersection Summary			
HCM 2000 Control Delay	80.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	132.4%	ICU Level of Service	H
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	650	30	65	560	85	115	30	215	0	0	0
Future Volume (vph)	20	650	30	65	560	85	115	30	215	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	11	12	12	12	12	12
Storage Length (ft)	80		0	100		0	150		0	0		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		487			515			528			149	
Travel Time (s)		13.3			14.0			14.4			4.1	
Confl. Peds. (#/hr)	19		77	77		19	59					
Confl. Bikes (#/hr)			16			41						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	6%	10%	4%	6%	2%	2%	2%	2%	2%	2%
Parking (#/hr)								0	0			
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	740	0	71	701	0	125	267	0	0	0	0
v/c Ratio	0.06	0.66		0.22	0.62		0.44	0.65				
Control Delay	5.5	11.8		7.6	10.9		36.3	16.4				
Queue Delay	0.0	0.0		0.0	1.1		0.0	0.0				
Total Delay	5.5	11.8		7.6	12.0		36.3	16.4				
Queue Length 50th (ft)	4	219		11	283		61	27				
Queue Length 95th (ft)	12	354		m18	m158		m113	106				
Internal Link Dist (ft)		407			435			448			69	
Turn Bay Length (ft)	80			100			150					
Base Capacity (vph)	359	1121		317	1123		327	441				
Starvation Cap Reductn	0	0		0	204		0	0				
Spillback Cap Reductn	0	0		0	0		0	0				
Storage Cap Reductn	0	0		0	0		0	0				
Reduced v/c Ratio	0.06	0.66		0.22	0.76		0.38	0.61				

Intersection Summary	
Area Type:	CBD

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	650	30	65	560	85	115	30	215	0	0	0
Future Volume (vph)	20	650	30	65	560	85	115	30	215	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	12	12	12	11	12	12	12	12	12
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0				
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00				
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00				
Flpb, ped/bikes	0.99	1.00		0.96	1.00		1.00	1.00				
Frt	1.00	0.99		1.00	0.98		1.00	0.87				
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00				
Satd. Flow (prot)	1507	1592		1415	1590		1540	1310				
Flt Permitted	0.32	1.00		0.30	1.00		0.95	1.00				
Satd. Flow (perm)	511	1592		448	1590		1540	1310				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	707	33	71	609	92	125	33	234	0	0	0
RTOR Reduction (vph)	0	2	0	0	6	0	0	168	0	0	0	0
Lane Group Flow (vph)	22	738	0	71	695	0	125	99	0	0	0	0
Confl. Peds. (#/hr)	19		77	77		19	59					
Confl. Bikes (#/hr)			16			41						
Heavy Vehicles (%)	3%	2%	6%	10%	4%	6%	2%	2%	2%	2%	2%	2%
Parking (#/hr)								0	0			
Turn Type	Perm	NA		Perm	NA		Split	NA				
Protected Phases		2			6		8	8				
Permitted Phases	2			6								
Actuated Green, G (s)	63.2	63.2		63.2	63.2		16.8	16.8				
Effective Green, g (s)	63.2	63.2		63.2	63.2		16.8	16.8				
Actuated g/C Ratio	0.70	0.70		0.70	0.70		0.19	0.19				
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0				
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)	358	1117		314	1116		287	244				
v/s Ratio Prot		c0.46			0.44		c0.08	0.08				
v/s Ratio Perm	0.04			0.16								
v/c Ratio	0.06	0.66		0.23	0.62		0.44	0.40				
Uniform Delay, d1	4.2	7.4		4.7	7.1		32.4	32.2				
Progression Factor	1.00	1.00		1.09	1.16		1.00	0.98				
Incremental Delay, d2	0.3	3.1		0.2	0.6		1.1	1.1				
Delay (s)	4.5	10.5		5.4	8.8		33.4	32.8				
Level of Service	A	B		A	A		C	C				
Approach Delay (s)		10.4			8.5			33.0			0.0	
Approach LOS		B			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	580	670	25	110	65
Future Volume (vph)	25	580	670	25	110	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	12	12
Storage Length (ft)	110			0	0	0
Storage Lanes	1			0	1	0
Taper Length (ft)	25				25	
Right Turn on Red				No		Yes
Link Speed (mph)		25	25		25	
Link Distance (ft)		606	253		150	
Travel Time (s)		16.5	6.9		4.1	
Confl. Peds. (#/hr)	21			21		4
Confl. Bikes (#/hr)				46		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	4%	3%	12%	0%	2%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	27	630	755	0	191	0
v/c Ratio	0.11	0.65	0.78		0.90	
Control Delay	22.9	22.8	24.8		78.6	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	22.9	22.9	24.8		78.6	
Queue Length 50th (ft)	1	32	218		106	
Queue Length 95th (ft)	m17	#534	#741		#232	
Internal Link Dist (ft)		526	173		70	
Turn Bay Length (ft)	110					
Base Capacity (vph)	250	974	973		221	
Starvation Cap Reductn	0	12	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.11	0.65	0.78		0.86	

Intersection Summary

Area Type: CBD

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	580	670	25	110	65
Future Volume (vph)	25	580	670	25	110	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	10	10	10	10	12	12
Total Lost time (s)	7.0	7.0	7.0		7.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		0.98	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	1.00		0.95	
Flt Protected	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1509	1535	1534		1539	
Flt Permitted	0.25	1.00	1.00		0.97	
Satd. Flow (perm)	394	1535	1534		1539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	630	728	27	120	71
RTOR Reduction (vph)	0	0	0	0	21	0
Lane Group Flow (vph)	27	630	755	0	170	0
Confl. Peds. (#/hr)	21			21		4
Confl. Bikes (#/hr)				46		2
Heavy Vehicles (%)	0%	4%	3%	12%	0%	2%
Turn Type	Perm	NA	NA		Prot	
Protected Phases		6	2		4	
Permitted Phases	6					
Actuated Green, G (s)	61.1	61.1	61.1		12.5	
Effective Green, g (s)	61.1	61.1	61.1		12.5	
Actuated g/C Ratio	0.61	0.61	0.61		0.12	
Clearance Time (s)	7.0	7.0	7.0		7.0	
Vehicle Extension (s)	1.0	1.0	1.0		2.0	
Lane Grp Cap (vph)	240	937	937		192	
v/s Ratio Prot		0.41	c0.49		c0.11	
v/s Ratio Perm	0.07					
v/c Ratio	0.11	0.67	0.81		0.89	
Uniform Delay, d1	8.1	12.8	14.9		43.0	
Progression Factor	1.75	1.30	1.00		1.00	
Incremental Delay, d2	0.6	2.6	7.4		34.2	
Delay (s)	14.9	19.3	22.3		77.2	
Level of Service	B	B	C		E	
Approach Delay (s)		19.1	22.3		77.2	
Approach LOS		B	C		E	

Intersection Summary			
HCM 2000 Control Delay	27.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	575	20	10	725	1	140	1	30	1	1	1
Future Volume (vph)	1	575	20	10	725	1	140	1	30	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	13	13	13	12	12	12
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		464			606			294			154	
Travel Time (s)		12.7			16.5			8.0			4.2	
Confl. Peds. (#/hr)	21		29	29		21	29		29	29		29
Confl. Bikes (#/hr)			16			46						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	648	0	0	800	0	0	186	0	0	3	0
v/c Ratio		0.73			0.90			0.78			0.01	
Control Delay		27.4			26.4			60.2			31.0	
Queue Delay		0.3			0.0			0.0			0.0	
Total Delay		27.7			26.4			60.2			31.0	
Queue Length 50th (ft)		215			187			103			1	
Queue Length 95th (ft)		#667			m#857			#250			9	
Internal Link Dist (ft)		384			526			214			74	
Turn Bay Length (ft)												
Base Capacity (vph)		884			890			240			285	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		28			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.76			0.90			0.78			0.01	

Intersection Summary	
Area Type:	CBD

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	575	20	10	725	1	140	1	30	1	1	1
Future Volume (vph)	1	575	20	10	725	1	140	1	30	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	11	11	11	11	13	13	13	12	12	12
Total Lost time (s)		5.5			5.5			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.98			0.97	
Flpb, ped/bikes		1.00			1.00			0.94			0.99	
Frt		1.00			1.00			0.98			0.95	
Flt Protected		1.00			1.00			0.96			0.98	
Satd. Flow (prot)		1580			1603			1505			1505	
Flt Permitted		1.00			0.99			0.76			0.94	
Satd. Flow (perm)		1579			1589			1195			1436	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	625	22	11	788	1	152	1	33	1	1	1
RTOR Reduction (vph)	0	1	0	0	0	0	0	7	0	0	1	0
Lane Group Flow (vph)	0	647	0	0	800	0	0	179	0	0	2	0
Confl. Peds. (#/hr)	21		29	29		21	29		29	29		29
Confl. Bikes (#/hr)			16			46						
Heavy Vehicles (%)	2%	4%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			5			5	
Permitted Phases	1			1			5			5		
Actuated Green, G (s)		50.3			50.3			20.1			20.1	
Effective Green, g (s)		50.3			50.3			20.1			20.1	
Actuated g/C Ratio		0.50			0.50			0.20			0.20	
Clearance Time (s)		5.5			5.5			5.0			5.0	
Vehicle Extension (s)		2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)		794			799			240			288	
v/s Ratio Prot												
v/s Ratio Perm		0.41			c0.50			c0.15			0.00	
v/c Ratio		0.81			1.00			0.75			0.01	
Uniform Delay, d1		20.9			24.9			37.5			32.0	
Progression Factor		1.00			0.51			1.00			1.00	
Incremental Delay, d2		9.0			24.9			10.4			0.0	
Delay (s)		29.9			37.7			48.0			32.0	
Level of Service		C			D			D			C	
Approach Delay (s)		29.9			37.7			48.0			32.0	
Approach LOS		C			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	35.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1595	455	150	330	0	0	0	0
Future Volume (vph)	0	0	0	0	1595	455	150	330	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	11	11	11	12	12	12
Right Turn on Red			No			No	No		Yes			No
Link Speed (mph)		25			25			30			30	
Link Distance (ft)		260			984			1156			2190	
Travel Time (s)		7.1			26.8			26.3			49.8	
Confl. Peds. (#/hr)						83						
Confl. Bikes (#/hr)						30						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	2229	0	0	522	0	0	0	0
v/c Ratio					1.40			0.89				
Control Delay					211.5			55.4				
Queue Delay					0.3			4.3				
Total Delay					211.7			59.8				
Queue Length 50th (ft)					~627			153				
Queue Length 95th (ft)					#723			#246				
Internal Link Dist (ft)		180			904			1076			2110	
Turn Bay Length (ft)												
Base Capacity (vph)					1590			584				
Starvation Cap Reductn					0			0				
Spillback Cap Reductn					118			30				
Storage Cap Reductn					0			0				
Reduced v/c Ratio					1.51			0.94				

Intersection Summary

Area Type: CBD

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1595	455	150	330	0	0	0	0
Future Volume (vph)	0	0	0	0	1595	455	150	330	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	11	11	11	12	12	12
Total Lost time (s)					6.0			9.0				
Lane Util. Factor					0.91			0.95				
Frpb, ped/bikes					0.97			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.97			1.00				
Flt Protected					1.00			0.98				
Satd. Flow (prot)					4337			3092				
Flt Permitted					1.00			0.98				
Satd. Flow (perm)					4337			3092				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1734	495	163	359	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2229	0	0	522	0	0	0	0
Confl. Peds. (#/hr)						83						
Confl. Bikes (#/hr)						30						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type					NA		Perm	NA				
Protected Phases					1			2				
Permitted Phases							2					
Actuated Green, G (s)					33.0			17.0				
Effective Green, g (s)					33.0			17.0				
Actuated g/C Ratio					0.37			0.19				
Clearance Time (s)					6.0			9.0				
Vehicle Extension (s)					2.0			2.0				
Lane Grp Cap (vph)					1590			584				
v/s Ratio Prot					c0.51							
v/s Ratio Perm								0.17				
v/c Ratio					1.40			0.89				
Uniform Delay, d1					28.5			35.6				
Progression Factor					1.00			1.00				
Incremental Delay, d2					184.7			15.7				
Delay (s)					213.2			51.3				
Level of Service					F			D				
Approach Delay (s)		0.0			213.2			51.3			0.0	
Approach LOS		A			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	182.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	132.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	610	80	45	635	60	80
Future Volume (Veh/h)	610	80	45	635	60	80
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	663	87	49	690	65	87
Pedestrians	2			2	71	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	6	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	253			487		
pX, platoon unblocked			0.71		0.81	0.71
vC, conflicting volume			821		1568	780
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			546		1015	488
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		65	78
cM capacity (veh/h)			685		187	388

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	750	739	152
Volume Left	0	49	65
Volume Right	87	0	87
cSH	1700	685	266
Volume to Capacity	0.44	0.07	0.57
Queue Length 95th (ft)	0	6	81
Control Delay (s)	0.0	1.9	35.1
Lane LOS		A	E
Approach Delay (s)	0.0	1.9	35.1
Approach LOS			E

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	70	60	130	85	35	120
Future Volume (Veh/h)	70	60	130	85	35	120
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	65	141	92	38	130
Pedestrians	50		50			50
Lane Width (ft)	13.0		12.0			11.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	5		4			4
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	493	287			283	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	493	287			283	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	91			97	
cM capacity (veh/h)	475	691			1222	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	141	233	168
Volume Left	76	0	38
Volume Right	65	92	0
cSH	555	1700	1222
Volume to Capacity	0.25	0.14	0.03
Queue Length 95th (ft)	25	0	2
Control Delay (s)	13.7	0.0	2.0
Lane LOS	B		A
Approach Delay (s)	13.7	0.0	2.0
Approach LOS	B		

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCS7 Freeway Diverge Report

Project Information

Analyst	MD	Date	4/16/2021
Agency	VHB	Analysis Year	2021 Existing Conditions
Jurisdiction	MassDOT	Time Period Analyzed	Weekday Morning Peak Hour
Project Description	Cambridge Street EB at I-90 On-Ramp	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	40.0
Segment Length (L) / Deceleration Length (L_A),ft	650	650
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	610	1285
Peak Hour Factor (PHF)	0.96	0.96
Total Trucks, %	3.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.971
Flow Rate (v_i),pc/h	654	1379
Capacity (c), pc/h	4356	1936
Volume-to-Capacity Ratio (v/c)	0.15	0.71

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.500
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	43.0
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	48.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	654	Ramp Junction Speed (S), mi/h	43.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	7.6
Level of Service (LOS)	A	Density in Ramp Influence Area (D_R), pc/mi/ln	4.0

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HCS7 Freeway Diverge Report

Project Information

Analyst	MD	Date	4/16/2021
Agency	VHB	Analysis Year	2021 Existing Conditions
Jurisdiction	MassDOT	Time Period Analyzed	Weekday Evening Peak Hour
Project Description	Cambridge Street EB at I-90 On-Ramp	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	40.0
Segment Length (L) / Deceleration Length (L_A),ft	650	650
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	700	735
Peak Hour Factor (PHF)	0.89	0.89
Total Trucks, %	1.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.990
Flow Rate (v_i),pc/h	794	834
Capacity (c), pc/h	4356	1936
Volume-to-Capacity Ratio (v/c)	0.18	0.43

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.451
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	43.0
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	48.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	794	Ramp Junction Speed (S), mi/h	43.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	9.2
Level of Service (LOS)	A	Density in Ramp Influence Area (D_R), pc/mi/ln	5.2

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HCS7 Freeway Diverge Report

Project Information

Analyst	MD	Date	4/16/2021
Agency	VHB	Analysis Year	2025 No Build Conditions
Jurisdiction	MassDOT	Time Period Analyzed	Weekday Morning Peak Hour
Project Description	Cambridge Street EB at I-90 On-Ramp	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	40.0
Segment Length (L) / Deceleration Length (L_A),ft	650	100
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	675	1395
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	3.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.971
Flow Rate (v_i),pc/h	756	1562
Capacity (c), pc/h	4356	1936
Volume-to-Capacity Ratio (v/c)	0.17	0.81

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.517
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	42.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	48.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	756	Ramp Junction Speed (S), mi/h	42.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	8.8
Level of Service (LOS)	A	Density in Ramp Influence Area (D_R), pc/mi/ln	9.9

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HCS7 Freeway Diverge Report

Project Information

Analyst	MD	Date	4/16/2021
Agency	VHB	Analysis Year	2025 No Build Conditions
Jurisdiction	MassDOT	Time Period Analyzed	Weekday Evening Peak Hour
Project Description	Cambridge Street EB at I-90 On-Ramp	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	40.0
Segment Length (L) / Deceleration Length (L_A),ft	650	100
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	840	990
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	1.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.990
Flow Rate (v_i),pc/h	922	1087
Capacity (c), pc/h	4356	1936
Volume-to-Capacity Ratio (v/c)	0.21	0.56

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.474
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	43.0
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	48.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	922	Ramp Junction Speed (S), mi/h	43.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	10.7
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	11.3

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HCS7 Freeway Diverge Report

Project Information

Analyst	MD	Date	4/16/2021
Agency	VHB	Analysis Year	2025 Build Conditions
Jurisdiction	MassDOT	Time Period Analyzed	Weekday Morning Peak Hour
Project Description	Cambridge Street EB at I-90 On-Ramp	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	40.0
Segment Length (L) / Deceleration Length (L_A),ft	650	100
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	715	1395
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	3.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.971
Flow Rate (v_i),pc/h	800	1562
Capacity (c), pc/h	4356	1936
Volume-to-Capacity Ratio (v/c)	0.18	0.81

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.517
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	42.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	48.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	800	Ramp Junction Speed (S), mi/h	42.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	9.3
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	10.2

HCS7 Freeway Diverge Report

Project Information

Analyst	MD	Date	4/16/2021
Agency	VHB	Analysis Year	2025 Build Conditions
Jurisdiction	MassDOT	Time Period Analyzed	Weekday Evening Peak Hour
Project Description	Cambridge Street EB at I-90 On-Ramp	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	40.0
Segment Length (L) / Deceleration Length (L_A),ft	650	100
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	860	990
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	1.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.990
Flow Rate (v_i),pc/h	944	1087
Capacity (c), pc/h	4356	1936
Volume-to-Capacity Ratio (v/c)	0.22	0.56

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.474
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	43.0
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	48.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	944	Ramp Junction Speed (S), mi/h	43.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	11.0
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	11.5

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HCS7 Freeway Diverge Report

Project Information

Analyst	MD	Date	4/16/2021
Agency	VHB	Analysis Year	2030 No Build Conditions
Jurisdiction	MassDOT	Time Period Analyzed	Weekday Morning Peak Hour
Project Description	Cambridge Street EB at I-90 On-Ramp	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	40.0
Segment Length (L) / Deceleration Length (L_A),ft	650	100
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	705	1440
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	3.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.971
Flow Rate (v_i),pc/h	789	1612
Capacity (c), pc/h	4356	1936
Volume-to-Capacity Ratio (v/c)	0.18	0.83

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.521
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	42.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	48.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	789	Ramp Junction Speed (S), mi/h	42.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	9.2
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	10.1

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HCS7 Freeway Diverge Report

Project Information

Analyst	MD	Date	4/16/2021
Agency	VHB	Analysis Year	2030 No Build Conditions
Jurisdiction	MassDOT	Time Period Analyzed	Weekday Evening Peak Hour
Project Description	Cambridge Street EB at I-90 On-Ramp	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	40.0
Segment Length (L) / Deceleration Length (L_A),ft	650	100
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	875	1055
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	1.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.990
Flow Rate (v_i),pc/h	961	1158
Capacity (c), pc/h	4356	1936
Volume-to-Capacity Ratio (v/c)	0.22	0.60

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.480
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	43.0
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	48.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	961	Ramp Junction Speed (S), mi/h	43.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	11.2
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	11.6

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HCS7 Freeway Diverge Report

Project Information

Analyst	MD	Date	4/16/2021
Agency	VHB	Analysis Year	2030 Build Conditions
Jurisdiction	MassDOT	Time Period Analyzed	Weekday Morning Peak Hour
Project Description	Cambridge Street EB at I-90 On-Ramp	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	40.0
Segment Length (L) / Deceleration Length (L_A),ft	650	100
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	765	1440
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	3.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.971	0.971
Flow Rate (v_i),pc/h	856	1612
Capacity (c), pc/h	4356	1936
Volume-to-Capacity Ratio (v/c)	0.20	0.83

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.521
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	42.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	48.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	856	Ramp Junction Speed (S), mi/h	42.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	10.0
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	10.7

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HCS7 Freeway Diverge Report

Project Information

Analyst	MD	Date	4/16/2021
Agency	VHB	Analysis Year	2030 Build Conditions
Jurisdiction	MassDOT	Time Period Analyzed	Weekday Evening Peak Hour
Project Description	Cambridge Street EB at I-90 On-Ramp	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	40.0
Segment Length (L) / Deceleration Length (L_A),ft	650	100
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	905	1055
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	1.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.990
Flow Rate (v_i),pc/h	994	1158
Capacity (c), pc/h	4356	1936
Volume-to-Capacity Ratio (v/c)	0.23	0.60

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.480
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	43.0
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	48.2
Flow in Lanes 1 and 2 (v_{12}), pc/h	994	Ramp Junction Speed (S), mi/h	43.0
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	11.6
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	11.9

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HCS7 Freeway Merge Report

Project Information

Analyst	MD	Date	4/19/2021
Agency	VHB	Analysis Year	2021 Existing Conditions
Jurisdiction	MassDOT	Time Analyzed	Weekday Morning Peak Hour
Project Description	Cambridge Street Westbound Merge with I-90 Off-Ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	25.0
Segment Length (L) / Acceleration Length (L_A),ft	900	900
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	175	1755
Peak Hour Factor (PHF)	0.78	0.96
Total Trucks, %	1.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.971
Flow Rate (v_i),pc/h	227	1839
Capacity (c), pc/h	4356	1839
Volume-to-Capacity Ratio (v/c)	0.47	1.00

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.308
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	43.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	43.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	227	Ramp Junction Speed (S), mi/h	43.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2066	Average Density (D), pc/mi/ln	23.9
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	15.2

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HCS7 Freeway Merge Report

Project Information

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Agency	VHB	Analysis Year	2021 Existing Conditions
Jurisdiction	MassDOT	Time Analyzed	Weekday Evening Peak Hour
Project Description	Cambridge Street Westbound Merge with I-90 Off-Ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	25.0
Segment Length (L) / Acceleration Length (L_A),ft	900	900
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	240	1595
Peak Hour Factor (PHF)	0.97	0.91
Total Trucks, %	1.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.990
Flow Rate (v_i),pc/h	250	1770
Capacity (c), pc/h	4356	1839
Volume-to-Capacity Ratio (v/c)	0.46	0.96

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.306
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	43.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	43.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	250	Ramp Junction Speed (S), mi/h	43.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2020	Average Density (D), pc/mi/ln	23.3
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	14.8

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HCS7 Freeway Merge Report

Project Information

Analyst	MD	Date	4/19/2021
Agency	VHB	Analysis Year	2025 No Build Conditions
Jurisdiction	MassDOT	Time Analyzed	Weekday Morning Peak Hour
Project Description	Cambridge Street Westbound Merge with I-90 Off-Ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	25.0
Segment Length (L) / Acceleration Length (L_A),ft	900	900
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	280	1720
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	1.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.971
Flow Rate (v_i),pc/h	307	1839
Capacity (c), pc/h	4356	1839
Volume-to-Capacity Ratio (v/c)	0.49	1.00

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.310
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	43.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	43.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	307	Ramp Junction Speed (S), mi/h	43.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2146	Average Density (D), pc/mi/ln	24.8
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	15.8

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Project Information

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Agency	VHB	Analysis Year	2025 No Build Conditions
Jurisdiction	MassDOT	Time Analyzed	Weekday Evening Peak Hour
Project Description	Cambridge Street Westbound Merge with I-90 Off-Ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	25.0
Segment Length (L) / Acceleration Length (L_A),ft	900	900
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	300	1560
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	1.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.990
Flow Rate (v_i),pc/h	329	1713
Capacity (c), pc/h	4356	1839
Volume-to-Capacity Ratio (v/c)	0.47	0.93

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.307
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	43.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	43.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	329	Ramp Junction Speed (S), mi/h	43.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2042	Average Density (D), pc/mi/ln	23.6
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	15.0

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HCS7 Freeway Merge Report

Project Information

Analyst	MD	Date	4/19/2021
Agency	VHB	Analysis Year	2025 Build Conditions
Jurisdiction	MassDOT	Time Analyzed	Weekday Morning Peak Hour
Project Description	Cambridge Street Westbound Merge with I-90 Off-Ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	25.0
Segment Length (L) / Acceleration Length (L_A),ft	900	900
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	310	1890
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	1.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.971
Flow Rate (v_i),pc/h	340	1839
Capacity (c), pc/h	4356	1839
Volume-to-Capacity Ratio (v/c)	0.50	1.00

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.312
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	43.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	43.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	340	Ramp Junction Speed (S), mi/h	43.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2179	Average Density (D), pc/mi/ln	25.2
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	16.1

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HCS7 Freeway Merge Report

Project Information			
Analyst	MD	Date	4/19/2021
Agency	VHB	Analysis Year	2025 Build Conditions
Jurisdiction	MassDOT	Time Analyzed	Weekday Evening Peak Hour
Project Description	Cambridge Street Westbound Merge with I-90 Off-Ramp	Units	U.S. Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	25.0
Segment Length (L) / Acceleration Length (L_A),ft	900	900
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors		
Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (V_i)	310	1625
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	1.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.990
Flow Rate (v_i),pc/h	340	1784
Capacity (c), pc/h	4356	1839
Volume-to-Capacity Ratio (v/c)	0.49	0.97

Speed and Density			
Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.310
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	43.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	43.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	340	Ramp Junction Speed (S), mi/h	43.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2124	Average Density (D), pc/mi/ln	24.5
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	15.7

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Project Information

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Agency	VHB	Analysis Year	2030 No Build Conditions
Jurisdiction	MassDOT	Time Analyzed	Weekday Morning Peak Hour
Project Description	Cambridge Street Westbound Merge with I-90 Off-Ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	25.0
Segment Length (L) / Acceleration Length (L_A),ft	900	900
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	300	1800
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	1.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.971
Flow Rate (v_i),pc/h	329	1839
Capacity (c), pc/h	4356	1839
Volume-to-Capacity Ratio (v/c)	0.50	1.00

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.311
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	43.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	43.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	329	Ramp Junction Speed (S), mi/h	43.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2168	Average Density (D), pc/mi/ln	25.0
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	16.0

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Jurisdiction	MassDOT	Time Analyzed	Weekday Evening Peak Hour
Project Description	Cambridge Street Westbound Merge with I-90 Off-Ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	25.0
Segment Length (L) / Acceleration Length (L_A),ft	900	900
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	320	1610
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	1.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.990
Flow Rate (v_i),pc/h	351	1768
Capacity (c), pc/h	4356	1839
Volume-to-Capacity Ratio (v/c)	0.49	0.96

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.310
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	43.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	43.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	351	Ramp Junction Speed (S), mi/h	43.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2119	Average Density (D), pc/mi/ln	24.5
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	15.6

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HCS7 Freeway Merge Report

Project Information

Analyst	MD	Date	4/19/2021
Agency	VHB	Analysis Year	2030 Build Conditions
Jurisdiction	MassDOT	Time Analyzed	Weekday Morning Peak Hour
Project Description	Cambridge Street Westbound Merge with I-90 Off-Ramp	Units	U.S. Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	25.0
Segment Length (L) / Acceleration Length (L_A),ft	900	900
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors

Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	340	2040
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	1.00	3.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.971
Flow Rate (v_i),pc/h	373	1839
Capacity (c), pc/h	4356	1839
Volume-to-Capacity Ratio (v/c)	0.51	1.00

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.313
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	43.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	43.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	373	Ramp Junction Speed (S), mi/h	43.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2212	Average Density (D), pc/mi/ln	25.5
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	16.3

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HCS7 Freeway Merge Report

Project Information			
Analyst	MD	Date	4/19/2021
Agency	VHB	Analysis Year	2030 Build Conditions
Jurisdiction	MassDOT	Time Analyzed	Weekday Evening Peak Hour
Project Description	Cambridge Street Westbound Merge with I-90 Off-Ramp	Units	U.S. Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	45.0	25.0
Segment Length (L) / Acceleration Length (L_A),ft	900	900
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Type	Freeway	Right-Sided One-Lane

Adjustment Factors		
Driver Population	Mostly Familiar	Mostly Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	0.975	0.975
Final Capacity Adjustment Factor (CAF)	0.968	0.968
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (V_i)	335	1700
Peak Hour Factor (PHF)	0.92	0.92
Total Trucks, %	1.00	1.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.990	0.990
Flow Rate (v_i),pc/h	368	1839
Capacity (c), pc/h	4356	1839
Volume-to-Capacity Ratio (v/c)	0.51	1.00

Speed and Density			
Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (M_S)	0.313
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	On-Ramp Influence Area Speed (S_R), mi/h	43.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FM})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	43.9
Flow in Lanes 1 and 2 (v_{12}), pc/h	368	Ramp Junction Speed (S), mi/h	43.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	2207	Average Density (D), pc/mi/ln	25.5
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	16.3

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Signal Warrant Analysis Worksheets

Build without Mitigation Condition

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: N Harvard St at Academic Way

Major Street Direction: Northbound-Southbound

Year: 2025 **Condition:** Build

Operating speed on major roadway: 25 mph

Number of approaches: 4

			Required approach volumes	
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**		Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Warrant 2	**FOUR HOUR VEHICULAR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-1 or 4C-2.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Warrant 3	**PEAK HOUR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-3 or 4C-4.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+ Proj. Driveway	Entering Vol. on Major Road Northbound	Entering Vol. on Major Road Southbound	Tot. Ent. Vol. On Major Rd	1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	52	199	357	555	No	No	No	No	No
7:00 - 8:00 AM	85	326	411	737	No	No	No	No	No
8:00 - 9:00 AM	121	450	430	880	No	Yes	Yes	Verify	No
9:00 - 10:00 AM	94	357	461	818	No	Yes	No	No	No
10:00 - 11:00 AM	74	281	391	672	No	No	No	No	No
11:00 - 12:00 AM	62	236	366	602	No	No	No	No	No
12:00 - 1:00 PM	65	248	378	627	No	No	No	No	No
1:00 - 2:00 PM	69	263	373	636	No	No	No	No	No
2:00 - 3:00 PM	70	266	397	663	No	No	No	No	No
3:00 - 4:00 PM	79	300	379	679	No	No	No	No	No
4:00 - 5:00 PM	100	381	392	774	No	Yes	No	No	No
5:00 - 6:00 PM	104	410	610	1020	No	Yes	No	Verify	No
6:00 - 7:00 PM	104	398	531	929	No	Yes	No	Verify	No
					No	**No**	**No**	**No**	**No**
				Warrants Met?		**1**		**2**	**3**
						NO		**No**	**No**

Note: 25% of right-turning traffic from minor street approach not included in analysis (75% included to be conservative due to heavy right-turning volumes)

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: **No**
Peak Four Hour Pedestrian Volumes: (non-concurrent)
<107
<107
<107
<107

Warrant 5, School Crossing: **n/a**
See MUTCD for details.

Warrant 6, Coordinated Signal System: **n/a**
See MUTCD for details.

Warrant 7, Crash Experience: **No**
# of accidents "correctable by signalization" occuring in the last 12 months: 0

Warrant 8, Roadway Network: **n/a**
See MUTCD for details.

Warrant 9, Grade Crossing: **n/a**
See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); 2009 Edition with Revisions 1 and 2, May 2012

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Western Ave at Academic Way

Major Street Direction: Eastbound-Westbound

Year: 2025 **Condition:** Build

Operating speed on major roadway: 25 mph

Number of approaches: 4

			Required approach volumes	
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**		Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Warrant 2	**FOUR HOUR VEHICULAR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-1 or 4C-2.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Warrant 3	**PEAK HOUR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-3 or 4C-4.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+ Proj. Driveway	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	62	230	552	783	No	No	No	No	No
7:00 - 8:00 AM	56	417	502	919	No	No	No	No	No
8:00 - 9:00 AM	70	485	560	1045	No	No	No	No	No
9:00 - 10:00 AM	61	432	543	975	No	No	No	No	No
10:00 - 11:00 AM	53	291	474	766	No	No	No	No	No
11:00 - 12:00 AM	61	272	540	812	No	No	No	No	No
12:00 - 1:00 PM	57	255	505	761	No	No	No	No	No
1:00 - 2:00 PM	61	285	548	832	No	No	No	No	No
2:00 - 3:00 PM	62	454	555	1010	No	No	No	No	No
3:00 - 4:00 PM	64	350	573	923	No	No	No	No	No
4:00 - 5:00 PM	84	370	745	1115	No	Yes	No	Verify	No
5:00 - 6:00 PM	75	431	740	1171	No	No	No	No	No
6:00 - 7:00 PM	87	272	773	1045	No	Yes	No	Verify	No
					No	**No**	**No**	**No**	**No**
				Warrants Met?		**1**		**2**	**3**
						NO		**No**	**No**

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No

Peak Four Hour Pedestrian Volumes: (non-concurrent) <107, <107, <107, <107

Warrant 5, School Crossing: n/a

See MUTCD for details.

Warrant 6, Coordinated Signal System: n/a

See MUTCD for details.

Warrant 7, Crash Experience: No

# of accidents "correctable by signalization" occuring in the last 12 months: 0

Warrant 8, Roadway Network: n/a

See MUTCD for details.

Warrant 9, Grade Crossing: n/a

See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); 2009 Edition with Revisions 1 and 2, May 2012

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)
TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Western Ave at Cattle Drive
Major Street Direction: Eastbound-Westbound

Year: 2025 **Condition:** Build

Operating speed on major roadway: 25 mph
Number of approaches: 3

			Required approach volumes Minimum*	Adjusted Minimum**
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**			
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Warrant 2 **FOUR HOUR VEHICULAR VOLUME**
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-1 or 4C-2.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Warrant 3 **PEAK HOUR VOLUME**
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-3 or 4C-4.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+ Proj. Driveway	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	162	313	540	854	Yes	Yes	Yes	Yes	No
7:00 - 8:00 AM	147	567	491	1058	No	Yes	Yes	Yes	No
8:00 - 9:00 AM	215	510	640	1150	Yes	Yes	Yes	Yes	Yes
9:00 - 10:00 AM	159	588	531	1119	Yes	Yes	Yes	Yes	No
10:00 - 11:00 AM	139	396	464	860	No	Yes	Yes	Yes	No
11:00 - 12:00 AM	158	370	528	898	Yes	Yes	Yes	Yes	No
12:00 - 1:00 PM	148	347	494	841	No	Yes	Yes	Yes	No
1:00 - 2:00 PM	161	387	535	923	Yes	Yes	Yes	Yes	No
2:00 - 3:00 PM	163	618	543	1161	Yes	Yes	Yes	Yes	No
3:00 - 4:00 PM	168	477	560	1037	Yes	Yes	Yes	Yes	No
4:00 - 5:00 PM	218	504	728	1232	Yes	Yes	Yes	Yes	Yes
5:00 - 6:00 PM	160	700	620	1320	Yes	Yes	Yes	Yes	Yes
6:00 - 7:00 PM	227	370	756	1126	Yes	Yes	Yes	Yes	Yes
					Yes	**Yes**	**Yes**	**Yes**	**Yes**
				Warrants Met?		**1**		**2**	**3**
						Yes		**Yes**	**Yes**

Note: 100% of right-turning traffic from minor street approach not included in analysis.
*From the criteria described for the warrant in the MUTCD.
**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)
+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No
Peak Four Hour Pedestrian Volumes: (non-concurrent)
<107
<107
<107
<107

Warrant 5, School Crossing: n/a
See MUTCD for details.

Warrant 6, Coordinated Signal System: n/a
See MUTCD for details.

Warrant 7, Crash Experience: No
# of accidents "correctable by signalization" occuring in the last 12 months: 0

Warrant 8, Roadway Network: n/a
See MUTCD for details.

Warrant 9, Grade Crossing: n/a
See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); 2009 Edition with Revisions 1 and 2, May 2012

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Western Ave at East Drive

Major Street Direction: Eastbound-Westbound

Year: 2025 **Condition:** Build

Operating speed on major roadway: 25 mph

Number of approaches: 4

Required approach volumes

			Minimum*	Adjusted Minimum**
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**			
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Note: Minor Street analyzed as 1 lane as 100% of right-turning traffic is not included in analysis.

Warrant 2 **FOUR HOUR VEHICULAR VOLUME**
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-1 or 4C-2.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Warrant 3 **PEAK HOUR VOLUME**
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-3 or 4C-4.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+ Proj. Driveway	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	32	296	619	915	No	No	No	No	No
7:00 - 8:00 AM	29	537	563	1099	No	No	No	No	No
8:00 - 9:00 AM	35	485	765	1250	No	No	No	No	No
9:00 - 10:00 AM	31	556	608	1164	No	No	No	No	No
10:00 - 11:00 AM	27	375	531	906	No	No	No	No	No
11:00 - 12:00 AM	31	350	605	955	No	No	No	No	No
12:00 - 1:00 PM	29	328	566	895	No	No	No	No	No
1:00 - 2:00 PM	32	366	614	980	No	No	No	No	No
2:00 - 3:00 PM	32	584	622	1207	No	No	No	No	No
3:00 - 4:00 PM	33	451	642	1092	No	No	No	No	No
4:00 - 5:00 PM	43	477	834	1311	No	No	No	No	No
5:00 - 6:00 PM	40	660	675	1335	No	No	No	No	No
6:00 - 7:00 PM	45	350	866	1216	No	No	No	No	No
					No	**No**	**No**	**No**	**No**
				Warrants		**1**		**2**	**3**
				Met?		**NO**		**No**	**No**

Note: 100% of right-turning traffic from minor street approach not included in analysis.

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: Yes
Peak Four Hour Pedestrian Volumes: (non-concurrent)
113
130
139
116

Warrant 5, School Crossing: n/a
See MUTCD for details.

Warrant 6, Coordinated Signal System: n/a
See MUTCD for details.

Warrant 7, Crash Experience: No
\# of accidents "correctable by signalization" occuring in the last 12 months: 0

Warrant 8, Roadway Network: n/a
See MUTCD for details.

Warrant 9, Grade Crossing: n/a
See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); 2009 Edition with Revisions 1 and 2, May 2012

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)

TRAFFIC SIGNAL WARRANT ANALYSIS (WARRANT 4 - PEDESTRIAN VOLUMES)

Intersection: Western Ave at East Drive
Year: 2025
Condition: Build

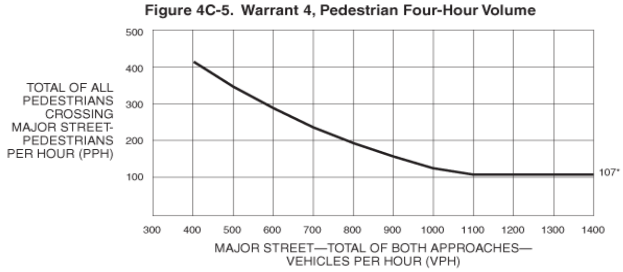
Four Hour Pedestrian Volume Warrant

	Total Major	Needed Ped Vols	Estimated Ped Vols: HBS Connection	Estimated Ped Vols: # 70 Bus	Existing Peds	Total Ped Volumes	Warrant Met?
3:00 - 4:00	1079	111	20	41	52	113	YES
4:00 - 5:00	1297	107	20	47	63	130	YES
5:00 - 6:00	1320	107	20	60	59	139	YES
6:00 - 7:00	1206	107	20	42	54	116	YES
							Yes

From MUTCD:

2009 Edition Part 4 Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume



*Note: 107 pph applies as the lower threshold volume.

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume

This figure shows a graph depicting numerical values for Warrant 4, Pedestrian Four-Hour Volume. The figure displays one curve.

The table below shows the approximate vehicles per hour (VPH) on the major street and corresponding pedestrians per hour (PPH) for the total of all pedestrians crossing the major street.

Table for Figure 4C-5

Pedestrian Four-Hour Volume	
VPH on the major street (Total of both approaches)	**PPH for the total of all pedestrians crossing the major street**
1400	107*
1300	107*
1200	107*
1100	107*
1000	125
900	150
800	200
700	225
600	300
500	350
400	400

* Note: 107 pph applies as the lower threshold volume.

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: N Harvard St at Academic Way

Major Street Direction: Northbound-Southbound

Year: 2030 **Condition:** Build

Operating speed on major roadway: 25 mph

Number of approaches: 4

			Required approach volumes	
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**		Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Warrant 2	**FOUR HOUR VEHICULAR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-1 or 4C-2.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Warrant 3	**PEAK HOUR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-3 or 4C-4.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+ Proj. Driveway	Entering Vol. on Major Road Northbound	Entering Vol. on Major Road Southbound	Tot. Ent. Vol. On Major Rd	1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	58	208	382	590	No	No	No	No	No
7:00 - 8:00 AM	95	341	441	782	No	Yes	No	No	No
8:00 - 9:00 AM	129	460	470	930	No	Yes	Yes	Verify	No
9:00 - 10:00 AM	104	374	494	868	No	Yes	No	No	No
10:00 - 11:00 AM	82	294	419	713	No	No	No	No	No
11:00 - 12:00 AM	69	247	393	639	No	No	No	No	No
12:00 - 1:00 PM	73	260	406	666	No	No	No	No	No
1:00 - 2:00 PM	77	275	401	676	No	No	No	No	No
2:00 - 3:00 PM	78	278	426	704	No	No	No	No	No
3:00 - 4:00 PM	88	314	407	721	No	No	No	No	No
4:00 - 5:00 PM	111	399	421	820	No	Yes	No	No	No
5:00 - 6:00 PM	123	440	645	1085	No	Yes	Yes	Yes	No
6:00 - 7:00 PM	116	416	570	986	No	Yes	No	Verify	No
					No	**No**	**No**	**No**	**No**
				Warrants		**1**		**2**	**3**
				Met?		**NO**		**No**	**No**

Note: 25% of right-turning traffic from minor street approach not included in analysis (75% included to be conservative due to heavy right-turning volumes)

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: **No**
Peak Four Hour Pedestrian Volumes: <107
(non-concurrent) <107
<107
<107

Warrant 5, School Crossing: **n/a**
See MUTCD for details.

Warrant 6, Coordinated Signal System: **n/a**
See MUTCD for details.

Warrant 7, Crash Experience: **No**
# of accidents "correctable by signalization" occuring in the last 12 months: 0

Warrant 8, Roadway Network: **n/a**
See MUTCD for details.

Warrant 9, Grade Crossing: **n/a**
See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); 2009 Edition with Revisions 1 and 2, May 2012

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Western Ave at Academic Way

Major Street Direction: Eastbound-Westbound

Year: 2030 **Condition:** Build

Operating speed on major roadway: 25 mph

Number of approaches: 4

		Required approach volumes	
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**	Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	500	500
	Minor Street : 1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	750	750
	Minor Street : 1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B		Warrant 1A	Warrant 1B
	Major Street : 1 Lane(s) on each approach	400	600
	Minor Street : 1 Lane(s) on each approach	120	60

Warrant 2 FOUR HOUR VEHICULAR VOLUME
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-1 or 4C-2.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Warrant 3 PEAK HOUR VOLUME
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-3 or 4C-4.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+ Proj. Driveway	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	71	261	619	881	No	No	No	No	No
7:00 - 8:00 AM	64	473	563	1036	No	No	No	No	No
8:00 - 9:00 AM	80	560	610	1170	No	Yes	No	No	No
9:00 - 10:00 AM	69	490	609	1099	No	No	No	No	No
10:00 - 11:00 AM	61	330	532	862	No	No	No	No	No
11:00 - 12:00 AM	69	309	605	914	No	No	No	No	No
12:00 - 1:00 PM	65	289	567	856	No	No	No	No	No
1:00 - 2:00 PM	70	323	614	937	No	No	No	No	No
2:00 - 3:00 PM	71	515	623	1138	No	No	No	No	No
3:00 - 4:00 PM	73	397	642	1040	No	No	No	No	No
4:00 - 5:00 PM	95	420	835	1255	No	Yes	No	Yes	No
5:00 - 6:00 PM	85	481	850	1331	No	Yes	No	Verify	No
6:00 - 7:00 PM	99	309	867	1176	No	Yes	No	Verify	No
					No	**No**	**No**	**No**	**No**
				Warrants Met?		**1**		**2**	**3**
						NO		**No**	**No**

*From the criteria described for the warrant in the MUTCD.
**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)
+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: **No**
Peak Four Hour Pedestrian Volumes: <107
(non-concurrent) <107
<107
<107

Warrant 5, School Crossing: **n/a**
See MUTCD for details.

Warrant 6, Coordinated Signal System: **n/a**
See MUTCD for details.

Warrant 7, Crash Experience: **No**
# of accidents "correctable by signalization" occuring in the last 12 months: 0

Warrant 8, Roadway Network: **n/a**
See MUTCD for details.

Warrant 9, Grade Crossing: **n/a**
See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); 2009 Edition with Revisions 1 and 2, May 2012

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)
TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Western Ave at Cattle Drive
Major Street Direction: Eastbound-Westbound

Year: 2030 **Condition:** Build

Operating speed on major roadway: 25 mph
Number of approaches: 3

Required approach volumes

			Minimum*	Adjusted Minimum**
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**			
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Warrant 2 **FOUR HOUR VEHICULAR VOLUME**
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-1 or 4C-2.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Warrant 3 **PEAK HOUR VOLUME**
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-3 or 4C-4.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+ Proj. Driveway	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	123	318	572	890	No	Yes	Yes	Verify	No
7:00 - 8:00 AM	112	576	520	1096	No	Yes	No	Yes	No
8:00 - 9:00 AM	155	545	675	1220	Yes	Yes	Yes	Yes	Verify
9:00 - 10:00 AM	121	597	562	1159	No	Yes	Yes	Yes	No
10:00 - 11:00 AM	105	402	491	893	No	Yes	No	Verify	No
11:00 - 12:00 AM	120	376	559	935	No	Yes	No	Verify	No
12:00 - 1:00 PM	112	352	523	876	No	Yes	No	Verify	No
1:00 - 2:00 PM	122	393	567	960	No	Yes	Yes	Verify	No
2:00 - 3:00 PM	123	627	575	1203	No	Yes	Yes	Yes	No
3:00 - 4:00 PM	127	484	593	1077	No	Yes	Yes	Yes	No
4:00 - 5:00 PM	165	512	771	1283	Yes	Yes	Yes	Yes	Yes
5:00 - 6:00 PM	130	690	660	1350	No	Yes	Yes	Yes	Verify
6:00 - 7:00 PM	172	376	801	1177	Yes	Yes	Yes	Yes	Verify
					No	**Yes**	**Yes**	**Yes**	**Yes**
				Warrants		**1**		**2**	**3**
				Met?		**Yes**		**Yes**	**Yes**

Note: 100% of right-turning traffic from minor street approach not included in analysis.
*From the criteria described for the warrant in the MUTCD.
**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)
+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No
Peak Four Hour Pedestrian Volumes: (non-concurrent)
<107
<107
<107
<107

Warrant 5, School Crossing: n/a
See MUTCD for details.

Warrant 6, Coordinated Signal System: n/a
See MUTCD for details.

Warrant 7, Crash Experience: No
# of accidents "correctable by signalization" occuring in the last 12 months: 0

Warrant 8, Roadway Network: n/a
See MUTCD for details.

Warrant 9, Grade Crossing: n/a
See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); 2009 Edition with Revisions 1 and 2, May 2012

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Western Ave at East Drive
Major Street Direction: Eastbound-Westbound

Year: 2030 **Condition:** Build

Operating speed on major roadway: 25 mph
Number of approaches: 4

Required approach volumes

			Minimum*	Adjusted Minimum**
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**			
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Note: Minor Street analyzed as 1 lane as 100% of right-turning traffic is not included in analysis.

Warrant 2 **FOUR HOUR VEHICULAR VOLUME**
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-1 or 4C-2.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Warrant 3 **PEAK HOUR VOLUME**
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-3 or 4C-4.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+ Proj. Driveway	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	44	323	656	978	No	No	No	No	No
7:00 - 8:00 AM	40	584	596	1181	No	No	No	No	No
8:00 - 9:00 AM	40	520	815	1335	No	No	No	No	No
9:00 - 10:00 AM	44	606	644	1250	No	No	No	No	No
10:00 - 11:00 AM	38	408	563	971	No	No	No	No	No
11:00 - 12:00 AM	43	382	641	1022	No	No	No	No	No
12:00 - 1:00 PM	41	358	600	957	No	No	No	No	No
1:00 - 2:00 PM	44	399	650	1049	No	No	No	No	No
2:00 - 3:00 PM	45	636	659	1296	No	No	No	No	No
3:00 - 4:00 PM	46	491	680	1171	No	No	No	No	No
4:00 - 5:00 PM	60	519	884	1403	No	No	No	No	No
5:00 - 6:00 PM	65	725	710	1435	No	No	No	No	No
6:00 - 7:00 PM	62	382	917	1299	No	No	No	No	No
					No	**No**	**No**	**No**	**No**
				Warrants		**1**		**2**	**3**
				Met?		**NO**		**No**	**No**

Note: 100% of right-turning traffic from minor street approach not included in analysis.
*From the criteria described for the warrant in the MUTCD.
**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)
+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: Yes
Peak Four Hour Pedestrian Volumes: (non-concurrent)
170
197
224
176

Warrant 5, School Crossing: n/a
See MUTCD for details.

Warrant 6, Coordinated Signal System: n/a
See MUTCD for details.

Warrant 7, Crash Experience: No
# of accidents "correctable by signalization" occuring in the last 12 months: 0

Warrant 8, Roadway Network: n/a
See MUTCD for details.

Warrant 9, Grade Crossing: n/a
See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); 2009 Edition with Revisions 1 and 2, May 2012

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)

TRAFFIC SIGNAL WARRANT ANALYSIS (WARRANT 4 - PEDESTRIAN VOLUMES)

Intersection: Western Ave at East Drive
Year: 2030
Condition: Build

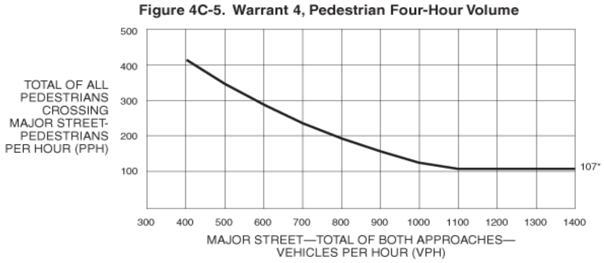
Four Hour Pedestrian Volume Warrant

	Total Major	Needed Ped Vols	HBS Connection	Estimated Ped Vols: # 70 Bus	Estimated Ped Vols: Existing Peds	Total Ped Volumes	Warrant Met?
3:00 - 4:00	1153	107	20	98	52	170	YES
4:00 - 5:00	1384	107	20	114	63	197	YES
5:00 - 6:00	1410	107	20	145	59	224	YES
6:00 - 7:00	1285	107	20	102	54	176	YES
							Yes

From MUTCD:

2009 Edition Part 4 Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume



*Note: 107 pph applies as the lower threshold volume.

Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume

This figure shows a graph depicting numerical values for Warrant 4, Pedestrian Four-Hour Volume. The figure displays one curve.

The table below shows the approximate vehicles per hour (VPH) on the major street and corresponding pedestrians per hour (PPH) for the total of all pedestrians crossing the major street.

Table for Figure 4C-5

Pedestrian Four-Hour Volume: VPH on the major street (Total of both approaches)	PPH for the total of all pedestrians crossing the major street
1400	107*
1300	107*
1200	107*
1100	107*
1000	125
900	150
800	200
700	225
600	300
500	350
400	400

* Note: 107 pph applies as the lower threshold volume.

Signal Warrant Analysis Worksheets

Build with Mitigation Condition

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Western Ave at Cattle Drive — **Build with Mitigation**

Major Street Direction: Eastbound-Westbound — **Revised ERC Site Distribution & Revised HBS Access**

Year: 2025 **Condition:** Build

Operating speed on major roadway: 25 mph

Number of approaches: 3

Required approach volumes

			Minimum*	Adjusted Minimum**
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**			
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Warrant 2 **FOUR HOUR VEHICULAR VOLUME**
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-1 or 4C-2.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Warrant 3 **PEAK HOUR VOLUME**
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-3 or 4C-4.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+ Proj. Driveway	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	85	313	527	840	No	Yes	No	No	No
7:00 - 8:00 AM	77	567	479	1046	No	Yes	No	No	No
8:00 - 9:00 AM	125	510	615	1125	No	Yes	Yes	Yes	No
9:00 - 10:00 AM	83	588	518	1106	No	Yes	No	Yes	No
10:00 - 11:00 AM	73	396	452	848	No	No	No	No	No
11:00 - 12:00 AM	83	370	515	885	No	Yes	No	No	No
12:00 - 1:00 PM	78	347	482	829	No	Yes	No	No	No
1:00 - 2:00 PM	84	387	522	910	No	Yes	No	No	No
2:00 - 3:00 PM	85	618	530	1148	No	Yes	No	Yes	No
3:00 - 4:00 PM	88	477	546	1023	No	Yes	No	No	No
4:00 - 5:00 PM	114	504	710	1214	No	Yes	No	Yes	No
5:00 - 6:00 PM	70	700	615	1315	No	No	No	No	No
6:00 - 7:00 PM	119	370	737	1108	No	Yes	No	Yes	No
					No	**Yes**	**No**	**Yes**	**No**
				Warrants		**1**		**2**	**3**
				Met?		**Yes**		**Yes**	**No**

Note: 100% of right-turning traffic from minor street approach not included in analysis.

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No
Peak Four Hour Pedestrian Volumes: (non-concurrent)
<107
<107
<107
<107

Warrant 5, School Crossing: n/a
See MUTCD for details.

Warrant 6, Coordinated Signal System: n/a
See MUTCD for details.

Warrant 7, Crash Experience: No
# of accidents "correctable by signalization" occuring in the last 12 months: 0

Warrant 8, Roadway Network: n/a
See MUTCD for details.

Warrant 9, Grade Crossing: n/a
See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); 2009 Edition with Revisions 1 and 2, May 2012

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Western Ave at East Drive

Build with Mitigation

Major Street Direction: Eastbound-Westbound

Revised ERC Site Distribution & Revised HBS Access

Year: 2025 **Condition:** Build

Operating speed on major roadway: 25 mph

Number of approaches: 4

Required approach volumes

			Minimum*	Adjusted Minimum**
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**			
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Note: Minor Street analyzed as 1 lane as 100% of right-turning traffic is not included in analysis.

Warrant 2	**FOUR HOUR VEHICULAR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-1 or 4C-2.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Warrant 3	**PEAK HOUR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-3 or 4C-4.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+ Proj. Driveway	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	88	288	619	907	No	Yes	No	No	No
7:00 - 8:00 AM	80	521	563	1084	No	Yes	No	Verify	No
8:00 - 9:00 AM	115	465	765	1230	No	Yes	No	Yes	No
9:00 - 10:00 AM	87	540	608	1148	No	Yes	No	Verify	No
10:00 - 11:00 AM	76	364	531	895	No	Yes	No	No	No
11:00 - 12:00 AM	86	340	605	945	No	Yes	No	No	No
12:00 - 1:00 PM	81	319	566	885	No	Yes	No	No	No
1:00 - 2:00 PM	88	356	614	969	No	Yes	No	Verify	No
2:00 - 3:00 PM	89	567	622	1190	No	Yes	No	Verify	No
3:00 - 4:00 PM	92	438	642	1079	No	Yes	No	Verify	No
4:00 - 5:00 PM	119	463	834	1297	No	Yes	No	Yes	No
5:00 - 6:00 PM	90	645	675	1320	No	Yes	No	Yes	No
6:00 - 7:00 PM	124	340	866	1206	No	Yes	Yes	Yes	No
					No	**Yes**	**No**	**Yes**	**No**
				Warrants		**1**		**2**	**3**
				Met?		**Yes**		**Yes**	**No**

Note: 100% of right-turning traffic from minor street approach not included in analysis.

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: Yes

Peak Four Hour Pedestrian Volumes: (non-concurrent) 113, 130, 139, 116

Warrant 5, School Crossing: n/a

See MUTCD for details.

Warrant 6, Coordinated Signal System: n/a

See MUTCD for details.

Warrant 7, Crash Experience: No

# of accidents "correctable by signalization" occuring in the last 12 months: 0

Warrant 8, Roadway Network: n/a

See MUTCD for details.

Warrant 9, Grade Crossing: n/a

See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); 2009 Edition with Revisions 1 and 2, May 2012

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Western Ave at Cattle Drive — **Build with Mitigation**

Major Street Direction: Eastbound-Westbound — **Revised ERC Site Distribution & Revised HBS Access**

Year: 2030 **Condition:** Build

Operating speed on major roadway: 25 mph

Number of approaches: 3

Required approach volumes

			Minimum*	Adjusted Minimum**
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**			
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Warrant 2 FOUR HOUR VEHICULAR VOLUME
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-1 or 4C-2.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Warrant 3 PEAK HOUR VOLUME
Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-3 or 4C-4.
Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+ Proj. Driveway	Entering Vol. on Major Road Eastbound	Westbound	Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants? 1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	74	317	573	890	No	No	No	No	No
7:00 - 8:00 AM	67	574	521	1095	No	No	No	No	No
8:00 - 9:00 AM	91	540	660	1200	No	Yes	No	Verify	No
9:00 - 10:00 AM	72	595	564	1159	No	No	No	No	No
10:00 - 11:00 AM	63	401	492	893	No	No	No	No	No
11:00 - 12:00 AM	72	375	560	935	No	No	No	No	No
12:00 - 1:00 PM	67	351	525	876	No	No	No	No	No
1:00 - 2:00 PM	73	392	568	960	No	No	No	No	No
2:00 - 3:00 PM	74	625	577	1202	No	No	No	No	No
3:00 - 4:00 PM	76	482	594	1077	No	Yes	No	No	No
4:00 - 5:00 PM	99	510	773	1283	No	Yes	No	Yes	No
5:00 - 6:00 PM	80	690	680	1370	No	Yes	No	No	No
6:00 - 7:00 PM	103	375	802	1177	No	Yes	No	Yes	No
					No	**No**	**No**	**No**	**No**
				Warrants		**1**		**2**	**3**
				Met?		**NO**		**No**	**No**

Note: 75% of right-turning traffic from minor street approach not included in analysis (25% included to be conservative)

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No
Peak Four Hour Pedestrian Volumes: <107
(non-concurrent) <107
<107
<107

Warrant 5, School Crossing: n/a
See MUTCD for details.

Warrant 6, Coordinated Signal System: n/a
See MUTCD for details.

Warrant 7, Crash Experience: No
# of accidents "correctable by signalization" occuring in the last 12 months: 0

Warrant 8, Roadway Network: n/a
See MUTCD for details.

Warrant 9, Grade Crossing: n/a
See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); 2009 Edition with Revisions 1 and 2, May 2012

MUTCD 2009 Edition with Revisions 1 and 2 (May 2012)
TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Western Ave at East Drive — **Build with Mitigation**

Major Street Direction: Eastbound-Westbound — **Revised ERC Site Distribution & Revised HBS Access**

Year: 2030 **Condition:** Build

Operating speed on major roadway: 25 mph
Number of approaches: 4

			Required approach volumes Minimum*	Adjusted Minimum**
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**			
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Note: Minor Street analyzed as 1 lane as 100% of right-turning traffic is not included in analysis.

Warrant 2	**FOUR HOUR VEHICULAR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-1 or 4C-2.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Warrant 3	**PEAK HOUR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-3 or 4C-4.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+ Proj. Driveway	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	120	311	654	965	No	Yes	No	Verify	No
7:00 - 8:00 AM	109	563	594	1158	No	Yes	No	Yes	No
8:00 - 9:00 AM	135	500	815	1315	No	Yes	Yes	Yes	Verify
9:00 - 10:00 AM	118	584	642	1226	No	Yes	No	Yes	No
10:00 - 11:00 AM	103	394	561	955	No	Yes	No	Verify	No
11:00 - 12:00 AM	117	368	639	1007	No	Yes	No	Verify	No
12:00 - 1:00 PM	109	345	598	943	No	Yes	No	Verify	No
1:00 - 2:00 PM	119	385	648	1033	No	Yes	No	Verify	No
2:00 - 3:00 PM	120	614	657	1271	No	Yes	Yes	Yes	Verify
3:00 - 4:00 PM	124	473	678	1151	No	Yes	Yes	Yes	No
4:00 - 5:00 PM	161	500	881	1382	Yes	Yes	Yes	Yes	Yes
5:00 - 6:00 PM	145	700	705	1405	No	Yes	Yes	Yes	Yes
6:00 - 7:00 PM	167	368	915	1283	Yes	Yes	Yes	Yes	Yes
					No	**Yes**	**No**	**Yes**	**Yes**
				Warrants Met?		**1**		**2**	**3**
						Yes		**Yes**	**Yes**

Note: 100% of right-turning traffic from minor street approach not included in analysis.

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: Yes
Peak Four Hour Pedestrian Volumes: (non-concurrent)
170
197
224
176

Warrant 5, School Crossing: n/a
See MUTCD for details.

Warrant 6, Coordinated Signal System: n/a
See MUTCD for details.

Warrant 7, Crash Experience: No
# of accidents "correctable by signalization" occuring in the last 12 months: 0

Warrant 8, Roadway Network: n/a
See MUTCD for details.

Warrant 9, Grade Crossing: n/a
See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); 2009 Edition with Revisions 1 and 2, May 2012

Massachusetts Bay Transportation Authority
Route 64
Weekday - Inbound
Fall 2019
(Urban Transportation Associates)

	05:30 (64.0)(B009) [3] {FA19}			05:50 (64.0)(B011) [7] {FA19}			06:20 (64.6)(B016) [3] {FA19}			**06:40 (64.6)(B010) [2] {WI19}**			07:00 (64.6)(B011) [3] {FA19}			07:20 (64.6)(B013) [9] {FA19}		
Seq - StopID - Stop Name	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
1 - 1214 - FANEUIL ST @ OAK SQUARE	1	0	1	4.3	0	4.3	3	0	3	2.5	0	2.5	6.3	0	6.3	12.7	0	14.6
2 - 1093 - FANEUIL ST @ BRACKETT ST	0	0	1	3	0	7.3	0	0	3	0	0	2.5	4.3	0	10.7	2.1	0	16.7
3 - 1094 - FANEUIL ST @ FAIRBANKS ST	1.3	0	2.3	1.3	0	8.6	0.3	0	3.3	4	0	6.5	4.7	0	15.3	2.2	0	18.9
4 - 1095 - FANEUIL ST @ OAKLAND ST	0	0	2.3	0.9	0	9.4	0	0	3.3	0.5	0	7	1.7	0	17	1.8	0.1	20.6
5 - 1097 - FANEUIL ST @ S HOBART ST	0	0	2.3	0	0	9.4	0	0	3.3	1.5	0	8.5	1.7	0	18.7	0.6	0	21.1
6 - 1098 - HOBART ST @ FALKLAND ST	0	0	2.3	0.1	0	9.6	0.3	0	3.7	1	0	9.5	1.7	0	20.3	1.6	0	22.7
7 - 1100 - HOBART ST @ BROOKS ST	1.3	0	3.7	1.4	0	11	3	0	6.7	5	0	14.5	3.7	0	24	6.1	0	28.8
8 - 1102 - N BEACON ST @ PARSONS ST	2	0	5.7	0.4	0	11.4	0.7	0	7.3	0.5	0	15	1.3	0	25.3	1	0	29.8
9 - 1103 - N BEACON ST @ GOODENOUGH ST	0	0	5.7	0	0	11.4	0	0	7.3	0	0	15	0	0	25.3	0	0	29.8
10 - 1104 - N BEACON ST OPP VINELAND ST	3.3	0	9	9	0	20.4	11.7	0	19	7	0.5	21.5	14.7	0.3	39.7	7.1	0.4	36.4
11 - 1105 - N BEACON @ MARKET ST	1.7	0	10.7	2.7	1.4	21.7	1.3	0	20.3	5	1.5	25	7	1.3	45.3	3.7	1	39.1
12 - 1107 - N BEACON ST @ ETNA ST	0	0	10.7	1.1	0	22.9	0.3	0	20.7	2	0	27	3	0.3	48	3.9	0.3	42.7
13 - 11070 - LIFE ST @ GUEST ST	0	0	10.7	0	0	22.9	0	0	20.7	0	0	27	0	0	48	0	0	43.4
14 - 11071 - ARTHUR ST @ GUEST ST - STOP &	0	0.3	10.3	0	0.1	22.7	0	0	20.7	0	0	27	0.7	0.7	48	1.3	1	43.6
15 - 1109 - N BEACON ST @ SAUNDERS ST	0.7	0	11	0	0	22.7	0.7	0	21.3	3.5	0	30.5	0.3	0.3	48	3.2	0	46.1
16 - 1110 - N BEACON ST @ CAMBRIDGE ST	0.7	2	9.7	1.6	1.3	23	2.7	9.7	14.3	2.5	9.5	23.5	6	13.3	40.7	6.9	7.2	45.8
17 - 1111 - CAMBRIDGE ST OPP HANO ST	0.3	0	10	0.9	2.4	21.4	3.7	0	18	3	1	25.5	3.3	0.7	43.3	5.8	0.8	50.8
18 - 1112 - CAMBRIDGE ST @ HARVARD AVE	0	0	10	0	0.4	21	0	0	18	3	0	28.5	0.7	1	43	0.7	0.1	51.3
19 - 1113 - CAMBRIDGE ST @ LINDEN ST	0.7	0	10.7	1.4	0.3	22.1	2.3	0.3	20	3.5	0.5	31.5	3.7	0	46.7	6.6	0.1	57.8
20 - 1114 - CAMBRIDGE ST @ N HARVARD ST	0.7	0	11.3	0.6	0	22.7	0.3	0	20.3	1	0	32.5	1	0	47.7	2	0.7	59.1
21 - 1115 - CAMBRIDGE ST @ SEATTLE ST	0.3	0	11.7	0	0	22.7	0.7	0	21	2	0	34.5	0.7	0	48.3	0.9	0.1	59.9
22 - 1116 - CAMBRIDGE ST @ MASS PIKE EXIT	0	0.3	11.3	0	0	22.7	0	0	21	0.5	0	35	0	0	48.3	0	0	59.9
23 - 1055 - RIVER ST OPP BLACKSTONE ST	0.7	0.3	11.7	1.1	0.3	23.6	0	0	21	1	2	34	2	0.7	49.7	2.9	2.2	60.6
24 - 1117 - PUTNAM AVE @ ALLSTON ST	0	0	11.7	0.1	0	23.7	0	0.3	20.7	0.5	0	34.5	0.7	0.7	49.7	0.2	0.1	60.7
25 - 1118 - MAGAZINE ST @ PUTNAM AVE	0	0	11.7	0.7	0	24.4	0	0	20.7	3	0	37.5	1.7	0.3	51	2	0.1	62.9
26 - 1119 - MAGAZINE ST @ ERIE ST	0	0	11.7	0.1	0	24.6	0.3	0	21	0	0	37.5	0	0	51	1.2	0.1	63.2
27 - 1120 - MAGAZINE ST @ MCTERNAN ST	0	0	11.7	0	0	24.6	0	0	21	0	0	37.5	0	0	51	0	0	63.2
28 - 1121 - MAGAZINE ST @ PERRY ST	0.7	0	12.3	0	0	24.6	0	0	21	0	0	37.5	0	0	51	0.1	0.2	63.1
29 - 1122 - MAGAZINE ST @ AUBURN ST	0	0	12.3	0	0	24.6	0	0	21	0	1.5	36	0	0.3	50.7	0.6	0.3	63.3
30 - 1060 - MAGAZINE ST @ GREEN ST	0	9	3.3	0	21.7	2.9	1	12	10	0.5	25.5	11	0.7	27.7	23.7	4.1	30.6	36.9
31 - 2446 - PROSPECT ST @ BISHOP ALLEN DR	.	.	.	.	.	.	0.3	0	10.3	0	0	11	0	0.3	23.3	0	0	36.9
32 - 2447 - PROSPECT ST @ HARVARD ST	.	.	.	.	.	.	0.3	0	10.7	0	0.5	10.5	0	3	20.3	0	0.6	36.3
33 - 2448 - PROSPECT ST @ BROADWAY	.	.	.	.	.	.	0	1	9.7	0.5	0	11	0.7	0.7	20.3	0.7	0.9	36.1
34 - 24482 - BROADWAY @ NORFOLK ST	.	.	.	.	.	.	0	0	9.7	0	0	11	0.3	2.3	18.3	0	1.9	34.2
35 - 24483 - BROADWAY @ COLUMBIA ST	.	.	.	.	.	.	0	0.7	9	0.5	0.5	11	1.3	0	19.7	0.7	0.9	34
36 - 24484 - BROADWAY @ WINDSOR ST	.	.	.	.	.	.	0.3	0.3	9	2.5	2.5	11	0.3	1.3	18.7	1	2.3	32.7
37 - 24485 - BROADWAY OPP HAMPSHIRE ST	.	.	.	.	.	.	0.3	3.3	6	1	8	4	0.3	7	12	0.2	11.9	21
38 - 2228 - BROADWAY @ GALILEO WAY	.	.	.	.	.	.	0	2	4	0	2	2	0	4	8	0	7.8	13.2
39 - 2231 - MAIN ST @ KENDALL STATION - R	.	.	.	.	.	.	0	4	0	0	1.5	0.5	0	8	0	0	13.2	0
40 - 72 - MASSACHUSETTS AVE @ PEARL ST	0	0.7	2.7	0	0	2.9	.	.	.	.	.	.	.	.	.	.	.	.
41 - 73 - MASSACHUSETTS AVE @ SIDNEY ST	0	1.3	1.3	0	1.9	1	.	.	.	.	.	.	.	.	.	.	.	.
42 - 730 - FRANKLIN ST @ SIDNEY ST	0	1.3	0	0	1	0	.	.	.	.	.	.	.	.	.	.	.	.
Maximum			12.3			24.6			21.3			37.5			51			63.3
Total	15.4	15.2		30.7	30.8		33.5	33.6		57.5	57		74.5	74.2		83.9	84.9	

07:40 (64.6)(B015) [37] {FA19}			07:55 (64.6)(B016) [2] {FA19}			08:15 (64.6)(B009) [1] {FA19}			08:40 (64.6)(B011) [5] {FA19}			09:05 (64.0)(B013) [5] {FA19}			09:25 (64.0)(B015) [11] {FA19}			09:55 (64.0)(B012) [1] {FA19}			10:30 (64.0)(B013) [8] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
9	0	9.1	8	0	8.5	13	0	13	7.4	0	7.4	3.6	0	5.4	5.5	0	5.6	4	0	4	4.5	0	5.5
2.6	0.2	11.7	9	0	17.5	0	0	13	3.8	0	11.3	1.4	0	6.8	0.7	0	6.4	1	0	5	1.6	0	7.1
4.1	0	16	0	0	17.5	0	0	13	1.3	0.3	12.3	0	0	6.8	1.1	0	7.5	0	0	5	0.8	0	7.9
2.2	0	18.2	3.5	0	21	2	0	15	2.8	0	15	1	0	7.8	0.9	0	8.4	4	0	9	0.6	0	8.5
1.1	0	19.3	0	0	21	1	0	16	2	0	17	0.4	0	8.2	0.7	0	8.7	1	0	10	0.9	0	9.4
0.7	0	20	1	0	22	4	0	20	0.8	0	17.8	0.2	0	8.4	0.4	0	9.1	0	0	10	0.4	0	9.8
4.7	0	24.6	3.5	0	25.5	0	0	20	3.3	0	21	1.4	0	9.8	1.2	0	10.5	3	0	13	1.6	0	11.4
0.8	0	25.4	0.5	0	26	0	0	20	1.4	0	19.6	0.8	0	10.6	0.3	0	10.8	1	0	14	0.8	0	12.1
0.1	0	25.5	0	0	26	0	0	20	0.4	0	20	0	0	10.6	0	0	10.8	0	0	14	0	0	12.1
2.5	0.2	27.7	3	0	29	2	0	22	2	0	22	2.2	0	12.8	3.2	0.1	13.9	5	0	19	3.4	0	15.5
3.1	0.4	30.4	1.5	0.5	30	2	0	24	2.2	4	20.2	3.2	0.8	15.2	1	0.3	14.6	4	1	22	1.4	0.3	16.6
3.1	0.1	33.4	1.5	2.5	29	1	1	24	3.8	1	23	1	0.6	15.6	1.3	0.2	15.7	2	1	23	1.8	0.1	18.3
0	0	33.4	0	0	29	0	0	24	0	0	23	0	0	15.6	0	0.1	15.6	0	0	23	0	0.1	18.1
0.8	0.8	33.4	0.5	3	26.5	0	0	24	0.8	1	22.8	0.2	0.4	15.4	0.5	0.8	15.4	0	1	22	0.4	1.9	16.6
2.3	0.1	35.6	0	0	26.5	0	0	24	1.6	0	24.4	1.2	0	16.6	0.6	0	16	0	0	22	1.3	0	17.9
3.6	1.8	37.4	5	3	28.5	1	3	22	7.6	3	29	5	1.8	19.8	3.2	1.4	17.8	0	2	20	1.4	1	18.3
5.9	0.3	43	7.5	0.5	35.5	3	0	25	5.2	0.2	34	2.6	1.4	21	4.9	0.8	21.9	6	1	25	3.3	0.9	20.6
1.8	0.1	44.7	0.5	0	36	0	0	25	1	0	35	0.2	0	21.2	0.2	0	22.1	0	0	25	0.1	0.1	20.6
6.7	0.2	51.2	1	0	37	3	0	28	8	0.4	42.6	3.6	0	24.8	4.3	0	26.4	5	0	30	1.8	0	22.4
1	0.2	52.1	0	0	37	3	0	31	0.8	0	43.4	0.8	0.2	25.4	0.5	0.2	26.6	2	2	30	0.9	0.5	22.8
0.5	0.1	52.4	0.5	0	37.5	0	0	31	1.6	0	45	1	0.2	26.2	0.3	0	26.9	2	0	32	0.4	0	23.1
0	0	52.4	0	0	37.5	0	0	31	0	0	45	0	0	26.2	0	0	26.9	0	0	32	0	0.1	23
1.4	0.9	52.9	1.5	0.5	38.5	0	3	28	1.8	1.2	45.6	0.2	0.4	26	0.7	0.2	27.5	1	1	32	1	0.6	23.4
0.3	0.1	53.1	0.5	0	39	0	0	28	0.2	0.8	45	0.4	0.2	26.2	0	0.2	27.3	0	0	32	0	0.1	23.3
1.6	0.4	54.4	4.5	0	43.5	.	.	.	2	0	46.3	1	0	25.5	0.6	0.4	28.8	.	.	.	0	0	25.4
0.7	0.4	54.6	1.5	0.5	44.5	0	0	28	1.3	0.5	47	0	0	25.5	0.3	0.1	26.8	0	0	32	0	0	22.6
0	0	54.6	0	0	44.5	0	0	28	0	0	47	0	0	27	0	0	26.8	0	0	32	0	0	23.3
0.4	0.1	54.9	0	0	44.5	0	0	28	0	1	46.2	0	0	27	0.1	0	27.6	0	0	32	0	0	23.3
0.1	0.4	54.7	0	0	44.5	0	0	28	0.2	0.8	45.6	0	0.2	26.8	0.1	0.5	27.3	0	0	32	0	0	23.3
3.9	27.3	31.2	1	23.5	22	0	14	14	2	21.2	26.4	0.2	17.6	9.4	0.4	21.2	6.5	0	25	7	0.5	14.1	9.6
0.1	0.1	31.2	0	0	22	0	0	14	0.2	0.4	26.2	.	.	.	.	.	.	.	.	.	.	.	.
0.2	0.9	30.5	0	0	22	0	1	13	0	0.4	25.8	.	.	.	.	.	.	.	.	.	.	.	.
0.6	1.1	30	0	1	21	0	0	13	0.2	0.8	25.2	.	.	.	.	.	.	.	.	.	.	.	.
0.7	0.3	30.4	0	0.5	20.5	0	0	13	0.2	0	25.4	.	.	.	.	.	.	.	.	.	.	.	.
1	0.6	30.9	1	0	21.5	0	0	13	0.2	0.2	25.4	.	.	.	.	.	.	.	.	.	.	.	.
0.3	2.3	28.8	0.5	1.5	20.5	0	1	12	0	0.6	24.8	.	.	.	.	.	.	.	.	.	.	.	.
0.3	9.8	19.4	0	6	14.5	0	4	8	0.4	10.8	14.4	.	.	.	.	.	.	.	.	.	.	.	.
0.1	8.2	11.3	0	6.5	8	0	4	4	0.4	10	4.8	.	.	.	.	.	.	.	.	.	.	.	.
0	11.1	0.2	0	8	0	0	4	0	0	4.8	0	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	0.4	0.6	9.2	0	0.2	6.3	0	2	5	0.1	1.6	8.1
.	.	.	.	.	.	.	.	.	.	.	.	0.2	6.4	3	0	4.4	1.9	1	4	2	0	2.8	5.4
.	.	.	.	.	.	.	.	.	.	.	.	0	2.8	0.2	0	1.9	0	0	1	1	0	5.4	0
		54.9			44.5			31			47			27			28.8			32			25.4
68.3	68.5		57	57.5		35	35		66.9	63.4		32.2	33.6		33	33		42	41		29	29.6	

Trip (RouteVar)(Block) [Observations]																							
11:15 (64.0)(B012) [6] {FA19}			11:50 (64.0)(B013) [4] {FA19}			12:30 (64.0)(B012) [3] {FA19}			13:10 (64.0)(B013) [1] {FA19}			13:50 (64.0)(B012) [4] {FA19}			14:30 (64.0)(B013) [3] {FA19}			15:15 (64.0)(B012) [4] {FA19}			16:00 (64.6)(B013) [6] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
3.8	0	3.8	2.3	0	2.3	1.7	0	1.7	4	0	4	1.3	0	1.3	1.3	0	1.3	4.8	0	6.3	5.2	0	5.3
0.7	0	4.5	0	0	2.3	0	0	1.7	0	0	4	1	0	2.3	0.3	0	1.7	0.5	0.3	6.5	0.7	0	6
0.2	0	4.7	1.3	0	3.5	1.3	0	3	0	0	4	0	0	2.3	0.7	0	2.3	0.3	0.3	6.5	0.2	0	6.2
0.3	0	5	1.5	0	5	0.7	0	3.7	2	0	6	0.8	0	3	0	0	2.3	1.8	0	8.3	2.3	0	8.5
0.2	0	5.2	0.5	0	5.5	0	0	3.7	0	0	6	0.5	0	3.5	1.3	0.3	3.7	0.3	0	7.7	0.2	0	8.7
0.2	0	5.3	0.5	0	6	0	0	3.7	0	0	6	0.5	0	4	0.7	0	4.3	1	0.3	8.3	0	0.5	8.2
1.2	0	6.5	0.3	0	6.3	2	0	5.7	1	1	6	0.3	0	4.3	0.3	0.3	4.3	0.5	0	9.5	0.8	0.2	8.8
0.3	0	6.8	0	0	6.3	0	0	5.7	1	0	7	1.3	0.5	5	0	0	4.3	0.5	0	10	0.5	0	9.3
0.7	0	7.5	0	0	6.3	0	0	5.7	0	0	7	0.3	0	5.3	0	0	4.3	0.3	0	10.3	0	0	9.3
1.3	0	8.8	0.5	0	6.8	0.7	0	6.3	8	0	15	1.5	0	6.8	1.7	1	5	0.8	0	11	2.5	0.8	11
1.2	0.5	9.5	0.5	0.3	7	0.7	0.7	6.3	1	0	16	0.8	0	7.5	1	0.3	5.7	0.3	0	11.3	1.7	0.2	12.5
0.3	0	9.8	0.8	0	7.8	0	0	6.3	2	1	17	1.5	0	9	4.7	0	10.3	1	0	12.3	0.8	0	13.3
0	0	9.8	0	0	7.8	0	0	6.3	0	0	17	0	0	9	0	0	10.3	0	0	12.3	0.2	0	13.5
1	1	9.8	0.5	0.5	7.8	0.7	0.7	6.3	0	0	17	1.3	1.3	9	2.7	0	13	0.8	0.5	12.5	1	1	13.5
0.7	0	10.5	1	0	8.8	1.3	0	7.7	0	0	17	0.8	0	9.8	1.7	0	14.7	0	0	12.5	0.7	0	14.2
0.7	0.7	10.5	0	0.3	8.5	1	0	8.7	2	0	19	1.3	0.8	10.3	2	1.3	15.3	1.3	0.3	13.5	0.5	2.2	12.5
1.8	0.2	12.2	2	0.3	10.3	1	0.7	9	1	2	18	3.8	0.3	13.8	2	0.7	16.7	0.5	0.5	13.5	2.2	0.5	14.2
0.2	0	12.3	0	0.3	10	1	0.3	9.7	0	0	18	0.5	0.3	14	0	0	16.7	0	0.5	13	0.8	0.5	14.5
0.5	0	12.8	1	0.5	10.5	1.3	0.3	10.7	1	4	15	0.3	0.8	13.5	1.3	0	18	2.5	0.5	15	2.2	1	15.7
0	0.3	12.5	0.3	0.3	10.5	0	0.3	10.3	0	0	15	1	1.8	12.8	1	0.3	18.7	0.3	0.8	14.5	1.5	0.3	16.8
0.2	0	12.7	0	0	10.5	0	0	10.3	0	0	15	0	0	12.8	0	0	18.7	0	0	14.5	0	0	16.8
0.3	0	13	0.5	0	11	0.7	0.3	10.7	0	0	15	0	0	12.8	0	0	18.7	0.3	0	14.8	0	0	16.8
0.7	0.2	13.5	0.8	0.3	11.5	1	0	11.7	0	0	15	1.3	0.3	13.8	0.3	0	19	0	0	14.8	2.3	0.8	18.3
0	0.2	13.3	0	0	11.5	0	0	11.7	0	0	15	0	0	13.8	0	0.3	18.7	0	0.3	14.5	0	0	18.3
0	0.5	15	0	0	14	0	1	16	0	0	15	0.3	0	14.7	0	0	18.7	0	0	13.5	0.3	0	18.7
0	0	14.6	0.3	0	12.3	0	0	10.5	0	0	15	0	0	14	0.3	0	19	0	0	14.5	0.2	0.2	18.7
0	0	13.2	0	0	11.8	0	0	11.3	0	0	15	0	0	14	0	0	19	0	0	14.5	0	0	18.7
0.2	0	13.3	0	0	11.8	0	0	11.3	0	1	14	0	0.5	13.5	0	0	19	0	0	14.5	0	0	18.7
0	0	13.3	0	0	11.8	0	0	11.3	0	0	14	0	0	13.5	0	0.3	18.7	0	0	14.5	0	0.7	18
0.3	9.8	3.8	0	7.3	4.5	0	8.3	3	0	12	2	0	12.3	1.3	0.3	16.7	2.3	0	8.3	6.3	0.3	12.5	5.8
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	5.8
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	5.8
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0.7	5.2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0.3	4.8
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.2	1.2	3.8
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.5	0.7	3.7
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.5	0.8	4.3
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0.2	4.2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	4.2	0
0.2	0.3	3.7	0	0.3	4.3	0	0.7	2.3	0	0	2	0.3	0.5	1.3	0	1	1.3	0	2.8	3.5	.	.	.
0	2	1.7	0	2.5	1.8	0	0.3	2	0	0	2	0	1	0.3	0	0.3	1	0.3	0.5	3.3	.	.	.
0	1.7	0	0	1.8	0	0	2	0	0	2	0	0	0	0.3	0	0.7	0.3	0	3.3	0	.	.	.
		15			14			16			19			14.7			19			15			18.7
17.2	17.4		14.6	14.7		15.1	15.6		23	23		20.7	20.4		23.6	23.5		18.1	19.2		29.3	29.5	

16:30 (64.6)(B014) [51] {FA19}			17:00 (64.6)(B012) [6] {FA19}			17:34 (64.6)(B008) [20] {FA19}			18:09 (64.6)(B010) [3] {FA19}			18:30 (64.6)(B014) [14] {FA19}			19:00 (64.0)() [6] {FA19}			20:00 (64.0)(B010) [1] {FA19}			21:10 (64.0)(B043) [7] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
3.1	0	3.1	4.3	0	4.7	5.1	0	5.1	2.3	0	2.3	1.9	0	2.1	0.5	0.0	0.5	6	0	6	0.7	0	0.9
0.4	0	3.5	0.2	0	4.8	0.4	0	5.7	0	0	2.3	0.1	0	2.2	0.2	0.0	0.7	0	0	6	0.1	0	1
0.5	0	4	1	0	5.8	0.2	0	5.9	0	0	2.3	0.1	0	2.3	0.2	0.0	0.8	0	0	6	0	0	1
1.8	0	5.8	0.7	0.5	6	1.8	0	7.7	0.3	0	2.7	0.8	0	3.1	0.5	0.0	1.3	0	0	6	0.4	0	1.4
0.2	0	5.9	0.2	0	6.2	0.2	0	7.5	0	0	2.7	0	0.1	2.9	0.0	0.0	1.3	0	0	6	0	0	1.4
0.6	0	6.5	0.7	0	6.8	0	0	7.5	0	0	2.7	0.1	0.1	3	0.0	0.0	1.3	0	0	6	0.1	0	1.6
1.2	0.1	7.5	0.3	0	7.2	0.7	0.6	7.7	3	0	5.7	0.1	0.2	2.9	0.3	0.0	1.7	0	0	6	0.1	0.1	1.6
0.2	0.1	7.6	0.3	0	7.5	0.1	0.2	7.6	0	0	5.7	0	0	2.9	0.0	0.0	1.7	0	0	6	0.1	0	1.7
0.2	0	7.8	0.2	0.2	7.5	0	0	7.6	0.3	0	6	0.1	0.1	3	0.0	0.0	1.7	0	0	6	0.3	0	2
3.5	0.6	10.7	2	0.2	9.3	1.1	0.2	8.5	0.3	0.3	6	0.8	0.1	3.6	0.3	0.0	2.0	1	0	7	1.1	0	3.1
1.5	0.7	11.5	2.3	0.5	11.2	1.7	0.4	9.8	0	0	6	0.4	0.1	3.9	0.3	0.0	2.3	0	2	5	0.1	0	3.3
2.1	0.2	13.3	2	0	13.2	1	0.1	10.8	0.3	0	6.3	0.5	0.1	4.4	0.0	0.0	2.3	0	0	5	0.1	0	3.4
0.1	0.1	13.3	0.3	0	13.5	0	0	10.8	0	0	6.3	0	0	4.4	0.0	0.0	2.3	0	0	5	0	0	3.4
1.7	1	14.1	2.2	0.8	14.8	3	1.3	12.4	2	0	8.3	1	0.1	5.3	1.0	0.2	3.2	0	0	5	0.4	0.1	3.7
0.8	0	14.8	1.5	0	16.3	0.6	0.1	12.9	0.3	0.3	8.3	0.1	0	5.4	0.2	0.0	3.3	0	0	5	1.4	0	5.1
1.5	2.5	13.8	0.8	1.2	16	0.7	1	12.6	1.7	2.3	7.7	0.1	0.6	5	1.2	0.0	4.5	2	0	7	0.1	0	5.3
1.9	0.7	15	3.2	0.5	18.7	2.6	0.6	14.6	3.3	0.3	10.7	1.5	0.2	6.3	1.0	0.0	5.5	0	0	7	0.7	0.4	5.6
0.3	0.3	15	0	0.3	18.3	0.2	0.2	14.6	0.7	0	11.3	0.6	0.3	6.6	0.2	0.0	5.7	1	0	8	0.1	0.3	5.4
2.2	0.4	16.8	0.5	0.3	18.5	1.8	0.2	16.2	0.7	0	12	1.1	0.1	7.6	0.5	0.2	6.0	0	0	8	0.9	0	6.3
0.2	0.4	16.6	0.3	0.5	18.3	0.1	1.8	14.5	0.3	0.3	12	0.2	0.4	7.4	0.5	0.0	6.5	0	1	7	0	0.3	6
0.1	0	16.6	0.2	0	18.5	0.1	0.1	14.5	0	0	12	0.1	0	7.5	0.0	0.3	6.2	0	0	7	0	0	6
0.3	0.1	16.8	0.3	0	18.8	0	0	14.5	0.3	0.3	12	0	0.1	7.4	0.0	0.2	6.0	0	0	7	0	0	6
2.2	0.9	18.1	2.8	1	20.7	0.9	0.9	14.5	0.3	0	12.3	0.4	0.3	7.5	0.2	0.3	5.8	0	0	7	0.3	0.4	5.9
0.1	0.1	18.1	0	0.2	20.5	0.1	0.8	13.8	0	0	12.3	0.1	0.3	7.3	0.0	0.0	5.8	0	0	7	0	0.3	5.6
0.4	0.4	18.4	0.2	0.3	20.3	0.4	0	14.3	0	0	12.3	0.1	0.1	7.3	0.0	0.0	5.8	0	0	7	0	0	5.6
0	0.4	17.8	0	1.5	18.8	0.4	0.2	14.4	0	0	12.3	0	0.1	7.2	0.0	0.0	5.8	0	0	7	0.1	0.3	5.4
0	0	17.8	0	0	18.8	0	0	14.4	0	0	12.3	0	0	7.2	0.0	0.0	5.8	0	0	7	0	0	5.4
0.1	0	17.9	0	0	18.8	0.1	0.1	14.3	0	0.3	12	0	0.1	7.1	0.0	0.0	5.8	0	0	7	0	0	5.4
0	0.5	17.4	0	0.2	18.7	0	0.1	14.3	0	0.3	11.7	0	0.1	7	0.0	0.0	5.8	0	0	7	0	0.1	5.3
0.6	10	8.1	0.8	12.8	6.7	0.5	8.1	6.6	0.7	5.7	6.7	0.3	4.2	3.1	0.0	4.5	1.3	1	6	2	0.9	4.9	1.6
0.2	0.1	8.2	0.3	0.3	6.7	0.1	0.2	6.5	0	1	5.7	0.4	0.6	2.8	.	.	.	.	.	.	.	.	.
0	1.5	6.7	0	0.3	6.3	0.1	0.2	6.4	0	0.7	5	0.1	0.1	2.7	.	.	.	.	.	.	.	.	.
0.1	0.8	6	0.3	0.7	6	0.1	1.5	5	0.3	0.7	4.7	0	0.4	2.3	.	.	.	.	.	.	.	.	.
0.1	0.3	5.8	0	1	5	0.1	0.6	4.5	0	0.7	4	0	0	2.3	.	.	.	.	.	.	.	.	.
0.1	0.3	5.6	0	0.5	4.5	0	0.2	4.3	0	0.3	3.7	0.1	0.6	1.8	.	.	.	.	.	.	.	.	.
0.9	1.5	5	0.8	0.8	4.5	0.5	0.7	4.1	0	0	3.7	0.1	0.5	1.4	.	.	.	.	.	.	.	.	.
1.1	0.8	5.3	0.8	0.5	4.8	0.6	0.8	3.8	0	2.3	1.3	0.4	0.4	1.4	.	.	.	.	.	.	.	.	.
0.3	0.6	5	0	0.5	4.3	0.2	0.3	3.8	0	0	1.3	0	0.3	1.1	.	.	.	.	.	.	.	.	.
0	4.7	0.3	0	4.3	0	0	3.8	0	0	1.3	0	0	1.1	0	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0.33333	1	0	0	2	0	0.1	1.4
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0.6	0.4	0	1	1	0	0.3	1.1
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0.4	0	0	1	0	0	0.3	0.9
		18.4			20.7			16.2			12.3			7.6			6.5			8			6.3
30.6	30.1		29.5	29.9		25.5	25.3		17.1	17.1		11.6	11.8		7.0	7.0		11	11		8	7.9	

22:20 (64.0)(B043) [1] {FA19}			23:30 (64.0)(B017) [2] {FA19}			24:35 (64.0)(B017) [2] {FA19}			Total		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
0	0	0	0.5	0	1	1.5	0	1.5	135.1	0	143.4
0	0	0	0	0	1	0	0	1.5	34.0667	0.5	177.667
1	0	1	0	0	1	0	0	1.5	28.0667	0.6	205.033
0	0	1	0	0	1	0	0	1.5	37.6	0.6	241.833
0	0	1	0	0	1	0	0	3	14.5	0.4	255.833
0	0	1	0.5	0.5	1.5	0	0	3	17.1	1.4	271.933
0	0	1	0	0	1.5	0	0	1.5	51.3333	2.5	320.167
0	0	1	0	0	1.5	0	0	1.5	15.8	0.8	332.067
0	0	1	0	0	1.5	0	0	1.5	2.9	0.3	334.767
0	0	1	0	0	1.5	0	0	1.5	103.233	4.7	432.8
0	0	1	0	0	1.5	0	0	1.5	53.3333	18.2	467.933
0	0	1	0.5	0	2	0.5	0.5	1.5	43.9	9	503.033
0	0	1	.	.	.	.	.	.	0.6	0.3	500.433
0	0	1	.	.	.	.	.	.	24.5	19.4667	505.067
0	0	1	0	0	2	0	0	1.5	26.4667	0.8	533.433
1	0	2	0	0.5	1.5	0	0	1.5	65.0667	73.7	525
0	1	1	0	0	1.5	2	0	3.5	85.9	18.9	592.1
0	0	1	0	0	1.5	0	0	3.5	13.7667	5	600.467
2	0	3	0	0	1.5	1	0	4.5	72.4	10.0667	662.8
0	0	3	0	0	1.5	0	0.5	4	20.3	13.1	669.8
0	0	3	0	0	1.5	0	0	4	11.6	0.83333	680.267
0	0	3	0	0	1.5	0	0	4	3.2	1.36667	682
1	0	4	0	0	1.5	0	0	4	29.7667	18.7333	693.433
0	0	4	0	0	1.5	0	0	4	3.2	5	691.633
0	0	4	0	0	1.5	0	0.5	3.5	18.8	4	657.733
0	0	4	0	0	1.5	0	0	3.5	6.7	4.3	706.333
0	0	4	0	0	1.5	0	0	3.5	0	0	707.433
0	0	4	0	0	1.5	0	0	3.5	1.7	3.3	706.433
0	1	3	0	0	1.5	0	0	3.5	1	7.3	700.433
0	2	1	0	0	1.5	0	0.5	3	20	436.3	284.533
.	.	.	.	.	.	.	.	.	1.6	3	210.6
.	.	.	.	.	.	.	.	.	0.7	9.2	202
.	.	.	.	.	.	.	.	.	3.5	10.3	195.5
.	.	.	.	.	.	.	.	.	1.4	7.9	188.9
.	.	.	.	.	.	.	.	.	5.1	6	188.2
.	.	.	.	.	.	.	.	.	7.7	16	179.9
.	.	.	.	.	.	.	.	.	6.9	66.4	120.2
.	.	.	.	.	.	.	.	.	1	46.4	75
.	.	.	.	.	.	.	.	.	0	74	1
0	0	1	0	1	0.5	0	1.5	1.5	1	13.6333	60
0	0	1	0	0	0.5	0	1.5	0	1.5	30.8	30.7
0	1	0	0	0	0.5	0	0	0	0	27.6	3.2
		4			2			4.5			707.433
5	5		1.5	2		5	5		972.3	972.7	

Massachusetts Bay Transportation Authority
Route 64
Weekday - Outbound
Fall 2019
(Urban Transportation Associates)

Seq - StopID - Stop Name	**06:05 (64.0)(B010) [2] {WI19}**			06:24 (64.0)(B011) [3] {FA19}			06:36 (64.6)(B013) [9] {FA19}			07:10 (64.6)(B016) [2] {FA19}			07:31 (64.6)(B009) [1] {FA19}			07:55 (64.6)(B011) [4] {FA19}		
	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
1 - 730 - FRANKLIN ST @ SIDNEY ST	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
2 - 2755 - GREEN ST @ PEARL ST	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.
3 - 1060 - MAGAZINE ST @ GREEN ST				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4 - 72 - MASSACHUSETTS AVE @ PEARL ST				.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5 - 1123 - GREEN ST @ MAGAZINE ST	7	0	7	1	0	1	.	.	.	.	.	.	.	.	.	.	.	.
6 - 2231 - MAIN ST @ KENDALL STATION - R	.	.	.	.	.	.	2.2	0	2.2	3	0	3	9	0	9	4.3	0	4.3
7 - 12231 - AMES ST @ BROADWAY				.	.	.	0	0	2.2	0	0	3	0	0	9	0	0.3	4
8 - 24486 - BROADWAY @ HAMPSHIRE ST	.	.	.	.	.	.	0	0.8	1.8	0.5	0	3.5	2	2	9	0.8	0.3	4.5
9 - 24487 - BROADWAY @ WINDSOR ST	.	.	.	.	.	.	0.2	0	1.8	3	1	5.5	6	4	11	2.8	0.8	6.5
10 - 24488 - BROADWAY @ COLUMBIA ST	.	.	.	.	.	.	0.2	0	2	0.5	0	6	0	0	11	1	0	7.5
11 - 24489 - BROADWAY @ NORFOLK ST	.	.	.	.	.	.	0	0	2	0.5	0	6.5	1	0	12	0.3	0	7.8
12 - 24490 - BROADWAY @ PROSPECT ST	.	.	.	.	.	.	0.3	0	2.3	0.5	0	7	1	0	13	0.5	0.3	8
13 - 2442 - PROSPECT ST @ HARVARD ST	.	.	.	.	.	.	0.7	0.2	2.8	0	0	7	2	0	15	0.3	0.8	7.5
14 - 2443 - PROSPECT ST @ BISHOP ALLEN DR	.	.	.	.	.	.	0	0	2.8	0.5	0	7.5	0	0	15	0.3	0.3	7.5
15 - 2444 - WESTERN AVE @ GREEN ST	0	0	7	2	0	3	1.4	0.2	4	3.5	0	11	3	3	15	4.5	0.3	11.8
16 - 1061 - WESTERN AVE @ KINNAIRD ST	0	0	7	0	0	3	0.2	0	4.2	0	0	11	0	1	14	0.5	0	12.3
17 - 1062 - WESTERN AVE @ HOWARD ST	0	0	7	0	0	3	0.1	0	4.3	1	0	12	0	0	14	0.5	0.8	12
18 - 1064 - WESTERN AVE @ PUTNAM AVE	0	0.5	6.5	0	0.3	2.7	0	0.4	3.9	0.5	0.5	12	0	4	10	0.8	1.5	11.3
19 - 1189 - CAMBRIDGE ST @ MASS PIKE	0	2	4.5	0	0.3	2.3	0	0.7	3.2	0	0	12	0	1	9	0.5	0.8	11
20 - 1190 - CAMBRIDGE ST @ SEATTLE ST	0	0	4.5	0	0	2.3	0	0	3.2	0	0	12	0	0	9	0	0	11
21 - 1191 - CAMBRIDGE ST @ LINCOLN ST	0	0	4.5	1	0	3.3	1.7	0	4.9	0.5	1	11.5	5	0	14	2.3	0	13.3
22 - 1193 - CAMBRIDGE ST @ FRANKLIN ST	0	0	4.5	0	0	3.3	0	0.3	4.6	0	1.5	10	0	1	13	0.3	0	13.5
23 - 1195 - CAMBRIDGE ST @ EMERY RD	0	0	4.5	0.7	0	4	0	0.4	4.1	0	0.5	9.5	0	0	13	0.5	0	14
24 - 1196 - N BEACON ST @ CAMBRIDGE ST	1	1	4.5	0	1.7	2.3	0.3	0.9	3.6	0.5	0.5	9.5	0	1	12	0.3	2.5	11.8
25 - 1197 - N BEACON ST OPP SAUNDERS ST	0	1.5	3	0	0.3	2	0	0.7	2.9	0	0	9.5	0	2	10	0	0	11.8
26 - 11971 - ARTHUR ST @ GUEST ST - STOP &	0	0	3	0.7	1	1.7	0.1	0	3	0	1.5	8	0	0	10	0	4	7.8
27 - 11972 - GUEST ST @ LIFE ST	0	1.5	1.5	0	0.7	1	0	0.1	2.9	0	1.5	6.5	0	1	9	0	4.5	3.3
28 - 1199 - N BEACON ST @ LIFE ST	0	0	1.5	0	0	1	0.1	0	3	0.5	0.5	6.5	0	0	9	0.8	0.3	3.8
29 - 1200 - N BEACON ST @ MARKET ST	0	0	1.5	0	0	1	0.1	0	3.1	0	0	6.5	0	1	8	0	0	3.8
30 - 1202 - N BEACON ST @ VINELAND ST	0	0	1.5	0	0	1	0	0.1	3	0.5	0.5	6.5	0	0	8	0	0	3.8
31 - 1203 - N BEACON ST @ BIRMINGHAM PKWY	0	1	0.5	0	0	1	0	0.3	2.7	0	0	6.5	0	2	6	0	1.3	2.5
32 - 1204 - BIRMINGHAM PKWY @ SOLDIERS FI	0	0	0.5	0	0	1	0	0.2	2.4	0	0	6.5	0	0	6	0	0	2.5
33 - 1206 - HOBART ST @ BROOKS ST	0	0	0.5	0	0	1	0.1	0	2.6	0	1.5	5	0	0	6	0	0.3	2.3
34 - 1208 - HOBART ST @ FALKLAND ST	0	0	1	0	0	1	0	0	3.4	0	0	5	3	0	9	0	0	2.3
35 - 12081 - FANEUIL ST @ DONNYBROOK RD	0	0	1	0	0	1	0	0	3.4	0	0	5	0	0	9	0	0	2.3
36 - 1210 - FANEUIL ST OPP GARFIELD SCHOO	0	0	1	0	0	1	0	0.2	3.2	0	3	2	0	3	6	0	1.3	1
37 - 1211 - FANEUIL ST @ BROOKS ST	0	0	1	0	0	1	0	0	3.2	0	0	2	0	0	6	0	0	1
38 - 1212 - FANEUIL ST @ BRACKETT ST	0	0.5	0	0	1	0	1.9	0.8	3.6	0.5	2	0.5	0	0	6	0	0.8	0.3
40 - 1214 - FANEUIL ST @ OAK SQUARE	0	0	0	0	0	0	0	1.7	1.9	0	0	0.5	0	6	0	0	0.3	0
Maximum			7			4			4.9			12			15			14
Total	8	8		5.4	5.3		9.6	8		16	15.5		32	32		21.3	21.5	

