DRAFT PROJECT IMPACT REPORT

Enterprise Research Campus Project

Boston, Massachusetts

JULY, 2021

SUBMITTED TO

Boston Redevelopment Authority,
d/b/a Boston Planning and
Development Agency
One City Hall Square, 9th Floor
Boston, MA 02201

PROPONENT

Tishman Speyer ERC Developer, L.L.C.
125 High Street
Boston, MA 02110

MASTER PLANNERS

Henning Larsen
250 West Broadway, 2nd Floor
New York, NY 10013

Studio Gang
50 Broad Street, Suite 1003
New York, NY 10004

PRODUCED BY

vhb

This page left intentionally blank.

Enterprise Research Campus Project

Boston, Massachusetts

SUBMITTED TO	**Boston Redevelopment Authority, d/b/a Boston Planning and Development Agency** One City Hall Square, 9th Floor Boston, MA 02201	
PROPONENT	**Tishman Speyer ERC Developer, L.L.C.** c/o Tishman Speyer 125 High Street Boston, MA 02110	
PREPARED BY	**VHB** 99 High Street, 10th Floor Boston, MA 02110	
MASTER PLANNERS	**Henning Larsen** 250 West Broadway, 2nd Floor New York, NY 10013	**Studio Gang** 50 Broad Street, Suite 1003 New York, NY 10004
	In association with: Acentech Arup DLA Piper Haley & Aldrich, Inc. Level Agency for Infrastructure Nelson Nygaard	 Nitsch Engineering RWDI Consulting Engineers and Scientists Scape Utile

July 28, 2021

This page left intentionally blank.

Table of Contents

Appendices

*This appendix is provided under a separate cover due to file size.

List of Tables

List of Figures

1

Project Description

Tishman Speyer ERC Developer, L.L.C. (the "Proponent") is pleased to submit this Draft Project Impact Report (DPIR) to continue review by the Boston Redevelopment Authority, d/b/a/ the Boston Planning & Development Agency (BPDA), under Article 80 of the Boston Zoning Code (the "Code") for the development of a portion of an approximately 14.2-acre parcel located at 100-112 Western Avenue in the Allston neighborhood of Boston. Please refer to Figures 1.1 and 1.2 for a site location map and context map, respectively. The proposed project represents the initial phase of development within the approximately 14.2-acre parcel, which area (the "PDA Area") has been designated as Planned Development Area (PDA) No. 115 (the "Project" or "Phase A").

The Project will be located on approximately 6 acres of developable area (the "Project Site"), and will be supported by various streets, sidewalks, and other utility infrastructure elements which are to be constructed on adjacent portions of the PDA Area by the Harvard Allston Land Company (HALC) (the "Enabling Infrastructure"). Phase A will contain approximately 900,000 square feet of mixed-use development consisting of a mix of uses that include residential, office/lab, hotel, conference center, restaurant, and retail use, along with nearly three acres of new publicly accessible streetscape and open space improvements. The combined Project Site and approximately 3.4 acres of Enabling Infrastructure will result in the improvement of approximately 9.4 acres of the PDA Area (collectively, the "Phase A Improved Area").

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.

The Proponent has been selected by the Harvard Allston Land Company and, in the future, will pursue entitlements in order to develop an additional approximately 4.8 acres within the PDA Area (such future phase of development, "Phase B"). These PDA Areas, which were not part of Phase A, had been envisioned as predominately surface parking lots in the PDA Master Plan. Further detail for the permitting and planning goals for Phase B are detailed in Chapter 2, *Phase B*. While Phase B is not the subject of this DPIR and Phase B is not currently being submitted for review under Article 80, the Proponent will be seeking approval of an Amended and Restated PDA Master Plan that includes Phase B.

Since filing the Project Notification Form (PNF) on February 2, 2021, the Proponent has had the opportunity to meet with members of the Impact Advisory Group, the Allston community, various City of Boston (the "City") departments, 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 Phase A offers opportunities for the Allston community to benefit from the Project's development, and is hopeful that through ongoing collaboration and dialogue with the community, the City and the BPDA 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

Through numerous, collaborative meetings with community/civic organizations, advocacy groups, elected officials, BPDA staff, various State and City agencies, as well as the Impact Advisory Group ("IAG") for the Project, the Proponent has sought to listen to, and 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-Letter of Intent meeting with the IAG and general public to re-introduce the Project and to gather feedback on what the community and other stakeholders would like to see included in Phase A. This was followed by the filing of the Letter of Intent and PNF on January 21, 2021 and February 2, 2021, respectively. A Scoping Session was held on February 25, 2021, and a second IAG/public meeting was conducted on March 4, 2021.

The PNF public comment period was extended to March 15, 2021, numerous public comments (the "PNF Comments") were received by the Proponent, and on May 14, 2021 the Scoping Determination was issued by the BPDA (the "Scoping"). Following receipt of the PNF

Comments and Scoping, the Proponent has endeavored to address and incorporate many of the ideas and suggestions into the Project.

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.

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.

1.1.1 Language Access Plan (LAP)

The Proponent is coordinating closely with the BPDA to develop a Language Access Plan (LAP) for the Project. Based on the BPDA's Limited English Proficiency Assessment, Mandarin Chinese, Brazilian Portuguese, and Spanish have been identified by the BPDA as threshold languages for the Allston neighborhood. The Proponent has prepared a Project Fact Sheet of this DPIR in each of these three threshold languages, and in response to community comment, the Proponent has also prepared the Project Fact Sheet of this DPIR in Korean and Russian (the "LAP Fact Sheets"), all of which will be made available on the Project page of the BPDA website. Additionally, in connection with the IAG/public meetings, the Proponent and BPDA have partnered to ensure that translation and interpretation services are available, as requested.

Please refer to Appendix G for the Project-specific Language Access Plan Checklist.

1.2 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 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.

1.2.1 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 (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.

› Building designs which incorporate these guiding principles in distinctive architecture are presented in this DPIR and contain a number of notable features which are intended to make the Project a community asset for the Allston neighborhood as well as a desirable place to live and work.

› The Project's conference center, which has been an important element of the PDA Master Plan since it was approved in 2018, 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 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 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 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.

1.2.2 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 2 acres to nearly 3 acres since the PNF. The result is that the portion of the "developable area" in Phase A (i.e., the Project Site, excluding streets and sidewalks) dedicated to publicly accessible open space is well over 2x the 20% of developable area required under the approved 2018 PDA Master Plan.
- When incorporating the streets and expansive sidewalks supporting the Project, the area dedicated to publicly accessible open space, street and sidewalk areas of the combined Phase A and Phase B represents over 50% of the total approximately 14 acre area of the PDA Area.
- 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.

1.2.3 Sustainability and Resiliency

- In response to the Scoping and PNF 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 PNF Comments, this DPIR further details the designs for an extensive stormwater management system that will be integrated into the Project. Through a series of retention basins and recharge systems, the Project will be developed to collect, store, and/or recharge back into the ground water over 500,000 gallons of stormwater, which is equivalent to 2.75 inches of rainfall (over the impervious area of the site) and significantly exceeds City of Boston requirements.
- 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 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.

1.2.4 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 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 of Boston.
- As described further in Section 1.3.2 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 development 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 Project retail 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.

1.2.5 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 Phase A and Phase B.
- 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 ~345 total units in the Project) and approximately 13,500 square feet (~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 onsite 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 onsite 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 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.
- It is estimated that the Project will generate new real estate tax revenue for the City of Boston in excess of $10 million annually.
- The Project is anticipated to be home to 2,300 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 2,000 construction jobs in a variety of trades. Additionally, the Proponent is committed to comply with the Boston Resident Jobs Policy (BRJP).

1.2.6 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 three 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 Hague Street to East Drive, including improvements to bicycle accommodations, and to sidewalks and pedestrian amenities.
- The Enabling Infrastructure will include the creation of three new streets: East Drive; Cattle Drive; and DEF Drive, all of which will be consistent with the objectives of the City'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 to and from 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 to 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

1.3 Project Description

Consistent with the BPDA's, the City's, and the community's goals for the PDA Area, the Proponent envisions that the Project will transform an underutilized site into a vibrant, inclusive mixed-use project that will complement the surrounding area. The Project will include uses consistent with PDA, 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 1.3 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.

1.3.1 Development Program

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

Table 1-1 Proposed Project Development Program Summary

Project Element	Size/Quantity
Building Uses[1]	
Lab/Office	440,000 SF
Residential	263,500 SF (345 units)
Hotel	135,000 SF (250 keys)
Conference	61,500 SF
Total GFA[2]	**900,000 SF**
Below-Grade Parking	300 spaces
On-Street Parking/Managed Curb Space	Approximately 40 spaces
Temporary Proximate Parking	280 spaces
Total Parking	**620 spaces**
Building Height[3]	
Lab/Office	Up to 140 feet
Residential, Hotel/Conference	Up to 190 feet

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 The heights of the component buildings of the Project will be at or below the height limits as set forth in the PDA Master Plan approved in 2018.

1.3.2 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 1.3.2, the Proponent has developed a multi-pronged framework of DEI initiatives.

1.3.2.1 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's 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, 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 of Boston.

1.3.2.2 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 help facilitate 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, 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.

1.3.2.3 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 2,400 on-site jobs relating to the office/R&D/lab, life sciences, hotel, retail, and parking uses within the Project, and an estimated 2,000 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.

1.3.2.4 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. Mr. McClory and Mr. Benjamin have been instrumental in partnering with the Proponent to incorporate DEI initiatives throughout all aspects of the Project development, 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 provides 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.

1.3.2.5 Fostering and Cultivation of Local/MBE/WBE Retailers

The Proponent's vision for the Project retail 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. As described in Section 4.4 of Chapter 4, *Urban Design*, 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.

1.3.3 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 the existing community and includes the next phase of the broader Greenway that will create a connection, in the future 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 nearly 3 acres, is the approximately 1.4-acre Project Greenway proposed at the heart of the Project Site. The Project Greenway is consistent with, and enhances, the vision established in the PDA Master Plan, and creates a new, publicly accessible open space destination for Allston and the surrounding communities.

A key goal of the approved PDA Master Plan is the creation of publicly accessible open space. In this regard, the Project exceeds the PDA goal of 20% of the developable area by providing nearly three acres of publicly accessible open space.

Please refer to Section 4.4 of Chapter 4, *Urban Design*, for additional information as it relates to public realm and open space improvements proposed as part of the Project.

1.3.4 Overview of Sustainability and Resiliency Approach

The Project consists of the development of an underutilized urban site with a new vibrant mixed-use sustainable project 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, which will exceed the City's requirements under Article 37 - Green Buildings. In addition, the Project will be eligible for Fitwel certification, which was originally created by the U.S. Centers for Disease Control to support healthier workplace environments, and 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 will 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 Project 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 5, *Sustainability and Climate Change Resiliency*, for further details on the sustainability and resiliency approach for the Project.

1.3.5 Housing and Affordability

The Project will 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 PNF filing, the residential component has been revised, increasing by 15 units (345 apartments overall) and approximately 13,500 square feet (approximately 263,500 SF of total residential). The Proponent intends to develop the Phase A residential buildings concurrently with other uses within the Project, and expects to deliver a much needed supply of 345 residential units to Allston as early as 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 onsite units will be affordable units allocated to families earning up to 70% of the Area Median Income (AMI), which is 15% greater than the number of affordable units required under the City's IDP policy to be affordable to families earning up to 70% of the Area Median Income. An additional 2% of Phase A's onsite units will be affordable units allocated to 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.

Please refer to Appendix G for the AFFH Assessment Tool.

The proposed 345 units will include a mix of studios, one-bedroom, and two-bedroom apartments. The residential buildings are early in the design process; however, the anticipated breakdown of unit types is detailed in Table 1-2 below.

Table 1-2 Anticipated Residential Unit Distribution

Unit Type	% of Units
Studio	38%
One-bedroom	48%
Two-bedroom	14%
Total	**100%**

1.3.6 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 an exchange of ideas, innovation, and connection.

The Project 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.

Section 4.5 of Chapter 4, *Urban Design*, contains additional information relating to building design for the Project.

1.3.7 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 offsite 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 three new complete streets: East Drive; Cattle Drive; and DEF Drive. Generous sidewalks and dedicated bike paths on Western Avenue, Cattle Drive, and East 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 Section 3.4 of Chapter 3, *Transportation*, for additional details on site vehicular, pedestrian and bicycle access and circulation.

1.3.8 Anticipated Project Phasing and Construction Mitigation

The Project is anticipated to commence construction in 2022, and to start delivering buildings as early as 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 the Enabling Infrastructure, which will involve some site preparation work within the PDA Area. The Proponent intends to begin construction on the Project buildings, the Treehouse Conference Center, and the Project Greenway as early as the first half of 2022.

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.

1.4 Affirmatively Furthering Fair Housing

The Proponent has agreed to comply, voluntarily, with the newly enacted Affirmatively Furthering Fair Housing ("AFFH") initiative as approved by the City of Boston. The Proponent is proud to participate in a first-of-its-kind assessment, and is committed to take meaningful actions to address disparities in housing, consistent with AFFH's tenets and goals.

In coordination with this filing, the Proponent is also submitting the AFFH Assessment Form for review by the Boston Interagency Fair Housing Development Committee (BIFDC). The various interventions and proposals detailed in the AFFH Assessment Form were informed by the statistical and demographic data generated by the *Housing and Household Composition Community Profile Map and Report Generation Tool*, as provided on the BPDA's AFFH website.

Please refer to Appendix G for the AFFH Assessment Tool.

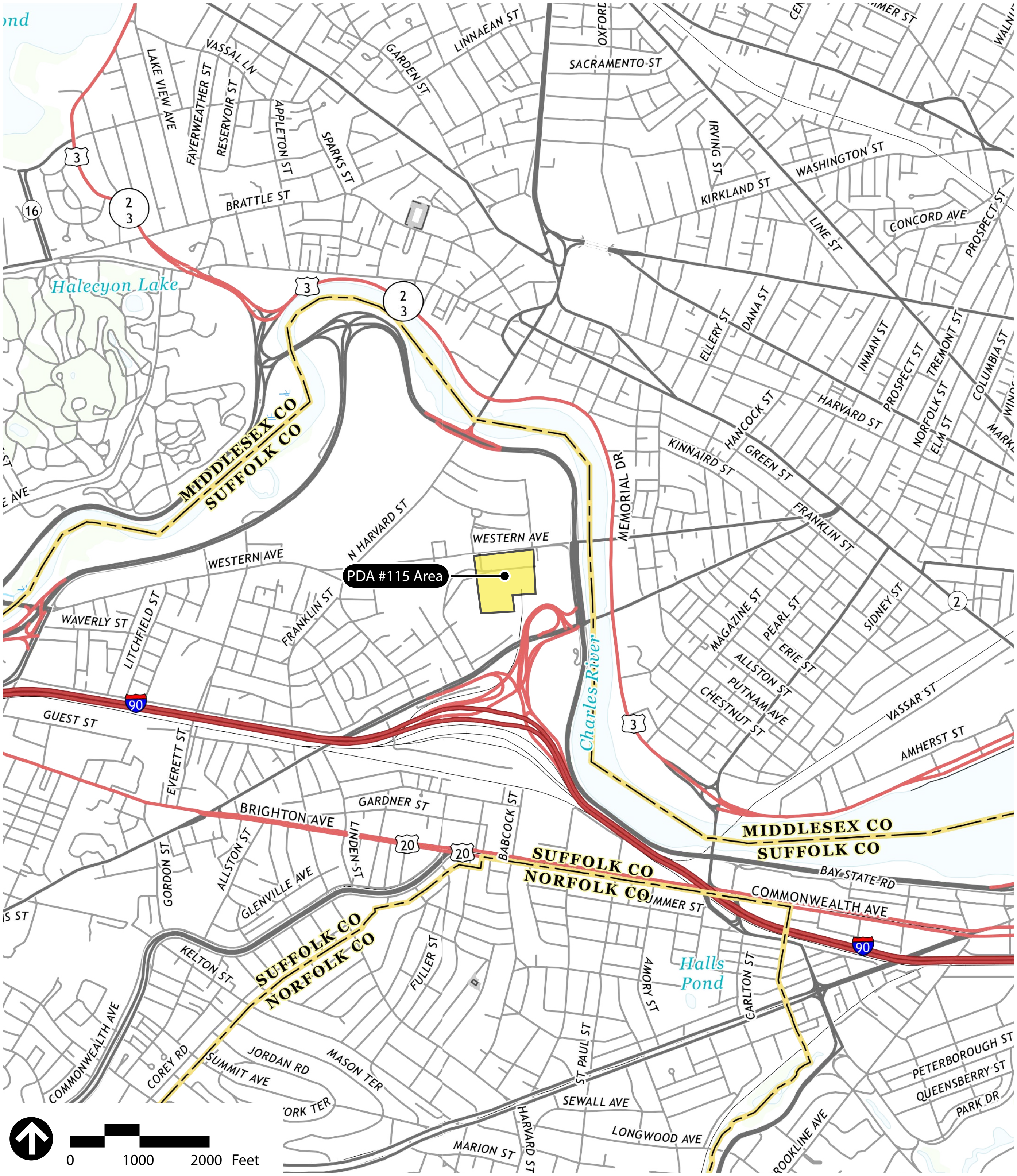
1.5 List of Anticipated Regulatory Controls, Approvals, and Permits

Table 1-3 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)

Table 1-3 List of Anticipated Regulatory Controls, Approvals, and Permits (Cont'd.)

Agency Name	Permit, Approval, or Amendment
State (continued)	
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
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



Source: USGS

Figure 1.1

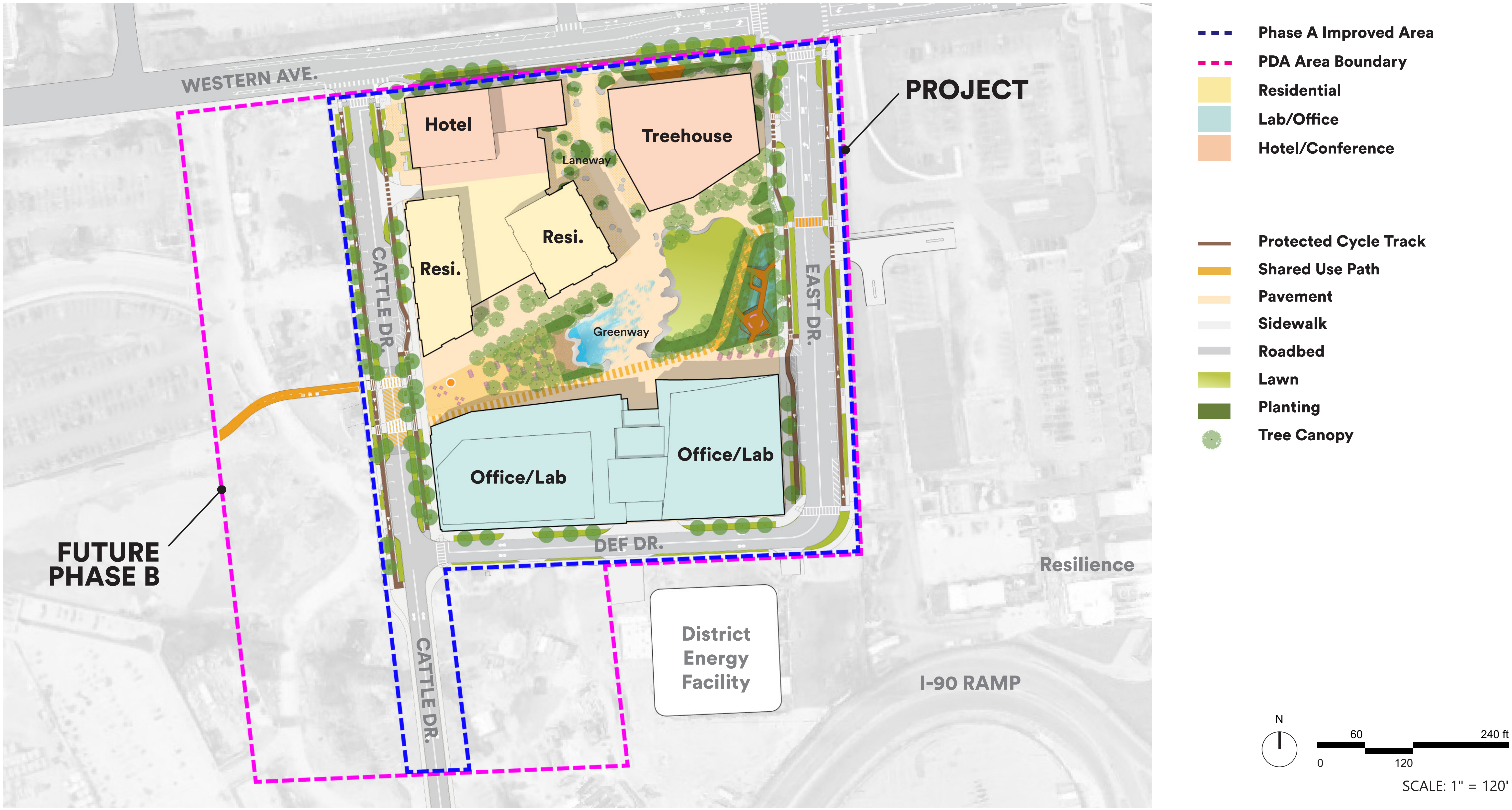
Site Location Map

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



Note: Illustrative purposes only. Subject to change.

Figure 1.3

Phase A Proposed Conditions Plan

Enterprise Research Campus Project
Boston, MA

2

Phase B

The Proponent will pursue entitlements to develop the approximately 4.8 acres of the PDA Area that are not being developed as part of the Project/Phase A (the "Phase B Site"). The currently approved PDA Master Plan identifies the Phase B Site portion of the approximately 14.2-acre PDA as an area for temporary surface parking lots that may be developed for additional buildings and open spaces based on future planning, review and approvals.

This DPIR includes a conceptual plan for Phase B to provide context for the review of Phase A, and for discussions with community groups, elected officials, and government agencies about the future development of Phase B. A proposed conceptual site plan of the full build-out of the entire PDA Area, including Phase A and Phase B (collectively, the "Full Build"), is annexed as Figure 2.1.

The potential development plan for Phase B was included in the PNF, and has been included, as appropriate, in the Proponent's community presentations since the outset of the review process. Phase B has been fully studied in the traffic analysis included in this DPIR and, in compliance with MEPA requirements, has also been included in the MEPA filings with respect to the Project. The Proponent intends to be transparent about the future development plans for Phase B, and this Chapter 2 aims to provide a description of Phase B, including a regulatory framework for its review in the future, and an overview of the mitigation and public benefits of Phase B.

As described below, the Full Build development program, as proposed, consists of development at an FAR of approximately 3.1, which is less than the 4.0 FAR referenced in the 2018 PDA Master Plan, as noted by 2018 amendments to the Code referenced in the 2018 PDA Master Plan. Additionally, Phase B includes a larger amount of residential space, and a higher percentage of affordable housing, than Phase A.

2.1 Phase B Regulatory Context

The Proponent intends to seek approval of an Amended and Restated Master Plan for Planned Development Area, No. 115 (the "Amended PDA Master Plan") to incorporate the additional benefits associated with Phase A/the Project, and to provide further master plan level planning and benefits for Phase B.

While Phase A will have a corresponding PDA Development Plan, which will align with the contents of this DPIR and ongoing Article 80 Large Project Review, the Proponent is pursuing entitlements for Phase B at the master plan level in order to establish the parameters for planning and review of Phase B. The Proponent will initiate a subsequent and separate Article 80 Large Project 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 on the Amended PDA Master Plan.

2.2 Phase B Description

The Proponent envisions that Phase B will further expand the vibrant, inclusive mixed-use project as proposed in Phase A, by replacing what was designated as surface parking lots in the approved 2018 PDA Master Plan with active commercial and residential uses and open space. Phase B will include uses consistent with the PDA Master Plan, which uses are anticipated to include the following:

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

2.2.1 Development Program

Table 2-1 summarizes the proposed development program for the Full Build of the PDA Area. As shown below, the Full Build development program consists of development at an FAR of approximately 3.1, which, as noted, is less than the 4.0 FAR referenced in the 2018 PDA Master Plan, as allowed by 2018 amendments to the Code referenced in the 2018 PDA Master Plan.

Table 2-1 Proposed Project Development Program Summary

Project Element	Phase A	Phase B	Full Build
Site Area			**+14.2 acres**
Building Uses[1]			
Lab / Office	440,000 SF	720,000 SF	1,160,000 SF
Residential	263,500 SF (345 units)	320,000 SF (420 units)	583,500 SF (765 units)
Hotel / Conference	135,000 SF (250 keys)	-	135,000 SF (250 keys)
Conference	61,500 SF	-	61,500 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	-	640 spaces	640 spaces
Temporary Off-site Parking[3]	280 spaces	-	-
Total Parking	**620 spaces**	**940 spaces**	**1,280 spaces**
Building Height & FAR[4]			
Lab / Office	Up to 140 feet	Up to 140 feet	
Residential, Hotel / Conference	Up to 190 feet	Up to 190 feet	
FAR			**3.1**

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 contain retail, restaurant, and other activated uses, which are included 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 Phase B Garage, temporary parking proximate to or within the Project Site will provide 280 parking spaces to satisfy Phase A parking demand.

4 As defined by Article 2A of the Boston Zoning Code.

2.2.2 Phase B Uses and Building Design Approach

Phase B is intended to provide a seamless expansion of the permeable, mixed-use district proposed for Phase A, with uses consistent with the PDA Master Plan. The intended use mix of Phase B is proposed to be approximately 30% residential (320,000 SF), containing up to 420 apartments, and 70% commercial (approximately 720,000 SF of uses that include lab/office). The ground floor areas of Phase B are intended to contain retail, restaurant, and other activated uses.

The conceptual master plan for Phase B calls for strategically locating buildings and building usages in a manner so as to best create a pedestrian-friendly and desirable environment. The master plan and buildings for Phase B include:

- Building 6 – A building that includes lab-office uses with below grade parking located east of Cattle Drive and south of DEF Drive, immediately adjacent to the District Energy Facility.
- Building 7 & 8 – A combined residential and above-grade structured parking complex, sited west of Cattle Drive and south of the Phase B Greenway. This site is intended to contain a below and above grade garage that will contain sufficient parking to satisfy demand for both Phase A and Phase B that is not accommodated below grade in Phases A and Phase B (the "Phase B Garage"). The Building 7 & 8 complex will wrap the Phase B Garage on three sides with two residential buildings, collectively containing up to 420 apartments.
- Buildings 9 & 10 – A two-building component including lab/office uses with below grade parking to be located west of Cattle Drive, south of Western Avenue, and immediately north of the Phase B Greenway. This lab/office complex is currently envisioned to be connected on the upper floors.

Further detail regarding the master plan design relating to Phase B will be presented as part of the Amended PDA Master Plan process.

2.2.3 Phase B Public Realm Improvements and Open Space

The Proponent intends to expand the Project Greenway westward with the development of a new "Phase B Greenway", and to construct additional, intimate sidewalk rooms along Cattle Drive. Phase B will increase the publicly accessible open space with over one acre of additional open space. When combined with the public realm improvements proposed in Phase A, the Full Build of the approximately 14.2-acre PDA Area will contain over 50% of public realm.

Further detail regarding the open space design for Phase B will be detailed as part of the PDA Development Plan for Phase B at that time. Additionally, the Proponent intends to conduct further study and public review of the Phase B Greenway and open space at the time of the review of Phase B in the aforementioned future Article 80 process.

2.2.4 Phase B Anticipated Phasing

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 will 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 currently pursuing the Amended PDA Master Plan, to be followed in the future by an Article 80 Large Project Review and community process and approval of a PDA Development Plan.

2.3 Phase B Summary of Public Benefits

Phase B will offer robust public benefits, building upon the strong foundation of Phase A. The usage of the Phase B Project Site as surface parking under the approved PDA Master Plan offers little public benefit to the Allston community or the broader public. The mitigation measures and public benefits detailed in this Section 2.3 are consistent with and in many cases improve upon the measures and benefits associated with Phase A. These public benefits will be incorporated into the Amended PDA Master Plan.

2.3.1 Public Realm

- Phase B will increase the publicly accessible open space within the approximately 14.2-acre PDA Area with approximately one additional acre of open space, with the completed Full Build including over 50% of the entire PDA Area to be dedicated to public realm space.
- The proposed Phase B open space areas will be programmed in coordination with the programming and activation elements of Phase A.

2.3.2 Housing and Diversity, Equity, and Inclusion ("DEI")

- The Proponent intends to provide enhanced affordability as part of Phase B, and 20% of the units built in Phase B will be designated as affordable.
- Phase B will comply with the City's AFFH policy in connection with the Phase B Article 80 review process.
- The Proponent intends to carry forward the inclusionary investor program from Phase A, and commits to reserve 5% of Phase B ownership for Black and Latinx investors.
- The Proponent will adopt the same procurement and selection commitments in Phase B that are being made for Phase A, and will pursue good faith efforts to award or cause to be awarded 15% of the total value of all pre-construction and construction contracts to certified MBE and WBE firms and consultants.
- In Phase B, the Proponent will continue its commitment to foster small, local, MBE, and/or WBE retailers, and as such, the Proponent is committed to allocating approximately 25% of the retail at the Project to such retailers, and, as necessary, to work with such retailers to provide advantageous lease terms.

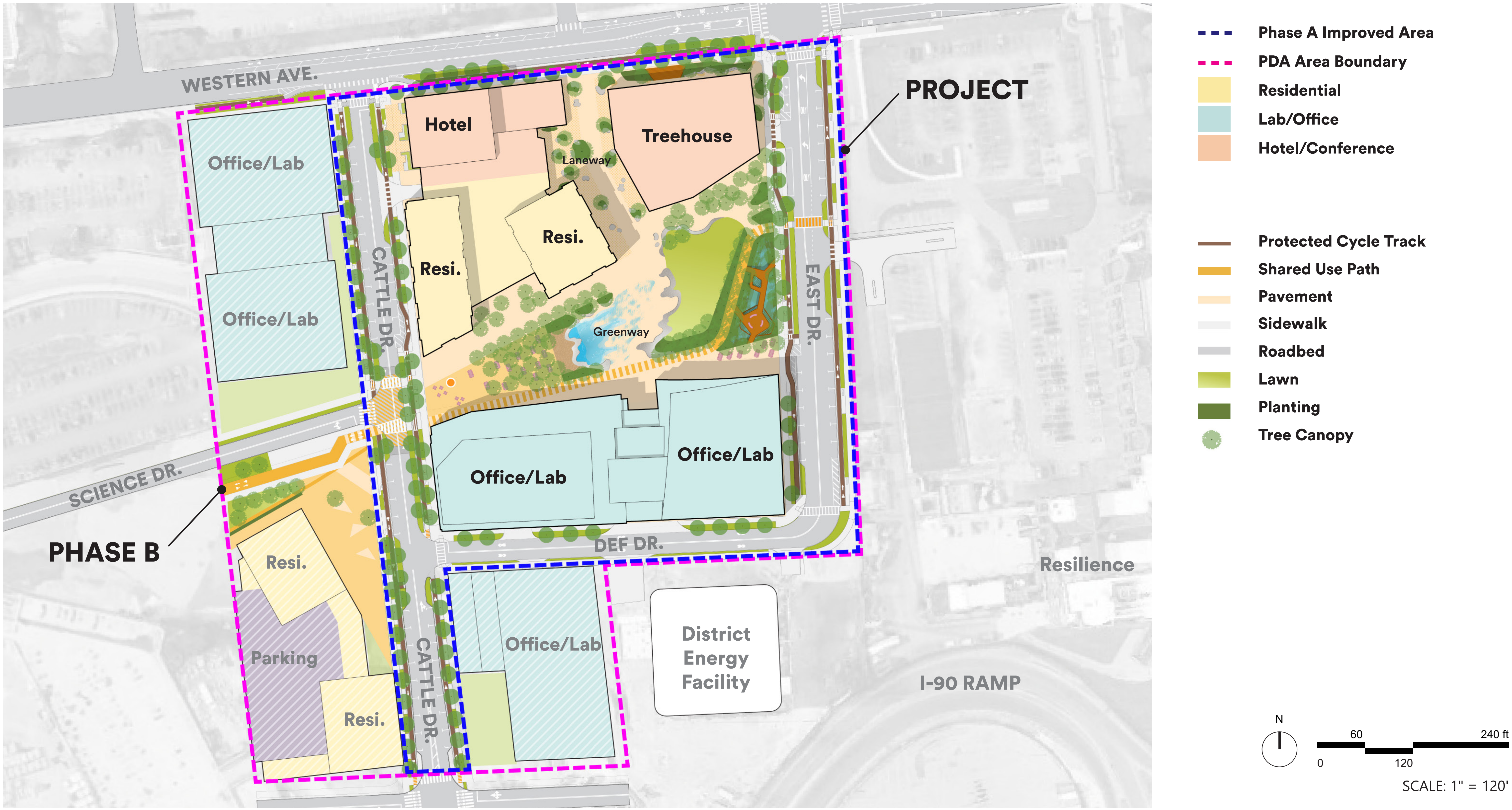
2.3.3 Sustainability and Resiliency

- The Proponent will carry forward into Phase B the commitment to emphasize sustainability, carbon reduction, and resiliency.
- Phase B, like Phase A, will exceed compliance with Article 37 of the Code and be designed to achieve LEED Gold certification.
- Phase B will commit to be fossil fuel-neutral by 2026 and fossil-fuel-free by 2050 consistent with the commitments made for Phase A.

- Consistent with Phase A, the Proponent will incorporate best practices for stormwater management systems that will collect, store, and recharge back into the ground water the equivalent of the 32-year storm associated with the Phase B Site.
- Phase B, like Phase A, will integrate sustainable construction methods throughout the development.

2.3.4 Transportation

- The Proponent has conducted a comprehensive transportation impact study that incorporates the proposed development of Phase B, which is detailed further in Chapter 3, *Transportation*, as the 2030 Condition (Full Build)
- In furtherance of facilitating non-vehicular travel, the Proponent intends to carry forward the Phase A commitment to lower parking ratios into Phase B, including 0.8 spaces per 1,000 SF of lab/office space and 0.5 spaces per residential units.
- Consistent with Phase A, Phase B will incorporate bicycle accommodations, facilities, and amenities, including bicycle parking and storage, consistent with the objectives of BTD's Complete Streets Guidelines.
- Consistent with the ongoing efforts for Phase A, the Proponent intends to coordinate with the Boston Transportation Department (BTD), and the MBTA to increase transportation service levels, including both MBTA bus service, and via a publicly-accessible transit connector service to and from the Phase B Site.
- Additionally, and consistent with ongoing efforts for Phase A, 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.



Note: Illustrative purposes only. Subject to change.

Figure 2.1

Full-Build Conditions Plan

Enterprise Research Campus Project
Boston, MA

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

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 8, 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 95^{th}-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															
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	*Intersection does not exist under Existing Condition*														
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															
NB L/T/R	*Intersection does not exist under Existing Condition*					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															
EB L/T/R	*Intersection does not exist under Existing Condition*					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						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	*Intersection does not exist under Exiting Condition*														
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

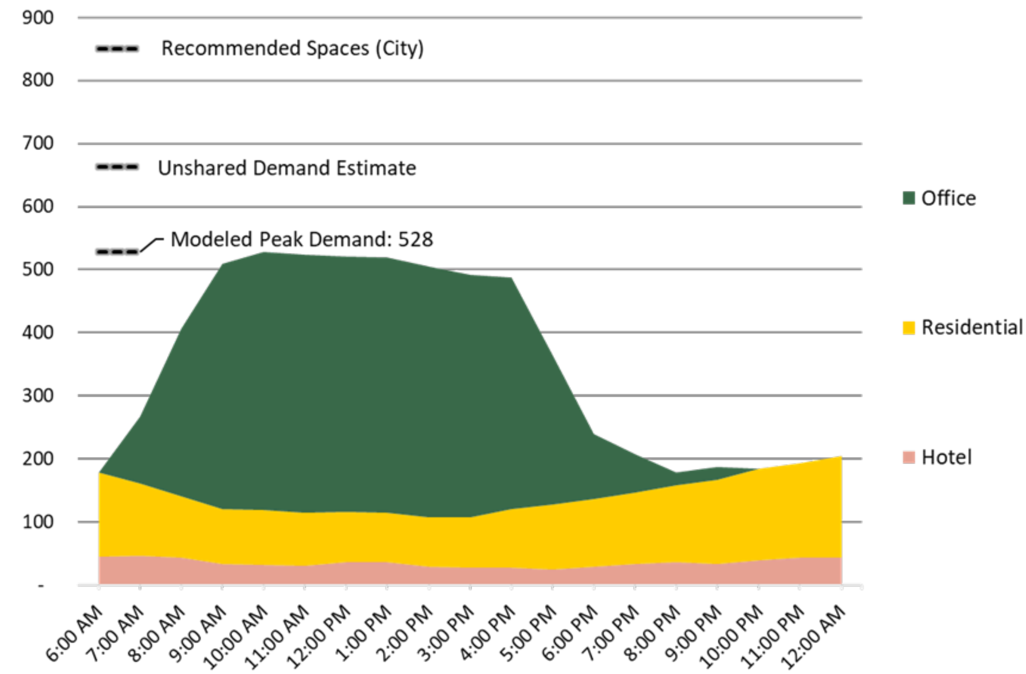
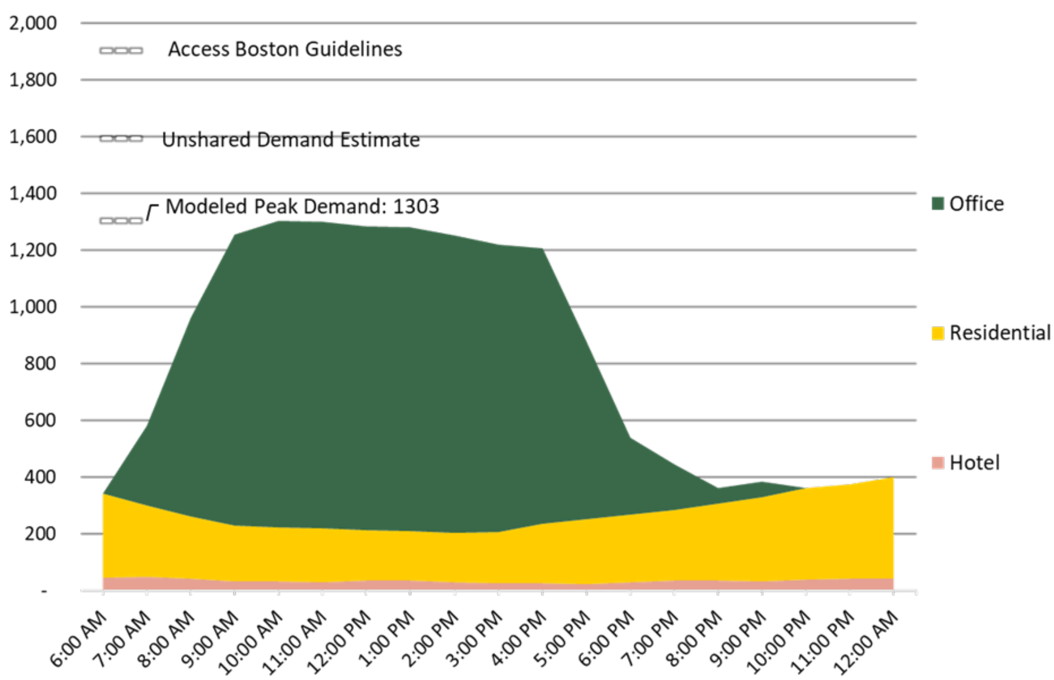


Chart: Shared Parking Analysis, Full Build (2030) Condition



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

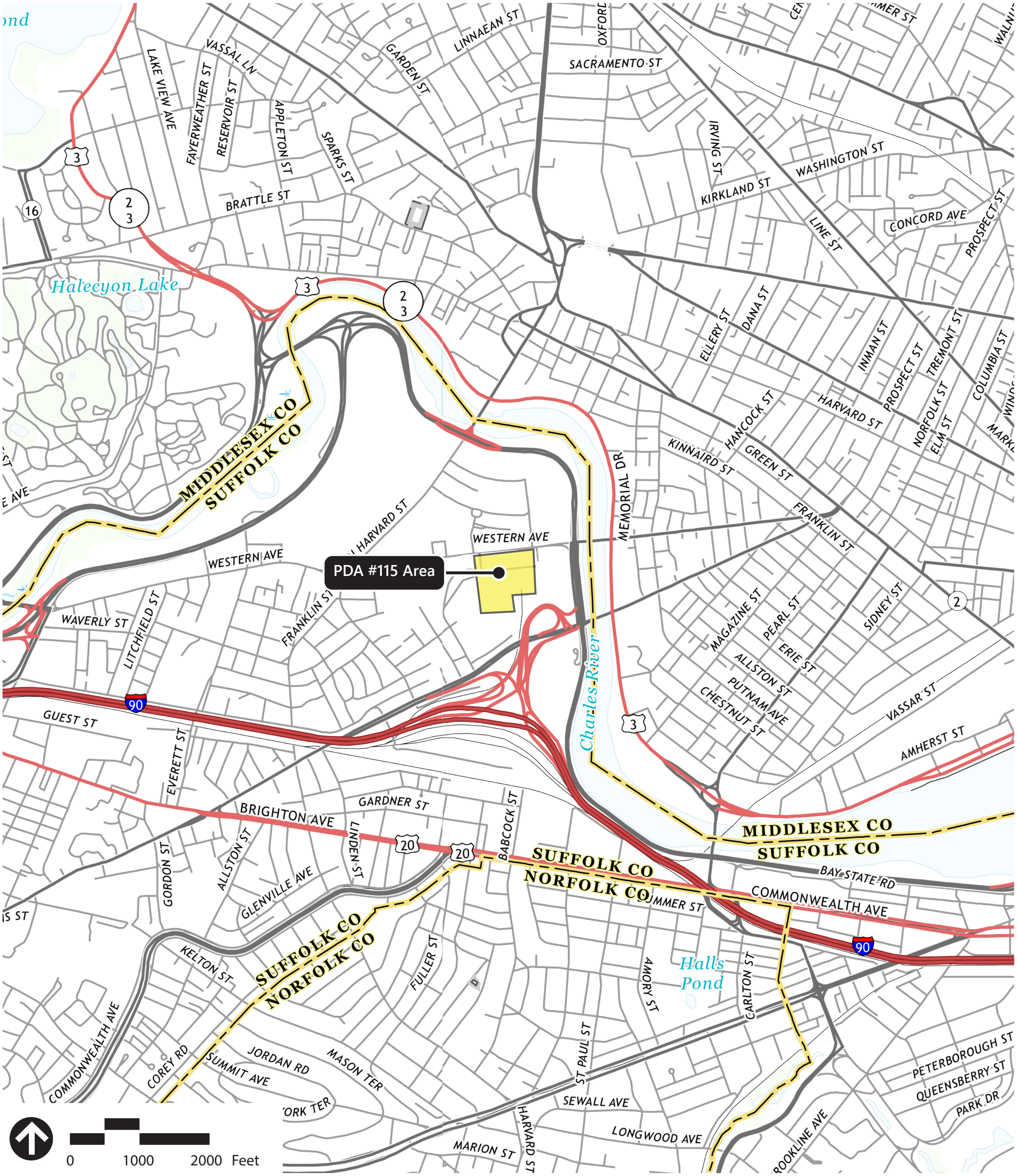
The annual reporting of the transportation monitoring program will include a review of MBTA bus and area transit ridership activity. The data will include the boarding and de-boarding activity of the area's MBTA bus routes at stops serving the Project area. Transit activity data (boardings by trip or 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.



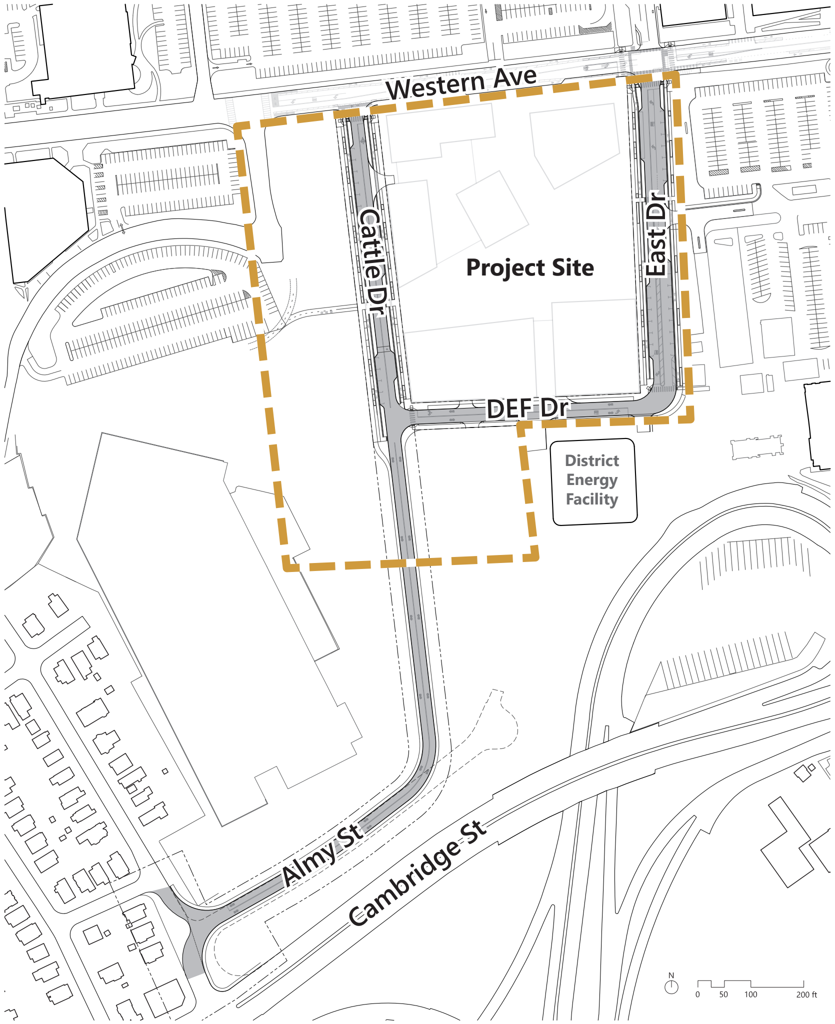
Source: USGS

Figure 3.1

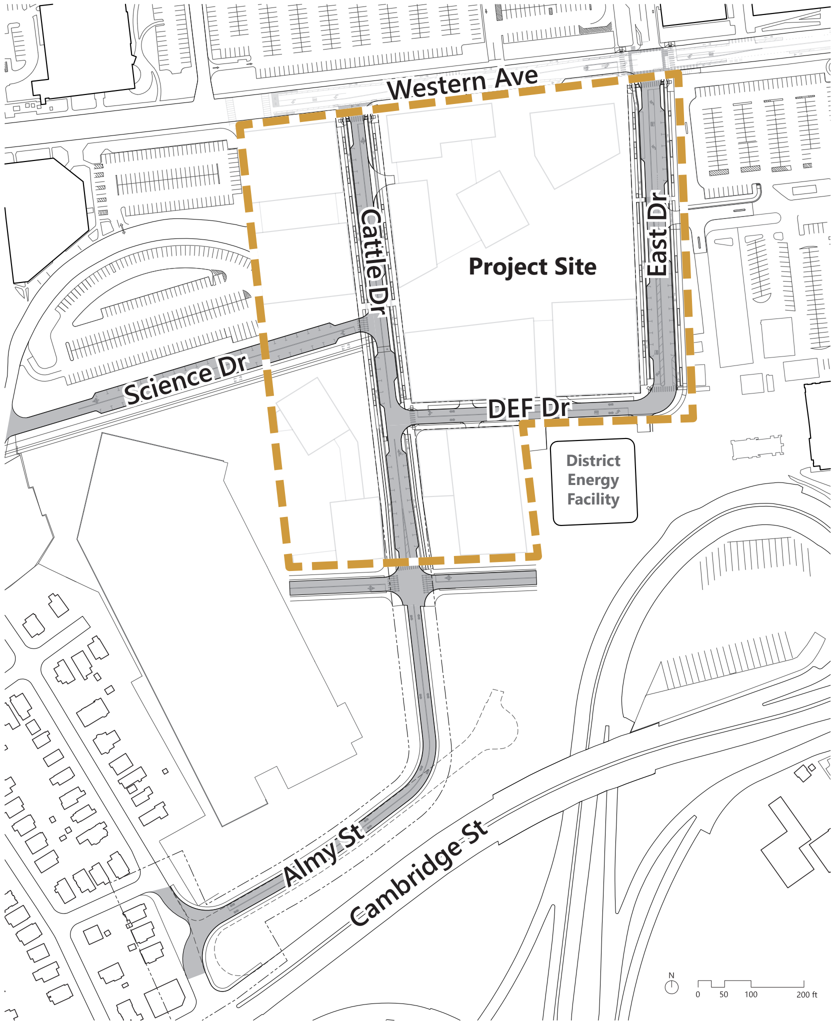
Site Location Map

Enterprise Research Campus Project
Boston, MA

Phase A



Phase B



PDA Boundary

Figure 3.2

ERC Enabling Streets

Enterprise Research Campus Project
Boston, MA

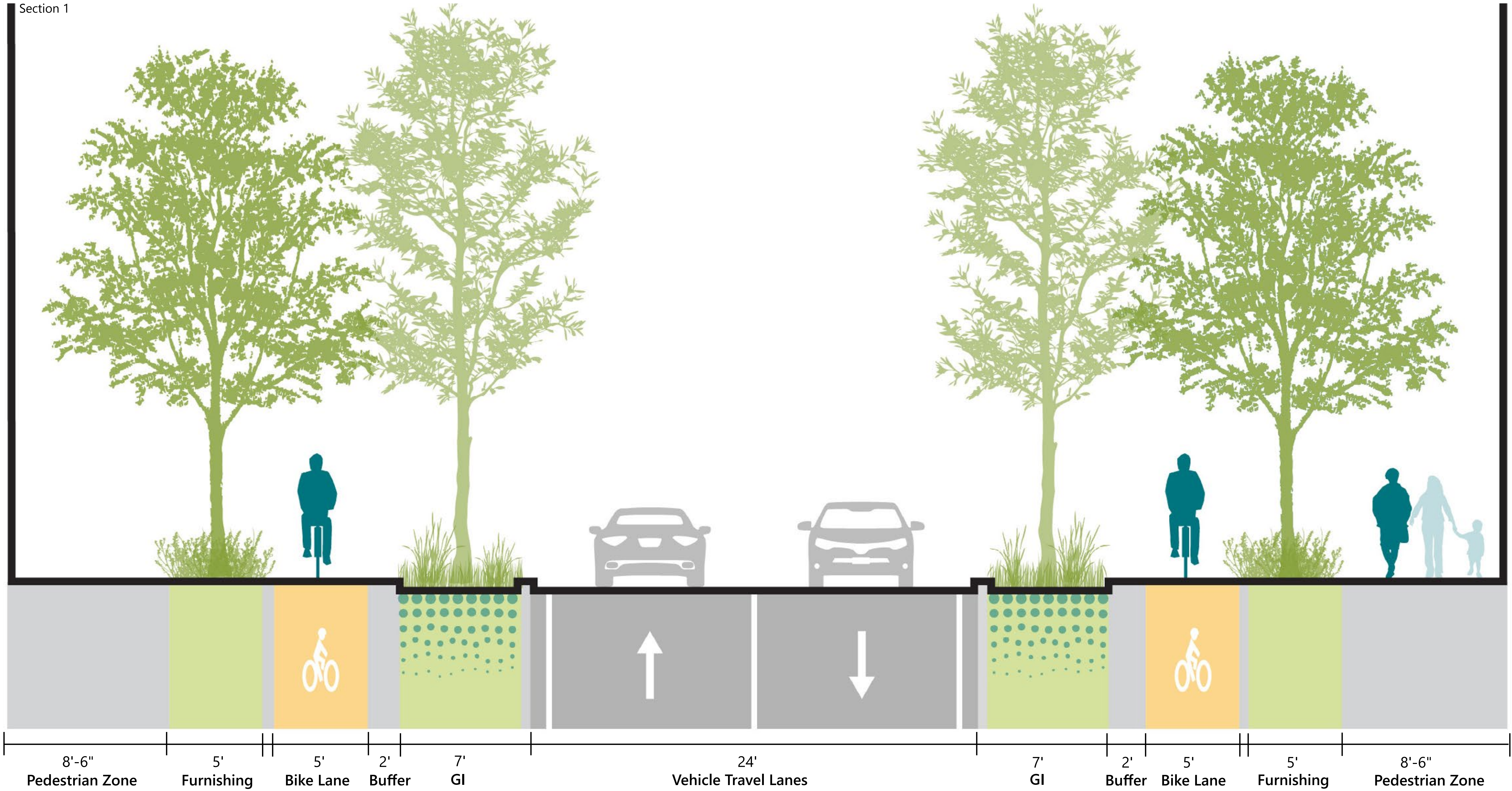
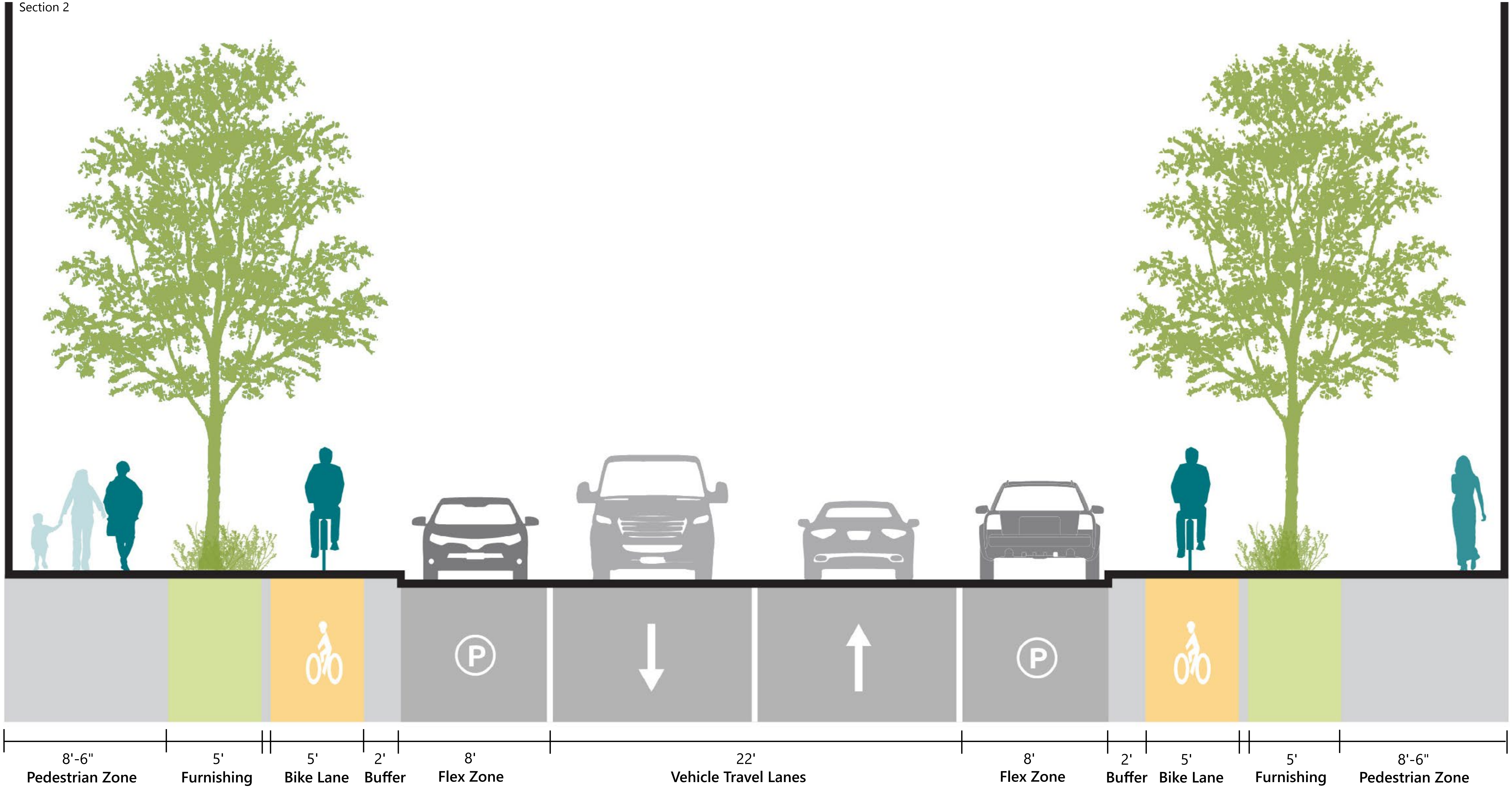


Figure 3.3a
Cattle Drive - Proposed Section
without Parking

Enterprise Research Campus Project
Boston, MA

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



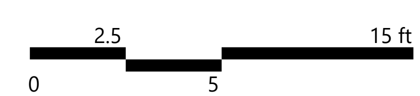


Figure 3.3b
Cattle Drive - Proposed Section
with Parking

Enterprise Research Campus Project
Boston, MA

Section 1

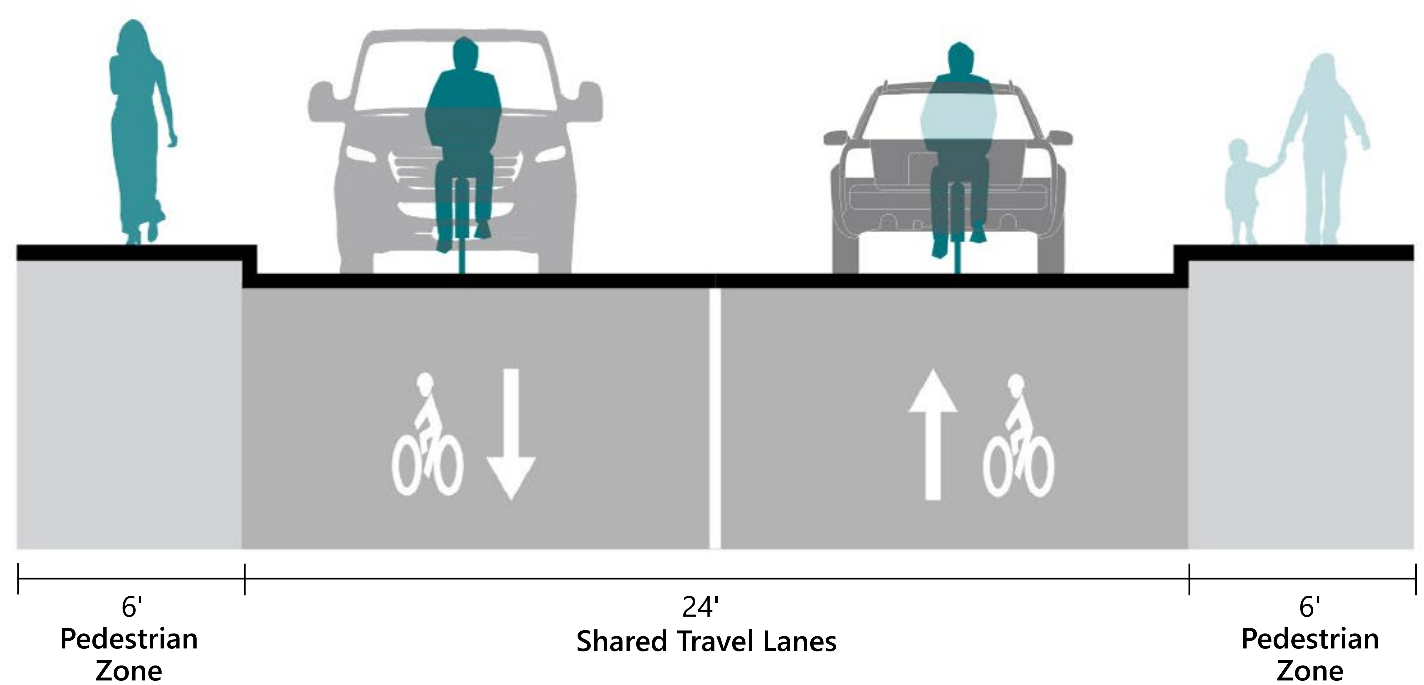
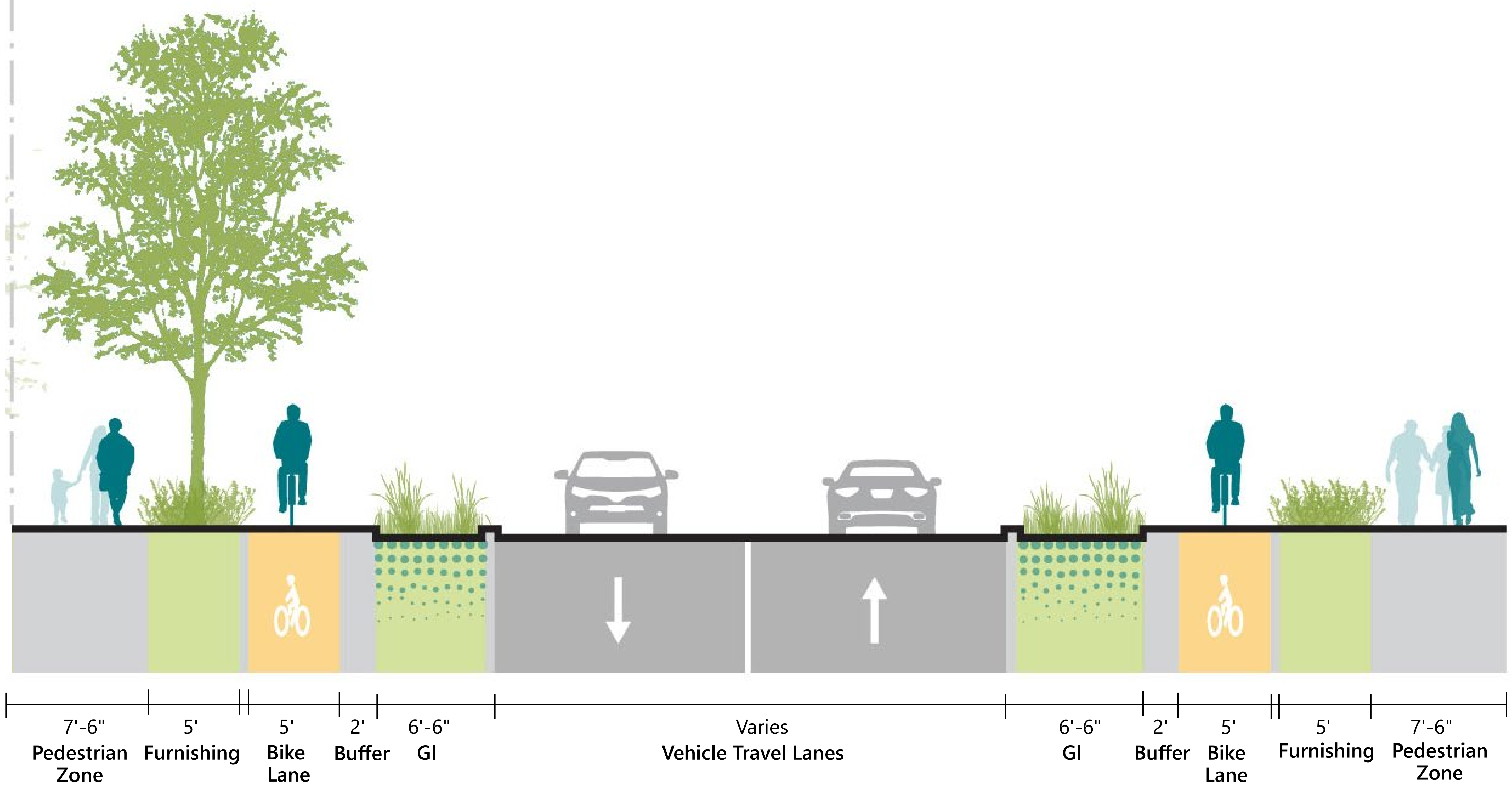


Figure 3.3c

Interim Cattle Drive - Proposed

Enterprise Research Campus Project
Boston, MA



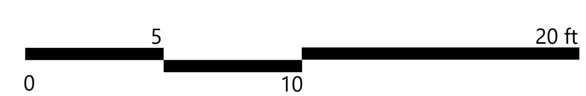


Figure 3.3d
East Drive - Proposed Section
without Parking

Enterprise Research Campus Project
Boston, MA

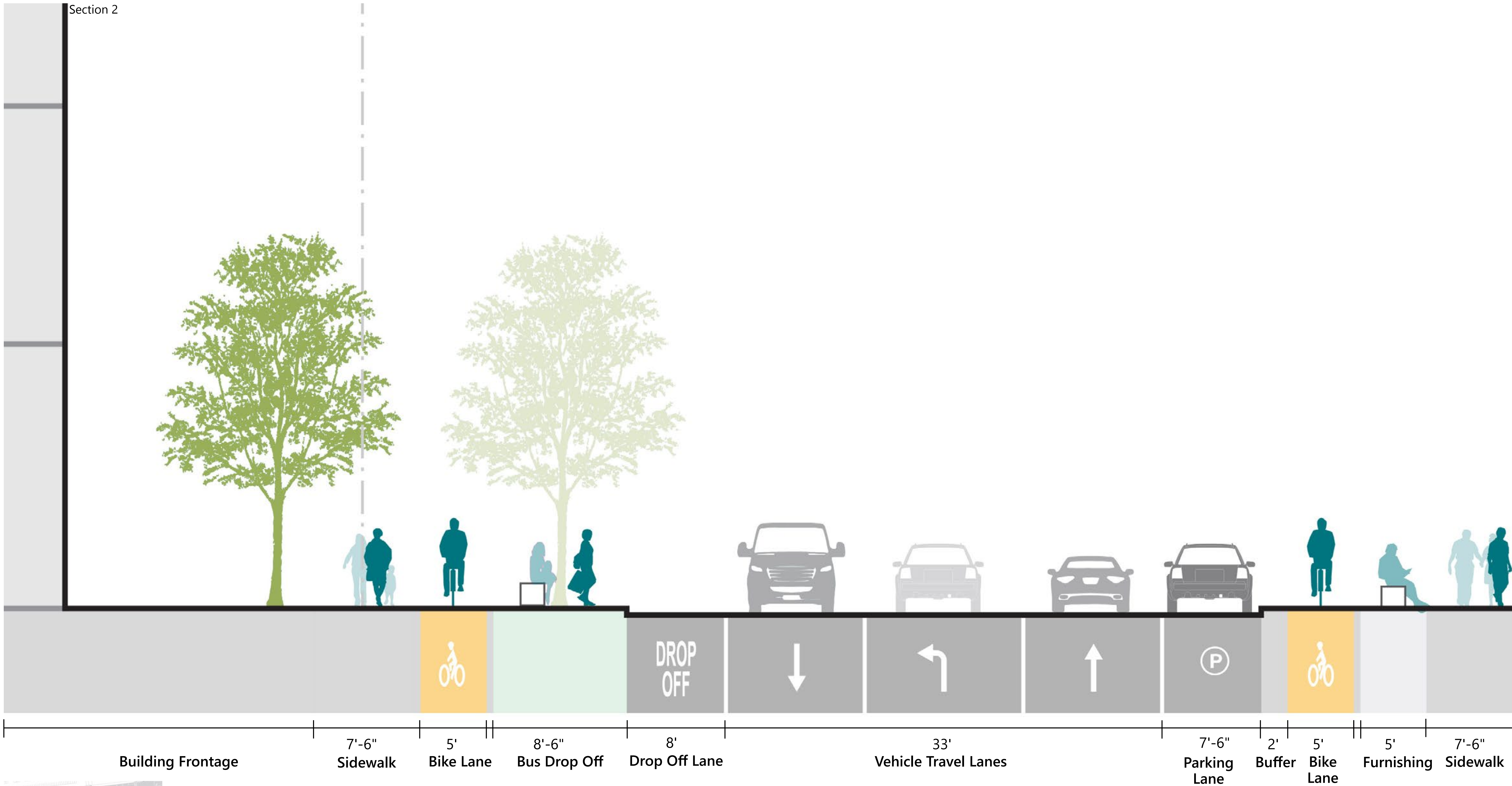
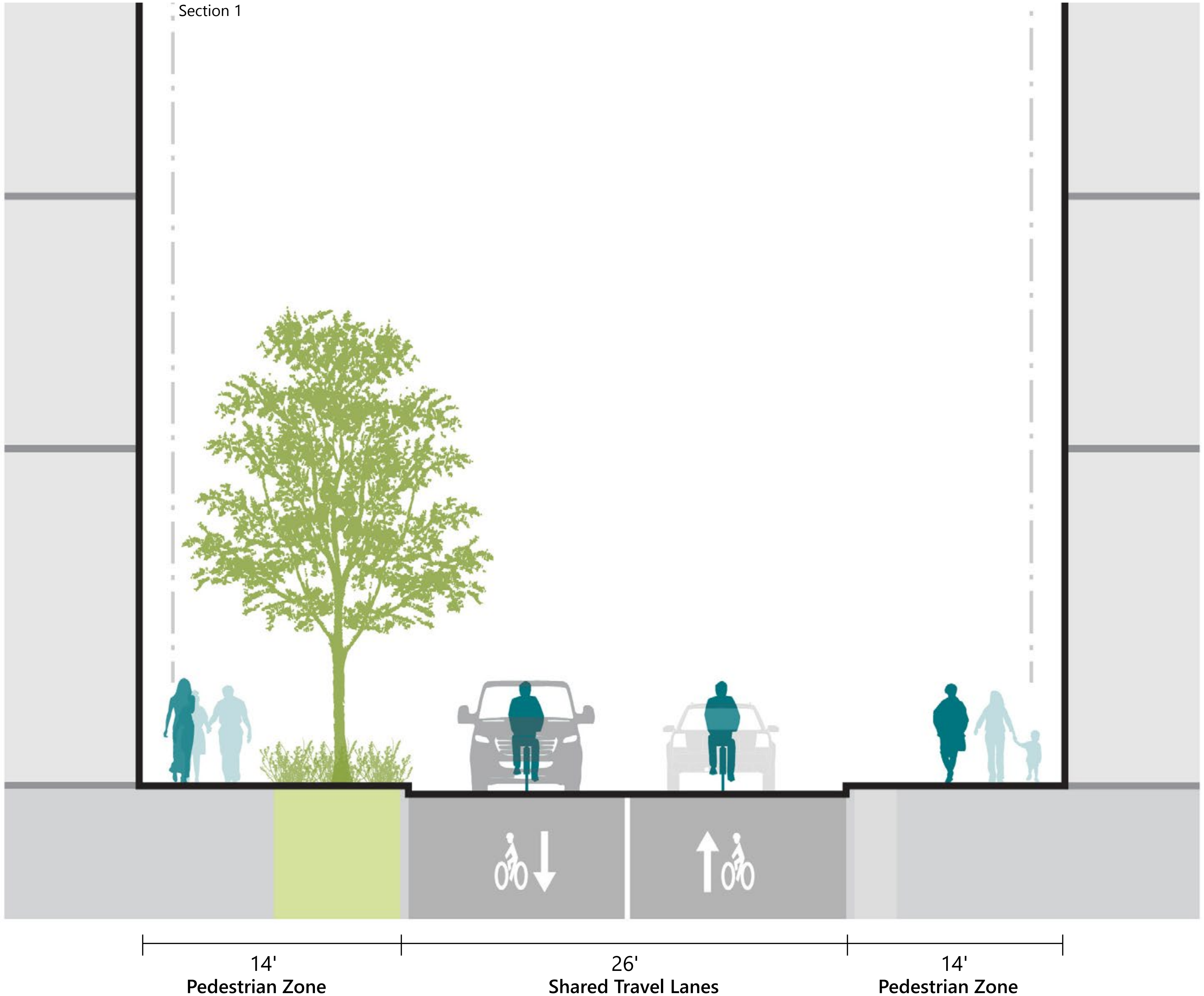


Figure 3.3e
East Drive - Proposed Section
with Parking

Enterprise Research Campus Project
Boston, MA

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



0 5 10 20 ft

Figure 3.3f

DEF Drive - Proposed

Enterprise Research Campus Project
Boston, MA

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

Section 1

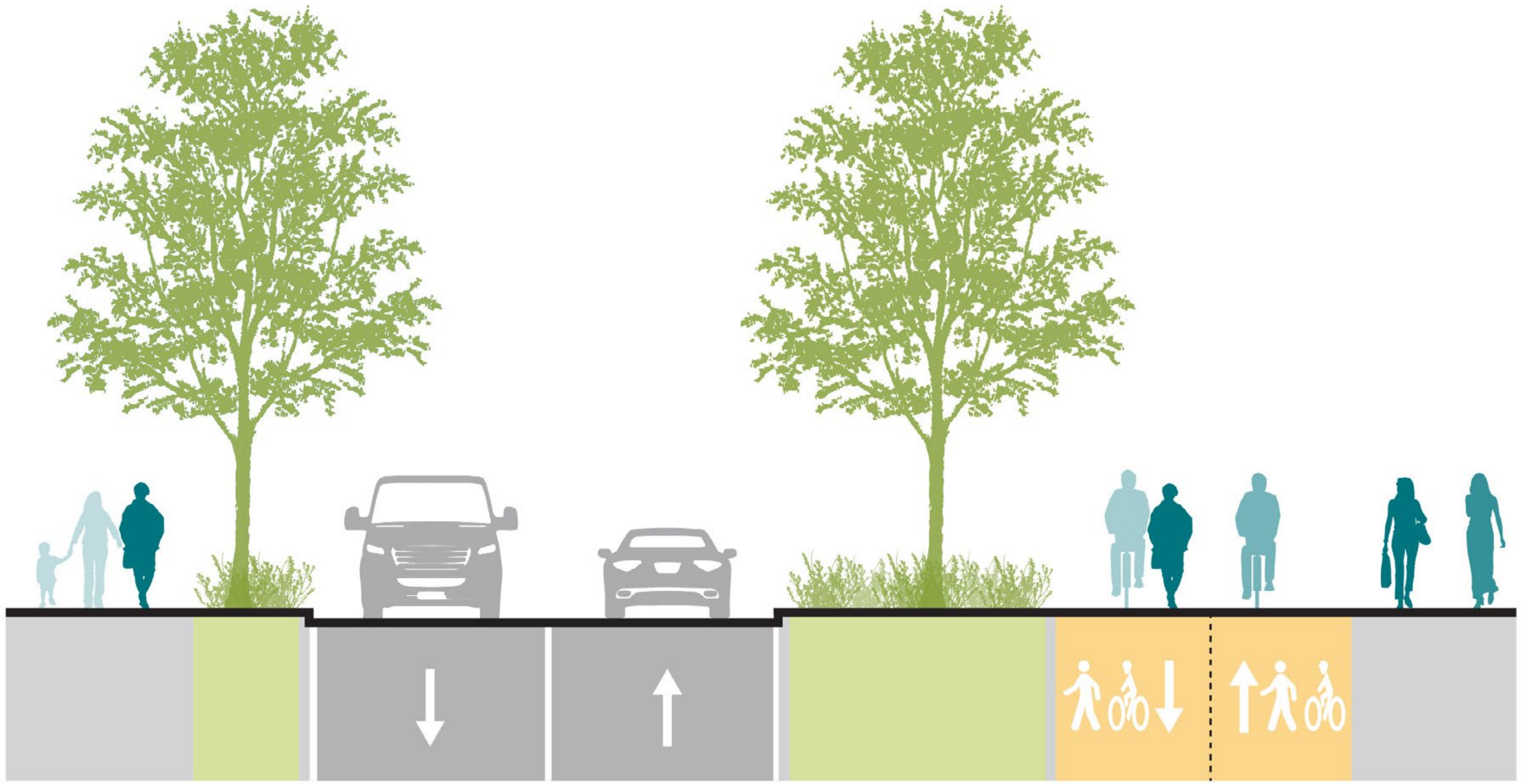


Figure 3.3g
Science Drive - Planned Section without Parking

Enterprise Research Campus Project
Boston, MA

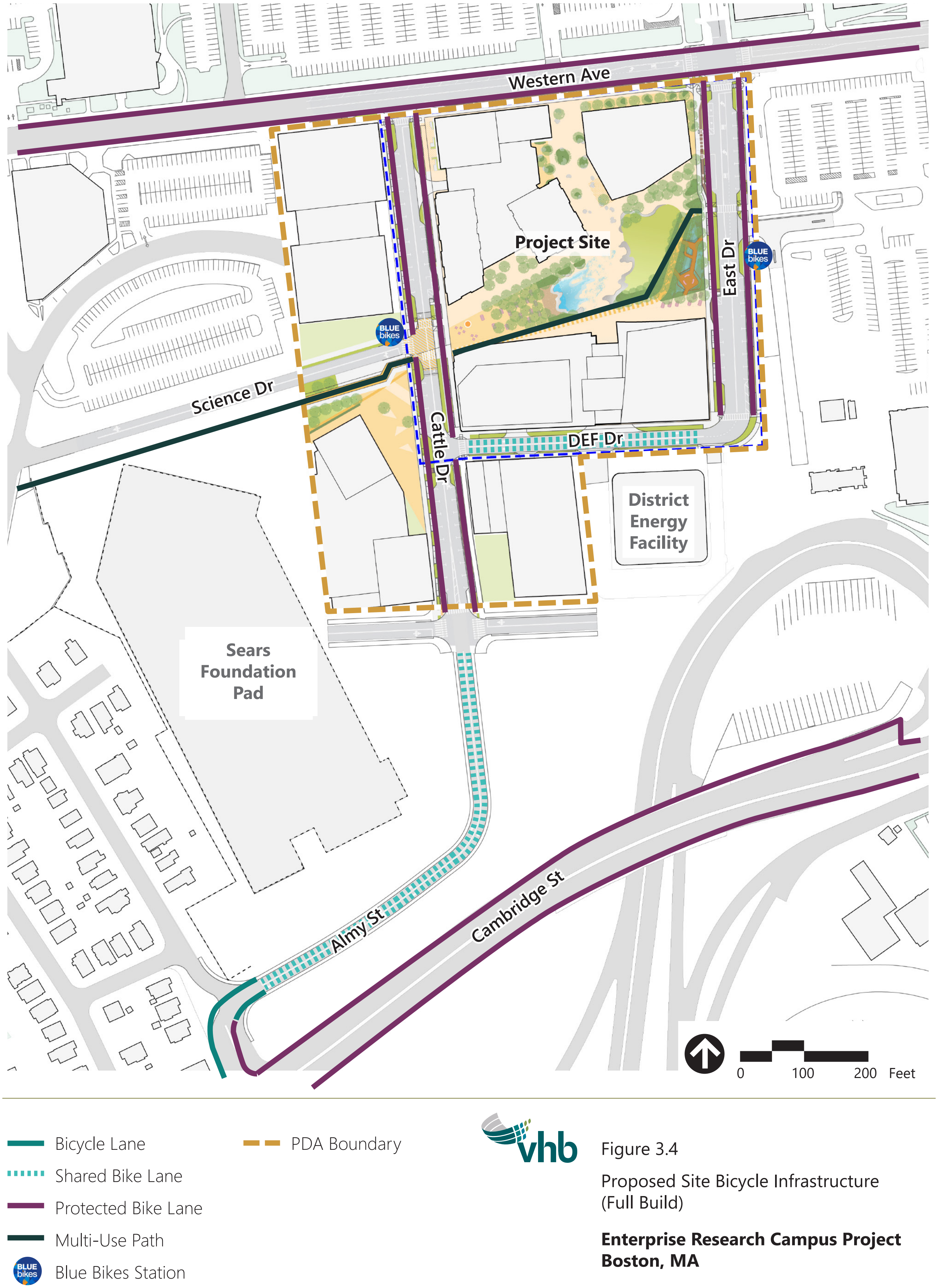


Figure 3.4

Proposed Site Bicycle Infrastructure (Full Build)

Enterprise Research Campus Project
Boston, MA

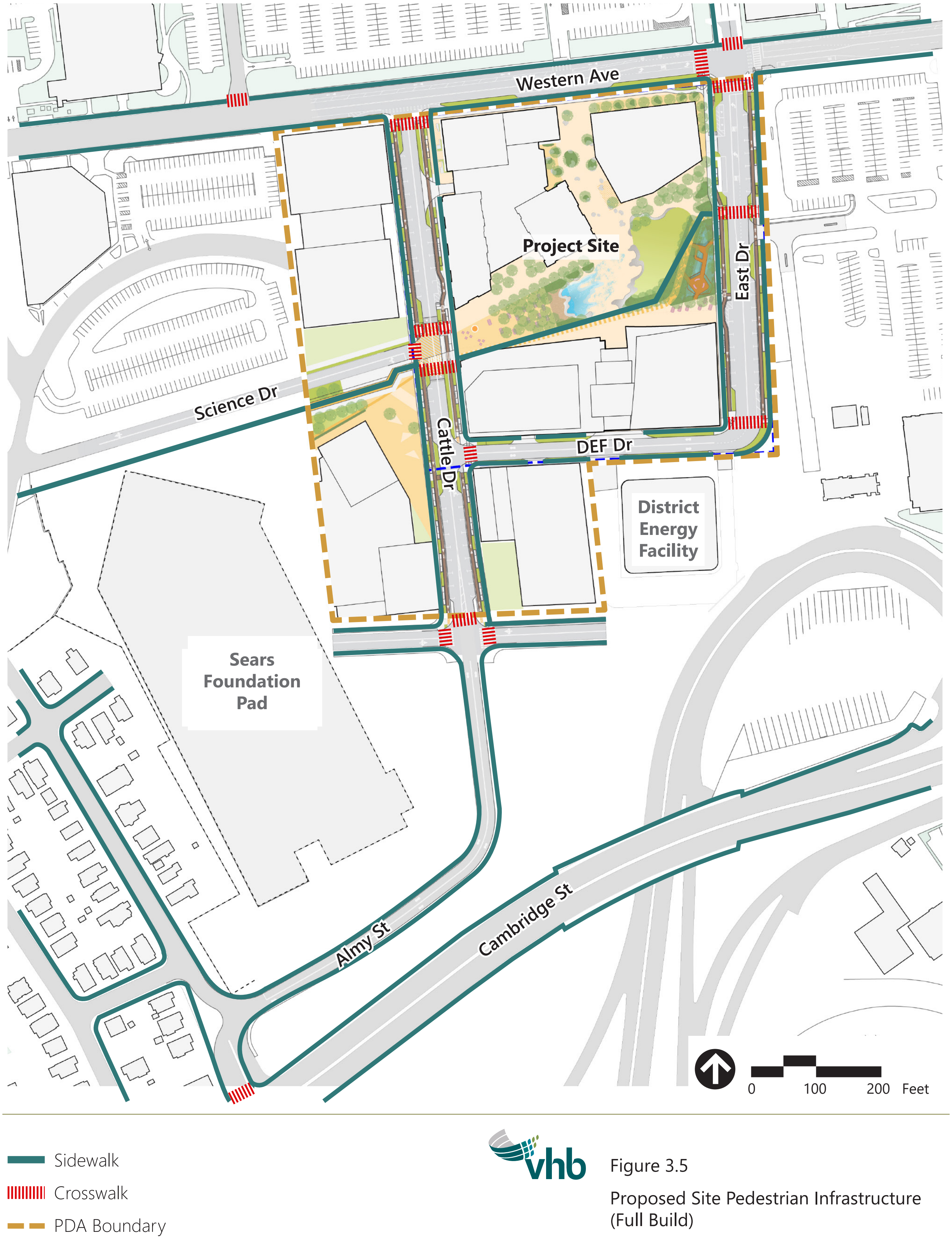
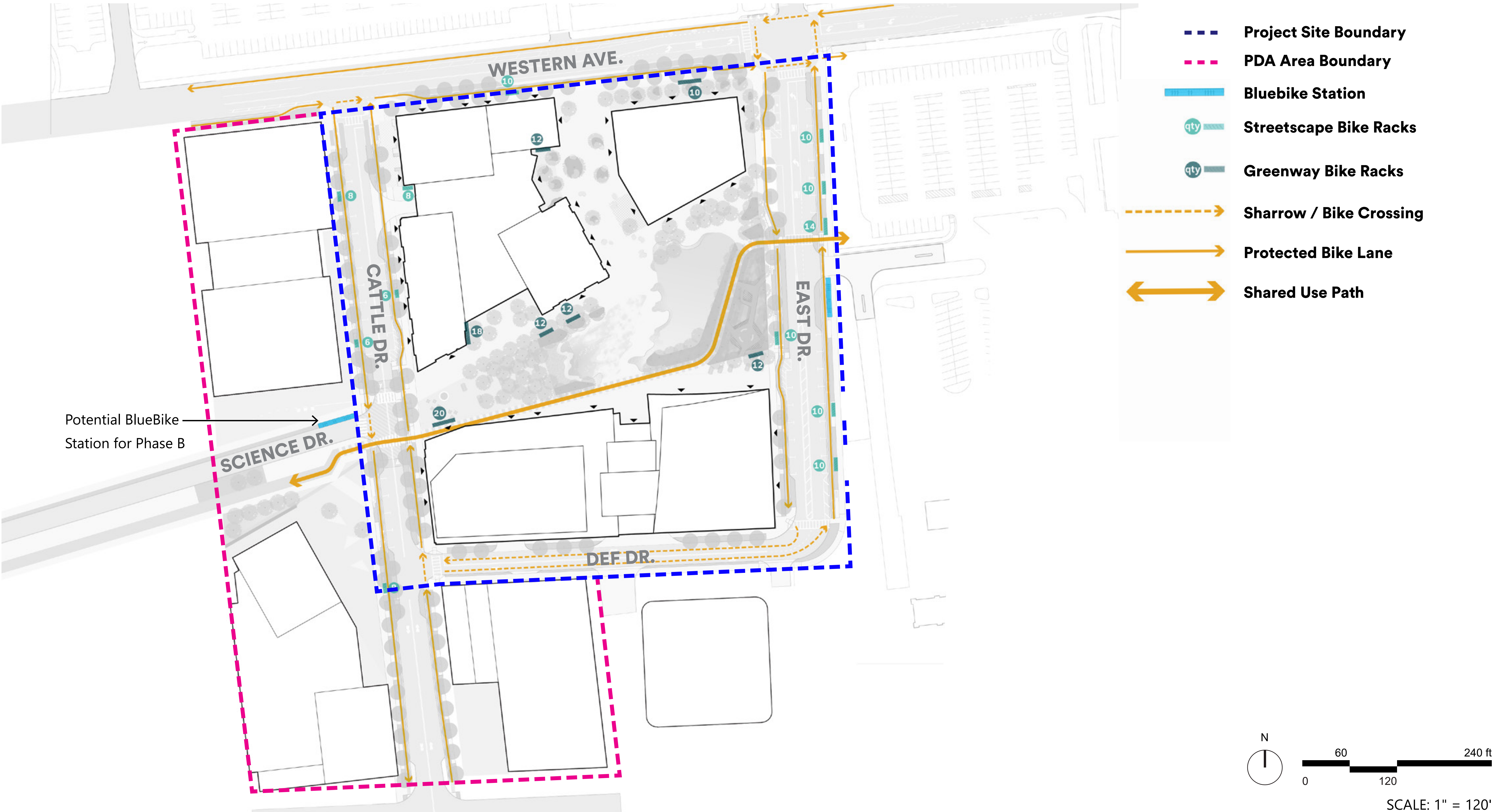


Figure 3.5

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

Base map aerial image: Nearmap Aerial (2020)

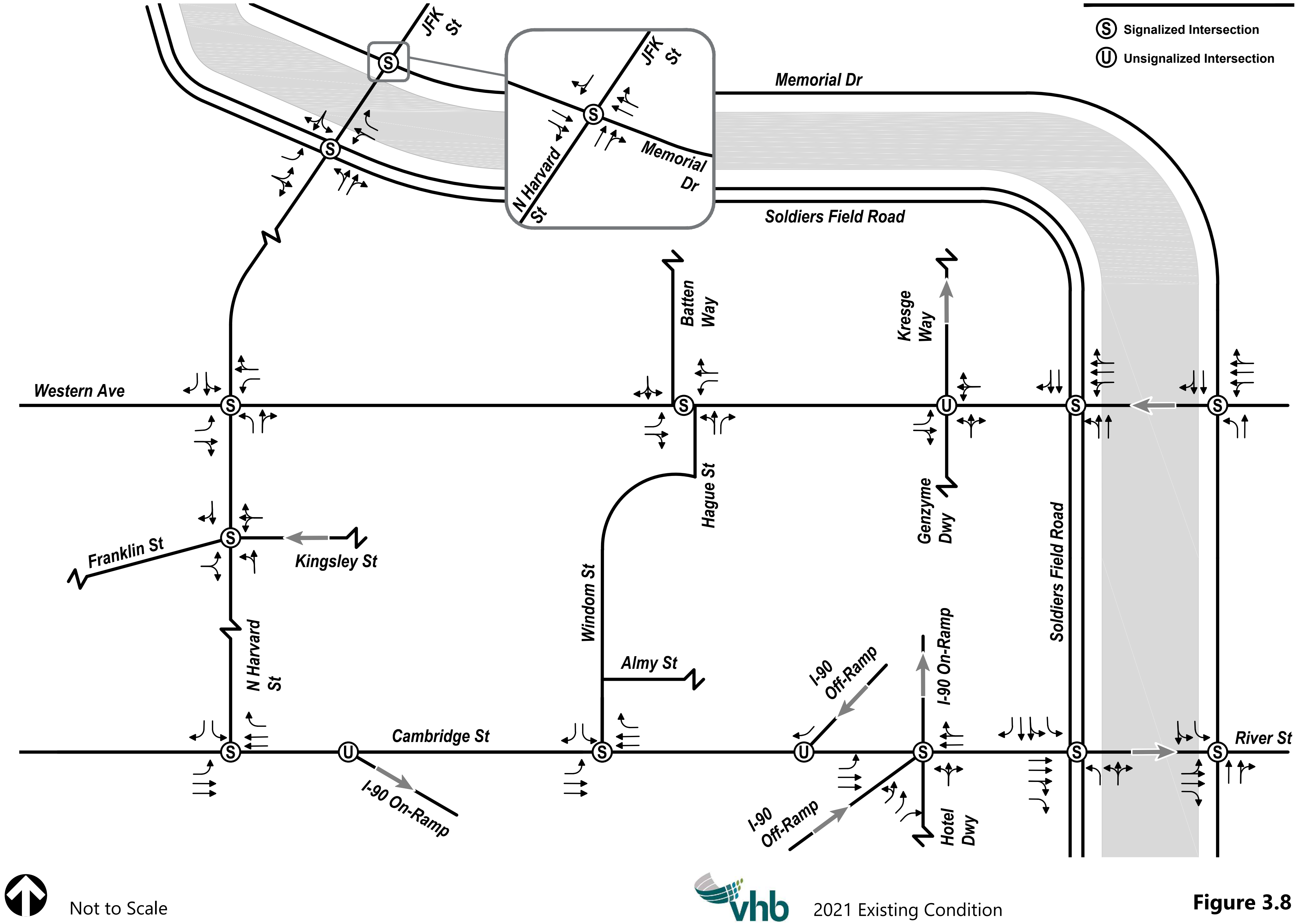
\# Existing and No-Build Intersection

\# ERC Intersection

Figure 3.7

Study Area Intersections

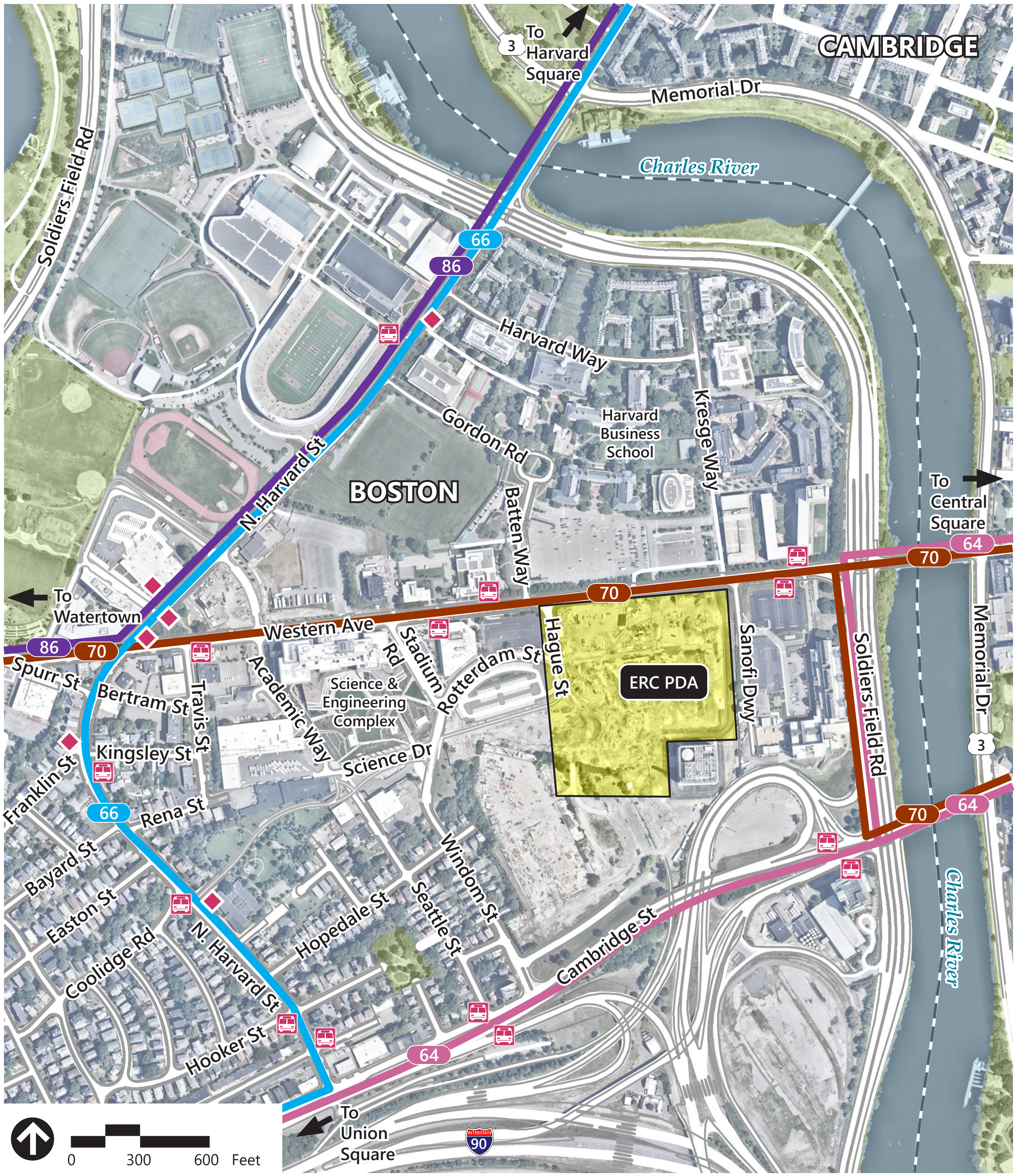
Enterprise Research Campus Project
Boston, MA



2021 Existing Condition
Roadway Geometry

Figure 3.8

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

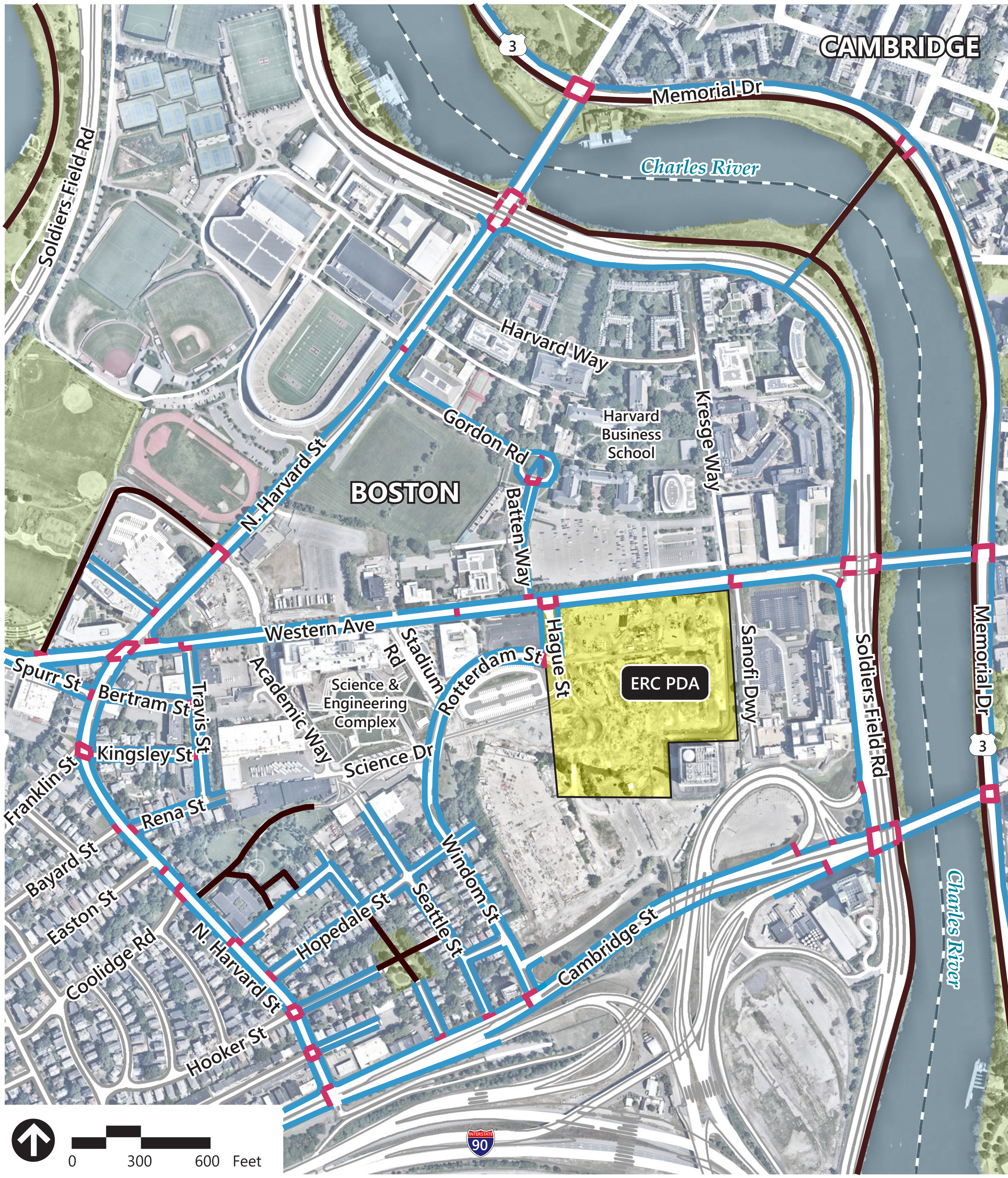
MBTA Bus Stop

MBTA Bus Shelter

Figure 3.9

Existing Public Transit Services and Stops

Enterprise Research Campus Project
Boston, MA

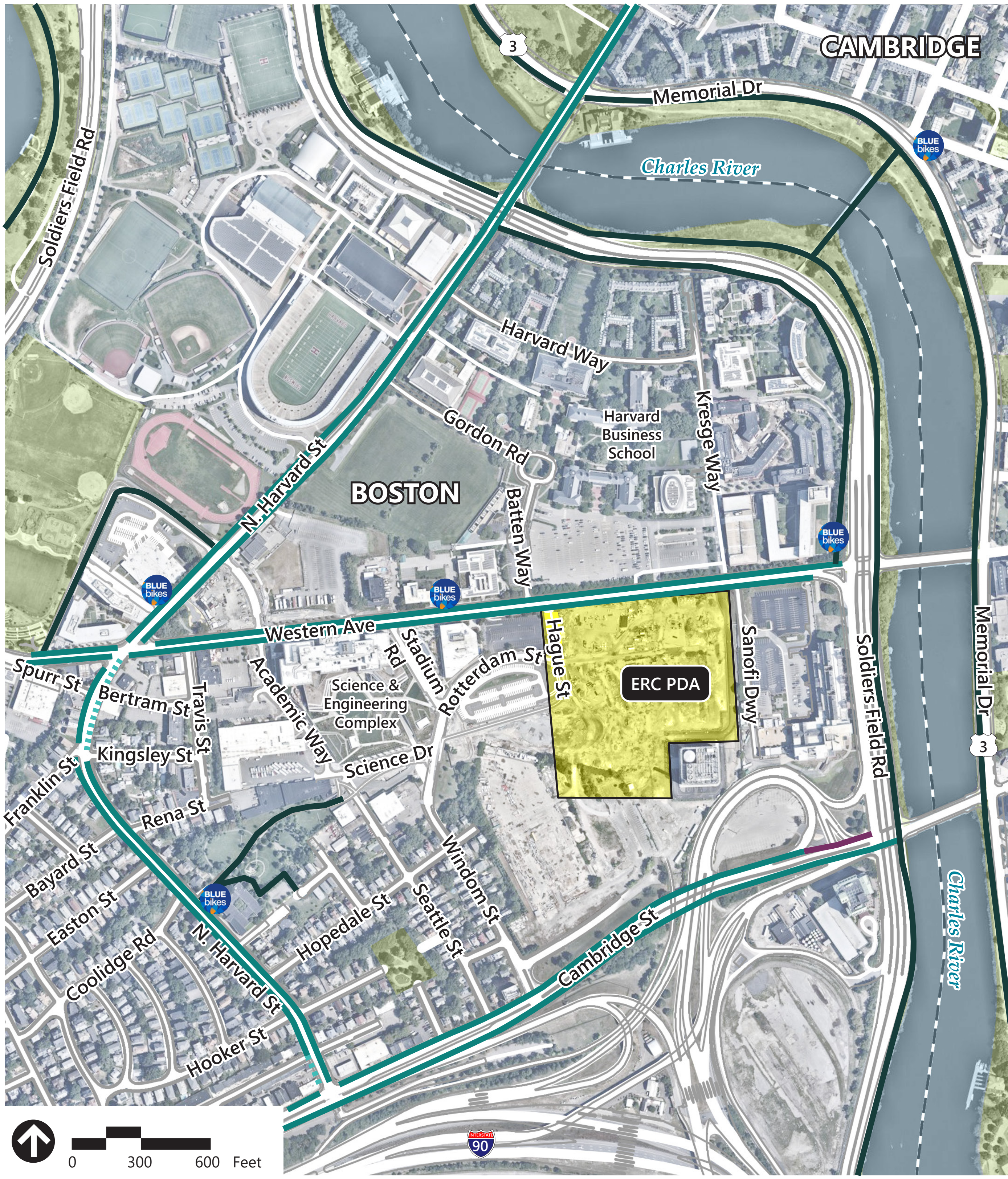


Base map aerial image: Nearmap Aerial (2020)

Crosswalk
Sidewalk
Multi-Use Path

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)

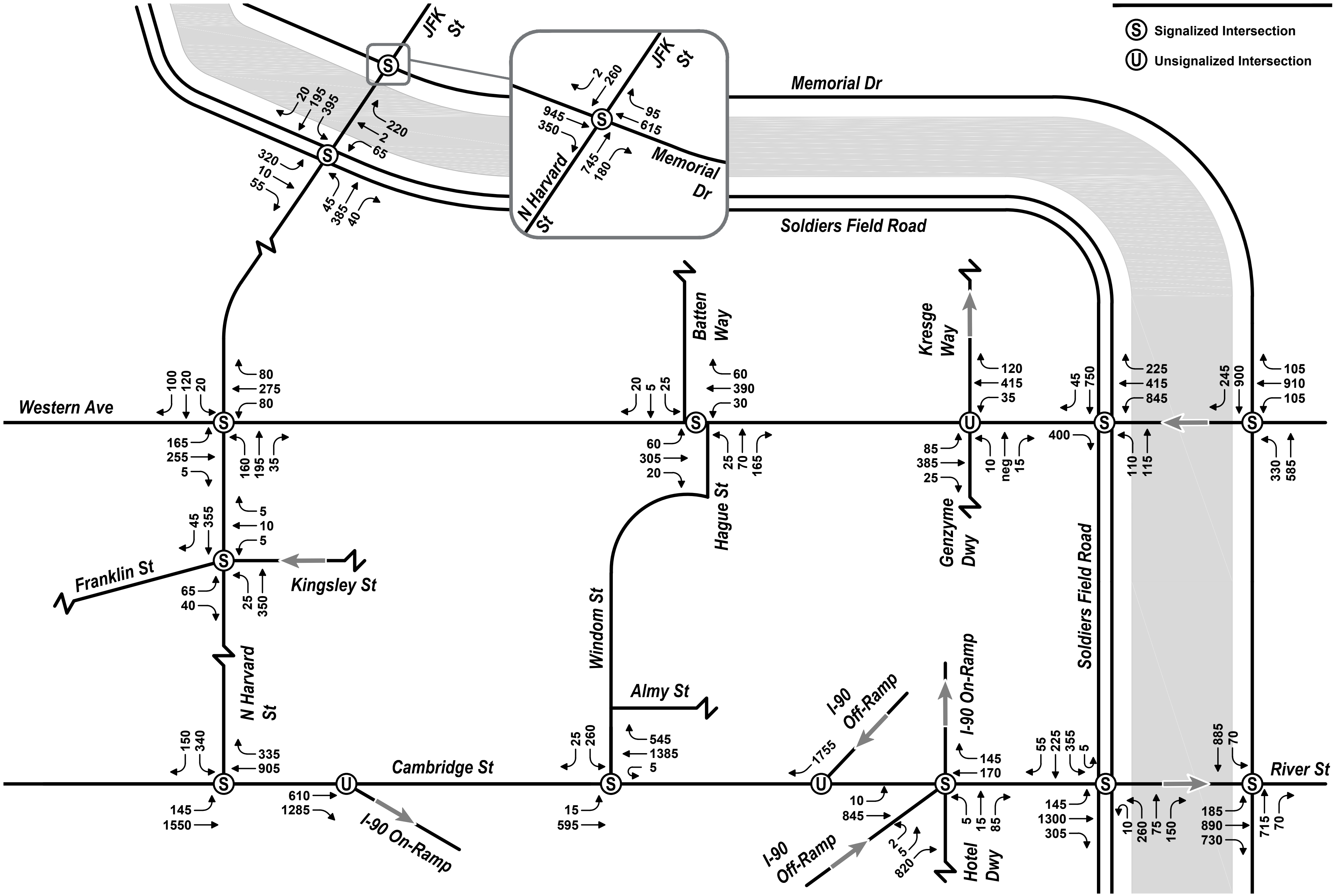
Bluebikes Station

Zipcar Location

Figure 3.12

Existing Bike Share and Car Share Locations

Enterprise Research Campus Project
Boston, MA

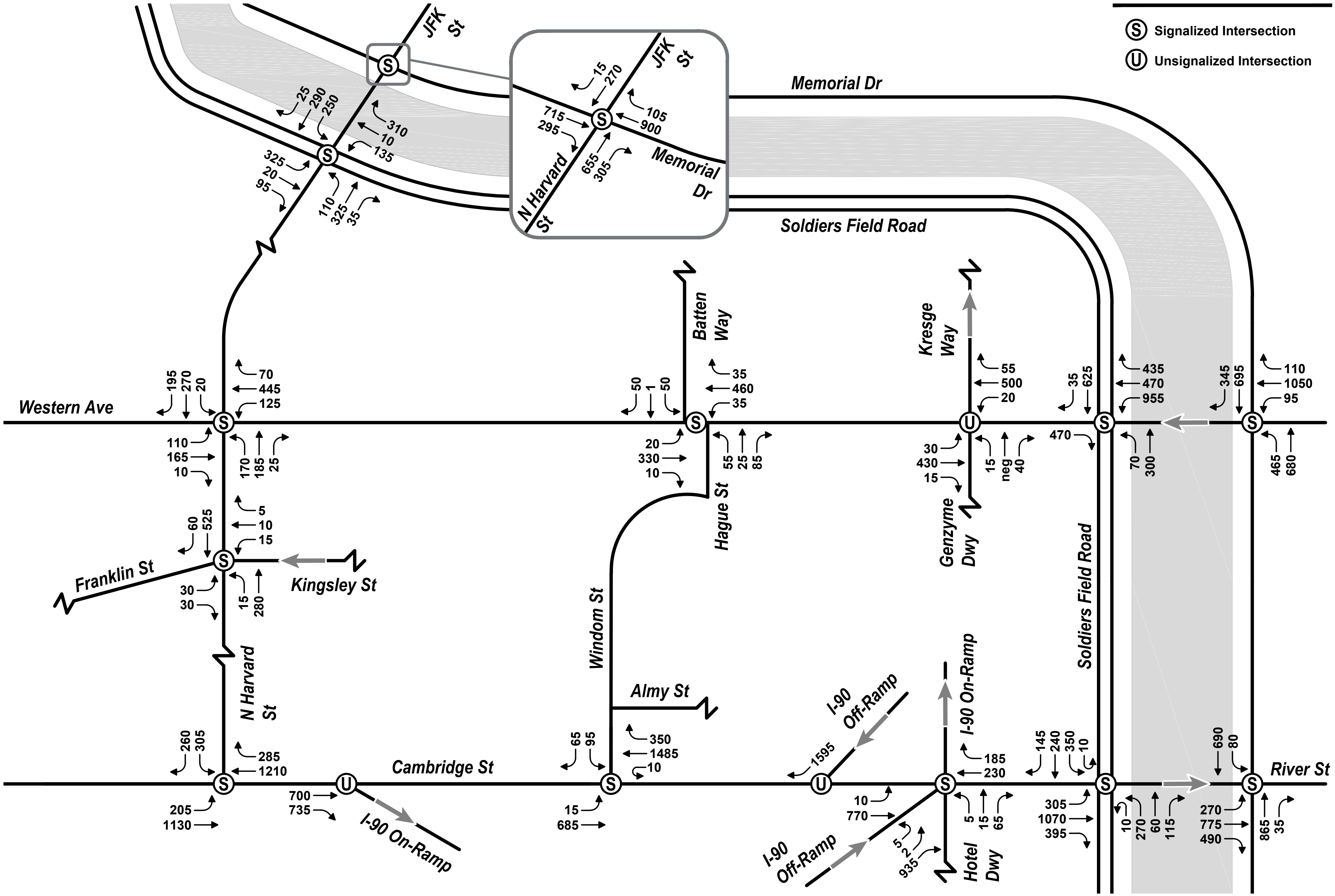


Not to Scale

2021 Existing Condition
Vehicle Volumes: Morning Peak Hour

Figure 3.13

Enterprise Research Campus Project
Boston, MA

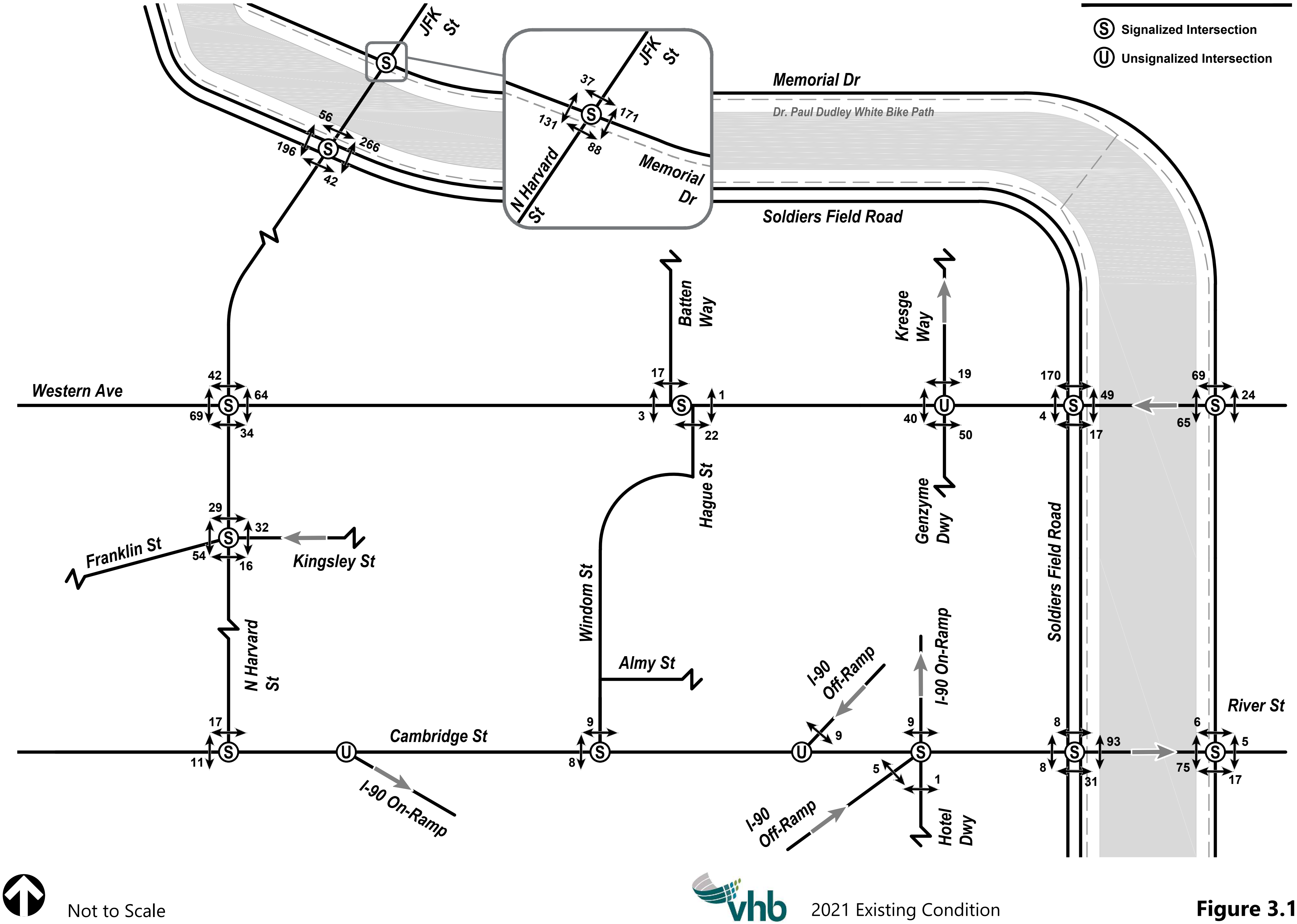


Not to Scale

2021 Existing Condition
Vehicle Volumes: Evening Peak Hour

Figure 3.14

Enterprise Research Campus Project
Boston, MA

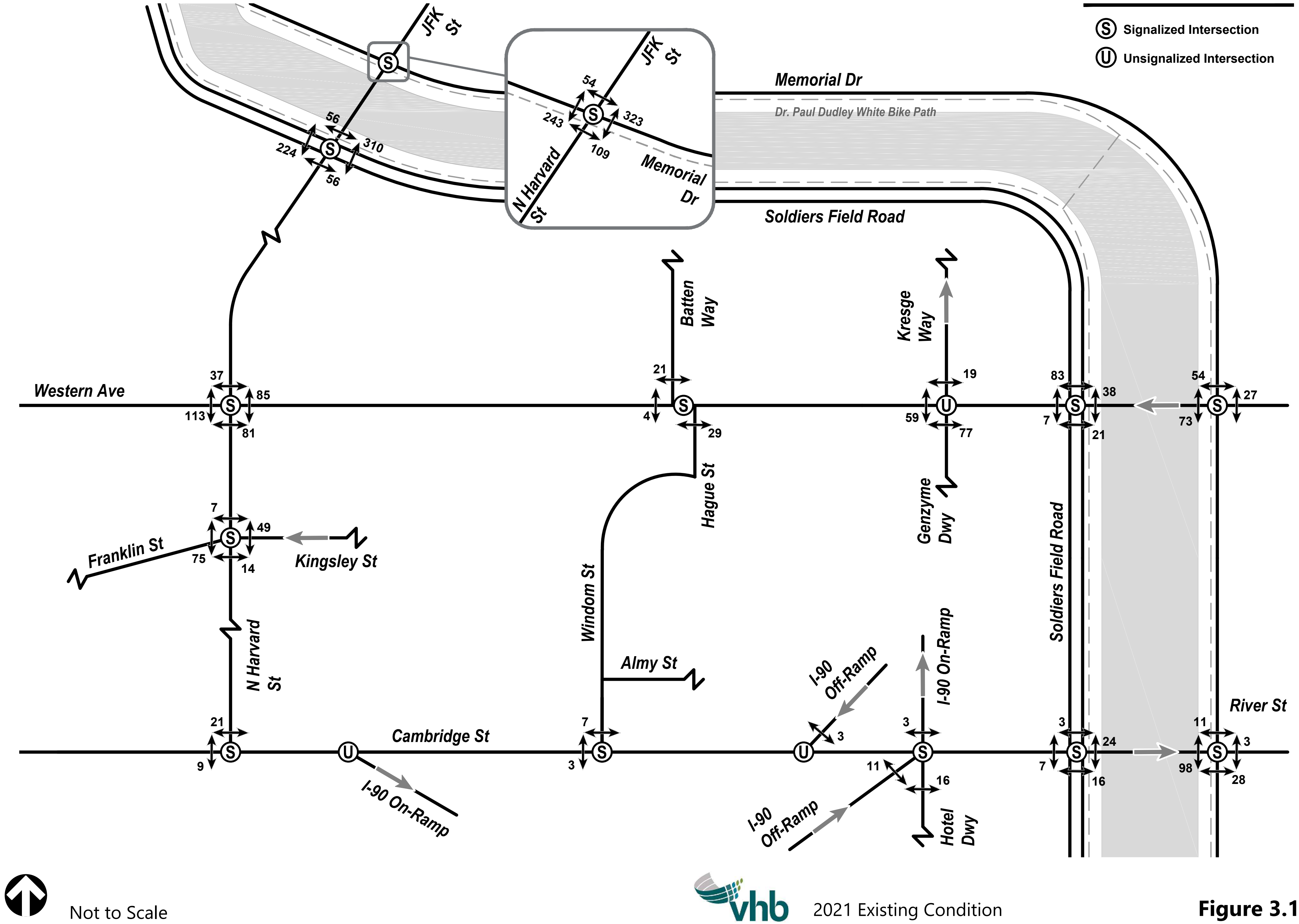


Not to Scale

2021 Existing Condition
Pedestrian Volumes: Morning Peak Hour

Figure 3.15

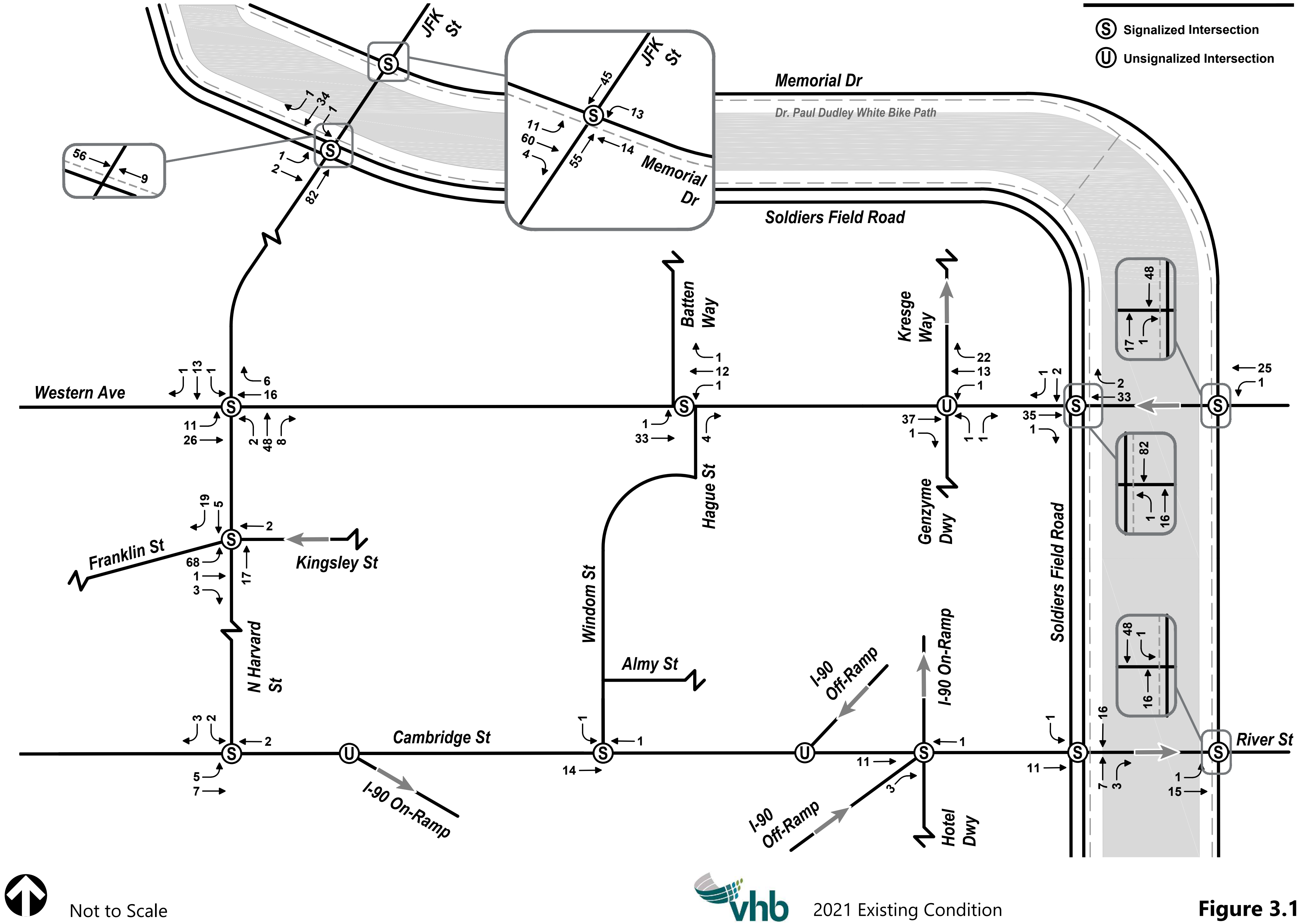
Enterprise Research Campus Project
Boston, MA



2021 Existing Condition
Pedestrian Volumes: Evening Peak Hour

Enterprise Research Campus Project
Boston, MA

Figure 3.16

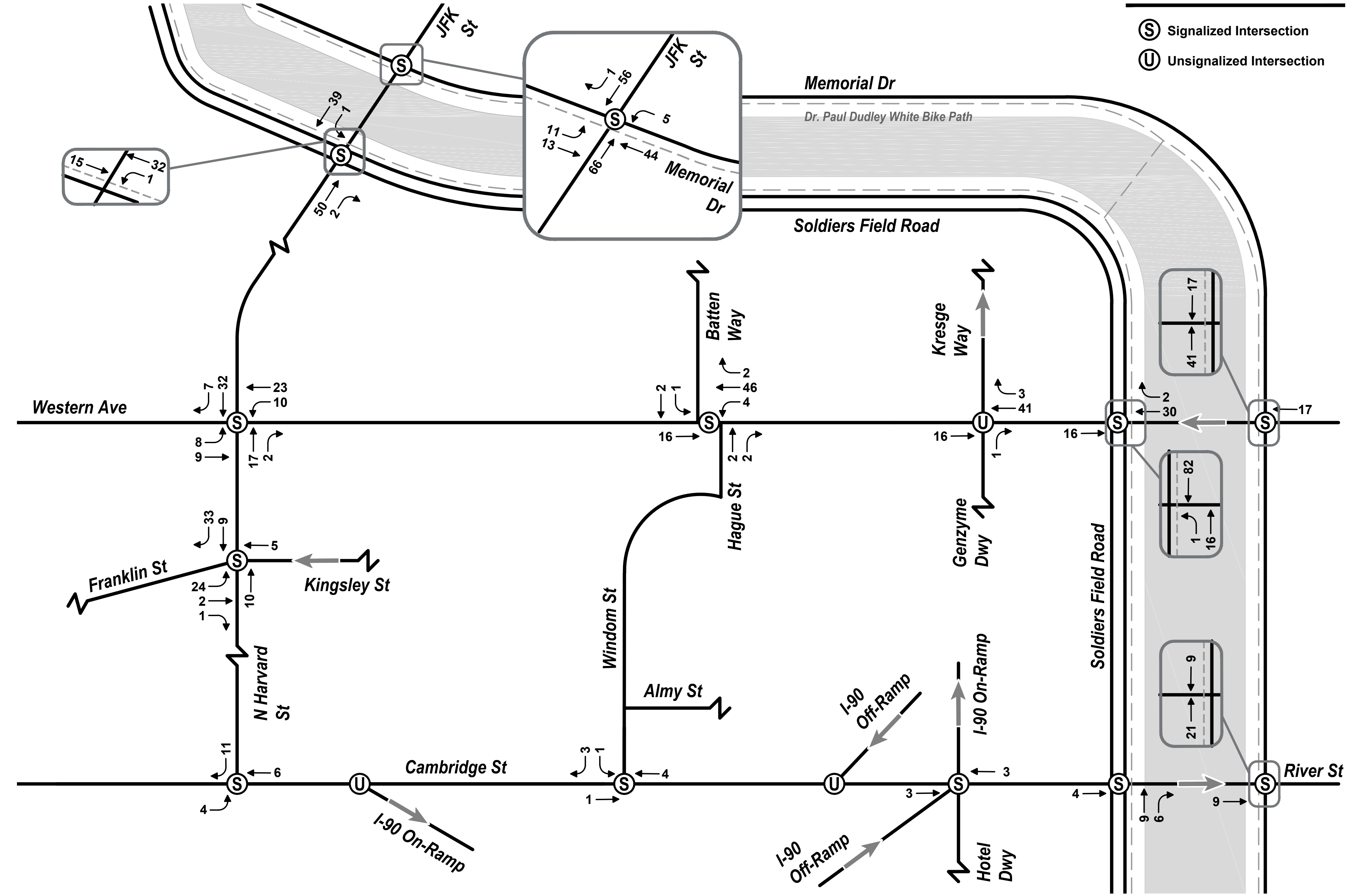


2021 Existing Condition
Bicycle Volumes: Morning Peak Hour

Figure 3.17

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Networks_Updated_05-27-2021.dwg

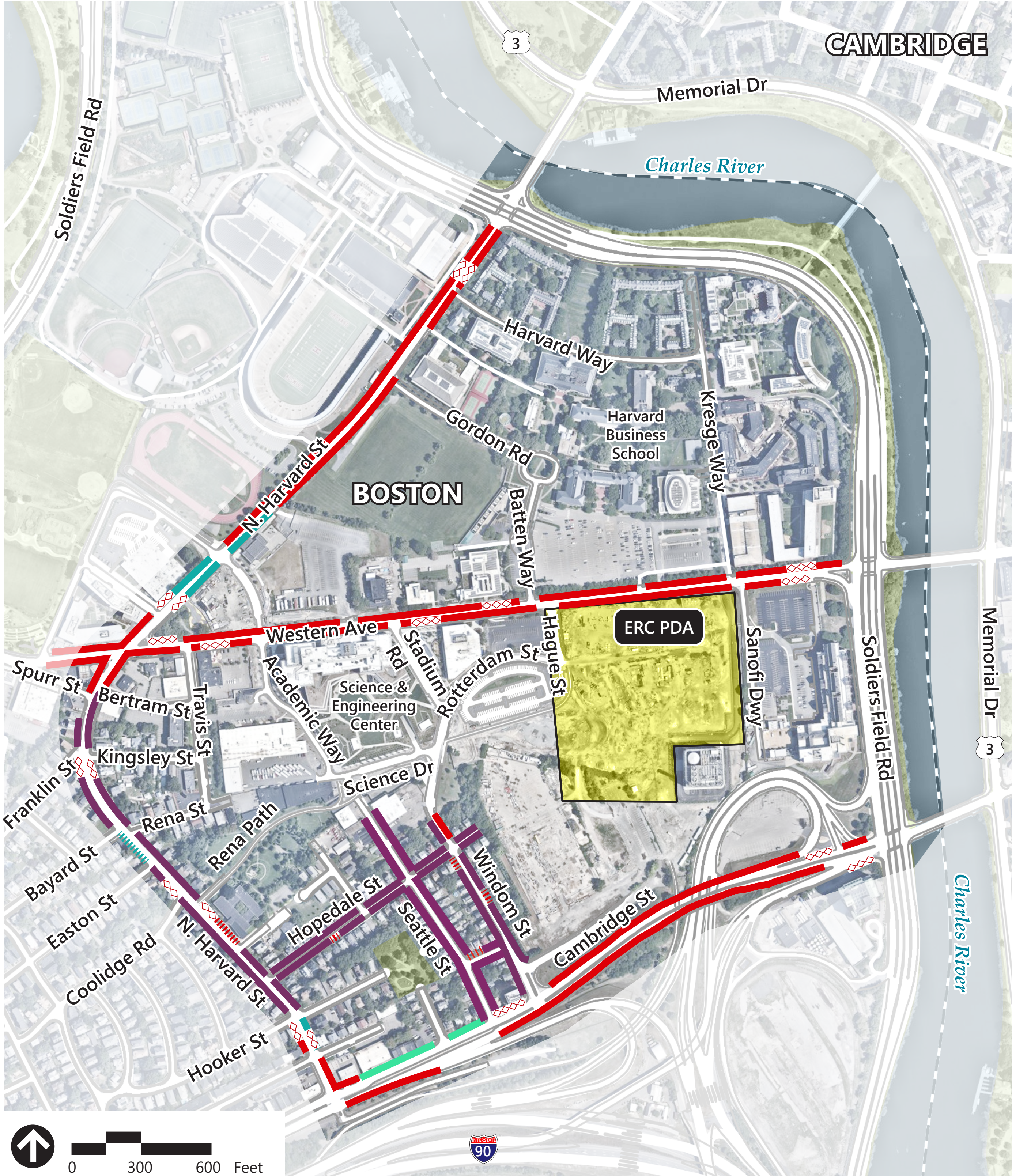


Not to Scale

2021 Existing Condition
BIcycle Volumes: Evening Peak Hour

Enterprise Research Campus Project
Boston, MA

Figure 3.18



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

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Transportation Figures_AD.indd p1 07/19/21

Image Source: Google Earth Pro Aerial

IMP Projects

Non-IMP Projects

Figure 3.20

Other Area Development Projects

Enterprise Research Campus Project
Boston, MA

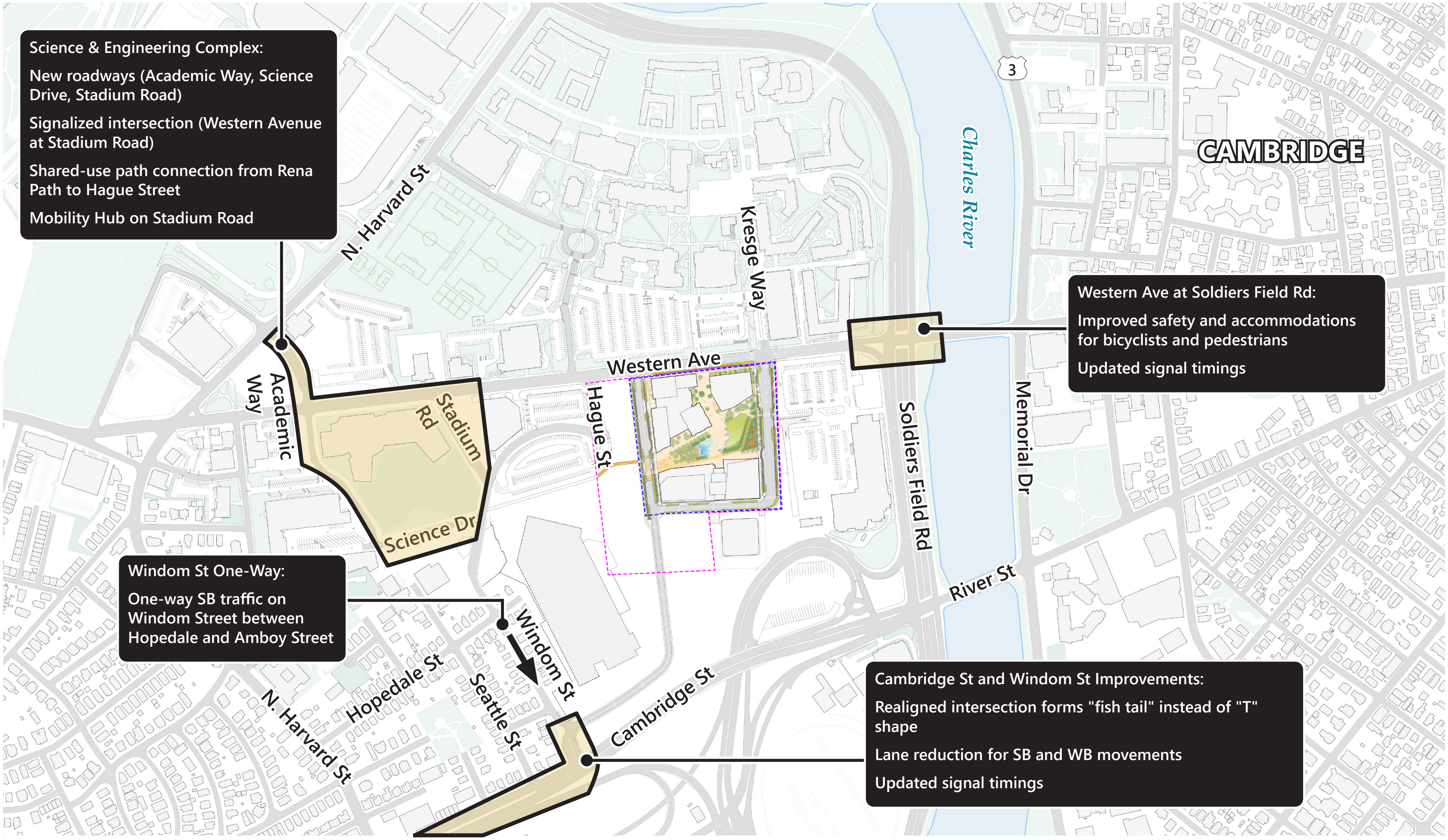
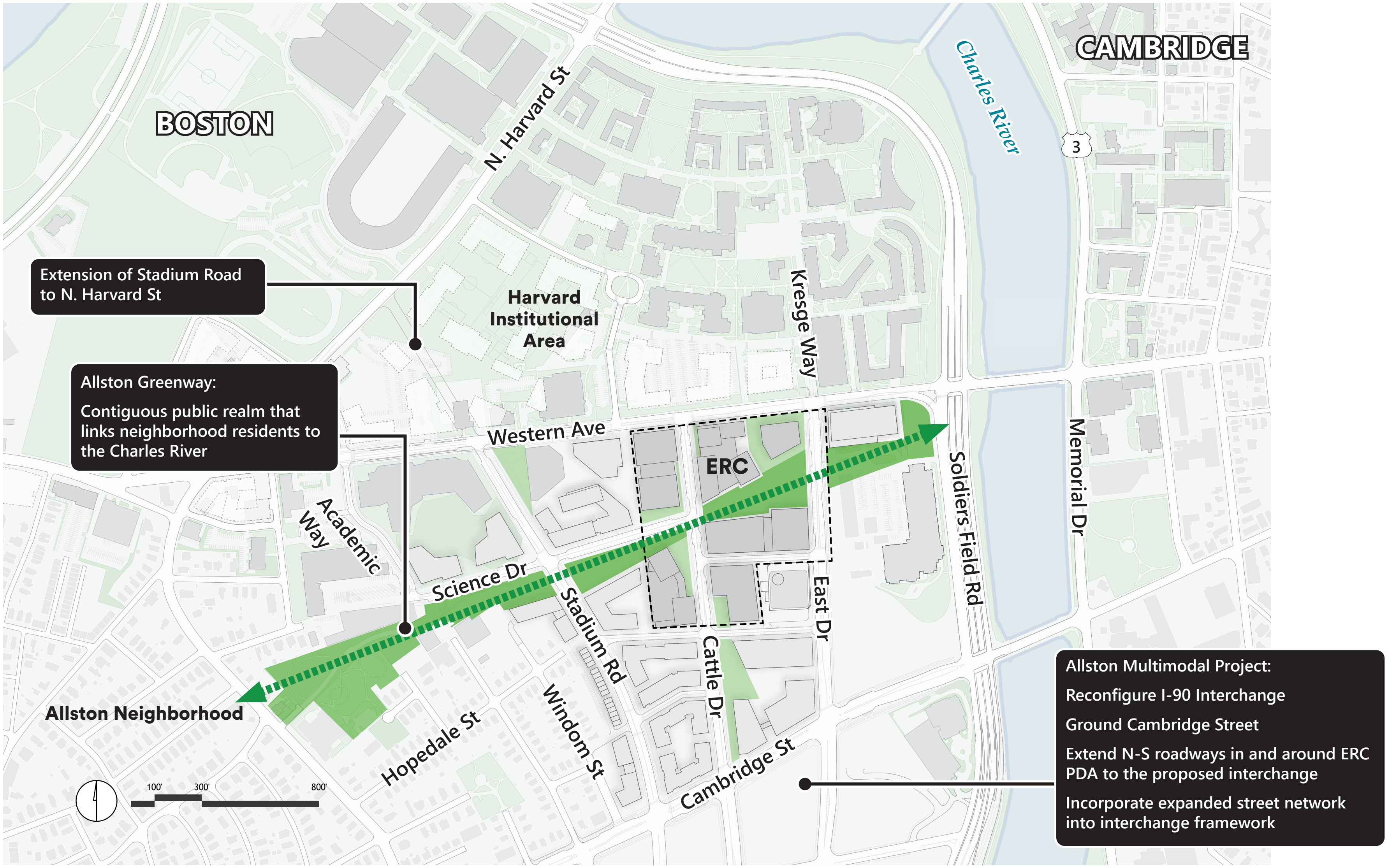


Figure 3.21

Implemented/Planned Infrastructure: 2025

Enterprise Research Campus Project
Boston, MA

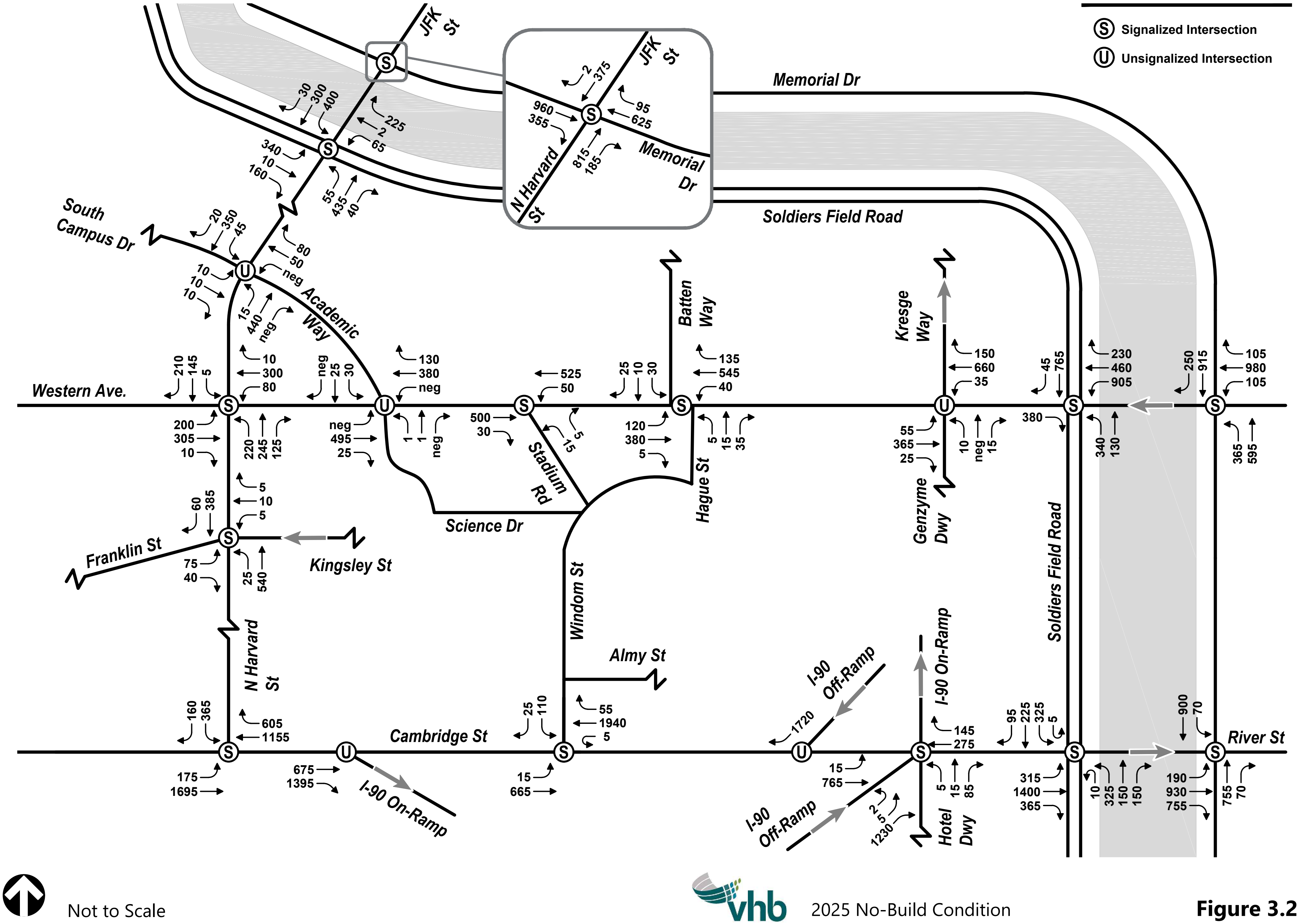


Note: Subject to change. For illustrative purposes only.

Figure 3.22

Future Potential Roadway Connections - Transportation Context

Enterprise Research Campus Project
Boston, MA



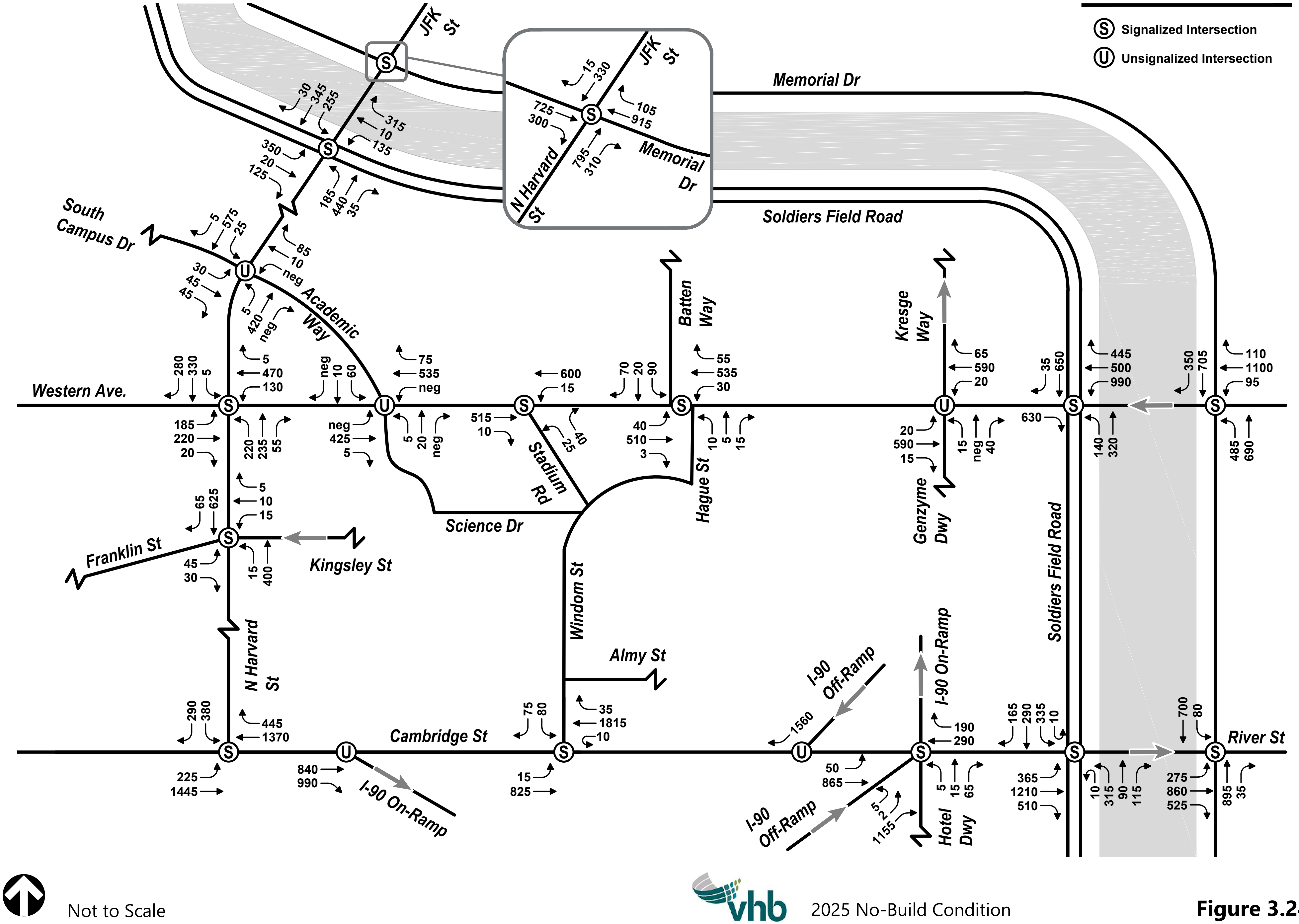
Not to Scale

2025 No-Build Condition
Vehicle Volumes: Morning Peak Hour

Figure 3.23

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Networks_Updated_05-27-2021.dwg

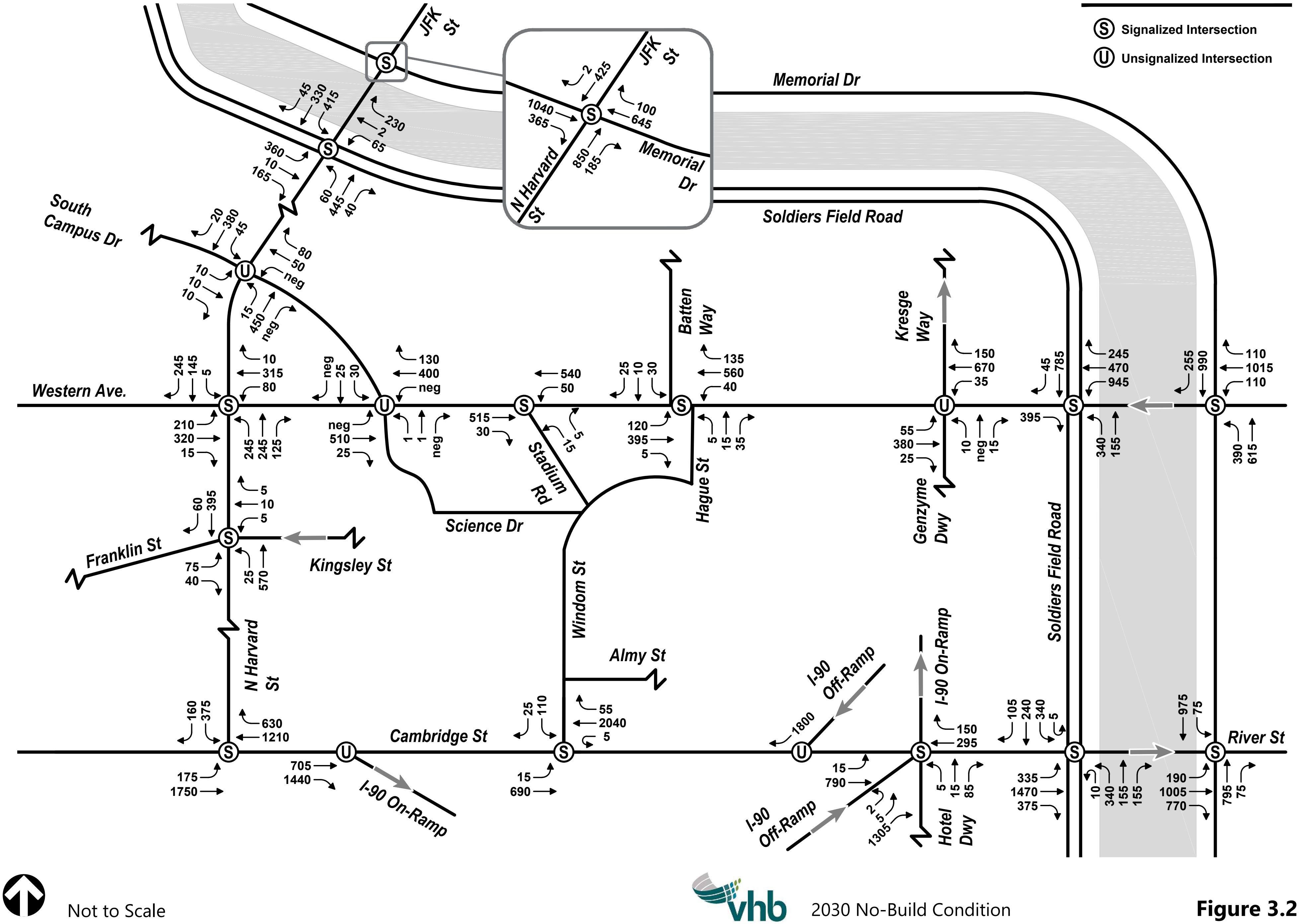


Not to Scale

2025 No-Build Condition
Vehicle Volumes: Evening Peak Hour

Figure 3.24

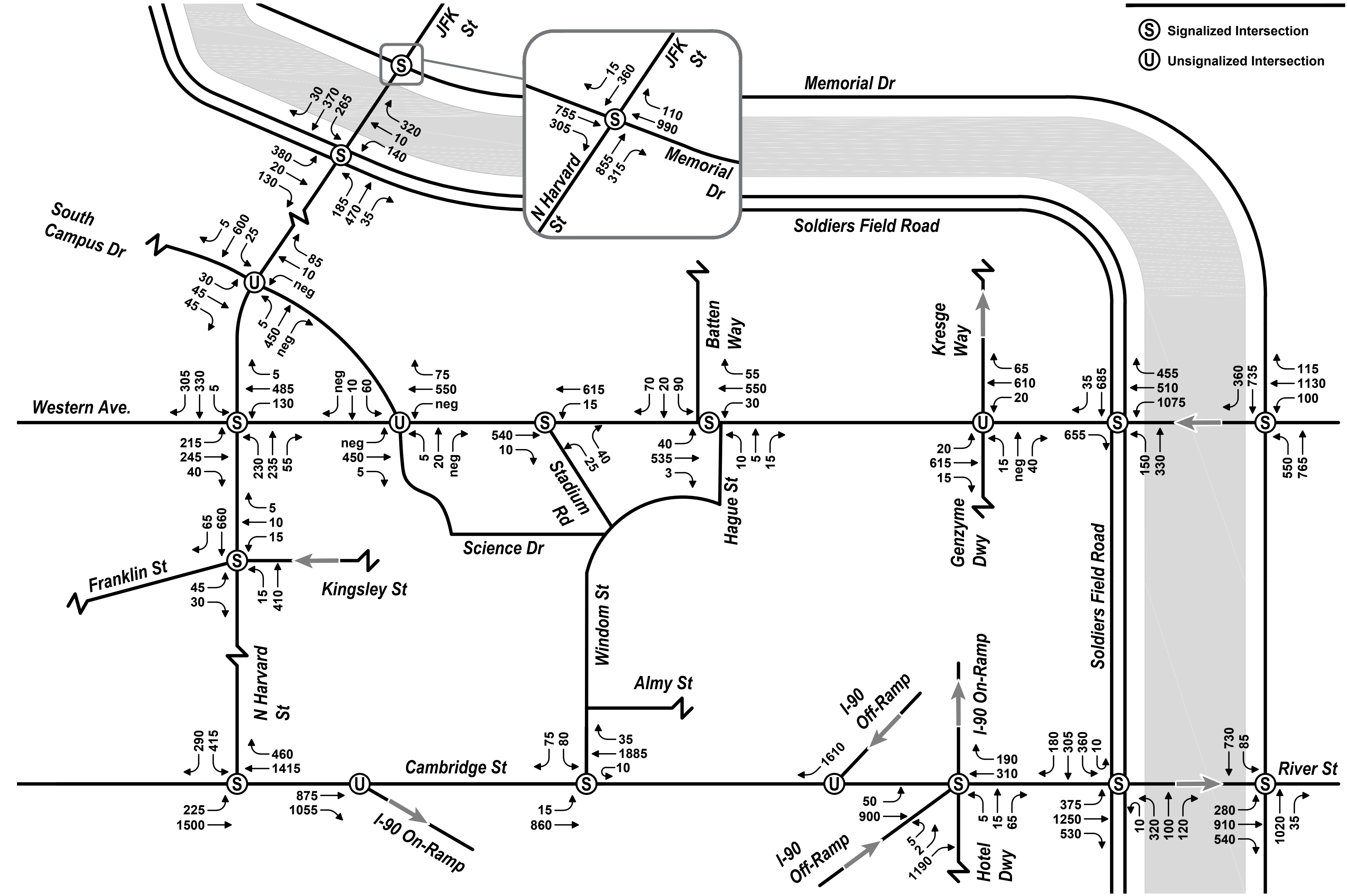
Enterprise Research Campus Project
Boston, MA



2030 No-Build Condition
Vehicle Volumes: Morning Peak Hour

Enterprise Research Campus Project
Boston, MA

Figure 3.25



Not to Scale

2030 No-Build Condition
Vehicle Volumes: Evening Peak Hour

Figure 3.26

Enterprise Research Campus Project
Boston, MA

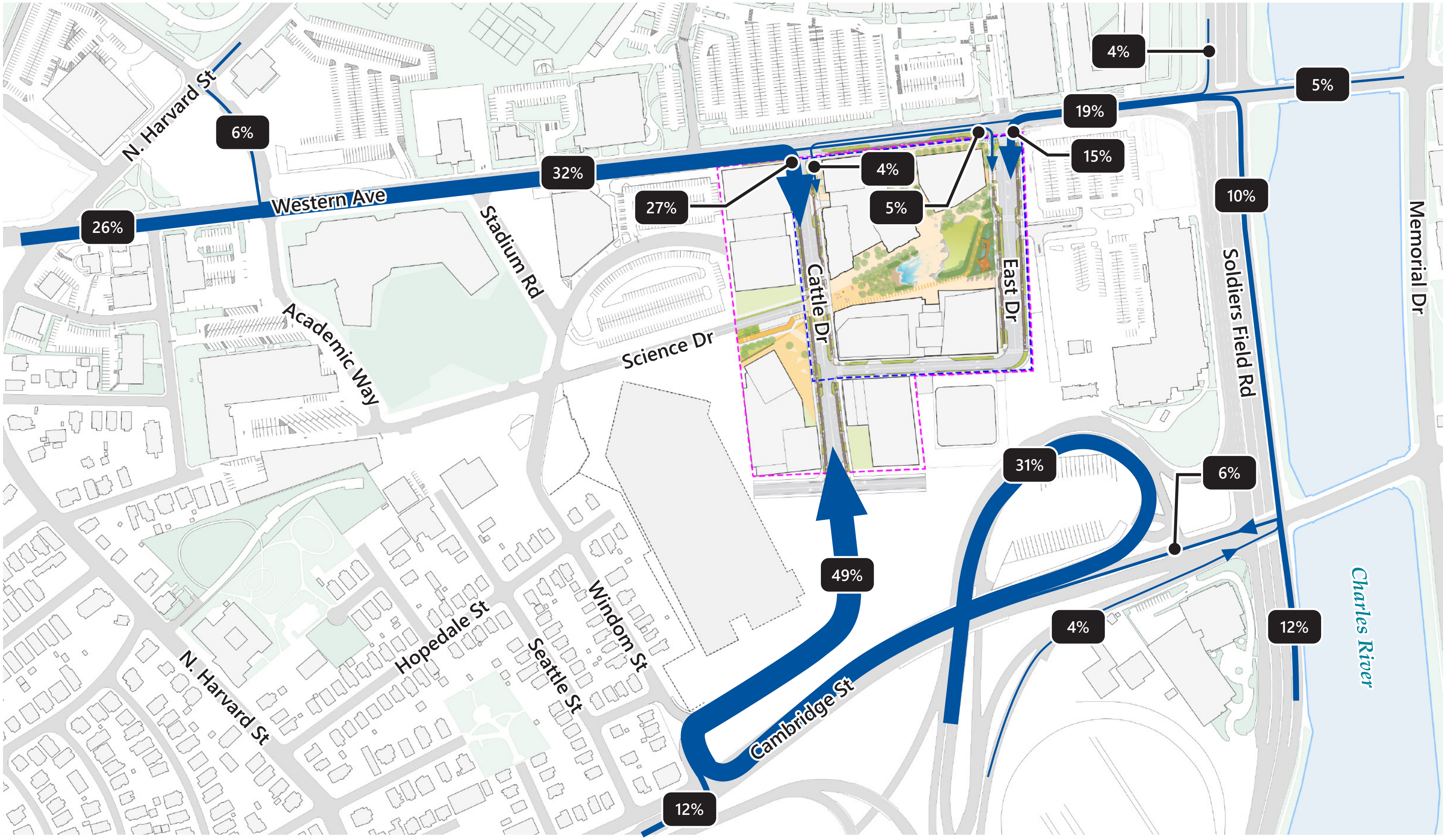


Figure 3.27a

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

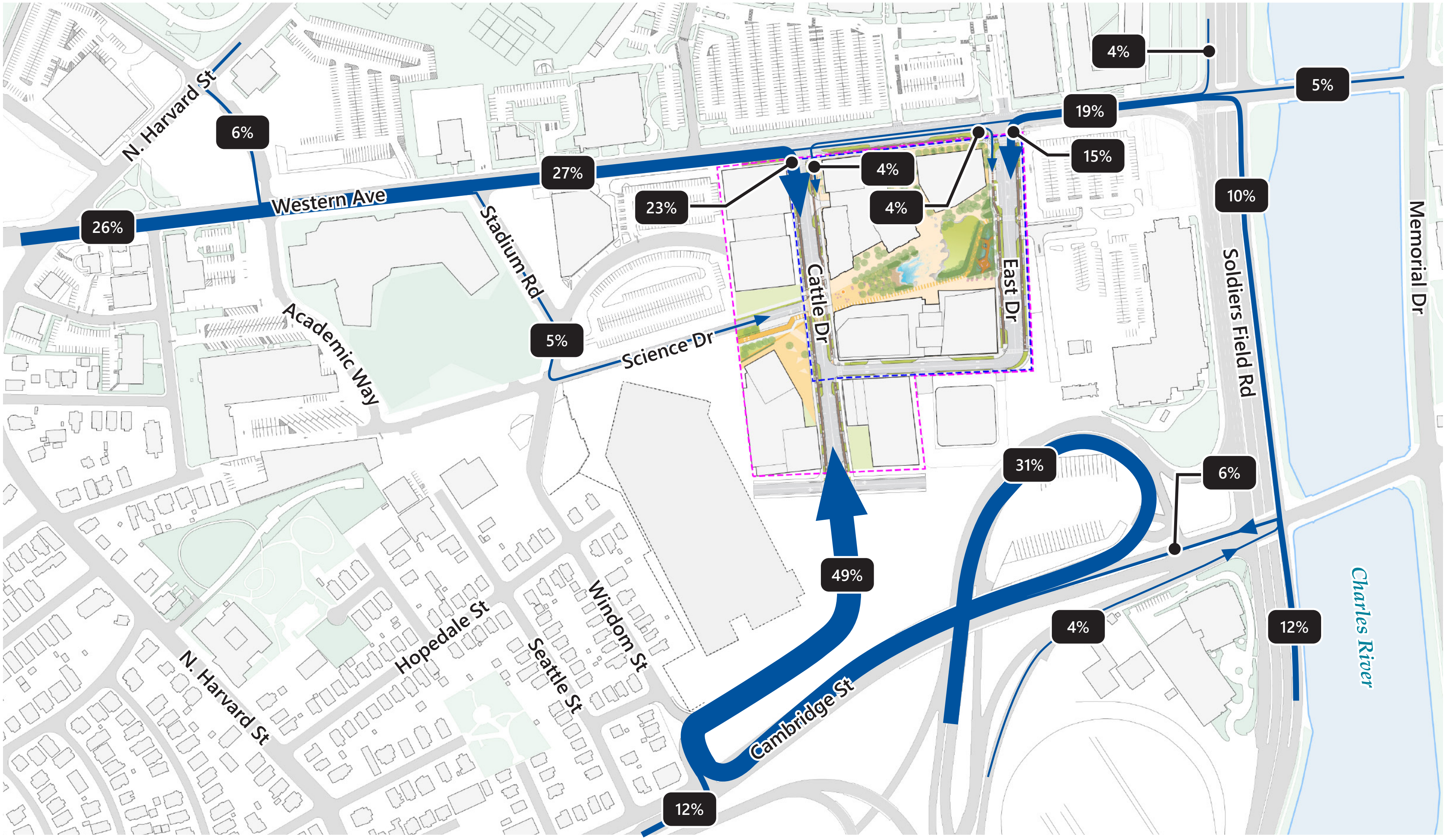


Figure 3.27c

Vehicle Trip Distribution (2030)
Morning Peak Hour - Entering

Enterprise Research Campus Project
Boston, MA

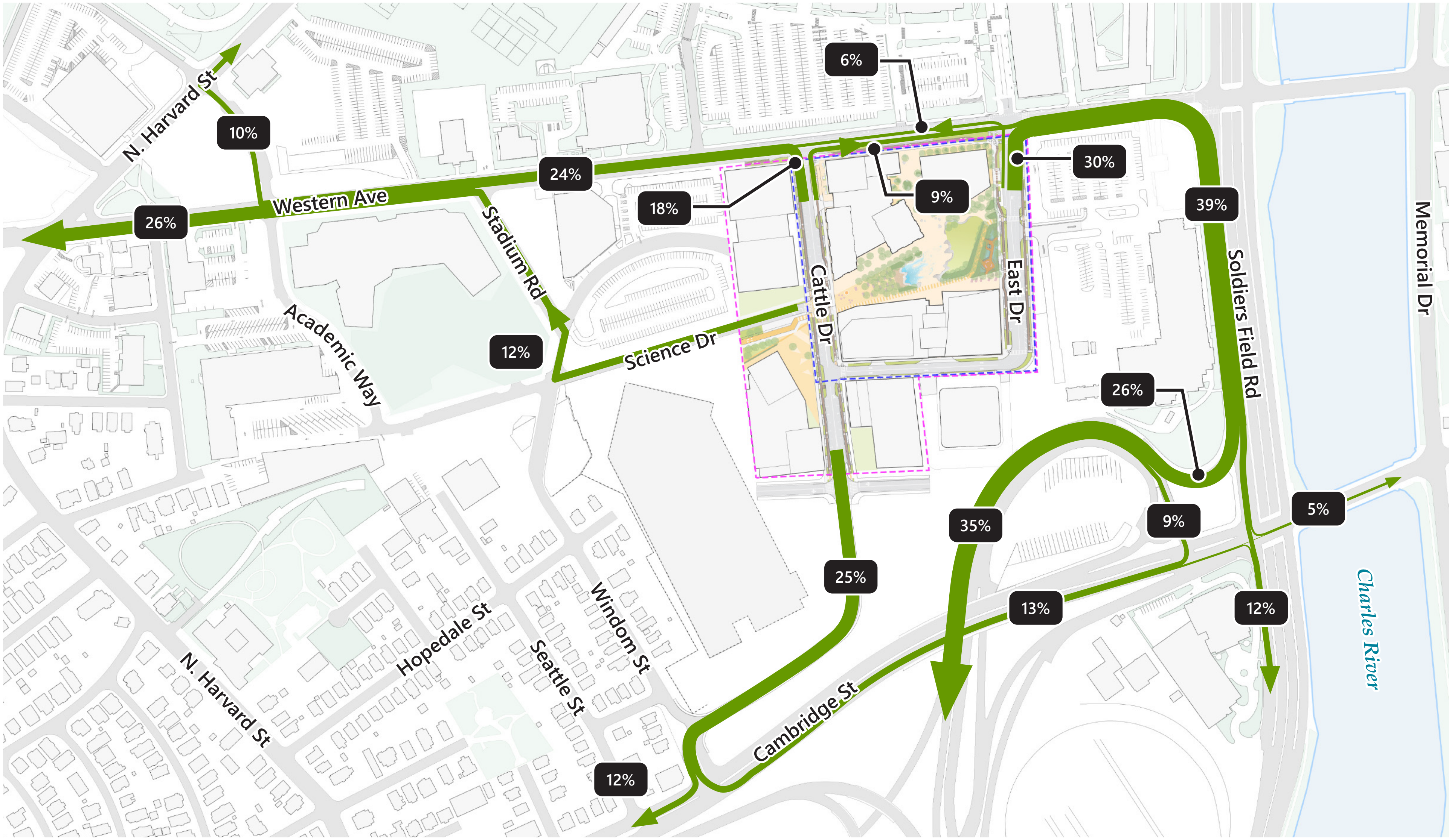
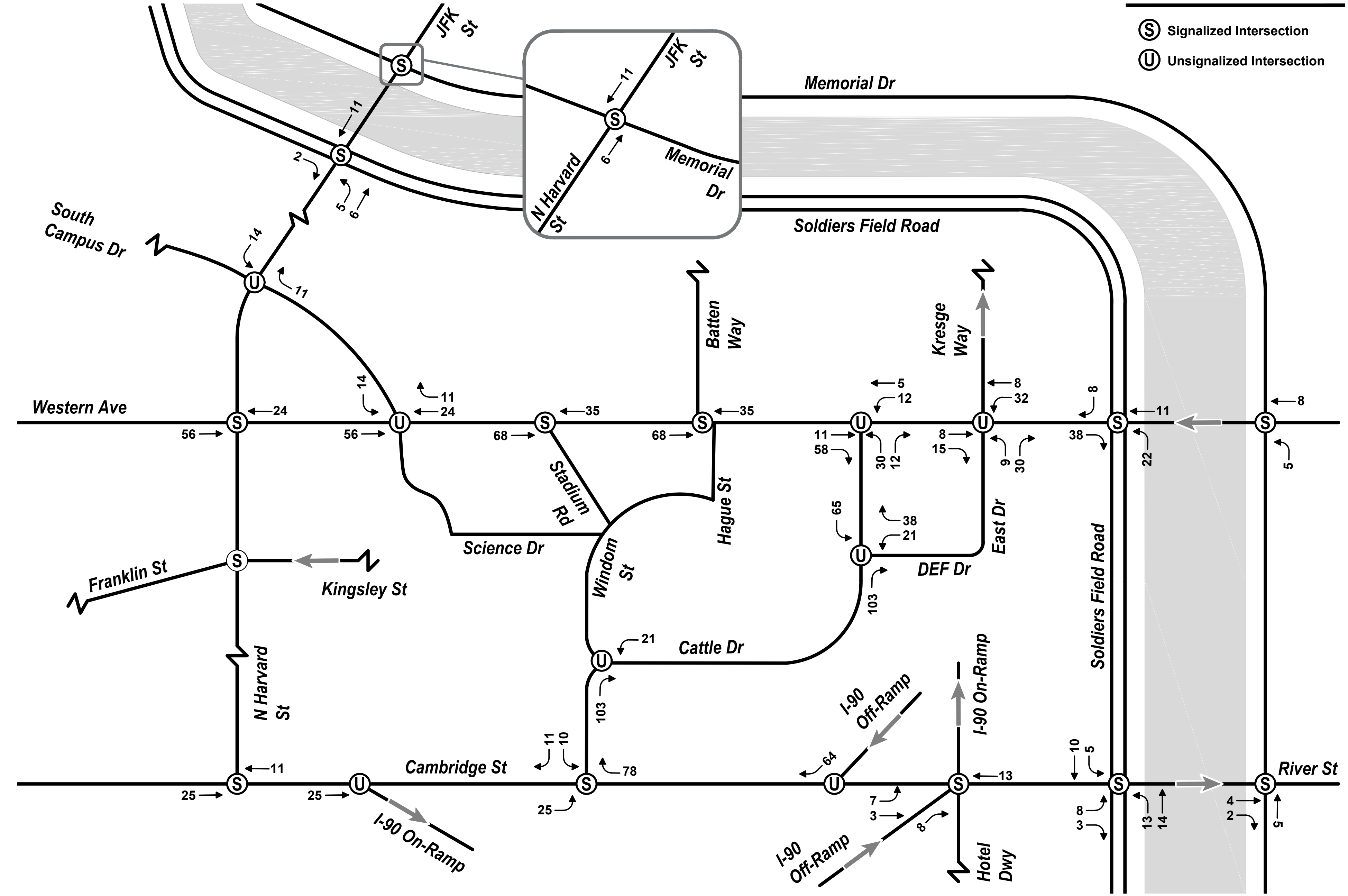


Figure 3.27d

Vehicle Trip Distribution (2030)
Evening Peak Hour - Exiting

Enterprise Research Campus Project
Boston, MA

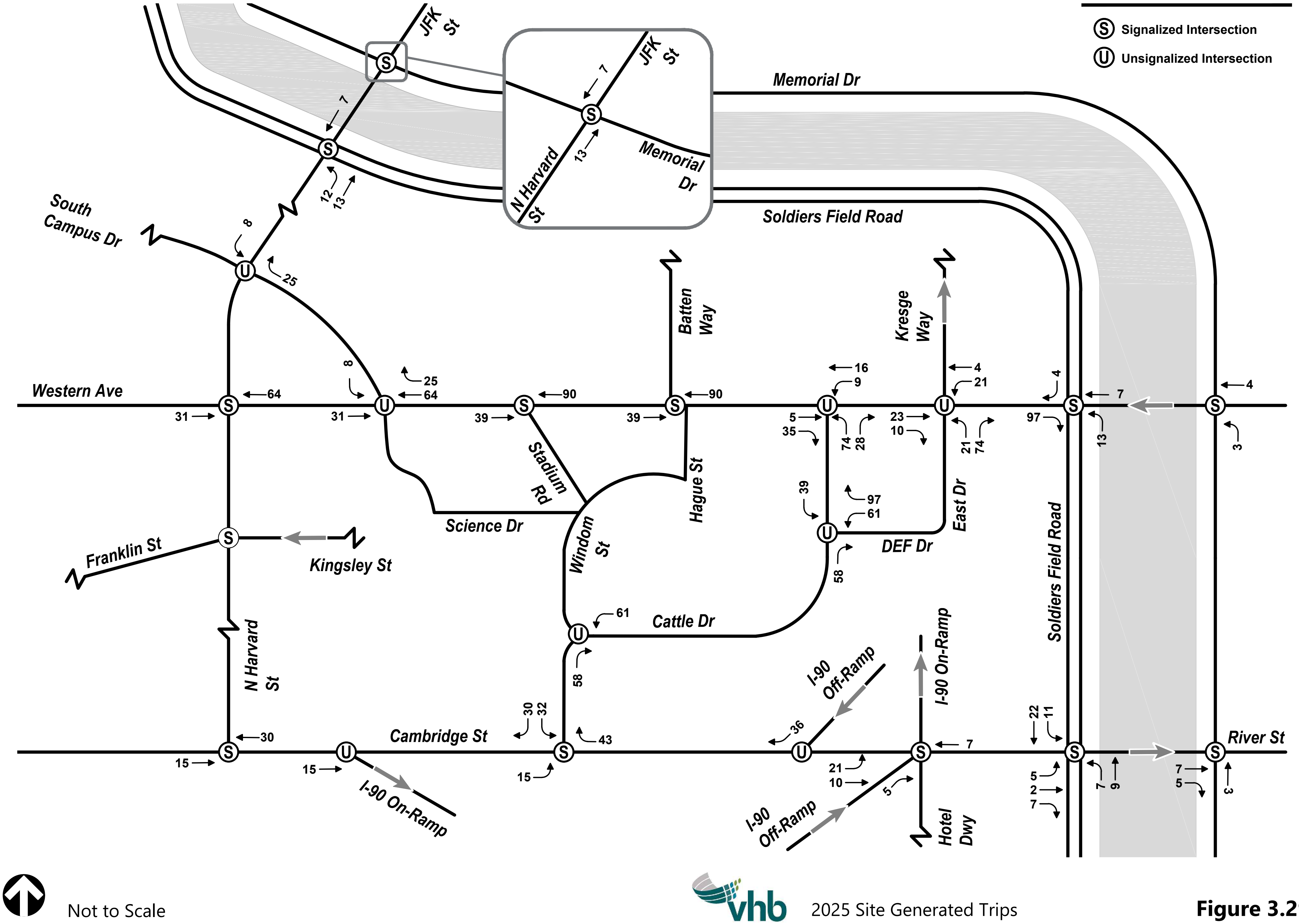


Not to Scale

2025 Site Generated Trips
Vehicle Volumes: Morning Peak Hour

Enterprise Research Campus Project
Boston, MA

Figure 3.28

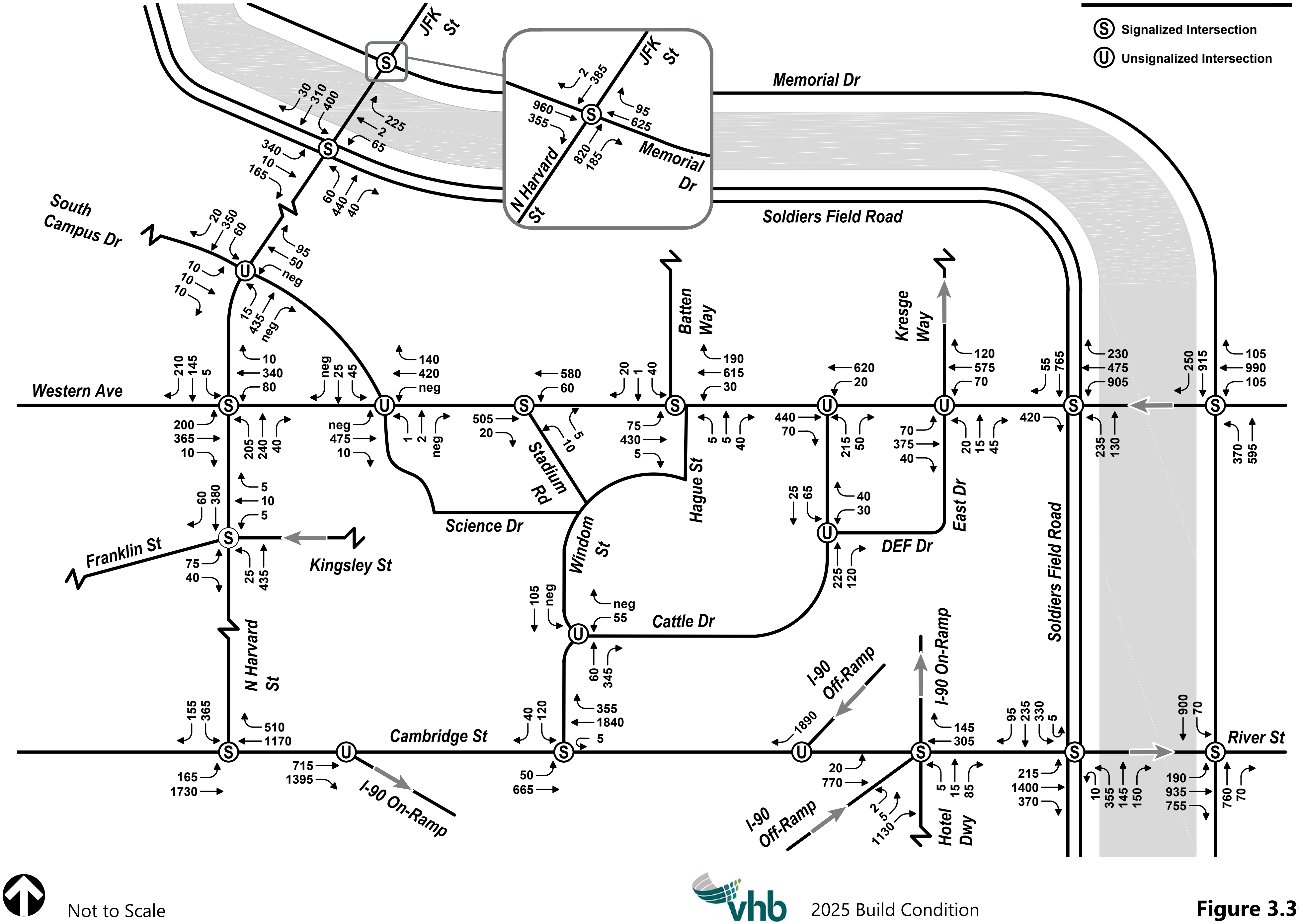


Not to Scale

2025 Site Generated Trips
Vehicle Volumes: Evening Peak Hour

Figure 3.29

Enterprise Research Campus Project
Boston, MA

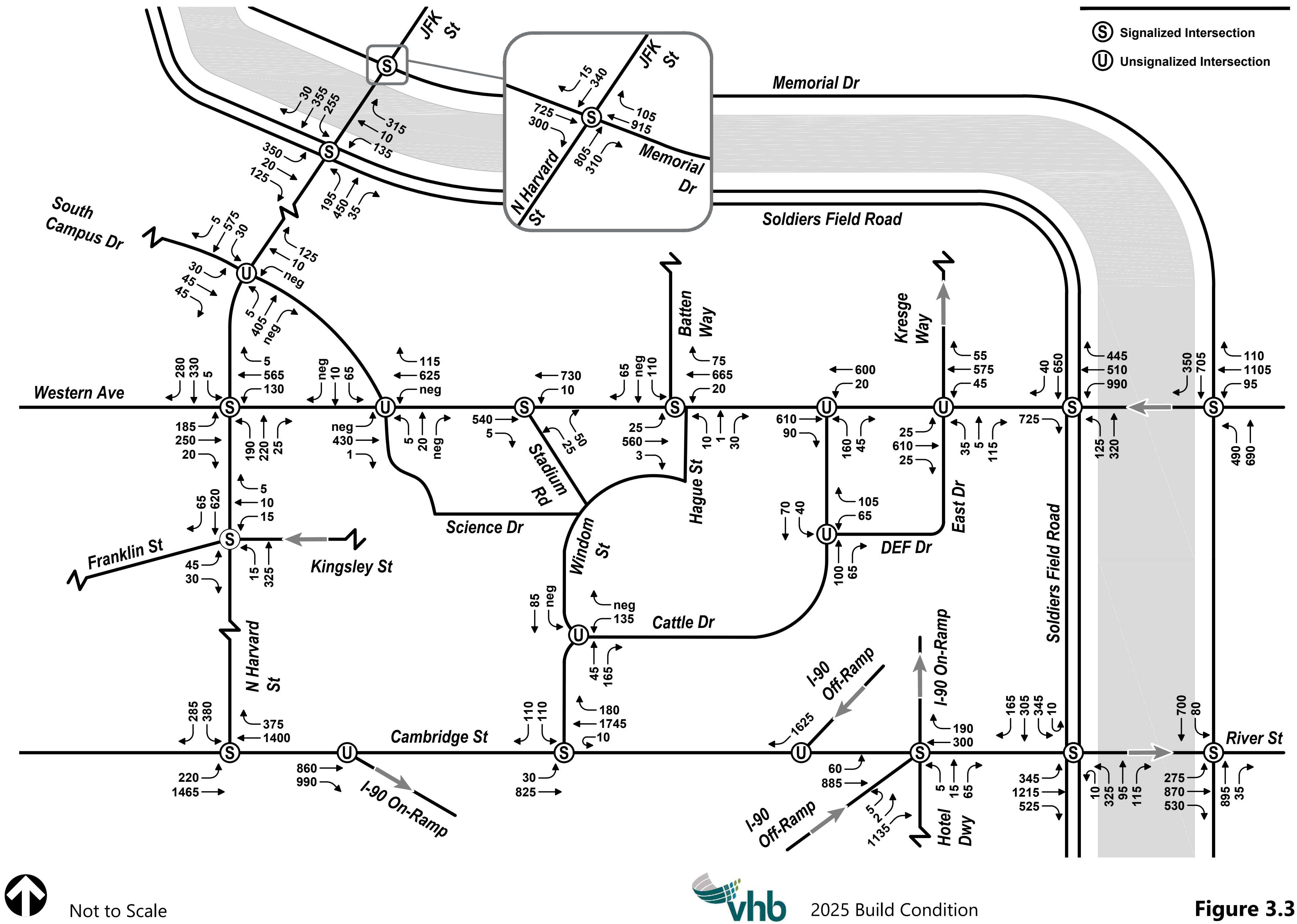


2025 Build Condition
Vehicle Volumes: Morning Peak Hour

Figure 3.30

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Networks_Updated_05-27-2021.dwg

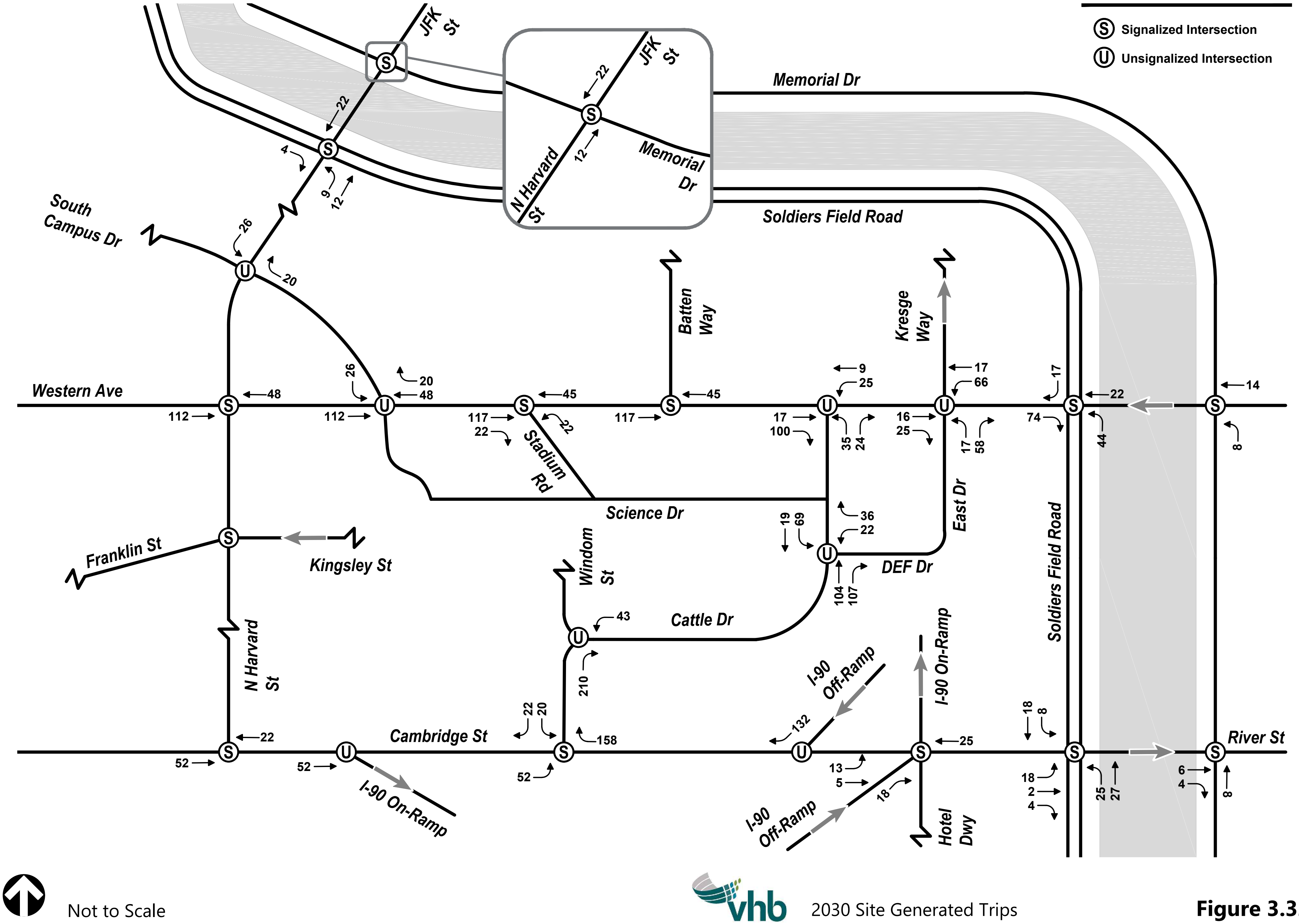


Not to Scale

2025 Build Condition
Vehicle Volumes: Evening Peak Hour

Figure 3.31

Enterprise Research Campus Project
Boston, MA

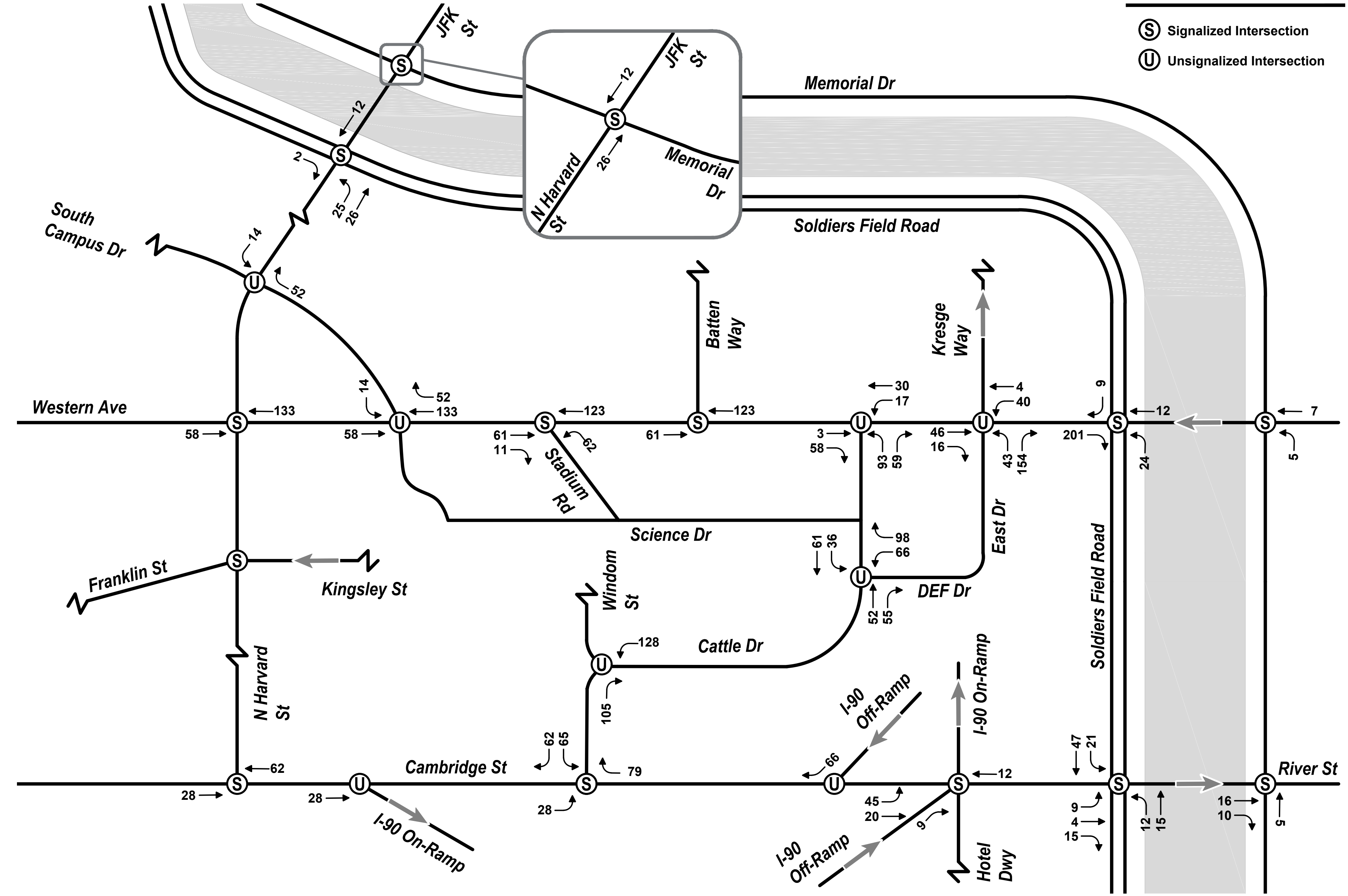


2030 Site Generated Trips
Vehicle Volumes: Morning Peak Hour

Figure 3.32

Enterprise Research Campus Project
Boston, MA

\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Networks_Updated_05-27-2021.dwg