08:20 (64.6)(B013) [5] {FA19}			08:41 (64.6)(B015) [12] {FA19}			09:13 (64.6)(B012) [1] {FA19}			09:45 (64.0)(B013) [8] {FA19}			10:33 (64.0)(B012) [3] {FA19}			11:12 (64.0)(B013) [2] {FA19}			11:51 (64.0)(B012) [4] {FA19}			12:30 (64.0)(B013) [2] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
.	.	.	.	.	.	.	.	.	0.8	0	1.1	1.3	0	1.3	1.5	0	1.5	1	0	1	4	0	4
.	.	.	.	.	.	.	.	.	0.9	0	2	1.7	1	2.7	1	0.5	2	2.3	0.3	3	0.5	0.5	4
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	3.3	0	5.3	2.3	0.3	4.7	1	0.5	2.5	3	0	6	5.5	0	9.5
4	0	4	2.9	0	3	5	0	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0	4	0.2	0	3.2	0	0	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.8	0.6	4.2	0.3	1.3	2.2	0	0	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.2	0	4.4	0.4	0.1	2.5	0	0	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2.6	0	7	1.2	0	3.7	1	0	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	0	8	0.4	0.3	3.8	0	0	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1.4	0	9.4	0.7	0.7	3.8	0	0	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.2	0	9.6	0.1	0	3.9	0	0	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.8	0.4	10	0.6	0.2	4.3	0	0	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5.8	0.6	15.2	5.7	0.2	9.8	4	0	10	2.5	0	7.8	1.3	0	6	2.5	0	5	1	0	7	1	0	10.5
0	0	15.2	0.2	0	10	0	0	10	0.4	0	8.1	0	0	6	0	0	5	0	0	7	0	0	10.5
0	0	15.2	0.4	0	10.4	0	3	7	0	0	8.1	0	0.3	5.7	0	0	5	0	0.5	6.5	0	0.5	10
1	2.2	14	1.7	2.1	10	0	5	2	0.3	0.9	7.5	0	0.7	5	0.5	0	5.5	0.8	1.3	6	0.5	0.5	10
0	0	14	0.2	0.7	9.5	0	0	2	0	0	7.5	0	0	5	0	0	5.5	0.5	0.3	6.3	0	0	10
0.8	0	14.8	0.2	0	9.7	0	0	2	0	0.1	7.4	0	0	5	0	0	5.5	0	0.5	5.8	0	0.5	9.5
0	0	14.8	0.2	0.1	9.8	0	0	2	0.1	0.1	7.4	0	0	5	1	0	6.5	0.3	0	6	0	0	9.5
0.8	0.8	14.8	0.4	1.2	9	0	0	2	0	1.1	6.3	0	0.7	4.3	0.5	0.5	6.5	0.3	1	5.3	0	0.5	9
0.6	0	15.4	0.2	0.4	8.8	1	0	3	0	0.3	6	0	0	4.3	0	0.5	6	0	0.5	4.8	0.5	1	8.5
0.8	0.8	15.4	0.9	0.1	9.6	0	0	3	0.3	0.3	6	3	0.7	6.7	0.5	0	6.5	0.3	0.3	4.8	0	1.5	7
0	1.2	14.2	0	0.3	9.3	0	0	3	0	0.1	5.9	0	0.7	6	0	1	5.5	0	0	4.8	0	0	7
0.4	0.8	13.8	0.2	1.8	7.8	0	0	3	0.5	0.8	5.6	0.7	0.3	6.3	1.5	1	6	1	0	5.8	1.5	2	6.5
0	4	9.8	0	2.9	4.8	0	1	2	0.1	1.1	4.6	0	0.7	5.7	0	0	6	0	0.5	5.3	0	0	6.5
0	1.6	8.2	0	0.8	4.1	0	0	2	0.1	0.6	4.1	0	0.3	5.3	0	1	5	0	0.8	4.5	0	0	6.5
0.2	0.6	7.8	0.1	0.8	3.3	0	1	1	0	0.8	3.4	0.7	0.3	5.7	0	0	5	0	0	4.5	0	0	6.5
0.2	1.2	6.8	1.5	0.5	4.3	0	0	1	0.1	0.4	3.1	0.7	3.3	3	0	1.5	3.5	0	1.5	3	0.5	3.5	3.5
0	0.8	6	0	0	4.3	0	0	1	0	0	3.1	0	0	3	0	0	3.5	0	0	3	0	0	3.5
0	0	6	0	0.1	4.3	0	0	1	0	0	3.1	0	0	3	0	0	3.5	0	0	3	0	0	3.5
0	0.2	5.8	0.1	0.3	4.1	0	0	1	0	0.4	2.8	0.3	1	2.3	1	0	4.5	0	1	2	0	0	3.5
0	0.4	5.4	0	0.2	3.9	0	0	1	0	0	2.6	0	0	2.3	0	0	4.5	0	0	2	0	0	3.5
0	0.4	5	0	0	3.9	0	0	1	0	0.4	2.2	0	0	2.3	0	0	4.5	0	0	2	0	0	3.5
0	3.6	1.4	0	3.2	0.8	0	1	0	0	0.6	1.6	0	0	2.3	0	1	3.5	0	1	1	0	0.5	3
0	0	1.4	0	0	0.8	0	0	0	0	0	1.6	0	0	2.3	0	0.5	3	0	0	1	0	0	3
1.8	1.4	1.8	0.1	0.5	0.3	0	0	0	1.1	1	2	0	1.7	0.7	0.5	3.5	0.5	0	0.5	0.5	0	1	2
0	0	1.8	0	0.3	0.1	0	0	0	0	1.3	1	0	0	0.7	0	0	0.5	0	0.5	0	0	2	0
		15.4			10.4			10			8.1			6.7			6.5			7			10.5
23.4	21.6		18.9	19.1		11	11		10.5	10.3		12	12		11.5	11.5		10.5	10.5		14	14	

Trip (RouteVar)(Block) [Observations]																							
13:09 (64.0)(B012) [3] {FA19}			13:48 (64.0)(B013) [3] {FA19}			14:28 (64.0)(B012) [4] {FA19}			15:08 (64.0)(B013) [7] {FA19}			15:56 (64.0)(B012) [3] {FA19}			16:35 (64.6)(B008) [18] {FA19}			17:05 (64.6)(B010) [3] {FA19}			17:35 (64.6)(B014) [13] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
5	0	5	3.7	0	4	2.8	0	2.8	5.1	0	5.1	9.7	0	9.7	.	.	.	.	.	.	.	.	.
1.3	0	6.3	0	0	4	4	0	6.8	3.4	0.1	8.4	4	1	12.7	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2.3	0	8.7	5.7	0.7	9	6	0	12.8	7.6	0.1	15.9	4	0.3	16.3	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	13.1	0	13.1	17	0	17	15.1	0	21.5
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.8	0	15.9	2.7	0	19.7	3.8	0.1	22.4
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	14.5	0.7	29.7	11	1.3	29.3	7.2	0.7	29.2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.4	0.7	31.4	3.7	0.7	32.3	1.3	1.4	29.1
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.7	0.2	31.9	0.3	0.3	32.3	0.5	1	28.6
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.6	0.1	32.3	0	0.3	32	0.4	0.2	28.8
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.7	0.6	32.4	1.7	0	33.7	0.6	0.5	29
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.7	0.3	32.8	0.7	0.3	34	0.9	0.6	29.3
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.7	0.3	35.2	4	0.3	37.7	3.2	0.7	31.8
1	0	9.7	1.3	0	10.3	2	0	14.8	2.7	0	18.6	5.7	0.3	21.7	13.7	0.9	48.1	16.7	0.7	53.7	11.6	1.2	42.2
0	0	9.7	0	0	10.3	0.5	0	15.3	0.1	0	18.7	0.3	0	22	0.6	0.1	48.6	0.3	0	54	0.2	0.1	42.4
0	1	8.7	0	0	10.3	0	0.5	14.8	0	0.3	18.4	0.3	0	22.3	0.5	0.9	48.2	0.7	0.3	54.3	0.4	0.5	42.3
1.3	0.7	9.3	1	1	10.3	1	0.5	15.3	3.6	0.6	21.4	2.7	1.3	23.7	1.8	1.4	48.5	3	2	55.3	1.4	1.9	41.8
0	0.3	9	0	0	10.3	0.3	0.3	15.3	0.1	0.1	21.4	0.3	0	24	0.7	0.2	49.1	0	0	55.3	0.1	0.3	41.5
0	0	9	0	0	10.3	0	0	15.3	0.1	0	21.6	0	0.3	23.7	0.2	1.1	48.1	0	0.3	55	0	0.4	41.2
0.3	0	9.3	0.3	0	10.7	0.3	0.3	15.3	0	0.1	21.4	0.3	0.7	23.3	0.7	1.3	47.5	0	0.3	54.7	0.6	0.8	41
1	0	10.3	0	1.3	9.3	0.3	2.5	13	1.3	2	20.7	0	1.7	21.7	0.7	6.7	41.6	0	5.7	49	0.6	7.1	34.5
0.3	0.7	10	0.7	1.7	8.3	0	0.8	12.3	1.7	0.9	21.6	1.7	3	20.3	2.6	5.2	38.9	1	3.3	46.7	1.5	3.7	32.4
0	0	10	6.7	1	14	1.5	0.5	13.3	3.1	1.4	23.3	3.7	1.3	22.7	2.1	5	35.9	3.7	6	44.3	2.5	3.1	31.8
0	0.7	9.3	0	0.7	13.3	0	1	12.3	0	0.9	22.4	0	0.7	22	0.1	0.8	35.2	0	0.7	43.7	0.5	1.3	31
0.3	1	8.7	0	0.3	13	0	0.5	11.8	1.7	0.4	23.7	0.3	1.3	21	2.9	1.5	36.6	3	0.7	46	2.3	2.2	31.1
0	0	8.7	0	0	13	0	0.5	11.3	0	0	23.7	0	0	21	0	0	36.6	0	0	46	0	0.2	30.9
0	0.3	8.3	1.3	0.3	14	0	0	11.3	0	0.4	23.3	0.3	0.7	20.7	0.1	1.8	34.8	1	1.7	45.3	0.2	1.2	30
0.3	0.3	8.3	0.3	0	14.3	0.3	0	11.5	0.6	1.9	22	1.7	1.3	21	1.3	2.3	33.8	0.3	2	43.7	0.8	2.2	28.7
0	2	6.3	0.3	7.7	7	0.3	4	7.8	0	8.7	13.3	1	5.3	16.7	0.3	5.8	28.2	0	4.7	39	0.4	4.3	24.8
0	0	6.3	0	0.7	6.3	0	0.5	7.3	0	0.6	12.7	0	0	16.7	0.1	0.5	27.8	0	0	39	0	0.4	24.4
0	0	6.3	0	0.3	6	0	0.8	6.5	0	0.6	12.1	0	0.7	16	0.1	0.7	27.2	0	0.7	38.3	0	1.2	23.2
0	0	6.3	0	0.3	5.7	0	1.5	5	0	4	8.1	0	3.3	12.7	0.3	5.4	22	0.7	10	29	1.2	5.3	19.1
0	0	5.5	0	1	4.7	0	0	5.7	0	1	7.1	0	0.7	12	0.2	1	21.2	0	2	27	0	2.1	17
0	0	5.5	0	0	4.7	0	0.3	5.3	0	0.6	6.6	0.3	0.3	12	0	0.6	20.6	0	2	25	0	1	16
0	2.5	3	0	0	4.7	0	0.7	4.7	0	0.9	5.7	0	1.3	10.7	0	2.4	18.2	0	3.7	21.3	0	2.5	13.5
0	0.7	4	0	0.7	4	0	0.5	3.8	0	0.7	5	0	0.3	10.3	0	2.4	15.7	0	2.3	19	0	2.2	11.2
0	1.3	2.7	0	4	0	1.8	3	2.5	0.3	2.9	2.4	0.7	9.7	1.3	0.1	15.2	0.6	0	18.3	0.7	0.4	11.4	0.5
0	2.7	0	0	0	0	0	1	1.5	0	2.3	0.1	0	0.7	0.7	0	0.6	0	0	0.7	0	0	0.1	0.4
		10.3			14.3			15.3			23.7			24			49.1			55.3			42.4
13.1	14.2		21.3	21.7		21.1	19.7		31.4	31.5		37	36.2		67.3	66.7		71.5	71.3		57.7	61.9	

18:05 (64.6)(B012) [5] {FA19}			18:35 (64.6)(B008) [1] {FA19}			19:10 (64.6)(B010) [1] {FA19}			20:35 (64.0)(B043) [7] {FA19}			21:45 (64.0)(B043) [13] {FA19}			22:55 (64.0)(B017) [1] {FA19}			24:00 (64.0)(B017) [2] {FA19}			25:05 (64.3)(B017) [2] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
.	.	.	.	.	.	.	.	.	5	0	5.1	2.6	0	2.9	1	0	1	0	0	0	.	.	.
.	.	.	.	.	.	.	.	.	2.7	0.6	7.3	1.6	0	4.5	1	0	2	0	0	0	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.5	0	0.5
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0.5
.	.	.	.	.	.	.	.	.	7	0.1	14.1	6.3	0	10.8	3	0	5	2.5	0	2.5	0.5	0	1
17	0	17	15	0	15	8	0	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.4	0	20.4	6	0	21	1	0	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4.8	0.6	24.6	6	0	27	4	0	13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.4	2.6	22.4	1	1	27	1	0	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.8	1.2	22	0	1	26	0	0	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0	22	0	0	26	0	0	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.2	0.8	21.4	0	0	26	0	0	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.4	0.2	21.6	1	0	27	1	0	15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3.4	0.2	24.8	3	0	30	1	0	16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10.8	1	34.6	15	0	45	8	0	24	5.1	0	19.3	2.5	0	13.4	2	0	7	0	0	2.5	0	0	1
0	0	34.6	0	0	45	0	0	24	0	0	19.3	0.2	0.1	13.5	0	0	7	0	0	2.5	0	0	1
0.2	0	34.8	1	0	46	0	0	24	0.3	0.1	19.4	0.1	0	13.5	0	0	7	0	0	2.5	0	0	1
0.8	1.2	34.4	1	1	46	0	1	23	0.9	0.6	19.7	0.2	0.5	13.2	0	0	7	0	0.5	2	0	0	1
0	0.6	33.8	1	0	47	0	0	23	0	0	19.7	0	1.4	11.8	0	0	7	0	0	2	0	0	1
0	0.8	33	0	0	47	0	0	23	0.1	0.7	19.1	0	0.5	11.3	0	0	7	0	0	2	0	0	1
1	0.4	33.6	0	0	47	0	0	23	0.1	0.7	18.6	0	0.4	10.9	0	1	6	0	0	2	0	0	1
0	4.6	29	0	0	47	1	1	23	0.3	3.7	15.1	0.6	1.4	10.2	0	1	5	0	0	2	0	0	1
1	1.4	28.6	0	9	38	1	1	23	0.6	0.4	15.3	0.5	0.6	10	1	0	6	1	0	3	0	0	1
2	2.8	27.8	1	5	34	0	3	20	0.6	1.3	14.6	0.8	0.7	10.2	1	0	7	1	0	4	0.5	0	1.5
0	2.8	25	0	2	32	0	0	20	0	0.4	14.1	0.1	0.8	9.4	0	1	6	0	0	4	0	0	1.5
0.8	1.6	24.2	2	1	33	0	3	17	0.9	0.7	14.3	1.1	0.2	10.3	0	0	6	0	0	4	0	0	1.5
0.2	0.6	23.8	0	0	33	0	0	17	0	0	14.3	0	0	10.3	0	0	6	0	0	4	0	0	1.5
0.8	1.4	23.2	0	1	32	0	4	13	0.4	2.3	12.4	0.1	0.9	9.5	0	2	4	0	0	4	0	0.5	1
1.6	1	23.8	2	0	34	0	0	13	0.6	0.9	12.1	0	0.7	8.8	0	0	4	0	0	4	0	1	0
0.2	4.4	19.6	0	5	29	0	2	11	0.3	2	10.4	0.3	2.2	6.9	0	2	2	0	1	3	0	0	0
0	0	19.6	0	0	29	0	0	11	0.1	0.6	10	0	0.2	6.7	0	0	2	0	0	3	0	0	0
0	1.8	17.8	0	0	29	0	1	10	0	0.3	9.7	0.2	0.4	6.5	0	0	2	0	0	3	0	0	0
0.2	4.4	13.6	0	9	20	0	0	10	0	1.4	8.3	0.1	0.9	5.7	0	2	0	0	1	2	0	0	0
0	1.4	12.2	0	0	20	0	3	7	0	1.4	6.9	0	0.5	5.2	0	0	0	0	0	2	.	.	.
0	0	12.2	0	0	20	0	0	7	0	0.4	6.4	0	1.2	4	0	0	0	0	0	2	.	.	.
0	2.8	9.4	0	3	17	0	2	5	0	0.7	5.7	0	0.1	3.9	0	0	0	0	0	2	.	.	.
0	1.4	8	0	4	13	0	0	5	0	0.6	5.1	0	0.6	3.3	0	0	0	0	0	2	0	0	0
0	7	1	2	15	2	0	3	2	0.3	5.3	0.3	0.6	3.1	1.2	0	0	0	0.5	1.5	1	0	0	0
0	1	0	0	0	2	0	2	0	0	0	0.3	0	0.7	0.5	0	0	0	0	1	0	0	0	0
		34.8			47			24			19.7			13.5			7			4			1.5
50	50		57	57		26	26		25.3	25.2		17.9	18.1		9	9		5	5		1.5	1.5	

Total		
On	Off	Load
43.5	0	44.5
24.4	4	65.7
0.5	0	0.5
0	0	0.5
68	2	132.1
115.6	0	122.1
19.9	0.4	138.8
51.9	8.3	183
22.4	12.3	192.9
8.8	3.7	198
4.2	0.9	201.2
7.6	2.9	206
8	2.4	211.5
19.5	2.4	228.6
136.3	8.4	489
3.5	1.3	491.2
5.5	8.7	487.7
24.8	34.1	478.3
3.7	9	473
1.4	5.2	469.3
15.7	7.2	477.8
8.1	47.3	438.5
18.1	35.3	421.3
38.1	42.4	417.1
0.7	21.6	396.1
21.9	27.6	390.5
0.3	20.8	370
5.7	24.4	351.3
10.9	18.1	344.1
6.6	73.6	277
0.2	8.9	268.4
0.3	8.8	259.9
4	53.2	210.9
3.2	14.7	200.4
0.3	7.2	193.4
0	41	152.6
0	16.9	136.7
12.6	115.4	36.4
0	24.9	12
		491.2
716.2	715.3	

Massachusetts Bay Transportation Authority
Route 66
Weekday - Inbound
Fall 2019
(Urban Transportation Associates)

	05:00 (66.6)(B339) [63] {FA19}			05:15 (66.6)(B341) [62] {FA19}			05:30 (66.6)(B319) [36] {FA19}			05:45 (66.6)(B329) [51] {FA19}			06:00 (66.6)(B334) [25] {FA19}			06:10 (66.6)(B337) [33] {FA19}			06:19 (66.4)(B120) [71] {FA19}			06:20 (66.6)(B338) [63] {FA19}			06:30 (66.2)(B082) [71] {FA19}			06:30 (66.
Seq - StopID - Stop Name	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On
1 - 912 - TREMONT ST @ WASHINGTON ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3.3	0	3.4	.	.	.	0.6	0	0.6	.
2 - 913 - WASHINGTON ST @ BRECK AVE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	15.5	0.3	18.9	.	.	.	2.6	0.2	3.1	.
3 - 915 - WASHINGTON ST @ LANGLEY RD	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.1	0	20.6	.	.	.	1.5	0	4.7	.
4 - 916 - WASHINGTON ST @ LAKE ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4.6	0.1	25.1	.	.	.	0.5	0.1	5.2	.
5 - 917 - WASHINGTON ST @ FOSTER ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3.8	0	28.8	.	.	.	0.3	0	5.4	.
6 - 918 - WASHINGTON ST @ CHESTNUT HILL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.1	0.4	29.5	.	.	.	0.2	0.2	5.4	.
7 - 919 - WASHINGTON ST OPP WALDO TERR	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.2	0.2	31.6	.	.	.	0.3	0.1	5.6	.
8 - 920 - CAMBRIDGE ST @ WASHINGTON ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	0.2	33.4	.	.	.	0.4	0.1	6	.
9 - 19201 - CAMBRIDGE ST OPP ELKO ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.1	0.1	33.5	.	.	.	0	0	6	.
10 - 922 - CAMBRIDGE ST OPP DUSTIN ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	0	33.7	.	.	.	0.1	0.1	6	.
11 - 924 - CAMBRIDGE ST @ GORDON ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.9	0	34.6	.	.	.	0.1	0	6.1	.
12 - 925 - CAMBRIDGE ST @ BARROWS ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.3	0.8	34.1	.	.	.	1.5	0.3	7.3	.
13 - 22549 - HARVARD SQ @ GARDEN ST - DAWE	2	0	2	1.2	0	1.3	1.6	0	1.6	2.9	0	2.9	1.5	0	1.6	1.8	0	1.9	.	.	.	2.8	0	2.8	.	.	.	2.5
14 - 32549 - ELIOT ST @ BENNETT ST	0.4	0	2.5	2.1	0	3.3	3.1	0	4.7	1	0	3.9	2.8	0	4.4	2.3	0	4.2	.	.	.	1.5	0	4.3	.	.	.	2.6
15 - 2550 - JFK ST @ ELIOT ST	1.3	0	3.8	0.1	0	3.5	0.1	0	4.8	0.2	0	4.1	0.4	0	4.8	0.2	0	4.4	.	.	.	0.3	0	4.6	.	.	.	1
16 - 2551 - N HARVARD ST @ GATE 2 HARVARD	0.1	0	3.9	0.1	0	3.6	0.1	0.5	4.4	0.1	0	4.3	0.4	0	5.2	0.2	0.1	4.5	.	.	.	0.2	0.1	4.7	.	.	.	0.6
17 - 2553 - N HARVARD ST @ WESTERN AVE	0.1	0	4	0.3	0.5	3.4	0.2	0.2	4.4	1.2	0.4	5.1	3.8	0.6	8.4	1.5	0.4	5.6	.	.	.	1.4	0.2	5.9	.	.	.	1.5
18 - 2554 - N HARVARD ST @ FRANKLIN ST	1.4	0	5.4	0.3	0.2	3.5	0.8	0.7	4.5	3.1	0.1	8.1	8.1	0.2	16.4	6.7	0.2	12	.	.	.	3.2	0	9.1	.	.	.	5.2
19 - 2555 - N HARVARD ST @ COOLIDGE RD	0.4	0	5.8	0.1	0	3.6	0	0	4.5	0.1	0	8.3	1.3	0.2	17.5	0.7	0.1	12.6	.	.	.	0.9	0.1	9.9	.	.	.	2.6
20 - 2556 - N HARVARD ST @ HOOKER ST	0.3	0.5	5.6	0	0	3.6	0.2	0	4.7	1.6	0.5	9.4	3.8	0.1	21.2	4.5	0.1	17.1	.	.	.	2.2	0	12.1	.	.	.	1.5
21 - 1191 - CAMBRIDGE ST @ LINCOLN ST	0.1	0	5.7	0.1	0	3.6	0.5	0	5.1	0.4	0	9.8	3.7	0	24.9	2.2	0	19.2	.	.	.	1.1	0	13.2	.	.	.	3
22 - 1193 - CAMBRIDGE ST @ FRANKLIN ST	0	0	5.7	0.1	0	3.8	0.3	0	5.4	0.1	0.3	9.6	0.4	0.3	25	0.6	0.3	19.5	.	.	.	0.5	0.3	13.4	.	.	.	1.1
23 - 1195 - CAMBRIDGE ST @ EMERY RD	1	0.1	6.6	0.4	0	4.1	0.1	0.3	5.3	1.1	0.1	10.6	2.6	0.4	27.2	0.8	0.3	20	.	.	.	0.4	0.5	13.3	.	.	.	2.3
24 - 926 - BRIGHTON AVE @ CAMBRIDGE ST	1.5	0.4	7.6	1.5	0.1	5.4	1.2	0.1	6.3	5.3	0.2	15.7	4.4	0.3	31.3	4.6	0.7	23.9	2	0.3	35.8	4.6	0.9	17	3.7	0.2	10.8	8.1
25 - 927 - BRIGHTON AVE @ ALLSTON ST	0.2	0.4	7.4	0.1	0.2	5.4	0.4	0	6.7	0.6	0.1	16.3	0.7	0	32	0.7	0.2	24.5	1	0.4	36.5	0.9	0.2	17.7	1.8	0.1	12.5	1.2
26 - 10928 - HARVARD AVE @ BRIGHTON AVE	1.4	0.1	8.7	0.9	0	6.2	1.3	0	8	3.5	0.1	19.7	1.6	0.3	33.2	2.4	0.3	26.5	1.6	0.4	37.7	0.9	0.2	18.4	2.2	0.5	14.2	1.9
27 - 1302 - HARVARD AVE @ COMMONWEALTH AV	4.1	1.2	11.6	2.4	0	8.6	5.3	0.4	12.9	4.5	0.5	23.7	6.2	1.6	37.8	4.5	1	30	5.1	0.7	42.1	5.3	0.6	23.1	8	0.6	21.6	3.8
28 - 11302 - HARVARD ST @ VERNDALE ST	0.7	0	12.3	0.2	0	8.8	0.2	0.1	13.1	1	0.1	24.6	1.7	0.7	38.8	1.7	0.3	31.4	1.5	0.1	43.5	1.2	0.2	24.2	1.9	0.1	23.5	1.9
29 - 1304 - HARVARD ST @ COOLIDGE ST	0	0	12.3	0.3	0.2	8.9	0.3	0.4	12.9	0.1	0.3	24.4	0.8	0.1	39.6	1.2	0	32.6	0.4	0.1	43.8	0.2	0.1	24.3	0.6	0.2	23.9	0.6
30 - 1306 - HARVARD ST @ SHAILER ST	0	0	12.4	0	0	8.9	0.1	0.5	12.5	0.4	0.1	24.7	0.1	0.3	39.4	0.3	0.4	32.5	0.3	0.1	44	0.1	0.5	24	0.2	0.3	23.7	0.2
31 - 1308 - HARVARD ST @ BEACON ST	1	0.5	12.8	0.4	0.4	8.8	0.7	0.3	12.9	0.6	0.5	24.8	1.6	1.3	39.6	2.5	1.1	33.9	1.4	0.8	44.6	0.6	0.8	23.7	0.6	0.5	23.8	0.6
32 - 1309 - HARVARD ST @ MARION ST	0.1	0	12.9	0.1	0	8.9	0.1	0	12.9	0.7	0	25.5	0.3	0	39.9	0.1	0.2	33.9	0	0	44.6	0.1	0	23.8	0	0	23.9	0.1
33 - 1310 - HARVARD ST @ HARRIS ST	0	0.2	12.7	0	0	8.9	0	0	12.9	0	0	25.5	0	0	39.9	0.2	0.2	33.9	0.2	0.2	44.7	0.2	0.1	23.9	0.1	0.4	23.6	0.2
34 - 1311 - HARVARD ST @ SCHOOL ST	0	0	12.7	0.1	0.4	8.6	0	0.2	12.7	0	0	25.5	0.6	0.1	40.3	0.2	0.2	33.8	0.3	0.1	45	0.1	0.3	23.6	0.1	0.1	23.6	0.1
35 - 1313 - HARVARD ST @ WASHINGTON ST	0	3.5	9.3	0.4	0.7	8.3	0.3	0.5	12.5	0.1	1.4	24.3	0.9	2	39.2	0.6	0.8	33.7	0.6	0.6	45	0.6	0.8	23.5	0.4	1.3	22.7	0.3
36 - 1555 - WASHINGTON ST @ WALNUT	0.1	0.5	8.9	0	0.2	8.2	0.3	0.3	12.5	0.4	0.2	24.4	0.6	1.3	38.6	0.5	0.5	33.7	0.4	0.2	45.2	0.7	0.2	23.9	0.8	0.1	23.4	0.9
37 - 1314 - HUNTINGTON AVE @ S HUNTINGTON	1.2	2.4	7.6	0.2	0.6	7.8	0.1	3.5	9	0.5	5	19.9	0.8	1.3	38.1	0.3	2.4	31.6	0.3	0.9	44.6	0.3	2	22.3	0.5	1.7	22.2	0.4
38 - 1315 - HUNTINGTON AVE @ PARKER HILL	0.2	0.1	7.7	0.1	0.1	7.8	0.4	0.3	9.1	1.8	0.3	21.5	3.2	1.1	40.2	2.4	0.9	33	2.4	0.2	46.8	4.1	0.3	26.1	4.3	0.4	26.2	3.1
39 - 1317 - HUNTINGTON AVE OPP FENWOOD RD	1	2.6	6.1	0.2	2.2	5.7	0.6	3.6	6.1	1.2	6.2	16.4	1.3	8.1	33.4	1.3	6.8	27.5	1.1	2.4	45.5	1.3	6	21.4	2.4	4.6	24	2.5
40 - 1319 - TREMONT ST OPP WIGGLESWORTH S	1.7	0.2	7.6	1	1	5.7	0.4	1.3	5.3	1	0.8	16.6	1.3	0.4	34.3	0.6	0.8	27.2	0.7	0.5	45.6	1.2	0.3	22.2	1.3	0.7	24.6	1.4
41 - 1320 - TREMONT ST @ SAINT ALPHONSUS	0.1	0	7.6	0.1	0	5.7	0	0.1	5.1	0.7	0.2	17.1	0.2	0.4	34.1	0.1	0.2	27.2	0.3	0.3	45.6	0.2	0.3	22.1	0.6	1	24.1	0.6
42 - 1322 - TREMONT ST @ SEWALL ST	0	0.1	7.5	0	0	5.7	0	0.1	5.1	0	0.4	16.8	0	0.4	33.7	0	0.2	26.9	0	0.2	45.5	0.1	0.6	21.7	0	0.4	23.8	0.1
43 - 1323 - TREMONT ST @ COLUMBUS AVE	0.9	2	6.4	0.1	2.4	3.5	0.6	1.5	4.1	0.4	3.9	13.3	2.4	5.6	30.6	5.9	3.5	29.3	6.1	1.9	49.7	10.4	4.4	27.7	13	3	33.7	10.9
44 - 11257 - MALCOLM X BLVD @ KING ST	0.1	0	6.5	0.1	0	3.5	0.1	0	4.2	0.2	0.2	13.3	1.5	1	31.1	0.8	1.5	28.7	0.6	0.8	49.5	1.6	0.7	28.6	2.3	0.7	35.4	1.6
45 - 1259 - MALCOLM X BLVD OPP MADISON PA	0	0	6.5	0	0	3.5	0	0	4.2	0	0.1	13.2	0	0.6	30.6	0	0.1	28.6	0	0.1	49.5	0.1	0.5	28.2	0.1	0.7	34.7	0.1
46 - 11323 - MALCOLM X BLVD OPP O'BRYANT H	0	0	6.5	0	0	3.5	0	0.8	3.4	0	2.8	10.5	0.1	8.4	22.2	0.2	16.8	12	0.8	20.9	29.4	0.1	20.1	8.3	0.1	26.3	8.5	0.2
47 - 11259 - MALCOLM X BLVD @ SHAWMUT AVE	0	0.2	6.3	0	0	3.5	0	0.1	3.4	0	0.3	10.2	0	0.8	21.5	0	0.4	11.6	0	0.4	29.1	0	0.6	7.7	0	1.2	7.3	0
48 - 64000 - DUDLEY STATION	0	6.3	0	0	3.4	0.1	0	3.4	0	0	10.2	0	0	21.5	0	0	11.6	0	0.3	2.6	26.8	0	7.7	0	0	7	0.2	0
49 - 399 - WARREN ST OPP KEARSARGE AVE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	26.8	.	.	.	.	.	.	.
50 - 40001 - WARREN ST @ DABNEY PL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	26.8	.	.	.	.	.	.	.
51 - 401 - WARREN ST @ WALNUT AVE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.1	0	26.8	.	.	.	.	.	.	.
52 - 404 - WARREN ST OPP WAVERLY ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.2	0	27	.	.	.	.	.	.	.
53 - 405 - WARREN ST OPP WOODBINE ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.2	0	27.2	.	.	.	.	.	.	.
54 - 406 - WARREN ST @ ML KING BLVD	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.2	0	27.3	.	.	.	.	.	.	.
55 - 407 - WARREN ST @ TOWNSEND ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.4	23.5	4.3	.	.	.	.	.	.	.
56 - 410 - WARREN ST @ WAUMBECK ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.1	0	4.3	.	.	.	.	.	.	.
57 - 411 - WARREN ST @ BRUNSWICK ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.1	0	4.4	.	.	.	.	.	.	.
58 - 412 - WARREN ST @ CRAWFORD ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.1	2.1	2.4	.	.	.	.	.	.	.
59 - 413 - BLUE HILL AVE @ WAYNE ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.1	0.6	1.9	.	.	.	.	.	.	.
60 - 414 - BLUE HILL AVE @ SEAVER ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0.1	1.8	.	.	.	.	.	.	.
61 - 1565 - FRANKLIN PARK LOOP @ ZOO ENTR	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1.3	0.5	.	.	.	.	.	.	.
Maximum			12.9			8.9			13.1			25.5			40.3			33.9			49.7			28.6			35.4	
Total	21.4	21.3		13	12.6		19.4	19.2		34.8	35.3		59.1	59.4		52.6	52.6		64.1	64.9		49.4	49.6		53.1	53.2		64.7

6)(B339) [38] {FA19}		06:40 (66.6)(B340) [54] {FA19}			06:48 (66.6)(B341) [34] {FA19}			06:56 (66.6)(B319) [41] {FA19}			07:04 (66.6)(B320) [12] {FA19}			07:13 (66.6)(B328) [61] {FA19}			07:22 (66.6)(B329) [35] {FA19}			07:31 (66.6)(B331) [41] {FA19}			07:40 (66.6)(B333) [33] {FA19}			07:48 (66.6)(B334) [36] {FA19}			07:57 (66.6)(B335) [31] {FA19}			08:07 (66.6)(B337) [46] {FA19}		
Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
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0	2.5	3.4	0	3.5	2.1	0	2.1	1.9	0	2	2.7	0	2.7	2.9	0	3	4.1	0	4.1	4.9	0	4.9	6.6	0	6.9	6	0	6	5.8	0	7.7	4.2	0	4.2
0	5	1.9	0	5.5	2.6	0	4.8	2.9	0	4.9	3.9	0	6.6	4	0	7	3.8	0	7.9	5.3	0	10.1	6.1	0	13	7.4	0	13.4	7.2	0.1	15.4	5.1	0	9.3
0	6	0.9	0	6.5	0.9	0	5.6	0.7	0	5.6	0.6	0	6.7	1	0	8.6	1	0	8.9	0.5	0.1	10.6	0.6	0	13.5	1	0	14.4	1.9	0.3	17.3	1.3	0	10.6
0.3	6.2	0.2	0.1	6.6	0	0.2	5.4	0.2	0.3	5.5	0.2	0.5	7	0.2	0.4	8.5	0.3	0.4	8.7	0.2	0.6	10.2	0.2	0.8	13	0	0.6	13.8	0.1	0.7	14	0.1	0.5	10.3
0.3	7.4	0.8	0.3	7.1	1	0.5	5.9	1	0.5	6	2.6	1.1	8.5	0.7	0.6	8.6	0.7	0.8	8.7	0.9	0.7	10.3	0.9	1.7	12.2	0.9	1.9	12.8	1.9	1.9	14.2	1.1	1.3	10.1
0.1	12.5	4.1	0.2	10.9	7.4	2.9	13.2	4.2	0.3	9.9	4.1	0.1	12.5	4	0.2	12.4	2.5	0.1	11.1	2.3	0.3	12.4	3	0.4	14.8	3.4	0.3	15.9	5.2	0.4	19	3.2	0.5	12.8
0	15.1	0.8	0.1	11.7	1.9	0.1	15	4.3	0	14.1	3.3	0.1	15.7	1.3	0.1	13.6	0.7	0.1	11.7	0.9	0.4	12.9	1.7	0.2	16.3	1.6	0.3	17.2	2.1	0.3	20.8	2.1	0.2	14.7
0.6	16.1	0.9	0.2	12.4	2.2	0.3	16.9	3.9	0.1	17.9	2.3	0	18	2	0.1	15.6	1.5	0.1	13.1	1.8	0.4	14.3	2.6	0.3	18.5	3.6	0.3	20.4	3.3	0.1	24	1.7	0	16.4
0	19	2.2	0.1	14.6	3.3	0	20.2	2.9	0	20.8	3.3	0	19.8	3.2	0	18.8	1.9	0.1	14.9	2.1	0.1	16.4	1.6	0.1	20.1	1.6	0	22	2.2	0.1	26	1	0.1	17.3
0.6	19.6	2.3	0.3	16.6	2.4	0.9	21.7	1.7	0.4	22	1	0.9	19.8	1.9	1.1	19.5	2.1	1.1	15.8	0.8	0.6	16.5	1	0.6	20.5	0.8	0.6	22.2	1.5	1.6	25.9	0.7	1	17
1.5	20.5	1.1	1.6	16.1	3.7	1.9	23.5	1.9	1.2	22.8	1.5	1.3	20	2.2	1.5	20.4	2	1.3	16.5	2.1	1.6	17	1.7	2.1	20.1	1.5	2	21.7	1.3	2	25.1	1.6	1	18
1.8	26.8	5	1.7	19.5	6.3	3.7	26.1	4.2	8.6	18.4	3.3	5.7	17.7	4.6	3.7	21.3	5.5	1.8	20.3	7.8	1.8	22.9	5.1	1.9	23.3	5.5	2.2	25	5.9	1.7	29.3	4	1.7	20.4
0.4	27.6	1.2	0.1	20.6	1.3	0	27.4	1.9	0.4	19.8	1.3	0.1	18.9	2.1	0.3	23.1	1.8	0.1	22	2.6	0.4	25.1	2.7	0.8	25.2	2.6	0.4	27.2	3.2	0.5	32	2.4	0.2	22.6
0.1	29	4	0.1	24.5	4.1	0.2	31.3	4	0.1	23.7	3.2	1	21.1	4.4	0.6	26.9	4.2	0.5	25.7	4.7	0.8	29	6.3	1.4	30.1	5.2	1	31.4	6.5	0.5	38	3.6	0.6	25.1
0.8	32	8.9	1.2	32.1	9.8	1.5	39.8	12	1.1	34.5	11.4	1.8	30.8	10.7	2.2	35.1	7.8	1.6	32	9.5	1.7	36.9	12.1	2.8	39.4	9.8	2.5	38.7	10.2	2.3	45.9	8.4	1.5	31.9
0.2	33.8	3.1	0	35.1	3.4	0	42.8	4	0	38.5	2.3	0.2	32.9	3.7	0.2	38.6	2.5	0.1	34.3	3.8	0.1	40.5	3.1	0.1	42.4	4.9	0.1	43.5	3	0.4	48.5	3.2	0.2	35.3
0.2	34.2	1.1	0.1	36.1	1.1	0.2	43.6	1.4	0.3	39.6	1.8	0.1	34.7	2.2	0.3	40.5	2.7	0.1	36.9	1.7	0.2	42	2.2	0.4	44.2	1.6	0.5	44.7	2.5	0.6	50.3	1.5	0.4	36.4
0.2	34.2	0.6	0.5	36.2	0.6	0.9	43.4	0.7	0.3	40	0.3	0	35	1.1	0.5	41.1	1.1	0.8	37.3	1.3	0.7	42.6	1	0.4	44.8	0.9	0.5	45	0.5	0.4	50.4	0.6	0.3	36.7
1.6	33.2	1.8	1.2	36.8	2.9	2.1	44.1	3	2.1	40.9	1.6	2.3	34.3	3.8	3.1	41.9	2.7	3.4	36.5	3.5	3.7	42.4	3.8	5.1	43.5	3.9	3.4	45.6	3.4	3.2	50.7	3.3	3.5	36.6
0	33.3	0.5	0.1	37.3	0.9	0.4	44.7	0.7	0.3	41.3	0.6	0.2	34.8	1.1	0.3	42.7	0.7	0.2	37.1	1	0.2	43.1	0.9	0.1	44.3	0.8	0.2	46.2	0.9	0.4	51.2	0.8	0.3	37
0.4	33.1	0.5	0.4	37.3	0.3	0.2	44.8	0.3	0.1	41.5	0.3	0.1	34.9	0.4	0.3	42.8	0.3	0.2	37.1	0.3	0.4	43.1	0.5	0.5	44.2	0.5	0.5	46.2	0.8	0.7	51.3	0.7	0.5	37.2
0.1	33.1	0.4	0.2	37.5	0.5	0.6	44.7	0.7	1.2	40.9	1.2	0.9	35.2	2.4	2	43.1	1.2	1.9	36.4	1.9	2.1	42.9	1.7	1.3	44.6	1	0.9	46.3	1.7	1.4	51.7	0.9	1	37.2
2.2	31.2	0.6	3.3	34.8	0.8	2.9	42.6	0.7	3.7	37.9	1.4	4	32.6	1.5	3	41.6	0.9	3.8	33.5	2.2	5.7	39.4	1.8	5	41.5	1.7	4.7	43.3	2	3.7	50	1.4	2.5	36.1
1.6	30.5	0.5	0.5	34.8	0.7	0.4	43	0.8	0.5	38.2	0.5	0.5	32.6	1.2	0.7	42.1	0.6	0.9	33.2	0.7	1	39.1	0.9	0.8	41.6	1.6	0.7	44.1	1.1	1	50	0.8	0.7	36.3
1.4	29.6	1.4	4	32.2	1	6	38	1	4.1	35.1	0.8	3.6	29.8	0.9	3	39.9	1	1.7	32.5	1.1	2	38.2	0.7	2.2	40	0.9	3.5	41.6	1.8	3.3	48.5	1	3.6	33.7
0.2	32.5	4.2	1	35.3	5.2	1.2	41.9	5.1	1.7	38.6	3.8	0.9	32.8	4.3	1.8	42.4	3.4	1.1	34.8	3.3	0.7	40.8	1.8	0.7	41.2	2.6	0.8	43.4	2.8	1.2	50.1	2	1.3	34.4
10	24.9	3.3	12.6	26	2.9	13.5	31.3	3	15.8	25.8	1.4	15.3	18.8	2.1	14.1	30.4	2.4	10.4	26.8	2.7	15	28.4	2.9	14	30.2	2.5	16.8	29	2.8	19.6	33.3	1.6	14	22.1
0.7	25.7	3.4	0.8	28.6	2.1	1.2	32.2	1.9	1.4	26.2	2.1	1.1	19.8	1.4	1.1	30.8	2.6	0.9	28.5	1.4	1.5	28.4	1.6	1.2	30.6	1.8	2.5	28.3	1.6	1.3	33.6	1.2	1.6	21.7
1.3	25.1	0.9	1.4	28.1	0.4	1.4	31.3	0.3	0.9	25.7	0.3	1	19.1	0.5	1.7	29.7	0.5	1.1	28	1.2	1.1	28.5	0.6	1.4	29.8	0.3	1.7	26.9	0.4	2.6	31.4	0.4	1.8	20.3
0.1	25	0.4	0.5	28	0.4	0.7	31	0.3	1.2	24.8	0.2	1.7	17.6	0.2	3	26.9	0.5	3.2	25.2	0.4	3.2	25.6	0.1	2.9	27	0.3	2.8	24.4	0.3	2	29.7	0.2	1.3	19.2
3.5	32.4	8.1	6.1	30	5.2	8.1	28.1	3.6	7	21.4	2	6	13.6	1.5	10.1	18.3	2.3	8.4	19.1	2	8.2	19.4	1.9	10.3	18.6	1.8	9.6	16.6	1.8	10.5	21	1.7	7.6	13.3
0.6	33.3	2	1.6	30.4	1.2	1.9	27.4	0.9	1.5	20.8	1	2.5	12.1	0.3	2.1	16.5	0.6	1.7	18	0.5	1	18.9	0.2	1	17.8	0.6	1	16.3	1.1	1	21.1	0.3	0.8	12.9
1.3	32.1	0.2	3.5	27	0.1	5.1	22.3	0	3.8	17.1	0	1.8	10.3	0	1.3	15.2	0.1	0.5	17.5	0	0.8	18	0	0.5	17.3	0	0.5	15.8	0	0.7	21.6	0	0.8	12.1
24.9	7.4	0	12.9	14.1	0	5.4	16.9	0	3.7	13.4	0	1.3	9	0	2	13.2	0	1.2	16.4	0	0.7	17.4	0.1	1.2	16.2	0	1.1	14.6	0.1	0.7	19.7	0	0.5	11.6
0.8	6.6	0	1.4	12.8	0.1	1.1	15.9	0	1.7	11.7	0	1.5	7.5	0.1	1.6	11.6	0.1	1.3	15.1	0	1.8	15.6	0	1.5	14.7	0.1	2.1	12.6	0	3.4	16.4	0	1.8	9.8
6.6	0	0	12.7	0.1	0	13.1	2.8	0	11.7	0	0	7.5	0	0	11.5	0.1	0	15	0.1	0	15.6	0	0	14.7	0	0	12.6	0	0	15.8	2	0	9.7	0.1
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	34.2			37.5			44.8			41.5			35.2			43.1			37.3			43.1			44.8			46.3			51.7			37.2
64.4		70.7	70.8		78.8	78.6		76.1	76		66.3	65.1		73.9	74.5		66.1	65.9		75.4	75.2		78	78.4		78.7	78.6		86.9	86.4		62.1	62.8	

08:16 (66.6)(B338) [29] {FA19}			08:25 (66.6)(B339) [44] {FA19}			08:34 (66.6)(B340) [34] {FA19}			08:43 (66.6)(B326) [33] {FA19}			08:52 (66.6)(B341) [32] {FA19}			09:00 (66.6)(B319) [40] {FA19}			09:08 (66.6)(B320) [24] {FA19}			09:17 (66.6)(B321) [40] {FA19}			09:25 (66.6)(B328) [43] {FA19}			09:33 (66.6)(B329) [39] {FA19}			09:43 (66.6)(B333) [35] {FA19}			09:55 (66.6)(B334) [2	
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off
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4.8	0	4.8	4.6	0	4.6	4.4	0	4.4	2.8	0	2.9	3.2	0	3.2	4	0	4	4.3	0	4.3	4.3	0	4.3	3.7	0	3.8	4.9	0	5	4.3	0	4.3	4.1	0
5.9	0.1	10.6	5.3	0	9.9	4.8	0.5	9.2	4.5	0	7.4	2.8	0.1	5.9	3.9	0	7.7	4.9	0	9.2	5.6	0	9.9	5.2	0	8.9	4.6	0	9.5	3.4	0	7.7	5.2	0
1.6	0	12.1	1.6	0	11.5	1.9	0.1	11.2	1.1	0	8.5	1.5	0.1	7.3	1.3	0	9.2	1	0	10.2	1.3	0	11.1	1.5	0	10.3	1	0	10.5	0.8	0	8.5	0.9	0
0.2	0.4	12	0.2	0.5	11.1	0.1	0.9	10.4	0.1	0.8	7.8	0	1	6.4	0.1	0.7	8.5	0.2	0.6	9.8	0.2	0.8	10.5	0.1	0.3	10.2	0.3	0.7	10.2	0.1	0.6	8	0.2	0.4
1	1.7	11.6	1.4	1.6	11	2.2	1.3	11.3	1	1.3	7.5	0.8	1	6.2	1	1.3	8.2	1.1	2	8.9	1.6	1.5	10.6	0.5	1.5	9.2	1.2	1.5	9.8	1.5	1.4	8.1	1.6	1
3	0.4	14.1	2.9	0.5	13.4	2.8	0.5	13.6	1.7	0.2	9	1.5	0.3	7.3	1.4	0.3	9.4	2.3	0.2	11	2	0.3	12.3	2.1	0.3	11	1.9	0.3	11.4	2.2	0.1	10.1	1.9	0.2
2.1	0.2	16	1.4	0.2	14.6	1.6	0.1	15.1	1.2	0	10.2	0.9	0	8.3	1.3	0.1	10.6	1.9	0.1	12.8	1.5	0	13.8	1.4	0.2	12.2	0.6	0.1	11.9	0.7	0.1	10.7	0.9	0.1
1.2	0	17.3	0.9	0.2	15.3	1.2	0	16.3	0.6	0.1	10.6	1	0.2	9	0.7	0.2	11.1	0.9	0.6	13.1	1	0.3	14.3	0.5	0.3	12.4	0.9	0.4	12.4	0.7	0.2	11.2	0.8	0.4
1.6	0.1	18.8	1.3	0	16.6	1.2	0.1	17.3	0.7	0	11.3	0.7	0.2	9.5	0.8	0.1	11.7	1.3	0	14.3	1.9	0	16.2	1.1	0	13.5	1.2	0.1	13.5	1.1	0.1	12.2	1.2	0
0.9	1.2	18.5	0.6	1.5	15.7	0.4	1.4	16.4	0.2	0.8	10.7	0.9	0.5	9.9	0.5	1	11.2	0.3	1.3	13.3	0.8	1.2	15.9	0.7	1.1	13.1	0.5	1.2	12.8	0.4	1.1	11.5	0.3	1.8
1.5	1.8	18.2	1.2	1.5	15.4	1.6	1.4	16.6	1	1.2	10.9	0.4	1.1	9.3	0.7	1.9	10.1	1.5	1.1	13.7	1.5	0.9	16.5	1.2	1.2	13.2	0.8	0.8	12.8	0.9	0.9	11.5	0.9	1.2
5.8	1.9	22.1	3	1.3	17	4.5	0.8	20.3	2.9	0.5	13.3	2.9	1	11.2	3.3	0.9	12.5	4.6	1.1	17.2	3.9	1	19.4	3.7	0.9	15.9	2.1	1	13.9	3.5	0.9	14	5.1	1.3
3.8	0.6	25.3	3	0.6	19.3	2	0.9	21.5	1.9	0.7	14.6	2.2	0.3	13	1.6	0.6	13.5	1.5	0.4	18.4	1.5	0.6	20.3	1.1	0.7	16.4	1.1	0.6	14.4	1.2	0.7	14.6	1.9	0.7
5.4	0.9	29.9	3.8	0.9	22.3	2.3	0.8	23	2.5	0.2	16.5	3.3	0.2	16.1	3.5	0.5	16.5	2.2	0.6	19.9	3.3	0.7	22.9	2.9	0.7	18.7	2.4	0.4	16.4	2.1	0.8	15.9	3.4	0.9
9.3	2.5	36.7	8.5	2	28.7	6.8	2.1	27.7	5.8	1.5	20.8	6.8	1.3	21.6	7.2	1.4	22.3	7.8	1.8	25.8	7.7	2	28.6	5.8	1.7	22.8	6.5	1.3	21.6	5.5	1.2	20.2	7.5	1.3
3	0.1	39.6	4	0.1	32.6	2.8	0.2	30.3	1.8	0.2	22.3	2.9	0.1	24.3	2.1	0.2	24.2	1.9	0.3	27.4	2.4	0.3	30.7	1.7	0.3	24.1	1.8	0.2	23.2	1.3	0.3	21.2	2	0.5
1.9	0.9	40.5	1	0.5	33.2	0.7	0.4	30.6	1.3	0.3	23.4	1.3	0.3	25.4	1.2	0.2	25.2	1.4	0.2	28.5	1.1	0.7	31.1	0.9	0.7	24.3	0.7	0.6	23.4	0.6	0.6	21.1	0.7	1.1
0.5	0.3	40.7	0.8	0.3	33.6	0.6	0.2	31.1	0.4	0.2	23.6	0.7	0.1	26	0.8	0.4	25.6	0.4	0.3	28.6	0.5	0.5	31	0.5	0.6	24.2	0.5	0.5	23.4	0.3	0.3	21.1	1.2	0.7
2.5	3.1	40	3.7	2.8	34.4	3	3.6	30.4	2.7	2.4	23.9	2.6	3.1	25.4	3.4	3.5	25.5	3.2	4.5	27.3	2.3	4.5	28.8	2	3.2	23	2.5	2.8	23.1	2.3	2.9	20.5	2.6	3.8
1.1	0.1	41.1	0.9	0.3	35	0.8	0.6	30.6	0.9	0.3	24.6	0.9	0.3	26.1	0.8	0.2	26.1	0.3	0.5	27	1	0.4	29.5	0.6	0.4	23.2	0.4	0.4	23.1	0.3	0.2	20.6	1	0.4
0.7	0.5	41.3	0.9	0.4	35.4	0.4	0.4	30.7	0.5	0.6	24.5	0.4	0.2	26.3	0.8	0.3	26.6	0.5	0.3	27.3	0.6	0.3	29.8	0.5	0.3	23.3	0.7	0.3	23.5	0.2	0.3	20.5	0.5	0.4
1.2	1.7	40.9	1.1	1.5	34.9	0.6	0.9	30.5	0.8	0.8	24.4	0.6	1.1	25.8	1	0.8	26.7	0.5	0.9	26.9	0.9	0.7	30	0.5	0.7	23.1	0.8	1.3	23	0.5	0.6	20.4	1	0.4
1.3	2.5	39.7	1.2	2.8	33.3	0.6	2.3	28.9	0.8	1.9	23.3	1.3	2.4	24.8	0.8	2.2	25.3	0.9	2.1	25.7	1.7	2.8	28.9	1	2.3	21.8	0.8	2.2	21.7	0.5	2.5	18.4	1.7	3.7
0.4	0.9	39.2	0.5	0.5	33.3	0.4	0.6	28.7	0.8	0.4	23.8	1	0.4	25.3	0.5	0.5	25.3	0.3	0.5	25.5	0.9	0.8	29	0.7	0.6	21.9	0.8	0.7	21.7	0.5	0.5	18.4	1.7	1.1
1.1	3.4	36.9	0.4	2.9	30.8	0.6	2.5	26.8	0.3	1.4	22.8	0.9	1.9	24.4	0.9	2.3	23.8	1	2.1	24.4	0.7	2.1	27.6	0.6	1.9	20.6	0.6	1.6	20.7	0.7	1.6	17.5	1.2	1.9
1.5	1.2	37.2	1.8	1	31.6	1.7	0.7	27.8	1.6	0.7	23.6	2.3	0.8	25.9	1.8	0.6	25	1.9	1.2	25.2	3.5	1.6	29.5	1.8	1.3	21.1	1.9	0.8	21.8	1.4	0.7	18.1	1.9	1.6
1.5	16.3	22.4	1.2	14.8	18.1	1.7	12.9	16.6	0.8	11.2	13.3	1.1	12	15	0.8	12.4	13.4	0.9	12.2	13.9	1	10.7	19.8	1	8.9	13.2	1.3	8	15.2	0.8	6.7	12.2	1.2	6.8
1.3	1.4	22.3	1.8	1.3	18.5	1.4	1.5	16.5	1.2	1	13.4	1.7	1.6	15.1	2.1	1.7	13.7	1.7	1	14.6	2.4	0.9	21.3	2.2	0.9	14.5	2.4	0.7	16.9	2.8	1.1	13.9	4.1	1
0.5	1.3	21.4	0.4	1.5	17.4	0.3	1	15.9	0.3	1.1	12.6	0.4	0.6	15	0.4	0.9	13.2	0.5	1.5	13.6	0.4	1.6	20.2	0.4	0.8	14.1	0.3	0.7	16.5	0.6	0.5	13.9	0.5	0.6
0.2	0.6	21	0.3	0.5	17.2	0.2	0.6	15.5	0.1	0.4	12.3	0	1	14	0.1	1	12.3	0	0.4	13.3	0.1	0.7	19.6	0.1	0.8	13.4	0.2	0.6	16.1	0.1	0.6	13.3	0.4	0.8
1.8	8.1	14.7	1.3	6	12.5	1.5	6.7	10.4	1.6	4.8	9.1	1.7	5.2	10.5	1.2	4.5	9	1.4	5.4	9.3	1.2	6.8	13.9	0.9	4.7	9.6	0.9	5.6	11.4	1.3	4.5	10.1	1.2	7.6
0.6	1.5	13.8	0.8	0.9	12.3	0.3	1	9.7	0.7	0.8	8.9	0.5	1.2	9.8	0.3	0.9	8.5	0.6	1	8.8	0.7	1.4	13.1	0.4	0.7	9.3	0.7	0.8	11.2	0.5	0.7	9.9	0.8	1
0	0.3	13.5	0	0.2	12.2	0	0.5	9.2	0	0.2	8.7	0	0.1	9.8	0	0.2	8.3	0	0.1	8.7	0	0.4	12.7	0	0.4	9	0.1	0.3	11	0.1	0.2	9.8	0	0.1
0	0.6	12.9	0	0.5	11.7	0	0.3	8.9	0	0.4	8.4	0	0.2	9.6	0.1	0.1	8.2	0	0.2	8.5	0	0.4	12.4	0	0.5	8.5	0.1	0.6	10.5	0.1	0.3	9.7	0	0.3
0	2.2	10.7	0	2	9.8	0.1	2.1	6.9	0	1.4	7	0	1.7	8	0	1.2	7	0	1	7.5	0	1.7	10.7	0.1	1.4	7.2	0.1	1.4	9.2	0	1.2	8.5	0	2.6
0	10.4	0.2	0	9.6	0.1	0	5.9	1	0	7	0	0	7.9	0	0	7	0	0	7.5	0	0	10.7	0	0	7.1	0.1	0	9.1	0.1	0	8.5	0	0	14
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		41.3			35.4			31.1			24.6			26.3			26.7			28.6			31.1			24.3			23.5			21.2		
69.2	69.2		61.8	61.2		55.5	55.8		44.6	44.8		49.2	49.5		50.4	50.1		53.2	53		59.5	59.3		47.4	47.4		47.6	47.6		43.3	42.9		59.6	59.7

29] {FA19}	10:08 (66.6)(B335) [31] {FA19}			10:21 (66.6)(B337) [39] {FA19}			10:34 (66.6)(B339) [38] {FA19}			10:47 (66.6)(B326) [38] {FA19}			11:00 (66.6)(B319) [34] {FA19}			11:13 (66.6)(B321) [42] {FA19}			11:26 (66.6)(B328) [34] {FA19}			11:39 (66.6)(B333) [32] {FA19}			11:52 (66.6)(B334) [37] {FA19}			12:05 (66.6)(B335) [34] {FA19}			12:18 (66.6)(B337) [32] {FA19}			12:31 (66.
Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On
4.1	4.9	0	5	3.6	0	3.8	4.7	0	4.7	3.6	0	3.6	4.3	0	4.4	4.9	0	4.9	5	0	5	5	0	5	4.6	0	4.6	6.1	0	6.1	8.5	0	8.6	6.3
9.2	6.1	0	11.1	3.7	0	7.3	3.5	0.1	8.2	3.9	0	7.5	4.2	0	8.6	4	0	8.8	4.4	0	9.4	4.7	0.1	9.7	4.3	0.1	8.7	4.3	0	10.2	5.9	0.1	14.5	5.2
10.1	2.1	0.1	13.1	1.3	0.1	8.6	1.2	0	9.4	1.1	0.1	8.3	1.2	0.1	9.8	1.9	0	10.6	1.8	0	11.2	2.1	0	11.8	2.2	0	11.3	2	0	12.2	1.5	0.1	15.7	2.7
9.9	0.4	0.9	12.5	0.4	0.5	8.5	0.4	0.6	9.2	0.7	0.2	8.8	0.6	0.2	10.2	0.7	0.3	11	0.3	0.2	11.3	0.6	0.6	11.8	0.7	0.4	11.6	0.5	0.3	12.4	1.1	0.3	16.5	0.5
10.5	1	1.6	12	1.4	0.7	9.2	1.5	0.7	10	1.2	0.8	9.2	1.4	0.9	10.7	1.3	1.1	11.2	1.5	0.8	12	1.4	1.3	12	1.4	1.8	11.2	1.3	0.9	12.8	1.5	1.4	16.5	1.2
12.2	2.1	0.3	13.8	1.3	0.2	10.3	1.3	0.4	10.8	1.6	0.3	10.6	1	0.4	11.4	1.7	0.2	12.7	2	0.5	13.5	1.8	0.6	13.2	1.2	0.4	12	1.4	0.3	13.9	2	0.3	18.2	1.1
12.9	0.9	0.5	14.2	0.9	0.3	10.9	0.5	0.2	11.1	0.5	0.3	10.8	0.7	0.2	11.9	0.8	0.2	13.3	0.6	0	14.1	0.6	0.5	13.3	0.5	0.4	12.1	0.8	0.3	14.4	0.6	0.2	18.5	0.5
13.3	0.6	0.5	14.3	0.6	0.3	11.3	0.6	0.2	11.5	0.6	0.2	11.2	0.7	0.3	12.3	0.8	0.4	13.7	0.7	0.5	14.2	0.4	0.7	13.1	0.5	0.6	12	0.7	0.5	14.6	0.8	0.8	18.6	0.4
14.5	1.4	0.1	15.5	1	0	12.3	0.5	0.1	12	0.3	0	11.4	0.4	0.1	12.5	0.5	0.1	14.1	0.6	0.2	14.6	0.6	0.1	13.6	0.4	0.1	12.2	0.4	0.1	14.9	0.5	0.1	19.1	0.5
13	0.5	1.4	14.6	0.8	0.9	12.2	0.7	1	11.7	0.4	1.5	10.3	0.1	1.7	10.9	0.7	1.2	13.6	0.4	1.1	13.9	0.6	1	13.2	0.1	0.8	11.6	0.4	1.4	13.9	0.3	0.8	18.5	0.5
12.8	1.2	1	14.8	0.9	1	12.1	0.6	0.6	11.7	0.3	0.5	10.1	0.6	0.7	10.9	0.8	0.9	13.5	1.2	1	14.1	0.4	1.3	12.4	0.6	0.5	11.7	0.6	1	13.5	0.6	1	18.1	0.9
16.5	4	1.3	17.5	3.4	1.2	14.4	2.8	1.2	13.4	2.7	1	11.8	2.9	1.2	12.6	2.4	1.5	14.4	2.9	1.3	15.7	2.8	1.4	13.8	3.4	1.1	14.1	4.6	1.1	17.1	3.8	2.4	19.5	3.4
17.7	2.3	0.6	19.2	2.1	0.6	15.9	1.9	0.8	14.6	2	0.5	13.3	1.9	0.6	13.8	2	0.6	15.8	1.6	0.9	16.3	1.5	0.7	14.7	1.1	0.5	14.6	3	0.8	19.3	2.9	0.9	21.5	2.1
20.1	3.6	1	21.9	3.9	0.7	19.2	3.1	0.8	16.8	1.8	0.7	14.3	3.1	0.6	16.3	2.5	0.8	17.4	2.9	1.1	18.1	2.9	1.3	16.3	2.4	1.2	15.7	3.6	1.1	21.8	2.5	1.1	22.9	2.9
26.3	7.8	2.1	27.5	6.3	2.2	23.3	5.5	2.1	19.9	6	1.3	19.1	5.1	2.1	19.2	6.6	2.5	21.5	6.5	2.2	22.4	5.3	1.8	19.8	4.4	2.4	17.7	6.2	2	26	6.1	2.8	26.2	6.1
27.8	1.9	0.6	28.8	1.9	0.5	24.7	2.3	0.6	21.6	1.7	0.4	20.3	1.9	0.5	20.6	2.1	0.3	23.4	2.5	0.6	24.4	2.1	0.5	21.4	1.5	0.5	18.7	2.7	0.5	28.2	2.3	0.5	27.9	2.3
27.4	0.8	0.8	28.8	0.6	0.5	24.8	1.1	0.6	22.1	0.7	0.3	20.7	0.6	0.4	20.9	0.4	0.5	23.3	0.6	0.6	24.4	1.2	0.6	22	0.6	0.4	18.9	0.4	0.4	28.3	0.6	0.8	27.7	0.6
27.9	1.1	0.9	29	0.6	0.5	24.8	1	0.4	22.7	0.8	0.4	21.2	0.9	0.5	21.3	0.9	0.6	23.5	0.6	0.4	24.5	0.7	0.6	22.1	0.7	0.4	19.3	0.5	0.7	28.1	0.6	0.8	27.5	0.7
26.7	2.1	3.5	27.6	2.9	4.4	23.4	3.1	4	21.8	2.9	3.5	20.6	2.7	3.9	20.1	3.6	4	23.1	2.9	3.8	23.7	3.5	3.8	21.8	3.4	3.2	19.5	3.6	3.7	28.1	4.7	3.9	28.2	3.3
27.4	0.7	0.2	28.2	0.8	0.4	23.8	0.4	0.4	21.8	0.4	0.3	20.6	1.1	0.4	20.8	0.9	0.3	23.7	0.6	0.4	23.9	0.8	0.4	22.3	0.7	0.5	19.7	1.3	0.5	28.9	0.9	0.4	28.7	1.1
27.5	0.5	0.5	28.1	0.3	0.5	23.5	0.4	0.6	21.7	0.4	0.5	20.5	0.5	0.5	20.9	0.6	0.5	23.9	0.7	0.6	24	0.9	0.6	22.6	0.8	0.4	20.1	0.8	0.5	29.1	1.1	0.8	29	0.9
28.1	0.6	0.7	28.1	0.7	0.8	23.5	0.8	0.9	21.6	0.8	0.7	20.6	0.7	0.6	20.9	0.6	0.9	23.6	0.5	0.8	23.7	0.6	0.8	22.4	0.9	0.6	20.4	0.4	0.5	29.1	0.8	0.8	29	0.5
26.1	1.2	3.2	26.1	1.4	2.8	22.1	1.5	2.3	20.8	1.5	2.1	19.9	1.4	2	20.3	1.3	2.8	22.1	1.1	2.3	22.5	1.3	1.8	21.9	0.9	1.5	19.9	1.1	2.4	27.9	1.4	2.3	28	1
26.7	0.8	0.9	25.9	1.1	1.7	21.4	1	0.8	20.9	0.8	0.7	20	0.9	0.9	20.4	1	1	22.1	0.7	1.4	21.8	1.3	0.9	22.4	1.2	1	20.1	0.9	1.4	27.3	1.1	1.1	28	1.1
26	0.4	2.1	24.2	0.6	1.9	20.2	0.8	1.2	20.5	0.7	0.8	19.9	0.8	1.6	19.6	0.9	1.9	21.1	0.8	1.7	20.9	0.7	2	21	0.9	1.6	19.3	0.4	2	25.7	0.8	3	25.8	0.9
26.4	2	1.3	25	2	1.1	21.1	2	1.5	21	1.4	1.9	19.5	2	1.1	20.5	2.2	0.9	22.4	1.6	1	21.5	2	1.3	21.8	1.1	1.1	19.4	1.6	1.6	25.7	1.6	1.4	26	1.6
20.8	0.6	6.9	18.7	1.3	5.9	16.5	1	5.4	16.6	1.2	5.9	14.8	1.6	4.5	17.6	1.9	4.9	19.5	1.2	4.4	18.3	1.7	5.3	18.2	1.5	4.6	16.3	1.4	5.6	21.6	1.3	5.4	22	1
24	3.7	1.6	20.8	3.6	0.9	19.1	4.3	1.3	19.6	3.6	1	17.4	4.6	1.4	20.7	4.4	1.1	22.8	4	1.1	21.1	6.2	0.9	23.5	3.8	1.1	19	4.2	1.5	24.3	4	1.3	24.7	5
23.9	0.5	1.1	20.2	0.6	1	18.8	0.7	0.6	19.8	0.3	0.7	17	1	0.9	20.9	0.7	0.7	22.8	0.9	0.8	21.2	0.9	0.7	23.7	0.5	0.5	18.9	0.7	1.1	23.9	0.8	0.4	25.1	0.8
23.4	0	0.7	19.5	0.2	1	18	0.1	0.5	19.4	0.1	0.6	16.6	0.3	0.7	20.5	0.3	0.7	22.4	0.3	0.5	21	0.2	0.8	23.2	0.2	0.6	18.5	0.3	0.7	23.4	0.3	0.5	24.9	0.2
17.1	1.4	5.1	15.8	1.2	5.9	13.3	0.8	5.6	14.6	0.9	5.9	11.6	1.9	6.4	16.1	1.5	7.6	16.3	1.3	6	16.4	1.3	7.7	16.8	0.9	6.5	12.9	1.4	6.9	17.9	1.1	7.4	18.5	1.1
16.9	0.5	1.1	15.3	0.6	1.3	12.7	0.7	1.4	13.9	0.9	1.4	11.1	0.6	1.3	15.4	1.2	1.7	15.8	0.8	1.6	15.6	1.3	1.8	16.3	1	2	11.9	1	2.7	16.1	0.8	2.1	17.3	1.1
16.8	0	0.3	15.1	0.1	0.2	12.6	0.1	0.1	13.9	0	0.3	10.8	0	0.3	15.2	0	0.3	15.6	0	0.2	15.4	0	0.1	16.1	0.1	0.1	11.9	0	0.4	15.8	0.1	0.2	17.2	0
16.5	0	0	15.1	0	0.3	12.3	0	0.1	13.8	0	0	10.7	0.1	0.4	14.8	0.2	0.4	15.3	0.1	0.2	15.3	0.1	0.1	16.1	0.1	0.1	11.9	0.1	0.4	15.5	0.3	0.2	17.3	0.2
14	0	2	13.1	0	1.5	10.7	0.1	1.8	12.1	0	1.6	9.1	0	2.4	12.5	0	2.9	12.5	0.1	2.5	12.9	0.1	2.5	13.7	0	2	9.9	0.1	2.2	13.4	0	2.2	15.2	0.2
0	0	13.1	0	0	10.6	0.2	0	12	0.1	0	9	0.1	0	12.4	0	0	12.5	0	0	12.9	0	0	13.7	0	0	9.9	0	0	13.4	0.1	0	15.2	0	0
28.1			29			24.8			22.7			21.2			21.3			23.9			24.5			23.7			20.4			29.1			29	
	57.7	58		52.1	52.4		51	50.9		45.8	45.4		51.8	52.2		56.3	56.3		53.7	53.6		57.6	58.3		48.6	48.9		58.8	58.9		63.2	63		57.9

																																	Trip (RouteVar)(Blo	
6)(B339) [33] {FA19}		12:44 (66.6)(B326) [38] {FA19}			12:57 (66.6)(B319) [26] {FA19}			13:09 (66.6)(B321) [32] {FA19}			13:21 (66.6)(B327) [58] {FA19}			13:33 (66.6)(B328) [36] {FA19}			13:45 (66.6)(B333) [29] {FA19}			13:57 (66.6)(B332) [37] {FA19}			14:08 (66.6)(B334) [43] {FA19}			14:18 (66.6)(B335) [41] {FA19}			14:28 (66.6)(B337) [38] {FA19}			14:32 (66.7)(B306) [62] {FA19}		
Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
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0	6.4	5.8	0	5.8	5.5	0	5.5	5.3	0	5.4	6.3	0	6.5	6.5	0	6.5	7.6	0	7.6	7.1	0	7.1	6.5	0	6.6	8.8	0	8.8	6.9	0	6.9	.	.	.
0.1	11.5	6	0.1	11.8	3.6	0	9.1	6.8	0	12	5.8	0.1	12.2	4.3	0.1	10.7	5.4	0.1	13.3	6.4	0.2	13.3	6.2	0	12.6	6.7	0	15.5	5.5	0	12.4	.	.	.
0.1	14.1	2.8	0	14.6	1.7	0	10.8	2.7	0.1	15	2.9	0.1	15.7	2.2	0.2	12.6	2	0	15.2	2.6	0	15.9	3.4	0.1	16.1	3.1	0	18.6	2.6	0.1	14.9	.	.	.
0.1	14.4	0.5	0.4	14.6	0.3	0.2	10.9	0.9	0.2	15.8	0.6	0.2	16.1	0.5	0.3	12.9	0.8	0.2	15.4	0.7	0.2	16.4	0.6	0.2	16.5	1.5	0.4	19.7	0.8	0.2	15.6	.	.	.
1.6	14	1.7	1.4	14.9	1.4	0.5	11.8	1.6	1.7	15.5	1.8	1	16.9	1.1	1.1	12.9	2.6	1.5	16.6	1.8	1.7	16.5	2	1.6	16.9	2	1.7	20	1.4	1.3	15.8	.	.	.
0.6	14.5	1.5	0.5	15.9	1.2	0.2	12.9	1.5	0.6	16.5	1.8	0.6	18.1	1.1	0.4	13.5	1.9	0.7	17.8	1.4	0.8	17.1	1	0.8	17.2	1.7	0.7	21	2	0.7	17.1	.	.	.
0.5	14.5	0.8	0.4	16.3	1.3	0.2	14	1.6	0.3	17.9	1	0.4	18.7	0.5	0.4	13.5	0.4	0.7	17.4	0.2	0.6	16.6	0.3	0.5	16.9	0.4	0.4	21	0.7	0.5	17.3	.	.	.
0.4	14.5	0.8	0.6	16.5	0.9	0.5	14.4	0.4	0.7	17.7	0.8	0.8	18.8	0.7	0.4	13.8	0.6	0.9	17.1	0.7	0.7	16.6	0.6	0.9	16.6	0.7	0.6	21.1	1	0.9	17.3	.	.	.
0.1	14.8	0.3	0.2	16.6	0.6	0	15	0.4	0.1	18	1	0.1	19.7	0.9	0.2	14.6	0.8	0.2	17.7	0.7	0.2	17.1	1	0.3	17.3	0.6	0.2	21.5	0.6	0.1	17.9	.	.	.
0.8	14.5	0.5	1.8	15.3	0.8	1.3	14.5	0.6	1.6	17.1	0.6	1.6	18.7	0.4	1	13.9	0.8	1.5	17	1.1	1.4	16.8	0.6	1.6	16.2	0.8	1.5	20.8	0.5	1.2	17.2	.	.	.
0.9	14.5	0.7	0.9	15.1	0.8	0.9	14.3	1.1	1.5	16.8	0.9	1.6	18	0.3	1.3	12.9	1.1	1.4	16.6	1.3	1.1	17	1.3	1	16.5	1.6	2	20.3	1.2	1.7	16.7	.	.	.
1.2	16.6	3.4	1.4	17	3.1	1.4	16	2.8	1.8	17.7	4.2	2.8	19.4	4.8	1.8	15.9	12	2.2	26.4	9.5	1.7	24.8	6.3	1.4	21.3	3.1	1.3	22.1	2.7	1.4	18	2.1	1.8	23.5
1.2	17.5	2	0.9	18.1	1.6	1.2	16.4	1.2	1.3	17.8	1.7	1.7	19.5	0.9	0.9	16	2.8	1.3	27.9	2.9	1.2	26.5	2.8	1.3	22.9	1.1	1.1	22.1	1.7	1.3	18.4	1.4	2.3	22.6
0.6	19.9	2.7	1.6	19.3	2.3	0.9	17.8	2.1	0.9	19	3.2	0.9	21.8	2.2	0.5	17.6	3.3	1.2	30	3.4	1.3	28.7	3.8	1.5	25.2	1.5	1.2	22.4	1.2	1.3	18.3	1.5	0.5	23.6
3	23	4.7	2.5	21.5	5.1	1.9	21	5.2	2.7	21.5	6.6	2.2	26.2	4	1.7	19.9	4.9	4.1	30.7	6.2	3.6	31.3	5.3	2.7	27.9	2.7	4	21.1	1.8	2.8	17.2	2.7	0.8	25.5
0.5	24.8	2.9	0.8	23.6	2.2	0.5	22.7	1.4	0.8	22.1	2.6	0.8	28	1.6	0.5	21.1	2.6	1	32.3	1.9	0.6	32.6	1.8	0.7	29	0.7	0.7	21.1	0.8	0.6	17.4	1	0.3	26.2
0.5	24.9	1	0.7	23.9	0.4	0.5	22.6	0.6	0.6	22.2	0.6	0.5	28.1	0.6	0.8	20.9	1.4	0.8	32.9	0.9	0.5	33	0.8	0.5	29.4	0.1	0.4	20.8	0.8	0.3	17.9	0.5	0.2	26.5
0.5	25.1	0.5	0.6	23.8	0.3	0.8	22.1	0.6	0.8	21.9	0.8	1.1	27.7	0.5	0.6	20.8	0.9	0.7	33.1	0.9	1.1	32.8	1.2	0.8	29.8	1.3	0.7	21.4	0.8	0.8	17.9	1.3	0.2	27.6
3.3	25.2	4.2	4.9	23.1	3.2	3.7	21.5	4.2	4.3	21.8	4	4.5	27.2	2.9	3.9	19.7	4.7	3.4	34.4	3.8	4.7	31.9	3.6	4.7	28.7	1.6	3.2	19.8	1.7	3.6	16	1.8	1.7	27.7
0.5	25.8	1	0.5	23.6	0.3	0.2	21.7	1.1	0.8	22.1	0.9	0.6	27.6	1.1	0.3	20.5	1.9	0.6	35.7	1.2	0.5	32.6	0.7	0.6	28.7	0.5	0.5	19.7	0.3	0.4	15.9	0.4	0.1	28
0.5	26.2	1.2	0.4	24.3	1.6	0.3	22.9	0.9	0.6	22.4	1.1	0.8	27.8	1	0.5	20.9	1.3	0.3	36.7	0.8	0.5	33	0.6	0.4	29	0.3	0.3	19.7	0.4	0.5	15.8	0.5	0.5	28
0.7	26	0.8	0.8	24.3	0.6	0.5	23	0.3	1.1	21.6	0.5	1.2	27.2	0.8	1	20.7	1.4	1.2	36.8	1.1	1.4	32.8	1.7	0.9	29.7	0.5	0.8	19.4	0.8	0.6	16	0.5	0.6	27.9
2.4	24.6	1.5	2.8	23	1.4	2.7	21.8	1.6	1.8	21.4	1.7	2.6	26.3	2.1	1.8	21.1	2.4	3.3	35.9	2.1	2	32.8	2.1	1.9	29.8	1.1	2.6	17.9	1	1.9	15.1	1	0.8	28.2
1.3	24.4	1.3	1.5	22.8	1	1.2	21.6	1.4	1	21.8	1.3	1.2	26.4	1.8	1.4	21.4	1.4	1.7	35.6	2.2	1.1	34	1.9	1.2	30.6	0.7	0.9	17.7	1	0.8	15.3	0.5	0.5	28.1
1.8	23.5	0.5	1.4	21.9	1	3.3	19.3	0.6	2	20.4	0.8	2.2	25	0.8	2.1	20.1	1	2.3	34.3	0.8	2	32.8	1	2.7	28.9	0.5	2.2	16	0.5	1.5	14.3	0.4	1.8	26.7
1.7	23.4	1.6	1.1	22.4	1.4	0.8	19.9	1.3	1.1	20.6	1.7	1.7	24.9	1.1	1.1	20.1	1.7	2	34	0.8	3.5	30.1	1.1	2.5	27.5	0.6	1.1	15.5	0.3	0.8	13.8	1	1.3	26.4
5.3	19.1	1.3	4.3	19.5	2.2	3.9	18.2	2.8	4.2	19.3	1.9	4.1	22.8	1.6	2.8	18.9	2.4	3.4	33	2.2	3.5	28.8	1.8	2.7	26.6	3.1	1.3	17.3	3.1	1.4	15.5	4.8	0.9	30.3
1.7	22.5	5.1	1.1	23.4	5.7	0.7	23.2	7.4	0.7	26	7.3	1.3	28.8	5.4	1.2	23.1	5.1	1.4	36.6	6	1.1	33.7	6.4	1.1	31.9	3.9	0.7	20.5	5.5	0.7	20.3	3.5	0.8	32.9
0.6	22.7	0.6	0.8	23.2	0.3	0.6	22.9	0.8	0.5	26.3	0.9	0.6	29.1	0.4	0.3	23.2	0.7	0.8	36.5	0.4	0.6	33.5	0.4	0.4	31.9	0.9	0.2	21.1	0.6	0.3	20.6	0.9	0.5	33.3
1.1	21.7	0.1	0.8	22.5	0.2	1	22.1	0.6	1.1	25.8	0.3	0.9	28.5	0.3	0.8	22.6	0.2	1.4	35.2	0.8	0.9	33.4	0.3	0.8	31.3	0.2	1	20.4	0.3	0.5	20.4	0.4	0.9	32.8
6.9	16	1.3	6.5	17.4	0.7	6	16.7	1.5	8.4	18.8	2.1	8.7	21.9	1.8	7	17.4	2.2	11	26.4	3	9.6	26.8	2	11.1	22.3	0.9	8.3	13	1.1	8.4	13.1	1.4	13.1	21.1
1.6	15.5	0.9	2.7	15.6	1.9	3.3	15.4	1.4	2.8	17.4	0.9	2.8	20.1	0.9	2	16.4	1.1	3.4	24.1	0.8	3.8	23.9	0.8	3.1	19.9	0.4	2.1	11.2	0.4	2.3	11.2	0.8	5.9	16
0.2	15.2	0	0.1	15.5	0.1	0	15.5	0	0.2	17.3	0	0.5	19.6	0.1	0.3	16.2	0.3	1.3	23	0.4	1.1	23.2	0.2	0.5	19.6	0.1	0.5	10.8	0.1	0.5	10.8	0.1	0.4	15.6
0.3	15.1	0	0.5	15	0.1	0.3	15.2	0	0.3	17	0.1	0.7	19	0.1	1.3	15	0.4	1.5	21.9	0.2	1.5	21.9	0	1.1	18.5	0.1	0.6	10.4	0.1	0.9	10.1	0.1	0.8	14.9
2.7	12.7	0.1	2.5	12.6	0.2	3.4	12	0.1	3.3	13.8	0.2	3.5	15.7	0.1	2.8	12.3	0.1	3	18.9	0.1	3.5	18.5	0.1	3.7	15	0	1.7	8.7	0.1	2.7	7.5	0	2.7	12.5
12.5	0.1	0	12.6	0	0	12	0	0	13.3	0.6	0	15.7	0	0	12.2	0.2	0	18.8	0.1	0	18.5	0	0	15	0	0	8.7	0	0	7.4	0.1	0	12.2	0
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	26.2			24.3			23.2			26.3			29.1			23.2			36.8			34			31.9			22.4			20.6			33.3
57.8		60.1	60.1		55	54.9		62.8	63.2		68.9	70.1		55.4	55		80.2	79.3		76.4	76.7		70.2	70.3		53.8	53.6		50.3	50.4		52.1	51.9	

ck) [Observations]

14:35 (66.7)(B342) [69] {FA19}			14:38 (66.6)(B339) [34] {FA19}			14:39 (66.7)(B336) [66] {FA19}			14:45 (66.7)(B097) [66] {FA19}			14:48 (66.6)(B326) [38] {FA19}			14:58 (66.6)(B350) [48] {FA19}			15:05 (66.7)(B323) [63] {FA19}			15:08 (66.6)(B322) [44] {FA19}			15:18 (66.6)(B321) [38] {FA19}			15:28 (66.6)(B324) [43] {FA19}			15:38 (66.6)(B327) [34] {FA19}			15:48 (66.6)(B328) [2	
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off
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32.3	0	32.4	.	.	.	16.3	0	16.3	5.4	0	5.4	.	.	.	.	.	.	21.5	0	21.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.1	0.1	32.4	.	.	.	0.1	0	16.4	0.1	0	5.7	.	.	.	.	.	.	0.1	0	21.6	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0.1	0.6	32.4	.	.	.	0	0.1	16.3	0.1	0	5.9	.	.	.	.	.	.	0.2	0.1	22	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	7	0	7.1	.	.	.	.	.	.	7.7	0	7.7	7.3	0	7.3	.	.	.	6.6	0	6.6	8	0	8.1	11.6	0	11.7	11.9	0	11.9	10.8	0
.	.	.	7.2	0	14.1	.	.	.	.	.	.	5	0.1	12.6	5.9	0	12.9	.	.	.	5.9	0	12.5	6.5	0	14.6	7.6	0	19.2	10.4	0.2	22.2	6.2	0
.	.	.	4	0.1	18	.	.	.	.	.	.	3.2	0	15.8	3.4	0.1	16.3	.	.	.	2.8	0	15.4	4.1	0.1	18.6	4	0.1	23	4	0.1	26.1	3.1	0.1
.	.	.	1	0.2	18.8	.	.	.	.	.	.	0.8	0.1	16.6	0.8	0.1	16.9	.	.	.	1.2	0.2	16.4	1.3	0.3	19.6	0.8	0.2	23.7	1.6	0.2	27.5	1	0.2
.	.	.	2.9	1.5	20.3	.	.	.	.	.	.	2.4	1.7	17.2	2.7	1.6	18	.	.	.	2.6	1.2	17.9	2.1	1.8	19.8	2.9	1.7	25	2	2.1	27.4	1.8	1
.	.	.	4.1	1.2	23.2	.	.	.	.	.	.	1.4	0.7	17.9	2.6	0.9	19.7	.	.	.	2.8	1.1	19.6	3.1	1.1	21.9	2.5	1	26.5	2.1	0.8	28.7	2	0.7
.	.	.	0.4	0.6	22.9	.	.	.	.	.	.	0.3	0.6	17.6	0.4	0.5	19.6	.	.	.	0.4	0.6	19.3	0.8	0.5	22.2	0.5	0.8	26.1	0.4	0.7	28.4	0.2	0.4
.	.	.	0.5	1.3	22.2	.	.	.	.	.	.	0.8	1.2	17.2	0.8	1.1	19.3	.	.	.	0.6	0.8	19.2	0.5	0.8	21.9	1	1.3	25.8	1.1	1.1	28.4	1	1.3
.	.	.	0.6	0	22.7	.	.	.	.	.	.	0.8	0	17.9	0.3	0	19.5	.	.	.	0.5	0.1	19.6	0.6	0.2	22.3	0.7	0.2	26.3	0.6	0.3	28.7	0.5	0.4
.	.	.	0.5	2	21.2	.	.	.	.	.	.	0.4	2.1	16.2	0.5	2.4	17.7	.	.	.	0.7	1.8	18.5	0.7	1.8	21.3	0.6	2.2	24.7	1	2.5	27.2	1.4	2
.	.	.	1.4	2.3	20.4	.	.	.	.	.	.	1.4	2	15.6	1.4	1.6	17.5	.	.	.	1.4	2.2	17.7	1.6	1.9	20.9	1.3	2.4	23.6	1.9	1.4	27.6	1.3	1.7
1.8	2	32.2	3.2	1.8	21.7	2.5	0.7	18	2.4	0.3	8.1	4.2	1.2	18.6	4.5	1.5	20.5	2.4	1.5	22.9	6.2	1.3	22.6	6.3	2	25.2	5.1	2.5	26.2	5.8	2.5	30.9	3.8	1.7
1	3.7	29.5	2.6	2.1	22.2	1.5	1.6	18	2	0.8	9.3	3.1	1.2	20.5	4.4	1.6	23.4	2	3.1	21.8	5.7	1.3	27.1	4.7	1.2	28.8	4	1.4	28.8	5.2	1.5	34.7	4.9	1.1
1.3	0.8	30	1.7	1	22.9	0.9	0.3	18.6	1.2	0.2	10.2	1.7	1.2	21	2.4	1	24.8	1.8	0.6	23	2.8	0.9	29	3.2	1.8	30.2	2	1.1	29.7	3.8	1.1	37.4	4.3	1
2.7	0.6	32.1	4.5	3.2	24.3	1.9	0.6	19.9	2.8	0.6	12.4	4.7	3	22.8	4.1	3	25.9	3.7	1.7	25	5.5	3	31.5	4.8	3.2	31.9	4.3	4.2	29.8	5	4.4	37.9	4.7	4.4
0.6	0.2	32.6	0.7	0.6	24.4	0.5	0.1	20.2	0.9	0.2	13.2	1.7	0.6	23.8	0.8	0.5	26.3	1	0.2	25.8	1.9	0.4	33	1.8	0.7	33	1.3	1	30.1	2.1	0.6	39.5	1	0.4
0.2	0	32.7	0.6	0.5	24.5	0.2	0	20.4	0.3	0	13.5	0.6	0.5	23.9	0.5	0.6	26.1	0.6	0.1	26.3	0.5	0.7	32.7	0.7	0.8	32.9	0.5	0.8	29.8	0.8	0.9	39.4	0.8	0.6
1.1	0.2	33.7	0.9	0.9	24.6	0.8	0.1	21.1	0.7	0.2	14	0.8	0.7	24.1	0.7	1.1	25.8	0.7	0.5	26.6	0.7	1.3	32.1	0.5	1.6	31.9	0.4	1.1	29	0.6	1.6	38.3	0.4	0.8
1.5	1.1	34.1	2.7	4	23.3	1.1	0.9	21.3	1.8	1.1	14.6	2.4	3.7	22.8	2.4	4.7	23.4	2.5	2.1	26.9	4.6	5	31.7	4.8	6.7	29.9	3.5	5.5	27	5	6.1	37.3	3.3	4.5
0.6	0.1	34.6	1.1	1	23.4	0.3	0.2	21.5	0.6	0.1	15.1	0.7	0.8	22.7	0.7	0.8	23.3	0.7	0.3	27.3	1.1	0.7	32.2	0.8	0.5	30.2	1.1	0.7	27.4	1.4	0.5	38.1	1.4	0.8
0.3	0.3	34.6	0.7	0.4	23.6	0.2	0.2	21.5	0.5	0.2	15.3	0.9	0.7	22.9	0.4	0.5	23.3	0.6	0.2	27.8	1.2	0.8	32.6	0.9	0.5	30.6	0.9	0.9	27.5	1.1	0.6	38.7	1.1	0.3
0.3	0.6	34.2	1.2	0.9	23.9	0.4	0.3	21.6	0.4	0.2	15.5	0.9	0.6	23.2	0.5	0.8	22.9	0.7	0.3	28.1	1	0.8	32.8	0.8	0.8	30.6	0.3	0.6	27.2	1.1	0.9	38.9	0.4	0.6
1.4	0.9	34.7	1.4	1.9	23.5	1.1	0.5	22.2	1.2	0.6	16.2	1.1	1.5	22.8	1.3	1.8	22.4	1.3	1.4	28	2.4	2.7	32.5	1.7	2.8	29.5	1.2	2	26.4	1.7	2.4	38.1	1.5	1.8
0.8	0.6	35	1.4	0.8	24.1	0.5	0.3	22.4	0.9	0.4	16.7	1.8	1.2	23.4	2.8	0.8	24.4	2.5	0.4	30.2	3.8	1.1	35.1	2.2	1	30.7	3	0.9	28.4	2.9	1.6	39.5	1.7	1
0.7	2.1	33.5	0.8	1.9	23.1	0.3	1.2	21.6	0.9	1.2	16.4	1.3	2.2	22.6	0.9	1.1	24.2	1	1.7	29.5	2	1.9	35.2	1.9	2.4	30.1	1.8	1.5	28.7	1.8	2.8	38.5	2.1	3.5
0.7	1.6	32.6	0.7	1.9	21.9	0.6	0.6	21.5	0.8	0.6	16.6	1	1.2	22.4	1	1.1	24.1	1	0.7	29.7	1.4	1.4	35.1	1.1	1.6	29.6	1.2	1.1	28.9	2	1.9	38.6	1.6	2
4.1	0.8	35.9	4.1	1.7	24.3	4	0.8	24.7	4.3	1	20	2	1.6	22.8	1.7	1.2	24.5	2.4	1.5	30.7	2.6	1.4	36.4	2.1	1.6	30.1	2.4	1.5	29.9	2.4	2.6	38.4	1.5	1.1
5.2	1	40.1	9.4	1.4	32.3	4.9	0.8	28.8	6.7	0.8	25.9	10.6	1.2	32.1	7.3	0.7	31.2	7.7	0.8	37.6	6.9	1	42.3	9.1	1.1	38	9.1	1.4	37.5	8.4	1.4	45.4	9.8	0.9
0.6	0.2	40.5	0.9	0.4	32.7	0.8	0.2	29.4	1.1	0.4	26.5	0.7	0.8	32	0.5	0.5	31.1	0.9	1	37.5	0.6	1	41.9	0.4	0.5	37.9	0.6	0.5	37.6	1.2	0.8	45.8	0.7	1
0.3	1	39.9	0.4	1.1	32.1	0.3	1.5	28.2	0.5	1.1	25.9	0.7	1	31.7	0.2	0.9	30.5	0.3	0.6	37.3	0.6	1	41.5	0.9	0.6	38.2	0.4	1	37.1	0.9	1.6	45	0.7	1.7
2.2	16.2	25.9	2.1	11.4	22.8	1.7	14.3	15.5	2	11.2	16.7	2.2	8.9	25	2.6	10.3	22.7	2.8	11.9	28.2	2.6	12.8	31.4	2.8	11.3	29.8	2.9	11.1	28.9	2.3	13.3	34.1	1.3	13.9
0.8	7	19.7	0.6	3.6	19.7	0.6	3.3	12.9	0.7	3.2	14.2	0.9	3.9	22	1	4.1	19.6	0.9	4.4	24.6	0.8	4.8	27.4	0.8	4.5	26	0.8	5.7	24	0.7	5.1	29.6	0.6	5.6
0.1	0.4	19.4	0.1	0.9	18.9	0	0.2	12.7	0.1	0.4	14	0	1.1	20.9	0.1	0.4	19.3	0	0.6	24	0.2	0.5	27.1	0.1	0.3	25.7	0	0.8	23.3	0	0.4	29.3	0	0.2
0.1	0.9	18.7	0.1	2.3	16.7	0.2	0.7	12.2	0.1	0.9	13.2	0.2	2.2	18.8	0.1	2	17.4	0.1	2	22.2	0.1	1.3	25.8	0.1	0.9	25	0.1	1.2	22.2	0.2	1.6	27.9	0	0.7
0.1	3.1	15.6	0.1	3.6	13.2	0	2.2	10	0.2	3.2	10.2	0.1	5.9	13	0.1	3.9	13.6	0.2	6.8	15.6	0.2	5.9	20.1	0.2	5	20.2	0.2	5.5	16.8	0.2	5.4	22.7	0	3.6
0	15.6	0	0	13.1	0.1	0	10	0	0	10.1	0.1	0	13	0	0	13.5	0.1	0	15.5	0.1	0	20	0.2	0	20.2	0	0	16.8	0	0	22.7	0	0	16.1
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		40.5			32.7			29.4			26.5			32.1			31.2			37.6			42.3			38.2			37.6			45.8		
61	61.7		71.6	71.6		41.7	41.7		38.7	39		68.5	68.4		67.1	66.7		59.6	60		80.9	81		82	82.1		80.6	80.7		93.6	93.7		76.9	77.1

29] {FA19}	15:58 (66.6)(B330) [24] {FA19}			16:08 (66.6)(B333) [39] {FA19}			16:18 (66.6)(B332) [48] {FA19}			16:28 (66.6)(B334) [41] {FA19}			16:38 (66.6)(B335) [33] {FA19}			16:48 (66.6)(B336) [28] {FA19}			16:58 (66.6)(B339) [36] {FA19}			17:08 (66.6)(B326) [46] {FA19}			17:18 (66.6)(B325) [67] {FA19}			17:28 (66.6)(B323) [46] {FA19}			17:38 (66.6)(B322) [51] {FA19}			17:48 (66.
Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On
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10.8	11.5	0	11.5	13.1	0	13.2	12.3	0	12.3	15.9	0	15.9	15.5	0	15.5	14.6	0	14.6	20.9	0	20.9	23.7	0	23.8	24.5	0	24.5	21.9	0	21.9	20.9	0	20.9	18.4
16.9	8	0	19.5	9.6	0.1	22.8	9.1	0.1	21.6	11.7	0	27.6	12.2	0.1	27.6	8.8	0.1	23.2	14.6	0.3	35.3	14	0.3	38.1	12.7	0.2	37	12.6	0.1	36.5	13.8	0.2	34.5	11.5
19.9	4	0	23.5	3.4	0.3	25.9	3.6	0.1	24.6	5.6	0.3	32.9	3.8	0.2	31.2	3.4	0.1	27.3	5.6	0.2	40.7	5.2	0.2	42.3	5.3	0.1	42.1	5.8	0.1	39	4.7	0.3	38.4	3.9
20.7	1.9	0.1	25.2	1.5	0.1	27.3	1.3	0.2	25.7	2.1	0.2	34.8	1.6	0.4	32.4	1.8	0.1	28	3.8	0.1	44.4	2.2	0.2	44.3	1.6	0.2	43.5	1.4	0.1	40.4	3.4	0.2	42.4	2.2
21.5	2.9	1.8	26.3	2.1	1.6	27.8	2.5	1.7	26.5	3.1	2	36	2.2	1.6	33	3.4	2.1	29.4	3.9	2.3	45.9	4.2	2.7	45.7	3.4	2.4	44.5	2.9	2.4	40.8	3.9	2.4	43.9	3
22.9	3	1	28.2	1.8	0.9	28.7	2	0.8	27.6	2.8	1.1	37.7	2.2	1.4	33.8	1.7	1.1	30	2.3	1	47.2	2.2	1.4	46.5	2.2	1.4	45.3	2.8	1.9	41.8	1.6	1.5	43.9	1.7
22.7	0.3	0.9	27.6	0.6	0.8	28.4	0.5	0.9	27.3	0.3	1	37	0.5	1.2	33.1	0.6	0.9	29.8	0.9	1.3	46.9	0.5	0.8	46.2	0.8	1.3	44.8	0.5	1.6	40.7	0.7	1.7	42.9	0.8
22.4	0.8	1.5	26.9	0.9	0.8	28.5	0.7	1.3	26.7	0.7	1.9	35.8	1.4	2.2	32.3	1.1	1.7	29.1	1.2	1.5	46.6	0.7	1.8	45.1	0.7	1.6	43.9	0.6	1.5	39.9	0.7	2.1	41.5	0.6
22.5	0.6	0.2	27.3	0.6	0.2	28.9	0.7	0.4	27	1	0.5	36.3	0.3	0.2	32.4	0.6	0.2	29.5	0.5	0.3	46.8	0.6	0.3	45.4	0.5	0.2	44.2	0.3	0.3	39.9	0.3	0.3	41.5	0.3
21.9	1.3	2.3	26.3	0.8	2.4	27.3	0.9	2.9	24.9	0.7	3.4	33.5	0.8	2.6	30.6	0.8	3.2	27.2	0.9	4.4	43.4	1.1	4.3	42.2	0.6	4	40.9	1	4.7	36.3	0.6	3.7	38.4	0.8
21.6	1.6	1.3	26.5	0.8	2.5	25.6	1.6	3.2	23.4	2.9	4.7	31.7	0.9	2.7	28.8	0.8	2.5	25.5	2.6	2.6	43.3	1.2	2.8	40.5	1	2.5	39.4	1.2	2.7	34.8	1.1	3	36.6	1.4
23.6	6.3	2.1	30.8	4.2	2.2	27.7	4.5	2.1	25.9	5.9	3.5	34.2	4.1	3.8	29.1	3.9	2.7	26.7	4.2	2.4	45.1	3.8	2.9	41.5	3.5	2.7	40.2	3.2	3.2	35	4.4	2.6	38.3	2.8
27.4	4.9	2	33.7	3.2	1.8	29.1	3.4	2.1	27.1	3.7	2	36.1	2.3	2.3	29.1	1.9	1.4	27.3	2.9	2.1	45.9	1.7	3	40.1	1.7	2.9	39	1.1	3	33.1	1.6	2.9	37	1.8
30.7	4	1.6	36	2.3	1	30.4	2.3	1.5	27.9	2.3	1.3	37.2	3.2	1.4	31	1.7	1.3	27.7	3.1	2.3	46.7	2.9	1.6	41.4	2.3	2.1	39.3	2.2	1.9	33.3	2.5	1.7	37.8	2.6
30.9	6.1	4.3	37.8	4.5	4.8	30.1	5	4.1	28.8	5.3	4.6	38	4.3	5.3	30	4.7	4.2	28.2	5.3	7.3	44.7	4.7	8.1	38	4.1	7.7	35.7	3.5	6.4	30.6	5	7.6	35.2	4.4
31.5	2.4	1.4	38.8	1.8	0.9	31.1	1.8	0.8	29.9	2.4	0.9	39.5	1.7	0.6	31.1	2	0.7	29.5	2	1.3	45.4	1.8	0.9	39	2	1	36.7	1.5	1	31.1	1.7	1.4	35.5	1.2
31.8	0.8	1	38.6	0.3	0.8	30.5	0.5	0.8	29.6	0.5	0.6	39.4	0.8	0.8	31.1	1.4	1	29.8	1	1.3	45.1	0.8	1.6	38.2	0.8	1.4	36	0.9	1	31	0.6	1.2	35	0.8
31.4	1	1.3	38.2	0.3	0.8	30	0.5	1.1	29	1.1	1.3	39.1	0.7	1.2	30.5	0.8	1	29.6	0.3	1.5	44	0.7	1.3	37.6	0.6	1.5	35.1	0.7	1.2	30.5	0.9	1.5	34.4	1.1
30.2	6	5.5	38.8	3.8	4.6	29.2	4	5	28	4.1	5.7	37.6	4.1	5.5	29.1	4.6	5.1	29.2	5.9	7.9	42	4.7	8.3	34	3.7	7	31.9	3.7	7.5	26.7	5.6	7.2	32.9	4
30.9	1.5	0.5	39.9	1.8	0.4	30.6	2.4	0.8	29.5	1.7	0.6	38.7	1.6	0.5	30.2	1.2	1	29.4	1.5	0.8	42.7	1.7	0.7	35	1	0.9	31.9	1.4	0.5	27.6	1.4	0.6	33.6	0.8
31.7	1.3	0.7	40.5	0.9	0.3	31.2	1.5	0.9	30.1	1.4	0.8	39.3	1.6	0.6	31.2	1.9	0.7	30.5	1.6	0.9	43.3	1.3	0.8	35.4	1.2	1.3	31.9	0.9	0.8	27.7	1.2	0.5	34.4	1.4
31.6	1	0.8	40.8	0.8	1	31	1.1	1.1	30.1	1.1	1.3	39.1	1.4	1.1	31.5	2.1	1.6	31	1.2	1.6	43	1.7	1.8	35.3	0.8	1.4	31.3	1.1	1.2	27.5	1.5	1.2	34.7	1
31.3	1.2	2	39.9	1.1	1.8	30.3	1.8	2.5	29.3	2.8	2.4	39.5	1.8	2.4	30.8	1.6	2.3	30.3	2.4	3.1	42.4	2	3	34.3	2.3	2.9	30.7	2.1	2	27.7	2	2.5	34.2	1
32	3	1.8	41	2.5	1.1	31.7	3.1	1.5	30.9	3.7	1.4	41.9	2.9	1.4	32.4	3.3	1.3	32.3	3.9	1.9	44.3	3.3	1.8	35.7	3.6	2.3	32	2.8	1.7	28.8	2	2.4	33.8	2
30.6	2	4.2	38.8	1.8	2.8	30.7	1.2	3.1	28.9	2.2	3.3	40.7	1.3	4.4	29.3	1.6	3.6	30.2	2.6	4.7	42.2	1.9	4	33.6	1.8	3.4	30.4	1.6	3.8	26.6	1.3	4.1	31	1
30.2	1	1.5	38.3	1.4	1.1	31	1.5	1.6	28.8	1.3	2.6	39.5	0.9	2.1	28	0.8	0.9	30.1	0.8	1.8	41.2	1	1.7	32.9	0.9	1.1	30.2	0.7	1.5	25.8	1.3	1.6	30.7	0.9
30.7	1.9	2.3	37.8	2.3	2.3	31	2.5	2	29.3	2.8	2.7	39.5	1.7	2.3	27.4	1.7	2.1	29.7	2.3	2.7	40.8	1.5	2.4	32	1.2	2.5	28.9	1.2	1.8	25.2	0.8	2.7	28.9	0.4
39.6	8.3	1.8	44.3	8.4	0.9	38.4	11.3	1.4	39.2	10.7	1.2	49	8.1	1.6	33.9	6.8	1.4	35.1	7	1.5	46.2	5	2.1	34.9	4.3	1.6	31.6	3.7	1.4	27.5	4.2	1.6	31.5	3.6
39.2	0.5	1.5	43.3	0.8	0.8	38.5	1	0.9	39.4	0.7	2.1	47.6	0.4	1	33.3	0.7	1.3	34.5	0.4	0.9	45.8	0.3	1.2	34.1	0.2	1.1	30.7	0.4	1.6	26.4	0.5	1.2	30.8	0.2
38.2	0.5	1.2	42.7	0.3	1.3	37.6	0.4	0.8	38.9	0.3	1.6	46.3	0.5	1.3	32.5	0.4	1.8	33.1	0.4	1.1	45.1	0.2	1.3	33	0.2	1.4	29.5	0.3	1.5	25.2	0.1	1.5	29.3	0.3
25.6	2.3	13.3	31.7	1.4	9.9	29.1	2.2	11.8	29.3	2.2	12.5	36	1.3	11.1	22.7	1.8	10	24.9	2	13.9	33.3	1.3	10.1	24.2	0.9	8.9	21.4	1.1	7.8	18.5	0.8	9.2	20.9	0.7
20.6	1.2	6.8	26	1.1	5.9	24.4	1.2	5.8	24.7	0.7	5.1	31.7	0.8	4.7	18.8	0.5	4.8	20.6	0.5	5.4	28.3	0.3	4	20.5	0.3	4.4	17.3	0.4	4.1	14.7	0.4	5	16.3	0.2
20.3	0.2	0.7	25.5	0	0.5	23.8	0	0.3	24.5	0	0.5	31.2	0	0.4	18.4	0	0.5	20.1	0	0.4	27.9	0.1	0.7	19.8	0	0.3	17	0	0.2	14.5	0	0.2	16.1	0
19.7	0.1	2	23.7	0.1	1.7	22.2	0.5	2.7	22.3	0	1.6	29.6	0.4	1.4	17.4	0	0.9	19.3	0.2	0.9	27.2	0.1	0.6	19.3	0.1	0.7	16.5	0.2	0.6	14.1	0	0.3	15.8	0
16.1	0.1	4.5	19.3	0.1	4.7	17.6	0.2	4.7	17.8	0.1	5.3	24.4	0.1	3.9	13.6	0	4.2	15.1	0	4.7	22.5	0.1	2.8	16.5	0	2.7	13.8	0	1.6	12.5	0	2.3	13.5	0
0	0	19.3	0	0	17.6	0	0	17.7	0.1	0	24	0.4	0	13.6	0	0	15	0.1	0	22.3	0.2	0	16.5	0.1	0	13.8	0	0	12.1	0.5	0	13.4	0.1	0
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39.6			44.3			38.5			39.4			49			33.9			35.1			47.2			46.5			45.3			41.8			43.9	
	93.5	93.2		80.4	80.7		89.1	88.7		103.8	104		87.4	87.3		83	82.8		108.7	108.7		98.5	98		90.8	90.9		85.7	84.8		91.5	91.8		76.8