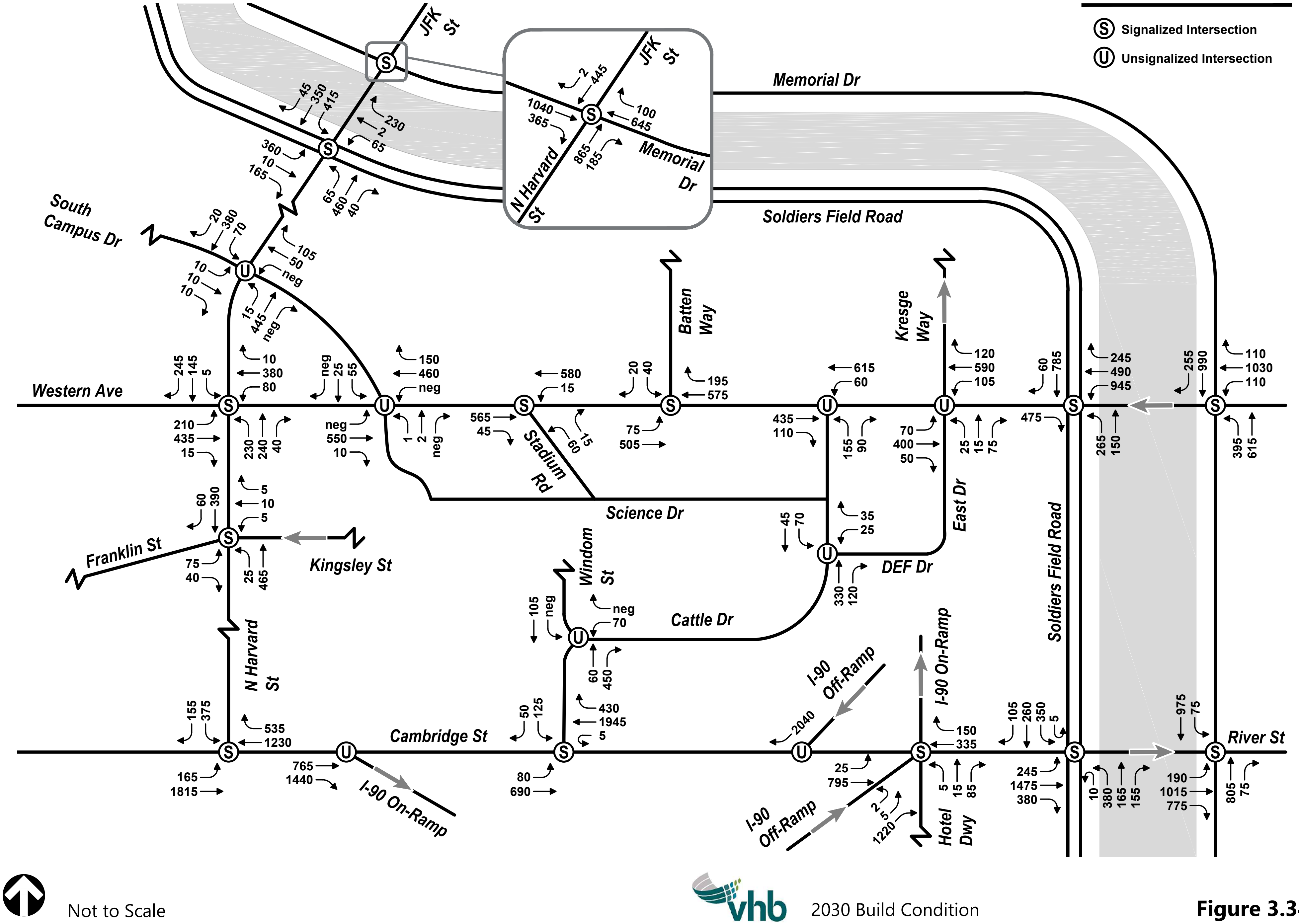


Not to Scale

2030 Site Generated Trips
Vehicle Volumes: Evening Peak Hour

Figure 3.33

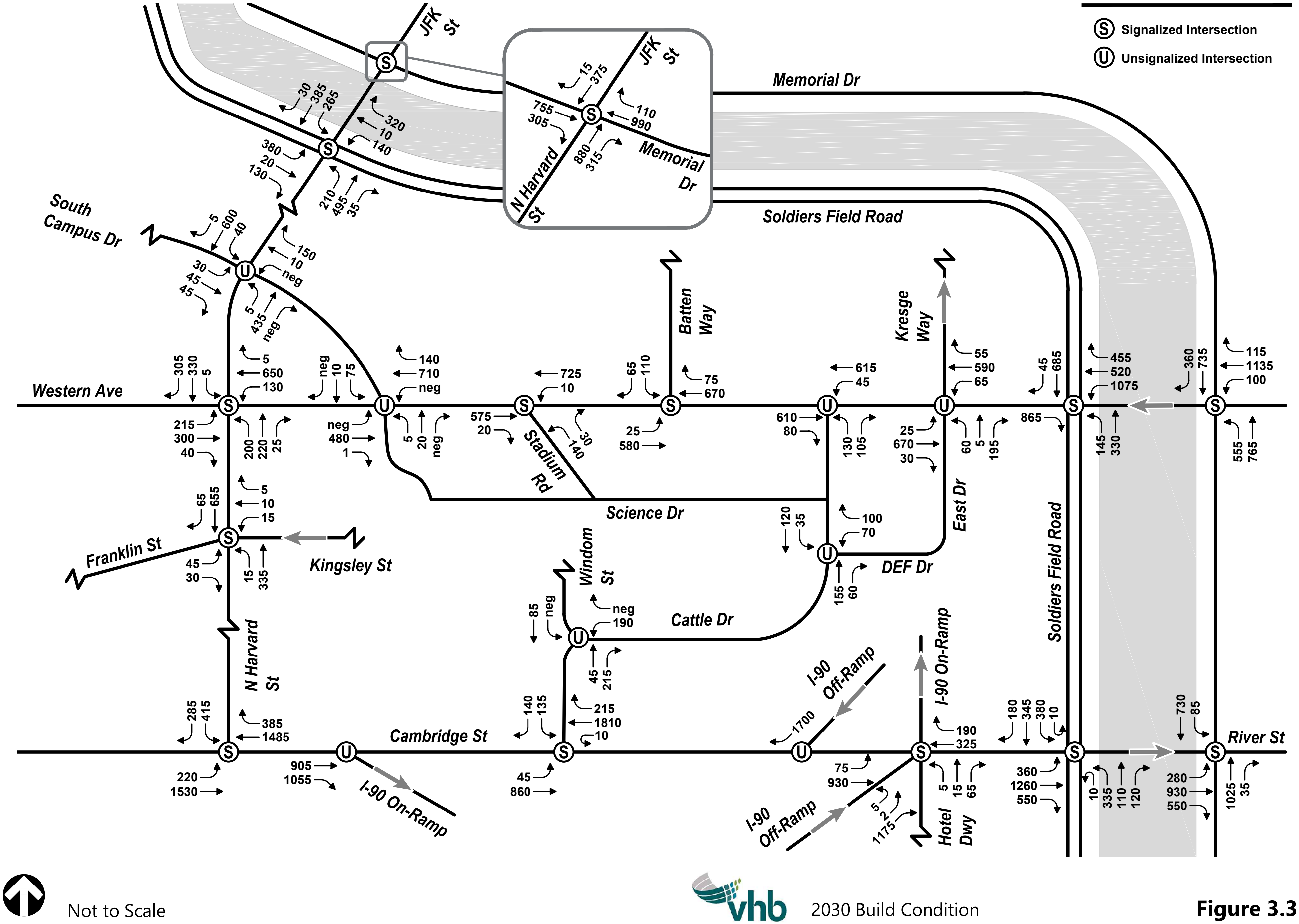
Enterprise Research Campus Project
Boston, MA



2030 Build Condition
Vehicle Volumes: Morning Peak Hour

Figure 3.34

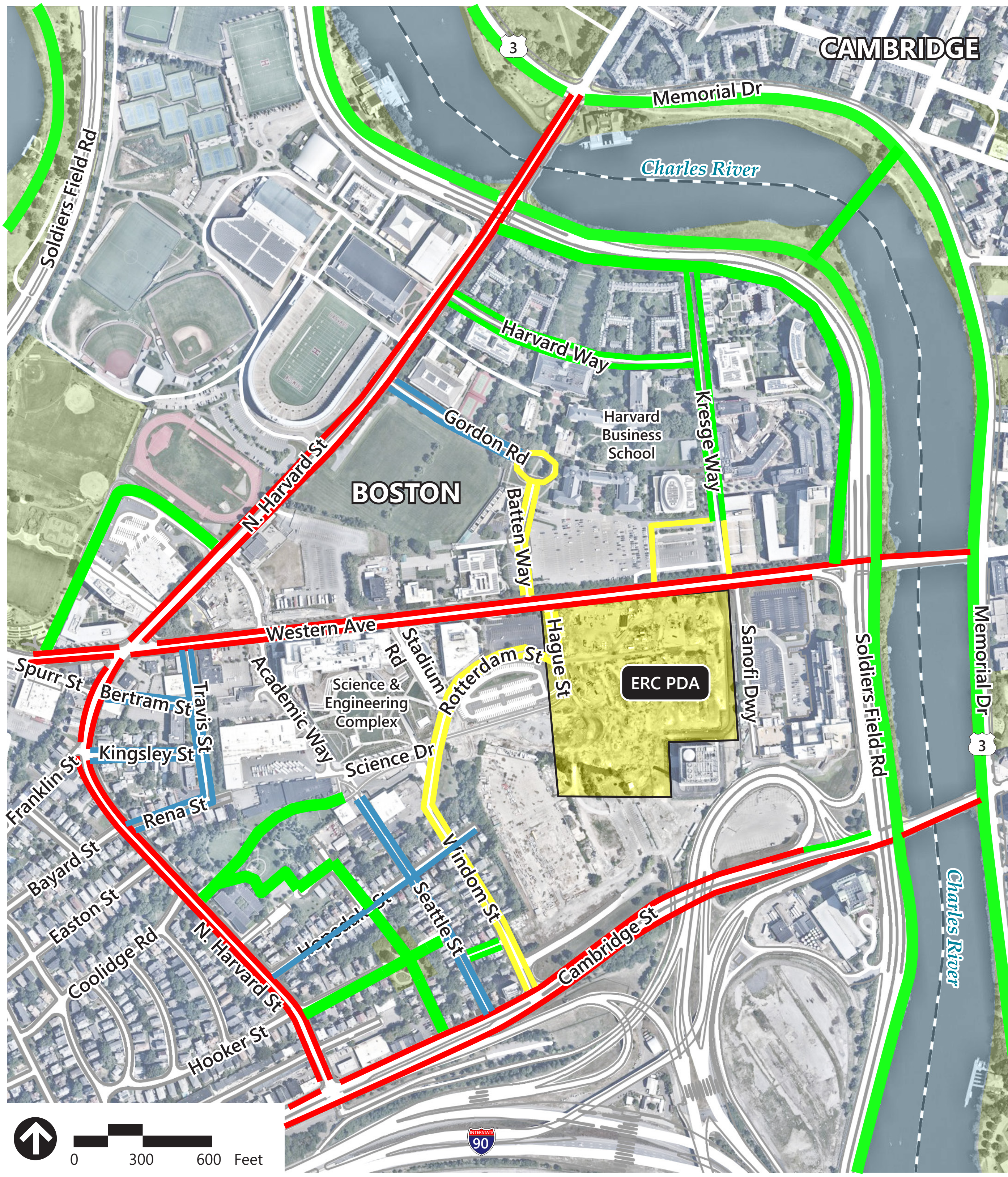
Enterprise Research Campus Project
Boston, MA



2030 Build Condition
Vehicle Volumes: Evening Peak Hour

Figure 3.35

Enterprise Research Campus Project
Boston, MA



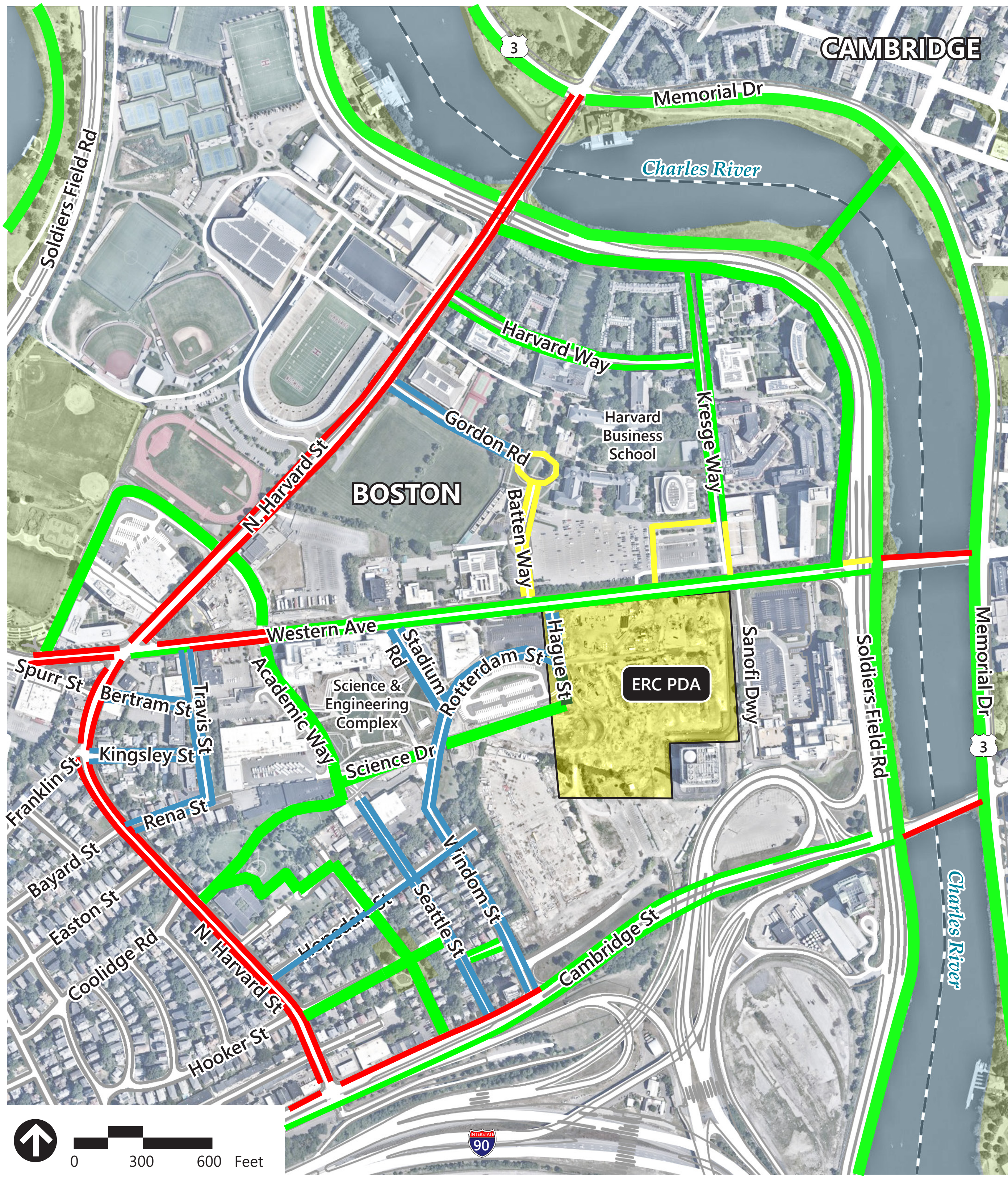
Base map aerial image: Nearmap Aerial (2020)

- 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



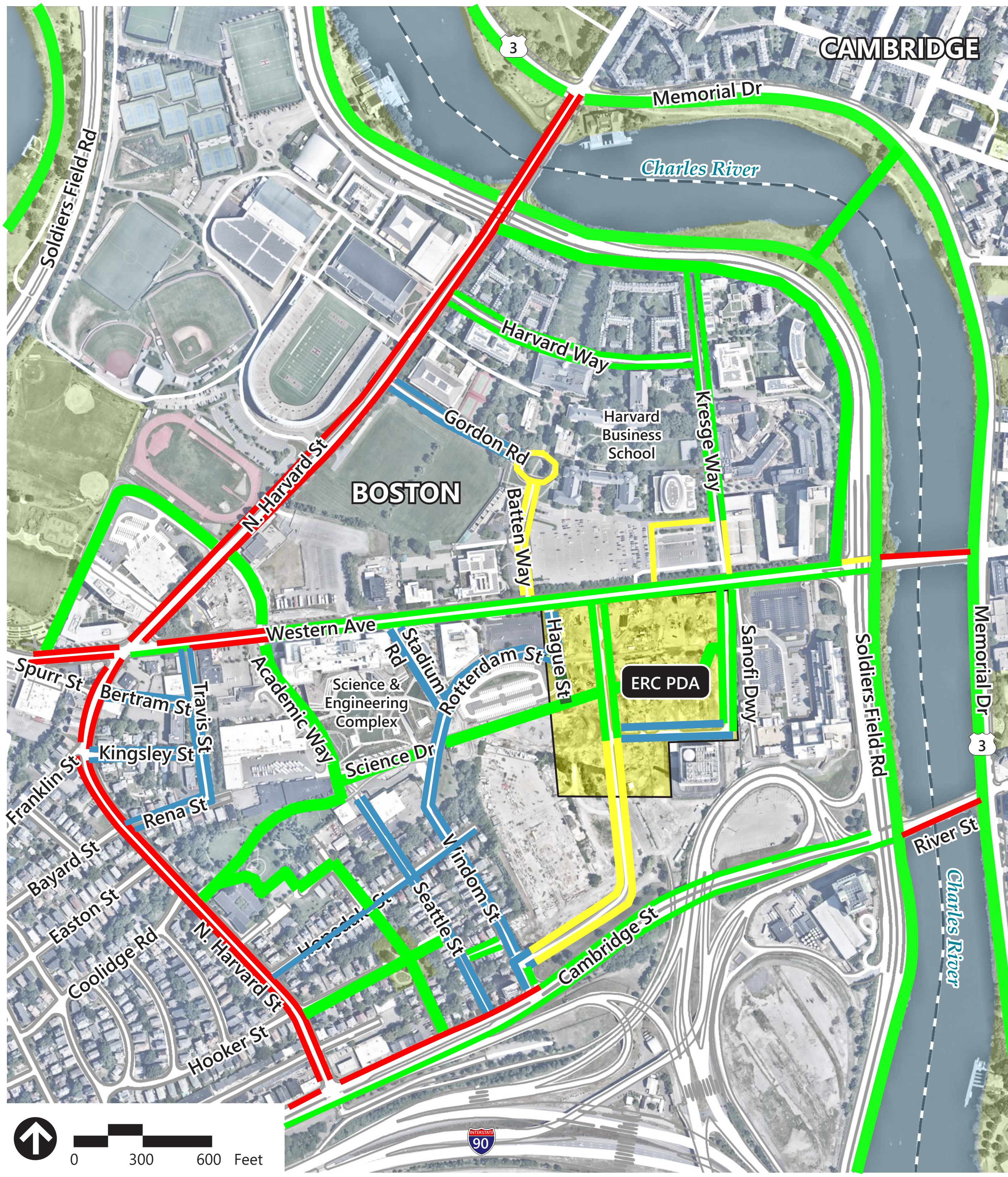
Base map aerial image: Nearmap Aerial (2020)

- 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

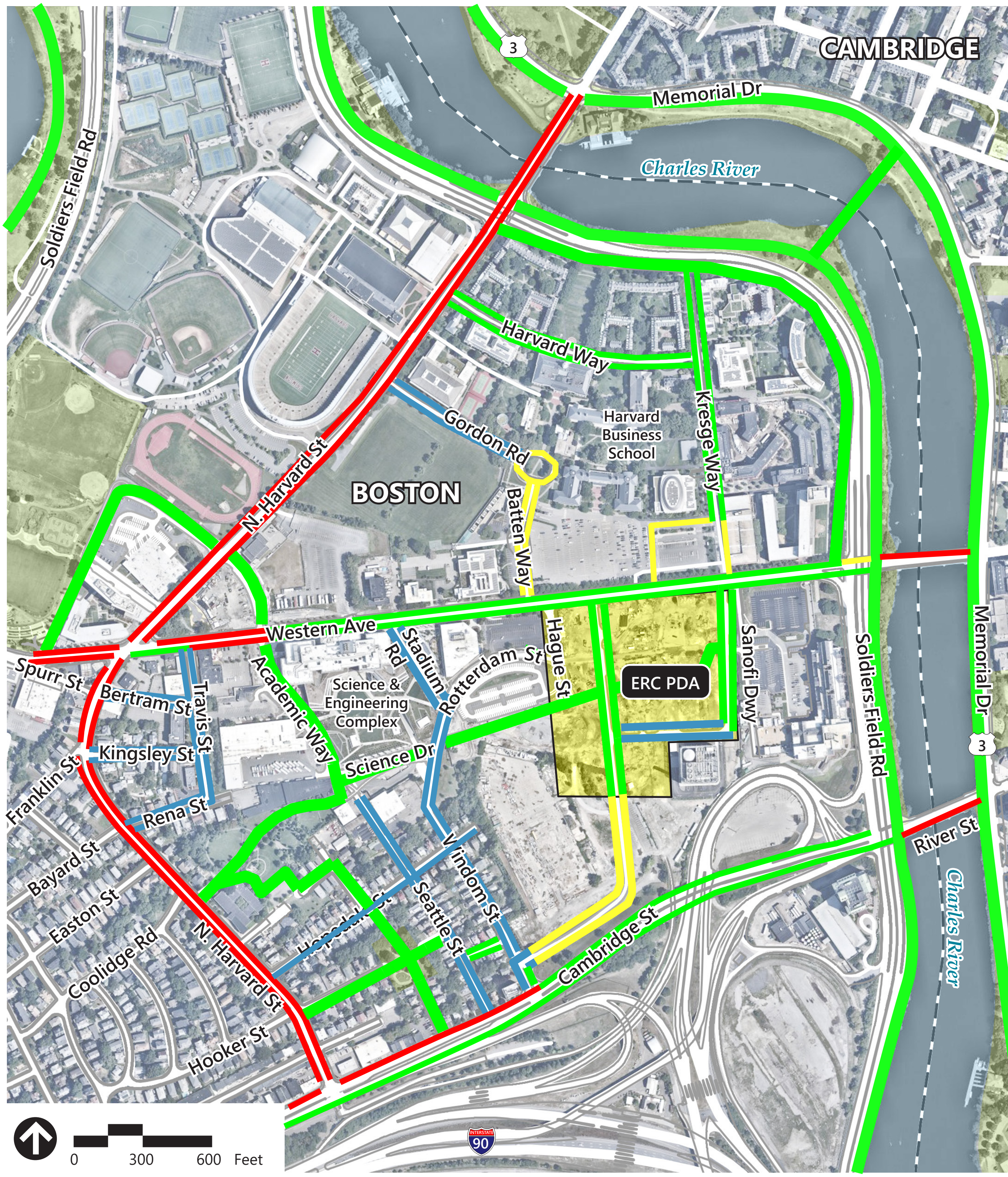
LTS 4 (most stressful)

vhb

Figure 3.36c

2025 Build Conditions
Bicycle Level of Traffic Stress

Enterprise Research Campus Project
Boston, MA



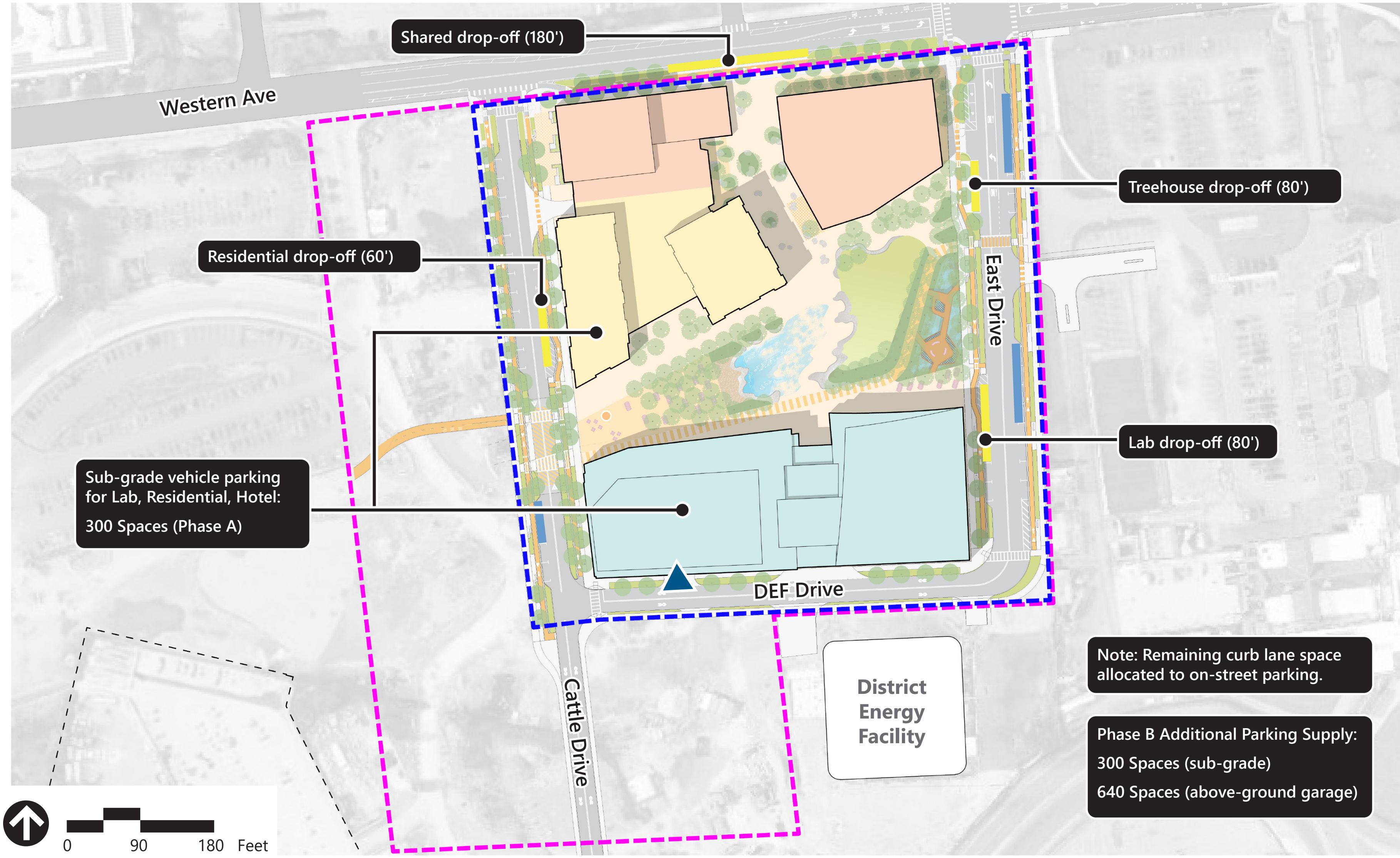
Base map aerial image: Nearmap Aerial (2020)

- 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

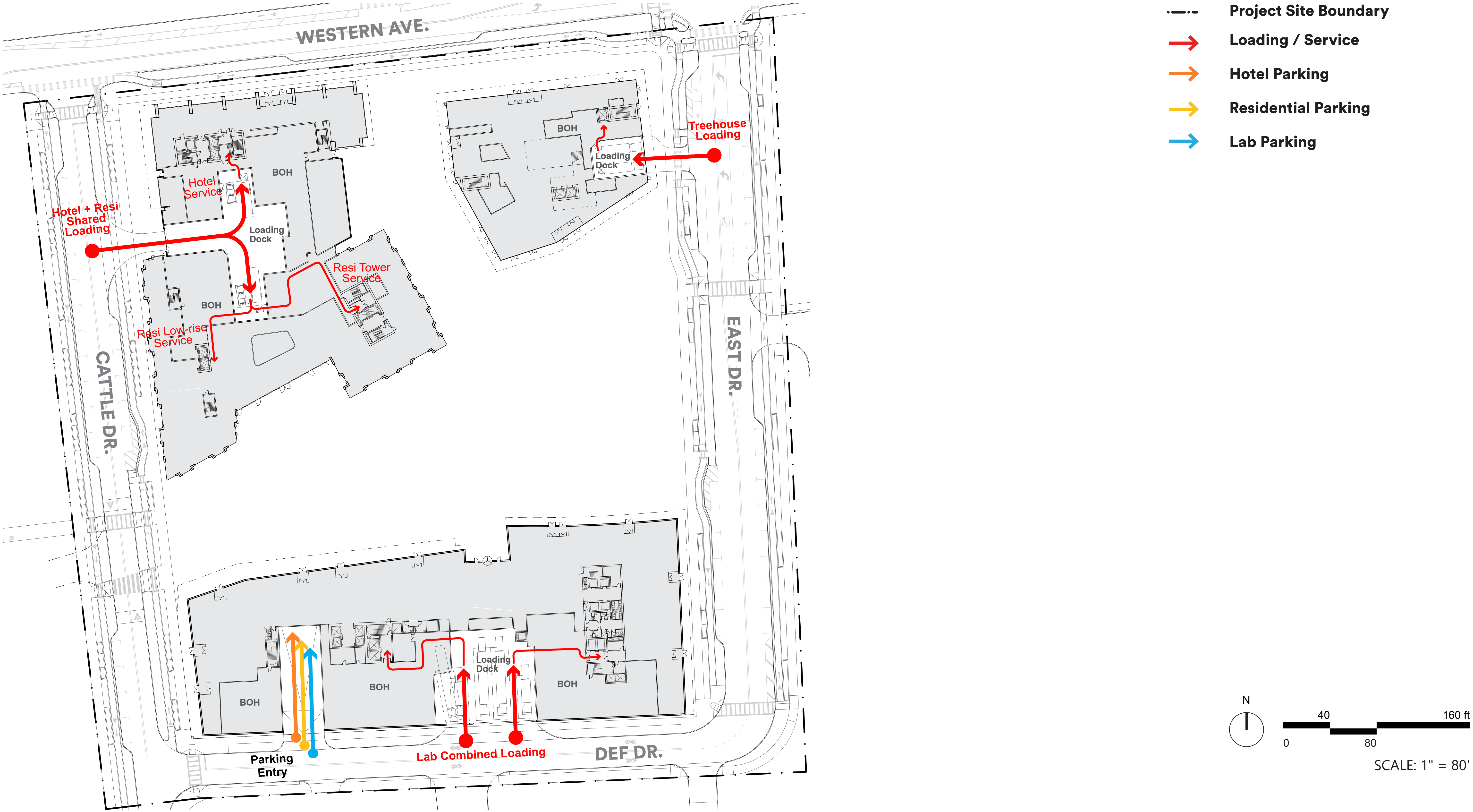


Figure 3.38

Proposed Loading Configuration

Enterprise Research Campus Project
Boston, MA

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

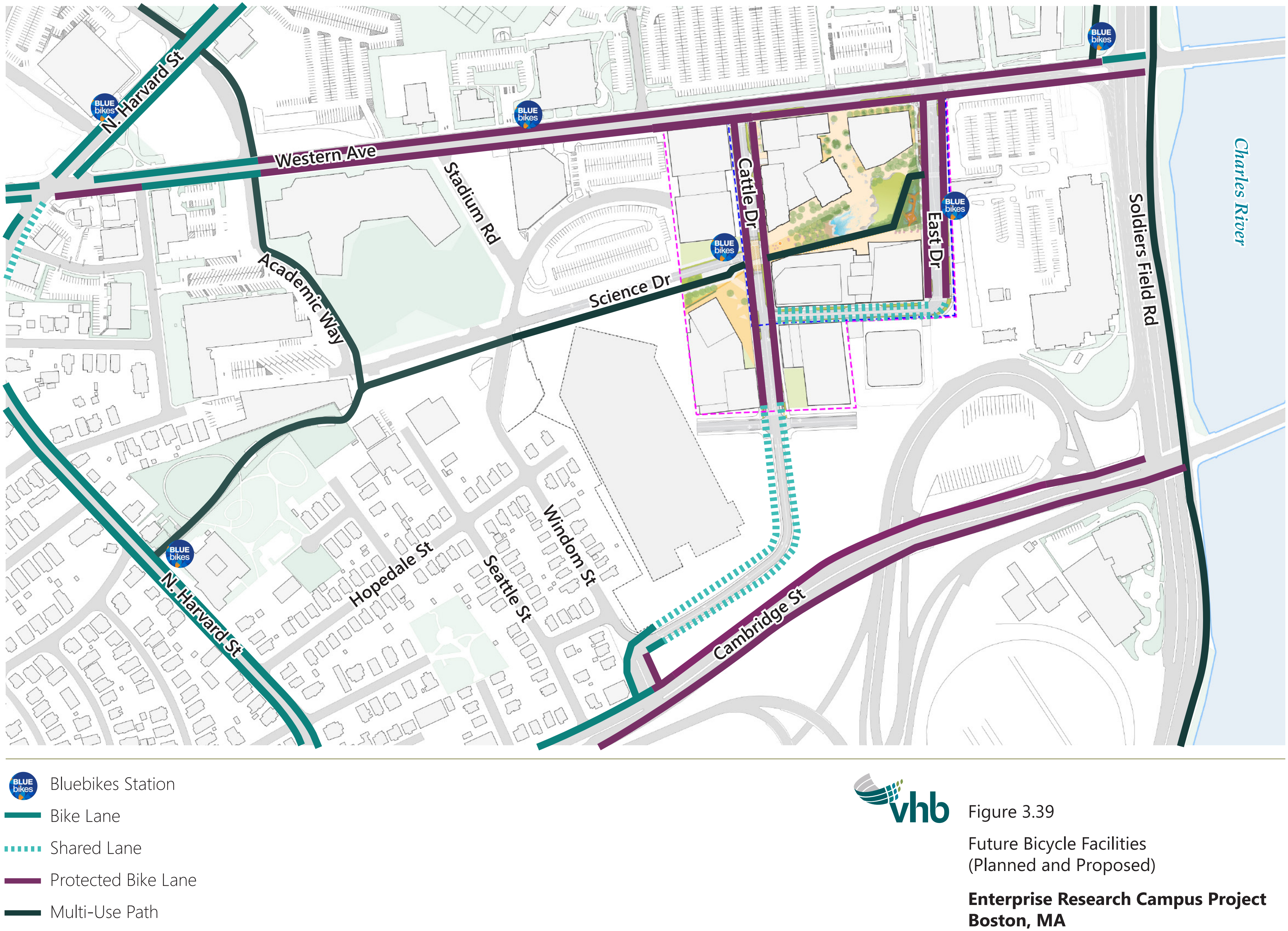
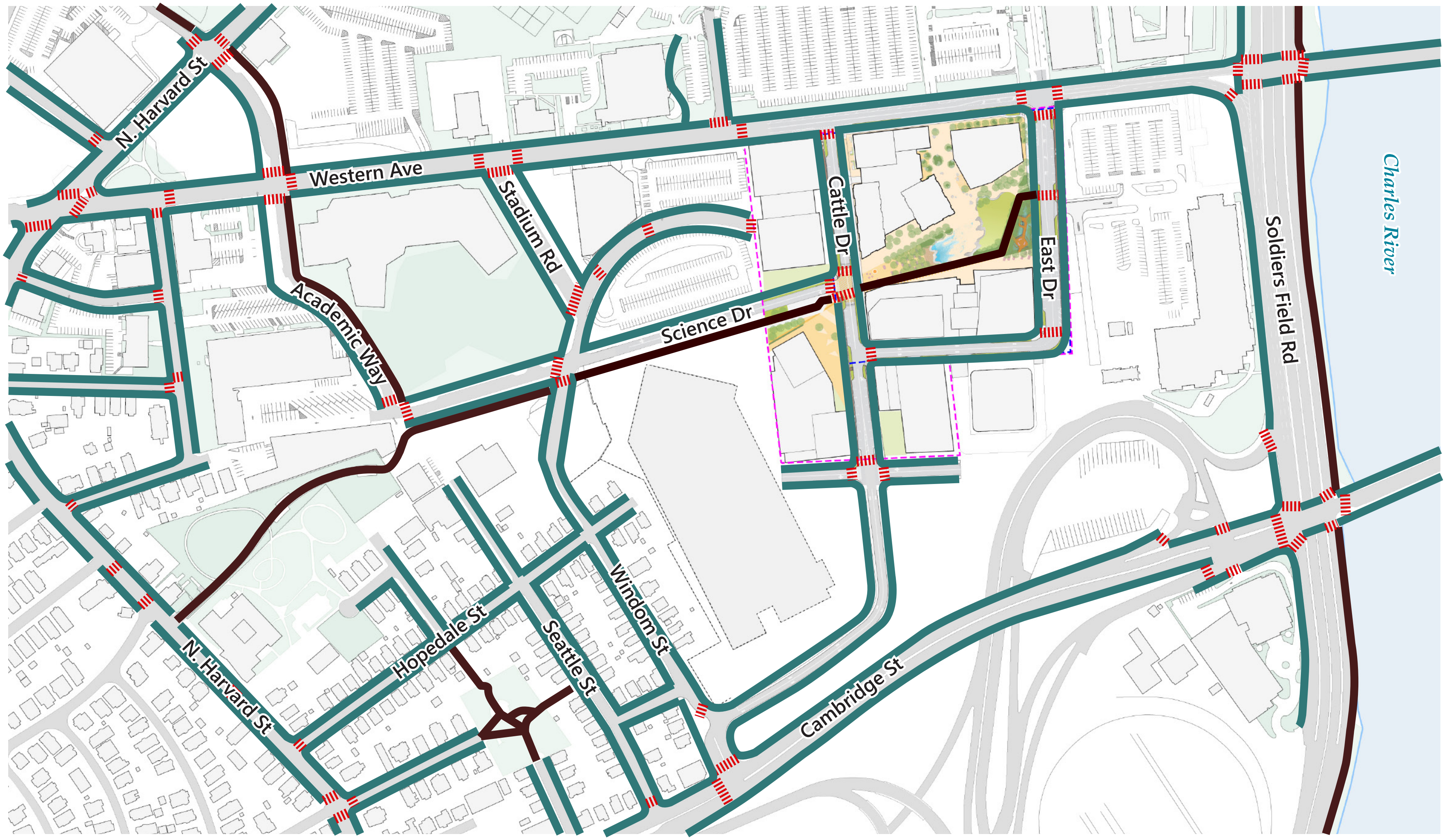


Figure 3.39

Future Bicycle Facilities
(Planned and Proposed)

Enterprise Research Campus Project
Boston, MA



Sidewalk
Crosswalk
Multi-Use Path

Figure 3.40

Future Pedestrian Infrastructure (Planned and Proposed)

Enterprise Research Campus Project
Boston, MA

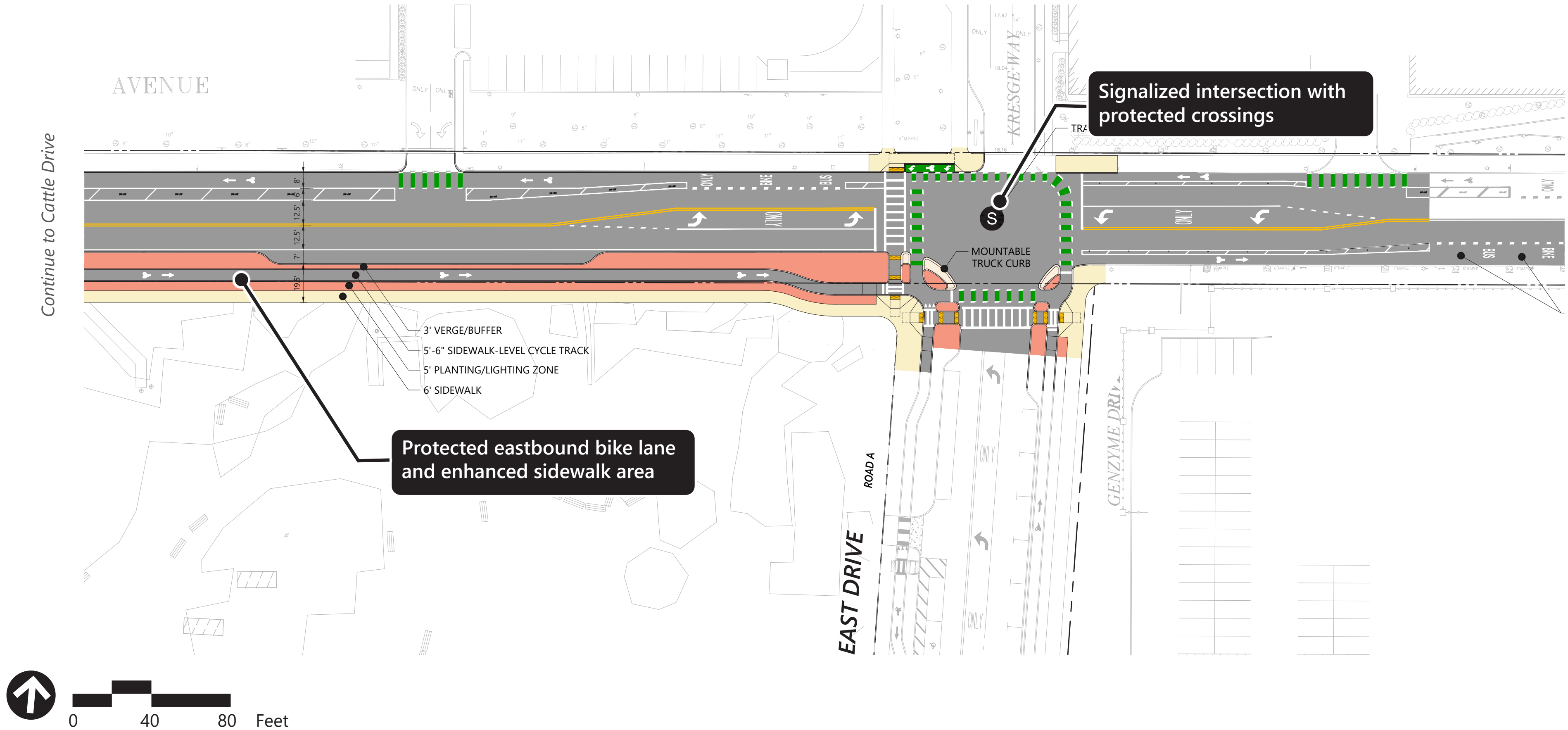


Figure 3.41a

Western Avenue Improvements Along Site Frontage (East Dr Segment)

Enterprise Research Campus Project
Boston, MA

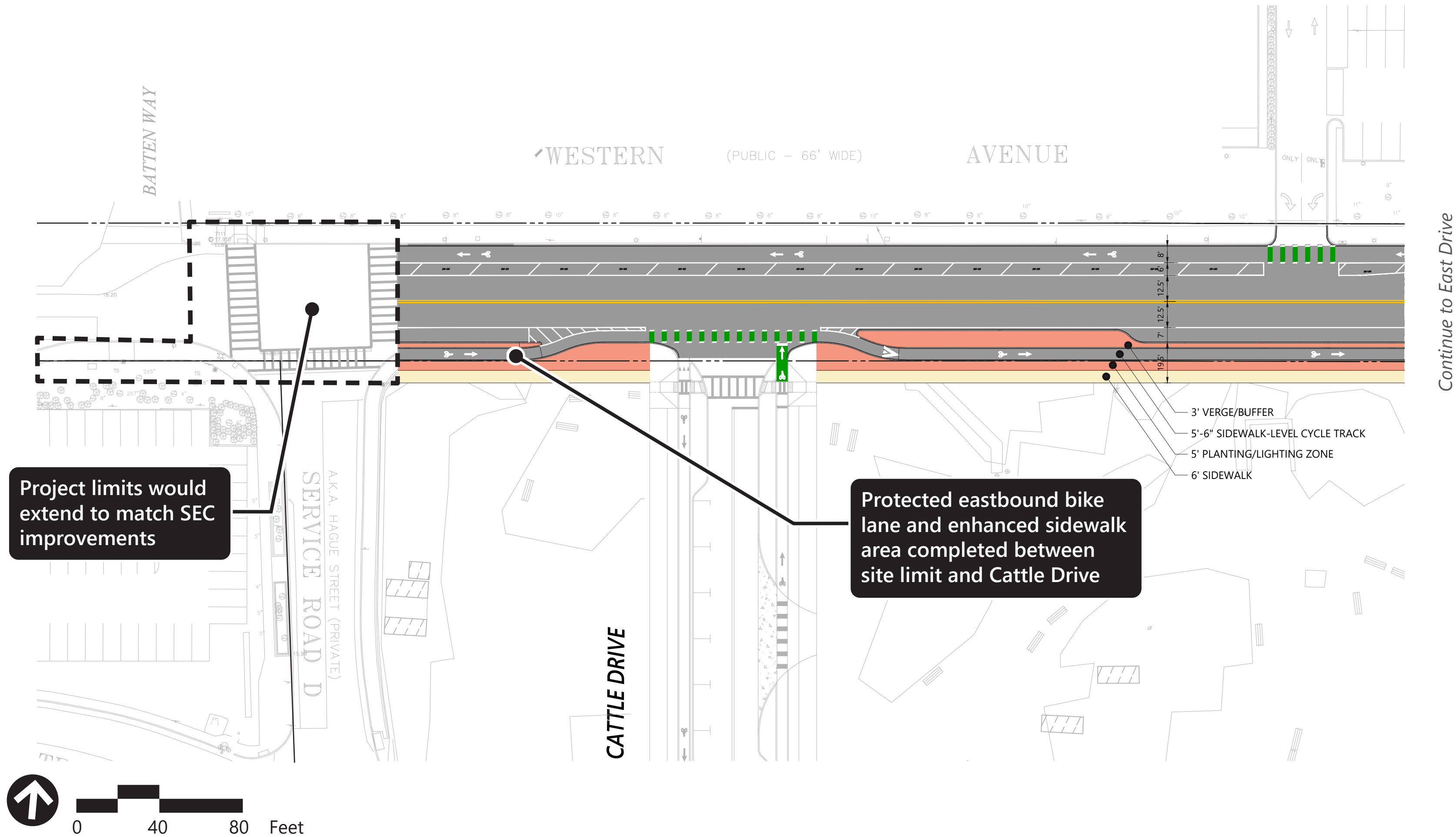
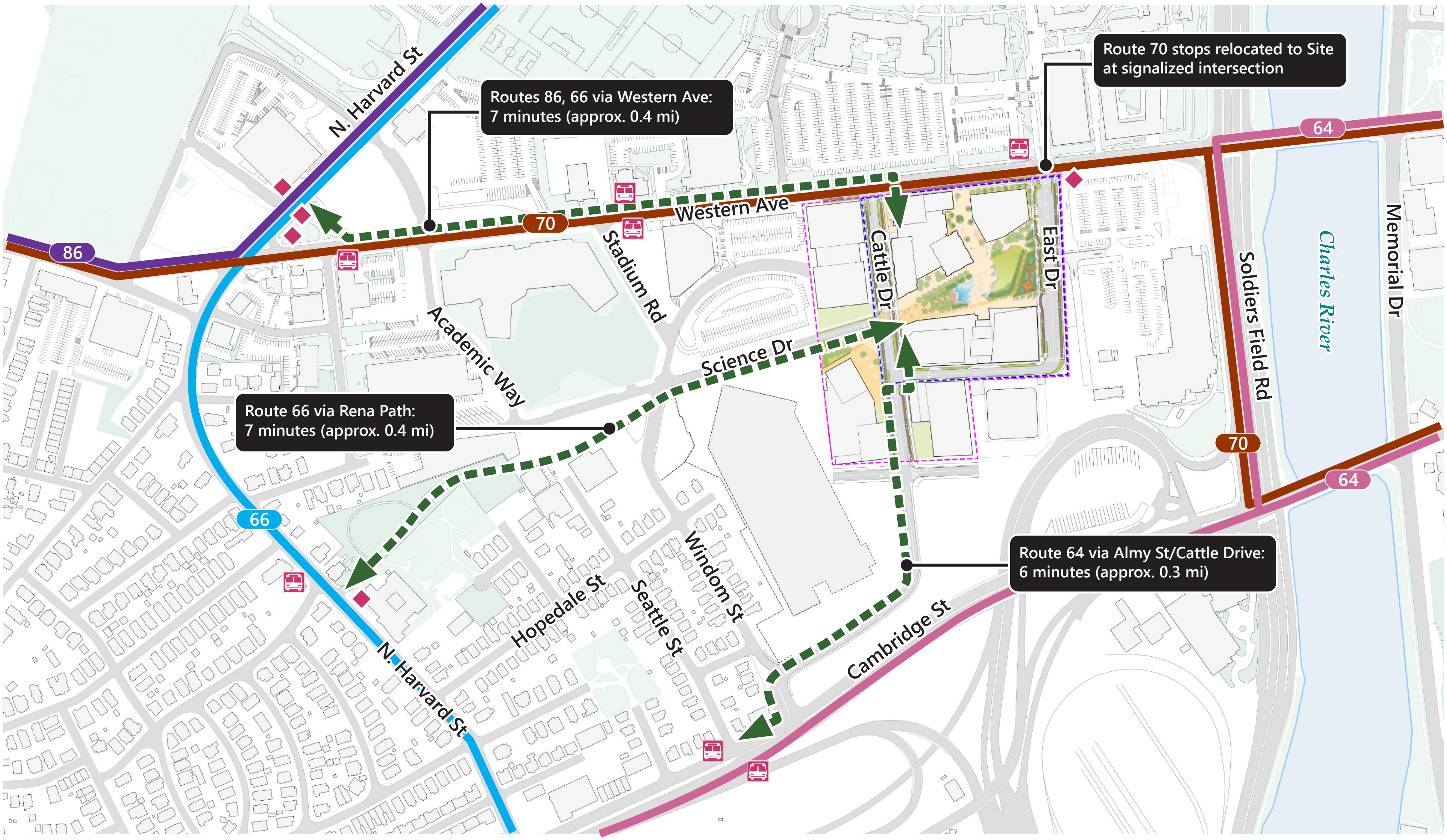


Figure 3.41b

Western Avenue Improvements
Along Site Frontage (Cattle Dr Segment)

Enterprise Research Campus Project
Boston, MA



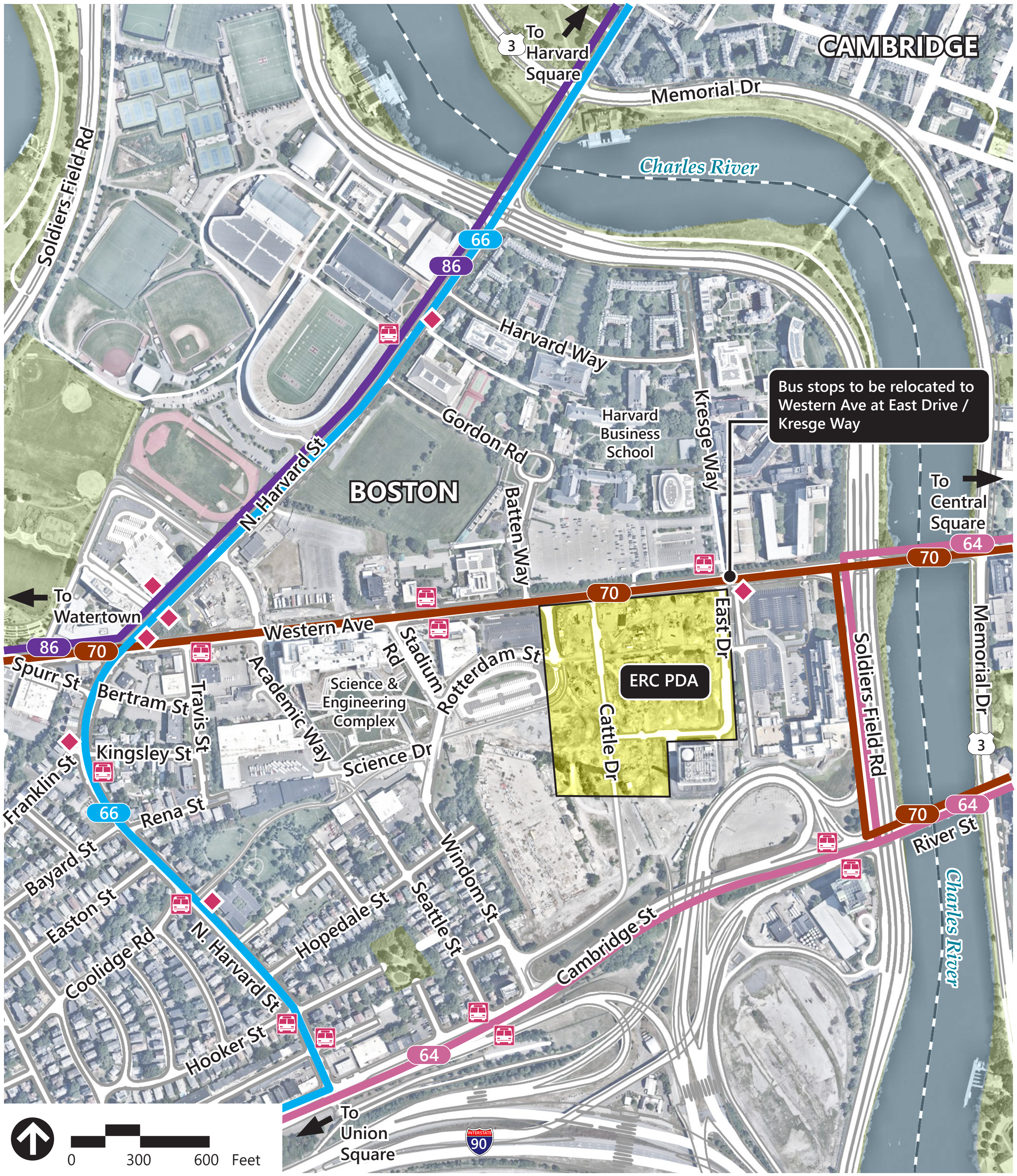
MBTA Bus Stop

MBTA Bus Shelter

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

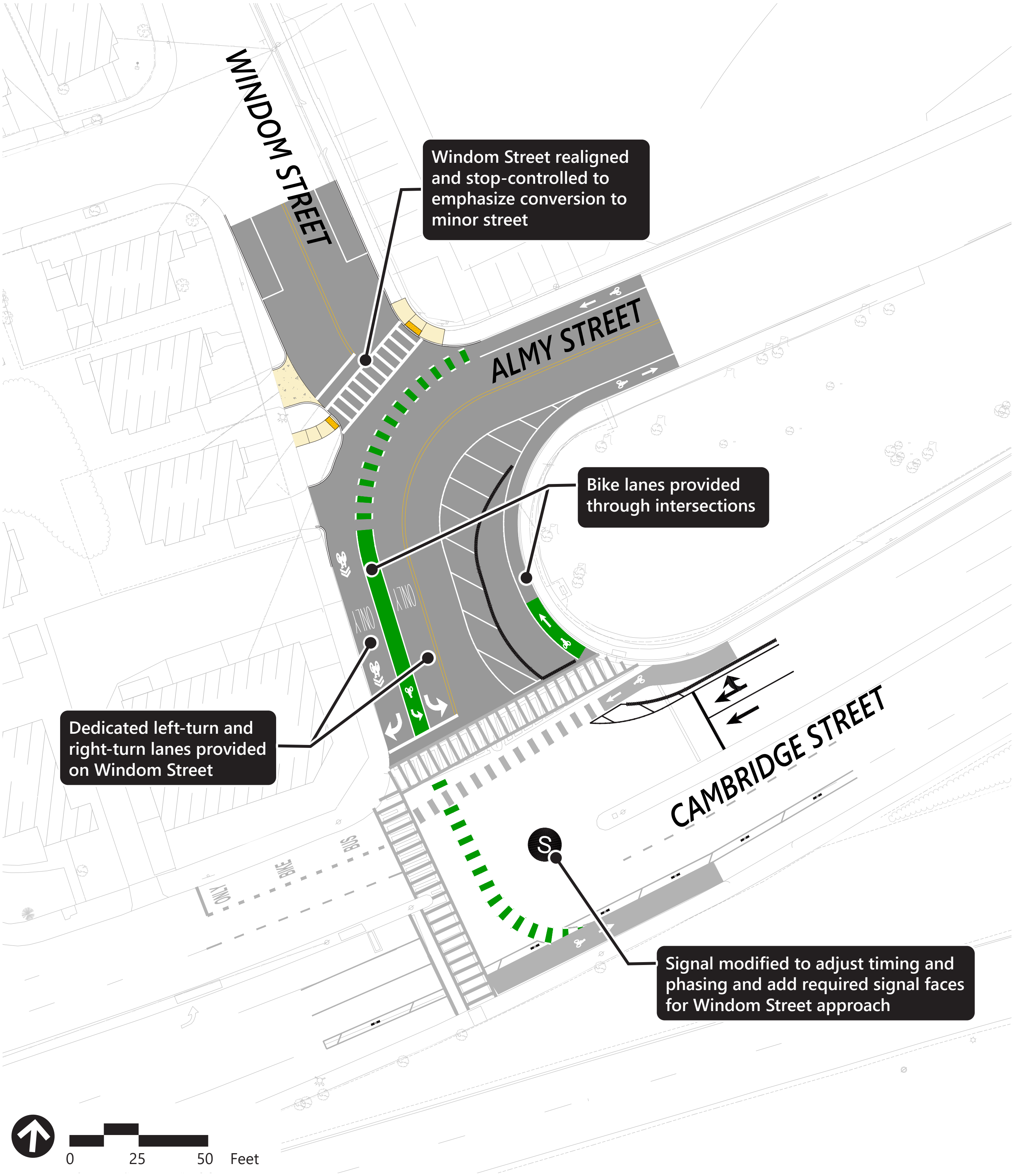


Figure 3.44

Cambridge/Windom/Almy Street Intersection Improvements

Enterprise Research Campus Project
Boston, MA

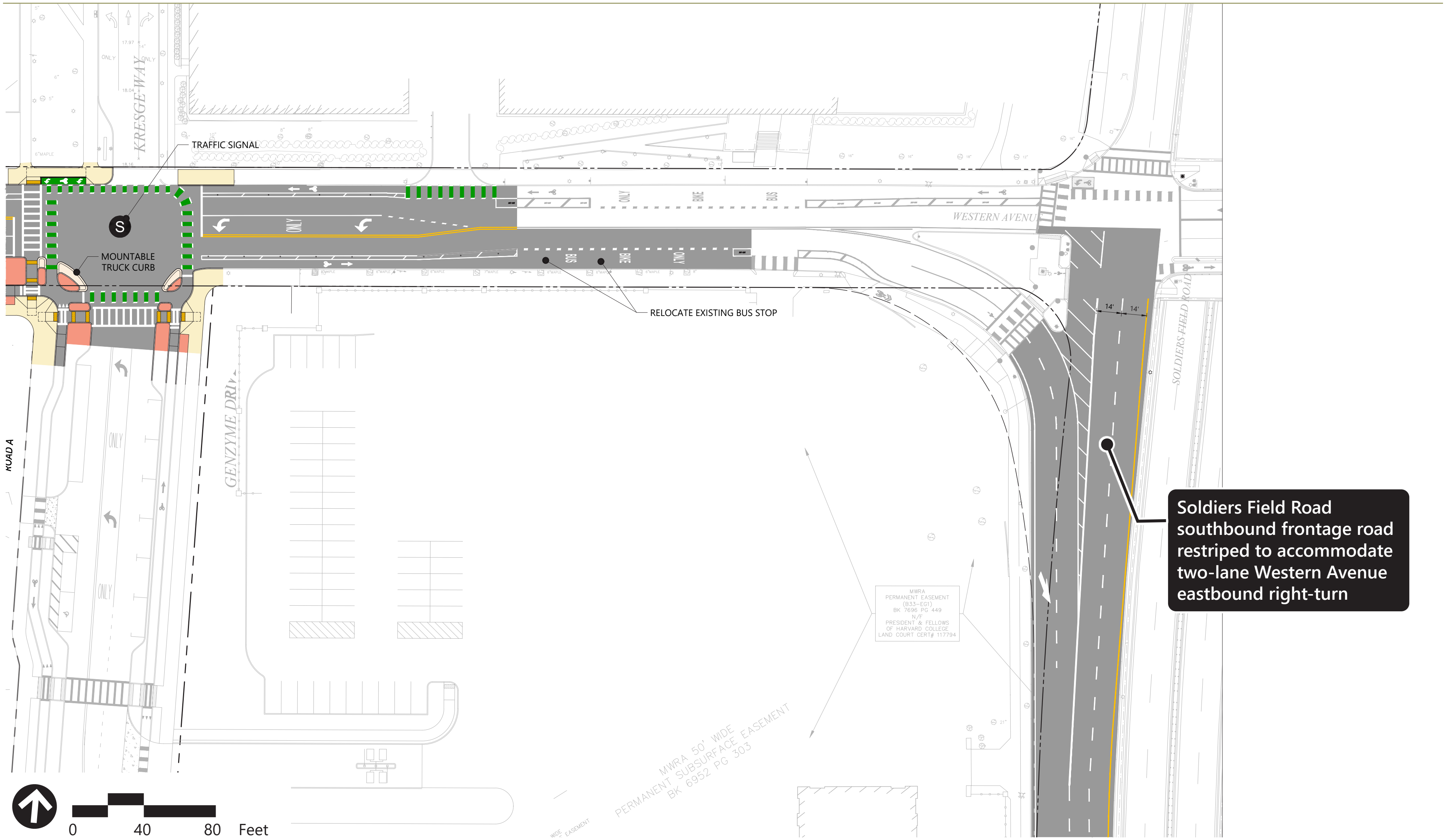
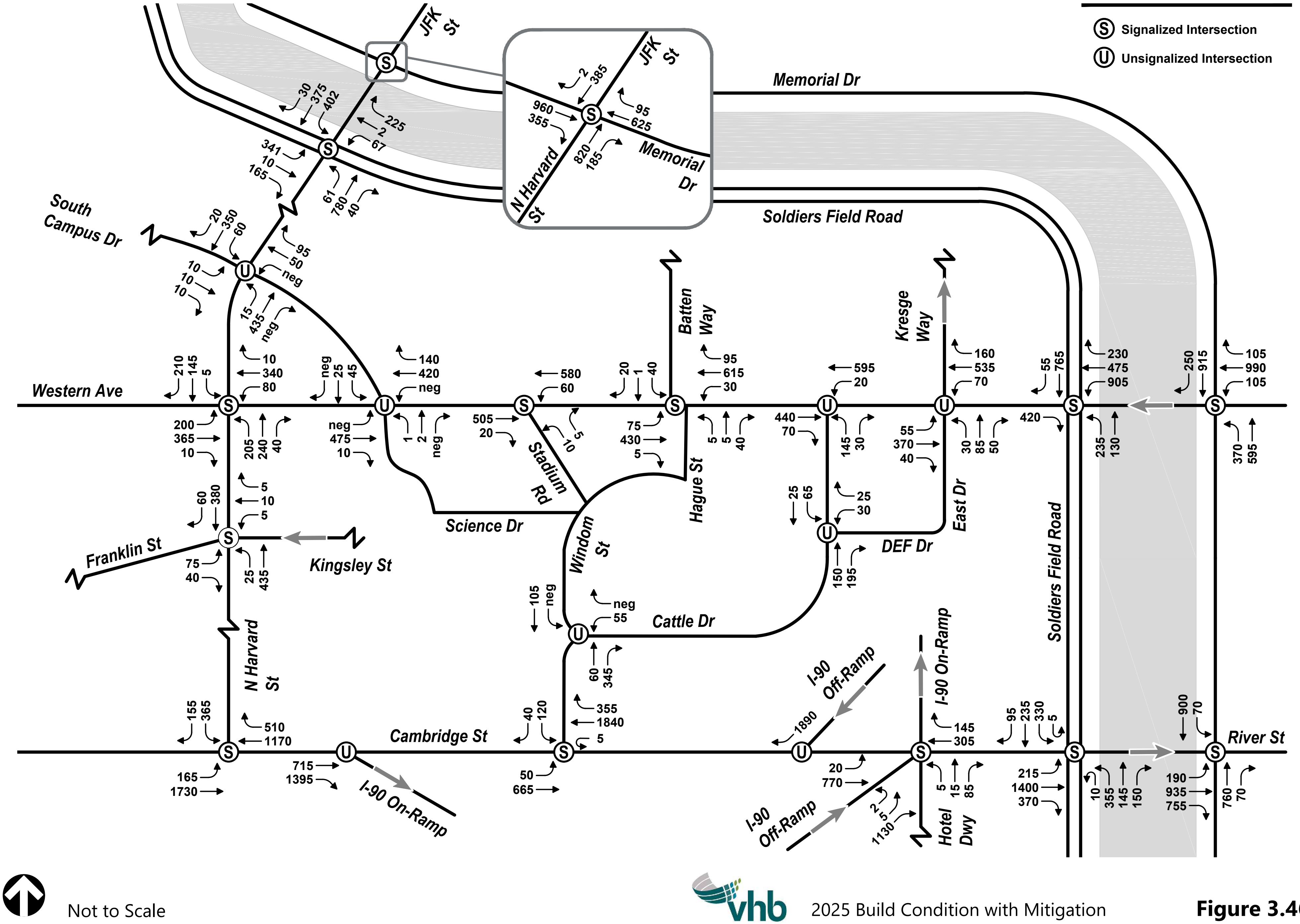


Figure 3.45

Western Avenue at Soldiers Field Road Improvements

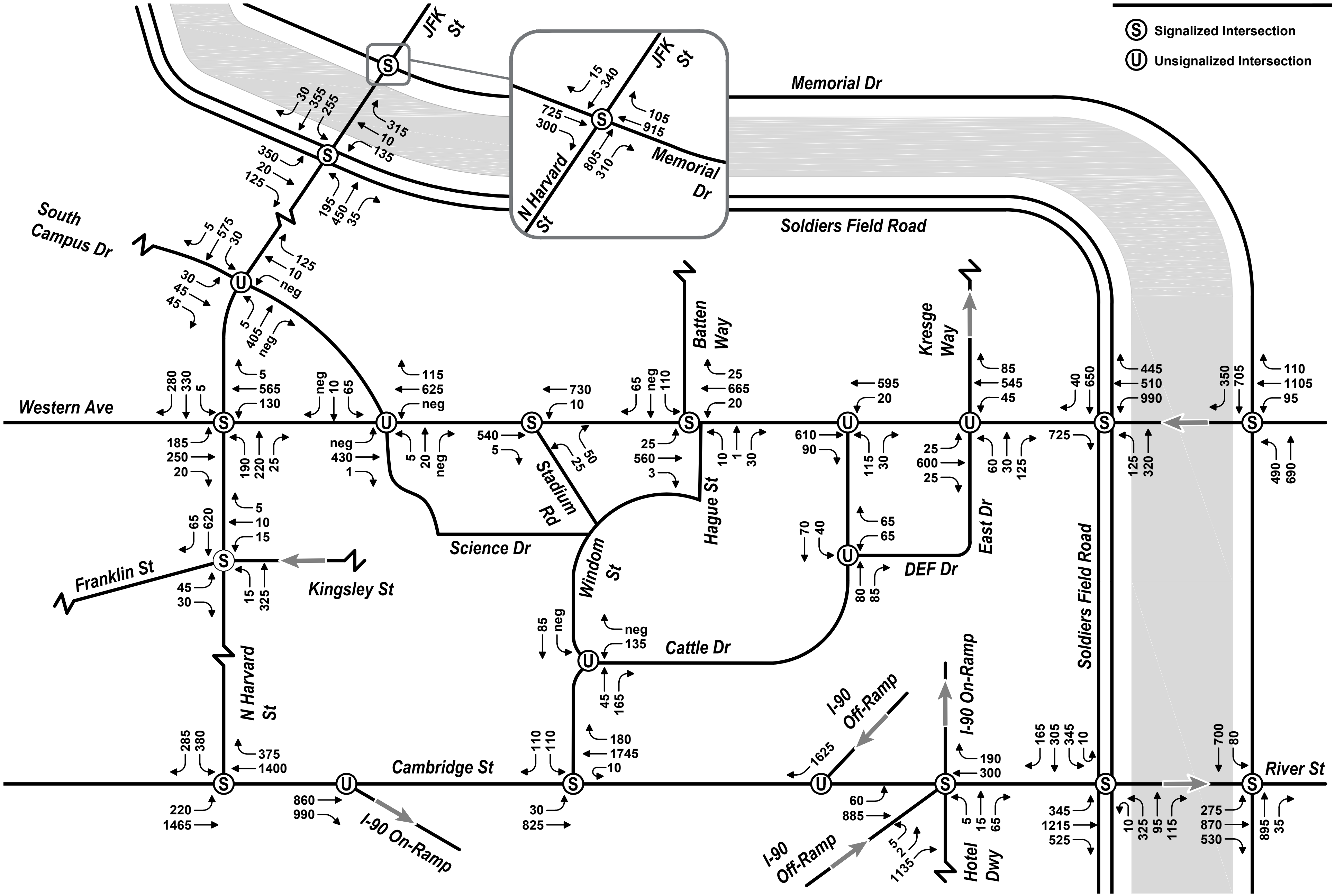
Enterprise Research Campus Project
Boston, MA



2025 Build Condition with Mitigation
Vehicle Volumes: Morning Peak Hour

Figure 3.46

Enterprise Research Campus Project
Boston, MA



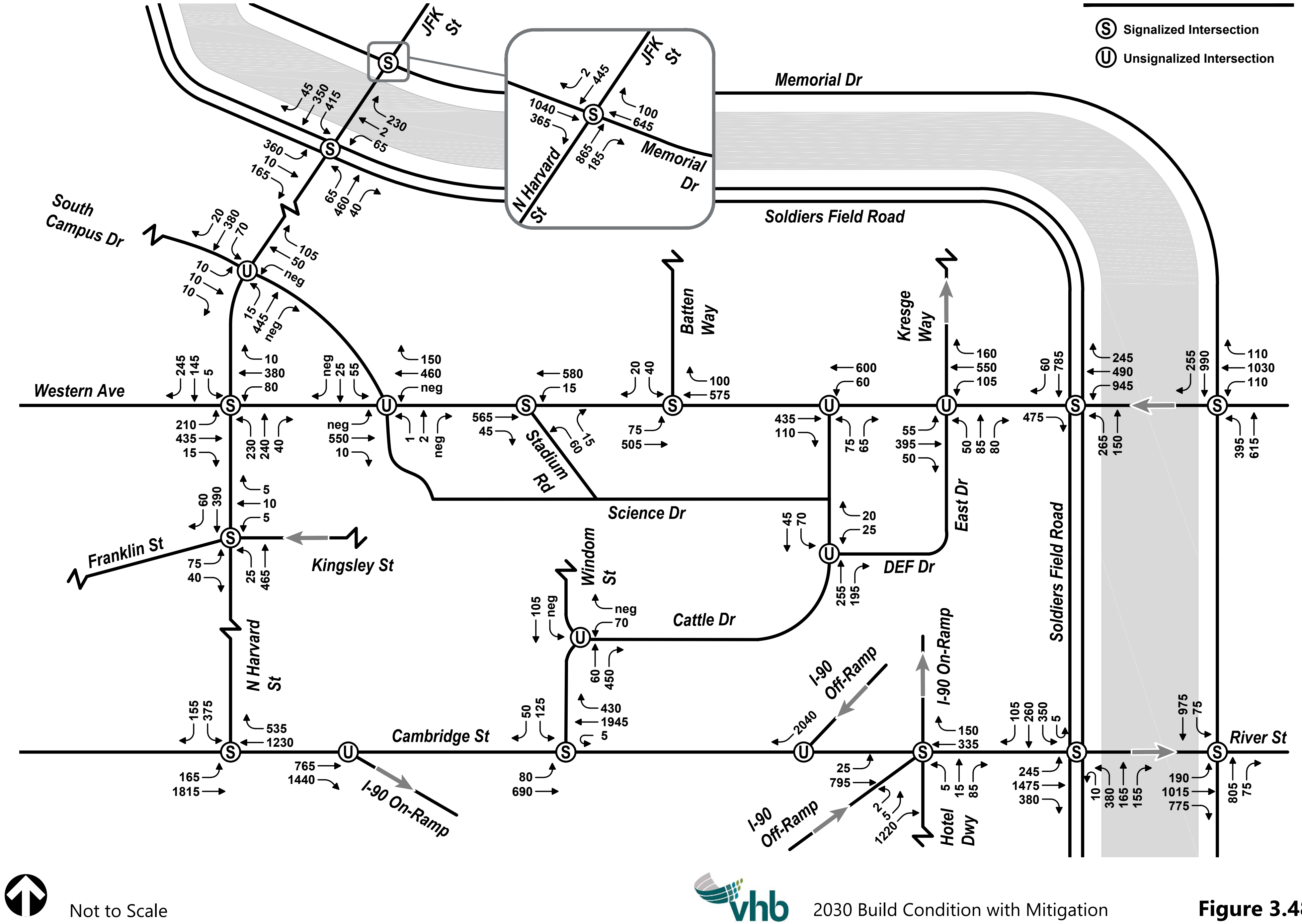
Not to Scale

2025 Build Condition with Mitigation
Vehicle Volumes: Evening Peak Hour

Enterprise Research Campus Project
Boston, MA

Figure 3.47

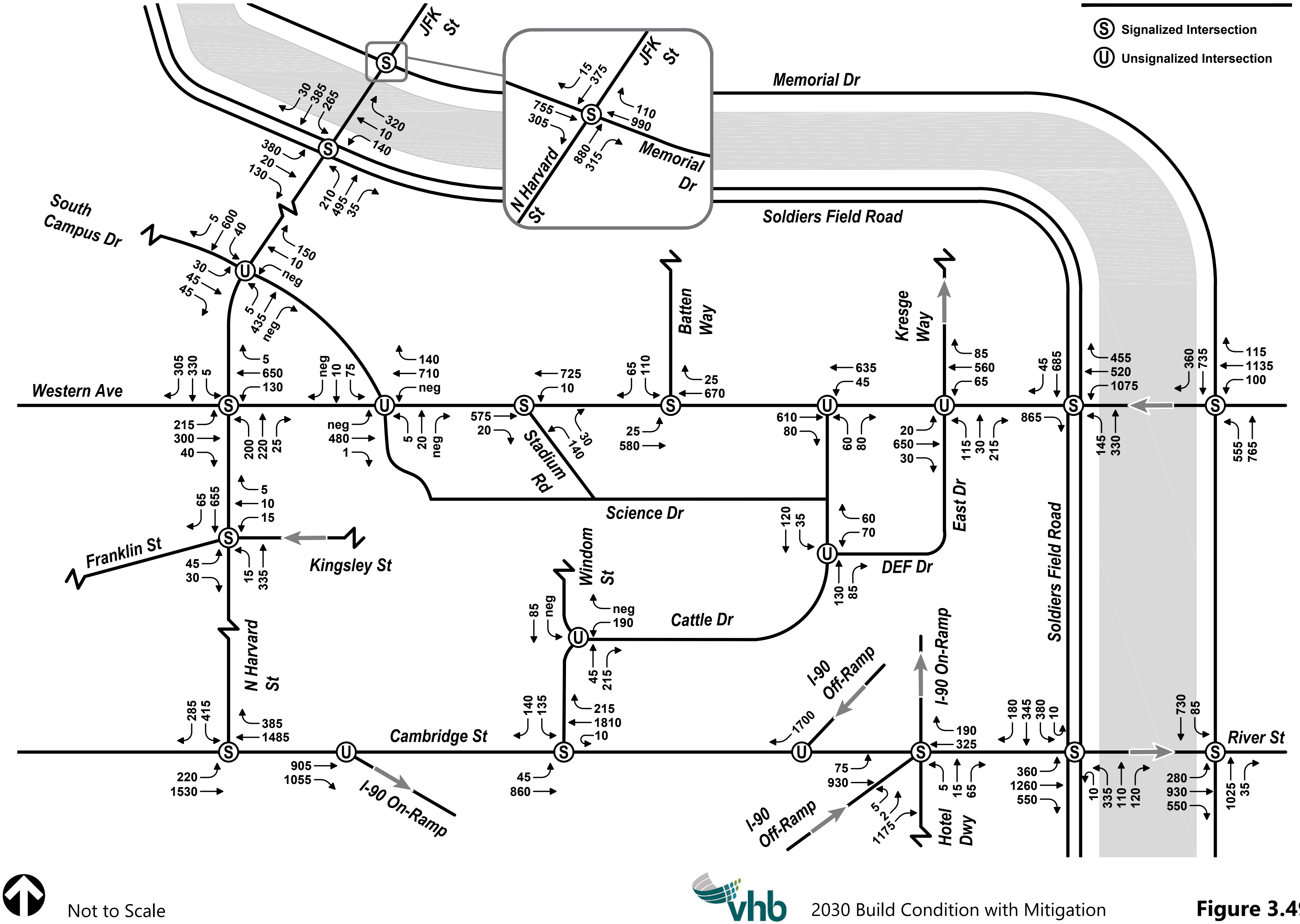
\\vhb\gbl\proj\Boston\15021.00 Harvard ERC\Graphics\FIGURES\DEIR-DPIR\Networks_Updated_05-27-2021.dwg



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

Urban Design

This chapter provides detailed descriptions of the building and site design of the Project, including its substantial public realm improvements. The Project represents a unique opportunity to transform an underutilized site into a vibrant, urban, mixed-use neighborhood. The Proponent and Project Team envision the Project as a new community of residents, researchers, entrepreneurs and visitors, who are inspired by a place designed for creativity and exploration. The Project is integrated into Harvard's Framework Plan for the larger area, which calls for an extensive, integrated public open space, a portion of which has already been completed by Harvard (Ray Mellone Park and Rena Park). Envisioned as a welcoming town square, the portion of this open space network constructed within the Project, the Project Greenway, will enable a wide range of programming potentials, creating outdoor spaces for gathering, collaboration, and innovation. The Project Greenway will be the creation of a material portion of publicly accessible open space in a network of public realm connections that will stretch from the Lower Allston neighborhood toward the Charles River. The open space network will create a pedestrian network from Allston to Cambridge, which will link the surrounding communities to the river and a range of programmable spaces. The Project proposes five buildings of varying uses. These buildings have been massed and sited in order to enhance the qualities of the Greenway, to make the site more permeable and welcoming, to create a variety of building scales, to mitigate wind and climate impacts, and to maximize the amount of active uses along building edges. The expansive open spaces, together with the proposed buildings and programming make the Project a mixed-use development that will serve as both a natural extension of an established neighborhood and a unique district providing new opportunities for working, living, and community building.

4.1 Summary of Key Findings

The Project will provide a range of public and community benefits, including new publicly accessible open space, economic activity, improved circulation, and a mix of uses and housing options. While high quality, sustainable, and distinct architecture is pivotal, at its core, the Project seeks to provide welcoming, programmable and inclusive open spaces that will themselves serve as social hubs and incubators. Public and community benefits as they relate to urban design include:

- Expanding Boston's network of innovation districts with a focus on connectivity, transit, accessibility, and inviting urban design to seamlessly merge local, regional, and global innovation clusters.
- Transforming an underutilized urban site into a vibrant mixed-use district that will provide multi-modal connections to the Project and the surrounding area.
- Improving the area's urban design character through the provision of a human-scale, mixed-use development, acting as a neighborhood hub for local culture and commercial activity within a live/work/play district.
- Prioritizing a human-scale experience at street level with a network of laneways, arranging building heights and proportions to create a playful urban profile.
- Providing robust publicly accessible open space totaling nearly three acres, which materially exceeds the 20% goal set forth in the existing PDA Master Plan. This public open space will be enhanced with programming and amenities, along with inviting shopping, dining, and residential experiences.
- Integrating inviting landscapes, encouraging interaction between building occupants and the public realm, while utilizing performative green infrastructure for stormwater management and specifying native plant species supporting biodiversity and an exuberant urban habitat.
- Configuring buildings and open spaces to maximize user comfort, ease of maintenance and operation, and a diverse mix of programming opportunities in response to environmental considerations including solar access, shade, wind protection, and acoustics.
- Providing accessible walkways along all streets surrounding the Project Site.

4.2 Neighborhood Context

Figure 4.1 shows the Project Site neighborhood context. The Project Site is situated just west of the Charles River and across Western Avenue, to the south, from Harvard Business School, between the Allston neighborhood and the Charles River. The Project Site is in a transitional area of Allston, where the immediate surrounding existing uses are few and the Project Site itself. The Project Site had a long history of industrial, warehousing, and freight distribution uses, and is currently an undeveloped parcel used for Harvard construction project staging. The Project will play a crucial role in enlivening this area, both through new building uses and populations, and through its contributions of infrastructure and compelling open spaces connecting the disparate areas surrounding it.

The adjacent neighborhood of Allston is a community of tremendous vibrancy, creativity, and diversity. As described in Section 1.3 of Chapter 1, *Project Description*, the Project, as well as the future Phase B, as described in Chapter 2, *Phase B*, will strive to stitch together with the existing neighborhood by designing inviting spaces, creating a destination with active ground floor uses, partnering with local & international organizations to activate the Project Site through programming, and cultivating a public realm that is responsive to community feedback. By doing so, it will celebrate and promote Allston's art scene and its multicultural character, and it will provide easy access to and from the Project for both local residents and those from afar.

To the north of the Project Site is Harvard University's Allston campus, the majority of which includes Harvard Business School buildings and associated uses (classrooms, administrative offices, etc.). Within the Harvard campus, Harvard Stadium lies further to the northwest of the Project Site across North Harvard Street, as well as other sports and recreational fields. Directly north of the Project Site, across Western Avenue, the campus edge consists of parking lots and the Soldiers Field Parking Garage, which support existing Harvard uses. A pivotal connection point occurs at the intersection between Western Avenue and East Drive/Kresge Way. To the west of the Project Site, situated adjacent to the Allston neighborhood on Western Avenue, the recently opened Science and Engineering Complex (SEC), located at 130-140 Western Avenue, will serve as a vital component to the larger area. The Project builds upon a cluster of development in the area that will foster and cultivate a vibrant public realm, creating a destination for both residents of the Allston neighborhood and members of the Harvard University community.

Due to the diversity of the uses and buildings around the Project Site, the Project demands sensitivity to the human scale of the neighborhood context, including considerations to the street widths and building heights of Allston, Western Avenue, the Charles River, Cambridge Street, Cambridge, and the neighboring residential areas. As such, emphasis will be made on building scale and massing by placing taller building heights farthest away from sensitive boundaries such as the Allston residential neighborhood and the Charles River. The architecture of the individual buildings within the Project will seek to emphasize the human scale through thoughtful and strategic step-backs along primary pedestrian spaces, façade articulation along the public realm, and through the planning of active uses that are welcoming and accessible along most building edges.

4.3 Proposed Master Plan Concept

The Project-specific master plan design has been developed to integrate into the draft update of the Framework Plan which was made publicly available by Harvard in June 2021. The key element of this revised Framework Plan is the Greenway running from West to East and expanding the open, public spaces in Allston, beginning with Ray Mellone Park and Rena Park. The Master Plan was developed with six guiding principles which sought to ensure an accessible 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. To achieve this, the Project reconfigured the 900,000 SF approved in the PDA Master Plan onto a single site surrounded by Western Avenue, Cattle Drive, East Drive and DEF Drive. This has allowed for a more efficient layout of the program uses whereby different buildings share services and have mutually beneficial massing. Most critically, as compared to the PDA Master Plan, the reconfiguration has more than doubled the amount of publidy accessible open space. The thoughtful and deliberate thinking behind the master plan design, will allow the Project to stand on its own, and to create a site that can be a destination from its conception.

4.3.1 Site Design Approach, Consistency with PDA Master Plan

The Project is consistent with the overall objectives, heights and program set forth in the approved PDA Master Plan. The Project re-orients the buildings illustrated in the approved PDA Master Plan in order to form a complete, self-sufficient Project from day one. The lab/office buildings are now placed on the south side of the Project Site, and situated between the Project Greenway and the adjacent District Energy Facility (DEF). The residential, hotel, and conference uses are placed in a desirable alignment on the north portion of the Project Site, granting them a presence on Western Avenue, and contributing to the momentum and vibrancy of the district. Critically, the planning seeks to maximize active uses along Western Avenue and Cattle Drive in order to contribute to the pedestrian oriented goals of these corridors.

The residential buildings are accessed from Cattle Drive, the laneway, and the Project Greenway. As stated in the PNF, the hotel/conference center uses have been separated in order to better pair the complementary service and loading needs of the hotel and residential buildings, and to allow the Treehouse Conference Center to become a focal point of the Project at the corner of Western Avenue and East Drive. The Treehouse Conference Center and its surrounding plaza are envisioned as a center of gravity for the Project, with increased visibility along Western Avenue. The building and its surrounding open space will create a welcoming gesture along Western Avenue to invite people into the Project Greenway. Services are shared between the residential and hotel uses, minimizing curb cuts and loading zones. Access to these shared, internalized building services will be integrated into the landscape design, paving design, and architecture, thereby minimizing any impact it may have on the pedestrian realm. By terminating Science Drive at the Cattle Drive intersection, the Project creates more pedestrian-friendly open space, and orients development around a completed portion of the Project Greenway at its center. This intersection between Cattle Drive, Science Drive, and the Project Greenway is envisioned as a key urban moment that is charged with energy and vibrancy. This intersection is being designed to have a pedestrian focus and create the sense of a plaza or town square rather than a conventional street crossing. The arrangement of the buildings, streets, and Project Greenway will allow for the establishment of a critical mass and activate the space to create a lively environment.

A key goal of the approved PDA Master Plan is the creation of publicly accessible open space. In this regard, the Project exceeds the PDA Master Plan goal of 20% open space by providing nearly three acres of publicly accessible open space

Along the ground floor, the building edges facing Cattle Drive, Western Avenue, and East Drive are programmed to be active, both along the streets and along the Project Greenway. Interruptions to these open spaces and sidewalks are minimized through the consolidation of services and loading between buildings, as shown in Figure 4.2a. The Project recognizes the importance of making connections between current residents, future residents, employees, students, researchers, and visitors, and, as such, is designed with generous spaces to gather. To further enhance the character and usability of the publicly accessible open spaces, buildings are sited to account for wind conditions, daylight access, and sources of sound pollution.

In order to enhance the porosity of the Project Site, pedestrian, bicycle, vehicular, and service access are carefully coordinated. These will weave into existing and future infrastructure in order to ensure that the Project Site is accessible and inviting from all approaches. The four streets surrounding the Project will each have a unique character:

- Western Avenue is the primary arrival point for the Project Site, where a generous central drop-off zone for vehicles is integrated into the road layout. The northern ground floor will be activated by the hotel lobby, retail, and the Treehouse Conference Center with its corresponding plaza space. At the center of the Western Avenue edge, pedestrians will be welcomed into the project laneway that leads south to the Project Greenway.
- Cattle Drive, running north-south, will be an important pedestrian and bicycle connector down to Cambridge Street, and eventually beyond to the future West Station as noted in the Framework Plan. This street is designed to incorporate vehicles, transit, cycling, and an active pedestrian realm. Building lobbies, retail and other active uses will also provide active ground floor frontage along Cattle Drive, while loading areas and service access will be reduced to a minimum along this neighborhood main street. This careful consideration of ground floor use and streetscape design will help activate the north-bound pedestrian promenade and adjoining street rooms. Expanded frontage zones, being called "street rooms" will further enrich and expand the pedestrian experience and reciprocity between buildings and the public realm along Cattle Drive.
- East Drive, also running north-south, will be an important connector for vehicular traffic. It incorporates street parking, as well as a potential transit service stop. Along the edge of East Drive, the Treehouse Conference Center will provide significant activation through a generous frontage zone. The lab/office building will also incorporate retail at the ground floor and together with the Treehouse Conference Center frames an expansive opening into the Project Greenway. It, too, will feature bicycle lanes and a thoughtfully designed pedestrian realm.
- DEF Drive completes the Project Site perimeter and primarily will be a street providing access to the existing DEF facility, to the Project's single underground parking garage entry, and to loading and services for the lab/office building.

In addition to generous sidewalks and dedicated bike paths on Western Avenue, Cattle Drive, and East Drive, pedestrian and bicycle movement through the Project Site is further facilitated within the Project Site through shared rights-of-way. It is supported by plaza spaces, a shared use path running east-west, and a pedestrian-only (except for emergency vehicles) laneway connecting Western Avenue to the heart of the Project Greenway.

4.3.2 Relationship to Surrounding Context

The Project is the first piece of a multi-year plan that is illustrated in the 2021 update to the Framework Plan. The design of the streets, open spaces, and buildings consider both the near-term and long-term conditions of the Project Site, in order to enable future integration into a potential larger context.

Open space and connective components of the Project take into account existing urban connections and pathways, such as Western Avenue, Kresge Way, and the shared use path that leads west to the Ray Mellone Park and Rena Park. In the near term, Cattle Drive will extend south and connect to Almy Street, and East Drive will turn into DEF Drive in order to service the lab/office buildings and access the underground parking entrance. The design of Western Avenue will continue the intent initialized by the recently completed portions of Western Avenue in front of the Science and Engineering Complex (SEC), incorporating the proper dimensions, and arrangement and different modes of movement. Additionally, buildings along Western Avenue will create a street presence along it, consistent with the SEC further west.

Building heights comply with the approved PDA Master Plan, and do not exceed the height of surrounding buildings and structures such as One Western Ave, and the DEF. The massing of all buildings seeks to enhance the pedestrian experience - particularly along Western Ave., Cattle Drive, and the Project Greenway – and therefore incorporate appropriate massing responses such as step-backs, expanded frontage zones, and façade articulation. The most integral component of the development, the Project Greenway, is designed to be a connective element to the Allston neighborhood to the west, and eventually toward the Charles River to the east. Its form, planning, and design strive to enhance this future connection, and to provide spaces that are accessible and welcoming. All areas will incorporate planting with native plant species and will seek to create an environment that is unique to Allston.

4.4 Public Realm and Open Space

The proposed improvements create an open and inviting public realm that aims to connect Allston residents with new employees, residents, and visitors of the Project, along with the Harvard community. A primary objective of the open space design is to create an environment that is open and inviting to the public, and to set up the rest of the Framework Plan areas for successful development in the future. Through a range of engaging public spaces, the Project seeks to establish strong connections with existing amenities, build upon completed portions of the open space network, and advance towards a future continuous open space connecting the Honan-Allston Public Library to Soldiers Field Road and toward the Charles River.

The City's Imagine Boston 2030 plan commits to investing in new open space, as well as to developing family- and kid- friendly environments that promote opportunities to play everywhere. Per the Open Space and Recreation Plan, 2015-2021, the Allston-Brighton area offers an open space ratio of 4.83 acres per 1,000 residents, which is lower than the city's average of 7.59 acres. The proposed improvements will help increase the area's open space ratio and follow the plan's goals of envisioning and creating an accessible open space system, enhancing the urban natural environment, and improving quality of life and well-being in the city.

The Project's new, publicly accessible open space area totals nearly three acres of the Project Site, including the approximately 1.4-acre Project Greenway, as well as building frontage zones, laneway, and planned "sidewalk rooms." The sidewalk rooms are areas intended to provide expanded areas adjacent to sidewalks to allow for publicly accessible areas that provide greenery, art or other visual and physical amenities. They provide pockets of resting space on opposite sides of Cattle Drive such that there is a street room on at least one side of the street in any given section, offering a dynamic alternating urban design approach to the previously envisioned one-sided boulevard in the PDA Master Plan. (Refer to Figure 4.13, which delineates the different components of the public realm and open space for the Project.)

Allston has a long history as a place with an experimental arts community and strong cultural identity. The Project is committed to building upon Allston's vibrant artist initiatives and will aim to identify key locations for both temporary and permanent art installations throughout the Project's public realm areas.

The open spaces designed as part of the Project include a range of both active and passive programs designed to meet the needs of different users such as an open plaza, a collaboration and picnic grove, a lawn, and an interactive water feature. These programs are identified in the context of a larger-scale open space design noted in the Framework, which includes an even broader range of programs and activities and significantly increases the open space available for current and future residents and visitors.

Table 4-1 below summarizes the proposed Public Open Spaces and their sizes.

Table 4-1 Proposed Public Open Space

Phase A Publicly Accessible Open Space Elements	Area (SF/Acre)
Project Greenway	Approximately 60,400 SF / ± 1.4 Acres
Other Public Open Space (includes building frontage zones, urban plazas, laneways & sidewalk rooms, but excluding streets and sidewalks)	Approximately 65,700 SF / ± 1.5 Acres
Total Publicly Accessible Open Space (does not include sidewalks, streets)	**126,000 SF / ± 2.9 Acres**

4.4.1 Project Greenway

The approximately 1.4-acre Project Greenway is proposed at the heart of the Project Site, which is consistent with the vision established in the Framework Plan and will create a new publicly accessible open space destination for the surrounding communities, and will bolster the area's connective, pedestrian fabric. Planning and concept development for the Project Greenway has been conducted in continued collaboration with the Framework Plan development; and continues to evolve and to be informed by the Framework Plan's vision for the larger greenway area.

This portion of the open space network will serve as a multi-constituency, multi-seasonal focal point of public realm space and programming. At the center of the Project Greenway, there will be a public plaza surrounded by active programs supporting recreation, everyday gathering, and local performances and events. The Project Greenway design will be flexible and able to accommodate unique seasonal programs and events, such as markets and winter festivals. While remaining open and flexible, the Project Greenway will contribute a significant landscape presence through a robust canopy, plantings, and visible green infrastructure where possible and appropriate, drawing inspiration from the Project Site's natural history of riverine salt marshes and mud flats. Refer to Figure 4.15 for a plan that identifies these interventions, which will help in establishing a rich native habitat and performative landscape to support physical and mental health. Lighting throughout the Greenway will balance a sense of visibility and legibility with minimizing light pollution; Project Team will contact Mass Audubon for consultation.

The Project Greenway will be visible and accessible from multiple points outside the Project Site, including along Cattle Drive, East Drive, and through the laneway leading from Western Avenue. When accessing the Project Greenway from the west, visitors are welcomed by an open urban plaza which is planned to span both sides of Cattle Drive upon the completion of Phase B. This intimate point of the Project Greenway, measuring approximately 90' from building to building, is wider and more open than the proposed greenway width as outlined in the approved PDA Master Plan. The crossing of Cattle Drive in this area is emphasized using a tabled crosswalk, emphasizing pedestrian and bicycle safety, and strengthening connectivity across the Cattle Drive. Immediately east of the plaza and between the west lab building and the residential building, the Project Greenway includes outdoor seating in a comfortable shaded grove. The grove can be used as a collaborative work environment, provide seating for workers or residents during lunch hour, and offer space for other spontaneous or programmed social gatherings. A raised accessible platform at the eastern edge of the grove can be used as a stage, which can face into the grove for smaller, intimate performances.

At the center of the Project Greenway, a large plaza activated with a playful water feature creates a key public, family-friendly destination, intended to draw a wide range of visitors of all ages. Designed as a flexible surface, the water feature can be turned off to allow the full plaza to be used for large events, gatherings, or special seasonal activities.

The eastern area of the Project Greenway houses a gently sloped lawn, located between the east lab and the Treehouse Conference Center. The lawn acts as an extension of the plaza and offers a flexible surface for lounging, small group gathering, and play.

At the easternmost area of the Project Greenway, visitors approaching from East Drive are welcomed by a densely planted stormwater retention basin (depicted in Figures 6.5a and 6.5b) which includes paths with intimate seating and immersive learning areas. Stormwater management is expressed and made visible as part of the design, referencing the region's historic riverine marsh ecology. Wide paved entry areas are located between the planted retention basin and the Treehouse Conference Center and east lab building, inviting pedestrians and cyclists into the Project Greenway; and setting up the connection for future phases of the greenway development to the east.

Frontage areas of the lab, residential, and Treehouse Conference Center facing the Project Greenway may host outdoor restaurant or café seating, or other retail and programming elements extending from the building interior onto the outdoor space. These are proposed as a visual extension of the Project Greenway space, supporting an active and successful retail edge, while the Project Greenway areas such as the grove, plaza, lawn, and stormwater retention basin are intended for wide public use, with no expectation of participation in retail activities.

Solar exposure, prevailing wind directions, and overall thermal comfort were taken into consideration in the design of the Project Greenway, and in the location and orientation of the various component buildings, both to maximize usability of the space through the seasons and to mitigate urban environmental stresses such as heat island effect.

A multifaceted public art strategy will be developed as part of the Project, including permanent and temporary art installations. The landscape design is intended to draw attention to site narratives such as its Native American and ecological histories.

Figure 4.14 depicts the conceptual Project Greenway plan, and Figures 4.16a through 4.16g depict images of the conceptual Project Greenway design.

4.4.1.1 Shared Use Path

A continuous and accessible shared pedestrian and bicycle path will traverse the Project Greenway between Cattle Drive and East Drive, contributing to a continuous future connection from the Allston neighborhood toward the Charles River. Path materiality, lighting, and other features will be designed in coordination with the larger greenway of the Framework Plan for visual and experiential consistency. The shared use path is envisioned as a path for leisurely strolling or cycling where users of different modes and abilities can share the space safely. At the intersection of the shared use path with Cattle Drive, a tabled mid-block crossing provides safe crossing for pedestrians and cyclists for visitors from the west. At the intersection of the shared use path with East Drive, a wide mid-block crosswalk provides safe crossing for pedestrians and cyclists to future phases of the greenway to the east. The shared used path is depicted in Figures 4.17 and 4.18.

4.4.2 Urban Design Approach to Cattle Drive

Envisioned as the Framework Plan's main pedestrian-focused street, a refined approach is proposed for Cattle Drive that further strengthens its promenade character. A series of publicly accessible outdoor "street rooms" are envisioned, creating a dynamic series of sidewalk expansions on alternating sides of the street, which add interest and preserve a human-scaled street section. The street rooms will have a distinct character increasing the range of available public activities and the level of pedestrian interest along the street. In addition to activating the pedestrian realm, the street rooms offer flexibility and opportunity to include greater canopy trees and greenery along the street, where sub-surface utilities might otherwise preclude. The streetscape design will respond to the street room locations with variation in paving material and furnishing to support increased opportunities for social interaction and to highlight the public-facing nature of the street rooms. In addition to the street rooms, the intersection between Cattle Drive, Science Drive and the Project Greenway will create the opportunity for a plaza-like space to be incorporated, further enhancing the pedestrian oriented focus of these streets, and seamlessly connecting them to the Project Greenway and shared use path.

4.4.3 Laneway and Urban Plazas

A laneway connecting Western Avenue directly to the Project Greenway, at the heart of the Project Site, will be located between the Treehouse Conference Center, and the residential and hotel buildings (Buildings 4 and 5). The laneway will be designed with a distinctly urban character, surrounded by active ground floor uses and lobby entrances to residential, hotel, and conference center uses. Canopy trees and other site elements will define and direct circulation between the different programs and establish a clear primary path between Western Avenue and the Project Greenway.

The plazas surrounding the Treehouse Conference Center will maintain a public and inviting character.

4.4.4 Streetscape Improvements

New streetscapes by the Proponent are proposed along the south side of Western Avenue, East Drive, DEF Drive, and Cattle Drive.

Streetscape improvements along the southern side of Western Avenue are intended to connect seamlessly with planned improvements to the west, maintaining a continuous bike path embedded within the sidewalk and separated from pedestrian circulation by distinct paving materials and tree planting. The proposed sidewalk width will maintain uninterrupted accessible pedestrian walkway throughout. Street lighting along Western Avenue will continue the established pattern and maintain Boston standards for light levels.

The proposed design for streetscapes along East Drive and Cattle Drive maintains consistency in the street section, continuing the pattern established along Western Avenue including a continued and separated bike path at sidewalk level, a furnishing and planting zone, and an accessible pedestrian walkway. The street section along DEF Drive is more space-constrained and will therefore not include separated bike paths. Materiality and fixtures for the streetscapes will be coordinated with the Institutional Master Plan standards used along Western Avenue, while creating variation in paving color and texture as well as sidewalk seating intended to establish a distinct yet related character along the Project Site’s streetscapes. Streetscape planting will include native or adapted urban-tested street trees selected in coordination with the Boston Parks & Recreation Department and set in structural soil with sufficient root space to minimize compaction of soils.

Building frontage zones and street rooms may include flexible retail and restaurant seating designed to help activate the street and create a lively and engaging environment.

4.5 Proposed Building Designs

The five buildings of the Project will be designed by a world-class group of architects and planners, setting a new standard for urban planning, public space, and architectural excellence in Allston. The Design Team has worked within the building envelopes set out in the master plan design, has complied with the height limits laid out in the PDA Master Plan, and has continued to prioritize the open spaces and pedestrian realm. Buildings will be designed in accordance with an overall design approach to achieve high quality, sustainable, and forward-thinking architecture. That approach prioritizes the human scale and pedestrian realm, and considers architectural approaches and materials that can yield unique but well-coordinated designs between each building. High quality materials, and carefully considered façade designs will further contribute to the sense of scale and quality of the buildings.

In order to create continuity and legibility in the architecture across the master plan design, certain building facades are identified with a need to be complementary or conceptually alike. Given the large variation of building shapes and sizes, which helps maximize open space, the facades of each building will play a key role in distinguishing buildings from each other, and ensuring that buildings come down to a human scale. This metric applies to individual building massings for the purpose of lending each a unique identity, while remaining coordinated with the rest of the master plan design.

The design intent is for façades to have texture and relief to give visual interest by producing depth and variation, and a human scale.

4.5.1 Height and Massing Approach

Figure 4.3 illustrates the planned Project building height and massing, and Figures 4.4a through 4.10a-d present proposed building elevations and sections, respectively. In order to develop a permeable mixed-use plan and building massing that emphasizes sensitivity to human scale, contextual street widths and building heights were studied with respect to the Allston neighborhood, Western Avenue, the Charles River, Cambridge Street, and Cambridge across the river. As such, structures that reach the taller heights are located farthest from sensitive boundaries such as the residential neighborhood and the Charles River. Height is concentrated in the middle of the Project, and planned height limits of 190 feet for residential and hotel, and 140 feet for Lab/office remain consistent with the PDA Master Plan. Along Western Avenue, a street wall is maintained by the Hotel building, which is planned to share a podium with two residential buildings: a low rise along Cattle Drive, and a high rise placed in the inner part of the site. The Treehouse Conference Center holds an important edge of the Project Site along Western Avenue, with direct adjacency to Harvard Business School, and welcoming plazas and laneways provide access from Western Avenue to the Project Greenway.

The maximum anticipated building heights (excluding provisions for mechanical penthouses) for the Project are as follows:

- Building 1 - Treehouse Conference Center - approximately 100 feet;
- Building 2 - Lab/Office - approximately 140 feet;
- Building 3 - Residential - approximately 100 feet;
- Building 4 - Hotel - approximately 190 feet; and
- Building 5 - Residential - approximately 190 feet.

4.5.2 Design Approach for Individual Buildings

4.5.2.1 Building 1 – Treehouse Conference Center

Treehouse Conference Center Design & Concept

The Treehouse Conference Center plays a key role in the Enterprise Research Campus, serving as a visual and programmatic anchor within the initial development phase. As a welcoming "front door" to the Project Site, the design reimagines the conference center as a low-carbon building and a destination of intellectual, social, and commercial life. In both its programming and its siting, the Treehouse Conference Center will serve as a welcoming hub for gatherings and events of all types, and as a gateway for the entire Enterprise Research Campus.

The approximately 61,500-square-foot facility features an active and open ground level that supports social gathering as well as breakout space for larger events. A "welcoming to all" approach will be a common thread through the design of the ground floor and surrounding public realm informing programming, accessibility, and aesthetics. The retail and public zone of the Treehouse Conference Center will activate the new district and extend and complement the energy of the Project Greenway's programming and gathering spaces.

The second and third levels address Harvard's need for expanded, flexible and self-sufficient conferencing. A large divisible ballroom is balanced with a variety of meeting spaces that support a dynamic conferencing experience. The upper levels are centered around a dynamic stair and atrium, with informal gathering spaces and lounge areas arrayed along a vertical spine, inviting conference attendees to enjoy ad hoc convening with views out to the Project Greenway. A beacon in more than just image, the building will lead by example with a design that achieves ambitious sustainability goals beyond typical compliance measures. As part of the climate-positive approach, the Treehouse Conference Center will have a low-carbon mass timber structure, highly efficient conditioning and lighting systems, and robust water management infrastructure. Healthy materials and excellent interior air quality are also central to the design. In addition to meeting Harvard's Green Building Standards, the project will include on-site renewable energy sources and pursue Living Building Challenge Core Green Building Certification.

Figures 4.6a-c and 4.10a present proposed Treehouse Conference Center elevations and sections, respectively.

4.5.2.2 Building 2 – Lab/Office

Lab/Office Design Concept & Vision

The lab/office building designed by Henning Larsen and Studio Gang will share services, and will feature a convener space to welcome a diverse range of people into the building. Its position on the south edge of the Greenway has made terracing and stepping a desirable massing approach, and has given each building a unique, but complementary identity. In addition to the convener program, the two massings of the building will share a series of terraces located in between them that will carry the design-intent of the Greenway onto the building.

The two visually related but distinct massings are carefully coordinated to contribute to the overall architectural composition of the Project, as well as to serve as a visual and acoustical buffer to the open space and residential buildings from the District Energy Facility.

The lab/office building is envisioned to compose three parts; two distinct but complementary massings on the east and west which are appropriately oriented toward the open space immediately north of each, and a connector piece housing shared elements. Through a series of lush terraces, the connector visually carries the Project Greenway vertically, further emphasizing the importance of the public realm as the Project Greenway character carries up and into the building. The massing of all three elements works consistently with the focus on the Project Greenway, by creating step-backs that increase the amount of daylight to the open space as part of the micro-climate strategy.

Massing Concept

The east lab/office massing contains focused stepping and articulation on the north-west corner, in order to open up to the Project Greenway and provide tenant terraces looking back to the Allston neighborhood. This massing articulation reduces the perceived height of the building, prioritizing the human scale at the Project Greenway gently curving inward. It further softens the massing's reading within the block. A warm, toned façade with three primary tiers of the building further humanizes the scale and softens the reading of the massing.

The west lab/office massing responds to its program, views, and the surrounding urban context. To maximize the amount of afternoon sunlight that reaches the Project Greenway, the building's upper floors gradually step back along the northern facade as they rise upward. At the lower floors, this massing creates a protected pedestrian connection for the building entrances and storefront, which continues around to the west on Cattle Drive. On the upper floors, the stepping opens up planted and occupiable terraces, which look down onto the Project Greenway, and provide building occupants with close connections to the outdoors and living vegetation.

Program & Use Description

At ground level, the lab/office building's front-of-house programming supports pedestrian engagement, with generous openings in the perimeter, creating fluid indoor-outdoor connections and supporting the energy of the Project Greenway's various activities. In addition to the lobbies and other active uses that wrap the building's three public sides, a centralized convener space is envisioned to accommodate a range of activities.

The single underground parking entry for the Project is located at the southern edge of the lab/office building, facing DEF Drive. The south-facing shared loading and services area provides direct and convenient access for the tenant spaces above, while being entirely located on DEF Drive, the least pedestrian-oriented street supporting the Project. The upper floors of the building are designed for flexibility for lab/office tenant use, with occupiable and planted terraces.

Ground Floor

At the ground floor, active uses have been wrapped along the most public building edges - the Project Greenway, Cattle Drive and East Drive. In addition to the programming, the building volumes enhance frontage zones that provide sheltered building entries, and spill-out zones in order to create a more direct and porous relationship to the Project Greenway and adjacent pedestrian realms. The service and back-of-house components of the building are consolidated along the south façade and will integrate access to the underground parking servicing all Phase A buildings.

At street level, the generous setbacks and chamfered northwest corner improve pedestrian flow and foster a clear, fluid relationship between indoors and outdoors. The West Lab design proposes a continuous setback along Cattle Drive to further encourage pedestrian uses and increase the connections between the Project and its surroundings. The building's cantilever creates protected outdoor spaces that widen the frontage zone on the Project Greenway.

Façade & Materiality

The horizontality of the west lab/office massing is further accentuated with continuous glazing at the lab/office levels, giving the workspaces panoramic views across the entire Project. The solid "strata" façade layers that alternate with the glass lend the architecture additional human scale and texture. The materiality of this layer will be explored further in the subsequent design phase to complement that of the east lab/office massing's warm terracotta, together working to create a harmonious yet distinct pairing that anchors the southern half of the Project.

The connector piece of the building stands as a neutral element, yielding attention to the architecture east and west of it. A highly transparent façade will enhance the collective nature of the space, glowing out into the Project Greenway and welcoming visitors. Terraces in the connector piece will further enhance its role not only as a link between the two sides of the building, but also to the public realm of the Project Greenway.

These current façade concepts will be further studied to achieve a high-performance, low-carbon envelope by using lightweight materials, integrating green building systems, and optimizing fabrication.

Figures 4.9a-c and 4.10d present proposed Lab/office building elevations and sections, respectively. Lab/Office building images are illustrated in Figures 4.11a-c.

4.5.2.3 Buildings 3+5 – Residential

Residential Design Concept & Vision

The master plan design calls for two separate buildings, a low rise and a high rise, atop a podium that is shared with the hotel. The design vision imagines two programmatically and visually related residential buildings, connected at the ground floor. The buildings are all-sided, to better engage with their surroundings while featuring expressive facades all around. The design addresses both the collective scale of the site as well as the individual scale of the residential unit.

Massing Concept

The design concept for the 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 Allston neighborhood, City and Charles River. This scheme provides all apartments with corner qualities. The articulation of the façade is further generated by varying the depth of each unit. The overall massing patterns of stacked typologies are governed by a gradient of sizes that smoothly transitions from smaller forms closer to the ground to larger ones at the top, transitioning from human scale to building scale.

Ground Floor

The podium is a truly mixed-use structure, accommodating a complex collection of retail, lobbies, residential amenities, and service programs. The two large ground floor spaces facing the Project Greenway are envisioned to house activities that will spill out onto the sidewalk and populate the public realm. The main residential lobby is located on Cattle Drive, and an adjoining amenity and service spaces will lead tenants to the high-rise lobby on the opposite side of the ground floor, along the laneway. The shared podium terrace is conceptualized as a lifted ground plane. A visual extension of the Project Greenway seeping through the buildings and featuring lush landscaping, with vegetation spilling over from the podium edges, visually connecting them to the Project Greenway.

Façade & Materiality

The residential buildings have a sharp, chiseled look, panoramic windows and bays that pop in and out. The facades are designed to appear solid in character while incorporating interactions with the outdoor wherever possible, through the use of large picture windows and glazed corners. The design has an inviting, textured quality, identifying this building as a place for living. A punched window facade with solid panels meets the desire to create a building envelope with depth and a sense of mass. Vertical glazed ribs will run along the horizontal spandrels while the vertical column covers will be lined with horizontal ones, generating an inter-woven pattern that will respond to light with sparkling reflections at different times of day. A limited set of possible window configurations will create a playful and varied façade pattern while controlling the complexity of the façade system.

Figures 4.7a-c and 4.10b present proposed Residential building elevations and sections, respectively. Residential building images are illustrated in Figures 4.11c-d.

4.5.2.4 Building 4 – Hotel

Hotel Design Concept & Vision

The hotel building is a figural portrait, standing among the historic tapestry of Allston. Marking the important corner of Western Avenue and Cattle Drive, the hotel building presents an iconic figure, identifiable at the scale of the City while framing a thoughtful streetscape. The broad sides that face north and south have a taut, shallow skin to reinforce the frontal character of the hotel while the short, east/west facing sides frame expanses of glass, opening the hotel to the surrounding context.

Program & Use Description

This new lifestyle hotel caters to the diverse market that surrounds Allston. In addition to its hotel rooms, it will host a variety of mixed-use services, retail, and restaurant destinations. The ground floor primarily consists of retail and restaurant spaces, made flexible to accommodate a variety of tenants. The retail program, and the accompanying street room, activate the corner of Western Avenue and Cattle Drive, creating an amenity that serves pedestrians in the Allston neighborhood and those using the Project Greenway.

Massing Concept

The hotel's massing is set back from Western Avenue to provide a more generous streetscape, proportional to the scale of the hotel. Similarly, the hotel's high rise mass is set back on Cattle Drive to balance the scale of the Allston neighborhood, complemented by new greenspace and an array of diverse frontages along both the eastern and western faces of the hotel. The movement of the high rise portion south and east separates it from the sensitive boundaries of the surrounding context, concentrating verticality towards the center of the Project Site. Standing strong and offset slightly from the intersection, the hotel rises with the final three floors projecting outward to the east, setting up dramatic views towards the Charles River.

Ground Floor

Framing the northern boundary of the Project, the ground floor of the hotel is designed to be inviting and creates a series of pedestrian focused street rooms, moments of relative quiet in the bustle of the city. Carved porches on the east and west and a covered walkway to the north, enhance the streetscape, offering shade and shelter while creating opportunities for the activities of the ground floor to spill out into the public realm. Along these edges, retail space is connected to a series of street rooms. The expanded streetscape along Western Avenue, created by a generous setback, also prioritizes an active lifestyle that emphasizes the pedestrian and the cyclist. The building façade is organized to emphasize a sensitivity to human scale and the context, occasionally complemented by terraces that invite the character of the street life up into the hotel building.

Façade & Materiality

Drawing inspiration from Allston and greater Boston, the material palette of the hotel is anticipated to consist of a metal panel façade system finished with a mixture of diffuse and reflective coatings that will resonate with the colors of the surrounding buildings and gently reflect the Boston sky. The north and south elevations reinforce the figural quality of those faces, broken only by the dynamic composition of window openings. A variety of panel sizes add scale and texture to the elevation, creating an appearance that varies in different light and weather conditions for a unique visitor experience. Enhancing the figural quality of the north and south, the east and west elevations frame expanses of subtly articulated glass, offering dramatic views of Allston to the west and downtown Boston to the east.

Figures 4.8a-b and 4.10c present proposed building elevations and sections for the Hotel, respectively.

4.6 Views

The Proponent has created a series of images which depict the Project as seen from several relevant locations adjacent to the Project Site. The images depict the Project buildings in relation their surroundings, and the images are presented for both build and no-build conditions. For more information on these views, please reference Figures 4.12a through i.

4.7 Accessibility

4.7.1 Site Accessibility

The Project Site is effectively flat at the north, south, west, and east property lines, along which there is complete pedestrian accessibility to and from the proposed programs within the Project Site limits. The proposed publicly accessible walkways along all streets will have pedestrian barrier-free accessibility to and from the Project Site. Refer to Figure 4.19a for a diagram of the accessible ground level for the Project, and Figures 4.19b-c for the accessible parking diagrams.

The Project will improve accessibility around the Project Site. All site conditions are planned to provide a smooth paved accessible path-of-travel to building entrances and egresses as required by the Massachusetts Architectural Access Board (MAAB) and City of Boston's Commission of Person with Disabilities Advisory Boards. All roadways are designed to favor easy and full access to public buildings and open spaces on the Project Site, including direct entry to parking lots and on-street parking. Circulation routes are designed to improve the pedestrian experience through accessible sidewalks with comfortable walking widths and plentiful street amenities such as seating. Where appropriate, curbless environments, which favor pedestrian movement when vehicular volumes are low, will be used. All pedestrian routes will be kept to a maximum five percent grade in compliance with Americans with Disabilities Act ("ADA") regulations. Refer to the completed Accessibility Checklist in Appendix B for additional details.

With regards to open space, the Project will provide accessible transitions from grade into publicly accessible open spaces including the Project Greenway and will provide access to all Project Site amenities for people of all abilities. All publicly accessible open spaces will be designed in accordance with universal accessibility guidelines including material choices, grading and inclusive access for all individuals, activities and programs planned for the space. Open spaces will be at-grade with primary circulation routes or will be connected to them via ramps (maximum five percent grade) integrated into the landscape. All open spaces will be readily accessible via public transportation and/or vehicular drop-off areas.

Figure 4.1

Neighborhood Context Plan

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.

Project Site Boundary

- Project Site Boundary
- Active Ground Floor Uses
- Lab/Office Lobby
- Hotel Lobby
- Residential Lobby/Common Area
- Conference Center Lobby
- Back of House
- Protected Cycle Track
- Shared Use Path
- Pavement
- Sidewalk
- Roadbed
- Lawn
- Planting
- Tree Canopy
- Building Entries
- Loading/Service Access
- Parking Entry/Exit

N

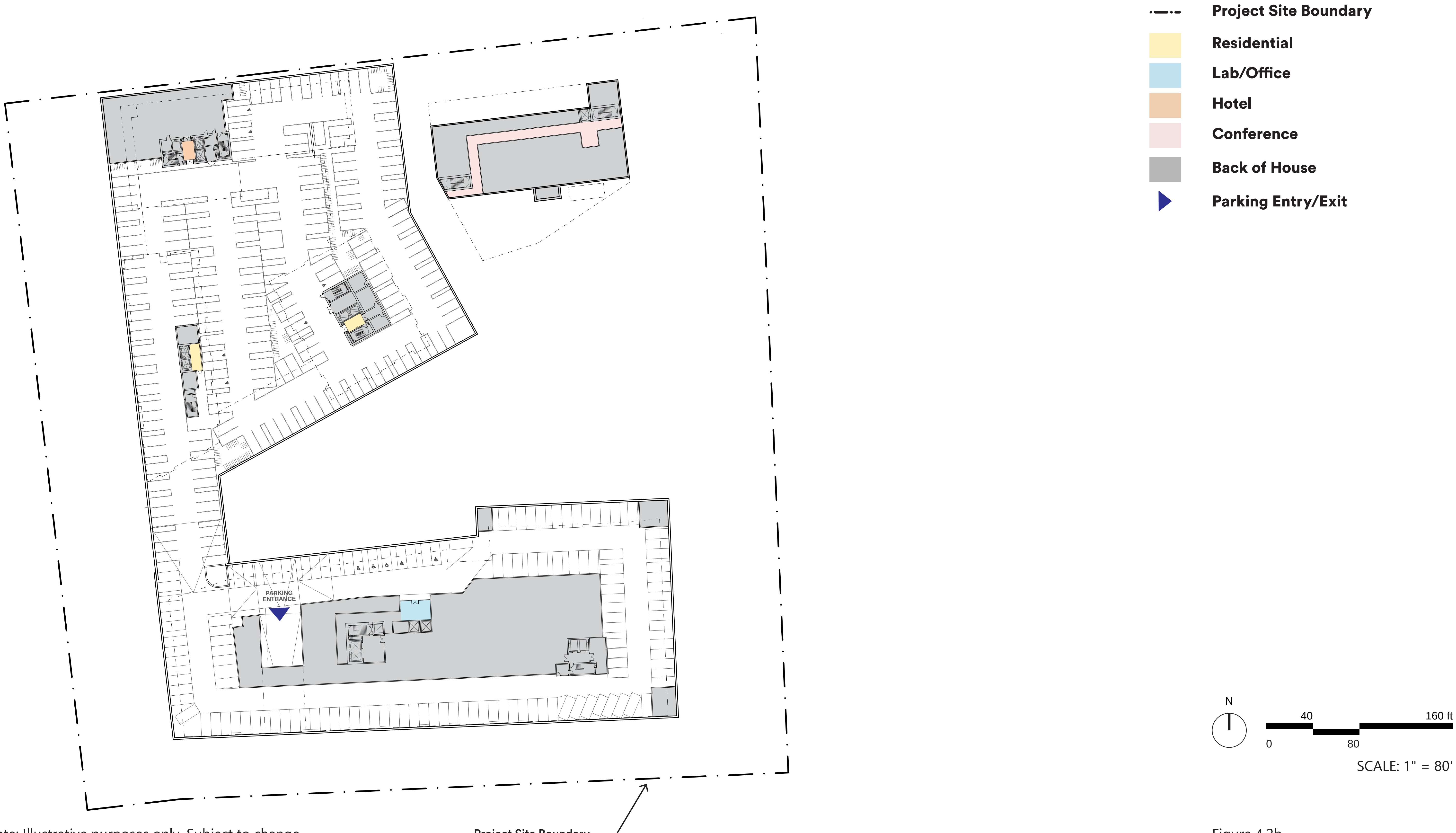
0 40 80 160 ft

SCALE: 1" = 80'

Figure 4.2a

Proposed Project Floorplans
Ground Floor
Enterprise Research Campus Project
Boston, MA

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



Note: Illustrative purposes only. Subject to change.

Figure 4.2b

Proposed Project Floorplans
Lower Level
Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.

Figure 4.2c

Proposed Project Floorplans
Typical Upper Levels
Enterprise Research Campus Project
Boston, MA

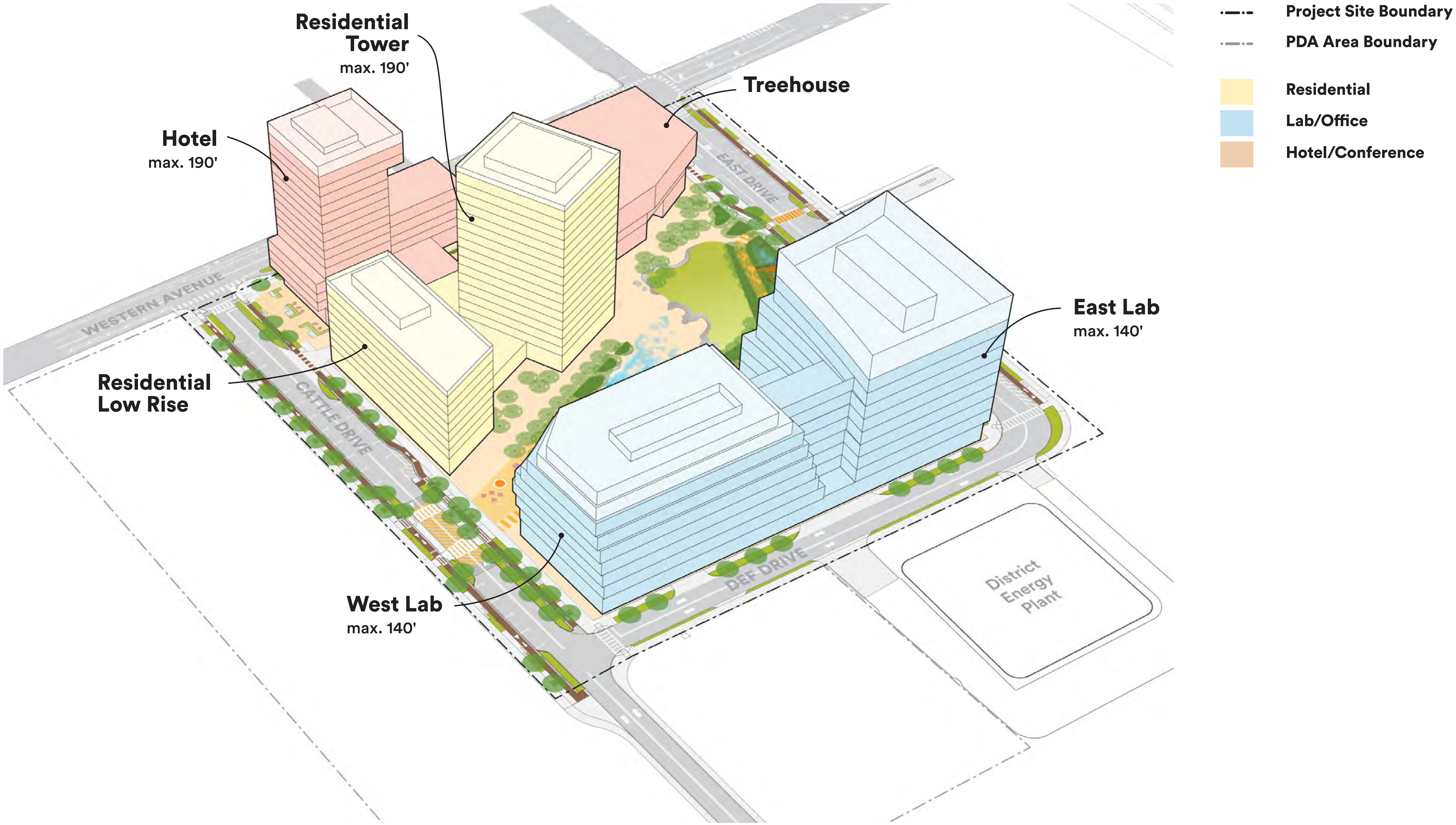
Prepared by: Henning Larsen, Studio Gang, Utile and Scape

Note: Illustrative purposes only. Subject to change.

Figure 4.2d

Proposed Project Floorplans
Roof Plan
Enterprise Research Campus Project
Boston, MA

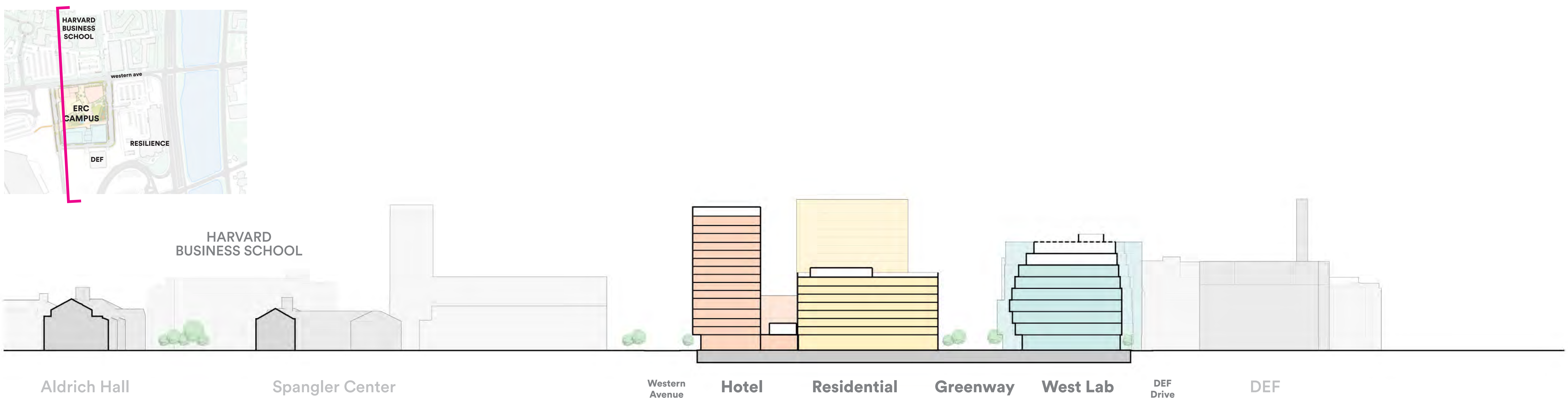
Prepared by: Henning Larsen, Studio Gang, Utile and Scape



Note: Illustrative purposes only. Subject to change.

Figure 4.3
Massing Diagram

Enterprise Research Campus Project
Boston, MA



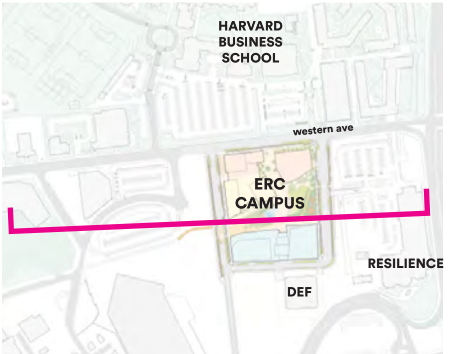
Note: Illustrative purposes only. Subject to change.
Surrounding building information from Boston Planning & Development Agency 3D Smart Model

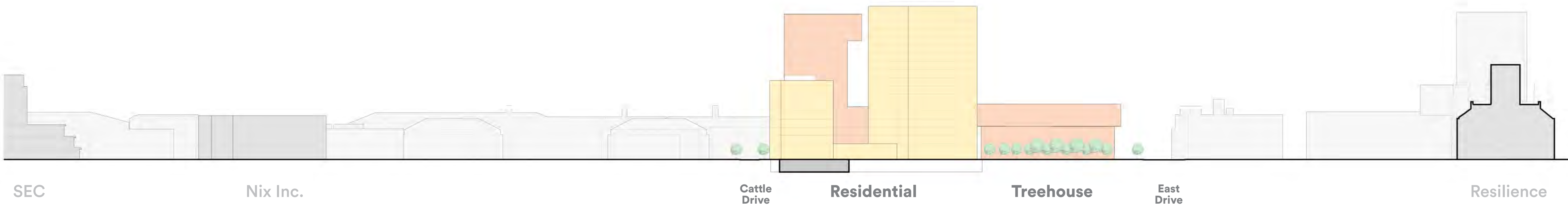
SCALE: 1/128" = 1'-0" 0 40 80 160 ft

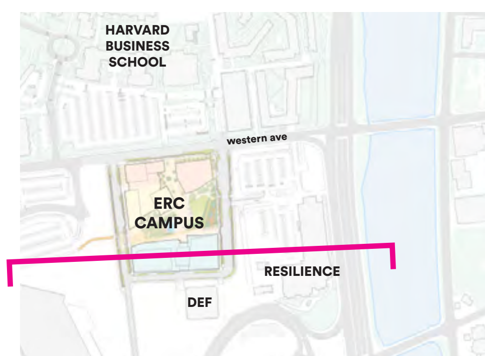
Figure 4.4a
Overall Section North-South

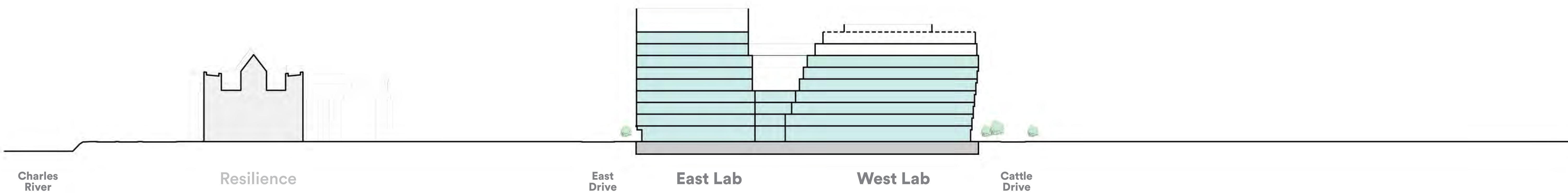
Enterprise Research Campus Project
Boston, MA

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









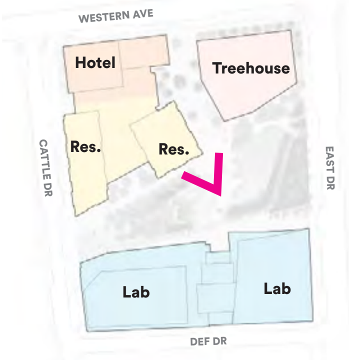
Note: Illustrative purposes only. Subject to change.
Surrounding building information from Boston Planning & Development Agency 3D Smart Model

SCALE: 1/128" = 1'-0" 0 64 128 256 ft

Figure 4.4b
Overall Section West-East

Enterprise Research Campus Project
Boston, MA

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



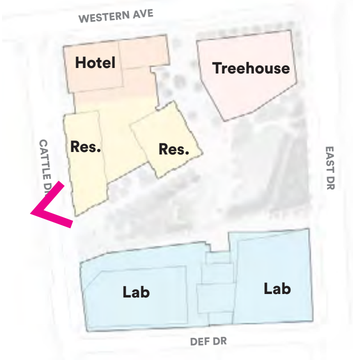
Note: Illustrative purposes only. Subject to change.

SCALE: 1/48" = 1'-0"   0 24 48 96 ft

Figure 4.5a

Proposed Project Elevations
Greenway North

Enterprise Research Campus Project
Boston, MA



Note: Illustrative purposes only. Subject to change.

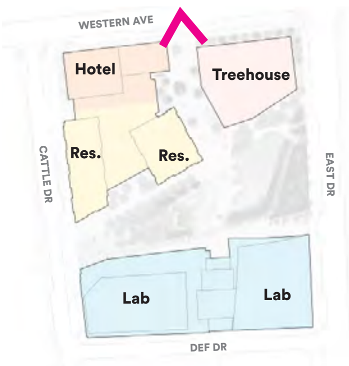
SCALE: 1/48" = 1'-0"   0   24   48   96 ft

Figure 4.5b

Proposed Project Elevations
Cattle Drive

Enterprise Research Campus Project
Boston, MA

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



Note: Illustrative purposes only. Subject to change.

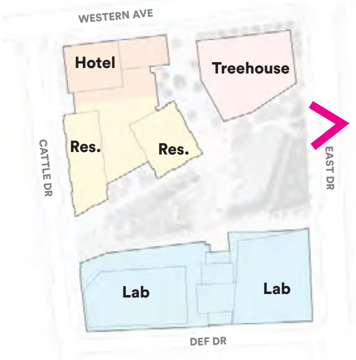
SCALE: 1/48" = 1'-0" 0 24 48 96 ft

Figure 4.5c

Proposed Project Elevations
Western Avenue

Enterprise Research Campus Project
Boston, MA

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



Note: Illustrative purposes only. Subject to change.

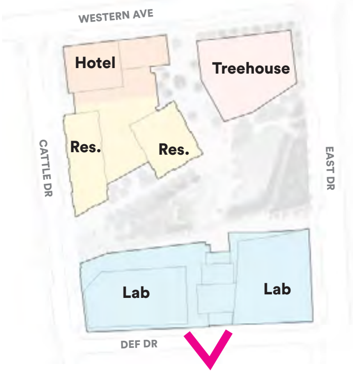
SCALE: 1/48" = 1'-0" 0 24 48 96 ft

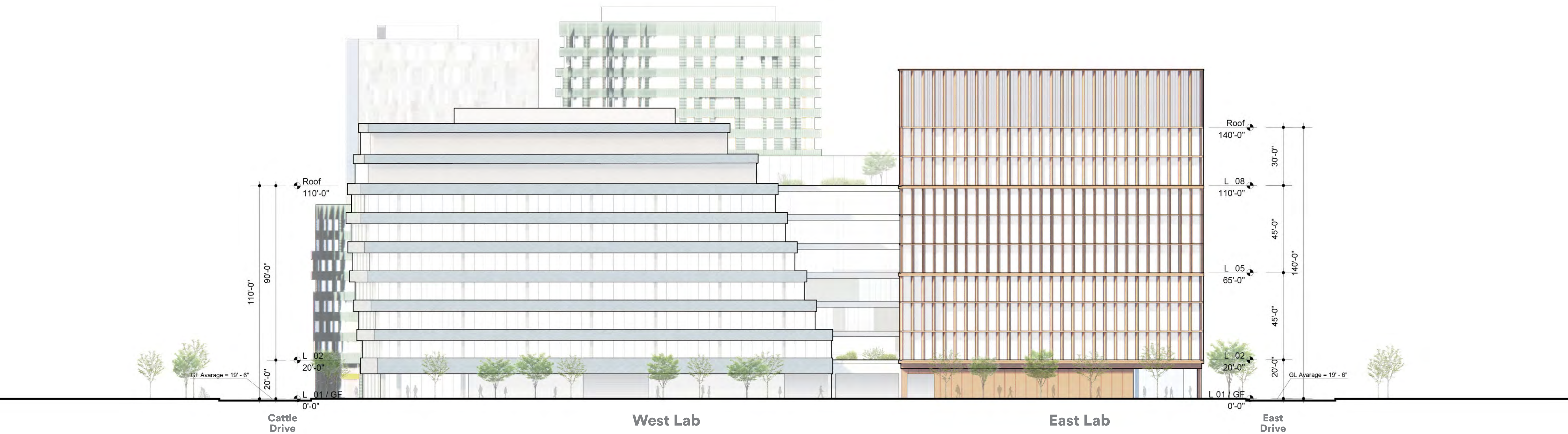
Figure 4.5d

Proposed Project Elevations
East Drive

Enterprise Research Campus Project
Boston, MA

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





Note: Illustrative purposes only. Subject to change.

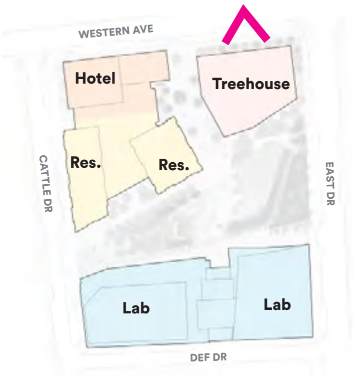
SCALE: 1/48" = 1'-0" 0 24 48 96 ft

Figure 4.5e

Proposed Project Elevations
DEF Drive

Enterprise Research Campus Project
Boston, MA

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



Note: Illustrative purposes only. Subject to change.

SCALE: 1/32" = 1'-0"

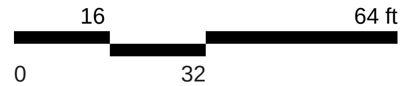
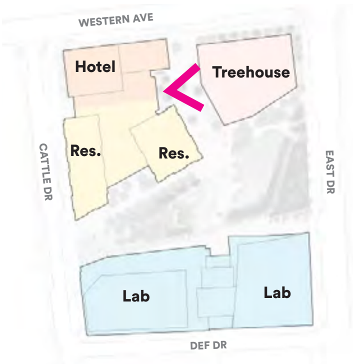


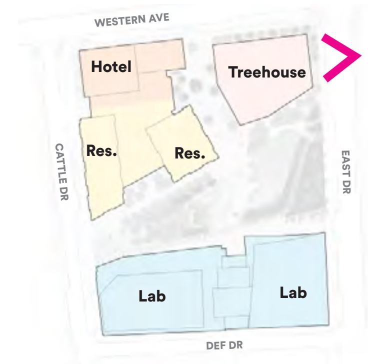
Figure 4.6a

Building Elevations - Conference Center North

Enterprise Research Campus Project
Boston, MA

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





Note: Illustrative purposes only. Subject to change.

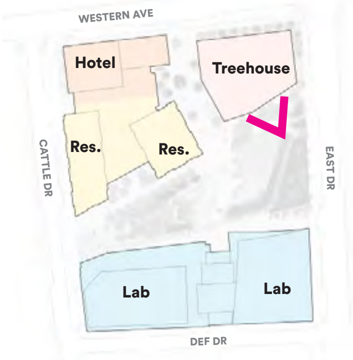
SCALE: 1/32" = 1'-0" 0 16 32 64 ft

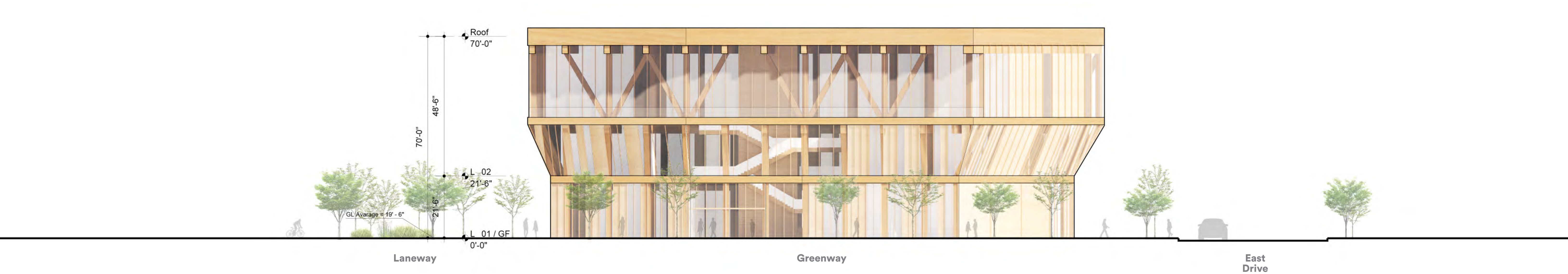
Figure 4.6b

Building Elevations - Conference Center
West & East

Enterprise Research Campus Project
Boston, MA

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





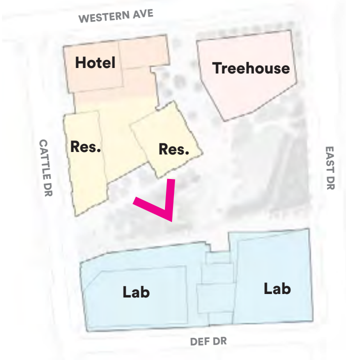
Note: Illustrative purposes only. Subject to change.

SCALE: 1/32" = 1'-0" 0 16 32 64 ft

Figure 4.6c

Building Elevations - Conference Center South

Enterprise Research Campus Project
Boston, MA



Note: Illustrative purposes only. Subject to change.

SCALE: 1/32" = 1'-0"

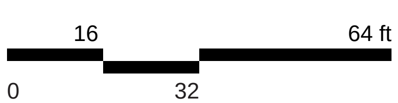
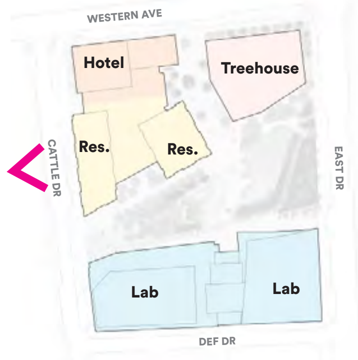


Figure 4.7a

Building Elevations - Residential South

Enterprise Research Campus Project
Boston, MA

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



Note: Illustrative purposes only. Subject to change.

SCALE: 1/32" = 1'-0"

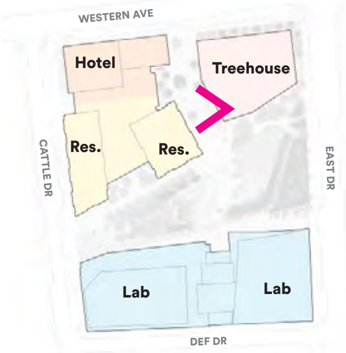
16 64 ft
0 32

Figure 4.7b

Building Elevations - Residential
West

Enterprise Research Campus Project
Boston, MA

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



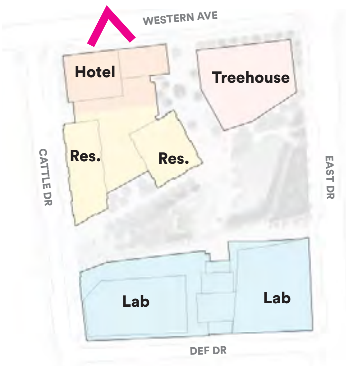
Note: Illustrative purposes only. Subject to change.

SCALE: 1/32" = 1'-0" 0 16 32 64 ft

Figure 4.7c

Building Elevations - Residential East

Enterprise Research Campus Project
Boston, MA



Note: Illustrative purposes only. Subject to change.

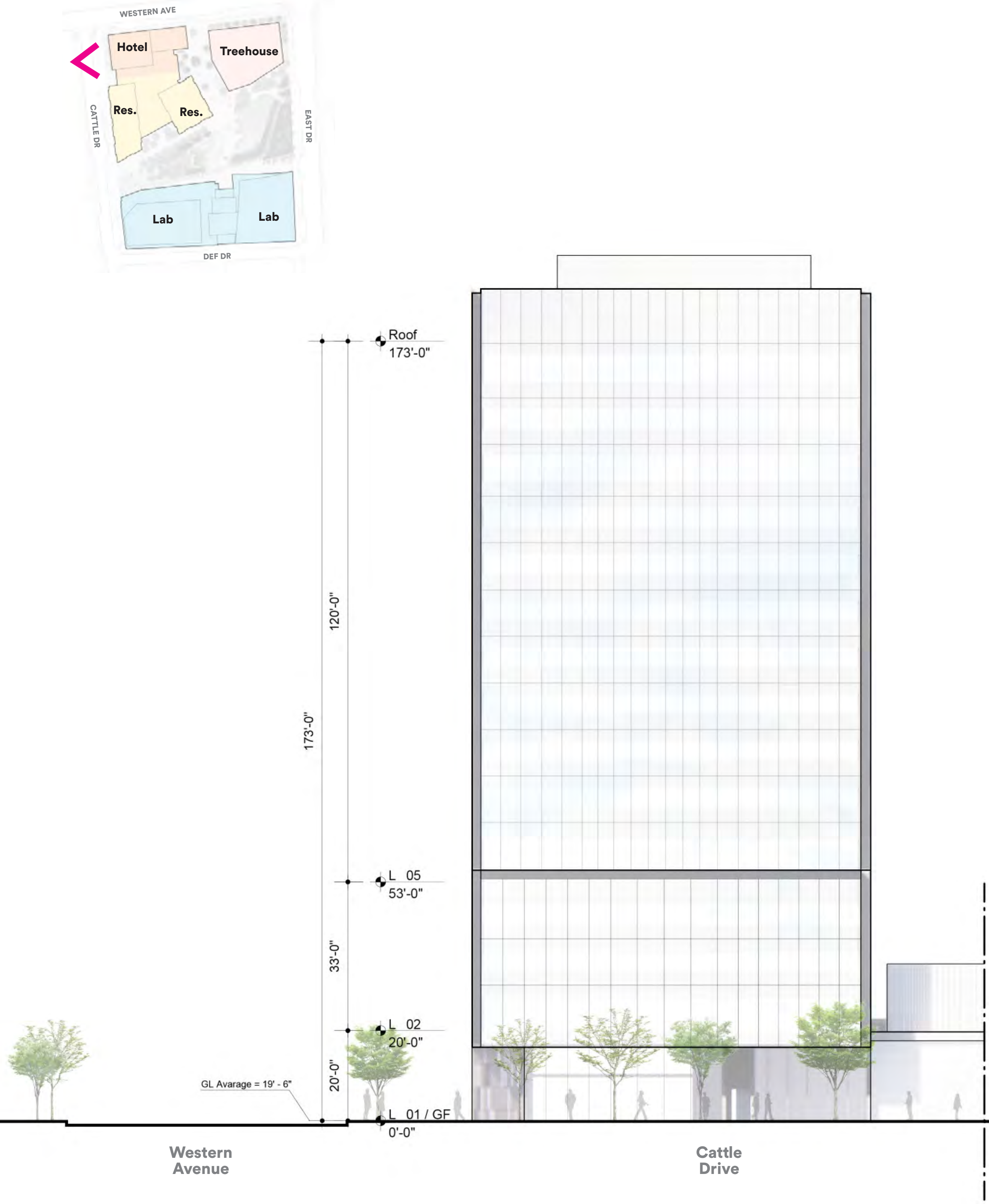
SCALE: 1/32" = 1'-0"   0 16 32 64 ft

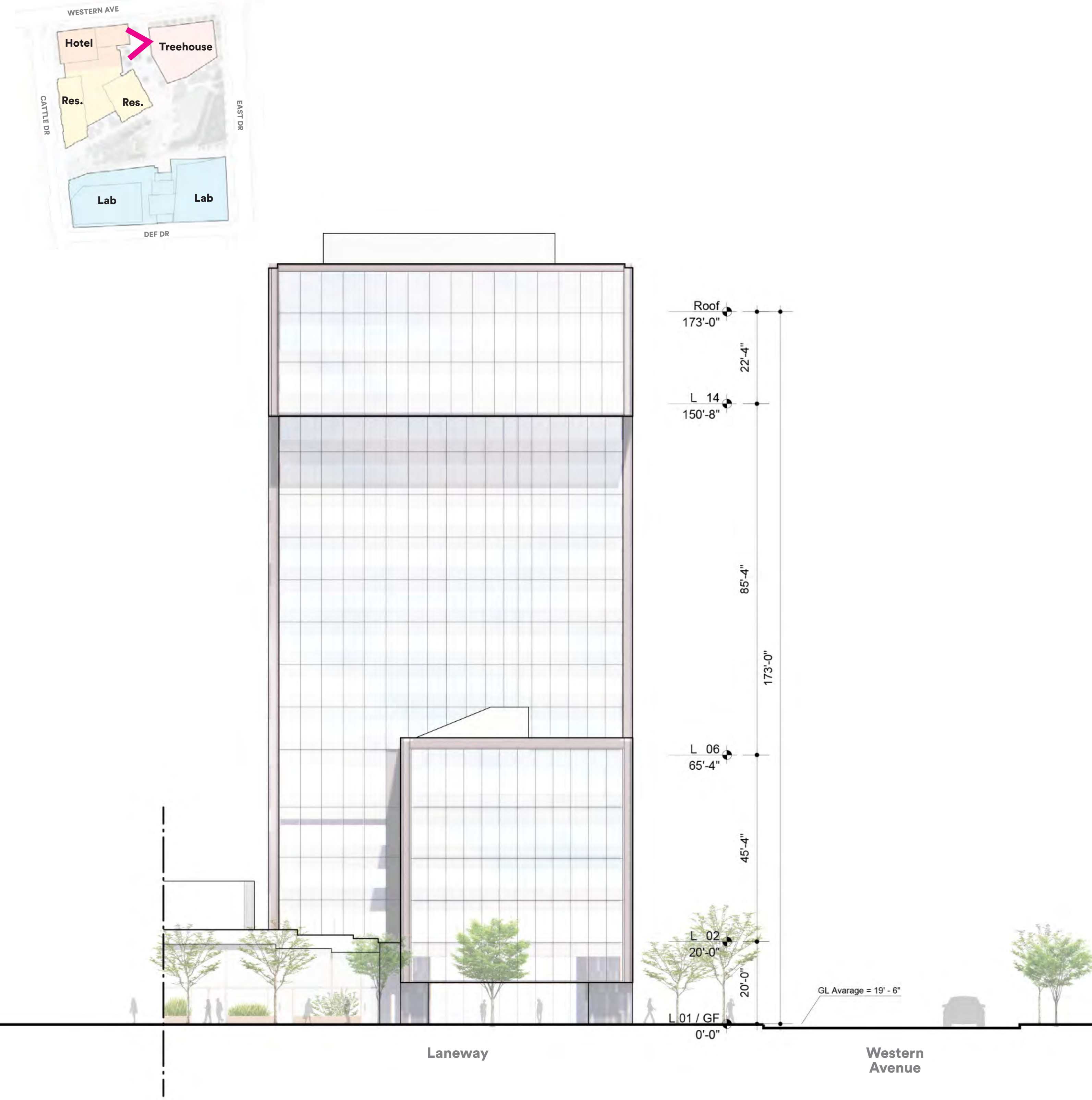
Figure 4.8a

Building Elevations - Hotel
North

Enterprise Research Campus Project
Boston, MA

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





Note: Illustrative purposes only. Subject to change.

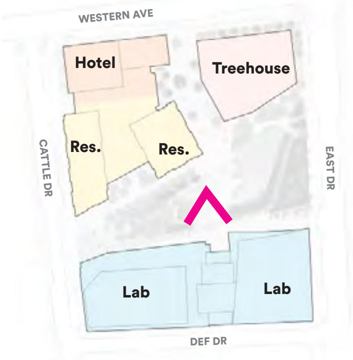
SCALE: 1/32" = 1'-0" 0 16 32 64 ft

Figure 4.8b

Building Elevations - Hotel
West & East

Enterprise Research Campus Project
Boston, MA

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



Note: Illustrative purposes only. Subject to change.

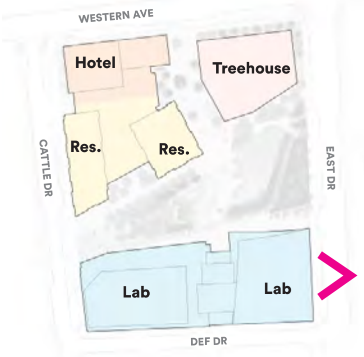
SCALE: 1/32" = 1'-0"   0 16 32 64 ft

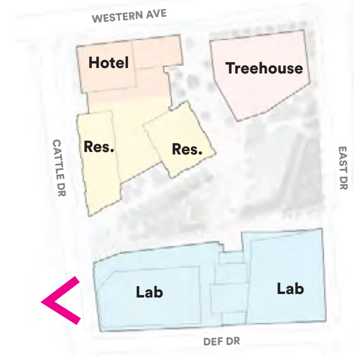
Figure 4.9a

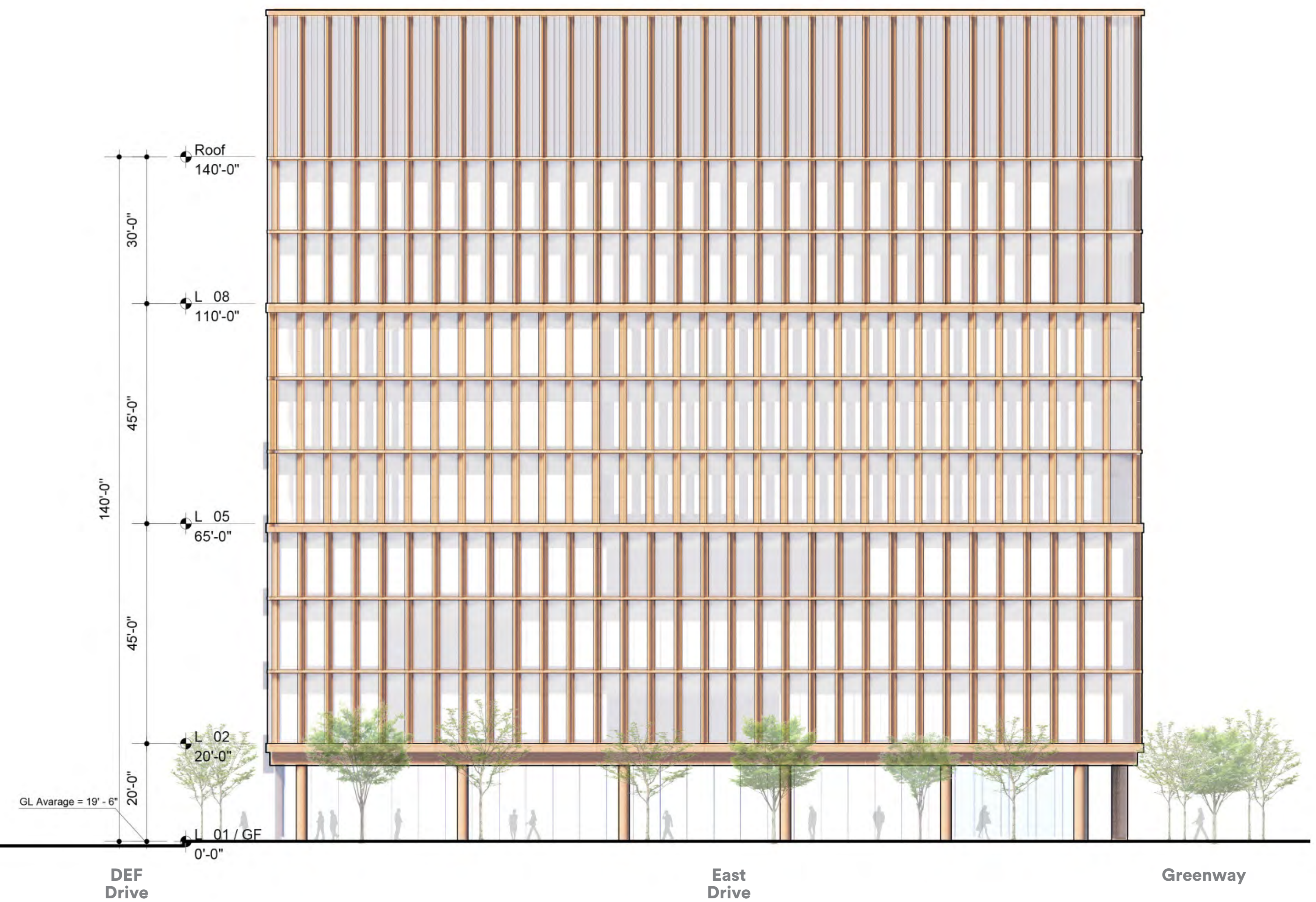
Building Elevations - Lab North

Enterprise Research Campus Project
Boston, MA

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







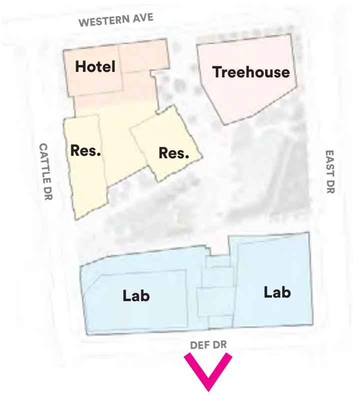
Note: Illustrative purposes only. Subject to change.

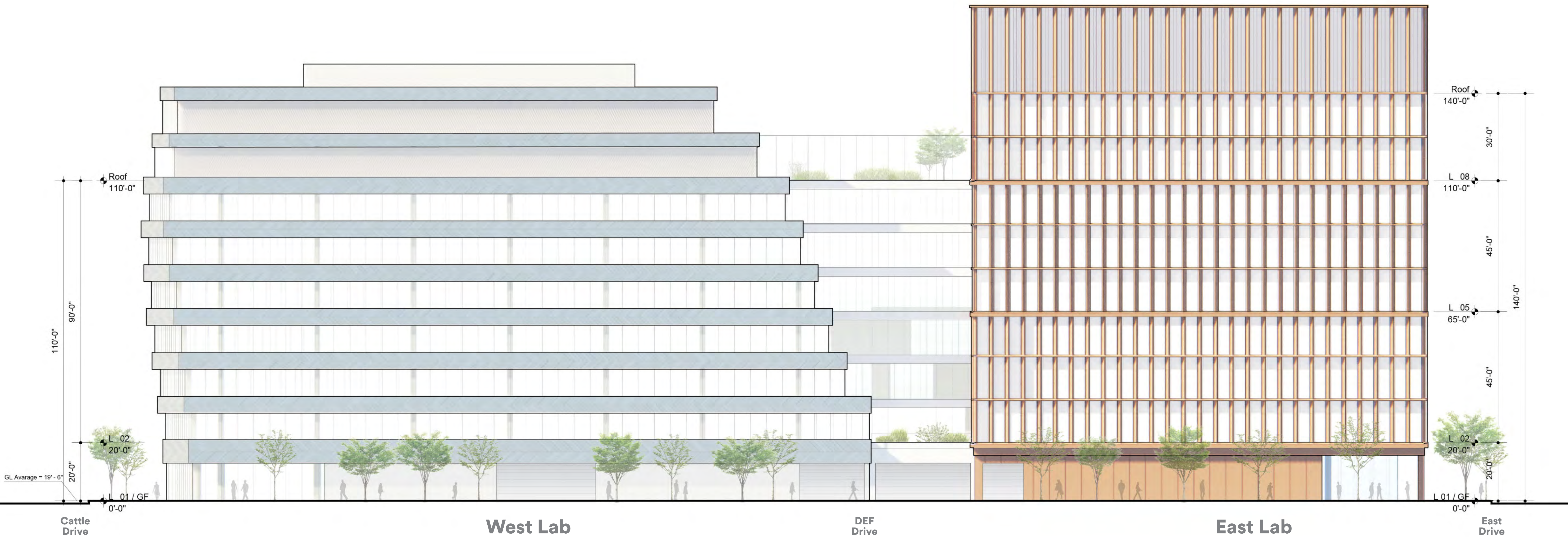
SCALE: 1/32" = 1'-0" 0 16 32 64 ft

Figure 4.9b

Building Elevations - Lab
East & West

Enterprise Research Campus Project
Boston, MA





Note: Illustrative purposes only. Subject to change.

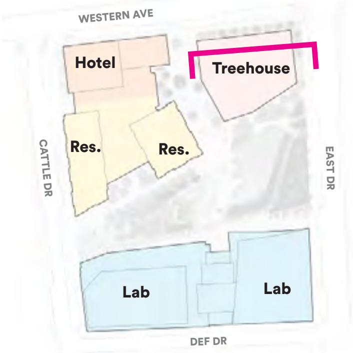
SCALE: 1/32" = 1'-0"   0 16 32 64 ft

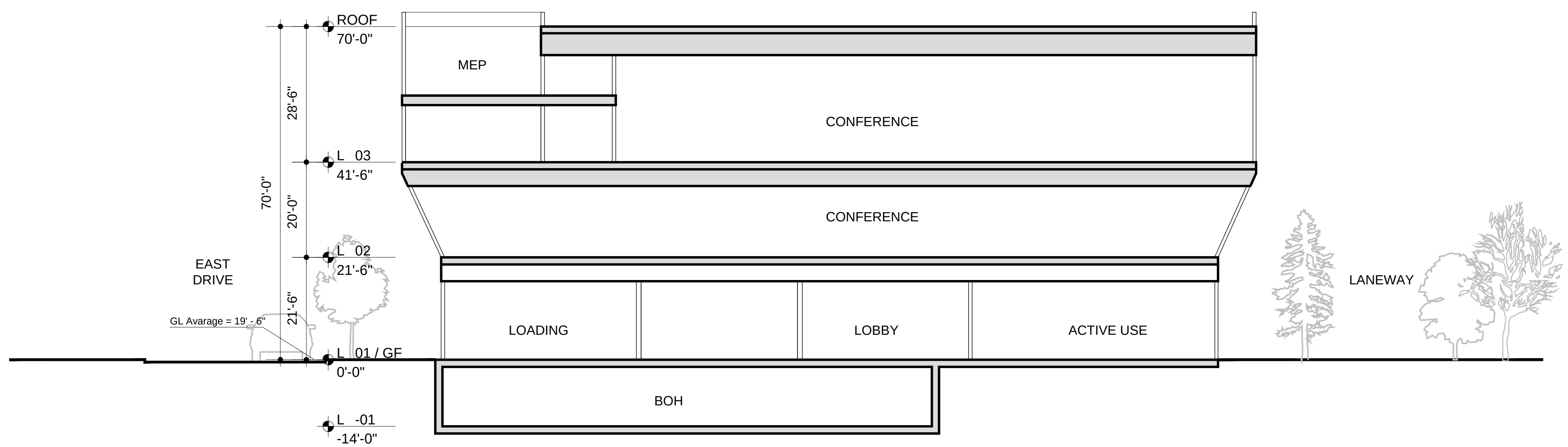
Figure 4.9c

Building Elevations - Lab
South

Enterprise Research Campus Project
Boston, MA

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





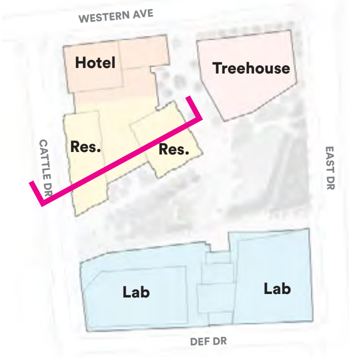
Note: Illustrative purposes only. Subject to change.

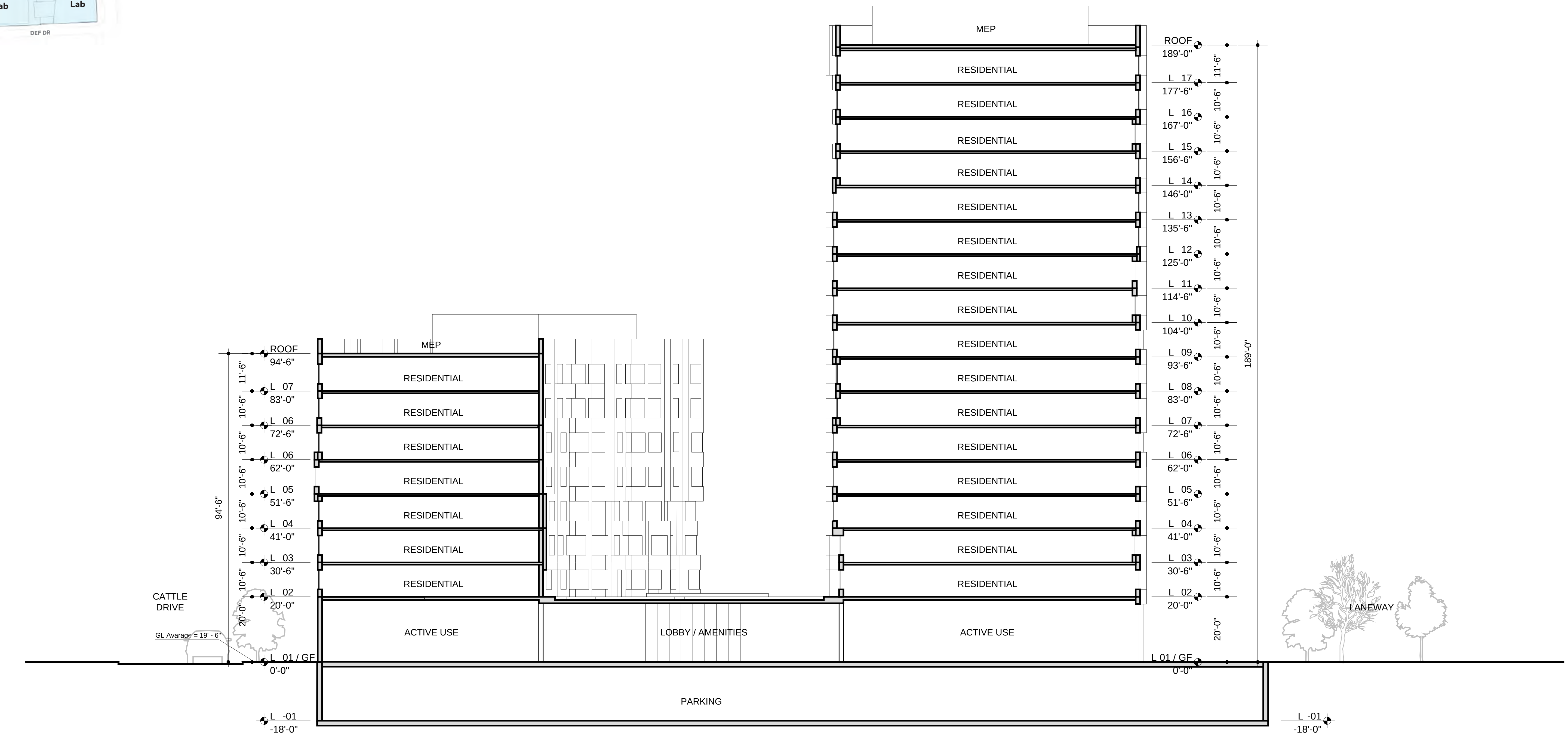
SCALE: 1/32" = 1'-0" 0 16 32 64 ft

Figure 4.10a

Building Sections - Conference Center

Enterprise Research Campus Project
Boston, MA





Note: Illustrative purposes only. Subject to change.

SCALE: 1/32" = 1'-0"

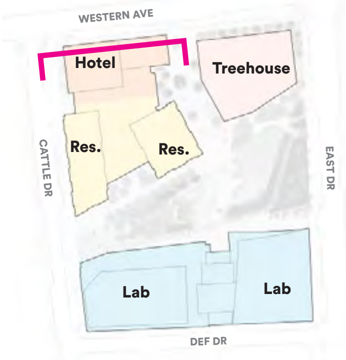
0 16 32 64 ft

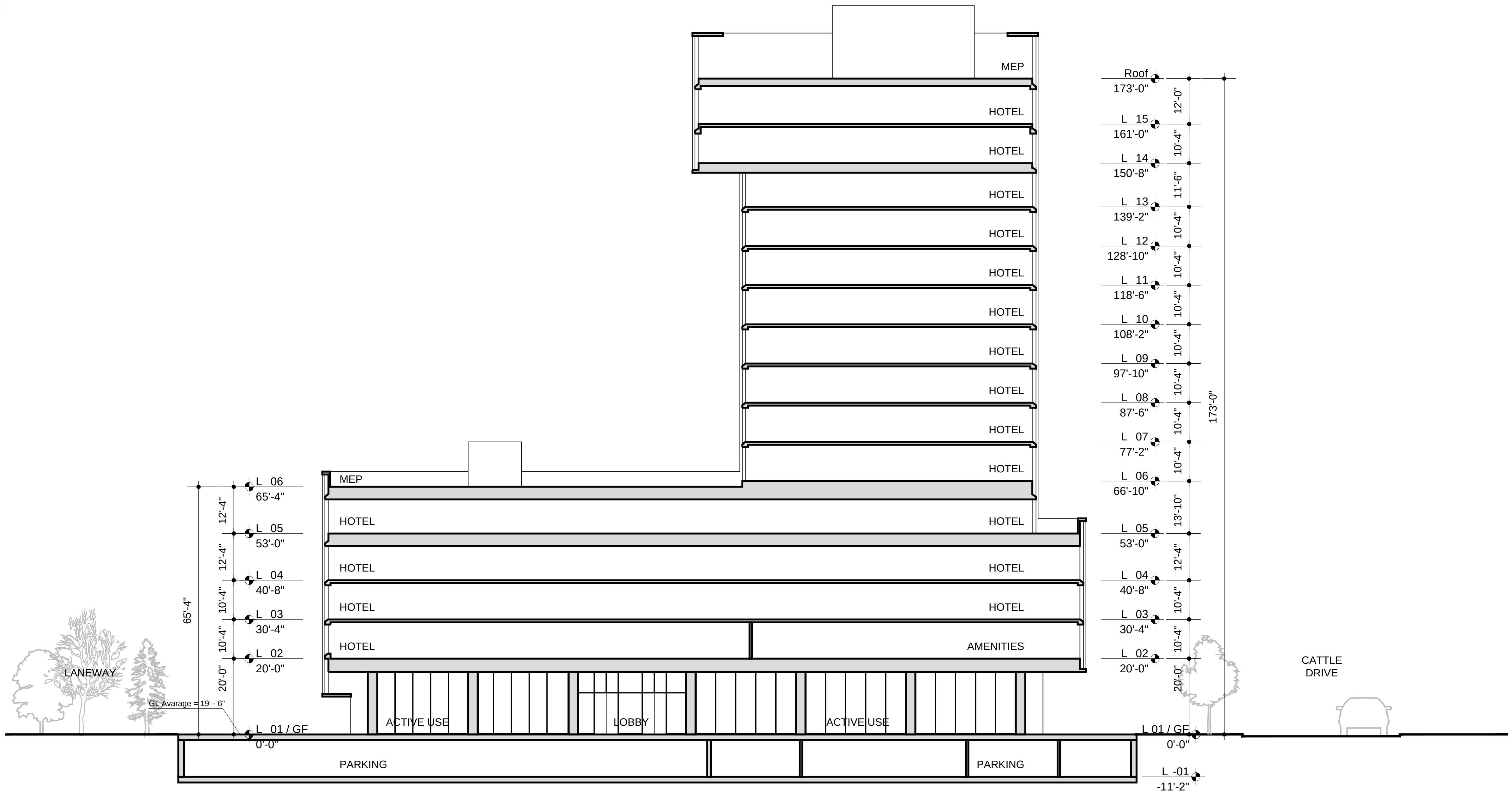
Figure 4.10b

Building Sections - Residential

Enterprise Research Campus Project
Boston, MA

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





Note: Illustrative purposes only. Subject to change.

SCALE: 1/32" = 1'-0"

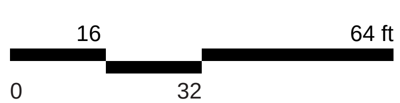
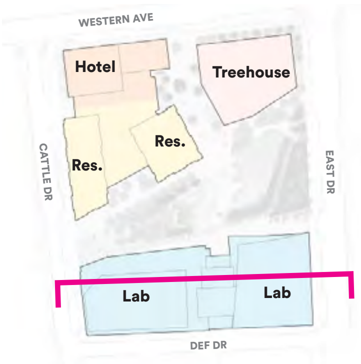
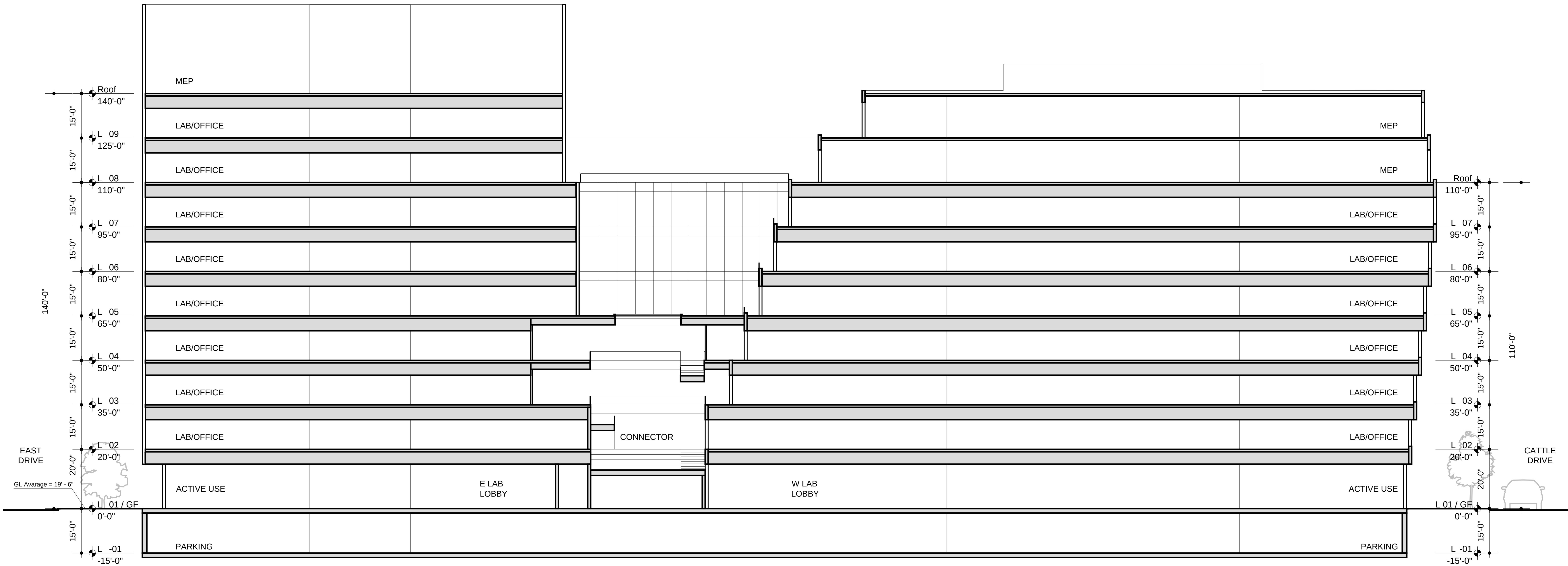


Figure 4.10c

Building Sections - Hotel

Enterprise Research Campus Project
Boston, MA





Note: Illustrative purposes only. Subject to change.

SCALE: 1/32" = 1'-0"

16 64 ft
0 32

Figure 4.10d

Building Sections - Labs

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only.
Subject to change.

Figure 4.11a

Project Renderings
From Plaza looking South

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.

Figure 4.11b

Project Renderings
From East Dr. looking West

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.

Figure 4.11c

Project Renderings
From Lawn looking West

Enterprise Research Campus Project
Boston, MA

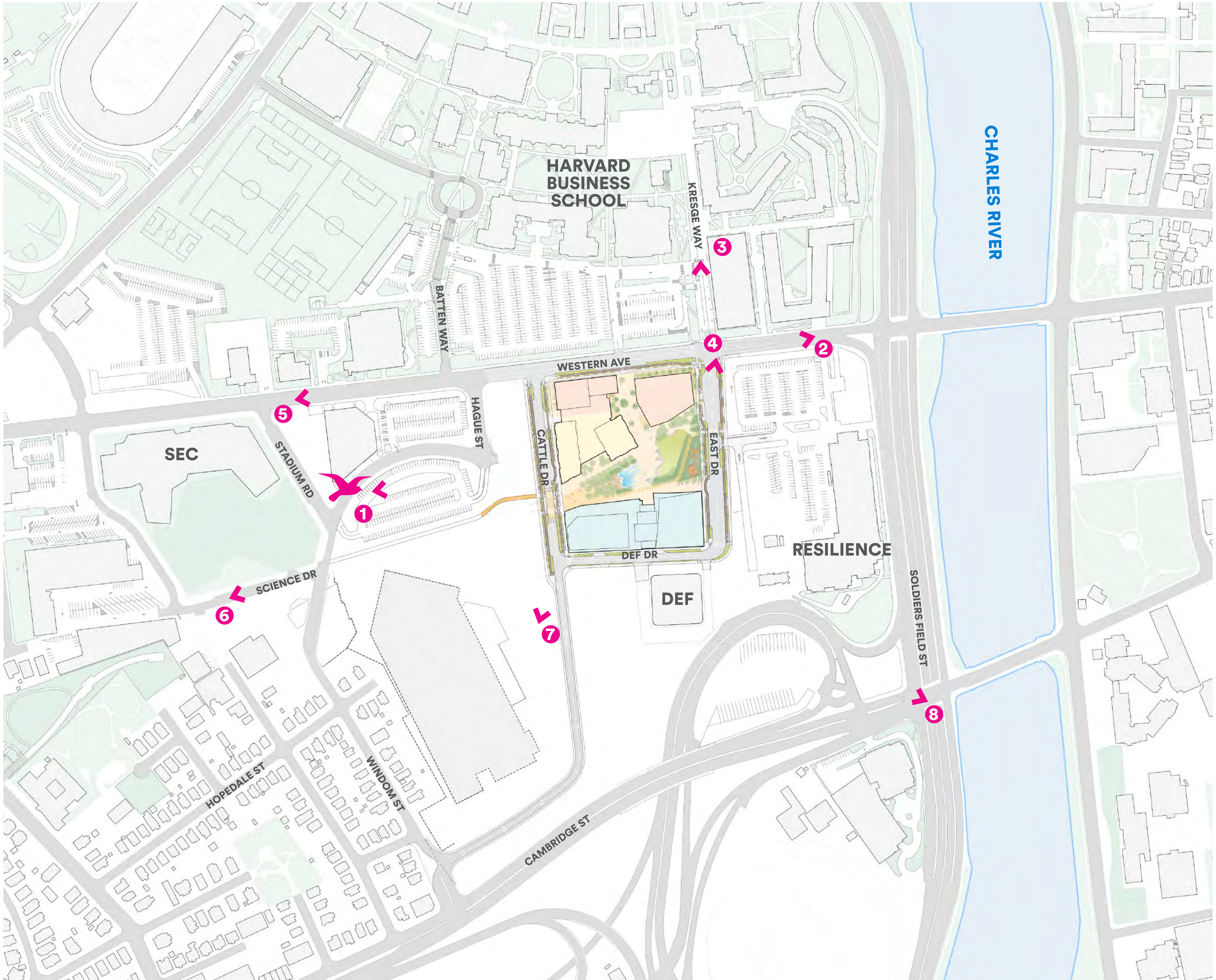
Prepared by: Henning Larsen, Studio Gang, Utile and Scape

Note: Illustrative purposes only. Subject to change.

Figure 4.11d

Project Renderings
From Cattle Dr. looking East

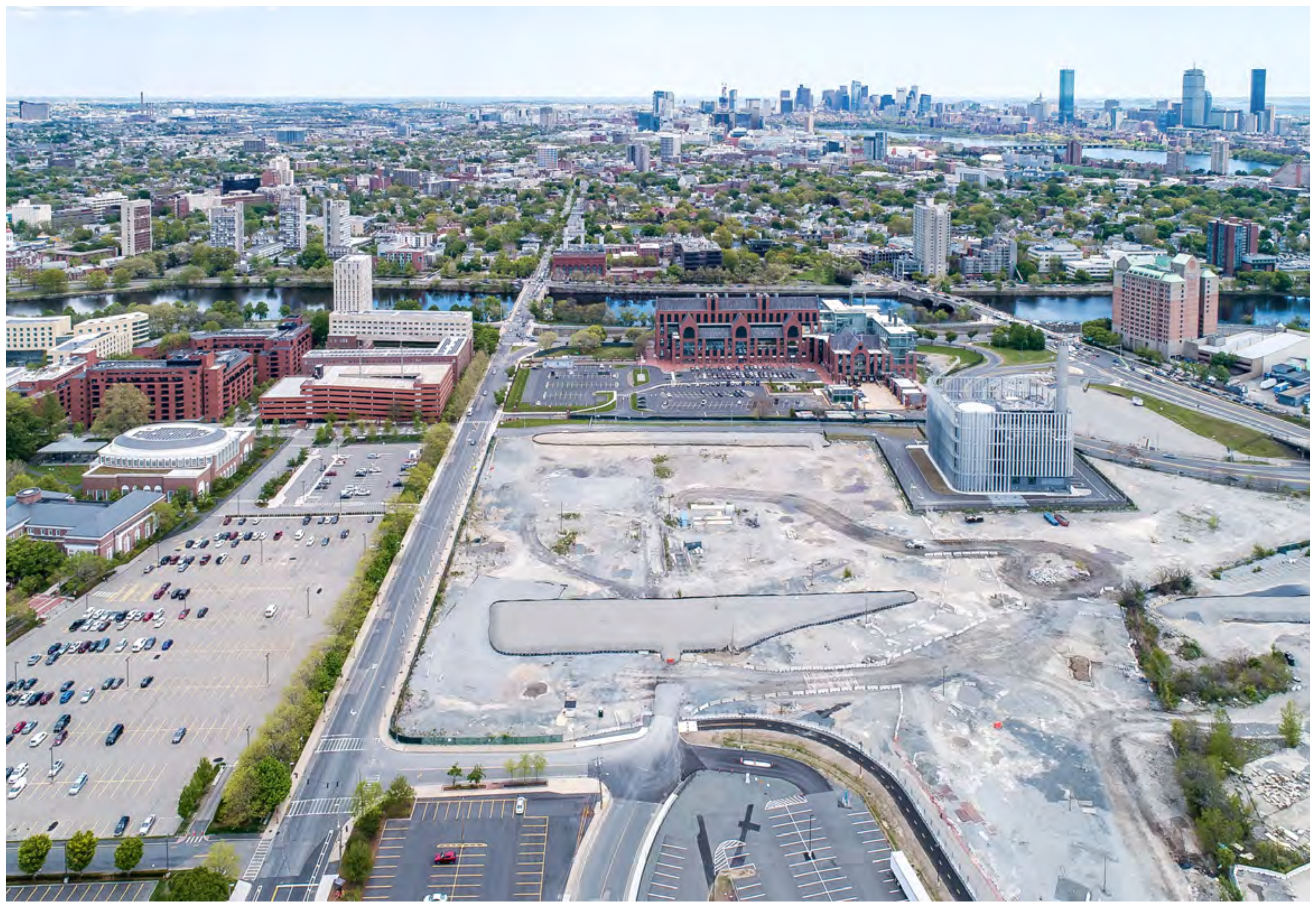
Enterprise Research Campus Project
Boston, MA



1 Aerial Looking East
2 Western Ave. Looking West
3 Kresge St. Looking South
4 Western Ave. & Kresge St.
5 Western Ave. Looking East
6 Science Dr. Looking East
7 Cattle Dr. Looking North
8 Soldiers Field Rd. Looking North-West

Figure 4.12a
View Perspectives - Key Plan

Enterprise Research Campus Project
Boston, MA



NO BUILD CONDITION

PHASE A CONDITION

Note: Illustrative purposes only. Subject to change.