6)(B321) [36] {FA19}		17:58 (66.6)(B324) [38] {FA19}			18:08 (66.6)(B327) [48] {FA19}			18:18 (66.6)(B328) [32] {FA19}			18:30 (66.6)(B330) [31] {FA19}			18:42 (66.6)(B332) [46] {FA19}			18:54 (66.6)(B334) [37] {FA19}			19:05 (66.6)(B336) [31] {FA19}			19:17 (66.6)(B339) [44] {FA19}			19:29 (66.6)(B326) [35] {FA19}			19:41 (66.6)(B325) [46] {FA19}			19:53 (66.6)(B322) [45] {FA19}		
Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
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0	18.4	19.8	0	19.8	18.7	0	19.1	20.7	0	20.7	21.3	0	21.3	19.6	0	19.6	18.8	0	19.4	14	0	14	14.7	0	14.7	15	0	15.4	14	0	14.1	12.8	0	12.8
0.3	29.2	11.6	0.1	31.4	11.3	0.1	30.4	9.7	0.1	31	10.1	0.3	31.4	11	0.2	30.1	9.5	0.1	28.7	11.6	0	25.4	9.8	0.1	24.5	8.4	0.1	23.7	10.3	0	24.4	10.2	0	23
0.5	34.3	5.9	0.2	37.1	5	0.2	35.2	4.6	0.1	34.5	5.4	0.1	36.2	5.1	0.2	35	5.3	0.2	33.9	5.5	0.2	30.5	4.8	0.2	29.1	3.9	0.2	27.7	4	0	28.4	4.7	0.1	27.4
0.3	35.5	1.4	0.1	38.4	1.6	0.3	36.5	1.5	0.2	35.8	0.7	0.3	36.6	1.2	0.3	35.9	1	0.1	34.8	1.4	0.1	31.8	1	0.2	30	1.1	0.1	28.6	0.8	0.1	29.1	0.8	0.1	28.2
2.4	36.1	3.7	1.7	40.3	3.6	2.4	37.7	3.1	2.1	36.8	2.9	2.7	36.8	2.4	2.3	36	2.9	2.3	35.4	2.3	1.9	32.2	2.7	2.2	30.5	2.8	2.1	29.3	2.7	2.1	29.7	2.3	2	28.5
1.4	36.4	1.8	1.1	41.1	2.3	1.1	39	1.4	1.5	36.8	1.5	1.3	37	1.4	1.6	35.8	1.9	1.5	35.8	1.5	1.7	31.9	1.8	1.3	31	1.5	1.1	29.2	1	1.2	29.5	1.1	1.8	27.8
1.7	35.5	0.5	1.3	40.2	0.6	1.2	38.4	0.5	0.8	36.4	0.5	1.9	35.6	0.4	1.3	34.9	0.2	1.2	34.8	0.3	1.5	30.7	0.5	1.3	30.1	0.4	1.3	28.3	0.1	1.8	27.9	0.6	1.5	26.9
1.9	34.2	0.4	1.7	38.9	0.5	1.7	37.2	0.3	1.3	35.4	0.4	1	35	0.5	1.4	33.9	0.3	1.5	33.6	0.4	1.3	29.8	0.2	1.4	28.9	0.4	1.5	27.6	0.2	1.2	26.9	0.2	1.1	26
0.1	34.4	0.5	0.3	39.1	0.3	0.3	37.2	0.4	0.1	35.7	0.3	0.1	35.2	0.3	0.4	33.8	0.5	0.3	33.8	0.4	0.4	29.8	0.3	0.5	28.8	0.4	0.7	27.2	0.3	0.4	26.8	0.2	0.2	26
3.4	31.9	0.8	3	36.8	1.4	4.1	34.7	0.8	3.6	32.9	1	4.1	32.1	0.7	3.8	30.8	0.7	3.2	31.4	0.5	3.3	27.1	0.6	2.3	27.1	0.5	2.8	24.9	0.4	2.6	24.6	0.4	2.7	23.6
2.7	30.6	1.1	2.6	35.3	1.3	2.4	33.6	1.1	2.6	31.4	0.8	2.4	30.5	1.1	1.9	30	1.2	2.6	30.1	1	2.4	25.7	0.4	1.9	25.6	0.4	2.3	22.5	0.5	2.3	22.9	0.4	2.8	21.3
3.1	30.4	2.2	2.7	34.8	2.8	1.9	34.5	2.4	2.7	31.2	2.5	2.1	31	2.1	1.7	30.4	2.1	2	30.2	2.7	1.5	26.9	2	1.7	26	2.9	2.3	23.1	2.6	1.9	23.6	2.6	2.3	21.6
3.3	28.9	2	3.2	33.7	1.4	2.8	33.1	1.1	2.7	29.6	1	2.8	29.2	1.1	2.8	28.7	1.5	2.6	29.1	1	2.3	25.7	1.2	2.5	24.6	1.2	1.9	22.5	0.7	2.2	22.1	0.7	2	20.4
1.7	29.9	1.8	1.7	33.7	3.1	1.2	35	2.3	1.5	30.3	2.2	1.7	29.6	1.9	1.8	28.7	2.8	2.6	29.4	1.1	2.1	24.7	1.7	1.6	24.8	1.4	1.5	22.4	1.2	1	22.3	1.9	1.1	21.2
6.7	27.8	2.7	6.1	30.3	4.2	7	32.2	3.3	6.7	26.9	3.9	6.6	26.9	4	6.8	25.9	3.8	6.8	26.3	3.2	4.9	23	3.4	4.1	24.1	4.1	4.7	22.4	4.5	5.3	21.6	4.1	4.6	20.7
0.7	28.3	1.7	0.8	31.2	1.6	1.1	32.6	1.2	0.7	27.4	1.6	1.1	27.4	1.4	1	26.3	1.6	0.8	27.2	0.8	0.9	22.9	1.2	1.3	24	1.3	0.8	22.9	1.6	0.7	22.5	2.2	0.7	22.2
1	28.1	0.9	0.8	31.3	0.9	1	32.4	0.7	0.8	27.3	0.3	1.3	26.5	0.6	1.1	25.8	0.6	0.7	27.1	0.3	0.6	22.6	0.6	0.7	23.9	0.7	0.5	23.1	0.7	0.7	22.5	0.9	0.6	22.4
1.8	27.5	0.5	1.2	30.7	0.8	1	32.2	0.6	1.3	26.6	0.8	1.4	25.9	1.2	1.2	25.8	0.9	0.9	27.1	0.3	0.7	22.2	0.4	0.7	23.5	0.5	0.5	23.1	0.5	0.6	22.4	0.4	0.5	22.2
5.4	26.1	3.7	6.1	28.2	5	5.9	31.4	4.1	5.3	25.4	3.7	5	24.6	4.2	6.1	23.9	4.1	4.9	26.3	2.5	3.5	21.2	4	4.9	22.6	3.1	4.5	21.7	3.1	4.5	21.1	4	4.6	21.6
0.9	26	1.1	0.9	28.4	1.4	0.6	32.1	1.6	1.2	25.8	1.1	0.9	24.8	1.3	0.9	24.3	1.4	1	26.7	1.4	1.2	21.4	1.3	1.6	22.3	1.1	0.7	22.1	1	1.2	21	0.4	0.9	21.2
0.7	26.7	1	1.1	28.4	0.9	0.8	32.2	0.7	0.8	25.6	0.7	0.7	24.9	0.9	0.7	24.5	1	0.4	27.4	0.4	0.3	21.5	0.5	0.8	22.1	0.7	0.6	22.2	0.8	0.8	21	0.5	1.1	20.6
1.1	26.6	0.8	0.9	28.3	0.6	1.6	31.3	0.7	1.6	24.7	0.8	1.6	24.1	0.8	1.4	23.9	0.4	0.7	27.1	0.3	0.8	21	0.7	1	21.8	0.7	1.3	21.5	0.6	1	20.6	0.3	0.5	20.4
2.6	25	0.9	2.3	27	0.8	2.4	29.6	0.7	2.3	23.1	0.5	3.1	21.4	1.2	2.5	22.7	1.2	2.4	25.8	1	1.8	20.1	1	1.5	21.3	2.2	1.8	21.9	1.2	2	19.8	1.2	1.6	20.1
2.1	24.9	1.4	1.7	26.7	1.3	2	28.9	1.2	1.9	22.4	1.2	1.8	20.8	1.3	1.3	22.7	1.8	1.8	25.8	1	1.3	19.8	1	1.4	20.9	1.5	0.9	22.6	2	1.3	20.5	2.4	1.5	21
2.9	22.9	1.4	3.1	25	0.7	4	25.6	0.6	3.5	19.6	0.8	3	18.5	0.7	4	19.3	0.4	4.1	22.2	0.4	3.3	16.9	0.7	3.8	17.8	0.8	4.1	19.3	0.7	3.3	18	0.7	3.6	18.1
1.5	22.4	0.8	1.7	24.1	0.9	2.2	24.3	0.8	2.1	18.3	1.2	1.5	18.3	0.5	1.3	18.5	0.5	1.2	21.5	0.7	1.2	16.4	0.7	1.3	17.1	1.1	1.2	19.3	0.9	1	17.8	0.7	1	17.9
2	20.8	1	1.9	23.2	0.7	2	23	0.5	0.9	17.8	0.9	1.4	17.7	1	1.6	17.8	0.7	1.7	20.5	0.4	1.5	15.3	0.3	1.5	15.9	0.5	1.2	18.5	0.8	1.4	17.2	0.5	0.9	17.4
1	23.4	3.8	1.2	25.7	4	1.4	25.6	2.9	1	19.8	3.5	1.1	20.1	3.7	0.9	20.7	3.8	1.3	23.1	3.7	0.9	18.1	2.5	1.1	17.3	2.7	0.9	20.4	2.7	0.7	19.2	2.6	1.1	18.9
1.1	22.4	0.3	0.6	25.4	0.3	0.6	25.3	0.1	0.8	19.1	0.3	1.1	19.3	0.4	1.2	19.9	0.5	0.9	22.6	0.4	0.8	17.7	0.4	0.8	16.9	0.7	0.9	20.3	0.4	0.7	18.9	0.3	0.7	18.5
1.3	21.5	0.1	0.9	24.6	0.1	1.2	24.3	0.1	0.8	18.4	0.2	1.3	18.3	0	1	18.9	0.1	1	21.7	0.1	1.2	16.7	0.1	0.8	16.1	0.2	0.8	19.7	0	0.6	18.3	0.2	0.8	17.9
7.8	14.4	0.9	7	18.5	0.6	7.2	17.8	0.7	6.3	12.8	0.7	6.5	12.5	0.8	7.3	12.4	0.4	7.5	14.6	0.5	6	11.2	0.5	5.6	11	0.5	6.5	13.6	0.3	7.2	11.5	0.4	6.8	11.5
3.9	10.7	0.4	3.8	15.1	0.5	4.1	14.2	0.4	2.8	10.4	0.5	2	10.9	0.4	2.1	10.7	0.3	1.6	13.3	0.2	1.5	9.9	0.4	2.3	9.2	0.3	2.8	11.1	0.5	2.3	9.7	0.5	2.4	9.6
0	10.6	0	0.3	14.8	0	0.2	14	0	0.1	10.3	0	0.3	10.6	0	0.4	10.3	0	0.4	12.9	0	0	9.9	0	0	9.2	0	0.1	11	0	0.1	9.6	0	0	9.5
0.2	10.4	0.1	0.5	14.3	0	0.4	13.6	0	0.4	9.9	0.1	0.5	10.2	0.2	1	9.4	0.1	1.2	11.8	0.1	0.8	9.2	0.1	0.2	9.1	0	0.2	10.8	0	0.2	9.4	0	0.1	9.4
1.8	8.6	0	2.3	12.1	0	2.2	11.5	0	1.6	8.3	0	1.8	8.4	0	1.8	7.6	0	1.9	9.9	0	1.4	7.8	0	1.3	7.8	0	1	9.9	0	1.3	8.1	0	1	8.4
8.1	0.5	0	11.9	0.2	0	11.2	0.3	0	8.3	0	0	8.3	0.1	0	7.6	0	0	9.8	0.1	0	7.8	0	0	7.8	0	0	9	0.9	0	7.9	0.2	0	8.4	0
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	36.4			41.1			39			36.8			37			36			35.8			32.2			31			29.3			29.7			28.5
77.4		77	76.8		79.2	79.8		70.8	70.5		73.4	73.1		73.4	72.9		72.3	73.2		61.4	61.1		61.5	61.7		63	62.9		61.1	61.6		61.2	61.1	

20:07 (66.6)(B324) [50] {FA19}			20:21 (66.6)(B327) [44] {FA19}			20:35 (66.6)(B330) [33] {FA19}			20:49 (66.6)(B334) [44] {FA19}			21:03 (66.6)(B343) [55] {FA19}			21:17 (66.6)(B326) [50] {FA19}			21:31 (66.6)(B325) [54] {FA19}			21:45 (66.6)(B344) [46] {FA19}			22:00 (66.6)(B324) [50] {FA19}			22:15 (66.6)(B345) [54] {FA19}			22:30 (66.6)(B346) [46] {FA19}			22:45 (66.6)(B347) [3	
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off
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16.3	0	16.3	13.6	0	13.6	13.1	0	13.2	11.7	0	11.7	15	0	15.1	12.9	0	12.9	13.4	0	13.4	11.3	0	11.7	13.4	0	13.4	14.9	0	15.1	10.4	0	10.9	12.8	0
11.1	0.1	27.3	9.3	0.1	22.8	8.9	0.1	22.1	9.3	0	21.3	10.1	0.1	25.1	11.8	0.1	24.6	9.9	0.1	23.2	13.4	0.2	24.7	13.3	0.1	26.7	14.3	0.2	29.2	12.5	0.1	23.3	13.3	0.1
4.6	0	31.9	5.3	0	28	2.8	0	24.9	4.5	0.1	25.2	4.9	0.1	29.9	4.7	0.1	29.2	3.9	0.1	27	4.8	0.1	29.3	4.4	0.1	30.9	4.7	0.1	33.9	3.1	0.1	26.3	3.7	0.1
0.9	0.1	32.6	0.6	0.2	28.5	0.5	0.1	25.3	0.7	0.1	26.4	1.5	0.1	31.3	0.8	0.1	30	1.1	0.1	28	0.7	0.1	30	0.7	0.3	31.4	0.6	0.2	34.3	0.4	0.2	26.6	0.4	0.2
2.3	1.7	33.3	2.3	2	28.7	1.5	1.4	25.4	1.8	1.7	26.5	2.1	1.8	31.6	1.8	1.9	30	1.4	1.4	27.9	2.3	1.2	31	1.2	1.4	31.2	1.8	0.9	35.3	1.5	0.9	27.2	0.8	0.7
1.4	1.6	33.1	1.3	1.2	28.8	1.1	1.1	25.4	1	1.1	26.4	0.7	1.3	31	0.9	1.4	29.5	0.9	1.5	27.3	0.8	1.6	30.3	0.9	1.2	30.9	0.9	1.3	34.9	0.6	0.8	27	0.5	1.4
0.1	1.1	32.2	0.2	1.3	27.7	0.1	0.9	24.5	0	1.4	25	0.3	1.3	29.9	0.2	0.6	29.1	0.1	1	26.4	0.2	0.8	29.7	0.1	0.7	30.3	0.1	0.9	34.1	0.1	1	26.1	0.2	1.3
0.3	1.6	31	0.3	1.8	26.2	0.2	0.9	23.8	0.2	1	24.2	0.3	1.8	28.4	0.4	1.9	27.6	0.1	1.7	24.8	0.3	3	26.9	0.3	2.9	27.7	0.4	2.8	31.7	0.1	1.8	24.4	0.3	1.4
0.1	0.4	30.7	0.1	0.4	26	0.2	0.2	23.8	0.3	0.2	24.3	0.2	0.3	28.3	0.1	0.2	27.4	0.1	0.3	24.6	0	0.2	26.8	0.1	0.3	27.5	0.2	0.2	31.6	0	0.3	24.2	0.2	0.3
0.6	2.9	28.4	0.4	2.3	24.1	0.4	2.2	21.9	0.1	2.6	21.8	0.8	3	26.1	0.3	2.6	25	0.2	2.3	22.5	0.7	2.7	24.8	0.9	2.1	26.3	0.6	3	29.3	0.4	2.5	22.1	0.8	3.6
0.6	2.4	26.6	0.3	1.7	22.8	0.5	1.7	20.6	0.3	1.4	20.6	0.7	2.6	24.6	0.4	3.3	22.5	0.4	2.8	20	0.7	2.9	22.5	0.5	3.6	23.2	0.3	4.1	25.5	0.2	3.6	18.8	0.8	3.3
2	2.1	26.4	1.4	2	22.2	1.5	1.6	20.6	2.1	1.9	20.8	2.2	2.1	24.9	1.6	2.4	21.6	1.4	1.7	19.7	1.7	2.1	22.1	2.4	2.2	23.4	2.5	1.8	26.2	1.1	1.2	18.7	1.6	2.1
1.1	2.4	25.1	1	2	21.2	0.5	2.2	18.9	0.6	1.7	19.8	1.7	2.3	24.3	0.8	2	20.4	0.7	1.7	18.8	0.7	1.9	20.8	0.9	1.6	22.7	0.8	2.6	24.4	0.3	2.5	16.5	0.4	2.6
1.3	1.7	24.7	1.3	1.5	21	1.7	1.7	18.9	1.3	1.3	19.7	1.6	1.1	24.6	1.4	1.3	20.2	1.7	1.6	18.9	3.1	1.5	22.5	3	1.6	24.2	1.5	2.1	23.8	1.3	1.2	16.7	1.4	1.5
3.5	5.5	22.7	3	5.2	18.8	2.5	4.1	17.2	2.9	4.8	17.7	4.7	5.1	24	3	3.8	19.5	3	4.1	17.8	4.1	5.8	20.8	3.1	5.3	22	2.6	5.7	20.7	1.7	4.2	14.3	2.4	4.6
1.7	0.9	23.6	1.4	0.8	19.5	0.7	0.7	17.3	0.9	0.8	17.8	1.2	0.6	24.7	0.9	0.6	19.8	0.6	0.6	17.8	1.2	0.4	21.7	0.7	0.4	22.3	0.7	0.7	20.7	0.5	0.4	14.3	0.3	0.3
0.5	0.9	23.3	0.3	0.6	19.2	0.3	0.6	17	0.7	0.6	17.9	0.6	0.6	24.7	0.5	0.7	19.6	0.6	0.5	17.9	1.7	0.6	22.8	0.2	0.4	22.1	0.1	0.6	20.3	0.2	0.3	14.2	0.1	0.4
0.2	0.8	22.8	0.2	0.6	18.7	0.4	0.4	17	0.1	0.7	17.4	0.2	0.5	24.4	0.2	0.4	19.3	0.2	0.8	17.3	0.3	0.9	22.3	0.2	0.6	21.6	0.2	0.5	20	0	0.3	13.9	0.1	0.5
3.7	4.1	22.4	3.2	4.1	17.8	2.5	3.3	16.2	4.8	3.5	18.7	4.1	3.5	25	2.8	2.7	19.5	3.1	2.5	17.9	2.4	3.9	20.8	2.2	3.1	20.8	2.2	2.4	19.8	1.1	1.4	13.7	2.7	1.3
0.8	1.2	22	0.5	1	17.4	0.4	0.6	16	0.5	0.9	18.2	0.8	0.8	25	0.6	1.1	18.9	0.4	0.6	17.8	0.3	0.4	20.7	0.3	0.5	20.5	0.1	0.9	19	0.4	0.4	13.6	0.5	0.6
0.6	1.2	21.4	0.7	0.4	17.6	0.2	0.4	15.8	0.8	0.6	18.5	0.7	0.5	25.1	0.3	0.4	18.8	0.3	0.5	17.5	0.6	0.4	20.9	0.4	0.3	20.7	0.4	0.5	18.9	0.3	0.1	13.8	0.9	0.3
0.3	0.8	20.9	0.4	0.8	17.2	0.5	1.2	15	0.6	1.1	18	0.3	0.9	24.5	0.3	0.8	18.3	0.2	0.5	17.2	0.5	0.7	20.6	0.1	1	19.8	0.3	1.1	18.1	0.1	0.3	13.7	0.2	0.4
0.6	1.8	19.7	1.1	1.1	17.2	0.8	1.4	14.4	1.1	1.3	17.8	1.1	1.4	24.2	0.9	1	18.2	0.9	0.9	17.1	0.9	0.7	20.8	1.1	0.7	20.1	1.4	0.6	18.9	1.1	0.8	14	0.4	0.3
2.1	1.3	20.5	1.6	1.1	17.6	1.4	1.2	14.6	0.9	1	17.7	2.5	1.2	25.5	0.8	0.9	18.1	0.4	0.6	16.9	0.7	0.8	20.7	2	1	21.1	2.2	0.8	20.3	0.2	0.8	13.3	1.1	1.1
0.5	2.9	18.1	1	2.9	15.7	0.4	2.3	12.7	0.9	2.9	15.8	1.2	3.6	23.1	1.5	2.6	17	0.9	3.1	14.8	1.3	2.6	19.4	0.7	2.4	19.4	1.7	3.5	18.5	1.2	2.5	11.9	3	1.9
0.5	1.3	17.3	0.6	1.1	15.2	0.5	1.5	11.7	0.5	1.8	14.4	0.3	2.1	21.3	0.3	1.3	16	0.3	1.7	13.4	0.4	2.3	17.5	0.4	2.5	17.3	0.4	1.1	17.7	0.2	0.9	11.2	0.2	0.9
0.5	1.2	16.6	0.4	1.2	14.4	0.4	1.2	10.9	0.7	1.2	13.9	0.5	1.3	20.6	0.4	0.9	15.4	0.3	1	12.7	0.4	1.7	16.2	0.9	1.1	17.1	0.5	1	17.2	0.3	0.3	11.1	0.7	1
2.3	1	18	3.9	1	17.3	2.8	0.8	12.9	3.5	0.8	16.5	2.4	1	22	2.5	0.7	17.3	2.4	0.9	14.2	3	0.7	18.5	2.2	0.8	18.6	2.3	1	18.6	3.9	0.4	14.6	4.2	0.5
0.5	0.7	17.8	0.5	0.5	17.3	0.3	0.7	12.5	0.2	1	15.8	0.2	1	21.2	0.4	0.7	17	0.2	0.5	14	0.1	0.7	17.8	0	0.4	18.2	0.1	0.6	18	0.3	0.5	14.4	0.2	0.8
0	0.8	16.9	0	0.6	16.8	0	0.8	11.7	0.1	0.5	15.4	0	0.8	20.4	0.1	0.9	16.1	0.1	1.2	12.9	0	1.1	16.7	0	0.7	17.4	0.1	0.7	17.4	0.1	0.5	14	0.1	0.3
0.4	5.8	11.5	0.3	6.1	11	0.5	4.5	7.6	0.3	6.7	9	0.2	9.6	11	0.3	5.9	10.5	0.2	5.5	7.6	0.3	6.5	10.5	0.2	6.5	11.1	0.2	6.8	10.9	0.4	4.4	9.9	0.3	4.8
0.5	2.4	9.5	0.3	2.7	8.6	0.3	1.6	6.4	0.1	2	7	0.2	2.8	8.4	0.4	1.7	9.2	0.3	1.1	6.8	0.2	1.7	9	0.1	1.5	9.8	0.1	1.9	9.1	0.3	2.3	7.9	0.3	3.1
0	0.1	9.4	0	0	8.6	0	0	6.4	0	0.2	6.8	0	0.1	8.3	0	0	9.2	0	0.1	6.8	0	0.2	8.8	0	0	9.8	0	0	9.1	0	0	7.9	0	0.2
0	0.3	9.1	0	0.5	8.1	0	0.3	6.1	0.1	0	6.9	0	0.2	8.2	0	0.5	8.8	0	0.4	6.4	0	0.3	8.6	0	0	9.7	0	0.1	9.1	0	0.1	7.8	0	0.1
0	1	8.1	0	0.8	7.3	0	0.5	5.5	0	1	5.9	0	0.9	7.3	0	0.6	8.2	0	0.7	5.7	0	0.8	8	0	1	8.8	0	1.3	7.8	0	0.9	7	0	1.3
0	8.1	0	0	7.3	0	0	5.5	0	0	5.8	0.1	0	7.3	0	0	8.2	0	0	5.7	0	0	7.8	0	0	8.8	0	0	7.8	0	0	7	0	0	11.8
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		33.3			28.8			25.4			26.5			31.6			30			28			31			31.4			35.3			27.2		
61.9	62.2		56.8	56.9		47.9	47.7		53.6	53.7		63.3	63.7		54.3	54.3		49.7	49.8		59.1	59.3		56.9	57.1		59.2	59.8		44.3	45		54.9	55.1

2] {FA19}	23:00 (66.6)(B348) [47] {FA19}			23:15 (66.6)(B326) [54] {FA19}			23:30 (66.6)(B349) [50] {FA19}			23:45 (66.6)(B351) [43] {FA19}			24:00 (66.6)(B345) [52] {FA19}			24:20 (66.6)(B347) [32] {FA19}			24:40 (66.6)(B348) [51] {FA19}			25:00 (66.6)(B349) [18] {FA19}			Total		
Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
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.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5.1	0.2	30.3
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.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.3	0.6	34.9
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2.5	0.3	37.2
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12.8	9.5	0	9.6	7.3	0	7.7	8.2	0	8.5	5.7	0	5.8	4.9	0	5.3	5.4	0	6	5.2	0	5.2	2.8	0	2.8	919.4	0	928.7
26	8.7	0	18.2	8.4	0	16.1	8.3	0	16.8	6.4	0	12.2	4.7	0	10	4.7	0	10.5	3.7	0	8.9	0.6	0	3.4	722.5	6.4	1648
29.6	3.1	0.1	21.2	2.3	0.1	18.4	3.6	0	20.6	2.4	0	14.6	4.1	0	14.1	3.8	0	14.4	1.9	0.1	10.7	0.3	0	3.7	286.6	7.7	1924.4
29.8	0.1	0.1	21.3	0.2	0.1	18.5	0.5	0.1	21	0.1	0	14.6	0	0	14	0.2	0	14.6	0.1	0	10.8	0	0	3.7	75.3	28.6	1969.2
29.9	1	0.8	21.5	0.9	0.6	18.7	0.7	0.3	21.3	1.6	0.1	16.1	0.6	0.5	14.2	0.3	0.3	14.5	0.6	0.5	10.9	0.1	0	3.8	185.8	140	2015.3
29	0.8	1.1	21.2	0.4	0.9	18.2	0.2	1.1	20.4	0.2	0.7	15.6	0.1	0.7	13.5	0.2	0.3	14.3	0.2	0.3	10.8	0	0	3.8	208.7	79.5	2147
27.9	0.1	1.3	19.9	0	1.3	17	0	1.1	19.3	0	0.4	15.2	0	0.7	12.9	0	1.1	13.3	0	0.7	10.2	0	0	3.8	74.2	64.3	2156.5
26.8	0.2	1.6	18.5	0.3	1.9	15.4	0.2	2	17.5	0	1.8	13.5	0	1.4	11.5	0	2.9	10.4	0	2.6	7.6	0	0.5	3.3	89	100.1	2146.1
26.6	0	0.1	18.4	0.1	0.2	15.3	0.1	0.2	17.3	0.3	0.2	13.6	0.1	0.3	11.4	0.2	0.2	10.5	0.1	0.4	7.3	0.1	0.1	3.2	81.9	17.1	2208.5
23.8	0.7	2	17.1	0.5	1.6	14.2	0.4	1.7	16	0.3	1.6	12.3	0.3	1.1	10.7	0.2	1	9.6	0	0.4	6.9	0	0.4	2.8	70.5	188.3	2091.2
21.3	0.9	1.7	16.2	0.5	1.6	13.1	0.1	1.6	14.6	0.2	1.1	11.5	0.2	1.6	9.3	0.2	1.8	8	0.1	1.5	5.6	0	0.2	2.6	107.5	178.9	2021.8
20.8	1.2	1.3	16.1	2.7	1.5	14.2	2.2	1.7	15.1	0.6	1.2	10.9	0.7	1.2	8.9	0.4	0.8	7.6	0.3	1	4.9	0.1	0.2	2.6	388.1	194.2	2357.5
18.7	0.4	2	14.5	0.3	1.5	13	0.4	2.2	13.3	0.3	1.7	9.5	0.3	1.8	7.4	0.4	1.3	6.7	0.1	0.5	4.5	0	0.2	2.5	193.9	149.8	2403.8
18.6	1	0.9	14.7	0.9	0.5	13.4	0.8	0.7	13.4	0.4	0.3	9.7	0.5	0.3	7.6	0.3	0.2	6.8	0.1	0.1	4.6	0.1	0	2.5	272	108.5	2565.6
16.4	2.4	3.3	13.9	1.8	3.4	11.9	1.9	3	12.4	1.4	3	8.1	2	1.8	7.6	1.8	2	6.6	0.7	0.8	4.5	0.7	0.1	3	562.1	345.4	2782.5
16.4	0.3	0.3	13.9	0.2	0.6	11.5	0.2	0.3	12.3	0.2	0.3	8	0.1	0.2	7.5	0.3	0.3	6.6	0.2	0.2	4.5	0	0	3	186.5	55.7	2914.1
16.1	0	0.4	13.6	0	0.2	11.3	0.1	0.4	12	0	0.2	7.8	0.1	0.2	7.5	0	0.2	6.4	0	0.2	4.3	0	0	3	81.7	58.9	2937.3
15.8	0.1	0.3	13.4	0.1	0.3	11.1	0.1	0.4	11.7	0	0.4	7.4	0	0.3	7.2	0	0.3	6.2	0.1	0.4	4	0	0	3	62.4	72	2927.9
17.1	2.4	1.5	14.3	1.2	1.2	11.1	1.1	1.3	11.5	1	0.5	7.9	0.7	0.5	7.3	0.5	0.2	6.5	0.3	0.5	3.8	0.1	0	3.1	324.3	385.6	2866.5
17	0.9	0.4	14.8	0.2	0.3	11	0.3	0.2	11.6	0.2	0.2	7.9	0.1	0.2	7.2	0.2	0.1	6.6	0.1	0.2	3.7	0	0	3.1	87.8	53.2	2901.8
17.6	0.1	0.4	14.5	0.1	0.3	10.8	0.1	0.3	11.5	0.1	0.1	7.9	0	0.1	7.1	0	0.1	6.5	0.1	0	3.7	0	0	3.1	69.9	50.9	2920.7
17.3	0	0.3	14.2	0.1	0.3	10.6	0	0.3	11.2	0	0.3	7.6	0	0.2	7	0	0.3	6.3	0	0.2	3.6	0.1	0	3.1	75	91.8	2903.7
17.4	0.3	0.5	14	0.1	0.4	10.4	0.1	0.1	11.2	0	0.3	7.3	0.1	0.1	6.9	0.2	0.4	6.1	0	0.6	3	0	0.1	3.1	128.4	225.9	2806.9
17.4	1.6	0.2	15.3	1.1	0.4	11.1	0.4	0.3	11.3	0.1	0.3	7.1	0.5	0.2	7.2	0	0.1	6.1	0	0.1	3	0	0.1	3	145.1	107.1	2844.6
18.6	2.3	1.4	16.2	1.6	1.5	11.2	1.7	1.9	11.2	0.7	1.2	6.7	1	1.2	7	0.4	1.1	5.3	0.1	0.5	2.5	0	0	3	107.6	278.5	2673.6
17.8	0.2	0.9	15.5	0.2	0.7	10.8	0.1	0.5	10.8	0.2	0.5	6.3	0.1	0.4	6.6	0.2	0.3	5.2	0.1	0.2	2.4	0.1	0.3	2.8	157.5	134.1	2697.1
17.6	0.7	1.2	14.9	0.5	0.7	10.6	0.1	0.3	10.5	0.1	0.3	6.2	0	0.3	6.3	0.1	0.3	4.9	0.1	0.3	2.3	0	0.2	2.6	165.5	520.4	2342.4
21.3	4.8	0.6	19.1	3.3	0.3	13.6	1.4	0.5	11.5	0.8	0.3	6.7	0.7	0.3	6.8	1.6	0.1	6.4	0.3	0.3	2.3	0	0.1	2.5	430.2	114.8	2657.5
20.7	0.1	0.7	18.5	0.1	0.4	13.3	0.1	0.4	11.2	0.1	0.2	6.5	0	0.2	6.6	0	0.2	6.3	0	0.1	2.2	0.1	0	2.6	51.7	88.1	2621.5
20.5	0.1	0.5	18.1	0.1	0.3	13.1	0	0.3	10.9	0	0.1	6.4	0	0.3	6.3	0	0.4	5.9	0	0.1	2.2	0	0.2	2.3	23.6	102.2	2543.2
16	0.1	4.7	13.6	0.1	4.4	8.9	0.3	3.8	7.4	0.1	1.7	4.8	0	1.7	4.6	0.1	1.8	4.3	0.1	0.7	1.5	0.1	1.8	0.7	187.7	810	1921.6
13.2	0.1	3.2	10.4	0.1	2.2	6.8	0.2	2	5.6	0.2	0.5	4.6	0.1	0.5	4.2	0.1	0.2	4.1	0.1	0.2	1.4	0.1	0	0.7	70.6	264.1	1727.7
13.1	0	0.1	10.4	0	0	6.7	0	0	5.6	0	0.2	4.4	0	0.1	4.1	0	0	4.1	0	0.1	1.3	0	0	0.7	3.7	48	1684.8
13	0	0.4	10	0	0.6	6.2	0	0.1	5.6	0	0	4.4	0	0	4.1	0	0	4.1	0	0	1.4	0.1	0	0.8	8.4	207.8	1485.2
11.8	0	0.9	9.1	0	0.6	5.6	0	0.5	5.1	0	0.5	3.9	0	0.7	3.4	0	0.3	3.8	0	0	1.4	0	0	0.9	4.7	232.2	1259.4
0	0	9.1	0	0	5.6	0	0	4.9	0.2	0	3.8	0.1	0	3.3	0	0	3.8	0.1	0	1.2	0.1	0	0.6	0.2	0.3	1219.9	40.6
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29.9			21.5			18.7			21.3			16.1			14.2			14.6			10.9			3.8			2937.3
	44.2	44.3		35.7	36.5		33.9	34.5		23.7	24		22	22.4		21.8	22.4		14.7	15		5.5	5.1		6754.7	6762	

Massachusetts Bay Transportation Authority
Route 66
Weekday - Outbound
Fall 2019
(Urban Transportation Associates)

	04:45 (66.6)(B319) [36] {FA19}			05:00 (66.6)(B329) [51] {FA19}			05:15 (66.6)(B334) [23] {FA19}			05:30 (66.6)(B337) [33] {FA19}			05:45 (66.6)(B339) [38] {FA19}			06:00 (66.6)(B341) [33] {FA19}			06:10 (66.6)(B319) [42] {FA19}			06:17 (66.5)(B068) [12] {FA19}			06:18 (66.6)(B320) [11] {FA19}			06:22 (66.5)(B098) [7] {FA19}		
Seq - StopID - Stop Name	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
1 - 390 - WARREN ST @ QUINCY ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2 - 392 - WARREN ST @ MAYWOOD ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3 - 393 - WARREN ST @ WOODBINE ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4 - 394 - WARREN ST @ WAVERLY ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5 - 395 - WARREN ST @ WHITING ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6 - 396 - WARREN ST @ MORELAND ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7 - 21151 - WARREN ST @ KEARSARGE AVE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8 - 64000 - DUDLEY STATION	4	0	4	7.6	0	7.6	15.8	0	15.8	22.9	0	22.9	16.3	0	16.3	25.3	0	25.3	15.5	0	15.5	19.6	0	19.6	11	0	11	14.7	0	14.7
9 - 1148 - MALCOLM X BLVD @ SHAWMUT AVE	1	0	5	0.3	0	7.9	0.4	0	16.2	0.2	0	23.1	0.5	0	16.8	2.7	0.1	27.9	1.2	0	17	1.8	0	21.3	0.2	0	11.2	1.1	0	15.9
10 - 11149 - MALCOLM X BLVD @ O'BRYANT HS	0	0	5	0	0	7.9	0	0	16.2	0.2	0	23.3	0.3	0	17.2	1.8	0	29.7	1.9	0	18.8	0.8	0.1	22.1	1.4	0	12.8	0.7	0	16.6
11 - 11148 - MALCOLM X BLVD @ MADISON PARK	0	0	5	0	0	7.9	0.5	0	16.7	1.5	0	24.8	1.7	0	18.9	3.5	0	33.2	1.5	0	20.3	0.5	0.1	22.5	0.2	0	13	0	0	16.6
12 - 21148 - MALCOLM X BLVD @ TREMONT ST	0.2	0	5.2	0.7	0	8.5	2	0	18.6	1.9	0	26.7	0.7	0	19.5	1.2	0.2	34.2	1.1	0	21.3	0.3	0	22.8	0.4	0	13.4	0.3	0	16.9
13 - 1357 - TREMONT ST OPP ROXBURY CROSSI	1.2	0.1	6.3	0.8	0.5	8.9	3.7	0.4	21.9	5.6	0.4	32	3.6	0.2	22.9	7.6	0.5	41.4	6.9	0.5	27.3	5.6	0.4	28	3.4	0.2	16.5	6.4	0.3	23
14 - 13590 - TREMONT ST @ TOBIN COMMUNITY	0	0	6.3	0	0	8.9	0.4	0.1	22.2	0.1	0	32.1	0.2	0.4	22.8	0.9	0.2	42.1	0.5	0	27.7	0	0	28	1	0	17.5	0	0	23
15 - 1360 - TREMONT ST @ SAINT ALPHONSUS	0	0	6.3	0	0	8.9	0	0	22.2	0.2	0	32.3	0.6	0.1	23.4	0.5	0	42.6	0.5	0.1	28.1	0.3	0	28.3	0.2	0	17.7	0.3	0.1	23.1
16 - 1362 - TREMONT ST @ HUNTINGTON AVE	0.2	1.1	5.4	0.1	1.3	7.8	0.4	5.6	17	2.4	8.5	26.2	0.7	9.8	14.3	0.9	14.2	29.4	1.1	10.4	18.8	0.4	8.3	20.3	0.3	6.1	11.9	0.3	6.6	16.9
17 - 1363 - HUNTINGTON AVE @ FENWOOD RD	0.3	0.2	5.5	0	0.5	7.3	0.2	0.3	16.9	0.5	0.1	26.5	0.4	0.1	14.6	0.2	0.1	29.5	0.2	1	18	0.1	1	19.4	0.3	0.4	11.8	0.1	0.3	16.7
18 - 1365 - 835 HUNTINGTON AVE OPP PARKER	0	0	5.4	0.1	0	7.4	0.6	0.1	17.4	0.6	1	26.1	0.9	0.2	15.4	0.8	0.1	30.3	0.5	0.1	18.4	0.5	0.2	19.8	0.8	0	12.6	1.4	0.3	17.9
19 - 1366 - HUNTINGTON AVE @ RIVERWAY	3.4	0	8.8	0.1	0	7.5	0.8	0.6	17.7	1	0.4	26.7	2.7	1.1	17	3.8	1.3	32.8	2.8	0.8	20.4	1.2	0.8	20.2	3.3	0.3	15.6	1.9	0.3	19.4
20 - 1526 - WASHINGTON ST @ PEARL ST	0.1	0.1	8.7	0.7	1.1	7	1.4	4.2	14.8	2.2	5.3	23.6	0.5	2.7	14.8	0.6	3.7	29.8	0.3	2.5	18.2	0.1	1	19.3	0.9	2	14.5	0.3	3.4	16.3
21 - 1367 - HARVARD ST @ KENT ST	0.2	0.1	8.8	0.2	0.2	7.1	0.3	0.2	14.9	0.2	0.5	23.2	0.2	1.8	13.2	0.3	1	29.1	0.3	0.8	17.7	0.2	0.8	18.7	0.1	0.2	14.5	0.1	1.1	15.3
22 - 1369 - HARVARD ST @ ASPINWALL AVE	0.1	0.1	8.8	0.1	0	7.1	0	0.2	14.7	0.2	0	23.4	0.5	0	13.7	0.3	0.1	29.3	0.4	0.1	18	0	0.1	18.6	0.5	0.2	14.7	0.1	0	15.4
23 - 1371 - HARVARD ST OPP VERNON ST	0.1	0.3	8.6	0.1	0.8	6.5	0.1	1.2	13.7	0.2	0.6	22.9	0.1	0.6	13.2	1.1	1.2	29.2	0.5	0.9	17.7	0	0.1	18.5	0	0.3	14.5	0	0.4	15
24 - 1372 - HARVARD ST @ BEACON ST	0.6	0.3	9	0.2	0.8	5.9	1.3	1	14	1	0.5	23.4	1.6	0.5	14.3	2.5	1.1	30.6	3.1	2	18.8	1.1	2.5	17.1	1.5	0.8	15.1	0	2.4	12.6
25 - 1373 - HARVARD ST @ STEDMAN ST	0	0	8.9	0	0	5.9	0	0.2	13.9	0.1	0.6	23	0.1	0.8	13.6	0.2	0.9	29.9	0.1	0.6	18.3	0.1	0.1	17.1	0.3	0.1	15.3	0	0.3	12.3
26 - 1375 - HARVARD ST @ COOLIDGE ST	0	0	8.9	0	0	5.9	0.1	0.1	13.8	0.2	0.6	22.5	0.2	0.2	13.5	0.1	0.4	29.7	0.1	0.2	18.2	0	0	17.1	0.2	0.1	15.4	0	0	12.3
27 - 1376 - HARVARD ST OPP VERNDALE ST	0.1	0.4	8.6	0	0.3	5.6	0	0.6	13.3	0.1	0.3	22.3	0.1	0.2	13.3	0.1	0.1	29.7	0.9	0.2	18.8	0.1	0.4	16.8	1.3	0.3	16.4	0	0	12.3
28 - 1378 - HARVARD AVE @ COMMONWEALTH AV	3.9	0.8	11.6	1.6	0.5	6.7	1.4	2.3	12.4	1.5	4.2	19.6	2.8	0.8	15.3	5.8	2.9	32.6	3.7	1.9	20.7	0.3	1.5	15.5	2.7	0.7	18.4	0.6	0.9	12
29 - 1379 - HARVARD AVE @ BRIGHTON AVE	0	0	11.7	0.1	0	6.7	0.1	0	12.5	0.3	1.2	18.7	1.2	0.2	16.3	0.8	0.4	33	0.3	0.7	20.3	0	1	14.5	0.7	1	18.1	0	1.4	10.6
30 - 964 - BRIGHTON AVE OPP QUINT AVE	3.1	0.8	13.9	1.3	0.9	7.1	1.1	2.4	11.2	1.3	3.7	16.3	1.2	1.8	15.7	1.8	6.8	27.9	1.1	3.5	17.9	0.7	3.6	11.6	0.5	2.5	16.1	0.1	2	8.7
31 - 966 - CAMBRIDGE ST @ N BEACON ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.1	2.7	10	.	.	.	0.3	3.4	5.6
32 - 967 - CAMBRIDGE ST @ SAUNDERS ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.2	0.8	9.4	.	.	.	0.1	0	5.7
33 - 969 - CAMBRIDGE ST @ DUSTIN ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	6.4	3	.	.	.	0.1	4.3	1.6
34 - 970 - CAMBRIDGE ST @ SPARHAWK ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1.4	1.6	.	.	.	0.1	1	1.1
35 - 971 - CAMBRIDGE ST @ ELKO ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0.3	1.3	.	.	.	0	0	1.1
36 - 972 - WASHINGTON ST @ WALDO TERR	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
37 - 973 - WASHINGTON ST @ MARKET ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
38 - 974 - WASHINGTON ST @ FOSTER ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39 - 975 - WASHINGTON ST @ BROCK ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
40 - 977 - WASHINGTON ST @ OAK SQUARE AV	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
41 - 9780 - WASHINGTON ST @ OAK SQ	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42 - 979 - TREMONT ST @ WASHINGTON ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
43 - 981 - TREMONT ST OPP TREMONT PL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
44 - 982 - TREMONT ST OPP CUFFLIN ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
45 - 983 - TREMONT ST @ PLAYSTEAD RD	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
46 - 985 - TREMONT ST @ WAVERLEY AVE	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
47 - 986 - TREMONT ST @ HIBBARD RD	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
48 - 987 - PARK ST @ TREMONT ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
49 - 988 - CENTRE ST @ JEFFERSON ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
50 - 989 - GALEN ST @ MAPLE ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
51 - 900 - WATERTOWN YARD	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
52 - 1111 - CAMBRIDGE ST OPP HANO ST	2.8	1.2	15.5	1.2	0.3	8.1	2.5	1.3	12.5	1	5.3	12	1.6	2.2	15.1	1.7	3.4	26.2	1.8	3.8	16	.	.	.	1.5	3	14.5	.	.	.
53 - 1112 - CAMBRIDGE ST @ HARVARD AVE	0	0	15.5	0	0	8.1	0	0	12.5	0	0	12.1	0.1	0	15.1	0	0	26.2	0	0.1	16	.	.	.	0	0.2	14.4	.	.	.
54 - 1113 - CAMBRIDGE ST @ LINDEN ST	1.1	0.1	16.5	0.2	0	8.3	0.2	0	12.7	2.2	0.1	14.2	1.6	0	16.7	2.6	0.2	28.6	1.5	0	17.5	.	.	.	1.9	0.4	15.9	.	.	.
55 - 2558 - N HARVARD ST @ EMPIRE ST	1.1	0.2	17.4	0.3	0	8.6	0.8	0.5	12.9	2.4	0.6	15.9	1.4	0.4	17.7	3.8	0.9	31.5	1.2	0.4	18.3	.	.	.	1.8	0	17.7	.	.	.
56 - 2559 - N HARVARD ST @ OXFORD ST	1.4	0.1	18.8	0.6	0	9.1	1.3	0	14.2	1.3	0	17.2	2.4	0	20.1	2	0.2	33.4	2.8	0	21	.	.	.	1	0	18.7	.	.	.
57 - 2560 - N HARVARD ST @ KINGSLEY ST	1.2	0.1	19.9	1	0.2	9.9	0.5	0.3	14.3	0.2	0.2	17.2	0.3	1	19.4	0.7	0.7	33.4	0.9	0.4	21.6	.	.	.	2.7	0.4	21.1	.	.	.
58 - 2561 - N HARVARD ST @ WESTERN AVE	2	2.3	19.6	0.7	1.8	8.8	0.3	1.9	12.8	0.3	3.5	14	0.6	4	15.9	1.5	11.3	23.6	1.3	3.8	19.1	.	.	.	0.4	0.8	20.6	.	.	.
59 - 2564 - N HARVARD ST OPP HARVARD STAD	0.1	0.9	18.8	0	0.3	8.6	0	1	11.8	0	0.4	13.6	0.1	0.6	15.4	0.1	1.2	22.4	0	0.7	18.4	.	.	.	0.2	0.5	20.3	.	.	.
60 - 25641 - JFK ST @ ELIOT ST	0.2	18.5	0.6	0.4	7.5	1.8	0.2	11.4	0.7	0.2	13.5	0.4	0.1	15.4	0.1	0.2	22.4	0.4	0.2	18.2	0.4	.	.	.	0.5	20.5	0.5	.	.	.
62 - 22549 - HARVARD SQ @ GARDEN ST - DAWE	0	0.5	0.1	0	1.5	0.3	0	0.5	0.2	0	0.2	0.2	0	0	0.1	0	0.2	0.2	0	0.3	0.1	.	.	.	0	0.2	0.4	.	.	.
63 - 1301 - 7 WINSHIP ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0.4	0.9	.	.	.	0	0.6	0.6
65 - 994 - WINSHIP ST @ UNION ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0.9	0	.	.	.	0	0.6	0
Maximum			19.9			9.9			22.2			32.3			23.4			42.6			28.1			28.3			21.1			23.1
Total	28.4	28.2		18.4	18.5		36.4	36.4		52	51.7		45.3	45.1		75.4	75.8		54.2	54		35	34.9		41.2	41.2		29	29.7	

06:26 (66.6)(B329) [35] {FA19}			06:27 (66.5)(B021) [7] {FA19}			06:31 (66.5)(B061) [8] {FA19}			06:34 (66.6)(B331) [41] {FA19}			06:35 (66.5)(B023) [8] {FA19}			06:39 (66.5)(B073) [11] {FA19}			06:42 (66.6)(B333) [33] {FA19}			06:43 (66.5)(B055) [7] {FA19}			06:47 (66.5)(B100) [5] {FA19}			06:50 (66.5)(B075) [9] {FA19}			06:50 (66.6)(B334) [34] {FA19}			06:58 (66.6)(B335) [21] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
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14.8	0	14.8	10.3	0	10.3	11.8	0	11.8	10	0	10	12.1	0	12.1	8.2	0	8.2	12.5	0	12.5	5.6	0	5.6	9.2	0	9.2	11.3	0	11.3	11.1	0	11.1	9	0	9.3
1.8	0	16.6	1.1	0	11.4	2.8	0	14.5	0.9	0	10.9	1.3	0	13.4	1.5	0	9.6	1.4	0.1	13.8	0.6	0	6.1	0.4	0.4	9.2	2.1	0.1	13.3	1.4	0.1	12.5	1.2	0.2	10.5
1.3	0.1	17.9	0.6	0	12	1.1	0.1	15.5	0.5	0.1	11.3	2.5	0	15.9	1.2	0	10.8	1.1	0.2	14.7	0.4	0	6.6	0	0	9.2	0.6	0	13.9	0.6	0.1	12.9	1.6	3.8	9.1
0.1	0	18	0	0	12	0	0	15.5	0.1	0.2	11.2	0	0	15.9	0	0	10.8	0.1	0.2	14.7	0.1	0	6.7	0	0	9.2	0	0	13.9	0	0	12.9	0	0.2	9
0.7	0	18.7	0.9	0.1	12.7	0.1	0	15.6	0.8	0	12	0.4	0	16.3	0.5	0	11.4	0.5	0.1	15.1	0.6	0	7.3	0	0	9.2	0.1	0	14	0.6	0.3	13.2	0.6	0.2	9.4
6.2	0.7	24.2	3.9	0.1	16.4	9.1	0.1	24.6	6.1	0.4	17.6	15.4	0.8	30.9	9.3	0.5	20.2	5.5	0.6	20.1	8.1	0.3	15.1	9	0	18.2	15.2	0.1	29.1	8.2	0.4	21.1	11.7	1	20.2
0.1	0	24.3	0	0	16.4	0.1	0	24.8	0.2	0.2	17.6	0.8	0.1	31.5	0	0.1	20.1	0.1	0.1	20.1	0.4	0	15.6	0.2	0.2	18.2	0.7	0	29.8	0.2	0.1	21.2	2.1	0.5	21.9
0.2	0.1	24.5	0	0	16.4	0	0.1	24.6	0.1	0	17.7	0	0.1	31.4	0	0.1	20	0.1	0.2	20	0	0	15.6	0	0.2	18	0.4	0	30.2	0.3	0.2	21.3	1	0.2	22.7
0.3	8	16.7	0.3	5.6	11.1	0.1	9.3	15.5	0.4	6.8	11.2	1	8.6	23.8	1.6	4	17.6	0.7	6.4	14.3	0.9	5.1	11.3	0.4	2	16.4	0.2	5.3	25.1	0.7	5.6	16.4	0.9	7	16.6
0.6	0.7	16.7	0	0.9	10.3	0.3	0.3	15.5	1.1	0.4	12	0.1	0.3	23.6	0.6	0.2	18.1	1	0.6	14.6	1.4	0	12.7	0.6	0.6	16.4	2.3	0.4	27	1.4	1	16.7	1.7	2.7	16.1
2	0.3	18.3	0.3	0	10.6	1	0.3	16.3	0.7	0	12.6	0.3	0	23.9	1.2	0	19.3	0.9	0.3	15.2	0.9	0.3	13.3	2.4	0	18.8	1.1	0.4	27.7	0.8	0.2	17.3	1.9	0.1	17.8
2.1	0.3	20.1	1.7	0	12.3	0.4	0	16.6	1.4	0.2	13.7	1	0.4	24.5	0.6	0	19.9	1.4	0.3	16.3	1.1	0.1	14.3	0.8	0	19.6	2.2	0.3	29.6	2.3	0.5	19.1	3.2	0.7	20.3
0.9	3	18.1	0	0.7	11.6	0.3	1.6	15.3	0.8	1.9	12.6	0.6	1	24.1	0.1	1.2	18.8	0.8	2.2	14.8	0	1.7	12.6	0	1	18.6	0.1	1.9	27.8	0.6	3	16.7	0.8	3	18
0.2	1.1	17.3	0.1	0.4	11.3	0.1	1.4	14	0.4	0.6	12.4	0.1	0.4	23.9	0	0.3	18.5	0.5	0.6	14.8	0.1	0.1	12.6	0	0.4	18.2	0.2	1	27	0.6	0.9	16.4	0.5	1.3	17.2
0.3	0.1	17.5	0.1	0.4	11	0	0.1	13.9	0.3	0.1	12.5	0.1	0.1	23.9	0.2	0.1	18.6	0.4	0.1	15.2	0.1	0	12.7	0.2	0.2	18.2	0	0.2	26.8	0.8	0.2	17	1.6	0.2	18.6
0.5	0.5	17.4	0.3	0.1	11.1	0.1	0.4	13.6	0.4	0.5	12.4	0.3	0.1	24	0.1	0.1	18.6	1	0.3	15.8	0	0.4	12.3	0.2	0.2	18.2	0.6	0.3	27	1.1	0.2	17.9	1.3	0.4	19.5
1.8	1.3	17.9	0.8	1.3	10.8	0.6	0.4	13.9	1.3	1.1	12.7	0.5	1.4	23.1	0.5	0.6	18.5	2.3	1.3	16.8	0.1	1	11.4	0.4	1	17.6	0.6	1.1	26.4	2.6	1.7	18.8	3.1	2	20.7
0.2	0.2	18	0	0	10.8	0	0.1	13.8	0.2	0.3	12.6	0	0.3	22.9	0	0.3	18.3	0.2	0.4	16.6	0.1	0.4	11.1	0	0	17.6	0	0.4	26	0.4	0.4	18.9	0.5	0.8	20.4
0.4	0.4	18	0	0.2	10.7	0	0.5	13.3	0.8	0.2	13.1	0	0	22.9	0	0	18.3	0.4	0.4	16.6	0	0.3	10.9	0	0	17.6	0.2	0.1	26.1	0.4	0.4	18.8	2.4	0.3	22.5
0.7	0.1	18.6	0	0.3	10.3	0	0.1	13.1	0.7	0.1	13.7	0	0	22.9	0.1	0	18.4	0.7	0.2	17.1	0	0	10.9	0	0	17.6	0	0.2	25.9	1.1	0.2	19.7	1.6	0.3	23.7
3.2	1.2	20.7	0	0.2	10.2	0.3	0.8	12.6	3.4	0.4	16.7	0	1.3	21.6	0.3	0.2	18.5	3.9	1.1	19.8	0	0.4	10.4	0.2	0.4	17.4	0.3	0.9	25.3	4.1	1.1	22.7	4.8	1.4	27.1
0.8	1.5	19.9	0	0.3	9.8	0.1	0.3	12.5	1	0.6	17.1	0.1	0.6	21.1	0	0.5	18	1.1	0.5	20.4	0	0.3	10.1	0	0.4	17	0.4	1	24.8	1.2	0.5	23.4	1.2	0.7	27.7
1.9	2.6	19.2	0.2	1.7	8.3	0.8	2.4	10.9	2	2.5	16.7	0.8	1.8	20.1	1.1	1.3	17.8	2	3.4	19	1.4	0	11.6	2.2	2.4	16.8	1.8	2.7	23.9	3.7	3.8	23.3	3.6	7.6	23.8
.	.	.	1.2	3.7	5.8	1	1.8	10.1	.	.	.	1	6.8	14.4	0.8	4	14.6	.	.	.	2.3	3.4	10.4	5.6	3.4	19	2.1	4.1	21.9	.	.	.	.	.	.
.	.	.	0	0.5	5.3	0	0.9	9.3	.	.	.	0.3	1.1	13.5	0	0.5	14.2	.	.	.	0	0	10.4	0.4	0.8	18.6	0.2	1.9	20.2	.	.	.	.	.	.
.	.	.	0	4.1	1.9	0.1	7.9	1.5	.	.	.	0	11.8	1.8	0	11.2	3	.	.	.	0.1	10	0.7	0.2	17.2	2.2	0	18.1	2.1	.	.	.	.	.	.
.	.	.	0	0	1.9	0	1.1	0.4	.	.	.	0	1.1	0.6	0.2	2.2	1.1	.	.	.	0	0.4	0.3	0	1.2	1.4	0	0.6	1.6	.	.	.	.	.	.
.	.	.	0	0.1	1.7	0	0.3	0.1	.	.	.	0	0.5	0.1	0	0.1	1	.	.	.	0	0.1	0.1	0	0.2	1.4	0	0.1	1.4	.	.	.	.	.	.
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2.2	3.5	17.9	.	.	.	.	.	.	3.9	2	18.6	.	.	.	.	.	.	3.7	2.5	20.2	.	.	.	.	.	.	.	.	.	4.4	2.2	25.5	5.5	2	27.7
0.1	0.1	17.8	.	.	.	.	.	.	0.2	0.1	18.6	.	.	.	.	.	.	0	0.1	20.2	.	.	.	.	.	.	.	.	.	0	0.1	25.5	0.4	0.3	27.8
2.4	1.4	18.8	.	.	.	.	.	.	2.1	0.3	20.4	.	.	.	.	.	.	2.2	0.2	22.2	.	.	.	.	.	.	.	.	.	3.2	0.3	28.4	3.6	0.3	30.5
2.4	0.4	20.9	.	.	.	.	.	.	2.3	0.2	22.5	.	.	.	.	.	.	3.2	0.4	24.9	.	.	.	.	.	.	.	.	.	3.6	0.6	31.4	3.7	0.8	33.4
2.6	0.4	23.1	.	.	.	.	.	.	3.1	0.9	24.7	.	.	.	.	.	.	3.2	0.2	27.8	.	.	.	.	.	.	.	.	.	1.6	0.4	32.6	2	0.4	35
1.5	0.4	24.2	.	.	.	.	.	.	1.9	0.4	26.2	.	.	.	.	.	.	1.8	0.3	29.4	.	.	.	.	.	.	.	.	.	1.9	1.1	33.4	4	1.5	37.4
1	1.2	24.1	.	.	.	.	.	.	1.1	1.3	26.1	.	.	.	.	.	.	1.7	1.6	29.5	.	.	.	.	.	.	.	.	.	1.6	1.3	33.7	1.7	1.3	37.8
0.5	0.6	24	.	.	.	.	.	.	0.3	1	25.3	.	.	.	.	.	.	0.1	1	28.6	.	.	.	.	.	.	.	.	.	0.1	0.8	33.1	0.2	1.7	36.2
0.4	23.4	1.3	.	.	.	.	.	.	0.3	25.5	0.4	.	.	.	.	.	.	1.7	29.7	2	.	.	.	.	.	.	.	.	.	0.9	33.4	1.4	1.5	36	2.7
0	1	0.3	.	.	.	.	.	.	0	0.2	0.2	.	.	.	.	.	.	0	0.3	1.7	.	.	.	.	.	.	.	.	.	0	0.6	0.8	0	0	2.7
.	.	.	0	0.3	1.4	0	0	0.1	.	.	.	0	0.1	0	0	0	1	.	.	.	0	0	0.1	0	0.6	0.8	0.2	0.7	1	.	.	.	.	.	.
.	.	.	0	1.4	0	0	0.1	0	.	.	.	0	0	0	0	0.9	0.1	.	.	.	0	0	0.1	0	1.6	0	0	0.8	0.2	.	.	.	.	.	.
		24.5			16.4			24.8			26.2			31.5			20.2			29.5			15.6			19.6			30.2			33.7			37.8
54.2	54.6		21.8	22.4		30.2	30.4		48.8	48.5		38.7	38.7		28.1	28.4		56.2	55.9		24.3	24.3		32.4	34.4		42.9	42.7		61.5	61.7		78.9	78.9	

07:00 (66.5)(B034) [11] {FA19}			07:05 (66.6)(B337) [40] {FA19}			07:12 (66.6)(B338) [25] {FA19}			07:20 (66.6)(B339) [40] {FA19}			07:28 (66.6)(B340) [30] {FA19}			07:36 (66.6)(B326) [29] {FA19}			07:44 (66.6)(B341) [32] {FA19}			07:52 (66.6)(B319) [39] {FA19}			08:00 (66.6)(B320) [24] {FA19}			08:09 (66.6)(B321) [40] {FA19}			08:18 (66.6)(B328) [41] {FA19}			08:27 (66.6)(B329) [38] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
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24.5	0	24.5	13.4	0	13.4	12.1	0	12.1	22.8	0	22.8	25	0	25	21.2	0	21.2	18.8	0	18.8	18	0	18	19.3	0	19.3	16.8	0	16.8	20.8	0	20.8	18.8	0	18.8
4.3	0.2	28.6	1.6	0.1	15	2.2	0	14.3	2.8	0.2	25.5	2.6	0.2	27.4	3.2	0.1	24.3	1.8	0	20.5	2.4	0.1	20.3	2.4	0.1	21.6	2.2	0.2	19.2	2.7	0.1	23.4	2.1	0.2	20.8
1.8	0.1	30.4	0.8	0.1	15.7	0.5	0.1	14.7	0.6	0.3	25.8	1.3	0.3	28.5	1	0.5	24.8	0.4	0.1	20.9	0.9	0.2	21	1.1	0	22.7	0.7	0.1	20.3	0.8	0.3	23.9	0.5	0.1	21.2
0	0	30.4	0	0	15.7	0	0.1	14.6	0.2	0	26	0.3	0.1	28.7	0.2	0	25	0.2	0.1	21	0.1	0	21.1	0.2	0	22.8	0.1	0	19.4	0.1	0	24	0.1	0	21.2
0.9	0.1	31.2	0.4	0.1	16	0.8	0	15.4	1.1	0	27.1	1	0.1	29.6	0.9	0.1	25.8	0.8	0.1	21.6	1.1	0.1	22	1.3	0.1	24	0.9	0.2	20.1	0.8	0.3	24.5	0.9	0.3	21.8
16	1	46.2	11.5	0.3	27.1	11.6	0.4	26.6	18.3	0.9	44.6	16.9	1.5	45	13	0.9	37.9	11	0.5	32.1	14.5	0.6	35.9	12.4	1.1	35.3	12.3	2.1	30.3	11.2	2	33.7	9.9	1.6	30.1
0.5	0.1	46.5	0.9	0.2	27.8	0.4	0.2	26.8	0.4	0.6	44.4	0.9	1.1	44.8	0.8	0.4	38.2	0.6	0.4	32.3	1	0.8	36.1	0.8	0.1	36	1.3	1.2	30.5	1	1	33.6	1.1	0.8	30.4
0.1	0.3	46.4	0.8	0.1	28.5	0.4	0.2	27	0.6	0.5	44.5	1.5	0.6	45.6	0.9	1.1	38	1.4	0.8	32.9	1.8	0.9	37.1	2.3	1.4	36.9	1.3	0.6	31.1	1.1	1	33.8	0.8	0.6	30.6
1.9	8.9	39.4	1.3	9.4	21.1	1	6.7	21.3	2.2	12.4	34.3	2.6	13.6	34.6	2.2	11.9	28.3	1.2	11	23.1	1.3	11.9	26.4	1.5	10.8	27.7	1.2	9.7	22.7	1.1	10	24.9	1	8.9	22.7
1.5	1.4	39.5	1.7	2	20.8	1.2	2.2	20.3	1.6	4.2	31.7	1.1	6.3	29.4	1.3	5.3	24.2	0.7	4.5	19.3	1.4	5.7	22.1	1.1	2.9	25.9	1.1	2.3	21.5	1.1	1.9	24.1	1.3	2	22
1.5	0.5	40.5	2.2	0.5	22.5	1.4	0.3	21.4	2.3	0.8	33.3	2.1	0.5	31	2	0.8	25.4	0.7	0.6	19.5	1.3	0.6	22.8	1.6	0.6	26.9	3.1	0.6	24	2.7	0.5	26.4	1.8	0.3	23.6
3.3	0.9	42.8	3	0.5	24.9	2.6	0.3	23.7	4	0.8	36.4	3.6	0.6	34	3.7	0.7	28.4	2.1	0.4	21.1	3.6	0.4	26.1	3.7	0.5	30.1	3.8	0.6	27.2	4.4	0.4	30.3	3.8	0.5	26.8
1.5	3.8	40.5	0.7	2.6	23	0.6	3.1	21.2	1.2	6.1	31.5	1.3	7.2	28.2	1.6	5.6	24.4	1	3.6	18.5	3.1	4.2	24.9	2.4	5.7	26.8	1.4	4.4	24.3	1.2	3	28.5	1.2	2.8	25.2
1	1.5	40	1.1	1.3	22.8	0.6	1	20.8	1.7	2.2	31	1.2	2.1	27.3	1.6	1.6	24.4	0.3	1.6	17.2	1.5	1.3	25.2	1.2	2	26	1.4	1.5	24.1	1.9	2.1	28.3	1.8	1.5	25.5
0.7	0.5	40.3	1.8	0.4	23.7	1.4	0.1	22.2	2.7	0.7	33	3.3	0.7	29.8	3.9	0.7	27.7	1.9	0.5	18.6	3.2	0.9	27.5	1.9	0.9	27	2.2	0.9	25.4	1.8	1	29	1.9	0.9	26.5
0.5	0.7	40	1	0.3	24.9	1.3	0.4	23	2.4	0.7	34.8	2.1	0.9	31	1.6	0.8	28.5	0.8	0.8	18.6	1.3	1.2	27.6	2.6	0.8	28.8	1.4	1	25.9	2.2	1.5	29.7	1.8	1.2	27.1
1	2.6	38.4	3.3	1.5	26.2	4.1	2.4	24.8	5.7	4	36.5	5	3.9	32.1	4.7	3.7	29.6	4.6	2.1	21.1	6.9	5.3	29.3	5.9	4	30.8	6.1	3.6	28.4	4.7	4.4	30	4.2	4.3	27
0.4	1.5	37.3	0.9	1	26.1	0.7	1.2	24.4	2.6	1.5	37.6	3.6	0.9	34.8	2.3	0.7	31.1	2.1	0.6	22.6	1.9	0.9	30.3	1.4	1	31.2	1.7	0.8	29.3	1.3	1	30.3	1.2	0.7	27.5
0.3	0.5	37.1	0.8	0.4	26.5	0.9	0.4	24.9	1.2	0.5	38.4	1.2	0.4	35.6	0.8	0.2	31.7	0.9	0.3	23.2	1.6	0.4	31.5	0.9	0.2	31.9	1.5	0.2	30.6	1.9	0.3	31.9	1.8	0.4	28.9
0.1	0.5	36.6	2.7	0.3	28.9	2	0.2	26.6	1.8	0.3	39.9	2.5	0.1	38	2.1	0.4	33.3	1.5	0.2	24.5	2	0.3	33.3	0.9	0.5	32.3	1.4	0.6	31.5	1.5	0.8	32.6	0.9	0.7	29.2
0.5	1.5	35.7	5.5	1.9	32.5	4.2	2.2	28.6	6.3	3.1	43.1	8.2	2.6	43.6	6.9	2.6	37.6	6.2	2.2	28.5	6.8	2.8	37.3	4.4	4.1	32.6	6.6	3.7	34.4	5.7	3.6	34.7	4.7	4.4	29.6
0.2	0.8	35.1	1.1	0.2	33.3	1.4	0.2	29.8	1.5	0.7	43.9	0.8	0.6	43.9	1.6	0.5	38.6	1.3	0.6	29.2	1.4	0.6	38.1	1.7	0.9	33.4	1.5	1.2	34.7	1.5	1.1	35.1	1.2	1.3	29.4
3.6	3	35.7	2.8	6.3	29.8	2.8	5.6	27	3.4	8.5	38.8	3.6	7.6	40	2.9	5	36.6	2.2	3.4	27.9	3.2	3.6	37.7	2.9	4.4	31.9	3.7	4.2	34.1	3.8	3.7	35.2	4.1	3.2	30.2
2.1	3.5	34.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
0	0.8	33.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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0.1	0.7	1.8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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.	.	.	4.3	2.5	31.5	3.7	2.3	28.3	4.7	2.1	41.3	3.9	2.5	41.4	4.3	3	38.8	2.7	2.5	28.1	4.5	3	39.3	3.8	2.7	32.9	5.2	3.6	35.9	5	3.6	36.7	3.4	2.2	31.5
.	.	.	0.1	0.1	31.5	0.3	0	28.6	0.3	0.1	41.5	0.5	0	41.8	0.4	0	39.2	0	0	28.1	0.2	0.1	39.4	0.3	0.1	33.2	0.1	0.1	36	0.1	0.1	36.7	0.1	0.1	31.5
.	.	.	2.8	0.4	33.9	5	0.4	33.1	3.7	0.3	44.8	4.1	0.2	45.7	3.5	0.1	41.6	2.7	0.3	30.5	3.4	0.2	42.6	2.6	0.2	35.6	3.3	0.5	38.4	4	0.4	40.3	2.8	0.2	34.1
.	.	.	3	0.4	36.5	3.6	0.4	36.3	3.5	0.4	47.9	2.1	0	47.8	3.3	0.3	44.6	2.8	0.1	33.2	3.4	0.2	45.7	2.5	0.1	38	2.1	0.2	40.3	2	0.5	41.9	2.3	0.6	35.8
.	.	.	2.2	0.2	38.6	2	0	38.3	3.7	0.1	51.6	2.1	0	49.8	1.9	0.1	46.4	3.1	0	36.3	1.8	0	47.5	1.8	0.1	39.7	1.9	0.1	42.1	1.5	0.1	43.2	1.8	0.2	37.4
.	.	.	2.7	2	39.3	2.6	1.4	39.5	2.7	1.3	53	2.8	1.5	51.2	2.3	1.1	47.5	1.7	0.8	37.2	1.7	0.7	48.5	2.5	1.4	40.8	1.6	0.8	42.9	1.4	0.8	43.8	1.8	0.9	38.3
.	.	.	2	1.2	40.1	1.2	0.9	39.9	2	1.5	53.6	2	1.9	51.2	2.2	2	47.7	1.7	2.1	36.8	2.1	2.1	48.4	2.1	2	40.9	1.6	2.5	42	1.2	1.6	43.4	1.6	1.2	38.7
.	.	.	0.3	2.4	38	0.4	1.6	38.7	0.8	1.7	52.7	0.5	1.8	49.9	1	2.6	46.1	0.2	1.3	35.6	0.3	1.7	47	0.2	1.5	39.5	0.4	1.9	40.5	0.3	1.5	42.2	0.2	1.1	37.8
.	.	.	1.3	38.9	1.6	2.1	40.5	2.3	1.3	53.8	1.3	0.9	50.7	0.9	1.8	46.9	2.3	0.6	36	0.6	1	47.7	1.1	0.8	39.9	1.1	0.5	40.3	1	0.9	42.8	1	0.9	38.1	1.4
.	.	.	0	0.4	1.3	0	0.3	2	0	0.1	1.2	0	0.1	0.8	0	0.7	1.6	0	0.2	0.5	0	0.3	0.8	0	0.4	0.7	0	0.4	0.6	0	0.2	0.8	0	0.6	0.8
0	0.3	1.5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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		46.5			40.1			39.9			53.6			51.2			47.7			37.2			48.5			40.9			42.9			43.8			38.7
68.3	68.2		78	78		75.1	75.1		110.1	110.4		110.6	110.6		101.1	100.4		78	77.7		98.7	98.8		90.5	90.5		90.4	90.1		91.7	91.6		81.8	81.9	

08:36 (66.6)(B331) [3] {FA19}			08:46 (66.6)(B333) [34] {FA19}			08:56 (66.6)(B334) [26] {FA19}			09:08 (66.6)(B335) [30] {FA19}			09:20 (66.6)(B337) [33] {FA19}			09:32 (66.6)(B339) [34] {FA19}			09:44 (66.6)(B326) [37] {FA19}			09:57 (66.6)(B319) [28] {FA19}			10:10 (66.6)(B321) [41] {FA19}			10:23 (66.6)(B328) [33] {FA19}			10:36 (66.6)(B333) [31] {FA19}			10:49 (66.6)(B334) [30] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
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12.3	0	12.3	18.2	0	18.3	16.9	0	16.9	21.5	0	21.5	17.3	0	17.3	17.1	0	17.1	15.7	0	15.7	13.3	0	13.3	17.6	0	17.6	11.5	0	11.5	12.5	0	12.5	8.8	0	8.8
2	0.3	14	2.9	0.3	20.8	2.2	0.1	19	1.4	0.1	22.7	1.9	0.2	19	1.9	0.3	18.8	1.8	0.2	17.3	0.9	0.1	14.1	1.3	0.1	18.8	1.4	0.1	12.8	1.2	0.1	13.6	1	0	9.8
0.3	0	14.3	0.1	0.1	20.9	0.1	0.1	19	0.4	0	23.1	0.3	0.1	19.2	0.4	0.1	19.1	0.1	0.1	17.3	0.1	0	14.2	0.2	0	19	0.3	0	13.1	0.1	0	13.7	0	0	9.8
0	0	14.3	0	0.1	20.8	0	0	19	0.1	0	23.1	0.1	0	19.3	0	0	19.1	0	0	17.3	0	0	14.3	0.3	0	19.2	0.1	0	13.2	0	0	13.7	0.1	0	9.8
0.7	0	15	0.6	0.1	21.3	0.7	0.3	19.5	0.7	0.1	23.7	0.9	0.2	20	0.5	0.1	19.5	0.4	0.1	17.6	0.1	0.1	14.3	0.7	0.3	19.6	0.3	0.2	13.3	0.4	0.1	14	0.9	0.2	10.5
14.3	0.7	28.7	10	1.9	29.4	7.1	2.2	24.3	9.6	1.4	31.9	9.3	0.9	28.4	8.2	1.4	26.2	8.1	1.4	24.3	6.4	1.4	19.3	9.5	1.4	27.7	7.5	1.3	19.5	5.9	1.2	18.7	4.4	0.9	14
0.3	1	28	1.1	2	28.5	1.1	1.7	23.7	0.8	0.7	32	1.1	0.8	28.7	0.7	0.8	26.1	0.7	0.5	24.4	0.7	0.5	19.5	0.9	0.9	27.7	0.5	0.4	19.7	0.6	0.5	18.8	0.9	0.5	14.4
0.7	0.3	28.3	0.9	0.8	28.7	0.3	0.9	23.2	1	0.3	32.7	1.8	0.9	29.5	0.6	0.5	26.2	0.6	0.5	24.5	0.7	0.5	19.7	0.6	1	27.3	0.2	0.8	19.1	0.2	0.7	18.3	0.6	0.6	14.4
1.7	8.7	21.3	0.9	8.3	21.3	1.2	4.9	20.3	1.2	6.9	27	1.2	7.3	23.4	1.5	6.7	20.9	1.2	5.8	19.9	1	4.1	16.6	1.5	6	22.7	1.3	5.3	15.1	0.9	3.7	15.4	0.6	4	11.1
1	2.3	20	1	1.3	20.9	1.7	1.7	20.3	2.1	1.2	27.8	2.4	1	24.8	2.5	1	22.4	1.6	1.4	20.1	1.3	0.9	17	2	1.2	23.6	2	1.2	15.9	1.6	0.9	16.1	2.2	0.6	12.7
1.7	0.7	21	1.8	0.9	21.8	3	0.3	23	2.8	1.1	29.5	1.9	0.9	25.7	1.7	1.5	22.6	1.6	1.6	20.1	1.7	1.3	17.4	2.9	1.8	24.7	1.8	1.1	16.6	2.7	1	17.8	1.5	0.8	13.5
4.3	0.3	25	5.6	0.4	27	4	0.5	26.5	4.6	0.7	33.4	4.2	0.5	29.4	3	0.7	25	2.9	0.6	22.4	2.3	0.4	19.3	3.2	0.8	27.1	2.2	0.7	18.2	2.5	0.5	19.7	2	0.3	15.2
0.3	1.7	23.7	1.2	3.5	24.7	1	2.8	24.6	2.3	2.9	32.8	1.3	2.5	28.2	0.8	2.2	23.6	1.4	2.6	21.3	2.1	2.1	19.3	2	2.7	26.4	1	1.8	17.3	1.2	1.6	19.3	0.9	1.3	14.8
1	0.7	24	2	2.1	24.6	1.5	1.8	24.4	2.4	2.4	32.8	1.9	1.8	28.3	1.4	1.9	23.1	2.3	1.8	21.8	3	1	21.3	3.4	1.2	28.6	2	1.8	17.5	2.1	1.4	20	2.3	0.9	16.3
1	0.7	24.3	1.7	0.6	25.8	1.3	0.3	25.3	2.9	0.6	35.1	1.6	0.3	29.6	1.4	0.4	24	2.1	0.5	23.4	1.4	0.7	22	1.8	0.3	30.1	1.6	0.4	18.7	1	0.3	20.7	1.9	0.3	17.8
0	1.3	23	1.6	1	26.4	1.2	1	25.6	1.4	0.8	35.7	1.3	1.1	29.8	0.9	1.3	23.6	1	1	23.4	1.3	0.9	22.4	1.5	1.3	30.3	0.7	0.6	18.8	1	1.2	20.5	1.5	0.5	18.8
0.3	4.3	19	4	4.4	26.1	4.3	2.9	27	5.3	6.6	34.4	4.4	5.5	28.7	3.5	3.6	23.5	3.6	3.9	23.1	3.4	2.9	22.9	5	5	30.3	3.5	3.5	18.8	4.5	4	21	2.8	2.6	19
0	0.3	18.7	1.1	0.8	26.4	1.2	2.1	26.1	1.7	1.8	34.3	1.3	1.3	28.7	1.1	0.8	23.8	1	0.6	23.5	1.2	1	23.1	1.8	0.9	31.3	0.9	0.8	18.9	1.2	2	20.2	1.1	0.9	19.1
0.7	0.3	19	2.3	0.5	28.2	1.1	0.6	26.6	1.5	0.8	35	1	0.7	28.9	0.7	0.6	23.9	0.5	0.5	23.5	0.7	0.9	23	1	1.1	31.1	0.6	1.1	18.4	0.5	0.6	20	0.3	0.4	19.1
2.3	0.7	20.7	1.1	0.9	28.3	1.1	1	26.7	2	1.9	35.1	0.9	1.7	28.1	0.6	0.9	23.6	0.7	1.4	22.8	0.9	0.7	23.2	0.8	1.6	30.4	0.6	0.9	18.1	0.6	1.7	19	0.6	1.2	18.6
6.7	2	25.3	5.2	2.6	30.9	5	3	28.7	5.9	4.6	36.5	4.6	4	28.7	4.4	4.1	23.9	4.8	3.9	23.7	4.8	4	24	4.2	3.9	30.7	2.6	3	17.6	2.4	3.1	18.3	2.9	2.5	19
0.7	1.3	24.7	1.8	1.7	31	2.7	1.8	29.6	2.3	2.9	35.9	1.5	2.1	28.1	1.3	1.8	23.3	1.3	1.7	23.3	1	2.5	22.5	1.4	3.7	28.5	0.7	1.9	16.4	1.2	1.9	17.6	0.9	1.7	18.2
4.7	3.3	26	3.1	2.4	31.7	3.6	3	30.2	4.4	3.7	36.5	3.2	3.2	28.1	2.3	2.7	22.9	2.4	2.5	23.2	1.9	2.7	21.7	2.5	2.7	28.3	1.5	2.2	15.7	1.8	1.8	17.5	1.4	1.9	17.7
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2	1.7	26.3	2.6	2.2	32.1	3.5	2.2	31.5	4.9	3	38.5	4.2	2.9	29.4	2.8	2.1	23.6	2.8	1.9	24	3.3	1.3	23.7	3	2.5	28.8	1.9	1.9	15.9	3.4	1.7	19.2	1.9	1.6	18
1	0.7	26.7	0.1	0.2	32.1	0.1	0	31.6	0.1	0.1	38.5	0.1	0.1	29.4	0.1	0.2	23.6	0.1	0.7	23.4	0.1	0.1	23.7	0	0.1	28.7	0.1	0.1	15.9	0.5	0.2	19.5	0	0.1	17.9
2	0.7	28	2.2	0.6	33.7	3.6	0.2	35	3.2	0.4	41.3	2.4	0.5	31.3	1.9	0.4	25.1	1.9	0.2	25	1.5	0.2	25	1.9	0.4	30.2	1.7	0.1	17.4	1.4	0.2	20.6	0.9	0.3	18.5
2.7	0.3	30.3	1.6	0.3	35	2.5	0.3	34.9	2.9	0.6	43.6	2.1	0.3	33.1	1.7	0.4	26.4	1.7	0.5	26.2	1.6	0.6	26	1.2	0.6	30.9	0.6	0.3	17.7	0.8	0.5	20.9	0.8	0.3	18.9
1.7	0.3	31.7	1.2	0.1	36.1	1.6	0.1	37.7	1.2	0.5	44.3	1.3	0.4	34.1	0.8	0.3	26.9	1.4	0.5	27.1	0.6	0.3	26.4	0.9	0.4	31.3	0.8	0.3	18.1	0.7	0.2	21.4	0.6	0.4	19.1
0	0.3	31.3	0.8	0.8	36.1	1	0.6	38	1	1.3	44	1.1	0.6	34.6	0.9	0.9	26.9	0.7	1.1	26.7	1	1.2	26.1	1	1	31.3	0.7	0.6	18.2	0.6	0.4	21.6	0.4	0.4	19.1
1.3	2.7	30	1.7	1.5	36.3	1.6	1.5	38.1	1.9	1	44.9	1.2	1.4	34.4	1.1	2	26	1.1	1.8	26	1	1.6	25.6	1.6	2	31	0.9	1.5	17.7	0.8	1.8	20.6	1	1.7	18.4
0	0.7	29.3	0.2	1.3	35.1	0.3	1.1	37.3	0.2	0.6	44.6	0.3	0.5	34.2	0.2	0.9	25.3	0.1	0.4	25.7	0.4	0.6	25.4	0.2	0.6	30.6	0.2	0.4	17.5	0.2	0.8	20	0.1	0.4	18.2
0.3	29	1	0.8	35.7	1	0.6	37.6	0.7	0.9	45.2	1.2	1.2	35	1.5	0.4	25.4	0.7	1.5	26.4	2.1	0.7	25.6	1.1	0.5	30.6	0.8	0.2	17.2	0.7	1	20.5	1.3	0.5	17.9	1.2
0	0.7	0.3	0	0.2	0.8	0	0.2	0.5	0	0.3	0.9	0	0.2	1.2	0	0.3	0.4	0	0.8	1.3	0	0.5	0.6	0	0.4	0.3	0	0.5	0.1	0	0.5	0.8	0	0.8	0.3
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		31.7			36.3			38.1			44.9			34.6			26.9			27.1			26.4			31.3			19.7			21.6			19.1
68	68		79.4	79.6		77.1	76.8		94.6	94.5		79.3	78.9		66.4	66.3		67.1	66.9		60.4	60.7		76.4	76.5		51.9	52		55.5	55.1		45.8	46	

11:02 (66.6)(B335) [20] {FA19}			11:15 (66.6)(B337) [22] {FA19}			11:28 (66.6)(B339) [31] {FA19}			11:41 (66.6)(B326) [32] {FA19}			11:54 (66.6)(B319) [20] {FA19}			12:07 (66.6)(B321) [26] {FA19}			12:20 (66.6)(B328) [24] {FA19}			12:33 (66.6)(B333) [27] {FA19}			12:46 (66.6)(B332) [28] {FA19}			12:59 (66.6)(B334) [43] {FA19}			13:10 (66.6)(B335) [39] {FA19}			13:20 (66.6)(B337) [37] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
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12.5	0	12.6	14.3	0	14.3	12.5	0	12.5	12.3	0	12.3	8.5	0	8.5	14.3	0	14.3	12.4	0	12.4	15.3	0	15.3	11.8	0	11.8	13.3	0	13.3	15.3	0	15.3	14.6	0	14.6
1.3	0	13.9	2.9	0.1	17.1	1.2	0	13.7	1.3	0	13.6	1	0	9.5	1.1	0	15.4	1.7	0.1	14	1.1	0	16.5	0.9	0	12.7	1	0	14.3	1.2	0.1	16.4	1.2	0	15.8
0.1	0	14	0.1	0	17.2	0.5	0	14.2	0.2	0	13.8	0.2	0	9.6	0.2	0.1	15.5	0.5	0.1	14.3	0.4	0	16.9	0.2	0	12.8	0.5	0	14.7	0.5	0.1	16.9	0.2	0	16.1
0.1	0.1	14.1	0.2	0	17.4	0.4	0	14.5	0	0	13.8	0.2	0.1	9.8	0.1	0	15.5	0.1	0	14.4	0.2	0	17.1	0.4	0	13.2	0.6	0	15.3	0.2	0	17.1	0.1	0	16.2
0.8	0.2	14.7	0.5	0	17.9	1.1	0.3	15.3	0.7	0.4	14.1	0.3	0.3	9.7	0.6	0.1	16.8	0.4	0.2	14.6	0.7	0.4	17.4	0.5	0.2	13.5	0.7	0.3	15.8	0.4	0.2	17.2	0.3	0.1	16.3
6	1.2	19.5	6.4	1.4	22.9	5.2	1.8	18.7	7.2	1.5	19.9	5.4	1.1	14	6	1	21.8	5.5	1.3	18.8	6.2	1.7	21.9	6.4	1.5	18.4	7.5	1.3	22	10.4	1.6	25.9	7.3	1.3	22.4
0.5	0.2	19.8	0.6	0.6	22.8	0.7	0.5	18.9	0.9	0.8	20.1	0.3	0.2	14.1	0.8	0.7	22	0.7	0.4	19.2	0.6	0.9	21.7	0.4	0.6	18.2	0.7	0.5	22.2	1.1	0.5	26.5	0.5	0.3	22.6
1.3	1.1	20	0.7	0.8	22.8	0.5	0.5	19	0.8	0.5	20.3	0.5	0.3	14.3	0.8	0.7	22.1	0.8	0.7	19.3	0.3	0.9	21	0.7	0.6	18.3	0.7	0.7	22.3	0.8	1.2	26.2	0.8	0.6	22.7
1.7	5	16.8	1	4.3	19.5	0.9	4.2	15.8	1.5	4.5	17.3	1.3	3	12.6	2.5	4.8	19.8	1.3	4.9	15.7	1.2	3.8	18.4	1.6	4.2	15.7	1.9	5.1	19.1	1.9	5.2	22.9	1.3	4.8	19.2
2.6	1.4	18	2.5	1	21	2.3	0.6	17.4	2.6	1.2	18.8	2.5	0.8	14.2	2.8	1	21.6	3.1	1.6	17.2	3.5	1.5	20.4	3.7	0.9	18.5	4.8	1	22.9	4.4	1.5	25.8	3.8	1.6	21.4
1.7	1	18.7	1.4	1.7	20.6	1.7	0.9	18.2	1.9	2.2	18.5	1.2	1.4	14.1	1.6	1.4	21.8	1.3	1.2	17.3	1.5	1	20.9	1.2	1	18.8	1.6	1.3	23.2	1.6	1.7	25.7	1.6	1.4	21.6
2.3	0.4	20.6	2	0.8	21.9	2.6	0.9	19.9	2.9	0.6	20.8	2	0.9	15.2	2.9	0.5	24.2	2.7	0.6	19.5	1.8	0.6	22	2.4	0.4	20.8	2.3	0.8	24.7	2.8	0.4	28.1	2.4	0.9	23.1
2.3	2.5	20.3	1.3	2.4	20.8	1.5	2.1	19.4	1.1	2	19.9	0.7	1.9	13.9	1.7	2.1	23.8	1.5	1.5	19.5	1.6	2.5	21.1	1.9	1.9	20.8	1.6	2.2	24.2	2.2	3.2	27.1	1.8	2.8	22.1
2.2	1.4	21.2	2.7	1.3	22.3	2.6	0.9	21.1	2.7	1.3	21.3	1.8	0.9	14.9	3.1	1.5	25.5	2.6	1	21	2.7	0.8	23	2.2	0.7	22.2	3	1.1	26	2.6	1.2	28.5	2.2	1	23.2
1.9	0.8	22.3	1.2	0.9	22.6	1.9	0.8	22.2	1.4	0.3	22.4	1.1	0.3	15.7	1.9	0.5	26.8	1	0.8	21.3	0.9	0.6	23.4	1.6	0.8	23.1	1.3	0.5	26.8	0.9	0.5	28.8	1.1	0.5	23.9
1.4	0.6	23.1	1.4	0.8	23.1	1.3	0.7	22.8	1.3	1	22.8	1.2	0.5	16.3	0.8	1	26.7	0.7	0.6	21.4	0.6	0.9	23.1	1.1	0.4	23.9	1.2	0.8	27.2	0.9	1.1	28.7	1.1	1.2	23.9
3.2	4.2	22.1	3.9	3.6	23.5	4.4	3.7	23.5	4.4	4.5	22.7	4.4	3.8	16.9	4.3	4	26.9	3.5	4	20.9	4.5	4.6	22.9	3.5	4.9	22.5	4.8	4.3	27.7	4.8	4.1	29.4	3.5	3.8	23.6
1.2	0.4	22.9	1.5	0.6	24.3	1.8	0.8	24.4	1.1	0.6	23.2	1.1	1.3	16.7	2.4	1.2	28.1	1.1	1.2	20.8	1.4	0.7	23.7	2	0.6	23.8	1.2	0.9	28	1.1	0.9	29.6	0.7	0.8	23.5
0.4	0.4	22.9	0.3	0.2	24.5	0.4	0.8	24	0.4	0.8	22.8	0.4	0.4	16.7	0.5	1.2	27.4	0.4	1.4	19.8	0.5	0.9	23.4	0.5	0.7	23.6	0.7	1.4	27.3	0.6	0.9	29.2	0.5	0.8	23.2
1.4	1.5	22.8	1.2	0.8	24.9	0.5	1.7	22.8	0.4	1.8	21.3	0.6	1.4	15.8	0.6	1.8	26.2	0.4	1.5	18.7	0.5	1.5	22.4	0.3	1	22.9	0.5	1.9	26	0.7	2.3	27.7	0.8	1.8	22.2
4.2	5.1	21.8	3.8	4.5	24.2	3.2	5	21	3.6	5.2	19.7	2.1	2.8	15.1	3.2	5	24.4	2.7	4.5	16.9	3.3	4.4	21.3	2.7	4.8	20.8	3.1	5.1	24	3.1	5.5	25.3	3.1	4	21.3
1.4	2.8	20.4	1.6	2.1	23.7	1.4	2.5	19.9	1.1	2.5	18.3	1.3	1.7	14.7	1.5	2.5	23.4	1.5	1.8	16.7	2	2.7	20.6	1.1	3	18.9	1.2	2.5	22.7	1.1	2.7	23.6	1.2	2.1	20.4
1.7	2.2	19.9	2	2.4	23.3	2	2.4	19.5	2.3	2.5	18.1	2.1	1.8	15	1.9	2.2	23.2	2.1	1.8	17	2.7	3.3	20	1.4	3.2	17.1	2	3.1	21.5	1.4	4.1	20.9	1.6	2.9	19.2
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2.5	2.1	20.3	2.3	1.8	23.8	3.5	1.7	21.3	2.8	2.1	18.8	2.1	1.4	15.6	2.1	2.3	23	1.9	1.6	17.3	2.6	1.9	20.7	2.3	3.1	16.9	2.3	3.3	20.6	2.8	3.2	20.5	4.4	2.6	20.9
0.1	0.1	20.4	0	0.1	23.6	0.3	0.1	21.5	0.1	0.2	18.7	0.3	0.3	15.6	0.1	0.1	22.9	0.1	0.4	17	0	0.1	20.6	0.1	0.1	16.4	0.1	0.2	20.6	0.1	0.4	20.2	0.2	0.4	20.8
1.8	0.4	21.8	1	0.4	24.2	1.8	0.3	22.9	1.3	0.3	19.7	0.6	0.4	15.8	1.7	0.7	24	1.6	0.4	18.2	1.9	0.6	21.9	1.2	0.7	16.9	1.5	0.4	21.6	0.9	0.5	20.6	1.3	0.1	22
0.3	0.4	21.7	0.7	0.7	24.3	1.1	0.6	23.4	1	0.6	20.1	0.6	0.8	15.6	1.1	0.5	24.5	1	0.8	18.4	1.3	1.1	22	1.1	0.7	17.4	0.9	1.1	21.4	0.6	1.3	19.9	1.1	2.2	20.9
0.8	0.6	21.9	0.5	0.5	24.2	0.6	1.1	22.9	1	0.6	20.5	1.1	1.1	15.6	1	1	24.5	1	0.8	18.6	1	0.6	22.4	1.1	0.3	18.2	1	0.3	22	0.6	1.2	19.4	0.6	0.7	20.8
0.6	2.2	20.3	0.5	1.2	23.5	0.6	1.1	22.5	0.5	1	19.9	0.6	0.8	15.4	0.4	1.8	23.2	0.8	0.5	18.9	0.9	0.7	22.6	0.5	1	17.8	0.3	1.4	21	0.4	1.2	18.7	0.5	1.2	20
1.7	2.2	19.9	1.6	2.3	22.8	1.8	1.3	23	1.6	1.8	19.7	0.8	1.5	14.7	1.5	1.6	23.1	1.5	2.3	18.1	1.6	2	22.3	0.8	2.1	16.4	1	2.7	19.4	1	2.1	17.5	0.8	2.1	18.8
0.5	0.6	19.8	0.3	0.6	22.4	0.5	1	22.5	0.3	1.1	18.8	0.1	0.6	14.2	0.3	0.7	22.7	0.6	0.7	18	0.4	1	21.7	0.4	0.4	16.4	0.3	0.7	18.9	0.3	0.5	17.4	0.4	0.3	18.9
0.6	20	0.9	0.5	21.7	1.7	0.3	22.5	0.5	0.3	18.8	0.6	1.1	14.8	1.4	0.6	22.8	1.1	0.8	17.5	1.9	0.9	21.9	1.5	0.6	16	1.4	1.2	19.2	1.9	0.9	17.1	2	0.7	18.7	1.4
0	0.4	0.6	0	1.2	0.5	0	0.2	0.3	0	0.2	0.4	0	0.5	1	0	0.5	0.6	0	1.4	0.5	0	0.7	0.8	0	0.9	0.5	0	0.8	1.1	0	1.2	0.8	0	0.9	0.5
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		23.1			24.9			24.4			23.2			16.9			28.1			21.4			23.7			23.9			28			29.6			23.9
61.1	61.5		60.9	60.8		61.1	61		61	60.9		47.5	47.1		64.4	65.3		57.3	57.6		64.1	64.3		56.6	56.7		64.8	64.9		67.6	67.7		61.7	61.9	

Trip (RouteVar)(Block) [Observations]

13:30 (66.6)(B339) [28] {FA19}			13:40 (66.6)(B326) [38] {FA19}			13:40 (66.8)(B032) [13] {FA19}			13:50 (66.6)(B350) [46] {FA19}			13:53 (66.6)(B319) [8] {FA19}			14:00 (66.6)(B322) [40] {FA19}			14:10 (66.6)(B321) [28] {FA19}			14:20 (66.6)(B324) [41] {FA19}			14:30 (66.6)(B327) [32] {FA19}			14:40 (66.6)(B328) [26] {FA19}			14:50 (66.6)(B330) [24] {FA19}			15:00 (66.6)(B333) [30] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
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14.9	0	14.9	14.8	0	14.8	2.2	5.2	35.8	9.1	0	9.1	13.5	0	13.5	12.5	0	12.5	13.6	0	13.6	16.2	0	16.2	17.4	0	17.5	13.3	0	13.3	12.1	0	12.1	15.6	0	15.6
1.1	0	16	2	0.1	16.7	1.2	0	37	6.3	0.1	14.9	6.4	0.1	19.8	2.8	0	15.3	1.8	0	15.4	1.3	0	17.8	1.1	0	18.6	0.8	0	14.2	0.8	0	12.8	1.4	0.2	16.8
0.2	0	16.2	4.7	0.1	21.3	1.1	0	38.1	15.8	0.3	31.2	9.3	0	29	7.9	0.3	23.5	3.3	0.1	18.6	4.3	0.1	22	4.1	0.2	22.4	2.8	0.2	16.8	1.5	0	14.3	3.2	0.1	19.9
0.1	0	16.3	0.1	0	21.4	0	0	38.1	0.6	0.1	31.7	0	0	29	0.5	0.1	23	0.2	0.1	18.6	0.3	0	22.2	3.1	0.1	25.4	3.6	0.1	20.4	1	0	15.2	0.4	0	20.2
0.4	0.1	16.6	0.4	0.9	20.8	0.1	0.7	37.5	0.7	0.8	31.6	1.4	1	29.4	0.7	0.6	24.2	0.5	0.1	19	1.4	0.4	22.6	1.7	0.8	26.3	1.9	0.4	21.9	0.6	0.2	15.6	0.4	0.5	20.1
9.4	1.6	24.5	7.9	2.9	25.9	2.6	3.1	37	5.2	5.9	31.1	5.3	3.3	31.4	4.2	3.4	25	5.5	2.2	22.4	7.2	3	26.9	10.7	2.6	34.5	8.5	2.3	28.1	8.1	2	21.8	11.9	2.5	29.5
0.5	0.5	24.5	0.8	0.3	26.3	0.2	0	37.2	0.6	0.7	31	0.1	0.3	31.3	1	0.7	25.4	0.2	0.7	21.8	1.2	1	27.1	1.2	1.2	34.4	0.5	0.6	28	0.6	1.3	21	0.7	0.9	29.4
0.5	0.8	24.2	0.6	1	25.9	0.3	0.8	36.7	0.3	0.7	30.7	0.1	1.6	29.8	0.3	0.6	25	0.5	0.8	21.6	0.4	0.8	26.8	0.8	0.8	34.5	0.9	0.7	28.2	1	1.1	20.9	1	1.2	29.2
1.8	4.8	21.2	1.8	4.9	22.8	0.4	3.9	33.2	1.5	5.4	26.8	0.6	4.4	26	1.5	4	22.6	1.9	4.9	18.6	3	5.7	24	2.9	7.3	30.2	2.5	5.2	25.6	2.6	3.2	20.3	3.8	5.3	27.7
3.9	1.4	23.7	3.4	1.3	25	0.3	0.2	33.2	2.7	1.2	28.3	2.1	1.1	27	2.7	1.4	23.9	2.6	1	20.3	5.4	1.9	27.5	6.5	1.7	35	4.6	1.8	28.5	5	1.4	23.9	7.2	1.9	32.9
2.1	1.6	24.2	1.9	2.1	24.8	0.2	2.1	31.3	1.1	2.2	27.2	0.9	2.1	25.8	1.3	2	23.1	0.4	1.8	18.9	1.6	2.3	26.8	1.8	2.5	34.3	1.5	2	27.9	2.3	2	24.1	1.8	2.8	31.9
3.5	0.7	27	2.4	0.8	26.4	0.6	0.3	31.6	1.1	0.6	27.8	1.3	0.5	26.5	1.7	0.4	24.5	1.3	0.5	19.7	1.6	1	27.5	2.5	1.1	35.6	2.2	0.6	29.5	2.6	0.6	26.1	2.7	1.2	33.4
1.5	2.4	26	1.2	2.8	24.7	0.1	0.6	31.1	0.8	2.5	26.1	0.8	1.4	25.9	0.8	2.1	23.2	0.9	2.1	18.6	1.7	1.4	27.8	1.8	2	35.5	1.6	1.7	29.4	1.8	1.5	26.4	1.9	2.3	32.9
2.6	1.2	27.5	1.6	1.7	24.6	0.1	0.1	31.1	1.5	0.7	26.9	1.4	0.6	26.6	1.4	0.9	23.6	1.6	1	19.1	2	1.3	28.6	2.5	1.4	36.6	3.3	0.7	32	3.2	1.3	28.4	2.2	1.2	34
1	0.6	27.8	1.8	0.7	25.7	0	0	31.1	1.4	0.6	27.7	1.6	0.4	27.9	2.1	0.5	25.2	2	0.4	20.8	3.6	0.7	31.6	3.3	0.8	39.2	2.4	0.3	34.1	1.6	0.7	29.3	2	0.9	35.1
1.2	1	28	0.7	1.1	25.3	0	0.1	31	0.5	0.6	27.6	0.9	0.9	27.9	0.4	0.6	25.1	0.4	0.8	20.4	0.9	1	31.4	1.2	1.3	39.1	0.7	0.6	34.2	1	0.6	29.7	0.8	1.1	34.8
4.9	5.2	27.7	4.1	4.3	25.1	0.9	0.5	31.5	2.5	3.3	26.7	2	3.1	26.8	2.4	3	24.5	2.9	2.6	20.7	3.5	4.2	30.7	4.5	4.7	38.8	3.4	5.8	31.8	3.4	4.1	29	3.7	5.2	33.3
0.9	1	27.6	1.2	1.1	25.3	0.4	0.2	31.6	1	0.7	27	0.8	0.6	26.9	0.6	0.5	24.6	1	0.6	21.1	0.9	1	30.5	2.3	1.4	39.7	2.5	1.1	33.2	1.1	0.5	29.7	1.7	1	34
0.6	0.8	27.4	0.5	0.6	25.2	0.3	0.4	31.5	0.3	0.4	26.9	0.5	0.5	26.9	0.3	0.6	24.2	0.3	1.1	20.3	0.6	1.1	30	1.4	1.1	40	0.7	0.7	33.2	0.5	0.6	29.5	0.5	0.6	33.9
0.8	2.4	25.8	0.7	1.6	24.3	0.1	0.7	30.9	0.4	1.2	26.1	0	0.9	26	0.2	1.4	23	0.5	1.4	19.4	0.8	1.2	29.6	0.7	2.4	38.3	0.5	2.3	31.4	0.4	1.5	28.4	0.9	2.4	32.4
2.8	5.4	23.1	2.4	4.7	21.9	0.4	1.8	29.5	1.8	3.9	24	0.6	3.6	23	1.5	5.1	19.4	1.8	3.3	17.8	2.5	4.9	27.1	2.5	5.7	35.1	2.5	5.9	28	3	6	25.4	3.4	5.8	30
1.3	2.3	22.2	1.2	2.6	20.6	0.2	2.9	26.8	0.7	1.9	22.8	0.3	1.1	22.1	0.9	2.1	18.2	1.1	1.9	17	1.3	2.5	26	1.4	4.9	31.7	1.6	3.8	25.8	1.2	2.9	23.7	1.4	3.5	27.9
2.4	2.8	21.7	2	4.6	18	3.4	2.6	27.6	1.9	5.9	18.8	0.8	6.8	16.1	1.7	3.3	16.7	1.8	3.3	15.5	2.1	3.6	24.5	2	3.9	29.8	2.2	3.8	24.3	2	3.4	22.3	2.3	3.4	26.8
.	.	.	.	.	.	1.2	3.1	25.8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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4.4	2.9	23.3	4	3	19	.	.	.	3	4.1	17.8	2.1	3.9	14.4	2.9	3.3	16.3	2.8	3.3	15	3.1	3.6	24	3	4	28.8	3.2	3.6	23.8	3.4	2.9	22.8	4.3	4.5	27.2
0.2	0.3	23.1	0.2	0.3	18.9	.	.	.	0.1	1	16.8	0.4	0.5	14.3	0.1	0.3	16.1	0.1	0	15.1	0.1	0.1	24	0.1	0.6	28.3	0.1	0.3	23.7	0.1	0.1	22.8	0.3	1.2	26.4
1.6	0.2	24.5	1.6	0.4	20.1	.	.	.	1	1	16.9	1	2.8	12.5	1.3	0.6	16.8	1.1	0.4	15.8	1.5	0.6	24.9	1.4	0.7	29	1.7	0.2	25.2	1	0.3	23.5	1.3	0.4	26.7
1.3	2.2	23.6	0.9	1	20.1	.	.	.	0.7	2	15.5	0.4	1	11.9	0.8	1.3	16.3	0.7	1.4	15.1	0.8	1.1	24.6	1.2	1.5	28.7	1.1	1.5	24.8	1.7	1.5	23.7	0.9	1.5	26.2
0.8	0.3	24.1	0.4	0.5	20	.	.	.	0.6	0.9	15.3	0.8	0.4	12.3	0.6	1.1	15.7	0.5	1.1	14.5	0.4	2.3	22.7	0.3	1.7	27.4	0.7	1.2	24.3	0.5	0.8	23.5	0.5	1.3	25.3
0.4	0.9	23.6	0.1	1.1	18.9	.	.	.	0.3	2.2	13.5	0.4	2.3	10.4	0.4	2.5	13.6	0.1	1.8	12.9	0.3	2	21	0.5	3.1	24.8	0.5	1.6	23.2	0.5	0.8	23.2	0.4	2.2	23.5
2	3	22.5	0.8	2.4	17.3	.	.	.	0.7	2	12.2	0.9	0.5	10.8	0.9	1.9	12.7	1.2	2	12.1	1.2	3.4	18.8	1.8	3	23.6	1.9	3	22.1	1.7	3.2	21.7	1.5	4	21.1
0.4	0.6	22.4	0.3	0.4	17.3	.	.	.	0.3	0.5	11.9	0.3	0.3	10.8	0.4	0.7	12.4	0.4	0.3	12.2	0.6	0.5	19	0.5	0.5	23.6	0.7	0.6	22.2	0.6	0.1	22.2	0.8	0.5	21.4
1	22.7	1.5	0.7	17.7	0.9	.	.	.	0.6	11.9	1	0.4	10.4	1.1	0.3	12.2	0.9	0.3	12.3	0.5	1.4	19.7	1.9	0.4	23.5	0.8	0.5	22.3	0.8	0.3	22	0.6	0.3	21.2	0.7
0	0.6	1	0	0.3	0.6	.	.	.	0	0.3	0.7	0	0.8	0.4	0	0.5	0.4	0	0.1	0.3	0	0.4	1.4	0	0.4	0.4	0	0.4	0.3	0	0.5	0.2	0	0.4	0.2
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		28			26.4			38.8			31.7			31.4			25.4			22.4			31.6			40			34.2			29.7			35.1
70.5	70.3		67.2	67.3		59.4	59.1		65.1	65.6		57.4	57.2		57.1	58		53.3	53.4		73.2	72.8		86.6	86.9		74.9	75.3		67.2	67.1		81.2	81.2	

15:10 (66.6)(B332) [34] {FA19}			15:20 (66.6)(B334) [33] {FA19}			15:30 (66.6)(B335) [24] {FA19}			15:40 (66.6)(B336) [26] {FA19}			15:50 (66.6)(B339) [27] {FA19}			16:00 (66.6)(B326) [32] {FA19}			16:10 (66.6)(B323) [39] {FA19}			16:20 (66.6)(B322) [33] {FA19}			16:30 (66.6)(B321) [16] {FA19}			16:40 (66.6)(B324) [35] {FA19}			16:50 (66.6)(B327) [38] {FA19}			17:00 (66.6)(B328) [31] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
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12.4	0	12.4	14.2	0	14.2	10	0	10	13.5	0	13.6	16.1	0	16.1	14.8	0	14.8	14.6	0	14.6	11.3	0	11.3	17.4	0	17.4	12.5	0	12.5	14.8	0	14.8	14.3	0	14.3
0.7	0.1	13.1	1.2	0	15.4	1.3	0.1	11.2	2.1	0	15.6	1.6	0	17.7	1.1	0	15.9	1.4	0.1	16	0.6	0	11.8	1.4	0.1	18.7	1.1	0	13.5	1.4	0.1	16.1	0.6	0	14.9
2.5	0.1	15.4	2.3	0.2	17.5	2.8	0.2	13.7	2	0.2	17.5	1.4	0	19	1.7	0.1	17.6	1.2	0	17.2	1	0	12.8	1.4	0.2	19.9	0.4	0	13.9	0.3	0	16.4	0.6	0	15.5
0.1	0.1	15.4	0.4	0	17.8	0.4	0	14.1	0.1	0	17.5	0.1	0	19.2	0.3	0	17.8	0.2	0	17.4	0.1	0.1	12.8	0.9	0	20.8	0.4	0	14.3	0.3	0.1	16.6	0.5	0	16
1.5	0.6	16.2	1.3	0.2	18.9	0.6	0.2	14.5	0.3	0.2	17.7	0.6	0.3	19.5	0.8	0.2	18.5	0.4	0.4	17.5	0.8	0.3	13.3	1.1	0.1	21.8	0.8	0.2	14.9	1	0.5	17.1	1	0.4	16.6
7.4	1.6	22	8	2.3	24.7	8.2	3.2	19.5	7.4	2	23	9.7	2.8	26.4	8.8	2.2	25.1	10.7	1.8	26.4	7.6	1.1	19.8	7	2.3	26.6	7	2	19.9	8.6	2.2	23.5	8.6	1.4	23.8
0.4	1	21.4	0.7	0.6	24.7	1.5	1	20.1	1.2	1.2	23	1.9	1.7	26.6	2.8	0.9	27	1.8	1	27.3	1.4	1	20.2	1	1	26.6	1.9	0.7	21.1	2.2	0.7	25	1.2	1.2	23.8
0.8	1.1	21.1	1	0.8	24.8	1.1	0.7	20.5	1	0.4	23.5	0.9	0.7	26.7	2	1	28	1.2	0.6	27.9	1.2	0.5	20.9	1.3	0.7	27.2	2	0.6	22.5	2.7	0.9	26.7	2.1	0.4	25.5
2.4	3.4	20.1	4.2	5.2	23.9	3.5	4.9	19.1	3.4	4.1	22.8	5.5	4.3	28	5.5	3.9	30	4.8	3.5	29.3	3	2.7	21.2	4.1	3.1	28.3	5.1	3.3	24.3	8	3.3	31.4	8.7	3.5	30.8
5.3	1.3	24.2	6.8	1.1	29.5	7.1	1	25.2	5.3	1	27.1	8.9	1	35.8	8.9	0.9	38	7.6	1.4	35.5	7.7	1	27.9	7.5	1.4	34.3	9.3	1.2	32.3	13.4	1.9	43	12.5	1	42.2
1.4	2.1	23.4	1.6	2.5	28.6	1.8	1.5	25.4	1.4	2.2	26.3	1.7	1.9	35.6	2	2.7	37.3	1.6	2.5	34.7	1.5	1.7	27.6	1.6	3.8	32.1	1.5	2.3	31.5	1.6	1.9	42.7	1.8	2.1	41.9
2.9	0.5	25.8	2.7	0.7	30.8	3.3	0.7	28	2	0.8	27.5	3.9	0.6	38.8	4.1	1	40.5	3.9	0.6	38	4.5	0.5	31.7	3.3	0.4	35.1	2.9	0.3	34	3.9	0.7	45.9	3.9	0.9	44.9
3.1	1.8	27.2	2.9	1.8	31.8	2.9	2.5	28.4	2	1.2	28.3	5	2.5	41.3	3.3	2.1	41.6	3.8	2.2	39.7	4.4	1.7	34.4	2.4	1.8	35.7	3.3	2.5	34.8	3.5	2.7	46.7	3	2.2	45.8
3.3	0.7	29.8	2.6	0.7	33.7	2.5	1.2	29.7	1.7	0.9	29.2	3.6	1	43.8	3.1	1.5	43.2	2.1	1.1	40.6	3.3	1	36.7	2.8	1	37.4	4.6	1.3	38.1	5.2	0.9	51	3.8	1.4	48.2
1.7	0.4	31.1	1.9	0.7	35	1.4	0.2	31	1.9	0.5	30.6	2.7	0.6	45.9	2.2	0.5	44.8	1.8	0.6	41.8	1.9	0.4	38.2	2	1.4	38	2.1	0.5	39.7	2.4	0.7	52.7	1.6	0.3	49.5
1.3	1	31.4	1	0.9	35.1	1.3	1.2	31.1	0.7	0.5	30.8	1.7	1.1	46.5	0.9	1.2	43.6	1.2	1.3	41.7	1.2	0.7	38.7	1.2	0.9	38.3	1.5	1.3	39.9	1.3	1.4	52.7	1.6	1.2	49.9
4.8	4.8	31.4	4.6	5.2	34.2	4.5	5.2	30.5	4.2	4.7	30.4	7.1	5.9	47.6	6.6	5	45.3	5.7	5.1	42.4	5.9	5.2	39.4	4.1	5.5	36.8	5.8	5.7	39.9	8.2	6.3	54.5	5.7	5.7	49.9
1.4	0.9	31.9	2.2	1.4	35	1.3	1	30.8	1.5	1.2	30.7	1.9	1.6	47.9	2.3	0.9	46.7	1.2	0.9	42.7	1.9	0.9	40.4	1.8	1.3	37.3	1.1	1.2	39.9	1.3	1.5	54.2	1.7	1.2	50.4
0.8	1.5	31.1	0.4	1	34.4	0.7	1.3	30.3	1	1.2	30.5	1.1	1	47.9	0.7	0.7	46.7	0.4	1.1	42	0.8	0.6	40.5	0.6	0.8	37.2	0.9	0.8	39.9	1	1.2	54.1	0.7	1.8	49.3
0.9	2.1	29.9	0.7	2.6	32.6	0.8	2.4	28.6	0.4	2.1	28.8	0.9	4.2	44.6	1	3.1	44.6	0.6	3.4	39.3	0.8	4.1	37.2	0.6	4.4	33.4	1.1	3.2	37.9	1.2	3.7	51.6	1.1	3.1	47.3
3.6	6.1	27.4	2.5	7.2	27.9	3	5.7	25.9	2.3	5.7	25.4	3	7.6	40	3.6	9.6	38.5	2.7	7.1	34.9	1.8	7.2	31.8	2.4	6.8	29.1	2.7	7.3	33.3	4.6	10.1	46.1	3.8	11.3	39.7
1.2	3.4	25.1	1.5	2.9	26.5	1.4	2.3	25	1.3	2.8	24	2.1	4.2	37.9	1.1	4.3	35.7	1.7	3.3	33.3	1.5	3.5	29.8	1.5	4	26.6	2.3	4.9	30.7	2.9	4.4	44.5	1.9	4.2	37.4
2.5	2.6	25	1.8	3.5	24.8	1.8	3.2	23.7	1.9	3.8	22	3.7	5.7	35.9	2.2	4	33.9	1.8	4.9	30.2	2.5	4.7	27.5	1.4	4.3	23.7	2.3	3.4	29.6	3.7	4.4	43.8	2.8	4.5	35.7
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3.2	3.4	24.8	2.7	3.5	24	2.4	3.5	22.6	2.3	2.4	21.9	4.1	4.7	36.6	3.3	6.3	30.9	2.3	5.3	27.2	2.6	4.5	25.7	2.6	3.9	22.4	2.5	4.7	27.5	4.7	4.8	43.6	3.5	4.6	34.6
0.1	0.4	24.5	0.1	0.5	23.6	0.4	0.7	22.4	0.1	0.3	21.7	0.1	0.3	36.4	0.1	0.1	30.9	0.1	0.4	26.9	0.3	0.8	25.2	0	0.1	22.3	0.1	0.3	27.3	0.1	0.4	43.3	0.4	0.4	34.5
2.1	0.5	26.1	2.8	0.3	26.1	1.3	0.8	22.9	1.7	0.9	22.4	2.2	0.5	36.8	1.8	1	31.7	1.6	0.6	28	1.3	0.6	25.8	1.4	0.4	23.4	1.6	0.5	28.4	1.9	0.6	44.6	1.3	0.5	35.4
1	1.7	25.5	1	2.2	24.9	1.2	2.7	21.4	1	2.3	21.1	1.6	2.1	36.3	0.8	2.6	29.8	0.8	2.4	26.4	1	2.2	24.7	0.6	1.9	22.1	0.6	1.9	27.1	1.1	2.9	42.8	0.5	2.6	33.2
0.6	0.9	25.1	0.4	0.8	24.5	0.4	1.3	20.5	0.2	0.5	20.8	0.4	1.9	34.9	0.7	2.4	28.1	0.5	1	25.9	0.7	1.2	24.2	0.3	0.6	21.8	0.5	1.1	26.5	0.7	2.1	41.3	0.4	1.2	32.5
0.7	2	23.8	0.6	2.3	22.8	0.3	2.1	19	0.5	2.2	19	0.4	2.6	32.8	0.7	2.3	26.4	0.4	2.2	24.2	0.4	1.5	23.2	0.4	1.7	20.5	0.7	1.5	25.7	0.6	2.6	39.3	0.8	2.5	30.7
2	4.4	21.5	1.9	4.2	20.5	2	2.5	18.8	1.2	2.2	18.1	0.9	3.6	30.1	1.3	4	23.8	1.8	4.1	21.9	2.4	2.8	22.8	2.2	2.9	19.8	1.9	2.9	24.7	1.5	4.8	36.1	2	4	28.7
2.7	0.6	23.6	1.8	0.7	21.5	1	0.6	19.4	0.8	0.5	18.4	0.7	0.5	30.3	1.9	0.2	25.5	1	0.7	22.1	1.2	0.7	23.3	0.2	0.3	19.7	0.5	0.3	24.8	0.5	0.8	35.7	0.2	0.6	28.2
1.3	24.6	1.5	0.6	21.7	0.9	1.9	20.3	2.2	0.3	18.2	0.9	0.4	30.1	1	0.7	25.8	0.8	0.5	20.9	2.1	1.8	24.1	2.6	0.9	20.3	1.1	1.3	25.6	1.7	2.2	36.9	2.6	0.6	28.1	1.4
0	0.2	1.3	0	0.4	0.5	0	0.2	2	0	0.5	0.3	0	0.7	0.4	0	0.3	0.6	0	1.7	0.4	0	1	1.6	0	0.4	0.7	0	0.5	1.1	0	0.4	2.1	0	0.8	0.6
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		31.9			35.1			31.1			30.8			47.9			46.7			42.7			40.5			38.3			39.9			54.5			50.4
76.1	75.9		78.4	78.1		74.1	74.4		66.7	66.7		95.9	95.7		91.1	90.8		81.4	82.2		78.4	78.3		77.4	77.8		82.3	82		106.8	105.9		93.2	93.1	

17:10 (66.6)(B330) [19] {FA19}			17:20 (66.6)(B333) [2] {FA19}			17:30 (66.6)(B332) [43] {FA19}			17:40 (66.6)(B334) [32] {FA19}			17:50 (66.6)(B335) [1] {FA19}			18:01 (66.6)(B336) [22] {FA19}			18:11 (66.6)(B339) [41] {FA19}			18:21 (66.6)(B326) [27] {FA19}			18:31 (66.6)(B325) [46] {FA19}			18:42 (66.6)(B323) [8] {FA19}			18:53 (66.6)(B322) [46] {FA19}			19:07 (66.6)(B324) [45] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
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11.7	0	11.7	5	0	5	11.9	0	11.9	10.8	0	10.8	8	0	8	10.9	0	10.9	6.4	0	7.4	11.1	0	11.1	7.6	0	7.6	8.4	0	8.4	7.4	0	7.4	7.9	0	7.9
0.7	0	12.5	0	0	5	0.8	0	12.7	0.9	0	11.7	5	0	13	1.2	0.2	12	0.7	0.1	8.7	0.9	0	12	0.7	0	8.3	0.5	0	8.9	0.5	0	7.9	0.4	0	8.4
0.1	0	12.6	3	0	8	0.8	0.1	13.8	0.4	0.1	12	0	0	13	0.6	0	12.5	0.5	0.3	8.5	0.7	0	12.7	0.7	0.1	8.8	0.1	0	9	0.5	0.1	8.3	0.6	0	9
0.4	0	12.9	0	0	8	0.3	0	14.1	0.3	0	12.3	2	0	15	0.1	0	12.7	0.2	0	8.4	0.1	0	12.8	0.1	0	9	0.1	0	9.1	0.1	0	8.4	0.2	0	9.1
0.9	0.1	13.7	0	0.5	7.5	0.5	0.3	14.3	0.4	0.2	12.4	0	0	15	1	0.1	13.6	0.6	0	8.9	0.7	0.1	13.3	0.7	0.2	9.4	0.3	0	9.4	0.3	0.2	8.5	0.4	0.1	9.4
7.9	1.4	20.3	3.5	1.5	9.5	7.2	1.6	19.8	6.5	1.7	17.3	5	3	17	8.9	1	21.5	4.8	1	12.7	6.6	1.3	18.7	4.2	1	12.7	7.8	1.5	15.6	4.2	1	11.7	4.4	0.8	12.9
1.1	0.4	20.9	0.5	0	10	1.2	0.8	20.3	1.4	0.7	18	2	2	17	1	0.7	21.8	0.4	0.2	12.9	0.9	0.7	18.9	0.6	0.4	12.8	0.5	0.5	15.6	1.1	0.3	12.4	0.8	0.2	13.6
1.9	0.6	22.2	1	0	11	2	0.7	21.7	1.1	0.3	18.8	0	0	17	1.7	0.5	23	1.1	0.2	13.8	1.4	0.3	20	1.3	0.3	13.9	1	0	16.6	1	0.3	13.2	1.2	0.3	14.4
4.6	3.2	23.6	1.5	2	10.5	5.8	3.1	24.4	4.2	2.8	20.2	4	4	17	6	3.7	25.3	3.5	1.9	15.4	4.9	2.6	22.2	2.4	1.7	14.6	3.5	3.6	16.5	3	1.7	14.5	3.3	1.3	16.4
10.5	1.3	32.8	3.5	0.5	13.5	8.9	1.2	32.1	7.4	1.6	26	6	2	21	8.9	0.8	33.4	8.5	0.8	23.1	8.5	1	29.7	6.1	0.6	20.1	6.8	0.8	22.5	8.4	0.9	22	7.9	0.7	23.7
1.1	1.6	32.3	0.5	0.5	13.5	1.4	2	31.6	1.4	1.6	25.8	0	2	19	1.9	2.1	33.2	1.5	0.8	23.9	1.4	1.3	29.9	1.2	1.2	20.1	1.3	2.3	21.5	1.2	1.6	21.7	1.4	1.2	23.9
2.3	0.5	34	3.5	0	17	3.4	0.7	34.3	2.8	0.9	27.7	4	0	23	1.6	0.8	34	3.5	0.9	26	4.3	0.8	33.3	2	0.4	21.7	3	0.8	23.8	2.5	0.6	23.6	2.5	0.4	26
2.3	1	35.3	2.5	1.5	18	3.3	1.2	36.3	3.4	2	29.1	4	1	26	2.5	2.5	33.9	2.1	1.5	27.2	2.2	1.3	34.2	1.4	1.2	21.9	2.9	1.4	25.3	1.6	1.4	23.8	1.4	1.2	26.2
3.2	1.5	36.9	4	1.5	20.5	3.3	0.9	38.7	3.4	0.7	31.8	4	1	29	3.4	0.2	37	2.4	0.8	28.8	2.4	1.2	35.4	1.9	0.6	23.2	2.6	1.1	26.8	2	0.8	25	2.1	0.5	27.8
1.7	0.2	38.4	0	0	20.5	1.6	0.8	39.5	1.8	0.4	33.2	2	0	31	1.2	0.5	37.8	1.4	0.6	29.6	1.7	0.9	36.2	1.1	0.6	23.7	1.3	0.9	27.1	1.2	0.6	25.6	0.9	0.6	28.1
1	1.1	38.4	0.5	1	20	1.2	1	39.7	1.4	0.8	33.8	3	0	34	1	1.3	37.4	1.3	0.8	30.2	1.3	0.9	36.6	1	0.8	23.9	1.8	0.4	28.5	1	0.6	26	1.1	0.9	28.3
4.9	6.3	37	2	5.5	16.5	6.7	5.6	40.8	5.3	4.8	34.3	9	5	38	7	5.6	38.8	5.5	3.8	31.9	7.1	5.3	38.4	4.6	3.5	25	6.3	5.3	29.5	6	3.7	28.3	5.3	3.7	29.8
1.9	1.3	37.6	0	0.5	16	1.6	1.3	41.2	1.5	1.4	34.5	0	4	34	1.5	0.5	39.8	1.3	0.9	32.3	2	0.8	39.6	1.4	0.8	25.6	2.3	0.6	31.1	1.4	0.5	29.2	1.9	0.9	30.9
1	1.4	37.2	0	0	16	0.6	1.4	40.4	0.8	1.5	33.8	0	0	34	0.7	1.1	39.4	0.5	1.3	31.5	0.7	1.2	39.2	0.5	0.9	25.1	0.5	0.9	30.8	0.6	0.8	29	0.2	1	30.1
0.3	3.2	34.3	0.5	2	14.5	0.8	2.5	38.7	0.4	3	31.1	0	3	31	1.1	2.3	38.2	0.5	2.5	29.5	0.3	3	36.5	0.6	2.5	23.3	0.5	1.8	29.5	0.6	2.3	27.4	0.6	2.8	28
1.4	8.3	27.4	1.5	4.5	11.5	2.6	7.6	33.8	1.7	7.6	25.2	3	9	25	3.2	10.1	31.3	2.1	7.7	23.9	2.5	9	30	1.8	6.3	18.8	3	5.6	26.9	1.8	7.4	21.7	1.9	7.6	22.3
1.4	3.7	25	2	3	10.5	1.4	3.7	31.4	1.2	3.2	23.2	0	3	22	1	3.7	28.5	1.4	3.6	21.7	1.2	3.6	27.6	1	2.8	17	1.4	4.1	24.1	1.5	3.1	20.1	1.4	2.8	20.9
0.9	3.4	22.6	0.5	1.5	9.5	2.4	3.8	30.1	1.4	2.9	21.6	0	7	15	2.4	3.9	27	1.8	3.1	20.3	1.7	4	25.4	1.5	2.7	15.8	3.1	2.5	24.8	1.7	2.9	19	1.2	3.4	18.6
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1.4	3.4	20.5	2	0.5	11	2.8	4.2	29.1	2.4	3.4	20.6	1	3	13	1.8	4.2	24.6	1.3	2.9	18.8	1.6	4.1	22.9	1.5	2.6	14.7	3.3	2.9	25.1	1.5	3.3	17.2	1.5	3.6	16.5
0	0.1	20.5	0.5	0	11.5	0.3	0.3	29	0.3	0.3	20.5	0	0	13	0	0.1	24.5	0.3	0.2	18.9	0.6	0.7	22.7	0.2	0.2	14.7	0	0.6	24.5	0.2	0.3	17.2	0.1	0.2	16.4
0.6	0.9	20.2	1.5	1.5	11.5	1	0.6	29.1	1.1	0.7	20.9	0	1	12	1	0.6	24.8	1.2	0.3	19.8	1.9	0.6	24	0.8	0.2	15.3	0.9	0.3	25.1	0.7	0.4	17.5	0.9	0.4	16.9
1.4	2.6	19	1	2.5	10	0.7	3	26.8	0.6	2.5	19	1	0	13	0.3	2.4	22.7	0.6	2.1	18.3	0.4	2.4	22	0.4	1.3	14.5	1.4	3.6	22.9	0.3	1.4	16.4	0.2	1.6	15.5
0.5	0.4	19.1	0	0.5	9.5	0.7	1	26.5	0.2	0.9	18.3	0	0	13	0.2	1	21.9	0.5	0.9	17.8	0.5	1.8	20.7	0.2	0.8	13.8	0.5	0.5	22.9	0.3	1.4	15.3	0.3	0.7	15.1
0.3	1.5	17.9	0	0.5	9	0.5	2.8	24.2	0.3	2.3	16.3	0	3	10	0.2	4	18	0.4	2.4	15.8	0.7	2.1	19.3	0.2	1.5	12.5	0.1	2.3	20.8	0.3	1.6	14	0.3	2	13.4
0.7	3	15.6	1	1	9	1.6	2.5	23.3	0.7	2.3	14.6	0	2	8	1.4	3.4	16.3	0.9	1.9	14.8	1	2.9	17.4	0.6	1.8	11.3	1.6	3.8	18.6	0.4	1.9	12.5	0.6	1.6	12.4
0.3	0.4	15.5	1	0.5	9.5	0.4	0.3	23.4	0.4	0.6	14.5	1	0	9	0.3	0.5	16.1	0.5	0.6	14.8	0.4	0.6	17.2	0.1	0.5	10.9	0	0	18.6	0.2	0.5	12.2	0.2	0.1	12.4
0.7	15.1	1.6	0	9.5	0	0.3	23.1	0.8	2.5	16	2.8	0	9	0	1.6	16.6	2.5	0.4	14.1	1.4	0.8	17.6	1.1	1	11.2	1.5	0	17.8	0.9	0.5	12.4	0.8	0.3	11.5	1.4
0	1.2	0.5	0	0	0	0	0.2	0.6	0	0.3	2.5	0	0	0	0	0.9	1.6	0	0.7	0.7	0	0.3	0.8	0	0.6	0.9	0	0.9	0	0	0.3	0.5	0	1.2	0.2
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		38.4			20.5			41.2			34.5			38			39.8			32.3			39.6			25.6			31.1			29.2			30.9
69.1	69.1		42.5	42.5		78	78.3		68.4	67.5		64	64		75.6	75.3		58.1	58.9		72.5	72.4		49.4	49.3		66.8	66.8		54	54.3		53.4	53.3	

19:21 (66.6)(B327) [42] {FA19}			19:35 (66.6)(B330) [31] {FA19}			19:50 (66.6)(B334) [41] {FA19}			20:05 (66.6)(B343) [42] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
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8.5	0	8.6	7.3	0	7.3	6.7	0	6.7	4.2	0	4.2
0.4	0	9	0.5	0	7.7	0.4	0.1	7.1	0.6	0	5
0.5	0.1	9.4	0.4	0	8.1	0.2	0	7.2	0.3	0	5.3
0	0	9.4	0.2	0	8.2	0	0	7.2	0.1	0	5.4
0.3	0.2	9.5	0.7	0.1	8.8	0.6	0.1	7.7	0.3	0	5.5
4.9	0.7	13.7	3.6	0.7	11.7	4.8	0.5	12	4.6	0.6	9.6
1.9	0.5	15.2	1	0.2	12.5	1.2	0.1	13.1	0.7	0.2	10.2
1.2	0.6	15.9	0.8	0.4	12.9	1	0.4	13.7	1.1	0.4	10.8
3.8	2.3	17.3	2	1.6	13.3	3.1	1.5	15.2	2.6	1.5	12
9.2	0.9	25.6	6.1	0.8	18.5	7.4	0.8	21.9	6.2	0.7	17.5
1.8	1	26.3	1.2	1.5	18.3	1.3	0.9	22.2	1.2	1.1	17.7
2.3	0.6	28.1	1.5	0.3	19.5	2.6	0.6	24.2	2.3	0.5	19.5
1.9	1.1	28.9	0.7	0.8	19.4	1.4	1	24.6	1.2	0.9	19.9
2.7	0.5	31.1	1.7	0.2	20.9	2.4	0.5	26.5	2.4	0.3	22
1.4	0.4	32.1	1.2	0.5	21.5	1.4	0.8	27.1	1	0.5	22.5
1.4	0.6	32.9	0.4	0.4	21.5	1.3	0.8	27.6	0.9	0.7	22.7
6.1	3.6	35.3	3.4	2.4	22.6	6.2	4.1	29.7	4.6	3	24.3
2.3	0.5	37.1	1.2	0.8	23.1	1.7	0.4	31	1	0.4	25
0.3	0.9	36.5	0.4	0.7	22.7	0.5	0.8	30.7	0.4	0.7	24.6
0.5	3	34	0.4	2.1	21.1	0.6	2.7	28.7	0.5	1.4	23.7
2.5	7.5	29.1	2.1	5.7	17.5	2.5	8.3	22.9	1.7	6.5	18.9
1.7	4.8	26.1	1.4	2.4	16.5	1.7	3.2	21.4	1	2.7	17.2
2	4.5	23.6	1.3	3	14.8	1.4	3.6	19.1	1.3	2.8	15.8
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2.2	4.5	21.3	1.3	2.4	13.7	1.4	3.4	17.1	1.4	3.2	14
0.1	0.2	21.1	0	0	13.7	0.1	0.3	16.9	0.1	0.1	14
1.5	0.6	22	0.9	0.4	14.3	0.9	0.7	17.1	0.5	0.4	14.2
0.5	1.7	20.7	0.3	0.8	13.8	0.3	1.3	16.1	0.2	1.2	13.2
0.5	1.2	20	0.2	0.8	13.2	0.1	0.8	15.4	0.1	0.6	12.8
0.4	2.2	18.2	0.2	1.9	11.5	0.2	1.7	13.9	0.1	1.2	11.7
1.1	1.7	17.6	0.7	1.8	10.4	0.6	2.1	12.4	0.5	1.7	10.5
0	0.2	17.4	0	0.1	10.4	0.2	0.2	12.3	0.2	0.1	10.6
1.4	18.4	1.7	0.3	10.4	0.5	1.2	13.3	1.5	0.3	9.3	1.8
0	0.2	1.5	0	0.2	0.3	0	0.3	1.2	0	1.5	0.4
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		37.1			23.1			31			25
65.3	65.2		43.4	43.4		55.4	55.3		43.6	44.2	

20:20 (66.6)(B326) [50] {FA19}			20:35 (66.6)(B325) [54] {FA19}			20:50 (66.6)(B344) [31] {FA19}			21:05 (66.6)(B324) [50] {FA19}		
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5.8	0	5.9	4.4	0	4.4	3	0	3	5.3	0	5.3
0.5	0	6.4	0.5	0	4.9	0.2	0	3.3	0.5	0	5.8
0.2	0	6.5	0.3	0	5.1	0.2	0	3.6	0.2	0	6
0	0	6.6	0.1	0	5.2	0.2	0	3.7	0	0	6
0.7	0.1	7.2	0.4	0	5.5	0.4	0.1	4	0.4	0	6.4
4.6	0.6	11.2	3.6	0.6	8.6	4.5	0.5	8	3.1	0.3	9.2
0.8	0.2	11.8	0.5	0.3	8.8	0.6	0.3	8.3	0.5	0.1	9.6
0.9	0.3	12.5	0.7	0.1	9.4	0.7	0.1	8.9	0.9	0.1	10.3
2.4	1.2	13.7	1.4	0.9	9.9	2.1	1.4	9.6	1.5	1.2	10.6
5.8	0.7	18.8	3.8	0.4	13.3	5.5	0.5	14.6	4.7	0.3	15.1
1	1.1	18.7	0.6	0.7	13.1	1	0.5	15.2	0.7	0.6	15.1
2.4	0.6	20.3	1.6	0.7	13.9	1.2	0.5	15.9	0.8	0.5	15.5
1	0.8	20.5	0.6	0.6	14	1.4	0.5	16.7	1.2	0.6	16.1
2.7	0.5	22.7	1.7	0.3	15.4	3.6	0.5	19.9	1.6	0.3	17.4
0.9	0.5	23.1	0.9	0.3	16	1.8	0.6	21.1	1.1	0.5	18
0.6	0.6	23	0.6	0.4	16.2	0.6	0.7	20.9	0.3	0.5	17.8
4.6	2.5	25.2	3.2	1.9	17.6	4.9	2.5	23.3	4.3	1.9	20.3
1.1	0.4	25.8	1.4	0.4	18.6	1.5	0.6	24.2	1	0.4	20.9
0.3	0.5	25.6	0.3	0.4	18.5	0.5	0.5	24.2	0.2	0.3	20.9
0.6	2	24.2	0.2	1.3	17.4	0.6	1.4	23.3	0.3	1.2	19.9
1.6	6.9	18.9	0.8	4.6	13.7	1.6	5.3	19.7	1	4.6	16.3
1.5	3.4	17.1	0.7	1.6	12.7	1	2.1	18.5	0.8	2	15.1
1.5	3.4	15.1	1.2	2.1	11.8	1.8	2.7	17.6	1.1	2.7	13.5
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1.7	2.6	14.5	1	1.9	10.9	0.7	2.6	15.7	0.9	1.8	12.6
0.2	0.3	14.4	0.3	0.4	10.8	0.1	0.4	15.5	0	0.2	12.4
0.7	0.6	14.4	0.7	0.4	11.1	1	0.8	15.6	1.4	0.7	13.2
0.2	1	13.6	0.2	0.9	10.4	0.4	1.3	14.6	0.5	1.1	12.6
0.2	0.8	13	0.1	0.6	9.9	0.3	1.1	13.9	0.1	0.6	12.1
0.2	1.6	11.6	0.1	0.6	9.5	0.3	0.9	13.3	0.1	0.7	11.5
1.1	1.9	10.8	0.8	1.6	8.8	0.8	1.7	12.4	0.4	0.9	11
0.2	0.2	10.8	0.3	0.2	8.8	0.7	0.4	12.7	0.3	0.1	11.2
1	11.3	1.4	0.3	8.4	1	0.9	12.6	1.4	0.2	10.3	1.3
0	0.3	1	0	0.7	0.3	0	0.5	1	0	1.1	0.1
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		25.8			18.6			24.2			20.9
47	46.9		33.3	33.3		44.1	43.6		35.4	35.6	

21:20 (66.6)(B345) [41] {FA19}			21:35 (66.6)(B346) [41] {FA19}			21:50 (66.6)(B347) [26] {FA19}			22:05 (66.6)(B348) [34] {FA19}		
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3.8	0	3.8	2.5	0	2.5	4.8	0	4.8	4.1	0	4.2
0.8	0	4.6	0.6	0	3.3	0.6	0	5.5	0.3	0	4.6
0.5	0.1	5	0.2	0	3.6	0	0	5.5	0.1	0	4.8
0.1	0	5.1	0	0	3.3	0	0	5.3	0	0	4.8
0.4	0	5.5	0.3	0	3.6	0.2	0	5.5	0.2	0	4.9
3.9	0.3	9	2.8	0.4	6	3.1	0.5	8.2	3.3	0.6	7.6
0.3	0	9.3	0.6	0	6.6	0.3	0.1	8.4	0.4	0	8
0.5	0.1	9.7	0.6	0.1	7	1	0.2	9.2	0.4	0.5	7.8
1.5	1.3	9.8	0.9	1.2	6.7	1	1	9.2	0.9	1.5	7.2
4.4	0.3	13.9	3.8	0.2	10.3	3.7	0.5	12.5	3.9	0.2	10.9
0.7	0.7	14	0.6	0.5	10.4	0.8	0.7	12.5	0.9	0.7	11.2
1.4	0.3	15.1	1.5	0.6	11.3	3.6	0.2	16	5.6	0.2	16.6
1.2	0.3	15.9	0.9	0.4	11.8	0.8	0.2	16.7	0.7	0.5	16.9
2.4	0.3	18	2.1	0.3	13.6	3.6	0.3	20	1.4	0.3	18
0.9	0.5	18.4	0.7	0.2	14.2	1.1	0.5	20.5	0.9	0.4	18.5
0.6	1	18	0.3	0.3	14.2	0.3	0.2	20.6	0.2	0.6	18.1
6	1.8	22.2	3.5	1.2	16.5	2.4	1.8	21.3	2.5	0.9	19.7
1.8	0.7	23.4	1.4	0.5	17.3	1.9	0.4	22.8	1.4	0.4	20.7
0.3	0.6	23	0.3	0.4	17.2	1	0.4	23.3	0.7	0.3	21.1
0.2	1.2	22	0.2	0.8	16.6	0.4	1.3	22.3	0.1	1.1	20.1
1.2	5.1	18.2	2	4	14.6	2.1	3.7	20.8	1.4	2.7	18.8
0.9	2.9	16.2	1.4	2.3	13.7	1.5	2.9	19.3	1.4	3.1	17
1.5	3.9	13.8	0.7	2.8	11.6	1.5	4.5	16.4	1	3.7	14.3
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1.4	2.7	12.6	1	1.3	11.3	1.2	2	15.5	1.7	2.2	13.9
0.4	0.3	12.6	0.2	0.8	10.7	0.2	0.5	15.3	0.2	0.1	14
1	0.3	13.2	0.8	0.2	11.3	1	0.3	16	0.8	0.5	14.2
0.1	1.4	12	0.1	1.4	10	0.2	2.9	13.3	0.1	3.3	11
0.1	0.7	11.4	0.1	0.6	9.5	0.2	1.4	12.1	0.1	0.8	10.3
0.1	1.7	9.8	0	1.1	8.4	0.1	0.8	11.3	0.1	0.6	9.8
0.4	1	9.1	0.6	0.6	8.3	0.5	1.2	10.7	0.6	1.2	9.2
0.2	0.1	9.3	0.2	0.2	8.4	0	0.3	10.5	0.1	0.1	9.2
1.1	9.8	1.4	2.2	9.9	2.4	0.9	10.5	1.7	0.2	8.5	1.1
0	0.4	1	0	0.1	2.3	0	0.8	0.8	0	0.9	0.1
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		23.4			17.3			23.3			21.1
40.1	39.8		33.1	32.4		40	40.1		35.7	35.9	

22:20 (66.6)(B326) [54] {FA19}			22:35 (66.6)(B349) [47] {FA19}			22:50 (66.6)(B351) [41] {FA19}			23:05 (66.6)(B345) [53] {FA19}			23:20 (66.6)(B346) [1] {FA19}			23:35 (66.6)(B347) [32] {FA19}			23:50 (66.6)(B348) [52] {FA19}			24:08 (66.6)(B349) [36] {FA19}			24:26 (66.6)(B351) [24] {FA19}			24:44 (66.6)(B345) [2] {FA19}			25:02 (66.6)(B347) [5] {FA19}			Total		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	38.8	0	38.8
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.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	38.8
5.8	0	5.8	4.9	0	4.9	3	0	3	2.7	0	2.7	8	0	8	3.7	0	3.7	3.2	0	3.3	1.7	0	1.8	2	0	2.1	1	0	1	0	0	0	1374.5	5.2	1410.4
0.2	0	6	0.2	0	5.3	0.3	0	3.3	0.1	0	2.8	0	0	8	0.2	0	3.9	0.1	0	3.3	0.1	0	1.9	0	0	2.2	0	0	1	0	0	0	152.9	6.1	1559.8
0.1	0	6	0	0	5.3	0.1	0	3.4	0	0	2.9	0	0	8	0.1	0	4	0.1	0	3.4	0	0	1.9	0	0	2.2	0	0	1	0	0	0	122.3	10.8	1674.1
0	0	6	0	0	5.3	0	0	3.3	0	0	2.9	0	0	8	0	0	4	0	0	3.4	0	0	1.9	0	0	2.3	0	0	1	0	0	0	32.9	2.1	1701.4
0.1	0	6.1	0.3	0.1	5.5	0.5	0	3.7	0.2	0	3.1	0	0	8	0.1	0	4	0.1	0	3.5	0.1	0.1	1.9	0	0	2.3	0	0	1	0	0	0	71.9	19.6	1753.4
2.5	0.5	8.1	2.1	0.4	7.1	2.3	0.1	5.9	2	0.5	4.5	0	0	8	0.8	0.3	4.6	0.6	0.1	4.1	0.9	0.1	2.8	0.7	0.1	2.8	2	0	3	0.8	0	0.8	808.9	139.1	2424.3
0.4	0	8.5	0.2	0	7.3	0.7	0	6.6	0.3	0	4.8	0	0	8	0.2	0	4.8	0.1	0	4.1	0	0	2.8	0.2	0	3	0	0	3	0	0	0.8	82.9	54.5	2453
0.4	0.1	8.8	0.3	0.2	7.5	0.2	0.3	6.5	0.3	0.1	5	1	0	9	0.5	0	5.3	0.1	0.1	4.2	0.1	0.1	2.9	0	0.1	2.9	0.5	0	3.5	0	0	0.8	86.5	53.1	2486.8
1.1	1.6	8.3	0.8	3	5.3	1.2	1.5	6.2	1.2	1	5.2	0	4	5	0.8	0.9	5.1	0.3	0.2	4.3	0.8	0.3	3.4	0.3	0.1	3.1	0.5	0.5	3.5	0.2	0.4	0.6	224.7	562.2	2151.6
3.9	0.2	12	1.7	0.2	6.7	2.3	0.3	8.2	3.2	0.2	8.2	1	0	6	1.3	0.1	6.3	0.9	0.2	5	1.8	0.1	5.1	0.8	0.3	3.7	0	0.5	3	0	0	0.6	408	132.7	2427.3
0.7	0.6	12.2	0.6	0.4	6.9	0.5	0.7	8	0.4	0.3	8.3	1	0	7	0.4	0.3	6.4	0.4	0.1	5.2	0.2	0.2	5.1	0.5	0.1	4	0	0	3	0	0	0.6	153	123.3	2457.4
4	0.3	15.9	1.8	0.3	8.3	1.3	0.3	9	0.9	0.1	9.1	0	0	7	0.6	0.3	6.7	0.5	0.2	5.4	1.2	0	6.3	0.4	0.1	4.3	0	0	3	0.2	0	0.8	288.6	59.2	2685.9
1.3	0.4	16.8	0.4	0.3	8.4	0.6	0.3	9.3	0.3	0.2	9.2	1	0	8	0.3	0.3	6.8	0.2	0	5.6	0.2	0	6.4	0	0.1	4.3	0	0	3	0	0	0.8	165.4	229.4	2622.4
1.7	0.1	18.4	1.1	0.1	9.4	1.3	0.1	10.5	1.1	0.1	10.1	3	0	11	0.5	0.2	7.1	0.2	0	5.8	0.2	0.1	6.5	0.1	0	4.3	0	0	3	0	0	0.8	210.1	107.4	2725.3
0.6	0.5	18.5	0.1	0.3	9.2	0.3	0.2	10.6	0.1	0.2	10	0	0	11	0.1	0.1	7.1	0.1	0.1	5.8	0.2	0.1	6.6	0	0	4.3	0	0	3	0	0	0.8	146	50.2	2820.8
0.4	0.5	18.4	0.3	0.3	9.2	0.5	0.2	10.8	0	0.1	10	0	0	11	0	0.2	7	0	0.1	5.7	0	0.1	6.5	0	0.1	4.1	0	0	3	0	0	0.8	101.4	82.2	2839.8
3	1.6	19.9	1.6	1	9.8	1.6	1.4	11	1.7	0.7	11	6	0	17	1.5	0.6	7.9	2	0.2	7.5	1.3	0.3	7.6	0.5	0.1	4.5	1.5	2	2.5	0.2	0	1	425.2	370.5	2894.9
0.7	0.5	20.1	0.7	0.2	10.3	0.4	0.2	11.1	0.6	0.1	11.4	0	0	17	0.5	0.2	8.3	0.7	0.2	8	0.3	0.1	7.8	0.2	0	4.7	0	0	2.5	0	0	1	125.4	86.9	2933.8
0.4	0.2	20.2	0.2	0.2	10.2	0.1	0.2	11	0.1	0.1	11.4	0	0	17	0.6	0	8.8	0.2	0.1	8.2	0.1	0	7.8	0	0.1	4.6	0	0	2.5	0	0	1	64.4	67	2930.2
0.1	1.3	19	0	0.3	10	0.1	0.6	10.6	0	0.6	10.8	0	1	16	0.1	0.4	8.5	0	0.3	7.9	0	0.1	7.7	0	0.2	4.4	0	0	2.5	0	0	1	74.3	155.8	2849.1
1.4	3.4	17.1	0.8	2.2	8.6	1.5	2.2	9.9	0.7	1.9	9.7	0	5	11	0.8	1.6	7.8	0.8	0.8	7.8	0.8	1.1	7.4	0.3	0.7	4	1	0.5	3	0	0.2	0.8	318.7	480.2	2687.7
1.1	2.6	15.6	0.6	1.1	8.1	0.6	1.4	9	0.5	0.8	9.3	0	3	8	0.2	0.8	7.1	0.1	0.8	7.1	0.4	0.8	7.1	0.1	0.3	3.8	0	1	2	0	0.2	0.6	124.3	238.8	2572.9
1.1	3.6	13.2	0.9	1.5	7.4	2.2	1.2	10.1	1.2	1.5	9	1	2	7	0.5	0.9	6.7	0.4	1.5	6	0.6	1.1	6.5	0.3	1	3	0	0	2	0	0	0.6	224.8	374.2	2423.4
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	18.7	39.9	171.9
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.8	7.8	165.9
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.5	119.1	49.1
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1.4	2.7	11.9	0.7	1.1	7.1	1.3	1	10.4	1.2	0.6	9.6	1	0	8	0.6	0.9	6.4	0.4	0.7	5.7	0.3	1.3	5.5	0	0.5	2.5	0	0	2	0	0.4	0.2	264.5	283.4	2216.8
0.2	0.2	11.9	0.1	0.2	7	0.2	0.1	10.5	0.1	0	9.6	0	0	8	0	0.1	6.3	0	0	5.7	0	0	5.5	0	0.1	2.5	0	0	2	0	0	0.2	15.7	23.5	2209.1
0.6	0.4	12	0.3	0.2	7.1	0.4	0.2	10.7	0.5	0.2	9.9	0	0	8	0.4	0.3	6.4	0.3	0.5	5.5	0.2	0.3	5.5	0.1	0.1	2.5	1	0	3	0	0	0.2	166	46.3	2324
0.2	2.8	9.4	0.1	1.2	6.1	0.3	1.8	9.1	0.2	1.5	8.6	0	3	5	0.1	1.3	5.3	0	0.9	4.6	0	1.1	4.3	0	0.5	2	0	0	3	0	0	0.2	123.6	125.7	2319.4
0	0.5	8.9	0	0.5	5.6	0.1	0.7	8.6	0.1	0.4	8.3	0	0	5	0	0.5	4.8	0	0.4	4.2	0	0.3	4.1	0	0	2	0	0	3	0	0	0.2	90.3	65.9	2345.2
0.1	1.1	7.9	0	0.6	5.1	0.1	0.6	8	0.1	1.8	6.6	0	0	5	0.2	0.4	4.5	0.1	0.2	4.1	0	0.5	3.6	0	0.2	1.8	0	0.5	2.5	0	0	0.2	74.4	135.9	2284.1
0.3	0.9	7.3	0.4	0.3	5.1	0.3	2	6.4	0.1	1	5.6	0	0	5	0.1	0.7	3.9	0.1	0.3	4	0	0.5	3.1	0.1	0.3	1.6	0	0	2.5	0.2	0	0.4	120.7	221.9	2184.6
0	0.1	7.2	0	0.1	5.1	0	0.1	6.3	0	0	5.6	0	0	5	0	0.1	3.8	0	0	4	0	0	3.1	0	0	1.6	0	0	2.5	0	0	0.4	38.1	65	2157.6
1.1	7.6	1.4	0.6	4.5	1.6	0.5	5.5	1.6	0.8	5.7	1.2	0	3	2	0.6	3.4	1	0.1	2	2.2	0.2	1.7	1.7	0	1.5	0.1	0	2	0.5	0	0.4	0	76.7	2164.5	131.7
0	0.3	1.1	0	1	0.5	0	1.3	0.3	0	0.3	0.8	0	2	0	0	0.4	0.6	0	2.1	0.1	0	1.4	0.3	0	0.1	0	0	0.5	0	0	0	0	0	58.3	73
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		20.2			10.3			11.1			11.4			17			8.8			8.2			7.8			4.7			3.5			1			2933.8
34.9	34.6		21.8	21.8		24.8	24.5		20.7	20		23	23		15.8	15.3		12.1	12.1		11.7	11.8		6.6	6.7		7.5	7.5		1.6	1.6		6821.2	6822.1	

Massachusetts Bay Transportation Authority
Route 70
Weekday - Inbound
Fall 2019
(Urban Transportation Associates)

	05:11 (70.5)(B031) [9] {FA19}			05:30 (70.5)(B032) [1] {FA19}			05:50 (70.5)(B034) [5] {FA19}			06:10 (70.5)(B037) [52] {FA19}			06:30 (70.5)(B035) [57] {FA19}			06:45 (70.6)(B031) [9] {FA19}			07:00 (70.5)(B191) [7] {FA19}			07:18 (70.5)(B032) [2] {FA19}			07:27 (70.6)(B192) [4] {FA19}			07:44 (70.
Seq - StopID - Stop Name	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On
53 - 9522 - WESTON ST @ CEDARWOOD AVE	1.1	0	1.2	1	0	1	1.2	0	1.2	0.4	0	0.4	2.1	0	2.1	.	.	.	0.3	0	0.3	0	0	0	.	.	.	.
54 - 86929 - STOW ST @ TAVERN RD	0.7	0	1.9	0	0	1	0	0	1.2	0.1	0	0.5	0.3	0	2.4	.	.	.	2	0	2.3	0	0	0	.	.	.	.
55 - 86930 - MAIN ST @ STOW ST	0.4	0.1	2.2	0	0	1	0	0	1.2	0.9	0	1.4	1.1	0	3.5	.	.	.	0.1	0	2.4	1	0	1	.	.	.	.
56 - 9526 - MAIN SHOPPING CENTER @ MARKET	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.2	0	1.2	.	.	.	.	.	.	3.3	0	3.3	.
57 - 86932 - MAIN ST @ SHERIDAN RD	0	0	2.2	0	0	1	0.2	0	1.4	0.4	0	1.8	0.4	0	3.8	0.6	0.1	1.7	0.4	0	2.9	0.5	0	1.5	0.8	0.5	3.5	.
58 - 86933 - 1164 MAIN ST OPP EDGEHILL RD	0	0	2.2	0	0	1	0	0	1.4	1.2	0	3	0.1	0	3.9	0.3	0	2	0	0	2.9	0	0	1.5	0	0	3.5	.
59 - 86934 - 1114 MAIN ST OPP MALONE ST	0	0	2.2	0	0	1	0	0	1.4	0.1	0	3.1	0.2	0	4.2	0	0	2	0	0	2.9	1.5	0	3	0.5	0	4	.
60 - 86935 - MAIN ST @ EVERETT ST	0	0	2.2	2	0	3	0.2	0	1.6	0.2	0	3.3	0.4	0	4.6	0.2	0	2.2	0.9	0	3.7	1.5	0	4.5	0	0	4	.
61 - 86936 - MAIN ST OPP PROSPECT HILL RD	0	0	2.2	0	0	3	0	0	1.6	0.3	0	3.7	0.6	0	5.2	0.4	0	2.7	1.6	0	5.3	2	0	6.5	1	0	5	.
62 - 86937 - MAIN ST @ WESTON ST	0.2	0	2.4	2	0	5	2.2	0	3.8	1.1	0	4.7	2.4	0	7.6	1.2	0	3.9	0.4	0	5.7	0	0	6.5	1	0	6	.
63 - 86938 - MAIN ST @ WELLINGTON ST	0.3	0	2.8	1	0	6	0.2	0	4	1	0	5.7	2.1	0	9.7	2.1	0	6	2	0	7.7	2	0	8.5	0	0	6	.
64 - 86939 - MAIN ST @ PROSPECT ST	2.4	0	5.2	4	0	10	1.8	0	5.8	1	0	6.8	2.8	0	12.5	1.6	0	7.6	1.6	0	9.3	0	0	8.5	2.5	0	8.5	.
65 - 86940 - MAIN ST @ HARVARD ST	1.3	0	6.6	1	0	11	0.8	0	6.6	1.4	0	8.1	2.4	0	14.9	0.7	0	8.2	1.9	0	11.1	2	0	10.5	0.5	0.3	8.8	.
66 - 86941 - MAIN ST @ DANIELS CT	0.2	0	6.8	1	0	12	1.2	0	7.8	1	0	9.2	0.8	0	15.7	1.3	0	9.6	0.7	0	11.9	2	0	12.5	0.8	0	9.5	.
67 - 86942 - 702 MAIN ST	1.3	0	8.1	0	0	12	0.4	0	8.2	0.7	0	9.8	0.2	0	15.9	0.3	0.2	9.7	0.3	0	12.1	0.5	0	13	1	0	10.5	.
68 - 86943 - MOODY ST @ MAIN ST	3.2	0	11.3	1	0	13	0.6	0	8.8	1.7	0.2	11.3	0.3	0	16.1	0.9	0	10.6	0.7	0.1	12.7	0	0	13	0	0	10.5	.
69 - 86944 - CARTER ST @ WALTHAM COMM RAIL	6.2	0	17.6	7	1	19	8.6	4	13.4	7.3	0.6	17.9	3	0.3	18.9	7.1	0.7	17	7.7	0.7	19.7	2.5	0.5	15	6	0.5	16	5.6
70 - 86945 - MAIN ST @ APPLETON ST	0.6	0	18.1	1	0	20	2.2	0	15.6	1.4	0	19.3	0.8	0	19.7	1.2	0	18.2	0.7	0	20.4	0.5	1	14.5	1.3	0	17.3	0.6
71 - 86946 - MAIN ST @ HEARD ST	0.6	0	18.7	2	0	22	0.8	0	16.4	1.2	0	20.5	0.8	0	20.5	0.8	0.1	18.9	0.1	0	20.6	0	0	14.5	0	0	17.3	1.4
72 - 8670 - MAIN ST @ TOWNSEND ST	3.4	0	22.1	3	0	25	3.4	0	19.8	2.2	0	22.7	1.8	0	22.2	2.9	0.1	21.7	1.6	0	22.1	1.5	0	16	1.5	0	18.8	1.2
73 - 8671 - MAIN ST @ CHAMBERLAIN TERR	0.2	0	22.3	0	0	25	0.2	0	20	1.2	0.2	23.7	0.4	0.1	22.6	0.6	0	22.2	0.4	0	22.6	2	0	18	0.8	0	19.5	0.4
74 - 8672 - MAIN ST OPP ROSE HILL WAY	0	0	22.3	1	0	26	0.6	0	20.6	1.4	0	25.1	0.7	0	23.2	0.2	0	22.4	0.6	0	23.1	1	0	19	0.8	0	20.3	0.4
75 - 8674 - MAIN ST @ WILLOW ST	1.1	0	23.4	3	0	29	0.8	0	21.4	0.2	0	25.3	0.2	0	23.5	1.3	0	23.8	1	0	24.1	1	0	20	0	0	20.3	0.2
76 - 8675 - MAIN ST @ LAFAYETTE ST	0.6	0	24	0	0	29	0	0	21.4	0.1	0	25.5	0.1	0	23.6	0	0	23.8	0.1	0	24.3	0	0	20	0	0	20.3	0
77 - 8676 - MAIN ST @ RANGELEY RD	0.1	0	24.1	0	0	29	0.8	0	22.2	1.1	0	26.5	0.1	0	23.7	0.6	0.1	24.2	1.3	0	25.6	1	0	21	0	0	20.3	0.2
78 - 8678 - MAIN ST OPP WARREN ST - WATER	0.2	0	24.3	0	0	29	0.2	0.2	22.2	1.3	0.3	27.5	1.1	0.4	24.5	2.8	0.1	26.9	1.9	0.4	27	0.5	0.5	21	0.3	0	20.5	0.2
79 - 8679 - MAIN ST OPP LONGFELLOW RD	0.8	0	25.1	0	0	29	1.2	0	23.4	0.8	0	28.3	0.4	0.6	24.3	0.4	0.4	26.9	1.9	0.1	28.7	2	0	23	0.3	0	20.8	0.6
80 - 8291 - MAIN ST @ EVANS ST	1.8	0	26.9	0	0	29	1.8	0	25.2	2.3	0.1	30.5	0.6	0.1	24.8	0.8	0.2	27.4	2	0.1	30.6	1.5	0	24.5	1.3	0	22	0.8
81 - 8292 - 590 MAIN ST OPP HERSON ST	0	0	26.9	1	0	30	1	0	26.2	1.5	0.1	32	2.9	0	27.7	0.9	0	28.3	0.7	0	31.3	1.5	0.5	25.5	1	0	23	1.6
82 - 8293 - MAIN ST OPP OLCOTT ST	0.1	0	27	1	0	31	0.6	0	26.8	0.4	0	32.4	1.4	0	29.1	2.1	0	30.4	4.6	0.1	35.7	2.5	0	28	1.8	0	24.8	1.6
83 - 8294 - MAIN ST @ OAKLAND ST	0.9	0.1	27.8	1	0	32	1.2	0	28	0.4	0	32.7	0.8	0.6	29.2	1	0	31.4	1.3	0.1	36.9	0	0	28	0.8	0.3	25.3	1.2
84 - 8298 - MAIN ST @ HOWARD ST	2.7	0	30.4	0	0	32	1.8	0	29.8	1.9	0	34.6	1.4	0	30.7	2.8	0.1	34.1	3	0.3	39.6	2.5	1	29.5	3	0.3	28	1.8
85 - 8295 - MAIN ST @ FRENCH ST	1.7	0.1	32	0	0	32	2.2	0	32	0.6	0	35.2	1.2	0.1	31.9	1.9	0.1	35.9	0.9	0.3	40.1	2.5	0	32	1	0	29	2.4
86 - 8296 - MAIN ST @ CHESTNUT ST	0.8	0.1	32.7	0	0	32	2.6	0.2	34.4	1	0.3	35.9	0.7	0	32.6	1.7	0	37.6	2.3	0.3	42.1	1	0.5	32.5	1	0	30	2.6
87 - 8297 - MAIN ST @ CROSS ST	1.8	3	31.4	2	8	26	2.6	6	31	0.8	8.1	28.6	0.8	4	29.3	1.6	7.4	31.7	2.6	6.3	38.4	0.5	7.5	25.5	1	6.3	24.8	3.2
88 - 1432 - ARSENAL ST @ IRVING ST	0.6	0	32	1	0	27	2.2	0	33.2	1.7	0.5	29.8	0.5	0.1	29.8	0.9	0	32.6	1.7	0	40.1	0	0.5	25	1.5	0.5	25.8	2.6
89 - 1433 - ARSENAL ST @ BEACON PK	0.2	0	32.2	0	0	27	0	0	33.2	0.1	0	29.9	0.2	0	29.9	0	0	32.6	0.1	0.1	40.1	2	0	27	0.8	0	26.5	0.4
90 - 1434 - ARSENAL ST @ BEECHWOOD AVE	0	0	32.2	0	0	27	1	0	34.2	2	0.4	31.5	1.1	0.1	31	2.2	0	34.8	0.7	0	40.9	0.5	0	27.5	0.8	0	27.3	2.2
91 - 1435 - ARSENAL ST @ LOUISE ST	0.9	0	33.1	0	0	27	0.2	0	34.4	0.3	0	31.7	0.4	0	31.4	0.2	0	35	0.6	0	41.4	0.5	0	28	0.3	0	27.5	0.6
92 - 1436 - ARSENAL ST OPP SCHOOL ST	0.2	1.7	31.7	1	0	28	0.4	0	34.8	0.5	0.2	32	1	1.6	30.8	0.4	0.4	35	1.9	0	43.3	2	0	30	0.5	0.3	27.8	2
93 - 1437 - ARSENAL ST @ TALCOTT AVE	0	0	31.7	0	0	28	0	0	34.8	0	0	32.1	0.7	0	31.6	1.3	0.1	36.2	0.1	0	43.4	0	0	30	0	0.3	27.5	0.2
94 - 1438 - 500 ARSENAL ST - WATERTOWN +	1	1.7	31	0	0	28	0	0.2	34.6	2.5	1.1	33.4	0.1	0.2	31.5	0.3	0.1	36.4	0.4	0.3	43.6	0.5	0.5	30	0	1	26.5	0.4
95 - 1441 - ARSENAL ST OPP ELM ST	0	0	31	0	5	23	0	0.4	34.2	2.3	0.1	35.7	0.8	0.1	32.2	0.7	0.1	37	1	0	44.6	0.5	0	30.5	0	0.5	26	0.2
96 - 1442 - ARSENAL ST OPP ARLINGTON ST	0.8	0.7	31.1	0	3	20	0.2	0.8	33.6	1.4	0.7	36.3	1.5	0.4	33.3	3.3	1.6	38.8	1.6	0.3	45.9	2	0.5	32	1	0.3	26.8	1
97 - 1043 - WESTERN AVE @ MACKIN ST	1.2	1.7	30.7	2	1	21	1.6	1.6	33.6	1.5	1.5	36.4	1.3	1.5	33.1	2.2	1.2	39.8	1.3	1.7	45.4	0.5	1	31.5	1.3	1.3	26.8	2.6
98 - 1045 - 450 WESTERN AVE	0	0	30.7	1	0	22	0.2	0	33.8	0.9	0	37.2	0.3	0	33.4	1.7	0	41.4	0.6	0	46	0	0	31.5	0.5	0.5	26.8	0.4
99 - 1046 - WESTERN AVE @ LITCHFIELD ST	0.9	0	31.6	2	0	24	2.2	0	36	4.2	0.1	41.3	2.2	0.1	35.5	2.6	0	44	2.1	0.6	47.6	1.5	1	32	0.8	0	27.5	2.2
100 - 1049 - WESTERN AVE @ EVERETT ST	5	1.6	35	2	0	26	4.4	0.8	39.6	2.4	0.4	43.2	1.6	0.5	36.6	1.2	1	44.2	1.4	0.1	48.9	0.5	0	32.5	0.8	0	28.3	7.2
101 - 1589 - WESTERN AVE @ RIVERDALE ST	0.4	1.8	33.7	0	4	22	1.8	3.8	37.6	1.1	0.8	43.5	1.6	1.3	36.9	2.4	1.2	45.4	1.6	0.3	50.1	2.5	0.5	34.5	1.5	1	28.8	3
102 - 1051 - WESTERN AVE @ TRAVIS ST	0.6	1.1	33.1	0	2	20	0.4	3.2	34.8	0.5	0.9	43.2	0.7	0.2	37.4	1.3	0.6	46.2	0.3	1.1	49.3	0.5	0.5	34.5	1.5	0.5	29.8	1.4
103 - 1052 - 130 WESTERN AVE	0	0	33.1	0	0	20	0	0	34.8	0	0	43.1	0	0	37.4	0.1	0.2	46.1	0	0	49.3	0	0	34.5	0	0	29.8	0.2
104 - 1053 - WESTERN AVE @ GENZYME	0	0	33.1	0	0	20	0.2	1	34	0.1	0.5	42.8	0.2	0.1	37.4	0.7	0.6	46.2	0.3	0.7	48.9	0.5	0	35	0.5	0.3	30	1
105 - 1055 - RIVER ST OPP BLACKSTONE ST	0.1	1	32.2	3	0	23	2.6	0.6	36	1.9	0.4	44.2	1.1	0.4	38.1	1.9	0.4	47.7	0.4	0.9	48.4	1	0	36	1.5	1	30.5	1.2
106 - 1056 - RIVER ST @ FAIRMONT ST	0	0	32.2	0	0	23	1.2	0.2	37	0.2	0	44.4	0.6	0	38.7	0.1	0.2	47.6	0.6	0.1	48.9	0	0	36	0.3	0.3	30.5	0.2
107 - 1057 - RIVER ST @ KELLY RD	0	0	32.2	0	0	23	0	0	37	0.1	0.1	44.3	0.4	0.3	38.8	0.4	0	48	0	0.3	48.6	0.5	0.5	36	0.5	0.5	30.5	0.4
108 - 1058 - RIVER ST @ PLEASANT ST	0	0	32.2	0	0	23	0	0	37	0	0.1	44.3	0.1	0.5	38.3	0	0	48	0	0.4	48.1	0	0	36	0	0.5	30	0
109 - 72 - MASSACHUSETTS AVE @ PEARL ST	0.7	29.1	3.8	1	22	2	1	26.6	11.4	0.8	36	9	0.6	29.4	9.5	0.9	34.1	14.8	1.1	32.4	16.9	0	28.5	7.5	0.3	18.8	11.5	0.4
110 - 73 - MASSACHUSETTS AVE @ SIDNEY ST	0	2.6	1.2	0	2	0	0.2	9.6	2.2	0.1	8	1.3	0	6	3.5	0.6	10.1	5.2	0	6.4	10.4	0	5	2.5	0	3.8	7.8	0.6
111 - 730 - FRANKLIN ST @ SIDNEY ST	0	1	0.2	0	0	0	0	2	0.2	0	0.7	0.6	0	3.5	0	0	4.6	0.7	0	10.4	0	0	2.5	0	0	7.8	0	0
112 - 1123 - GREEN ST @ MAGAZINE ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Maximum			35			32			39.6			44.4			38.8			48			50.1			36			30.5	
Total	47.3	47.4		48	48		61.2	61.2		63.2	62.4		52.4	52.5		66.9	66.1		65.4	64.9		52.5	52.5		47.7	47.4		56.4

8)(B033) [5] {FA19}		07:47 (70.5)(B034) [4] {FA19}			08:00 (70.5)(B037) [30] {FA19}			08:25 (70.6)(B039) [1] {FA19}			08:50 (70.5)(B031) [8] {FA19}			09:10 (70.6)(B190) [41] {FA19}			09:30 (70.5)(B032) [3] {FA19}			09:50 (70.6)(B033) [5] {FA19}			10:20 (70.5)(B037) [47] {FA19}			10:40 (70.6)(B039) [5] {FA19}			11:00 (70.5)(B195) [11] {FA19}			11:30 (70.6)(B032) [3] {FA19}		
Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
.	.	2.8	0	2.8	0.3	0	0.4	.	.	.	0.9	0	0.9	.	.	.	1	0	1	.	.	.	0.4	0	0.4	.	.	.	0.9	0	0.9	.	.	.
.	.	0.5	0	3.3	0.1	0	0.5	.	.	.	0	0	0.9	.	.	.	0	0	1	.	.	.	0	0	0.4	.	.	.	0	0.1	0.9	.	.	.
.	.	1.3	0	4.3	0.1	0	0.6	.	.	.	0.3	0	1.1	.	.	.	0	0.3	0.7	.	.	.	0.5	0	0.9	.	.	.	0.8	0.1	1.6	.	.	.
.	.	.	.	.	.	.	.	7	0	7	.	.	.	0.7	0	0.8	.	.	.	3	0	3	.	.	.	4	0	4	.	.	.	5	0	5
.	.	1	0	5.3	0.1	0	0.7	1	0	8	0	0	1.1	0.2	0	0.9	0	0	0.7	0	0	3	0.1	0	1	0.2	0	4.2	0.2	0	1.8	0	0	5
.	.	0	0	5	0.1	0	0.8	1	0	9	0.1	0	1.3	0.1	0	0.9	0	0	0.7	0	0.2	2.8	0.1	0	1.1	0.2	0	4.4	0.3	0	2.1	1	0	6
.	.	0	0	5	0	0	0.9	0	0	9	0.1	0	1.4	0.1	0	1	0	0	0.7	0	0	2.8	0.1	0	1.2	0	0	4.4	0	0	2.1	0	0	6
.	.	0.5	0	5.5	1.3	0	2.2	1	0	10	0.1	0	1.5	0.6	0	1.6	0	0	0.7	0.4	0	3.2	0.2	0	1.4	0.2	0	4.6	0.4	0	2.5	0	0	6
.	.	0.5	0	6	0.5	0	2.7	0	0	10	0.3	0	1.8	0.1	0	1.8	0	0	0.7	0.2	0	3.4	0.2	0	1.6	0	0	4.6	0.2	0	2.6	0.7	0	6.7
.	.	0.5	0	6.5	0.9	0	3.6	0	0	10	0.5	0	2.3	0.9	0	2.7	0.7	0	1.3	1.4	0.6	4.2	1.1	0	2.7	0.2	0	4.8	0.4	0	3	0.3	0	7
.	.	0.8	0	7.3	1.4	0	5	0	0	10	1.3	0	3.5	0.4	0	3.1	0.7	0.3	1.7	1	0	5.2	0.6	0	3.2	1	0.2	5.6	0.5	0	3.5	1.3	0.3	8
.	.	4.3	0	11.5	1.8	0	6.8	0	0	10	0.8	0	4.3	1.5	0.1	4.4	1.3	0	3	1.2	0.2	6.2	1.5	0	4.7	0.4	0.4	5.6	0.4	0.1	3.7	0	0	8
.	.	1	0	12.5	1.2	0	7.9	2	0	12	1.5	0	5.8	1	0	5.4	0.7	0	3.7	0.8	0	7	1.6	0.1	6.2	0.4	0.2	5.8	1.1	0	4.8	1	0	9
.	.	0.8	0	13.3	0.7	0	8.6	0	0	12	0.9	0	6.6	1.1	0.2	6.2	0	0	3.7	0.8	0	7.8	0.6	0.1	6.7	0.2	0	6	1.1	0	5.9	1.3	0	10.3
.	.	0	0	13.3	0.4	0	9	0	0	12	0.4	0	7	0.1	0.2	6.2	0	0	3.7	0	0	7.8	0.3	0.1	6.8	0	0.4	5.6	0.3	0.2	6	0.7	0	11
.	.	2.3	0.3	15.3	0.9	0	9.9	1	0	13	2	0	9	0.6	0	6.8	0.7	0	4.3	0.4	0	8.2	0.4	0	7.1	0.6	1.2	5	0.9	0	6.9	2.7	0.7	13
0	6.4	8.3	1.5	22	6.4	0.7	15.6	1	0	14	7.5	0.5	16	4.7	0.6	10.9	3.3	0.3	7.3	2.2	0.6	9.8	4.2	0.6	10.7	6	0.4	10.6	5.9	0.8	12	6	1	18
0	7	0.8	0	22.8	0.8	0	16.4	0	0	14	1.3	0	17.3	0.5	0	11.4	0	0	7.3	0.2	0	10	0.4	0.1	11	0.4	0	11	0.3	0	12.3	0.3	0	18.3
0	8.4	0.3	0	23	0.6	0	17	0	0	14	1.5	0.1	18.6	0.4	0	11.7	0	0	7.3	0.4	1	9.4	0.4	0.1	11.3	0.6	0	11.6	0.2	0	12.5	0.3	0	18.7
0	9.6	2.5	1.8	23.8	1.4	0	18.3	2	0	16	2.1	0.1	20.6	1.1	0	12.8	0.3	0	7.7	0.2	0	9.6	0.6	0.1	11.8	0.8	0.4	12	0.4	0	12.8	0.3	0.7	18.3
0	10	1.5	0	25.3	1	0.1	19.3	1	0	17	0.8	0.1	21.3	0.6	0	13.4	0	0	7.7	0.4	0	10	0.4	0.1	12.1	0.8	0.2	12.6	0.4	0.1	13.1	0.3	0	18.7
0	10.4	1.8	0	27	0.8	0	20	1	0	18	0.1	0	21.4	0.3	0.1	13.7	0	0	7.7	0.4	0	10.4	0.2	0	12.3	0	0	12.6	0.9	0	14	0.7	0	19.3
0	10.6	0.5	0	27.5	0.3	0.2	20.2	0	0	18	0.1	0.3	21.3	0.2	0	13.8	0	0	7.7	0.2	0.6	10	0.4	0.2	12.5	0.4	0	13	0.4	0	14.4	0	0	19.3
0	10.6	0.3	0	27.8	0	0	20.1	0	0	18	0	0	21.3	0	0	13.8	0	0	7.7	0	0	10	0	0	12.6	0	0	13	0.2	0.1	14.5	0	0	19.3
0	10.8	0	0	27.8	0.1	0.1	20.1	0	0	18	0.1	0.1	21.3	0.1	0	13.9	0	0	7.7	0	0	10	0.2	0	12.8	0.2	0	13.2	0.3	0	14.7	1.7	0	21
0	11	1.3	0	29	1.1	0.1	21.1	3	0	21	2	0.1	23.1	0.4	0.1	14.2	0	0	7.7	0.2	1	9.2	0.8	0.3	13.2	0.2	0	13.4	1.2	0.2	15.7	0	0.7	20.3
0	11.6	0.8	0	29.8	0.4	0	21.5	0	0	21	0.3	0	23.4	0.1	0	14.3	0	0	7.7	0	0	9.2	0.1	0	13.4	0.4	0	13.8	0.1	0	15.8	0	0	20.3
0	12.4	1.5	0.3	31	0.6	0.2	22	0	0	21	0.1	0	23.5	0.2	0	14.5	0	0	7.7	0.2	0	9.4	0.1	0	13.5	0	0	13.8	0.2	0	16	0	0	20.3
0	14	1	0	32	1.8	0.2	23.6	2	0	23	0.6	0.1	24	0.3	0	14.8	0	0	7.7	0.2	0	9.6	0.4	0.1	13.9	0	0	13.8	0	0.1	15.9	0.3	0	20.7
0	15.6	2	0	34	0.9	0.1	24.4	2	1	24	0.9	0	24.9	0.5	0	15.3	2	0.3	9.3	0.8	0	10.4	0.3	0.1	14.1	0	0.4	13.4	0.7	0	16.6	0	0	20.7
0	16.8	0.8	0.5	34.3	1.1	0.4	25.2	0	0	24	0.1	0	25	0.2	0.1	15.4	0.3	0.3	9.3	0.4	0	10.8	0.3	0.1	14.3	0.8	0	14.2	0.5	0.2	17	0	0	20.7
0.2	18.4	4	0	38.3	2.1	0.1	27.2	7	2	29	2	0.4	26.6	1.3	0	16.7	0	0	9.3	0.6	0.2	11.2	0.6	0.1	14.7	1	0	15.2	1.6	0.4	18.3	0.3	0.3	20.7
0.2	20.6	4.3	0	42.5	1.8	0.1	28.8	2	0	31	0.9	0	27.5	1.3	0	17.9	2.3	0	11.7	1	0	12.2	0.6	0.1	15.2	1.4	0.4	16.2	1.2	0.1	19.4	0.7	1	20.3
0.4	22.8	2	0.3	44.3	1.6	0.3	30.1	2	0	33	1.8	0.1	29.1	1	0.2	18.8	1	0	12.7	0.6	0.2	12.6	0.8	0	15.9	1.4	0	17.6	1.2	0.2	20.4	1.3	0	21.7
4.8	21.2	5.8	8.3	41.8	3.3	6.9	26.5	4	6	31	3.6	8.9	23.9	1.6	3.7	16.7	0.3	1.7	11.3	1	2	11.6	2.1	3.1	14.9	3.4	2.6	18.4	3.5	4.1	19.7	4.3	1.7	24.3
0.2	23.6	5.5	0.5	46.8	1.5	0.4	27.6	0	0	31	1	0	24.9	0.8	0.1	17.4	0	0	11.3	1.2	0	12.8	0.3	0.1	15.1	0.2	0	18.6	1.6	0.2	21.2	0	0.7	23.7
0	24	0.3	0	47	0.5	0	28.1	0	0	31	0.1	0	25	0.1	0	17.5	0	0	11.3	0	0	12.8	0.1	0	15.2	0	0	18.6	0.3	0.1	21.4	0	0	23.7
0.2	26	1.5	0	48.5	1.6	0.2	29.5	3	0	34	0.9	0	25.9	0.4	0	17.9	0	0.3	11	0.2	0.2	12.8	0.4	0.6	15	0.4	0.4	18.6	0.3	0.2	21.5	0	0.3	23.3
0.2	26.4	1	0	49.5	0.7	0	30.1	0	0	34	0.1	0	26	0.4	0.1	18.2	0	0	11	0.6	0.2	13.2	0.1	0	15.1	0.2	0	18.8	0	0	21.5	0	0	23.3
0	28.4	2.5	1.5	50.5	1.4	0.8	30.7	1	2	33	0.9	0.6	26.3	0.4	0.4	18.2	0	0	11	0.8	0.4	13.6	0.3	0.1	15.2	0	0	18.8	1	0.3	22.2	0.7	0.3	23.7
0.2	28.4	0.3	0.8	50	0.2	1.7	29.1	0	0	33	0	0.4	25.9	0.2	0.1	18.3	0	0.3	10.7	0.2	0.2	13.6	0.2	0.1	15.3	0.4	0.4	18.8	0.5	0.7	21.9	0	0.3	23.3
1.2	27.6	0.3	0.5	49.8	0.6	0.8	28.9	2	0	35	0.3	0.9	25.3	0.4	1.7	17	0.3	1.3	9.7	0.4	1	13	0.8	1.2	14.9	1	4.8	15	2.2	1.7	22.4	1.3	1.7	23
0	27.8	0.5	0.3	50	0.3	0.2	28.9	0	0	35	0.5	0	25.8	0.1	0.1	17.1	0	0	9.7	0.8	0.4	13.4	0.3	0.1	15	0	0.2	14.8	0.4	0.1	22.6	1	0	24
1	27.8	2.8	0	52.8	1.3	0.4	29.8	4	1	38	1	0.5	26.3	1.1	0.2	18	0	0.3	9.3	1.2	1	13.6	0.7	0.1	15.6	0.4	0.2	15	1.1	0.2	23.5	1.7	0.3	25.3
0.6	29.8	1.3	1.5	52.5	1.9	1.4	30.4	0	3	35	1.5	1.3	26.5	0.8	0.9	17.9	1.3	0	10.7	0.4	0	14	1	0.7	15.9	1.2	0.6	15.6	1.2	0.8	23.9	0.3	1	24.7
0	30.2	0	0.3	52.3	0.2	0.2	30.4	0	0	35	0.3	0	26.8	0	0.1	17.8	0	0	10.7	0	0.2	13.8	0.3	0	16.1	0.6	0.2	16	0.5	0	24.4	0	0	24.7
0	32.4	0.8	0.3	52.8	2	0.1	32.2	2	0	37	2	0.3	28.5	0.8	0.2	18.4	0.3	0	11	0.6	0	14.4	1.5	0.2	17.4	1.6	0	17.6	1.6	0.5	25.5	0.7	0.3	25
0.2	39.4	6	0.3	58.5	2.3	1.2	33.3	5	2	40	0.8	0.4	28.9	1.1	0.5	19	0.3	0.3	11	1.8	1.2	15	1.6	0.5	18.5	1.8	0.6	18.8	1.6	0.7	26.5	1	0.3	25.7
0.4	42	2.8	1.5	59.8	1.7	0.9	34.2	2	1	41	1.6	1	29.5	0.8	0.8	19.1	0	0	11	1.2	0.4	15.8	0.6	0.7	18.5	1.6	0	20.4	0.5	1.9	25	0.3	1.3	24.7
1.2	42.2	1	2	58.8	0.8	1	33.9	1	1	41	0.3	0.4	29.4	0.8	0.7	19.2	0.3	0.7	10.7	0.2	0.4	15.6	0.4	0.7	18.1	0.8	1.4	19.8	0.7	1.1	24.6	0	0.7	24
0.8	41.6	0	0.3	58.5	0	0.5	33.4	0	0	41	0	0.1	29.3	0	0.1	19.1	0	0	10.7	0	0	15.6	0	0.1	18.1	0	0.2	19.6	0	0	24.6	0	0	24
0.4	42.2	1.3	2.5	57.3	0.1	0.2	33.3	0	0	41	0	0.4	28.9	0.3	0	19.3	0	0	10.7	0	0.2	15.4	0	0	18.1	0.2	0	19.8	0.5	0.2	25	0	0	24
2.4	41	1	0.5	57.8	1.6	0.6	34.3	3	1	43	0.9	0.5	29.3	0.7	0.5	19.6	0	0	10.7	1.4	0.6	16.2	0.8	0.4	18.5	1	0.4	20.4	0.6	0.9	24.7	0.3	0.3	24
0.6	40.6	0.3	0.3	57.8	0.5	0.3	34.5	0	0	43	0.4	0.4	29.3	0	0.3	19.3	0	0	10.7	0.4	0	16.6	0.1	0.1	18.5	0	0	20.4	0	0.3	24.5	1	0	25
0	41	0.3	0	58	0.2	0.3	34.4	0	0	43	0	0.3	29	0	0.1	19.1	0.3	0	11	0.2	0.2	16.6	0.1	0.1	18.6	0	0	20.4	0.2	0	24.6	0	0	25
0	41	0.3	0.5	57.8	0.1	0.2	34.3	0	0	43	0.1	0	29.1	0	0.2	19	0	0	11	0	0	16.6	0	0.4	18.2	0.2	0.2	20.4	0	0.3	24.4	0	0.7	24.3
28.4	13	1.3	34.5	24.5	0.6	24.5	10.4	0	34	9	0.4	24.5	5	0.4	14	5.6	0	6.3	4.7	0	14.2	2.4	0.3	16.3	2.2	0.2	16.4	4.2	0.1	19.6	4.8	0.7	19.3	5.7
10.6	3	0	20.3	4.3	0	8.1	2.3	0	9	0	0	4.1	0.9	0.1	2.9	3.1	0	0.3	4.3	0	1	1.4	0.1	1.1	1.2	0.4	1.4	3.2	0	1.4	3.5	0	0	5.7
2.4	0.6	0	4.3	0	0	2.3	0.1	0	0	0	0	0.9	0	0	3.9	0	0	4.3	0	0	1.4	0	0	1	0.2	0	3.2	0	0	3.4	0.1	0	5	0.7
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	42.2			59.8			34.5			43			29.5			19.6			12.7			16.6			18.6			20.4			26.5			25.7
56.6		86.9	85.7		56	55.8		63	63		48.1	47.8		31.9	33.2		17.4	17.3		29.8	29.8		30.6	30		37.4	37.4		41.6	41.4		39.5	38.9	

Trip (RouteVar)(Block) [Observations]

11:53 (70.5)(B033) [18] {FA19}			12:15 (70.6)(B037) [46] {FA19}			12:43 (70.5)(B039) [6] {FA19}			13:05 (70.6)(B195) [6] {FA19}			13:40 (70.5)(B032) [2] {FA19}			14:00 (70.6)(B033) [18] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
1.5	0	1.6	.	.	.	1.5	0	1.5	.	.	.	2	0	2	.	.	.
0.1	0	1.7	.	.	.	0	0	1.5	.	.	.	0.5	0	2.5	.	.	.
0.6	0.1	2.2	.	.	.	2	0.2	3.3	.	.	.	1.5	0	4	.	.	.
.	.	.	4.3	0	4.3	.	.	.	3.5	0	3.5	.	.	.	6	0	6
0.3	0.1	2.5	1.2	0.6	5	0	0	3.3	0	0	3.5	0	0	4	0.3	0	6.3
0.4	0	2.9	0.4	0	5	0.3	0	3.7	0	0	3.5	0	0	4	0.3	0	6.6
0.1	0	3	0	0	5	0	0	3.7	0	0	3.5	0	0	4	0	0	6.6
0.4	0.1	3.4	0.2	0	5	0.5	0	4.2	0.2	0	3.7	0	0	4	0.3	0.1	6.8
0.1	0	3.5	0.2	0	5.2	0.5	0	4.7	0.5	0	4.2	0	0	4	0.6	0.2	7.2
0.6	0	4.1	0.4	0.1	5.5	0.8	0	5.5	0.5	0.5	4.2	2.5	0	6.5	0.2	0.1	7.4
0.1	0.1	4.1	0.3	0	5.8	0.7	0	6.2	0.3	0	4.5	0	0	6.5	0	0	7.4
0.6	0	4.6	0.6	0.2	6.3	2.7	0.3	8.5	2.2	0	6.7	1.5	0	8	0.9	0.2	8.1
1	0.2	5.4	1	0.3	7	2.3	0	10.8	0.5	0	7.2	3	0	11	1.3	1	8.4
0.3	0	5.8	1	0.3	7.7	1.8	0	12.7	0.2	0.2	7.2	3.5	0	14.5	1.2	0.3	9.3
0.2	0.1	5.9	0.2	0.2	7.6	0.3	0.2	12.8	0.8	0.2	7.8	0.5	0	15	0.3	0.1	9.6
0.6	0.1	6.4	0.3	0.1	7.9	0.3	0.3	12.8	0.3	0	8.2	0.5	0	15.5	0.2	0.1	9.7
5.1	0.8	10.7	6.3	0.7	13.5	4.2	0.3	16.7	4.5	1.2	11.5	4.5	2	18	7.9	1.2	16.5
0.2	0.1	10.9	0.5	0	14	1.2	0.2	17.7	0	0	11.5	0	0	18	0.5	0.1	16.9
0.3	0.2	11	0.4	0.3	14.2	0.5	0	18.2	0.2	0	11.7	0	0	18	0.4	0.3	17.1
0.6	0	11.6	0.8	0.2	14.8	0	0	18.2	0.2	0.2	11.7	0	0.5	17.5	0.8	0.1	17.8
0.5	0.1	12	0.8	0.2	15.5	0	1.2	17	1.2	0	12.8	0	0	17.5	0.9	0.4	18.3
0.2	0	12.2	0.3	0.2	15.5	0.3	0	17.3	0.2	0	13	0	0	17.5	0.2	0.1	18.4
0.4	0.1	12.5	0.3	0.2	15.7	0	0.3	17	0.3	0.3	13	0.5	0	18	1	0.3	19.1
0.1	0	12.6	0	0	15.7	0	0	17	0.3	0	13.3	0.5	0	18.5	0.1	0	19.2
0.2	0.1	12.6	0.3	0.1	15.9	0	0	17	0.2	0.3	13.2	0.5	0.5	18.5	0.3	0.1	19.5
0.9	0.1	13.5	0.9	0.4	16.3	0.2	0.2	17	1.2	0.5	13.8	0	1	17.5	1.8	0.3	21
0.1	0	13.6	0	0	16.3	0	0	17	0.3	0	14.2	0	0	17.5	0.1	0	21.1
0	0.1	13.5	0.2	0	16.5	0.3	0.2	17.2	0	1	13.2	0	0	17.5	0.1	0.2	21
0.3	0.1	13.7	0.3	0.2	16.6	0	0	17.2	0.5	0.2	13.5	0	0	17.5	0.2	0.3	20.8
0.2	0.1	13.8	0.2	0.3	16.5	0	0	17.2	0	0	13.5	0	0	17.5	0.4	0.2	21.1
0.2	0.2	13.8	0.2	0.2	16.5	0.2	0.3	17	0.8	0.3	14	0	0.5	17	0.2	0.1	21.2
0.8	0.1	14.6	0.7	0.2	17.1	0.3	0	17.3	1.5	0.2	15.3	0.5	0	17.5	1.2	0.1	22.3
0.2	0.1	14.7	0.8	0	17.8	0.2	0.2	17.3	0.3	1	14.7	0	0.5	17	0.8	0.2	22.9
0.4	0.3	14.8	0.3	0.4	17.7	0	0	17.3	0.2	0.2	14.7	0	0	17	0.3	0.3	22.9
3.3	3.1	15.1	2.9	3.3	17.2	1	2.2	16.2	1.7	3.2	13.2	0	1.5	15.5	2	3.2	21.7
0.5	0.1	15.5	0.7	0.2	17.7	0.3	0.2	16.3	0.7	0.2	13.7	1	0	16.5	0.8	0.5	21.9
0.1	0	15.6	0.1	0.1	17.7	0	0	16.3	0	0	13.7	0	0	16.5	0.3	0	22.2
0.4	0.2	15.8	0.5	0.2	17.9	0.8	0	17.2	1	0.2	14.5	0.5	0	17	1.7	0.1	23.8
0.1	0	15.9	0	0	17.9	0	0	17.2	0.2	0	14.7	0	0	17	0.1	0	23.9
0.6	0.1	16.3	0.4	0.2	18.1	0	0	17.2	0.3	0.3	14.7	0	0	17	1	0.7	24.2
0.1	0.4	16.1	0.3	0.4	18	0.3	0	17.5	0.3	0.3	14.7	0.5	1	16.5	0.9	0.6	24.6
1.3	1.5	15.9	1.6	2	17.7	1.2	1.5	17.2	1.5	0.8	15.3	1.5	0.5	17.5	2.8	2.1	25.4
0.2	0.2	15.8	0.6	0.1	18.1	0.5	0.2	17.5	1	0	16.3	0.5	0	18	0.9	0.2	26.1
1.9	0.2	17.5	1.9	0.4	19.6	1	0.3	18.2	2.8	0.5	18.7	1	0.5	18.5	2.1	0.2	28
1.2	1.8	16.8	0.7	1	19.3	0.2	1.2	17.2	1	1	18.7	0	1	17.5	1.9	1.7	28.2
0.4	0	17.3	0.3	0	19.7	0	0	17.2	0	0.5	18.2	0.5	0	18	0.4	0.2	28.5
1.7	0.1	18.9	1	0.4	20.3	0.7	0.7	17.2	0.3	0.5	18	0.5	0.5	18	0.5	0.3	28.7
1.3	0.3	19.8	1.3	0.6	21.1	0.3	0.3	17.2	2	0.7	19.3	0.5	0	18.5	2.1	1.2	29.6
0.6	0.9	19.4	0.5	0.8	20.8	0.7	0.8	17	0.3	0.7	19	0	0.5	18	1.1	1.1	29.6
0.2	1.1	18.6	0.7	1	20.5	0.5	0.2	17.3	0.2	1.3	17.8	0.5	0.5	18	0.8	0.8	29.6
0	0.1	18.5	0	0	20.4	0	0	17.3	0	0	17.8	0	0	18	0	0.1	29.5
0.3	0.2	18.6	0.3	0.2	20.6	0.2	0.3	17.2	0.2	0.7	17.3	0.5	0	18.5	1.5	0.3	30.7
1.7	0.3	20	0.8	0.6	20.9	1	0	18.2	2.5	0.8	19	0.5	0.5	18.5	1.7	0.8	31.6
0.3	0	20.3	0.1	0.2	20.8	0.2	0	18.3	0	0.3	18.7	0	0.5	18	0.2	0.2	31.6
0.2	0.2	20.2	0.1	0.1	20.8	0	0	18.3	0	0.2	18.5	0	0.5	17.5	0.2	0.4	31.4
0.1	0.4	19.9	0.1	0.2	20.7	0	0	18.3	0	0.2	18.3	0	0	17.5	0.2	0.2	31.3
0.3	16.8	3.4	0.4	16.4	4.9	0.2	13.2	5.3	1.2	15.5	4	0	17	0.5	0.2	23	8.6
0.1	1.7	1.8	0	0.8	4.1	0	0.5	5	0	0.7	3.3	0	0	0.5	0	0.8	7.7
0	1.6	0.3	0	5	0	0	5	0	0	4.5	0	0	0.5	0	0	8.1	0
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
		20.3			21.1			18.3			19.3			18.5			31.6
34.5	34.6		38.7	39.6		30.2	30.5		38.1	39.4		30	30		52.2	53.2	

14:25 (70.5)(B193) [12] {FA19}			14:50 (70.6)(B039) [19] {FA19}			**15:17 (70.5)(B038) [16] {SP19}**			15:20 (70.8)(B190) [19] {FA19}			15:45 (70.6)(B032) [2] {FA19}			16:06 (70.5)(B036) [4	
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off
0.9	0	1.1	.	.	.	2.7	0	2.7	.	.	.	.	.	.	2.4	0
0	0	1.1	.	.	.	0	0	2.7	.	.	.	.	.	.	0.1	0
2.3	0.1	3.4	.	.	.	4	0	6.7	.	.	.	.	.	.	2.9	0
.	.	.	4.3	0	4.3	.	.	.	.	.	.	9.5	0	9.5	.	.
0.7	0	4.1	0.9	0	5.2	1.4	0.1	8	.	.	.	2	0	11.5	0.3	0
0.3	0	4.3	0	0	5.2	0	0	8	.	.	.	0	0	11.5	0.4	0
0	0	4.3	0	0.1	5.1	0.1	0	8.1	.	.	.	0	0	11.5	0.1	0
0.5	0	4.8	0.2	0.2	5.1	0.5	0	8.6	.	.	.	0	0	11.5	0.5	0
0.5	0	5.3	0.1	0.1	5.2	0.4	0	8.9	.	.	.	0.5	0.5	11.5	0.8	0
0.3	0	5.7	0.4	0	5.6	0.8	0.1	9.6	.	.	.	1.5	0	13	0.5	0
0.2	0.2	5.7	0.5	0	6.1	0.8	0	10.4	.	.	.	0	0	13	0.6	0
1.2	0.3	6.5	0.9	0.1	6.9	1.3	0.2	11.4	.	.	.	5	1	17	1.3	0.5
2.3	0.3	8.6	1.4	0.5	7.8	1.6	0.1	12.9	.	.	.	3	0.5	19.5	2	0.1
1.3	0.3	9.6	0.6	0.3	8.2	1.8	0.3	14.4	.	.	.	0.5	1	19	0.5	0.2
0.4	0.7	9.3	0.4	0.1	8.5	0.3	0	14.7	.	.	.	0.5	1.5	18	1.1	0.1
0.8	0.2	10	0.3	0.1	8.6	0.5	0.1	15.1	.	.	.	0	0.5	17.5	1.1	0.1
11.3	1.5	19.8	5.4	0.8	13.2	5.3	1.5	18.9	6.8	0	7.6	5	1	21.5	5.9	1.4
0.7	0.2	20.3	0.5	0.1	13.6	0.5	0.1	19.4	0.5	0.5	7.6	0	0	21.5	1.7	0.2
0.8	0.5	20.6	0.5	0.3	13.8	1.1	0.1	20.4	0.6	0.1	8.2	1	0	22.5	0.3	0.1
1.5	0.3	21.8	1	0.3	14.5	0.8	0.3	20.9	1.1	0	9.3	0	0	22.5	0.7	0.1
1	0.2	22.7	0.7	0.3	14.9	0.4	0.2	21.1	1.4	0	10.7	0	0	22.5	0.6	0.2
0.1	0	22.8	0.3	0.1	15.2	0	0.4	20.7	0.6	0.1	11.2	0.5	0	23	0.3	0
0.3	0.2	22.8	0.2	0	15.3	0.3	0.1	20.9	0.3	0.1	11.5	0	0	23	0.7	0.3
0.3	0.2	22.9	0.1	0	15.4	0	0	20.9	0	0	11.5	0	0	23	0	0.1
0.7	0	23.6	0.3	0.1	15.6	0	0.1	20.8	0.2	0	11.7	0	0	23	0.2	0.1
2	0.8	24.8	1.2	0.2	16.6	0.6	0.3	21.2	2.6	0.2	14.1	1.5	1	23.5	1.6	0.2
0.1	0.1	24.8	0.4	0	17	0.1	0	21.3	0.3	0	14.4	0	0	23.5	0	0.1
0	0	24.8	0.3	0	17.3	0.1	0.1	21.3	0.1	0.1	14.4	0	0.5	23	0.4	0.6
0.8	0.1	25.6	0.2	0	17.5	0.3	0.4	21.1	0.3	0	14.7	0	0	23	0.3	0.1
0.6	0.2	26	0.1	0	17.6	0.2	0	21.3	0.1	0	14.8	0	0	23	0.5	0.1
0.2	0.5	25.7	0.5	0.2	17.9	0.1	0.2	21.3	0.1	0	14.9	1.5	0.5	24	0.3	0.1
2.2	0.3	27.6	0.5	0.1	18.4	0.8	0.3	21.7	0.9	0.3	15.5	1	0	25	0.6	0.3
0.9	0.1	28.4	1.4	0.2	19.6	1.4	0.1	23	0.8	0.2	16.2	0.5	0.5	25	0.5	0.4
0.7	0.4	28.7	0.3	0.3	19.5	0.1	0.1	23	0.5	0	16.7	0.5	0	25.5	0.3	0.3
2.6	4	27.3	3.1	4.7	17.9	1.4	4.6	19.8	1.9	2.1	16.5	2.5	5	23	3.6	4.8
1.5	0.7	28.1	2.2	0.1	20	1.3	0.1	21	1.5	0.3	17.7	2	0	25	0.9	0.6
0.4	0.1	28.4	0.3	0	20.3	0.1	0	21.1	0.3	0	18	0.5	0	25.5	0.2	0.1
1.8	0	30.2	1.5	0.3	21.5	1.4	0.1	22.4	3.5	0.1	21.4	0	0	25.5	0.3	0.2
0	0.1	30.1	0.1	0.1	21.6	0	0	22.4	0.2	0	21.6	0	0	25.5	0.2	0
1.9	1.9	30.1	1.5	0.6	22.4	0.5	0.6	22.3	1.1	0.4	22.3	0.5	1	25	1.5	0.4
2.3	1.4	31	1.5	0.5	23.4	0.9	0.3	22.9	0.7	0.1	22.9	0.5	1	24.5	1.8	0.2
3.8	1.9	32.9	1.9	2.6	22.7	1.6	1.3	23.1	2.5	1.9	23.6	2	2.5	24	1.6	1.5
1.8	0.2	34.5	1.4	0.1	24.1	0.8	0.1	23.8	1.5	0.1	25	0	0	24	1.2	0.2
2.7	0.3	36.9	1.1	0.3	24.8	1.7	0.4	25.1	2.1	0.3	26.8	1.5	1	24.5	3.6	0.5
3.3	2.3	37.9	1	1.1	24.8	1	1.5	24.6	1.4	1.6	26.6	0	2	22.5	0.9	1.7
0.8	0.1	38.6	0.3	0.1	25	0.8	0.1	25.3	0.4	0.2	26.8	1	0	23.5	0.6	0.4
1	0.5	39.1	0.8	0.2	25.7	1.2	0.2	26.4	0.8	1.1	26.5	1	1	23.5	0.7	0.5
3.4	1.7	40.8	3.3	1.8	27.2	1.8	2.1	26	2.3	1.2	27.6	2	3	22.5	1.8	1
0.8	2	39.7	0.8	1.6	26.4	0.6	2.1	24.5	0.6	1.8	26.4	1	0.5	23	0.5	2.3
1.5	0.4	40.8	1.1	1.6	25.9	0.7	0.8	24.4	0.9	1.1	26.2	2	1.5	23.5	0.7	1
0	0	40.8	0	0	25.9	0.1	0	24.4	0	0	26.2	0	0	23.5	0	0
1.4	0	42.2	1.2	0.3	26.8	0.6	0.3	24.8	1.6	0.2	27.6	1	0	24.5	1.3	0.2
1.8	0.8	43.1	1.7	0.9	27.6	2.7	0.6	26.9	4.3	0.7	31.2	2	1	25.5	1.5	1.2
0.5	0.2	43.4	0.4	0.3	27.8	0	0.1	26.8	0.3	0.4	31.1	0	0.5	25	0.2	0.5
0.1	0.3	43.2	0.4	0.1	28.1	0	0.1	26.7	0.1	0.3	30.8	0	0	25	0.1	0.3
0.1	0.5	42.8	0.1	0.3	27.9	0.1	0.3	26.5	0.1	0.1	30.8	0	0.5	24.5	0.3	0.7
0.8	40	3.8	0.3	24.4	3.8	0.1	22.3	4.3	0.3	25.9	5.2	0	19.5	5	0.4	24.4
0.1	0.8	3.1	0	0.7	3.1	0	0.8	3.5	0	0.6	4.6	0	1.5	3.5	0	0.7
0	2.4	0.7	0	3	0.1	0	3.5	0	0	4.3	0.3	0	3.5	0	0	4.4
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
		43.4			28.1			26.9			31.2			25.5		
70.3	70.3		49.9	50.2		47.7	47.5		45.6	46.4		53.5	53.5		53.4	53.5