Figure 4.12b

View Perspectives - View 1
Birds-eye Looking East

Enterprise Research Campus Project
Boston, MA

NO BUILD CONDITION

PHASE A CONDITION

Note: Illustrative purposes only. Subject to change.

Figure 4.12c

View Perspectives - View 2
Wester Ave. Looking West

Enterprise Research Campus Project
Boston, MA

NO BUILD CONDITION

PHASE A CONDITION

Note: Illustrative purposes only. Subject to change.

Figure 4.12d

View Perspectives - View 3
Kresge St. Looking South

Enterprise Research Campus Project
Boston, MA

NO BUILD CONDITION

PHASE A CONDITION

Note: Illustrative purposes only. Subject to change.

Figure 4.12e

View Perspectives - View 4
Western Ave. & Kresge Way

Enterprise Research Campus Project
Boston, MA

NO BUILD CONDITION

PHASE A CONDITION

Note: Illustrative purposes only. Subject to change.

Figure 4.12f

View Perspectives - View 5
Western Ave. Looking East

Enterprise Research Campus Project
Boston, MA

NO BUILD CONDITION

PHASE A CONDITION

Note: Illustrative purposes only. Subject to change.

Figure 4.12g

View Perspectives - View 6
Science Dr. Looking East

Enterprise Research Campus Project
Boston, MA

NO BUILD CONDITION

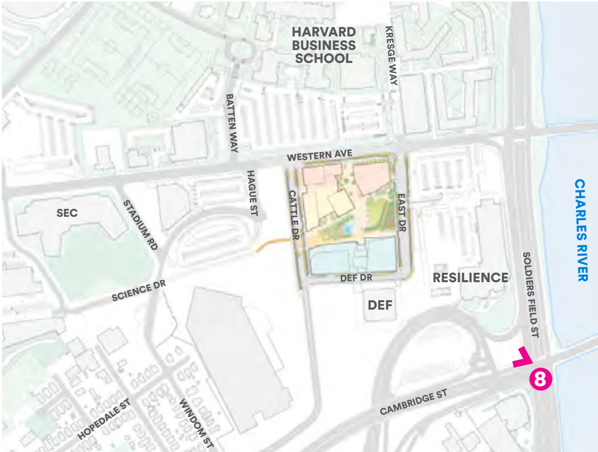
PHASE A CONDITION

Note: Illustrative purposes only. Subject to change.

Figure 4.12h

View Perspectives - View 7
Hopedale St. Looking East

Enterprise Research Campus Project
Boston, MA



NO BUILD CONDITION

PHASE A CONDITION

Note: Illustrative purposes only. Subject to change.

Figure 4.12i

View Perspectives - View 8
Soldiers Field Rd. Looking North West

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.

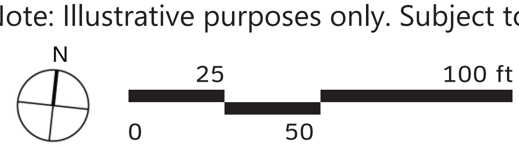
Figure 4.13

Public Realm/Streetscape Improvement Plan

Enterprise Research Campus Project
Boston, MA

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

Note: Illustrative purposes only. Subject to change.



SCALE: 1" = 50'

Figure 4.14

Conceptual Greenway Plan

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.

Project Site Boundary

Tree Canopy Coverage
Greenway: 35,787 square feet
Streetscape: 26,985 square feet

Permeable Paving
Greenway: 49,342 square feet
Streetscape: 5,119 square feet

Pervious Bike Lane
Greenway: 2,147 square feet
Streetscape: 13,357 square feet

Vegetation
Greenway: 21,418 square feeet
Streetscape: 17,465 square feet

N

0 40 80 160 ft

SCALE: 1" = 80'

Figure 4.15
Vegetation, Permeability, and Canopy

Enterprise Research Campus Project
Boston, MA

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

Note: Illustrative purposes only. Subject to change.

Figure 4.16a
Conceptual Greenway Rendering - Canopy

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.

Figure 4.16b
Conceptual Greenway Rendering - Plaza & Water Feature

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.

Figure 4.16c
Conceptual Greenway Rendering - Birds-eye Greenway

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.

Figure 4.16d
Conceptual Greenway Rendering - Bio-Classroom

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.

Figure 4.16e
Conceptual Greenway Rendering -
Laneway & Plaza

Enterprise Research Campus Project
Boston, MA

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

Note: Illustrative purposes only. Subject to change.

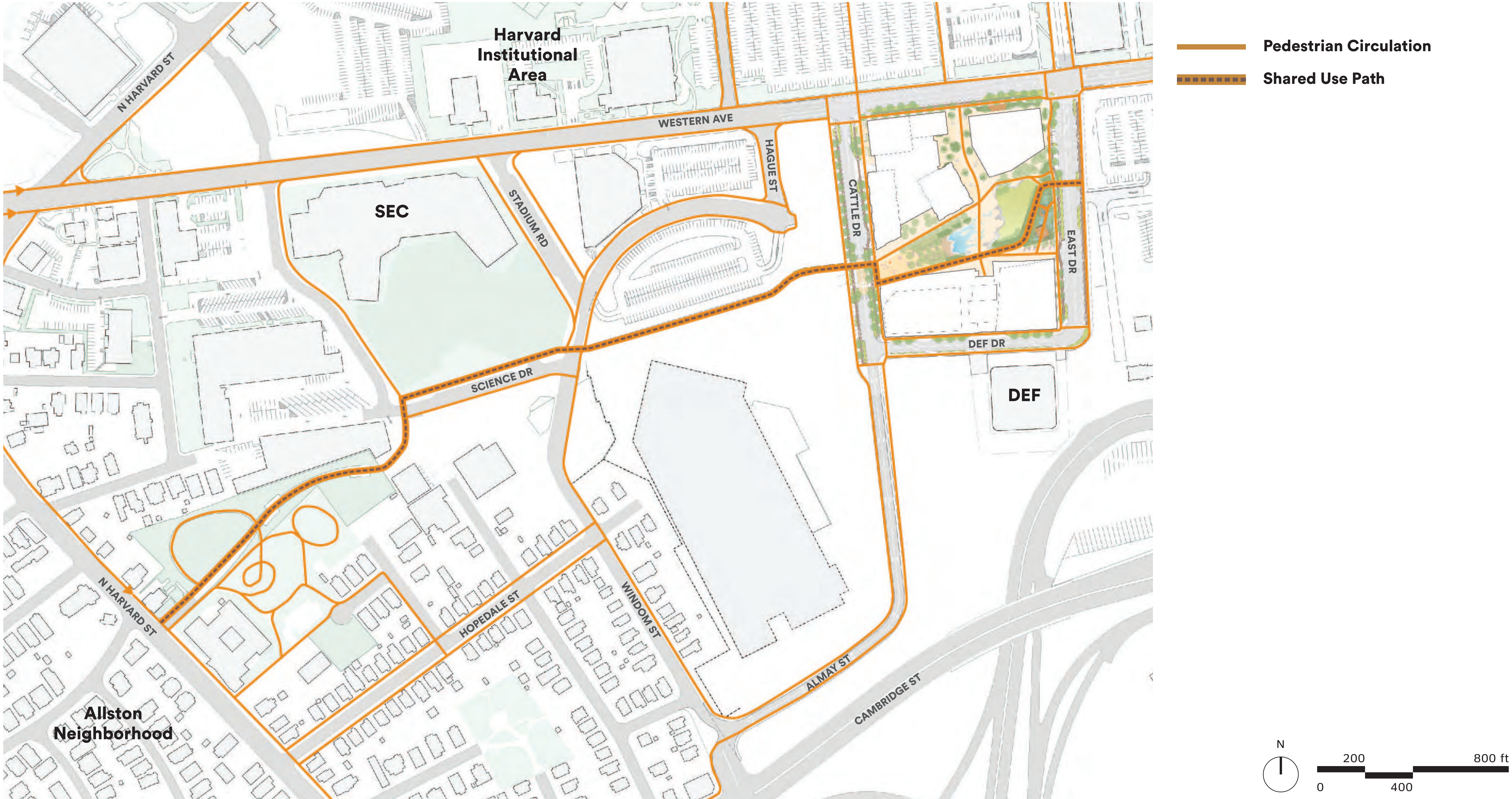
Figure 4.16f
Conceptual Greenway Rendering - Lawn

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.

Figure 4.16g
Conceptual Greenway Rendering - Greenway

Enterprise Research Campus Project
Boston, MA



Note: Illustrative purposes only. Subject to change.

Figure 4.17

Off-Site Non-Motorized Connection to Project Site

Enterprise Research Campus Project
Boston, MA

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

Note: Illustrative purposes only. Subject to change.

Figure 4.18
Site Non-Motorized Circulation

Enterprise Research Campus Project
Boston, MA

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

Project Site Boundary

Active Ground Floor Uses

Lab/Office Lobby

Hotel Lobby

Residential Lobby/Common Area

Treehouse

Back of House

Shared Use Path

Protected Cycle Track

Accessible Path & Building Entries

Note: Illustrative purposes only. Subject to change.

Figure 4.19a

Ground Level Accessibility Diagram

Enterprise Research Campus Project
Boston, MA

Project Site Boundary
Active Ground Floor Uses
Lab/Office Lobby
Hotel Lobby
Residential Lobby/Common Area
Treehouse
Back of House

Shared Use Path
Protected Cycle Track

Accessible Path & Building Entries
Accessible Parking / Pick-up / Drop-off
Parking Entry/Exit
Loading/Service Access

N

0 40 80 160 ft

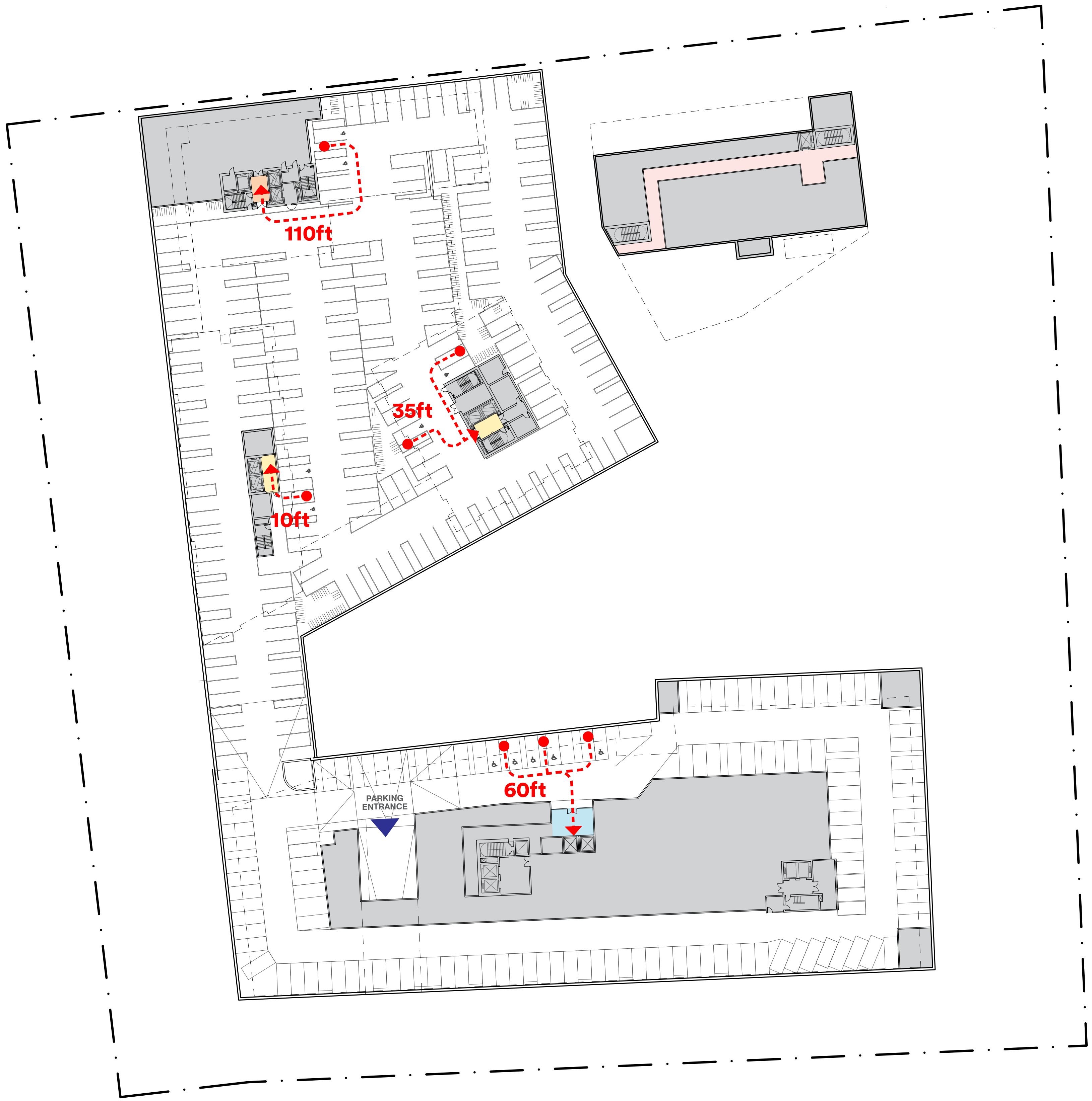
SCALE: 1" = 80'

Note: Illustrative purposes only. Subject to change.

Figure 4.19b
Ground Level Parking Accessibility Diagram

Enterprise Research Campus Project
Boston, MA

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



Project Site Boundary
Lab/Office
Hotel
Residential
Back of House
Accessible Path & Building Entries

N
0 40 80 160 ft
SCALE: 1" = 80'

Note: Illustrative purposes only. Subject to change.

Figure 4.19c

P1 Level Parking Accessibility Diagram

Enterprise Research Campus Project
Boston, MA

5

Sustainability and Climate Change Resiliency

This chapter describes the overall approach to sustainable design, construction, and operation for the Project. Included is a preliminary assessment of green building design, in compliance with the requirements of Article 37 of the Boston Zoning Code relative to the City's Green Building policies and procedures (Article 37). This chapter also discusses the approach to preparing for projected climate change conditions, in accordance with the BPDA Climate Change Preparedness and Resiliency Policy (the "Resiliency Policy"). The required Climate Change Preparedness and Resiliency Checklist (the "Resiliency Checklist") has been completed for the Project and is provided in Appendix B.

5.1 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, previously developed urban/industrial site with 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 also be eligible to receive Fitwel certification in addition to LEED Gold certification for the Lab/Office, Residential and Hotel buildings.
- 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.
- The Project has increased its commitment to energy and stationary source GHG emissions reduction as compared to the Base Case, i.e. approximately 30% for energy (corresponding to a 20% energy reduction from the Stretch Code) and approximately 19% for emissions. This has increased by 5% from the PNF submission which stated 25% energy reduction.

The Project's proposed design demonstrates a 74% reduction in natural gas energy and GHG emissions, representing a savings to 2,634 tons per year compared to the Base Case. With these significant reductions in fossil fuel use, the Project's primary energy source is electricity (approximately 82%) which positions the Project for a pathway to carbon neutrality.

Coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 19% to 90% compared to the Base Case, representing a savings of 8,728 tons per year. These immediate reductions in electricity GHG emissions are far ahead of the Massachusetts electrical grid decarbonization.

- The Project's proposed design for each building would also meet the proposed Zero Net Carbon Building Zoning Proposal percent carbon reduction requirement of 40%.
- The Project will incorporate design elements to improve on-site stormwater management and reduce risk of precipitation-based flooding. The Project will provide a significant amount of public realm and open space improvements, including the Project Greenway, and will be designed and engineered to manage the 32-year storm (6.7 inches of rainfall), exceeding Boston Water and Sewer Commission (BWSC) requirements. Refer to Section 7.3.2 of Chapter 7, *Infrastructure*, for additional details in relation to stormwater infiltration. The project is exploring the feasibility and cost-effectiveness for stormwater capture and reuse for cooling tower make-up water, plumbing and irrigation.
- 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. First floor elevations are proposed to be raised to be between 18.5-19.5 feet Boston City Base (BCB). While the Project has limited coastal flood risk, the team is also considering opportunities to elevate additional equipment within the building to provide extra flood protection.
- 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 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 approximately 60,000 SF, and is detailed further in Figure 4.15.

5.2 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.

5.2.1 Massachusetts Stretch Energy Code

As part of the *Green Communities Act of 2008,* Massachusetts developed the optional Stretch Energy Code that gives municipalities the option to enact a more strenuous energy performance code for buildings than the conventional state building code. The Stretch Energy Code increases the energy efficiency code requirements for new construction (both residential and commercial) and for major residential renovations or additions in municipalities that choose to adopt it.

Fully effective November 7, 2020, the Stretch Energy Code[1], as adopted by the City of Boston, requires projects to achieve, at minimum, a 10 percent energy efficiency improvement when compared to the State's Base Energy Code (the "Base Energy Code"). Projects may demonstrate the energy use savings by either meeting the performance standard of 10 percent better than ASHRAE 90.1-2013[2] or using a prescriptive methodology based on International Energy Conservation Code ("IECC") 2018. In addition to the performance-based compliance pathway, the Stretch Energy Code now also requires that buildings meet IECC 2018 *C402.1.5 Component Performance Alternative* for building envelope performance. Using a U-value x Area calculation, projects must be able to demonstrate that their building envelope design is at least as efficient as a code-compliant baseline.

5.2.2 City of Boston Article 37 – Green Building

Article 37 submittal requirements include completing a LEED scorecard to demonstrate that a project is being designed and constructed to achieve the level "certified" using the LEED building rating system most appropriate for the Project, without requiring the Proponent to register and/or certify the project through a third-party verification process, (but following demonstration the project is designated as "LEED Certifiable" under Article 37). With the LEEDv4 rating system effective as of October 31, 2016, the BPDA requires initial Article 80-B, Large Project Review submissions to demonstrate LEED Certifiable status using LEEDv4.

The BPDA transmits completed LEED submissions to the Boston Interagency Green Building Committee ("IGBC"), which advises the BPDA on a proposed project's compliance with the provisions of Article 37. The IGBC consists of representatives of city agencies, including the BPDA, Boston Environmental Department, Boston Transportation Department, the Inspectional Services Department, and the Mayor's Office.

5.2.3 City of Boston Building Energy Reporting and Disclosure Ordinance

In April 2013, the City of Boston enacted the Building Energy Reporting and Disclosure Ordinance ("BERDO").[3] BERDO requires owners of large buildings to report their energy and water usage data on an annual basis. As of 2017, large buildings are defined as non-residential buildings larger than 35,000 square feet ("SF"), residential buildings that are at least 35,000 SF (or have more than 35 units), and any parcel with multiple buildings that sum to 100,000 SF (or more than 100 units). Additionally, all buildings are required to complete an energy action or energy assessment every five years.

1 780 CMR, Ninth Edition, Chapter 13: Energy Efficiency Amendments as of 8/7/2020

2 American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE) 90.1 Energy Standard for Buildings Except for Low-Rise Residential Buildings

3 https://www.boston.gov/departments/environment/building-energy-reporting-and-disclosure-ordinance

As part of its 2019 Update to the Climate Action Plan, the City of Boston identified its intent to amend BERDO under "Action 5: Develop a Carbon Emissions Performance Standard to Decarbonize Existing Large Buildings".

Per the Climate Action Plan, "*The standard will require that all buildings larger than a certain threshold meet fixed carbon targets that decrease over time. Performance standards specific to different building typologies will ensure that buildings make steady progress on emissions reductions, while allowing building owners to develop solutions that are cost-effective and appropriate for the building's use. The new standard will build on the reporting requirement of BERDO and replace the current energy action and assessment requirement.*"[4]

In January 2021, A draft policy was issued that proposes amendments to BERDO to include a building emissions performance standard. The proposed policy would apply to currently covered buildings starting in 2025 and 2030 for newly covered buildings. The policy proposes declining emissions limits on an emissions intensity (per-square foot) basis specific to a building's use type. The draft policy also recognizes off-site renewable electricity meeting the City's definitions as a means on compliance with the emissions intensity limits.

The Project will be subject to the requirements of BERDO once it is complete and in operation. A discussion of energy and GHG emissions performance is provided in Section 5.4.2 below.

5.2.4 Harvard Green Building Standards

Harvard University's Green Building Standards[5] (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[6]; Fossil Fuel Neutral by 2026 and Fossil Fuel Free by 2050[7].

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.

4 https://www.boston.gov/sites/default/files/imce-uploads/2019-10/city_of_boston_2019_climate_action_plan_update_2.pdf page 44.

5 https://green.harvard.edu/sites/green.harvard.edu/files/HarvardGreenBuildingStandards2017.pdf

6 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.

7 https://green.harvard.edu/campaign/harvards-climate-action-plan

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.

5.3 Updated Sustainability/Green Building Design

The Project proposes to redevelop a former industrial site, re-use land efficiently by increasing density, add a diverse and complementary mix of uses, and provide for infrastructure systems that aim to discourage single-occupancy vehicles and promote low-carbon modes of transportation. The Proponent, along with the Project Team has developed a holistic approach to sustainability through strategies that address site, water and stormwater efficiency, energy efficiency, healthy materials, indoor environmental quality and resilience. This approach aims to develop landscape design that accounts for local ecological conditions in order to reduce the need for mechanical cooling and sun protection on buildings, absorb rainwater, mediate wind impacts, lower an area's carbon footprint, and increase human well-being.

The Proponent strongly believes that the real estate industry has an important role to play in carbon reduction. Therefore, all buildings in the Project will be eligible to achieve LEED Gold certification at a minimum and are proposed to be highly energy efficient, exceeding the minimum requirements of the new Stretch Energy Code, reduce GHG emissions and source energy from natural gas and have building envelope designs that exceed minimum prescriptive requirements. The Proponent has studied all-electric options for heating and domestic hot water in all buildings to assess cost effectiveness (through a life cycle cost analysis) in the Zero Carbon Building Assessment. Refer to Appendix D for full details.

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 Proponent is also committed to studying low-carbon district energy systems in lieu of traditional combined heat and power ("CHP") to further reduce GHG emissions. Refer to Section 5.4.2 and 5.4.4 for full details.

In addition to reducing Scope 1 and 2 emissions, the Proponent will conduct a whole building life cycle assessment (LCA) to account for Scope 3 embodied carbon emissions for structure and enclosure in all buildings proposed for the Project. Options to reduce embodied carbon will be analyzed for feasibility and cost effectiveness.

5.3.1 Updated LEED/Green Building Design Approach

This section describes changes to the LEED checklists since the initial PNF filing. The Project will apply LEED v4 ratings systems to each of the key building typologies, as follows:

- **Core & Shell Lab/Office**: LEED for Core & Shell Developments (LEED-CS), which represents approximately 50% of total gross floor area[8] and 2 buildings;
- **Multi-Family Residential**: LEED for New Construction and Major Renovations (LEED-NC), which represents approximately 29% of total gross floor area and 2 buildings. For the purposes of LEED, one certification will be sought;
- **Hotel**: LEED-NC for Hospitality, which represents approximately 15% of total gross floor area and 1 building; and
- **Conference Center:** LEED-NC, which represents approximately 7% of total gross floor area and 1 building.

In summary, with further design development, the point totals for each building typology has increased since the PNF as follows:

- **Core & Shell Lab/Office**: LEED for Core & Shell Developments (LEED-CS), increased from 66 points to 71 points;
- **Multi-Family Residential**: LEED for New Construction and Major Renovations (LEED-NC), increased from 60 points to 66 points; and
- **Hotel**: LEED-NC for Hospitality, increased from 60 points to 71 points; and
- **Conference Center:** LEED-NC, increased from 60 points to 71 points

Refer to Figures 5.1a-d for updated LEED checklists by building typology and LEED rating system, as identified above. All building types demonstrate eligibility for LEED v4 Gold certification at a minimum, exceeding Article 37 minimum requirements and are committed to formal LEED certification with the US Green Building Council (USGBC) and Green Business Certification, Inc. (GBCI).

Each building typology included in the Project will pursue a variety of credits and points across the eight LEED v4 credit categories. The following sections describe the LEED credits that have contributed to the increase in points for each building typology as follows:

- LT credit 6 Bike Facilities: Each building proposed for the Project will incorporate bicycle facilities for long and short-term bike parking to meet LEED and City of Boston requirements. Additionally, shower and changing facilities will be installed in Office/Lab building and the Treehouse Conference Center to meet LEED and City of Boston requirements. [+1 point for the Office/Lab and Treehouse Conference Center]
- SS credit 4 Rainwater Management: The Project will incorporate green infrastructure strategies into the landscape and civil design to manage stormwater onsite for the 32-year storm (6.7 inches of rainfall) and improve overall water quality. Using version 4.1 credit criteria, the 90th percentile rainfall event for Boston is 1.16-inches. The Project is

8 Excluding parking garage area

designing stormwater storage & infiltration to handle 2.75" rainfall which would achieve all three (3) points. [+1 point for all Project buildings]

- EA credit 2 Optimize Energy Performance: The anticipated energy points have changed for the following building types as follows:
  - Office/Lab building: Due to the increased fuel switching from natural gas to electricity, the energy cost savings reduced slightly. [-1 point]
  - Residential building: No change to LEED point achievement.
  - Hotel: Due to the change in the proposed HVAC systems, the energy cost savings increased considerably from 8 to 12 points. [+4 points]
- EA credit 5 Renewable Energy: The Project will utilize version 4.1 Renewable Energy credit which has combined the Renewable Energy Production and Green Power and Carbon Offsets credits in version 4. Using version 4.1, the Project will procure renewable electricity to achieve at least 3 points using Tier 2 and/or Tier 3 renewable electricity certificates (RECs) as part of the Proponent's commitment to procure renewable electricity in collaboration with Harvard University's procurement. The exact type of RECs is unknown at this time and therefore both Tier 2 and Tier 3 are identified as options. [+2 points for all Project buildings including a regional priority credit]
- MR credit 3 BPDO Sourcing of Raw Materials: The Project will utilize version 4.1 for achievement of this credit. In the latest LEED quarterly addenda, the threshold for 1 point was lowered from 20% to 15% to achieve 1 point. The buildings will select materials with high levels of recycled content, considered to be regional materials, and Forestry Stewardship Council (FSC)-certified wood. [+1 point for all Project buildings]
- MR credit 4 BPDO Material Transparency: The Project will utilize version 4.1 for achievement of this credit. In the latest LEED quarterly addenda, the threshold to achieve Option 2 Material Ingredient Optimization for 1 point was lowered from 10 to 5 compliant products with third-party verified Red List Free or Cradle to Cradle Bronze or higher certified projects. [+1 point for all Project buildings]
- EA credit 2 Low-emitting Materials: The Project will utilize version 4.1 for achievement of this credit and will seek to achieve at least 4 product categories for achievement. [+1 point for all Project buildings]
- ID credit: The Treehouse Conference Center will achieve all Innovation in Design Points. The additional point has preliminarily identified the LEED Pilot credit Integrative Analysis of Building Materials for achievement. [+1 point]

5.3.1.1 Fitwel Certification

Fitwel is a health and wellness certification scheme developed by the US Centers for Disease Control and is now administered by the Center for Active Design. Fitwel is a certification scheme for the built environment that is solely focused on human health. As such, it is a complement to an environmentally focused green building rating scheme like LEED. All credits in Fitwel are elective and are weighted against seven health impact categories. Projects can earn certification as one, two, or three star. Fitwel certification will be evaluated for its feasibility for each building type under the applicable rating system for each typology in subsequent filings.

In 2017, Tishman Speyer established a working relationship with The Center For Active Design (CfAD) as one of the first Fitwel Champions in the market, and has utilized the Fitwel certification scheme to design and manage properties to enhance factors of health and wellbeing such as natural light, access to green space, indoor air quality and support for active travel modes. Focus on indoor air quality and infectious disease transmission has only increased over the past year, in light of the global pandemic, and the Proponent's commitment to Fitwel reflects a holistic approach to sustainability by addressing both environmental and human health. The Project will be eligible to receive Fitwel certification for the residential, lab/office and hotel buildings as follows;

- Hotel – Single Tenant Scorecard;
- Residential – Multifamily Residential Scorecard;
- Lab/Office – Multi-tenant Base Building Scorecard

Tishman Speyer have many operational policies already in place that will contribute to Fitwel certification at the Enterprise Research Campus including;

- Tobacco and Smoke-free Environment policy for all indoor and outdoor areas and signage (3.11, 4.1 & 6.1)
- Indoor Air Quality Policy (6.3)
- Integrated Pest Management Plan (6.7)
- Occupant satisfaction survey (8.9)
- Stakeholder collaboration process (8.10)
- Health food and beverage policy (10.2)
- Emergency Preparedness Plan (12.1)

Additional credits will be confirmed as the project design, amenities, programming and operations develop to achieve at least 1-star Fitwel certification.

5.3.2 Pathway to LEED Platinum

As described in Section 5.3.1 above, each of the LEED checklists have increased their anticipated point totals considerably since the PNF, ranging from 6-11 point increases. Each of the LEED checklists indicate enough 'maybe' or possible points to achieve LEED Platinum certification. LEED Platinum is the highest level of LEED certification and requires achievement of at least 80 points. The pathway to LEED Platinum for each building typology is summarized as follows:

- **Core & Shell Lab/Office**: LEED for Core & Shell Developments (LEED-CS), increased from 66 points to 71 points plus 12 'maybe points' for a potential total of 83 points;
- **Multi-Family Residential**: LEED for New Construction and Major Renovations (LEED-NC), increased from 60 points to 66 points plus 15 'maybe points' for a potential total of 81 points;

- **Hotel**: LEED-NC for Hospitality, increased from 60 points to 71 points plus 12 'maybe points' for a potential total of 83 points; and
- **Conference Center:** LEED-NC, increased from 60 points to 71 points plus 18 'maybe points' for a potential total of 89 points.

The following sections describe the LEED credits as part of a Platinum pathway for each building typology as follows:

- LT credit 4 Surrounding Density and Diverse Uses: The density of the surrounding area and all potential diverse uses are unknown at this time but the ERC is in a rapidly growing part of Boston. At the time of LEED design submission, additional density and diverse uses may contribute to achievement of additional points. [+2 points for all buildings]
- LT credit 2 Access to Quality Transit: There is potential for additional bus and/or shuttle routes and/or increase in the frequency of trips for transportation serving the ERC as compared to current transportation access. At the time of LEED design submission, additional transportation service and/or frequency of trips could contribute to achievement of additional points. [+1 point for all buildings]
- It is anticipated that all Sustainable Site credits will be achieved and therefore no further opportunity for additional points.
- EA credit 1 Enhanced Commissioning: Monitoring-based Commissioning will be explored for implementation on all buildings and if pursued would contribute to Platinum certification. [+1 point for all buildings]
- EA credit 2 Optimize Energy Performance: Achievement of additional anticipated energy points have been assumed as each building is early in the design phase, e.g. concept level of development only. The design teams will continue to assess cost-effective energy strategies and refine the energy performance as the building designs develop. Anticipated additional points for each building type is as follows:
  - Office/Lab building: potential for additional 2 points
  - Residential building: potential for additional 3 points.
  - Hotel: potential for additional 1 point since an additional 4 points has already been indicated for achievement from the PNF stage.
  - Conference Center: potential for additional 3 points.
- EA credit 3 Advanced Energy Metering: As part of a Platinum pathway, the Office/Lab and Conference Center building typologies would explore achievement of sub-metering energy uses. This is a maybe credit as the total number and therefore cost of additional meters is unknown at this time. This credit will be assessed for the cost/benefit as the design develops for both building typologies. [+1 point]
- EA credit 5 Renewable Energy: As stated above, the Project will procure renewable electricity to achieve at least 3 points using Tier 2 and/or Tier 3 renewable electricity certificates (RECs) as part of the Proponent's commitment to procure renewable electricity in collaboration with Harvard University's procurement. The exact type of RECs is unknown at this time and therefore both Tier 2 and Tier 3 are identified as options. An additional 2 points has been indicated as possible and will be assessed for achievement

once the energy performance and design is more developed and procurement details are known. [+2 points for all buildings]

- MR credit 1 Building Life Cycle Impact Reduction: The Project will conduct an LCA per LEED requirements, MRc1 Option 4, for structure and enclosure to account for embodied carbon in each building. As part of a pathway to Platinum, buildings have indicated possibility of reducing embodied carbon as follows:
  - Office/Lab, Residential and Hotel buildings: 10% reduction in embodied carbon for additional 2 points + 1 regional priority credit.
  - Conference Center: The Treehouse Conference Center will explore the use of a mass timber structure which would contribute to reducing embodied potential for an additional 3 points or 20% reduction, plus 1 regional priority point.
- EQ credit 5 Thermal Comfort: The Conference Center will confirm achievement of this credit as the programming and system designs develop. At this early phase of design, compliance with this credit cannot be confirmed. [+1 point Conference Center only]
- EQ credit 6 Interior Lighting: Compliance with the interior lighting credit using version 4.1 will be assessed as the design for the Residential, Hotel and Conference Center develop. At this early phase of design, compliance with this credit cannot be confirmed as to which additional strategy could be achieved. To achieve 2 points (1 point and 1 strategy is already assumed), projects need to achieve 3 of 4 strategies. [+1 point]
- EQ credit 7 Daylight: Compliance with the daylight credit using version 4.1 will be assessed as the design for the Residential, Hotel and Conference Center develop. At this early phase of design, compliance with this credit cannot be confirmed. To achieve 1 point, at least 40% of regularly occupied floor area needs to achieve spatial daylight autonomy of 300 lux for 50% of hours and include glare control. [+1 point]
- EQ credit 8 Quality Views: The Conference Center will confirm achievement of this credit as the programming and space layouts develop. At this early phase of design, compliance with this credit cannot be confirmed. [+1 point Conference Center only]

The Proponent and design teams will continue to assess achievement of LEED Platinum throughout design phases and will be eligible for at least a Gold level of certification.

5.4 Energy Conservation and Greenhouse Gas Emissions Reduction Approach

The Proponent strongly believes that the real estate industry has an important role to play in carbon reduction. 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 City of Boston’s commitment to carbon neutrality by 2050. The approach is organized around energy efficiency, electrification and renewable energy supply. Each proposed building 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 within each building for heating, domestic hot water, and potentially other end uses will be analyzed as part of the Zero Carbon Building Assessment and assessed for cost effectiveness using a life cycle cost analysis approach. Additionally, the

Project will conduct 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 with standalone heating and cooling plant. However, the Proponent is committed to studying district energy systems and electrification of thermal demands within individual buildings and evaluating for the tradeoffs, both positive and negative, on future energy use, energy cost, and GHG emissions. In addition to the ambient water loop district energy options being studied, the Proponent will also study the feasibility of solar + storage systems per the smart utilities policy. Additionally, the Treehouse Conference Center is also being studied for connection to the District Energy Facility.

5.4.1 Methodology

The building energy modeling to quantify estimated energy performance and stationary source GHG emissions for the Project utilized a prototype energy model for each proposed building typology. The results of each prototype have been scaled-up based on the proposed development program on a square footage basis. Each prototype has been developed as a baseline designed to meet the minimum requirements of the 9th Edition of the Building Code that incorporates the building energy provisions of the IECC 2018 with MA Amendments, or Base Case, and the proposed building design with ECMs incorporated as GHG-reduction measures, as described herein. The proposed building typologies for the Project include:

- Core & Shell Lab/Office;
- Multi-family Residential;
- Hotel;
- Conference Center; and
- Below-ground structured parking.

The energy model results (i) have disaggregated energy consumption by both end use and energy input (e.g. fuel and electricity) and (ii) demonstrate the energy efficiency beyond accounting for measured trade-offs in tabular form. Each typology was modeled with currently proposed building envelope performance, HVAC system type, occupancy schedule, and ventilation rates for the buildings. Integrated Environment Solution Virtual Environment software version 2019 was used to energy model each building typology. Excel spreadsheets were used to aggregate each typology model results and scale up energy use per the proposed development program.

The energy conservation measures can be divided into the buildings' envelope construction materials and design and the ventilation, heating, cooling, and other energy consuming processes specific to the building type. The following section presents the specific proposed building improvements (and their correlating energy modeling parameters for reference) that are assumed to be included as part of the Project by typology for the purpose of this analysis. The specific proposed improvements will likely be subject to design modifications as necessary to achieve the energy and stationary source GHG emissions reduction based on the final building program and design, and future building users.

5.4.1.1 Energy Model and Analysis Conditions

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 consumed energy is then converted into the amount of CO_2 emitted using the standardized conversion factors.[9] 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 Project. 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.

9 Electricity converted using 658 lbs CO2 per MWh (2018 ISO New England Electric Generator Air Emissions Report). Natural Gas converted using 117 lbs CO2 per MMBtu (US Energy Information Administration).

5.4.2 Energy Model Results by Building Typology

5.4.2.1 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 440,000 SF of lab/office space with ground-floor retail and restaurant space.

Descriptions of the noteworthy building improvements and resulting building energy savings are presented below. The proposed design was based on several key energy efficiency and electrification 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 UxA calculation per the Stretch Energy Code. A summary of the UxA calculation for this typology is provided in Appendix D;
- 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 5-1.

Table 5-1 Summary of Energy Modeling Inputs – Laboratory/Office Typology

Modeling Parameter	Base Case[10]	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

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.

Table 5-2 Preliminary Energy Model Results: Core & Shell – Lab/Office Typology

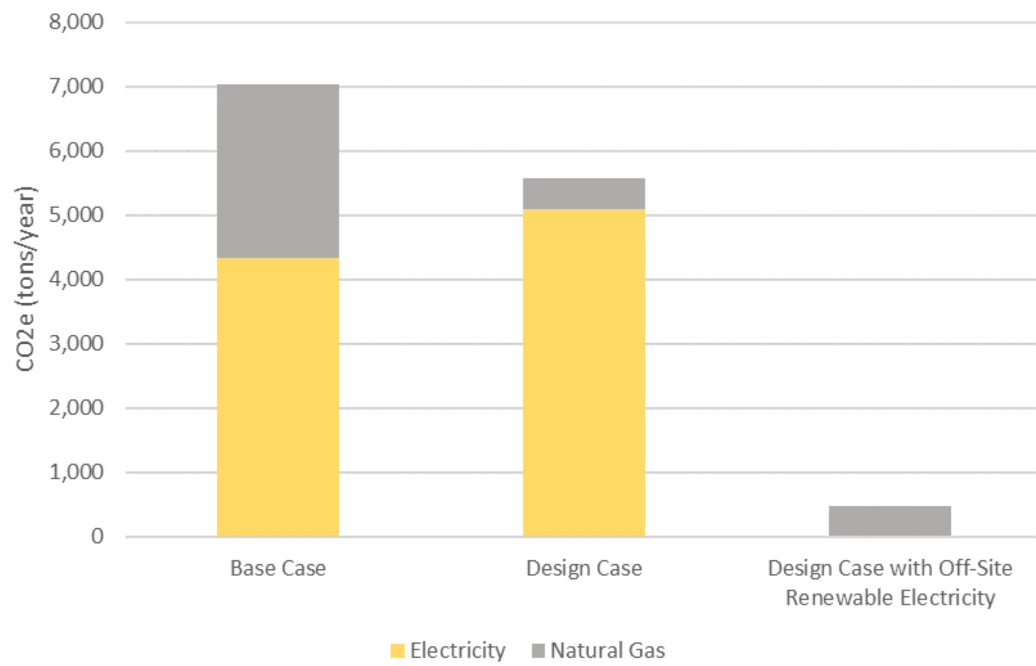
	Total Energy Consumption			
	Electricity (MWh/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Energy Use Intensity (kBtu/sf/yr)
Base Case	13,163	46,341	91,253	174
Design Case	15,509	8,121	61,039	117
End-Use Savings	-2,346	38,219	30,214	
Percent Savings	**-18%**	**82%**	**33%**	**33%**

	Total GHG Emissions			
	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	GHG Intensity (tons CO2e/sf/yr)
Base Case	4,331	2,711	7,042	0.0134
Design Case	5,103	475	5,578	0.0106
End-Use Savings	-772	2,236	1,464	
Percent Savings	**-18%**	**82%**	**21%**	**21%**

As shown in Table 5-2, with the proposed building design and system improvements, the estimated energy use reduction for the Core & Shell Lab/Office typology is approximately 33% compared to the Base Case or 23% better than Stretch Code, which equates to an approximately 21% percent reduction in stationary source CO_2 emissions.

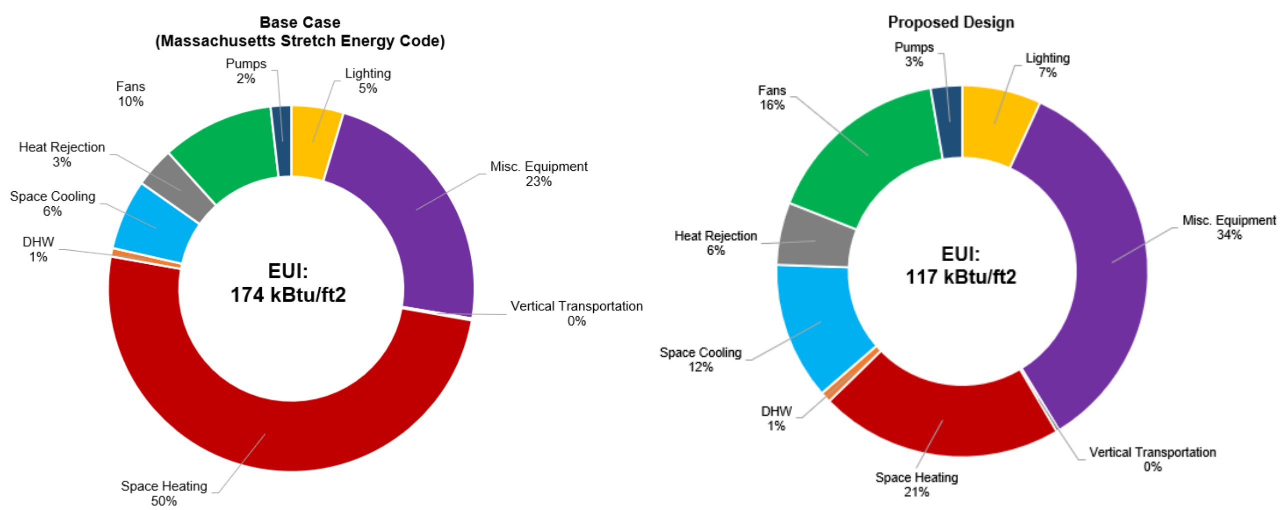
More importantly, the proposed design has reduced fossil fuel energy consumption from natural gas by 82% compared to the Base Case. Coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 21% to 93% compared to the Base Case.

Graph 5-1 Lab/Office GHG emissions



Graph 5-2 below present a breakdown of the Core & Shell Lab/Office typology energy use by end use for both the Base Case and the Design Case.

Graph 5-2 Lab/Office Typology Energy End Use



5.4.2.2 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 263,500 SF of residential space, combined with ground-floor retail and restaurant space, across two buildings.

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 provided in Appendix D;
› 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.

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 5-3.

Table 5-3 Summary of Energy Modeling Inputs – Residential 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- 0.50 (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

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.

Table 5-4 Preliminary Energy Model Results – Residential Typology

	Total Energy Consumption			
	Electricity (MWh/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Energy Use Intensity (kBtu/sf/yr)
Base Case	3,227	9,470	20,480	72
Design Case	3,392	4,852	16,425	58
End-Use Savings	-165	4,618	4,005	
Percent Savings	**-5%**	**49%**	**20%**	**20%**

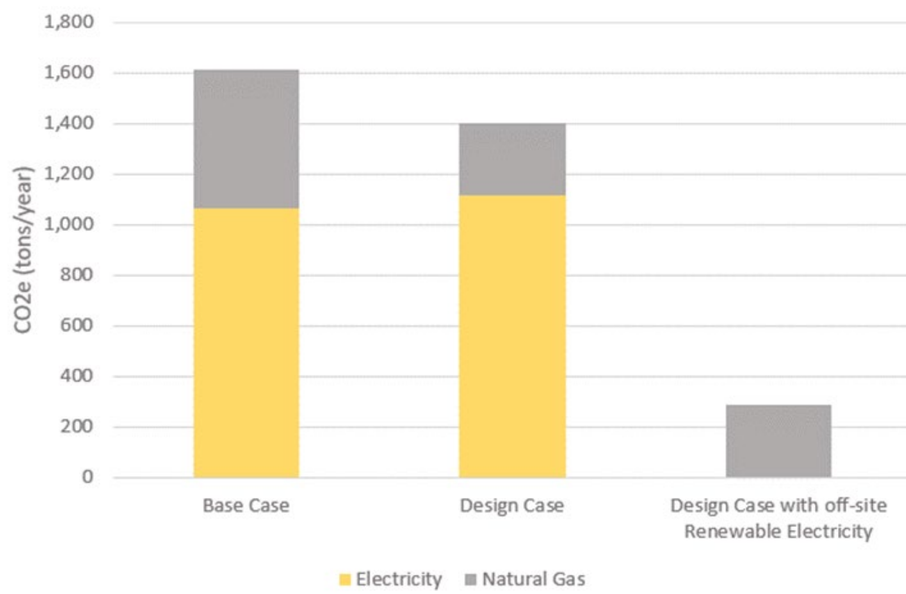
	Total GHG Emissions			
	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	GHG Intensity (tons CO2e/sf/yr)
Base Case	1,062	554	1,616	0.0057
Design Case	1,116	284	1,400	0.0049
End-Use Savings	-54	270	216	
Percent Savings	**-5%**	**49%**	**13%**	**13%**

As shown in Table 5-4, with the proposed building design and system improvements, the estimated energy use reduction for the Residential typology is approximately 20% compared to the Base Case or 10% better than Stretch Code, which equates to an approximately 13% reduction (476 tpy) in stationary source CO_2 emissions.

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.

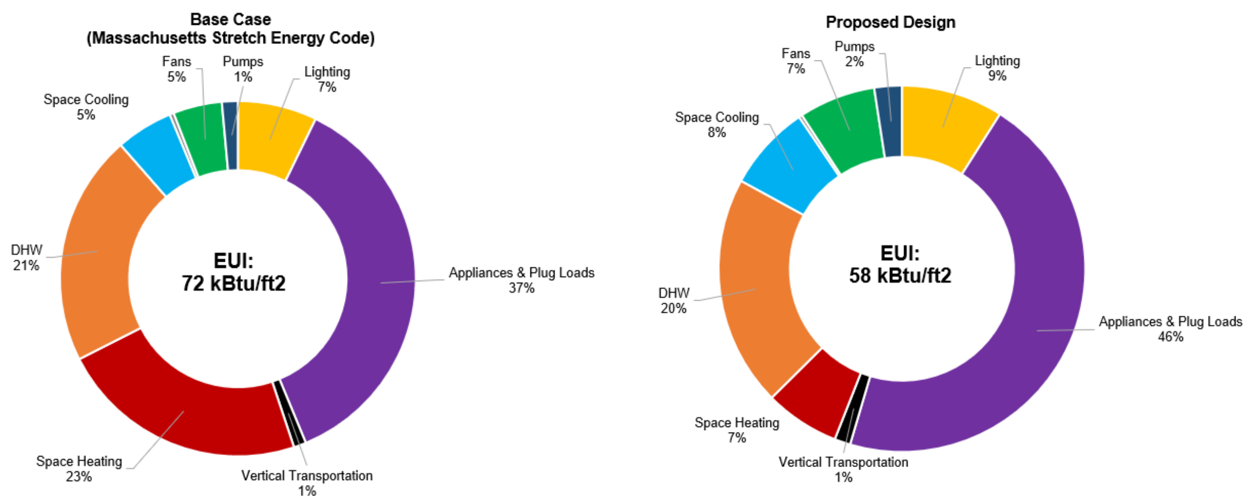
The Proponent and design team have focused study and analysis on electrification of the heating system and is continuing to consider this option. Decision on systems is also pending the results of the district energy study that has focused on reducing natural gas use for domestic hot water and heating. The analysis will be submitted to the City of Boston for review in Fall 2021.

Graph 5-3 Residential GHG emissions



Graph 5-4 below present a breakdown of the Residential typology energy use by end use for both the Base Case and the Design Case

Graph 5-4 Residential Typology Energy End Use



5.4.2.3 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 135,000 SF of hotel guest room/circulation space with ground floor retail/dining space. The energy model of this typology considered the full proposed building area.

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 provided in Appendix D;
› 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 lighting control systems.

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 5-5.

Table 5-5 Summary of Energy Modeling Inputs – Hotel Typology

Modeling Parameter	Base Case[12]	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

12 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 5-6 Preliminary Energy Model Results – Hotel Typology

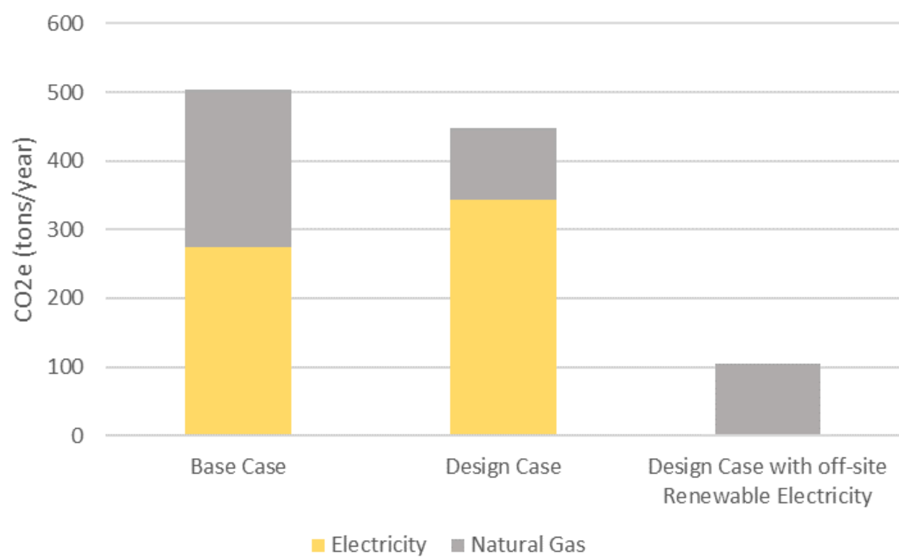
	Total Energy Consumption			
	Electricity (MWh/yr)	**Natural Gas (MMBtu/yr)**	**Total (MMBtu/yr)**	**Energy Use Intensity (kBtu/sf/yr)**
Base Case	834	3,915	6,761	46
Design Case	1,041	1,785	5,337	37
End-Use Savings	-207	2,131	1,424	
Percent Savings	**-25%**	**54%**	**21%**	**21%**
	Total GHG Emissions			
	Electricity (tons/yr)	**Natural Gas (tons/yr)**	**Total (tons/yr)**	**GHG Intensity (tons CO2e/sf/yr)**
Base Case	274	229	503	0.0035
Design Case	343	104	447	0.0031
End-Use Savings	-68	125	56	
Percent Savings	**-25%**	**54%**	**11%**	**11%**

As shown in Table 5-6, with the proposed building design and system improvements, the estimated energy use for the Hotel typology is approximately 21% less than the Base Case or 11% better than Stretch Code, which equates to an approximately 11% percent reduction (56 tpy) in stationary source CO_2 emissions.

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.

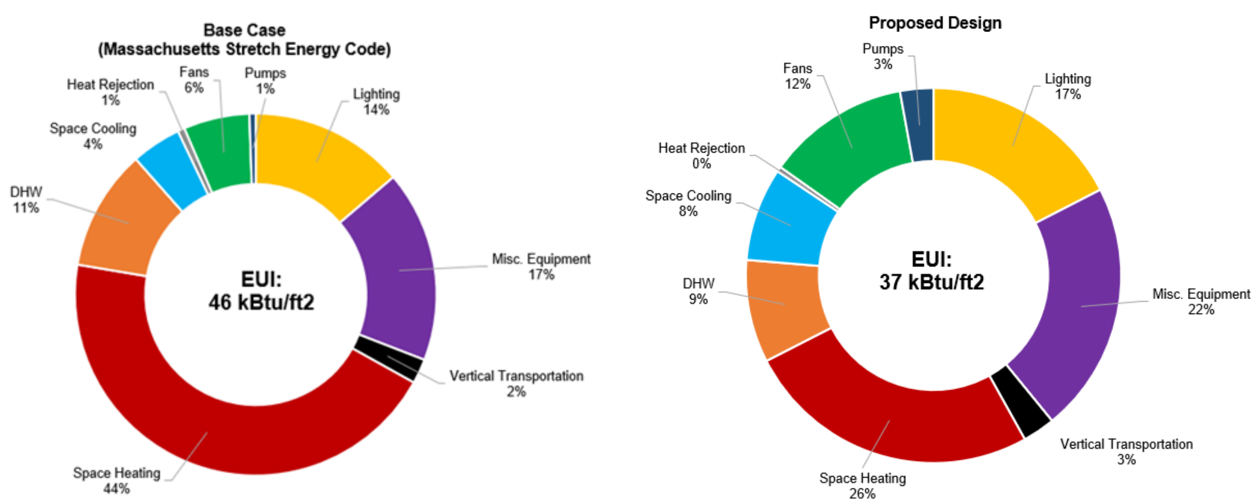
The Proponent and design team have focused study and analysis on electrification of the heating system and is continuing to consider this option. Decision on systems is also pending the results of the district energy study that has focused on reducing natural gas use for domestic hot water and heating. The analysis will be submitted to the City of Boston for review in Fall 2021.

Graph 5-5 Hotel GHG emissions



Graph 5-6 below present a breakdown of the Hotel typology energy use by end use for both the Base Case and the Design Case.

Graph 5-6 Hotel Typology Energy End Use



5.4.2.4 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. The feasibility analysis associated with all-electric systems is detailed in the attached Zero Carbon Building Assessment. The Treehouse 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 provided in Appendix D;
› 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.

A summary of the various energy modeling inputs, including the energy conservation measures listed above, are presented in Table 5-7.

Table 5-7 Summary of Energy Modeling Inputs – Conference Center Typology

Modeling Parameter	Base Case[13]	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

13 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 5-8 Preliminary Energy Model Results – Conference Center Typology

	Total Energy Consumption			
	Electricity (MWh/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Energy Use Intensity (kBtu/sf/yr)
Base Case	681	1,039	3,363	56
Design Case	533	984	2,804	47
End-Use Savings	148	54	559	
Percent Savings	**22%**	**5%**	**17%**	**17%**

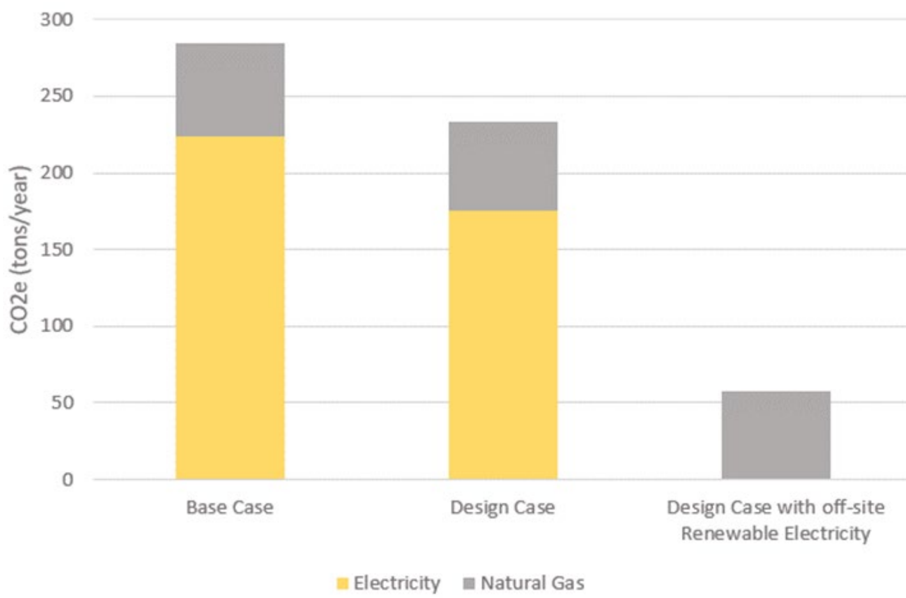
	Total GHG Emissions			
	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	GHG Intensity (tons CO2e/sf/yr)
Base Case	224	61	285	0.0047
Design Case	175	58	233	0.0039
End-Use Savings	49	3	52	
Percent Savings	**22%**	**5%**	**18%**	**18%**

As shown in Table 5-8, with the proposed building design and system improvements, the estimated energy use reduction for the conference center typology is approximately 17% compared to the Base Case or approximately 7% better than Stretch Code, which equates to an approximately 19% percent reduction (69 tpy) in stationary source CO_2 emissions.

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.

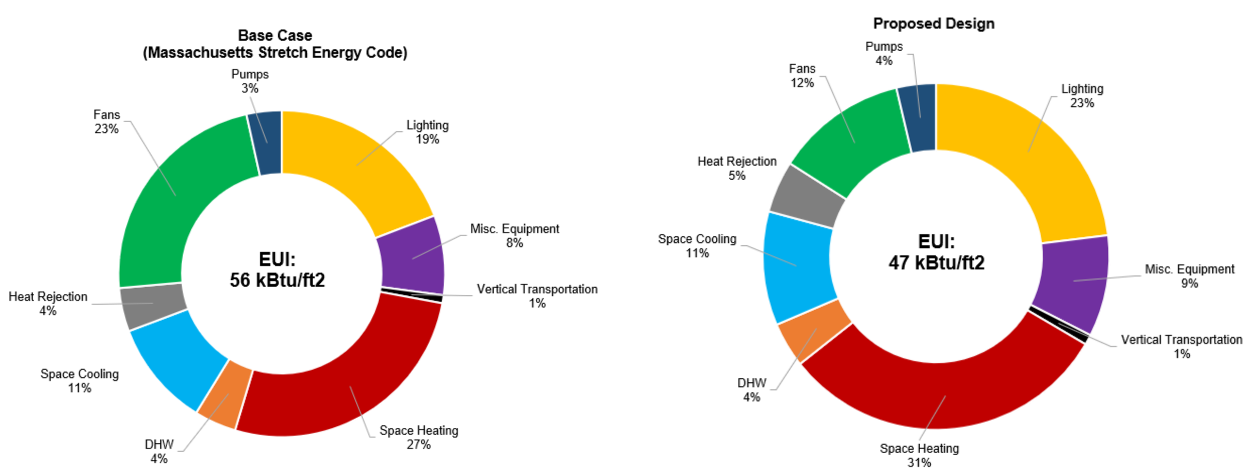
The Treehouse Conference Center is also being studied for connection to Harvard's District Energy Facility (DEF) which would eliminate on-site equipment for heating and domestic hot water generation. The Proponent and design team is continuing to consider options for electrification of space heating and hot water should the building continue to have stand-alone systems but final decision is pending the outcome of connection to the DEF.

Graph 5-7 Conference Center GHG emissions



Graph 5-8 below presents a breakdown of the Conference Center typology energy use by end use for both the Base Case and the Design Case.

Graph 5-8 Conference Center Typology Energy End Use



5.4.2.5 Overall Project Emissions

The following provides a summary of the estimated energy performance and GHG emissions for the Project, which comprises of approximately 900,000 gross floor area across the four building typologies. Results associated with below-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 masterplan results. Table 5-9 below provides results for the buildings, parking, and buildings with parking.

Table 5-9 Project Energy Usage and Stationary Source CO_2 Emissions

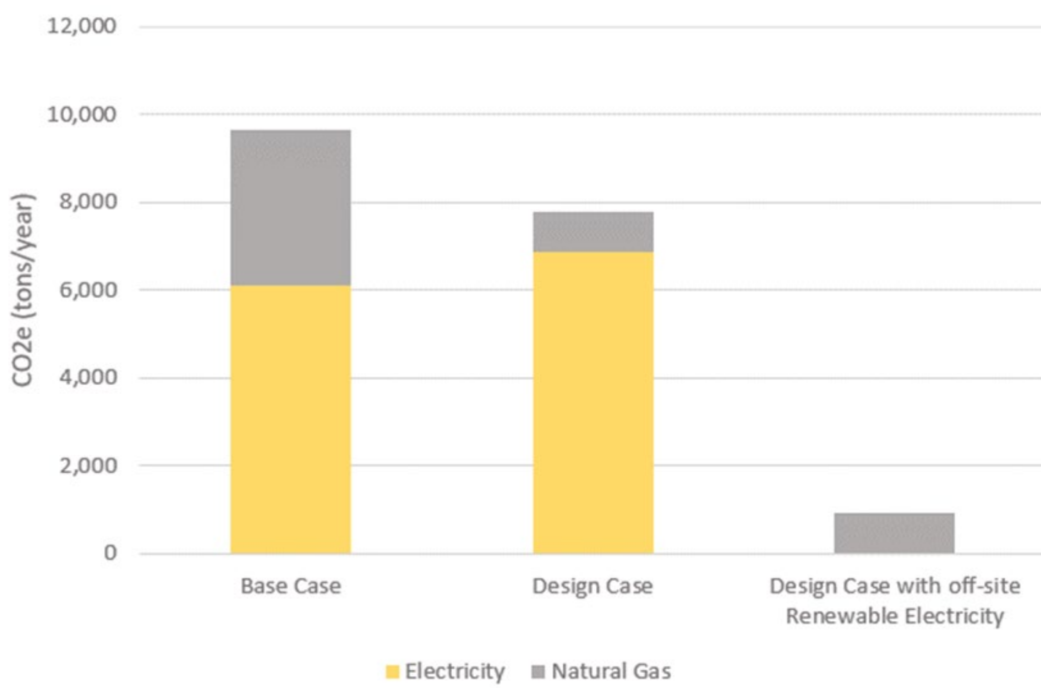
	Total Energy Consumption			CO_2 Emissions		
	Electricity (MMBtu/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Electricity (tons/ yr)[1]	Natural Gas (tons/ yr)	Total (tons/ yr)
Project without Parking						
Base Case	61,092	60,764	121,857	5,891	3,555	9,445
Design Case	69,863	15,742	85,605	6,736	921	7,657
End-Use Savings	-8,771	45,022	36,252	-846	2,634	1,788
Percent Savings	**-14%**	**74%**	**30%**	**-14%**	**74%**	**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%**	**0.0%**	**31%**	**31%**	**0.0%**	**31%**
Project with Parking						
Base Case	63,201	60,764	123,966	6,094	3,555	9,649
Design Case	71,318	15,742	87,060	6,877	921	7,798
End-Use Savings	-8,117	45,022	36,906	-783	2,634	1,851
Percent Savings	**-13%**	**74%**	**30%**	**-13%**	**74%**	**19%**

The Project demonstrates considerable energy and stationary source GHG emissions reduction as compared to the Base Case, i.e. approximately 30% for energy (corresponding to a 20% energy reduction from the Stretch Code) and approximately 19% for emissions. This has increased by 5% from the PNF submission which stated 25% energy reduction.

The Project's proposed design demonstrates a 74% reduction in natural gas energy and GHG emissions, representing a savings to 2,634 tons per year compared to the Base Case. With these significant reductions in fossil fuel use, the Project's primary energy source is electricity (approximately 82%) which positions the Project for a pathway to carbon neutrality.

Coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 19% to 90% compared to the Base Case, representing a savings of 8,728 tons per year. These immediate reductions in electricity GHG emissions are far ahead of the Massachusetts electrical grid decarbonization.

Graph 5-9 Project GHG Emissions



These immediate GHG emissions savings significantly compound GHG emissions savings over the life of the project. From 2025 to 2035, the aggregate emissions saved are 55,986 tons as compared to the electricity grid.[14] This is equivalent to 7.25 years' worth of the Project's estimated emissions.

5.4.3 Zero Net Carbon Building Zoning Proposal

In addition to the modeling results discussed above, the proposed designs have been prepared per the proposed changes to Article 37 via the Boston Low Carbon Building Technical Advisory Group (TAG) as of 4/12/2021.[15] The proposal includes two new performance requirements:

1. Percent Carbon Reduction which proposed a 40% reduction in emissions relative to the Massachusetts Stretch Code base case, where the Design Case emissions calculations assume the ISO-NE 2035 electricity emissions factor of 392 lb/MWh. This future electricity emissions factor reaches parity with natural gas.

14 Electricity grid emissions projections are based on the current 658 lbs/MWh declining to 400 lbs/MWh by 2035.

15 Per slides from ZNC – Low Carbon Building TAG Meeting #4. Published online by Boston Planning & Development Agency (BPDA). http://www.bostonplans.org/getattachment/2cba8dbe-585e-44c9-82af-06797079a0da

2. Carbon Emission Intensity (CEI) targets measured in kg CO2e per square foot. Targets have been proposed for common building typologies and each target varies by typology.

The following tables summarize the proposed building typologies relative to these two proposed criteria.

Table 5-10 Zero Net Carbon Proposal: Lab/Office Typology

	Total GHG Emissions			
	Electricity (tons/yr)	**Natural Gas (tons/yr)**	**Total (tons/yr)**	**GHG Intensity (kg CO2e/sf/yr)**
Base Case	4,331	2,711	7,042	12.2
Design Case – ZNC Zoning 2035[16]	3,040	475	3,515	Design Case: 6.1 *(CEI Target: 4.5)*[17]
End-Use Savings	1,291	2,236	3,527	
Percent Savings	**30%**	**82%**	**50%**	**50%**

The Laboratory/Office typology meets the proposed Boston Low Carbon Building TAG criteria by achieving an emissions reduction of 50% relative to the Base Case, exceeding the target threshold of 40%. The Design Case emissions intensity (6.1 kg CO2e/sf/yr) would not meet the proposed weighted CEI target of 4.5 kg Co2e/sf/yr.

Table 5-11 Zero Net Carbon Proposal: Residential Typology

	Total GHG Emissions			
	Electricity (tons/yr)	**Natural Gas (tons/yr)**	**Total (tons/yr)**	**GHG Intensity (kg CO2e/sf/yr)**
Base Case	1,062	554	1,616	5.2
Design Case – ZNC Zoning 2035	665	284	949	3.0 *(CEI Target: 1.6)*[18]
End-Use Savings	397	270	667	
Percent Savings	**37%**	**49%**	**41%**	**41%**

The Residential typology meets the proposed Boston Low Carbon Building TAG criteria by achieving an emissions reduction of 41% relative to the Base Case, exceeding the target threshold of 40%. The Design Case emissions intensity (3.0 kg CO2e/sf/yr) would not currently meet the proposed CEI target of 1.6 kg Co2e/sf/yr.

16 Electricity emissions calculated using an emissions factor of 392 lbs/MWh

17 Weighted average CEI assuming 60% wet lab, 40% office.

18 CEI for High Density Multifamily

Table 5-12 Zero Net Carbon Proposal: Hotel Typology

	Total GHG Emissions			
	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	GHG Intensity (kg CO2e/sf/yr)
Base Case	274	229	503	3.1
Design Case – ZNC Zoning 2035	204	104	308	1.9 *(CEI Target: 1.9)*
End-Use Savings	70	125	195	
Percent Savings	**26%**	**54%**	**39%**	**39%**

The Hotel typology is very close to the proposed Boston Low Carbon Building TAG stipulations by achieving an emissions reduction of 39% relative to the Base Case compared to the proposed threshold of 40%. However, the Design Case emissions intensity (1.9 kg CO2e/sf/yr) meets the proposed CEI target of 1.9 kg Co2e/sf/yr.

Table 5-13 Zero Net Carbon Proposal: Conference Center Typology

	Total GHG Emissions			
	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	GHG Intensity (kg CO2e/sf/yr)
Base Case	224	61	285	4.3
Design Case – ZNC Zoning 2035	105	58	162	2.5 *(CEI Target: N/A)*[19]
End-Use Savings	120	3	123	1.9
Percent Savings	**53%**	**5%**	**43%**	**43%**

The Conference typology meets the proposed Boston Low Carbon Building TAG stipulations by achieving an emissions reduction of 43% relative to the Base Case, exceeding the proposed target threshold of 40%. The Design Case emissions intensity is 2.5 kg CO2e/sf/yr; there is no CEI target proposed for a Conference or Assembly typology.

5.4.4 Zero Carbon Building Assessment

In support of Harvard's Fossil Fuel-Neutral By 2026 and Fossil Fuel-Free By 2050 goals, the City of Boston's commitment to Carbon Neutrality by 2050 and 2019 Climate Action Plan Update, a Zero Carbon Building Assessment is included as part of the Article 37 design review of building projects by the IGBC. The intent of the Zero Carbon Building Assessment is to determine the most effective solution(s) for reducing carbon emissions within a building. The Zero Carbon Building design takes into account low energy design defined by

19 The typology-based CEI requirements do not include a Conference or Assembly typology.

a very high performance building envelope, all electric building systems, and on- and off-site renewables. A first and life cycle cost assessment is also included in the analysis.

The Proponent has provided the Zero Carbon Building Assessment for each of the four building typologies. Refer to Appendix D for full details on assumptions and results.

5.4.5 District Energy/Microgrid Feasibility 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 (the Project and Phase B, 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. The study will assess the viability of a District Energy system, distributed energy resources (DER), and/or microgrid for clusters of buildings. Since the PNF filing, the Proponent has held an initial meeting with the City of Boston on March 31, 2021 to review the approach and proposed systems to be studied in the District Energy Microgrid Feasibility Study.

At the meeting, it was agreed the district systems to be studied would include an ambient water loop served by a combination of air to water heat pumps, ground source and electric boilers in incremental steps to reduce natural gas consumption in buildings for heating and domestic hot water demands. The analysis will be submitted to the City of Boston for review in Fall 2021.

5.4.6 Clean and Renewable Energy Evaluation

The preliminary rooftop solar PV system feasibility analysis has been updated since the PNF phase. It remains a preliminary analysis as roof plans remain in early concept phase and planning. 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:

- Conference Center 65kW array
- Hotel 22kW array
- Lab/Office building 2 60kW array
- Lab/Office building 3 46kW array
- Residential buildings 30kW array

The solar PV arrays result in a total potential of 223 kW across five buildings. Detailed results are provided in Table 5-14 below.

Table 5-14 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
Lab/Office 2	9,311	68.7	23	0.7%	0.7%
Lab/Office 3	6,198	53.5	18	0.9%	0.8%
Hotel	1,041	26.2	9	2.5%	1.9%
Residential	3,392	34.9	11	1.0%	0.8%
Conference	533	75.3	25	14.1%	10.7%
Total	**20,475**	**258.6**	**85**	**1.3%**	**1.1%**

The solar system would be projected to produce approximately 258.6 MWh per year of energy, which is equivalent to approximately 85 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 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.

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.

5.4.7 Energy Efficiency Assistance

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[20] 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.

5.4.7.1 Alternative Energy Credits[21]

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.

20 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.

21 https://www.mass.gov/service-details/qualifying-air-source-heat-pump-in-the-aps

- 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.

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 below.

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 the Zero Carbon Building Assessment in Appendix D for full incentive analysis.

5.4.7.2 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 Zero Carbon Building Assessment in Appendix D for full incentive analysis.

5.4.7.3 Mass Save Passive House Incentives[22]

Mass Save offers a Passive House incentive that is separate and additional 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. The project does not achieve 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.

Please refer to the Zero Carbon Building Assessment in Appendix D for full incentive analysis.

5.5 Climate Change 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”), which is provided in Appendix B. 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 are relatively minor and easily

22 https://www.masssave.com/saving/residential-rebates/passive-house-incentives

repairable and that the occupants remain safe at the site and building level. These are further discussed in the following section.

5.5.1 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 uses 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.

5.5.2 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 PNF Figure 4.2, 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 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, in order to assess any new coastal flood impacts identified for the Project Site.

5.5.3 Extreme Weather and Rising Temperature

Climate change is expected to result in more extreme weather events. 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.

Table 5-15 Current and Projected Temperatures and Rainfall

	Average Summer Temperature	Hot Days over 90°F	Cold Days below 32°F	Rainfall per Storm
Current	69°F	11	120	5.25"
2030	↑ 73°F	↑ 40 (+5 days over 100°F)	↓ 86	↑ 5.60"
2070	↑ 84°F by 2100	↑ 90 (+33 days over 100°F)	↓ 34 by 2100	↑ 6.00"

Source: Climate Ready Boston Projections

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 is a potential issue on-site, even in the near term. The Project will be designed to manage the 32-year storm (6.7 inches of rainfall), which translates to stormwater resiliency storage to accommodate an additional 1.5-inches of runoff, above the required 1.25-inch water quality volume, over the impervious site areas to meet BWSC and BPDA requirements for groundwater recharge. These volumes result in a planned total of 2.75-inches of stormwater storage for the Project.

5.5.4 Potential Resiliency Measures / Concepts

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 currently include elevation of critical equipment. Additional measures may include increased elevation of equipment, flood-proofing the entrance to the parking garage on DEF drive and potentially re-grading portions of the site.

The Project Team will continue to monitor 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.

5.5.4.1 Site Resiliency Measures

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. The Project will provide stormwater resiliency storage to accommodate an additional 1.5-inches of runoff, above the required 1.25-inch water quality volume, over the impervious site areas to meet BWSC and BPDA requirements for 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 51,855 SF of tree canopy at the Project Site, approximately 20% of the total site area.

5.5.4.2 Building Resiliency Measures

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 between 18.5' and 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 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 buildings will be designed to be solar-ready. Refer to 5.4.5 for details.

This page intentionally left blank.

LEED v4 for BD+C: Core and Shell

Project Checklist

Project Name: Enterprise Research Campus - Lab/Office Typology
Date: June-2021
DPIR Filing

Y	?	N				
1			D	Credit	Integrative Process	1

Y	?	N				
11	**3**	**6**			**Location and Transportation**	**20**
			D	Credit 1	LEED for Neighborhood Development Location	20
2			D	Credit 2	Sensitive Land Protection Option 1: Previously Developed Land	2
		3	D	Credit 3	High Priority Site	3
4	2		D	Credit 4	Surrounding Density and Diverse Uses	6
2	1	3	D	Credit 5	4.1 Access to Quality Transit (bus+ shuttle frequency)	6
1			D	Credit 6	4.1 Bicycle Facilities (5% long term + 2.5% short term)	1
1			D	Credit 7	4.1 Reduced Parking Footprint (option 2 30% reduction)	1
1			D	Credit 8	4.1 Electric Vehicles (Option 1: 5% EVSE or 2 spaces)	1

Y	?	N				
11	**0**	**0**			**Sustainable Sites**	**11**
Y			C	Prereq	Construction Activity Pollution Prevention	Required
1			D	Credit 1	Site Assessment	1
2			D	Credit 2	Site Development - Protect or Restore Habitat	2
1			D	Credit 3	Open Space (30% Site Area incl. Bldg Footprint)	1
3			D	Credit 4	Rainwater Management	3
2			D	Credit 5	Heat Island Reduction (Roof + Non-Roof)	2
1			D	Credit 6	Light Pollution Reduction	1
1			D	Credit 7	Tenant Design and Construction Guidelines	1

Y	?	N				
7	**0**	**4**			**Water Efficiency**	**11**
Y			D	Prereq	Outdoor Water Use Reduction	Required
Y			D	Prereq	Indoor Water Use Reduction	Required
Y			D	Prereq	Building-Level Water Metering	Required
1		1	D	Credit 1	Outdoor Water Use Reduction (50% reduction or no irrigation)	2
3		3	D	Credit 2	Indoor Water Use Reduction (3 pts = 35% reduction)	6
2			D	Credit 3	Cooling Tower Water Use	2
1			D	Credit 4	Water Metering (2 end uses: Irrigation + CT make up)	1

Y	?	N				
18	**6**	**9**			**Energy and Atmosphere**	**33**
Y			C	Prereq	Fundamental Commissioning and Verification	Required
Y			D	Prereq	Minimum Energy Performance	Required
Y			D	Prereq	Building-Level Energy Metering	Required
Y			D	Prereq	Fundamental Refrigerant Management	Required
3	1	2	C	Credit 1	Enhanced Commissioning (+1 MBCx maybe)	6
11	2	5	D	Credit 2	Optimize Energy Performance (24% savings)	18
	1		D	Credit 3	Advanced Energy Metering	1
		2	D	Credit 4	Demand Response	2
3	2		D	Credit 5	4.1 Renewable Energy	5
1			D	Credit 6	Enhanced Refrigerant Management	1
			C	~~Credit 7~~	~~Green Power and Carbon Offsets~~	

Y	?	N				
7	**2**	**5**			**Materials and Resources**	**14**
Y			D	Prereq	Storage and Collection of Recyclables	Required
Y			C	Prereq	Construction and Demolition Waste Management Planning	Required
1	2	3	C	Credit 1	Building Life-Cycle Impact Reduction (Option 4 LCA)	6
1		1	C	Credit 2	4.1 BPDO - Environmental Product Declarations (Option 1)	2
1		1	C	Credit 3	4.1 BPDO - Sourcing of Raw Materials (15% + 30% cost)	2
2			C	Credit 4	4.1 BPDO - Material Ingredients (Option 1 & Option 2)	2
2			C	Credit 5	C&D Waste Management (Option 1: Diversion)	2

Y	?	N				
7	**0**	**3**			**Indoor Environmental Quality**	**10**
Y			D	Prereq	Minimum Indoor Air Quality Performance	Required
Y			D	Prereq	Environmental Tobacco Smoke Control	Required
2			D	Credit 1	Enhanced Indoor Air Quality Strategies	2
3			C	Credit 2	Low-Emitting Materials (4 product categories)	3
1			C	Credit 3	Construction Indoor Air Quality Management Plan	1
		3	D	Credit 4	Daylight	3
1			D	Credit 5	Quality Views	1

Y	?	N				
6	**0**	**0**			**Innovation**	**6**
1			D	Credit 1	Pilot - Comprehensive Composting	1
1			D	Credit 2	Innovation - Occupant Comfort Survey	1
1			D	Credit 3	Exemplary performance: SS8 Green Vehicles	1
1			D	Credit 4	Innovation - Green Building Education	1
1			D	Credit 5	Innovation - Purchasing- lamps (Low Mercury Lighting)	1
1			D	Credit 6	LEED Accredited Professional	1

Y	?	N				
3	**1**	**0**			**Regional Priority**	**4**
1			D	Credit 1	Regional Priority: Energy Performance (8 pts = 17%)	1
1			C	Credit 2	Regional Priority: Rainwater Management (2 pts)	1
	1		D	Credit 3	Regional Priority: MRc1 Building Life-cycle Impact Reduction (2 pts)	1
1			D	Credit 4	Regional Priority: Renewable Energy (2 pts = 3%)	1

Y	?	N				
71	**12**	**27**			**TOTALS** Possible Points:	**110**

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

Figure 5.1a

LEED Scorecard for Lab/Office

Enterprise Research Campus Project
Boston, MA

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name: Enterprise Research Campus - Residential Typology
Date: June-2021
DPIR Filing

D = Design submission & C = Construction Submission

Y	?	N			Integrative Process	1
1			D	Credit	Integrative Process	1

Y	?	N			Location and Transportation	16
8	4	4				
			D	Credit 1	LEED for Neighborhood Development	16
1			D	Credit 2	Sensitive Land Protection (previously developed land)	1
		2	D	Credit 3	High Priority Site	2
2	3		D	Credit 4	Surrounding Density and Diverse Uses	5
2	1	2	D	Credit 5	4.1 Access to Quality Transit (bus+ shuttle frequency)	5
1			D	Credit 6	4.1 Bicycle Facilities (5% long term + 2.5% short term)	1
1			D	Credit 7	4.1 Reduced Parking Footprint (option 2 30% reduction)	1
1			D	Credit 8	4.1 Green Vehicles (2% or 2 spaces EV charging)	1

Y	?	N			Sustainable Sites	10
10	0	0				
Y			C	Prereq	Construction Activity Pollution Prevention	Required
1			D	Credit 1	Site Assessment	1
2			D	Credit 2	Site Development - Restore Habitat (25% site area)	2
1			D	Credit 3	4.1 Open Space (30% total site area)	1
3			D	Credit 4	4.1 Rainwater Management	3
2			C	Credit 5	Heat Island Reduction (Option 1)	2
1			D	Credit 6	Light Pollution Reduction	1

Y	?	N			Water Efficiency	11
5	0	6				
Y			D	Prereq	Outdoor Water Use Reduction	Required
Y			D	Prereq	Indoor Water Use Reduction	Required
Y			D	Prereq	Building-Level Water Metering	Required
1		1	D	Credit 1	Outdoor Water Use Reduction (50% reduction)	2
1		5	D	Credit 2	Indoor Water Use Reduction (25% reduction)	6
2			D	Credit 3	Cooling Tower Water Use	2
1			D	Credit 4	Water Metering (2 end uses: DHW + Irrigation)	1

Y	?	N			Energy and Atmosphere	33
15	6	12				
Y			C	Prereq	Fundamental Commissioning and Verification	Required
Y			D	Prereq	Minimum Energy Performance	Required
Y			D	Prereq	Building-Level Energy Metering	Required
Y			D	Prereq	Fundamental Refrigerant Management	Required
3	1	2	C	Credit 1	Enhanced Commissioning (+1 MBCx maybe)	6
8	3	7	D	Credit 2	Optimize Energy Performance (20% savings)	18
		1	D	Credit 3	Advanced Energy Metering	1
		2	C	Credit 4	Demand Response	2
3	2		D	Credit 5	4.1 Renewable Energy	5
1			D	Credit 6	Enhanced Refrigerant Management	1
			C	~~Credit 7~~	~~Green Power and Carbon Offsets~~	

Y	?	N			Materials and Resources	13
7	2	4				
Y			D	Prereq	Storage and Collection of Recyclables (+ compost)	Required
Y			C	Prereq	Construction and Demolition Waste Management Planning	Required
1	2	2	C	Credit 1	Building Life-Cycle Impact Reduction (5% reduction, 10% or 20%)	5
1		1	C	Credit 2	4.1 BPDO - Environmental Product Declarations (Option 1)	2
1		1	C	Credit 3	4.1 BPDO - Sourcing of Raw Materials (15% + 30% cost)	2
2			C	Credit 4	4.1 BPDO - Material Ingredients (Option 1 & Option 2)	2
2			C	Credit 5	C&D Waste Management (Option 1: Diversion)	2

Y	?	N			Indoor Environmental Quality	16
11	2	3				
Y			D	Prereq	Minimum Indoor Air Quality Performance	Required
Y			D	Prereq	Environmental Tobacco Smoke Control	Required
2			D	Credit 1	Enhanced Indoor Air Quality Strategies	2
3			C	Credit 2	4.1 Low-Emitting Materials (4 product categories)	3
1			C	Credit 3	Construction Indoor Air Quality Management Plan	1
2			C	Credit 4	Indoor Air Quality Assessment (Air Quality Testing)	2
1			D	Credit 5	Thermal Comfort (ASHRAE 55 + 50% occupants have control)	1
1	1		D	Credit 6	4.1 Interior Lighting	2
	1	2	D	Credit 7	4.1 Daylight	3
1			D	Credit 8	Quality Views	1
		1	D	Credit 9	Acoustic Performance	1

Y	?	N			Innovation	6
6	0	0				
1			D	Credit 1	Pilot - Bird Collision Deterrence	1
1			D	Credit 2	Innovation - Occupant Comfort Survey	1
1			D	Credit 3	Innovation - O+M Starter Kit (Green Cleaning + IPM)	1
1			D	Credit 4	Innovation - Green Building Education	1
1			D	Credit 5	Innovation - Purchasing- lamps (Low Mercury Lighting)	1
1			D	Credit 6	LEED Accredited Professional	1

Y	?	N			Regional Priority	4
3	1	0				
1			D	Credit 1	Regional Priority: SS 4 Rainwater Management (2 points)	1
1			D	Credit 2	Regional Priority: EA 2 Energy Performance (8pt)	1
	1		D	Credit 3	Regional Priority: MRc1 Building Life-cycle Impact Reduction (2 pts)	1
1			D	Credit 4	Regional Priority: EA 5 Renewable Energy	1

Y	?	N		TOTALS	Possible Points:	110
66	15	29				

Figure 5.1b

LEED Scorecard for Residential

Enterprise Research Campus Project
Boston, MA

LEED v4 for BD+C: Hospitality

Project Checklist

Project Name: Enterprise Research Campus - Hotel Typology
Date: June-2021
DPIR Filing

Y	?	N				
1			D	Credit	Integrative Process	1

Y	?	N				
9	3	4			**Location and Transportation**	**16**
			D	Credit 1	LEED for Neighborhood Development Location	16
1			D	Credit 2	Sensitive Land Protection	1
		2	D	Credit 3	High Priority Site	2
3	2		D	Credit 4	Surrounding Density and Diverse Uses	5
2	1	2	D	Credit 5	4.1 Access to Quality Transit (bus+ shuttle frequency)	5
1			D	Credit 6	4.1 Bicycle Facilities (5% long term + 2.5% short term)	1
1			D	Credit 7	4.1 Reduced Parking Footprint (option 2 30% reduction)	1
1			D	Credit 8	4.1 Electric Vehicles (Option 1: 5% EVSE or 2 spaces)	1

Y	?	N				
10	0	0			**Sustainable Sites**	**10**
Y			C	Prereq	Construction Activity Pollution Prevention	Required
1			D	Credit 1	Site Assessment	1
2			D	Credit 2	Site Development - Restore Habitat (25% site area)	2
1			D	Credit 3	4.1 Open Space (30% total site area)	1
3			D	Credit 4	4.1 Rainwater Management	3
2			D	Credit 5	Heat Island Reduction (Option 1)	2
1			D	Credit 6	Light Pollution Reduction	1

Y	?	N				
5	0	6			**Water Efficiency**	**11**
Y			D	Prereq	Outdoor Water Use Reduction	Required
Y			D	Prereq	Indoor Water Use Reduction	Required
Y			D	Prereq	Building-Level Water Metering	Required
1		1	D	Credit 1	Outdoor Water Use Reduction (50% reduction)	2
1		5	D	Credit 2	Indoor Water Use Reduction (25% reduction)	6
2			D	Credit 3	Cooling Tower Water Use	2
1			D	Credit 4	Water Metering (2 end uses: Irrigation + DHW)	1

Y	?	N				
19	4	10			**Energy and Atmosphere**	**33**
Y			C	Prereq	Fundamental Commissioning and Verification	Required
Y			D	Prereq	Minimum Energy Performance	Required
Y			D	Prereq	Building-Level Energy Metering	Required
Y			D	Prereq	Fundamental Refrigerant Management	Required
3	1	2	C	Credit 1	Enhanced Commissioning (+1 MBCx maybe)	6
12	1	5	D	Credit 2	Optimize Energy Performance 30% savings)	18
		1	D	Credit 3	Advanced Energy Metering	1
		2	C	Credit 4	Demand Response	2
3	2		D	Credit 5	4.1 Renewable Energy	5
1			D	Credit 6	Enhanced Refrigerant Management	1
			C	~~Credit 7~~	~~Green Power and Carbon Offsets~~	

Y	?	N				
7	2	4			**Materials and Resources**	**13**
Y			D	Prereq	Storage and Collection of Recyclables	Required
Y			C	Prereq	Construction and Demolition Waste Management Planning	Required
1	2	2	C	Credit 1	Building Life-Cycle Impact Reduction (5% reduction, 10% or 20%)	5
1		1	C	Credit 2	4.1 BPDO - Environmental Product Declarations (Option 1)	2
1		1	C	Credit 3	4.1 BPDO - Sourcing of Raw Materials (15% + 30% cost)	2
2			C	Credit 4	4.1 BPDO - Material Ingredients (Option 1 & Option 2)	2
2			C	Credit 5	C&D Waste Management (Option 1: Diversion)	2

Y	?	N				
11	2	3			**Indoor Environmental Quality**	**16**
Y			D	Prereq	Minimum Indoor Air Quality Performance	Required
Y			D	Prereq	Environmental Tobacco Smoke Control	Required
2			D	Credit 1	Enhanced Indoor Air Quality Strategies	2
3			C	Credit 2	4.1 Low-Emitting Materials (4 product categories)	3
1			C	Credit 3	Construction Indoor Air Quality Management Plan	1
2			C	Credit 4	Indoor Air Quality Assessment (Air Quality Testing)	2
1			D	Credit 5	Thermal Comfort (ASHRAE 55 + 50% occupants have control)	1
1	1		D	Credit 6	4.1 Interior Lighting	2
	1	2	D	Credit 7	4.1 Daylight	3
1			D	Credit 8	Quality Views	1
		1	D	Credit 9	Acoustic Performance	1

Y	?	N				
6	0	0			**Innovation**	**6**
1			D	Credit 1	Pilot - Comprehensive Composting	1
1			D	Credit 2	Pilot - Bird Collision Deterrence	1
1			D	Credit 3	Exemplary performance: SS8 Green Vehicles	1
1			D	Credit 4	Innovation - Green Building Education	1
1			D	Credit 5	Innovation - Purchasing- lamps (Low Mercury Lighting)	1
1			D	Credit 6	LEED Accredited Professional	1

Y	?	N				
3	1	0			**Regional Priority**	**4**
1			D	Credit 1	Regional Priority: SS 4 Rainwater Management (2 points)	1
1			D	Credit 2	Regional Priority: EA 2 Energy Performance (8pt)	1
	1		D	Credit 3	Regional Priority: MRc1 Building Life-cycle Impact Reduction (2 pts)	1
1			D	Credit 4	Regional Priority: EA 5 Renewable Energy	1

Y	?	N				
71	12	27			**TOTALS** Possible Points:	**39**

Figure 5.1c

LEED Scorecard for Hotel

Enterprise Research Campus Project
Boston, MA

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name: Enterprise Research Campus - Conference Center
Date: June-2021
DPIR Filing

D = Design submission & C = Construction Submission

Y	?	N				Points
					Integrative Process	**1**
1			D	Credit	Integrative Process	1

Y	?	N				Points
9	3	4			**Location and Transportation**	**16**
			D	Credit 1	LEED for Neighborhood Development	16
1			D	Credit 2	Sensitive Land Protection (previously developed land)	1
		2	D	Credit 3	High Priority Site	2
3	2		D	Credit 4	Surrounding Density and Diverse Uses	5
2	1	2	D	Credit 5	4.1 Access to Quality Transit (bus+ shuttle frequency)	5
1			D	Credit 6	4.1 Bicycle Facilities (5% long term + 2.5% short term)	1
1			D	Credit 7	4.1 Reduced Parking Footprint (option 2 30% reduction)	1
1			D	Credit 8	4.1 Electric Vehicles (Option 1: 5% EVSE or 2 spaces)	1

Y	?	N				Points
10	0	0			**Sustainable Sites**	**10**
Y			C	Prereq	Construction Activity Pollution Prevention	Required
1			D	Credit 1	Site Assessment	1
2			D	Credit 2	Site Development - Restore Habitat (25% site area)	2
1			D	Credit 3	4.1 Open Space (30% total site area)	1
3			D	Credit 4	4.1 Rainwater Management	3
2			C	Credit 5	Heat Island Reduction (Option 1)	2
1			D	Credit 6	Light Pollution Reduction	1

Y	?	N				Points
7	0	4			**Water Efficiency**	**11**
Y			D	Prereq	Outdoor Water Use Reduction	Required
Y			D	Prereq	Indoor Water Use Reduction	Required
Y			D	Prereq	Building-Level Water Metering	Required
1		1	D	Credit 1	Outdoor Water Use Reduction (50% reduction)	2
3		3	D	Credit 2	Indoor Water Use Reduction (35% reduction)	6
2			D	Credit 3	Cooling Tower Water Use	2
1			D	Credit 4	Water Metering (2 end uses: Irrigation + CT make up)	1

Y	?	N				Points
20	7	6			**Energy and Atmosphere**	**33**
Y			C	Prereq	Fundamental Commissioning and Verification	Required
Y			D	Prereq	Minimum Energy Performance	Required
Y			D	Prereq	Building-Level Energy Metering	Required
Y			D	Prereq	Fundamental Refrigerant Management	Required
3	1	2	C	Credit 1	Enhanced Commissioning (+1 MBCx maybe)	6
13	3	2	D	Credit 2	Optimize Energy Performance (cost savings 32% = 13 pts)	18
	1		D	Credit 3	Advanced Energy Metering	1
		2	C	Credit 4	Demand Response	2
3	2		D	Credit 5	4.1 Renewable Energy	3
1			D	Credit 6	Enhanced Refrigerant Management	1
			C	~~Credit 7~~	~~Green Power and Carbon Offsets~~	2

Y	?	N				Points
7	3	3			**Materials and Resources**	**13**
Y			D	Prereq	Storage and Collection of Recyclables (+ compost)	Required
Y			C	Prereq	Construction and Demolition Waste Management Planning	Required
1	3	1	C	Credit 1	Building Life-Cycle Impact Reduction (5% reduction, 10% or 20%)	5
1		1	C	Credit 2	4.1 BPDO - Environmental Product Declarations (Option 1)	2
1		1	C	Credit 3	4.1 BPDO - Sourcing of Raw Materials (15% + 30% cost)	2
2			C	Credit 4	4.1 BPDO - Material Ingredients (Option 1 & Option 2)	2
2			C	Credit 5	C&D Waste Management (Option 1: Diversion)	2

Y	?	N				Points
8	4	4			**Indoor Environmental Quality**	**16**
Y			D	Prereq	Minimum Indoor Air Quality Performance	Required
Y			D	Prereq	Environmental Tobacco Smoke Control	Required
2			D	Credit 1	Enhanced Indoor Air Quality Strategies	2
3			C	Credit 2	4.1 Low-Emitting Materials (4 product categories)	3
1			C	Credit 3	Construction Indoor Air Quality Management Plan	1
2			C	Credit 4	Indoor Air Quality Assessment (Air Quality Testing)	2
	1		D	Credit 5	Thermal Comfort (ASHRAE 55 + 50% occupants have control)	1
	1	1	D	Credit 6	4.1 Interior Lighting	2
	1	2	D	Credit 7	4.1 Daylight	3
	1		D	Credit 8	Quality Views	1
		1	D	Credit 9	Acoustic Performance	1

Y	?	N				Points
6	0	0			**Innovation**	**6**
1			D	Credit 1	Pilot - Comprehensive Composting	1
1			D	Credit 2	Pilot - Integrative Analysis of Building Materials	1
1			D	Credit 3	Exemplary performance: SS8 Green Vehicles	1
1			D	Credit 4	Innovation - Green Building Education	1
1			D	Credit 5	Innovation - Purchasing- lamps (Low Mercury Lighting)	1
1			D	Credit 6	LEED Accredited Professional	1

Y	?	N				Points
3	1	0			**Regional Priority**	**4**
1			D	Credit 1	Regional Priority: SS 4 Rainwater Management (2 points)	1
1			D	Credit 2	Regional Priority: EA 2 Energy Performance (8pt)	1
	1		D	Credit 3	Regional Priority: MRc1 Building Life-cycle Impact Reduction (2 pts)	1
1			D	Credit 4	Regional Priority: EA 5 Renewable Energy	1

Y	?	N				
71	18	21			**TOTALS**	**Possible Points: 110**

Figure 5.1d

LEED Scorecard for Convention Center

Enterprise Research Campus Project
Boston, MA

6

Environmental Protection

This chapter describes the existing environmental conditions on and near the Project Site and the potential impacts that may occur as a result of the Project. A goal of the Project is to better utilize the Project Site and complement adjacent uses while avoiding, minimizing, and/or mitigating potential adverse environmental impacts to the surrounding area to the greatest extent feasible.