40] {FA19}	16:25 (70.8)(B193) [12] {FA19}			16:30 (70.6)(B038) [11] {FA19}			16:55 (70.8)(B039) [7] {FA19}			16:59 (70.5)(B043) [33] {FA19}			17:24 (70.8)(B041) [5] {FA19}			17:30 (70.6)(B190) [17] {FA19}			17:56 (70.5)(B042) [36] {FA19}			18:12 (70.6)(B032) [1] {FA19}			18:30 (70.5)(B193) [6] {FA19}			18:40 (70.6)(B036) [43] {FA19}			19:00 (70.5)(B039) [3] {FA19}			19:15 (70.
Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On
2.4	.	.	.		.		.	.	.	3.4	0	3.4	.	.	.	.	.	.	2.2	0	2.2	.	.	.	0.6	0	0.6	.	.	.	1.3	0	1.3	.
2.5	.	.	.		.		.	.	.	0	0	3.4	.	.	.	.	.	.	0	0	2.3	.	.	.	0	0	0.6	.	.	.	0	0	1.3	.
5.4	.	.	.		.		.	.	.	5.3	0	8.7	.	.	.	.	.	.	2.9	0.1	5.1	.	.	.	1	0	1.7	.	.	.	0.3	0	1.7	.
.	.	.	.	11.2	0	11.2	.	.	.	.	.	.	.	.	.	8.6	0	8.6	.	.		5	0	5	.	.		2.4	0	2.5	.	.		3.3
5.6	.	.	.	0.5	0.1	11.5	.	.	.	0.6	0	9.3	.	.	.	1.5	0	10.1	0.6	0	5.7	1	0	6	0.5	0	2.2	0.2	0	2.7	0	0	1.7	0
6	.	.	.	0	0	11.5	.	.	.	0.1	0	9.4	.	.	.	1.3	0.2	11.2	0.2	0	5.9	0	0	6	0.7	0	2.8	0.4	0	3.1	0	0	1.7	0
6.1	.	.	.	0	0	11.5	.	.	.	0.1	0	9.5	.	.	.	0.1	0	11.4	0.1	0	5.9	0	0	6	0	0	2.8	0	0	3.1	0	0	1.7	0
6.6	.	.	.	0.1	0.1	11.5	.	.	.	0.9	0	10.4	.	.	.	0.2	0.1	11.5	0.2	0	6.1	0	0	6	0.3	0	3.2	0.3	0	3.5	0.3	0	2	0.3
7.4	.	.	.	1.5	0.2	12.8	.	.	.	0.3	0.2	10.5	.	.	.	0.2	0.1	11.5	0.5	0	6.6	0	0	6	0.2	0	3.3	0.2	0	3.6	0	0	2	0.5
7.8	.	.	.	0.7	0.2	13.4	.	.	.	0.8	0	11.3	.	.	.	0.4	0	11.9	0.4	0	7	0	0	6	0	0	3.3	0.1	0	3.7	0.3	0	2.3	0.3
8.4	.	.	.	0.3	0.3	13.4	.	.	.	0.7	0	11.9	.	.	.	0.3	0.5	11.6	0.3	0	7.3	1	0	7	0.3	0	3.7	0.4	0.1	4.1	0.3	0	2.7	0
9.2	.	.	.	0.5	1.1	12.7	.	.	.	1.4	0.3	13	.	.	.	0.9	0.4	12.2	1.5	0.2	8.6	2	0	9	0	0	3.7	0.7	0.1	4.6	0.3	0	3	0.1
11	.	.	.	0.7	0.7	12.7	.	.	.	2.1	0.1	15	.	.	.	1.2	0.6	12.8	1.3	0	9.9	1	1	9	1.5	0	5.2	0.6	0.2	5	0	0	3	1
11.4	.	.	.	0.7	0	13.5	.	.	.	0.8	0.8	15	.	.	.	1	0.4	13.5	0.6	0.1	10.3	0	0	9	0.7	0	5.8	0.2	0	5.2	0	0	3	0
12.4	.	.	.	0.5	0.2	13.8	.	.	.	0.7	0.5	15.2	.	.	.	0.2	0.1	13.6	0.1	0	10.4	0	0	9	0.7	0	6.5	0	0	5.2	0	0	3	0
13.4	.	.	.	2.5	0.3	16.1	.	.	.	0.7	0.5	15.4	.	.	.	1.9	0.4	15.1	0.4	0.3	10.5	2	0	11	0.3	0.2	6.7	0.2	0.1	5.3	0	0	3	0
17.9	5.3	0	5.9	2.9	2.5	16.5	6.6	0	7.7	6.1	1.1	20.5	4.6	0	4.8	7.6	1.8	20.9	3.8	0.7	13.7	7	2	16	3.2	0.2	9.7	1.9	0.6	6.5	2.3	0	5.3	2.9
19.4	0.6	0	6.5	0.6	0.2	17	0.4	0.1	8	0.8	0.1	21.2	1.4	0	6.2	0.9	0.2	21.6	0.4	0.1	13.9	0	0	16	0.2	0	9.8	0.3	0	6.8	0.7	0	6	0.4
19.6	0.4	0	6.9	0	1.5	15.5	0.1	0	8.1	0.5	0.1	21.6	0.6	0	6.8	0.7	0.5	21.8	0.6	0.4	14.1	1	1	16	0	0.2	9.7	0	0.1	6.7	0	0.3	5.7	0
20.2	0.6	0	7.5	1.3	0.2	16.5	0.7	0	8.9	0.5	0.2	21.9	0.2	0	7	1.2	0.4	22.6	0.7	0.2	14.6	0	0	16	0	0	9.7	0.1	0.2	6.6	0.3	0	6	0.4
20.5	0.6	0.2	7.9	0.1	0.4	16.3	0.7	0	9.6	0.5	0.4	22	0.2	0.4	6.8	0.8	0.5	22.9	0.3	0.4	14.5	0	0	16	0.3	0.2	9.8	0.1	0.2	6.6	0.3	0	6.3	0
20.8	0.2	0	8.1	0.2	0	16.5	0	0	9.6	0.1	0.1	21.9	0	0	6.8	0.2	0.1	23	0.1	0.1	14.5	0	0	16	0.2	0.2	9.8	0	0.1	6.5	0	0	6.3	0
21.2	0.6	0.1	8.6	0.9	0.2	17.2	0.1	0.1	9.6	0.5	0.3	22.2	0	0	6.8	0.1	0.5	22.6	0.3	0.1	14.6	3	1	18	0.3	0	10.2	0	0.1	6.4	0	0	6.3	0
21.2	0.1	0	8.7	0	0	17.2	0	0	9.6	0	0	22.2	0.2	0	7	0	0	22.6	0.1	0	14.7	0	0	18	0	0	10.2	0	0	6.4	0	0	6.3	0
21.3	0.3	0.2	8.8	0.2	0	17.4	0	0.1	9.4	0.3	0.2	22.3	0	0	7	0.2	0	22.8	0.4	0.1	15	0	0	18	0	0	10.2	0	0	6.4	0	0	6.3	0
22.7	1.3	0	10.1	1	0.2	18.2	0.7	0	10.1	1	0.2	23.1	0.6	0	7.6	1.1	0.6	23.3	0.6	0.2	15.4	1	0	19	0.2	0	10.3	0.2	0.1	6.5	0.3	0	6.7	0.5
22.7	0.3	0.1	10.3	0.2	0	18.4	0	0	10.1	0.1	0	23.2	0	0	7.6	0.2	0.1	23.4	0	0.1	15.4	0	0	19	0	0	10.3	0	0	6.4	0	0	6.7	0
22.5	0.2	0	10.4	0.9	0.1	19.2	0.4	0	10.6	0.4	0.3	23.2	0	0	7.6	0.1	0.1	23.4	0.1	0.1	15.3	0	0	19	0	0	10.3	0	0	6.5	0	0	6.7	0.1
22.7	0.2	0.1	10.5	0.5	0.3	19.4	0.1	0	10.7	0.3	0.3	23.3	0.2	0	7.8	0.4	0.1	23.8	0	0	15.4	0	0	19	0	0	10.3	0	0	6.5	0	0	6.7	0
23.1	0	0.1	10.4	0.4	0	19.7	0.1	0.1	10.7	0.1	0	23.3	0	0	7.8	0.2	0.2	23.8	0.1	0.2	15.3	0	0	19	0.2	0.2	10.3	0.1	0	6.6	0.7	0	7.3	0.3
23.3	0.2	0.3	10.3	0.1	0.3	19.5	0.1	0	10.9	0.3	0.1	23.5	0	0.2	7.6	0.2	0.5	23.5	0.2	0.1	15.3	1	1	19	0	0.7	9.7	0.1	0.1	6.6	0.7	0	8	0.5
23.6	0.5	0.3	10.6	1	0.1	20.5	0.9	0	11.7	0.4	0.2	23.8	0	0	7.6	0.5	0.5	23.5	0.3	0.4	15.2	0	0	19	0	0.7	9	0.1	0	6.7	1	0	9	0.1
23.7	0.3	0.3	10.7	0.4	0	20.8	0.3	0.1	11.9	0.4	0.5	23.6	0.8	0.4	8	0.9	1.5	22.9	0.2	0.5	14.9	2	0	21	0.2	0.5	8.7	0.1	0.3	6.5	0	0	9	0.4
23.8	0.3	0.1	10.9	0.3	0.3	20.8	0.3	0.3	11.9	0.2	0.4	23.5	0.2	0.8	7.4	0.4	0.1	23.2	0.2	0.3	14.9	0	0	21	0.5	0.3	8.8	0	0.1	6.4	0	0.3	8.7	0
22.6	2.2	1.1	12	2.4	3.3	19.9	2.3	2.3	11.9	3.3	3.7	23.1	2	0.4	9	4.2	3.4	24.1	3.4	1.8	16.4	2	6	17	1.7	1.5	9	0.9	1	6.4	2.3	0.3	10.7	0.5
23	1.5	0.3	13.2	1.4	0.3	21	1.4	0.9	12.4	0.7	0.5	23.3	0.8	0	9.8	0.4	0.5	23.9	0.3	0.2	16.5	0	1	16	0.5	0.3	9.2	0.2	0.1	6.5	0	0	10.7	0.5
23.2	0.4	0.1	13.5	0.4	0	21.4	0.1	0	12.6	0.1	0	23.4	0	0	9.8	0.2	0	24.1	0.1	0	16.6	0	0	16	0	0	9.2	0	0	6.5	0.7	0	11.3	0.1
23.3	0.3	0	13.8	0.2	0.4	21.2	0.3	0.6	12.3	0.2	0	23.6	0	0	9.8	0.3	0.5	23.9	0.3	0.1	16.7	1	1	16	0	0	9.2	0.2	0.1	6.5	0.7	0	12	0.1
23.5	0.4	0.1	14.1	0.7	0	21.9	0.9	0	13.1	0.1	0	23.7	0	0	9.8	0.3	0.1	24.1	0.3	0.1	16.9	0	0	16	0	0	9.2	0	0	6.6	0	0	12	0.1
24.6	1.6	0.6	15.1	2	0.2	23.7	2	0.1	15	1.1	0.2	24.6	0.8	0.4	10.2	1.5	0.6	24.9	0.7	0.3	17.2	1	0	17	0.5	0.3	9.3	0.4	0.2	6.8	1.3	0	13.3	0.1
26.1	1.3	0.3	16.2	2.6	0.1	26.3	0.6	0.1	15.4	0.8	0.1	25.2	1.2	0	11.4	1.2	0.2	25.9	0.6	0.4	17.4	2	0	19	0.7	0.2	9.8	0.3	0	7.1	0	0	13.3	0.3
26.2	1.3	0.6	16.9	1.5	1	26.8	1.4	0.9	16	1.4	1.2	25.5	2	1.6	11.8	1.6	0.9	26.6	0.7	0.7	17.4	0	0	19	0.8	0.3	10.3	0.4	0.1	7.4	1	1	13.3	0.1
27.2	0.3	0.3	16.9	2	0	28.8	1	0.4	16.6	1.1	0.1	26.5	0.2	0	12	1.1	0.5	27.2	0.8	0.1	18.1	0	0	19	0.5	0	10.8	0.3	0	7.7	0.3	0	13.7	0.1
30.3	2.5	0.3	19.2	1.9	0.5	30.3	1.9	0.6	17.9	1.6	0.4	27.7	1	0.4	12.6	1.6	1.3	27.6	1.1	0.3	18.9	2	1	20	0.7	0.5	11	0.6	0.1	8.2	4	0.3	17.3	0.9
29.5	0.4	1.1	18.5	1.5	1.3	30.5	1.6	1.1	18.3	1	1.4	27.2	0.2	0.8	12	0.5	1.5	26.6	0.3	1.3	17.9	1	0	21	1	0.2	11.8	0.3	0.4	8	0	1.3	16	0.1
29.7	0.1	0	18.6	1	0.3	31.3	0.9	0	19.1	0.4	0.2	27.5	0.2	0	12.2	1.1	0.2	27.4	0.2	0	18.1	0	0	21	0.2	0	12	0.3	0.1	8.2	0	0	16	0
29.9	0.5	0.2	18.9	0.4	0.6	31	0	0.1	19	0.4	0.5	27.5	0.4	0	12.6	0.5	0.2	27.7	0.3	0.8	17.6	0	2	19	0.2	0.5	11.7	0.1	0.1	8.2	0.3	1	15.3	0.1
30.8	1.8	0.8	19.9	1.1	0.6	31.5	3	1.1	20.9	0.9	1.3	27	0.6	0.8	12.4	1	1.4	27.4	0.4	1	16.9	1	1	19	1.3	0.3	12.7	0.6	0.3	8.5	0.3	0.3	15.3	0.4
29	0.6	1.7	18.8	0.3	2	29.7	0.6	1.7	19.7	0.4	1.9	25.5	0.4	1.4	11.4	0.3	3.1	24.6	0.2	1.3	15.8	1	1	19	0	0.8	11.8	0.1	0.7	7.9	0.3	3	12.7	0.1
28.7	0.5	0.4	18.9	1.1	0.9	29.9	2.3	0.9	21.1	0.6	0.7	25.5	0.4	0.6	11.2	0.4	0.9	24.1	0.4	0.9	15.3	0	0	19	0	0.3	11.5	0.1	0.7	7.3	1	0	13.7	0.3
28.7	0	0	18.9	0	0	29.9	0	0	21.1	0	0	25.5	0	0	11.2	0	0	24.1	0	0	15.3	0	0	19	0	0.2	11.3	0	0	7.3	0	0	13.7	0
29.8	0.9	0	19.8	0.7	0.5	30.2	1.4	0	22.6	0.8	0.1	26.2	0.2	0	11.4	0.4	0.1	24.4	0.4	0.2	15.5	0	0	19	0	0	11.3	0.2	0.1	7.4	0	0	13.7	0.1
30.1	1.8	0.6	21.1	1.5	0.5	31.2	0.6	0.9	22.3	1	0.7	26.5	0	0.6	10.8	0.8	0.4	24.8	0.4	0.4	15.4	0	0	19	0.2	0.2	11.3	0.4	0.1	7.6	0	0.7	13	0.6
29.9	0.6	0.2	21.5	0.1	0	31.3	0.4	0.3	22.4	0.1	0.2	26.3	0	0.4	10.4	0.2	0.1	24.9	0	0.1	15.3	0	0	19	0.2	0	11.5	0.1	0	7.7	0	0	13	0
29.7	0.1	0.1	21.5	0	0.5	30.8	0.3	0.6	22.1	0.1	0.4	26	0	0.4	10	0.1	0.2	24.8	0	0.3	15	0	1	18	0	0	11.5	0	0.1	7.7	0	0	13	0
29.3	0	0.3	21.3	0.2	0.4	30.6	0.1	0.6	21.7	0.2	0.7	25.5	0	0.6	9.4	0.1	0.6	24.4	0.1	0.5	14.6	0	1	17	0	0	11.5	0	0.4	7.3	0	0.7	12.3	0.1
5.4	0.2	18.2	3.3	0.5	29.3	1.9	1.6	21.7	2.7	0.2	19.8	6.1	1	9.8	1.4	0.1	23.4	1.2	0.3	13	1.9	0	16	1	0	11	0.5	0.2	6.6	0.9	1.3	13.7	1.3	0.3
4.6	0	0.6	2.7	0	0.6	1.3	0.3	0.6	2.4	0.7	0.5	6.3	0.4	0.2	1.6	0	0.9	0.2	0.4	0.9	1.4	1	1	1	0	0.5	0	0.1	0.3	0.7	0.7	0.7	1.3	4
0.3	0	2.7	0	0	1.2	0.1	0	1	1.4	0	6.1	0.7	0	0.8	0.8	0	0.2	0.1	0	0.8	0.6	0	0	1	0	0	0	0	0.5	0.3	0	0	1.3	0
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30.8			21.5			31.5			22.6			27.7			12.6			27.7			18.9			21			12.7			8.5			17.3	
	31.3	32.4		53.7	54		36.5	37.3		47.6	47.6		20.8	21		51.4	51.7		31.4	30.2		39	38		20.6	20.5		14.5	14.4		23.3	23.6		20

6)(B037) [8] {FA19}		**19:28 (70.5)(B038) [11] {SP19}**			19:45 (70.6)(B196) [4] {FA19}			20:00 (70.5)(B042) [9] {FA19}			20:15 (70.6)(B032) [1] {FA19}			20:31 (70.5)(B036) [6] {FA19}			21:03 (70.6)(B037) [1] {FA19}			21:35 (70.5)(B010) [2] {FA19}			22:00 (70.6)(B044) [11] {FA19}			22:30 (70.5)(B045) [51] {FA19}			23:05 (70.5)(B040) [45] {FA19}			**23:40 (70.5)(B036) [17] {SP19}**		
Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
.	.	1	0	1	.	.	.	0	0	0	.	.	.	0.5	0	0.5	.	.	.	0.5	0	0.5	.	.	.	0.4	0	0.4	0.5	0	0.5	0	0	0
.	.	0	0	1	.	.	.	0	0	0	.	.	.	0	0	0.5	.	.	.	0	0	0.5	.	.	.	0	0	0.4	0	0	0.5	0	0	0
.	.	0.2	0	1.2	.	.	.	0.2	0	0.2	.	.	.	0.2	0	0.7	.	.	.	0.5	0	1	.	.	.	1	0	1.4	0.6	0	1.1	1.3	0	1.3
0	3.3	.	.	.	2.3	0	2.3	.	.	.	5	0	5	.	.	.	0	0	0	.	.	.	9.9	0	9.9	.	.	.	.	.	.	.	.	.
0	3.3	0.2	0	1.4	0.5	0	2.8	0.2	0	0.4	0	0	5	0.3	0	1	0	0	0	0.5	0	1.5	1.1	0	11	0.2	0	1.6	0.1	0	1.2	0	0	1.3
0	3.3	0.1	0	1.5	0	0	2.8	0.3	0	0.8	0	0	5	0.2	0	1.2	0	0	0	0	0	1.5	0	0.3	10.7	0	0	1.7	0	0	1.2	0	0	1.3
0	3.3	0	0	1.5	0	0	2.8	0	0	0.8	0	0	5	0	0	1.2	0	0	0	0	0	1.5	0.2	0	10.9	0	0	1.7	0	0	1.2	0	0	1.3
0	3.5	0.3	0	1.7	0.3	0	3	0.1	0	0.9	0	0	5	0.2	0	1.3	0	0	0	0	0	1.5	0	0.1	10.8	0	0	1.7	0	0	1.2	0.1	0	1.4
0	4	0.3	0	2	1	0	4	0	0	0.9	0	0	5	0	0.2	1.2	0	0	0	0	0	1.5	0	0.1	10.7	0.1	0	1.7	0.6	0	1.8	0	0	1.4
0	4.3	0	0	2	0.5	0	4.5	0	0	0.9	1	0	6	0	0	1.2	0	0	0	0.5	0	2	0	0.6	10.1	0.9	0	2.6	0.1	0	1.9	0.1	0	1.5
0.1	4.1	0.1	0	2.1	0	0	4.5	0.6	0	1.4	0	1	5	0.2	0	1.3	0	0	0	0	0	2	0	0	10.1	0.3	0	2.9	0.2	0	2	0	0	1.5
0	4.3	0.4	0.1	2.4	0.3	0	4.8	0.1	0	1.6	0	2	3	0.2	0	1.5	0	0	0	0	0	2	0.8	0.7	10.2	1.6	0	4.5	1.4	0	3.4	0.4	0.1	1.8
0	5.3	0.6	0.2	2.8	1	0.3	5.5	0.3	0	1.9	0	0	3	0	0	1.5	5	0	5	0	0	2	1.8	1.3	10.7	1	0	5.4	0.7	0	4.1	0.4	0	2.2
0.1	5.1	0.3	0	3.1	0	0.3	5.3	0.1	0	2	0	0	3	0.8	0	2.3	2	0	7	0.5	0	2.5	0.3	0	11	0.1	0	5.5	0.2	0	4.3	0.1	0	2.2
0	5.1	0	0	3.1	0	0	5.3	0	0	2	0	0	3	0	0	2.3	0	0	7	0	0	2.5	0.1	0.3	10.8	0.1	0	5.6	0	0	4.3	0	0	2.2
0	5.1	0.1	0.2	3	0	0.3	5	0	0	2	0	0	3	0.3	0	2.7	0	0	7	0	0	2.5	0	0.7	10.1	0.1	0.1	5.6	0	0	4.3	0.1	0.7	1.6
0.6	7.4	1.5	0.1	4.5	1.3	1	5.3	2.6	0.4	4.2	8	1	10	3.2	0	5.8	8	1	14	4	0	6.5	6.4	2	14.5	2.4	0.3	7.6	2.5	0.3	6.5	2.9	0.2	4.3
0	7.8	0.2	0	4.6	0.8	0.3	5.8	0.6	0.1	4.7	1	0	11	0.2	0	6	0	0	14	1.5	0	8	0.5	0.1	14.8	0.4	0.1	8	0.4	0.1	6.8	0.4	0	4.6
0.1	7.6	0	0	4.6	0	0	5.8	0	0	4.7	1	0	12	0.2	0	6.2	0	0	14	0.5	0	8.5	0.2	0	15	0.1	0.3	7.9	0.2	0.4	6.6	0	0	4.6
0.3	7.8	0.1	0	4.7	0.3	0	6	0.8	0	5.4	1	0	13	0.3	0	6.5	0	0	14	0	0	8.5	0.5	0	15.5	0.3	0.1	8	0.1	0.4	6.4	0.1	0.1	4.6
0	7.8	0	0.2	4.5	0	0	6	0.6	0	6	3	1	15	0.8	0	7.3	2	2	14	0	0	8.5	0.3	0.1	15.6	0.1	0	8.1	0	0	6.4	0	0	4.6
0	7.8	0	0	4.5	0	0	6	0	0	6	0	0	15	0	0	7.3	0	0	14	0	0	8.5	0	0	15.6	0	0	8.1	0	0	6.4	0	0	4.6
0	7.8	0	0.2	4.4	0	0.5	5.5	0	0	6	0	0	15	1	0	8.3	0	0	14	0	0	8.5	0.4	0.4	15.6	0.1	0.4	7.8	0	0.1	6.4	0.1	0.2	4.6
0	7.8	0	0	4.4	0	0	5.5	0	0	6	0	0	15	0	0	8.3	0	0	14	0	0	8.5	0	0	15.6	0	0	7.8	0	0	6.4	0	0	4.6
0	7.8	0	0	4.4	0	0	5.5	0	0	6	0	0	15	0.2	0	8.5	0	0	14	0	0	8.5	0.1	0	15.7	0.1	0	7.9	0	0	6.3	0.1	0.1	4.6
0	8.3	0.2	0.1	4.5	0.3	0	5.8	0.1	0	6.1	0	0	15	0	0	8.5	0	0	14	0	0	8.5	1	0.6	16.1	0.7	0.1	8.5	1	0	7.3	1.9	0	6.5
0	8.3	0	0.1	4.4	0	0	5.8	0	0	6.1	0	0	15	0	0	8.5	0	0	14	0	0	8.5	0	0	16.1	0	0	8.5	0	0	7.3	0	0.1	6.4
0	8.4	0.2	0.1	4.5	0	0	5.8	0	0	6.1	0	0	15	0	0	8.5	0	0	14	0	0	8.5	0.1	0	16.2	0	0	8.5	0.4	0	7.6	0	0	6.4
0	8.4	0.3	0	4.7	0	0	5.8	0.2	0	6.3	0	0	15	0	0	8.5	0	0	14	0	0	8.5	0.1	0	16.3	0.1	0	8.6	0.1	0	7.7	0	0.1	6.2
0.3	8.4	0.4	0	5.1	0	0.3	5.5	0.1	0	6.4	3	0	18	0	0	8.5	0	0	14	0	0	8.5	0	0	16.3	0.1	0.1	8.6	0.2	0	7.9	0	0	6.2
0.5	8.4	0	0	5.1	0	0	5.5	0	0	6.4	0	0	18	0.3	0	8.8	0	0	14	1	0	9.5	0.3	0	16.5	0.1	0	8.7	0	0	7.9	0	0	6.2
0.3	8.3	0.1	0.1	5.1	0	0	5.5	0	0	6.4	0	0	18	0.2	0.3	8.7	0	0	14	0.5	0	10	1	0.1	17.5	0.3	0.1	8.9	0.1	0	8	0.5	0	6.7
0	8.6	0.2	0.1	5.2	0	0.3	5.3	0.4	0	6.9	0	0	18	0	0	8.7	0	0	14	0	0	10	1.4	0.9	17.9	0.7	0	9.6	1.5	0	9.5	0.1	0	6.8
0	8.6	0	0.2	5	0	0.5	4.8	0.3	0	7.2	0	1	17	0.3	0	9	0	0	14	0	0	10	0	0	17.9	0.1	0.2	9.5	0.1	0.2	9.4	0.2	0.1	6.9
0.8	8.4	1.6	0.6	6	0.5	0.3	5	1.4	0.8	7.9	1	0	18	0.7	0.7	9	1	8	7	0.5	1.5	9	0.7	1	17.6	0.3	1.6	8.2	1	1.2	9.3	0.2	1.2	5.9
0.1	8.8	0.2	0	6.2	0.3	0.3	5	0.4	0	8.3	0	0	18	0	0	9	0	0	7	1.5	0	10.5	0	0.5	17.2	0.1	0.1	8.3	0.1	0	9.3	0.1	0.2	5.8
0	8.9	0	0	6.2	0	0	5	0	0	8.3	0	0	18	0	0	9	0	0	7	0	0	10.5	0.2	0	17.4	0	0	8.3	0	0	9.3	0.1	0	5.9
0.3	8.8	0	0.1	6.1	0	0	5	0.2	0	8.6	0	0	18	0	0	9	1	0	8	0.5	0	11	0.4	0.1	17.6	0.2	0	8.4	0	0	9.3	0	0	5.9
0.1	8.8	0	0	6.1	0	0	5	0	0	8.6	0	0	18	0.2	0	9.2	1	0	9	0	0	11	0	0	17.6	0	0	8.4	0	0	9.3	0	0	5.9
0	8.9	0	0.3	5.8	0.3	0.3	5	0.2	0.1	8.7	0	0	18	0.5	0	9.7	2	0	11	1.5	0	12.5	0.3	0	17.9	0.2	0.1	8.5	0.4	0	9.6	0.2	0.1	6
0	9.1	0.1	0	5.9	0	0	5	0.6	0	9.2	0	0	18	0.5	0.2	10	2	0	13	1.5	0	14	2.7	0.1	20.5	1.1	0	9.6	0.8	0	10.4	0.8	0	6.8
0.6	8.6	0.4	0.3	6	0	0	5	0.7	0.2	9.7	6	2	22	1.2	0.3	10.8	5	0	18	3.5	0.5	17	0.9	0	21.5	0.8	0.1	10.4	0.5	0	10.9	0.9	0.5	7.2
0.1	8.6	0.4	0.1	6.3	0.8	0.8	5	0.3	0	10	0	0	22	1.5	0	12.3	0	0	18	0.5	0	17.5	1.3	0.1	22.6	0.8	0	11.1	0.7	0	11.5	0.1	0.1	7.3
0	9.5	0.7	0.1	6.9	0.3	0	5.3	0.4	0.8	9.7	3	3	22	0.8	0.3	12.8	3	0	21	4.5	0.5	21.5	1.3	0.9	23	3.3	0.5	13.9	1.2	0.8	12	0.7	0.2	7.8
0.4	9.3	0.4	0.4	6.9	0.3	0.8	4.8	0.2	0	9.9	0	0	22	0.2	0.3	12.7	0	0	21	0	0.5	21	0.4	1.1	22.3	0.1	0.2	13.8	0.1	0.3	11.8	0	1.5	6.3
0.4	8.9	0	0	6.9	0	0	4.8	0.2	0.3	9.8	0	0	22	0.3	0	13	0	0	21	0.5	0	21.5	0.1	0	22.4	0.1	0	13.9	0.1	0	11.8	0	0	6.3
0.1	8.9	0.5	0.1	7.4	0	0.3	4.5	0.1	0.6	9.3	0	0	22	0.2	0	13.2	1	2	20	0	0	21.5	0.3	0.7	21.9	0.2	0.3	13.8	0.1	0.1	11.8	0	0.1	6.2
0.4	8.9	0.4	0.3	7.5	0.5	0	5	0.2	0.3	9.2	0	0	22	1.2	0.2	14.2	0	0	20	0	0.5	21	1.3	0.1	23.1	0.6	0.2	14.2	2.5	0.2	14.1	0.4	0.2	6.5
0.1	8.9	0.4	0.5	7.4	0	0.5	4.5	0.3	0.7	8.9	1	0	23	0.3	0.3	14.2	0	6	14	1.5	1.5	21	0.3	1	22.4	0.3	0.8	13.7	0.1	1	13.2	0	1.4	5.1
0.3	8.9	0.1	0.3	7.2	0.3	1	3.8	0.6	0.3	9.1	4	1	26	0.3	0.3	14.2	0	1	13	0	0	21	0.2	1.4	21.2	0.1	0.7	13.1	0.1	1.1	12.2	0.1	1.1	4.1
0	8.9	0	0.1	7.1	0	0	3.8	0	0	9.1	0	0	26	0	0	14.2	0	0	13	0	0	21	0	0	21.2	0	0	13.1	0	0	12.2	0	0	4.1
0.1	8.9	0	0	7.1	0	0	3.8	0.2	0.8	8.6	0	0	26	0.3	0.2	14.3	0	0	13	1	0	22	0	0	21.2	0.1	0	13.2	0.2	0	12.4	0.1	0	4.2
0.3	9.3	0.4	0.1	7.4	0.8	0	4.5	0.3	0.6	8.3	1	0	27	0.3	0	14.7	1	0	14	3.5	0.5	25	0.1	0.3	21	0.3	0.2	13.4	0	0.1	12.3	0	0.1	4.1
0.3	9	0.1	0	7.5	0	0	4.5	0	0	8.3	2	1	28	0	0.2	14.5	0	0	14	0	0	25	0.3	0.5	20.8	0	0	13.4	0	0.1	12.3	0	0	4.1
0	9	0	0	7.5	0	0	4.5	0	0.6	7.8	0	5	23	0	0.5	14	0	1	13	0	0.5	24.5	0	0.3	20.5	0	0	13.3	0	0.2	12.1	0	0.2	3.9
0	9.1	0.5	0.1	7.8	0	0.3	4.3	0	0.2	7.6	0	2	21	0	0	14	0	0	13	0	0	24.5	0	0.3	20.3	0	0.1	13.2	0	0.3	11.8	0	0	3.9
8.3	1.1	0.2	7.1	0.9	0	3.8	0.5	0.4	7.1	1.2	0	18	3	0.3	13.3	1	1	14	1	0.5	21.5	3.5	0.7	18.9	2.1	0.2	11.5	2	0.3	11.1	1	0.1	3.4	0.6
0.1	5	0.1	0.4	0.7	0.5	1	0.5	0	0.2	1	0	3	0	0.3	0.8	0.7	0	0	1	0	1	2.5	0	0.2	1.9	0.1	0.8	1.4	0.1	0.3	0.8	0	0.5	0.1
0.8	4.3	0	0.6	0.1	0	0	0.5	0	0.6	0.4	0	0	0	0	0.5	0.2	0	0	1	0	2.5	0	0	1.3	0.6	0	1.1	0.3	0	0.6	0.2	0	0	0.1
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	9.5			7.8			6			10			28			14.7			21			25			23.1			14.2			14.1			7.8
15.9		13.3	13.2		13.2	13.2		14.3	14.7		41	41		18.7	18.6		35	35		31	31		38	37.1		20.3	20.1		19.3	18.9		12.6	12.5	

24:15 (70.5)(B045) [14] {FA19}			24:40 (70.3)(B040) [29] {FA19}			Total		
On	Off	Load	On	Off	Load	On	Off	Load
0.2	0	0.2	.	.	.	34	0	34.5
0	0	0.2	.	.	.	4.4	0.1	39
0.1	0	0.4	.	.	.	33.4	1	71.4
.	.	.	.	.	.	99.5	0	99.7
0.1	0	0.4	.	.	.	21.3	1.5	190.6
0	0	0.4	.	.	.	9.9	0.7	199.2
0	0	0.4	.	.	.	3.4	0.1	202.7
0	0	0.4	.	.	.	17	0.7	218.6
0	0	0.4	.	.	.	18.2	1.6	235.1
0	0	0.4	.	.	.	32	2.2	264.9
0	0	0.4	.	.	.	28.2	3.1	289.6
0	0	0.4	.	.	.	61.7	8.6	342.3
0.1	0	0.6	.	.	.	64	8	398.1
0	0	0.6	.	.	.	37.6	4.9	431.1
0	0	0.6	.	.	.	14.3	5.4	439.8
0	0	0.6	.	.	.	34.4	7.9	466.5
3.1	0	3.6	1.1	0	1.3	289.9	43.5	716.6
0.1	0	3.7	0	0	1.3	34.4	4	746.8
0.1	0	3.8	0	0	1.3	24.7	8.1	763.7
0	0	3.8	0	0	1.3	51.2	7.3	807.3
0	0	3.8	0	0	1.3	31.6	9.7	829.5
0	0	3.8	0	0	1.3	16.9	1.6	844.3
0	0	3.8	0	0	1.3	23	7.4	860.6
0	0	3.8	0	0	1.3	3.2	0.4	863.7
0	0	3.8	0	0	1.3	12.7	2.4	873.5
0.2	0	4	0	0	1.3	47.1	11.7	908.5
0	0	4	0	0	1.3	12.8	1.8	919.7
0	0	4	0	0	1.3	20.2	4.5	935.2
0	0	4	0	0	1.3	24.4	3.4	956.5
0	0	4	0	0	1.3	34.5	4.4	986.2
0	0	4	0	0	1.3	22.5	9.6	999.1
0	0	4	0	0	1.3	59.9	10.4	1049.2
0.1	0	4.1	0	0	1.3	50.1	11.4	1087.6
0.1	0.1	4.1	0	0	1.3	35.5	10.7	1112.6
0	1.9	2.2	0.1	0	1.3	112	196.5	1028.3
0	0	2.2	0	0.1	1.2	48.6	12.2	1065
0	0	2.2	0	0	1.2	9.9	0.6	1074.1
0	0	2.2	0	0	1.2	38.5	7.5	1105
0	0	2.2	0	0	1.2	12	1.1	1115.6
0	0	2.2	0	0	1.2	46.8	20.6	1141.3
0	0	2.2	0.3	0	1.5	36.4	13.5	1164
0.6	0.1	2.7	0	0	1.5	70.8	54.9	1180.4
0.1	0	2.8	0	0	1.5	34	11.6	1202.5
0	0.1	2.7	0	0	1.5	90.5	31.3	1262
0	0.4	2.4	0	0.2	1.3	48.6	58.7	1252.1
0	0	2.4	0	0	1.3	18.7	4.6	1266.2
0.1	0.8	1.6	0	0.6	0.7	50.5	21.4	1295.2
0.1	0	1.7	0	0.1	0.7	91.5	37.9	1348.9
0	0	1.7	0	0.2	0.5	45	72.3	1321.7
0	0	1.7	0	0	0.5	36.2	47.5	1310.4
0	0	1.7	0	0	0.5	0.4	2.8	1307.8
0.1	0	1.8	0	0	0.5	23.1	11.9	1319.5
0	0	1.8	0	0	0.6	63.2	28.3	1354.6
0	0	1.8	0	0	0.6	12.2	9.7	1357.3
0	0	1.8	0	0	0.6	5.4	17.1	1345.2
0	0	1.8	0	0.1	0.5	3.2	16.6	1332.2
0.1	1.1	0.9	0	0.1	0.4	24.5	1089	273.5
0.3	1	0.4	.	.	.	11.3	139.4	146.7
0	0.1	0.4	.	.	.	0	131.8	19.5
.	.	.	0	0.4	0	0	0.4	0
		4.1			1.5			1357.3
5.6	5.6		1.5	1.8		2241.2	2237.3	

Massachusetts Bay Transportation Authority
Route 70
Weekday - Outbound
Fall 2019
(Urban Transportation Associates)

	04:31 (70.5)(B031) [9] {FA19}			04:50 (70.5)(B032) [1] {FA19}			05:05 (70.5)(B034) [5] {FA19}			05:20 (70.5)(B037) [52] {FA19}			05:40 (70.5)(B035) [60] {FA19}			05:55 (70.6)(B031) [9] {FA19}			06:08 (70.5)(B191) [7] {FA19}			06:25 (70.5)(B032) [2] {FA19}			06:34 (70.6)(B192) [6] {FA19}			06:45 (70.5)(B034) [5] {FA19}			07:00 (70.
Seq - StopID - Stop Name	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On
1 - 730 - FRANKLIN ST @ SIDNEY ST	1.1	0	1.1	0	0	0	2	0	2	0.2	0	0.2	0.8	0	0.8	0.9	0	1.1	1.9	0	1.9	0	0	0	1	0	1	1.2	0	1.2	.
2 - 2755 - GREEN ST @ PEARL ST	0	0	1.1	0	0	0	0.4	0	2.4	0.4	0	0.7	3.2	0	4.1	3.6	0	4.7	0.7	0.1	2.4	3	0	3	2	0	3	4.4	0.2	5.4	.
3 - 1123 - GREEN ST @ MAGAZINE ST	0.4	0	1.6	0	0	0	0.2	0	2.6	1.7	0	2.3	5	0	8.9	12	0.1	16.6	4.3	0	6.7	6.5	0	9.5	4	0	7	11.4	0	16.8	8.5
4 - 2444 - WESTERN AVE @ GREEN ST	0	0	1.6	6	0	6	0.4	0	3	0.1	0	2.4	0.7	0	9.7	2	0	18.6	1.1	0	7.9	0.5	0	10	1.3	0	8.3	2.2	0.2	18.8	.
5 - 1061 - WESTERN AVE @ KINNAIRD ST	0	0	1.6	0	0	6	0	0	3	0	0	2.4	0	0	9.7	0.3	0	18.9	0	0	7.9	0	0	10	0	0	8.3	0.4	0	19.2	0.3
6 - 1062 - WESTERN AVE @ HOWARD ST	0	0	1.6	0	0	6	0	0	3	0	0	2.4	0.8	0	10.5	0	0	18.9	0	0	7.9	0	0	10	0	0	8.3	0.4	0	19.6	0
7 - 1064 - WESTERN AVE @ PUTNAM AVE	0	0	1.6	0	0	6	0.6	0	3.6	0.1	0	2.5	0.4	0.1	10.8	0.2	0.9	18.2	0	0.4	7.4	0.5	1	9.5	0.7	0.5	8.5	0.4	0.4	19.6	0
8 - 1067 - WESTERN AVE OPP GENZYME	0	0	1.6	0	0	6	0	0	3.6	0	0	2.4	0	0.3	10.5	0	1.1	17.1	0	0	7.4	0	0	9.5	0	0.3	8.2	0	0.6	19	0
9 - 1068 - 125 WESTERN AVE	0	0	1.6	0	0	6	0	0	3.6	0	0	2.4	0	0.5	10	0	0.9	16.2	0	0	7.4	0	0	9.5	0	0.2	8	0	0.2	18.8	0
10 - 1070 - WESTERN AVE @ N HARVARD ST	0.9	0	2.4	0	0	6	0	0.2	3.4	3.5	0	5.9	1.4	0.2	11.1	1.4	0.1	17.6	2	0	9.4	0.5	0.5	9.5	4.5	0	12.5	2.4	0.8	20.4	0.5
11 - 1071 - WESTERN AVE OPP RIVERDALE ST	0	0	2.4	0	0	6	0	0	3.4	0.4	0	6.3	0.1	0	11.3	0	0	17.6	0	0	9.4	0.5	0	10	0.2	0	12.7	0.4	0	20.8	0.5
12 - 1072 - WESTERN AVE @ EVERETT ST	0	0	2.4	0	0	6	0	0	3.4	0.4	0	6.6	0.8	0.3	11.7	0.3	0.4	17.4	0	0.1	9.3	0	1	9	0.2	0.2	12.7	0.2	0.8	20.2	0.5
13 - 1074 - 367 WESTERN AVE OPP BRIGHTON	0	0	2.4	0	0	6	0	0	3.4	0.6	0	7.2	0.2	0.1	11.8	0	0.3	17.1	0	0	9.3	0	0	9	0	0.2	12.5	0	0.2	20	0
14 - 1075 - WESTERN AVE OPP LITCHFIELD ST	0	0	2.4	0	0	6	0	0	3.4	0.1	0	7.3	0.2	0.3	11.7	0.3	0.6	16.9	0.3	0	9.6	0	0	9	1.3	0	13.8	1.4	0.2	21.2	0
15 - 1076 - 445 WESTERN AVE	0	0	2.4	0	0	6	0	0	3.4	0	0	7.3	0	0	11.6	0	0.1	16.8	0	0	9.6	0	0	9	0	0.2	13.7	0	0.4	20.8	0
16 - 1077 - 495 WESTERN AVE	0	0	2.4	0	0	6	0	0	3.4	0.3	0	7.5	0.9	0.1	12.4	0.2	0	17	0.9	0	10.4	1	0.5	9.5	0.8	0	14.5	3.2	0.4	23.6	0.3
17 - 1443 - ARSENAL ST @ ARLINGTON ST	0	0	2.4	0	3	3	0	0.2	3.2	0.1	1.8	5.8	0.2	1.4	11.3	0.9	2.3	15.6	0.6	0.7	10.3	0.5	0.5	9.5	0	1.7	12.8	0.2	2	21.8	0.5
18 - 1444 - ARSENAL ST @ ELM ST	0	0	2.4	0	0	3	0	0	3.2	0	0.1	5.7	0	0.1	11.2	0.8	0.1	16.2	0.1	0	10.4	0	0	9.5	0.3	0.7	12.5	0	1.4	20.4	0
19 - 1445 - ARSENAL ST @ WATERTOWN + ARSE	0	0	2.4	0	0	3	0	0	3.2	0	0	5.7	0	0	11.2	0	0.1	16.1	0.4	0.6	10.3	1	0.5	10	0.3	0.3	12.5	0	0.8	19.6	0
20 - 1447 - ARSENAL ST OPP TALCOTT AVE	0	0	2.4	0	0	3	1	0.2	4	0.2	0	5.9	0	0.8	10.4	0	0.1	16	0	0.1	10.1	0	0.5	9.5	0	0.2	12.3	0	0.2	19.4	0
21 - 1448 - ARSENAL ST @ SCHOOL ST	0	0	2.4	0	0	3	0	0	4	0	1.3	4.6	0	1.1	9.4	0	0.6	15.4	0.1	0.9	9.4	0	1.5	8	0.2	1.2	11.3	0	2.2	17.2	1
22 - 1449 - ARSENAL ST OPP LOUISE ST	0	0	2.4	0	0	3	0	0	4	0	0	4.6	0	0	9.4	0	0	15.4	0	0	9.4	0.5	0	8.5	0	0	11.3	0	0.4	16.8	0
23 - 1450 - ARSENAL ST OPP BEECHWOOD AVE	0	0	2.4	0	0	3	0	0	4	0.1	0.3	4.3	0.1	0.5	9	0.1	0.8	14.8	0	0	9.4	0	1	7.5	0	1.2	10.2	0.4	2.2	15	1
24 - 1451 - ARSENAL ST OPP BEACON PK	0	0	2.4	0	0	3	0	0.2	3.8	0	0	4.3	0	0.1	8.9	0	0.8	14	0	0	9.4	0	0	7.5	0	0	10.2	0	0.2	14.8	0.5
25 - 1452 - ARSENAL ST @ IRVING ST	0	0	2.4	0	0	3	0	0	3.8	0	0	4.3	0.1	0	8.9	0	0.2	13.8	0.1	0	9.6	0	0	7.5	0.2	0.7	9.7	0	0	14.8	0
26 - 8815 - MAIN ST @ MERCHANTS ROW	0.1	0	2.6	0	0	3	0.2	0.6	3.4	0.3	1.2	3.4	1.1	1.5	8.5	1.4	1.4	13.8	2.6	0.6	11.6	4	0.5	11	1.8	0.3	11.2	1.4	1.4	14.8	1.3
27 - 8816 - MAIN ST @ THAXTER ST	0	0	2.6	0	0	3	0	0	3.4	0	0	3.4	0	0	8.4	0	0	13.8	0	0	11.6	0	0	11	0	0.2	11	0	0	14.8	0
28 - 8817 - MAIN ST OPP CHESTNUT ST	0	0	2.6	0	0	3	0	0	3.4	0	0	3.4	0	0	8.4	0	0	13.8	0	0	11.6	0	0	11	0	0	11	0	0	14.8	0
29 - 88171 - MAIN ST OPP GREEN ST	0	0	2.6	0	0	3	0	0	3.4	0	0	3.4	0.2	0.1	8.6	0.1	0	13.9	0	0	11.6	0	0	11	0	0.2	10.8	0.2	0	15	0
30 - 8818 - MAIN ST @ WAVERLEY AVE	1	0	3.6	0	0	3	0.4	0	3.8	0.2	0	3.6	0	0.2	8.4	0.3	0	14.2	0.1	0.1	11.6	0	0	11	0.7	0.7	10.8	0	0.2	14.8	0
31 - 8819 - MAIN ST @ EDENFIELD AVE	0.1	0.1	3.6	0	0	3	0	0	3.8	0.3	0	3.8	0.2	0.7	7.9	0.8	0.8	14.2	0.3	0.6	11.3	1.5	0.5	12	0.5	0.7	10.7	0	0.8	14	0
32 - 8820 - MAIN ST @ OLNEY ST	0.1	0	3.7	0	0	3	0	0	3.8	0	0	3.8	0	0.3	7.6	0	0.3	13.9	0	0.3	11	0	1	11	0	0	10.7	0	0.4	13.6	0
33 - 8339 - MAIN ST @ OLCOTT ST	0	0	3.7	0	0	3	0	0	3.8	0	0	3.8	0	0	7.6	0.1	0.1	13.9	0	0	11	0	0	11	0	0	10.7	0.2	0	13.8	0
34 - 8821 - MAIN ST @ COPELAND ST	0	0	3.7	0	0	3	0	0	3.8	0	0.1	3.8	0.1	0.2	7.5	0.6	0.2	14.2	0.3	0.6	10.7	0	1	10	0	0.2	10.5	0	0.6	13.2	0
35 - 8822 - MAIN ST @ WILMOT ST	0	0	3.7	0	0	3	0	0	3.8	0	0	3.8	0.1	0.1	7.5	0	0.3	13.9	0.1	0.1	10.7	0	0	10	0	0	10.5	0	2.6	10.6	0
36 - 8823 - MAIN ST @ EMERSON RD	0	0	3.7	0	0	3	0	0	3.8	0	0	3.8	0	0	7.5	0	0.3	13.6	0	0	10.7	0	0.5	9.5	0	0	10.5	0	0	10.6	0
37 - 8824 - MAIN ST @ LONGFELLOW RD	0	0	3.7	0	0	3	0	0	3.8	0	0	3.8	0	0	7.5	0	0	13.6	0	0	10.7	0	0	9.5	0	0	10.5	0	0	10.6	0
38 - 8825 - MAIN ST @ WARREN ST - WALTHAM	0	0	3.7	0	0	3	0	0	3.8	0	0.7	3	0.4	0.5	7.4	0.4	1.9	12.1	0	2.4	8.3	0.5	1	9	0	0.5	10	0.2	0.8	10	0
39 - 8826 - MAIN ST @ BEAL RD	0	0	3.7	0	0	3	0	0	3.8	0	0.1	3	0	0	7.4	0	0	12.1	0	0	8.3	0	0	9	0	0	10	0	0	10	0
40 - 9521 - MAIN ST @ BOWKER RD	0	0	3.7	0	0	3	0	0	3.8	0	0	3	0	0	7.4	0	0	12.1	0	0	8.3	0	0	9	0	0	10	0	0	10	0
41 - 8828 - MAIN ST OPP WILLOW ST	0.4	0	4.1	0	0	3	0.2	0	4	0.7	0	3.7	0	0.1	7.3	0	0	12.1	0.1	0.3	8.1	0	0	9	0	0	10	0	0.2	9.8	0
42 - 8830 - MAIN ST @ ROSE HILL WAY	0	0	4.1	0	0	3	0	0	4	0	0	3.7	0	0	7.3	0	0.1	12	0	0.1	8	0	0	9	0	0	10	0	0	9.8	0
43 - 8831 - MAIN ST @ CHAMBERLAIN TERR	0	0.9	3.2	0	0	3	0	0.2	3.8	0.5	0	4.1	0	0	7.3	0	1.2	10.8	0.1	0.1	8	0	0.5	8.5	0.2	0	10.2	0.2	0.2	9.8	0.3
44 - 8832 - MAIN ST @ PLEASANT ST	0	0	3.2	0	0	3	0	0	3.8	0.1	0.1	4.1	0.1	0.2	7.2	0	0.1	10.7	0	0	8	0	0	8.5	0	0	10.2	0	0.2	9.6	0
45 - 8833 - MAIN ST @ CRAVEN CIR	0.1	0.1	3.2	0	0	3	0	0.2	3.6	0.2	0	4.3	0.1	0.3	7	0	0.2	10.4	0	0	8	0	0	8.5	0	0.3	9.8	0	0.2	9.4	0
46 - 88332 - MAIN ST @ LIBERTY ST	0	0.3	2.9	0	1	2	0	0.2	3.4	0.1	0	4.3	0	0	7	0	0.3	10.1	0	0.1	7.9	0	0.5	8	0	0.3	9.5	0	0.2	9.2	0
47 - 88333 - CARTER ST OPP COMMUTER RAIL S	0.2	0.7	2.7	0	0	2	0.6	0.2	3.8	1.2	1.2	4.3	0.5	2.8	4.6	1	3.6	7.6	0.9	2	6.7	0	2.5	5.5	0.8	2.7	7.7	0.8	2.8	7.2	.
100 - 88334 - 691 MAIN ST	0	0.1	2.6	0	0	2	0	0.2	3.6	0	0	4.3	0.1	0	4.7	0.7	0.1	8.1	0.3	0	7	0	0	5.5	0.2	0.7	7.2	0	0.6	6.6	.
101 - 88335 - MAIN ST @ EXCHANGE ST	0	0	2.6	0	0	2	0	0	3.6	0.4	0	4.8	0.1	0.2	4.6	0.8	0.1	8.8	0.3	0	7.3	0	0	5.5	0	0	7.2	0.4	0.6	6.4	.
102 - 18335 - MAIN ST @ GRANT ST	0	0	2.6	0	0	2	0	0	3.6	0	0.2	4.5	0	0.2	4.4	0.8	0	9.6	0	0.9	6.4	0.5	0.5	5.5	0	0.2	7	0	0.6	5.8	.
103 - 88336 - MAIN ST @ FISKE ST	0.1	0.2	2.4	0	0	2	0.2	0	3.8	0.2	0.1	4.6	0	0.8	3.6	0.2	0.1	9.7	0	0.4	6	0	2	3.5	0	0.2	6.8	0.4	0.4	5.8	.
104 - 88337 - MAIN ST @ HAMMOND ST	0	0	2.4	0	0	2	0	0.2	3.6	0.6	0.2	5	0	0.6	3	0	0.9	8.8	0	0.6	5.4	0.5	0.5	3.5	0	0.7	6.2	1.2	0.4	6.6	.
105 - 8841 - MAIN ST @ PALMER ST	0	0.1	2.3	0	0	2	0	0	3.6	0	0	5	0	0	3	0	0.6	8.2	0	0	5.4	0	0	3.5	0	0.2	6	0	0.2	6.4	.
106 - 8842 - MAIN ST @ PROSPECT HILL RD	0	0	2.3	0	0	2	0	0	3.6	0	0	5	0	0	3	0	0.2	8	0	1	4.4	0	0	3.5	0	0.2	5.8	0	0.4	6	.
107 - 8843 - MAIN ST @ LUNDA ST	0	0	2.3	0	0	2	0	0	3.6	0	0	5	0	0	3	0	0	8	0	0	4.4	0	0	3.5	0	0	5.8	0	0	6	.
108 - 8844 - MAIN ST @ MALONE ST	0	0	2.3	0	0	2	0	0	3.6	0	0	5	0	0	3	0	0	8	0	0	4.4	0	0	3.5	0	0	5.8	0	0	6	.
109 - 8845 - MAIN ST @ EDGEHILL RD	0	0	2.3	0	0	2	0	0	3.6	0	0	5	0	0	3	0	0	8	0	0	4.4	0	0	3.5	0	0	5.8	0	0	6	.
110 - 8846 - MAIN ST @ HILL RD	0	0	2.3	0	0	2	0	0	3.6	0	0.2	4.8	0	0.2	2.8	0	0.7	7.3	0	1	3.4	0	0	3.5	0	0.3	5.5	0	0	6	.
111 - 8848 - MAIN ST @ STOW ST	0.1	1.3	1.1	0	0	2	0	1.8	1.8	0	4.6	0.2	0	1.3	1.6	0	1.4	5.9	0	2	1.4	0	2.5	1	0	1.3	4.2	0	3	3	.
112 - 8849 - STOW ST @ TAVERN RD	0	0	1.1	0	0	2	0	0	1.8	0	0	0.2	0	0.1	1.5	.	.	.	0	0	1.4	0	0	1	.	.	.	0	0	3	.
113 - 8850 - TAVERN RD @ WESTON ST	0	0	1.1	0	0	2	0	0	1.8	0	0	0.2	0	0.1	1.4	.	.	.	0	0.6	0.9	0	0	1	.	.	.	0	0.8	2.2	.
114 - 9522 - WESTON ST @ CEDARWOOD AVE	0	0.8	0.3	0	2	0	0	1.8	0	0	0.2	0	0	1.4	0	.	.	.	0	0.9	0	0	1	0	.	.	.	0	2.2	0	.
115 - 9525 - MAIN SHOPPING CENTER @ MARSHA	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	5.9	0	.	.	.	.	.	.	0	4.2	0	.	.	.	.
116 - 86943 - MOODY ST @ MAIN ST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.8
117 - 86944 - CARTER ST @ WALTHAM COMM RAIL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
118 - 8178 - WATERTOWN SQ TERMINAL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Maximum			4.1			6			4			7.5			12.4			18.9			11.6			12			14.5			23.6	
Total	4.6	4.6		6	6		6.2	6.2		13	12.4		17.9	17.8		30.2	30.3		17.6	17.6		21.5	21.5		21.2	21.7		33.6	33.6		16

3)(B033) [4] {FA19}		07:06 (70.5)(B037) [34] {FA19}			07:15 (70.6)(B039) [1] {FA19}			07:45 (70.5)(B031) [9] {FA19}			08:10 (70.6)(B190) [44] {FA19}			08:20 (70.5)(B032) [3] {FA19}			08:45 (70.6)(B033) [4] {FA19}			09:15 (70.5)(B037) [47] {FA19}			09:35 (70.6)(B039) [3] {FA19}			09:55 (70.5)(B195) [11] {FA19}			10:30 (70.6)(B032) [3] {FA19}			10:50 (70.5)(B033) [19] {FA19}			11:16 (70.6)(B037) [4	
Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off
.	.	1.4	0	1.8	0	0	0	5.2	0	5.9	2.7	0	2.7	2.3	0	2.3	4.3	0	5	2.9	0	2.9	2.7	0	2.7	1.8	0	1.9	3.7	0	3.7	2.5	0	2.7	1	0
.	.	6.4	0	8.2	6	0	6	13.8	0.2	19.7	8.5	0	11.2	3.3	0.3	5.7	5	0	10	6.3	1.5	8.7	6	0	8.7	3.1	0	5	4.3	0	8	3.8	0	6.5	1.6	0
0	8.5	12	0.1	20.1	7	0	13	18.7	0.1	38.2	12.2	0.1	23.3	6.3	0	12	10.5	0	20.5	11.4	0.6	19.9	10.7	0.3	19	11.7	0	16.7	10.7	0.3	18.3	10.6	0.3	16.7	4.3	0.1
.	.	2.9	0	23	1	0	14	4.3	0.3	42.2	3.7	0.1	27	1	0	13	2.5	0	23	3.3	0	23.2	1	0	20	1.6	0	18.4	0.7	0.3	18.7	1.5	0.1	18.2	0.5	0
0	8.8	1	0	24	0	0	14	0.8	0.3	42.7	0.8	0	27.8	1.3	0	14.3	0.3	0	23.3	0.3	0.1	23.4	0	0	20	0.3	0	18.6	0.3	0	19	0.1	0	18.2	0.1	0
0	8.8	1.4	0.1	25.3	1	0	15	1.2	0.1	43.8	0.7	0.1	28.4	0.3	0	14.7	1.3	0	24.5	0.3	0.3	23.4	0	0	20	0.1	0.4	18.4	0.3	1	18.3	0.3	0.5	18	0.1	0.1
1.8	7	0.8	2.4	23.7	0	0	15	2.3	3.6	42.6	1.1	1.4	28.1	0.3	1.3	13.7	1.8	2.3	24	0.7	0.8	23.3	0.3	0.7	19.7	0.8	0.9	18.3	0.3	0.7	18	0.7	0.8	17.9	0.4	0.3
0	7	0	0.4	23.3	0	0	15	0.2	1.3	41.4	0.1	0.9	27.3	0	0.7	13	0	1.3	22.8	0.6	0.4	23.5	0	0	19.7	0.3	0.5	18.1	1.7	1	18.7	0.2	0.2	17.9	0	0.1
0.3	6.8	0	0.2	23.1	0	0	15	0	0.1	41.3	0.1	0.4	27	0	0	13	0.5	1	22.3	0.1	0.4	23.2	0	2	17.7	0	0.5	17.6	0.3	1.3	17.7	0	0.3	17.6	0	0.1
0.3	7	1.8	0.2	24.7	0	1	14	1.9	0.3	42.9	3.1	0.6	29.5	1	1	13	3.5	0.8	25	2.5	0.7	25	1	0.7	18	2.2	0.8	19	2	0.3	19.3	2.1	0.8	18.9	1	0.1
0	7.5	0.4	0	25.1	0	0	14	1.1	0.3	43.7	1.4	0.2	30.7	1	0	14	1	0.5	25.5	1	0	25.9	0	0	18	0.3	0.4	18.9	0.7	0	20	0.3	0.1	19.1	0.3	0.1
0	8	1.3	1	25.5	0	0	14	1.2	1.8	43.1	1.2	1	31	0	0.7	13.3	1	1.5	25	0.4	0.8	25.4	0	0.7	17.3	0.2	0.6	18.5	0.7	1.7	19	0.2	1.3	17.9	0.3	0.3
0	8	0.9	0.1	26.2	0	0	14	0.7	1.1	42.7	0.6	0.5	31	0.7	0	14	0.3	0.3	25	0.3	0.3	25.5	0.7	1	17	0.7	0.3	18.9	0.3	0	19.3	0.5	0.1	18.4	0.2	0.1
0.3	7.8	0.5	0.2	26.4	0	0	14	0.4	1	42.1	0.3	1	30.3	0	0	14	0	0.3	24.8	0.3	0.3	25.4	0.3	0.3	17	0.5	0.4	19	0	1	18.3	0.5	0.5	18.4	0.1	0.2
0	7.8	0.1	0.3	26.2	0	0	14	0	0.1	42	0.1	0.7	29.7	0	0.7	13.3	0	0.5	24.3	0	0.3	25.2	0	0.7	16.3	0	0.5	18.5	0	0.3	18	0.2	0.3	18.3	0	0.2
0.3	7.8	1.8	0.6	27.4	2	1	15	1.2	2.4	40.8	2.2	1.3	30.5	2	0	15.3	1.8	1	25	2.3	1.3	26.1	1.7	0.3	17.7	0.9	1	18.5	1.3	0	19.3	1.7	0.4	19.6	0.4	0.4
1	7.3	0.6	1.4	26.6	0	3	12	0.7	4.8	36.7	0.2	2.5	28.2	0.3	2.7	13	0	4	21	0.5	1.6	25	0	0.7	17	0.3	1.2	17.5	0.3	0.7	19	0.3	0.9	19	0.1	0.4
0	7.3	0.1	2	24.8	0	2	10	0.3	2.1	34.9	0	1.6	26.6	0.7	2	11.7	0	1.5	19.5	0.1	1.2	23.9	0	1.7	15.3	0	1	16.5	0	0.7	18.3	0.1	0.9	18.2	0	0.5
0.8	6.5	0.2	0.6	24.4	0	1	9	0.2	1.3	33.8	0.3	1.1	25.8	0.3	1.3	10.7	0	1	18.5	0.8	1.5	23.2	0.3	0.7	15	1.5	1.6	16.5	2	2	18.3	2.5	2.1	18.6	1	0.9
0	6.5	0	1.1	23.3	0	0	9	0	1.7	32.1	0.3	2.1	24	0	0.3	10.3	0	2	16.5	0.2	0.7	22.7	0	0.7	14.3	0.3	0.3	16.5	1	0.3	19	0.1	0.4	18.3	0.1	0.1
0.3	7.3	0.7	0.6	23.4	0	0	9	0.9	1.9	31.1	0.4	0.9	23.5	1.3	1	10.7	0.5	1	16	0.4	2.1	21	1	2.3	13	0.3	0.9	15.8	0.3	1	18.3	0.1	0.6	17.7	0.1	0.3
0	7.3	0.1	0.1	23.4	0	1	8	0	0.9	30.2	0.1	0.1	23.4	0	0	10.7	0	0	16	0	0.1	20.9	0	0	13	0.1	0	15.9	0	0	18.3	0	0.2	17.5	0	0
0	8.3	0.9	0.6	23.6	0	0	8	0.4	0.8	29.9	0.2	0.4	23.1	0	0	10.7	0	0	16	0.3	0.2	20.9	0.3	0.3	13	0.1	0.2	15.8	0	0.3	18	0.1	0.5	17.1	0.1	0.1
0	8.8	0	0.6	23.1	0	0	8	0.1	1.3	28.7	0	0.4	22.7	0	0	10.7	0.3	0	16.3	0	0.1	20.8	0	0	13	0	0.5	15.4	0	0	18	0	0.2	16.8	0	0.1
0	8.8	0.1	0.3	22.8	1	0	9	1	1.3	28.3	0.3	0.5	22.5	0	0.3	10.3	0	0.3	16	0.3	0.5	20.7	1.3	0	14.3	0.1	0.6	14.8	0	0	18	0.2	0.3	16.7	0	0.1
1	9	2.5	2.9	22.4	1	1	9	1.8	2.6	27.6	2.4	4.6	20.3	0.7	4.3	6.7	2	5.5	12.5	3.4	3.3	20.7	2.7	1.3	15.7	3.5	2.6	15.7	2.3	2	18.3	2.3	1.7	17.3	1.5	0.7
0.3	8.8	0.1	0.6	21.9	0	0	9	0.4	0.4	27.6	0.2	0.4	20.1	0	0	6.7	0	0	12.5	0.3	0.7	20.4	0	0.7	15	0.5	0.4	15.8	0.3	2	16.7	0.3	1.1	16.5	0.7	0.1
0	8.8	0	0	21.9	0	0	9	0	0	27.6	0	0	20	0	0.3	6.3	0	0	12.5	0	0	20.4	0	0	15	0	0.1	15.7	0	0	16.7	0	0	16.5	0	0
0	8.8	0.2	0	22.1	0	0	9	0.2	0	27.8	0.3	0.5	19.8	0.3	0	6.7	0.5	0	13	0.2	0.2	20.3	0	0	15	0.1	0.1	15.7	0	0.3	16.3	0.2	0.4	16.3	0	0.1
0	8.8	0.6	0.7	22	1	0	10	0.1	0.1	27.8	0.1	0.4	19.6	0	0.3	6.3	0.3	0.5	12.8	0.5	1	19.8	0.3	1	14.3	0.2	1.6	14.3	0	0.3	16	0.3	0.4	16.2	0.3	0.2
0.8	8	0.3	0.6	21.6	0	1	9	0.7	0.4	28	0.7	0.6	19.7	0.7	0	7	0.3	0.3	12.8	0.5	0.8	19.6	0.3	0	14.7	0.4	0.5	14.1	0	0	16	0.6	0.5	16.3	0.2	0.3
0.5	7.5	0.4	0.4	21.7	0	0	9	0	0	28	0.1	0.1	19.7	0	0	7	0	0	12.8	0.1	0.1	19.6	0.3	0	15	0	0.1	14	0	0	16	0.2	0	16.5	0	0.1
0	7.5	0.8	0	22.5	0	0	9	0.2	0.1	28.1	0	0.2	19.6	0	0	7	0	0	12.8	0.1	0	19.7	0.3	0	15.3	0.1	0.3	13.8	0	0	16	0	0.2	16.3	0.1	0.1
0.3	7.3	0.1	1	21.5	0	0	9	0.8	0.8	28.1	0	0.5	19	0	0.7	6.3	0	0.5	12.3	0	0.4	19.3	0	0	15.3	0.3	0.3	13.8	0	0.7	15.3	0.1	0.3	16.1	0	0.1
0.3	7	0	0.6	20.9	0	0	9	0	0.6	27.6	0.2	0.1	19.1	0	0	6.3	0	0	12.3	0	0	19.3	0	0	15.3	0.1	0.1	13.8	0	0	15.3	0.1	0.1	16	0	0
0.3	6.8	0	0.2	20.7	0	0	9	0	0	27.6	0	0.1	19	0	0	6.3	0	0	12.3	0	0.1	19.2	0	0	15.3	0	0	13.8	0	0	15.3	0.1	0	16.1	0	0
0	6.8	0	0	20.7	0	0	9	0	0.1	27.4	0	0	19	0	0	6.3	0	0	12.3	0	0.1	19.1	0	0	15.3	0	0	13.8	0	0	15.3	0	0	16.1	0	0.1
0.3	6.5	0.1	0.9	19.9	0	0	9	0	0.9	26.6	0.1	1.1	18.1	0	0	6.3	0	0.3	12	0.3	0.8	18.6	0	0.3	15	0.3	0.7	13.4	0.3	0	15.7	0.4	0.5	16	0.2	0.1
0	6.5	0.1	0.1	19.9	0	0	9	0.1	0.7	26	0.2	0.9	17.4	0	0	6.3	0	0.3	11.8	0.1	0.4	18.2	0.3	0.3	15	0	0.5	12.8	0	0.7	15	0	0.1	15.9	0	0.1
0	6.5	0	0.1	19.9	0	0	9	0	0	26	0	0.1	17.3	0	0	6.3	0	0.3	11.5	0	0	18.2	0	0	15	0	0	12.8	0	0	15	0	0.1	15.8	0	0
0.5	6	0.2	0.2	19.8	0	0	9	0.2	1.3	24.9	0.2	0.3	17.2	0	0	6.3	0	0.3	11.3	0.3	0.4	18.2	1.3	0.7	15.7	0	0.2	12.6	0.3	0.3	15	0.2	0.3	15.7	0.1	0.1
0	6	0	0.1	19.7	0	0	9	0.1	0	25	0.1	0.2	17.1	0.7	0	7	0	0	11.3	0.1	0.4	17.9	0	0	15.7	0	0.2	12.5	0	0	15	0	0	15.7	0	0.1
0	6.3	0.4	0.3	19.8	1	0	10	0.3	1	24.3	0.2	0.5	16.8	0	0	7	0	0	11.3	0.3	0.6	17.6	0	0	15.7	0.2	0.4	12.3	0	0.3	14.7	0.2	0.5	15.4	0.1	0.1
0	6.3	0.1	0.3	19.6	2	0	12	0.6	0.6	24.3	0.3	0.2	16.9	0	0.3	6.7	0	0	11.3	0.2	0.3	17.5	0	0.7	15	0.3	0	12.5	0	0.3	14.3	0.2	0.2	15.4	0	0.1
0.5	5.8	0	0.1	19.4	0	0	12	0	1	23.3	0	0.5	16.5	0	0	6.7	0	0	11.3	0	0.4	17.1	0	1	14	0.1	0.9	11.7	0	1	13.3	0	0.8	14.5	0.1	0.1
0	5.8	0	1.1	18.4	1	0	13	0	1	22.3	0.1	1.3	15.3	0	0.3	6.3	0	1	10.3	0.1	0.4	16.9	0.3	0	14.3	0	0	11.7	0.3	0.7	13	0.3	1.6	13.2	0.2	0.5
.	.	1.6	5.9	14.1	3	2	14	2.6	5.8	19.1	1.4	4.2	12.5	1	1	6.3	1.5	2.5	9.3	1	4.7	13.1	0.3	7.3	7.3	1.5	4.9	8.3	1.3	2	12.3	0.4	4.6	9	1.3	1.6
.	.	0.4	0.3	14.2	1	0	15	0.8	1.3	18.6	0.4	1.5	11.5	0	0.7	5.7	0	0.3	9	0.2	0.8	12.5	0	0	7.3	0.1	0.5	7.8	0	0	12.3	0.2	0.5	8.7	0.2	0.1
.	.	0.3	0.7	13.8	0	0	15	0.3	0.9	18	0.1	0.5	11.1	0	0.3	5.3	0.3	0	9.3	0.1	0.5	12.1	0.3	1.3	6.3	0	0.2	7.6	0	0	12.3	0.1	0.5	8.3	0.1	0.3
.	.	0.1	0.4	13.5	0	0	15	0	0.2	17.8	0.2	0.2	11.1	0	0	5.3	0	1	8.3	0.1	0.3	11.9	0	0	6.3	0	0.7	6.9	0	0.7	11.7	0	0.6	7.7	0.1	0.1
.	.	0.1	0.5	13.1	0	0	15	0.6	0.9	17.4	0.5	0.8	10.8	0	1	4.3	0	0.8	7.5	0.1	1.1	10.9	0.7	0	7	0.2	1.3	5.8	0	3	8.7	0.1	1.1	6.7	0.3	0.9
.	.	0.1	2	11.2	0	0	15	0	0.6	16.9	0.4	0.6	10.6	0	1	3.3	0	1.3	6.3	0.2	1.3	9.8	1	1	7	0.1	0.7	5.2	1.3	0	10	0.1	0.9	5.8	0.1	1.4
.	.	0.1	0.5	10.9	0	1	14	0	0.4	16.4	0	0.4	10.3	0	0.7	2.7	0	1.3	5	0	0.8	9	0	0.3	6.7	0.1	0.4	4.9	0	0	10	0	0.4	5.5	0.1	0.4
.	.	0.1	1.9	9.1	0	1	13	0	0.8	15.7	0	0.9	9.4	0	0.3	2.3	0	0	5	0	0.4	8.7	0	0	6.7	0.1	0.6	4.4	0	0.7	9.3	0	0.2	5.3	0.2	0.5
.	.	0	0.3	8.7	0	0	13	0	0.3	15.3	0	0.3	9.2	0	0	2.3	0	0.3	4.8	0	0.6	8.1	0	0.3	6.3	0	0.2	4.2	0	0.7	8.7	0.2	0.3	5.2	0	0.1
.	.	0	0	8.7	0	0	13	0	0	15.3	0	0	9.2	0	0	2.3	0	0	4.8	0	0	8.1	0	0	6.3	0	0	4.2	0	0	8.7	0	0.3	4.8	0	0.1
.	.	0	1	7.8	0	1	12	0.1	2	13.4	0	1.4	7.8	0	0	2.3	0	0.3	4.5	0	0.4	7.7	0	0.7	5.7	0	0.2	4	0	0	8.7	0	0	4.8	0	0.1
.	.	0	0.2	7.6	0	0	12	0	0.2	13.2	0	0	7.8	0	0	2.3	0	0	4.5	0	0.4	7.3	0	0	5.7	0.1	0.6	3.5	0.7	0.7	8.7	0	0.8	4	0	0.1
.	.	0	3.7	3.9	0	2	10	0	7.1	6.1	0	3.3	4.5	0	1	1.3	0	2	2.5	0	2.9	4.4	0	0	5.7	0.2	1.5	2.3	0	1	7.7	0	1.1	2.9	0	0.5
.	.	0	0.2	3.7	.	.	.	0	0.3	5.8	.	.	.	0	0	1.3	.	.	.	0	0.2	4.2	.	.	.	0	0.2	2.1	.	.	.	0	0	2.9	.	.
.	.	0.1	3.6	0.2	.	.	.	0	4.1	1.7	.	.	.	0.3	1	1	.	.	.	0	1.8	2.4	.	.	.	0	1.1	1	.	.	.	0.1	1.2	1.8	.	.
.	.	0	0.1	0.1	.	.	.	0	1.4	0.2	.	.	.	0	0.3	0.7	.	.	.	0	1	1.4	.	.	.	0	0.8	0.2	.	.	.	0	1.7	0.1	.	.
.	.	.	.	.	0	10	0	.	.	.	0	4.4	0.1	.	.	.	0	2.5	0	.	.	.	0	5.7	0	.	.	.	0	7.7	0	.	.	.	0	4
3.8	2.8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	0.8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	9			27.4			15			43.8			31			15.3			25.5			26.1			20			19			20			19.6		
15.7		44.2	44.4		28	28		66.5	67		48.8	49		25.8	25.8		39.5	40.6		43.5	43.4		35.4	35.7		35.7	35.5		37.7	38		35.3	34.8		17.6	17.8

Trip (RouteVar)(Block) [Observations]

47] {FA19}	11:40 (70.5)(B039) [5] {FA19}			12:00 (70.6)(B195) [6] {FA19}			12:35 (70.5)(B032) [1] {FA19}			12:55 (70.6)(B033) [18] {FA19}			13:25 (70.5)(B193) [6] {FA19}			13:45 (70.6)(B039) [11] {FA19}			14:08 (70.5)(B041) [1] {FA19}			14:30 (70.8)(B190) [17] {FA19}			14:40 (70.6)(B032) [2] {FA19}			15:00 (70.5)(B036) [40] {FA19}			15:22 (70.6)(B038) [43] {FA19}			15:30 (70.8)(B193) [12] {FA19}		
Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
1.1	5.4	0	6.2	3.2	0	3.2	2	0	2	2.2	0	2.3	1.3	0	2.2	3.4	0	3.4	2	0	2.5	3.8	0	4.5	2	0	2.5	3.7	0	3.7	4.7	0	4.7	4.7	0	4.9
2.7	3	0.2	9	5.2	0.2	8.2	5	1	6	6.3	0	8.6	4.8	0	7	5.4	0.2	8.5	8.5	0	11	5.6	0.2	9.9	9.5	0	12	11.9	0.7	14.9	7.7	0.1	12.3	7.6	0.4	12.1
6.8	10.2	0.4	18.8	8.5	0	16.7	14	0	20	13.6	0.3	21.9	9.8	0.3	16.5	14.2	0.2	22.5	15	0	36	7.2	0.2	16.8	14.5	0	26.5	17.2	0.5	31.9	14.6	0	27.1	14.8	0.3	26.6
7.3	2.2	0	21	1.8	0	18.5	3	0	23	3.1	0.1	24.9	2.5	0.7	18.3	1.5	0.1	23.9	1	0	37	2.1	0.2	18.7	2	0	28.5	2.5	0.1	33.6	3.9	0.1	30.9	2.7	0.2	29.1
7.3	0.4	0	21.4	0	0	18.5	0	0	23	0.3	0.1	25.2	0.2	0	18.5	0	0	23.9	0	1	36	0.1	0	18.8	1	0	29.5	0.2	0.1	33.7	0.4	0	31.3	0.4	0	29.5
7.3	0.4	0	21.8	0	0	18.5	0	0	23	0.3	0.6	24.9	0	0	18.5	0.1	0.4	23.6	0	0	36	0	0.1	18.6	0.5	1	29	0.2	0.4	33.4	0.1	1.2	30.2	0.7	0.8	29.3
7.4	0.8	1.2	21.4	0.8	0.5	18.8	1	0	24	0.8	2	23.7	0.8	0.8	18.5	0.5	1.9	22.2	0	1	35	1	0.4	19.2	3.5	1.5	31	1.2	1.4	33.2	1.3	1.2	30.3	0.5	1.1	28.8
7.3	0	0.2	21.2	0.5	0.2	19.2	0	0	24	0.1	0.3	23.4	0	0.2	18.3	0.2	0.1	22.3	0	0	35	0.1	0.1	19.2	0	0	31	0.3	0.5	33	0.2	0.7	29.8	0.2	0.5	28.4
7.2	0.6	0.4	21.4	0.2	0	19.3	0	0	24	0.1	0.3	23.2	0	0.7	17.7	0.1	0.1	22.3	0	1	34	0.2	0.1	19.3	0	0	31	0.5	0.2	33.3	0.1	0.1	29.8	0.1	0.3	28.3
8	0.2	0.8	20.8	2.2	0.3	21.2	2	0	26	2.4	0.6	25	1.5	0.5	18.7	2.5	0.4	24.4	2	1	35	2.7	1	21	3.5	3	31.5	3.6	1.3	35.6	2.6	3.1	29.3	4	1.4	30.8
8.2	0	0	20.8	0.3	0.2	21.3	1	0	27	0.4	0.3	25.1	0.3	0.2	18.8	0.4	0.3	24.5	0	0	35	0.4	0.2	21.1	0.5	2	30	0.7	0.2	36.1	1	0.6	29.7	0.1	0.8	30.1
8.2	1.2	1.8	20.2	0.3	1	20.7	0	2	25	0.6	0.9	24.8	0.7	0.8	18.7	0.4	0.6	24.2	2	2	35	0.6	1.1	20.7	1	6.5	24.5	2.2	1.9	36.4	0.6	1.8	28.5	1.3	2.4	29
8.3	0.8	0.6	20.4	0.8	1.2	20.3	1	1	25	0.5	0.6	24.7	0.2	1	17.8	0.2	1.2	23.2	0	3	32	0.6	0.5	20.8	1	0	25.5	1	1.3	36.1	0.3	0.8	28	0.7	0.8	28.8
8.3	0	1	19.4	0.2	0	20.5	0	0	25	0.3	0.7	24.3	0	0	17.8	0.4	0.6	22.9	0	0	32	0	1.1	19.8	0	2.5	23	0.4	2.1	34.4	0.2	1.1	27.1	0.2	1.8	27.3
8.1	0	0	19.4	0.3	0.3	20.5	0	0	25	0.4	0.5	24.2	0	0	17.8	0	0.1	22.8	2	0	34	0.1	0.1	19.8	0	0	23	0.1	0.4	34.1	0	0.3	26.8	0.2	0.3	27.2
8.1	1.2	2	18.6	1.3	1.5	20.3	0	0	25	0.4	0.9	23.7	2.8	0.3	20.3	2.4	1.5	23.7	6	2	38	1	1.4	19.4	2	2.5	22.5	2.8	1.9	35	1.8	1.2	27.3	1.5	1.9	26.8
7.7	0.2	0.6	18.2	0	2.3	18	0	1	24	0.6	1.4	22.9	0.3	1.5	19.2	0.1	1.3	22.5	0	4	34	0.2	0.8	18.8	1	0.5	23	0.7	1.9	33.9	0.2	0.7	26.8	0.2	1.8	25.2
7.3	0	1.2	17	0.2	0.3	17.8	0	2	22	0.2	1.5	21.6	0	0.8	18.3	0.2	0.9	21.8	0	2	32	0.9	0.7	18.9	0	0	23	0.5	1.4	32.9	0.3	1	26.1	0.3	0.8	24.7
7.4	2.2	0.4	18.8	1	2.3	16.5	1	3	20	2.3	2.6	21.3	2.7	1.5	19.5	2.8	1.8	22.8	3	4	31	1.4	0.7	19.6	5	0.5	27.5	2.5	2.3	33.1	2.1	2.1	26.2	1.4	0.9	25.2
7.4	0.2	0	19	0.3	0.8	16	1	1	20	0.2	0.4	21.1	0.2	1.7	18	0.4	1.7	21.5	0	0	31	0.2	0.5	19.3	0.5	0.5	27.5	0.5	1.2	32.4	0.2	0.6	25.8	0.1	0.5	24.8
7.2	0.4	0.2	19.2	0	0.5	15.5	0	1	19	0.3	0.7	20.7	0.8	0.2	18.7	0.3	0.4	21.4	0	1	30	0.9	0.4	19.8	1.5	0	29	0.9	1	32.3	0.6	0.9	25.5	0.6	1	24.3
7.2	0.2	0.2	19.2	0	0	15.5	0	0	19	0.2	0.1	20.8	0	0.2	18.5	0	0.2	21.2	0	0	30	0	0.1	19.6	0	0.5	28.5	0.2	0.3	32.2	0	0.1	25.5	0.3	0	24.6
7.1	0	0.2	19	0.3	0	15.8	0	0	19	0.1	0.2	20.7	0	0.5	18	0.1	0.4	20.9	0	0	30	0.3	0.2	19.8	0.5	0	29	0.5	0.4	32.3	0.2	0.3	25.4	0.1	0.2	24.5
7	0	0	19	0	0.2	15.7	0	0	19	0.2	0.1	20.7	0	0.5	17.5	0.1	0.5	20.5	0	0	30	0.2	0.1	19.9	0	0	29	0.2	0.4	32.2	0	0.6	24.9	0.2	0.2	24.5
7	0.2	0.8	18.4	0	0.2	15.5	0	0	19	0.2	0.6	20.3	0.3	0	17.8	0.3	0.5	20.3	0	1	29	0.2	0.6	19.5	1	0	30	0.3	0.7	31.7	0.5	0.9	24.5	0.4	0.7	24.3
7.8	2.4	3.4	17.4	2.8	2.8	15.5	3	4	18	4	2.6	21.8	3	2	18.8	4.7	2.3	22.7	4	1	32	4.1	2.1	21.5	8	8.5	29.5	11	3.7	39.1	4.7	2.1	27.1	3	2.2	25.1
8.3	0.8	0.8	17.4	0.7	0	16.2	2	0	20	0.4	0.3	21.9	0.5	0.2	19.2	0.4	0.5	22.5	1	1	32	0.1	0.6	21	0	1	28.5	1.1	1.7	38.6	0.4	0.3	27.2	0.2	0.5	24.8
8.3	0	0	17.4	0	0	16.2	0	0	20	0	0	21.9	0	0	19.2	0	0	22.5	0	0	32	0	0	21	0	0	28.5	0	0	38.6	0	0	27.2	0	0	24.8
8.3	0	1	16.4	0.3	0.7	15.8	0	0	20	0.2	0.7	21.3	0	0.3	18.8	0.2	0.5	22.2	0	1	31	0.1	0.4	20.7	0.5	0	29	0.4	0.8	38.2	0.3	0.6	26.9	0.3	1.2	23.8
8.3	0.4	0.6	16.2	0.8	0.8	15.8	0	0	20	0.2	0.7	20.9	0.2	0.7	18.3	0.4	0.6	21.9	0	1	30	0.2	1.1	19.8	0	0	29	0.5	1.9	36.8	0.1	0.9	26.1	0.2	1.2	22.8
8.3	0.4	0.6	16	0	0.7	15.2	0	0	20	0.2	1.3	19.8	0	0.8	17.5	0	0.5	21.4	0	3	27	0.4	1.7	18.5	0.5	1	28.5	0.3	1.4	35.6	0.4	1.6	24.9	0	2.1	20.8
8.2	0	0	16	0.3	0.2	15.3	0	1	19	0	0.3	19.5	0	0.2	17.3	0.1	0.2	21.3	0	0	27	0	0.1	18.4	0	0.5	28	0.2	0.2	35.6	0.1	0.5	24.4	0.2	0.7	20.3
8.2	0.4	0.4	16	0.2	0	15.5	0	0	19	0.3	0.9	18.8	0	0.5	16.8	0.3	0.5	21.1	0	0	27	0	0.2	18.1	0	0.5	27.5	0.1	1.6	34	0	0.5	24	0	0.5	19.8
8.1	0	0	16	0	0.2	15.3	0	0	19	0.1	0.1	18.8	0	0.7	16.2	0.3	0	21.4	0	0	27	0.1	0.3	17.9	0	0	27.5	0.1	1.3	32.8	0	0.3	23.7	0	0.4	19.3
8.1	0	0.4	15.6	0	0	15.3	0	0	19	0.1	0.1	18.8	0	0.2	16	0.2	0	21.5	0	0	27	0	0.1	17.8	0	0	27.5	0.3	0.1	32.9	0	0.3	23.4	0.1	0.3	19.2
8.1	0	0.2	15.4	0	0	15.3	0	0	19	0.1	0	18.9	0.2	0.2	16	0.1	0	21.6	0	0	27	0	0.3	17.5	0	0	27.5	0.1	1.1	31.9	0	0.4	23	0	0.5	18.7
8.1	0	0.2	15.2	0	0	15.3	0	1	18	0	0.3	18.6	0	0	16	0	0.1	21.5	0	0	27	0	0.2	17.4	0	0	27.5	0	0.1	31.8	0	0.1	23	0	0	18.7
8.2	0	0.2	15	0.7	0.7	15.3	0	0	18	0.3	1.1	17.8	0.2	0.7	15.5	0.6	1.5	20.6	0	1	26	0	0.6	16.7	1	0	28.5	0.5	1.5	30.8	0.1	1.1	22	0.4	1.3	17.8
8.1	0	0	15	0	0.2	15.2	0	0	18	0.2	0.2	17.7	0.2	0.3	15.3	0	0.4	20.3	0	1	25	0.2	0.1	16.9	0.5	1	28	0.1	0.3	30.6	0.2	0.5	21.7	0	0.1	17.7
8.1	0	0	15	0	0	15.2	0	1	17	0	0.1	17.7	0	0	15.3	0.1	0	20.4	0	0	25	0	0.1	16.8	0	0	28	0.1	0.1	30.6	0	0.1	21.6	0	0.2	17.5
8.1	0.4	0.4	15	0	0.2	15	0	1	16	0.1	0.2	17.6	0	0.7	14.7	0	0.5	19.8	0	1	24	0	0.4	16.5	0	0.5	27.5	0.2	0.6	30.1	0.1	0.5	21.2	0.1	0.4	17.2
8.1	0	0	15	0.2	0.2	15	0	0	16	0.4	0.4	17.5	0	0.3	14.3	0.2	0.4	19.6	2	0	26	0.1	0.5	16.1	0.5	0	28	0.1	0.4	29.8	0.2	0.2	21.3	0	0.2	17
8.1	0	0.8	14.2	0.2	1.2	14	0	2	14	0.1	0.5	17.1	0	0.7	13.7	0.1	1	18.7	0	2	24	0.3	1.4	14.9	0	2.5	25.5	0.2	1.7	28.3	0.2	1.3	20.2	0	0.7	16.3
8	0.4	0.2	14.4	0	0	14	0	0	14	0.3	0.6	16.8	0	0.3	13.3	0.2	1	17.9	0	0	24	0	0.6	14.4	0	1	24.5	0.1	1.3	27.1	0	1.1	19.1	0.1	2.2	14.3
7.9	0.2	1	13.6	0	0.3	13.7	1	0	15	0.1	0.4	16.5	0.3	0.5	13.2	0.1	0.9	17.1	0	0	24	0	0.2	14.1	0	0	24.5	0.2	0.6	26.6	0.1	0.3	18.9	0	0.8	13.4
7.6	0.6	0.4	13.8	0.2	0.7	13.2	0	0	15	0.2	0.9	15.7	0	1.2	12	0.1	0.9	16.3	0	1	23	0	2.6	11.5	0	0	24.5	0.3	2.1	24.8	0	1.1	17.9	0	1.4	12
7.4	1	6.2	8.6	0.5	5.7	8	0	3	12	0.7	5.7	10.8	0.8	4.7	8.2	0.9	6.9	10.3	1	10	14	.	.	.	1.5	10.5	15.5	1.1	10.5	15.4	2.4	6	14.3	.	.	.
7.4	0.4	1.4	7.6	0.2	0.5	7.7	0	0	12	0.1	0.8	10.1	0.2	1.7	6.7	0.5	1.1	9.6	0	0	14	.	.	.	1	2	14.5	0.3	2.6	13.1	0.5	1.3	13.5	.	.	.
7.3	0.2	1	6.8	0	0.2	7.5	0	0	12	0.4	0.4	10.2	0.2	0.5	6.3	0.3	0.5	9.4	0	2	12	.	.	.	2	1	15.5	0.3	1.4	12	0.3	0.6	13.2	.	.	.
7.4	0	0.6	6.2	0.2	0.2	7.5	0	3	9	0.2	0.4	9.9	0.5	1.5	5.3	0.3	0.5	9.1	0	0	12	.	.	.	1.5	0	17	0.1	0.9	11.3	0.1	0.8	12.5	.	.	.
6.8	0	1	5.2	0.2	1.2	6.5	0	2	7	0.1	1.3	8.7	0.7	0.8	5.2	0.5	1.7	7.8	0	2	10	.	.	.	0	1	16	0.2	2.5	9	0.2	1.2	11.5	.	.	.
5.5	0	0.2	5	0	1.8	4.7	0	0	7	0.4	1.2	8	0.5	0.2	5.5	0.5	0.7	7.5	0	3	7	.	.	.	0	4	12	0.2	2.4	6.8	0.4	1.7	10.1	.	.	.
5.1	0	0	5	0.2	0.3	4.5	0	2	5	0	0.5	7.5	0	0.5	5	0.1	0.4	7.3	0	3	4	.	.	.	0	0	12	0.1	0.7	6.1	0.2	0.9	9.3	.	.	.
4.8	0	0	5	0	0.5	4	0	2	3	0.2	0.9	6.8	0.2	1	4.2	0	1.1	6.2	0	0	4	.	.	.	0	0	12	0.1	0.9	5.3	0.1	0.8	8.6	.	.	.
4.7	0	0	5	0	0	4	0	0	3	0	0	6.8	0	0.2	4	0	0	6.2	0	0	4	.	.	.	0.5	0	12.5	0.1	0.8	4.5	0	0.9	7.8	.	.	.
4.7	0	0	5	0	0	4	0	0	3	0	0.2	6.6	0	0	4	0	0	6.2	0	0	4	.	.	.	0	0	12.5	0	0	4.5	0	0	7.8	.	.	.
4.6	0	0	5	0	0.3	3.7	0	0	3	0.2	0.6	6.2	0	1	3	0	0.2	6	0	0	4	.	.	.	0	0	12.5	0	0.4	4.1	0	0.5	7.2	.	.	.
4.5	0	0.6	4.4	0	0	3.7	0	0	3	0	0.2	6	0	0.2	2.8	0	0	6	0	0	4	.	.	.	0	0	12.5	0	0.4	3.7	0.2	0.4	7.1	.	.	.
4	0	2	2.4	0	0.5	3.2	0	3	0	0	0.8	5.2	0	2.3	0.5	0	0.6	5.1	0	2	2	.	.	.	0	1	11.5	0	2.1	1.6	0	2	5.2	.	.	.
.	0	0.6	1.8	.	.	.	0	0	0	.	.	.	0	0	0.5	.	.	.	0	0	2	.	.	.	.	.	.	0	0.5	1.1	.	.	.	.	.	.
.	0	0.4	1.4	.	.	.	0	0	0	.	.	.	0	0	0.5	.	.	.	0	0	2	.	.	.	.	.	.	0	0.2	0.9	.	.	.	.	.	.
.	0	1.4	0	.	.	.	0	0	0	.	.	.	0	0.5	0	.	.	.	0	0	2	.	.	.	.	.	.	0	0.9	0.1	.	.	.	.	.	.
0.1	.	.	.	0	3.2	0	.	.	.	0	5.2	0	.	.	.	0	5.5	0	.	.	.	.	.	.	0	11.5	0	.	.	.	0	5	0.3	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.9	8.8	3.6	.	.	.	.	.	.	.	.	.	0.7	8.4	4.3
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	2.8	0.8	.	.	.	.	.	.	.	.	.	0	3.6	0.7
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8.3			21.8			21.3			27			25.2			20.3			24.5			38			21.5			31.5			39.1			31.3			30.8
	37.4	38.2		35.1	35.3		37	37		45.7	45.7		36.9	38		47.2	46.4		49.5	58		36.3	36		68	68.5		73.2	72.3		54.9	55.4		48.6	48	

15:50 (70.5)(B043) [37] {FA19}			16:00 (70.8)(B039) [7] {FA19}			16:20 (70.6)(B190) [17] {FA19}			16:30 (70.8)(B041) [5] {FA19}			16:50 (70.5)(B042) [37] {FA19}			17:00 (70.6)(B032) [1] {FA19}		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
8.9	0	8.9	6.9	0	6.9	11.4	0	11.4	4.2	0	5.4	10.1	0	10.1	7	0	7
8.4	0.4	17	8.3	0.4	14.7	9.9	0.6	20.8	8	0.2	13.2	15	0.7	24.6	4	0	11
11.4	0.4	28.9	5.3	0.4	19.6	12.8	0.4	33.1	9.4	0	22.6	14	0.9	40.1	19	0	30
2.6	0.1	30.7	2.1	0.1	21.6	3	0.2	35.9	5.2	0	27.8	2.4	0.1	41.5	2	0	32
0.2	0	31.8	0.1	0	21.7	0.2	0	36.1	0.2	0	28	0.6	0	42.1	0	0	32
0.1	0.7	31.2	0.1	0	21.9	0.2	0.5	35.8	0.2	0.2	28	0.2	0.3	41.9	0	0	32
0.4	1.1	30.4	1.6	0.3	23.1	0.9	1.1	35.6	1.4	1.8	27.6	0.8	1.2	41.6	0	1	31
0.4	0.6	30.2	0.4	0	23.6	0.5	1	35.1	0.2	0	27.8	0.4	0.6	41.4	0	0	31
0.3	0.1	30.4	1.1	0	24.7	0.6	0.4	35.4	1.4	0.2	29	0.9	0.1	42.2	0	1	30
4	1.6	32.7	2.6	2	25.3	2.2	2.3	35.2	2	1.6	29.4	3	2.6	42.6	6	0	36
0.4	0.3	32.8	0.3	0.1	25.4	0.6	0.6	35.2	0.6	0.6	29.4	0.4	0.6	42.4	0	0	36
0.9	1	32.7	0.4	0.9	25	1.4	1.1	35.5	1.4	4	26.8	1.7	1.6	42.5	0	6	30
0.7	0.4	33	0.4	0.6	24.9	0.2	0.9	34.9	0.4	0.2	27	0.8	1.3	41.9	0	0	30
0.3	1	32.3	0	0.7	24.1	0.2	1	34.1	0.4	0.4	27	0.4	1.3	41	0	0	30
0	0.1	31.9	0	0	24.1	0	0.4	33.8	0	0.4	26.6	0.1	0.1	41	0	0	30
1.6	1.4	32.2	0.4	0.6	24	3.3	1.4	35.7	1.6	1.4	26.8	2.4	1.4	41.9	6	1	35
0.8	1.2	32	0	1.3	22.7	0.6	2.2	34.1	1	3.2	24.6	0.4	2.5	39.8	0	3	32
0.6	0.8	31.8	0.1	0.6	22.3	0.2	0.8	33.5	0.2	0.4	24.4	0.3	1.4	38.7	1	2	31
1.2	1.4	31.6	0.7	1.3	21.7	2.4	1.9	34	2.2	0.6	26	2.1	0.8	40.1	10	2	39
0.3	0.4	31.6	0	0.6	21.1	0.1	0.3	33.8	0.2	0	26.2	0.5	1	39.6	0	0	39
0.9	0.4	32.1	0.4	1.4	20.1	1.6	0.5	34.8	1.2	0.6	26.8	1.2	1.1	39.8	2	6	35
0.2	0.2	32.1	0	0	20.1	0.1	0.2	34.8	0	0.2	26.6	0.2	0.4	39.6	0	0	35
0.2	0.3	32	0.1	0.4	19.9	0.1	0.5	34.3	0.2	0.8	26	0.4	0.9	39.1	2	0	37
0	0.3	31.7	0	0	19.9	0.1	0.3	34.1	0	0.4	25.6	0.4	0.6	38.8	0	1	36
0.1	0.5	31.4	0.3	0.1	20	0.2	0.6	33.6	0.2	1.4	24.4	0.2	1.1	38	4	0	40
6	3.6	33.8	4.9	2.9	22	7.2	3	37.8	8.6	4.6	28.4	6.1	2.5	41.6	14	6	48
0.4	0.5	33.6	0.1	0.3	21.9	0.3	0.5	37.6	0.2	1	27.6	0.5	0.6	41.5	1	0	49
0	0	33.6	0	0	21.9	0	0	37.6	0	0	27.6	0	0	41.5	0	0	49
0.2	0.6	33.2	0	0.9	21	0.1	0.9	36.8	0.8	0.4	28	0.2	1	40.7	2	1	50
0.3	0.6	32.9	0.3	0.9	20.4	0.5	1.4	35.9	0.8	4	24.8	0.5	1.2	39.9	0	1	49
0.5	1.3	32.1	0.3	1.6	19.1	0.5	1.5	34.9	0.4	2.4	22.8	0.5	1.7	38.7	0	4	45
0.1	0.6	31.6	0	0	19.1	0.4	0.5	34.8	0	0.6	22.2	0	0.6	38.1	0	0	45
0	0.6	31	0	0.3	18.9	0	1	33.8	0	0.8	21.4	0	1.9	36.2	1	2	44
0.1	0.8	30.3	0	0.7	18.1	0.4	0.5	33.7	0	0.8	20.6	0.2	1.9	34.6	1	3	42
0.1	0.2	30.2	0	0	18.1	0.1	0.4	33.5	0	0.2	20.4	0.1	0.2	34.4	0	0	42
0	0.3	29.9	0	0.1	18	0	0.4	33.1	0	0	20.4	0.1	0.5	34.1	0	1	41
0	0.2	29.7	0	0	18	0	0.2	32.9	0	0	20.4	0.1	0.2	33.9	0	0	41
0.1	1	28.8	0	1.4	16.6	0.1	0.9	32	0.2	0.4	20.2	0.1	1.1	32.9	0	2	39
0.2	0.4	28.6	0	0.4	16.1	0.1	0.4	31.7	0	0.6	19.6	0.1	0.6	32.4	0	0	39
0	0.1	28.6	0	0.1	16	0	0.1	31.6	0	0	19.6	0	0.1	32.4	0	0	39
0.2	0.4	28.4	0.1	1	15.1	0.1	0.7	30.9	0	0.2	19.4	0.2	0.8	31.8	0	1	38
0	0.2	28.2	0	0.3	14.9	0.1	0.5	30.6	0	0.4	19	0	0.9	30.9	0	1	37
0.3	0.9	27.6	0	0.7	14.1	0.1	0.7	30	0	3	16	0.3	1.1	30.1	0	1	36
0.6	0.6	27.6	0	0.9	13.3	0.1	1.7	28.4	0.2	2	14.2	0	1.4	28.7	0	1	35
0.3	0.7	27.2	0	0.3	13	0.2	1.4	27.1	0	0.6	13.6	0	1.1	27.7	0	0	35
0.3	1	26.5	0	1.4	11.6	0.5	0.8	26.8	0	1.2	12.4	0.3	1.7	26.2	0	0	35
3	9.9	19.6	.	.	.	1.7	9.6	18.9	.	.	.	0.9	9.9	17.2	1	22	14
0.6	0.8	19.7	.	.	.	0.1	1	18	.	.	.	0.2	1	16.5	1	0	15
0.4	1.3	18.8	.	.	.	0.1	0.6	17.5	.	.	.	0.2	0.9	15.7	0	0	15
0.2	1.2	17.8	.	.	.	0	0.8	16.7	.	.	.	0.1	1	14.8	0	0	15
0.1	2.8	15.1	.	.	.	0	2.9	13.8	.	.	.	0.1	3.1	11.7	3	3	15
0.6	3.2	12.5	.	.	.	0.3	3.1	11	.	.	.	0.2	2.5	9.4	0	3	12
0.1	1.3	11.3	.	.	.	0	0.8	10.2	.	.	.	0.1	0.6	8.8	0	2	10
0.1	1.4	10	.	.	.	0	2.9	7.3	.	.	.	0.1	1.4	7.5	0	3	7
0	0.9	9.1	.	.	.	0	0.8	6.5	.	.	.	0	0.7	6.8	0	2	5
0	0	9.2	.	.	.	0	0.2	6.4	.	.	.	0	0.1	6.7	0	0	5
0	0.9	8.2	.	.	.	0.2	1.1	5.5	.	.	.	0	1.2	5.5	0	0	5
0	0.9	7.4	.	.	.	0	0.5	5	.	.	.	0	0.8	4.8	0	0	5
0.1	5.4	2.1	.	.	.	0.2	1.6	3.5	.	.	.	0	0.8	4	0	0	5
0	0.6	1.5	.	.	.	.	.	.	.	.	.	0	2.1	1.9	.	.	.
0	0.5	1	.	.	.	.	.	.	.	.	.	0	0.5	1.4	.	.	.
0	0.7	0.3	.	.	.	.	.	.	.	.	.	0	1	0.4	.	.	.
.	.	.	.	.	.	0	3.5	0	.	.	.	.	.	.	0	5	0
.	.	.	1.6	8.9	4.3	.	.	.	0.2	8.6	4	.	.	.	.	.	.
.	.	.	0	3.1	1.1	.	.	.	0	3.8	0.2	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
		33.8			25.4			37.8			29.4			42.6			50
59.8	61.1		38.9	38		66.2	66.1		53.2	54.2		70.1	71.3		87	87	

17:20 (70.5)(B193) [12] {FA19}			17:30 (70.6)(B036) [40] {FA19}			17:50 (70.5)(B039) [6] {FA19}			18:05 (70.6)(B037) [6] {FA19}			18:25 (70.5)(B041) [5] {FA19}			18:40 (70.6)(B196) [13] {FA19}			19:00 (70.
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On
12.5	0	12.5	15	0	15.1	11.3	0	11.7	9.3	0	11	10	0	10	6.8	0	6.9	4.1
17.3	0.3	29.4	18.9	0.4	33.7	13.3	0.3	24.7	11	0.2	21.8	9.2	0.4	18.8	14.2	0.1	21	11.3
15.9	0.6	44.8	18	0.3	51.5	14.2	0.3	38.5	14.5	0.5	35.8	12.8	0.4	31.2	16.4	0.2	37.2	12.3
2.7	0.3	47.1	3	0.2	54.2	4.5	0	43	1.7	0	37.5	2.6	0.2	33.6	3.8	0.3	40.6	2.4
0.2	0.2	47.1	0	0	54.3	0	0	43	0	0.2	37.3	0.6	0	34.2	0	0	40.6	0.1
0.4	0.6	46.9	0.5	0.6	54.1	1.3	1.2	43.2	0.5	0.7	37.2	0	0.2	34	0.2	0.6	40.2	0.3
1.2	1.9	46.2	1.5	1.8	53.9	1	1.7	42.5	1.2	1	37.3	1.4	1.8	33.6	1.1	1.2	40.1	1
0	0.5	45.7	0.3	0.7	53.6	0.5	0.5	42.5	0	0	37.3	0.4	0.4	33.6	0.4	0.3	40.2	0.1
0.5	0.6	45.6	0.4	0.5	53.5	0.2	0.3	42.3	0	0	37.3	0.6	0.4	33.8	0.1	0.1	40.2	0.3
2.4	1.5	46.5	2.2	2.9	52.8	1.2	2.3	41.2	2.3	1.7	38	0.8	1.8	32.8	2.8	1.5	41.5	2.3
0.8	0.5	46.8	1.1	2.8	51.5	1.7	0.2	42.7	0.3	0.3	38	0.4	0.4	32.8	0.6	0.8	41.2	0.6
1.2	1.3	46.8	0.9	1.8	51.3	0.5	1.2	42	1	1.7	37.3	0.2	1.4	31.6	0.4	1.5	40.2	0.6
0.5	1.2	46.1	0.6	1.5	50.4	0.2	1.2	41	1.2	1.5	37	0.4	1	31	0.4	2.2	38.4	0.2
0.3	2.2	44.2	0.4	1.9	48.9	0	0.8	40.2	0.2	1.3	35.8	0.2	1.4	29.8	0.6	1.5	37.5	0.4
0.1	0.3	44	0.1	0.1	48.9	0.3	0.3	40.2	0	0.7	35.2	0	0	29.8	0	0.2	37.4	0.1
1.3	1.7	43.7	1.7	1.4	49.2	2.2	1.2	41.2	0.8	1.7	34.3	0.4	1.6	28.6	1.3	2	36.7	1.1
0.5	4.9	39.3	0.6	4	45.8	0.7	2	39.8	0.8	2.3	32.8	0.2	2	26.8	0.1	1.6	35.2	0.3
0.1	0.4	38.9	0.5	0.9	45.4	0.7	0.3	40.2	0	1	31.8	0.6	0.8	26.6	0.4	1.2	34.4	0.2
2.5	1.3	40.2	2.1	0.9	46.6	1.2	0.5	40.8	1.7	0.3	33.2	1	0.6	27	2.3	1.2	35.5	1.1
0.2	0.5	39.8	0.4	1	45.9	0.5	0.8	40.5	0.2	0.8	32.5	0	0	27	0.2	0.5	35.2	0
0.6	1.3	39.1	0.4	1.3	45	0.3	1	39.8	0.7	0.7	32.5	0.2	1	26.2	0.8	0.9	35	0.2
0	0.1	39	0.1	0.8	44.2	0	0.5	39.3	0.2	0.7	32	0	0.2	26	0	0.8	34.2	0.1
0.1	1	38.1	0.2	2	42.5	0	1	38.3	0	1.3	30.7	0.2	0.8	25.4	0.4	0.5	34.1	0.2
0.2	1.3	36.9	0	0.8	41.7	0	1	37.3	0	1.2	29.5	0	0.2	25.2	0	0.6	33.5	0.1
0	1.3	35.6	0.3	1.3	40.7	0	0.8	36.5	0.2	0.8	28.8	0	1.2	24	0.2	0.9	32.8	0.1
5.1	4.3	36.4	8	2.9	45.8	5.2	6.3	35.3	6.2	1.2	33.8	1.8	3	22.8	6.1	1.3	37.5	3.6
0.4	0.5	36.3	0.5	0.6	45.6	0.3	0.2	35.5	0.3	0.7	33.5	0	0.4	22.4	0.5	0.1	37.9	0.4
0	0	36.3	0	0	45.6	0	0	35.5	0	0	33.5	0	0	22.4	0	0	37.9	0
0.2	0.5	36	0.4	1.7	44.3	0	0.3	35.2	0	1	32.5	0	1.6	20.8	0.2	0.5	37.5	0.1
0.7	1.6	35.1	0.2	1.6	42.9	0	1.8	33.3	0.3	2.2	30.7	0	0.6	20.2	0	1.4	36.2	0
0.3	2.2	33.3	0.1	2.5	40.5	0.7	1.3	32.7	0	1	29.7	0.2	1.4	19	0.2	1.9	34.5	0.2
0.1	0.6	32.8	0.2	1.1	39.6	0	1.2	31.5	0	0.3	29.3	0	0	19	0.1	0.5	34	0.1
0.1	1.1	31.8	0.1	1.8	37.9	0	1.8	29.7	0	1.2	28.2	0	1.2	17.8	0	1.2	32.8	0
0.3	2.2	29.9	0.1	1.6	36.4	0	3.2	26.5	0	1.8	26.3	0	0.6	17.2	0.1	1.2	31.6	0
0.1	0.5	29.5	0.1	0.2	36.3	0	0.2	26.3	0	0.2	26.2	0	0	17.2	0	0.2	31.5	0
0	0.4	29.1	0	0.2	36.1	0	0	26.3	0	0.5	25.7	0	0.4	16.8	0	0.4	31.1	0
0	0.5	28.6	0	0.4	35.7	0	0.3	26	0	0.5	25.2	0	0.6	16.2	0	0.2	30.8	0
0.1	1.7	27	0.2	2.1	33.8	0	0.7	25.3	0.2	0.3	25	0	0.6	15.6	0.1	1.5	29.4	0.1
0	0.2	26.8	0.2	1.1	33	0.3	0.2	25.5	0	0	25	0	0	15.6	0.2	0.1	29.5	0.1
0	0.3	26.5	0	0.1	32.9	0	0.2	25.3	0	0	25	0	0.2	15.4	0	0.2	29.2	0
0.1	0.5	26.1	0.1	0.8	32.2	0	0.7	24.7	0	0.3	24.7	0	0.4	15	0.1	0.5	28.8	0
0	0.8	25.3	0	1	31.2	0	0.7	24	0	1.2	23.5	0	0.6	14.4	0	0.9	27.8	0.1
0	1	24.3	0.1	2.4	29	0	1.5	22.5	0	0.7	22.8	0	0.6	13.8	0.2	1.7	26.3	0.1
0	0.5	23.8	0.1	2.4	26.8	0.3	1.2	21.7	0	2.3	20.5	0	1.4	12.4	0	0.4	25.9	0
0.2	1.3	22.7	0.1	0.4	26.4	0	1.2	20.5	0	0.8	19.7	0	0.6	11.8	0.1	0.5	25.5	0
0.2	1.6	21.3	0.1	2.7	23.9	0	2.5	18	0	1.7	18	0	0.4	11.4	0	2.8	22.7	0.1
1	4.8	17.5	0.6	9	15.5	0.5	8.2	10.3	0.7	7.2	11.5	0.8	4.2	8	1	8.1	15.6	0.4
0.3	0.7	17.1	0.1	0.6	15	0	0.5	9.8	0.3	0.5	11.3	0.4	1.2	7.2	0.2	0.8	14.9	0
0	0.7	16.4	0.2	0.8	14.4	0	1.2	8.7	0	0.3	11	0	0.5	7.5	0	0.3	14.6	0
0	1.4	15	0	0.7	13.7	0	0.5	8.2	0	1.2	9.8	0	0.8	6.8	0	1.8	12.8	0
0	3.3	11.8	0.1	3.6	10.2	0	2	6.2	0	1.5	8.3	0	1.3	5.5	0	3.2	9.6	0
0.3	2.5	9.6	0.1	2.9	7.4	0	1.8	4.3	0.2	2.2	6.3	0	1.3	4.3	0.1	1.4	8.3	0
0	3.3	6.3	0.1	0.9	6.5	0	1	3.3	0	1.2	5.2	0	1.5	2.8	0	1.6	6.7	0
0.1	2.1	4.3	0.1	1.3	5.3	0	1.2	2.2	0	1.2	4	0	0.6	2.4	0	1.7	5	0.1
0	0.6	3.7	0.1	0.4	5	0	0.2	2	0	0.8	3.2	0	0.4	2	0	0.2	4.8	0
0	0	3.7	0	0	5	0	0	2	0	0	3.2	0	0.4	1.6	0	0	4.8	0
0	0.8	2.9	0	0.5	4.5	0	0	2	0	0.5	2.7	0	0.2	1.4	0	0.5	4.3	0
0	1.2	1.8	0	1.1	3.4	0	0.3	1.7	0	0	2.7	0	0	1.4	0	0	4.3	0
0	0.3	1.5	0	0.9	2.5	0	0.3	1.3	0	0.5	2.2	0	0	1.4	0	0.6	3.7	0
0	0.8	0.7	.	.	.	0	0.3	1	.	.	.	0	0.2	1.2	.	.	.	0
0	0.3	0.3	.	.	.	0	0.3	0.7	.	.	.	0	0.6	0.6	.	.	.	0
0	0.3	0	.	.	.	0	0.7	0	.	.	.	0	0.6	0	.	.	.	0
.	.	.	0	2.4	0.6	.	.	.	0	2.2	0	.	.	.	0	3.7	0	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
		47.1			54.3			43.2			38			34.2			41.5	
71.1	71.2		81.2	82.6		63.1	63.4		56	57.8		45.4	46.6		62.7	62.1		44.9

5)(B042) [39] {FA19}		19:15 (70.6)(B032) [1] {FA19}			19:35 (70.5)(B036) [43] {FA19}			20:07 (70.6)(B037) [7] {FA19}			20:40 (70.5)(B010) [8] {FA19}			21:05 (70.6)(B044) [10] {FA19}			21:35 (70.5)(B045) [49] {FA19}			22:10 (70.5)(B040) [43] {FA19}			22:50 (70.5)(B044) [10] {FA19}			23:25 (70.5)(B045) [48] {FA19}			24:10 (70.8)(B040) [45] {FA19}			25:04 (70.2)(B045) [32] {FA19}			Total	
Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off
0	4.6	6	0	7	4	0	4.2	7.1	0	7.4	3.4	0	3.6	4.1	0	4.1	3.2	0	3.2	2.6	0	2.6	2.8	0	3.5	3.2	0	3.3	0.8	0	0.9	.	.	.	232.7	0
0.4	15.9	6	0	13	10.3	0	14.4	13.6	0.1	20.9	9.9	0.1	13.4	9.4	0.5	13.1	11.1	0.1	14.2	11.3	0	13.9	6.8	0	10.3	7.4	0	10.6	3.4	0	4.4	.	.	.	404.3	10.5
0.3	28.2	11	0	24	11.4	0.2	25.7	15.9	0.4	36.3	14.5	0.1	27.8	11.2	0.3	24	12.1	0.2	26.1	11.1	0.1	24.8	10.7	0	21	9.7	0.1	20.2	7.4	0	11.5	2.2	0	2.2	626.9	10.3
0.1	30.5	3	0	27	2.8	0.1	28.4	3.1	0.3	39.1	2.6	0.1	30.3	2.9	0.2	29.1	2.8	0.1	29.3	2.3	0.1	27.1	2.5	0	23.5	1.3	0.1	21.4	0.7	0	12.1	.	.	.	128.6	5.1
0	30.6	1	0	28	0.1	0	28.5	0	0	39.1	0	0	30.3	1	0.1	30	0.4	0.1	29.6	0.1	0	27.2	0.2	0.2	23.5	0	0	21.4	0.1	0.1	12.1	0	0	2.2	14.4	2.5
0.2	30.6	0	0	28	0.2	0.1	28.6	0.9	1.1	38.9	0.1	0	30.4	0.4	0.4	30	0.2	0.2	29.6	0.2	0	27.3	0.2	0	23.7	0.2	0.5	21	0.1	0	12.2	0	0	2.2	17	15.2
1	30.5	0	1	27	0.8	0.9	28.4	0.7	2.4	37.1	0.4	0	30.8	0.9	1	29.9	0.7	0.6	29.7	1	1	27.3	0.3	0.8	23.2	0.1	0.5	20.6	0.7	0.2	12.7	0	0.2	2	43.7	58.8
0.3	30.4	0	0	27	0.2	0.2	28.5	0	0.3	36.9	0	0.1	30.6	0.3	0.2	30	0.1	0.2	29.7	0.2	0.4	27.1	0	0.3	22.9	0.5	0	21.1	0.1	0.2	12.6	0	0	2	9.7	18.7
0.1	30.6	0	0	27	0.1	0.1	28.5	0	0.1	36.7	0	0	30.6	0.5	0.1	30.4	0.1	0	29.8	0	0.1	27	0	0.2	22.7	0	0	21.1	0	0	12.6	0	0	2	10	16
1.3	31.6	0	0	27	1.9	1.6	28.9	2.9	3.6	36	2	1.5	31.1	2	2.4	30	2.6	1	31.3	2.8	1.2	28.6	2.9	1.2	24.4	1.5	1.1	21.5	1.1	0.3	13.4	0	0	2.1	121.9	59.8
0.5	31.7	0	0	27	0.2	0.8	28.3	0.3	1.4	34.9	0.3	0.5	30.9	0.1	0.5	29.6	0.2	0.6	30.8	0.2	0.5	28.3	0.3	0.7	24	0.1	0.3	21.3	0	0.1	13.3	0	0	2	24.2	19.5
1.4	30.9	0	2	25	0.8	1.5	27.6	0.7	1	34.6	0.6	1.9	29.6	0.2	0.9	28.9	0.9	1.1	30.6	0.9	0.5	28.7	2.2	0.7	25.5	0.2	0.2	21.3	0.1	0.2	13.2	0.1	0	2.1	37.1	71.9
0.9	30.3	0	0	25	0.5	0.8	27.3	0.4	0.7	34.3	0.1	0.3	29.5	0.6	1.1	28.4	0.4	0.8	30.3	0.4	0.8	28.3	0.6	0.4	25.7	0.6	0.4	21.5	0	0.6	12.7	0	0	2.1	23.4	35.4
1.5	29.2	0	0	25	0.2	1.2	26.3	0.1	1.3	33.1	0	0.4	29.1	0.1	1.9	26.6	0.1	1.2	29.1	0.2	1.7	26.8	0	1.1	24.6	0	0.5	21	0.1	1.9	10.8	0	0.1	2	12.4	43.8
0.3	28.9	0	0	25	0	0.5	25.8	0.1	0.4	32.9	0	0.1	29	0.1	0.1	26.6	0	0	29.1	0.1	0.1	26.8	0.2	0.3	24.5	0	0.4	20.6	0	0.1	10.8	0	0	2	4.7	12.2
1.6	28.5	0	3	22	0.8	2	24.6	1.9	1.1	33.6	0.8	0.5	29.3	0.7	1.8	25.5	0.9	1	28.9	0.8	1.6	26	1.2	0.9	24.8	1.1	0.8	21	0.3	0.5	10.6	0	0.1	1.9	82.7	59.8
1.3	27.5	0	0	22	0.2	1.2	23.5	0	1.1	32.4	0.5	0.8	29	0.6	0.7	25.4	0.9	0.8	29	1	1.5	25.6	1.3	2.5	23.6	0.2	0.5	20.7	0.1	0.2	10.5	0.1	0.9	1.1	20.7	98
0.7	27	0	0	22	0.2	0.4	23.3	0.6	0.4	32.6	0	0.8	28.3	0.3	2.3	23.4	0.2	2.7	26.6	0.1	1.3	24.3	0.2	1.5	22.3	0.1	0.9	19.9	0.1	0	10.6	0	0	1.1	11.8	53.8
0.5	27.6	2	0	24	1.1	0.8	23.6	2.9	1.1	34.3	1.4	0.4	29.3	0.5	0.3	23.6	1.2	0.1	27.7	1.2	0.1	25.3	1.4	0	23.7	0.5	0	20.3	1.3	0	11.8	0	0	1.1	82.2	56.4
0.2	27.4	0	0	24	0	0.3	23.3	0	0	34.3	0	0	29.3	0.3	0.6	23.3	0.1	0.5	27.2	0.2	0.2	25.3	0	0.1	23.6	0.3	0	20.6	0.2	0	12	0	0	1.1	10.7	28.5
0.9	26.7	0	2	22	0.2	1.2	22.3	0.4	0	34.7	0.5	0.1	29.6	1	0.8	23.5	1.4	0.6	28	0.6	0.3	25.6	0.8	0.7	23.7	0	0.1	20.5	0	0.2	11.9	0	0	1.1	29	52.1
0.3	26.4	0	0	22	0.1	0.1	22.2	0	0.1	34.6	0	0.4	29.3	0	0.1	23.4	0	0.1	27.9	0	0.2	25.4	0	0	23.7	0	0	20.5	0	0.1	11.8	0	0	1.1	2.7	10
1.1	25.6	0	1	21	0	0.6	21.7	0.3	1.4	33.4	0	0.5	28.8	0	0.2	23.2	0.1	0.3	27.7	0	0.2	25.2	0	0.5	23.2	0	0.1	20.3	0	0.2	11.6	0	0	1.1	10.7	27.4
0.6	25	0	0	21	0	0.3	21.3	0	0.7	32.7	0	0.6	28.1	0.1	0.3	23	0	0.2	27.5	0	0.3	25	0.1	0.1	23.2	0	0.1	20.2	0	0	11.6	0	0	1.1	2.8	18
0.6	24.5	0	2	19	0.1	0.9	20.6	0	1.3	31.4	0	0.3	27.9	0.3	1.1	22.2	0.2	1.3	26.4	0.1	0.4	24.6	0.1	0.8	22.5	0.2	0.4	20	0.1	0.4	11.3	0	0.1	1	15	30.7
1.4	26.7	10	0	29	5.1	1.3	24.3	4.4	1.9	34	7.1	1	34	4.8	2.2	24.8	4.8	1.2	30	5.6	1.2	29	4.4	0.3	26.6	2	0.5	21.4	1.5	0.7	12.1	.	.	.	227.5	131
0.2	26.9	2	1	30	0.2	0.3	24.2	0.1	0.4	33.7	0.5	0	34.5	0.1	0.3	24.6	0.1	0.4	29.7	0	0.1	28.8	0.2	0.2	26.6	0	0	21.4	0	0	12.1	.	.	.	18.5	22.1
0.1	26.8	0	0	30	0	0	24.2	0	0	33.7	0	0	34.5	0	0	24.6	0	0	29.7	0	0	28.8	0	0	26.6	0	0	21.4	0	0	12.1	.	.	.	0	0.5
0.7	26.3	0	0	30	0.1	0.7	23.6	0	0.4	33.3	0.1	0.9	33.8	0.3	0.7	24.2	0.1	1.1	28.6	0.1	1.2	27.7	0.1	0.9	25.8	0	0.2	21.2	0	0.6	11.5	.	.	.	9.8	26.9
1.6	24.7	1	3	28	0.1	1.1	22.6	0.1	0.7	32.7	0.1	1.8	32.1	0	1.6	22.6	0.1	1	27.7	0.1	0.8	27	0	1.2	24.6	0.1	0.4	20.9	0	0.2	11.3	.	.	.	14.6	48.9
1.8	23	0	0	28	0.3	1.5	21.4	0.1	1	31.9	0.3	1.8	30.6	0	0.9	21.7	0.3	1.6	26.4	1.3	1.9	27	0.5	1.2	23.9	0.1	1.6	19.5	0	0.5	10.8	.	.	.	17.4	61.3
0.3	22.8	0	0	28	0	0.3	21.2	0.1	0.4	31.6	0	0.3	30.4	0	0.1	21.6	0	0.3	26.1	0	0.2	26.8	0.1	0.7	23.3	0	0.1	19.4	0	0.5	10.3	.	.	.	3.3	16.7
1.4	21.4	0	1	27	0	1	20.2	0	0.6	31	0	0.5	29.9	0	0.6	21	0	0.2	25.9	0	0.3	26.5	0	0.1	23.2	0	0.1	19.2	0	0.1	10.2	.	.	.	4.4	27.4
0.6	20.8	0	1	26	0	0.4	19.8	0.3	0	31.3	0.1	0.5	29.5	0	0.3	20.7	0	0.3	25.6	0	0.4	26.1	0	0.2	23	0	0.3	18.9	0	0	10.2	.	.	.	5.5	34.1
0.1	20.7	0	1	25	0	0.1	19.7	0	0	31.3	0	0.1	29.4	0	0	20.7	0	0	25.6	0	0.1	26	0	0.2	22.8	0	0.1	18.8	0	0	10.2	.	.	.	1.8	10.4
0.2	20.6	0	0	25	0	0.2	19.5	0	0.3	31	0	0.3	29.1	0	0	20.7	0	0.5	25	0	0.7	25.4	0	0	22.8	0	0.1	18.7	0	0	10.1	.	.	.	0.7	10.7
0.2	20.4	0	0	25	0	0	19.4	0	0	31	0	0	29.1	0	0	20.7	0	0	25	0	0	25.4	0	0	22.8	0	0	18.7	0	0	10.1	.	.	.	0.1	5.6
0.5	19.9	0	3	22	0.1	0.4	19.1	0.3	0.4	30.9	0	1.1	28	0.2	0.9	20	0	0.6	24.4	0.4	0.3	25.4	0	0.2	22.6	0	0.1	18.6	0	0.2	9.9	.	.	.	9.2	44.8
0.2	19.9	0	0	22	0	0.2	19	0	0.1	30.7	0	0.4	27.6	0	0.4	19.6	0.1	0.1	24.4	0.2	0.1	25.5	0.1	0.8	21.9	0	0.3	18.4	0	0.2	9.7	.	.	.	3.8	15.1
0.1	19.8	0	0	22	0	0.3	18.6	0	0.3	30.4	0	0.3	27.4	0	0	19.6	0	0.1	24.3	0	0.3	25.2	0	0.1	21.8	0	0.1	18.3	0	0	9.7	.	.	.	0.2	5.2
0.4	19.5	0	0	22	0.1	0.3	18.3	0.4	0.4	30.4	0	0.4	27	0	0.1	19.5	0.1	0.2	24.1	0	0.4	24.8	0	0.9	20.9	0	0.8	17.5	0	0.3	9.4	.	.	.	6.6	23.1
0.4	19.1	0	3	19	0	0.8	17.6	0	0.7	29.7	0.1	1.4	25.8	0	0.5	19	0	0.3	23.8	0	0.8	24	0	0.3	20.6	0	0.6	17	0	0.2	9.2	.	.	.	5	21.3
1	18.2	0	2	17	0	1	16.7	0.1	0.6	29.3	0	1	24.8	0.1	1.6	17.5	0	1	22.8	0	0.8	23.2	0.1	1.9	18.8	0	0.9	16	0	0.8	8.5	.	.	.	6.5	50.5
0.8	17.4	0	3	14	0	2	14.6	0	0.7	28.6	0.1	1	23.9	0	1	16.5	0	1	21.8	0	1.3	21.8	0	2	16.8	0	0.7	15.4	0	0.6	7.9	.	.	.	6.4	41.8
0.5	16.9	0	0	14	0	0.3	14.3	0	0.9	27.7	0	1	22.9	0	0.9	15.6	0.1	0.8	21.2	0.1	2.1	19.9	0.1	0.7	16.2	0	0.2	15.2	0	0.2	7.7	.	.	.	3.8	29.1
2.1	14.9	0	1	13	0.2	1.9	12.6	0	2	25.7	0.5	1.6	21.8	0.2	1.3	14.5	0.2	1.4	19.9	0	0.8	19	0.2	1.5	14.9	0.1	1.1	14.1	0	0.8	7	.	.	.	6.7	56.4
6.1	9.2	1	4	10	0.3	4.8	8.1	0.6	11	15.3	0	9	12.8	0.1	5.6	9	0.1	8.8	11.3	0.3	10	9.3	0.1	8.8	6.2	0	6.2	7.9	.	.	.	.	.	.	46.9	301.4
0.5	8.8	0	0	10	0	0.4	7.9	0	1.3	14	0	0.3	12.5	0	0.3	8.7	0	0.7	10.7	0	0.2	9	0	0.2	6	0	0.7	7.2	.	.	.	.	.	.	11	30.8
0.4	8.4	0	0	10	0.1	0.4	7.5	0	1.1	12.9	0	1	11.5	0	0.3	8.4	0	0.6	10.1	0	0.9	8.1	0	0.4	5.6	0	0.6	6.5	.	.	.	.	.	.	8.3	26
0.9	7.5	0	0	10	0	0.9	6.6	0	0.7	12.1	0	1.8	9.8	0	0.7	7.7	0.1	0.9	9.3	0.1	1.6	6.7	0	0.8	4.8	0	2	4.6	.	.	.	.	.	.	5.2	34.4
2.2	5.3	0	3	7	0	2.1	4.5	0	4.4	7.7	0.1	4	5.9	0.1	2.1	5.7	0	2.3	7	0.1	2.3	4.5	0	0.8	4	0	0.7	3.9	.	.	.	.	.	.	9.2	80.9
1.2	4.1	0	2	5	0	1.5	3.1	0	2.1	5.6	0	2.8	3.1	0	1.3	4.4	0	1.8	5.3	0	1.7	2.8	0	1.2	2.8	0	1.1	2.8	.	.	.	.	.	.	9.4	70.7
1.1	3.1	2	0	7	0	1.6	1.5	0	1.1	4.4	0	0.8	2.4	0	1.7	2.7	0	1.2	4	0	0.5	2.3	0	1.3	1.5	0	0.8	2	.	.	.	.	.	.	3.2	40.3
1.2	2	0	1	6	0	0.2	1.2	0	0.7	3.7	0.1	1	1.5	0	0.6	2.1	0	0.6	3.4	0	0.1	2.2	0	0.3	1.2	0	0.5	1.5	.	.	.	.	.	.	1.6	39.3
0.2	1.8	0	0	6	0	0.3	0.9	0	1	2.7	0	0.3	1.3	0	0	2.1	0	0.2	3.3	0	0.3	1.9	0	0.1	1.1	0	0.3	1.2	.	.	.	.	.	.	0.9	15
0	1.8	0	0	6	0	0	0.9	0	0	2.7	0	0.3	1	0	0	2.1	0	0.1	3.2	0	0	1.9	0	0	1.1	0	0.1	1.1	.	.	.	.	.	.	0	1.8
0.1	1.7	0	0	6	0	0.2	0.7	0	0	2.7	0	0.3	0.8	0	0	2.1	0	0.3	2.9	0	0.3	1.7	0	0	1.1	0	0.3	0.9	.	.	.	.	.	.	0.5	17.3
0.3	1.4	0	0	6	0	0.2	0.5	0	0.6	2.1	0	0	0.8	0	0.2	1.9	0	0.2	2.7	0	0.2	1.4	0	0.2	0.9	0	0	0.9	.	.	.	.	.	.	1	13.9
0	1.4	0	2	4	0.2	0.3	0.6	0	0.3	1.9	0	0.3	0.5	0	0.2	1.7	0	1.2	1.5	0	0.1	1.3	0	0	0.9	0	0.1	0.8	.	.	.	.	.	.	0.8	76.5
0.2	1.3	.	.	.	0	0	0.6	.	.	.	0	0	0.5	.	.	.	0	0.6	1	0	0.1	1.2	0	0	0.9	0	0	0.8	.	.	.	.	.	.	0	7
0.4	0.9	.	.	.	0	0.1	0.5	.	.	.	0	0	0.5	.	.	.	0	0.3	0.7	0	0.1	1.1	0	0.2	0.7	0	0.1	0.7	.	.	.	.	.	.	0.5	18.3
0.5	0.3	.	.	.	0	0.3	0.2	.	.	.	0	0.5	0	.	.	.	0	0.4	0.3	0	0.5	0.6	0	0.7	0	0	0.6	0	.	.	.	.	.	.	0	25.2
.	.	0	4	0	.	.	.	0	1.9	0	.	.	.	0	1.5	0.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	99
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	31.7			30			28.9			39.1			34.5			30.4			31.3			29			26.6			21.5			13.4			2.2		
46		45	46		43	43.2		58.4	58.3		46.2	47.3		43.5	45.8		46	46.1		45.7	45.3		40.7	41.4		29.5	29.3		18.2	18.1		2.4	2.4		2433.8	2456.8

Load
245.4
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Massachusetts Bay Transportation Authority
Route 86
Weekday - Inbound
Fall 2019
(Urban Transportation Associates)

	05:00 (86.0)(B117) [17] {FA19}			05:23 (86.0)(B119) [45] {FA19}			05:46 (86.0)(B121) [2] {FA19}			06:01 (86.0)(B123) [43] {FA19}			06:11 (86.0)(B124) [28] {FA19}			06:20 (86.0)(B117) [16] {FA19}			06:28 (86.0)(B118) [	
Seq - StopID - Stop Name	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off
1 - 29005 - SULLIVAN STATION BUSWAY - BER	22.9	0	22.9	25.6	0	25.6	17	0	17	17	0	17	15.4	0	15.4	11	0	11.1	12.5	0
2 - 2757 - CAMBRIDGE ST @ BRIGHTON ST	0.1	0	22.9	0	0	25.6	0	0	17	0.1	0	18	0	0	15.4	0.1	0	11.2	0.1	0
3 - 2758 - CAMBRIDGE ST @ PARKER ST	0	0	22.9	0	0	25.7	0.5	0	17.5	0.5	0	18	0.3	0	15.7	0.3	0	11.4	0.2	0.2
4 - 2759 - WASHINGTON ST @ MT VERNON ST	0	0.2	22.8	0.3	0.6	25.4	1	0.5	18	1	0.2	19.1	1	2.1	14.6	0.2	0.3	11.4	0.2	0.3
5 - 12759 - WASHINGTON ST @ MYRTLE ST - C	1.1	0	23.8	0.5	0	25.9	0.5	0	18.5	0.5	0	18.9	1.1	0.6	15.1	0.7	0	12.1	0.7	0
6 - 2760 - WASHINGTON ST @ FRANKLIN ST	0	0.5	23.3	0	0	25.9	0	0	18.5	0.1	0	18.9	0	0	15.1	0.1	0	12.1	0.2	0
7 - 2761 - WASHINGTON ST @ TUFTS ST	0.1	0	23.4	0.1	0	26	0	0	18.5	0	0	19	0.1	0	15.2	0.3	0	12.4	0.8	0.6
8 - 23921 - CROSS ST @ FOUNTAIN AVE	0.6	0	24.1	0.1	0	26	0	0	18.5	0.2	0.2	19	0.4	0.3	15.3	0.3	0.2	12.4	0.6	0.2
9 - 2393 - CROSS ST @ OLIVER ST	0	0	24.1	0.1	0	26.1	0	0	18.5	0.3	0	19.2	0.4	0	15.8	0.1	0	12.6	0.1	0.2
10 - 2394 - PEARL ST @ CROSS ST	3.2	0.1	27.2	2.2	0	28.3	1	0	19.5	1.6	0.1	20.8	2.3	0.2	17.9	1.8	0.1	14.3	3.2	0
11 - 2689 - 422 MCGRATH HWY	0	0.4	26.8	0	0	28.3	0	1.5	18	0.2	0.3	20.7	0	0.1	17.8	0	0.3	14.1	0.3	0.2
12 - 2763 - WASHINGTON ST @ BOSTON ST	1.3	1.4	26.7	3.4	0.1	31.5	0	1.5	16.5	0.3	0.4	20.6	0.6	0.3	18.2	1.1	0.6	14.6	1	0.5
13 - 2610 - WASHINGTON ST @ WASHINGTON TE	0	0.2	26.5	0	0.1	31.5	1	0	17.5	0.1	0	20.7	0.5	0.1	18.6	0.4	0	14.9	0.1	0
14 - 2612 - SOMERVILLE AVE @ STONE AVE	0.4	1	25.9	0.2	3.3	28.4	0.5	0.5	17.5	0.8	1.1	20.3	0.6	1.1	18.1	0.3	0.9	14.3	0	2.4
15 - 2613 - WASHINGTON ST @ WEBSTER AVE	1.5	0.2	27.3	1.3	0.2	29.5	2.5	0	20	0.9	0.3	21	0.5	0.3	18.3	2	0.1	16.1	1.2	0.6
16 - 2615 - WASHINGTON ST OPP PARKER ST	0.1	0	27.4	0.2	0	29.6	0	0	20	0.5	0.6	20.8	0.5	0.5	18.4	0.6	0.2	16.6	0.5	0.5
17 - 2616 - WASHINGTON ST @ LELAND ST	0.1	0	27.4	0.1	0	29.7	0	0	20	0.3	0	21.2	0.1	0	18.5	0.4	0	16.9	1.2	0
18 - 2545 - WASHINGTON ST @ DANE ST	0	0	27.4	0.1	0	29.8	0	0	20	0.4	0.1	21.5	0.4	0.1	18.8	1.1	0	18	1.8	0.2
19 - 2546 - WASHINGTON ST @ BEACON ST	0.6	0.4	27.6	0.6	1	29.4	0.5	0.5	20	0.8	0.9	21.4	0.8	0.4	19.2	0.7	1.1	17.6	0.5	1
20 - 2547 - KIRKLAND ST OPP TROWBRIDGE ST	0.1	0.2	27.5	0	0	29.4	0	0.5	19.5	0.1	0.6	20.9	0.1	0.4	18.9	0.8	0.5	17.9	0.5	0.6
21 - 2548 - KIRKLAND ST @ KIRKLAND PLACE	0.3	2.6	25.2	0	2.4	27	1	2	18.5	0.3	0.8	20.4	0.3	1.9	17.3	0.1	0.4	17.6	0	1.6
22 - 22549 - HARVARD SQ @ GARDEN ST - DAWE	0.6	8.1	17.6	0.5	9.5	18	1.5	1.5	18.5	0.7	7.2	13.9	0.8	5.6	12.5	0.8	6.2	12.2	0.5	5.8
23 - 32549 - ELIOT ST @ BENNETT ST	1	5.5	13.1	1	6.4	12.6	1.5	4	16	2.3	4.7	11.5	2	4.1	10.4	1.8	2.4	11.6	1.8	2.7
24 - 2550 - JFK ST @ ELIOT ST	0	0.1	13	0.2	0.7	12.1	0	1	15	0.2	0.6	11.1	0.1	0.1	10.5	0.1	0.1	11.6	0.1	0.2
25 - 2551 - N HARVARD ST @ GATE 2 HARVARD	0	0.1	12.9	0	0.3	11.8	0	1.5	13.5	0	0.9	10.2	0	0.3	10.2	0	0.5	11.1	0	0.1
26 - 2553 - N HARVARD ST @ WESTERN AVE	0.1	2.9	10	0.1	2.3	9.6	1	1	13.5	1.2	0.9	10.5	0.2	0.8	9.6	0.1	0.6	10.7	0.2	0.5
27 - 1071 - WESTERN AVE OPP RIVERDALE ST	0.1	0.1	10	0.1	0.2	9.5	0	0	13.5	0.5	0.1	10.9	0.4	0.3	9.6	0	0.2	10.5	0.2	0
28 - 1072 - WESTERN AVE @ EVERETT ST	0.1	2.3	7.8	0.1	1.3	8.3	1	1	13.5	0.6	1.7	9.7	0	0.7	9	0.1	0.8	9.8	0	0.8
29 - 1074 - 367 WESTERN AVE OPP BRIGHTON	0.3	0	8.1	0.5	0.1	8.7	1	0	14.5	0.3	0.4	9.7	0.3	0.2	9.1	0.2	0.1	9.9	0.2	0.2
30 - 1075 - WESTERN AVE OPP LITCHFIELD ST	0	0	8.1	0.1	2.3	6.5	0.5	0	15	0.4	0	10.1	0.5	0.1	9.4	0.7	0	10.6	0.7	0.2
31 - 1076 - 445 WESTERN AVE	0	0	8.1	0	0	6.5	0	0	15	0	0	10.1	0	0	9.4	0.1	0.1	10.6	0.4	0.2
32 - 1077 - 495 WESTERN AVE	0.9	0.4	8.6	0.2	0.4	6.4	1	0.5	15.5	1.3	0.2	11.2	0.5	0.3	9.6	1.4	0.1	11.9	1.4	0.3
33 - 1079 - MARKET ST @ VINELAND ST	0.9	0.6	8.9	0.1	1.2	5.2	1.5	0	17	0.2	1.8	9.6	0.6	2.7	7.6	0.6	3.1	9.4	0.8	1.5
34 - 1081 - MARKET ST OPP GARDENA ST	1.5	0	10.5	1.6	0.1	6.7	0.5	0	17.5	2.7	0.4	11.9	1.5	0.4	8.7	1.1	0.5	10	1.8	0.5
35 - 1083 - MARKET ST @ ARLINGTON ST	0.1	0	10.5	0.4	0.1	7.1	1	0	18.5	0	0.7	11.3	0.1	0.3	8.5	0.2	0.3	9.9	0	1.1
36 - 1084 - CHESTNUT HILL AVE @ WASHINGTO	0.4	1.6	9.3	1	1.9	6.2	2	1	19.5	0.9	3.7	8.5	0.2	1.8	7	0.8	3.1	7.6	1.2	3.5
37 - 1085 - CHESTNUT HILL AVE @ ACADEMY H	0	0	9.3	0.1	0	6.3	0	0	19.5	0.1	0	8.6	0	0	6.9	0.4	0	8	1.2	0.1
38 - 1086 - CHESTNUT HILL AVE @ JACKSON A	0.4	0	9.7	0.1	0	6.5	0	0	19.5	0.1	0	8.7	0	0.1	6.9	0.2	0	8.2	0.2	0.2
39 - 1087 - CHESTNUT HILL AVE @ WILTSHIRE	0.5	0.1	10.1	0.5	0	7	0.5	1	19	0.5	0	9.2	1.1	0.3	7.7	0.9	0.4	8.7	1	0.5
40 - 1088 - CHESTNUT HILL AVE @ EMBASSY R	0	0.1	9.9	0.1	0	7.1	0	1	18	0.4	0	9.6	1.1	0.3	8.5	2.9	0.6	11	1.1	0.2
41 - 1089 - CHESTNUT HILL AVE @ SOUTH ST	0	0.5	9.4	0.2	0.4	6.8	0	0	18	0.3	0.7	9.1	0.4	0.4	8.5	0.6	0.4	11.2	1.3	0.3
42 - 1090 - CHESTNUT HILL AVE @ COMMONWEA	0	0.4	9.1	0	0.1	6.8	0	4	14	0.1	0.3	8.9	0	0.2	8.4	0.1	0.8	10.5	0.5	0.4
43 - 1092 - CHESTNUT HILL AVE @ BEACON ST	0.1	0.9	8.2	0	1.7	5.1	0	0.5	13.5	0	2.4	6.5	0	0.9	7.5	0	0.9	9.6	0	1.5
44 - 21917 - RESERVOIR BUSWAY	0	7.8	0.4	0	4.7	0.4	0	13.5	0	0	6.2	0.3	0	6.7	0.8	0	9	0.6	0	10.2
Maximum			27.6			31.5			20			21.5			19.2			18		
Total	39.4	38.7		41.7	41.4		38.5	38.5		38.8	38.5		35.2	35		35.5	34.9		40.3	40.1

3] {FA19}	06:37 (86.0)(B135) [57] {FA19}			06:45 (86.0)(B119) [43] {FA19}			06:54 (86.0)(B136) [26] {FA19}			07:03 (86.0)(B120) [10] {FA19}			07:14 (86.0)(B121) [2] {FA19}			07:26 (86.0)(B122) [12] {FA19}			07:38 (86.0)(B123) [42] {FA19}			07:53 (86.0)(B124) [25] {FA19}			08:09 (86.
Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On
12.5	17.9	0	17.9	13.2	0	13.3	15	0	15	16.9	0	16.9	14.5	0	15	23.8	0	23.8	14	0	14.1	17.4	0	17.5	15.9
12.5	0	0.1	17.8	0	0	13.3	0	0	15	0.1	0	17	0	0	15	0.3	0	24	0.2	0	14.3	0.1	0	17.6	0.3
12.6	0.1	0.1	17.8	0.1	0	13.4	0.3	0	15.3	0.1	0	17.1	1.5	0	16.5	0.7	0.1	24.6	1	0	15.3	0.9	0	18.5	1.2
12.5	0.1	0.3	17.7	0.1	0.2	13.3	0.2	0.3	15.2	0.4	0.2	17.3	1	0	17.5	0.4	0.4	24.6	0.5	0.2	15.5	0.7	0.5	18.7	1
13.2	0.9	0.2	18.4	0.8	0.1	14	0.7	0.3	15.6	0.4	0.3	17.4	0	0	17.5	3.8	0.3	28.2	1.7	0.3	16.9	1.3	0	20	2.2
13.5	0.1	0.1	18.3	0	0	14	0.2	0.5	15.3	0	0.1	17.3	0	0	17.5	0.9	0.5	28.6	0.6	0.3	17.2	0.4	0.1	20.3	0.7
13.6	0.8	0.1	18.9	0.3	0	14.3	0	0	15.3	0.1	0	17.4	0	0	17.5	0.1	0.1	28.6	0.4	0.1	17.5	0.4	0.3	20.4	0.3
14	0.3	0.3	18.9	0.2	0.2	14.3	0.5	0.4	15.4	0.2	1.1	16.5	1.5	0	19	0.7	2.1	27.2	0.8	0.7	17.6	0.9	0.8	20.5	2.3
13.9	0.1	0.1	19	0.3	0	14.6	0.4	0	15.8	0	0	16.5	0	0	19	0.5	0	27.7	0.3	0	17.9	0.4	0	20.9	0.3
17.2	1.3	0.1	20.2	1	0.1	15.5	1.8	0	17.6	4.7	0.1	21.1	3	0	22	4.6	0.3	32	6.1	0.2	24	4.3	0	25.5	5.9
17.3	0.3	0.4	20.2	0.5	0	16	0.8	0	18.4	1.6	0	22.7	1.5	0	23.5	0.6	0	32.6	1.1	0.1	24.6	0.8	0	25.8	1.7
17.8	1.4	0.7	20.8	0.6	0.3	16.3	1.7	0.5	19.5	3.4	1.3	24.8	4.5	0.5	27.5	2.1	1.3	33.4	3.2	0.7	27.2	2.2	0.9	27	2.6
17.9	0.1	0	20.9	0.1	0	16.3	0.2	0.1	19.7	1.4	0	26.2	0	0	27.5	0.3	0.4	33.3	0.2	0.1	27.3	0.2	0.1	27.1	0.3
15.5	0.3	0.9	20.3	0.3	0.4	16.3	0.7	1.4	19	0.6	3.3	23.5	2	4.5	25	1.3	5	29.7	2.4	1.4	28.3	1.8	1.3	27.6	2.1
16.2	2.2	0.9	21.6	1.8	0.5	17.6	2	1.1	19.8	4.4	1.7	26.2	5.5	2.5	28	5.6	0.8	34.4	3.3	0.4	31.2	3.7	0.5	30.7	6.1
16.2	0.3	0.7	21.2	0.3	0.1	17.9	0.7	0.6	19.9	1	0.6	26.6	1.5	6	23.5	1.3	4	31.8	1.7	2.4	30.6	2.1	0.7	32.1	1.3
17.4	0.8	0	22	1.3	0	19.2	1.7	0	21.6	1.3	0	27.9	2.5	0	26	0.8	0.2	32.4	2	0.1	32.5	2	0.1	34.1	1.7
19	1.5	0.5	23.1	0.9	0.1	20	1.1	0.3	22.4	1.1	0.2	28.8	1.5	0	27.5	2.6	0.5	34.5	3.9	0.6	35.8	3.5	0.9	36.7	2.4
18.5	1.1	1.3	22.8	1.5	0.9	20.6	3.9	0.7	25.7	4.2	1.4	31.6	3	1	29.5	3.9	1	37.4	4.9	1.9	38.8	5.4	1.8	40.3	5.5
18.3	0.2	1.1	22	0.3	0.8	20.1	0.7	0.6	25.8	0.9	1.5	31	2	1	30.5	1.8	1.2	38.1	1.3	0.8	39.3	1.5	0.9	40.9	1
16.7	0.1	1.5	20.5	0.2	0.9	19.4	0.5	0.9	25.4	0.8	1.2	30.6	0	1.5	29	0.3	0.9	37.5	0.7	1.2	38.8	0.4	2.4	38.9	0.5
11.4	1.4	6.3	15.6	2	6	15.3	3.2	10.4	18.2	6.2	11.6	25.2	6	11.5	23.5	5.1	12.7	29.9	4.7	14	29.5	2.6	15.7	25.8	3.3
10.5	2	3.9	13.7	4	3.7	15.7	4.6	3	19.8	6.1	5.4	25.9	4.5	8	20	5.5	6.6	28.8	6.2	6.5	29.3	3.9	7.4	22.2	3.6
10.5	0.5	0.1	14.1	0.4	0	16.1	0.3	0	20.2	1	0.4	26.5	0.5	0	20.5	1	0.7	29.2	1.9	0.3	30.9	2.1	0.2	24.1	0.9
10.4	0	1.4	12.7	0	1.1	15	0.3	2.3	18.1	0	2.3	24.2	0	2	18.5	0.3	4.7	24.8	0.1	3.4	27.6	0.2	1.6	22.7	0.3
10	0.1	0.8	12	0.4	1	14.4	1.2	1	18.3	0.5	1.4	23.3	0.5	1.5	17.5	0.6	1.8	23.5	0.5	2	26.1	0.7	1.8	21.6	0.4
10.2	0.1	0.1	12	0	0.2	14.3	0.7	0.5	18.5	1.7	0.9	24.1	0	0	17.5	0.4	0.9	23	0.7	0.7	26	0.9	0.8	21.7	1.1
9.5	0.2	1.5	10.7	1	1.3	14	1.5	1.6	18.4	0.6	3.2	21.5	0.5	1	17	0.8	2.2	21.6	0.8	1.4	25.4	0.4	0.9	21.3	0.7
9.4	0.9	0.1	11.4	2.4	0.1	16.3	1.7	0.1	20	1.6	0.4	22.7	4	0	21	1.6	0.3	22.9	1.5	0.3	26.7	1	0.2	22.1	0.5
9.8	0.3	0.4	11.3	0.4	0.4	16.3	1.7	0.3	21.4	1.8	0.4	24.1	1.5	0	22.5	0.8	0.8	23	0.5	0.7	26.4	0.6	0.5	22.2	0.2
10	0.2	0.3	11.2	0.1	0.7	15.6	0.2	0.3	21.3	0.1	0.6	23.6	0	1	21.5	0	0.8	22.2	0	0.8	25.6	0.1	2.4	19.9	0
11.1	1.7	0.7	12.2	1.4	1.1	15.9	1.8	0.7	22.4	3.8	0.5	26.9	1.5	1	22	0.8	0.6	22.4	1	0.7	25.9	1	0.6	20.3	0.6
10.3	1.1	2.4	10.8	1.5	4.4	13	2.9	4.8	20.5	2.4	8.6	20.7	1.5	7.5	16	1.3	4.8	18.8	1.5	7.3	20	1.3	4.7	16.9	0.7
11.5	1.7	0.5	12.1	1.4	0.3	14.1	2.1	1	21.6	6.3	0	27	6.5	0	22.5	2.9	0.1	21.7	3.5	0.8	22.7	2.6	0.4	19.1	2.3
10.5	0.8	0.8	12	1.1	1.7	13.5	1.5	2.2	21	1.9	3.3	25.6	0	2	20.5	1.7	1.8	21.5	1.9	1.4	23.2	1.4	1.4	19.2	1
8.2	1.5	3.8	9.6	1.7	3.6	11.6	2.7	7.7	16	2.4	12.5	15.5	3	9	14.5	1.3	5.7	17.1	1.6	4.8	20	1.4	4.7	15.9	0.8
9.3	1.6	0.1	11	1	0.3	12.3	1.2	1.1	16.1	1.1	1.3	15.3	0.5	0	15	0.9	0.7	17.3	0.7	0.9	19.9	0.6	0.6	15.8	0.3
9.4	0.7	0	11.8	1	0	13.2	1.2	0.1	17.2	2	0.2	17.1	2	0.5	16.5	0.3	0.4	17.2	0.3	1.3	18.9	0.2	0.4	15.7	0.1
9.9	0.9	0.3	12.4	1.2	0.4	14	1.3	0.5	17.9	1.5	0.6	18	1	0.5	17	1.2	0.7	17.7	0.9	0.7	19	0.5	1	15.2	0.6
10.8	1.5	0.5	13.4	2.7	0.7	16	1.2	0.3	18.9	2.6	0.8	19.8	4.5	2	19.5	2.1	1	18.8	2.4	1	20.4	1.8	1.6	15.5	0.6
11.8	0.3	0.7	13	0.4	0.9	15.5	0.6	1.4	18	1	1.4	19.4	0.5	2.5	17.5	0.3	2.3	16.7	0.6	2.7	18.3	0.4	2	14	0.4
11.8	0.4	0.6	12.8	0.7	0.9	15.2	0.5	2	16.6	0.2	1.1	18.5	0.5	0	18	0.2	1.7	15.2	0.5	1.8	16.9	0.2	2	12.2	0.2
10.4	0	1.3	11.5	0	0.7	14.5	0.1	1.4	15.3	0	1.8	16.7	0	0	18	0	1.3	13.9	0	2	14.9	0	2.2	10	0
0.2	0	11.4	0.1	0	14.5	0	0	15.2	0.2	0	16.7	0	0	18	0	0	13.4	0.5	0	14.6	0.3	0	9.9	0.1	0
19			23.1			20.6			25.8			31.6			30.5			38.1			39.3			40.9	
	47.8	47.4		48.6	48.6		65.6	65.6		88.4	88.4		84.5	85		85.5	85.1		82.1	81.6		74.3	74.3		73.9

0)(B117) [15] {FA19}		08:25 (86.0)(B118) [11] {FA19}			08:48 (86.0)(B119) [44] {FA19}			09:17 (86.0)(B029) [57] {FA19}			09:47 (86.0)(B123) [36] {FA19}			10:22 (86.0)(B189) [13] {FA19}			11:00 (86.0)(B137) [9] {FA19}			11:40 (86.0)(B138) [45] {FA19}			12:15 (86.0)(B139) [57] {FA19}		
Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
0	15.9	10.6	0	10.6	13.6	0	13.6	14.5	0	14.5	12	0	12.1	10.3	0	10.3	15.7	0	15.7	13.7	0	13.7	9.2	0	9.2
0	14.9	0.2	0	10.8	1	0	14.5	0.4	0	14.9	0.3	0.1	12.4	0	0	8.2	0.2	0	15.9	0.4	0	14.1	0.1	0	9.4
0	16.1	0.7	0	11.5	0.6	0	15.1	0.3	0	15.2	0.4	0	13.1	0.7	0	8.9	0.4	0.1	16.2	0.4	0	15	0.2	0.1	9.5
0.4	16.7	0.7	0	12.3	0.4	0	15.5	0.6	0	15.8	1.8	0.1	14.9	0.5	0	9.4	0.6	0.2	16.6	0.4	0.3	14.6	0.4	0.2	9.8
0.1	18.8	1.5	0.4	13.4	0.7	0.7	15.5	1.6	0.3	17	1.1	0.4	15.6	1.6	0.2	10.8	0.9	1.8	15.7	1.3	1.3	14.8	0.8	0.5	10.1
0.1	19.4	0.6	0.2	13.8	0.3	0	15.9	0.4	0	17.5	0.5	0.1	15.9	1.1	0.1	11.8	0.2	0	15.9	0.7	0.1	15.4	0.3	0	10.3
0.6	19.1	0.5	0.2	14.1	0.2	0.1	16	0.2	0.2	17.4	0.1	0.1	15.9	0.3	0	12.1	0.6	0.1	16.3	0	0.1	15.4	0	0	10.3
1.3	20.2	1.6	0.2	15.5	3.1	0.2	19	0.6	0.3	17.8	0.2	0.1	16	0	0	12.1	0.2	0	16.6	0.4	0.5	15.3	0.2	0.1	10.4
0.1	20.4	0.8	0	16.4	0.3	0.1	19.2	0.5	0.1	18.4	0.4	0.1	16.4	0.4	0	12.5	0.7	0	17.2	0.1	0	15.4	0.1	0	10.5
0.1	26.1	3.3	0	20.6	2.7	0.2	21.9	2.9	0.1	21.2	2.7	0.2	18.7	2.3	0	14.3	1.3	0.1	18.4	1.8	0.3	16.9	1.7	0.2	11.8
0.1	27.7	0.7	0	20.1	0.9	0.1	22.3	1.1	0.1	22.1	0.7	0.1	19.4	0.5	0	15.1	0.8	0.3	18.9	0.3	0.4	16.8	0.2	0.2	11.9
0.8	29.5	2.8	0.6	22.3	1.9	0.5	23.7	1.9	0.3	23.4	2.8	0.8	21.4	1.5	0.6	16	1.7	1.1	19.4	2.2	1	18.1	0.7	0.4	12.1
0.3	29.5	0.5	0.2	22.5	0.2	0.2	23.8	0.4	0	23.7	0.2	0.1	21.4	0.2	0.2	16	0.2	0	19.7	0.2	0.3	17.9	0.2	0.1	12.3
1.3	30.3	0.7	1.3	22	1.4	1.3	23.9	2.4	1.5	24.6	0.7	2.3	19.8	0.5	1.5	15	0.7	1.3	19	0.9	3.1	15.8	0.4	0.7	12
0.5	35.9	4.7	0.5	26.2	4	0.5	27.3	4.6	0.5	28.7	3.3	0.7	22.5	3.5	0.9	17.5	3.2	1.3	20.9	3.3	0.7	18.4	2.5	0.6	13.9
0.1	37.1	0.6	0	26.8	0.8	0.1	28	0.7	0.1	29.2	0.8	0.1	23.1	0.4	0	17.9	0.2	0.1	21	0.2	0.6	18	0.3	0.1	14.1
0.1	38.7	1.1	0.3	27.6	1.5	0.4	29.1	0.6	0.1	29.8	0.6	0.1	23.7	0.2	0.1	18.1	0.4	0	21.4	0.5	0.1	18.5	0.7	0.1	14.7
0.3	40.7	3.9	0.3	31.3	1.6	0.4	30.3	1.8	0.5	31.1	1.4	0.1	24.9	0.8	0.2	18.7	0.7	0.3	21.8	0.5	0.4	18.5	0.8	0.3	15.1
1.2	45	3.2	0.9	33.5	3.4	1.4	32.4	2.8	1.2	32.7	3	1.4	26.5	1.5	0.2	19.9	1.1	1.3	21.6	1.3	0.5	19.4	0.8	0.6	15.3
0.9	45.1	0.6	1.4	32.8	0.5	0.5	32.4	1.3	0.5	33.5	0.7	0.5	26.6	0.2	0.2	20	0.6	1	21.1	0.4	0.6	19.2	0.3	0.4	15.2
3.7	41.9	0.2	4.1	28.9	0.5	4.3	28.5	0.3	3.4	30.4	0.3	2.9	24	0.5	3.2	17.3	0.3	2.2	19.2	0.8	1.8	18.2	0.9	1.1	15
15.9	29.3	1.8	10.4	20.4	3	9.5	22.1	2.9	10.8	22.5	2.3	7.8	18.6	2.5	6.4	13.4	3.4	5.8	16.9	3.7	6.4	15.6	4.6	6.3	13.4
8.3	24.5	4.8	5.9	19.3	3.1	6	19.2	4.9	5	22.4	4.2	5.9	16.9	2.1	2.8	12.6	2.7	2.7	16.9	4.2	3.3	16.5	4.8	2.3	15.8
0.5	24.9	1	0.1	20.2	1.9	0.1	21	1	0.5	22.9	1.2	0.3	17.8	0.8	0.1	13.4	1.1	0.1	17.9	2.3	0.1	18.7	1.5	0.1	17.1
2.7	22.4	0.2	2.2	18.2	0.2	0.9	20.2	0.2	1.9	21.3	0.3	0.8	17.3	0.2	1	12.5	0.1	0.9	17.1	0.2	0.8	18.1	0.4	0.4	17
1.5	21.3	0.6	0.7	18.1	0.4	1.5	19.2	0.7	1.8	20.2	1	1.5	16.7	0.2	1	11.7	0.8	1.6	16.3	0.9	1.8	17.2	1.6	2	16.8
0.8	21.7	0.5	0.5	18.1	0.5	0.5	19.2	0.3	0.5	20	0.4	0.3	16.8	0.3	0.3	11.7	0	2.3	14	0.3	0.7	16.8	0.3	0.4	16.5
1.4	20.9	0.6	0.9	17.8	0.5	0.6	19.1	0.3	1.7	18.6	0.3	1.4	15.8	0.6	0.6	11.7	0.3	1.2	13.1	0.5	1.3	16.1	0.8	1.1	16.1
0.2	21.2	0.2	0.3	17.7	0.6	0.3	19.4	0.8	0.5	18.8	1	0.2	16.5	0.2	0.4	11.5	0.4	0.6	13	0.9	0.8	16.2	0.8	0.7	16.1
0.7	20.7	0.2	0.5	17.5	0.5	0.2	19.6	0.6	1	18.6	0.4	0	16.9	0.2	0	11.7	0.8	0.3	13.4	0.3	0.3	16.2	0.5	0.8	15.9
1.3	19.4	0.2	1.1	16.5	0.1	0.7	19	0.2	0.6	18.4	0	0.5	16.4	0.2	0.1	11.8	0.2	0	13.7	0.1	0.1	16.2	0.1	0.3	15.8
0.7	19.3	1.2	1	16.7	1.7	1.2	19.5	1.6	1	19	1.6	1	17	1	0.5	12.4	1.8	0.4	15	1.9	0.9	17.3	1.3	1.1	16
6.8	14.3	0.2	6.7	10.2	0.9	5.7	14.7	1.5	6.3	14.2	1.2	3.6	14.7	0.8	4.6	8.5	1.8	2.2	14.6	1.5	2	16.8	1	2.4	14.8
0.2	16.4	3.5	0.1	13.6	3.6	0.4	17.9	1.7	0.3	15.6	0.7	0.4	15	0.3	0.3	8.5	0.4	0.4	14.6	1.1	0.9	16.9	2	0.8	15.9
0.9	16.5	0.7	0.1	14.3	0.5	0.5	17.8	0.5	1.2	14.9	0.8	1.3	14.5	0.5	0.6	8.5	0.7	1.1	14.1	0.9	1.3	16.6	0.4	0.9	15.4
3	14.3	0.8	1.7	13.4	1.8	3.5	16.1	1.9	2.8	14.1	1.9	3.5	12.9	1.5	1.1	8.9	1.8	4.4	11.4	1.8	5.1	13.3	1.8	4	13.2
0.8	13.8	0.4	2.1	11.6	0.3	1.8	14.6	0.4	0.5	13.9	0.1	0.2	12.8	0.8	0.5	9.2	0.4	0.8	11.1	0.1	0.5	12.9	0.2	0.4	13
0.4	13.4	0.4	0	12	0.1	0.4	14.4	0.2	0.5	13.7	0.3	0.4	12.7	0.2	0.2	9.2	0.2	0.6	10.8	0.1	0.8	12.3	0.1	0.9	12.2
1	13.1	0.5	2.1	10.4	0.5	0.9	14	0.5	0.9	13.2	0.9	1.2	12.4	0.1	0.8	8.5	1.1	1.7	10.2	0.2	1.2	11.2	0.2	1.3	11.1
0.7	12.9	0.9	0.2	11.1	0.6	0.7	13.9	0.3	0.5	13	0.6	1.1	11.9	0.2	0.2	8.4	0.2	0.7	9.8	0.4	1.2	10.5	0.1	1	10.2
1.1	12.3	0.4	1.8	9.6	0.1	1	13	0.3	1.2	12.1	0.4	1.6	10.7	0.2	1.6	6.9	0.1	1.3	8.6	0.1	1	9.6	0.1	1	9.3
1.3	11.2	0.9	1.9	8.6	0.1	3.6	9.5	0.1	3	9.2	0.1	2.4	8.4	0.1	1.9	5.1	0	1.9	6.7	0.1	1.7	8	0.1	1.8	7.6
1.9	9.3	0.1	1.4	7.4	0	2	7.5	0	1.5	7.7	0	1.2	7.2	0	1.2	3.8	0	1.4	5.2	0	2	6.1	0.1	2.2	5.5
9.1	0.2	0	7.4	0	0	7.5	0	0	7.5	0.1	0	6.4	0.8	0	6.2	0	0	5.2	0	0	5.6	0.5	0	5.3	0.2
	45.1			33.5			32.4			33.5			26.6			20			21.8			19.4			17.1
73.2		59.6	59.7		60.6	60.5		60.8	60.7		53.7	53.3		40	39.8		49	48.8		51.4	51.9		43.6	43.2	

Trip (RouteVar)(Block) [Observations]																									
12:35 (86.0)(B141) [65] {FA19}			12:55 (86.0)(B142) [12] {FA19}			13:10 (86.0)(B143) [35] {FA19}			13:24 (86.0)(B144) [42] {FA19}			13:44 (86.0)(B145) [18] {FA19}			14:04 (86.0)(B146) [9] {FA19}			14:24 (86.0)(B141) [64] {FA19}			14:44 (86.0)(B140) [23] {FA19}			15:02 (86.0)(B147) [	
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off
9.8	0	9.8	12.8	0	12.8	8.9	0	8.9	11.8	0	11.8	12.6	0	12.6	19.4	0	19.4	16.9	0	16.9	11.3	0	11.3	18.5	0
0.1	0	9.9	0.2	0	13	0.1	0	9	0.1	0	11.9	0.3	0	12.8	0.1	0	19.6	0.1	0	17	0.1	0	11.3	0.3	0
0.2	0	10.1	0	0.1	12.9	0.2	0	9.3	0.1	0	12	0.3	0.1	13.1	0.2	0.1	19.7	0.2	0.1	17.2	0.1	0	11.4	0.8	0
0.5	0.3	10.3	0	0.1	12.8	0.2	0.1	9.3	0.4	0.4	11.9	0.6	0.4	13.3	0.9	0.1	20.4	0.7	0.4	17.5	0.8	0.2	12	1.3	0.6
0.7	0.4	10.6	0.7	0.5	13	0.9	0.4	9.8	0.8	0.5	12.2	0.7	0.5	13.4	1.4	0.9	21	1.3	0.6	18.1	0.7	0.3	12.4	1	1
0.1	0.1	10.7	0.3	0.3	13	0.1	0.2	9.8	0.1	0.2	12.1	0.7	0.3	13.8	1.7	0.2	22.4	0.2	0.1	18.2	0.2	0	12.6	0.1	0.4
0	0	10.7	0.2	0.3	12.9	0.1	0.3	9.6	0.1	0.1	12.1	0.1	0.1	13.8	0	0	22.4	0.1	0	18.3	0.1	0	12.7	0.3	0.1
0.2	0.3	10.6	0.3	0	13.2	0.1	0.3	9.4	0.2	0.3	12	1.3	0.2	15	1.9	0.3	24	0.2	0.4	18.2	0.8	0.5	13	1	0
0.1	0.2	10.5	0	0	13.2	0.1	0	9.6	0.1	0	12	0.1	0.2	14.9	0.1	0.2	23.9	0.1	0	18.2	0.1	0	13.5	0	0.3
1	0.3	11.3	1.3	0.6	13.9	1.1	0.2	10.4	1	0.3	12.8	1.6	0.3	16.2	0.9	0.8	24	1.4	0.4	19.2	3.6	0.3	16.8	1.9	0.3
0.3	0.2	11.3	0.1	0.5	13.5	0.3	0.3	10.4	0.3	0.6	12.5	0.7	0.6	16.4	0	0.3	23.7	0.2	0.3	19	0.2	0.9	16.1	0.3	0.3
0.9	1.2	11	1.2	0.7	14	0.4	0.3	10.5	0.7	1	12.1	1.2	0.7	16.9	1.4	0.4	24.7	0.9	1.4	18.5	0.9	1.3	15.2	0.9	1.5
0.2	0.2	11	0.2	0.3	13.9	0.1	0.2	10.4	0.4	0.3	12.1	0.2	0.1	16.9	0	0	24.7	0.1	0.2	18.4	0.1	0.1	15.2	0	0.5
0.4	1.5	10	0.4	0.6	13.8	0.5	1.1	9.8	0.4	1.9	10.6	0.7	2.6	15.1	1.1	4.2	21.6	0.7	3.3	15.8	1	2.7	13.4	1.1	5.1
1.8	1	10.8	1.6	0.8	14.5	0.9	0.9	9.9	1.2	0.6	11.3	1.8	0.8	16.1	1	1	21.6	2.8	1.4	17.3	3.9	1.7	15.6	3.3	1.4
0.1	0.1	10.7	0.3	0.2	14.7	0.2	0.3	9.7	0.1	0.1	11.3	0.2	1.1	15.3	0.4	1.4	20.6	0.4	0.4	17.3	0.1	0.3	15.4	0	0.1
0.2	0	10.9	0	0.1	14.6	0.2	0.1	9.7	0.1	0	11.4	0.1	0.1	15.3	0.3	0	20.9	0.1	0.1	17.3	0.1	0.1	15.3	0.3	0.1
0.4	0.2	11	0.5	0.2	14.9	0.1	0.1	9.8	0.5	0.2	11.7	0.4	0.2	15.5	0.9	0.6	21.2	0.5	0.9	16.9	0.7	0.6	15.5	0.3	0.1
0.9	0.8	11.2	0.9	0.6	15.3	0.6	0.6	9.8	0.6	0.5	11.8	1.3	0.5	16.3	0.7	1.3	20.6	0.7	0.7	16.8	1	0.7	15.8	1.3	0.3
0.2	0.3	11.1	0.2	1.3	14.2	0.3	0.3	9.8	0.2	0.3	11.7	0.3	0.7	15.9	0.3	1.2	19.7	0.3	1.1	16	0.8	0.3	16.4	0.4	0.3
0.4	0.8	10.7	0.5	0.9	13.8	0.8	0.4	10.2	0.5	0.5	11.7	1.2	0.9	16.2	1.6	1.7	19.6	1.1	1.7	15.4	2.4	1	17.8	1.4	0.5
2.7	3.4	10	1.8	5.4	10.2	1.9	3.2	8.8	3.5	3.7	11.6	2.7	5.8	13.2	5.1	5.8	18.9	5.1	5.2	15.3	7.2	5.7	19.2	6.8	7.5
2.9	2.5	10.4	2.5	1.8	10.9	2.4	2.4	8.9	3.8	2.2	13.2	3.9	2.9	14.1	6.4	2	23.3	5.3	2.2	18.3	10.7	2.8	27.1	5.8	2.8
1.2	0.1	11.4	1.7	0	12.6	1	0	9.9	1	0.2	14	2.1	0.3	15.9	3.9	0.2	27	1.6	0.2	19.7	1.7	0.2	28.6	1.8	0
0.2	0.3	11.4	0.6	0.1	13.1	0.3	0.3	9.9	0.3	0.2	14	0.6	0.2	16.3	0.9	0.3	27.6	0.5	0.2	20	0.8	0.4	29	0.5	0.4
0.8	1.1	11.1	1.2	0.8	13.4	0.8	0.8	9.9	1	1.9	13.1	1.2	1.1	16.4	1.7	3.8	25.4	1.5	2.4	19.1	2.5	2.3	29.1	1.1	1.6
0.2	0.2	11.2	0.2	0.1	13.5	0.2	0.4	9.7	0.9	0.4	13.6	0.7	0.6	16.5	1.8	0.8	26.4	0.6	0.7	19	0.6	1.1	28.6	0.9	0.1
0.8	1.5	10.5	0.3	0.6	13.3	0.6	1.3	9	0.9	2.2	12.3	1	1.2	16.3	2	1.2	27.2	0.8	0.9	18.8	1.8	1.1	29.3	0.8	0.6
0.8	0.3	10.9	0.4	0.5	13.2	0.7	0.4	9.3	0.5	0.4	12.4	1.1	0.3	17	1.6	0.7	28.1	2.3	0.8	20.3	3.5	1	31.8	1.8	0.4
0.1	0.2	10.8	0.2	0.6	12.8	0.2	0.2	9.3	0.2	0.3	12.4	0	0.5	16.5	0.2	1.2	27.1	0.1	0.7	19.7	0.4	0.6	31.6	0	0.3
0.1	0.2	10.8	0	0.2	12.6	0	0.1	9.3	0.2	0.1	12.5	0.2	0.3	16.4	0	0.2	26.9	0	0.2	19.5	0.2	0.3	31.6	0	0
1.1	0.7	11.1	1.1	1.3	12.4	1	0.4	9.8	0.9	0.9	12.5	1.1	0.7	16.8	2	0.9	28	1.6	0.9	20.2	3.1	1.3	33.4	1.5	0.6
0.9	1.7	10.3	1.2	1.2	12.4	0.7	2	8.5	1.3	1.3	12.5	1.6	2.2	16.1	3.1	3.1	28	1.4	2.5	19	1.4	3.2	31.7	1.1	2.9
1.5	0.8	11.1	0.9	0.3	13.1	0.6	0.7	8.4	0.7	1	12.2	1.2	1.1	16.2	0.8	2.6	26.2	0.6	2.3	17.3	1	3.7	29	0.9	2.9
0.3	0.7	10.8	0	0.5	12.6	0.3	0.8	7.9	0.7	0.7	12.3	0.4	1.2	15.4	0.8	1.8	25.2	1	1.6	16.7	1.3	2.8	27.5	0.3	2.5
1	3.2	8.5	1.6	3.2	11	1.1	2	7.1	1.8	3.2	10.9	2.1	3.7	13.7	2.8	5.4	22.6	1.8	4.3	14.3	2.2	6.5	23.2	1.4	4.1
0	0.3	8.3	0	0.2	10.8	0.1	0.4	6.7	0.1	0.5	10.5	0.1	1.1	12.7	0.1	1.2	21.4	0.1	0.9	13.6	0.1	1.4	21.9	0	1.1
0	0.4	7.8	0.1	0.3	10.7	0.1	0.3	6.5	0.1	0.7	9.9	0.1	0.9	11.9	0	4.1	17.3	0.1	1.2	12.5	0.1	1.7	20.3	0	1.3
0.1	0.8	7.1	0.3	0.6	10.3	0.1	0.6	6	0.2	1	9.1	0.3	1.2	11	0.1	2	15.4	0.1	0.8	11.8	0.2	2.7	17.8	0	2.5
0.1	0.7	6.6	0	0.6	9.8	0.1	0.9	5.2	0.1	1.3	7.9	0.3	1.1	10.3	0.4	2.3	13.6	0.2	2.1	9.9	0.2	4.3	13.7	0.3	2.1
0.1	0.7	6	0.2	0.9	9	0.1	0.5	4.8	0.2	1	7.1	0.3	0.8	9.7	0	0.8	12.8	0.1	0.8	9.1	0	2.3	11.5	0.1	1.8
0.1	1.4	4.7	0	1.3	7.8	0	1.3	3.5	0	1.6	5.5	0.2	2.2	7.7	0.3	2.6	10.6	0.2	1.9	7.4	0	2.7	8.8	0	2.6
0	1.4	3.3	0	2.1	5.7	0.1	0.8	2.8	0	0.9	4.7	0	1.2	6.5	0.1	4	6.7	0	2.6	4.9	0	3.3	5.5	0	2.1
0	3.2	0.1	0	5.7	0	0	2.8	0	0	4.6	0.1	0	6.4	0.1	0	6.3	0.3	0	4.8	0.1	0	5.5	0	0	5.9
		11.4			15.3			10.5			14			17			28.1			20.3			33.4		
33.5	33.7		36	36.4		28.6	28.7		38.1	38.1		47.6	47.4		68.4	68		54	53.7		68	67.9		59.6	59

8] {FA19}	15:17 (86.0)(B127) [9] {FA19}			15:32 (86.0)(B128) [51] {FA19}			15:47 (86.0)(B129) [11] {FA19}			16:02 (86.0)(B109) [53] {FA19}			16:17 (86.0)(B130) [7] {FA19}			16:34 (86.0)(B148) [12] {FA19}			16:51 (86.0)(B131) [11] {FA19}			17:08 (86.0)(B125) [6] {FA19}			17:25 (86.
Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On
18.5	11.7	0	11.7	14.5	0	14.5	14.5	0	14.5	15.3	0	15.3	16.6	0	16.6	19.3	0	19.3	18	0	18	26.3	0	26.3	20.2
18.8	0.2	0.2	11.7	0.3	0	14.7	0.5	0	15	0.2	0	15.5	0.3	0	16.9	0.1	0	19.3	0.2	0	18.2	0.4	0	32	0.4
19.5	0	0	11.7	0.3	0.1	14.9	0.3	0	15.3	0.2	0	16	0	0	16.9	0.3	0	19.6	0.4	0.1	18.5	0.4	0	32.4	0.3
20.1	0.7	0.1	12.2	1.3	0.1	16.1	0.7	0	16	0.3	0.1	16.3	0.3	0	17.1	0.1	0	19.7	0.6	0.3	18.8	0.8	0	33.2	0.6
20.1	0.3	0.6	12	0.4	1	15.6	0.7	1.5	15.2	0.5	1	15.8	0.3	1	16.4	0.4	1	19.1	0.6	1.5	17.9	0.2	1.3	27	0.5
19.9	0.2	0.1	12.1	0.3	0.2	15.7	0.8	0.4	15.6	0.4	0.2	16	0.1	0.1	16.4	0.3	0.3	19.2	0.3	0.4	17.8	0	0.3	26.7	0.2
20	0.1	0.1	12.1	0.5	0.2	16.1	0.5	0.3	15.8	0	0.2	15.9	0	0.1	16.3	0	0.4	18.8	0	0.4	17.5	0.3	0.7	26.3	0.2
21	0.1	0.2	12	0.6	0.7	16.1	0.5	0.3	16.1	0.2	1.2	14.9	0.1	0.6	15.9	0.5	0.9	18.3	0.2	1.5	16.2	0.5	4.8	22	0.2
20.8	0	0	12	0	0.1	16.1	0.3	0.7	15.6	0.1	0.1	14.8	0	0.6	15.3	0.1	0.1	18.3	0.1	0.2	16.7	0.8	0.7	22.2	0.3
22.4	1	0.4	12.6	1.9	0.6	17.4	1.3	0.4	16.5	2.2	0.4	16.6	1.7	0.3	16.8	1.8	1.5	18.6	2.2	0.8	18.1	3.3	1.5	24.2	1.7
22.4	0.2	0.1	12.7	0.3	0.3	17.4	0.3	0.4	16.5	0.3	0.2	16.6	0.5	0.3	17	0.3	0.7	18.2	0.3	0.4	18	0	0.2	24	0.2
21.8	0.7	0.6	12.8	0.7	1	17.1	0.8	1.1	16.2	0.8	0.9	16.5	1.3	0.9	17	1.1	1	18.3	0.7	1.2	16.8	0.8	1.8	23	1.1
21.3	0.2	0.6	12.4	0.1	0.5	16.7	0.2	0.5	15.8	0.2	0.4	16.2	0.1	0.3	16.9	0.1	0.3	18	0.1	1.1	15.8	0.3	0.7	22.7	0.2
17.3	1	3.6	9.9	0.6	2.4	15	0.4	1.7	14.5	0.5	1.6	15.2	1.9	1.7	17	0.6	3.7	14.9	1.2	2.6	14.4	1.8	6.7	17.8	1.5
19.1	1.7	0.4	11.1	2.1	1.9	15.2	1.9	1.9	14.5	1.9	0.9	16.1	1.6	1.4	17.1	1.7	3	13.6	2.1	0.7	15.7	5	1.2	21.7	2.4
19	0.1	0.4	10.8	0.1	0.5	14.8	0.5	0.1	14.8	0.1	0.1	16.1	0.3	0.1	17.3	0	0.9	12.7	0.6	0.6	15.7	2.2	0	23.8	0.6
19.1	0.2	0	11	0.2	0.2	14.8	0.2	0.3	14.7	0.2	0.2	16.1	0.6	0.3	17.6	0.5	0.4	12.8	0.2	0.5	15.4	0	0	23.8	0.3
19.3	0.1	0.4	10.7	0.3	0.7	14.4	0.4	0.3	14.8	0.5	0.5	16.2	0.1	0.9	16.9	0.6	0.7	12.7	0.5	0.5	15.4	1	2.2	22.7	1.3
20.3	0.7	0.6	10.8	1.8	1.1	15	1	1	14.8	1.9	1.3	16.8	1.9	0.9	17.9	1.1	0.7	13.1	1.5	1	15.9	1.7	2.7	21.7	1.8
20.4	0.9	0.1	11.6	0.6	0.4	15.2	0.5	0.4	15	0.5	0.1	17.2	0	0.1	17.7	1	0.3	13.8	0.7	0.1	16.5	1.7	0.7	22.7	0.7
21.3	1.4	0.3	12.7	1.7	0.5	16.3	2.3	0.5	16.8	2.1	0.8	18.5	3.1	0.3	20.6	4.3	0.8	17.3	8.5	0.9	24.2	5.2	1.3	26.5	2.5
20.5	5.4	5	13.1	5.4	6.4	15.4	5.9	5.6	17.1	8.8	5.6	21.6	10.3	5.9	27.9	12.2	5.5	24	13.1	6.9	30.4	12	9	29.5	9.4
23.5	5.9	2	17	6.5	1.5	20.4	7.1	2	22.2	9.2	2	28.8	11.1	2.1	36.6	9.1	1.6	31.5	11.9	1.5	40.7	17.3	2.3	44.5	8.7
25.3	2.8	0	19.8	2.2	0.3	22.3	2.8	0	25	2.3	0.2	30.8	4.5	0.2	39	2.3	0.2	33.7	4.9	0	45.6	3.5	0.5	47.5	2.8
25.4	0.9	0.2	20.4	1.7	0.3	23.5	0.9	0.1	25.8	1.6	0.2	32.2	3.4	0.1	43.6	3.5	0.9	36.3	3.6	0.2	49.1	1.5	0.3	48.7	1.4
24.9	2.8	1.8	21.4	1.8	1.6	23.7	2.9	1.5	27.3	2.1	1.7	32.6	2.6	1.7	44.4	3.3	2.8	36.7	4.3	2.8	50.5	2.5	2.3	48.8	3.2
25.6	0.7	0.8	21.3	0.3	0.5	23.5	0.2	0.4	27.1	0.8	0.5	32.9	0.6	0.4	44.6	0.8	0.3	37.2	1.3	1.3	50.5	0.5	0.7	48.7	1
25.8	1.7	1.3	21.7	1.3	1.1	23.8	0.6	1	26.7	1.2	1.8	32.3	1.4	0.6	45.4	0.8	0.8	37.2	0.8	0.7	50.6	1.3	1.3	48.7	0.2
27.1	1.3	0.8	22.2	1.2	0.5	24.5	1	1.5	26.3	1	0.7	32.6	2	1	46.4	1.7	0.8	38	0.8	1	50.5	1	0.7	49	0.8
26.9	0.2	1.2	21.2	0.2	0.6	24	0.1	0.4	26	0.3	0.5	32.4	0.1	0.1	46.4	0.2	0.6	37.6	0.6	0.5	50.6	0	0.8	48.2	0.2
26.9	0	0.4	20.8	0	0.2	23.9	0	0.2	25.8	0.1	0.2	32.2	0.3	0.4	46.3	0.1	0.4	37.3	0.6	0.7	50.5	0.2	0.3	48	0.1
27.8	1	0.6	21.2	1.6	0.7	24.8	3.3	0.8	28.3	2.4	0.9	33.7	2.6	1.6	47.3	3.9	0.8	40.4	4.5	1.6	53.4	3.3	1.3	50	1.5
26	0.4	1.7	20	0.9	2.5	23.3	2.1	2.8	27.5	2.3	3.7	32.4	3.6	2.7	48.1	3.3	3.1	40.7	3.9	3.6	53.6	2.3	3.5	48.8	1.2
24	1.1	3.1	18	0.6	2	21.9	0.7	2.6	25.6	0.7	2.6	30.5	1.1	3	46.3	0.4	3.5	37.6	0.8	1.5	52.9	1.5	1.8	48.5	0.2
21.8	0.6	1.7	16.9	0.3	2.4	19.8	0.2	1.7	24.1	0.9	2.7	28.8	0.3	2.1	44.4	0.6	3.2	35	1.5	4.7	49.7	0.8	1.7	47.7	0.2
19	1.7	6.1	12.4	1.7	4	17.5	1	6.6	18.5	1.6	5.3	25	1.1	4.4	41.1	1.3	4.8	31.6	2.7	7.4	45.1	2.7	6.7	43.7	1.9
17.9	0.8	1.6	11.7	1.8	1.7	17.6	0.8	0.7	18.5	0.3	1.9	23.4	0.6	2.4	39.3	0.6	1	31.2	0.5	1.4	44.3	0.3	2.7	41.3	0.2
16.6	0	1	10.7	0.1	1.2	16.5	0.1	1.2	17.5	0	2	21.4	0	4.1	35.1	0.2	1.3	30	0.5	1.9	42.9	0.5	1.8	40	0.2
14.1	0	0.7	10	0.1	1.3	15.3	0	0.5	17	0.3	1.3	20.4	0.6	2.4	33.3	0.3	1.8	28.5	0	2.3	40.6	0.5	2.8	37.7	0
12.3	0.3	2	8.3	0.1	3.6	11.8	0.5	1.7	15.7	0.4	3	17.8	0.9	5.9	28.3	0.1	4	24.6	0.5	7.5	33.6	0.5	5.5	32.7	0.2
10.6	0	0.6	7.8	0.1	1.3	10.5	0.1	1.3	14.5	0	2.2	15.7	0.1	3.7	24.7	0	4.7	19.9	0	5.8	27.8	0.2	4	28.8	0.1
8	0	2	5.8	0	2	8.5	0.3	3	11.8	0.1	2.4	13.4	0	3.7	21	0.2	5.3	14.8	0.1	6.2	21.7	0	7.3	21.5	0.1
5.9	0.1	1.6	4.3	0	2	6.5	0	3	8.8	0	5.9	7.5	0	6.4	14.6	0	5	9.8	0	9.1	12.6	0	7.8	13.7	0
0	0	4.3	0	0	6.1	0.3	0	8.8	0	0	7.5	0	0	14.6	0	0	9.8	0.1	0	12.6	0	0	13	0.7	0
27.8			22.2			24.8			28.3			33.7			48.1			40.7			53.6			50	
	49.2	49.3		56.5	56.3		59.2	59.2		64.8	65		78	79.4		79.1	78.9		95.9	96		105.1	104.9		70.8

0)(B126) [17] {FA19}		17:43 (86.0)(B127) [9] {FA19}			18:01 (86.0)(B128) [51] {FA19}			18:19 (86.0)(B129) [12] {FA19}			18:41 (86.0)(B130) [19] {FA19}			19:08 (86.0)(B131) [39] {FA19}			19:36 (86.0)(B126) [30] {FA19}			20:04 (86.0)(B129) [12] {FA19}			20:32 (86.0)(B130) [19] {FA19}		
Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
0	20.2	28.3	0	28.3	23.6	0	23.6	18.2	0	18.2	15.7	0	15.8	15.2	0	15.2	15	0	15	12.8	0	12.8	10.2	0	10.2
0	20.5	1.7	0.1	29.9	0.9	0.1	24.5	0.7	0	18.8	0.6	0.1	16.4	1	0.1	16.2	0.7	0	15.7	0.5	0	13.3	0.2	0	10.4
0	20.8	0.9	0.1	30.7	0.6	0	25	0.5	0	19.3	0.5	0	16.8	0.6	0	16.7	0.3	0	16	0.3	0	13.7	0.4	0	10.8
0.1	21.4	0.7	0	31.3	0.6	0.3	25.3	0	0.4	18.9	0.5	0.3	17.1	0.4	0.1	17	0.1	0	16	0.1	0	13.8	0.2	0.3	10.8
1.8	20.1	0.6	1.2	30.7	0.4	0.8	25	0.3	1.1	18.2	0.3	1.2	16.2	0.3	1.3	16.1	0.2	1.8	14.5	0.2	0.8	13.1	0.4	0.7	10.5
0.5	19.7	0.1	0.9	29.9	0.2	0.4	24.7	0.3	0	18.4	0	0.2	16.1	0	0.3	15.8	0.2	0.2	14.5	0.2	0.2	13.1	0.2	0.1	10.6
0.4	19.5	0	0.9	29	0.2	0.4	24.5	0	0.3	18.1	0.2	0.4	15.8	0.2	0.3	15.6	0.2	0.4	14.3	0.3	0.2	13.3	0.1	0.1	10.7
1.5	18.2	0	2.3	26.7	0.2	2.3	22.4	0.1	0.4	17.8	0.1	1.1	14.7	0.1	1.1	14.6	0.2	0.8	13.7	0.2	0.6	12.8	0.1	0.8	10
0.1	18.2	0.2	0	26.9	0.1	0.3	22.2	0	0.2	17.6	0.1	0.2	14.7	0	0.2	14.4	0.1	0.3	13.5	0	0.3	12.5	0.1	0.2	9.9
0.3	19.6	1.1	0.7	27.3	1.1	1.4	22.3	0.7	0.5	17.8	1.2	0.8	15	0.9	0.8	14.5	1.2	0.7	14.1	1.1	0.9	12.7	1.1	0.4	10.6
0.6	19.2	1.1	2.3	26.1	0.4	0.6	21.6	0.4	0.8	17.4	0.2	0.4	14.8	0.3	0.5	14.3	0.2	0.3	14	0.3	0.5	12.4	0.1	0.4	10.3
0.5	19.9	0.9	0.9	26.1	0.9	1.8	20.8	0.8	1.3	17	0.4	0.6	14.7	0.9	0.5	14.7	0.8	1.1	13.6	1	1	12.4	0.3	1.3	9.4
0.4	19.8	0.2	0.2	26.1	0.2	0.6	20.4	0.5	0.3	17.3	0.3	0.6	14.3	0.2	0.4	14.4	0.1	0.1	13.5	0.3	0.3	12.5	0.1	0.4	9.1
2.9	18.4	1.1	4.4	22.8	1	2	19.5	0.9	1.7	16.5	1.2	2.5	12.9	0.9	2.1	13.3	0.7	1.7	12.5	0.3	1.8	11	0.5	1.7	7.8
1.1	19.6	2.6	1.7	23.7	2.2	1.6	20.2	1.6	1.1	17	2.3	1	14.2	1.3	0.9	13.7	1.9	0.8	13.7	2.3	0.3	12.9	1.5	0.4	8.9
0.4	19.8	0.2	0.2	23.7	0.3	0.6	19.8	0.3	0.4	16.8	0.2	0.6	13.8	0.1	0.5	13.3	0.3	0.4	13.6	0	0.8	12.2	0.1	0.6	8.4
0.2	19.9	0.8	1	23.4	0.4	0.5	19.7	0.7	0.3	17.2	0.4	0.3	13.8	0.1	0.3	13.2	0.2	0.3	13.5	0.1	0.3	12	0.5	0.1	8.8
1.9	19.3	1.1	1.2	23.3	1	1.5	19.2	0.8	1	16.9	0.6	0.4	14.1	0.8	1	12.9	0.7	1	13.2	1	0.4	12.6	1.1	0.5	9.5
1.3	19.8	2.6	1.9	24	1.2	1.1	19.3	1.3	1.3	17	1.2	0.9	14.3	1.3	1.7	12.5	1.1	0.8	13.5	1	0.8	12.8	0.9	0.5	9.9
0.9	19.6	0.3	1.1	23.2	0.8	0.5	19.5	0.6	0.7	16.9	0.8	0.4	14.7	0.2	0.4	12.3	0.1	0.6	13.1	0.1	0.3	12.6	0.1	0	9.9
0.8	21.2	4	0.6	26.7	2.3	0.7	21.1	2	0.8	18.2	2	0.2	16.6	2.4	0.6	14.1	2.4	0.5	15	1.3	0.6	13.3	1.2	0.1	11
6.9	23.7	12.1	6.9	31.9	7.5	5.1	23.5	7.3	4.4	21	7.9	3.5	21	6.8	3.1	18	6.1	3.3	17.8	5.6	2.3	16.7	6.5	2.5	15.1
2	30.4	10.6	3	39.4	9.5	1.9	31.3	8.1	2.3	26.8	12.1	2.8	30.3	8.7	1.6	25.2	9.3	1.8	25.3	9.7	1.7	24.7	5.9	0.8	20.2
0.1	33.1	4	0.3	43.1	3.4	0.1	34.6	2.9	0.3	29.3	3.4	0.2	33.5	2.9	0.1	28	2.9	0	28.2	2.6	0.3	26.9	3.2	0	23.3
0.2	34.4	1.7	0.9	43.9	0.9	0.4	34.7	0.9	0.5	29.8	0.8	0.3	34	0.6	0.2	28.4	0.3	0.2	28.4	0	0.3	26.7	0.3	0	23.6
1.7	35.9	3	2.4	44.4	2.6	3	34.3	2.1	1.9	29.9	1.9	3.7	32.2	2.1	1.7	28.8	1.8	1.8	28.4	1.6	1.9	26.3	1.1	2.2	22.5
0.6	36.3	0.4	1	43.9	0.3	0.6	34	0.7	0.4	30.2	0.2	0.6	31.8	0.4	0.8	28.4	0.5	0.6	28.6	0.8	0.5	26.6	0.2	0.5	22.2
0.6	35.8	0.4	0.9	43.4	1.1	1.9	33.3	0.8	0.5	30.4	0.8	1.6	30.9	0.9	1.4	27.9	0.8	1.3	28.1	0.3	0.8	26.2	0.2	1.4	21
0.8	35.8	0.9	1.1	43.2	0.7	1.1	32.9	2	0.7	31.8	0.5	0.8	30.7	0.6	0.6	28	0.6	0.6	28.1	0.8	1.6	25.4	0.3	0.8	20.5
0.6	35.3	0.1	1.8	41.6	0.1	1.2	31.8	0.1	1	30.8	0.3	0.6	30.4	0.2	0.7	27.5	0.4	0.9	27.6	0	0.8	24.7	1.3	1.8	19.9
0.1	35.2	0.1	0.4	41.2	0.1	0.1	31.8	0	0	30.8	0.1	0.2	30.3	0.1	0.2	27.4	0	0	27.3	0.1	0.1	24.7	0.2	0.3	19.8
1.3	35.5	1.7	0.7	42.2	2.4	0.9	33.3	2.4	1.8	31.5	1.8	1.1	31	0.6	1.2	26.8	1	1.2	27.2	1.3	0.9	25	0.7	0.6	19.8
1.7	35	2.1	2.9	41.4	1.6	2.6	32.3	0.6	2.3	29.8	0.9	3.5	28.5	1.1	2.4	25.5	0.7	2.4	25.5	0.6	2.3	23.3	2	1.7	20.2
1.7	33.5	0.3	2.6	39.2	0.4	2.5	30.2	0.5	3.3	27.1	0.6	3.1	26	0.8	2.8	23.5	0.4	2.4	23.6	0.7	1.9	22.1	0.2	0.8	19.6
2.5	31.2	1	3.6	36.7	0.5	2.8	27.8	0.1	1.4	25.8	0.1	2.3	23.8	0.2	2.2	21.5	0.2	2.3	21.5	0.1	1.8	20.4	0.1	2.2	17.5
7.3	25.8	2.6	8.1	31.1	1.5	5.7	23.7	0.7	4.7	21.8	1.1	4.9	19.9	1.1	4.1	18.5	1	4	18.4	0.3	2.8	17.9	0.7	2.5	15.8
3	23	0.1	2.9	28.3	0.1	1.2	22.6	0.1	1.3	20.6	0	1.9	18.1	0.1	1.2	17.3	0.1	1.1	17.5	0	2.4	15.5	0.1	1.5	14.4
1.1	22.1	0	1.9	26.4	0.1	2.1	20.6	0.1	2.3	18.3	0.1	2.4	15.7	0.1	1.7	15.6	0	1.3	16.2	0	1.7	13.8	0.1	1.2	13.3
2	20.1	0	1.4	25	0.2	1.2	19.5	0.1	0.9	17.5	0.1	1.1	14.7	0.1	1.4	14.3	0	1.5	14.7	0	1.1	12.8	0	0.6	12.6
3.2	17.1	0.1	4.4	20.7	0.2	3.1	16.6	0	3.2	14.3	0.2	3.7	11.2	0	3.8	10.5	0.1	3.5	11.2	0	1.8	10.9	0	2.1	10.6
2.8	14.4	0	3.2	17.4	0	2.7	13.9	0	3.7	10.7	0	2.2	9.1	0	1.4	9.2	0	1.7	9.5	0.1	1.5	9.5	0	2.1	8.5
4.9	9.5	0	5.8	11.7	0	2.8	11.1	0	3.6	7.1	0	2.4	6.6	0	2.9	6.3	0	3.3	6.2	0	2.8	6.8	0	2.8	5.6
4.4	5.1	0	4.8	6.9	0	4.5	6.6	0	3.7	3.4	0.1	3.5	3.2	0	3	3.3	0	3.5	2.7	0	3.7	3.1	0	3	2.6
5.1	0	0	6.9	0	0	6.6	0	0	3.4	0	0	3.1	0.1	0	3.1	0.2	0	2.7	0	0	3.1	0	0	2.6	0
	36.3			44.4			34.7			31.8			34			28.8			28.6			26.9			23.6
70.3		89.7	89.6		71.8	71.6		60.2	60.2		61.8	61.7		54.6	54.7		52.9	53.2		48	48.2		42.5	42.6	

21:15 (86.0)(B132) [34] {FA19}			22:00 (86.0)(B133) [2] {FA19}			22:45 (86.0)(B134) [32] {FA19}			23:25 (86.0)(B133) [3] {FA19}			24:05 (86.0)(B134) [33] {FA19}			Total		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
9.5	0	9.5	5.5	0	5.5	5.2	0	5.2	6.7	0	7	3.2	0	3.3	817.1	0	818.6
0.1	0	9.7	0	0	5.5	0	0	5.2	0	0	7	0.1	0	3.4	14.5	0.8	834.8
0.3	0	10	0	0	5.5	0.3	0	5.5	0	0	7	0	0	3.4	20.4	1.3	854.6
0	0.1	10	0	0	5.5	0.1	0.1	5.5	0.3	0	7.3	2.4	0	5.8	29.7	12.4	871.9
0.1	1	9.1	0	0	5.5	0	0.1	5.5	0	0.3	7	0	0	5.7	41.3	33.9	874
0.1	0	9.2	0	0	5.5	0	0	5.5	0	0.3	6.7	0	0	5.7	14.8	9.6	879.1
0.1	0.3	9.1	0	0	5.5	0	0	5.5	0	0	6.7	0	0	5.8	9.6	9.6	879.3
0.1	0.6	8.5	0	0	5.5	0.3	0.2	5.5	0	0	6.7	0	0.2	5.5	26.2	33.6	872.1
0.1	0.1	8.5	0	0	5.5	0	0	5.5	0	0	6.7	0	0.2	5.3	9.7	6.2	877
0.8	1	8.3	0	0	5.5	0	0.2	5.4	0	0.7	6	0	0.8	4.5	106.8	21.1	964.4
0.1	0.3	8	0	0	5.5	0.1	0.1	5.3	0	0.3	5.7	0	0.2	4.3	22.6	18.5	965.7
0.8	0.4	8.4	1.5	0	7	0.4	0.1	5.7	0	2.7	3	0	0.1	4.2	70.1	46.4	987.6
0	0.4	8.1	0	0	7	0.4	0.1	6	0.3	0.3	3	0	0.1	4.2	12.4	13	986.8
0.7	0.9	7.9	0	0.5	6.5	0.7	0.2	6.5	0.3	0	3.3	0.1	0.5	3.8	46.2	112.7	920.9
2	0.3	9.5	0	0.5	6	1.3	0.7	7.1	1	0	4.3	0.4	0.7	3.5	132.7	48.4	1004.7
0.1	0.1	9.4	0.5	0.5	6	0.1	0.3	6.9	0	0	4.3	0	0.1	3.4	25.1	30.3	999.2
0.1	0.1	9.4	0.5	0	6.5	0	0.1	6.8	0	0	4.3	0	0	3.4	29.5	7.7	1021
0.6	0.2	9.7	0	0	6.5	0.5	0.4	7	1	0	5.3	0.2	0	3.6	52.3	25.1	1048.4
0.8	0.3	10.2	0.5	0.5	6.5	0.5	0.5	6.9	0	0	5.3	0.2	0	3.8	89	50.9	1086.4
0.2	0.2	10.2	0	0	6.5	0.1	0.1	6.9	0.3	0	5.7	0.1	0	3.8	29.2	29.9	1085.8
1.6	0.1	11.7	0	0	6.5	0.3	0.1	7.2	0.3	0	6	0.1	0.9	3	70.2	68.7	1087.4
11.6	2.1	21.2	7.5	1.5	12.5	3.7	1.1	9.8	3	0	9	1.2	0.8	3.5	270.2	350.5	1010.7
8.2	1	28.4	11.5	1.5	22.5	4.5	1.3	13	5.7	0.3	14.3	2.9	0.2	6.2	319.8	175.3	1154.6
2.2	0.2	30.4	0.5	0	23	1	0.1	14	1.7	0	16	1.2	0	7.4	96.1	10.7	1238.2
0.7	0.2	30.9	0	1	22	0.1	0.5	13.5	0	0	16	0	0	7.4	32.5	43.5	1227.8
1.9	1.2	31.6	0.5	1.5	21	0.5	0.7	13.3	1.7	0	17.7	0.2	0.5	7.2	72.3	89.9	1209.4
0.1	0.5	31.2	0	0.5	20.5	0.2	0.3	13.1	0.3	1	17	0.1	0.1	7.2	26	28.6	1207
0.3	0.9	30.7	0.5	0.5	20.5	0.7	0.8	13	0.7	0	17.7	0	0.2	7	38.1	63.9	1181.5
0.3	0.8	30.2	0	0	20.5	0.4	0.2	13.3	0	0	17.7	0	0.1	6.9	53.5	27.5	1207.5
0.3	1.5	29	0	2.5	18	0	0.8	12.5	0	1.3	16.3	0	0.6	6.3	20.3	35.3	1192.4
0.1	0.2	28.8	0	0	18	0	0	12.5	0	0	16.3	0	0.2	6.1	5.2	18.1	1179.3
2	0.6	30.2	2	0.5	19.5	0.4	0.5	12.3	0.3	0	16.7	0.3	0.5	5.9	86.8	43.7	1222.5
1.1	3.3	28	0.5	2.5	17.5	0.1	1.2	11.3	0	1.3	15.3	0	0.2	5.7	71.8	169.7	1125.7
0.4	3.1	25.3	0	4	13.5	0.1	1.7	9.7	0	1	14.3	0	0.6	5.1	73	75.8	1123.5
0.1	2.9	22.5	0	0.5	13	0.1	0.7	9	0	3	11.3	0.1	0.5	4.7	31.2	86.5	1068.7
0.4	3.1	19.8	0	3	10	0	1.5	7.5	1	2.7	9.7	0	1.1	3.6	78.1	233.9	912.8
0	1.3	18.5	0	0.5	9.5	0	0.8	6.8	0	1	8.7	0	0.4	3.2	19.5	53.7	878.6
0.1	2	16.6	0	0.5	9	0	1.1	5.7	0	2.3	6.3	0	0.6	2.6	13.2	55	837
0	1.5	15	0	1	8	0	0.3	5.3	0	0.7	5.7	0	0.4	2.2	21.8	58.5	799.7
0	3.3	11.8	0	1.5	6.5	0	1.4	4	0	2.3	3.3	0	0.7	1.5	34.1	103	731.2
0	1.7	10.1	0	0	6.5	0	0.6	3.4	0	0.3	3	0	0.2	1.3	10.8	85.5	656.1
0	3.3	6.8	0.5	2	5	0	1.1	2.3	0	1	2	0	0.6	0.7	7.7	124.6	539.4
0	3.4	3.4	0	2.5	2.5	0	1.5	0.9	0	0	2	0	0.5	0.2	0.8	135.5	405
0	3.4	0	0	2.5	0	0	0.8	0.1	0	2	0	0	0.2	0	0	399.4	7.9
		31.6			23			14			17.7			7.4			1238.2
48	47.9		32	32		22.1	22.3		24.6	24.8		12.8	13		3052.2	3048.2	

Massachusetts Bay Transportation Authority
Route 86
Weekday - Outbound
Fall 2019
(Urban Transportation Associates)

	05:39 (86.0)(B117) [17] {FA19}			06:01 (86.0)(B119) [44] {FA19}			06:23 (86.0)(B121) [2] {FA19}			06:43 (86.0)(B123) [43] {FA19}			06:56 (86.0)(B124) [27] {FA19}			07:08 (86.0)(B117) [16] {FA19}			07:20 (86.0)(B118) [	
Seq - StopID - Stop Name	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off
1 - 21917 - RESERVOIR BUSWAY	3.3	0	3.7	2.7	0	3.1	3.5	0	3.5	4.4	0	4.8	4.3	0	4.9	3.5	0	4.1	4.8	0
2 - 1027 - CHESTNUT HILL AVE @ ENGLEWOOD	1.2	0	4.9	2.2	0	5.3	3.5	0	7	5	0	9.7	3.7	0.3	8.3	5.2	0.1	9.2	4.5	0
3 - 1029 - CHESTNUT HILL AVE @ COMMONWEA	0.4	0	5.4	1.6	0	6.9	1	0	8	1.1	0.1	10.8	0.8	0	9.1	1.4	0	10.6	1.5	0
4 - 1030 - CHESTNUT HILL AVE @ STRATHMOR	0.8	0	6.1	1.4	0	8.2	1	0	9	0.9	0	11.7	1.2	0	10.3	3.9	0	14.6	4	0.2
5 - 1031 - CHESTNUT HILL AVE @ CHISWICK	1.2	0	7.3	2.9	0	11.1	2	0	11	1.2	0	12.8	1.6	0	11.9	2.5	0.1	17	3.6	0.1
6 - 1032 - CHESTNUT HILL AVE OPP WILTSHI	0.7	0	8	1.1	0	12.2	5.5	0	16.5	0.6	0	13.3	0.7	0	12.6	1.6	0.1	18.6	2.8	0.1
7 - 1033 - CHESTNUT HILL AVE @ WALLINGFO	1.5	0	9.5	1	0	13.1	3	0	19.5	1.1	0	14.5	0.9	0	13.4	2	0.1	20.5	1	0.2
8 - 1034 - CHESTNUT HILL AVE @ UNION ST	0.6	0.1	10.1	1.8	0	14.9	0	0	19.5	1.2	0	15.7	2.1	0	15.5	2.5	0.1	22.9	2.6	0.1
9 - 1026 - CHESTNUT HILL AVE @ VERONICA	0	0.2	9.8	0.7	0.5	15.1	3	0	22.5	1.6	0.1	17.1	1.7	0.5	16.7	3.2	0.4	25.6	3	0.2
10 - 1035 - MARKET ST @ WASHINGTON ST	1.6	0.6	10.9	1.1	0.2	16	2.5	1.5	23.5	3.1	0.2	20	3.1	0.3	19.6	3.4	0.9	28.1	3.2	0.8
11 - 1036 - MARKET ST @ SPARHAWK ST	0.9	0	11.8	1.7	0.3	17.5	2	0	25.5	1.5	0.1	21.4	1.4	0.1	20.8	1.1	0.6	28.6	3.5	0.5
12 - 1038 - MARKET ST @ GARDENA ST	1.8	0.1	13.5	3.4	0	20.8	5.5	0	31	7.3	0	28.7	4.1	0.1	24.7	3.7	0.1	32.3	4.8	0.4
13 - 1039 - MARKET ST @ N BEACON ST	1	0.1	14.4	1.5	0.1	22.3	2	1	32	2.7	0.3	31	2	0.3	26.4	2.8	0.4	34.6	2.7	0.4
14 - 1040 - MARKET ST @ GUEST ST	1.6	0.2	15.9	0.6	0.6	22.3	1.5	0	33.5	1.5	0.3	32.2	0.9	0.3	27.1	1.1	0.5	35.2	0.6	0.9
15 - 1041 - MARKET ST @ CENTOLA ST	0.1	0	15.9	0.1	0.3	22.1	0	0	33.5	0.6	0.1	32.7	0.2	0.1	27.1	0.4	0.1	35.4	0.5	0.5
16 - 1042 - MARKET ST @ LOTHROP ST	0	0	15.9	0	0	22.1	0	0	33.5	0	0	32.7	0	0	27.2	0.4	0	35.9	0.8	0.3
17 - 1043 - WESTERN AVE @ MACKIN ST	0.3	0.6	15.6	2.5	1.9	22.7	6	1.5	38	2	4	30.7	2.1	1.1	28.1	2.2	1.6	36.5	1.5	2.1
18 - 1045 - 450 WESTERN AVE	0.1	0.1	15.6	0	0	22.7	0.5	0	38.5	0.9	0	31.6	0.8	0.1	28.7	1.6	0	38.1	0.6	0.1
19 - 1046 - WESTERN AVE @ LITCHFIELD ST	1.8	0.3	17.1	4.5	0.3	27	2.5	0	41	2.8	0.1	34.3	3.4	0.1	32.1	4.9	0.3	42.8	2.7	0.4
20 - 1049 - WESTERN AVE @ EVERETT ST	3.8	0.3	20.6	3.2	0.6	29.5	2.5	0	43.5	1.9	0.4	35.8	2.3	0.2	34.3	2.3	1.2	43.9	1.8	0.9
21 - 1589 - WESTERN AVE @ RIVERDALE ST	0.6	0.2	21	0.6	0.8	29.4	1	0	44.5	1.3	0.3	36.7	2.3	0.6	36	1.5	0.4	45	2.2	0.5
22 - 2561 - N HARVARD ST @ WESTERN AVE	0.6	0.6	21.1	2	1	30.4	8.5	0.5	52.5	2.8	0.2	39.3	2.4	0.1	38.3	4	0.6	48.4	1.6	0.2
23 - 2564 - N HARVARD ST OPP HARVARD STAD	0.1	1	20.1	0.2	1.4	29.2	0	0	52.5	0.8	0.5	39.6	0.5	0.7	38.1	0.1	0.7	47.9	0.2	1.9
24 - 2565 - 16 ELIOT ST	0.2	2	18.3	0	4	25.2	0.5	6.5	46.5	0.5	5.5	34.6	0.3	4.8	33.6	0.7	7.1	41.4	0.5	5.5
25 - 20762 - HARVARD BUSWAY	0.6	9.7	9.2	1.3	13.6	13	3	22.5	27	5.6	20.6	19.6	3.1	19.8	17	5.6	25.1	21.9	4.1	28
26 - 2567 - QUINCY ST @ KIRKLAND ST	0	0.5	8.7	0.1	2	11	0	0	27	0.4	1.5	18.5	0.7	0.9	16.7	0.7	1.4	21.2	0.4	1.1
27 - 2568 - KIRKLAND ST @ SUMNER RD	0.1	0	8.8	0.1	0	11.1	1.5	0	28.5	0.1	0.3	18.3	0	0.7	16.1	0	0.4	20.8	0.1	0.2
28 - 2569 - KIRKLAND ST @ TROWBRIDGE ST	0.1	0.1	8.8	0.4	0	11.4	0	0	28.5	0.1	0.1	18.3	0.2	0.1	16.1	0.4	0.5	20.8	0	0.5
29 - 2570 - WASHINGTON ST @ BEACON ST	0.1	0.1	8.8	0.2	0	11.6	0.5	0	29	0.5	0.8	18.1	0.6	1.1	15.7	1.6	1.9	20.4	1.1	1.8
30 - 2571 - WASHINGTON ST @ CALVIN ST	0.4	0.1	9.1	1	0.1	12.5	3.5	0	32.5	2.2	0.2	20.1	2.1	0.6	17.3	2.1	0.4	22.1	1.6	0.1
31 - 25711 - WASHINGTON ST @ PERRY ST	0.2	0.1	9.2	0.9	0	13.4	0	1	31.5	1.3	0.2	21.1	0.6	0.2	17.7	0.6	0.2	22.6	1.2	0.2
32 - 25712 - WASHINGTON ST @ PARKER ST	0.4	0.1	9.5	0	0	13.4	0	0	31.5	0.3	0.1	21.4	0.6	0.1	18.1	0.4	0.1	22.9	0.8	0.1
33 - 25713 - WASHINGTON ST @ KINGMAN RD	0.7	0.2	10	0.8	0.7	13.6	4	1	34.5	3.4	1	23.7	2.3	0.8	19.7	2.1	0.6	24.4	2.1	0.4
34 - 2597 - SOMERVILLE AVE @ PROSPECT ST	0	0	10	0.1	0.3	13.3	0	0	34.5	1	0.1	24.7	0.6	0.1	20.3	0.8	0.1	25.2	1.3	0.1
35 - 2773 - WASHINGTON ST @ MERRIAM ST	0.1	0.1	10	0.6	0.1	13.9	0	1	33.5	1.1	0.6	25.2	1.5	0.3	21.4	1.6	0.9	25.9	2.2	0.3
36 - 2774 - WASHINGTON ST @ MCGRATH HWY	0.2	0	10.2	0.7	0.1	14.5	0.5	0	34	1.6	0.1	26.7	1.3	0.4	22.3	1.5	0	27.4	0.8	0.2
37 - 2659 - MCGRATH HWY @ ALSTON ST	0.1	0	10.3	0	0	14.5	0.5	0.5	34	0.2	0.2	26.6	0.4	0.3	22.4	0.1	0.3	27.3	0.4	0.2
38 - 2392 - CROSS ST @ ALSTON ST	0.7	0.2	10.8	2.3	0.5	16.4	1	2.5	32.5	1.4	0.8	27.4	1.3	0.7	23.1	1.6	0.7	29.2	0.5	1.1
39 - 2776 - WASHINGTON ST @ NEW WASHINGTO	0.1	0.1	10.8	0	0.3	16.2	0	0	32.5	0.4	0.7	26.8	0.7	0.1	23.6	0.3	0.1	28.3	0.2	0.8
40 - 2778 - WASHINGTON ST OPP MYRTLE ST	0.4	0.1	11.1	0.4	0.8	15.8	1	0.5	33	1.6	0.9	27.6	1.3	0.7	24.2	2.4	0.2	30.5	0.5	0.2
41 - 2777 - WASHINGTON ST @ INNER BELT RD	0	0.3	10.8	0.1	0.2	15.7	0	0.5	32.5	0.3	0.7	27.2	0	0.6	23.6	0.1	0.9	29.6	0	0.3
42 - 2779 - CAMBRIDGE ST @ CARTER ST	0	0	10.8	0	0	15.7	0	0	32.5	0	1.2	26	0	0.3	23.3	0.1	0.4	29.4	0	2.5
43 - 29001 - SULLIVAN STATION BUSWAY - BER	0	10.5	0.2	0	15.4	0.3	0	32	0.5	0	26	0.1	0	23.2	0.1	0	29.4	0	0	18.8
Maximum			21.1			30.4			52.5			39.6			38.3			48.4		
Total	28.4	28.6		45.8	46.1		73	72.5		68.3	68.3		60.1	60.7		78	79		72.3	73.2