In compliance with the Article 80 Large Project Review guidelines of the Code, the Project will address potential environmental impacts in the following categories:

- Wind
- Solar Glare
- Shadow
- Air Quality
- Operational Solid & Hazardous Waste
- Construction

A complete wind tunnel and solar glare analysis are provided in this DPIR filing, as required based on the methodologies described in Sections 6.2 and 6.3, respectively. The PNF included shadow and daylight impact analyses (refer to Sections 6.4 and 6.7 of Chapter 6, *Environmental Protection*, respectively). These studies were not updated for this DPIR as there have been only minor changes in the building massing that would not significantly change the previous study results. Those studies present a more conservative impact analysis since they are based on more bulky building massing. Additionally, a noise analysis and hazardous waste assessment were provided in the PNF (refer to Sections 6.9 and 6.12 of Chapter 6, *Environmental Protection*, respectively) and do not warrant revisions to what was previously presented. The Project Site does not include any designated wetland or tideland areas.

6.1 Summary of Key Findings and Benefits

The analysis of potential environmental impacts resulting from the Project include the following conclusions:

- **Wind** – The Project is not predicted to result in any Dangerous conditions either annually or seasonally. The one location that is predicted to result in wind gust at an Unacceptable level can be mitigated with building design measure or landscaping.
- **Solar Glare** –For pedestrians, only Moderate levels of visual impact at short durations were predicted to fall on the study area. Any solar reflection predicted to effect drivers

would last only under an hour; on average lasting only 6 to 18 minutes. No significant thermal impacts are expected to occur either on the site of the development or in the surrounding neighborhood.

- **Shadow** – The preliminary shadow study conducted and included in the PNF was not updated for this filing. The PNF included the shadow analysis in Section 6.4 of Chapter 6, *Environmental Protection*. This study was not updated for this DPIR as there have been minor changes in the building massing, which did not materially change the previous study results. The incremental shadows produced are consistent with the existing urban shadow pattern and are not expected to have any significant effect on pedestrian use or enjoyment at or around the Project Site.
- **Air Quality** – The Project will comply with all applicable air quality regulations and no exceedances of the National Ambient Air Quality Standards (NAAQS) are anticipated.
- **Operational Solid and Hazardous Waste** – During operations, the Proponent anticipates the management of solid wastes typically associated with residential, hotel, conference and lab/office uses, and will provide adequate space within buildings for recycling storage.
- **Construction** – The Proponent will develop a detailed Construction Management Plan (CMP) and will continue to update the CMP for approval by Harvard and the Boston Transportation Department (BTD) prior to construction, which will outline logistical details, public protection plans, and measures to mitigate air quality impacts, noise, construction waste, and rodents.

6.2 Pedestrian Wind Conditions

A computer-based Pedestrian Wind Comfort Assessment has been conducted for the Project. The following section describes the wind tunnel study methodology. Refer to Appendix E for the complete pedestrian wind tunnel study.

6.2.1 Methodology

To assess the wind environment around the Project, a 1:300 scale model of the Project Site and surroundings was constructed for the wind tunnel tests of the following configurations:

- No-Build Condition – represents the existing site with existing surroundings without the Project;
- Build Condition – represents the initial phase of development (Phase A) of Project with future surroundings; and
- Full-Build Condition – represents the full build out of the Project Site (Phases A and B) with future surroundings.

The wind tunnel model included all relevant surrounding buildings and topography within an approximately 1,200 feet radius of the Project Site. The wind and turbulence profiles in the atmospheric boundary layer beyond the modelled area were also simulated in the wind tunnel. The wind tunnel model was instrumented with 153 specially designed wind speed sensors (presented previously in PNF Figure 6.1, and as shown on Figures 6.1a through 6.2b herein) to measure mean and gust speeds at a full-scale height of approximately 5 feet above local grade in pedestrian areas throughout the Project Site. Wind speeds were measured for 36 directions in a 10-degree increment. The measurements at each sensor location were recorded in the form of ratios of local mean and gust speeds to the mean wind speed at a reference height above the model. The placement of wind measurement locations was based on our experience and understanding of the pedestrian usage for the Project Site and was reviewed by the Project Team and BPDA.

Refer to the complete wind tunnel study provided in Appendix E for further information on methodology, such as the meteorological data assumed.

6.2.1.1 Wind Testing Criteria

The BPDA has adopted two standards for assessing the relative wind comfort of pedestrians. First, the BPDA wind design guidance criterion states that an effective gust velocity (hourly mean wind speed +1.5 times the root-mean-square wind speed) of 31 mph should not be exceeded more than one percent of the time.

The second set of criteria used by the BPDA to determine the acceptability of specific locations is based on the work of Melbourne. This set of criteria is used to determine the relative level of pedestrian wind comfort for activities such as sitting, standing, or walking. The criteria are expressed in terms of benchmarks for the 1-hour mean wind speed exceeded one percent of the time.

Table 6-1 below presents the wind criteria used to determine wind impacts for a development.

Table 6-1 BPDA Mean Wind Criteria*

Category	Wind Speed
Wind Comfort	**Mean Wind Speed (mph)**
Dangerous	> 27
Uncomfortable for Walking	> 19
Comfortable for Walking	≤ 19
Comfortable for Standing	≤ 15
Comfortable for Sitting	≤ 12
Gust Acceptability	**Effective Gust Speed (mph)**
Acceptable	≤31
Unacceptable	>31

* Applicable to the hourly mean wind speed exceeded 1% of the time.

6.2.2 Wind Tunnel Study Results

The following sections summarize the predicted wind conditions for the No-Build and Full-Build Conditions. The complete study, including the predicted wind conditions for the Build Condition (Phase A only) is presented in the full study provided in Appendix E.

6.2.2.1 No-Build Wind Conditions

Under the No-Build Condition, there are no areas with mean speeds categorized as Dangerous either annually or seasonally (Figure 6.1a). Mean wind speeds on and around the existing Project Site are generally Comfortable for Walking (Figure 6.1a). Wind speeds higher than those Comfortable for Walking occur off-site to the southeast of the Project Site around the DEF (Locations 92, 147 and 148, as shown in Figure 6.1a).

The effective gust criterion of 31 mph is also met at all areas assessed on both annual and seasonal bases, as shown in Figure 6.2a.

6.2.2.2 Full-Build Wind Conditions

No areas with mean wind speeds categorized as Dangerous are predicted either annually or seasonally and there are no Uncomfortable conditions predicted off-site, as shown in Figure 6.1b.

The future wind conditions within and around the Project Greenway are predicted to be mostly Comfortable for Sitting and Standing. Under the Full-Build Condition, the predicted mean wind speeds around the perimeter of the Project Site are generally expected to remain similar to or are improved, in some cases, compared to the Build Condition (Phase A only). Specifically, the Uncomfortable wind conditions predicted at on-site Location 92, and off-site Locations 147 and 148 under the No-Build Condition are expected to be improved and become comfortable for walking in the Full-Build Condition (Figure 6.1b).

An overall increase in the wind activity along the west façade of the Hotel-Residential Building is predicted under the Full-Build Condition, which is due to the prevailing northwesterly and southwesterly winds channeling between that building and the future building to the west (on-site Locations 8-11 and 15, as shown in Figure 6.1b). Also, Uncomfortable wind speeds are predicted at the corners or edges of the future buildings (Locations 38, 72, 92, 97, 98, 102, 104, 106, 115, 116, 118 and 119, as shown in Figure 6.1b). Refer to Section 6.2.2.3 below for potential measures to be considered to mitigate for these conditions.

The effective gust criterion of 31 mph is predicted to be met at all locations annually, except for the northeast corner of the southwest Phase B future building (on-site Location 106 in Figure 6.2b).

6.2.2.3 Wind Mitigation Considerations

Wind control solutions for the Uncomfortable conditions predicted at some of the building corners and edges can be implemented to minimize the wind impact of the Project, as it relates to the pedestrian safety and comfort. These measures would be aimed at deflecting the downwashing winds and diffusing the energy of accelerating and channeling flows. For example, installing a canopy along the north façade of the Hotel Building wrapping around the northwest and northeast corners could be considered as a measure to divert the downwashing winds from reaching the ground level and accelerating around the corners. Alternatively, the Proponent may consider implementing wind screens or landscaping features near the building corners and edges to disrupt the accelerating winds. Corner canopies and/or vertical wind control features can also be considered near the windy corners of the Office/Lab Buildings.

To extend the benefits of landscaping to the winter season, when winds are the strongest, evergreen species could be considered. Strategic distribution of landscaping/hardscaping elements along the east sidewalk of Cattle Drive can also help moderate the channeling impact in the Full-Build Condition.

For building entrances where wind speeds are higher than desired, additional mitigation in the form of screens or vegetated planters can be implemented perpendicular to the façade on both sides of the entrances. Alternatively, the entrances could be recessed behind the respective façades to create a sheltered doorway.

Examples of such wind mitigation features discussed above are shown in Image 7 of the wind tunnel study provided in Appendix E. The effectiveness of these mitigation strategies would need to be quantified through further wind tunnel testing.

6.3 Shadow

A preliminary shadow impact assessment was conducted for the Project and submitted in the PNF filing. The PNF included the shadow analysis in Section 6.4 of Chapter 6, *Environmental Protection*. This study was not updated for this DPIR as there have been minor changes in the building massing, which did not materially change the previous study results. The study presented in the PNF reflects a more conservative impact analysis, as the massing was in an earlier conceptual stage and has been reduced during the design process.

The incremental shadows produced are consistent with the existing urban shadow pattern and are not expected to have any significant effect on pedestrian use or enjoyment at or around the Project Site. In particular, the Project will not cast any new shadows on Historic Resources including the Charles River, Soldiers Field Road, Harvard Stadium, the Charles River Basin Historic District, B&B Chemical Company historic building, or any other historic resources in the vicinity of the Project Site.

6.4 Solar Glare

The BPDA Development Review Guidelines require projects undergoing Article 80B, Large Project Review to analyze the potential impacts from solar glare on the following areas, in order to identify the potential for visual impairment or discomfort due to reflective spot glare:

› Potentially affected key roadways;
› Public open spaces; and
› Pedestrian areas.

Furthermore, development projects must consider the potential for solar heat buildup in any nearby buildings receiving reflective sunlight from the Project, if applicable. A solar glare study has been conducted for the Project, the methodology and results of which is presented below.

6.4.1 Methodology

A computer model of the Project and its surrounding urban area was developed using proprietary software called Eclipse. Consistent with the wind and shadow methodologies, based on guidance from the BPDA, the solar glare study assumes future planned developments, or background projects, surrounding the Project Site. These future developments will be based on the currently proposed building height and massing.

The solar glare analysis will use "clear sky" solar data at Boston's Logan International Airport and assumed no cloud cover ever occurs to provide a "worst case" scenario, showing the full extent of when and where glare could occur. Finally, a statistical analysis will be performed to assess the frequency, intensity, and duration of the glare events. Reflections from existing structures will not be accounted for, but shadows from these structures are factored in.

A preliminary set of simulations was conducted to determine peak reflection intensities and the frequency of reflection occurrence for a broad area around the development. This served to identify areas which may experience high intensity or very frequent reflections and informed the 18 receptor locations identified (refer to Table 2 of the complete solar glare study provided in Appendix E). These receptor points represent drivers, pedestrians, and building facades. The results summarized below (and presented in more detail in the complete solar glare study provided in Appendix E) quantify the frequency, intensity and duration of glare events at the receptors, as well as the sources of those reflections.

6.4.1.1 Visual Glare and Thermal Criteria

The following criteria will be used to identify potential visual glare impacts for the Project:

- **Low**: Either no significant reflections occur, or the reflections will have a minimal effect on a viewer.
- **Moderate:** The reflections can cause some visual nuisance only to viewers looking directly at the source.
- **High:** The reflections can cause safety issues to viewers who are unable to look away from the source, such as drivers.
- **Damaging:** The brightest glare source is bright enough to permanently damage the eye for a viewer looking directly at the source.

6.4.2 Solar Glare Study Results

6.4.2.1 Solar Glare Impacts

Drivers

With the addition of the glazed buildings, a driver's experience travelling in the vicinity of the Project Site could be altered as a result of the Project at the following locations:

- Travelling south at the Harvard Business School parking lot exit (receptor D4); and
- Travelling west around the ramp (receptor D13).

These High impact reflections are expected to last under an hour, but on average lasts only 6 to 18 minutes. The impacts on the parking lot exit (D4) were predicted between 7:30 am EST and 9:30 am EST from January to mid-February and again from late-October to December. The impacts on the ramp (D13) were predicted between 3:00 pm EST and 4:15 pm EST from early-January to late-February, and again from mid-October to early-December. This equates to high impact glare events being possible at the parking lot exit and the ramp for 0.66% and 1.2% of the daytime respectively, on an annual basis.

All other glare events predicted as a result of the Project would occur at times when the sun would also be in a driver's field-of-view so that a driver would already experience intense glare from the sun, likely reducing the perceived impact of any reflected light due to the Project. Refer to the complete solar glare study provided in Appendix E for these locations.

Pedestrians

Moderate levels of visual impact (i.e., a temporary nuisance, not a safety risk) were predicted to fall on most of the pedestrian and facade receptors studied. The potential impacts predicted on the facade facing Western Avenue (F16) and DEF Road (F17) were predicted to be minor. Any reflections that do reach these areas are expected to be short in duration (20 minutes or less) and are possible at most 0.5% of the daytime annually.

6.4.2.2 Thermal Impacts

No significant thermal impacts (i.e., risks to human safety or property damage) are expected to occur either on the site of the development or in the surrounding neighborhood. The planar facades of the proposed development ensure that reflected sunlight will not focus (multiply) in any particular area.

The majority of reflected solar energy at the studied facade areas was predicted to be low intensity (less than 300 W/m2) and short duration. Therefore, these reflections are not expected to lead to a significant additional cooling load for a building.

6.5 Air Quality

The purpose of the air quality assessment is to demonstrate that the Project satisfies applicable regulatory requirements, and whether it complies with the 1990 Clean Air Act Amendments (CAAA) following the local and the U.S. Environmental Protection Agency (EPA) policies and procedures. The sections below discuss regulatory context, existing background concentrations, and the microscale and mesoscale analyses.

6.5.1 Background

The CAAA resulted in states being divided into attainment and non-attainment areas, with classifications based upon the severity of their air quality problems. Air quality control regions are classified and divided into one of three categories: attainment, non-attainment, and maintenance areas, depending upon air quality data and ambient concentrations of pollutants. Attainment areas are regions where ambient concentrations of a pollutant are below the respective NAAQS; non-attainment areas are those where concentrations exceed the NAAQS. A maintenance area is an area that used to be non-attainment but has demonstrated that the air quality has improved to attainment. After 20 years of clean air quality, maintenance areas can be re-designated to attainment.

The Project is in the Allston neighborhood within the City of Boston, Suffolk County, Massachusetts, which under the EPA designation is a carbon monoxide (CO) Maintenance area. Projects located in a CO maintenance area are required to evaluate their CO concentrations with the NAAQS, as has been done for this Project. The City of Boston is in attainment for the remainder of the criteria pollutants.

6.5.2 Air Quality Standards

The EPA has established the NAAQS to protect the public health. Massachusetts has adopted similar standards as those set by the EPA for CO. Table 6-2 presents the NAAQS for carbon monoxide.

Table 6-2 National Ambient Air Quality Standards

	Primary Standards		
Pollutant	Level	Averaging Time	Form
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour	Not to be exceeded more than once per year
	35 ppm (40 mg/m^3)	1-hour	

DEP maintains a network of air quality monitors to measure background CO concentrations. Background concentrations are ambient pollution levels from all stationary, mobile, and area sources. Background CO concentrations are determined by choosing the maximum of the second-highest annual values from the previous three years. Looking at the air quality monitor closest to the Project Site (Harrison Avenue) for the years 2017-2019, the CO background values are 1.6 ppm for the 1-hour averaging time and 1.3 ppm for the 8-hour averaging time. These values are much less than the 1-hour and 8-hour NAAQS. The background values are presented in Table 6-3.

Table 6-3 Air Quality Background Concentrations

	Background Concentrations		NAAQS	
Pollutant	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide	1.3 ppm	8-hour	9 ppm	8-hour
	1.6 ppm	1-hour	35 ppm	1-hour

Monitoring Location: Harrison Avenue, Boston, MA. Years 2017-2019.

The potential CO concentrations from motor vehicle traffic related to the Project will be considered in conjunction with these background concentrations to demonstrate that the Project will comply with the NAAQS Standards.

6.5.3 Microscale Air Quality Analysis

This section presents an overview of and the results for the microscale ("hot spot") assessment conducted for the Project. The purpose of the air quality assessment is to demonstrate that the Project satisfies applicable local, State and Federal requirements, and to determine whether it complies with the 1990 CAAA following the local and the U.S. EPA policies and procedures.

6.5.3.1 BPDA Development Review Guidelines

The BPDA Development Review Guidelines require "a microscale analysis predicting localized carbon monoxide concentrations should be performed, including identification of any locations projected to exceed the National or Massachusetts Ambient Air Quality Standards, for projects in which:

- Project traffic would impact intersections or roadway links currently operating at Level of Service ("LOS") D, E, or F or would cause LOS to decline to D, E, or F; or
- Project traffic would increase traffic volumes on nearby roadways by 10 percent or more (unless the increase in traffic volume is less than 100 vehicles per hour); or
- The Project will generate 3,000 or more new average daily trips on roadways providing access to a single location."

As presented in Chapter 3, *Transportation*, the traffic analysis indicates that the LOS at one of the study intersections will decline to D, E, or F and intersection volumes will increase by more than 10 percent under the build condition. As such, a microscale analysis was conducted pursuant to the BPDA Development Review Guidelines.

6.5.3.2 Microscale Analysis Methodology

The modeling for the microscale analysis followed the EPA's guidelines. The traffic data was evaluated, and locations were selected based on the requirements of the BPDA Development Review Guidelines and the EPA modeling guidance.

The microscale analysis calculates maximum 1-hour and 8-hour CO concentrations in the Project area during the peak CO season (winter). Emission factors were developed using the MOVES2014b program and were combined with the traffic data in EPA's computer model CAL3QHC Version 2.0 model to calculate the CO worst-case concentrations. EPA's CAL3QHC is an air quality dispersion model that applies emission factors obtained from MOVES2014b to projected traffic conditions in order to obtain localized pollutant concentrations at real-world locations.

The microscale analysis utilized the traffic (volumes and speeds) and emission factor data for the No Build and Build Conditions. These data were incorporated into air quality models and demonstrate that the Project will meet the CAAA criteria. The microscale analysis calculated CO concentrations at congested intersections near the Project Site under the No Build and Build conditions for comparison purposes. The worst-case CO concentrations were added to the background levels to determine if the Project's concentrations complied with the NAAQS.

Receptor locations were selected near the congested intersections based upon areas where the public may have access. The intersection receptors were placed at the edge of the roadway, but not closer than 10 feet (3 meters) from the nearest travel lane; as required by the EPA. The results calculated at these receptor locations represent the highest concentrations at each intersection. Receptor locations were grouped by intersection, to simplify the presentation of the results. Receptor locations farther away from the intersections will have lower concentrations because of the dispersion characteristics. The receptor locations that are along other portions of the roadways in the study area are expected to have lower concentrations than the receptor locations at the intersection as the emission rates for vehicles traveling along these roadways are much lower than the emission rates for vehicles queuing at intersections.

6.5.3.3 Emission Rates

All the vehicle emission factors used in the microscale analysis were obtained using the EPA's MOVES2014b emissions model. MOVES2014b calculates CO emission factors from motor vehicles for free-flow conditions in grams per vehicle mile and for idling conditions in grams per vehicle hour. The emission rates used in this study were developed with the data provided by DEP. The emission factors for the microscale analysis were based upon a morning peak hour on a typical weekday in the winter for Suffolk County and were calculated for idle and free-flow conditions based upon roadway travel speeds and grades.

6.5.3.4 Traffic Data

The air quality study evaluates the air quality impacts of the vehicular traffic associated with the Project on the environment. The vehicle traffic represents the worst-case conditions, which includes the increase in traffic volumes due to specific developments proposed for the study area, projected traffic growth over time, and future traffic associated with the Project. The air quality study utilizes traffic and emissions data for the future No-Build and future Build Conditions. These data are incorporated into the EPA air quality models to generate air pollutant concentrations that demonstrate whether the Project would have air quality impacts. The scenarios modeled include:

- No-Build Condition: reflects background growth associated with other planned projects and general background regional growth.
- Build Condition: assuming the No Build Condition background growth with the Project fully constructed and in operation.

The Build with Mitigation Condition was not modeled since delays under this condition are improved and emissions are expected to be less than the Build Condition. Traffic data (volumes, delays, and speeds) was developed for each analysis condition. The traffic volumes and level of-service for the study area were evaluated, and based on the BPDA Development Review Guidelines, the intersection of Cambridge Street at Windom Street was chosen for analysis. This intersection was chosen because it experiences both the largest volume increase and the largest delay increase, representing the intersection most affected by the Project. If this intersection complies with the NAAQS, it is anticipated that all intersections will comply with the NAAQS. The analysis considered the morning peak hour traffic conditions at the intersections as this is the condition where the largest volume increase and delay increase occurred.

6.5.3.5 Microscale Air Quality Study Results

The CO concentrations for each intersection under the No-Build and Build Conditions are presented in Table 6-4. The results show that there are no increases for 1-hour and 8-hour CO concentrations between the No Build and Build Conditions due to the traffic volume increase and intersection delays experienced at the study intersection. The maximum 1-hour CO concentrations were 1.9 ppm, and the maximum 8-hour CO concentrations were 1.5 ppm for the No-Build and Build conditions. The results of the microscale analysis demonstrate that the No Build and Build CO concentrations (both 1-hour and 8-hour values) for the Project are well below the NAAQS.

Appendix E includes the microscale air quality analysis model input and output files.

Table 6-4 Predicted Maximum 1-Hour and 8-Hour CO Concentrations

Intersection	Receptor Quadrant	1-Hour CO Concentrations (ppm)[1,2]		8-Hour CO Concentrations (ppm)[3,4]	
		No Build	Build	No Build	Build
Cambridge Street at Windom Street	Northwest	1.9	1.9	1.5	1.5
	Northeast	1.9	1.9	1.5	1.5
	South	1.9	1.9	1.5	1.5

Source: VHB, Inc.

1 The concentrations are expressed in parts per million (ppm) and include a 1-hour background concentration of 1.6 ppm. The 1-hour NAAQS for CO is 35 ppm.

2 Concentrations represent maximum concentrations within the grouping of receptors placed at each intersection.

3 The concentrations are expressed in parts per million (ppm) and include an 8-hour background concentration of 1.3 ppm and a persistence factor of 0.7. The 8-hour NAAQS for CO is 9 ppm.

4 Concentrations represent maximum concentrations within the grouping of receptors placed at each intersection.

6.5.3.6 Conclusion of Microscale Analysis

The air quality evaluation demonstrated that the development of the Project would not result in adverse localized air quality impacts. The microscale analysis evaluated Project-related vehicles traveling through congested intersections in the study area. This analysis demonstrates that all existing and future CO concentrations are below the NAAQS. Specifically:

› All the one-hour CO concentrations were 1.9 ppm and are well below the CO NAAQS of 35 ppm; and
› All the eight-hour CO concentrations were 1.5 ppm and are below the CO NAAQS of 9 ppm.

The microscale study demonstrates that the Project conforms to the CAAA and the State Implementation Plan (SIP) because:

› No violation of the NAAQS is expected to be created;

- No increase in the frequency or severity of any existing violations (none of which are related to this development) is anticipated to occur; and
- No delay in attainment of any NAAQS is expected to result due to the implementation of the proposed action.

Based upon the analysis presented herein and the conclusions summarized above, no significant adverse air quality impacts from the Project are anticipated on the microscale level.

6.5.4 Mesoscale Air Quality Analysis

A mesoscale air quality analysis may be required if the Project is expected to be of regional significance. The BPDA requires a mesoscale air quality analysis if a project produces 10,000 or more vehicle trips per day. As described in Chapter 3, *Transportation*, the Project is anticipated to generate less than 10,000 vehicle trips per day, therefore this analysis is not required for the BPDA, as noted in the BPDA Comment letter.

6.6 Solid and Hazardous Waste (During Operations)

The project will include recycling collection areas for items such as mixed paper, corrugated cardboard, glass, plastics, metals, alkaline batteries, and electronic waste. Regarding the Lab/Office building, the operational solid waste generated will be similar to that of other office buildings at approximately 2.5 lb/sf annually. The final tenant mix for the Lab/Office is not known at this time, but the Proponent anticipates that any laboratory/research and development/office use of the Project will generate the types and quantities of waste common to most laboratory research facilities.

6.7 Construction

This section 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 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 section includes the following information (with DPIR section references in **bold**):

- Details of the anticipated construction schedule (**Section 6.6.1**);
- Construction period impacts and proposed mitigation (**Section 6.6.2**);
- Construction Logistics and public protection (**Section 6.6.2.1**);

- Subsurface Construction (**Section 6.6.2.2**);
- Potential impacts and proposed mitigation measure associated with below grade construction (**Section 6.6.2.3**);
- Discussion on construction vehicle emissions controls (**Section 6.6.2.4**);
- Discussion on mitigating noise during construction (**Section 6.6.2.5**);
- Description on Project's generation, handling, recycling and disposal of construction and demolition debris (C&D) and measures to reduce solid waste generation (**Section 6.6.2.6**);
- Description of measures to manage stormwater during construction (**Section 6.6.2.7**);
- Description of how rodent control will be managed during the construction period (**Section 6.6.2.8**); and
- An approach to communication and neighborhood outreach (**Section 6.6.2.9**).

6.7.1 Construction Schedule

There will be five buildings constructed as part of this initial Phase inclusive of a Lab/Office building, Residential, Hotel, and Treehouse conference center. The following construction milestones presented in Table 6-5 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 6-5 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

6.7.2 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 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 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 6.3 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 are permitted. Construction mitigation will be consistent and respectful of existing Harvard policies, practices and commitments that have been made to the community.

As part of the Project, there will be limited contractor parking and construction staging as shown in Figure 6.3. 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 6.3. 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 amendment to construction contracts.

6.7.2.1 Construction 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 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.

6.7.2.2 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 Conference Center, is planned to be at approximately 14 feet below future site grades. No below grade space is planned beneath the Conference Center, and the ground level slab will be established to align with final site grades planned around the Conference Center.

The excavation for the garage will be conducted within an engineered lateral support of excavation ("SOE") system anticipated to be an interlocking steel sheetpiling 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 sheetpile 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. The Proponent will ensure that waste removal and disposal during construction will be in conformance with the City of Boston and MassDEP regulations for solid and hazardous waste disposal.

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.

6.7.2.3 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.

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.

6.7.2.4 Construction 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.

6.7.2.5 Construction 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."

6.7.2.6 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.

1 Harvard University Disposal Facility List, 2021 (or more recent). 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

6.7.2.7 Construction 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 fence, 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 its locally designated agency.

6.7.2.8 Construction 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 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].

6.7.2.9 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

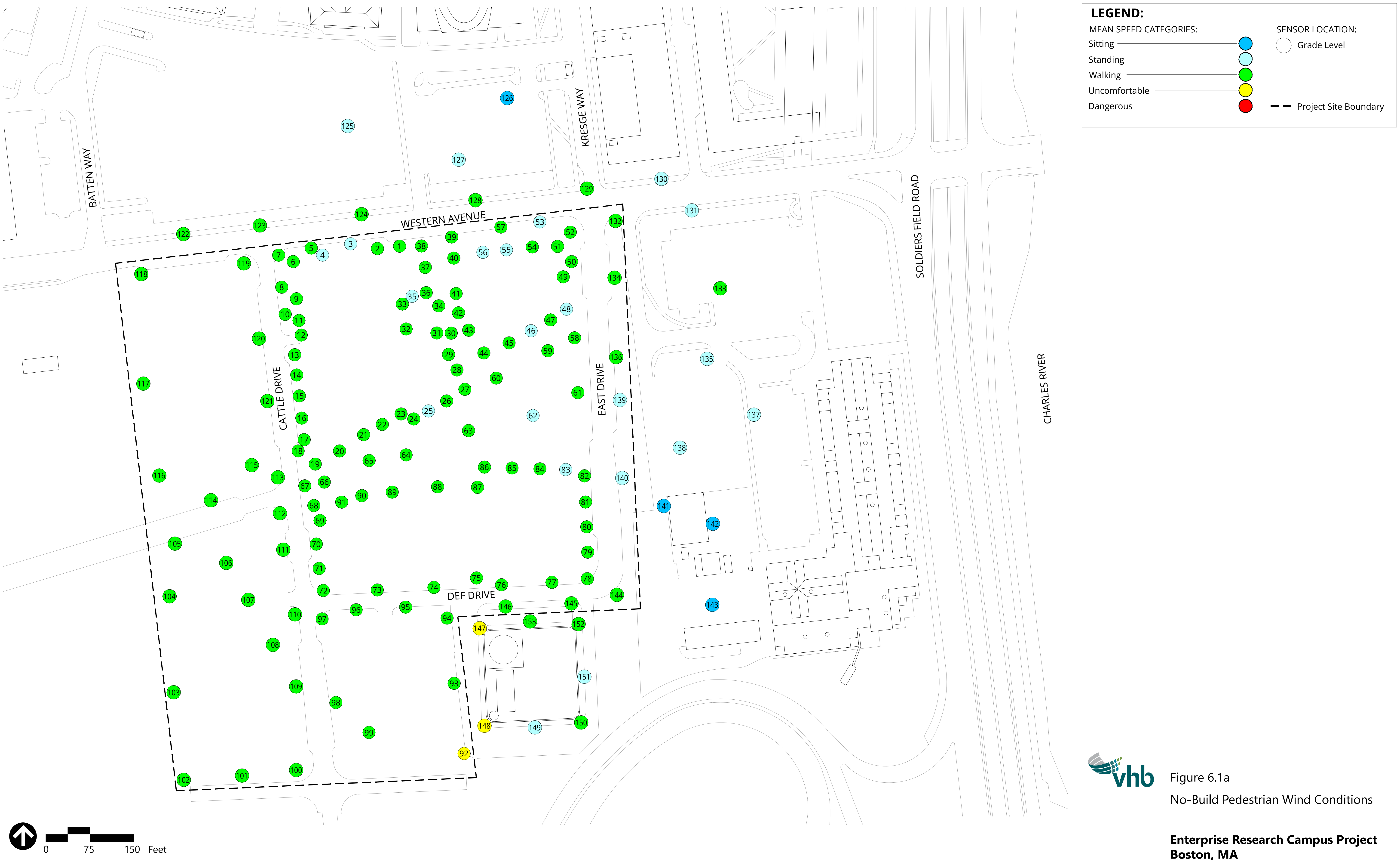
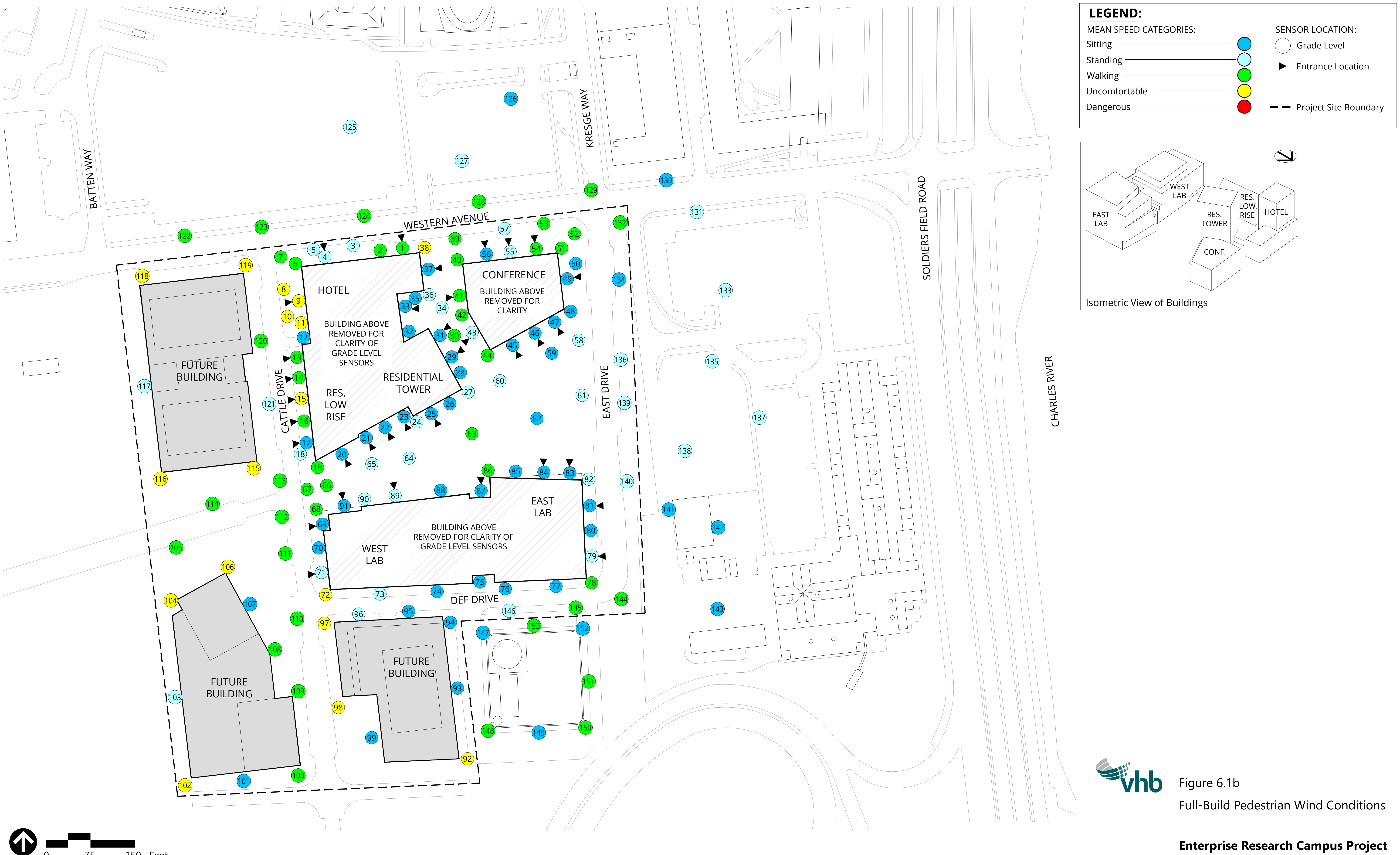


Figure 6.1a

No-Build Pedestrian Wind Conditions

Enterprise Research Campus Project
Boston, MA

Source: RWDI



Source: RWDI

Figure 6.1b

Full-Build Pedestrian Wind Conditions

Enterprise Research Campus Project
Boston, MA

Figure 6.2a

No-Build Wind Gusts

Enterprise Research Campus Project
Boston, MA

Source: RWDI

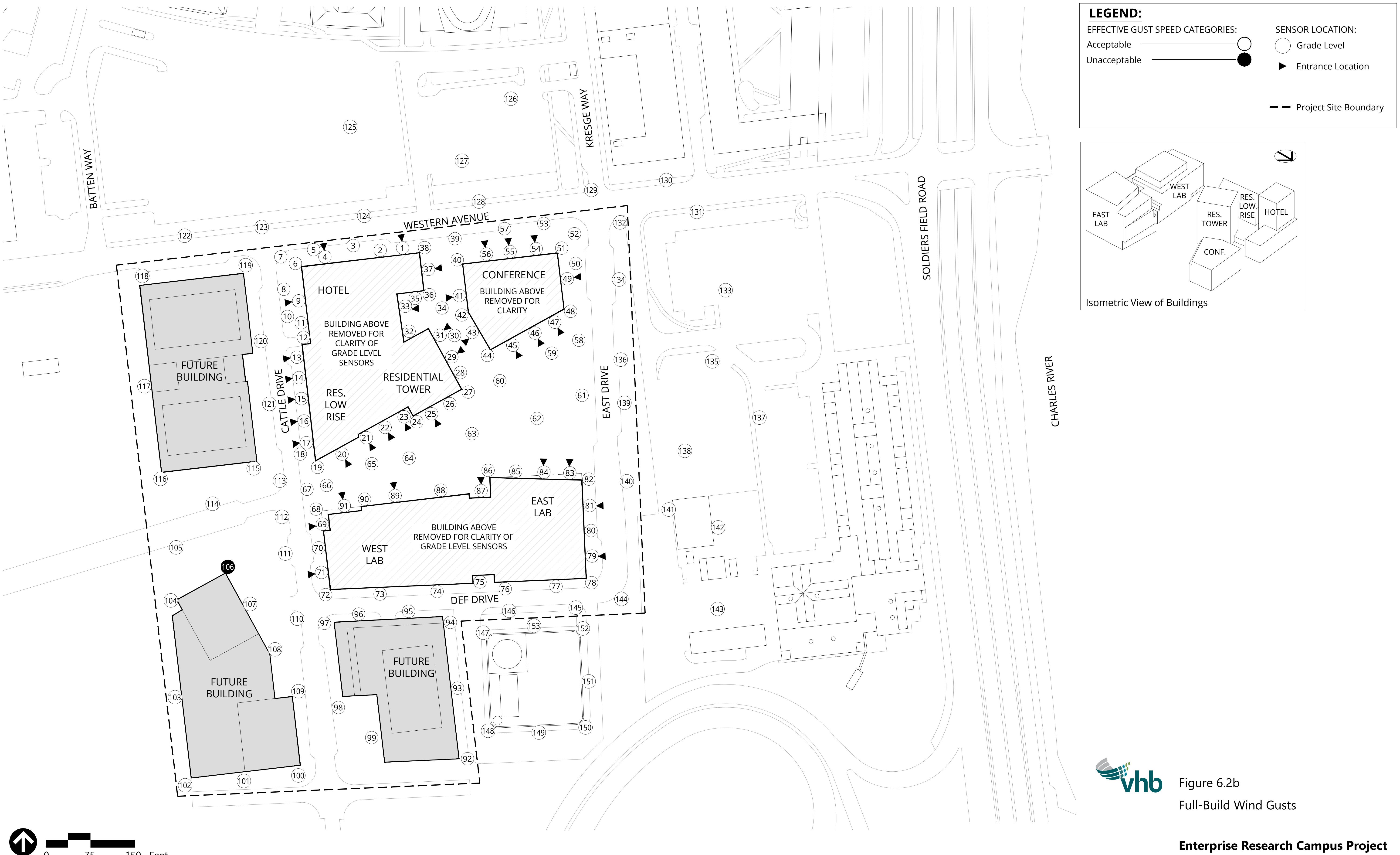


Figure 6.2b

Full-Build Wind Gusts

Enterprise Research Campus Project
Boston, MA

Source: RWDI

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 6.3

Proposed Construction Truck Routes

Enterprise Research Campus Project
Boston, MA

7

Infrastructure Systems

This chapter describes the existing infrastructure within and adjacent to the Project Site, planned infrastructure within the vicinity of the Project Site as part of other projects, and the proposed infrastructure required for the Project, including stormwater management, water use, sewerage, energy and broadband. This chapter also describes the Smart Utility Technologies that will be incorporated in light of the City of Boston's Smart Utilities Policy. 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.

Refer to Figure 7.1 for a schematic drawing of existing utilities, Figure 7.2 for planned utilities and proposed connections, Figure 7.3 for the Project's connection to the North Allston Storm Drain Extension Project, Figure 7.4 for the Cambridge Street interim drainage system, Figures 7.5a and 7.5b for the Project's proposed green infrastructure, and Figures 7.6 and 7.7 for the Project's roadway utility cross sections.

7.1 Summary of Key Findings and Benefits

The key impact assessment findings and benefits related to infrastructure systems include:

› The Project will incorporate on-site stormwater best management practices (BMPs) and treatment systems, which will significantly improve the overall quality of stormwater runoff, reduce runoff volumes, and control peak rates of runoff in comparison to existing conditions.
› 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. The Project will provide stormwater resiliency storage to accommodate an additional 1.5 -inches of runoff, exceeding the City's required 1.25-inch water quality volume, for the

impervious site areas of the Project. These volumes result in a total of 2.75-inches of stormwater management for the Project.

- The Project will comply with the *2008 MassDEP Stormwater Management Policy and Standards* and will improve both the quality and quantity of stormwater runoff from the Project Site compared to existing conditions.
- Based on the current development program, the Project is estimated to generate approximately 147,701 gallons per day (GPD) of sanitary sewage and will require approximately 162,471GPD of water.
- Since the increase in sewage flows is expected to be greater than 15,000 GPD, the Project is expected to result in contributions of 4:1 Infiltration and Inflow (I/I) fees calculated based on the proposed sewage flows.
- The Project is not expected to result in any increased peak flows, pollutants, or sediments that would potentially impact the local storm drainage systems.

7.2 Regulatory Context

7.2.1 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.

7.2.2 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.

7.2.3 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.

7.2.4 BPDA Smart Utilities Policy

Adopted in June of 2018 and updated in 2020, the BPDA's Smart Utilities Policy seeks to develop a more equitable, sustainable, affordable, resilient, and integrated planning approach among energy, transportation, water and communication utilities in the City of Boston. Per the policy, Smart Utility Technologies (SUTs) required for Article 80 projects depend on: (a) the floor area of the project; and/or (b) the project's required mitigation of traffic, street lighting, and surface water runoff.

7.3 Stormwater Management

This section describes existing Project Site drainage conditions, planned infrastructure near the Project Site, proposed drainage conditions, and mitigation measures associated with stormwater infrastructure.

7.3.1 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. 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 7.1, and planned stormwater management infrastructure, as shown on Figure 7.2.

7.3.1.1 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.

7.3.1.2 East Drive

HALC plans to construct a north-south private way open to public travel along the easterly edge of the Project. There is an existing 18-inch storm drain main off-site within East Drive that connects to a 48-inch main flowing southerly. This 48-inch main currently discharges to the MassDOT drainage system and will eventually be reconnected to the BWSC drainage system. Refer to Section 7.3.1.5 for more information.

7.3.1.3 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 within the temporary roadway currently serving the DEF, installed by Harvard and approved by BWSC. 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 7.3.1.5 for more information.

7.3.1.4 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 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.

7.3.1.5 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 7.3.

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 when the NASDEP is completed. The Cambridge Street interim drainage system is shown in Figure 7.4.

The drainage systems that will service the Project are designed to collect and discharge the current BWSC 10-year design storm.

7.3.2 Proposed Stormwater Management Approach

As described in Chapter 1, *Project Description*, the Project Site will be developed with five new buildings, paved roadways with sidewalks, walkways and plazas, and landscaping. It is anticipated to be approximately 85% impervious for a total of 7.65 acres, which is an increase of 57% 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 may help reduce impervious area by 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 24% of the Site (14% of the Project Greenway and 10% of the streetscape).

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 manage an additional 1.5-inches of runoff as a Project requirement. The infiltration systems will be designed so as to not increase 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 evaluating 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 assess the proposed system's ability to handle the peak flows of these larger 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, 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 manage 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 7.5a and 7.5b. 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.

7.3.2.1 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 8 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.

7.3.3 Compliance with MassDEP Stormwater Management Standards

As described in Section 7.2.2, 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 redevelopment 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, plazas, paved sidewalk, roadways, and Project Greenway. 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 to 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 recharge 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 with 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.

7.4 Sanitary Sewage

This section describes existing conditions or planned infrastructure near the Project Site, and proposed conditions and mitigation measures associated with wastewater infrastructure.

7.4.1 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. The existing wastewater infrastructure surrounding the Project Site is shown on Figure 7.1. Planned wastewater infrastructure and proposed building service connections are shown on Figure 7.2.

7.4.1.1 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 as part of a separate project.

7.4.1.2 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.

7.4.1.3 DEF Drive

There are no existing or planned sanitary sewer mains within DEF Drive.

7.4.1.4 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.

7.4.2 Proposed Sewage Flow and Connections

The proposed drainage system is illustrated in Figure 7.2. The Project's sewage generation rates were estimated using 310 CMR 15.203 and the proposed building programs, as shown in Table 7-1. 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 construction 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.

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 Treehouse Conference Center (retail, conferencing and meeting space), lab/office, restaurant, retail, hotel and residential. 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 147,701 GPD in wastewater flows. Table 7-1 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 7-1 Estimated Future Sewer Generation

Building Use	Units[1]	310 CMR Value	Total Flow
Building 1			
Conference Center	61,500 SF	15 GPD/user	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
	188 seats	35 GPD/seat	
	9,347 SF	50 GPD/1,000 SF	
Restaurant			6,580 GPD
Retail			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
TOTAL			**147,701 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).

7.4.3 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 147,701 GPD, or 0.147 MGD, a peak flow factor of 3 is applied for times of higher flow, resulting in 0.441 MGD (0.147 MGD x 3 = 0.441 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 likely 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.

7.4.4 Mitigation Measures

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.

7.5 Domestic Water and Fire Protection

This section describes existing conditions or planned water infrastructure near the Project Site, proposed conditions, and mitigation measures associated with use of potable water. The existing water system is shown in Figure 7.1. Planned water infrastructure work and proposed building connections are shown on Figure 7.2.

7.5.1 Existing and Planned Water Supply System

The BWSC maintains water mains adjacent to the Project Site. There are four water systems within the City, and these provide service to portions of the City based on ground surface elevation. The four systems are Southern Low (abbreviated SL), Southern High (commonly known as high service and abbreviated SH), Northern Low (abbreviated NL), and Southern Extra-High (abbreviated SEH) Services. There are existing BWSC water mains and new water mains installed by HALC to eventually be turned over to BWSC. There are no active water mains within the Project Site.

7.5.1.1 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.

7.5.1.2 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.

7.5.1.3 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.

7.5.1.4 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.

7.5.1.5 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 garage between Buildings 2 and 3. The water main will be located within a BWSC easement.

7.5.2 Proposed Water Demand and Connection

The estimated water demand for domestic services for the Project is based on estimated sewage generation, as described in Section 7.4.2. 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 162,471 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 Treehouse Conference 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.

7.5.3 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.

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.

7.6 Other Utilities

This section describes existing conditions or planned infrastructure near the site, proposed conditions, and mitigation measures associated with natural gas, electrical and telecommunications utilities.

7.6.1 Natural Gas Service

National Grid owns the existing underground gas system in the public ways around the Project Site and will own the planned gas infrastructure in the future roadways. The existing gas infrastructure is shown in Figure 7.1. A conceptual layout for new gas mains and services to the proposed buildings is shown in Figure 7.2.

7.6.1.1 Western Avenue

There is an existing 6-inch gas main in Western Avenue which is planned to be upgraded to a 12-inch gas main.

7.6.1.2 East Drive

There is a newly constructed 12-inch gas main in East Drive, which connects to the 6-inch gas main in Western Avenue and provides service to the DEF building.

7.6.1.3 District Energy Facility Drive

There is no gas main in DEF Drive.

7.6.1.4 Cattle Drive

There is a planned 12-inch gas main in Cattle Drive that will connect to the new 12-inch gas main in Western Avenue. It is expected that adequate service is available in the existing system for the Project. The Proponent will work with National Grid to determine the necessary service connections and gas meter locations required for the proposed buildings.

7.6.2 Electrical Service

Eversource owns the existing below-grade electrical system in the adjacent public ways. There are planned electrical ductbanks for East Drive and Cattle Drive. It is expected that adequate service will be available to service the Project. New services will connect to new vault locations in the roadways. The Proponent is committed to taking an integrated and comprehensive approach to energy planning. The existing electrical infrastructure is shown in Figure 7.1. Conceptual electrical connections to the proposed buildings is shown in Figure 7.2.

7.6.3 Telecommunications

There is an existing telecommunications ductbank installed in East Drive to provide service to the DEF building. There are planned telecommunications ductbanks for Cattle Drive to provide service to the new buildings. The Proponent will work with the private telecommunication companies to determine the infrastructure improvements needed, confirm adequate system capacity for the Project, coordinate service connections and interior routing locations, and obtain appropriate approvals. Existing telecommunications infrastructure is shown in Figure 7.1. A conceptual layout for new telecommunications ductbanks and services to the proposed buildings is shown in Figure 7.2.

7.6.4 Protection of Utilities During Construction

Existing public and private infrastructure located within nearby public rights-of-way will be protected during Project construction. The installation of proposed utility connections within public ways will be undertaken in accordance with BWSC, Boston Public Works Department, the Dig-Safe Program, and applicable utility company requirements. Specific methods for constructing proposed utilities where they are near to, or connect with, existing water, sewer, and drain facilities will be reviewed by the BWSC as part of its Site Plan Review process. All necessary permits will be obtained before the commencement of work.

7.7 Smart Utilities Policy

As described in Section 7.2.4, the BPDA adopted the Smart Utility Policy for Article 80 Development Review on June 14, 2018 and updated in 2020. The following section summarizes the approach to addressing the City of Boston's Smart Utilities Policy for the Project. The Project has evaluated the applicability and ability to integrate Smart Utility Standards into new buildings using the Boston Smart Utilities Checklist in coordination with the roadway infrastructure being designed and constructed by Harvard. The Project, along with the Harvard roads, will strive to promote utilities that are easier to build, maintain and upgrade, and will aim to make utilities more affordable and efficient for residents and businesses. The completed Smart Utilities Checklist is provided in Appendix B. Refer to Figure 7.2 for proposed utilities, and Figures 7.6 and 7.7 for roadway utility cross sections.

7.7.1 Green Infrastructure

For all projects at or above 100,000 SF of floor area, the BPDA, in consultation with BWSC, shall recommend the use of green infrastructure to infiltrate a volume of runoff equal to 1.25 inches of rainfall times the total impervious area on-site. The Project will meet this recommendation and will retain an additional 1.5 inches of storm water runoff from the impervious areas of the Project Site. Additional green infrastructure measures are being evaluated by HALC. Refer to Section 7.3.2 for a description of proposed green infrastructure and Figures 7.5a and 7.5b for proposed green infrastructure in the roadways and on-site.

7.7.2 District Energy System / Microgrid

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 (the Project and Phase B, 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. The study will assess the viability of a District Energy system, distributed energy resources (DER), and/or microgrid for clusters of buildings. Since the PNF filing, the Proponent has held an initial meeting with the City of Boston on March 31, 2021 to review the approach and proposed systems to be studied in the District Energy Microgrid Feasibility Study. The meeting was attended by Nupoor Monani, Manuel Esquivel and Brad Swing at the City of Boston.

At the meeting, it was agreed the district systems to be studied would include an ambient water loop served by a combination of air to water heat pumps, ground source and electric boilers in incremental steps to reduce natural gas consumption in buildings for heating and domestic hot water demands. The analysis will be submitted to the City of Boston for review in Fall 2021.

7.7.3 Adaptive Signal Technologies

The need to provide new or improve signals as a result of the Project will be identified as part of the DPIR upon completion of the signal warrant analysis.

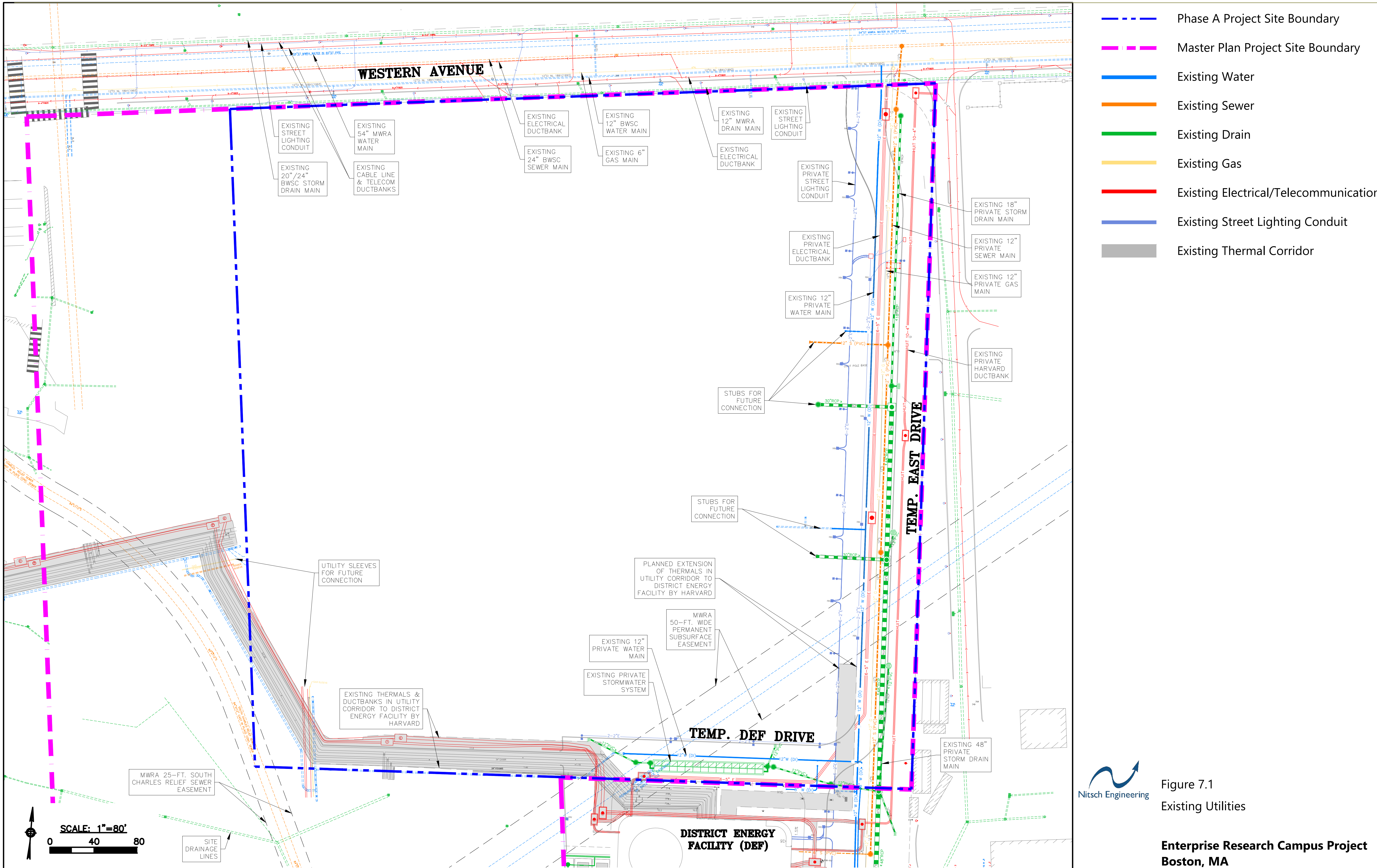
7.7.4 Streetlight Installation

New streetlights will be installed as part of HALC's work with respect to the roadways. New composite pullboxes and street lighting conduits will be installed as required for the Project. Shadow conduits for future fiber optic service will be included for new street lighting work in the Western Avenue public way and will be provided for Cattle Drive, East Drive, and DEF Drive should they become public ways in the future. The Proponent will coordinate required improvements to the existing streetlight system with the Boston Public Works Department.

7.8 Broadband Ready Buildings

The Proponent has begun to consider readiness for broadband at the Project Site. The Project will strive to create a built environment that is responsive to new and emerging connectivity technologies and enable an environment of competition and choice that results in more favorable outcomes for the community. Refer to Appendix B for the completed Broadband Ready Buildings Questionnaire.

This page left intentionally blank.



Nitsch Engineering

Figure 7.1

Existing Utilities

Enterprise Research Campus Project
Boston, MA

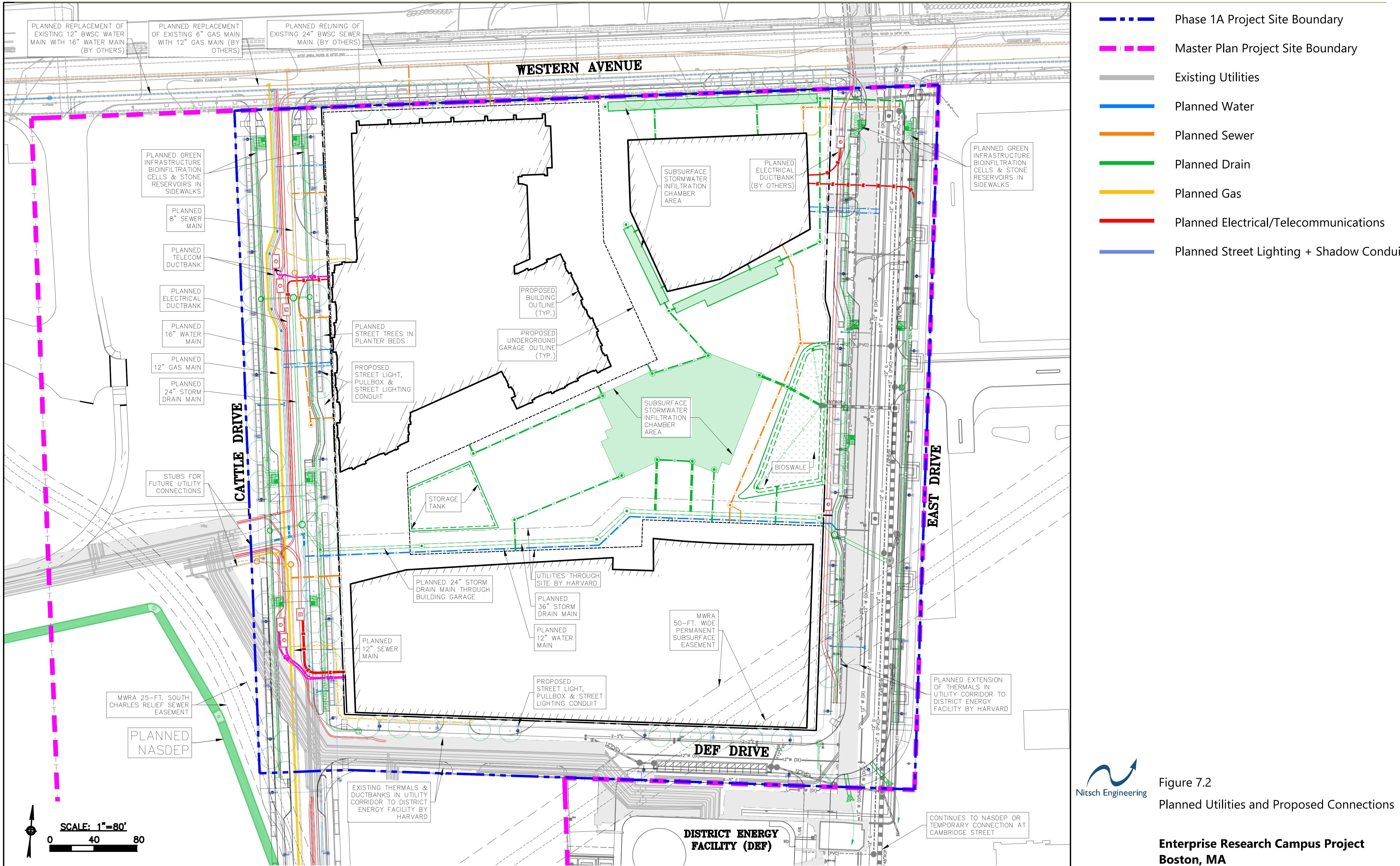
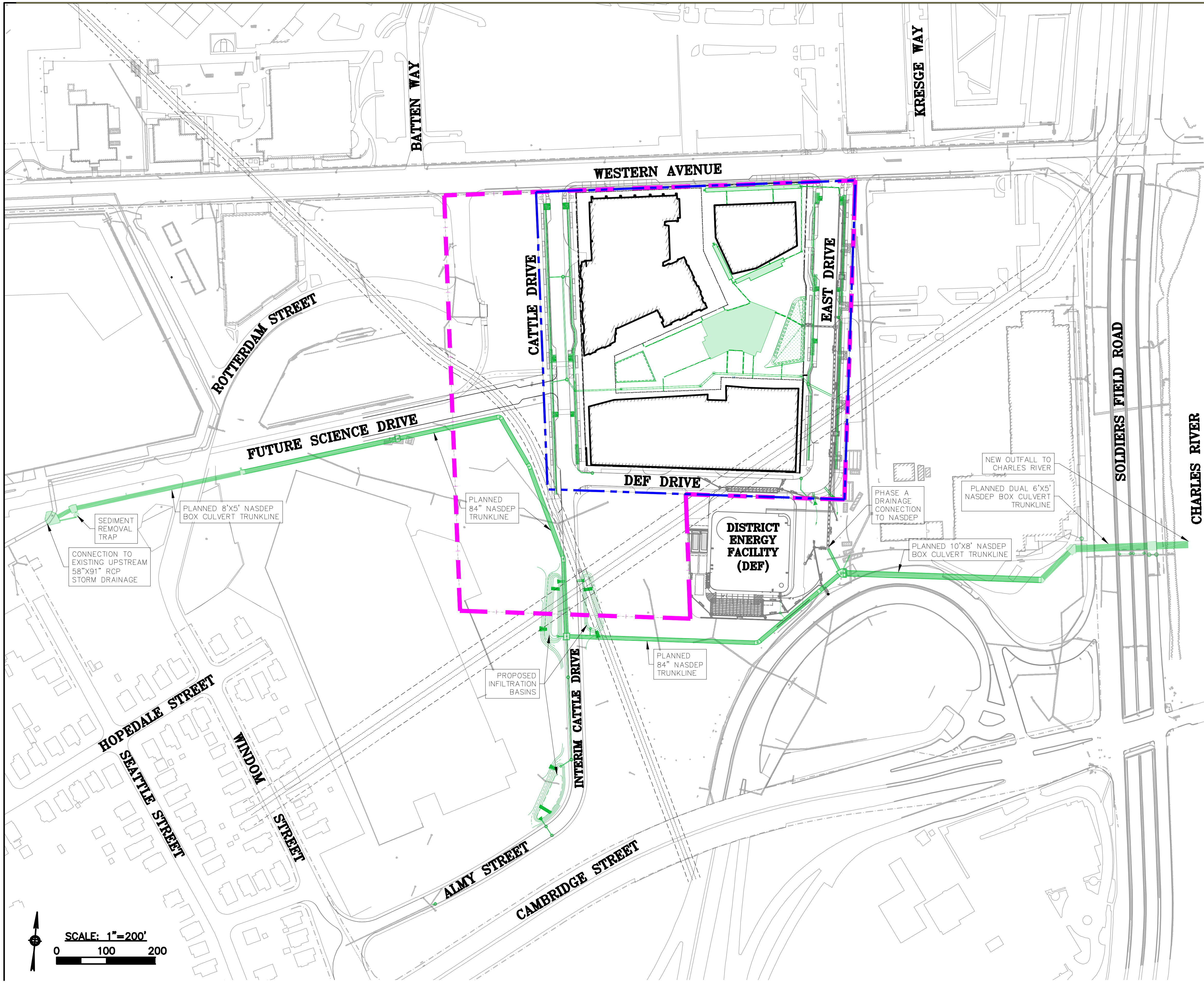


Figure 7.2

Planned Utilities and Proposed Connections

Enterprise Research Campus Project
Boston, MA

Note: Illustrative purposes only. Subject to change.



Phase A Project Site Boundary

Master Plan Project Site Boundary

Planned Drain

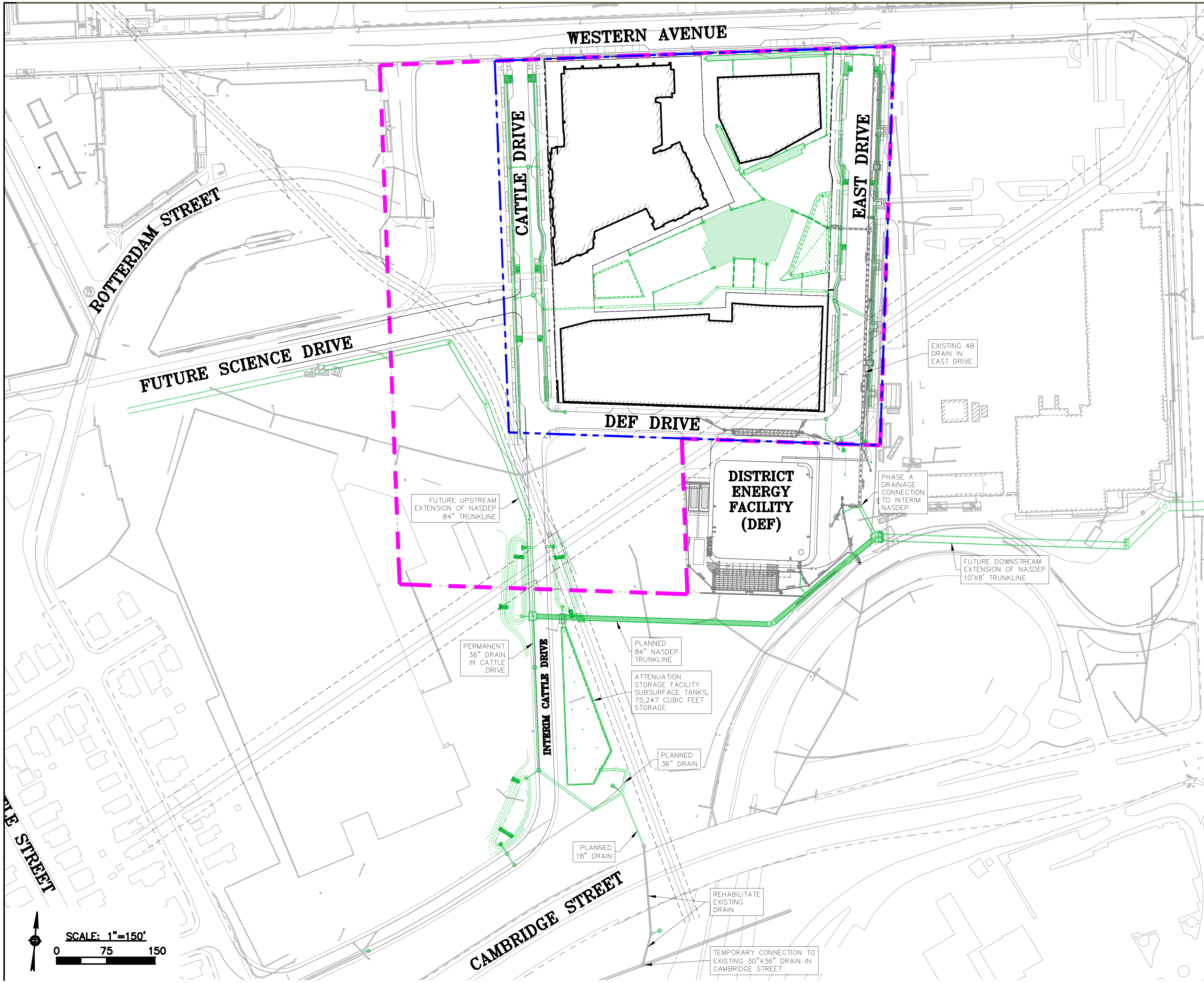
Existing Drain

Nitsch Engineering

Figure 7.3

Planned NASDEP Connection

Enterprise Research Campus Project
Boston, MA



Phase A Project Site Boundary

Master Plan Project Site Boundary

Planned Drain

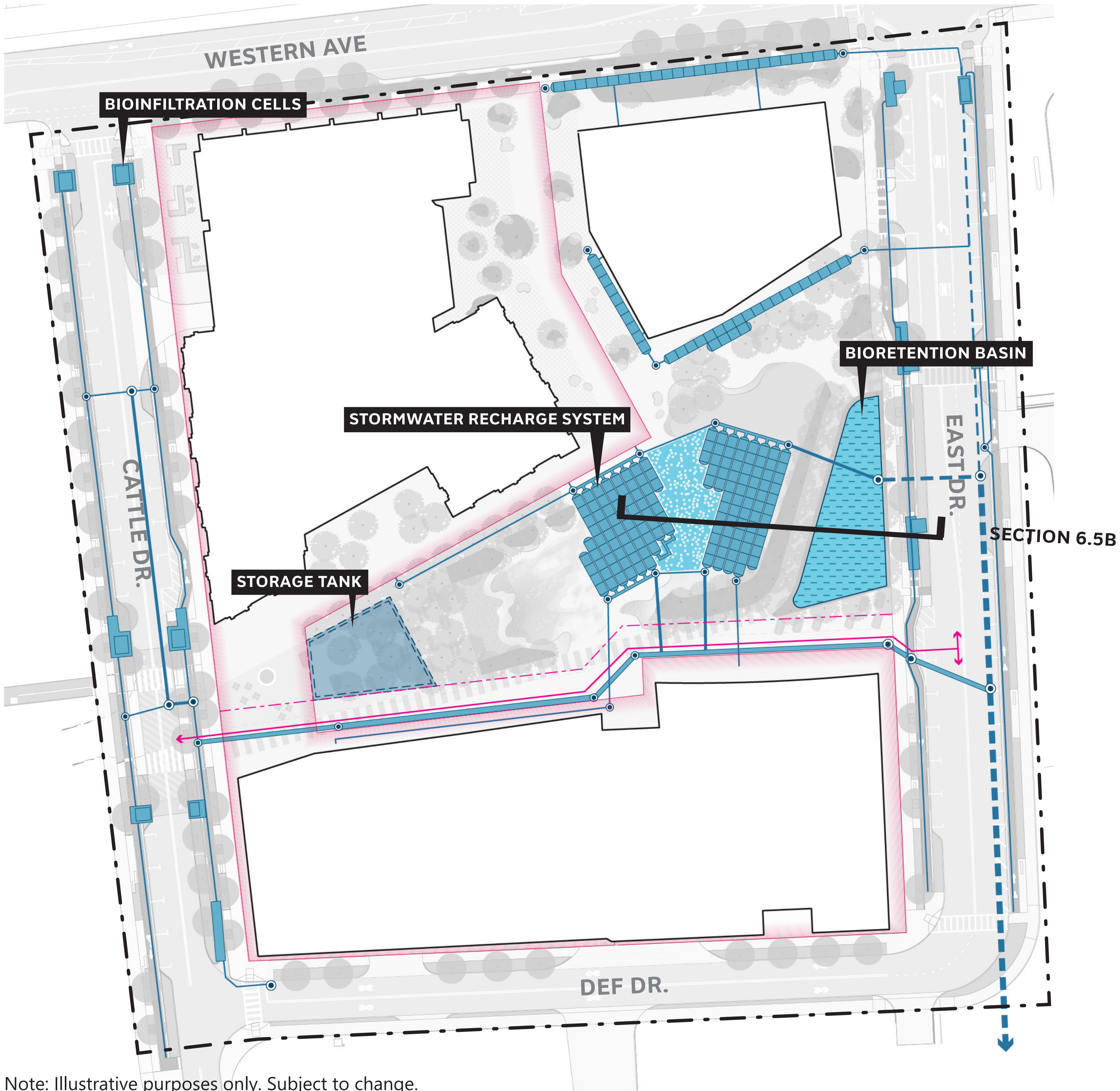
Existing Drain

Nitsch Engineering

Figure 7.4

Cambridge Street Interim Stormwater Connection

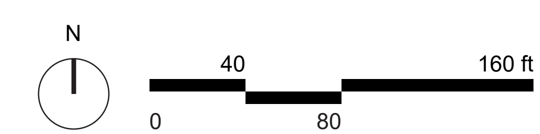
Enterprise Research Campus Project
Boston, MA



- 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.



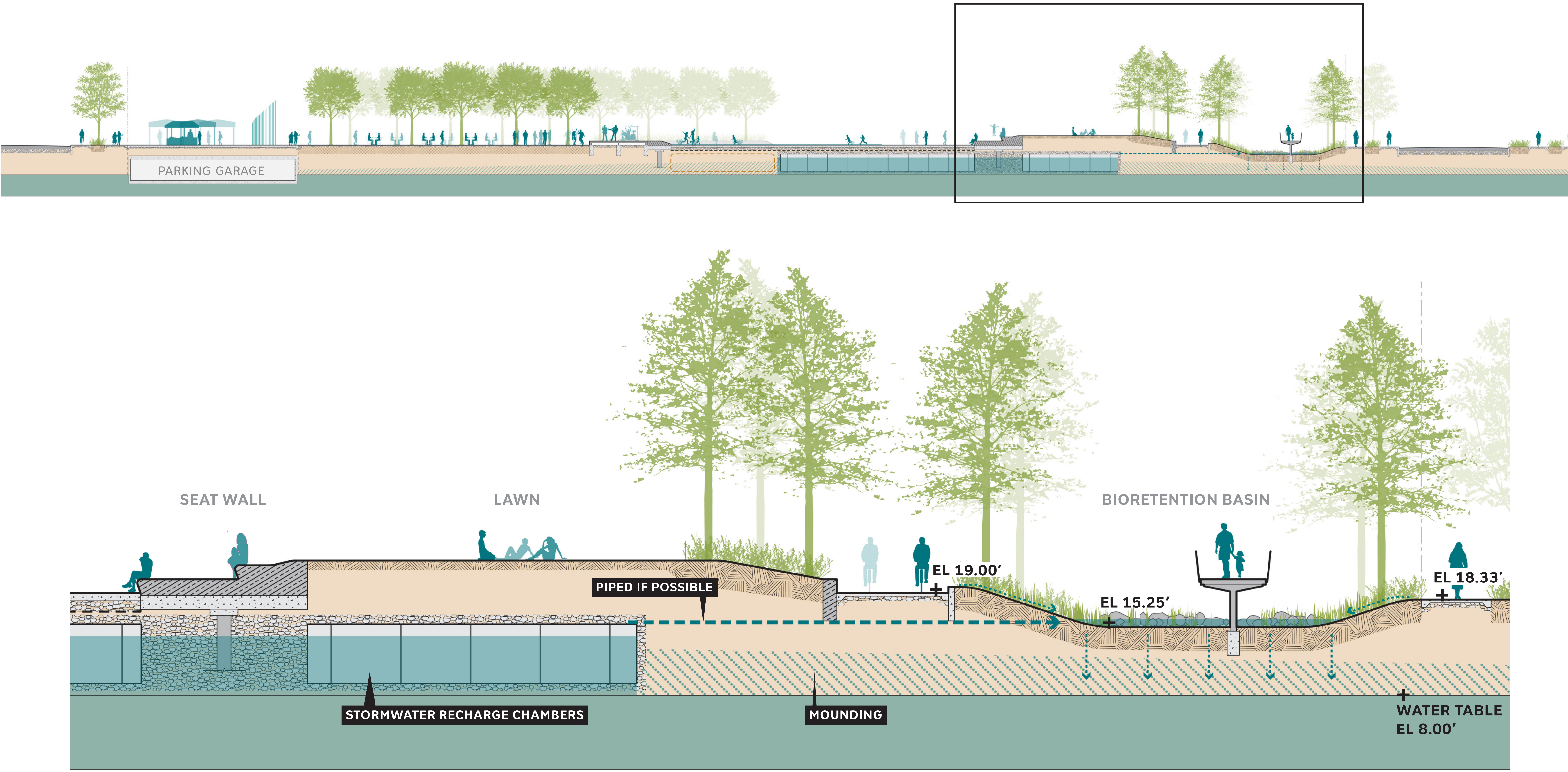
SCALE: 1" = 80'

Note: Illustrative purposes only. Subject to change.

Figure 7.5a

Stormwater Management

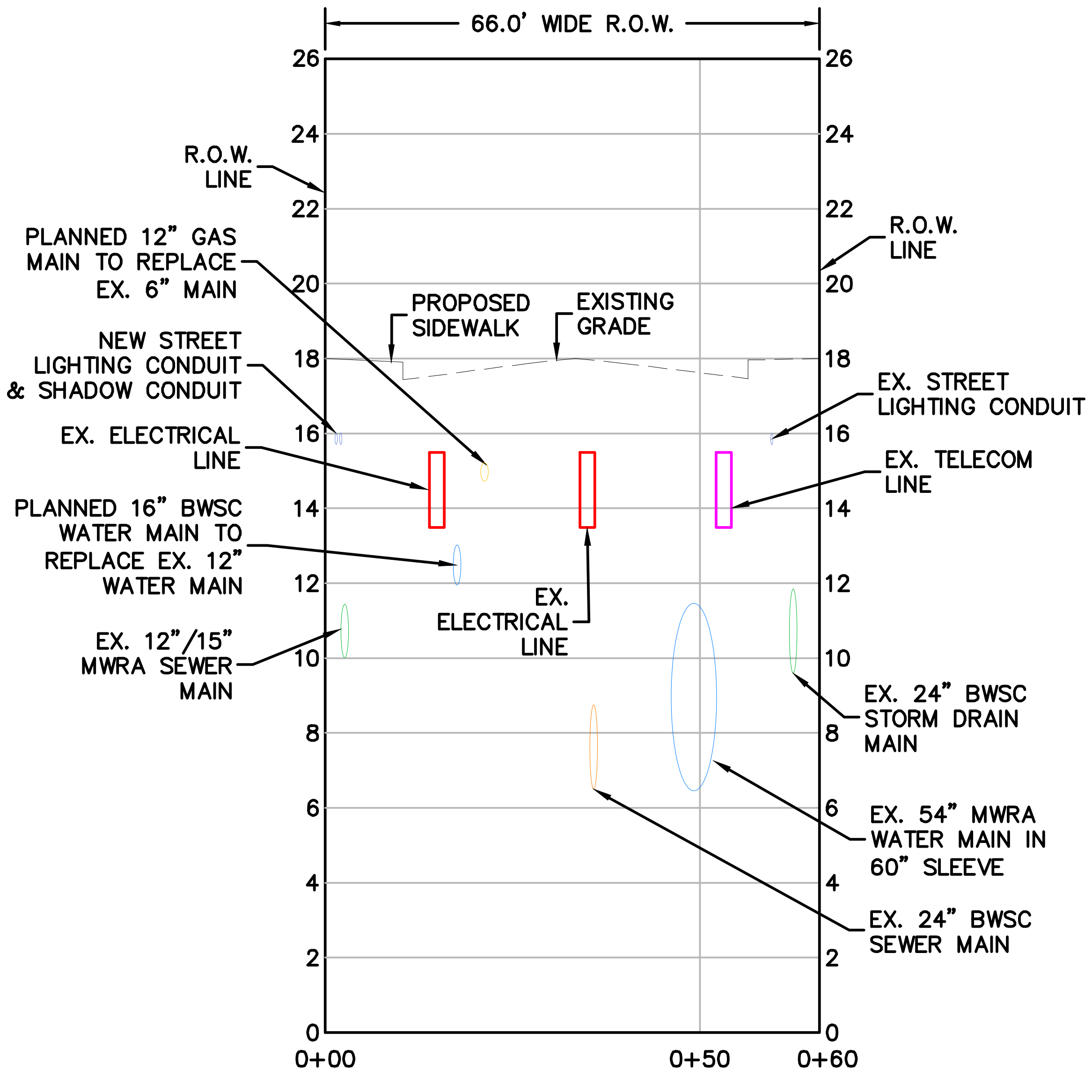
Enterprise Research Campus Project
Boston, MA



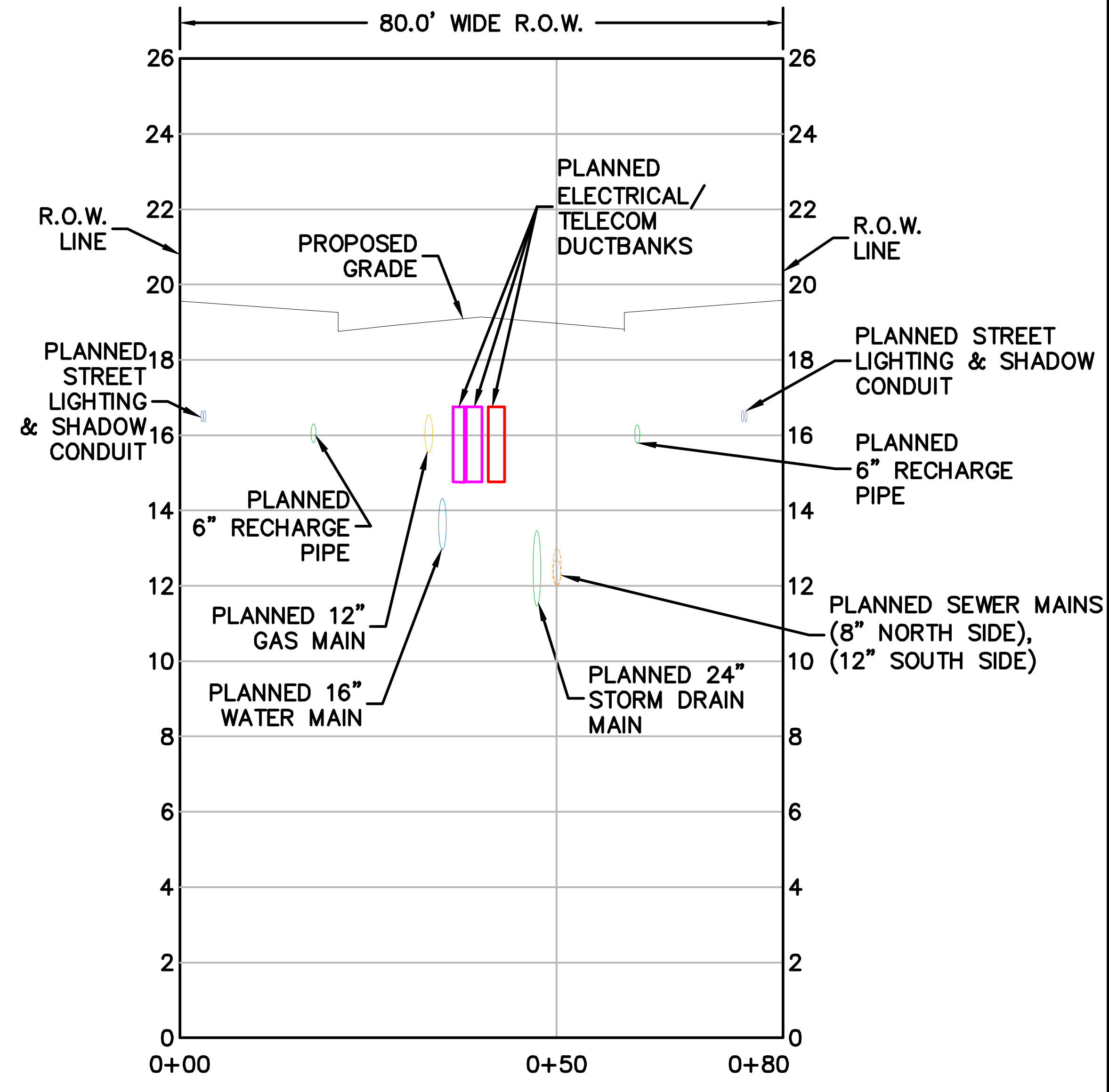
Note: Illustrative purposes only. Subject to change.

Figure 7.5b

Stormwater Management



WESTERN AVENUE
NOT TO SCALE



CATTLE DRIVE
NOT TO SCALE

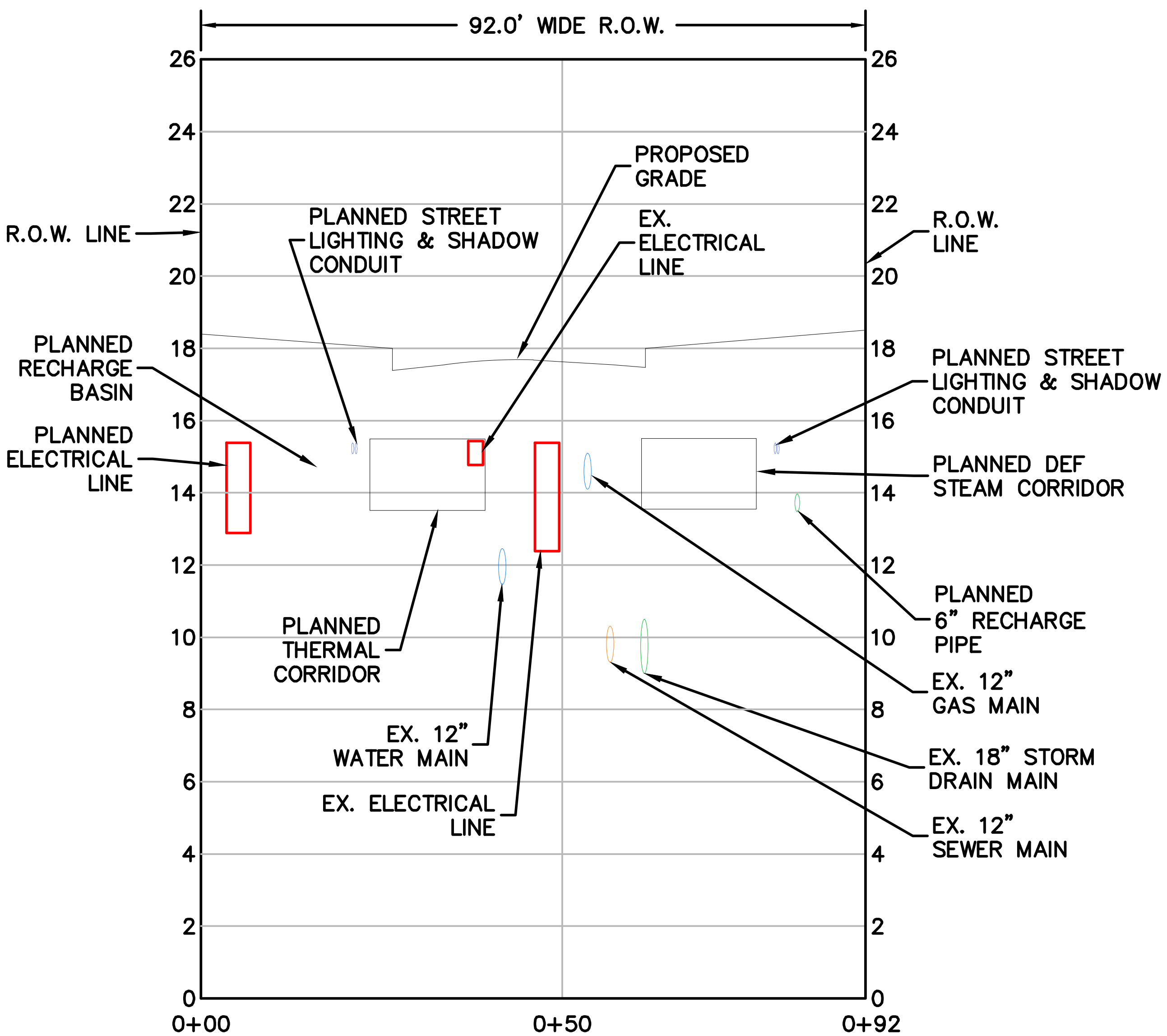
NOTE: UTILITY SIZES, DEPTHS & LOCATIONS ARE APPROXIMATE BASED ON AVAILABLE RECORD & DESIGN INFORMATION & MAY VARY FROM ACTUAL CONDITIONS.

Nitsch Engineering

Figure 7.6

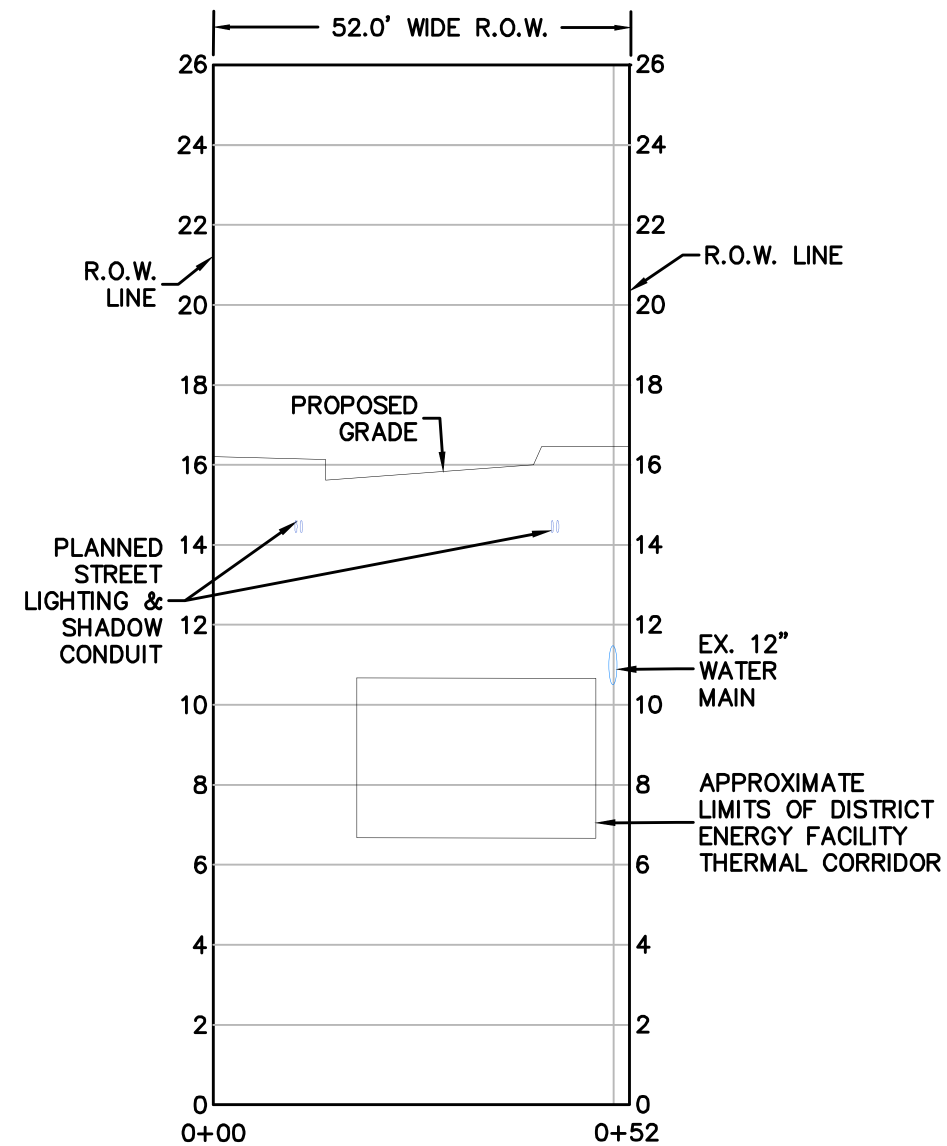
Roadway Cross Sections 1

Enterprise Research Campus Project
Boston, MA



EAST DRIVE

NOT TO SCALE



DEF DRIVE

NOT TO SCALE

NOTE: UTILITY SIZES, DEPTHS & LOCATIONS ARE APPROXIMATE BASED ON AVAILABLE RECORD & DESIGN INFORMATION & MAY VARY FROM ACTUAL CONDITIONS.

Nitsch Engineering

Figure 7.7

Roadway Cross Sections 2

Enterprise Research Campus Project
Boston, MA

8

Response to PNF Comments

This chapter includes responses to the PNF Scoping Determination issued May 14, 2021. Copies of the Scoping Determination and each comment letter received during the public review period of the PNF are included in this chapter. The Scoping Determination is assigned a letter and all other comment letters are assigned a number, as listed below in Table 8-1 below. Each individual comment is assigned a comment code that corresponds to the comment delineations on the Scoping Determination and each comment letter for reference. The responses provided herein aim to refer to specific sections of the DPIR for further information, where appropriate. A copy of each comment letter is included in Appendix F, *PNF Comments*.

Table 8-1 List of PNF Comment Letters

Letter No.	Commenter	Affiliation	Date Received
ENF Comments			
SD	Development Review Department	Boston Redevelopment Authority d/b/a Boston Planning and Development Authority (BPDA)	May 14, 2021
1	Unknown	BPDA Transportation	March 16, 2021
2	Multiple	BPDA Urban Design	May 3, 2021
3	Maura T. Zlody	Interagency Green Building Committee (IGBC)	April 2, 2021
4	Multiple	BPDA Smart Utilities	March 9, 2021
5	Katie Pederson	BPDA	February 22, 2021
6	John P. Sullivan	Boston Water and Sewer Commission	March 2, 2021
7	Jeffrey Alexis	Boston Public Works Department	March 2, 2021
8	Carrie Marsh Dixon	Boston Parks and Recreation Commission	March 15, 2021
9	Barbara Parmenter	IAG	March 2021
10	Christine Varriale	IAG	March 15, 2021

Letter No.	Commenter	Affiliation	Date Received
ENF Comments			
11	Multiple	Task Force	May 3, 2021
12	Liz Breadon	Boston City Council	March 26, 2021
13	Janet Moonan	Charles River Watershed Association	March 24, 2021
14	Anna Leslie	Allston Brighton Health Collaborative	March 23, 2021
15	Tim McHale	Allston Brighton Resident, HATF Chair	May 5, 2021

PNF Scoping Determination

Comment SD.1

As part of the BPDA's Article 80 review, the Proponent is required to prepare and submit to the BPDA a proposed Draft Project Impact Report ("DPIR") pursuant to Section 80B of the Code. The document must set forth in sufficient detail the planning framework of the Proposed Project and the cumulative impacts of the Proposed Project to allow the BPDA to make a determination about the merits of the Proposed Project.

Response

The Proponent has filed this DPIR, which includes the Project's planning framework and its cumulative impacts.

Comment SD.2

The Proponent is requested to respond to the specific elements outlined in this Scope.

Response

This chapter, Chapter 8, *Response to PNF Comments*, includes responses to specific elements outlined in the Scoping Determination.

Comment SD.3

The proposed DPIR shall contain the information necessary to meet the specifications of Article 80 as well as any additional information requested below.

Response

The DPIR has included information necessary to meet the specifications of Article 80 and Scoping Determination comments.

Comment SD.4

Throughout this initial phase of review, the Proponent has taken steps to meet with community members, elected officials, and various City agencies / departments. Regular conversations and meetings with all interested parties must continue through the duration of the public review process, ensuring that what is presented in the DPIR is beneficial to the respective neighborhood and the City of Boston as a whole.

Response

The Proponent has undertaken multiple channels of direct outreach to and meetings with members of the community, neighborhood organizations, election officials, and numerous City agencies and departments. See Section 1.1 in Chapter 1, *Project Description*.

Comment SD.5

The Proposed Project will be the first major development in the implementation of Harvard's Enterprise Research Campus Framework Plan ("Framework Plan") on a site that is currently vacant. As such, it is of the utmost importance that the Proposed Project creates a strong sense of place for the community through the articulation of its design, programming, and community benefits.

Response

Regarding the focus on the Project design within the broader Framework Plan, please see Section 4.3.2 in Chapter 4, *Urban Design*. The Framework Plan is not a master plan, nor is it intended for regulatory approval; instead, it presents a systems-based framework that describes the rationale for circulation, public realm, infrastructure, and other systems in the ERC. The robust template set forth by the Framework Plan, especially for community building, guided the planning for the Project. The Proponent's plans call for the implementation of robust programming throughout the Project's public realm and intends to provide a strong package of community benefits. Please see Section 1.2 in Chapter 1, *Project Description* for further details.

Comment SD.6

A central goal dating back to the 2005 North Allston Strategic Framework for Planning through today has been the creation of a Harvard campus (whether academic or commercial in nature) that is welcoming to the public. The Proposed Project proposal does much to implement this goal. This aim of creating a new neighborhood that is integrated with the rest of North Allston physically and that draws in all residents and visitors must continue to inform design and programming decisions.

Response

The Project is proposed in light of the Framework Plan, which takes into consideration the ongoing planning and development of Allston to the north of the PDA Area (the University's Institutional Master Plan Area) and to the south (the Massachusetts Department of Transportation's I-90 Allston Multimodal Project). The Framework Plan is intended to guide near-term thinking while also providing a framework and guidelines for development beyond the initial phase addressed in the DPIR. Central to the Framework Plan and advanced through this Project is the planned expansion of the Greenway, which begins at the Honan-Allston Branch Library, will pass through the ERC from Stadium Road through East Drive, and eventually continue eastward toward river frontage. The Greenway will comprise a landscaped corridor that will provide key pedestrian and bicycle connections between the existing Allston neighborhood, the ERC, and other areawide constituencies, and will draw in residents and visitors with a range of activities from passive relaxation, to performance, education, and active recreation, that will address the needs of people of various ages, abilities, and interests.

Comment SD.7

It is expected that the Proposed Project will be responsive to recent and ongoing planning in the neighborhood including the Allston Brighton Mobility Study and the Western Ave. Corridor Rezoning Study.

Response

The Proposed Project has been developed to be responsive with the recent and ongoing planning studies in the area, including the Allston Brighton Mobility Study and the Western Avenue Corridor Rezoning Study. The design of the Project Site and the proposed off-Site transportation mitigation promotes sustainable transportation modes and was developed based on the goals and visions outlined in the two ongoing neighborhood studies. Section 3.4.3 in Chapter 3, *Transportation*, discusses the consistency of the Project design with local and regional planning efforts.

Comment SD.8

The Framework Plan, while not a regulatory document, is a key component of the planning, design, and review process. While the Framework Plan is developed by Harvard and not controlled by the Proponent, it must continue to evolve in parallel with the DPIR and other regulatory documents submitted by the Proponent in order to provide the BPDA with critical long-term context for the Proposed Project.

Response

The Proponent recognizes and respects the fact that the Project is being developed as the initial phase of a broader Framework Plan developed by Harvard, which lays out planning goals for the broader approximately 36-acre ERC area. While the Proponent cannot comment to the Framework plan outside of the 14-acre PDA Area, the Proponent has worked to seamlessly integrate into, and to build upon the vision of the Framework Plan to develop a vibrant, mixed use and sustainable community where creativity and innovation thrive. Harvard recently issued an update to the Framework Plan, "Enterprise Research Campus Framework Plan - 2021 Update", to provide the BPDA with additional context for the Project.

Comment SD.9

It is expected that the Proponent will work with Harvard and define specific strategies for achieving the goals of the broader Framework Plan within the Proposed Project, including but not limited to affordable housing, workforce development, sustainability and resilience, transportation, and public realm, and in conjunction with BPDA staff as well as the Task Force and community.

Response

The Proponent has been, and will continue to, work closely with the BPDA, the Task Force and the broader community to further refine the affordable housing, workforce development, sustainability and resilience, transportation and public realm strategies and improvements provided as part of the Project. Further details on each aspect of the Project are included in the relevant chapters, and a comprehensive package of public benefits is included in Section 1.2 of Chapter 1, *Project Description*.

Comment SD.10

While the PNF address a 6-acre site referred to in the PNF as "Phase A", it will be important to understand and present this in the context of the Proponent's vision for the entire 14-acre site identified in the PDA Master Plan. It is expected that design development of the remainder of this parcel known as "Phase B" will continue in parallel with the DPIR with special attention paid to the seams between Phases A and B and edges where Phases A and B intersect with the existing neighborhood and larger Framework Plan.

Response

The Proponent has worked to be transparent with regard to the potential plans for Phase B. Please refer to Chapter 2, *Phase B* for further detail and context on this topic.

See Section 4.3 in Chapter 4, *Urban Design* in reference to the site surroundings and its context with the PDA framework plan.

See Section 4.4.2 in Chapter 4, *Urban Design* for the urban Design Approach to Cattle Drive where the west edge of Phase A meets Phase B, including at the intersection where the Project Greenway crosses from Phase A into Phase B.

Comment SD.11

The DPIR should include the most up-to-date information the Proponent's collaboration and reviews the Massachusetts Environmental Protection Act Office and any other public agencies as relevant. Throughout the review process for the DPIR, the BPDA encourages the Proponent to keep the City of Boston and the community apprised of those reviews.

Response

Section 1.1 in Chapter 1, *Project Description*, presents information on the Proponent's collaboration and review under the Massachusetts Environmental Policy Act (MEPA). A MEPA public site consultation was held virtually on February 22, 2021. Notice of filing of the Draft Environmental Impact Report (DEIR) is expected to be published by MEPA on August 11, 2021. The City of Boston is included in the distribution list for the MEPA filings.

Comment SD.12

The size of the Proposed Project and degree of change envisioned at the site have generated excitement but also confusion during the initial review process. While the DPIR will contain additional information, it will be important to ground the public's understanding of the project in concrete and contextual terms. It is expected that the Proponent will [provide] a combination of drawings, renderings, videos, and other creative approaches to anchor the understanding of the Proposed Project in relation to the surrounding neighborhood and comparable areas elsewhere in *the city. Please refer to the letter from BPDA Urban Design and Planning in Appendix A for more information.*

Response

Refer to Figures 4.1-4.12i in Chapter 4, *Urban Design* for more detailed project information on the urban design and proposed architectural elevations and renderings for the Project.

Comment SD.13

The BPDA appreciates the community benefits outlined in the PNF. However, it is expected that the DPIR will include detailed proposals elaborating on the nature of these benefits with clear quantifiable commitments from the Proponent on all fronts.

Response

The Proponent has provided further details and specifics surround the Project's public benefits in each chapter of the DPIR, and they are summarized in Section 1.2 in Chapter 1, *Project Description*.

Comment SD.14

Housing affordability and the effect of the Proposed Project on the neighborhood have been subjects of great interest and concern during the initial review process. The BPDA expects the Proponent to provide a range of rental opportunities and explore creative approaches to accommodate homeownership opportunities, including income-restricted units that exceed the threshold stipulated by the Inclusionary Development Policy.

Response

Please refer to Section 1.2.5 of Chapter 1, *Project Description* for further details regarding the Proponent's commitments to provide affordable housing with on-site rental apartments.

Comment SD.15

Further, the BPDA expects that the project will investigate and apply strategies outlined in the Affirmatively Furthering Fair Housing zoning amendment and comply with the procedures and requirements of this regulation.

Response

The Proponent intends to investigate the strategies outlined in the Affirmatively Further Fair Housing (AFFH) and comply with the AFFH program.

Comment SD.16

With a significant portion of the Proposed Project dedicated to office, retail, hospitality, and research and life-sciences manufacturing uses, the Proposed Project presents an opportunity to *have a meaningful impact on workforce development for the neighborhood and the city. It is expected that the DPIR will include detailed strategies for growing the participation of diverse populations in these sectors and creating employment opportunities at all skill levels.*

Response

Further detail regarding the Proponent's intentions around workforce development are noted in Section 1.3.2 of Chapter 1, *Project Description*.

Comment SD.17

It is also expected that Harvard's involvement in the Proposed Project will enable greater and long-lasting community participation through innovative models like the Ed Portal.

Response

Further detail regarding the Proponent's intentions around workforce development are detailed further in Section 1.2 of Chapter 1, *Project Description*, which may include partnerships with organization like the Ed Portal.

Comment SD.18

The nature of the Proposed Project's retail strategy was similarly a subject of interest during the initial review process. Commenters and members of the Task Force expressed a desire for neighborhood-scale retail, opportunities for local businesses to rent space, incubator space for small business startups, and increased participation of MBE/WBE tenants who would otherwise not be able to afford such space. The Proponent should be prepared to discuss its strategies for attracting neighborhood-serving retail and fostering small local businesses and identify quantifiable targets

Response

As detailed in Section 1.3.3 of Chapter 1, *Project Description*, the Proponent's vision for the Project retail 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.

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 to operate at the Project.

Comment SD.19

Greater outreach to the Allston/Brighton artists' community will be important as the review of the Proposed Project continues. The BPDA looks forward to working with the Proponent, local elected officials, the Mayor's Office of Neighborhood Services, Mayor's Office of Arts and Culture, and local civic groups to develop strategies that will enable this community to have active participation in shaping the Proposed Project and using it once completed.

Response

The Proponent retains a strong commitment to fostering the arts and recognizes the importance of partnering with the Allston-Brighton artist community. Further detail is provided in Section 1.2 *Chapter Description*.

Comment SD.20

The Proposed Project includes a central Greenway that has the promise to provide many benefits to North Allston by enhancing connectivity from the residential neighborhood to the Charles River. The Greenway has constituted a central organizing element of Harvard's planning for years, and one that has been embraced by community and the BPDA alike. The Proponent must continue working with the BPDA and community address how the Greenway is designed especially at key nodes where it intersects with Cattle Drive, East Drive, and opens up to create an entrance on Western Ave.

Response

The Proposed Project has fully embraced and will advance the vision for the Greenway. See Section 4.4.1 in Chapter 4, *Urban Design*, for a description of the Project's Greenway design. The Proponent will continue to work with the BPDA and the community to review and refine the design of the Project Greenway.

Comment SD.21

In addition, the BPDA encourages the Proponent to continue to engage the Task Force and community to determine what types of new public open space best address the programmatic and environmental needs and goals of the community.

Response

The Proponent held a public meeting on July 13, 2021 to review the design of the Project Greenway and Open Space with the Task Force and the community and to discuss these matters.

Comment SD.22

Given the location, size, and impact of the Proposed Project, it is crucial that the Proponent identify and commit to transit mitigation measures and TDM measures in coordination with Harvard.

Response

The Project proposes several key transit mitigation measures, including implementation of supplemental transit service connections and transit priority on Western Avenue and other corridors. The Project will also 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 Sections 3.12.2 and 3.12.5 of Chapter 3, *Transportation* for details. Among the measures is the provision of bus service to complement MBTA services for transit demand. The Proponent has been working with Harvard's Transportation department to plan for future service that could accommodate the Project's transit demand for a Harvard Square connection. The Proponent has also been in conversation with the Allston-Brighton TMA to plan for a collaboration for a potential Boston Landing service.

Comment SD.23

The BPDA appreciates the Proposed Project's commitment to sustainability and looks forward to working with the Proponent to identify specific strategies to advance goals outlined in the PNF.

Response

The Project will redevelop an underutilized, previously developed urban/industrial site with 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. The Project Team looks forward to collaborating to advance sustainability and resiliency goals for the project. Please reference DPIR Chapter 5, *Sustainability and Climate Change Resiliency*, for more updated information on the Project's approach to these important topics.

Comment SD.24

All development projects have construction impacts. As with any urban development, there needs to be a balance of construction related inconveniences with the daily activities that will continue to occur adjacent to the Proposed Project site. A detailed approach to the construction management must be included in the DPIR, including strategies for construction management over the Proposed Project's multiple phases and community involvement in developing construction management plans.

Response

The Proponent is sensitive to these issues as expressed by the City and the community. Refer to section 6.7 in Chapter 6, *Environmental Protection*, for review of construction management and related impacts for the project site.

Comment SD.25

The Proponent must take into account all BPDA approved and under review proposals in the Allston/Brighton neighborhoods, scheduled infrastructure improvements in the general area, and nearby large-scale developments in the City of Boston while conducting the DPIR's required studies (transportation, infrastructure, open space, etc.).

Response

Section 3.6.1 in Chapter 3, *Transportation*, reference nearby large-scale developments which were analyzed in support of the Transportation impact and mitigation analysis. Relevant large-scale developments were also considered and included in the analysis of environmental impacts (wind and shadow for instance) of the Project as well.

Comment SD.26

The Proponent must clearly describe the overall phasing of the Proposed Project. The buildings to be constructed in each phase of the Proposed Project should be specified along with an anticipated timeline for each phase. The BPDA acknowledges that project timelines are subject to change due to market conditions and other factors.

Response

Further detail regarding the anticipated phasing for the Project are noted in Section 1.3.8 of Chapter 1, *Project Description*.

Comment SD.27

In addition to full-size scale drawings, ten (10) copies of a bound booklet and an electronic copy (PDF format) containing all submission materials reduced to size 8-1/2" x 11", except where otherwise specified, are required. The booklet should be printed on both sides of the page. Bound booklets should be mailed directly to all of the Task Force members, community groups, and other interested parties in support of the public review process. A copy of this Scoping Determination should be included in the booklet for reference.

Response

The proponent will comply with these circulation requirements. A copy of the Scoping Determination is included within this chapter, Chapter 8, *Response to PNF Comments*.

Comment SD.28

Pursuant to Article 80B, the DPIR should provide the following information:

› *Development Team*

- *Names of developer(s), including description of development entity(ies), attorney, project consultants and architects.*
- *Business address, telephone number, fax number and e-mail, where available, for each.*
- *Designated contact for each.*

Response

Details of the development team, as requested in the comment, are included in Section 2.1 of Chapter 2, *General and Legal Information/Regulatory Context* of the PNF.

Comment SD.29

› *Legal Information*

- *Legal judgments or actions pending concerning the Proposed Project*
- *History of tax arrears on property owned in Boston by Applicant.*
- *Evidence of site control over project area, including current ownership and purchase options of all parcels in the Proposed Project, all restrictive covenants and contractual restrictions affecting the Proponent's right or ability to accomplish the Proposed Project, and the nature of the agreements for securing parcels not owned by the Applicant.*
- *Nature and extent of any and all public easements into, through, or surrounding the site.*

Response

Details of the legal information, as requested in the comment, are included in Section 2.2 of Chapter 2, *General and Legal Information/Regulatory Context* of the PNF.

Comment SD.30

Disclosure of Beneficial Interests in the Proposed Project must be provided pursuant to Section 80B-8 of the Boston Zoning Code.

Response

The Proponent will provide the Disclosure of Beneficial Interest document as required under Section 80B-8 of the Boston Zoning Code.

Comment SD.31

The DPIR shall include an up-to-date listing of all anticipated permits or approvals required from other municipal, state or federal agencies, including a proposed application schedule.

Response

An updated list of anticipated permits or approvals is included in Table 1-2 of Chapter 1, *Project Description*.

Comment SD.32

A statement on the applicability of the Massachusetts Environmental Policy Act ("MEPA") should be provided. If the Proposed Project is subject to MEPA, all required documentation should be provided to the BPDA, including but not limited to, copies of the Environmental Notification Form, decisions of the Secretary of Environmental Affairs, and the proposed schedule for coordination with BPDA procedure.

Response

As stated in Section 2.3.2.1 of the PNF, the Project requires a Section 8(m) permit from the MWRA for construction over a deeply buried water tunnel and exceeds the MEPA Review Threshold related to sewage generation (301 CMR 11.03(5)(b)(4a)) requiring MEPA review. The BPDA is included within the distribution list for the Project's MEPA filings.

Comment SD.33

The DPIR shall include a complete description of the Project Site including, at minimum, square footage of the sites, a map indicating the boundaries, a legal description including metes and bounds, existing site conditions, and the surrounding development context, i.e., a description of the surrounding environment including the height, other dimensions, use, and other relevant characteristics of existing nearby buildings, as well as an inventory of surrounding proposed projects.

Response

Refer to Figure 1.4 of Chapter 1, *Project Description* in the PNF for the Site Survey and Figures 4.1 and 4.4a-b in Chapter 4, *Urban Design*, for neighborhood context plan and site sections with surrounding context.

Comment SD.34

Only projects that have completed or are currently undergoing Article 80 review should be included and should be included as proposed in their filings at the Boston Planning & Development Agency.

Response

Details regarding the description of the project is noted in Section 1.3 of Chapter 1, *Project Description*.

Comment SD.35

The Project Site, as defined in the DPIR, must be utilized for each Project Description and for any calculations or comparisons.

Response

Noted.

Comment SD.36

The DPIR shall contain a full description of the Proposed Project and any alternative(s) and their elements, including size, physical characteristics, FAR (utilizing the definition for calculation as provided for in the Boston Zoning Code), and proposed uses, including any uses planned or considered for all elements of the project during the summer months.

Response

Details regarding the description of the Project is noted in Section 1.3 of Chapter 1, *Project Description*. See below regarding analysis of alternatives.

Comment SD.37

The analyses as provided for in the Transportation Component, Environmental Protection Component, and Urban Design Component sections of this Scoping Determination, as well as any additional analysis specified by the BPDA, shall be required for the following alternatives:

- *Alternative 1. No build as a means of measuring the baseline.*
- *Alternative 2. The Proposed Project as set forth in EPNF or as modified via formal notification to the BRA in advance of submission of the DPIR.*
- *Alternative 3. Any additional alternative or alternatives defined by the BPDA. The BPDA reserves the right to extend the requirement of any and all elements of the analysis described herein to an additional alternative.*

Response

The Proponent has studied a No build alternative and the Proposed Project, with those analyses detailed in Chapter 3, *Transportation,* Chapter 5, *Sustainability and Climate Change Resiliency*, and Chapter 6, *Environmental Protection*. The Proponent did not receive a request to study additional alternatives as part of this DPIR filing.

The Proponent did provide alternatives to the Proposed Project as requested under the separate State permitting process with MEPA. Those alternatives are detailed in Chapter 3, Alternatives Analysis of the Draft Environmental Impact Report ("DEIR") which will be published on August 11, 2021. The City of Boston is included in the distribution list for the MEPA filings.

Comment SD.38

The DPIR shall include a detailed traffic and transportation analysis that examines the Proposed Project's impact on the transportation network and proposes measures intended to mitigate, limit, or minimize any adverse impact reasonably attributable to the Proposed Project.

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, *Transportation,* 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 3.7, a summary of transit service capacity analyses is provided in Section 3.8, and a summary of bicycle level of traffic stress analyses is provided in Section 3.9. The final stage of the study discusses possible measures to improve existing and future mobility in the area.

Comment SD.39

The scope of the analysis must utilize as its framework the Transportation Access Plan guidelines to be further defined in consultation with the Boston Transportation Department ("BTD").

Response

The analyses provided in Chapter 3, *Transportation*, are based on the Transportation Access Plan guidelines. Prior to starting the transportation analyses, the Proponent 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 included in Appendix C for reference.

Comment SD.40

Pursuant to Section 80B-3.1 of the Boston Zoning Code, this section of the DPIR should contain, at a minimum, the following elements. Additional questions and required submissions have been added to the baseline requirements of Article 80 based on concerns specific to the project and on comment letters. Not all items will apply to the Proposed Project. Please reach out to the Boston Transportation Department to discuss attached comment letter.

Response

The development of Chapter 3, *Transportation*, was completed based on the elements specified by City of Boston transportation staff at BPDA and BTD and by MassDOT and DCR transportation staff. Prior to starting the transportation analyses, the proponent 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 included in Appendix C for reference.

Comment SD.41

Traffic Management Element. *The Proponent shall work with BTD to identify applicable items of study:*

- *Identify the Proposed Project's impact on the transportation network from expected travel volumes, vehicle trip generation, and directional distribution; the location of loading and unloading activities, including service and delivery; the Proposed Project's impact on the vehicular and circulation systems within the impact area, including the number and type of vehicles, pedestrians, and bicyclists, vehicle occupancy rates (VOR), and the Proposed Project's impact on road corridors and intersection capacities, including Levels of Service and intersection delays from 6:00 a.m. to 8:00 p.m. and for any other times of day that significant activity is anticipated in the Proposed Project.*

Response

Refer to Chapter 3, *Transportation*, for the proposed Project's impacts on the transportation network. Section 3.6.4 describes the trip generation potential of the Project, including the number of vehicles, pedestrians, bicyclists, and transit riders and vehicle occupancy rates. Section 3.6.5 summarizes the vehicular trip distribution. Section 3.7 provides a summary of the Project's impact on road corridors and intersections capacities, including level of service and intersection delay. Section 3.10 outlines the on-street curb lane allocation on Site including the location of loading and unloading activities.

Comment SD.42

- *Inventory, map, and discuss on- and off-street loading, provide estimates of the level of loading and delivery activity, and describe in detail any special loading policies and procedures to be implemented.*

Response

Refer to Section 3.10 of Chapter 3, *Transportation*, for a description of the on-street curb lane allocation on Site, including the location of loading and unloading activities and a summary of the curbside loading space needs analysis.

Comment SD.43

- *Identify mitigation procedures that are intended to mitigate, limit, or minimize the number of vehicle trips generated by the development, and the Proposed Project's interference with the safe and orderly operation of the transportation network; such measures may include an on-site traffic circulation plan, flexible employee work hours, dissemination of transit information, changes in traffic patterns, and full or partial subsidies for public mass transit.*

Response

The Proponent proposes a broad range of management strategies to reduce the traffic impacts of the Project and a robust mitigation program to offset impacts identified. Refer to Section 3.12.3 of Chapter 3, *Transportation*, for a summary of the proposed roadway improvements to help mitigate the Project's impacts on the roadway network and refer to Section 3.12.5 for a summary of the comprehensive transportation demand management program.

Comment SD.44

- *The DPIR shall describe Transportation Demand Management ("TDM") measures that are being considered for the Proposed Project.*

Response

Refer to Section 3.12.5 of Chapter 3, *Transportation*, for a summary of the proposed transportation demand management program.

Comment SD.45

- *Review provisions for service and emergency vehicle access to the proposed dormitory building.*

Response

Refer to Section 3.10 of Chapter 3, *Transportation*, for a description of the on-street curb lane allocation on Site, including the location of loading and unloading activities. The proposed residential use will be general residential multifamily housing and will not be a dormitory associated with Harvard University. Proposed building frontage zones and open space account for emergency access on the Project site. Continued conversation with Boston's Fire Department will occur throughout future design phases.

Comment SD.46

› ***Parking Management Element.*** *The Proponent shall work with BTD to:*

- *Identify the location of proposed drop-off/pick-up, short-term parking, loading, and queuing for both autos and trucks. If no queuing area is available for trucks, identify steps to be taken to avoid negative impacts, referencing the projected frequency of delivery activity and any operational procedures to ensure that deliveries are adequately timed and spaced out.*

Response

Refer to Section 3.12.5 of Chapter 3, *Transportation*, which identifies dedicated curb and loading spaces as a TDM measure. For a description of the on-street curb lane allocation on Site, including the location of loading and unloading activities and a summary of the curbside loading space needs analysis, see Section 3.10. Section 3.10.4 provides a summary of the proposed loading access for Phase A. The Proponent will continue to work with BTD regarding projected frequency of delivery activity and any operational procedures.

Comment SD.47

- *Identify the demand created by the Proposed Project for tenant, commuter, and short- and long-term visitor parking; non-tenant and other parking needs within the Impact Area; and evening and weekend parking needs*

Response

Refer to Section 3.11 of Chapter 3, *Transportation*, for the shared parking demand analysis which includes the demand created by the proposed Project for tenant, commuter, and short-term and long-term visitor parking. Weekend parking study results were not included in the transportation chapter as the peak parking demand on weekdays is the driving factor behind the parking supply. Weekend demand will be much lower without the office demand and, as such, does not drive total parking supply needs.

Comment SD.48

- *Include operational policies and strategies for the Proposed Project that addresses the location, cost, and number of public, private, high-occupancy vehicle, and special-needs parking demand; short-term and long-term space availability; pricing structure of parking rates; location and type of off-site parking; and methods of transporting people to the site from off-site parking*

Response

Refer to Section 3.11 of Chapter 3, *Transportation*, for the shared parking demand analysis, Section 3.4.6 for a summary of the on-site parking supply and access, and Section 3.12.5 for a summary of the transportation demand management program that includes several items to address parking demand management.

Comment SD.49

- *Document parking impacts of the Proposed Project. Describe alternative off street parking locations for displaced parkers as necessary.*

Response

The site is currently undeveloped and, as such, there are no displaced parkers. Refer to Section 3.11 of Chapter 3, *Transportation*, for the shared parking demand analysis. As noted in Section 3.4.6, the proposed Project is expected to provide enough parking spaces to meet the demand of the Project through on-Site spaces and through the temporary interim parking spaces that will be provided for Phase A of the Project.

Comment SD.50/SD.51

› *Article 80 Construction Management Element. The Construction Management Element shall, at a minimum:*

- *Identify the impact from the timing and routes of truck movement and construction deliveries for the Proposed Project; proposed street closings; and the need for employee parking.*
- *Identify, and provide a plan for implementing, mitigation measures that are intended to mitigate, limit, or minimize, to the extent economically feasible, the construction impact of the Proposed Project by limiting the number of construction vehicle trips generated by the Proposed Project, the demand for construction-related parking (both on-site and off-site), and the interference of building construction with the safe and orderly operation of the Transportation Network, such measures to include the use of alternative modes of transport for employees and materials to and from the site; appropriate construction equipment, including use of a climbing crane; staggered hours for vehicular movement; traffic controllers to facilitate equipment and trucks entering and exiting the site; covered pedestrian walkways; alternative construction networks and construction planning; and restrictions of vehicular movement*

Response

Refer to Sections 6.6 in Chapter 6, *Environmental Protection,* for a review of construction management and related impacts to logistics, mitigation, and public protection.

Comment SD.52

- *Designate a liaison between the Proposed Project, public agencies, and the surrounding residential and business communities.*

Response

The Proponent has not yet selected a construction manager for the construction of the Project. Once one or more construction managers have been on boarded, the Proponent will designate a liaison, who will coordinate with the relevant public agencies, residents, and businesses.

Comment SD.53

› ***Pedestrian Analysis.*** *Address the adequacy of sidewalks and other pedestrian infrastructure in the area of the Proposed Project and potential safety issues at pedestrian crossings. Propose improvements to facilitate pedestrian circulation to and* *around the Proposed Project and ways that development can improve the overall pedestrian circulation system of the neighborhood.*

Response

The Proposed Project, and its Enabling Infrastructure, will provide an extensive network of *new* pedestrian connections and improved crossings. Refer to Section 3.5.3 of Chapter 3, *Transportation*, for a summary of the existing pedestrian infrastructure and Sections 3.4.5 and 3.12.1 for summaries of the proposed improvements both on-Site and off-Site to facilitate pedestrian circulation to and around the proposed Project. The future pedestrian network that will serve the Site and the neighborhood is presented in Figure 3.5.

Comment SD.54

- ***Mitigation.*** *Identify measures to mitigate any transportation impacts identified in the preceding sections.*

Response

Refer to Section 3.12 of Chapter 3, *Transportation*, for a summary of all transportation related mitigation, including transit enhancements, pedestrian/bicycle accommodation improvements, roadway improvements, and details of the transportation demand management plan.

Comment SD.55

The DPIR shall contain an Environmental Protection Component as outlined below. Opportunities for sustainable design, as well as other issues, are described in the written comments from public agencies. These comments are included in Appendix 2 and are incorporated herein by reference and made a part hereof. The analyses as provided for in the Environmental Protection Component section of this Scoping Determination shall be required for each of the alternatives.

Response

Chapter 6, *Environmental Protection*, is included within the DPIR.

Comment SD.56

- ***Wind.*** *A quantitative wind tunnel analysis of the potential pedestrian level wind impacts shall be required for the DPIR. This analysis shall determine potential pedestrian level winds adjacent to and in the vicinity of the project site and shall identify the projected annual wind speeds for each season at each location.*

Response

A summary of the wind tunnel study is included in Section 6.2 of Chapter 6, *Environmental Protection*. Refer to Appendix E for the full wind tunnel study.

Comment SD.57

- *Expected wind levels should be reported using the amended Melbourne scale.*

Response

The wind tunnel study complies with this comment. Refer to Chapter 6, *Environmental Protection* and Appendix E.

Comment SD.58

- *The DPIR shall identify any areas where wind velocities are expected to exceed acceptable levels, including the BRA's guideline of an effective gust velocity of 31 mph not to be exceeded more than 1% of the time.*

Response

The wind tunnel study complies with this comment. A summary of the wind tunnel study is included in Section 6.2 of Chapter 6, *Environmental Protection*. Refer to Appendix E for the full wind tunnel study.

Comment SD.59

Particular attention shall be given to areas of pedestrian use, including, but not limited to, the entrances to the proposed buildings and existing buildings in the vicinity of the Proposed Project, the sidewalks and walkways within and adjacent to the Proposed Project's development and in the vicinity of the proposed development. Specific locations to be evaluated shall be determined in consultation with the BRA and the City of Boston Environment Department

Response

The wind tunnel study complies with this comment. A summary of the wind tunnel study is included in Section 6.2 of Chapter 6, *Environmental Protection*. Refer to Appendix E for the full wind tunnel study.

Comment SD.60

- *For areas where wind speeds are projected to exceed acceptable levels, measures to reduce wind speeds and to mitigate potential adverse impact shall be identified and tested in the wind tunnel to quantify the expected benefit.*

Response

Refer to Section 6.2.2.3 in Chapter 6, *Environmental Protection* for a summary of mitigation measures proposed as a result of the wind impacts.

Comment SD.61

- *Should the qualitative analysis indicate the possibility of excessive or unacceptable pedestrian level wind speeds, additional study may be required.*

Response

An additional study was conducted. Section 6.2 in Chapter 6, *Environmental Protection* presents the quantitative wind tunnel study results. The full study is included in Appendix E.

Comment SD.62

- *The wind tunnel testing shall be conducted in accordance with the following guidelines and criteria:*
- *Data shall be presented for both the existing (no-build) and for the future build scenario(s) (see above).*

Response

The Project's wind tunnel study complies with this comment. A summary of the wind tunnel study is included in Section 6.2 of Chapter 6, *Environmental Protection.* Refer to Appendix E for the full wind tunnel study.

Comment SD.63

- *The analysis shall include the mean velocity exceeded 1% of the time and the effective gust velocity exceeded 1% of the time. The effective gust velocity shall be computed as the hourly average velocity plus 1.5 x root mean square variation about the average. An alternative velocity analysis (e.g., equivalent average) may be presented with the approval of the Authority.*

Response

The Project's wind tunnel study complies with this comment. A summary of the wind tunnel study is included in Section 6.2 of Chapter 6, *Environmental Protection.* Refer to Appendix E for the full wind tunnel study.

Comment SD.64

- *Wind direction shall include the sixteen compass points. Data shall include the percent or probability of occurrence from each direction on seasonal and annual bases.*

Response

36 compass points were included. Refer to Appendix E for the full wind tunnel study,

Comment SD.65

- *Results of the wind tunnel testing shall be presented in miles per hour (mph).*

Response

The Project's wind tunnel study complies with this comment. A summary of the wind tunnel study is included in Section 6.2 of Chapter 6, *Environmental Protection*. Refer to Appendix E for the full wind tunnel study.

Comment SD.66

- *Velocities shall be measured at a scale equivalent to an average height of 4.5-5 feet.*

Response

Velocities were measured at a scale equivalent to an average height of 5 feet. Refer to Appendix E for the full wind tunnel study.

Comment SD.67

- *The model scale shall be such that it matches the simulated earth's boundary and shall include all buildings within at least 1,600 feet of the project site.*

Response

Per post-PNF coordination with BPDA, the wind tunnel study included surrounding buildings within 1,200 feet of the Project site. Refer to Appendix E for the full windy tunnel study.

Comment SD.68

- *All buildings taller than 25 stories and within 2,400 feet of the project site should be placed at the appropriate location upstream of the project site during the test.*

Response

There are no buildings taller than 25 stories within this vicinity. Therefore, this is not applicable to the Project's wind tunnel study.

Comment SD.69

- *The model shall include all buildings recently completed, under construction, and planned within 1,500-2,000 feet of the project site.*

Response

Per post-PNF coordination with BPDA, a proximity of 1,200 feet in the model was used.

Comment SD.70

- *Prior to testing, the model shall be reviewed by the Authority. Photographs of the area model shall be included in the written report.*

Response

Appendix C of the PNF presents the qualitative computer-based study with the simulation model (Section 2.3). The sensor plan was reviewed by the BPDA.

Comment SD.71

- *The written report shall include an analysis which compares mean and effective gust velocities on annual and seasonal bases, for no-build and build conditions, and shall provide a descriptive analysis of the wind environment and impacts for each sensor point, including such items as the source of the winds, direction, seasonal variations, etc., as applicable.*

Response

The Project's wind tunnel study complies with this comment. A summary of the wind tunnel study is included in Section 6.2 of Chapter 6, *Environmental Protection*. Refer to Appendix E for the full wind tunnel study.

Comment SD.72

- *The report shall also include an analysis of the suitability of the locations for various activities (e.g., walking, sitting, standing, driving etc.) as appropriate, in accordance with Melbourne comfort categories.*

Response

The Project's wind tunnel study complies with this comment. A summary of the wind tunnel study is included in Section 6.2 of Chapter 6, *Environmental Protection*. Refer to Appendix E for the full wind tunnel study.

Comment SD.73

- *The report also shall include a description of the testing methodology and the model, and a description of the procedure used to calculate the wind velocities (including data reduction and wind climate data). Detailed technical information and data may be included in a technical appendix but should be summarized in the main report.*

Response

The Project's wind tunnel study complies with this comment. A summary of the wind tunnel study is included in Section 6.2 of Chapter 6, *Environmental Protection*. Refer to Appendix E for the full wind tunnel study.

Comment SD.74

- *The pedestrian level wind impact analysis report shall include, at a minimum, the following maps and tables:*
    - *Maps indicating the location of the wind impact sensors, for the existing (no-build) condition and future build scenario(s).*

Response

The Project's wind tunnel study complies with this comment. A summary of the wind tunnel study is included in Section 6.2 of Chapter 6, *Environmental Protection*. Refer to Appendix E for the full wind tunnel study.

Comment SD.75

- *Maps indicating mean and effective gust wind speeds at each sensor location, for the existing (no-build) condition and each future build scenario, on an annual basis and seasonally. Dangerous and unacceptable locations shall be highlighted.*

Response

Refer to section 6.2 in Chapter 6, *Environmental Protection*, for review of wind conditions and wind study results for the Project. Refer to Appendix E for the full wind tunnel study. Annual maps, and annual and seasonal tables, are provided within Appendix E, to clearly convey this information.

Comment SD.76

- *Maps indicating the suitability of each sensor location for various pedestrian-related activities (comfort categories), for the existing (no-build) condition and each future build scenario, on an annual basis and seasonally. To facilitate comparison, comfort categories may be distinguished through color coding or other appropriate means. In any case, dangerous and unacceptable conditions shall be highlighted.*

Response

Refer to Appendix E and Section 6.2 in Chapter 6, *Environmental Protection*.

Comment SD.77

- *Tables indicating mean and effective gust wind speeds and the comfort category at each sensor location, for the existing (no build) condition and for each future build scenario, on an annual basis and seasonally.*

Response

The Project's wind tunnel study complies with this comment. Refer to Appendix E.

Comment SD.78

- *Tables indicating the percentage of wind from each of the sixteen compass points at each sensor location, for the existing (no-build) condition and for each future build scenario, on an annual basis and seasonally.*

Response

Refer to Appendix E for the full wind tunnel study with these details.

Comment SD.79

- *All maps should include a north arrow and be oriented and of the same scale as shadow diagrams.*

Response

The Project's wind tunnel study complies with this comment. Refer to Appendix E.

Comment SD.80

- ***Shadow.*** *A shadow analysis shall be required for existing and build conditions for the hours 9:00 a.m., 12:00 noon, and 3:00 p.m. for the vernal equinox, summer solstice, autumnal equinox, and winter solstice and for 6:00 p.m. during the summer and autumn.*

Response

The PNF included a shadow analysis in Section 6.4 of Chapter 6, *Environmental Protection*. This study was not updated for this DPIR as there have been only minor changes in the building massing and these would not significantly change the previous study results. The study presented in the PNF reflects a more conservative impact analysis since it is based on more bulky building massing.

Comment SD.81

- *This analysis should use the same metrics as applied by Mass. DEP for Chapter 91 shadow analyses and include documentation of net new shadows lasting more than one hour.*

Response

See response to Comment SD. 80. Refer to PNF Section 6.4 of Chapter 6, *Environmental Protection*.

Comment SD.82

- *It should be noted that due to time differences (daylight savings vs. standard), the autumnal equinox shadows would not be the same as the vernal equinox shadows and therefore separate shadow studies are required for the vernal and autumnal equinoxes.*

Response

See response to Comment SD. 80. Refer to PNF Section 6.4 of Chapter 6, *Environmental Protection*.

Comment SD.83

- *Shadows shall be determined using the Boston Altitude and Azimuth data (Sun Altitude/Azimuth Table, Boston, Massachusetts).*

Response

See response to Comment SD. 80. Refer to PNF Section 6.4 of Chapter 6, *Environmental Protection*.

Comment SD.84

- *The shadow impact analysis must include net new shadow as well as existing shadow. Diagrams must clearly show the incremental impact of the proposed new buildings. For purposes of clarity, new shadow should be shown in a dark, contrasting tone distinguishable from existing shadow.*

Response

See response to Comment SD. 80. Refer PNF to Section 6.4 of Chapter 6, *Environmental Protection*.

Comment SD.85

- *The shadow impact study area shall include, at a minimum, the entire area to be encompassed by the maximum shadow expected to be produced by the Proposed Project (i.e., at the winter solstice).*

Response

See response to Comment SD. 80. Refer to PNF Section 6.4 of Chapter 6, *Environmental Protection*.

Comment SD.86

The build condition shall include all buildings under construction and any proposed buildings anticipated to be completed prior to completion of the Proposed Project.

Response

See response to Comment SD. 80. Refer to PNF Section 6.4 of Chapter 6, *Environmental Protection*.

Comment SD.87

- *Shadow from all existing buildings within the shadow impact study area shall be shown.*

Response

See response to Comment SD. 80. Refer to PNF Section 6.4 of Chapter 6, *Environmental Protection*.

Comment SD.88

› *A North arrow shall be provided on all figures and street names, doorways, bus stops, open space and areas where pedestrians are likely to congregate (in front of historic resources or other tourist destinations, for example) should be identified.*

Response

Noted. Figures have been updated accordingly.

Comment SD.89

› *Particular attention shall be given to areas of pedestrian use, including, but not limited to, the entrances to the project buildings and existing buildings in the vicinity of the Proposed Project, the sidewalks and walkways within and adjacent to the Proposed Project development.*

Response

Particular attention was paid to these issues. Refer to Section 4.4 in Chapter 4, *Urban Design*.

Comment SD.90

› *The DPIR should propose mitigation measures to minimize or avoid any adverse shadow impact.*

Response

The PNF included shadow and daylight impact analyses in Sections 6.4 and 6.7 of Chapter 6, Environmental Protection, respectively. These studies were not updated for this DPIR as there have been only minor changes in the building massing that would not significantly change the previous study results. Those studies present a more conservative impact analysis than the currently designed building envelopes, so if further shadow and daylight studies were conducted, the impacts would be reduced.

Comment SD.91

› ***Combined Wind and Shadow Impacts.*** *Figures depicting no-build and build wind monitoring locations should be of an orientation and scale consistent with that used for shadow diagrams so that the cumulative effect of wind and shadow can be determined.*

Response

Please note that in further discussions between the Proponent and BPDA, this scope item has been rescinded.

Comment SD.92

- ***Daylight.*** *A daylight analysis for both build and no-build conditions shall be conducted by measuring the percentage of skydome that is obstructed by the Proposed Project and evaluating the net change in obstruction.*

Response

The PNF included a daylight analysis in Section 6.7 of Chapter 6, *Environmental Protection*. This study was not updated for this DPIR as there have been only minor changes in the building massing and these would not significantly change the previous study results. The study presents a more conservative impact analysis since it is based on a more bulky building massing.

Comment SD.93

- *The study should treat two elements as controls for data comparisons: existing conditions and context examples.*

Response

See response to Comment SD.92. Refer to PNF Section 6.7 of Chapter 6, *Environmental Protection*.

Comment SD.94

- *Daylight analyses should be taken for each major building facade fronting these essentially public ways or open spaces.*

Response

See response to Comment SD.92. Refer to PNF Section 6.7 of Chapter 6, *Environmental Protection*.

Comment SD.95

- *The midpoint of each public accessway or roadway should be taken as the study point.*

Response

See response to Comment SD.92. Refer to PNF Section 6.7 of Chapter 6, *Environmental Protection*.

Comment SD.96

- *The BRADA program must be used for this analysis.*

Response

See response to Comment SD.92. Refer to PNF Section 6.7 of Chapter 6, *Environmental Protection*.

Comment SD.97

- ***Solar Glare.*** *Please refer to the BRA's Environmental Review comment letter.*

Response

Please refer to the responses to BRA's Environmental Review Comment letter presented below in Comments 5.1-5.16. See Section 6.4 in Chapter 6, *Environmental Protection*, for review of solar glare and related project studies.

Comment SD.98

- ***Air Quality.*** *Please refer to the BRA's Environmental Review Comment letter.*

Response

Please refer to the responses to BRA's Environmental Review Comment letter presented below. See Section 6.5 in Chapter 6, *Environmental Protection*.

Comment SD.99

- ***Solid and Hazardous Wastes.*** *The presence of any contaminated soil or groundwater and any underground storage tanks at the project site shall be evaluated and remediation measures to ensure their safe removal and disposal shall be described.*

Response

Section 6.12 of Chapter 6, *Environmental Protection*, of the PNF summarized the site environmental conditions and applicable remediation measures.

Comment SD.100

- *Any assessment of site conditions pursuant to the requirements of M.G.L. Chapter 21E that has been or will be prepared for the site shall be included in the DPIR (reports may be included in an appendix but shall be summarized in detail, with appropriate tables and figures, within the main text).*

Response

Section 6.12 of Chapter 6, *Environmental Protection*, of the PNF summarized the site environmental conditions.

Comment SD.101

- *Materials in the building to be demolished should be characterized and measures to mitigate impacts during demolition should be identified.*

Response

As described in the PNF, Section 6.12 of Chapter 6, *Environmental Protection*, there are no buildings at the Project Site and therefore no buildings that require demolition. Construction debris may be encountered during excavation, including potential buried structures or former foundations and remnant materials, such as asphalt, brick, concrete, wood, granite blocks, and other debris in the fill. The Proponent will ensure that handling, waste removal and reuse, recycling, or disposal during construction and operation will be in conformance with the City of Boston and the MassDEP regulations for solid waste disposal.

Comment SD.102

- *The DPIR shall quantify and describe the generation, storage, and disposal of all solid wastes from the construction and operation of the Proposed Project.*

Response

The DPIR quantifies and describes these matters. Refer to Section 6.7 in Chapter 6, *Environmental Protection,* for a review of construction waste.

Comment SD.103

- *The DPIR shall identify the specific nature of any hazardous wastes that may be generated and their quantities and shall describe the management and disposal of these wastes.*

Response

The DPIR identifies and describes these matters. Refer to Sections 6.6 in Chapter 6, *Environmental Protection,* for review of construction management and related impacts to logistics, mitigation, and public protection.

Comment SD.104

- *In addition, measures to promote the reduction of waste generation and recycling, particularly for paper, glass, plastics, metals, and other recyclable products, and compliance with the City's recycling program, shall be described in the DPIR.*

Response

All typologies will fulfill the City's and LEED v4 Materials and Resources prerequisite for Storage and Collection of Recyclables, including dedicated areas accessible to waste haulers and building occupants for collection and storage of recyclable materials (including mixed paper, corrugated cardboard, glass, plastics, and metals).

In addition, the Lab/Office, Hotel, and Conference typologies currently include the LEED Pilot Credit for Comprehensive Composting, meeting the credit criteria pertaining to regular compost collection and offsite processing.

As described in Section 5.2.4 of Chapter 5, *Sustainability and Climate Change Resiliency*, in accordance with Harvard Green Building Requirements, the project is committed to meeting the LEED credit criteria for construction and demolition waste management which translates to diverting at least 75% of construction and demolition waste from landfill.

Comment SD.105

- ***Noise.*** *The DPIR shall establish the existing noise levels at the project site and vicinity based upon a noise-monitoring program and shall calculate future noise levels after project completion based on appropriate modeling and shall demonstrate compliance with the Design Noise Levels established by the U.S. Department of Housing and Urban Development for residential and other sensitive receptors and with all other applicable Federal, State, and City of Boston noise criteria and regulations.*

Response

A noise analysis was provided in the PNF (Section 6.9 of Chapter 6, *Environmental Protection*) and changes to the Project as reflected in the DPIR do not warrant revisions to what was previously presented.

Comment SD.106

- *Any required mitigation measures to minimize adverse noise impacts shall be described.*

Response

A noise analysis and description of mitigation measures was provided in the PNF (Section 6.9 of Chapter 6, *Environmental Protection*) and changes to the Project as reflected in the DPIR do not warrant revisions to what was previously presented.

Comment SD.107

- *An analysis of the potential noise impacts from the project's mechanical and exhaust systems, including emergency generators, and compliance with applicable regulations of the City of Boston shall be required.*

Response

A noise analysis was provided in the PNF (Section 6.9 of Chapter 6, *Environmental Protection*) and changes to the Project as reflected in the DPIR do not warrant revisions to what was previously presented.

Comment SD.108

- *A description of the project's mechanical and exhaust systems and their location shall be included.*

Response

A noise analysis was provided in the PNF (Section 6.9 of Chapter 6, *Environmental Protection*) and changes to the Project as reflected in the DPIR do not warrant revisions to what was previously presented.

Comment SD.109

- *Measures to minimize and eliminate adverse noise impacts on nearby sensitive receptors, including the project itself, from mechanical systems and traffic shall be described.*

Response

A noise analysis was provided in the PNF (Section 6.9 of Chapter 6, *Environmental Protection*) and changes to the Project as reflected in the DPIR do not warrant revisions to what was previously presented.

Comment SD.110

- *The DPIR should identify the potential for adverse noise impacts stemming from building activities and occupants, referencing any noise impacts from THE PROPONENT's other buildings and any relevant similarities or differences between those facilities and the Proposed Project, e.g., operable windows.*

Response

A noise analysis was provided in the PNF (Section 6.9 of Chapter 6, *Environmental Protection*) and changes to the Project as reflected in the DPIR do not warrant revisions to what was previously presented.

Comment SD.111

- ***Nighttime Lighting.*** *The DPIR should explain, in text or graphics as appropriate:*
  - *The type of exterior lighting to be used on each façade or other portion of the building and the elements of the design that mitigate nighttime lighting impacts of the building on surrounding areas.*

Response

The Proponent will design all exterior building lighting to balance safety and legibility with minimizing light pollution as the project progresses

Comment SD.112

- *The DPIR should specify the type of interior lighting (i.e. fluorescent vs. incandescent, recessed or not) to be used in each portion of the building and, in the case of the common areas and non-residential portions of the program, the hours that the lighting will be on.*

Response

The Proponent will continue to investigate all types of interior lighting and design as the project progresses.

Comment SD.113

- *The DPIR should also discuss the measures being taken to minimize the impact of interior lighting on the surrounding areas.*

Response

Interior building lighting will balance safety and legibility with minimizing light pollution.

Comment SD.114

› ***Stormwater Management/Water Quality.*** *Stormwater management requirements and suggestions are included in the section on environmental sustainability below.*

Response

Noted. Refer to stormwater management discussed in Section 7.3 of Chapter 7, *Infrastructure Systems*.

Comment SD.115

› ***Flood Hazards/Wetlands.*** *Describe any affected flood hazard zones or wetlands and proposed actions.*

Response

As described in Section 5.5.2 of Chapter 5, *Sustainability and Climate Change Resiliency*, 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) 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.

Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for information on the proposed stormwater management system's ability to handle future flooding.

Comment SD.116

- ***Tidelands/Chapter 91.*** *Demonstrate that the Projects are in compliance with Massachusetts' Chapter 91 Tidelands Program.*

Response

The *Massachusetts' Chapter 91 Tidelands Program.* is not applicable to the Project.

Comment SD.117

- ***Geotechnical Impact/Groundwater.*** *A description and evaluation analysis of existing sub-soil conditions at the project site, groundwater levels, potential for ground movement and settlement during excavation and foundation construction, and potential impact on adjacent buildings, utility lines, and the roadways shall be required.*

Response

Refer to Section 6.7.2.2 in Chapter 6, *Environmental Protection*, for reference to subsurface conditions and analysis.

Comment SD.118

- *This analysis shall also include a description of the foundation construction methodology, the amount and method of excavation, and measures to prevent any adverse effects on adjacent buildings, utility lines, and roadways.*

Response

Refer to Section 6.7.2.2 in Chapter 6, *Environmental Protection*, for reference to subsurface conditions and analysis.

Comment SD.119

- *Measures to ensure that groundwater levels will be maintained and will not be lowered during or after construction also shall be described.*

Response

Refer to Section 6.6.2.2 in Chapter 6, *Environmental Protection*, for reference to subsurface conditions and measures.

Comment SD.120

- *In addition, the geotechnical analysis shall evaluate the earthquake potential in the project area and shall describe measures to be implemented to mitigate any adverse impacts from an earthquake event.*

Response

Refer to Section 6.7.2.2 in Chapter 6, *Environmental Protection,* for reference to subsurface conditions. Additionally, The Project will perform engineering evaluations to consider seismic design requirements for the buildings, including site coefficient, liquefaction susceptibility of foundation soils, seismically induced settlements and dynamic lateral earth pressures.

Comment SD.121

› ***Construction Impacts.*** *A construction impact analysis shall include a description and evaluation of the following:*

- *Measures to protect the public safety.*
- *Potential dust and pollutant emissions and mitigation measures to control these emissions.*
- *Potential noise generation and mitigation measures to minimize increase in noise levels.*
- *Location of construction staging areas and construction worker parking; measures to encourage carpooling and/or public transportation use by construction workers.*
- *Construction schedule, including hours of construction activity.*
- *Access routes for construction trucks and anticipated volume of construction truck traffic.*
- *Construction methodology (including foundation construction), amount and method of excavation required, disposal of the excavate, description of foundation support, maintenance of groundwater levels, and measures to prevent any adverse effects or damage to adjacent structures and infrastructure.*
- *Method of demolition of the existing building on the project site and disposal of the demolition debris.*
- *Potential for the recycling of construction and demolition debris, including asphalt from the existing parking lots.*
- *Measures to make construction fencing as attractive as possible to ensure the visual character of the streetscape.*
- *Identification of best management practices to control erosion and to prevent the discharge of sediments and contaminated groundwater or stormwater runoff into the City's drainage system during the construction period.*
- *Impact of project construction on rodent populations and description of the proposed rodent control program, including frequency of application and compliance with applicable City and State regulatory requirements.*

Response

Refer to Section 6.7 in Chapter 6, *Environmental Protection,* for review of construction management and related impacts to logistics, mitigation, and public protection.

Comment SD.122

› ***Street Lighting.*** *The Proponent will be required to perform design review with the BPDA Urban Design Department on any current and future plans for signage and lighting.*

Response

As part of design review, the Proponent will meet with the BPDA's Urban Design Department and Boston Street Lighting Division for current and future plans for signage and lighting as required.

Comment SD.123

› ***Views.*** *The DPIR shall present views of the Proposed Project from locations to be determined through consultation with the BPDA's Urban Design Department.*

Response

See Figures 4.12a-b in Chapter 4, *Urban Design,* for project renderings highlighting key project views.

Comment SD.124

› ***Relationship to Surrounding Context.*** *The DPIR should describe the design of the Proposed Project in relationship to the surrounding urban context, including adjacent buildings, streets, and plazas.*

Response

Refer to Figure 1.2 in Chapter 1, *Project Description* for Project Site Context.

Comment SD.125

› ***Design Submission Requirements.*** *The following urban design materials for each Proposed Project schematic design must be submitted for the DPIR. Materials must be at the required scale and in a printed form that is reproducible, as well as in electronic file form:*

- *A written description of program elements and space allocation for each element.*

Response

Refer to Section 4.5 of Chapter 4, *Urban Design*, for a summary of all schematic design and programmatic elements.

Comment SD.126

- *Black and white 8"x10" photographs of the site and neighborhood.*

Response

Refer to Figure 1.5 in Chapter 1, *Project Description* of the PNF for Existing Site Photos.

Comment SD.127

- *Plans and sections for the area surrounding the project at an appropriate scale (1"=100' or larger) showing relationships of the Proposed Project to the surrounding area and district regarding massing, building height, open space, major topographic features, pedestrian and vehicular circulation, and land use.*

Response

Refer to Figure 4.1 in Chapter 4, *Urban Design*, for neighborhood context plan and Figures 4.4a-b for building sections in Chapter 4, *Urban Design*.

Comment SD.128

- *Sketches and diagrams of alternative proposals to clarify design issues and massing options.*

Response

Not applicable to the DPIR. No alternative proposals are being considered as this time. This comment will continue to be taken into account during design review.

Comment SD.129

- *Eye-level perspectives showing the proposal in the context of the surrounding area; views should display a particular emphasis, on important viewing areas such as key intersections, accessways, or public parks/attractions.*

Response

See Figures 4.11a-d and 4.12a-b in Chapter 4, *Urban Design,* for project renderings highlighting key project views.

Comment SD.130

- *Long-ranged (distanced) views of the Proposed Project must also be studied to assess the impact on the skyline or other view lines.*

Response

See Figures 4.12a-b in Chapter 4, Urban Design, for project renderings highlighting key project views.

Comment SD.131

- *At least one bird's-eye perspective should also be included.*

Response

See Figures 4.12a-b in Chapter 4, Urban Design, for project renderings highlighting key project views.

Comment SD.132

- *All perspectives should show (in separate comparative sketches) both the build and no-build conditions*

Response

See Figures 4.12a-b in Chapter 4, Urban Design, for project renderings highlighting key project views under proposed conditions.

Comment SD.133

- *The BPDA must approve the view locations before analysis is begun. View studies should be cognizant of light and shadow, massing and bulk.*

Response

Those view locations and perspectives as detailed in Figures 4.12a-b in Chapter 4 include the locations requested by the BPDA.

Comment SD.134

- *Aerial views of the project in perspective or isometric form.*

Response

See Figures 4.12a-b in Chapter 4, Urban Design, for project renderings highlighting key project views.

Comment SD.135

- *A site plan at 1 "= 16' or larger showing:*
    - Relationships of proposed and existing adjacent buildings and open spaces.
    - Open spaces defined by buildings on adjacent parcels and across streets.
    - Location of pedestrian ways, driveways, parking, service areas, streets, and major landscape features.
    - Accessible pedestrian, vehicular, and service access and flow through the parcel and to adjacent areas.
    - Phasing possibilities clearly indicating the scheme for completing the improvements.
    - Construction limits.

Response

Refer to Figures 4.1,4.2, 4.13 through 4.16 and 4.19 in Chapter 4, *Urban Design*, for review of design elements noted above, and Section 6.6 in Chapter 6, *Environmental Protections,* for review of construction limits.

Comment SD.136

- *Site sections at 1"=16' or larger showing relationships to adjacent buildings and spaces.*

Response

Refer to Figures 4.4a-b and 4.12 in Chapter 4, *Urban Design*, to view sections and a site plan in the context of adjacent sites.

Comment SD.137

- *A massing model at 1"=40' showing all buildings in the area and a study model at 1"=16' showing facade design.*

Response

The Proponent will coordinate with the BPDA following the submission of the DPIR.

Comment SD.138

- *Drawings at an appropriate scale (e.g., 1"=8') describing architectural massing, facade design, and proposed materials including:*
    - *Site plans before and after construction.*
    - *Elevations in the context of the surrounding area.*
    - *Sections showing organization of functions and spaces.*
    - *Building plans showing ground floor and typical upper floor.*

Response

Refer to Figure 1.3 in Chapter 1, *Project Description* for proposed conditions, Figures 4.5-4.9 in Chapter 4, *Urban Design* for elevations, Figures 4.10a-dfor sections, and Figures 4.2a-d for floor plans.

Comment SD.139

- *A site survey at 1"=40' showing nearby structures, utilities and benchmarks*

Response

Refer to Figure 7.1 in Chapter 7, *Infrastructure Systems*.

Comment SD.140

- *A written and/or graphic description of the building materials and its texture, color, and general fenestration patterns is required for the proposed development.*

Response

Refer to Section 4.5 in Chapter 4, *Urban Design* for a written description, and Figures 4.5-4.9 for a graphic representation of the exterior buildings' materials.

Comment SD.141

- *Electronic files describing the site and Proposed Project at Representation Levels one and two ("Streetscape" and "Massing") as described in the document Boston "Smart Model": CAD & 3D Model Standard Guidelines.*

Response

The Proponent is submitting electronic files to the BPDA in coordination with the Standard Guidelines.

Comment SD.142

- *The schedule for submittal of Design Development materials.*

Response

The Proponent will continue to coordinate with the BPDA Urban Design staff regarding the timing of submission of Design Development materials.

Comment SD.143

› ***Building Orientation, Envelope, and Façade Design.*** *Reduce thermal loads entering the building as much as possible.*

Response

Section 5.4.2 in Chapter 5, *Sustainability and Climate Change Resiliency* describes the preliminary envelope design and load reduction measures for each typology. Each building typology will meet with UA code provision and therefore will be at least as efficient as the prescriptive code. Appendix D describes the preliminary envelope code compliance (UxA) calculation demonstrating envelopes that exceed code requirements for performance. The Master Plan is at pre-conceptual level of development and as such the architecture of the envelope design is not developed. As the design phase of the buildings begin, envelope and façade design will seek to optimize for energy, daylight, and views.

Comment SD.144

- *Consider the building orientation, envelope, and design carefully, including glazing selection, window and door shading, wall construction, roof color, and building shape.*

Response

Refer to the response to Comment SD.143: Section 5.4.2 in Chapter 5, *Sustainability and Climate Change Resiliency* describes the preliminary envelope design and load reduction measures for each typology. Appendix D describes the preliminary envelope code compliance (UxA) calculation demonstrating envelopes that exceed code requirements for performance.

Each of the LEED checklist reflects achievement of the Heat Island Reduction credit which includes green roof and light-colored roof materials to reflect heat.

Comment SD.145

- *Make use of thermal mass to absorb heat and shift peak heating to off-peak hours.*

Response

The Project has increased its commitment since the PNF to energy and stationary source GHG emissions reduction as compared to the Base Case, i.e. approximately 30% for energy (corresponding to a 20% energy reduction from the Stretch Code). Coupled with the Proponent's off-site renewable electricity procurement anticipated in collaboration with Harvard University, the GHG emissions reduction increases from 19% to 91% compared to the Base Case.

The Project has already proposed several conservation measures that are impactful and appropriate to the specific building typology. Thermal mass is not an appropriate strategy for a Lab/Office building since the loads and energy are driven by ventilation air requirements and have significant internal gains. The proposed design for the residential and hotel buildings has significantly reduced space heating energy to only 7% of total energy consumption.

Comment SD.146

- *Building massing and façade treatment should respond to microclimate conditions and enhance appropriate solar control.*

Response

As described in Section 5.5.4.1 of Chapter 5, *Sustainability and Climate Change Resiliency*, the Project will reduce the urban heat island impacts using strategies including shading structures and materials with high solar reflectance/albedo and has indicated achievement of the LEED Heat Island Reduction credit for each building typology.

Comment SD.147

- *The DPIR should describe any simulation designed to quantify the effects of these design choices.*

Response

Section 5.4.2 in Chapter 5, *Sustainability and Climate Change Resiliency* describes the preliminary modeling results of the proposed design cases in comparison to baseline cases dictated by the Stretch Energy Code. The simulation demonstrates significant energy and emissions savings across the site that exceed code minimum requirements.

Comment SD.148

- ***Energy.*** *Energy conservation strategies should be explored at an early stage in the design and should include such approaches as taking advantage of natural day lighting, passive solar gain, passive cooling and ventilation which tie into HVAC systems, use of alternative energy strategies (including making the building design adaptable for the future inclusion of innovative energy and environmental technologies as they develop over time), in addition to properly sized efficient heating and ventilating systems, with heat recovery and other conservation strategies.*

Response

Section 5.4.2 in Chapter 5, *Sustainability and Climate Change Resiliency* describes energy conservation measures incorporated in the preliminary designs of each typology. The energy simulations described in this chapter consider the potential for reduced HVAC sizing stemming from load reduction via high performance envelope and heat recovery. As described in Section 5.4.5, all buildings will be constructed to be solar-ready for future onsite renewable energy installations.

Comment SD.149

- *Siting, orientation and massing of building should optimize passive strategies for light and energy management and design for natural and displacement ventilation.*

Response

Refer to the response of SD.143. Section 5.4.2 in Chapter 5, *Sustainability and Climate Change Resiliency* describes the preliminary envelope design and load reduction measures for each typology. Appendix D describes the preliminary envelope code compliance (UxA) calculation demonstrating envelopes that exceed code requirements for performance.

Given Boston's climate, there is a very limited window of days/times of the year when natural ventilation can occur. Air side economizer in appropriate building typologies can be utilized to take advantage of 'free cooling'. Displacement ventilation is not an appropriate strategy for the Lab/Office, Hotel or Residential buildings. At the Conference Center, displacement ventilation may be considered in assembly spaces should it prove to be cost effective and result in material energy savings.

Comment SD.150

- *Building design should specify energy efficient HVAC and lighting systems, appliances, and other equipment, and solar preheating of makeup air.*

Response

Section 5.4.2 in in Chapter 5, *Sustainability and Climate Change Resiliency* describes energy conservation measures incorporated in the preliminary designs of each typology, including high-performance HVAC systems and LED lighting fixtures with low lighting power densities.

Comment SD.151

- *Early quantification and cost-benefit analysis through iterative energy simulation is helpful and would provide feedback on size of systems and envelope design early enough to impact those decisions.*

Response

Refer to Appendix D for the Carbon Neutral Building Assessment. Additionally, per Harvard's Green Building Standards, the individual buildings will assess additional energy efficiency strategies using life cycle costing to quantify the 20 year impacts on GHG emissions, energy and maintenance cost during concept for elements with major budget implications and schematic design phase for major energy consuming systems.

Comment SD.152

- ***Water Management.*** *Sustainable water management practices should be considered early in the site and building design process, and the process should explore integrated approaches to stormwater retention, treatment, and reuse, building and landscape water needs, and groundwater recharge.*

Response

The Proponent, along with the Project Team has developed a holistic approach to sustainability through strategies that address site, water and stormwater efficiency. Please refer to discussion of stormwater in Section 7.3 of Chapter 7, *Infrastructure Systems*.

Comment SD.153

- *To the extent possible, the systems put in place should strive to work with the natural hydrology of the area, and the building should incorporate additional opportunities to conserve water beyond water-saving technologies required by law.*

Response

This design aims to develop a landscape that accounts for local ecological conditions in order to absorb rainwater, manage stormwater on site and re-use water on site. A bio-swale has also been incorporated into the Project's Greenway design, which will be an interactive and educational stormwater management feature on site. Please refer to Section 7.3 of Chapter 7, *Infrastructure Systems* for the stormwater approach and re-use of stormwater.

Comment SD.154

› *Possibilities for using graywater for functions that are conventionally served by potable water should be explored. Stormwater captured from impervious areas or from roofs and hardscapes can be used for non-potable water uses.*

Response

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 recharge systems in the Greenway for greater storm events. Site plaza areas will be directed to the recharge systems on-Site. Refer to Section 7.3 of Chapter 7, *Infrastructure Systems* for the stormwater approach and re-use of stormwater.

Comment SD.155

› *The DPIR shall contain an evaluation of the project site's existing and future stormwater drainage and stormwater management practices.*

Response

Refer to Section 7.3 of Chapter 7, *Infrastructure Systems* for the existing and future stormwater drainage and stormwater management practices.

Comment SD.156

› *The DPIR shall illustrate existing and future drainage patterns from the project site and shall describe and quantify existing and future stormwater runoff from the site and the Proposed Project's impacts on site drainage.*

Response

Refer to Section 7.3 of Chapter 7, *Infrastructure Systems* for the existing and future drainage patterns from the project site and description of existing and future stormwater runoff from the site and the proposed project's impacts on site drainage.

Comment SD.157

› *The Proposed Project's stormwater management system, including best management practices to be implemented, measures proposed to control and treat stormwater runoff and to maximize on-site retention of stormwater, measures to prevent groundwater contamination, and compliance with the Commonwealth's Stormwater Management Policies, also shall be described.*

Response

Refer to Section 7.3 of Chapter 7, *Infrastructure Systems* for the project's stormwater management system, BMPs, control and treatment of runoff, prevention of groundwater contamination, and compliance with the Commonwealth's Stormwater Management Policies.

Comment SD.158

- *The DPIR shall describe the project area's stormwater drainage system to which the project will connect, including the location of stormwater drainage facilities and ultimate points of discharge.*

Response

Refer to Section 7.3 of Chapter 7, *Infrastructure Systems* for the project's stormwater drainage connection and ultimate discharge points.

Comment SD.159

- *The DPIR shall respond to the comments from the Boston Water and Sewer Commission, which are contained in Appendix 2 and incorporated herein by reference.*

Response

Noted. Responses to BWSC comments are included in this chapter.

Comment SD.160

The DPIR should summarize any historic resources that will be affected by the Proposed Project, the position of public agencies on those resources (including any necessary regulatory process) and present a plan to minimize the adverse impact of the Proposed Project.

Response

The Site does not contain historic resources that will be affected by the project.

Comment SD.161

The DPIR must include an infrastructure impact analysis.

Response

Refer to Chapter 7, *Infrastructure Systems* for a description of existing and planned infrastructure, proposed building connections, and impact to the surrounding infrastructure.

Comment SD.162

The discussion of the Proposed Project's impacts on infrastructure systems should be organized system-by-system as suggested below. The DPIR must include an evaluation of the Proposed Project's impact on the capacity and adequacy of existing water, sewerage, energy (including gas and steam), and electrical communications (including telephone, fire alarm, computer, cable, etc.) utility systems, and the need reasonably attributable to the Proposed Project for additional systems or facilities.

Response

Refer to Chapter 7, *Infrastructure Systems* for a description of existing and planned infrastructure, proposed building connections, and impact to the surrounding infrastructure.

Comment SD.163

Thorough consultation with the planners and engineers of the utilities will be required and should be referenced in the Infrastructure Component section.

Response

The proponent has held planning meetings with BWSC to review certain key elements of the project. As the project design progresses, the Proponent will continue to coordinate with the relevant utility authorities. Refer to Chapter 7, *Infrastructure Systems* for a description of existing infrastructure, planned infrastructure in the roadways which will be designed to service the proposed buildings, and proposed connection locations.

Comment SD.164

Any system upgrading or connection requiring a significant public or utility investment, creating a significant disruption in vehicular or pedestrian circulation, or affecting any public or neighborhood park or streetscape improvements, constitutes an impact which must be mitigated.

Response

Refer to Chapter 7, *Infrastructure Systems* for a description of existing infrastructure, planned infrastructure in the roadways which will be designed to service the proposed buildings, and proposed connection locations. The site will include new roadways with infrastructure to support the proposed buildings. Upgrades to existing infrastructure have been evaluated and proposed improvements are described.

Comment SD.165

› ***Water and Sewer.*** *Provide the following information on the Proposed Project's impacts on water and sewer infrastructure and on water quality. As appropriate, this information can be integrated with the sustainability sections of the IMP and the DPIR.*

- *Estimated water consumption and sewage generation from the Proposed Project and the basis for each estimate. Include separate calculations for air conditioning system make-up water.*

Response

Refer to Section 7.4.2 of Chapter 7, *Infrastructure Systems* for proposed wastewater flows and Section 7.5.2 for proposed water demand.

Comment SD.166

- *Description of the capacity and adequacy of water, sewer, and storm drain systems and an evaluation of the impacts of the Proposed Project on those systems.*

Response

Refer to Chapter 7, *Infrastructure Systems* for an evaluation of the water, sewer, and storm drain systems adjacent to the Site. The project will include new infrastructure sized for the Project's needs.

Comment SD.167

- *Description of the Proposed Project's impacts on the water quality of Boston Harbor or other water bodies that could be affected by the projects, if applicable.*

Response

The Project's design to manage 2.75-inches of runoff will provide additional treatment beyond what is typically required by BWSC and MassDEP stormwater standards, as outlined in Chapter 7, *Infrastructure Systems*. 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. Refer to Section 7.3.2 of Chapter 7, *Infrastructure Systems* for a description of improvement to water quality as a result of the project.

Comment SD.168

- *Description of mitigation measures to reduce or eliminate impacts on water quality.*

Response

Refer to Section 7.3.2 of Chapter 7, *Infrastructure Systems* for a description of ways the project will reduce or eliminate impacts and improve water quality.

Comment SD.169

- *Description of impact of on-site storm drainage on water quality; if this is described more fully in another section, reference that analysis here.*

Response

Refer to Section 7.3.2 of Chapter 7, *Infrastructure Systems* for a description of ways the project will reduce or eliminate impacts and improve water quality.

Comment SD.170

- *Detail methods of protection proposed for infrastructure conduits and other artifacts, including BSWC sewer lines and water mains, during construction.*

Response

Refer to Section 7.6.4 of Chapter 7, *Infrastructure Systems* for a description of utility protection during construction.

Comment SD.171

- *Detail the energy source of the interior space heating; how obtained, and, if applicable, plans for reuse of condensate.*

Response

Refer to Section 5.4.2 in Chapter 5, *Sustainability & Resiliency*, for review of energy modeling and interior heating.

Comment SD.172

- *Identification of measures to conserve resources, including any provisions for water recycling.*

Response

Refer to Section 7.3.2 of Chapter 7, *Infrastructure Systems* for a description of water re-use on site.

Comment SD.173

› ***Energy Systems.*** *The DPIR should discuss the Proposed Project's approach to energy systems and conservation. As appropriate, this information can be integrated with the sustainability sections of the IMP Amendment and the DPIR.*

Response

The Proponent has provided an update to the proposed building energy systems and conservation measures including an analysis of the resulting energy consumption and GHG emissions. The updated energy analysis and Project approach to energy systems and conservation is presented in Section 5.4 of Chapter 5, *Sustainability and Climate Change Resiliency*.

Section 5.4.2 describes energy conservation measures incorporated in the preliminary designs of each typology.

Comment SD.174

› *The discussion should include at a minimum the following:*

- *Description of all energy (heat, electrical, cooling, etc.) requirements of the project and evaluation of the Proposed Project's impacts on resources and supply*

Response

The Proponent has provided an update to the proposed building energy systems and conservation measures including an analysis of the resulting energy consumption and GHG emissions. The updated energy analysis and Project approach to energy systems and conservation is presented in Section 5.4 of Chapter 5, *Sustainability and Climate Change Resiliency*.

The Resiliency Checklists provided with the DPIR contain annual heating, cooling, and electrical requirements for each typology.

Comment SD.175

- *Description of measures to conserve energy usage and consideration of the feasibility of including solar energy provisions or other on-site energy provisions.*

Response

The Proponent has provided an update to the proposed building energy systems and conservation measures including an analysis of the resulting energy consumption and GHG emissions. The updated energy analysis and Project approach to energy systems and conservation is presented in Section 5.4 of Chapter 5, *Sustainability and Climate Change Resiliency*. The Proponent is still evaluating the feasibility of solar-PV for the Project and has presented the work done to date in Section 5.4.6 of Chapter 5, *Sustainability and Climate Change Resiliency*.

Comment SD.176

› ***Other Systems.*** *The DPIR should also discuss emergency systems, gas, steam, optic fiber, cable, and any other systems impacted by the Proposed Project. The location of transformer and other vaults required for electrical distribution or ventilation must be chosen to minimize disruption to pedestrian paths and public improvements both when operating normally and when being serviced and must be described.*

Response

Refer to Sections 7.6 and 7.7 in Chapter 7, *Infrastructure*, for review of utilities and smart utility policy for the Project.

Comment SD.177

› ***Public Notice.*** *The Proponent will be responsible for preparing and publishing in one or more newspapers of general circulation in the city of Boston a Public Notice of the submission of the DPIR to the BRA as required by Section 80A-2. This Notice shall be published within five (5) days after the receipt of the DPIR by the BRA.*

Response

The Proponent will comply with this requirement.

BPDA Transportation

Comment 1.1

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.

Response

The development of Chapter 3, *Transportation*, was completed based on the vision set out in Go Boston 2030. Specifically, the mode shares used were determined based on the goals set out in Go Boston 2030 and the proposed mitigation and transportation demand management plan was determined based on enhancing the accommodations for all users and encouraging people to use non-vehicle modes of travel. Refer to Section 3.6.4.5 for a summary of the mode shares used to develop the trip generation and Section 3.12 for details on the proposed roadway, transit, and pedestrian/bicycle improvements as well as the proposed transportation demand management program.

Comment 1.2

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.

Response

The transportation forecasting and modeling included in Chapter 3, *Transportation*, was completed based on coordination with BPDA and BTD transportation staff. Prior to starting the transportation analyses, the proponent 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 included in Appendix C for reference.

Comment 1.3

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.

Response

Refer to Sections 3.4.5 and 3.12 of Chapter 3, *Transportation*, for detailed descriptions of the proposed pedestrian/bicycle mitigation. Section 4.4 Public Realm and Open Space elaborates on the Project Greenway and Streetscape. At the midblock crossing on Cattle Drive connecting the Project Greenway with the Science Drive shared-use path, a raised crossing is proposed to slow down traffic and enforce pedestrian/bicycle right-of-way over vehicle traffic. The specific materiality, signage, and pavement markings for the roadway crossings will be coordinated with City of Boston transportation staff at BPDA and BTD as the roadway design progresses.

Comment 1.4

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.

Response

Refer to Section 3.9 of Chapter 3, *Transportation*, for a summary of the bicycle level of traffic stress analysis for existing and proposed roadway conditions. Refer to Figures 3.11, 3.39, and 3.4 in Chapter 3, *Transportation,* for diagrams referencing existing, planned and proposed bike facilities.

Comment 1.5

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.

Response

Refer to Section 3.4.5.2 of Chapter 3, *Transportation*, for a summary of the proposed bicycle parking spaces based on BTD's Bike Parking Guidelines. All bike parking spaces and bike parking rooms will be designed based on the BTD guidelines. Refer to Figures 3.6 in Chapter 3, *Transportation,* and Figure 4.18 in Chapter 4, *Urban Design,* for diagrams referencing proposed bike parking and site circulation.

Comment 1.6/1.7

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.

Response

Refer to Section 3.4.5.2 of Chapter 3, *Transportation*, for a summary of the proposed bicycle parking spaces and bike sharing stations based on BTD's Bike Parking Guidelines. Based on the BTD guidelines, the Proponent will include a 19-dock Bluebikes station on-Site, and anticipates an additional station to be provided as part of Phase B.

Comment 1.8

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.

Response

Refer to Section 3.4.4 of Chapter 3, *Transportation*, for a summary of the proposed street network including cross-section figures of each of the proposed new roadways. The final design of the streetscape improvements is currently being coordinated with BPDA transportation, BTD, and PIC staff.

Comment 1.9/1.10

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.

Response

Refer to Section 3.10.2 of Chapter 3, *Transportation*, for descriptions of the proposed curbside activity and on-site parking access. The Proponent has made it a priority to minimize the size of curb cuts and consolidate loading docks where possible. In addition, the location of all curb cuts has been designed to minimize conflicts with pedestrians with no curb cuts for loading and parking proposed along Western Avenue. Refer to Figure 3.38 for the location of all loading and parking curb cuts on-Site for Phase A.

All curb cuts and sidewalks will be designed so the sidewalks are flush across the driveway to maintain pedestrian accessibility.

Comment 1.11

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.

Response

Refer to Section 3.8.2 of Chapter 3, *Transportation*, for a description of the proposed transit service that will serve the Project Site. The Proponent is engaged in specific coordination with Harvard University to develop a transit service plan that supports Project transit demand to/from Harvard Square as well as Harvard University's needs.

Comment 1.12

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.

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 and will be developed in coordination with BPDA transportation and BTD staff. See Section 3.12.5 of Chapter 3, *Transportation* for details.

BPDA Urban Design

Comment 2.1

The Framework Plan, while not a regulatory document, is a key component of the planning, design, and review process for this area. While the Framework Plan is Harvard's product, not Tishman Speyer's, the ERC must evolve with the Framework Plan to provide a strong, new context for the further development of the area covered by the Framework Plan.

Response

Regarding the relationship of the Project design to the broader Framework Plan, please refer to Section 4.4.1 of Chapter 4, *Urban Design*.

Comment 2.2

For years the Greenway has constituted a central organizing element of Harvard's planning, and one that has been embraced by residents and the BPDA alike. The Greenway should drive the placement and design of buildings, not vice versa.

Response

The greenway remains a central organizing element of site design. Refer to Section 4.3.1 in Chapter 4, *Urban Design,* for review of site design approach and approach to building locations.

Comment 2.3

A central goal from the time of the 2005 Strategic Framework for Planning through today has been the creation of a Harvard campus (whether academic or commercial in nature) that is welcoming to the public. The current proposal does much to implement this goal; however, the aim of creating a new neighborhood that is integrated with the rest of North Allston physically and that draws in all residents and visitors must continue to inform design and programming decisions.

Response

Refer to response to Comment SD.6 and Section 4.3.1 of Chapter 4, *Urban Design*.

Comment 2.4

We would like to note that we will expect detailed design drawings for the DPIR stage in order to provide in-depth comments on site, landscape, and architectural design, as well as access and circulation. To this point we have not seen as much development in the project as we would typically expect to by this point in the process, which means there are likely to be additional rounds of comment. Issues listed below are grouped by topic area:

Response

The DPIR submission, specifically Chapter 4, *Urban Design*, and accompanying Figures, contains detailed floor plans, elevations, sections & images which provide an update on the proposed design of the Project.

Comment 2.5

- *Detailed landscape plan, illustrating existing and proposed trees, and topography should be provided.*

Response

Refer to Figure 4.13 and 4.4a-b in Chapter 4, *Urban Design,* for plans referencing Public Realm and Streetscape Improvement Plan and sections demonstrating topography on site.

Comment 2.6

- *The primary objective of the site design should be creating an environment that is open to the public and setting up the rest of the Framework plan area for successful development.*

Response

The proposed design creates an open and inviting public realm that aims to connect Allston residents with new employees, residents, and visitors of the Project, along with the Harvard community. A primary objective of the open space design is to create an environment that is open and inviting to the public, and to set up the rest of the Framework Plan areas for successful development in the future. Please refer to Section 4.4 in Chapter 4, *Urban Design* for further context.

Comment 2.7

- *A site design that puts focus on the public realm, hierarchy of public and private open spaces and the pedestrian connections on the site with respect to programming of the ground floor of all proposed and existing buildings is encouraged.*

Response

Refer to Section 4.4 in Chapter 4, *Urban Design,* for reference to public realm and open space design outline.

Comment 2.8

- *Locations of buildings should frame designed public spaces that are accessible and welcoming to both current and future residents of the neighborhood.*

Response

Refer to Section 4.3.1 in Chapter 4, *Urban Design*, for reference to the site design approach and intent.

Comment 2.9

- *The buildings should relate to each other on the site, creating various scale plazas and open spaces for the public enjoyment.*

Response

Refer to Section 4.3.1 in Chapter 4, *Urban Design*, for reference to the site design approach and intent.

Comment 2.10

- *Open space should be designed as such. Currently, the plan shows spaces that feel like the areas leftover once building footprints were determined. How can the building footprints be adjusted to help make the open spaces intentional.*

Response

Refer to Section 4.3.1 in Chapter 4, *Urban Design*, for reference to the site design approach and intent.

Comment 2.11

- *The greenway devolves to a very narrow dimension at the intersection of Cattle Drive. What is the design expression here -- does it read as being part of the Greenway, Cattle Drive, or is there a third vernacular (perhaps, a square?) that defines the intersection of these two systems? And if a square, how can the design and shape of the adjacent buildings help to define this new public square as a place in its own right, separate from the Cattle Drive street room and Greenway experiences?*

Response

Refer to Section 4.4.1 and 4.4.2 in Chapter 4, *Urban Design*, for reference to the design intent of the Project.

Comment 2.12

- *What is the expression of the Greenway north of Science Drive given that there is a thermal utility running alongside it? Will street trees be feasible, what is the planting strategy?*

Response

The Proponent will continue to explore the conceptual design of the Project Greenway west of Cattle Drive and will be reviewing these concepts with the BPDA in subsequent meetings. As Phase B and the greenway associated with Phase B are not the focus of this DPIR filing, more information on those topics will be provided in subsequent filing documents respecting Phase B.

Comment 2.13

- *What is the expression of the street rooms along Cattle Drive and what are the strategies or elements being used to ensure that they read as a continuous network of spaces? How will these set up future development south of the ERC?*

Response

Refer to Section 4.4.2 in Chapter 4, *Urban Design,* for reference to design intent of the street rooms on Cattle Drive.

Comment 2.14

- *What is the expression of the Greenway at its widest dimension on the eastern edge? Given that there are no utility constraints in this area, we would like to see this being used for trees and other planting.*

Response

Refer to Section 4.4.1 in Chapter 4, *Urban Design,* for reference to the Project Greenway and design intent. Along the eastern edge of the Greenway, a Bio-Classroom is planned where visitors to the ERC can interact with and learn from the stormwater management feature at this location. This edge also contains large amounts of canopy cover as it approaches East Drive.

Comment 2.15

- *East Drive has been intended as a major vehicle route. How will the greenway and multi use path be designed to safely cross it?*

Response

Refer to Section 4.4.1.1 in Chapter 4, *Urban Design,* for reference to the shared use path and its design intent. Placement and design of the crossing of East Drive will maximize its visibility with advance signage and warning systems to alert motorists of the presence of bicyclists and pedestrians. In addition, a signalized crossing is anticipated at the intersection of East Drive and Western Avenue.

Comment 2.16

- *Provide a drawing that has dimensions of the Greenway and identifies elements that will help to establish its various intended programs.*

Response

Refer to Figure 4.13 Public Realm and Streetscape Improvement Plan in Chapter 4, *Urban Design,* for reference to the Project Greenway and programmatic elements associated with it.

Comment 2.17

- *Pedestrian paths should provide safe, well lit, and welcoming access throughout the site. Provide sufficient dimension for separated bicycle and pedestrian pathways.*

Response

Refer to Sections 4.7., 4.4.1.1, and 4.4.4 in Chapter 4, *Urban Design,* for reference to Accessibility, Shared Use Path, and Streetscape improvements.

Comment 2.18

- *The massing strategy that results in a major loading entrance on Cattle Drive and a wide-open space around the Conference Center on East Drive is still curious, even understanding the desired association with the Business School. How does this massing reinforce the Framework plan of a major traffic corridor on East Drive and the primary retail spine on Cattle Drive.*

Response

Due to the diversity of the uses and buildings around the Project Site, the Project demands sensitivity to the human scale of the neighborhood context including considerations to the street widths and building heights of Allston, Western Avenue, the Charles River, Cambridge Street, and neighboring residential areas. As such, emphasis has been made on building scale and massing by placing taller building heights farthest away from sensitive boundaries such as the residential neighborhood and the Charles River. While creating a consistent street wall on Western Avenue consistent with the Science Engineering Complex (SEC) down the road, the massing configuration also delineates the Project Greenway, the geometry of which evokes future connections to the Allston Neighborhood, Ray Mellone Park, and Cambridge. By consolidating the building program into a block bounded by Western Avenue, Cattle Drive, DEF Drive and East Drive, the project creates a complete block with efficiently consolidated services, maximizing active uses on the Project Greenway, Western Ave, and Cattle Drive. The loading entrance at Cattle Drive will be carefully treated and considered in order to create architectural and landscape continuity at this point. This entry is designed as a single lane, in-and-out access point, to a single consolidated service area that is shared by three buildings. This means that service vehicles will not idle at this access point as all truck/vehicle turning has been absorbed into the building podium. As a whole, the project greatly reduces that number of curb cuts, driveways, and exterior loading areas, thereby yielding more space to publicly accessible open spaces and active building frontages.

The design team believes that having efficient loading and a rich, well designed public realm do not have to be mutually exclusive. At points of overlap the loading or services become a momentary, albeit carefully considered, interruption that is urban in nature.

Cattle Drive will continue to be a pedestrian focused corridor for the area. Both the streetscape and building design intend to create a pedestrian focused, bike-friendly street with moments for respite and gathering. For example, the Hotel Building at Western Ave. and Cattle Drive is set back from the street to create an expanded outdoor space where hotel active uses can spill-out and seating and landscape can be expanded from the sidewalk. Likewise, along the Residential and Lab/Office buildings frontage zones ensure that building entries do not interrupt pedestrian flows, but also create zones for spill out from buildings.

Comment 2.19

› *The amount of proposed ground floor activation/retail in Phase A seems high for what we know about retail in the area. This combined with much of the retail access and visibility being located away from Cattle Drive may be pulling the center of gravity into the site and away from the street. Provide more information about how the project will support the level of proposed retail and the location.*

Response

The Proponent believes that activating the ground floor with retail and other active uses is an important part of the strategy for developing a vibrant and inviting mixed-use community. The Proponent is in the early stages of developing a ground floor activation strategy, and recognizes that the strategy will need to contemplate both a variety of ground floor uses, as well as different population levels based on the different stages of the Project's development. As we develop the ground floor activation strategy, we also intend to do so in a way that will attract local and minority and women-owned retailers and we have included additional information about our commitment to this goal in Section 1.3.2 of Chapter 1, *Project Description*.

Comment 2.20

› *The exposed parking garage at the western edge of Phase B is not desirable. Can this be screened with additional residential uses? If the existing PDA boundary poses a dimensional constraint, please explore a potential redefinition of the PDA Master Plan Area that shows the boundary realignment that would be needed to accommodate a fully covered parking garage.*

Response

While Phase B is not the subject of the current review under Article 80 as detailed in this DPIR, the Proponent has considered the condition and believes that the recommended approach to address the exposed portion of the garage is to treat it with an architectural screen that would be developed in connection with the Phase B design and approval process.

Comment 2.21

- *Please provide a detailed drawing showing drop offs, entrances, and driveways to the project from Western Ave. and Cattle Drive.*

Response

Refer to Figure 3.7 in Chapter 3, *Transportation*, for drawings detailing drop-offs, parking, and other designated curb uses associated with the project.

Comment 2.22

- *Care should be taken to minimize the impact of the proposed service entries on Cattle Drive and Science Drive to keep the continuity of the pedestrian public realm (at the street rooms and the Greenway, respectively)*

Response

Refer to Section 4.3.1 in Chapter 4, *Urban Design,* for reference to site design approach.

Comment 2.23

- *Continue to explore secondary streets like DEF Drive that can be the location of services.*

Response

Refer to Figure 3.7 in Chapter 3, *Transportation*, for drawing detailing use of DEF Drive for related services, including location of the parking garage and service entries.

Comment 2.24

- *Provide detailed information about each building proposal, including access, program locations, loading, and more information on design strategy.*

Response

Refer to Section 4.5 in Chapter 4, *Urban Design*, for reference to proposed building designs.