13] {FA19}	07:32 (86.0)(B135) [56] {FA19}			07:44 (86.0)(B119) [44] {FA19}			07:56 (86.0)(B136) [26] {FA19}			08:08 (86.0)(B120) [10] {FA19}			08:20 (86.0)(B121) [2] {FA19}			08:32 (86.0)(B122) [12] {FA19}			08:44 (86.0)(B123) [38] {FA19}			09:00 (86.0)(B124) [24] {FA19}			09:16 (86.
Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On
5.1	5.9	0	6	6.4	0	6.4	8.4	0	8.5	7	0	7	5	0	5	5.2	0	5.7	8.4	0	8.7	5.7	0	5.8	4.8
9.6	6.4	0.1	12.3	7.7	0	14.1	8.3	0.1	16.8	8.9	0	15.9	5	0	10	5.8	0	11.4	5.8	0	14.7	5	0	10.8	5.7
11.2	3.1	0.1	15.3	3.6	0	17.7	3.8	0	20.6	4.5	0	20.4	3.5	0	13.5	2	0	13.4	2.8	0.1	17.4	2.1	0.1	12.8	2.7
15	3	0.1	18.3	4	0	21.6	4.5	0	25	4.4	0.2	24.6	2.5	0	16	3.2	0.1	16.5	2.5	0	19.9	1.9	0	14.8	2.8
18.5	4.3	0.2	22.4	5.3	0.2	26.7	6	0.6	30.5	4.3	0.2	28.7	4	0	20	3.8	0.2	20.2	3.8	0.2	23.5	2.6	0.2	17.2	3.7
21.2	1.2	0.1	23.5	1.4	0.1	28	1.1	0.1	31.5	1.6	0	30.3	0.5	0	20.5	1.6	0.1	21.7	1.7	0.1	25.1	1.3	0	18.4	1.7
22.1	2.2	0.3	25.4	3	0.2	30.8	2.9	0.2	34.2	1.6	0	31.9	2	0	22.5	1.9	0.2	23.4	1.6	0.2	26.5	1.4	0.1	19.7	1.9
24.6	3.4	0.1	28.7	2.9	0.2	33.5	3.4	0.1	37.5	4	0.1	35.8	3	0	25.5	1.5	0.1	24.8	2.6	0.2	28.8	1.1	0	20.8	1.1
27.5	4.4	0.5	32.6	5	0.9	37.6	3.8	1.5	39.7	3.3	1.4	37.7	4	0	29.5	3.3	1.8	26.3	3.1	1.1	30.9	2.4	0.7	22.4	2.7
29.8	4.9	0.7	36.9	6.3	0.7	43.2	6.2	0.5	45.3	4.2	0.7	41.2	3	0	32.5	5.2	0.4	31	4.6	0.8	34.8	3.5	1.1	24.9	4.5
32.8	5.3	0.9	41.2	4.3	0.4	47	3.9	0.2	49	3.8	0.1	44.9	4	0	36.5	2.8	0.3	33.4	1.8	0.3	36.3	2.3	0.3	26.8	2.6
37.2	4.6	0.2	45.5	3.8	0.1	50.7	3.7	0	52.7	2.9	0.1	47.7	4.5	0.5	40.5	1.3	0	34.8	1.8	0.3	37.8	1.5	0.2	28.2	2.6
39.5	2.3	0.3	47.6	2.4	0.3	52.8	2	0.4	54.2	2.2	1.2	48.7	3.5	0.5	43.5	1.8	0.4	36.1	1.7	0.2	39.3	1.9	0.5	29.6	1.5
39.2	0.6	0.5	47.7	0.5	0.5	52.8	0.7	0.7	54.2	1	1.1	48.6	1	1	43.5	0.9	1.4	35.6	1.2	2.3	38.1	0.8	1.9	28.5	1.5
39.3	0.5	0.6	47.6	0.3	0.3	52.8	0.4	0.5	54.1	0.2	0.3	48.5	0	0.5	43	0.3	0.8	35	0.3	0.7	37.7	0.2	0.5	28.2	0.1
39.8	0.4	0.2	47.8	0.3	0	53	0.1	0.1	54.1	0.1	0	48.6	0	0	43	0.1	0	35.1	0.1	0.3	37.5	0	0.1	28.1	0
39.3	2.7	1.7	48.8	2.5	2.1	53.5	4	2.7	55.3	2.6	2.6	48.6	1	1.5	42.5	3.4	1.8	36.8	1.7	2.8	36.4	1.5	1.6	28.1	1.3
39.8	0.8	0	49.5	0.5	0.1	53.8	0.8	0.2	55.9	1.3	0.1	49.8	1	0.5	43	0.2	0.3	36.7	0.3	0.2	36.5	0.4	0	28.4	0.1
42.2	3.6	0.3	52.8	3.4	0.3	57	2.4	0.2	58.2	4.1	0.7	53.2	2	1	44	2.3	0.5	38.4	2.2	0.6	38.1	1.3	0.5	29.2	1.9
43	2.1	1.6	53.2	3.2	2.8	57.3	2.8	1.5	59.5	1.4	0.3	54.3	1.5	0	45.5	1.9	0.4	39.9	1.4	1	38.5	2.1	0.5	30.8	1.5
44.7	1.8	0.6	54.3	2.3	0.9	58.7	2.2	0.7	61	2.4	0.3	56.4	3.5	1	48	0.8	0.2	40.5	0.9	0.7	38.7	1.1	0.5	31.3	0.8
46.1	2.8	0.8	56.3	2.3	0.7	60.3	2.3	0.4	62.8	1.3	0.4	57.3	3	0	51	1.4	0.3	41.7	2.6	0.4	41	2.2	0.3	33.2	2.2
44.4	0.6	2	54.9	0.9	2.3	59	0.8	2.2	61.4	0.5	1.8	56	0	0	51	0.1	1.6	40.2	0.2	0.7	40.4	0.1	0.8	32.5	0.1
39.5	1	8.9	47	1.4	14	46.4	1.8	13.7	49.5	1.6	16.8	40.8	0	11.5	39.5	0.4	9.8	30.8	0.7	8.3	32.8	0.6	5.5	27.5	0.3
15.5	5.5	30.3	22.3	3.7	26.4	23.7	4.3	31.7	22.2	3.6	23.2	21.2	4.5	26	18	3.2	17	16.9	4.1	16	20.9	2.9	14.8	15.6	2.1
14.8	0.7	2.3	20.6	0.5	3.2	21	0.5	5.7	17	0.8	7.6	14.4	1	5.5	13.5	0.5	3.9	13.5	0.6	4.1	17.4	0.5	4.4	11.7	0.4
14.8	0.2	0.1	20.7	0.1	0	21	0.2	0.1	17	0.2	0	14.6	0	0.5	13	0	0.3	13.2	0.2	0.2	17.4	0.1	0.3	11.5	0
14.2	0.5	0.5	20.8	0.6	0.3	21.3	0.5	0.6	16.9	0.4	0.3	14.7	0	0	13	0.3	0.2	13.3	0.4	0.3	17.6	0.2	0.2	11.5	0.4
13.5	2.1	2.7	20.1	1	2.2	20.1	1.1	1.2	16.8	1.5	0.9	15.3	1	3.5	10.5	1.5	1.3	13.6	1.4	1.3	17.7	0.7	1.6	10.6	1
15.1	2.6	0.6	22.1	1.8	0.4	21.5	2.3	0.4	18.8	2.3	0.8	16.8	2.5	0.5	12.5	1.2	0.6	14.2	1	0.4	18.2	1.1	0.3	11.4	0.7
16.1	1.8	0	23.9	1.4	0	22.9	1	0	19.8	0.7	0	17.5	0	0	12.5	0.6	0	14.8	0.6	0.3	18.6	0.5	0.3	11.6	0.3
16.8	2.5	0.1	26.3	0.7	0.1	23.5	0.4	0.2	20	0.2	0.2	17.5	0.5	1	12	0.3	0.3	14.8	0.4	0.1	18.8	0.1	0.3	11.4	0
18.5	2.7	0.5	28.4	1.4	1.8	23.1	1.3	1.2	20.2	1.9	1.5	17.9	0	0	12	0.8	2.3	13.3	1.3	2.3	17.8	0.5	1.9	10	0.5
19.8	1.2	0.2	29.4	1.2	0.2	24.1	0.8	0.5	20.5	0.2	0.2	17.9	0	0	12	0.6	0.5	13.4	0.4	0.3	17.9	0.2	0.3	9.8	0.8
21.6	2.6	0.6	31.3	1.2	0.6	24.7	1.3	0.1	21.7	1.4	0.5	18.8	0.5	0	12.5	0.9	0.7	13.7	1	0.7	18.1	0.7	0.3	10.2	0.4
22.3	2	0.9	32.4	0.8	0.5	25	0.9	0.6	22	1.2	0	20	0	0	12.5	0.4	0.2	13.9	0.4	0.4	18.2	0.5	0.4	10.3	0.7
22.5	0.4	0.3	32.5	0.1	0.2	24.9	0.2	0.1	22.2	0.9	0.2	20.7	0	0	12.5	0.3	0.3	14	0.2	0.1	18.2	0.2	0.1	10.4	0
21.8	1.5	1.7	32.7	0.7	0.9	25	0.6	0.4	22.3	0.5	0	21.2	0.5	0	13	0.3	0.1	14.2	0.3	0.3	18.2	0.3	0.3	10.5	0.3
21.4	0.8	0.3	32.9	0.8	0.4	25.3	0.5	0.1	22.6	0.4	0.3	21.3	0	0	13	0.3	0.3	14.3	0.4	0.1	18.5	0.2	0.1	10.4	0.3
21.7	0.9	0.4	33.3	0.3	0.2	25.1	1.6	0.5	23.8	0.8	0.5	21.6	0	0	13	0.3	0.1	14.4	0.5	0.6	18.4	0.5	0.5	10.3	0.1
21.4	0.1	1	32.4	0	1	24.2	0.1	1.5	22.4	0.1	1.2	20.5	0	1	12	0	0.6	13.8	0.1	0.3	18.2	0.1	0.1	10.3	0.1
18.8	0	2.6	29.8	0	1.5	22.6	0	2.8	19.6	0	3.4	17.1	0	2	10	0	3.5	10.3	0	4.8	13.5	0	2.1	8.1	0
0	0	29.8	0	0	22.6	0	0	19.6	0	0	17.1	0	0	10	0	0	10.3	0	0	13.1	0.4	0	8.1	0	0
46.1			56.3			60.3			62.8			57.3			51			41.7			41			33.2	
	96	95.7		90	89.6		93.9	93.9		86.3	86.3		68	68		62.7	63.2		67.1	67.2		52.3	51.8		56.2

0)(B117) [15] {FA19}		09:35 (86.0)(B118) [11] {FA19}			09:57 (86.0)(B119) [42] {FA19}			10:20 (86.0)(B029) [56] {FA19}			10:45 (86.0)(B123) [40] {FA19}			11:20 (86.0)(B189) [17] {FA19}			11:55 (86.0)(B137) [10] {FA19}			12:30 (86.0)(B138) [54] {FA19}			13:05 (86.0)(B139) [57] {FA19}		
Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
0	5	4.7	0	4.7	5.6	0	5.6	3.8	0	3.9	4.6	0	6	2.8	0	3	4.9	0	4.9	4.5	0	4.6	4.8	0	5
0	10.7	2.6	0	7.4	3.4	0	8.3	3.3	0	7.1	2.9	0.1	9.7	1.9	0	4.9	2.9	0.1	7.7	2.3	0	6.9	3.2	0.1	8.1
0.1	13.3	2.7	0.2	9.9	2	0.1	10.2	1.6	0	8.7	1.3	0.2	10.8	1.8	0	6.7	1.2	0	8.9	2.1	0.4	8.9	1.9	0.2	9.7
0	16.1	0.7	0.1	10.5	1	0	11.2	1.5	0.1	10.2	2.3	0	12.6	1.5	0	8.2	1.3	0	10.2	1.2	0	9.7	1.3	0.1	10.9
0.3	19.5	1.5	0.3	11.8	3.9	0.3	14.8	2.5	0.1	12.6	1.5	0.2	13.9	1.9	0.2	9.9	1.2	0.4	11	2.1	0.5	11.3	1.7	0.3	12.4
0.3	20.9	0.8	0.1	12.5	1.4	0.2	16	1.1	0.2	13.4	2	0.2	15.7	1.9	0.2	11.6	1.7	0.4	12.3	2	0.4	12.9	1.7	0.2	13.9
0.1	22.7	1.1	0	13.6	0.9	0.3	16.6	0.8	0.1	14.1	1.2	0.1	16.9	1	0	12.6	1.6	0.2	13.7	0.7	0	13.6	0.9	0.2	14.6
0	23.8	0.9	0.1	14.5	1.1	0.1	17.6	0.8	0.1	14.8	0.7	0.1	17.5	0.9	0	13.6	0.3	0.2	13.8	0.7	0.1	14.2	0.8	0.1	15.4
0.9	25.5	2.5	0.7	16.3	2.3	1.1	18.7	1.5	0.5	15.9	2.6	0.7	19.4	1.6	0.5	14.6	1.9	0.9	14.8	1.5	0.9	14.8	1.6	1.1	15.9
0.9	29.1	2.7	0.3	18.7	3.1	1.2	20.6	3.9	0.6	19.2	3.4	0.6	22.2	3.8	0.9	17.6	3.9	1.3	17.4	3.9	0.9	17.8	4.5	0.8	19.7
0.1	31.6	1.8	0.3	20.3	2.3	0.3	22.6	2.2	0	21.4	1.9	0.2	23.9	2.4	0.2	19.8	2.3	0.1	19.6	2	0.2	19.6	2.4	0.8	21.2
0.2	34	4.3	0.1	24.5	1.9	0.2	24.3	2.2	0.1	23.5	2.1	0.5	25.5	1.6	0.4	21.1	1.9	0.9	20.6	1.7	0.5	20.8	1.6	0.9	21.9
0.5	35.1	1.8	0.3	26	1.8	0.3	25.8	1.6	0.3	24.9	1.8	0.4	26.9	1.9	0.6	22.4	1.8	0.8	21.6	1.6	0.6	21.9	1.7	0.6	23
1.7	34.9	1	0.8	26.2	1	1	25.7	0.7	0.8	24.8	1	0.6	27.3	1.2	0.5	23.1	1.3	0.4	22.5	1.5	0.6	22.8	1.8	0.6	24.1
0.3	34.7	0.1	0.1	26.2	0.5	0.3	25.9	0.1	0.3	24.6	0.1	0.5	27	0.2	0.1	23.2	0.2	0.2	22.5	0	0.3	22.6	0.1	0.3	23.8
0	34.7	0.5	0.2	26.5	0.2	0	26	0.1	0.2	24.5	0.1	0.1	26.9	0	0	23.2	0.1	0.6	22	0.1	0.1	22.5	0.1	0.2	23.8
2	34	1.6	0.9	27.3	1.1	1.1	26.1	1	1.1	24.5	1	1.2	26.7	1.2	0.8	23.7	1	1.8	21.2	0.6	1.5	21.7	1	3	21.8
0	34.1	0	0	27.3	0.3	0.1	26.3	0.1	0.1	24.6	0.5	0.1	27.1	0.1	0.1	23.7	0.5	0	21.7	0.4	0.1	22	0.6	0.3	22.1
0.5	35.5	2.3	0.5	29.1	1.1	0.3	27.1	1.9	0.9	25.5	1.6	0.6	28	2	0.8	24.9	1.3	0.9	22.1	1.3	0.5	22.8	1.4	0.9	22.6
1.1	35.9	1.6	0.4	30.4	1.5	0.6	28.1	1.5	0.7	26.3	1.5	0.7	28.9	1.7	0.9	25.7	1.5	0.5	23.1	1.9	1.5	23.1	1.5	1	23.1
0.3	36.5	1	0.5	30.8	1.1	0.3	28.9	0.8	0.5	26.6	0.9	0.3	29.5	0.7	0.5	25.9	1.5	0.7	23.9	1.2	0.9	23.4	0.6	0.2	23.6
0.5	38.1	0.8	1.1	30.5	2.4	0.6	30.6	1.6	0.8	27.4	1.8	0.7	30.6	1.7	0.7	26.9	2.6	1.1	25.4	2.4	0.7	25.2	2.2	1	24.8
0.6	37.6	0	0.6	29.9	0.2	0.8	30	0.5	0.9	26.9	0.1	0.6	30.1	0.6	0.5	27	0.5	0.5	25.4	0.3	0.6	24.9	0.6	0.4	25
7.5	30.4	0.4	6.4	23.9	0.5	7.2	23.4	0.5	6.1	21.4	0.8	6.3	24.6	1.5	5.9	22.6	1	5.1	21.3	1	6.4	19.4	1.8	5.7	21.1
15.9	16.5	2.3	12.5	13.7	2.6	12.4	13.8	2.5	10.9	13	3.8	11.3	17.1	4.1	12.9	13.7	4.9	8.9	17.3	5.9	9.9	15.4	6.3	10.1	17.5
4.8	12.1	0.2	4.5	9.5	0.3	3.2	10.9	0.4	2.6	10.9	0.7	3.2	14.6	1.1	2.6	12.2	0.8	1.4	16.7	0.9	1.4	14.9	1.9	1.2	18.2
0.2	11.9	0	0	9.5	0.1	0.1	10.9	0.1	0.1	10.8	0.2	0.1	14.7	0.1	0.2	12.1	0.3	0.1	16.9	0.1	0	15	0.5	0.1	18.6
0.2	12.1	0	0	9.5	0.4	0.2	11	0.3	0.3	10.9	0.4	1.1	14	0.1	0.1	12	0.2	0.4	16.7	0.3	0.1	15.3	0.4	0.6	18.4
1.4	11.7	1.5	0.7	10.3	0.5	1.1	10.5	0.4	0.7	10.6	0.5	1	13.5	0.4	0.9	11.5	0.7	1.6	15.8	0.6	0.9	15	0.6	0.7	18.3
0.9	11.5	1.1	0.2	11.2	0.7	0.7	10.5	0.5	0.6	10.5	0.6	0.8	13.2	0.6	0.2	11.9	1.1	0.6	16.3	0.5	0.6	14.9	1.3	1.2	18.4
0.3	11.5	0.2	0	11.4	0.2	0	10.6	0.2	0	10.7	0.2	0.3	13.1	0.2	0.1	12.1	0.7	0	17	0.1	0.2	14.9	0.2	0.7	17.9
0.1	11.4	0	0	11.4	0	0	10.6	0.1	0.1	10.7	0.1	1	12.2	0.2	0.1	12.2	0	0.1	16.9	0.1	0.1	14.9	0.1	0.2	17.8
1.4	10.5	0.6	0.3	11.7	0.4	1.7	9.3	0.4	1.6	9.4	1	1.5	11.8	0.8	1.2	11.8	1.1	3.2	14.8	0.8	2.6	13.2	1.5	2.6	16.7
0.2	11.1	0.9	0.3	12.4	0.2	0.3	9.1	0.6	0.4	9.6	0.6	0.3	12.1	0.6	0.9	11.5	0.5	1.4	13.9	1.5	0.6	14	1.3	0.7	17.2
0.3	11.2	0.5	0.4	12.5	0.8	0.6	9.3	0.6	0.4	9.8	0.8	0.7	12.1	0.6	0.4	11.8	1.8	0.4	15.3	2.7	0.6	16.1	2.4	0.5	19.1
0.6	11.3	0.8	1.1	12.2	0.6	0.5	9.5	0.6	0.5	9.9	0.6	0.5	12.3	0.6	0.5	11.9	0.3	0.7	14.9	1	0.5	16.6	1.4	0.5	19.9
0.1	11.1	0.5	0.1	12.6	0.1	0.2	9.4	0.2	0.2	9.9	0.3	0.5	12.1	0.2	0.1	12.1	0.6	0.5	15	0.7	0.2	17.1	0.8	0.5	20.2
0.1	11.5	0.8	0.3	13.2	0.2	0.2	9.2	0.2	0.5	9.7	0.5	0.5	12.1	0.2	0.4	11.9	0.2	0.8	14.4	0.5	1.1	16.9	0.1	1.3	19.1
0	11.6	0.4	0.1	13.5	0.1	0	9.6	0.1	0.3	9.5	0.1	0.1	12.1	0.1	0.4	11.6	0.2	0.5	14.1	0.3	2.1	14.8	0.2	0.4	18.9
0.4	11.3	1.1	0.5	14	0.4	0.3	9.7	1.9	0.4	10.9	0.5	0.5	12.1	0.6	1.1	11.2	0.8	0.9	14	0.8	0.9	14.7	0.6	1.4	18.1
0.5	10.9	0.2	0.2	14	0.1	0.2	9.5	0.2	0.1	10.9	0.1	0.4	11.8	0.2	1.2	10.2	0.5	0.6	13.9	0.2	1.5	13.4	0.1	1.4	16.8
2.5	8.5	0	1.7	12.3	0	0.8	8.7	0	0.6	10.4	0	0.5	11.3	0	0.2	9.9	0	1.5	12.4	0	0.3	13	0.1	0.6	16.2
8.5	0	0	12.3	0	0	8.7	0	0	10.4	0	0	10	1.3	0	9.9	0	0	12.4	0	0	12.9	0.4	0	16.1	0.1
	38.1			30.8			30.6			27.4			30.6			27			25.4			25.2			25
56.3		48.5	49.2		48.3	47.6		44.9	45.2		48.7	49.3		46.6	47.2		53.1	53.1		54	54.2		59.6	59.8	

Trip (RouteVar)(Block) [Observations]

13:25 (86.0)(B141) [65] {FA19}			13:45 (86.0)(B142) [12] {FA19}			14:05 (86.0)(B143) [37] {FA19}			14:20 (86.0)(B144) [42] {FA19}			14:50 (86.0)(B145) [22] {FA19}			15:10 (86.0)(B146) [8] {FA19}			15:28 (86.0)(B141) [62] {FA19}			15:50 (86.0)(B140) [21] {FA19}			16:07 (86.0)(B147) [1	
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off
3.8	0	3.9	4.6	0	4.6	4.9	0	4.9	6	0	6.1	9.3	0	9.3	5.8	0	6.1	8.3	0	8.3	10.2	0	10.2	7.8	0
2.4	0	6.4	1.6	0	6.2	2	0.1	6.8	1.7	0.1	7.7	2.7	0	12	3	0	9.1	2.5	0	10.8	3	0	13.2	2	0
1	0.1	7.2	1	0.4	6.8	1.2	0.6	7.5	0.9	0.2	8.4	1.6	0.1	13.5	1.4	0.3	10.3	1.6	0.2	12.3	1.3	0.2	14.4	0.7	0
0.8	0	8	1.2	0	7.9	1.1	0	8.6	2.2	0	10.5	1	0.1	14.3	1	0.1	11.1	1.5	0.1	13.7	0.8	0.1	15.1	1.4	0.2
1.2	0.3	9	0.8	0.7	8.1	1.3	0.3	9.6	1.3	0.2	11.6	1.1	0.5	15	0.4	0.5	11	0.6	0.6	13.8	0.8	0.6	15.3	1.5	0.6
1.1	0.1	10	0.7	0.2	8.6	1.3	0.2	10.7	1.2	0	12.8	2.2	0.6	16.6	0.6	0.4	11.3	1.3	0.5	14.5	1.1	0.6	15.8	1.3	0.3
0.3	0	10.2	0.6	0	9.2	0.7	0.1	11.3	0.4	0	13.2	0.9	0	17.5	1.3	0	12.5	0.5	0	14.9	0.4	0.4	15.8	0.3	0.1
0.6	0	10.8	0.8	0	9.9	0.2	0.1	11.5	0.3	0.2	13.3	0.8	0.2	18.1	1.6	0.1	14	0.5	0.2	15.2	0.2	0.3	15.8	0.2	0
1	0.8	11	0.9	0.8	10	1.2	0.9	11.8	1.4	0.5	14.1	2.5	1.6	19	1.9	1	14.9	3	1.1	17.2	1.8	1.2	16.4	1.4	1.7
3	0.6	13.4	3.2	0.7	12.5	3.1	0.6	14.3	2.6	0.9	15.8	5.5	2	22.6	8.5	1.5	21.9	10.2	1.2	26.1	6	1.1	21.3	3.7	1.1
1.2	0.3	14.3	1	0.4	13.1	1.9	0.2	15.9	1	0.2	16.7	2.5	0.2	25	2.5	0.1	24.3	1.4	0.4	27.2	2.8	0.3	23.8	2.2	0.9
0.9	0.4	14.9	0.5	0.3	13.3	0.9	0.6	16.2	0.7	0.4	17	1.8	0.9	25.9	1	1.1	24.1	1	1.9	26.3	0.9	2.2	22.5	1	0.5
1	0.5	15.4	0.6	0.3	13.7	1.4	0.4	17.2	0.5	0.3	17.2	1.9	1.3	26.5	2.1	0.8	25.5	3.4	2	27.8	2.4	1.3	23.6	1.4	0.3
1.1	0.4	16.1	1.2	1	13.8	1.7	0.4	18.5	2.8	0.3	19.7	5	0.6	30.9	4.6	1	29.1	5.9	0.9	32.8	5	0.3	28.3	4.2	0.3
0	0.1	16.1	0	0.1	13.8	0	0.2	18.3	0.2	0.1	19.8	3.2	0.9	33.2	0.5	0	29.6	0.2	0.2	32.7	0.2	0.6	27.9	0.1	0.1
0.1	0.2	15.9	0.1	0.2	13.7	0	0.2	18.1	0	0.2	19.6	0.5	0.4	33.3	0.1	0.4	29.4	0.2	0.1	32.7	0.4	0.1	28.2	0.3	0.4
1	1.4	15.5	0.8	1.4	13	1	1.1	18	1.5	0.9	20.2	2.8	3.7	32.4	1.5	1.3	29.6	1.6	2.3	32	3.3	1.3	30.2	1.8	1
0.3	0.1	15.7	0.7	0.3	13.3	0.6	0.1	18.5	0.6	0	20.8	1	0.3	33.1	0.9	0.3	30.3	0.7	0.2	32.5	0.8	0.2	30.8	0.5	0
0.8	0.4	16	3.2	0.2	16.3	0.8	0.6	18.6	1	2.8	19.1	0.8	1.8	32.1	2.3	1.3	31.3	0.9	3.4	29.9	1.2	1.8	30.2	0.9	1.2
1.4	0.5	16.9	1.4	0.7	17.1	2.1	0.8	19.9	1.9	0.6	20.4	5.9	1.9	36.1	4.4	2.5	33.1	3	2.1	30.8	5.4	1.3	34.3	3.1	0.8
0.5	0.5	17	0.5	0.4	17.2	0.7	0.4	20.1	0.5	0.4	20.4	0.8	1	36	0.9	0.6	33.4	1	1.9	29.9	1.1	1.1	34.3	1.9	0.4
1.1	0.6	17.4	1.5	0.7	18	2.1	0.4	21.8	1.6	0.6	21.4	2.2	0.7	37.5	2.9	1.5	34.8	2.6	0.8	31.7	2.7	1	36	2.1	1
0.5	0.3	17.6	1	0.6	18.4	0.3	0.1	21.9	1.4	0.1	22.7	1.3	0.5	38.2	1.4	0.6	35.5	2.6	0.2	34.1	3	0.6	38.5	3.3	0.1
0.9	3.8	14.7	1.5	3.5	16.4	1.5	4.8	18.6	0.6	4.1	19.2	2	2.8	37.4	4.6	7.1	33	1.8	4.7	31.2	2.4	5	35.8	1.6	3.9
4.6	7.5	11.8	4.4	9.2	11.7	6	8.5	16.1	5.3	9.9	14.6	11.8	19.2	29.9	9.4	13.1	29.3	9	14.8	25.5	11.2	15.8	31.3	11.5	11.6
1.3	0.8	12.3	0.9	0.8	11.8	1.6	1	16.7	1.5	1.7	14.4	4.6	0.9	33.6	2.5	0.3	31.5	2	0.6	26.9	4.5	0.8	35	2.7	1.9
0.1	0.1	12.2	0.5	0.3	12	0.2	0.1	16.9	0.2	0	14.6	0.3	0.3	33.7	0	0	31.5	0.5	0.1	27.3	0.7	0.2	35.5	0.3	0
0.5	0.3	12.4	0.8	0.3	12.6	0.8	0.6	17.1	0.6	0.2	15	1.4	0.1	35	0.8	0	32.3	0.8	0.3	27.8	0.6	0.4	35.8	0.4	0.1
0.2	0.5	12.2	0.4	0.5	12.5	1.6	0.7	17.9	0.6	0.6	15	1.8	1.8	34.9	2.3	0.8	33.8	1.3	1	28.1	1.7	2	35.5	1.6	2
0.6	0.5	12.2	1.3	0.3	13.4	0.4	0.4	18	0.5	0.8	14.6	1	1.6	34.3	1.3	0.9	34.1	0.8	1	27.9	0.5	1.7	34.3	0.8	1.3
0.2	0.2	12.1	0	0.3	13.2	0.2	0.1	18.1	0.1	0.1	14.6	0.1	0.4	34	0	0.4	33.8	0	0.5	27.4	0.1	0.6	33.9	0.4	0.1
0.2	0.4	11.8	1	0.4	13.8	4.6	0.1	22.6	1.4	0	15.9	0.6	0.1	34.5	0.4	0.3	33.9	1.1	0.2	28.4	0.3	0.2	34	0.1	0.8
1	1.8	11	0.8	1.7	12.8	2.3	3	21.9	1.7	2.3	15.3	2.3	4.5	32.3	0.4	4.3	30	1	2.9	26.4	1.8	4.1	31.7	1.8	2.9
1	0.2	11.8	1.3	0.2	13.9	1.1	0.4	22.6	1.5	0.4	16.5	3.1	0.9	34.6	1.3	0.9	30.4	1.1	0.5	27.1	1	1	31.7	1.6	0.7
1.2	0.5	12.4	1	0.4	14.5	2	0.6	24	0.7	0.5	16.6	2.9	0.6	36.9	1	0.6	30.8	1.6	0.5	28.2	1.9	0.9	32.7	1.4	0.7
0.5	0.3	12.6	0.4	0.3	14.7	0.8	1.9	22.9	0.8	0.7	16.7	2	0.6	38.3	1.3	0.5	31.5	1.3	0.5	29	1.4	1.4	32.7	2.5	0.7
0.3	0.2	12.8	0.3	0.3	14.7	0.7	0.4	23.2	0.4	0.5	16.6	0.8	0.2	38.9	0.3	0.5	31.3	0.7	0.4	29.4	0.9	0.1	33.5	1.7	0.8
0.1	1	12	0.3	1	13.9	0.2	1.9	21.4	0.2	1.1	15.6	0.2	2.4	36.6	0	1.6	29.6	0.3	1.8	27.8	0.2	2.5	31.3	0	2
0.1	0.3	11.8	0.4	0.3	14	0.3	1.1	20.8	0.2	0.5	15.7	0.5	1.7	35.5	0	0.8	28.9	0.2	0.7	27.3	0.1	1	30.5	0.2	1.4
0.3	0.6	11.4	0.9	1.7	13.3	0.7	1.7	19.8	0.2	1.2	14.5	0.3	1.4	34.4	0.4	1.1	28.1	0.5	1	26.8	0.5	2.4	28.6	0.2	1.1
0.2	0.3	11.3	0.4	0.9	12.8	0.3	0.7	19.5	0.2	0.5	14.2	0	1.1	33.3	0.1	1.3	27	0.3	1.2	25.8	0	0.9	27.7	0.4	0.6
0	0.3	11	0	0.1	12.7	0.1	0.5	19.1	0	0.3	14	0.1	0.6	32.8	0	0.9	26.1	0	0.6	25.2	0	0.7	25.8	0.1	1
0	11	0	0	12.7	0	0	19.1	0	0	14	0	0	32.8	0	0	26.1	0	0	25.2	0	0	26.1	0	0	27.8
		17.6			18.4			24			22.7			38.9			35.5			34.1			38.5		
38.4	38.2		44.5	44.6		55.9	56		48.4	48.4		93.1	93.3		76.7	76.9		78.8	78.8		84.6	84.4		72.4	72.4

10] {FA19}	16:25 (86.0)(B127) [9] {FA19}			16:43 (86.0)(B128) [51] {FA19}			17:01 (86.0)(B129) [12] {FA19}			17:19 (86.0)(B109) [55] {FA19}			17:37 (86.0)(B130) [19] {FA19}			17:55 (86.0)(B148) [17] {FA19}			18:13 (86.0)(B131) [40] {FA19}			18:28 (86.0)(B125) [16] {FA19}			18:41 (86.
Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On
7.8	9.4	0	9.4	12.7	0	12.7	13.3	0	13.3	12.5	0	12.5	14.8	0	14.8	13.2	0	13.4	12.3	0	13.7	10.5	0	10.5	6.3
9.8	2.4	0	11.9	2.1	0.1	14.8	3.7	0.1	16.9	4.3	0.2	16.6	2.7	0.1	15.4	3.2	0	16.6	3	0.3	16.6	3.1	0.1	13.6	2.9
10.5	1	0.4	12.4	1.6	0.4	16	1.4	0.2	18.2	1.1	0.6	17.5	1.1	0.3	16.2	1.1	0.6	17.1	1.2	0.4	18.2	1.9	0.2	15.3	0.8
11.7	2.8	0.4	14.8	1.9	0.3	17.6	1.7	0.2	19.7	4.1	0.3	21.3	1.2	1.3	16.1	1.6	0.2	18.5	1.7	0.4	19.5	0.9	0.4	15.8	1.2
12.6	1.1	1.1	14.8	0.9	0.9	17.5	1.3	1.6	19.4	1.2	0.8	21.6	0.9	0.9	16.1	1.9	1.2	19.1	1.3	1.5	19.4	0.9	1.6	15.1	0.7
13.6	0.4	0.3	14.9	0.8	0.7	17.6	1.2	0.5	20.1	1.1	0.8	22	0.7	0.6	16.2	0.6	0.6	19.2	0.7	1	19.1	0.3	0.4	14.9	0.4
13.8	0.2	0.2	14.9	0.2	0.2	17.6	0.5	0.3	20.3	0.4	0.3	22.1	0.3	0.8	15.7	0.2	0.5	18.9	0.5	0.6	19	0.4	0.4	14.9	0.3
14	0.4	0.2	15.1	0.7	1	17.3	0.6	0.5	20.3	0.8	0.6	22.3	0.4	0.5	15.6	0.9	1	18.9	0.7	0.6	19.1	0.6	0.5	14.9	0.4
13.7	1.8	0.3	16.6	1.2	0.8	17.6	1.1	1	20.4	1.3	1	22.6	1.4	0.8	16.1	1.1	0.6	19.4	1.4	0.5	19.9	0.6	0.5	15.1	0.8
16.3	3.8	1.4	18.9	4.5	1	21.1	3.7	0.8	23.3	5.3	1.2	26.7	4.2	1.1	19.3	4	1.8	21.6	4.9	1.5	23.3	2.3	2.1	15.3	1.7
17.6	1.4	1.3	19	1.3	0.9	21.5	1.1	0.5	23.8	1.6	1.9	26.3	0.7	0.8	19.1	1.3	0.9	22	1.5	0.6	24.3	0.8	0.4	15.7	0.7
18.1	2.1	0.7	20.4	0.6	1.3	20.9	1.6	1	24.4	1.3	1.9	25.7	0.3	1.5	17.9	0.4	1.8	20.6	1	1.5	23.8	1.4	1.2	15.9	0.4
19.2	1.6	1.1	20.9	2.3	1	22.2	1.8	1.5	24.8	1.5	1.9	25.3	0.3	1.2	17	1.2	1.1	20.6	1	0.7	24.2	0.3	0.5	15.7	0.9
23.1	5.9	0.7	26.1	6.1	0.8	27.5	11.2	1	34.9	7.2	0.6	31.9	2.8	0.6	19.2	4.9	0.6	24.9	5.2	0.7	28.7	3.9	0.6	18.9	2.1
23.1	0.2	0.1	26.2	0.3	0.1	27.6	0.9	0.7	35.2	0.5	0.5	31.9	0	0.5	18.7	0.2	0.7	24.4	0	0.5	28.2	0.1	0.6	18.4	0
23	0	0.2	26	0.1	0.2	27.5	0	0.1	35.1	0.3	0.4	31.8	0.2	0.7	18.2	0.1	0.4	24.1	0.1	0.2	28.1	0.1	0	18.5	0
23.8	1.3	1.4	25.9	1.4	1.9	27	2.3	1.7	35.7	2.5	1.9	32.3	1.2	1.1	18.2	1.2	0.8	24.5	1.1	1	28.1	0.8	0.9	18.4	0.5
24.3	1.2	0.1	27	1.5	1	27.5	2.1	0.8	36.9	2	0.5	33.9	1.1	0.6	18.6	2	0.5	26.1	0.9	0.3	28.7	1.2	0.1	19.4	0.3
24	1.3	1.8	26.6	0.9	0.9	27.6	0.8	1.3	36.4	1.9	0.9	34.8	1.4	0.7	19.3	1.2	0.6	26.7	0.6	1.2	28.1	0.3	1.3	18.5	0.6
26.3	4.2	1.2	29.6	3.6	1.3	29.9	2.9	2.1	37.3	3.3	1.1	37	1.6	1.4	19.5	3.2	0.9	28.9	2.5	0.8	29.8	1.4	0.6	19.3	0.9
27.8	1.7	0.2	31	3	0.4	32.5	1.8	0.5	38.5	1.2	0.9	37.3	0.5	0.5	19.5	1.6	0.5	30.1	0.8	1.1	29.6	0.8	1.4	18.7	0.8
28.9	2.7	0.6	33.1	3.5	0.6	35.3	6.8	0.3	44.9	3.9	1.2	40.1	2.3	0.7	21.1	2.9	0.5	32.5	2.1	1.2	30.5	2.6	0.6	20.7	1.8
32.1	4.8	0.6	37.3	3.2	0.3	38.3	2.7	0.8	46.8	2	0.4	41.6	1.7	0.2	22.6	1.9	0.3	34.1	1.3	0.2	31.6	0.9	0.3	21.3	0.6
29.8	3.1	5.9	34.6	1.9	4.7	35.5	2.2	6.8	42.2	2.5	7.1	37.1	1.8	4.8	19.6	1	4.2	30.9	1	5.3	27.3	1.2	3.7	18.8	0.4
29.7	12.7	13.7	33.6	18.3	16.4	37.4	16.3	14.8	43.8	16.3	17.5	35.9	9.5	7.9	22.9	13.1	14.1	29.9	11.1	11.2	27.2	10.3	8.4	20.7	6.4
30.5	7	0.7	39.9	7.2	1.4	43.4	6.4	1.3	48.9	4.2	0.9	39.2	1.7	0.7	23.9	2.4	0.9	31.4	2.7	0.7	29.2	1.9	0.3	22.3	2.2
30.8	0.9	0	40.8	0.9	0.2	44.2	0.4	0.2	49.2	0.7	0.2	39.7	0.4	0.2	24.2	0.4	0.2	31.5	0.3	0	29.5	0.4	0.1	22.6	0.1
31.1	0.3	0.3	40.8	1	0.5	44.7	0.7	0.2	49.7	0.6	0.7	39.6	0.3	0.4	24	0.6	0.5	31.6	0.3	0.2	29.2	0.2	0.4	22.4	0.1
30.7	3	2	41.8	2.1	1.7	45.1	2.4	1.3	50.8	3.2	2.2	40.6	1.4	1.9	23.6	1.1	2.9	29.9	1.1	2.3	28.4	1.5	1.6	22.4	0.6
30.2	1.1	1	41.9	1.1	1.9	44.3	1.7	2.3	50.2	1	2.7	39	0.8	2.9	21.5	1.1	2.5	28.4	0.5	2.5	26.3	0.6	2.3	20.7	0.2
30.5	0.7	0.8	41.8	0.9	0.9	44.3	0.2	0.7	49.7	0.4	1.1	38.3	0.2	1	20.7	0.1	0.8	27.6	0.2	0.7	25.8	0.1	0.5	20.3	0
29.8	0.3	0.7	41.4	0.5	0.7	44	0.5	0.5	49.7	0.3	0.4	38.3	0.3	0.5	20.4	0.1	0.8	26.9	0	0.7	25.2	0.1	0.3	20	0
28.7	0.7	7.1	35	1.7	5.5	40.3	1	6.9	43.8	0.8	5.7	33.3	0.4	3.3	17.6	0.3	5	22.2	0.6	5.2	20.6	0.4	4.8	15.6	0.2
29.6	1.1	0.9	35.2	1.5	2.5	39.3	1.3	1.7	43.3	0.9	1.2	33.1	0.3	0.6	17.3	1.1	1.2	22.2	0.9	0.9	20.5	0.3	0.9	15.1	0.6
30.3	1	1.1	35.1	1.3	1.2	39.4	0.8	1.1	43.1	1.3	1.3	33	0.8	0.6	17.5	0.6	0.9	21.8	1	0.7	20.9	0.3	1.1	14.3	0.3
32.1	1.4	2.2	34.3	0.9	1.2	39.2	0.6	1.4	42.3	0.8	0.8	33	0.7	0.9	17.3	0.4	0.6	21.6	0.5	0.9	20.5	0.5	0.6	14.2	0.4
33	1.3	0.4	35.2	0.7	0.4	39.5	1.3	0.5	43	0.6	0.2	33.3	0.1	0.5	16.9	0.3	0.2	21.6	0.1	0.4	20.1	0.2	0.2	14.2	0.2
31	0.2	3	32.4	0.3	3.5	36.5	0.2	4.6	38.6	0.3	4.4	29.2	0.1	1.7	15.9	0.1	3.3	18.4	0.2	3	17.3	0.1	2.6	11.6	0.2
29.8	0.7	1.4	31.7	0.4	1.4	35.4	0.1	1.7	37	0.1	1.5	27.9	0.1	0.5	14.9	0.1	0.5	18	0.2	1.2	16.4	0.3	0.9	10.9	0
28.9	0	2	29.7	0.4	2	33.7	0.3	1.9	35.3	0.2	1.3	26.8	0	0.8	14.2	0.2	1.2	17.1	0	1.1	15.3	0	1.2	9.8	0.1
28.7	0	1.1	28.6	0.1	1.2	32.6	0.1	0.9	34.5	0	1.4	25.4	0	1.1	13.1	0	2.2	14.9	0.1	1.3	14	0.1	0.6	9.3	0.1
27.8	0	2.1	26.4	0	0.7	31.9	0.1	1.4	33.2	0	0.4	25	0	0.8	12.3	0	0.9	13.9	0	0.7	13.3	0.1	0.4	8.9	0
0	0	26.4	0	0	31.6	0.3	0	33.2	0	0	24.9	0.1	0	12.3	0.1	0	13.9	0	0	12.9	0.4	0	8.9	0	0
33			41.9			45.1			50.8			41.6			24.2			34.1			31.6			22.6	
	87.2	87.1		95.6	95.7		101.1	100.9		95.5	95.8		60.7	60.3		72.9	72.9		66.6	68.7		54.7	54.5		37.2

0)(B126) [32] {FA19}		18:54 (86.0)(B127) [9] {FA19}			19:06 (86.0)(B128) [49] {FA19}			19:18 (86.0)(B129) [12] {FA19}			19:37 (86.0)(B130) [19] {FA19}			20:00 (86.0)(B131) [40] {FA19}			20:27 (86.0)(B126) [31] {FA19}			20:55 (86.0)(B129) [13] {FA19}			21:25 (86.0)(B130) [19] {FA19}		
Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
0	6.5	4.2	0	4.2	6.6	0	6.6	5.6	0	5.6	3.7	0	3.7	3.9	0	3.9	5.1	0	5.1	4.3	0	4.3	4.7	0	4.7
0.1	9.3	1.2	0	5.4	1.3	0	7.8	1.6	0	7.2	2.3	0	6	1.9	0	5.8	2	0.1	7	1.3	0	5.6	1.6	0	6.4
0.2	9.9	0.6	0.6	5.4	1.1	0.2	8.7	0.9	0.2	7.9	0.9	0.2	6.8	1.1	0.1	6.8	0.7	0.2	7.6	0.4	0.1	5.9	0.2	0.2	6.4
0.4	10.6	0.9	0.1	6.2	0.9	0.2	9.4	0.8	0.2	8.6	0.9	0.1	7.6	0.6	0.2	7.1	1.2	0.1	8.6	0.5	0.1	6.3	0.6	0.2	6.8
0.9	10.4	0.4	0.7	6	0.7	0.9	9.2	0.5	0.6	8.5	0.7	0.3	8.1	0.9	0.2	7.8	0.8	0.2	9.3	0.3	0	6.6	0.8	0.1	7.5
0.4	10.4	0.3	1.2	5.1	0.4	0.5	9.1	0.3	0.5	8.3	0.2	0.2	8.1	0.2	0.3	7.7	0.2	0.5	9	1.1	0.6	7.1	0.4	0.4	7.5
0.3	10.4	0	0.1	5	0.4	0.2	9.2	0.2	0.3	8.3	0.3	0.1	8.4	0.2	0.1	7.8	0.4	0.2	9.3	0.2	0.1	7.2	0.1	0.1	7.5
0.1	10.7	0.3	0.2	5.1	0.4	0.2	9.4	0.1	0.2	8.2	0.2	0.2	8.4	0.2	0.2	7.8	0.3	0.2	9.4	0.1	0.1	7.2	0.6	0	8.1
0.5	11	0.3	0.1	5.3	0.5	0.4	9.5	0.3	0.4	8	0.2	0.4	8.2	0.3	0.3	7.7	0.3	0.1	9.5	0.3	0.1	7.4	0.1	0.1	8.2
0.9	12	2.2	0.3	7.2	2.1	0.3	11.2	2.5	0.3	10.3	2.3	0.6	9.9	2.3	0.5	9.6	2.2	0.7	11	0.6	0.2	7.8	3.3	0.4	11
0.7	12	1.1	0	8.3	0.6	0.6	11.2	0.2	0.3	10.2	1	0.1	10.8	0.3	0.2	9.6	0.9	0.3	11.5	0.7	0.5	8	0.2	0.5	10.7
0.9	11.5	0.8	0.2	8.9	0.7	0.6	11.4	0.7	0.4	10.4	0.5	0.8	10.5	0.3	0.7	9.3	0.3	0.7	11.2	0.2	0.4	7.8	0.1	0.3	10.5
0.4	12.1	0.8	0.9	8.8	0.5	0.5	11.4	0	0.6	9.8	0.5	0.2	10.9	0.6	0.3	9.6	1	0.6	11.6	0.8	0.2	8.5	0.6	0.7	10.4
0.2	13.9	1.9	0.2	10.4	1.8	0.3	12.8	1.2	0.3	10.8	1	0.3	11.6	1.2	0.6	10.5	1	0.3	12.3	1.1	0.2	9.5	1	0.1	11.3
0.2	13.7	0.3	0	10.8	0	0.1	12.8	0	0	10.8	0	0.1	11.5	0	0.1	10.4	0	0.1	12.2	0	0.1	9.4	0	0	11.3
0	13.7	0	0.1	10.7	0	0.4	12.4	0	0.3	10.4	0	0.1	11.4	0	0.1	10.3	0	0.2	12	0	0.2	9.2	0	0	11.3
0.6	13.6	0.4	0.6	10.6	0.3	1	11.7	0.8	1.3	9.8	0.4	0.6	11.2	0.4	0.9	9.9	0.2	0.6	11.6	0.2	0.5	8.8	0.2	0.5	11
0.2	13.7	0.8	0.1	11.2	0.3	0.1	11.9	0.1	0.1	9.8	0.2	0.3	11.1	0.1	0	9.9	0.1	0.1	11.5	0.2	0	9.1	0.4	0	11.4
0.7	13.3	0.6	0.4	11.3	0.9	0.5	12.3	0.2	0	10	0.3	0.1	11.3	0.8	0.2	10.6	0.3	0.2	11.6	0.2	0.4	8.9	1.1	0.2	12.2
0.3	13.9	0.8	0	12.1	0.9	0.6	12.6	0.4	0.3	10.2	1.1	0.8	11.5	1	0.4	11.1	1.2	0.2	12.6	1.4	0.1	10.2	1.7	0.5	13.4
0.4	14.3	0.6	0.1	12.6	0.4	0.7	12.3	0.3	0.6	9.9	0.8	0.6	11.7	0.8	0.4	11.6	0.5	0.4	12.7	0.8	0.2	10.9	0.8	0.3	13.9
0.2	15.9	1.6	0.2	13.9	1.3	0.3	13.3	1.8	0.5	11.3	2	0.3	13.5	1.5	0.5	12.5	2	0.3	14.5	0.8	0.3	11.4	0.7	0.2	14.5
0.2	16.3	0.2	0.1	14	0.5	0.1	13.7	0.1	0.2	11.2	0.4	0	13.9	0.5	0.1	12.9	1	0	15.4	0.8	0.2	12	0.6	0	15.1
2.9	13.8	2.3	2.2	14.1	0.5	2.7	11.5	0.2	2	9.3	0.3	1.6	12.6	0.5	1.4	12.1	0.7	2.4	13.8	0.5	1.6	10.8	1.2	1	15.3
5.8	14.4	7.7	5	16.8	6.4	4.4	13.5	9.3	3.8	14.8	8.6	4.4	16.8	8	4	16.2	9.5	4.5	18.8	11.4	3.8	18.4	14.7	6.6	23.5
0.5	16.1	3.6	0.6	19.8	2.3	0.3	15.5	1.6	0.4	16	2.6	0.4	19.1	3.6	0.2	19.5	2	0.1	20.6	0.5	0	18.9	1.3	0.3	24.4
0.1	16.2	0.1	0	19.9	0.2	0	15.7	0.2	0.1	16.1	0.3	0.1	19.2	0.1	0	19.6	0.1	0	20.7	0.1	0	19	0.1	0.1	24.5
0.1	16.2	0.3	0.2	20	0.1	0.1	15.7	0.3	0.4	16	0.2	0.2	19.2	0.4	0.3	19.7	0.2	0.2	20.6	0.1	0.1	19	0.2	0	24.7
1.3	15.4	0.9	2	18.9	0.7	1.3	15.1	0.6	1.9	14.7	0.3	1.3	18.3	0.7	1.5	18.9	0.5	1.9	19.3	0.4	1.1	18.3	0.2	1	23.9
1.5	14.1	0.1	1.7	17.3	0.3	1.7	13.7	0.3	1.3	13.6	0.6	1.7	17.2	0.4	1.6	17.7	1.1	1.3	19.1	0.7	1.4	17.6	0.3	1.8	22.4
0.3	13.9	0	0.3	17	0.2	0.6	13.3	0	0.5	13.1	0.2	0.5	16.9	0.1	0.6	17.2	0	1.1	18	0	0.6	17	0.1	0.7	21.7
0.1	13.8	0.1	0.2	16.9	0.2	0.1	13.3	0	0	13.1	0	0.2	16.7	0	0.4	16.8	0	0.2	17.8	0	0.2	16.8	0	0.2	21.6
2.6	11.3	0.1	2.7	14.3	0.7	2.3	11.6	0.7	1.8	12	0.5	3.2	14.1	0.4	2.8	14.5	0.4	2.9	15.3	1.1	1.9	15.9	1.6	1.9	21.2
0.7	11.3	0.1	1.1	13.3	0.2	0.6	11.2	0.3	0.7	11.7	1	0.6	14.4	0.8	0.8	14.5	0.5	0.6	15.2	0.7	0.5	16.2	0	0.5	20.7
0.3	11.3	0.3	0.9	12.8	0.6	0.6	11.1	0.3	0.9	11.1	0.8	0.6	14.6	0.5	0.3	14.8	0.8	0.8	15.2	0.8	0.2	16.8	1.2	0.7	21.1
0.4	11.3	0.2	0.3	12.7	0.5	0.4	11.2	0.3	0.6	10.8	0.5	0.4	14.7	0.3	0.8	14.2	0.5	0.5	15.1	0.1	0.2	16.7	0.1	1.2	20
0.2	11.3	0	0.6	12.1	0.2	0.2	11.2	0	0.1	10.7	0.3	0.4	14.6	0.5	0.2	14.5	0.3	0.4	14.9	0.2	0	16.8	0.1	0.4	19.7
2.5	8.9	0	2.4	9.7	0.1	2	9.3	0.2	1.5	9.3	0.6	1.7	13.5	0.1	2.3	12.3	0.1	2	13	0.1	2.9	14	0	3.4	16.3
0.3	8.6	0	0.1	9.6	0	0.5	8.9	0	0.8	8.6	0.1	0.9	12.6	0.1	0.6	11.8	0.1	0.9	12.3	0.2	0.6	13.5	0	0.6	15.7
0.6	8.1	0	1	8.6	0.1	0.5	8.4	0.1	0.2	8.5	0	0.9	11.7	0	0.9	11	0	0.8	11.5	0.1	0.6	13	0.1	0.7	15.1
0.4	7.8	0	0.6	8	0	0.7	7.8	0.1	0.8	7.8	0	0.5	11.2	0	0.8	10.2	0	0.5	11	0	0.3	12.7	0	2.4	12.7
0.3	7.5	0	0.7	7.3	0	0.3	7.4	0	0.3	7.5	0	0.2	11	0	0.3	9.9	0	1	10	0	0.2	12.5	0	0.1	12.6
7.5	0	0	7.3	0	0	7.4	0	0	7.4	0.1	0	11	0	0	9.7	0.3	0	10	0	0	12.5	0	0	12.6	0
	16.3			20			15.7			16.1			19.2			19.7			20.7			19			24.7
37.2		36.1	36.1		35.9	35.4		33.1	33.1		36.8	37.2		35.6	35.9		38.5	38.4		33.3	33.3		41	41	

22:05 (86.0)(B132) [35] {FA19}			22:45 (86.0)(B133) [3] {FA19}			23:25 (86.0)(B134) [34] {FA19}			24:05 (86.0)(B133) [3] {FA19}			24:40 (86.0)(B134) [33] {FA19}			Total		
On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load	On	Off	Load
6.7	0	6.7	2.7	0	3.3	3.3	0	3.3	3	0	3	0.6	0	0.6	339.1	0	348
2.7	0	9.3	1.7	0	5	0.7	0	4	1.3	0	4.3	0.2	0	0.7	174.5	2.2	519
0.9	0.1	10.1	0	0	5	0.1	0.1	4	0	0	4.3	0	0	0.7	79.3	9	591.5
1	0.1	11	0	0	5	0.1	0.1	4	0	0	4.3	0.2	0	1	88.6	6.8	671.9
0.5	0.2	11.3	0	0.3	4.7	0.1	0	4.1	0	0	4.3	0	0	1	94	22.9	743.8
0.3	0.3	11.3	1.3	0	6	0	0	4.1	0	0	4.3	0	0	1	59.4	15.6	787.5
0	0	11.3	0	0.3	5.7	0	0	4.1	0	0	4.3	0	0	1	47.4	8.2	826.7
0.1	0.1	11.3	0	0	5.7	0	0.1	4	0	0.7	3.7	0	0	1	53	10.2	869.9
0.1	0.6	10.8	0.3	0.3	5.7	0	0.1	3.9	0	0.3	3.3	0	0	1	89.2	35.9	922.2
1.5	0.5	11.9	0.3	0	6	2.7	0	6.6	2	0	5.3	0.1	0.1	1	193.9	42.3	1074.5
0.3	0.2	11.9	1	0	7	0.2	0.1	6.7	0	0	5.3	0	0.2	0.8	93.6	20.3	1147.1
0.2	1.5	10.6	0.3	0.3	7	0.2	0.8	6.1	0	0.3	5	0.1	0.1	0.9	96.8	33.1	1211.3
1.5	0.9	11.1	0.3	0.7	6.7	0.7	0.7	6.1	1	1.3	4.7	0	0.1	0.8	81.9	35.1	1258.9
4.6	0.4	15.3	0.3	1	6	0.4	0	6.5	0	0	4.7	0	0	0.9	121.8	33.9	1346.7
0.1	0.4	15.1	0	0.3	5.7	0	0.1	6.4	0	0	4.7	0	0	0.9	12.5	15.2	1344.2
0	0.2	14.9	0	0	5.7	0	0.1	6.4	0	0	4.7	0	0	0.9	6.1	8.5	1341.6
0.3	1.1	14.1	0.3	0	6	0.4	0.7	6	0	0	4.7	0.1	0	1	77.4	76.5	1342.7
0.2	0.3	14	0	0	6	0.1	0	6.1	0	0	4.7	0	0	1.1	33.3	9.1	1366.4
0.4	0.3	14.1	0	0	6	0.1	0.4	5.8	0	0	4.7	0	0	1.1	84.5	37.1	1413.7
1.4	0.7	14.9	0.7	0	6.7	1.1	0.1	6.9	0.3	0	5	0.5	0	1.6	113.1	43.7	1483.1
0.7	0.4	15.1	0.7	0	7.3	0.2	0.2	6.9	2	0	7	0.1	0	1.7	61.9	28.4	1516.5
1.3	0.1	16.4	1	0	8.3	1.9	0.1	8.7	0.7	0	7.7	0.4	0	2	121.9	29.7	1608.8
0.7	0	17.1	0	0	8.3	0.1	0	8.7	0	0	7.7	0.1	0	2.1	46.9	30.2	1625
1.3	0.8	17.6	2	0	10.3	2.2	1.3	9.6	0.3	0	8	0.2	0.1	2.1	62.2	282.7	1404.5
11.5	4.9	24.1	9.7	2.3	17.7	5.6	1.5	13.7	5	3.3	9.7	1.4	0.2	3.2	385.6	697.6	1094.9
1.2	0.4	25	2.3	0	20	1.4	0	15.1	1	0	10.7	0.1	0	3.3	94.9	87.9	1101.9
0.1	0	25.1	0.3	0	20.3	0	0	15.1	0	0	10.7	0	0	3.3	13.2	6.6	1108.8
0.1	0.1	25.1	0	0	20.3	0.1	0.1	15.2	0	0.3	10.3	0	0	3.3	19.4	14.3	1113.5
1.6	0.9	25.7	0	1.3	19	0.3	0.7	14.7	0	0	10.3	0.1	0.1	3.3	55.3	71.5	1098
0.4	1.3	24.8	0.7	1	18.7	0.1	0.5	14.3	0	0.3	10	0	0.2	3.2	55.1	55.2	1097.6
0.2	0.3	24.7	0	0.3	18.3	0	0.3	14	0	1	9	0	0.4	2.7	18.4	20.8	1095.3
0	0.2	24.5	0	0.3	18	0	0.2	13.8	0	0	9	0	0	2.7	20.3	13.9	1101.4
0.4	2.3	22.7	0	5	13	0.1	0.8	13.1	0	1	8	0	0.2	2.5	57.6	134.7	1024.3
1.3	0.4	23.6	0.3	0.3	13	0	0.5	12.7	0	1.7	6.3	0	0.1	2.4	41.6	32.2	1034.4
2.1	0.3	25.4	0.3	0.3	13	0.3	0.1	12.8	0	0	6.3	0	0	2.5	56.4	30.4	1060
0.4	0.9	24.9	0.3	0.7	12.7	0.3	3.5	9.7	0	1.3	5	0	0.1	2.3	40.1	36	1064.4
0.1	0.6	24.5	0	0	12.7	0.1	0.4	9.4	0	0	5	0	0.5	1.8	20.1	15.4	1068.9
0.2	2.7	22	0.7	2	11.3	0.1	1.6	7.8	0	0.7	4.3	0	0.7	1.2	21.9	85.2	1008.3
0.3	1.1	21.1	0	0.7	10.7	0	0.6	7.2	0	1.7	2.7	0	0.1	1.1	11.7	34	984.5
0	1.1	20.1	0	0	10.7	0.1	0.7	6.6	0	0	2.7	0	0.1	1.1	25	44.4	964.6
0	0.8	19.4	0	0	10.7	0.1	0.4	6.3	0	0	2.7	0	0	1.1	5.3	41.8	928.1
0	0.8	18.5	0	0	10.7	0	0.1	6.2	0	0	2.7	0	0	1.1	0.7	52.5	874.5
0	18.5	0	0	10.3	0.3	0	6.1	0.1	0	2.7	0	0	1	0.1	0	870	5.2
		25.7			20.3			15.2			10.7			3.3			1625
46.7	46.8		27.5	27.7		23.2	23.1		16.6	16.6		4.2	4.3		3174.9	3181	

Build with Mitigation Traffic Volumes Description

Under the 2025 and 2030 Build Conditions (without Mitigation), the Project trip distribution between Cattle Drive and East Drive did not consider the effects of one intersection being signalized and the other one not being signalized. Therefore, traffic was distributed with the majority of left-turning traffic exiting the Site using Cattle Drive to turn onto Western Avenue, since Cattle Drive provides a more direct route. However, with a signal at East Drive under the 2025 and 2030 Build with Mitigation Conditions, it is expected that a majority of left-turning traffic exiting the Site will use East Drive instead to take advantage of the protected movement a signal provides to minor street traffic turning left from a minor approach onto a major approach. (It should be noted that under the 2030 Conditions without Mitigation, it is already assumed that a portion of the Site generated left-turning traffic will likely use Science Drive and Stadium Road to turn left onto Western Avenue via the traffic signal at Stadium Road.)

In addition, the installation of a traffic signal at East Drive / Kresge Way could impact traffic entering the Harvard Business School. Under Existing conditions, vehicles can enter the Harvard Business School campus from Western Avenue via Kresge Way or Batten Way. However, internal to the Harvard Business School campus there is no connection between the different areas that these roadways serve. Based on conversations with Harvard Business School, if a traffic signal were to be installed at the intersection of Western Avenue at East Drive / Kresge Way, modifications would be considered within the Harvard Business School campus to allow internal connections between the different areas served by Kresge Way and Batten Way. This would allow vehicles to use either roadway to access the Harvard Business School campus instead of being limited to one roadway or the other. The benefit of this internal connection would be that vehicles entering Harvard Business School from Cattle Drive and I-90 and destined for the Batten Way area would no longer be forced to turn left from Cattle Drive onto Western Avenue and then right from Western Avenue onto Batten Way. It is likely that some drivers who do this movement would take advantage of the signal at Western Avenue at East Drive / Kresge Way by taking East Drive and traveling straight through the intersection from East Drive onto Kresge Way. The 2025 and 2030 Build with Mitigation Conditions also account for this shift in Harvard Business School traffic.

BUILD WITH MITIGATION SITE DISTRIBUTION CALCULATIONS

2025 Build Condition (Phase A)
Site Trip Distribution

		Build without Mitigation										Build with Mitigation									
		RESIDENTIAL		HOTEL		OFFICE / R&D		RETAIL / RESTAURANT		PASS BY		RESIDENTIAL		HOTEL		OFFICE / R&D		RETAIL / RESTAURANT		PASS BY	
INTERSECTION	MOVEMENT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT
12:: Western Ave at Kresge Way / East Dr / Genzyme Driveway																					
Western Ave	EB L																				
	EB T		12%		10%		10%		10%	-20%			7%		6%		6%		6%	-20%	
	EB R	7%		6%		6%		6%		20%		7%		6%		6%		6%		20%	
Western Ave	WB L	24%		14%		14%		14%		30%		24%		14%		14%		14%		30%	
	WB T	8%		5%		5%		5%		-30%		8%		5%		5%		5%		-30%	
	WB R																				
East Dr / Genzyme Driveway	NB L		8%		7%		7%		7%		30%		20%		18%		18%		18%		30%
	NB T																				
	NB R		35%		29%		29%		29%		20%		40%		33%		33%		33%		20%
13:: Western Ave at Batten Way/ Hague St																					
Western Ave	EB L																				
	EB T	37%		32%		32%		32%				37%		32%		32%		32%			
	EB R																				
Western Ave	WB L																				
	WB T		40%		36%		36%		36%				40%		36%		36%		36%		
	WB R																				
Hague St	NB L																				
	NB T																				
	NB R																				
Batten Way	SB L																				
	SB T																				
	SB R																				
15:: Western Ave at Stadium Road																					
Western Ave	EB T	37%		32%		32%		32%				37%		32%		32%		32%			
	EB R																				
Western Ave	WB L																				
	WB T		40%		36%		36%		36%				40%		36%		36%		36%		
Stadium Road	NB L																				
	NB R																				
17:: Western Ave at Cattle Dr																					
Western Ave	EB T	7%		6%		6%		6%		-30%		7%		6%		6%		6%		-30%	
	EB R	30%		26%		26%		26%		30%		30%		26%		26%		26%		30%	
Western Ave	WB L	8%		5%		5%		5%		20%		8%		5%		5%		5%		20%	
	WB T		8%		7%		7%		7%	-20%			20%		18%		18%		18%	-20%	
Cattle Drive	NB L		32%		29%		29%		29%		20%		20%		18%		18%		18%		20%
	NB R		12%		10%		10%		10%		30%		7%		6%		6%		6%		30%
18:: Cattle Dr at DEF Drive																					
DEF Drive	WB L		13%		25%		25%		25%				13%		25%		25%		25%		
	WB R		44%		39%		39%		39%				27%		24%		24%		24%		
Cattle Drive	NB T																				
	NB R	31%		49%		49%		49%				31%		49%		49%		49%			
Cattle Drive	SB L	38%		31%		31%		31%				38%		31%		31%		31%			
	SB T																				

BUILD WITH MITIGATION SITE DISTRIBUTION CALCULATIONS

2030 Build Condition (Full Build)
Site Trip Distribution

		Build without Mitigation										Build with Mitigation									
		RESIDENTIAL		HOTEL		OFFICE / R&D		RETAIL / RESTAURANT		PASS BY		RESIDENTIAL		HOTEL		OFFICE / R&D		RETAIL / RESTAURANT		PASS BY	
INTERSECTION	MOVEMENT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT	ENTER	EXIT
12:: Western Ave at Kresge Way / East Dr / Genzyme Driveway																					
Western Ave	EB L																				
	EB T		12%		10%		10%		10%	-20%			7%		6%		6%		6%	-20%	
	EB R	5%		5%		5%		5%		20%		5%		5%		5%		5%		20%	
Western Ave	WB L	24%		14%		14%		14%		30%		24%		14%		14%		14%		30%	
	WB T	8%		5%		5%		5%		-30%		8%		5%		5%		5%		-30%	
	WB R																				
East Dr / Genzyme Driveway	NB L		6%		7%		7%		7%		30%		20%		18%		18%		18%		30%
	NB T																				
	NB R		35%		29%		29%		29%		20%		40%		33%		33%		33%		20%
13:: Western Ave at Batten Way																					
Western Ave	EB L																				
	EB T	31%		27%		27%		27%				31%		27%		27%		27%			
Western Ave	WB T		27%		24%		24%		24%				27%		24%		24%		24%		
	WB R																				
Batten Way	SB L																				
	SB R																				
15:: Western Ave at Stadium Road																					
Western Ave	EB T	31%		27%		27%		27%				31%		27%		27%		27%			
	EB R	6%		5%		5%		5%				6%		5%		5%		5%			
Western Ave	WB L																				
	WB T		27%		24%		24%		24%				27%		24%		24%		24%		
Stadium Road	NB L		13%		12%		12%		12%				13%		12%		12%		12%		
	NB R																				
17:: Western Ave at Cattle Dr																					
Western Ave	EB T	5%		5%		5%		5%		-30%		5%		5%		5%		5%		-30%	
	EB R	26%		22%		22%		22%		30%		26%		22%		22%		22%		30%	
Western Ave	WB L	8%		5%		5%		5%		20%		8%		5%		5%		5%		20%	
	WB T		6%		7%		7%		7%	-20%			20%		18%		18%		18%	-20%	
Cattle Drive	NB L		21%		17%		17%		17%		20%		7%		6%		6%		6%		20%
	NB R		12%		10%		10%		10%		30%		7%		6%		6%		6%		30%
18:: Cattle Dr at DEF Drive																					
DEF Drive	WB L		7%		13%		13%		13%				7%		13%		13%		13%		
	WB R		23%		19%		19%		19%				14%		12%		12%		12%		
Cattle Drive	NB T	15%		24%		24%		24%				15%		24%		24%		24%			
	NB R	16%		25%		25%		25%				16%		25%		25%		25%			
Cattle Drive	SB L	20%		16%		16%		16%				20%		16%		16%		16%			
	SB T		6%		12%		12%		12%				6%		12%		12%		12%		

BUILD WITH MITIGATION VOLUME REDISTRIBUTION CALCULATIONS

Location: Allston, MA

		2025 Conditions								2030 Conditions							
		2025 BUILD VOLUMES - WITHOUT MITIGATION		CHANGE IN SITE DISTRIBUTION		CHANGE IN HBS TRIPS		2025 BUILD VOLUMES - WITH MITIGATION		2030 BUILD VOLUMES - WITHOUT MITIGATION		CHANGE IN SITE DISTRIBUTION		CHANGE IN HBS TRIPS		2030 BUILD VOLUMES - WITH MITIGATION	
INTERSECTION	MOVEMENT	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
12:: Western Ave at Kresge Way / East Dr / Genzyme Driveway																	
Western Ave	EB L	70	25			-15	-5	55	20	70	25			-15	-5	55	20
	EB T	375	610	-5	-10			370	600	400	670	-7	-20			395	650
	EB R	40	25					40	25	50	30					50	30
Western Ave	WB L	70	45					70	45	105	65					105	65
	WB T	575	575			-38	-31	535	545	590	590			-38	-31	550	560
	WB R	120	55			38	31	160	85	120	55			38	31	160	85
East Dr / Genzyme Driveway	NB L	20	35	10	26			30	60	25	60	22	57			50	115
	NB T	15	5			72	23	85	30	15	5			72	23	85	30
	NB R	45	115	5	10			50	125	75	195	7	20			80	215
13:: Western Ave at Batten Way/ Hague St																	
Western Ave	EB L	75	25					75	25	75	25					75	25
	EB T	430	560					430	560	505	580					505	580
	EB R	5	3					5	3								
Western Ave	WB L	30	20					30	20								
	WB T	615	665					615	665	575	670					575	670
	WB R	190	75			-95	-49	95	25	195	75			-95	-49	100	25
Hague St	NB L	5	10					5	10								
	NB T	5	1					5	1								
	NB R	40	30					40	30								
Batten Way	SB L	40	110					40	110	40	110					40	110
	SB T	1						1									
	SB R	20	65					20	65	20	65					20	65
15:: Western Ave at Stadium Road																	
Western Ave	EB T	505	540					505	540	565	575					565	575
	EB R	20	5					20	5	45	20					45	20
Western Ave	WB L	60	10					60	10	15	10					15	10
	WB T	580	730					580	730	580	725					580	725
Stadium Road	NB L	10	25					10	25	60	140					60	140
	NB R	5	50					5	50	15	30					15	30
17:: Western Ave at Cattle Dr																	
Western Ave	EB T	440	610					440	610	435	610					435	610
	EB R	70	90					70	90	110	80					110	80
Western Ave	WB L	20	20					20	20	60	45					60	45
	WB T	620	600	10	26	-38	-31	595	595	615	615	22	57	-38	-31	600	635
Cattle Dr	NB L	215	160	-10	-26	-57	-18	145	115	150	135	-22	-57	-57	-18	75	60
	NB R	50	45	-5	-10	-15	-5	30	30	90	105	-7	-20	-15	-5	65	80
18:: Cattle Dr at DEF Drive																	
DEF Drive	WB L	30	65					30	65	25	70					25	70
	WB R	40	105	-15	-36			25	65	35	100	-14	-36			20	60
Cattle Drive	NB T	225	100			-72	-23	150	80	330	155			-72	-23	255	130
	NB R	120	65			72	23	195	85	120	60			72	23	195	85
Cattle Drive	SB L	65	40					65	40	70	35					70	35
	SB T	25	70					25	70	45	120					45	120

May not balance due to rounding

APPENDIX D: ENF Comments

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
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March 12, 2021

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME	: Enterprise Research Campus Project
PROJECT MUNICIPALITY	: Boston
PROJECT WATERSHED	: Charles River
EEA NUMBER	: 16320
PROJECT PROPONENT	: Tishman Speyer ERC Developer, L.L.C.
DATE NOTICED IN MONITOR	: February 10, 2021

Pursuant to the Massachusetts Environmental Policy Act (M.G.L. c. 30, ss. 61-62I) and Section 11.03 of the MEPA Regulations (301 CMR 11.00), I hereby determine that this project **requires** the preparation of a mandatory Draft Environmental Impact Report (DEIR).

Project Description

As described in the Environmental Notification Form (ENF), the project consists of the construction of approximately 1,940,000 square feet (sf) of mixed uses in ten buildings. The project will be constructed in two phases. Phase A involves the construction of five buildings with a total of 900,000 sf of gross floor area (GFA), including 420,000 sf of laboratory/office space, 232,000 sf (330 units) of residential space, a 127,000-sf (250 rooms) hotel, a 75,000-sf conference center and 46,000 sf of retail, restaurant and other activated uses on the ground floor. Phase A also includes the construction of roadways, utilities and 620 parking spaces, of which 300 spaces will be located in an underground parking garage and 280 spaces in a temporary surface parking lot. Phase B consists of the construction of five buildings with a total GFA of 1,040,000 sf, including 634,000 sf of lab/office uses, 336,300 sf (420 units) of residential space and 69,700 sf of retail, restaurant and other activated ground floor space. Phase B will also include the construction of one below-grade parking garage with 300 spaces and one above-grade garage with 640 spaces, including 280 spaces that will be relocated from the temporary surface lot constructed in Phase A. The project will provide approximately three acres of open space, including an east-west Greenway that will bisect the site. Open space will be constructed in both phases of the project.

According to the ENF, new roadways will be constructed by Harvard University (Harvard) to provide access to the project site and to support future development of Harvard-owned land in the area. East Drive will extend in a southerly direction from Western Avenue along the site's eastern property boundary to a new east-west street called DEF Drive. The western end of DEF Drive will form an intersection with a roadway that will be called Cattle Drive. Cattle Drive will extend south from Western Avenue through the site and connect to Almy Street near the intersection of Almy Street and Cambridge Street. Science Drive will be a new roadway that extends from Cattle Drive near the central portion of the project site to Rotterdam Street to the west.

Project Site and MEPA History

The 14.2-acre project site[1] is bordered to the north by Western Avenue, to the east by the Sanofi-Genzyme facility, to the south by Harvard's District Energy Facility (DEF) and other Harvard-owned land and to the west by Harvard's John A. Paulson School of Engineering and Applied Sciences currently under construction, and a residential neighborhood. The site was previously developed for commercial uses and a railyard and is in use as a construction laydown area for Harvard-related construction projects in the area.

Approximately half of the project site was included within the planning area of an Institutional Master Plan (IMP) for development of Harvard's Allston Campus that initiated MEPA review in 2007 (EEA# 14069). As described in the Final Environmental Impact Report (FEIR), the IMP identified 11 projects to be constructed over a ten-year period, including a hotel and conference center on the portion of the project site adjacent to Western Avenue. The IMP completed MEPA review with the issuance of a Certificate on the FEIR on October 17, 2014; however, because of the long-term buildout of the IMP, a Special Review Procedure (SRP) (the "2014 SRP") was established to provide a procedure for review of individual projects identified in the IMP. As described in the SRP, Project Commencement Notices (PCNs) are required for each component of the IMP other than the two that were fully analyzed in the FEIR (the Chao Center and Baker Hall projects). In addition, Harvard was required to submit an Interim Update (IU) approximately five years after the 2014 FEIR Certificate; the IU was filed in January 2020 and a Certificate on the IU was issued on February 7, 2020.

Segmentation and Future Development within Allston Landing North

Subsequent to MEPA review of the IMP, Harvard determined that, rather than develop the subject project site as part of the IMP, the site would be included in the commercial development of the Enterprise Research Campus (ERC). Harvard submitted a Planned

[1] This area includes the Phase A and Phase B sites and roadways immediately adjacent to the development site, but not the southerly extension of Cattle Drive or westerly extension of Science Drive.

Development Area (PDA) Master Plan to the Boston Planning and Development Agency (BPDA) which described a 900,000-sf mixed-use development on the same approximately 14-acre parcel that is proposed to be developed as described in this ENF. The PDA Master Plan anticipated construction of office/lab and residential uses in addition to the hotel and conference center originally proposed in the IMP. The BPDA approved the PDA Master Plan in 2018. The IU submitted to MEPA in 2020 acknowledged that the site of the hotel and conference center proposed in the IMP would instead be incorporated into the ERC; however, Harvard has not formally sought to revise the IMP or the 2014 SRP to reflect the updated status of the hotel and conference center.

In connection with the 2018 PDA Master Plan, Harvard submitted a Framework Plan to the BPDA that provided planning-level context for potential development of other Harvard property in the area, including approximately 36 acres of land south of Western Avenue but north of Cambridge Street. This 36-acre area ("the Framework Area") contains the project site described in this ENF and the PDA Master Plan area. Harvard has indicated that it plans to file an updated Framework Plan with the BPDA in connection with BPDA review of the project described in this ENF.

The MEPA regulations include anti-segmentation provisions to ensure that project Proponents do not evade, defer or curtail MEPA review by segmenting one project into smaller ones that, individually, do not meet or exceed MEPA thresholds. The MEPA regulations at 301 CMR 11.01(2)(c) note that the determination as to whether various activities constitute one project should consider "whether the work or activities, taken together, comprise a common plan or independent undertakings, regardless of whether there is more than one Proponent; any time interval between the work or activities; and whether the environmental impacts caused by the work or activities are separable or cumulative."

To address segmentation with respect to the buildout of the Framework Area, Harvard will request that a new SRP be established to address future development of Harvard-owned land within the Framework Area. [2] The SRP request should also identify portions of the ENF project site that will no longer be subject to the 2014 SRP and include an updated Framework Plan, if available, to inform the review procedures. To clarify the MEPA review process for projects within this area, the request to establish a new SRP should be submitted prior to the filing of the DEIR for this ENF project. While it is anticipated that the MEPA review procedures established in the new SRP will apply to future development of Harvard land excluding this ENF project site, the SRP will provide a mechanism for assessing the cumulative impacts of development within the Framework Area, including the ENF project site. As noted above, new roadways proposed to be constructed in the Framework Area will provide connections to land south of Cambridge Street ("Allston Landing South") that is owned by Harvard and anticipated to be available for development upon completion of the Massachusetts Department of Transportation's (MassDOT) I-90 Allston Interchange Project (EEA# 15278). The DEIR filed for the I-90 project included an estimate that over eight million sf of development (including air rights parcels) could occur in Allston Landing South upon completion of the highway project. The SRP request

[2] Harvard's commitment to request a new SRP is referenced in a letter dated December 30, 2020 from Doug Husid to Tori Kim (MEPA Director), included as an attachment to the ENF.

should provide an overview of potential development of Allston Landing South (to the extent this information is available) and should include a commitment to submit a master plan for MEPA review if and when information becomes available.

Additionally, I note that the North Allston Storm Drain Extension Project (NASDEP), proposed by the Boston Water and Sewer Commission (BWSC), is concurrently undergoing MEPA review. Though the project is proposed by the BWSC, it is being designed and funded by Harvard. The NASDEP is proposed to alleviate chronic flooding in the North Allston neighborhood, and it will convey stormwater from Harvard-owned property, including the Framework Area and the ERC. The MEPA Office has coordinated the filings of the ENFs for this project and the NASDEP to ensure that public disclosure of the direct and indirect impacts of the two projects occur simultaneously. As described above, Harvard has committed to MEPA review of future development within the Framework Area which will be served by the NASDEP.

Environmental Impacts and Mitigation

Potential environmental impacts of the project include the addition of 9.8 acres of impervious area; generation of 23,984 average daily trips (adt); construction of 1,280 parking spaces; use of 256,558 gallons per day (gpd) of water; and generation of approximately 233,234 gpd of wastewater. Greenhouse Gas (GHG) emissions and other air pollutants are associated with the burning of fossil fuels for on-site energy use and transportation.

The ENF identified potential mitigation measures at a conceptual level and should be further described in the DEIR. The project will minimize and mitigate transportation-related impacts through construction of pedestrian and bicycle facilities and implementation of Transportation Demand Management (TDM) measures to encourage use of public transit and other alternate modes of travel. It will add three acres of public open space that will serve as a connection between residential areas west of the site and the Charles River parkland. The project design will include a stormwater management system with Best Management Practices (BMPs) to improve water quality, reduce flow rates and infiltrate stormwater. The project will employ measures to conserve water and contribute to Infiltration/Inflow (I/I) reduction to preserve sewer capacity. The project will be required to demonstrate that it will take measures to minimize GHG emissions and incorporate climate change resiliency measures.

Permitting and Jurisdiction

The project is undergoing MEPA review and is subject to preparation of a mandatory EIR pursuant to Sections 11.03(6)(a)(6) and 11.03(6)(a)(7) of the MEPA regulations because it requires State Agency Actions and will generate 3,000 or more new adt on roadways providing access to a single location and will construct 1,000 or more parking spaces, respectively. The project also exceeds the ENF thresholds at 301 CMR 11.03(1)(b)(2), creation of five or more acres of impervious area and 301 CMR 11.03(5)(b)(4)(a), New discharge to a sewer system of 100,000 or more gpd of sewage, industrial wastewater or untreated stormwater. It requires a Vehicular Access Permit from the Massachusetts Department of Transportation (MassDOT), a Construction and Access Permit from the Department of Conservation and Recreation (DCR), and Section 8(m), Construction Site Dewatering Discharge and, potentially, Sewer Use

Discharge Permits from the Massachusetts Water Resources Authority (MWRA). The project may require an Air Quality Self-Certification or Air Plan Approval from the Massachusetts Department of Environmental Protection (MassDEP). It is subject to the MEPA GHG Emissions Policy and Protocol.

The project requires Article 80 Large Project Review, a Planned Development Area (PDA) Master Plan Amendment and PDA Development Plan Approval by the Boston Planning and Development Agency (BPDA), a Site Plan Approval and Stormwater Connection and Recharge Permit from the Boston Water and Sewer Commission (BWSC) and a Transportation Access Plan Agreement (TAPA) and Construction Management Plan (CMP) approval from the Boston Transportation Department (BTD). The project requires a determination of no hazard to air navigation from the Federal Aviation Administration (FAA) and a National Pollutant Discharge Elimination System (NPDES) Stormwater General Permit from the Environmental Protection Agency (EPA).

Because the Proponent is not seeking Financial Assistance from the Commonwealth for the project, MEPA jurisdiction extends to those aspects of the project that are within the subject matter of required or potentially required State Agency Actions and that may cause Damage to the Environment as defined in the MEPA regulations.

Review of the ENF

The ENF briefly described existing site conditions, provided a basic project description and conceptual plans and identified alternatives to the project. It included estimates of the project's impacts with respect to transportation, water and wastewater infrastructure and land alteration and stormwater management and identified potential measures to mitigate these impacts. The DEIR should provide a more detailed description of the project's impacts and mitigation measures, as set forth in the Scope below.

SCOPE

General

The DEIR should follow Section 11.07 of the MEPA regulations for outline and content and provide the information and analyses required in this Scope. It should clearly demonstrate that the Proponent will avoid, minimize and mitigate Damage to the Environment to the maximum extent practicable through project alternatives and design.

Project Description and Permitting

The DEIR should include updated site plans for existing and post-development C.1
conditions at a legible scale and a detailed description of all project components. It should C.2
identify any changes since the filing of the ENF. Conceptual plans should be provided at a
legible scale and clearly identify buildings, public areas, open space, impervious areas, C.3
pedestrian and bicycle accommodations, roadways, and stormwater and utility infrastructure. It
should provide a detailed description and plans of the Greenway and other public open space, C.4

including the area of open space to be provided in each phase, design of the surface treatment of the open space and measures to promote public use of and access to open space areas. The DEIR C.4
should describe potential long-term development of open space and pathways in the vicinity of the site and how the project will be designed to support public access throughout the area. The C.5
DEIR should identify and describe State, federal and local permitting and review requirements associated with the project, provide an update on the status of each of these pending actions, C.6
analyze applicable statutory and regulatory standards and requirements, and provide a discussion of the project's consistency with those standards. The DEIR should identify all components in Phase A and Phase B, including on-site and off-site roadways, provide a project phasing C.7
schedule and describe environmental impacts and mitigation measures to be implemented in each phase, including open space.

The ENF identified proposed roadways providing access to the site from Western Avenue, Windom Street via Almy Street, and Rotterdam Street via Science Drive, that will be constructed by Harvard to support the project and future development in the Framework Area, but did not describe the roadways or identify associated impacts. I note that analysis of the intersections associated with these roads are included in the transportation study described below. Therefore, it would appear that the full extent of these roadways and associated infrastructure are components of this project. As the full extent of these roadways and this project are part of a common plan in accordance with 301 CMR 11.01(2)(c), the DEIR should describe and include plans of all on-site and off-site roadways and infrastructure to be improved and/or constructed in connection with the project, C.8
address the timing of the design and construction of these facilities and identify impacts and mitigation measures associated with the construction and operation of these roadways and infrastructure.

The information and analyses identified in this Scope should be addressed within the main body of the DEIR and not in appendices. In general, appendices should be used only to provide raw data, such as drainage calculations, traffic counts, capacity analyses and energy modelling, which are otherwise adequately summarized with text, tables and figures within the main body of the DEIR. Information provided in appendices should be indexed with page numbers and separated by tabs, or, if provided in electronic format, include links to individual sections. Any references in the DEIR to materials provided in an appendix should include specific page numbers to facilitate review.

Environmental Justice

According to the EEA Environmental Justice (EJ) Viewer (http://maps.massgis.state.ma.us/map_ol/ej.php), the project site is located within an EJ population meeting the criteria of Minority and Income. The Massachusetts Legislature is expected to pass legislation ("An Act creating a next-generation roadmap for Massachusetts climate policy") in the near future that requires meaningful review of projects affecting EJ populations, including their cumulative environmental and public health impacts. Additionally, the MEPA Office just released a DRAFT MEPA Interim Protocol for Environmental Justice Outreach which will likely be in effect when the DEIR is submitted. In anticipation of these pending requirements, I encourage the Proponent to develop a plan for outreach to the EJ population in Allston which addresses the following (as appropriate):

C.9

- Notification of public meetings and/or filings of the DEIR and permit applications at non-
traditional information repositories, such as houses of worship, community centers, C.9
community web sites, environmental and community justice organizations, as well as traditional repositories, including libraries and government offices;
- Use of alternative and/or community-specific media outlets to provide public notice,
including local public broadcasting stations, social media and community newspapers; C.10
- Engaging EJ organizations and other community-based organizations directly for
assistance in outreach efforts; C.11
- Public education efforts regarding the technical aspects of the project, such as fact sheets with visuals that include a summary of the project and associated technologies and
processes along with a description of potential impacts of similar facilities, using lay- C.12
person language and terms in an effort to ensure the community understands the potential impacts of the project and can provide meaningful input;
- Scheduling public meetings at locations and times convenient for neighborhood
stakeholders, and in consideration of public transportation availability; and C.13
- Establishing a local information repository that is convenient and accessible for the EJ
Population, as well as providing such information on-line. C.14

The Proponent should utilize collaborative approaches to communicating with the public C.15
about the project, including public deliberation and consensus-building where appropriate, to address public concerns. I encourage the Proponent to commence implementation of the outreach
plan prior to filing the DEIR. The DEIR should report on outreach efforts undertaken prior to the C.16
filing of the DEIR and propose further steps that could be taken during various stages of MEPA review, such as a public meeting to be held during the DEIR comment period. I encourage the
Proponent to request an extended comment period for the DEIR to provide additional time for C.17
public review of the project. The Proponent should consult with the MEPA Office prior to filing
the DEIR regarding its public outreach plan and potential analyses of cumulative environmental C.18
and public health impacts.

Alternatives Analysis

The ENF included a comparison of the Preferred Alternative to a No Build, 2018 PDA and a Full Build Alternatives. The No Build Alternative would maintain the site in its current state and represents a baseline condition to which other alternatives can be compared. The 2018 PDA Alternative would include the buildings and uses approved by the BPDA in 2018 for the current PDA Master Plan. It would involve the development of 900,000 sf of mixed uses in four buildings on the 14-acre site. The 2018 PDA Alternative would include 400,000 sf of lab/office space, 250,000 sf of residential space, a 250,000-sf hotel and conference center, 800-900 parking spaces and one acre of public open space. This alternative would add 7.85 acres of impervious area, generate 6,994 adt (unadjusted), use 77,583 gpd of water and generate 70,530 gpd of wastewater. The Full Build Alternative would be constructed in two phases with the same massing as the Preferred Alternative, but would include more office/lab space and fewer residential units. Specifically, the Full Build Alternative would include the construction of 10 buildings with 1,440,000 sf of lab/office uses, 250,000 sf (250 units) of residential space, a 250,000-sf (200 rooms) hotel and conference center, 1,280 parking spaces and three acres of public copen space. It would add 9.8 acres of impervious area, generate 15,320 adt (unadjusted), use 114,763 gpd of water and generate 104,330 gpd of wastewater.

The DEIR should include an expanded alternatives analysis that includes, at a minimum, C.19
an evaluation of an alternative design with a reduced building footprint and increased pervious
area. For each alternative, the DEIR should provide a conceptual plan and quantify C.20
environmental impacts. It should compare the alternatives with respect to their impacts on traffic,
public open space, water use, wastewater generation, impervious area and stormwater C.21
management. The DEIR should review an alternative road layout that does not extend beyond
the project site and compare the environmental impacts and traffic operations to the Preferred C.22
Alternative.

Traffic and Transportation

The ENF included limited information about the project's impacts or mitigation measures. During the review period, the Proponent submitted a Transportation Impact Analysis Scoping Request (Scoping Request) to MassDOT that included additional information on the project's daily and peak period trip generation, adjusted vehicle trip volumes based on mode share assumptions, a proposed list of intersections and roadway to be analyzed and a proposed scope of analysis.

The DEIR should include a traffic study prepared consistent with the EEA/MassDOT C.23
Transportation Impact Assessment (TIA) Guidelines issued in March 2014, MassDOT's
comment letter, and this Scope. The TIA should provide a comprehensive evaluation of the C.24
project's use of area roadways, public and private transit, pedestrian and bicycle facilities, and
other transportation modes. It should describe existing conditions, include a plan of the C.25
transportation study area, and identify the proposed site access and egress. It should provide
counts of existing traffic in the traffic study area and include projections for future traffic C.26
conditions under No Build, Build, and Build with Mitigation scenarios. The analysis should
model future conditions in 2025 and 2030 to reflect the phased build-out of the project; the DEIR C.27
should explicitly define the building area and uses upon which the 2025 scenario is based.
Existing conditions should be based on historic, pre-pandemic traffic volumes adjusted to 2019
conditions to represent the 2021 Existing Conditions scenario. The No Build and Build scenarios C.28
should incorporate background growth due to trips generated by nearby planned development
projects within the timeframe analyzed in the analysis and, for MassDOT roadways, a typical C.29
background growth rate in traffic volumes. Future conditions should incorporate transportation
projects by MassDOT, MBTA, DCR, the City and Harvard, and describe how the project's
proposed design and transportation mitigation program is consistent with the vision and mobility C.30
goals of MassDOT's Allston Multimodal Project (EEA#15278).

The study area for the TIA should, at a minimum, include the following roadways and
intersections, including proposed roadways that will be present under future conditions: C.31

- Western Avenue at Soldiers Field Road;

- Western Avenue at Kresge Way/Sanofi Genzyme Driveway/Project Driveway;
- Western Avenue at Batten Way/Hague Street;
- North Harvard Street at Soldiers Field Road;
- North Harvard Street at Western Avenue;
- North Harvard Street at Franklin Street/Kingsley Street;
- Cambridge Street at North Harvard Street;
- Cambridge Street at Windom Street;
- Cambridge Street at I-90 Ramps/Double Tree Hotel;
- Cambridge Street at Soldiers Field Road;
- Western Avenue at Stadium Road;
- Western Avenue at Academic Way;
- North Harvard Street at Academic Way;
- Western Avenue at Cattle Drive;
- Western Avenue at East Drive;
- Interim Cattle Drive at Windom Street;
- Western Avenue at Memorial Drive (Cambridge);
- River Street at Memorial Drive (Cambridge);
- JFK Street at Memorial Drive (Cambridge);
- Merge of I-90 off-ramp onto Cambridge Street westbound; and
- Diverge of I-90 on-ramp from Cambridge Street eastbound.

C.31

Any additional intersections where project- generated trips are anticipated to increase peak hour traffic volume by five percent or more, or by more than 100 vehicles per hour, should be included in the TIA. According to MassDOT, the Proponent may be required to prepare merge/diverge analyses for the Soldiers Field Road exit and entrance ramps at North Harvard Street and River Street/Western Avenue, as well as the I-90 mainline exit and entrance ramps at the Allston Interchange, including the ramp merge/diverge locations within the interchange, depending on the expected trip distribution. The Proponent should consult with MassDOT prior to preparing the DEIR to determine the need for theses analyses and should include the results in the DEIR (if required).

C.32

C.33

C.34

The TIA should describe the project's anticipated transportation impacts and identify appropriate mitigation measures. The Proponent should indicate a clear commitment to implement proposed mitigation measures and describe the timing of their implementation, including whether measures are implemented based on phases of the project or occupancy levels.

C.35

Trip Generation

According to the ENF and Scoping Request, the project will generate 23,420 adt based on based on trip rates published in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 10th edition, using Land Use Codes (LUC) 221 (Mid-Rise Residential), 222 (High-Rise Residential), 310 (Hotel), 710 (General Office Building), 760 (Research and Development Center), 810 (Shopping Center) and 932 (High-Turnover Restaurant). Adjusted for projected levels of transit, bicycle and pedestrian mode shares, the project will generate 8,141 vehicle trips on an average weekday, including 679 vehicle trips in the morning peak period and 821 vehicle trips in the evening peak period, and 4,284 transit trips, including 539 transit trips in the morning peak period and 640 transit trips in the evening peak period.

The estimate of the adjusted vehicle trips included in the ENF is nearly 2,000 vehicle trips lower than the estimate provided in the Scoping Request. C.36 The DEIR should fully document the trip generation estimates for each mode and clarify the discrepancy between the values provided in the ENF and Scoping Request. For the total project and for each land use, the TIA should provide estimates of weekday daily and weekday morning peak period trips for each C.37 mode and describe and document any adjustment of these estimates. As requested by MassDOT, the DEIR should provide an explanation of why the existing site trip generation is assumed to be negligible, compare the net adjusted trip generation with empirical trip data from a similar site, if C.38 available, and document how the mode share assumptions were developed.

Bicycle and Pedestrian Facilities

The DEIR should provide a comprehensive and detailed description of existing and C.39 proposed pedestrian facilities in the study area, including sidewalks, crosswalks, bicycle facilities and bicycle parking spaces. It should review the regional pedestrian and bicycle network and describe potential measures to enhance connections between the site and regional routes, public C.40 transportation facilities and complementary land uses such as shopping centers and residential areas. The TIA should evaluate these routes based on the origin-destination of potential residents, employees and visitors. C.41

According to the ENF, the new roadways will be constructed with pedestrian and bicycle accommodations to facilitate the use of these modes of travel to and from the site. The project also includes the construction of a multi-use path bisecting the site from Cattle Drive to East Drive. The DEIR should describe all proposed bicycle and pedestrian facilities that will be C.42 provided on the new streets, within the project site and any off-site locations, if applicable. It should identify bicycle and pedestrian mitigation measures, including links between the project site and adjacent land uses and transit facilities, that will help ensure that walking and bicycling will be an attractive way to access the site to meet the project's mode share goals; C.43 The Proponent should consider the feasibility of expanding existing routes or promoting new routes to encourage bicycle and pedestrian travel. The TIA should identify areas that are structurally deficient or not meeting current codes for accessibility, including sidewalks, crosswalks, ramps, and pedestrian equipment and propose mitigation measures to address these conditions. C.44

Public Transportation

The site is served by bus routes operated by the Massachusetts Bay Transportation Authority (MBTA), including Bus Route 70 on Western Avenue and Bus Routes 64, 66, and 86, which have bus stops within walking distance of the site. As noted above, the Proponent anticipates that a high number of trips to and from the site will be undertaken using public transportation.

The TIA should include an analysis of the transit demand on MBTA bus routes generated C.45 by the project. It should provide an analysis of the impacts of project-generated ridership on each C.46

bus route by comparing 2021 Existing, 2025 No Build, 2025 Build, 2030 No Build and 2030 Build conditions in accordance with the MBTA's Office of Performance Management and C.46 Innovation's (OPMI) methodology for calculating passenger comfort metrics (as evaluated in the Service Delivery Policy [SDP]). Mitigation should be proposed for any bus route that falls below the 96 percent route-wise minimum threshold for the comfort metric (share of passenger travel time experienced in comfortable conditions); any trip for which project-generated C.47 passengers will cause the trip to exceed the threshold; and/or any trip above the crowding threshold under 2025 No Build or 2030 No Build conditions to which project-generated passengers will be added. The DEIR should include a review of pedestrian routes between the project site and bus stops to be used by employees and visitors and describe the existing C.48 conditions along these routes. It should recommend any upgrades or modifications to pedestrian crossings, bus stops, sidewalks and other facilities that would help ensure safe, accessible travel for bus customers and meet the codes and standards related to the Americans with Disabilities C.49 Act (ADA), the Massachusetts Architectural Access Board (MAAB) and Federal Transit Administration (FTA) regulations and guidance. The DEIR should document how proposed transit mitigation will be consistent with transit improvement measures planned by MassDOT, C.50 MBTA and the City.

Traffic Operations

The TIA should describe the anticipated vehicle trip distribution. For each intersection, C.51 the DEIR should provide capacity analyses for the weekday peak periods for 2021 Existing, C.52 2025 No Build, 2025 Build, 2030 No Build and 2030 Build conditions and any intersections where mitigation is proposed. For all analysis scenarios, the TIA should provide illustrations depicting the peak hour 50^{th} (average) and 95^{th} percentile queue lengths for each lane group/turning movement and a tabular summary of the results of the intersection operations analysis, including volume-to-capacity ratios (V/C), average delays and level-of-service (LOS). C.53 The DEIR should identify any instances where extended queues would block vehicle movements at study area intersections, including those involving access to the state highway system, and propose mitigation measures to address these impacts.

The DEIR should include a safety analysis for all intersections and roadway segments C.54 within the study area. The analysis should calculate crash rates using MassDOT data for the most recent continuous five-year period. C.55 The TIA should document crash rates and identify appropriate mitigation for any locations exceeding the State and/or District 6 averages. C.56 The North Harvard Street at Soldiers Field Road as a Highway Safety Improvement Program (HSIP) bicycle cluster and North Harvard Street at Soldiers Field Road and Cambridge Street at Soldiers Field Road as HSIP vehicle clusters. Prior to submitting the DEIR, the Proponent should identify C.57 all HSIP study area intersections and coordinate with the MassDOT Highway Division's Safety Section to determine if a Road Safety Audit (RSA) is necessary.

Any proposed roadway improvements, including bicycle/pedestrian facilities, that are recommended to mitigate traffic impacts should be consistent with Complete Streets design C.58 guidelines contained in the *MassDOT Project Development and Design Guide*. The DEIR should include detailed plans that demonstrate the feasibility of constructing any proposed C.59

roadway improvements. The Proponent should consult with MassDOT and DCR prior to filing the DEIR regarding any roadway improvements affecting State roads. C.60

Parking

The project includes the construction of a total of 1,280 parking spaces that will be located in below- and above-ground parking garages upon completion of both phases. Phase A will include a below-grade parking structure with 300 spaces and 320 surface parking spaces, of which 280 will be relocated into a parking garage in Phase B. The DEIR should document how the parking supply was developed and compare the number of proposed spaces to the amount required based on the most recent edition of ITE's *Parking Generation*, local zoning requirements and comparable facilities. C.61 It should reevaluate the number of parking spaces required for the project based on the comparison above, identify the number of parking spaces that can be reduced through implementation of TDM measures, and consider banking some land that would only be developed for parking if warranted by demand. C.62 The TIA should describe the number of parking spaces that will be occupied throughout the day, identify periods of peak use and evaluate opportunities for shared parking. C.63 It should include an analysis of potential reductions in parking supply if higher non-vehicular mode shares can be achieved. C.64

Transportation Demand Management

According to the ENF, the Proponent will encourage the use of alternative modes of travel to the site by implementing a TDM program and providing pedestrian and bicycle facilities, including a bicycle sharing station. The DEIR should include a comprehensive TDM plan to reduce the number of single-occupancy vehicle (SOV) trips to the site by both employees and visitors and evaluate the expected trip reduction of each. It should include a thorough evaluation of TDM measures, including but not limited to the following:

- Reducing the number of proposed parking spaces;
- Implementing a parking cash-out program and/or charging market rates for parking;
- Providing on-site amenities and conveniences that would reduce the need for automobile travel;
- Administering carpooling and vanpooling programs and incentives for participation;
- Providing free or subsidized transit passes;
- Improving pedestrian access to nearby transit hubs;
- Providing a robust set of bicycle and pedestrian amenities;
- Providing a mobility hub to centralize multiple mode pf transportation, including taxis and transportation network companies such as Uber and Lyft; and,
- Joining the Allston/Brighton Transportation Management Association (TMA).

C.65

Transportation Monitoring Program

The DEIR should include a draft traffic monitoring program to evaluate the assumptions made in the traffic study and the adequacy of the transportation mitigation measures, including the TDM program. C.66 The program should include annual traffic monitoring for a period of five C.67

years beginning six months after occupancy of the full build-out of the project. The monitoring program should include:

- Simultaneous automatic traffic recorder (ATR) counts at each parking entrance for a continuous 24-hour period on a typical weekday; C.67
- Weekday AM and weekday PM peak hour turning movement counts (TMC) and operations analysis at mitigated intersections and parking entrances;
- Travel survey of employees and patrons of the site; and,
- Transit ridership counts.

Stormwater

The project will increase impervious area at the site from 4.15 acres to 13.95 acres. According to the ENF, the stormwater management system will include catch basins, area drains, trench drains and infiltration systems designed to capture 2.75 inches of runoff from paved surfaces, which is equivalent to a 32-year storm event, and to maintain pre-construction runoff rates and volumes for the 2-, 10-, 25- and 100-year storm events. Runoff in excess of the storage capacity of the proposed stormwater management system will be directed to the NASDEP if available, or to the existing 30-inch by 36-inch BWSC storm drain in Cambridge Street.

The DEIR should describe the stormwater management system and how it will be designed to meet the Massachusetts Department of Environmental Protection's (MassDEP) C.68
Stormwater Management Standards (SMS) to improve water quality and maintain pre-development peak discharge rates and volumes. It should include a plan showing the location of C.69
BMPs, low-impact design (LID) and green infrastructure measures. The DEIR should confirm that favorable groundwater conditions are present in the proposed locations of infiltration BMPs. C.70
The DEIR should provide analysis of the capacity of the stormwater management system under future climate conditions, as described below. C.71 It should provide a detailed description, including calculations, of how specific stormwater management measures, such as infiltration, will be designed in conformance with the phosphorous and pathogen Total Maximum Daily Loads C.72
(TMDL) established for the Charles River. According to the ENF, three releases of hazardous waste have been assigned Release Tracking Numbers (RTN) pursuant to M.G.L. 21E and the Massachusetts Contingency Plan (MCP). The DEIR should document the location of proposed infiltration BMPs in relation to areas of contaminated soil and/or groundwater and describe any necessary remedial actions and/or stormwater management system design considerations. C.73

According to the ENF, only approximately 0.25 acres of the 14.2-acre site will be impervious upon completion of the project. The DEIR should evaluate surface treatment designs to increase pervious area, particularly in the three acres of public open space to be provided by the project. C.74 In addition, the DEIR should review potential areas of the site that may be suitable for coverage by porous pavement and other measures to minimize runoff, including capture of runoff from rooftops and other impervious surfaces. C.75 The Proponent should review comments submitted by BWSC and the Charles River Watershed Association (CRWA) and incorporate their requirements and, where feasible, recommendations into the design of the stormwater management system presented in the DEIR. C.76

Water and Wastewater

The project will use 256,558 gpd of water and generate 233,234 gpd of wastewater. According to the ENF, domestic and fire protection water will be delivered to the site by connections to existing or planned water mains in Western Avenue, East Drive, DEF Drive, Cattle Drive and/or located within the Greenway. The ENF indicated that the project's wastewater would be directed to the BWSC system through new connections to existing or planned sewer mains in Western Avenue, East Drive and/or Cattle Drive.

The DEIR should describe the location and size of infrastructure and connections to the C.77
City's water and sewer systems, including water and sewer service mains to be constructed by
Harvard. It should document that adequate water and sewer capacity exists to serve the site. The
DEIR should identify and describe water conservation measures that will be incorporated into
design and operations. At a minimum, the DEIR should review the feasibility of installing low- C.78
flow plumbing fixtures and using rainwater or gray water for irrigation and other purposes.

According to the MWRA, wastewater from the site discharges into separated storm
drains and sanitary sewers. Wastewater from BWSC's sewer main in Western Avenue is
discharged to the MWRA's South Charles Relief Sewer (SCRS), which collects flows from both
combined and separated sewer systems. The SCRS, in turn, conveys flows to the MWRA's Ward
Street Headworks and Boston main Drainage Tunnel for transport to the Deer Island Treatment
Plant. Infiltration and Inflow (I/I) and stormwater flows from combined systems can exceed the
capacity of the MWRA's system and contribute to combined sewer overflows (CSOs) to the
Charles River. The project will be required to mitigate its contribution of flow into the City's C.79
sanitary system. MassDEP regulations at 314 CMR 12.04(2)(d) specify that communities with
CSOs must require projects generating 15,000 gpd or more of new wastewater flow to remove C.80
four gallons of I/I for each gallon of wastewater. The Proponent should consult with the City to
identify appropriate I/I mitigation for this project. The DEIR should include a commitment to I/I
removal and identify any mitigation projects or monetary contribution by the Proponent. C.81
Groundwater discharges into the sanitary system are prohibited without a Temporary C.82
Construction Dewatering Permit from the MWRA. The DEIR should indicate whether the
project will require a discharge permit from the MWRA's Toxic Reduction and Control (TRAC)
Department and should include a commitment to use oil/gas separators in the parking garage C.83
drainage systems.

Climate Change

Governor Baker's Executive Order 569: Establishing an Integrated Climate Change Strategy for the Commonwealth (EO 569; the Order) was issued on September 16, 2016. The Order recognizes the serious threat presented by climate change and directs Executive Branch agencies to develop and implement an integrated strategy that leverages state resources to combat climate change and prepare for its impacts. The Order seeks to ensure that Massachusetts will meet GHG emissions reduction limits established under the Global Warming Solution Act of 2008 (GWSA) and will work to prepare state government and cities and towns for the impacts of climate change. I note that the MEPA statute directs all State Agencies to consider reasonably foreseeable climate change impacts, including additional greenhouse gas emissions, and effects, such as predicted sea level rise, when issuing permits, licenses and other administrative approvals and decisions under M.G.L. c. 30, § 61.

The GHG Policy and requirements to analyze the effects of climate change through EIR review play an important role in this statewide strategy. These analyses advance proponents' understanding of a project's contribution and vulnerability to climate change. I encourage the Proponent to consider complementary approaches – such as Passivehouse design for the hotel and residential buildings, incorporation of renewable energy generation and inclusion of low impact development in site design, all of which can improve the project's resiliency, reduce GHG emissions and conserve and sustainably employ natural resources.

Adaptation and Resiliency

The region's climate is expected to experience higher temperatures and more frequent and intense storms. The Northeast Climate Science Center at the University of Massachusetts at Amherst has developed projections of changes in temperature, precipitation and sea level rise for Massachusetts. This data is available through the Climate Change Clearinghouse for the Commonwealth at www.resilientMA.org. By the end of the century, the average annual temperature in the Charles River Basin is projected to rise by 3.5 to 10.7 degrees Fahrenheit (F), including an increase in the number of days with temperatures over 90 F from 15 to up to 76 days compared to the 1971-2000 baseline period. During the same time span, the average annual precipitation is projected to increase by 0.7 to 8.2 inches, which may be associated with more frequent and more intense storms. The City's online Climate Ready Boston Map Explorer (https://www.boston.gov/departments/environment/climate-ready-boston-map-explorer) identifies the site as being in an area potentially vulnerable to stormwater flooding and high daytime land surface temperature.

The City is a participant in the Commonwealth's Municipal Vulnerability Preparedness (MVP) program. The MVP program is a community-driven process to define natural and climate-related hazards, identify existing and future vulnerabilities and strengths of infrastructure, environmental resources and vulnerable populations, and develop, prioritize and implement specific actions the City can take to reduce risk and build resilience.

The DEIR should discuss potential effects of climate change to the project site and C.84
describe features incorporated into the designs of the projects that will increase the resiliency of the site to likely climate change impacts. I encourage the Proponent to consult the data available from the City, including *Climate Ready Boston* (December 2016), and the resilientMA.org website to develop climate change scenarios for the site and identify potential adaptation C.85
measures. The *Massachusetts State Hazard Mitigation & Climate Adaptation Plan* (2018) may provide additional resources to assist in this analysis. In particular, the DEIR should provide a narrative identifying the useful life[3] of the project and describing the criticality of project assets C.86

[3] For the purpose of this analysis, "useful life" is the estimated number of years an asset will be in use before needing reinvestment to continue performing its normal function(s). The anticipated useful life assumes regular and adequate maintenance is implemented; this differs from the design life (or service life), which is typically shorter.

relative to the populations affected by loss or inoperability of the project; the length of time the project can be inoperable without consequence; whether the project is located within or serves C.86 environmental justice/vulnerable populations; and the nature and severity of impacts if the project becomes inoperable. The DEIR should identify any key risks and vulnerabilities of the project under current and projected climate conditions, and identify any project components that C.87 are likely impacted by those risks and/or will be designed to adapt to such risks.

According to the ENF, the project will be designed to be resilient to climate change, including flooding from more severe storm events and the urban heat island effect as the average temperature increases. The DEIR should identify site elements that will be designed to minimize impacts associated with more frequent and intense storms and extreme heat waves including, but not limited to: C.88

- Ecosystem-based adaptation measures to reduce heat island effect and mitigate stormwater runoff, such as minimizing impervious area and integrating tree canopy cover, rain gardens and LID stormwater management techniques;
- Stormwater management system design that will accommodate rainfall under projected climate conditions; C.89
- Reuse of stormwater for irrigation and cooling tower make-up water; C.90
- Use of on-site renewable energy systems that may provide added resiliency during periods of power loss during storms; C.91
- Protection of emergency generator fuel supplies from effects of extreme weather and flood-proofing; C.92
- Elevation of critical infrastructure above projected base flood elevations taking into account the effects of climate change; and, C.93
- Expansion of the size of emergency generators to allow for select common areas and other emergency and life safety systems to remain operational for a period of time beyond code requirements, specifically in residential buildings. C.94

The DEIR should review potential risks and vulnerabilities of the site and identify design measures intended to increase the project's resiliency to these risks and vulnerabilities. I note C.95 that increasing landscaped open space may help minimize urban heat island effects and flood damage. In the DEIR, the Proponent should describe any additional design features that may C.96 provide resiliency and support adaptation under future climate scenarios. The Proponent should demonstrate use of best available climate projections and data in designing project elements, including stormwater management systems and other applicable features, and, if the project (including supporting infrastructure) will not be designed to meet specifications based on climate projections, provide an explanation of the reasons and a description of whether and how the C.97 project will be able to take further steps to adapt to climate conditions at a later stage.

Greenhouse Gas (GHG) Emissions

This project is subject to review under the May 5, 2010 MEPA GHG Policy. The Policy requires Proponents to quantify carbon dioxide (CO_2) emissions and identify measures to avoid, minimize or mitigate such emissions. The analysis should quantify the direct and indirect CO_2 emissions of the project's energy use (stationary sources) and transportation-related emissions C.98

(mobile sources). Direct emissions include on-site stationary sources, which typically emit GHGs by burning fossil fuel for heat, hot water, steam and other processes. Indirect emissions result from the consumption of energy, such as electricity, that is generated off-site by burning of fossil fuels, and from emissions from vehicles used by residents, employees, vendors, customers and others.

The ENF indicated that the proposed buildings will be constructed with energy-efficient heating, cooling, and ventilation systems, and included a commitment that the project will be fossil-fuel neutral by 2026 and fossil free by 2050. The DEIR should include a GHG analysis prepared in accordance with the GHG Policy, guidance provided in the comment letter submitted by the Department of Energy Resources (DOER), which is incorporated in this Certificate in its entirety, and this Scope. C.99

Stationary Sources

The DEIR should include an analysis that calculates and compares GHG emissions associated with: 1) a Base Case that conforms to the 9th Edition of the Massachusetts Building Code, which references the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1-2013 and the International Energy Conservation Code (IECC) 2015 C.100 and 2) a Mitigation Alternative that achieves greater reductions in GHG emissions. C.101 The City has adopted the Massachusetts Stretch Energy Code (SC). Therefore, the project will be required to meet the applicable version of the SC in effect at the time of construction. C.102 The SC increases the energy efficiency code requirements for new construction (both residential and commercial) and for major residential renovations or additions in municipalities that adopt it. The SC requires a reduction in energy use of 10 percent compared to that achieved by complying with the baseline energy provisions of the State Building Code. An updated SC took effect in November 2020 with new Massachusetts amendments to ASHRAE 90.1-2013-Appendix G. The Base Case for all buildings should be established based on the base Building Code with comparisons to building performance based on the updated SC. C.103

The GHG analysis should clearly demonstrate consistency with the key objective of MEPA review, which is to document the means by which Damage to the Environment can be avoided, minimized and mitigated to the maximum extent practicable. C.104 The DEIR should identify the model used to analyze GHG emissions, clearly state modeling assumptions, explicitly note which GHG reduction measures have been modeled, and identify whether certain building design or operational GHG reduction measures will be mandated by the Proponent to future occupants or merely encouraged for adoption and implementation. C.105 The DEIR should include the modeling printouts for each alternative and emission tables that compare base case emissions in tons per year (tpy) with the Preferred Alternative showing the anticipated reduction in tpy and percentage by emissions source. C.106 The DEIR should provide data and analysis in the format requested in DOER's letter. C.107

The DEIR should present an evaluation of mitigation measures identified in DOER's comment letter. In particular, the feasibility of each of the mitigation measures outlined below should be assessed for each of the major project elements, and if feasible, GHG emissions reduction potential associated with major mitigation elements should be evaluated to assess the C.108

relative benefits of each measure. The DEIR should explain, in reasonable detail, why certain C.109
measures that could provide significant GHG reductions were not selected – either because it is
not applicable to the project or is deemed technically or financially infeasible. It should include a
review of available financial incentives potentially available for the project, as described in C.110
DOER's comment letter. At a minimum, the DEIR should consider the following GHG
mitigation measures:

- Residential and hotel buildings designed in conformance with Passivehouse standards; C.111
- Above-Code continuous roof and wall insulation and avoiding glass curtain wall assemblies to minimize heat loss and uncontrolled infiltration through the building envelope; C.112
- Electric space heating and water heating using air source heat pumps (ASHP), variable refrigerant flow (VRF), ground source heat pumps (GSHP) and/or solar thermal systems; C.113
- High-albedo roofing materials, external shading and windows with improved solar heat gain coefficient (SHGC); C.114
- Energy recovery ventilation and wastewater systems; C.115
- Rooftop solar PV systems and/or solar-ready roofs; and,
- LED lighting, both exterior and interior. C.116

C.117 The project includes hotel and residential buildings, which are well-suited to
Passivehouse design for the significant increased energy efficiency, reduced GHG emissions,
and lower utility costs. As noted by DOER, recent studies have demonstrated that buildings
constructed to Passivehouse design standards are economically feasible and may be eligible for
financial incentives. The DEIR should analyze an alternative project design that includes C.118
Passivehouse design in the hotel and residential buildings. It should evaluate the scenario
detailed in DOER's comment letter that provides for partial electric space heating of lab/office
space using a hybrid of centrally-located air to water (or ground to water) heat pumps and gas- C.119
fired boiler in which the air source heat pump provides 80-90 percent total annual heating end
use. Key components of this approach that should be incorporated into the modelling presented
in the DEIR include:

- A hot water distribution loop of 120 degrees Fahrenheit (F);
- A centralized heating plant consisting of both an air to water heating pump and a gas-fired condensing boiler; C.120
- Boiler sized for 100 percent of the peak load;
- Air source heat pump sized for 25 percent of the peak load; and,
- Prioritized air source operation with use of the boiler only when loads exceed 25 percent of the peak load.

The DEIR should review the financial incentives identified in DOER's comment letter C.121
and incorporate these potential funding sources in analyses of Passivehouse design and
electrification of space and water heating. The Proponent should consult with staff from DOER C.122
and the MEPA Office prior to submitting the DEIR. The DEIR should clearly demonstrate that
the Proponent is taking all feasible measures to mitigate GHG impacts to the maximum extent C.123

practicable, and provide a clear justification if energy efficiency measures that appear technically C.123
feasible will not be adopted for the project.

Mobile sources

The GHG analysis should include an evaluation of potential GHG emissions associated C.124
with mobile emissions sources. The DEIR should follow the guidance provided in the GHG
Policy for *Indirect Emissions from Transportation* to determine mobile emissions for Existing C.125
Conditions, Build Conditions, and Build Conditions with Mitigation. The Proponent should C.126
thoroughly explore means to reduce overall single occupancy vehicle trips. The DEIR should
also review measures to promote the use of low-emissions vehicles, including installing electric
vehicle (EV) charging stations and EV-ready infrastructure at parking spaces. More information C.127
on electric vehicle infrastructure can be obtained from the MassEVolves program at
www.massevolves.org. The Build with Mitigation model should incorporate TDM measures and C.128
any roadway improvements implemented by the project, and document the reductions in GHG
emissions associated with the mitigation. The DEIR should explain how TDM measures will be
monitored and adjusted over time, and provide a methodology for quantifying emission
reductions impacts rather than an assumed percentage reduction. C.129

GHG Self-Certification

The DEIR should include a commitment to provide a self-certification to the MEPA
Office upon construction of the project. It should be signed by an appropriate professional (e.g.
engineer, architect, transportation planner, general contractor) indicating that all of the GHG C.130
mitigation measures, or equivalent measures that are designed to collectively achieve identified
reductions in stationary source GHG emission and transportation-related measures, have been
incorporated into the project. If equivalent measures are adopted, the project should commit to
achieving the same level of GHG emissions (i.e., "carbon footprint") identified in the Mitigation C.131
Alternative expressed in volumetric terms (tpy).

<u>Construction Period</u>

The DEIR should identify the schedule for construction of various elements and phases. C.132
It should identify construction-period impacts and mitigation relative to noise, air quality, water
quality, and traffic, including pedestrians, bicyclists and transit riders. The DEIR should confirm
that the project will require its construction contractors to use Ultra Low Sulfur Diesel fuel, and
discuss the use of after-engine emissions controls, such as oxidation catalysts or diesel
particulate filters. More information regarding construction-period diesel emission mitigation C.133
may be found on MassDEP's web site at http://www.mass.gov/dep/air/diesel/conretro.pdf.

The DEIR should provide more information regarding the project's generation, handling, C.134
recycling, and disposal of construction and demolition debris (C&D) and identify measures to
reduce solid waste generated by the project. I encourage the Proponent to commit to C&D C.135
recycling activities as a sustainable measure for the project. Demolition of any structures must
comply with the MassDEP Asbestos Regulations (310 CMR 7.15) that require a pre-demolition
and post-abatement survey and inspection by a licensed asbestos monitor, and identify regulatory C.136

requirements and potential mitigation measures for the removal, handling, and disposal of C.136
asbestos containing material (ACM) and other demolition debris. The DEIR should describe
mitigation measures related to the excavation, treatment, handling and disposal or contaminated C.137
soil and groundwater at the site. The Proponent is reminded that any contaminated material
encountered during construction must be managed in accordance with the MCP and with prior C.138
notification to MassDEP.

The project will be required to develop a Stormwater Pollution Prevention Plan (SWPP) C.139
in accordance with its NPDES CGP to manage stormwater during the construction period. The
DEIR should describe stormwater management measures that will be implemented during C.140
construction. It should describe potential construction period dewatering requirements, discuss
how dewatering will be conducted in a manner consistent with MWRA regulations/guidelines, C.141
and identify any necessary permits.

<u>Mitigation and Draft Section 61 Findings</u>

The DEIR should include a separate chapter summarizing all proposed mitigation C.142
measures, including construction-period measures. This chapter should also include draft Section
61 Findings for each permit to be issued by State Agencies. The DEIR should contain clear
commitments to implement these mitigation measures, estimate the individual costs of each C.143
proposed measure, identify the parties responsible for implementation, and a schedule for
implementation. The DEIR should clearly indicate which mitigation measures will be
constructed or implemented based upon project phasing, either tying mitigation commitments to
overall project square footage/phase or environmental impact thresholds, to ensure that adequate C.144
measures are in place to mitigate impacts associated with each development phase.

<u>Responses to Comments</u>

The DEIR should contain a copy of this Certificate and a copy of each comment letter
received. It should include a comprehensive response to comments on the ENF that specifically
address each issue raised in the comment letter; references to a chapter or sections of the DEIR
alone are not adequate and should only be used, with reference to specific page numbers, to C.145
support a direct response. This directive is not intended to, and shall not be construed to, enlarge
the Scope of the DEIR beyond what has been expressly identified in this certificate.

<u>Circulation</u>

The Proponent should circulate the DEIR to those parties who commented on the ENF, to C.146
any State Agencies from which the Proponent will seek permits or approvals, and to any parties
specified in section 11.16 of the MEPA regulations. The Proponent should consult with the
MEPA Office prior to filing the DEIR to determine whether additional distributions or outreach C.147
may be warranted to the surrounding community. Per 301 CMR 11.16(5), the Proponent may
circulate copies of the EIR to commenters in CD-ROM format or by directing commenters to a C.148
project website address. However, the Proponent must make a reasonable number of hard copies
available to accommodate those without convenient access to a computer and distribute these
upon request on a first-come, first-served basis. The Proponent should send correspondence C.149

accompanying the CD-ROM or website address indicating that hard copies are available upon request, noting relevant comment deadlines, and appropriate addresses for submission of comments. The DEIR submitted to the MEPA office should include a digital copy of the complete document. A copy of the DEIR should be made available for review at the Allston branch of the Boston Public Library.[4]

C.149

C.150

K. Theoharides

March 12, 2021
Date

Kathleen A. Theoharides

Comments received:

02/21/2021	Audrey Berry
02/22/2021	Boston Water and Sewer Commission (BWSC)
03/02/2021	Massachusetts Department of Transportation (MassDOT)
03/02/2021	Charles River Watershed Association (CRWA)
03/02/2021	Allston Brighton Health Collaborative
03/02/2021	Paula Alexander
03/02/2021	Barbara Parmenter
03/02/2021	Massachusetts Water Resources Authority (MWRA)
03/02/2021	Department of Conservation and recreation (DCR)
03/08/2021	Department of Energy Resources (DOER)

KAT/AJS/ajs

[4] Requirements for hard copy distribution or mailings will be suspended during the Commonwealth's COVID-19 response, to the extent public facilities are closed. Please consult the MEPA website for further details on interim procedures during this emergency period: https://www.mass.gov/orgs/massachusetts-environmental-policy-act-office.

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Jamey Tesler, Acting Secretary & CEO

massDOT
Massachusetts Department of Transportation

March 2, 2021

Kathleen Theoharides, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114-2150

RE: Boston: Enterprise Research Campus – ENF
(EEA #16320)

ATTN: MEPA Unit
Alex Strysky

Dear Secretary Theoharides:

On behalf of the Massachusetts Department of Transportation, I am submitting comments regarding the Environmental Notification Form for the Enterprise Research Campus project in Boston, as prepared by the Office of Transportation Planning. If you have any questions regarding these comments, please contact J. Lionel Lucien, P.E., Manager of the Public/Private Development Unit, at (857) 368-8862.

Sincerely,

David J. Mohler
Executive Director
Office of Transportation Planning

DJM/jll

cc: Jonathan Gulliver, Administrator, Highway Division
Patricia Leavenworth, P.E., Chief Engineer, Highway Division
John McInerney, District 6 Highway Director
Neil Boudreau, Assistant Administrator of Traffic and Highway Safety
Metropolitan Area Planning Council
Massachusetts Bay Transportation Authority
Boston Planning and Development Authority, City of Boston
Boston Transportation Department
Department of Conservation and Recreation

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Jamey Tesler, Acting Secretary & CEO

massDOT
Massachusetts Department of Transportation

MEMORANDUM

TO: David Mohler, Executive Director
Office of Transportation Planning

FROM: J. Lionel Lucien, P.E, Manager
Public/Private Development Unit

DATE: March 2, 2021

RE: Enterprise Research Campus – ENF
(EEA #16320)

The Public/Private Development Unit (PPDU) has reviewed the Environmental Notification Form (ENF) for the proposed Enterprise Research Campus (ERC) project in the Allston neighborhood of Boston. The project is located at 100 Western Avenue and will be developed by Tishman Speyer ERC Developer ("Proponent"). The project site consists of approximately 14.22 acres of land bounded by Western Avenue to the north, Sanofi-Genzyme to the east, the District Energy Facility and undeveloped land abutting Cambridge Street to the south, and Hague Street to the west. The site has historically been the home of transportation-related industrial uses, most recently by CSX Transportation. In 2000, the site was purchased by Harvard University, and in 2015 CSX Transportation relinquished its rights to the area. The site is currently used as a construction laydown and staging area for other Harvard University facilities. The project site is part of Harvard's vision of eventual development of their land holdings between Western Avenue and Cambridge Street.

The project will include 1,940,000 square feet (sf) of development, including 1,160,000 sf of lab/office uses, 135,000 sf of hotel space (250 keys), 75,000 sf of conference space, and 750 residential units. The project will be constructed in two phases. Phase A will include 900,000 sf of development on six acres, including all the hotel and conference space, 440,000 sf of lab/office space, and 330 residential units. Phase B will include the remainder of the lab/office space (720,000 sf) and residential units (420 units). The project will be supported by 1,280 parking spaces, of which approximately 40 spaces will be located on-street and the remainder will be garage-structured. Phase A will include 620 parking spaces and Phase B will include 940.

Access to the site will be provided via two new roadways that will intersect the south side of Western Avenue, Cattle Drive and East Drive. Access will also be provided from Cambridge Street via Almy Street. A third new roadway will be created, DEF Drive, which will run east-west to connect the new Cattle Drive and East Drive. The existing disused roadways on the project site, Hague Street and Rotterdam Street, will be eliminated. Of the total project site, 3.7 acres will be allocated to private streets and sidewalks open to public use. The streets, sidewalks, and other utility infrastructure to support the project will be constructed by Harvard Allston Land Company.

The project is expected to generate 23,984 unadjusted vehicle trips per day and 6,030 adjusted vehicle trips per day. The project trip generation and parking exceed the Massachusetts Environmental Policy Act (MEPA) Environmental Impact Report (EIR) transportation thresholds, 11.03(6)(a)(6), "generation of 3,000 or more New ADT on roadways providing access to a single location," and 11.03(6)(a)(7), "construction of 1,000 or more New parking spaces at a single location." Due to the project's proximity to MassDOT facilities including, Interstate 90 (I-90), the I-90 ramps, and the bridges over I-90 and Soldiers Field Road, the project may require an Access Permit from MassDOT should any off-site mitigation involve modifications to these facilities.

Separate from the ENF, the Proponent provided MassDOT with a Transportation Scoping Letter (TSL), prepared generally in conformance with guidance provided in the MassDOT/EOEEA *Transportation Impact Assessment (TIA) Guidelines*. MassDOT provides the following comments and scope of work for the Draft Environmental Impact Report (DEIR):

Scope of Work

The DEIR should include a TIA prepared in conformance with the current 1.1
MassDOT/EOEEA *TIA Guidelines*. The study should include a comprehensive multimodal assessment of the transportation impacts of the project. The TIA should provide an evaluation of mobility to and from the project site for the existing conditions, future No-Build
conditions, and future Build conditions within the study area. The future Build conditions 1.2
should include an analysis of conditions both with and without any improvements suggested to mitigate project impacts. The study should propose a mitigation package intended to improve mobility for all users, with a particular focus on increased use of walking, bicycling,
and transit by residents, employees, and visitors. Items listed below should be accounted for 1.3
in preparing the TIA.

Trip Generation

The TSL determined that trip generation projections using Institute of Transportation Engineers (ITE) *Trip Generation Manual* (10th Edition) Land Use Codes (LUCs) 710 – General Office, 760 – Research & Development Center, 221 – Mid-Rise Residential, 222 – High-Rise Residential, 820 – Shopping Center, 932 – High-Turnover Restaurant, and 310 – Hotel would most accurately reflect the proposed development. MassDOT asks that the TIA
consider whether LUC 310 accurately captures the trip generation of the conference facility 1.4
included in the hotel.

The TSL includes an adjusted trip generation that reflects mode share. The mode share estimates are based on U.S. Census data and projected trends in the *Go Boston 2030* plan for Allston. These adjustments result in a trip generation, presented in the TSL, of 8,141 vehicle

trips on an average weekday, including 679 vehicle trips during the weekday morning peak
hour and 821 vehicle trips during the weekday evening peak hour. MassDOT notes that the
adjusted vehicle trip generation presented in the TSL is different from the adjusted trip
generation presented in the ENF. The TSL also projects 4,284 transit trips on an average
weekday, including 539 transit trips during the weekday morning peak hour and 640 transit
trips during the weekday evening peak hour. The TIA should provide a detailed description of
how the trip generation is calculated and clarify the discrepancy between the ENF and the 1.5
TSL.

<u>Mode Split</u>

Several MBTA bus routes stop in the vicinity of the project site including routes 64,
66, 70, and 86. The TSL presents the mode split for the proposed project, based on U.S.
Census data and the *Go Boston 2030* plan for the Allston area. MassDOT generally accepts
and recommends that TIAs use mode share data based on existing data or empirically
projected trends. Should the Proponent use aspirational mode share data, MassDOT requires
that the Proponent provide quantitative analysis on how the transportation improvements and 1.6
policies implemented by the project will achieve that mode share goal.

The TIA should include all back up data used to arrive at the mode split estimates to
corroborate assumptions included in the analyses. The TIA should also include mode share
estimates for taxi/Transportation Network Company (TNC, i.e. Uber and Lyft) trips because
this would likely be a popular mode for the hotel and conference patrons. In accounting for 1.7
these trips, the transportation analysis should take into consideration that one person trip made
by a taxi/TNC results in two vehicle trips.

<u>Trip Distribution</u>

Vehicle and transit trips should be assigned to the study area network. The TIA should
provide all appropriate back up documentation to verify how the distribution percentages are 1.8
calculated and assigned to the roadway network and the transit system.

<u>Study Area</u>

The TSL proposes a study area consisting of the following intersections:

- Western Avenue at Soldiers Field Road;
- Western Avenue at Kresge Way/Sanofi Genzyme Driveway/Project Driveway;
- Western Avenue at Batten Way/Hague Street;
- North Harvard Street at Soldiers Field Road;
- North Harvard Street at Western Avenue; 1.9
- North Harvard Street at Franklin Street/Kingsley Street;
- Cambridge Street at North Harvard Street;
- Cambridge Street at Windom Street;
- Cambridge Street at I-90 Ramps/Double Tree Hotel; and

- Cambridge Street at Soldiers Field Road. 1.9

In addition, by the time of the future scenarios, three additional intersections will be constructed in the study area as part of the Harvard Science and Engineering Complex:

- Western Avenue at Stadium Road; 1.10
- Western Avenue at Academic Way; and
- North Harvard Street at Academic Way.

Furthermore, the Build scenarios that include the project will include three additional project driveway intersections (Western Avenue at Kresge Way/Sanofi Genzyme Driveway/Project Driveway will be the fourth project driveway):

- Western Avenue at Cattle Drive; 1.11
- Western Avenue at East Drive; and
- Interim Cattle Drive at Windom Street.

MassDOT asks that the study area be expanded to include the following intersections:

- Western Avenue at Memorial Drive (Cambridge);
- River Street at Memorial Drive (Cambridge);
- JFK Street at Memorial Drive (Cambridge); 1.12
- Merge of I-90 off-ramp onto Cambridge Street westbound; and
- Diverge of I-90 on-ramp from Cambridge Street eastbound.

Finally, depending on the expected trip distribution, MassDOT may request merge/diverge analyses for the Soldiers Field Road exit and entrance ramps at North Harvard Street and River Street/Western Avenue, as well as the I-90 mainline exit and entrance ramps 1.13
at the Allston Interchange, including the ramp merge/diverge locations within the interchange.

The I-90 ramps are under MassDOT jurisdiction and the bridges over Soldiers Field Road, the Charles River, and I-90 are also under MassDOT jurisdiction. Soldiers Field Road and the intersections that provide access to Soldiers Field Road are under Department of Conservation and Recreation (DCR) jurisdiction. The study area will be subject to review by MassDOT in coordination with DCR when the comprehensive TIA is submitted. Please note that additional study area intersections should be included in the TIA if project-generated trips 1.14
are anticipated to increase peak hour traffic volume by five percent or more, or by more than 100 vehicles per hour.

<u>Background Growth</u>

As described in the TSL, baseline traffic volumes should use historic traffic counts adjusted to 2019 conditions, standing in for 2021, according to the revised MassDOT *Guidance on Traffic Count Data*. The TSL notes that counts within the study area from 2017 1.15
have been identified.

In developing future No-Build and Build traffic volumes, the TIA should include trips 1.16
generated by other nearby planned and/or approved projects as part of the background growth.
ITE trip rates or completed TIAs should be used to estimate the vehicle trip generation of un-
built and/or yet to be occupied space. In addition, an annual growth factor should be 1.17
superimposed on existing traffic volumes prior to the addition of the volumes associated with
background project-specific growth. The TSL proposes using no annual growth factor to
develop future scenarios, in accordance with the City of Boston's guidance. However,
MassDOT asks that for MassDOT controlled facilities, particularly I-90 and the I-90 ramps, 1.18
that the analysis reflect a typical positive growth in roadway volumes.

The DEIR should further describe and clarify the other development planned by 1.19
Harvard near the project site. The DEIR should clarify how this project will relate to and
integrate with MassDOT, Boston, and Harvard's vision for development and transportation in 1.20
the Allston area.

While the planning horizon year for TIAs is typically seven years from the time of
submittal of the TIA, the TSL proposes Medium Term and Long Term scenarios in 2025 and
2030, respectively, to reflect the phased development of the site. MassDOT accepts this 1.21
approach and asks that the Proponent clarify with MassDOT the project-related development
that should be included in the 2030 No-Build scenario.

Future scenarios should also incorporate planned transportation projects. The 1.22
Proponent should coordinate with MassDOT, the MBTA, and the City of Boston about
ongoing and planned transportation improvements in the vicinity of the project site. The TSL
states that the analysis for the future scenarios will not include the Massachusetts Turnpike/I-
90 Interchange reconstruction (and West Station) (the Allston Multimodal Project) because,
according to the Boston Region MPO's long-range transportation plan, the project is not 1.23
expected to start construction until the 2030 to 2034 period. MassDOT concurs with this
approach. Nevertheless, the Proponent should ensure that the design and transportation
mitigation program for this project is consistent with the vision and mobility goals of the
Allston Multimodal Project.

<u>Traffic Operations</u>

Capacity analyses should be conducted for the weekday morning and evening peak
hours for both existing and future conditions for each development alternative considered. In 1.24
addition, capacity analyses for Build with mitigation conditions should be provided for all
intersections, particularly those with impacts to the state highway system.

The TIA should provide illustrations depicting the peak hour 50th (average) and 95th
percentile queue lengths for each lane group/turning movement at each study area
intersection, for all analysis scenarios. The information contained in these illustrations should
clearly demonstrate that the project would not result in any extended queues that would block 1.25
vehicle movements to/from study area intersections, particularly those involving state
highways. Appropriate mitigation should be identified at any locations where queue

blockages occur. Color-coded illustrations should also be prepared depicting the level of service (LOS) for each lane group/turning movement for each case. 1.25

Safety

The TIA should include a safety analysis for all intersections and roadway segments within the study area. The analysis should calculate crash rates using MassDOT data for the most recent continuous five-year period. 1.26 Crash rates should be documented, and additional mitigation considered at any locations exceeding the State and/or District 6 averages.

The Proponent should determine if any study area intersections are listed in the Highway Safety Improvement Program (HSIP) and coordinate with the MassDOT Highway Division's Safety Section to determine if a Road Safety Audit (RSA) is necessary. An initial review provided in the TSL identifies North Harvard Street at Soldiers Field Road as an HSIP bicycle cluster and North Harvard Street at Soldiers Field Road and Cambridge Street at 1.27 Soldiers Field Road as HSIP vehicle clusters. The Proponent should coordinate with MassDOT about the need to complete RSAs at the HSIP eligible intersections before the submission of the DEIR; MassDOT anticipates that RSAs will be required.

Conceptual Plans

The TIA should include sufficiently detailed conceptual plans (minimum of 80-scale) for proposed roadway improvements in order to verify the feasibility of constructing such improvements. These plans should clearly show proposed lane widths and offsets, layout lines 1.28 and jurisdictions, and land uses adjacent to areas where improvements are proposed.

Transit

As described above, the MBTA currently operates extensive bus service near the site and the project anticipates substantial transit mode share. The TIA should contain an analysis 1.29 of additional transit demand generated by the project and the capacity on the MBTA bus routes proximate to the project site. Once the transit trip generation is developed and applied to the network, the TIA should address the following issues:

The analysis should be compliant with the MBTA's Office of Performance 1.30 Management and Innovation's (OPMI) methodology for calculating the existing, future No-Build, and future Build comfort metrics (as evaluated in the Service Delivery Policy [SDP]) for each bus route within the project study area. Mitigation should be proposed for:

- Any bus route receiving new passengers that falls below the 96% route-wise 1.31 minimum threshold for the SDP comfort metric (share of passenger travel time experienced in comfortable conditions);
- Any trip for which the new passengers would cause the trip to exceed the threshold; and/or 1.32

- Any trip which was already above the crowding threshold and to which new passengers would be added. 1.33

The Proponent should coordinate with the MassDOT PPDU and MBTA Service 1.34
Planning in advance proposing of potential solutions to offset these project-related impacts.

The TIA should show how residents, employees, and visitors using the bus network 1.35
will travel between the site and the bus stops. The TIA should show how pedestrian crossings
and bus stops can be coordinated to ensure safe, accessible travel for bus customers. Of
particular importance to the MBTA are all codes and standards related to the Americans with 1.36
Disabilities Act (ADA), the Massachusetts Architectural Access Board (MAAB) along with
the Federal Transit Administration (FTA) regulations and guidance. The Proponent should
present the existing conditions on routes between nearby bus stops and the project site and
how those conditions should be upgraded/improved to ensure a fully accessible path of travel 1.37
for all customers.

The TIA should also identify and document transit improvement proposals under
evaluation by MassDOT, the MBTA, and the City of Boston. Mitigation proposed for the
project should be consistent with ongoing transit improvement initiatives of these agencies. 1.38

<u>Pedestrian Access</u>

The project will include new roadways internal to the project site, constructed by the Harvard Allston Land Company. All new roadways will include sidewalks on both sides of the roadway. New crosswalks will be added across the roadways that intersect Western Avenue and provide access to the project site. One of the new roadways, Cattle Drive, will include a mid-block raised crosswalk to connect with the new multi-use path to the west of the project site. This multi-use path will travel from east to west across the project site and integrate with a greenway system envisioned for the area.

Because the project anticipates a high pedestrian mode share, it is expected that the 1.39
Proponent will provide a mitigation package that ensures walking and bicycling will be an
attractive way to access the site. The TIA should provide an inventory of existing sidewalks
and crosswalks within the study area and should address the quality and condition of those 1.40
facilities. The TIA should include a commitment to improvements in any areas that are
structurally deficient or not meeting current codes for accessibility, including sidewalks,
crosswalks, ramps, and pedestrian equipment. Special attention should be given to linking the 1.41
proposed development to adjacent complementary land uses and transit facilities.

<u>Bicycle Access</u>

As described in the TSL, the project will include new bicycle infrastructure connecting to the protected bike lanes along Western Avenue, including separated bike lanes on both sides of the new roadways, Cattle Drive and East Drive.

The TIA should include a detailed inventory of the bicycle network to include 1.42
bikeway types, bikeway widths, and bicycle numbers and speeds. The Proponent should
identify the likely travel routes for bicyclists within the study area. The degree to which these 1.43
routes can safely support bicycle travel should also be examined. The TIA should reevaluate
these routes based on the origin-destination of potential residents, employees, and visitors.
Based on this analysis, the Proponent should consider the feasibility of expanding some of 1.44
these existing routes or considering new routes to encourage bicycle travel in and around the
site. The Proponent should work closely with MassDOT and the City of Boston to provide a
seamless connection between the existing and planned bicycle facilities in the study area. 1.45

Parking

According to the TSL, the project would include the provision of 1,280 parking spaces. The TSL notes that the parking supply will be constrained and priced at fair market value to discourage accessing the site by single occupancy vehicle (SOV) travel. The TIA
should explain the methodology used to determine the total parking required. The ITE 1.46
Parking Generation Manual (5th Edition) generally provides a reasonable basis for
comparison to parking requirements under local zoning. The TIA should include a summary 1.47
of parking need and supply for comparable facilities based on multiple data sources. The TIA
should also determine the number of parking spaces occupied at various times of day and
identify periods of peak use. 1.48

Transportation Demand Management (TDM)

The TSL states that the Proponent is committed to implementing TDM measures. The
TIA should include a comprehensive TDM program that would implement measures aimed at minimizing SOV and TNC trip generation to achieve the robust non-SOV mode share presented in the TSL. 1.49
The TDM program should further investigate measures that would maximize usage of existing and potential new pedestrian, bicycle, and transit facilities. Such measures may include the following:

- Limiting the available parking supply;
- Provision of a parking cash-out program and/or charging for parking;
- Provision of on-site amenities and conveniences that would reduce the need for automobile travel;
- Provision of carpooling and vanpooling programs and perks; 1.50
- Provision of free or subsidized transit passes;
- Provision of a mobility hub to centralize multiple modes of transportation including the TNC/taxi trips expected to serve the hotel;
- Provision of seamless, welcoming, and direct pedestrian access to nearby transit hubs; and
- Provision of robust bicycle and pedestrian amenities.

The ENF states that the project will join the Allston/Brighton Transportation Management Association (TMA). The Proponent should work with the TMA to develop a TDM program for the project. 1.51

Transportation Monitoring Program

The Proponent will be required to conduct an annual transportation monitoring program for a period of five years, beginning six months after occupancy of the full-build project. The goals of the monitoring program will be to evaluate the assumptions made in the EIR and the adequacy of the mitigation measures, as well as to determine the effectiveness of the TDM program. It would include:

- Simultaneous automatic traffic recorder (ATR) counts at each parking entrance for a continuous 24-hour period on a typical weekday; 1.52
- Weekday morning and evening peak hour turning movement counts (TMCs) and operations analysis at "mitigated" intersections, including those involving parking entrances;
- Travel survey of residents, employees, and visitors at the site (to be administered by the Transportation Coordinator); and
- Transit Ridership counts.

The Proponent should continue consultation with the City of Boston, DCR, and appropriate MassDOT units, including PPDU, the MBTA, and the District 6 Office. If you have any questions regarding these comments, please contact me or Catrina Meyer at *Catrina.Meyer@dot.state.ma.us*. 1.53

dcr
Massachusetts

March 2, 2021

Secretary Kathleen A. Theoharides
Executive Office of Energy and Environmental Affairs
Attn: Alex Strysky, MEPA Office
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

Re: EOEEA #16320 Enterprise Research Campus Project ENF

Dear Secretary Theoharides:

The Department of Conservation and Recreation ("DCR" or "Department") is pleased to submit the following comments in response to the Environmental Notification Form ("ENF") submitted by Tishman Speyer ERC Developer (the "Proponent") for the Enterprise Research Campus Project (the "Project").

As described in the ENF, the Project is seeking local approvals to develop approximately 10.5 acres of a 14-acre site located at 100 Western Avenue in the Allston neighborhood of Boston. The Project will contain approximately 1.94 million square feet of mixed-use development which will be developed in multiple phases, and consist of residential, office/lab, hotel, conference functions, restaurant, and retail use, along with new public open space areas.

A DCR Construction and Access Permit ("CAP") will be needed to modify DCR parkway intersection geometry or to adjust traffic signal timing, as DCR has management responsibility for Soldiers Field Road and associated intersections.

Soldiers Field Road and Associated Intersections

The intersection of Cambridge Street with Soldiers Field Road, which is included as a study area intersection, is of particular interest to DCR, as it currently operates poorly and causes ripple effects in nearby intersections. DCR will coordinate with the Proponent, Harvard University, and the City of Boston to identify intersection and signal timing adjustments to support additional traffic from the Project, and to unlock traffic flow along and across the Charles River. In particular, DCR would like to explore the concept of eliminating one of the five signal phases to improve efficiency and cycle length at this intersection. 2.1

Second, DCR strongly recommends that the Traffic Impact Analysis ("TIA") devote a full section to discussion of post-pandemic trip-making as it relates to the Project. Using traditional Institute of Traffic Engineers assumptions will not be sufficient without explaining adjustments to changes in travel choices regarding mode split, trip generation, and growth rates. Although the TIA must make mathematical projections of traffic volumes to conduct a full capacity analysis, as MEPA requires, the TIA must clearly explain the uncertainty of base assumptions and the resulting calculations. 2.2

Finally, DCR strongly recommends that the Proponent take new (2021) traffic counts at all study area intersections and Automatic Traffic Recorders (ATRs) wherever historic counts were taken, so that a comparison of pre-pandemic and current traffic volumes can be made. If traffic monitoring will be a part 2.3

of Total Traffic Demand (TDM) measures, traffic counts from 2021 will be an important baseline data point. 2.3

Thank you for the opportunity to comment on the ENF. Please contact the Director of Construction & Access Permitting, Sean Casey at sean.casey@mass.gov regarding DCR Construction and Access Permits. Please contact Jeffrey Parenti related to traffic planning coordination at jeffrey.parenti@mass.gov.

Sincerely,

Jim Montgomery
Commissioner

Cc: Jeffrey Parenti, Sean Casey, Priscilla Geigis, Patrice Kish, Tom LaRosa (DCR)

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF
ENERGY AND ENVIRONMENTAL AFFAIRS
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Karyn E. Polito
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Kathleen A. Theoharides
Secretary

Patrick Woodcock
Commissioner

8 March 2021

Kathleen Theoharides, Secretary
Executive Office of Energy & Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02114
Attn: MEPA Unit

RE: Enterprise Research Campus Project, Boston, MA, EEA #16320

Cc: Maggie McCarey, Director of Energy Efficiency, Department of Energy Resource
Patrick Woodcock, Commissioner, Department of Energy Resources

Dear Secretary Theoharides:

We've reviewed the Environmental Notification Form (ENF) for the proposed project. The project includes 1.9M-sf of new built space (1.16M-sf of lab/office, 0.57M-sf residential (750 units), 135,000-sf of hotel (250 units), 75,000 sf conference center). In addition, restaurant and retail will be incorporated on the ground floor. For this project we expect key mitigation measures to include:

- Passivehouse (for the residential and possibly the hotel); 3.1

- Building design and construction practices that result in low heating and cooling thermal energy demand intensity (heating and cooling "TEDI") (for all buildings) by:

    - Maintaining envelope integrity with framed, insulated walls with continuous insulation; 3.2

    - Thermally-broken windows and other components to eliminate thermal bridges;

    - Minimizing glass curtain wall assemblies and excessive windows;

    - Low air-infiltration, confirmed with in-building air-infiltration testing;
    - Energy recovery; 3.2
    - Management of solar heat gains;
- Efficient electrification of space heating, including:
    - For residential, retail, restaurant, office, hotel: Air-to-air and air-to-water heat pumps for space heating; 3.3
        - Alternatively for above uses, particularly office: low temperature, hydronic space heating with heat-input provided by in-building, central plant consisting of air-to-water heat pump;
    - For highly ventilated lab office, including speculative core-and-shell developments: low temperature, hydronic space heating with heat-input provided by hybrid, in-building, central plant consisting of air-to-water heat pump (primary) and gas boilers (secondary); 3.4
- Efficient electrification of water heating, where feasible; 3.5
- Extensive rooftop solar-readiness (all buildings); 3.6
- Electric vehicle ready parking spaces (all buildings). 3.7

Experience has shown that the above deliver 50 to 80% less emissions than projects built to Code while improving affordability and resilience. In addition, significant incentives may be available, including MassSave® incentives, Alternative Energy Credits (AECs), and Solar Massachusetts Renewable Target (SMART) credits. For this project, just the MassSave® Passivehouse incentive for the residential portion of the project is worth up to **$2.25M**.

Passivehouse

Passivehouse is an energy efficiency building standard that results in an ultra-low energy building requiring little energy use for space heating and cooling. This is achieved by focusing on envelope performance, airtightness, solar heat gain management, and energy recovery. Passivehouse projects also typically have efficient electrified heating and much smaller-sized HVAC systems.

Experience and published studies show that for low-rise and mid-rise residential development, Passivehouse doesn't necessarily cost more to build because improvements to envelope are offset by reductions in HVAC[1]. In high-rise residential construction, Passivehouse costs nominally more[2].

Local experience has also verified the cost effectiveness of Passivehouse. For example, the Massachusetts Clean Energy Center's "Passive House Design Challenge", consisting of eight (8) Passivehouse multifamily buildings, showed incremental cost-of-building increase between 1.4% and 3%[3] for all eight projects. One of these projects, the Finch Cambridge project, was recently completed in Cambridge. Incremental as-built cost-of-building was 1.4% over code. The project team produced a detailed as-built cost-of-building report showing Passivehouse cost $5,000 more per unit[4] than code. The MassSave Passivehouse incentive, payable to the developer, is $3,000 per unit.

Passivehouse is an energy code standard which is unlike other energy efficient building approaches in that its truly performance based by requiring mandatory, rigorous in-field tests to confirm that strict standards are being met. Passivehouse methods are recognized by both Massachusetts building Code, MassSave®[3], and incentives under Massachusetts' Alternative Portfolio Standard (APS). For qualifying multifamily buildings, MassSave® incentive for Passivehouse is approximately $3,000 per dwelling unit, or $2.25M when applied across this project.

Passivehouse also delivers:

- *Significant reduction in utility costs:* Passivehouse is much more affordable to residents;

- *Improved resiliency:* Passivehouse buildings can stay warm (or cool, in the summer) for extended periods of time even with loss of power.

- *Superior comfort and quality:* Buyers and tenants benefit from: reduced exterior noise, superior air quality, and premium doors and windows. Occupants describe superior comfort, even when they are immediately adjacent to windows. Building owners benefit from: reduced HVAC systems, less moving parts, and reduced maintenance.

There is significant Passivehouse experience in Massachusetts. There are over 5,000 Passivehouse units being designed, or under construction, in eastern Massachusetts alone. Most of these projects are in the Boston metro area. The Bunker Hill Redevelopment project in Charlestown will be the largest Passivehouse project in the western hemisphere. Additionally, upon completion of Winthrop Square Tower, Boston will be home to a 750,000-sf office space certified as Passivehouse which will be the tallest Passivehouse project on earth.

Passivehouse is recommend for all residential buildings and potentially the hotel, as well. 3.8

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[1] Pennsylvania Housing and Finance Association. *Passivehouse Cost Comparison Data set 2015, 2016, 2018* [Data Set]

[2] Feasibility Study to Implement the Passivehaus Standard on Tall Residential Buildings, FXcollaborative, 30 March 2017, Prepared for NYSERDA

[3] MassSave® is a consortium of Massachusetts utility companies designed to deliver energy efficiency throughout the Commonwealth of Massachusetts.

Passivehouse Examples

The Distillery
Boston, MA

Winthrop Center
Boston, MA

Newton Northland
Newton, MA

Bunker Hill Housing Development
Charlestown, MA

Newton Riverside
Newton, MA

Envelope, Heat Recovery, and Solar Gains

The combination of quality envelope, heat recovery, and management of solar gains can result in significant reduction in heating (and cooling) thermal energy demand intensity (TEDI, units of kBtu/sf-yr)[4]. In addition to reduced utility costs and emissions, the value of a targeted focus on heating and cooling TEDI results in:

- Simplified space heating electrification;
- Reduction, and possible elimination, of perimeter heating systems;
- Improved resiliency;
- Reduced peak demands;
- Improved occupant comfort;

[4] Although they have the same units, heating and cooling TEDI is not the same as heating and cooling EUI. TEDI represents energy requirement, not energy consumption. For guidance on how to extract TEDI information from building models see "Energy Modeling Guidelines", City of Vancouver, Planning, Urban Design and Sustainability Department, Land Use Development and Policy Guidelines, Version 2.0, amended 18 July 2018 and "Designing to TEDI, TEUI, and GHGI Performance Metrics", International Building Performance Simulation Association (IBPSA), by Chan *et al*

- Reduced maintenance.

Specific TEDI reduction strategies are:

- High-performance window and walls;
- Thermal-broken windows and components to eliminate thermal bridges;
- Low air-infiltration;
- Ventilation heat recovery;
- Solar gain management via external shading and/or low solar heat gain coefficient (SHGC)

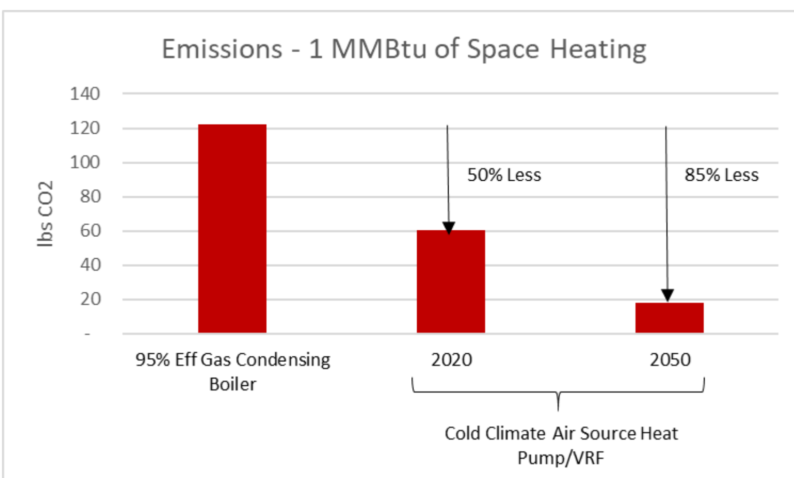
Buildings with curtain wall envelope require high performing windows and high performing opaque spandrels to achieve heating TEDI reductions. High performing windows and high performing opaque spandrels should be carefully evaluated if curtain-wall construction is considered. 3.9

Efficient Electrification – Space Heating

Efficient electrification of space heating entails the swapping of fossil fuels (natural gas, oil, and propane), or electric resistance systems, with cold-climate rated air source heat pumps or ground source heat pumps.

Electrification of space is a key mitigation strategy with significant short- and long-term implications on GHG emissions. Massachusetts grid emissions rates continue to decline with the implementation of clean energy policies that increase renewable electricity sources. The implication is that efficient electric space heating with cold climate air source heat pump (or ground source heat pump) has lower emissions than other fossil-fuel based heating options, including best-in-class (95% efficient) condensing natural gas equipment.

Currently, efficient electric heating has approximately **50% lower emissions** in Massachusetts than condensing natural gas heating. By 2050, and possibly sooner, efficient electric heating is expected to have approximately **85% lower emissions** in Massachusetts than condensing natural gas heating. See illustration below.



Except as noted below, the DOER recommends efficient electrification of space heating for all new construction.

Electrifying Space Heating: Residential, Restaurant, Hotel, Retail, and Office Buildings

Space heating of residential, hotel, restaurant, retail, and office buildings can be readily accomplished using one of the following approaches:

- Air to air heat pumps

  Air to air heat pumps can be readily incorporated into small and mid-size residential, office, retail, and other buildings.

- Air to air variable refrigerant flow (VRF) heat pumps

  Air to air VRF heat pumps can also be readily incorporated into small and mid-size residential, office, retail, and other buildings. In addition, such systems can also be incorporated into large floorplate and tall residential, office, retail, and other buildings.

- Central air to water heat pumps

  In-building, central air to water heat pumps can be readily incorporated into any size building, floor plate size, and building use. These systems consist of an in-building, centrally located air and/or ground to water heat pump heating plant which provides hot water to a 120F thermal distribution loop for space heating. This option also provides an approach for speculative buildings in which the floor space use may not be known.

We anticipate that between the above three approaches, a feasible means exists to readily electrify space heating of any residential, restaurant, hotel, retail, and office use on this project. 3.10

Electrifying Space Heating: Lab/Office Buildings

Lab/office buildings typically have high ventilation loads which has made electrification of space heating a challenge in the past, particularly in a speculative core/shell project. However, DOER is aware of highly-ventilated, speculative core and shell lab/office projects that are pursuing a pathway to partially electrify space heating. The approach uses a hybrid of air to water (or ground to water) heat pumps with gas equipment as backup in which the heat pump can provide 80-90% total annual heating end use.

Key strategies for this hybrid approach are as follows:

- Include a hot water distribution loop of 120°F;
- Include an in-building, centralized heating plant consisting of an air-to-water (or ground-to-water) heat pump and a gas-fired condensing boiler;

- Size the boiler for 100% of the peak load; size the air source heat pump for 25% to 50% of the peak load;

- Prioritize the heat pump operation first and utilize boiler only when loads exceed 25-50% of peak. The objective is to provide 80-90% of the total annual heating with air source.

A hybrid approach like this may provide a feasible means to partially electrify space heating of highly ventilated lab/office building, including speculative core/shell projects.

Efficient Electrification – Service Water Heating

Similar to above, due to Massachusetts low electric grid emissions, even swapping from best in class condensing gas to heat pump service water heating results in significant emissions reduction. However, heat pump service water heating is challenging in some building settings.

<u>Service water heating – Office, retail, and possibly lab/office</u>

Office, retail, and possibly lab/office generally have low service water loads. Heat pump service water heating using packaged air source heat pump equipment is usually feasible. Such units can be distributed throughout the buildings at or near the service water points of use. We recommend this approach for those building types.

<u>Service water heating – Residential, hotel, restaurant, and possibly lab/office</u>

Residential multifamily, hotel, restaurant, and possibly lab/office uses typically have larger water loads and/or limited interior space to locate packaged heat pump water heating equipment near point of use. Alternative approaches in these applications include:

- *Centrally located air source water heating:* These systems consist of centrally located heat pumps, usually with the compressors outdoors, which provide hot water to water distribution piping to the end use locations. These are usually engineered solutions with less packaged equipment options.

- *Condensing gas hot water heaters*: These systems consist of either centrally located, or distributed, natural gas fired heating equipment. Centrally located equipment is preferable as it allows an opportunity to swap to heat pump water heating in the future.

- Some combination of above.

We recommend the above be evaluated, with a priority toward heat pump water heating. 3.11

Solar PV

Rooftop PV can provide significant GHG benefits as well as significant financial benefits. The project should review opportunities to maximize on-site PV by setting aside as much roof space as possible for future rooftop PV. 3.12

Even if PV is not installed during building construction, it is important to plan the project to ensure that roof space is set aside for PV and that roof space doesn't become unnecessarily encroached 3.13
with HVAC appurtenances, diminishing the opportunities for future PV. Electrification of heating and Passivehouse can both contribute to enabling more PV as these approaches can reduce rooftop equipment associated with conventional code HVAC.

Electric Vehicle (EV) Ready Parking Spaces

EV charging stations are critical for the continual transition towards electric mobility. Even if EV charging stations are not installed during construction, it is critical to maximize EV-ready spaces as it is significantly cheaper and easier to size electrical service and install wiring or wiring conduit during construction, rather than retrofitting a project later.

We encourage the project to maximize EV-ready parking spaces for the project. 3.14

Incentives

Buildings which incorporate the above strategies can qualify for significant incentives:

- MassSave® performance-based incentives[5] offer incentives for every kWh or therm saved compared to a program-provided energy model. The above energy efficiency strategies offer opportunities for large kWh and therm savings.

- MassSave® Passivehouse incentives[6] are available to multifamily buildings which meet either PHI or PHIUS Passivehouse certification. In addition to a $3,000/unit incentive, MassSave® also funds pre-construction feasibility and modeling. The incentive structure is as follows:

Passive House Incentive Structure for Multi-Family Mid- and High-Rise Buildings			
Incentive Timing	**Activity**	**Incentive Amount**	**Max. Incentive**
Pre-Construction	Feasibility Study	100% Feasibility costs	$5,000
	Energy Modeling	75% of Energy Modeling costs	$500/Unit, max. $20,000
	Pre-Certification	$500/unit	N/A
Post-Construction	Certification	$2,500/unit	
	Net Performance Bonus	$0.75/kWh	
		$7.50/therm	

- Alternative Energy Credits (AECs)[7] offer incentives to electrify building space heating using heat pumps and/or VRF. This program also includes multipliers which increase

[5] https://www.masssave.com/en/saving/business-rebates/new-buildings-and-major-renovations/
[6] https://www.masssave.com/saving/residential-rebates/passive-house-incentives
[7] https://www.mass.gov/guides/aps-renewable-thermal-statement-of-qualification-application

value if the building meets Passivehouse standards or buildings built to HERs 50 or less. These credits may be distributed on a quarterly basis over time; or, may be distributed in a lump sum to the developer if certain conditions are met.

- Massachusetts SMART program[8] provides significant incentives for solar development on top of federal and state tax incentives. SMART includes pathways which allow solar production to be sold without off-takers. This may be of potential interest to building developers as this allows them to develop rooftop solar without necessarily engaging with building tenants. For this reason, setting aside rooftop solar PV areas helps ensure that building owners' ability to monetize the roof is not impacted.

Codes and Baseline

Massachusetts Stretch Code applies to this project. Stretch Code requires a 10% energy performance improvement over ASHRAE 90.1-2013-Appendix G plus Massachusetts amendments including C402.1.5 (envelope), C405.3 and C405.4 (lighting), C405.10 (EV charging), and C406 (three additional efficiency measures).

Projects should include the three C406 additional efficiency measures in their Baseline. 3.15

Recommendations for the Next Submission

Recommendations are as follows:

1. Conduct separate models for by building type as follows:
    a. Office
    b. Lab/office
    c. Low rise residential
    d. High rise residential 3.16
    e. Retail
    f. Restaurant
    g. Hotel

2. Ensure Baseline building scenarios meet all requirements including relevant MA amendments. Clearly indicate which three C406 measures are being used in the Baseline. C406 measures should be regarded as project commitments. For example, if the project 3.17 choses additional solar PV, the solar PV would be considered a project commitment. Emissions reduction due to C406 measures is considered "code required" and does not count as mitigation.

3. Separately for each modeled building develop two UA analysis tables, as follows:

    a. One table that shows how the baseline complies with Table 5.5-5 of ASHRAE 90.1 2013 Appendix G plus Massachusetts Amendment C401.2.4. Fenestration limits 3.18 will vary depending upon building type.

[8] https://www.mass.gov/solar-massachusetts-renewable-target-smart

b. A second table that shows how the proposed complies with 2018 IECC Tables C-402.1.3, C402.1.4, and C-402.4. Fenestration limit should be 30% when calculating minimum performance requirements for all building types. 3.19

4. A combination of high-performing envelope, heat recovery, and solar gain management should be used throughout with an aim toward reducing heating TEDI. Strategies to achieve this include:

   a. *Above code-threshold envelope* (vertical walls, windows, roofs and exposed lower level floors). Priority should be given to increasing continuous insulation and framed insulated wall sections. Distinguish between R value of batt and R value of continuous insulation. Continuous insulation necessarily means insulation that is uninterrupted by hangers, studs, etc. Indicate planned wall assembly U value and wall construction type (mass, wood, metal stud, etc). Confirm that the relationship between R-value and assembly U-factor conform to Appendix A of the Code.

   b. *Glass curtain wall/spandrel systems should be minimized as much as possible, and avoided where possible,* as these are the lowest performing wall systems.

      - If curtain wall systems are used, evaluate systems having opaque "spandrel" portion of R-10 or better. 3.20

   c. *Reduce air infiltration to Passivehouse levels to 0.08 cfm at 74 Pa (in all buildings)*. In-building field tests are recommended to confirm air-infiltration.

   d. *Ventilation Energy Recovery*. High performing energy recovery is essential to achieving low TEDI.

   e. *Solar gain management*. Manage solar gains with external shading and/or low solar heat gain coefficient (SHGC).

5. At a minimum, develop the following scenarios:

   a. *Low rise residential, high rise residential, and hotel*: Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. Efficient electric (electric air source heat pump/VRF or central air to water heat pump to 120F thermal distribution loop) space heating and gas water heating. External shading and improved solar heat gain coefficient windows to control space cooling loads. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy. 3.21

      - Investigate in-building, centrally located air source heat pump water heating sub scenario to above.

b. *Low rise residential, high rise residential, and hotel:* Passivehouse with efficient electric space heating (electric air source heat pump/VRF or central air to water heat pump to 120F thermal distribution loop) and gas water heating. This study should be performed by a qualified Passivehouse consultant and could leverage MassSave® funded feasibility study and modeling. 3.22

- Investigate in-building, centrally located air source heat pump water heating sub scenario to above.

c. *Lab/office*: Improved envelope and inclusion of energy recovery to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. In-building, centrally-located hybrid efficient electric space heating (air to water heat pump sized at 25 to 50% peak heating capacity as priority backed-up with 95% efficient gas boiler sized at 100% peak, connected to 120°F thermal distribution hot water loop). External shading and improved solar heat gain coefficient windows to control space cooling loads. 3.23 Energy reduction shall be attributable to reductions in heating, cooling, fan, ventilation, and pumping. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy.

d. *Office*: Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. In-building, centrally-located efficient electric space heating (air to water heat pump sized at 100% peak heating capacity with no gas boiler back-up). External shading and improved solar heat gain coefficient windows to control space cooling loads. Heat pump hot service hot water. Energy reduction shall be attributable to reductions in heating, cooling, fan, 3.24 ventilation, and pumping. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy.

- Investigate air to air VRF heat pump alternative for space heating

e. *Retail*: Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. Efficient electric (electric air source heat pump/VRF) space heating. External shading and improved solar heat gain coefficient windows to control space cooling loads. Electric air source heat pump service hot water. Energy reduction shall be attributable to reductions in 3.25 heating, cooling, fan, ventilation, and pumping. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy over reductions in lighting and miscellaneous energy reduction.

f. *Restaurant*: Improved envelope and inclusion of energy recovery as described above to achieve heating TEDI reduction. Downsize the HVAC as much as possible, including evaluating perimeter heating elimination. Efficient electric (electric air source heat pump/VRF) space heating. External shading and improved 3.26 solar heat gain coefficient windows to control space cooling loads. Gas service hot water. Energy reduction shall be attributable to reductions in heating, cooling, fan, ventilation, and pumping. We expect GHG mitigation to come primarily from reductions in heating, cooling, pumping, and fan energy over reductions in lighting and miscellaneous energy reduction. 3.26

6. Evaluate incentives, including:

\

   a. Estimate of Alternative Energy Credits; 3.27

   b. Estimates of MassSave® incentives, based on meeting with utility. 3.28

7. Evaluate rooftop solar PV. This should include building roof plans showing location of planned solar and location of roof HVAC equipment and other appurtenances. 3.29

8. Maximize EV-ready parking spaces. Confirm commitment to installed EV charging station and EV ready spaces. 3.30

9. Submit project modeling files to the DOER on a flash drive. 3.31

10. Compare model results total and individual end uses with representative, prototype buildings developed by Pacific Northwest National Labs/Department of Energy found at the link below. Provide a summary explaining potential differences.

    - https://www.energycodes.gov/sites/default/files/documents/BECP_901_2013_Progress_Indicator_0_0.pdf 3.32

    - http://www.energycodes.gov/sites/default/files/documents/2013EndUseTables.zip

    - https://www.energycodes.gov/commercial-energy-cost-savings-analysis

11. Include a table similar to the example below. For "code value" ensure that the value incorporates any improved efficiency per requirements of Section C406.1 of the Massachusetts' amendments. 3.33

Measure/Area	**Base Code**	**Proposed**	**% Change**	**Comment**
AC Efficiency (EER)				
Bldg 1	*code value*	*design value*	%	
Bldg 2	*code value*	*design value*	%	
ERV Effectiveness (%)				
Bldg 1	*code value*	*design value*	%	
Bldg 2	*code value*	*design value*	%	
Boiler (% efficiency)				
Bldg 1	*code value*	*design value*	%	
Bldg 2	*code value*	*design value*	%	
LPD (Watts/sq ft)				
Bldg 1	*code value*	*design value*	%	
Bldg 2	*code value*	*design value*	%	
(continue to include service water, equipment, etc)				

Sincerely,

Paul F. Ormond, P.E.
Energy Efficiency Engineer
Massachusetts Department of Energy Resources

Brendan Place
Clean Energy Engineer
Massachusetts Department of Energy
Resource

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Executive Director

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TTY: (617) 788-4971

March 2, 2021

Kathleen A. Theoharides, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge St, Suite 900
Attn: MEPA Office, Alex Strysky
Boston, MA 02114

Subject: EOEEA #16320 Environmental Notification Form
Enterprise Research Campus, Boston, MA

Dear Secretary Theoharides,

The Massachusetts Water Resources Authority (MWRA) appreciates the opportunity to comment on the Environmental Notification Form (ENF) submitted by Tishman Speyer ERC Developer, L.L.C. (the "Proponent") for Enterprise Research Campus Project (the "Project") in Boston, Massachusetts. The Project site is an approximately 14.2 acre parcel located at 100 Western Avenue in the Allston neighborhood of Boston and owned by Harvard University. The Project involves construction of a mixed-use development to be built in multiple phases consisting of residential, office, laboratory, hotel, conference, restaurant, retail and public open space. Preexisting buildings on the Project site have been demolished in recent years and the site currently serves as a laydown/stockpile area for other projects Harvard-related projects.

Comments on the ENF relate to stormwater, wastewater issues and the need for Infiltration/Inflow (I/I) Removal, Toxic Reduction and Control (TRAC) discharge permitting and MWRA Enabling Statute Section 8(m) permitting.

Stormwater

The ENF states that stormwater from the Project will flow to the Boston Water & Sewer Commission (BWSC) storm drainage system. BWSC, in collaboration with Harvard University, is currently seeking permits for the North Allston Storm Drain Extension Project (NASDEP), which will create a major public infrastructure asset owned and maintained by BWSC and represents a significant investment in shared public infrastructure for the North Allston Neighborhood. The NASDEP is designed to convey the current 10-year BWSC design storm runoff collected by the existing upstream North Allston catchment area drainage system. It will connect to an existing BWSC trunk drain through Rena Park and extend through the Allston Landing North area to a proposed new submerged outfall into the Charles River. If the NASDEP is not available in time to serve the Project, storm drain improvements will be constructed to convey the current 10-year BWSC design storm runoff from the

Project to the existing 30-inch by 36-inch BWSC storm drain main in Cambridge Street, which ultimately discharges to the Charles River. Peak flows will be attenuated through a stormwater storage facility before discharging to the Cambridge Street drain, so that neither the downstream drainage system nor the upstream catchment area is adversely impacted. Unlike the proposed NASDEP, these interim storm drain improvements would not provide improved long-term resiliency to storm events or alleviate flooding for the thousands of residents in the North Allston neighborhood catchment area. The ENF notes that the Proponent understands that interim storm drain improvements would be decommissioned by BWSC when the NASDEP is completed.

Wastewater

The ENF reports that the Project will generate approximately 233,234 gallons per day (gpd) of new wastewater flow from the now vacant Project site. According to BWSC storm drain and sewer maps, the Project site is served by separate storm drains and sanitary sewers. The BWSC sanitary sewer in Western Avenue conveys flows to MWRA's South Charles Relief Sewer (SCRS). The SCRS collects wastewater flows from combined sewer areas and separate sanitary sewer areas in parts of Boston, Brookline, Newton, Watertown and Waltham and conveys these flows to MWRA's Ward Street Headworks in Roxbury, which directs flows into MWRA's Boston Main Drainage Tunnel for transport to the Deer Island Treatment Plant. Due to infiltration (groundwater) and inflow (rainwater) ("I/I") that can enter tributary community sanitary sewers and stormwater collected by tributary community combined sewers, combined flows in large storms can exceed the capacity of the MWRA facilities and contribute to combined sewer overflows ("CSO") to the Charles River Basin.

To ensure that the Project's wastewater flow does not increase system surcharging or overflows
in large storms, the Proponent and BWSC should effect a 4:1 offset of the Project's new wastewater 4.1
flow by removing stormwater and/or I/I from a hydraulically related sewer system(s). Four gallons of
extraneous flow should be removed for every gallon of new wastewater flow, in compliance with 4.2
Massachusetts Department of Environmental Protection regulation and BWSC I/I policy. Increasing
wastewater flow to the BWSC and MWRA sewer systems without offset can compromise the sewer
system benefits and Charles River water quality benefits of MWRA's recently completed $912 million
region-wide CSO control plan.

TRAC Discharge Permitting

MWRA prohibits the discharge of groundwater and stormwater into the sanitary sewer system, pursuant to 360 C.M.R. 10.023(1) except in a combined sewer area when permitted by the Authority and the local community. The Project site has access to a storm drain and is not located in a combined sewer area. Therefore, the discharge of groundwater or stormwater to the sanitary sewer system associated with this Project is prohibited.

A Sewer Use Discharge Permit is required prior to discharging process wastewater, laboratory wastewater or photoprocessing wastewater from office, high-tech, R&D, laboratory or commercial space associated with the Project into the MWRA sanitary sewer system. A Sewer Use Discharge Permit is also required prior to discharging laundry effluent from any hotel associated with the Project into the

MWRA sanitary sewer system. For assistance in obtaining these permits, representatives of the proposed laboratory, commercial space and hotel should contact Ken Cunningham, Industrial Coordinator, in the TRAC Department at (617) 305-5623.

Any gas/oil separators in parking garages associated with the Project must comply with 360 C.M.R. 10.016 and State Plumbing Code. Installation of the proposed gas/oil separator(s) may not be back filled until inspected and approved by the MWRA and the Local Plumbing Inspector. For assistance in obtaining an inspection, the Proponent should contact John Feeney, Source Coordinator, in the TRAC Department at (617) 305-5631.

Section 8(m) Permitting

Section 8(m) of Chapter 372 of the Acts of 1984, MWRA's Enabling Legislation, enables the MWRA to issue permits to build, construct, excavate, or cross within or near an easement or other property interest held by the MWRA, with the goal of protecting Authority-owned infrastructure. An 8(m) permit may be required due to the proximity of MWRA water and wastewater infrastructure to the Project site. The Proponent should contact Ralph Francesconi in the Operations Permitting Group at (617) 305-5827 for assistance related to this matter.

On behalf of the MWRA, thank you for the opportunity to provide comments on this Project. Please do not hesitate to contact me at 1 (617) 788-4958 with any questions or concerns.

Sincerely,

Beth Card
Director
Environmental and Regulatory Affairs

cc: John Viola, MassDEP
Adam Horst, BWSC

Boston Water and Sewer Commission

980 Harrison Avenue
Boston, MA 02119-2540
617-989-7000

February 22, 2021

Secretary Kathleen A. Theoharides
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office
Erin Flaherty No. 16307
100 Cambridge Street, Suite 900
Boston, MA 02114

Re: Enterprise Research Campus Project at 100 Western Avenue ENF

Dear Secretary Theoharides:

The Boston Water and Sewer Commission (Commission) has reviewed the Environmental Notification Form (ENF) for the above referenced Project (Project). The Project Site is located at 100 Western Avenue in Allston neighborhood of Boston.

The Project will entail the construction of a mixed-use development of 1.94 million square feet, including laboratory/R&D, office, residential, hotel, conference center, and retail uses, and uses complementary thereto, as well as expansive public realm and open space improvements to be developed in multiple phases. The ENF considers the full build out of the developable area of the Project Site (Phases A and B).

Water, sewer, and storm drain service for the Project Site is provided by the Boston Water and Sewer Commission. According to the ENF, water demand for the project is estimated at 256,558 gallons per day (gpd). For water service the Project Site is served on Western Avenue by 12-inch northern low pit cast iron water main installed in 1891 and rehabilitated in 1993. There are also several privately owned water mains located on the Project Site.

According to the ENF, sewage generation for the Project is estimated at 233,234 gpd. For sewer service the Project Site is served on Western Avenue by a 24-inch sanitary sewer.

For drainage the Project Site is served by an 18-inch, Commission owned water main located on the west bound side of Western Avenue. The 18-inch storm drain enlarges to 20-inches and then to 24-inches as it extends towards the Charles River. There is also a 12-inch storm drain owned by the Department of Conservation and Recreation located on the eastbound side of Western Avenue. The 12-inch DCR drain enlarges to 15-inches as it extends towards the Charles River.

The Commission comments regarding the Project are provided below.

General

1. The Proponent must submit a site plan and General Service Application to the Commission for the proposed Project. Prior to the initial phase of the site plan development the Proponent should meet 5.1

with the Commission's Design and Engineering Customer Services to review water main, sewer and storm drainage system availability and potential upgrades that could impact the Project's development. 5.1

2. Any new or relocated water mains, sewers and storm drains must be designed and constructed at the Proponent's expense. They must be designed and constructed in conformance with the Commission's design standards, Water Distribution System and Sewer Use Regulations, and Requirements for site Plans. The site plan should include the locations of new, relocated and existing water mains, sewers (including the MWRA's sewer on site) and drains which serve the Project Site, proposed service connections, water meter locations, as well as back flow prevention devices in the facilities that will require inspection. 5.2

3. With the site plan the Proponent must provide detailed estimates for water demand (including water required for landscape irrigation), wastewater generation, and stormwater runoff for the Project. The Proponent should provide separate estimates of peak and continuous maximum water demand for retail, irrigation and air-conditioning make-up water for the Project. Estimates should be based on full-site build-out of the Project. 5.3

4. It is the Proponent's responsibility to evaluate the capacity of the water and sewer system serving the Project Site to determine if the systems are adequate to meet future Project demands. With the site plan the Proponent must include a detailed capacity analysis for the water and sewer systems serving the Project Site, as well as an analysis of the impact the Project will have on the Commission's systems and the MWRA's systems overall. The analysis should identify specific measures that will be implemented to offset the impacts of the anticipated flows on the Commission and MWRA sewer systems. 5.4

5. Developers of projects involving disturbances of land of one acre or more are required to obtain an NPDES General Permit for Construction from the Environmental Protection Agency. The Proponent is responsible for determining if such a permit is required and for obtaining the permit. If such a permit is required for the proposed Project, a copy of the Notice of Intent and any pollution prevention plan submitted to EPA pursuant to the permit must be provided to the Commission's Engineering Services Department prior to the commencement of construction. 5.5

6. The design of the Project must comply with the City of Boston's Complete Streets Initiative, which requires incorporation of "green infrastructure" into street designs. Green infrastructure includes greenscapes, such as trees, shrubs, grasses and other landscape plantings, as well as rain gardens and vegetative swales, infiltration basins, and paving materials and permeable surfaces. The proponent must develop a maintenance plan for the proposed green infrastructure. For more information on the Complete Streets Initiative see the City's website at http://bostoncompletestreets.org/ 5.6

Sewage/Drainage

7. The Department of Environmental Protection (DEP), in cooperation with the Massachusetts Water Resources Authority (MWRA) and its member communities are implementing a coordinated approach to flow control in the MWRA regional wastewater system, particularly the removal of extraneous clean water (e.g., infiltration/ inflow ("I/I")) in the system. Pursuant to the policy new developments with design flow exceeding 15,000 gpd of wastewater are subject to the Department of 5.7

Environmental Protection's regulation 314 CMR 12.00, section 12.04(2)(d). This regulation requires all new sewer connections with design flows exceeding 15,000 gpd to mitigate the impacts of the development by removing four gallons of infiltration and inflow (I/I) for each new gallon of wastewater flow added. The Commission will require the Proponent to develop an inflow reduction plan consistent with the regulation. The 4:1 reduction should be addressed at least 90 days prior to activation of water service and will be based on the estimated sewage generation provided with the Project site plan. 5.7

8. Oil traps are required on drainage systems discharging from enclosed parking garages. Discharges from the oil traps must be directed to a building sewer and must not be mixed with roof or other surface runoff. The requirements for oil traps are provided in the Commission's Requirements for Site Plans. 5.8

9. Grease traps will be required in any food service facility in the new development in accordance with the Commission's Sewer Use Regulations. The proponent is advised to consult with the Commission before preparing plans for food service facilities. 5.9

10. Sanitary sewage must be kept separate from stormwater at all times and separate sanitary sewer and storm drain service connections from the building to the sewer system must be provided. Under no circumstances will stormwater be allowed to discharge to a sanitary sewer. The Commission requires that existing stormwater and sanitary sewer service connections, if any are to be re-used by the Project, be dye tested to confirm they are connected to the appropriate system. 5.10

11. The discharge of dewatering drainage to a sanitary sewer is prohibited by the Commission and the MWRA. The discharge of any dewatering drainage to the storm drainage system requires a Drainage Discharge Permit from the Commission. If the dewatering drainage is contaminated with petroleum products for example, the Proponent will be required to obtain a Remediation General Permit from the EPA for the discharge. 5.11

12. A Total Maximum Daily Load (TMDL) for Nutrients has been established for the Lower Charles River Watershed by the Massachusetts Department of Environmental Protection (DEP). In order to achieve the reductions in phosphorus loadings required by the TMDL phosphorus concentrations in stormwater discharges to the lower Charles River from Boston must be reduced by 64%. To accomplish the necessary reductions in phosphorus the Commission requires developers of projects in the lower Charles River watershed to infiltrate stormwater discharging from impervious areas in accordance with DEP requirements. With the site plan the Proponent must submit a phosphorus reduction plan for the Project. 5.12

13. The Proponent must fully investigate methods for infiltrating stormwater on-site before the Commission will consider a request to discharge stormwater to the Commission's system. The site plan must indicate how storm drainage from roof tops and other impervious surfaces will be managed. All projects at or above 100,000 square feet of floor area are required to retain, on site, a volume of runoff equal to 1.25 inches of rainfall times the impervious area. A feasibility assessment for infiltrating stormwater on-site must be submitted with the site plan for the Project. 5.13

14. The Massachusetts Department of Environmental Protection (MassDEP) has established Performance Standards for Stormwater Management. The Standards address stormwater quality, quantity and recharge. In addition to Commission standards, the proposed Project will be required to meet MassDEP's Stormwater Management Standards. 5.14

15. In conjunction with the site plan and General Service Application the Proponent will be required to submit a Stormwater Pollution Prevention Plan. The plan must:

    - Specifically identify how the Project will comply with the Department of Environmental Protection's Performance Standards for Stormwater Management both during construction and after construction is complete. 5.15

    - Identify specific best management measures for controlling erosion and preventing the discharge of sediment, contaminated stormwater or construction debris to the Commission's drainage system when construction is underway.

    - Include a site map which shows, at a minimum, existing drainage patterns and areas used for storage or treatment of contaminated soils, groundwater or stormwater, and the location of major control or treatment structures to be utilized during construction.

16. The Commission requests that the Proponent install a permanent casting stating: "Don't Dump: Drains to Charles River" next to any new catch basin installed as part of the Project. The Proponent may contact the Commission's Operations Division for information regarding the purchase of the castings. 5.16

17. The Commission encourages the Proponent to explore additional opportunities for protecting stormwater quality by minimizing sanding and the use of deicing chemicals, pesticides and fertilizers. 5.17

<u>Water</u>

18. The Proponent is required to obtain a Hydrant Permit for use of any hydrant during construction of the Project. The water used from the hydrant must be metered. The Proponent should contact the Commission's Operations Department for information on obtaining a Hydrant Permit. 5.18

19. The Commission utilizes a Fixed Radio Meter Reading System to obtain water meter readings. Where a new water meter is needed, the Commission will provide a Meter Transmitter Unit (MTU) and connect the device to the meter. For information regarding the installation of MTUs, the Proponent should contact the Commission's Meter Installation Department. 5.19

20. The Proponent should explore opportunities for implementing water conservation measures in addition to those required by the State Plumbing Code. In particular the Proponent should consider indoor and outdoor landscaping which requires minimal use of water to maintain. If the Proponent plans to install in-ground sprinkler systems, the Commission recommends that timers, soil moisture indicators and rainfall sensors be installed. The use of sensor-operated faucets and toilets in common areas of buildings should also be considered. 5.20

Thank you for the opportunity to comment on this Project.

Yours truly,

John P. Sullivan, P.E.
Chief Engineer and Operations Officer

JPS/as

cc: J. Hughes, Tishman Speyer
K. Ronan, Mass. Water Resources Authority
M. Zlody, Boston Environment Department
P. Larocque, BWSC

Charles River Watershed Association

March 2, 2021

Via Email

Alex Strysky
Environmental Analyst, MEPA Office
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114
alexander.strysky@massmail.state.ma.us

Re: Comments on Harvard Enterprise Research Campus Project (EEA No. 16320) Environmental Notification Form

Dear Mr. Strysky:

Charles River Watershed Association ("CRWA") submits the following comments on the Environmental Notification Form ("ENF") for the Enterprise Research Campus Project located at 100 Western Avenue, Boston, Massachusetts filed with the MEPA Office on February 1, 2020. This project consists of development of an approximately 14.2-acre parcel located at 100 Western Avenue in the Allston neighborhood. Specifically, the project includes 1.94 million square feet (SF) gross floor area of mixed-use development, which will be constructed in multiple phases and consist of residential (750 units at 570 SF), office/lab area (1,160,000 SF), hotel (135,000 SF), conference function (75,000 SF), some restaurant and retail use, along with new public realm and open space areas, including the "Project Greenway," and utilities to support development. The project will create approximately 9.8 acres of new impervious surface resulting in a total impervious cover of 13.95 acres on site. A total of 6,030 vehicle trips per day will be added to the area. The project intends to install a total of 1,280 parking spaces (600 spaces below ground, 640 spaces ultimately in a garage, and some on-street as well as temporary proximate parking during construction phasing). The project is anticipated to use approximately 256,500 gallons per day of water and generate approximately 233,250 gallons per day of wastewater. As proposed, this project currently meets/exceed more than one mandatory Environmental Impact Report ("EIR") threshold per 301 CMR 11.03, and therefore will be preparing and submitting an EIR.

Impervious Surfaces and Stormwater Management

The project is proposing to cover this 14.2-acre site almost entirely (over 98%) with impervious surface (the proponent is proposing to add 9.8 acres of new impervious surface for a total of 13.95 acres). Impervious surfaces exacerbate stormwater pollution and runoff and contribute to heat island effects.

Page 6 and Section 1.4.6.1 of the ENF discuss Stormwater Management:

- "The available site area between the buildings, referred to herein as the Project Greenway, will be used to provide stormwater storage and promote stormwater infiltration to recharge groundwater via underground stormwater chambers. Runoff from building roofs will be collected internally and directed to the stormwater infiltration systems."

- "The on-site drainage systems that will service the Project are designed to collect and discharge the current BWSC 10-year design storm" (24-hour storm duration, NRCS Type III rainfall pattern, total rainfall depth of 5.15 inches)

- "The Project will aim to provide stormwater infiltration systems and other green infrastructure measures underneath the Project Greenway and within the roadways. The infiltration systems will be used to provide storage and promote infiltration via groundwater recharge, and Project Site runoff will be collected by catch basins, area drains, and trench drains, and directed to the infiltration systems. The roadways surrounding the buildings will also be collected by catch basins with deep sumps and hoods and directed to the infiltration systems. The infiltration systems will be designed to capture 1.25-inches of runoff from the impervious site areas to meet BWSC and BPDA requirements, along with an additional 1.5- inches of runoff. The total 2.75-inches equals the amount of runoff anticipated from a 32- year storm event. For storms greater than a 32-year event, overflow pipes will be provided to direct excess runoff to the storm drain mains in the roadways."

- "The infiltration systems will be designed so as to not increase existing runoff rates and volumes of stormwater for the 2- year, 10-year, 25-year, and 100-year storms will be explored by the Proponent as the design progresses, which could further minimize the size of the stormwater chambers."

Figure 1.5, Existing and Planned Utilities, shows planned drains, including the approximate extent of the subsurface stormwater infiltration chamber area.

According to the National Climate Assessment, the amount of precipitation falling in very heavy events increased by 71% in New England from 1958 to 2012. The Climate Ready Boston Map Explorer shows that areas of this project site, as well as BWSC drainage catchments upstream and downstream of the project site, have predicted stormwater flooding in the near-, medium-, and long-term.[1] The BWSC City of Boston Inundation Model shows extensive areas of flooding, many of which are predicted to be over one foot, in a 100-year storm even with 2030 sea level rise and a 100-year storm s[2]

Given this site's proximity to the Charles River, stormwater runoff from impervious surfaces on the site will have a significant environmental impact. CRWA requests the project proponent provide significantly more detail related to stormwater management in the EIR:

6.1

- The ability of the stormwater management systems to accommodate larger storms (such as the 100-year storm event) than the 32-year storm event should be evaluated.

[1] https://boston.maps.arcgis.com/apps/View/index.html?appid=7a599ab2ebad43d68adabc9a9ebea0e6&extent=-71.1583,42.2897,-70.9309,42.4060
[2] https://www.bwscstormviewer.com/index.html

- The ability of the stormwater management systems to handle current and predicted future rainfall amounts using the best available science should be evaluated (see addition comments under climate change section). 6.2

- Creation of new impervious surfaces should be avoided and existing impervious surfaces should be removed wherever possible. CRWA acknowledges that the project incorporates some structured parking, which is far preferable to surface parking. The proponent should consider whether more can be done to reduce the amount of surface parking. 6.3

- The ENF narrative vaguely indicates that stormwater management techniques will include green infrastructure measures. Figure 1.5, Existing and Planned Utilities, shows planned drains, including approximate green infrastructure locations. Green infrastructure must be extensively incorporated into the design to capture and treat stormwater generated by impervious surfaces. More information about the types of green infrastructure specifically intended to be employed and the anticipated stormwater management benefits should be provided in the EIR so that the public can fully understand the environmental impacts of impervious surfaces on this site and mitigation alternatives. 6.4

- The ENF also does not say whether the proponent has considered alternatives to impervious surfaces such as porous pavement for walkways or use of green roofs or cisterns to reduce the volume of runoff generated by the project. Additional alternative stormwater management opportunities should be presented and evaluated in the EIR. 6.5

Concerns about Water Quality Protection

Stormwater runoff from the project site will discharge to the BWSC's drainage system and ultimately reach segment MA72-36of the Charles River,[3] which is an impaired waterbody requiring a Total Maximum Daily Load ("TMDL") according to the Massachusetts Year 2016 Integrated List of Waters for the following pollutants:[4]

Impairment	EPA TMDL No.
(Fish Passage Barrier*)	
(Flow Regime Modification*)	
(Non-Native Aquatic Plants*)	
Chlorophyll-a	33826
DDT in Fish Tissue	
Dissolved Oxygen	
Escherichia Coli (E. Coli)	32371
Fish Bioassessments	
Harmful Algal Blooms	33826
Nutrient/Eutrophication Biological Indicators	33826
Oil and Grease	
PCBs In Fish Tissue	
pH, High	
Phosphorus, Total	33826
Sediment Bioassay (Acute Toxicity Freshwater)	
Transparency / Clarity	33826
Unspecified Metals in Sediment	

[3] 6.1 miles from Watertown Dam (NATID: MA00456), Watertown, to the Boston University Bridge, Boston/Cambridge.

[4] Note that impairments with a * do not require development of a TMDL

Two TMDLs apply to this segment of the river:

- Total Maximum Daily Load for Nutrients In the Lower Charles River Basin, Massachusetts, June 2007 (EPA TMDL No. 33826); and
- Final Pathogen TMDL for the Charles River Watershed January 2007 (EPA TMDL No. 32371).

There is no discussion in the ENF about how the project will address these pollutants and TMDLs. Complete documentation of how the project is designed to address the pollutants of concern and TMDLs, including calculations, should be provided in the EIR. 6.6 Additional stormwater management plans detailing system sizing, type, and location should be provided in the EIR, along with calculations showing that the project complies with the phosphorus TMDL, which requires no additional inputs of phosphorus to the river and a significant reduction from existing development. 6.7

Impacts from Climate Change

Section 1.4.5 provides an overview of the sustainability and resiliency approach of the project. This is the only section in the ENF that specifically mentions climate change resiliency. There are a number of places in the ENF that mention energy conservation and reduction in greenhouse gas emissions, however, the overall ENF is lacking in documentation on how the proposed project will address concerns about impacts due to climate change, as well as mitigate and not further exacerbate these concerns. 6.8

The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan[5] or "SHMCAP" outlines the following climate projections:

- Precipitation. Total annual precipitation is projected to increase by 1 to 6 inches by mid-century, and by 1.2 to 7.3 inches by the end of this century. This will result in up to 54.3 inches of rain per year, compared to the 1971-2001 average annual precipitation rate of 47 inches per year. Precipitation during winter and spring is expected to increase, with the number of days with rainfall accumulation over 1 inch reaching 11 days by the end of this century, representing an increase of 4 days from the observed average between 1971 and 2000. At the same time, precipitation during summer and fall is expected to decrease, with number of continuous dry days projected to increase to nearly 20 days per year at the end of this century compared to the observed average of 16.64 days per year from 1971 to 2001.

- Flooding. More intense and frequent downpours will result in more stormwater runoff, higher surface water levels, more frequent flooding in areas that lie within the floodplain, and inundation of land not typically affected by flooding. Projected increases in extreme precipitation events will also increase the risk of flash flooding and damage to drainage systems not designed to accommodate the higher flows. Flooding caused an average of over $9.1 million in damages per year between 2007 and 2014, with highly developed areas being most vulnerable.

- Heat. The average, maximum, and minimum temperatures in Massachusetts are likely to increase significantly over the next century. The average annual temperature is projected

[5] https://www.mass.gov/files/documents/2018/10/26/SHMCAP-September2018-Full-Plan-web.pdf

to increase from 47.6 degrees Fahrenheit (°F) to 50.4 to 53.8°F (a 2.8 to 6.2°F change) by mid-century, and to 51.4 to 58.4°F (a 3.8 to 10.8°F change) by the end of this century. Summer highs are projected to reach 85.6°F by mid-century, and 91.4°F by the end of this century, compared to the historical average of 78.9°F. The number of days per year with daily maximum temperatures over 90°F is projected to increase by 7 to 26 days (up to 31 days total) by the 2050s, and by 11 to 64 days (up to 69 days total) by the 2090s, compared to the average observed range from 1971 to 2000 of 5 days per year.

- Drought. As precipitation patterns change and average temperatures increase, the frequency and intensity of drought is projected to increase during the summer and fall. Increased drought frequency may also exacerbate the impacts of flood events, as droughts can cause vegetation that would otherwise have helped mitigate flooding to die off. Vegetated areas not only reduce the risk of downstream flooding but also increase the rate of groundwater recharge, which in turn increases an area's resilience to future drought events.

- Storms. Severe winter storms and nor'easters are currently the most frequently occurring natural hazard in the state. Massachusetts also experiences 20–30 thunderstorm days per year, with high winds occurring even more frequently. Tropical storms and hurricanes also impact the state, with an average occurrence of one event every two years. All of these severe weather events are expected to increase in intensity and frequency, including higher precipitation amounts.

Further detail about how the project will specifically address these climate concerns should be provided in the EIR. 6.9

Trees & Vegetation

Trees and other vegetation protect air and water quality, help to control stormwater runoff and flooding, and provide natural cooling. We are glad to see that the project will include planting trees and shrubs within proposed vegetated areas. We urge the project proponent to maximize the amount of trees and plantings covering the site in an effort to minimize impervious cover. We recommend use of native species and drought tolerant plantings in all cases. 6.10

Relationship to Proposed North Allston Storm Drain Extension Project (NASDEP) (EEA No. 16319)

The ENF acknowledges that Boston Water and Sewer Commission (BWSC) has also filed an ENF (EEA no. 16319) that covers a project proposing to construct a new 84" drain line and a new outfall that will discharge directly to the Charles River between 500 Soldiers Field Road and Cambridge Street. The proposed drainage system will redirect runoff from the catchment area located on the south side of Western Avenue that currently discharges to Charles River north of Western Avenue via two outfalls, including the Harvard ERC land.

We appreciate that the ENF clarifies that, "in the event that the NASDEP is not available in time to serve the Project, storm drain improvements will be constructed to convey the current 10-year BWSC design storm runoff from the Project to the existing 30-inch by 36-inch BWSC storm drain main in Cambridge Street, which ultimately discharges to the Charles River (via BWSC outfall SDO-034)." (Page 1-10) The ENF further explains that, in this case, "peak flows will be attenuated through a stormwater storage facility before discharging to the existing BWSC drainage system in Cambridge Street, so that neither the downstream drainage system nor the upstream catchment area is adversely impacted. The storm drain improvements described in this paragraph, unlike the completed NASDEP, would not provide improved long-term resiliency to storm events and alleviate flooding for the thousands of residents in the North Allston neighborhood catchment area, and our current understanding is that those storm drain improvements would be decommissioned by BWSC when the NASDEP is completed. The drainage systems that will service the Project are designed to collect and discharge the current BWSC 10-year design storm." (Page 1-10)

The EIR should provide additional detail, including description and plans, showing the 6.11
proposed drainage routes from the project site to the Charles River under both scenarios described above. The EIR should also include information (description of extent, duration, frequency, etc.) in both written and visual format on the historical flooding areas that will contribute to the downstream route and provide calculations and modeling showing that the proposed project will
not have adverse impacts on the downstream drainage system nor the upstream catchment area as 6.12
indicated in the ENF (see quote above), both under present and anticipated climate conditions (see previous comment sections).

Water Use & Sewer Generation

Page 3 of the ENF lists anticipated water use and wastewater generation. Page 15 of the ENF provides information on the anticipated wastewater generation. Section 1.4.6.2 generally describes water and wastewater connections and that "the Proponent will coordinate with the BWSC for approval of these connections, as well as the increase in sewage flows. Improvements and connections to BWSC infrastructure will be reviewed as part of the BWSC's Site Plan Review." (Page 1-11)

However, the ENF does not provide any supporting information to document the estimated
water use and wastewater generation. The EIR should provide documentation and calculations to 6.13
support the numbers given in the ENF. In addition, the project development program listed in Table 1-1 of the ENF shows almost 60% (1,160,000 SF of the 1,940,000 SF total) of the project will be lab/office space. The range of possible water use and wastewater generation from this broad use is significant. The EIR should provide further estimates about likely space uses and
provide a real-world basis for anticipated water and wastewater needs based on constructed 6.14
projects in the area with similar uses.

Construction Period Impacts

The ENF identifies the project's need to obtain coverage under the EPA NPDES Construction General Permit, and, if necessary, a Construction Site Dewatering Discharge Permit from the Massachusetts Water Resources Authority (MWRA).

Given the proximity of this site to the Charles River, we are concerned that this project may have significant dewatering needs during construction. It is likely dewatering discharges will enter the BWSC drainage system and therefore the Charles River. In addition, as mentioned in the ENF (see Page 6 and Page 1-5, Section 1.2 Existing Site Conditions), the project site has been regulated under the Massachusetts Contingency Plan (MCP). Further detail on construction period 6.15

dewatering, including volumes, flow rates, anticipated water quality concerns, including any posed by MCP-documented contamination, and potential impacts on the drainage system and river should be provided in the EIR. 6.15

Operation & Maintenance of the Drainage System

The ENF provides no information on proposed operation and maintenance of the drainage system, including the green stormwater infrastructure and the subsurface infiltration system. Such documentation should be provided in the EIR. 6.16

Public Engagement

We are concerned there has been a lack of public education and engagement around this project. Section 1.8, Community Outreach, documents only two specific meeting dates (Harvard Allston Task Force on January 19, 2021 and the Allston Civic Association (ACA) on January 20, 2021), which were held right before the ENF was submitted, and states that "various other meetings with leaders of local community groups" have been conducted. The ENF anticipates "additional outreach, public meetings, and community engagement will be conducted as part of the City of Boston Article 80 review process, as well as the review process for this ENF. As required by MEPA regulations, the Proponent will participate in a site consultation (assumed to be held virtually given COVID-19). The Proponent is also committed to facilitating access to persons with limited English proficiency. This is expected to include development of a Project-specific language access plan, which will be in accordance with the BPDA's Language Access Plan (once finalized) and will be subject to approval by the BPDA, to facilitate outreach and communications with person with limited English proficiency."

We share the concerns raised by other stakeholders that there has not been adequate public education and engagement around this project. The project proponent should undertake an extensive program to provide information to local residents and businesses, as well as the public and entities who will be impacted by the construction period (e.g., commuters, businesses etc.), about the perceived necessity for the project, its benefits, and its impacts. This outreach should be conducted in conjunction with the provision of more details and specifics about the project in the EIR. 6.17

Thank you for considering these comments.

Sincerely,

Janet S.A. Moon

Janet Moonan, PE
Stormwater Program Director

From: Anna Leslie
To: Strysky, Alexander (EEA)
Cc: Michael Moran; Liz Breadon; Jennifer Migliore; hatf2021@gmail.com
Subject: Enterprise Research Campus (Harvard ERC) comments - EEA # 16320
Date: Tuesday, March 2, 2021 2:45:50 PM

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Enterprise Research Campus (Harvard ERC) comments - EEA # 16320

Dear Mr. Strysky,

I'm submitting the following comments as Director of the Allston Brighton Health Collaborative. The following should be included in the full draft EIR:

Community engagement has been severely lacking thus far. As a community stakeholder and network hub, I heard about this comment period by accidental word of mouth. The size of this project has extensive impact on the neighborhood well beyond immediate abutters. The plan must include increased opportunities for community members to learn and ask questions as well as an articulated plan as to how the project team will go to existing community spaces 7.1
and bring the information to those spaces. The reliance on community stakeholders proactively seeking out this information and opportunities to comment is not an equitable process.

Transportation and mobility analysis must be much more deeply assessed. Allston and Brighton do not exist in isolation and neither do transportation systems. The traffic generation estimates are startling given the fixed limitations of the corridor and no proposal for increased 7.2
MBTA service. To say nothing of the additional developments and traffic generation to come from other locations on the Western Ave corridor. This requires a regional assessment, this cannot be assessed within the bound geography of the ERC. I strongly recommend that the project team engage our Transportation Committee in developing project TDM and TAPA plans. What currently exists in the plan is incomplete and inadequate. 7.3

I defer to community stakeholders in echoing and reiterating the below additional comments:

- Please provide a more detailed description of greenspace and an analysis of how green space and use of green infrastructure could help mitigate stormwater drainage, water 7.4
impairment, and urban heat island impacts. Is the planned green space adequate for these important environmental benefits, as well as the associated health benefits for community members, workers, and residents. Please assess how increased green infrastructure might reduce the need for, or augment, the North Allston Drain Extension 7.5
Project.
- Impervious cover is not green space. Please provide more analysis of how proposed impervious cover will impact stormwater drainage, water impairment, and urban heat island effect, especially in light of possible future conditions of more intense storm 7.6
events, higher ambient temperatures, and greater climate variability.
- A more complete analysis of the pollutants associated with the development and how these will be treated. As is, the statements in the ENF are more aspirational. Phosphorus 7.7
is of particular concern.

- Please provide an alternative analysis that reflects more green infrastructure and low impact design for stormwater retention and treatment and other associated impact mitigation (urban heat island, tree cover, air quality mitigation, mental health). Specifically is there a way for the proposed Project Greenway to serve as a more significant stormwater treatment and conveyance feature in place of or in addition to the North Allston Drain Extension Project. 7.8
- More details on energy use and potential generation and distribution, including a consideration for zero-net carbon buildings as is likely to be required in the Boston Zoning Code in the near future. 7.9

Thank you,
Anna Leslie
--
Anna Leslie, MPH
Director, Allston Brighton Health Collaborative
617-515-5321

Allston Brighton Community Calendar

The Allston Brighton Health Collaborative is a collaboration of organizations devoted to working together to promote and improve the health and wellbeing of the communities of Allston and Brighton. We achieve this by working in partnership and by engaging the residents of Allston and Brighton in order to identify the needs of the community and to create programming to address those needs.

DeVoe, Lauren

From: Paula Alexander <rnina3344@hotmail.com>
Sent: Tuesday, March 2, 2021 3:52 PM
To: Strysky, Alexander (EEA)
Cc: Ed Kotomori; Tim McHale; Anthony D'Isidoro; Mark Handley; Gerald Autler; liz.breadon@boston.gov; kevin honan
Subject: EEA# 16320 Enterprise Research Campus Project, Boston (Allston) (Due March 2, 2021)

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Dear Sir,
I am a lifelong resident and homeowner on North Harvard Street, Allston and I am writing to provide my comments on the ERC development project in our neighborhood.

There is so much missing information from the developer, that it is difficult to give you a response. Recently there has been a complete breakdown of an updated water/sewer pipe beside my house due to the installation of a traffic signal pole and another wifi pole installed over this pipe. I am trying to work with city officials to correct this breakdown. I know there is currently a huge water/sewer pipe installation at the ERC site but the community has not been advised or recently updated with the status of this work. 8.1

Given the immense size of the new ERC development (especially in terms of building heights and density) along with all the other developments so near to our residential homes, I am unable to provide you with my comments until we are given a true picture of what is being done with the infrastructure of water and sewer and other utilities and how all of these over-development proposals will negatively affect our quality of life in terms of water and air pollution, traffic construction vehicles, parking, transportation, etc. I believe your comment period needs to be postponed until further details are given to us. Thank you. 8.2

Sincerely,
Paula Alexander
email: rnina3344@hotmail.com
cell: 617-510-2038

From: Barbara Parmenter
To: Strysky, Alexander (EEA)
Cc: Michael Moran; kevin.honan@mahouse.gov; Liz Breadon; Will Brownsberger; Tim McHale; Tony D"Isidoro; jemigliore91@gmail.com
Subject: Enterprise Research Campus (Harvard ERC) comments - EEA # 16320
Date: Tuesday, March 2, 2021 11:42:54 AM

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Enterprise Research Campus (Harvard ERC) comments - EEA # 16320

Dear Mr. Strysky,

I have read the Environmental Notification Form for the Enterprise Research Campus (ERC) - EEA 16320 - and would like to submit the following comments:

Tishman Speyer has committed in its ENF to a full draft environmental impact report (DEIR) because the impacts of this project will exceed the mandatory EIR threshold requirement. I would like to see the following included in the Draft EIR:

1. Green space - More detailed description of greenspace and an analysis of how green space and use of green infrastructure could help mitigate stormwater drainage, water impairment, and urban heat island impacts. Is the planned green space adequate for these important environmental benefits, as well as the associated health benefits for 9.1 community members, workers, and residents. I would also like to see how increased green space could increase these benefits. 9.2 I also want to see how increased green infrastructure might reduce the need for, or augment, the North Allston Drain Extension Project. 9.3

2. Impervious cover - This is the inverse of green space. We need more analysis of how proposed impervious cover will impact stormwater drainage, water impairment, and urban heat island effect, especially in light of possible future conditions of more intense storm events, higher ambient temperatures, and greater climate variability. 9.4 I would also like to see how reduced impervious cover could reduce the environmental and health harms. 9.5

3. We need to see a fuller analysis of the pollutants associated with the development and how these will be treated. As is, the statements in the ENF are more aspirational. I am especially concerned about phosphorus. 9.6

4. Traffic generation - I would like to see more analysis regarding how the 23,000+ trips per day will be handled - the estimate is for 6,000+ vehicle trips, the others being 9.7

divided up into transit, bike, TNC, walking, internal, etc. But no additional MBTA
service is proposed and bicycle facilities are not detailed. Is MBTA bus service 9.8
adequate for this increase in demand? Are the proposed bike facilities adequate? 9.9
What are the proposed links to communities to which people will be commuting? 9.10
What impact will nearby development have on this capacity? Developments in
Watertown and south of the Mass Pike (e.g, Allston Yards) should be included in this 9.11
analysis. In addition the Transportation Demand Management (TDM) incentives need
to be detailed and the specific outcomes need to be modeled. As is, the incentives
are very basic and there is no analysis of to what extent these might actually mitigate 9.12
transportation demand. Offering MBTA passes for only 3 months seems particularly
inadequate - some kind of permanent discount seems more realistic in terms of TDM.

5. Alternatives analysis - I believe the alternatives analysis is inadequate (no-build, 2018 PDA, Full Build, Preferred (the last three are very similar). I would like to see an
alternative analysis that reflects more green infrastructure and low impact design for 9.13
stormwater retention and treatment and other associated impact mitigation (urban heat island, tree cover, air quality mitigation, mental health). Specifically is there a
way for the proposed Project Greenway to serve as a more significant stormwater 9.14
treatment and conveyance feature in place of or in addition to the North Allston Drain Extension Project.

6. I would also like to see more details on energy use and potential generation and
distribution, including a consideration for zero-net carbon buildings as is likely to be 9.15
required in the Boston Zoning Code in the near future.

7. Community outreach - I would like to see a more expansive plan for outreach to hard 9.16
to reach communities, not just the main community organizations. Also, there needs to be a plan for outreach to those with limited English, above and beyond following
the BPDA’s language access plan, which is not finalized and may not be finalized 9.17
within the time period in question.

Thank you for this opportunity to comment,

Barbara Parmenter
77 Harriet St.
Brighton, MA

Member, Harvard Allston Task Force
Member, Allston Brighton Health Collaborative Transportation Committee
Member, 350 Mass - Boston Node, Allston Brighton Working Group
Steering Committee member, Brighton Allston Community Coalition

Energy & Environmental Affairs
Public Comments Portal

alexander.strysky@mass.gov

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Comment Details

EEA #/MEPA ID*	First Name	Address Line 1	Organization
16320	Audrey	34 Windom St.	--
Comments Submit Date	**Last Name**	**Address Line 2**	**Affiliation Description**
2/21/2021	Berry	--	Individual
Review Due By	**Phone**	**State**	**Status**
3/22/2021	--	MASSACHUSETTS	Opened
Reviewer	**Email**	**Zip Code**	
Alex Strysky (857) 408-6957	audreyinboston@gmail.com	02134	

Comments

Topic: Enterprise Research Campus Parking Concerns

Generally, I like what I see with the mixed-use building plans and the greenways. The one concern I have is parking: I don't think there is enough. I see that the numbers you are projecting for walkers are based on trends in Boston, but I do not think that it captures the nature of the Allston neighborhood. I have lived in this neighborhood for 16 years and I almost never walk anywhere because most things are just not that close. This isn't downtown Boston where things are dense and it's relatively easy to walk from an apartment to an office to a restaurant. In the summer, I think people are more willing to walk, but in bad/cold weather, I just don't think people would walk. In the past, we have had considerable difficulty with parking in our neighborhood. There is essentially no street parking around this part of Allston (except on residential streets). We already see problems at Barry's Corner with people double parking frequently to access Trader Joe's. All existing street parking is almost always occupied. I don't see how it is possible to build so many residential units and not plan to have one parking space for each unit. Many of the people in my neighborhood have more than one vehicle, so it seems ridiculous to think that every unit shouldn't have at least one parking space. I think that your building plans should include more parking garages or under-building parking. When New Balance built their headquarter building, there was a big parking garage included. The same needs to happen here for all these proposed office spaces. 10.1

Attachments

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