Comment 2.25

- *Provide renderings of the edges of Phase A and of all open spaces.*

Response

Refer to Figures 2.4a-2.11d in Chapter 4, *Urban Design,* for reference to building renderings and elevations.

Comment 2.26

- *Architectural expression of all facades should be clarified.*

Response

Refer to Figures 2.4a-2.11d in Chapter 4, *Urban Design,* for building elevations, and Section 4.5 in Chapter 4, *Urban Design,* for a written description of the design approach.

Comment 2.27

The following urban design materials for the Proposed Project's schematic design must be submitted for the DPIR:

- *Written description of program elements and space allocation for each element.*

Response

Refer to Sections 4.4 and 4.5 in Chapter 4, *Urban Design,* for reference to program and schematic design of the buildings. Comment 2.28

Comment 2.28

- *Detailed site plan with topography, circulation both pedestrian and vehicular, existing and proposed buildings, and all open space. In particular show/explain the edges of the project and how these are setting up future development.*

Response

Refer to Figure 4.13 and 4.4a-b in Chapter 4, *Urban Design,* for plans referencing Public Realm and Streetscape Improvement Plan and sections demonstrating topography on site.

Comment 2.29

- *Detailed landscape plan, illustrating proposed trees, and topography.*

Response

Refer to Figures 4.13-4.15 and 4.4a-b in Chapter 4, *Urban Design*, for reference to landscaping plan and proposed tree plan and sections demonstrating topography on site.

Comment 2.30

- Elevations, sections (at different scales including extending well beyond the site to show the context/lack of context) and 3D views illustrating the relationships of the *proposed structures to the neighborhood, especially along existing and proposed streets.*

Response

Refer to Figures 4.16a-g and 4.5a-4.9cin Chapter 4, *Urban Design,* for reference to building renderings and elevations.

Comment 2.31

- *Eye-level perspectives showing the proposal, including public areas and plazas.*

Response

Refer to Figures 4.12 and 4.16a-g in Chapter 4, *Urban Design*, for reference to eye-level perspectives of publicly accessible open space areas and plazas.

Comment 2.32

- *Project phasing diagram.*

Response

Refer to Figure 2.1 in Chapter 2, *Phase B*, for reference to phasing diagram for project site.

BPDA IGBC

Comment 3.1

The IGBC accepts the proposed rating system selections. The high number of possible additional points in typology suggests that Platinum may be achievable for several buildings. We encourage Tishman Speyer to set a bold example for all of Allston Landing.

Response

As described in Section 5.3.1 of Chapter 5, *Sustainability and Climate Change Resiliency*, all typologies are currently reflecting LEED Gold certification and a pathway to Platinum certification has been provided in Section 5.3.2. Additional LEED points are being tracked as "Maybe" points which may allow for Platinum certification.

Comment 3.2

In support of the City of Boston's Resiliency and GHG emissions reduction goals, including Carbon Neutral by 2050, the IGBC requests:

› *Maximized Solar Energy System – optimize roof design and height for installed Solar PV systems.*

Response

The Proponent has performed a solar PV analysis for the Project and has presented the results in Section 5.4.6 of Chapter 5, *Sustainability and Climate Change Resiliency*. This section details the Proponent's assumptions on available PV area and plans solar readiness. The Solar PV assessment is also incorporated into the Zero Carbon Building Assessments.

Given the very limited impact of the solar PV potential on-site and the Proponent's commitment to procure new 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 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.

Comment 3.3

› *Enhanced Building Envelope – reduced air infiltration (ACH below 0.6), increased opaque curtain wall insulation (below U-0.05), improved vision curtain wall performance (below U-0.20), improved window performance (below U-0.20), tuned glazing with Solar Heat Gain Coefficient (below SGHC 0.30), and increased insulation levels for roof (R-60 c.i.), wall (R-30+ with c.i.), and slab (R-7.5 c.i.) conditions.*

Response

The currently proposed building envelopes are presented in Section 5.4 of Chapter 5, *Sustainability and Climate Change Resiliency*. The Proponent has worked to provide an energy efficient envelope that still meets the aesthetic goals of the Project. The Carbon Neutral Building Assessment of the DPIR provides analysis with an enhanced building envelope option for each typology, including reduced air filtration (0.06 cfm/ft2 façade at 50 Pa), U-0.05 opaque curtain wall, glazing ranging from U-0.15 to U-0.2 depending on typology, SHGC 0.28, R-60 c.i. roof, R-36 c.i. opaque walls, and slab with minimum R-7.5 c.i.

Comment 3.4

- *Optimized Building Systems – smaller, more efficient and alternative heating, cooling, dedicated fresh air with ERV and hot water systems that fully consider the improved envelope performance.*

Response

The currently proposed building systems are presented in Section 5.4 of Chapter 5, Sustainability and Climate Change Resiliency. Through the iterations of energy analysis that have been done to date, the Proponent has worked properly size mechanical systems and reduce the building's dependency on natural gas. The Carbon Neutral Building Assessment of the DPIR includes equipment sized to meet the reduced loads of the improved envelope performance. These analyses consider efficient air-source heat pump systems (Lab/Office typology) and air-source VRF systems (Residential, Hotel, and Conference typologies). All typologies are modeled with efficient air-to-water heat pumps for domestic water heating.

Comment 3.5

- *An all electrical building with state-of-the-art energy management systems.*

Response

The currently proposed building systems are presented in Section 5.4 of Chapter 5, Sustainability and Climate Change Resiliency. Electrification has been studied for the modeling typologies in the Zero Carbon Building Assessments presented Section 5.4.4 and in Appendix D.

The Carbon Neutral Building Assessment considers all-electric scenarios by incorporating air-source heat pump systems (Lab/Office typology) and air-source VRF systems (Residential, Hotel, and Conference typologies). All typologies are modeled with efficient air-to-water heat pumps for domestic water heating. For the Residential and Hotel typologies, a small amount of natural gas consumption is still assumed to be present due to cooking activities in the ground floor restaurant spaces.

Comment 3.6

The energy model in the PNF compares a base and design case. The next step is the Carbon Neutral Building Assessment that details a potential high-performance net zero carbon building design.

Response

The Proponent has completed Carbon Neutral Building Assessments for the modeling typologies in this filing. The assessments are presented in Section 5.4.4 of Chapter 5, *Sustainability and Climate Change Resiliency*, and Appendix D.

Comment 3.7

An updated model should include multiple solution packages for achieving carbon neutral and all electric building performance.

Response

The Carbon Neutral Building Assessment has been completed and is described in Section 5.4.4 of Chapter 5, *Sustainability and Climate Change Resiliency* specific to each typology. Additionally, as described in Section 5.2.4, 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.

Comment 3.8

Upon preparation of the Carbon Neutral Building Assessment please contact us through Nupoor Monani of the BPDA to schedule an IGBC meeting to review the assessment, discuss the District Energy Microgrid Feasibility Study and to finalize mitigation strategies.

Response

Following the DPIR filing, the project team will coordinate with the parties listed above. As described in the Section 5.4.5 of Chapter 5, *Sustainability and Climate Change Resiliency*, since the PNF filing, the Proponent has held an initial meeting with the City of Boston on March 31, 2021 to review the approach and proposed systems to be studied in the District Energy Microgrid Feasibility Study. The meeting was attended by Nupoor Monani, Manuel Esquivel and Brad Swing as representatives of the BPDA and the City of Boston.

Comment 3.9

Please identify utility and state energy efficiency and renewable/clean energy assistance resources, including energy modeling and MassSave Passive House programs, and provide information on any support that will be afforded to the project.

Response

The Proponent discusses potential incentives available to the Project in Section 5.4.7 of Chapter 5, *Sustainability and Climate Change Resiliency*. Incentives calculations are included the Zero Carbon Building Assessments and solar PV analysis. This section outlines the Proponent's assessment of available federal, state and utility incentives available through energy efficiency, renewable energy, and potentially alternate energy credit (AEC) programs.

Comment 3.10

A Resiliency Report Summary should be generated and updated online for each building.

Response

Separate Climate Resiliency Checklists have been provided for each typology in Appendix B of the DPIR.

Comment 3.11

Please follow up with Ms. Monani in responding to IGBC comments and the provision of the requested information and items.

Response

Following the DPIR filing, the project team will coordinate with Ms. Monani in responding to IGBC comments.

BPDA Smart Utilities

Comment 4.1

Utility Site Plan:

Smart Utilities Lights:

- *Thank you for identifying the location of street lighting and shadow conduit on Cattle Drive. Please include a line to represent the conduit and label it appropriately in the Key of the diagram. The conduit should extend to the limits of work.*

Response

Refer to Section 7.7.4, Figure 7.2 (Proposed Utilities), Figure 7.6 (Roadway Cross Sections 1) and Figure 7.7 (Roadway Cross Sections 2) in Chapter 7, *Infrastructure Systems* for proposed street lighting and shadow conduits.

Comment 4.2

- *Will you carry out significant sidewalk reconstruction along Western Avenue? If so, please also add sidewalk shadow conduit along Western Avenue.*

Response

Western Avenue sidewalk reconstruction will be coordinated with other planned work in Western Avenue. Refer to Section 7.7.4, Figure 7.2 (Proposed Utilities), Figure 7.6 (Roadway Cross Sections 1) and Figure 7.6 (Roadway Cross Sections 2) in Chapter 7, *Infrastructure Systems* for proposed street lighting and shadow conduits.

Comment 4.3

- *For any sidewalks where you identify shadow conduit, please also identify the following:*

(1) Where this conduit could receive power/fiber from the respective electrical utility and telecom utility on the ROW. (Note: the tie-in into the utility service is not required, but we are interested in making sure that planning for the interconnection of both utilities has taken place as part of the design.)

Response

Refer to Section 7.7.4 in Chapter 7, *Infrastructure Systems,* for streetlight installation information.

Comment 4.4

(2) Where the handholes for these two conduits would be located. Handholes should be located at least at the nodes of the conduit, where the conduit will connect to the utility service, and at the base of any pertinent street lights. (Note: PIC is currently recommending one dual handhole for these conduits.)

Response

Noted. Refer to Section 7.7.4 in Chapter 7, *Infrastructure Systems,* for streetlight installation information.

Comment 4.5

Green Infrastructure:

- *Thank you for identifying the location of the infiltration chamber. Please identify the corresponding volume of the infiltration chamber on the Utility Site Plan.*

Response

Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for a summary of Stormwater Management Approach and Figure 7.5 for estimated storage volumes, which are subject to change due to the design of the Project Greenway.

Comment 4.6

- *Thanks for identifying the location of additional green infrastructure on the sidewalks. Please also show existing and proposed trees.*

Response

Refer to Figure 7.5 in Chapter 7, *Infrastructure Systems,* for reference to information on planned infrastructure.

Comment 4.7

- *Please begin a Smart Utilities Checklist by filling out Part 1 (basic project information) and Part 4 (Green Infrastructure). Specify the types of Green Infrastructure that will be included.*

Response

Refer to updated Smart Utilities Checklists in Appendix B and Figures 7.2, 7.5, 7.6, and 7.7 in Chapter 7, *Infrastructure Systems*.

Comment 4.8

Telecom Ductbank:

- *Will the proposed telecom ductbank include shadow conduit for the City?*

Response

The proposed telecom ductbank will be coordinated to provide shadow conduit as required by the City.

Comment 4.9

- *Does the proposed duct bank have enough capacity for future developments in the PDA area?*

Response

The proposed telecom ductbank is being designed to account for future project phases.

Comment 4.10

- *Gas meters: Show the location of the gas meters and whether they are located inside or outside the building.*

Response

The gas meter locations have not been determined and will be coordinated with the gas utility provider as design progresses.

Comment 4.11

- *Electrical Transformers: Please include the proposed location of any electrical transformers on site.*

Response

The electrical transformer locations have not been determined and will be coordinated with the electric utility provider as design progresses.

Comment 4.12

- *Please include in your USP any infrastructure needed to comply with the City of Boston EV Readiness Policy for New Developments. This may include EV chargers, additional electrical services, transformers, empty conduit, etc.*

Response

Infrastructure for EV readiness will continue to be advanced with design development of the project and will comply with the *City of Boston EV Readiness Policy*.

Comment 4.13

District Energy Microgrid Feasibility Assessment and Master Plan:

› *As identified in the PNF, this project should prepare a District Energy Microgrid Feasibility Assessment that leads to a District Energy Microgrid Master Plan. We will soon request a kick-off meeting with the project proponent in order to lay the ground for the first part of the study, the Screening Analysis.*

Response

Refer to Smart Utilities Checklist in Appendix B and Section 7.7.2 in Chapter 7, *Infrastructure Systems*, for information on District Energy Microgrid Feasibility.

The Proponent is committed to completing a District Energy Microgrid Feasibility Study for the Project. The study will assess the viability of a District Energy system, distributed energy resources (DER), and/or microgrid for clusters of buildings. Since the PNF filing, the Proponent has held an initial meeting with the City of Boston on March 31, 2021 to review the approach and proposed systems to be studied in the District Energy Microgrid Feasibility Study.

At the meeting, it was agreed the district systems to be studied would include an ambient water loop served by a combination of air to water heat pumps, ground source and electric boilers in incremental steps to reduce natural gas consumption in buildings for heating and domestic hot water demands. The analysis will be submitted to the City of Boston for review in August 2021.

Comment 4.14

› *The technologies to be prioritized in the Screening Analysis include:*

- *Swear heat recovery*
- *Ground-source heat pumps (study potential wells located on both the private parcels and under public streets).*
- *PV + Battery Storage for the site as a whole.*

Response

The Screening Analysis and information on the technologies has been studied and will be included in a District Energy Feasibility Study. As indicated in Section 7.7.2 of Chapter 7, *Infrastructure Systems*, the report & analysis will include an ambient water loop served by a combination of air to water heat pumps, ground source and electric boilers in incremental steps to reduce natural gas consumption in buildings for heating and domestic hot water demands. Section 5.4.6 in Chapter 5, *Sustainability and Climate Change Resiliency,* references the PV analysis.

Comment 4.15

› *The Screening Analysis should look at the phasing of the development, including buildings, streets, and applicable infrastructure.*

Response

Please refer to comment response 4.14.

Comment 4.16

- *The screening analysis should estimate available energy from the three technologies identified above and well as building energy loads.*

Response

Please refer to comment response 4.14.

Comment 4.17

Report of Potential Conflicts:

- *Please provide the report of potential conflicts generated by entering your project into the City of Boston Utility Coordination Software (COBUCS). If any conflicts are identified, we would then request information on how the team plans to address these conflicts with the relevant entities.*

Response

The Project entered Western Avenue into the COBUCS system, which indicated Western Avenue as a Future Guaranteed Street Bike Lane 2014-2019. A Guaranteed Street time period does not appear to be established by the Public Works Department and the Project will coordinate with proposed work in Western Avenue as the design progresses.

Comment 4.18

Smart Utilities Checklist:

- *Please begin a Smart Utilities Checklist (basic information) for your project and fill out Part 4 of the Checklist (as requested above)*

Response

Refer to the Smart Utilities Checklist in Appendix B.

Comment 4.19

After receiving and reviewing the other information requested above, we may ask that some of the design elements for the other items (i.e., design of sidewalk shadow conduit) are memorialized by submitting an update to the Smart Utilities Checklist. We can guide the team more efficiently towards the section(s) of the Checklist that would be necessary after the information above has been received and reviewed.

Response

Noted.

BPDA Environment

Comment 5.1

Wind

The Proponent shall be required to conduct a quantitative analysis (wind tunnel) of the pedestrian level wind impacts. The analysis shall determine the potential pedestrian level winds adjacent to and in the vicinity of the Proposed Project and identify the wind velocities that are expected to exceed acceptable levels, including the Boston Planning & Development Agency's (the "BPDA") guideline of an effective gust velocity of 31 miles per hour (mph) not to be exceeded more than 1% of the time.

Response

Refer to Section 6.2 in Chapter 6, *Environmental Protection*, for the wind tunnel analysis.

Comment 5.2

Particular attention shall be given to public and other areas of pedestrian use, including, but not limited to, entrances to the Proposed Project and existing and proposed buildings in the vicinity of the Proposed Project, on the existing and proposed open spaces, dedicated public parklands and publicly accessible open spaces, as well as sidewalks and pedestrian walkways adjacent to and in the vicinity of the Proposed Project site.

Response

Refer to Section 6.2 in Chapter 6, *Environmental Protection*, for the wind tunnel analysis. This analysis was factored into the master plan development and will continue to be considered as design develops.

Comment 5.3

In particular, the Proponent shall be required to study the west-facing building bases and corners of Building 4 along Western Avenue, and between Building 3 and Building 2 where wind conditions are predicted to be uncomfortable.

Response

Noted. Refer to Section 6.2 in Chapter 6, *Environmental Protection*, for the wind tunnel analysis.

Comment 5.4

The following conditions shall be evaluated:

1. Existing (No Build) – this configuration represents existing and all in-construction projects.

2. Build Condition – this configuration existing, all in-construction projects and the Proposed Project.

3. Full Build –this configuration includes existing, all in-construction buildings, the Proposed Project, all BPDA approved projects not yet under construction.

Response

Noted. Refer to Section 6.2 in Chapter 6, *Environmental Protection,* for the wind tunnel analysis.

Comment 5.5

The Proponent has submitted a wind sensor plan that has been reviewed and approved.

Response

Noted.

Comment 5.6

The model scale shall be 1:300 and shall include all buildings within 1,200 feet of the Proposed Project site.

Response

Noted. Refer to Section 6.2 in Chapter 6, *Environmental Protection,* for the wind tunnel analysis.

Comment 5.7

The Proponent shall be required to work with the Urban Design team to refine the Proposed Project design to reduce adverse pedestrian level wind impacts.

Response

The Project Team received feedback on the proposed wind sensor plan and the qualitative wind analysis provided in the PNF from the BPDA on March 12, 2021. BPDA's comments were incorporated into the wind tunnel study presented in the DPIR (see Appendix E). The wind sensor plan was ultimately approved on March 22, 2021.

Comment 5.8

<u>Shadow</u>

The Proponent has conducted a shadow analysis for the hours of 9:00 a.m., 12:00 noon, and 3:00 p.m. for the vernal equinox, summer solstice, autumnal equinox, and winter solstice and for 6:00 p.m. in the summer solstice and autumnal equinox.

Response

See response to Comment SD. 80. Refer to PNF Section 6.4 of Chapter 6, *Environmental Protection*.

Comment 5.9

The shadow impact analysis examined the existing shadows and the incremental effects of the Proposed Project, on the existing and proposed open spaces, including but not limited to dedicated public parkland and publicly accessible open spaces, as well as sidewalks and pedestrian walkways adjacent to and in the vicinity of the Proposed Project.

Response

See response to Comment SD. 80. Refer to PNF Section 6.4 of Chapter 6, *Environmental Protection*.

Comment 5.10

Results of the shadow analysis demonstrate that during the fourteen time periods studied, no adverse shadow impacts are anticipated to be generated. However, as the Proposed Project design advances the Proponent shall be required to conduct an additional shadow analysis. The Proponent shall be required to demonstrate future refinements to the Proposed Project design shall not create adverse shadow impacts.

Response

See response to Comment SD. 80. Refer to PNF Section 6.4 of Chapter 6, *Environmental Protection*.

Comment 5.11

<u>Solar Glare</u>

The Proponent shall be required to conduct a solar glare analysis. The analysis shall measure potential reflective glare from the Proposed Project onto potentially affected streets and public open spaces as well as the sidewalk areas in order to determine the likelihood of visual *impairment or discomfort due to reflective spot glare. If deemed necessary, mitigation measures to eliminate any adverse reflective glare shall be identified and included.*

Response

A solar glare analysis is described in Section 6.4 in Chapter 6, *Environmental Protection*.

Comment 5.12

Daylight

(Please refer to Urban Design's comments)

Response

Noted. See responses to Urban Design comments (Comments 2.1-2.32).

Comment 5.13

Air Quality

A microscale analysis predicting localized carbon monoxide concentrations shall be performed, including identification of any locations projected to exceed the National or Massachusetts Ambient Air Quality Standards, for projects in which: 1) project traffic would impact intersections or roadway links currently operating at Level of Service ("LOS") D, E, or F or would cause LOS to decline to D, E, or F; 2) project traffic would increase traffic volumes on nearby roadways by 10% or more (unless the increase in traffic volume is less than 100 vehicles per hour); or, 3) the project will generate 3,000 or more new average daily trips on roadways providing access to a single location.

Response

The Proponent has presented a microscale air quality assessment for the Project in Section 6.4.3 of Chapter 6, *Environmental Protection*. The results of the microscale analysis indicate the Project will not cause an exceedance of the NAAQS.

Comment 5.14

The Proponent shall not be required to conduct a mesoscale analysis predicting the change in regional emissions of volatile organic compounds ("VOCs") and nitrogen oxides ("NOx") shall be performed, as the Proposed Project is anticipated to generate approximately 5,121 vehicle trips per day.

Response

Since daily vehicle trips are less than the threshold, a mesoscale analysis is not required as noted by the comment.

Comment 5.15

Noise

The Proponent conducted a noise analysis of potential noise impacts associated with the Proposed Project's anticipated mechanical equipment and service activities. The analysis demonstrates that the Proposed Project will be in compliance with the Regulations for the Control of Noise in the City of Boston, MassDEP noise limits and the HUD interior design noise level standards.

Response

Noted.

Comment 5.16

Sustainable Design/Green Buildings

(Please [see] Interagency Green Building Committee comment letter)

Response

The IGBC comment letter has been reviewed and responded to. Comments pertaining to LEED Certification are addressed in Section 5.3 of Chapter 5, *Sustainability and Climate Change Resiliency*. Comments pertaining to the Carbon Neutral Building Assessment have been addressed in the Assessment which is described in Chapter 5.4.4 and Appendix D. Comments pertaining to Resiliency Reports are addressed in the separate Climate Resiliency Checklists, which have been provided for each typology in Appendix B.

Boston Water and Sewer Commission

Comment 6.1

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 and July 13, 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 6.2

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

Noted. The proposed work will be designed to meet BWSC standards, regulations, and requirements, and will be submitted to BWSC for review and approval.

Comment 6.3

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

Noted. Estimated sewage generation is included in Section 7.4.2 of Chapter 7, *Infrastructure Systems* and estimated water demand is in Section 7.5.2. The Proponent will provide updated estimated water demand, wastewater generation, and stormwater runoff rates as part of the Site Plan review process.

Comment 6.4

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

Noted. 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 6.5

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

Noted. The Project will obtain a NPDES General Permit for Construction.

Comment 6.6

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

Noted. The Project will comply with Complete Street requirements and incorporate green infrastructure into the Project. Refer to Section 7.3.2 and Figure 7.5 in Chapter 7, *Infrastructure Systems*.

Comment 6.7

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

Noted. The Project will develop an inflow reduction plan consistent with the regulation.

Comment 6.8

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. Refer to Section 7.4.2 in Chapter 7, *Infrastructure Systems*.

Comment 6.9

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. Refer to Section 7.4.2 in Chapter 7, *Infrastructure Systems*.

Comment 6.10

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

Noted. New building services will be directed to separate, dedicated storm mains and sewer mains, respectively.

Comment 6.11

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

The Project will obtain a Drainage Discharge Permit and Remediation General Permit, if required.

Comment 6.12

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%. 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 Proponent will submit a phosphorus reduction plan to BWSC during the Site Plan review process that meets the City's requirements.

Comment 6.13

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 retain 1.25 inches of rainfall times the impervious area, and actively manage an additional 1.5 inches over that same area for resiliency storage, which well exceeds the City's requirement. Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems*.

Comment 6.14

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 7.3.3 in Chapter 7, *Infrastructure Systems*.

Comment 6.15

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 6.16

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

Noted. "Don't Dump" plaques will be installed at new catch basins.

Comment 6.17

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 6.18

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 as required throughout construction.

Comment 6.19

For information regarding the installation of MTUs, the Proponent should contact the Commission's Meter Installation Department.

Response

Noted. Refer to Section 7.5.3 in Chapter 7, *Infrastructure Systems*.

Comment 6.20

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

Noted. Refer to Section 7.5.3 in Chapter 7, *Infrastructure Systems*.

Public Works Department

Comment 7.1

Project Coordination:

The developer should work with PWD and PIC regarding the newly proposed streets: Cattle Drive, East Drive, Def Drive, and Science Drive. Should the developer want to petition these streets to be converted to public streets, note that newly proposed streets need to be built according to PWD design standards. Roadway Design Standards – Typical Plans and Cross Sections.

Response

Refer to Section 3.4.4 of Chapter 3, *Transportation*, for detailed descriptions of the proposed street network, including cross-sections of each roadway. The design of the new roadways is consistent with PWD standards and their permitting will be coordinated with City of Boston Transportation staff at BPDA, BTD, PWD, and PIC. Currently, these streets are intended to be private ways open to public travel.

Comment 7.2

Site Plan:

The developer must provide an engineer's site plan at an appropriate engineering scale that shows curb functionality on both sides of all streets that abut the property.

Response

Refer to Section 3.4.4 of Chapter 3, *Transportation*, for detailed descriptions of the proposed street network, including 80-scale plans of the proposed roadways.

Comment 7.3

Construction Within the Public Right-of-Way (ROW)

All proposed design and construction within the Public ROW shall conform to PWD Design Standards (https://www.boston.gov/departments/public-works/public-works-design-standards). Any non-standard materials (i.e. pavers, landscaping, bike racks, etc.) proposed within the Public ROW will require approval through the Public Improvement Commission (PIC) process and a fully executed License, Maintenance and Indemnification (LM&I) Agreement with the PIC.

Response

All proposed design and construction within the Public ROW will conform to PWD Design Standards and any non-standard materials proposed within the Public ROW will be coordinated through the PIC process.

Comment 7.4

Please note that the comments below are specific to proposed work within the Public ROW.

Response

Noted. See responses to comments below.

Comment 7.5

Sidewalks:

The developer is responsible for the reconstruction of the sidewalks abutting the project and, wherever possible, to extend the limits to the nearest intersection to encourage and compliment pedestrian improvements and travel along all sidewalks within the ROW within and beyond the project limits.

Response

The Proponent will reconstruct the sidewalk along the site frontage on the south side of Western Avenue and will tie into the existing/proposed sidewalks east and west of the site in order to encourage pedestrian travel within and beyond the Project limits. Refer to Sections 3.4.5 and 3.12.1 of Chapter 3, *Transportation*, for detailed descriptions of the proposed pedestrian and bicycle accommodation improvements.

Comment 7.6/7.8/7.9/7.10

The reconstruction effort also must meet current American's with Disabilities Act (ADA)/ Massachusetts Architectural Access Board (AAB) guidelines, including the installation of new or reconstruction of existing pedestrian ramps at all corners of all intersections abutting the project site if not already constructed to ADA/AAB compliance per Code of Massachusetts Regulations Title 521, Section 21 (https://www.mass.gov/regulations/521-CMR-21-curb-cuts). This includes converting apex ramps to perpendicular ramps at intersection corners and constructing or reconstructing reciprocal pedestrian ramps where applicable.

Please note that at signalized intersections, any alteration to pedestrian ramps may also require upgrading the traffic signal equipment to ensure that the signal post and pedestrian push button locations meet current ADA and Manual on Uniform Traffic Control Devices (MUTCD) requirements. Any changes to the traffic signal system must be coordinated and approved by BTD.

All proposed sidewalk widths and cross-slopes must comply to both City of Boston and ADA/AAB standards.

The developer is encouraged to contact the City's Disabilities Commission to confirm compliant accessibility within the Public ROW.

Response

All proposed and reconstructed sidewalks, crosswalk ramps, and signalized intersections (including signal post and pedestrian push button locations) will meet City of Boston, ADA, and AAB guidelines and the Proponent will coordinate with the City's Disabilities Commission to confirm compliant accessibility within the Public ROW. Refer to Sections 3.4.5 and 3.12.1 of Chapter 3, *Transportation*, for detailed descriptions of the proposed pedestrian and bicycle accommodation improvements.

Comment 7.7

Plans showing the extents of the proposed sidewalk improvements associated with this project must be submitted to the PWD Engineering Division for review and approval. Changes to any curb geometry will need to be reviewed and approved through the PIC.

Response

Plans showing the extents of the proposed sidewalk improvements associated with the Project will be submitted to the PWD Engineering Division for review and approval and changes to any curb geometry will be reviewed and approved through the PIC. A graphic of the proposed Western Avenue cross section, including the reconstructed sidewalk on the south side of the roadway, is included in Chapter 3, *Transportation*, as Figure 3.40 (a and b).

Comment 7.11

Driveway Curb Cuts:

Any proposed driveway curb cuts within the Public ROW will need to be reviewed and approved by the PIC. All existing curb cuts that will no longer be utilized shall be closed.

Response

All proposed driveway curb cuts within the Public ROW, including the East Drive and Cattle Drive curb cuts on Western Avenue, will be reviewed and approved by the PIC. During Phase A, the existing Resilience Driveway (formerly Sanofi) curb cut on Western Avenue will be closed and during Phase B the existing Hague Street curb cut on Western Avenue will be closed. Refer to Section 3.4.4 of Chapter 3, *Transportation*, for details on the proposed street network.

Comment 7.12

Discontinuances:

Any discontinuances (sub-surface, surface or above surface) within the Public ROW must be processed through the PIC.

Response

All discontinuances within the Public ROW will be processed through the PIC.

Comment 7.13

Easements:

Any easements within the Public ROW associated with this project must be processed through the PIC.

Response

All easements within the Public ROW associated with this Project will be processed through the PIC.

Comment 7.14

Landscaping:

The developer must seek approval from the Chief Landscape Architect with the Parks and Recreation Department for all landscape elements within the Public ROW. The landscaping program must accompany a LM&I with the PIC.

Response

Noted. The proposed public right-of-way improvements will be submitted to Parks and Recreation Department during the PIC permitting process and development of the LM&I.

Comment 7.15

Street Lighting:

The developer must seek approval from the PWD Street Lighting Division, where needed, for all proposed street lighting to be installed by the developer. All proposed lighting within the Public ROW must be compatible with the area lighting to provide a consistent urban design. The developer should coordinate with the PWD Street Lighting Division for an assessment of any additional street lighting upgrades that are to be considered in conjunction with this project.

Response

Noted. The proposed public right-of-way improvements will be submitted to PWD Street Lighting Division during the PIC permitting process.

Comment 7.16

All existing metal street light pull box covers within the limits of sidewalk construction to remain shall be replaced with new composite covers per PWD Street Lighting standards.

Response

Noted.

Comment 7.17

Metal covers should remain for pull box covers in the roadway.

Response

Noted.

Comment 7.18

For all sections of sidewalk that are to be reconstructed in the Public ROW that contain or are proposed to contain a City owned street light system with underground conduit, the developer shall be responsible for installing shadow conduit adjacent to the street lighting system. Installation of shadow conduit and limits should be coordinated through the BPDA Smart Utilities team.

Response

Noted.

Comment 7.19

Roadway:

Based on the extent of construction activity, including utility connections and taps, the developer will be responsible for the full restoration of the roadway sections that immediately abut the property and, in some cases, to extend the limits of roadway restoration to the nearest intersection. A plan showing the extents and methods for roadway restoration shall be submitted to the PWD Engineering Division for review and approval.

Response

Noted. Most of the roadway work will involve the construction of new sidewalks, utility connections, and furnishing zones. Proposed work on Western Avenue will be coordinated with Public Works and other planned work adjacent to the Site to determine extent and methods for roadway restoration with PWD Engineering Division.

Comment 7.20

Additional Project Coordination:

All projects must be entered into the City of Boston Utility Coordination Software (COBUCS) to review for any conflicts with other proposed projects within the Public ROW. The developer must coordinate with any existing projects within the same limits and receive clearance from PWD before commencing work.

Response

Noted. Western Avenue has been entered into the COBUCS system.

Comment 7.21

The developer shall work with PWD and the Boston Water and Sewer Commission (BWSC) to determine appropriate methods of green infrastructure and/or stormwater management systems within the Public ROW.

Response

Coordination with BWSC has been on-going. Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for a description and Figure 7.5 for a description of proposed green infrastructure.

Comment 7.22

The ongoing maintenance of such systems shall require an LM&I Agreement with the PIC.

Response

Noted. An LM&I for maintenance of green infrastructure in the public roadways will be established during the PIC permitting process.

Comment 7.23

Effects of water infiltration with respect to the adjacent underpass structure and underground MBTA tunnels that may be negatively impacted by infiltration may impact the ability to install such systems and should be considered. Coordination with PWD and MBTA will be required.

Response

There are no underpasses or MBTA infrastructure within the Project Site environs.

Comment 7.24

Resiliency:

Proposed designs should follow the Boston Public Works Climate Resilient Design Guidelines (https://www.boston.gov/environment-and-energy/climate-resilient-design-guidelines) where applicable.

Response

Refer to Section 5.5 in Chapter 5, *Sustainability and Climate Change Resiliency* for the resilient design approach for the project, including the pertinent guidelines and standards assumed for analysis.

Boston Parks and Recreation Department

Comment 8.1

In advance of the renewal of its IMP in 2023, Harvard should provide an open space plan that connects all four neighborhoods around a comprehensive framework of green infrastructure. The plan should be based on an analysis of current needs and future buildout, and an impact assessment on public parks. It should provide for the passive and active recreational needs of the communities it will create, as well as the existing neighborhoods that are currently underserved.

Response

While the Proponent cannot comment to the open space plan outside of the 14-acre ERC site, the Proponent, as part of the concept design process for the Project Greenway, has researched and analyzed the existing publicly-accessible open spaces in the Project area to better understand the types of spaces that currently serve the area and how the design of the Project Greenway might complement the existing community open spaces. Further, the design of the Project Greenway was inspired by the role it is envisioned to play as "the Hub" within the broader greenway developed as part of the Framework Plan, and the Project Greenway includes hardscape and softscape elements to provide for both the passive and active recreational needs of both future residents and the existing neighborhood. Chapter 4, *Urban Design* includes additional information about the design of the Project Greenway.

Comment 8.2

The proponent should explain how the open space meets the needs of the buildout, or mitigate the impacts offsite, as well as contribute to the larger open space planning for the entire area.

Response

See Section 4.4 of Chapter 4, *Urban Design,* for reference to the design of the Public Realm and Open Space.

Comment 8.3

The proponent should provide detailed design of the open space that will serve the passive and active recreational needs of the development; meet the needs of the existing neighborhood; and contribute to a framework plan that will serve Harvard's holdings in Allston at full buildout.

Response

See Section 4.4 of Chapter 4, *Urban Design,* for reference to the design of the Public Realm and Open Space.

Comment 8.4

The full buildout plan shows two phases, but the acreage that is delineated in the text is difficult to discern on the plan. [7]*The proponent should clarify how the open space is being measured. Streets, sidewalks, parking etc. are public realm and should not be conflated with open space.*

Response

The DPIR seeks to clarify how open space is being measured so that different areas are not conflated as referenced in the comment. See Section 4.4 of Chapter 4, *Urban Design,* for reference to the design of the Public Realm and Open Space.

Comment 8.5

The 20% open space acreage that was negotiated related to the developable area should be defined and confirmed. The difference in open space at this site between the 2013 IMP, the 2018 PDA and the 2021 PNF should be quantified, including new development proposed in Phase B. A reduction in total open space since the 2013 IMP, combined with a significant increase in full buildout, should be mitigated elsewhere in the Allston neighborhood.

Response

The DPIR seeks to clarify how open space is being quantified. See Section 4.3.1 of Chapter 4, *Urban Design,* for reference to the site design approach relative to the PDA Master Plan. Additionally, please refer to Section 4.4, *Urban Design* for a table detailing what constitutes publicly accessible open space within the approximately 6-acre developable area (i.e. the Project Site).

Comment 8.6

Harvard's open space network should increase in relation to projected buildout across the neighborhoods is controls. It should be planned and implemented in the near term so that it serves as an amenity to the existing neighborhood and a framework for future development. That includes the phases of open space proposed in the PNF. This will ensure that the open space is implemented as planned, and is not impacted by revisions to the IMP or amendments to PDAs.

Response

Details regarding broader, district-wide open space planning are included in recently provided draft of the Framework Plan prepared by Harvard University, which was released in June 2021. Within the Project, the details of the Project Greenway are outlined in Section 4.4.1 of Chapter 4, *Urban Design*.

Since the filing of the PNF, the Proponent has increased the new publicly accessible open space improvements from approximately 2 acres to nearly 3 acres.

Comment 8.7

The proponent should confirm the maximum projected population of residents and other users of the mixed use development, and relevant demographics. The significant increase in projected households since the approved PDA should be considered towards the provision of open space.

This assessment will inform the demand for open space for active recreation use at buildout, compared to the amount of open space to be provided by the project, the resulting impacts to existing public open space in the neighborhood, and the appropriate mitigation of this impact.

Response

Based on estimates, the Proponent anticipated that the day-to-day Project Site population to be approximately 3,000 employees, residents, and hotel guests, of which, approximately 475 would be residents. This results in an open space ratio of 6.10 acres per 1,000 residents, well above the Allston-Brighton area average ratio of 4.83 acres per 1,000 residents. With this population level in mind, as well as the variety of different types of users anticipated, the Project Greenway was developed to provide flexibility to accommodate different types of active and passive uses, and to be an engaging amenity for the Project and the broader Allston neighborhood.

Comment 8.8

The proponent should explain how it is addressing the public open space needs outlined in the City's Imagine Boston 2030, which includes the Open Space and Recreation Plan 2015-2021. The active recreation needs of this new population should be provided for onsite or mitigated offsite so as not to impact already overburdened public parks.

Response

As noted, in Chapter 1, Project Description, the Proponent has designed nearly three acres of publicly accessible open space across the entire area that is subject to the PDA Master Plan, which is more than double the commitments detailed in the previously approved PDA Master Plan. See also Section 4.4 of Chapter 4, *Urban Design*.

Comment 8.9

Harvard should address how the proposed greenway meets the public open space needs outlined in the City's Imagine Boston 2030, which includes the Open Space and Recreation Plan 2015-2021.

Response

The City's Imagine Boston 2030 plan commits to investing in new open spaces in areas of new housing and job growth, as well as developing family- and kid- friendly environments that promote opportunities to play everywhere. Per the Open Space and Recreation Plan, 2015-2021, the Allston-Brighton area offers an open space ratio of 4.83 acres per 1,000 residents, which is lower than the city's average of 7.59 acres.

The Project Greenway will increase the area's open space ratio, and will deliver on the plan's goals of creating an accessible open space system, enhancing the urban natural environment, and improving quality of life and well-being in the city. 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.

Comment 8.10

A comprehensive needs analysis and impact assessment should be conducted in order to determine the amount of active and passive open space that Harvard should provide in order to serve its own development; provide amenity to the existing neighborhood which is currently underserve; provide for sustainable development and climate resiliency and set an example for a world-class framework of open space to serve its future development.

Response

The Framework Plan addresses the open space plan at the district level, north of Cambridge Street.

The Proponent, as part of the concept design process for the Project Greenway, has researched and analyzed the existing publicly-accessible open spaces in the vicinity of the Project to better understand the types of spaces that currently serve the area and how the design of the Project Greenway might complement the existing community open spaces.

The Proponent's proposal for the Project Greenway as detailed in Section 4.4.1 of Chapter 4, *Urban Design,* outlines the elements of the open space planned for this first phase of development in the ERC, and how the Project Greenway fits within the larger Framework Plan.

Comment 8.11

This open space planning is beyond the scope of this PNF, but within the scope of the ERC Framework, the pending update to the IMP and the comprehensive planning for land controlled by Harvard. Active recreational space of a regional scale should be integrated throughout the open space framework, along with corridors on the north-south as well as east-west axis.

Response

While not the subject of the ongoing Article 80 review, the updated Framework Plan released by Harvard in June provides details regarding district-scale open space planning efforts.

Comment 8.12

Harvard and the proponent should provide detailed information about how DEI strategies will be implemented in the public realm if it is privately owned.

Response

The Proponent is committed to Diversity, Equity, and Inclusion initiatives at all level of the Project, including in the design and operation of the public realm. The proposed publicly accessible open space areas are planned to be inclusively 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.

As detailed in Section 1.3.2 of Chapter 1, *Project Description*, the Proponent's vision for the Project retail 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.

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 to operate at the Project.

Comment 8.13

The most effective way to make the open space feel inclusive would be to transfer the ownership to a public entity so that it is owned by all.

Response

Both the Proponent and Harvard are committed to the long-term viability and success of the Project, with ongoing assurance that open spaces will be publicly accessible, well maintained, and actively programmed to a world-class level.

Comment 8.14

The open space in the PNF plan should be designed to be visible and accessible from multiple points outside of the site.

Response

The DPIR seeks to address this comment. See Section 4.4.1 and Figures 4.12a-b of Chapter 4, *Urban Design*. Refer to Figures 4.12a-i in Chapter 4, *Urban Design*, for reference to view perspectives.

Comment 8.15

Open space that is required, negotiated or proposed as impact mitigation for increased zoning or development rights in a PDA, or as a public benefit under regulatory requirements, should be protected in perpetuity through a gift in fee to a public entity or a conservation restriction approved through the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA). Please note that an easement for public access is not the same level of permanent protection as fee simple ownership or a conservation restriction.

Response

The Proponent and Harvard are committed to the long-term viability and success of the Project, with ongoing assurance that open spaces will be publicly accessible, maintained, and actively programmed to a world-class level. The Proponent and Harvard believe the proposal that the Project's permits and approval will require public access to open spaces is aligned with the goals for the Project and is consistent with how public access has been maintained at various project sites throughout Boston.

Comment 8.16

The shadow impacts on open space should be assessed year round, dawn to dusk and mitigated.

Response

See response to Comment SD. 80. Refer to PNF Section 6.4 of Chapter 6, *Environmental Protection*.

Comment 8.17

If pets are to be allowed, they should be accommodated onsite so to not burden the public realm.

Response

The overall project design will integrate accommodations for pets as part of planned open space and as reflected in the larger planned framework plan, including anticipated programming in later phases of the Project Greenway.

Comment 8.18

During the IMP renewal in 2023, Harvard should conduct an open space needs assessment and impact analysis for its full buildout. It should evaluate the potential to expand the greenway framework to include north-south orientations, and implement these linear corridors in advance of development. It should assess the opportunity to allocate funding or property to create a new publicly owned park of a regional scale including athletic fields suitable for active recreation.

Response

The Proponent acknowledges this comment while also recognizing that it is beyond the scope of this Article 80 review.

Comment 8.19

The proponent should complete an open space needs assessment and impact analysis specific to its project, and mitigate any impacts through a contribution to the City's Fund for Parks. This contribution should be at a level commensurate with the scale of the development.

Response

The Proponent has researched and analyzed the open space needs in the area, which are reflected in the design for the Project Greenway and streetscape design. The Proponent and Harvard intend to make a sizeable investment in the design, construction, maintenance, and ongoing programming of the publicly accessible open spaces in the Project to create a world-class mixed-use district.

Barbara Parmenter

Comment 9.1

Create housing opportunities that meet the needs of people in the community

- *Report on housing cost burden by race/ethnicity/age/family status in Allston Brighton, outreach to hard to reach communities, and a plan for how the ERC will address housing inequities*

Response

The Proponent intends to provide a sizeable commitment to create affordable housing that is planned to deliver much needed supply to the Allston neighborhood as early as 2024, potentially with a range of AMIs subject to ongoing dialogue between elected officials, the community, and the Proponent. Further detail regarding housing and housing affordability are noted in Section 1.3.5 of Chapter 1, *Project Description*.

Comment 9.2

- *Complete AFFH Zoning documentation and requirements*

Response

The Proponent is complying, voluntarily, with the AFFH legislation recently approved by the City of Boston. Further detail is provided in Section 1.4 of Chapter 1, *Project Description*.

Comment 9.3

- *Provide 25% IDP units at 50-100% AMI*

Response

The Proponent will be able to increase the supply of affordable housing in Allston, and anticipates delivering the Phase A affordable units as early as 2024. The Proponent can provide a blended affordability level of approximately 18% percent across Phase A & Phase B, with 17% affordability in Phase A and 19%-20% affordability in Phase B subject to the public benefits package associated with Phase B. Further detail on the Proponent's affordability commitments is included in Section 1.3.5 of Chapter 1, *Project Description*.

Comment 9.4

- *Working with housing organizations to substantially expand affordable home ownership*
- *Explore with housing advocates innovative programs to preserve existing family housing in the community (perhaps as part of a community land trust model) while helping seniors downsize*

Response

As detailed in Section 1.3.5 of Chapter 1, *Project Description*, the Proponent intends to provide affordable, for-rent apartments in Phase A. The Proponent is not considering any for-sale housing on-site. The Project will result in substantial linkage payments to the Neighborhood Housing Trust based on the development of Development Impact Project uses.

Comment 9.5

Institute energy plans that are global and regional models

- *Move towards zero net carbon earlier than 2050*

Response

As described in the Section 5.2.4 of Chapter 5, *Sustainability and Climate Change Resiliency*, 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.

Coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction for the Master Plan increases from 19% to 91% compared to the Base Case, representing a savings of 8,734 tons per year. These immediate reductions in electricity GHG emissions are far ahead of the Massachusetts electrical grid decarbonization. Refer to Section 5.4.3 and 5.4.4.

Comment 9.6

- *Commit to more substantial reduction in GHG emissions at the start and on a more accelerated pace that will meet and ideally exceed Boston's Climate Action Plan*

Response

The Proponent has committed to further energy reduction measures than those presented in PNF. These measures further reduce the Project's dependency on natural gas by replacing energy consumption through electricity. As the grid continues to green, this reduction in natural gas use in favor of electricity is expected further reduce the Project's GHG emissions. The GHG emissions reduction increases from 19% to 91% compared to the Base Case, representing a savings of 8,734 tons per year. The updated energy analysis is presented in Section 5.4 of Chapter 5, *Sustainability and Climate Change Resiliency*.

Specifically, 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.

Comment 9.7

- *Move to 100% electric as soon as is feasible and explain any case where this is not feasible*

Response

Since the PNF, the Proponent has reduced the Project's natural gas use such that a 74 percent reduction in natural gas energy and GHG emissions is expected from the baseline. This has been achieved through further electrification of the proposed building systems, including air source heat pumps in the lab/office buildings. The updated energy analysis is presented in Section 5.4 of Chapter 5, *Sustainability and Climate Change Resiliency*.

The Carbon Neutral Building Assessment described in Section 5.4.4 and Appendix D of the DPIR considers all-electric building scenarios for each typology.

Comment 9.8

- *Use ASHRAE 90.1 2019 as the pertinent standard for baseline energy model and other performance metrics*

Response

The Project uses the ASHRAE 90.1-2013 standard with Massachusetts Amendments as required by the building code. ASHRAE 90.1-2019 has not yet been adopted in the building code. Refer to the Section 5.4.2 of Chapter 5, *Sustainability and Climate Change Resiliency* for detailed energy and greenhouse gas emissions results by typology.

Comment 9.9

- *Commit to LEED Platinum / Passive House without purchasing Renewable Energy Certificates (RECs)*

Response

Section 5.3.1 in Chapter 5, *Sustainability and Climate Change Resiliency* describes the LEED approach for the Project and Section 5.3.2 describes the Pathway to Platinum. The Carbon Neutral Building Assessment described in Section 5.4.3 considers building cases with systems and envelope arrangements that are comparable to Passive House (PHIUS) guidelines.

Comment 9.10

- *Provide detailed results, explanations, and rational for your decisions concerning the certifications you have committed to study: Fitwel, Passive House, LEED Zero Energy, Living Building Challenge, and Boston Green Building Credits*

Response

Section 5.3.1 in Chapter 5, *Sustainability and Climate Change Resiliency* describes the LEED and *Fitwe*l approach for the Project. Aligned with Tishman Speyer's Sustainability Plan and to complement the LEED Gold certification and climate mitigation approach, the Proponent has committed to achieving Fitwel certification for the lab/office, residential and hotel buildings as follows;

- Residential – Multifamily Residential Scorecard;
- Hotel – Single Tenant Scorecard;
- Lab/Office – Multi-tenant Base Building Scorecard.

As described in Section 5.2.4, The Project will align with Harvard's Green Building Standards; the Project will achieve LEED v4 Gold certification.

The Carbon Neutral Building Assessment described in Section 5.4.4 considers building cases with systems and envelope arrangements that are comparable to PassiveHouse (PHIUS) guidelines.

The Proponent is investigating the feasibility of Living Building Challenge (Comment SD.98) across the project site, including on each building specific design.

Comment 9.11

- *Back up other statements with detailed explanations of your decisions and the data you are basing these decisions on (e.g., commitment to explore energy conservation measures as feasible)*

Response

The Proponent has performed extensive evaluations of various energy conservation measures including electrification and Passive House alternatives for this DPIR filing. This information is provided in Section 5.4 of Chapter 5, *Sustainability and Climate Change Resiliency* and in Appendix D. The Proposed Design has taken into account cost-effective energy efficiency measures that result in energy and emissions savings. As described in Section 5.1, coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction increases from 19% to 90% compared to the Base Case, representing a savings of 8,728 tons per year. These immediate reductions in electricity GHG emissions are far ahead of the Massachusetts electrical grid decarbonization.

Comment 9.12

- *Develop a plan for a district energy grid than can benefit the site and the neighborhood*

Response

As described in the Section 5.4.5 of Chapter 5, *Sustainability and Climate Change Resiliency*, the Proponent is carrying out a district energy feasibility study aligned with BPDA Smart Utilities policy to be completed by August 2021.

Comment 9.13

Foster mobility improvements that make getting around BETTER not worse

- *Design the mobility network to connect to the wider city and region - Boston, Cambridge, Watertown - by working with other agencies, planning initiatives, developers, and communities. This includes biking, pedestrian, and transit infrastructure and services*

Response

Refer to Section 3.12 of Chapter 3, *Transportation*, for detailed descriptions of the proposed roadway, transit, pedestrian, and bicycle improvements to help offset the Project's impacts on the transportation network. All proposed improvements will be coordinated with City of Boston transportation staff at BPDA, BTD, and PWD, and with MassDOT and DCR.

Comment 9.14

- *Provide a traffic analysis that takes into account all the area developments and your vision of mobility across the larger area, in addition to the specific impacts of the ERC*

Response

Refer to Sections 3.6.1 and 3.6.2 of Chapter 3, *Transportation*, for the area development projects and roadway improvements that are included in the traffic analysis. It should be noted these projects and improvements were reviewed by BPDA and BTD transportation staff prior to the initiation of these studies.

Comment 9.15

- *Protect neighborhood streets from increases in traffic*

Response

The new street network will encourage drivers to access and egress the Project Site from Western Avenue and Cambridge Street, not from local neighborhood streets. The proposed Cattle Drive Extension will connect between Cambridge Street and the Project Site. Proposed mitigation improvements include a realignment of the intersection of Windom Street at Almy Street to emphasize Almy Street/Interim Cattle Drive as the access/egress route to/from Cambridge Street. Two new streets (so-called East and Cattle Drives) will provide new connections directly to Western Avenue. Refer to Section 3.4.4 of Chapter 3, *Transportation*, for a description of the new roadway network and Section 3.12.3 and Figure

3.44 for a description and graphic of the proposed improvements at the intersection of Windom Street at Almy Street.

Comment 9.16

- *Plan for a future of all electric vehicles*

Response

The Project Site will be designed to accommodate electric vehicles. Consistent with the City of Boston's Electric Vehicle Readiness Policy, the project will equip 25% with electrical supply and the remaining 75% will be EV ready. Refer to Section 3.4.6 of Chapter 3, *Transportation*, for a detailed description of the on-site parking supply.

Comment 9.17

- *Substantially reduce the amount of interim surface parking*

Response

A shared parking demand analysis was conducted to determine the total expected demand for 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 those uses to maximize efficiency and seek to ensure that only the necessary amount of parking is constructed to meet expected demand. The approved PDA Master Plan anticipated 800 to 900 spaces. As a result of the proposed transportation management plan and approach to shared parking, approximately 620 parking spaces are planned as part of the current Project. Refer to Section 3.4.6 of Chapter 3, *Transportation*, for a detailed description of the shared parking demand analysis.

Comment 9.18

Carry out the recommendations of the Allston Brighton Health Collaborative's Transportation Committee

Response

Chapter 3, *Transportation*, of the DPIR considered the comments and recommendations the Allston Brighton Health Collaborative provided on the PNF. Refer to the responses to Comments 14.1-14.12 provided in this chapter.

Comment 9.19

Enlarge green space that is extensive and ecologically functional

- *Reduce impervious cover (currently 97%), incorporate more actual green space*

Response

Refer to Section 7.3.2, *Infrastructure Systems* for a description of reduced impervious area and Figures 7.5a-b for a plan showing proposed landscape areas.

Comment 9.20

- *Design so as to remind and instruct people of the area's natural marshland past*

Response

The proposed Project Greenway will be designed to take into account and highlight the area's natural and cultural past. Pervious materials and landscape areas will be maximized in the Project Greenway and roadways to promote green infrastructure and reduce impervious cover.

Comment 9.21

- *Be true to the commitment to creating "a rich natural habitat" and make that greenspace have real ecological functions that can connect us to nature - past, present and future.*

Response

While remaining open and flexible, the Project Greenway will contribute a significant landscape presence through a robust canopy, plantings, and visible green/performative infrastructure where possible and appropriate, drawing inspiration from the site's natural history of riverine salt marshes and mud flats. These interventions will help in establishing a rich native habitat and performative landscape to support physical and mental health.

Comment 9.22

- *Think beyond the project site to how this fits into the larger development area and neighborhood*

Response

The Project continues to be contemplated as a part of the larger ERC Framework Plan. The project team continues to work with Harvard as it updates the Framework Plan to facilitate efforts to ensure that the Project advances a coherent, sensitive, and publicly accessible urban realm.

Comment 9.23

- *Provide actual metrics, dimensions, etc. to green vs. non-green open space, functions of the different elements (planters, permeable pavement, vegetated areas, green infrastructure, gray infrastructure, etc.)*

Response

Refer to Figures 7.5a-b of Chapter 7, *Infrastructure Systems* for the proposed stormwater management. Figures 4.13 and 4.14 in Chapter 4, *Urban Design,* illustrate the conceptual landscape plan, including planters, permeable pavement, vegetated areas, and gray and green infrastructure.

Comment 9.24

- *Provide details, data, explanations, and rationales for Sustainable Sites credit considerations and decisions*

Response

Section 5.3.1 in Chapter 5, *Sustainability and Climate Change Resiliency* describes the LEED approach for the Project. All LEED checklists reflect all Sustainable Sites credits that are anticipated for achievement. Separate from the buildings, HALC is seeking the Institute for Sustainable Infrastructure's *Envision* certification for the streetscape and Greenway improvements.

Comment 9.25

- *Commit to minimizing light pollution and to bird-safe environments*

Response

See Section 4.5 in Chapter 4, *Urban Design,* for reference to building designs. Lighting throughout the Project Greenway will balance safety and legibility with minimizing light pollution. Bird-safe glass treatments on buildings will be studied and implemented in accordance with local guidelines and regulations. All LEED checklists reflect the Light Pollution Reduction credit is anticipated for achievement.

Comment 9.26

Plan for a changing climate and protect the Charles River

- *Provide more specific information and explanations regarding specific climate change risks and how the project addresses these*

Response

Section 5.5 in Chapter 5, *Sustainability and Climate Change Resiliency* describes the Resiliency approach for the Project.

Comment 9.27

- *Explain the rationale for choosing a 32-year storm event for stormwater design - the plan should accommodate a 100-year storm event*

Response

The proposed design will reduce peak rates of runoff from the 2-, 10-, 25-, and 100-year design storms compared to the existing condition. Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for more information on the Project's intent to exceed the City's requirements for stormwater management.

Comment 9.28

- *Commit to reduce impervious cover and increase the use of green infrastructure, or at a minimum, analyze alternatives for increased use of green infrastructure and provide the results of these analyses*

Response

Planned streetscape and site improvements incorporate green infrastructure measures. Refer to Figures 7.5a-b and Section 7.3.2 in Chapter 7, *Infrastructure Systems*.

Comment 9.29

- *Provide details about the specific components and location of green infrastructure and stormwater treatment*

Response

Refer to Section 7.3.2 and Figure 7.5 in Chapter 7, *Infrastructure Systems*.

Comment 9.30

- *Provide more details about how the project will manage and prevent additional pollution of the Charles River, including TMDLs / phosphorus.*

Response

The Project and the design will represent a change in land use, installation of green infrastructure, and recharge, which will provide a minimum of 64% phosphorus removal, which meets the reduction requirement outlined in the TMDL Report for the Lower Charles River Basin. Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems*.

Comment 9.31

Make this a model of economic opportunity and development for Allston / Brighton / Boston residents and businesses

- *Commit to renewable energy/climate resiliency workforce education and training during the construction phase*

Response

Information regarding the Project's workforce development strategy is included in Section 1.3.2 of Chapter 1, *Project Description*, and the Proponent looks forward to continuing the conversation with the community to further develop the Project's workforce development strategy.

Comment 9.32

› *Prepare an analysis of all possible careers that this project will support, the skill sets and education required for each of these, and a plan to help prepare area residents for these careers*

Response

The Project will create job opportunities throughout each stage of the development, from pre-construction, through construction, and into operations after the project opens. Jobs will be created by the Project across multiple industries including, architecture, engineering, finance, construction, marketing, and leasing, as well as in retail, hospitality, life sciences and others. The Proponent is committed to developing a workforce development strategy that is designed to help area residents prepare for and gain access to jobs created by the Project, and is interested in feedback from the community to better understand the community's interests and priorities in these areas. Information regarding the Project's workforce development strategy is included in Section 1.3.2 of Chapter 1, *Project Description*, and the Proponent looks forward to continuing the conversation with the community to further develop the Project's workforce development strategy.

Comment 9.33

› *Explain and increase your commitment to 5% investor ownership for Black, Latinx, and/or women*

Response

The Proponent is pleased to announce that we have exceeded our target commitment of 5% ownership by Black and Latinx investors. Further details regarding inclusive ownership are noted in Section 1.3.2 of Chapter 1, *Project Description*. This initiative 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 of Boston.

Comment 9.34

› *Provide more specifics about your commitment to local/MBE/WBE retail businesses and commit to below-market rents for these businesses*

Response

As detailed in Section 1.3.2 of Chapter 1, *Project Description*, the Proponent's vision for the Project retail 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.

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 to operate at the Project.

Comment 9.35

- *Commit to Local 26 union labor for jobs in the proposed hotel*

Response

The Proponent is in active discussion with Local 26 regarding the operation of the proposed hotel at the Project.

Comment 9.36

Especially given that this is a project undertaken by one of the top universities in the world, on land it has owned for years, how will this development show that Harvard both understands and will seriously address the critical housing crisis we face?

Response

The Proponent cannot comment on housing outside of the PDA Area, but as detailed in Chapter 1, *Project Description*, the Proponent is committing to increase the onsite housing supply and is committing that approximately 18% of on-site dwelling units will be affordable units across Phase A and Phase B in aggregate, and anticipates the critical increase in the supply of affordable housing unit in Allston will be available as early as 2024.

Comment 9.37

How will it foster a more equitable multi-racial, multi-ethnic, multi-age community that welcomes families?

Response

The Proponent acknowledges the historical challenges Protected Classes have experienced gaining equitable access to housing. As noted in Section 1.4 of Chapter 1, *Project Description*, the Proponent will comply, voluntarily, with the recently approved AFFH program, and more information regarding the Proponent's plans in this regard are included in the Project's AFFH Assessment Form

Comment 9.38

I would like Harvard (perhaps through its professional schools or research centers) to report on housing conditions and cost burdens in the Allston Brighton area disaggregated by race, ethnicity, age, and family status.

Response

The Proponent cannot respond to requests of Harvard. However, as part of the Proponent's participation in the AFFH program, the Proponent used the City of Boston's *Housing and Household Composition Community Profile Map and Report Generation Tool* to better understand the housing needs within the Allston neighborhood, and used that information to inform its affordable housing program.

Comment 9.39

I would like to see serious efforts to engage community members outside of the usual formal public meeting process, and to work with neighborhood service organizations to reach out in particular to people who speak languages other than English at times and places convenient to them to understand the housing-related burdens they face.

Response

The Proponent has met with numerous organizations and individuals in the Allston community outside of the formal Article 80 review process to seek their input into various components of the Project. Further detail regarding the Proponent's community outreach efforts is included in Section 1.1 of Chapter 1, *Project Description*. The Proponent looks forward to continuing these efforts, and welcomes the opportunity to meet with and hear from more members of the community to better understand the community's interests and priorities, and to continue to improve the project with the benefit of the community's input.

In addition, the Proponent is committed to engaging with non-English speakers, and has, in connection with the PNF, provided project information in Spanish, Brazilian Portuguese, and simplified Chinese, and, in connection with this filing, has produced Project Fact Sheets in these languages. The Proponent welcomes introductions to English and non-English speakers who are interested in speaking about the Project, and would value this input.

Comment 9.40

The results of both these should be reported to the HATF and to the community at large as soon as possible, prior to the Draft Environmental Impact Report (DEIR), and it should be included in that report.

Response

Please refer to Response to Comments 9.38 and 9.39 above.

Comment 9.41

The DEIR should also adhere to the new Boston Affirmatively Furthering Fair Housing (AFFH) reporting requirements, and use the AFFH process and consultations with housing experts to plan a strategy that truly meets the needs of our community for fair and affordable housing.

Response

The Proponent is complying voluntarily with the AFFH program recently approved by the City of Boston, and further detail is provided in Section 1.4 of Chapter 1, *Project Description*.

Comment 9.42

The findings of these reports should then go into the planning and design of the ERC project for its housing, retail, and office spaces.

Response

Please refer to Response to Comment 9.41 above.

Comment 9.43

We need housing that reflects the needs of our community members, along with small business and other entrepreneurial opportunities, as well as community spaces that will benefit a wide array of people.

Response

The Proponent's affordable housing strategy was developed with the benefit of the data available in the City of Boston's *Housing and Household Composition Community Profile Map and Report Generation Tool and* seeks to be responsive to the community's needs. More information on the Proponent's affordable housing program is included in Section 1.3.5 of Chapter 1, *Project Description*.

A critical component of the Proponent's retail strategy is to attract local, small, and/or Minority and Women-owned retailers to the Project site. As detailed in Section 1.3.2 of

Chapter 1, *Project Description*, the Proponent's vision for the Project retail 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.

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 to operate at the Project.

Comment 9.44

In particular, the % of Inclusionary Development Program (IDP) units should be at least 25% of all units, and these should include a mix of units at the 50-100% Area Median Income (AMI).

Response

The Proponent is committed to providing approximately 18% on-site affordability across Phase A and Phase B, with 17% of units in Phase A being affordable, and 19%-20% of units in Phase B being affordable subject to the public benefits package associated with Phase B. The Proponent anticipates that the Phase A affordable units will be available as early as 2024. Further detail regarding these affordability commitments is included in Section 1.3.5 of Chapter 1, *Project Description*.

Comment 9.45

There should be no compact units, and the share of studios and 1-bedrooms should be small, with a larger share of 2 and 3-bedroom units.

Response

The Proponent is not proposing Compact Living units in the Project. The proposed unit mix, is detailed in Section 1.3.5 of Chapter 1, *Project Description,* and is informed by the data included in the *City of Boston's Housing and Household Composition Community Profile Map and Report Generation Tool*.

Comment 9.46

Harvard needs to address the dire need for home-ownership opportunities in Allston Brighton. Most of the current projects are rental units, over 1,000 rental units currently proposed. We need substantial funding for affordable home-ownership that reflects the needs of families in Boston and Allston Brighton. Work with housing organizations and advocates to develop an innovative approach to home ownership for families. Looking at Boston as a "living lab for aging," this could also foster innovative approaches to helping seniors downsize and opening up neighborhood housing to families.

Response

The Proponent cannot comment on housing developed outside of the PDA Area, however, the Proponent has been transparent that home ownership opportunities are not being offered within the Project. The Proponent's affordable housing program is detailed in Section 1.3.5 of Chapter 1, *Project Description*, and includes approximately 18% on-site affordability across Phase A and Phase B, providing a critical supply of housing to the Allston neighborhood as early as 2024.

Comment 9.47

The proponents consider exploring the feasibility of a district energy grid, but we'd like to see it actually happen. This could be a game-changing model of how an urban/lab/commercial/residential district can create a resilient, affordable energy environment, and an educational opportunity for the rest of the region.

Response

Section 5.4.5 of Chapter 5, *Sustainability and Climate Change Resiliency* describes the district energy and microgrid feasibility study approach for the Project.

Comment 9.48

The project proponents commit LEED Gold "certifiability" but not to actual certification. This meets the City of Boston requirements but why not get certified? And why not LEED Platinum to be a global example? Or commit to Passive House certification rather than just exploring it?

Response

Section 5.3.1 of Chapter 5, *Sustainability and Climate Change Resiliency* describes the LEED approach for the Project. Currently all typologies are on track to receive actual LEED Gold certification (not merely certifiability) with additional "Maybe" points being considered to achieve LEED Platinum certification, but because the Proponent does not control the third-party certification process, the commitments reference compliance with the requirements necessary for certification.

Comment 9.49

Given that Boston's Climate Action Plan calls for 50% reduction of GHG emissions by 2030 and 100% by 2050, and that it is very likely that these buildings will be around in 2050, the proposed plan builds in failure to meet those goals. In order to meet those goals, buildings need to have 27% less emissions by 2021. The goal for the project GHG emissions is 22% reduction in GHG emissions, so it is short of the goal as planned. Please provide a modified plan that will meet and ideally exceed the City's CAP. Again, this is a project that has ambitions to be a regional, national, and global exemplar.

Response

Since the PNF Filing, the Proponent has worked to decrease the Project’s dependency on natural gas and to further electrification. As revised, the Project’s proposed design demonstrates an approximately 74 percent reduction in natural gas energy. The Project will also comply with Harvard’s Fossil Fuel-Neutral By 2026 and Fossil Fuel-Free By 2050 goals. As described in Section 5.1 of Chapter 5, *Sustainability and Climate Change Resiliency*, coupled with the Proponent’s off-site renewable electricity procurement in collaboration with Harvard University, the magnitude of GHG emission reduction has been increased from 19% to 90% compared to the Base Case, representing a savings of approximately 8,728 tons per year. These immediate reductions in electricity GHG emissions are far ahead of the Massachusetts electrical grid decarbonization. As the grid continues to green, this reduction in natural gas use in favor of electricity is expected to further reduce the Project’s GHG emissions. The updated energy analysis is presented in Section 5.4.

Comment 9.50

Likewise the statement that in the end, electricity will supply 59% of energy needs and gas 40% is very odd at this point in 2021 when we are aiming for the complete electrification of our buildings. Why is a brand new project of this size and scope still using such a large percentage of natural gas for energy? What other alternatives has the proponent considered? And why have these choices been made?

Response

The Project’s design advancement since the PNF has further reduced reliance on fossil fuels. The Project’s primary energy source is now anticipated to be electricity (approximately 82%) which positions the Project for a pathway to carbon neutrality. The Proponent has performed extensive evaluations of various energy conservation measures including electrification and Passive House alternatives for this DPIR filing. This information is provided in Section 5.4 of Chapter 5, *Sustainability and Climate Change Resiliency* and in Appendix D. Appendix D provides detailed results of the Carbon Neutral Building Assessment for each building typology.

Comment 9.51

The proponents state (4.1) that they will "utilize energy-efficient HVAC and lighting equipment and systems, and incorporate other potential energy conservation measures, as reasonable and feasible" (emphasis added). We would like to see the quantified results of an analysis into the feasibility of and the rationale for their choices in these determinations when this investigation is completed, ideally by the next report (DEIR).

Response

The Proponent has performed extensive evaluations of various energy conservation measures including alternative envelope assemblies and mechanical systems for this DPIR filing. This information is provided in Section 5.4 of Chapter 5, *Sustainability and Climate Change Resiliency* and primarily in Appendix D. Section 5.4.2 also includes results of updated energy analyses for each typology and descriptions of the energy conservation measures incorporated in each. All building typologies exceed the minimum Stretch Code requirements.

Comment 9.52

The project references the ASHRAE 90.1 2013 and proposes to be 15% lower than the Stretch Code, which also references ASHRAE 90.1 2013. The PND also references the Harvard Green Building Standard which references ASHRAE 90.1-2010. The baseline energy model and other performance metrics should reference the new ASHRAE 90.1 2019 as the pertinent Standard.

Response

The Project uses the ASHRAE 90.1-2013 standard with Massachusetts Amendments as required by the building code. Refer to the Section 5.4.2 of Chapter 5, *Sustainability and Climate Change Resiliency* for detailed energy and greenhouse gas emissions results by typology.

Comment 9.53

The proponents promise to study and consider a number of green building design certifications, including Fitwel, Passive House, LEED Zero Energy, Living Building Challenge, and Boston Green Building Credits. Please present the detailed results for each of these analyses in your next report (DEIR) and the rationale for why you will or will not seek certification.

Response

Section 5.3.1 of Chapter 5, *Sustainability and Climate Change Resiliency* describes the LEED approach for the Project.

Section 5.3.1.1 describes the Fitwel approach of the Project. Aligned with Tishman Speyer's Sustainability Plan and to complement the compliance with requirements for LEED Gold certification and the Project's climate mitigation approach, the Proponent has committed to achieving Fitwel certification for the residential and hotel buildings as follows;

› Residential – Multifamily Residential Scorecard;
› Hotel – Single Tenant Scorecard;

As described in the Section 5.2.4, the Project will align with Harvard's Green Building Standards; the Project will satisfy requirements to achieve LEED v4 Gold certification.

The Carbon Neutral Building Assessment described in Chapter 5.4.4 and Appendix D of the DPIR considers building cases with systems and envelope arrangements that are comparable to PassiveHouse (PHIUS) guidelines.

The Proponent is investigating the feasibility of Living Building Challenge (LBC) across the project site, including on each building specific design.

Comment 9.54

In the next report (DEIR), we also need to see the details of what is meant by "fossil fuel neutral" by 2026 and "fossil fuel free" by 2050. First, is that the same as carbon neutral and carbon free?

Response

Fossil fuel neutral indicates that all carbon emissions associated with fossil fuel usage (natural gas) will be offset such that the net result is zero emissions. Fossil fuel free indicates that no fossil fuels will be use. These vary slightly from carbon neutral and carbon free which account for carbon emissions from both fossil fuel and electricity usage.

As described in Section 5.4 of Chapter 5, *Sustainability and Climate Change Resiliency*, 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 City of Boston's commitment to carbon neutrality by 2050. The approach is organized around energy efficiency, electrification and renewable energy supply. Each proposed building 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 within each building for heating, domestic hot water, and potentially other end uses will be analyzed as part of the Zero Carbon Building Assessment and assessed for cost effectiveness using a life cycle cost analysis approach. Additionally, the Project is completing 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 procuring new, purchased-caused off-site renewable electricity in collaboration with Harvard University's procurement. 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.

Comment 9.55

Secondly is that achieved by on-site renewable, off-site renewable purchases, and if a combination, how much of each within each time period.

Response

Section 5.4.6 of Chapter 5, *Sustainability and Climate Change Resiliency* describes the preliminary onsite PV study for the Project. As described in Section 5.4, 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 City of Boston's commitment to carbon neutrality by 2050. Given the limited contribution of on-site renewables, the Master Plan will utilize new off-site renewables to achieve significant reductions in GHG emissions far ahead of the Massachusetts electric grid.

Comment 9.56

And the final 100% mark should be moved up considerably in time - this is a new project, ideally build it to be fossil fuel free from the beginning or at least show us the plan for how you will get there quickly. Why take nearly 30 more years to 2050? For a project of this size and global reach, consider using Passive House technology or Net Zero construction without purchasing Renewable Energy Credits.

Response

Refer to Section 5.4.2.5 of Chapter 5, *Sustainability and Climate Change Resiliency* for the Project's approach to reducing natural gas consumption on site. The Master Plan Project's proposed design demonstrates an approximately 74% reduction in natural gas energy and GHG emissions, representing a savings to approximately 2,621 tons per year compared to the Base Case. With these significant reductions in fossil fuel use, the Project's primary energy source is electricity (approximately 82%) which positions the Project for a pathway to carbon neutrality. Coupled with the Proponent's off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction has been increased from 19% to 91% compared to the Base Case, representing a savings of approximately 8,734 tons per year. These immediate reductions in electricity GHG emissions are far ahead of the Massachusetts electrical grid decarbonization. The Proponent is also committed to Fossil Fuel Neutral by 2026.

Comment 9.57

In light of the above, please provide a report of increased traffic along Western Ave from all new developments along Western Ave, Lincoln Street, Allston Yards, and Watertown's Arsenal Street Corridor.

Response

The traffic analyses presented in Chapter 3, *Transportation*, consider other area development projects as required by the City. Refer to Section 3.6.1 and Figure 3.20 for a description of other area developments projects that may affect traffic conditions on study area roadways, including Western Avenue.

Comment 9.58

Incorporate these figures into your own planning and explain how Harvard and Tishman Speyer will work with other new developers in the area to ensure that transit, bicyclists, pedestrians, and cars can travel safely and efficiently within the corridor and Allston neighborhood and easily connect to points beyond.

Response

The Proponent will coordinate with City of Boston transportation staff at BPDA and BTD to develop all mitigation and TDM measures and the Proponent is committed to joining the Allston Brighton Transportation Management Association (TMA) to coordinate TDM programs with other nearby developments.

Comment 9.59/9.60/9.61

And please provide your vision of how the local neighborhood will be enhanced by your mobility planning and designs, rather than unduly burdened.

Specifically, please address how cars/trucks traversing the development between Cambridge St. and Western Ave. will be managed.

How will Windom Street and Seattle Street be impacted, and what will be done to eliminate these impacts?

Response

The new street network will encourage drivers to access and egress the Project Site from Western Avenue and Cambridge Street, not from local neighborhood streets. The proposed Cattle Drive Extension will connect between Cambridge Street and the project site. Proposed mitigation improvements include a realignment of the intersection of Windom Street at Almy Street to emphasize Almy Street/Interim Cattle Drive as the access/egress route to/from Cambridge Street. Two new streets (East and Cattle Drive) will provide new connections directly to Western Avenue.

The Project will also enhance pedestrian and bicycle accommodations by creating the Project Greenway that will provide a separated pedestrian and bicycle connection between North Harvard Street and the Charles River via Rena Path and the Project Site.

Refer to Section 3.4.4 of Chapter 3, *Transportation*, for a description of the new roadway network, Section 3.12.3 and Figure 3.44 for a description and graphic of the proposed improvements at the intersection of Windom Street at Almy Street, and Section 3.12.1 for a description of the proposed pedestrian and bicycle accommodation improvements.

Comment 9.62

Increase the 25% share of Electric Vehicle parking in light of the Governor's commitment and other recent commitments to be selling only EVs by 2035. Or at least plan for 100% of parking spaces to be EV ready.

Response

Consistent with the City of Boston's Electric Vehicle Readiness Policy, the project will equip 25% with electrical supply and the remaining 75% will be EV ready for the future.

Comment 9.63

And please substantially reduce the amount of interim surface parking in your current plan. Providing that much surface parking is harmful in terms of impervious cover, stormwater, and heat, and comes at the expense of potential greenspace. Why in the world encourage that level of parking in 2021? Start finding ways to reduce automobile commuting to this site from the start.

Response

A shared parking demand analysis was conducted to determine the total expected demand for 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 those uses to maximize efficiency and ensure that only the necessary amount of parking is constructed to meet expected demand. The approved PDA Master Plan anticipated 800 to 900 spaces. As a result of the proposed transportation management plan and approach to shared parking, approximately 620 parking spaces are planned as part of the current Project. Refer to Section 3.11 of Chapter 3, *Transportation*, for a detailed description of the shared parking demand analysis.

Comment 9.64

Allston Brighton Health Collaborative's Transportation Committee recommendations:

- *Proponent be required to adopt the City of Boston's Complete Streets guidelines for the development. Anything that is done on the street that does not follow these guidelines must apply for an exemption from the City.*

Response

All new roadways will be designed based on the City of Boston's Complete Streets guidelines. Refer to Section 3.4.4 of Chapter 3, *Transportation*, for a description of each new roadway, including graphical cross-sections of each street.

Comment 9.65/9.66

- *As mitigation and community benefit, and upon board approval, Proponent must first be required to fund public transit improvements before approval for study or creation of a private shuttle service. Transit improvements include bus lanes, bus shelters, and signal replacement to allow for transit signal priority. Should a shuttle be implemented it be open and accessible to the public.*
- *As mitigation and community benefit, and upon board approval, Proponent be required to fund safety and accessibility improvements for all bus stops within 0.5 mile radius. Improvements include bus shelters, lighting, garbage cans, bike racks, and real-time countdowns.*

Response

Refer to Section 3.12.2 of Chapter 3, *Transportation*, for a description of the proposed transit mitigation, including: exploring bus priority treatments to improve MBTA service, bus stop improvements, and implementation of publicly-accessible transit services in cooperation with Harvard University, Allston-Brighton TMA, and other Allston-area stakeholders.

Comment 9.67

- *As mitigation, Proponent be required to partner with Boston Bikes to help fund at least one additional Bluebikes bike-sharing station anywhere in Allston or Brighton.*

Response

Refer to Section 3.4.5.2 of Chapter 3, *Transportation*, for a summary of the proposed bike sharing stations based on BTD's Bike Parking Guidelines. Based on the BTD guidelines, the Proponent will include a new 19-dock Bluebikes stations on-Site as part of the current project and anticipates a second station in conjunction with Phase B.

Comment 9.68

- *Proponent's parking ratio may not exceed 0.45 per unit.*

Response

Refer to Section 3.11 of Chapter 3, *Transportation*, for a summary of the shared parking analysis. The actual rate for the residential uses at the peak shared demand point is anticipated to be less than 0.45 spaces per unit.

Comment 9.69/9.70

- *Proponent be required to contract with and provide space for car-sharing vehicles (e.g. Zipcar).*
- *Proponent be required to contract with and provide space for Electric Vehicle rentals with charging stations on-site and additional charging stations for private vehicles.*

Response

The Proponent will provide one on-site car share parking space and as consistent with the City of Boston's Electric Vehicle Readiness Policy, the project will equip 25% with electrical supply and the remaining 75% will be EV ready for the future. Refer to Section 3.12.5 of Chapter 3, *Transportation*, for a summary of all the proposed TDM measures.

Comment 9.71

- *Proponent be required to provide covered and secured spots and charging capabilities for bikes and micro-mobility devices (eg. e-scooters, e-bikes) at a minimum 1.0 ratio.*

Response

Refer to Section 3.4.5.2 of Chapter 3, *Transportation*, for a summary of the proposed on-site bike parking accommodations. For residential units, the Proponent will provide a minimum of one covered and secured bike parking space per each residential unit.

Comment 9.72

- *Proponent be required to provide discounts or free monthly MBTA passes and Bluebikes yearly passes to residents who do not use their parking spots.*

Response

Refer to Section 3.12.5 of Chapter 3, *Transportation*, for a summary of TDM measures. The Proponent will participate in the MBTA's Perq corporate pass program to offer pre-tax transit benefits to all tenants and a subsidized bike share membership per the City's Bike Share Corporate Program will be offered to each tenant.

Comment 9.73

- *Proponent be required to build curbside allotment, designated pick-up drop off locations.*

Response

The Proponent is committed to accommodating the anticipated pick-up/drop-off activity along designated curb space to minimize the potential disruption to non-Project traffic. Refer to Section 3.10 of Chapter 3, *Transportation*, for a summary of the curbside activity and on-street curb lane allocation.

Comment 9.74

- *Proponent be required to set commercial/institutional parking rates (including educational and medical), to be greater than an MBTA monthly pass.*

Response

Refer to Section 3.12.5 of Chapter 3, *Transportation*, for a summary of TDM measures. The Proponent will provide unbundled parking that is priced at market rates.

Comment 9.75

- *Proponent is encouraged to contract for already available public parking in lieu of on-site parking. (E.g., night parking on lots that have low evening usage.)*

Response

Refer to Section 3.11 of Chapter 3, *Transportation*, for a detailed description of the shared parking demand analysis. The amount of total parking provided was determined based on the anticipated parking demand for each use and is approximately 37-percent below the City of Boston's recommended maximum parking requirements.

Comment 9.76

However, the current design misses an opportunity to make this a special place in terms of nature and natural history. Recall that this area was once a marsh, and most likely an important place for Native Americans. It was filled and developed for industrial uses as the PNF explains. We can never recreate a natural world here, but we can create something of a bridge to this past world, one that could educate today's users, offer a natural balm for hectic lives, and provide a more functional ecosystem. We need to think in innovative ways that would be worthy of Frederick Law Olmsted's approach to solving environmental issues in the Fenway, Muddy River and other parts of Boston's famous Emerald Necklace. This could be an outstanding model for climate resiliency, greenspace, and urban ecosystem functioning, and would be an incredible educational resource for Boston's universities, the metropolitan community, and visitors from around the world.

Response

See responses to Comments 9.20 and 9.21 and refer to Section 4.4.1 in Chapter 4, *Urban Design,* for reference to the Project Greenway and related design approach. As noted, this project will exist in a larger framework of the greenway, which will include future phases connecting existing Rena Park to the Charles River.

Comment 9.77

By expanding the area's vegetated greenspace and using green infrastructure, the project could create a place for nature and quiet reflection. Keep in mind both the natural marsh past of this space, the current stormwater flooding potential (which will be increasing due to climate change), and the need for a truly green environment for human physical and mental health.

Response

The Greenway will be a performative landscape designed to provide active management for 2.75" of runoff from the impervious site areas that is, in conjunction with other stormwater management strategies is expected to greatly reduce flooding potential in the area.

Comment 9.78

In the PNF, it states that the Project Greenway "will establish a rich native habitat and performative landscape." But how this is done is not at all clear. Can you explain what that means? What species, and what ecological functions are you are seeking to design into the Greenway? What are your performance expectations?

Response

Additional detail on the design evolution of the Greenway is provided in Section 4.4.1. Review and further development of the Project Greenway will continue with respect to plant species, ecological functions and their fit within the larger context of the greenway.

Comment 9.79

The flip side of this is that the PNF states that the project will have 97% impervious cover. Additional permeable green vegetated areas are necessary for stormwater management. Directing stormwater to an underground system of pipes and tanks misses a unique opportunity to create humane surface green areas that echo the marshland past.

Response

Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for additional information on the stormwater design and reduced impervious area.

Comment 9.80

As is, while the Project Greenway is exciting, it doesn't seem very green. For example the Harvard ERC PNF, while promising to promote natural ecological diversity, shows that much of the proposed "open space" is hardscape with planters. While clearly there is a need for pedestrian areas, more actual functional green space is necessary. In the DEIR, please provide the dimensions of proposed green, vegetated areas disaggregated from the hardscape/planter areas, and don't color the hardscape areas as green - this is misleading. What will the specific functions of the various spaces be in terms of stormwater management, urban temperature mitigation, air quality, habitat, and mental health?

Response

Refer to Figure 4.15 in Chapter 4, *Urban Design*, for permeable, planted, and tree canopy areas. As noted, this project and proposed Project Greenway is the first phase is a larger framework plan. Future phases will continue to incorporate functional green space, as consistent with the larger framework plan. For stormwater functions of the Greenway, please also refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for additional information on the stormwater design.

Comment 9.81

"Sustainable Sites" section 4.3.1.4 sounds very aspirational (you say we will do x, y, and z in terms of the LEED Sustainable Sites credits). We need to see details, including clear explanations of alternatives and potential impacts of chosen approach versus alternatives (including planning for 100-year storm events - see below).

Response

Refer to Section 5.3.1 in Chapter 5, *Sustainability and Climate Change Resiliency* for the LEED approach for the Project. Refer to Chapter 5.5 for the resiliency approach for the Project.

Comment 9.82

The site is located on a major continental bird migration flyway. For the sake of both humans and birds, the developer should commit to preventing additional light pollution following International Dark Sky guidance and work with Mass Audubon to ensure lighting and habitat that is safe for migrating and resident birds.

Response

The Proponent will evaluate the International Dark Sky guidance and will review the proposed lighting and habitat of the Project in relation to migrating and resident birds

Comment 9.83

There is little discussion in the PNF regarding how this project will address key climate change risks, including increased precipitation, increased flooding, increased heat, increased drought periods, and increased intensity and frequency of storm events. The DEIR should discuss how the project will address each of these specific climate concerns.

Response

Refer to Section 5.5 in Chapter 5, *Sustainability and Climate Change Resiliency* for the resiliency approach for the Project.

Comment 9.84

Also explain your rationale for choosing a 32-year storm event for your stormwater design. Due to likelihood of increased frequency, intensity, and duration of storms, the proximity to the Charles River, and the propensity of this zone for increasing stormwater flooding, the drainage plan should be able to accommodate an 100-year storm event.

Response

The proposed design will reduce peak rates of runoff from the 2-, 10-, 25-, and 100-year design storms compared to the existing condition. Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for more information on the Project's intent to exceed the City's requirements for stormwater management.

As described in Section 5.5.2 of Chapter 5, *Sustainability and Climate Change Resiliency,* 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) 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.

Comment 9.85

Please provide the details of the commitments to reduce impervious cover, increase greenery and green infrastructure, and the feasibility studies concerning stormwater capture and re-use for cooling tower make-up water.

Response

Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for more information on reduction of impervious cover, increasing green space and green infrastructure.

Comment 9.86

At present in the PNF, the green infrastructure commitments are vague. Green infrastructure should be extensively incorporated into the overall design of this project. The developers should provide details about the different types and locations of green infrastructure elements, and how and how much stormwater these components will capture and treat.

Response

Refer to Section 7.3.2 and Figure 7.5 in Chapter 7, *Infrastructure Systems* for information on green infrastructure and the stormwater design. The Project will actively manage 2.75" of stormwater from the impervious areas of the Site, including the roadways. This significantly exceeds the minimum 1.25" retention required by the BPDA and BWSC.

Comment 9.87

What alternatives have been considered for managing stormwater through green infrastructure?

Response

Refer to Section 7.3.2 and Figure 7.5 in Chapter 7, *Infrastructure Systems* for information on green infrastructure and the stormwater design.

Comment 9.88

Given the proximity to the Charles River, please provide more details about how will the project address potential pollutants including the Total Maximum Daily Load (TMDLs) that apply to the Charles River.

Response

Refer to Section 7.3.2 and Figure 7.5 in Chapter 7, *Infrastructure Systems* for information on the Project's design to minimize impacts to the Charles River and meet Total Suspended Solids and Phosphorus reduction requirements.

Comment 9.89

During the construction phase, given that you are committing to world-class energy and green infrastructure goals, use your expertise and the construction process itself to educate and train community youth and adults in these important climate-related growth opportunity areas. This is such a fabulous opportunity to engage young people and young adults in a new and exciting field. There are ongoing programs in the Boston area that you could connect with in this regard that could help organize this kind of initiative.

Response

The Proponent has conducted a study, and desires feedback from the Community and other stakeholders, regarding potential workforce development opportunities in connection with the Project. Further detail regarding workforce development is noted in Section 1.2 of Chapter 1, *Project Description*.

Comment 9.90

In the operational phase, there are multitudes of career possibilities. Please do a careful analysis and report of the various potential careers that will be generated by this development, identify the skill sets and education needed for each of these, and commit to educating/training people in our community for these careers. Again, you could connect to existing partnerships that would help you achieve this mission. These would include lab/office jobs, but also property management, resilient landscaping, hospitality, event planning, convention operations, etc. Please present this report as part of your next planning document.

Response

The Project will create job opportunities throughout each stage of the development, from pre-construction, through construction, and into operations after the project opens. Jobs will be created by the Project across multiple industries including, architecture, engineering, finance, construction, marketing, and leasing, as well as in retail, hospitality, life sciences and others. The Proponent is committed to developing a workforce development strategy that is designed to help area residents prepare for and gain access to jobs created by the Project, and is interested in feedback from the community to better understand the community's interests and priorities in these areas. Information regarding the Project's workforce development strategy is included in Section 1.3.2 of Chapter 1, *Project Description*, and the Proponent looks forward to continuing the conversation with the community to further develop the Project's workforce development strategy.

Comment 9.91

It is vital that Black, Latinx, and women owned businesses have a substantial role in this project. I believe that 5% is not an adequate proportion of investors. Please explain how you derived this figure and your rationale for using it. I would like to see a much higher share of Black, Latinx, and women investors. They are the majority in our city, not the minority.

Response

The Proponent is pleased to announce that we have exceeded our target commitment of 5% ownership by Black and Latinx investors. Further details regarding inclusive ownership are noted in Section 1.3.2 of Chapter 1, *Project Description*. This initiative represents one of if not the largest such inclusionary investor initiative (in terms of total dollars) for a private development in the history of the City of Boston.

Comment 9.92

You also state that a "sizable proportion" of ground-floor retail space will be reserved for businesses which are local, MBE or WBE. Please DEFINE what that "sizable" share will be, and make sure it includes all three groups. And please commit to offering below-market rents to these spaces to our local, MBE, AND WBE businesses.

Response

As detailed in Section 1.3.2 of Chapter 1, *Project Description*, the Proponent's vision for the Project retail 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.

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 to operate at the Project.

Comment 9.93

Finally, the developers should commit to Local 26 (the hotel employees union) for jobs at the proposed hotel.

Response

The Proponent is in active discussion with Local 26 regarding the operation of the proposed hotel at the Project.

Christine Varriale

Comment 10.1

Due to the density and height of this project and its location within Harvard-owned land, the proponent should set aside 20% of their apartments as affordable under the city's inclusionary development policy.

Response

Further detail regarding housing and housing affordability are noted in Section 1.3.5 of Chapter 1, *Project Description*.

Comment 10.2

I would like to see the developer use the 20% IDP units to offer a tiered mix of affordable and workforce housing. Most can be at 70% AMI, but please also include some at 50% or 60% AMI and some at 100% AMI.

Response

The Proponent is open to providing units with deeper levels of affordability, however, offering units at lower levels of AMI would need to be balanced with units with AMI levels over 100%. The Proponent welcomes the community's feedback on whether offering units at both higher and lower AMI levels is desirable.

Comment 10.3

Transit, Parking, and Traffic: I am pro the lower parking ratio and would like to see a higher bike parking ratio within the project. I would also like to see the developers commit to providing a $20/month transit subsidy to residents in the rental building that can go through an MBTA pass, ZipCar membership, or BlueBike pass.

Response

Refer to Sections 3.3.5.2, 3.11.1, and 3.12.5 of Chapter 3, *Transportation*, for details on the proposed bicycle parking ratios, vehicle parking ratios, and proposed TDM measures. The Proponent will participate in the MBTA's Perq corporate pass program to offer pre-tax transit benefits to all tenants and a subsidized bike share membership per the City's Bike Share Corporate Program will be offered to each tenant to further encourage a shift toward more sustainable transportation modes.

Comment 10.4

The development team should also work closely with the MBTA to improve service on the 86, 70, and 66 bus routes within the project area.

Response

The Proponent kicked off its collaboration with the MBTA relative to local transit services on April 30, 2021. The Proponent continued this dialog during the preparation of this DPIR and will continue the coordination via a set of studies related to exploring the feasibility of implementing bus priority measures. Refer to Section 3.12.2 of Chapter 3, *Transportation*, for a detailed description of the proposed transit improvements.

Comment 10.5

I would also like to see a specific loading zone with pick-up and drop-off for rideshare vehicles within the property. We do not need these cars blocking traffic and the bike lane.

Response

All loading and pick-up/drop-off activities will take place in a curbside lane separate from travel lanes and bike lanes. Refer to Section 3.10 of Chapter 3, *Transportation*, for a detailed description of curbside activity and on-street curb lane allocation, including a curbside loading space needs analysis.

Comment 10.6

Harvard Business School also has a shuttle service that runs from Barry's Corner to Harvard Square, stopping within the business school. I would like to see this shuttle service re-oriented to accommodate this development. This shuttle service is publicly accessible to the community and will do a great job to curb the use of single occupancy vehicles entering and exiting the development site.

Response

The Proponent is engaged in specific coordination with Harvard University to develop a transit service plan that supports Project transit demand to/from Harvard Square as well as Harvard University's own needs. Refer to Section 3.12.2 of Chapter 3, *Transportation*, for a description of the proposed transit service that will serve the Site.

Comment 10.7

Green/Open Space: Thank you to the developer for holding significant green and open space within the project, even the potential for open performance space. I would like to see plans laid out by Tishman Speyer on who will be running the programming for the open space. They should commit to partnering with a local public arts organization and look to support the local arts and music community here in Boston.

Response

The Proponent intends to draw upon Tishman Speyer's deep well of experience in active programming of publicly accessible open space. Placemaking is a key part of the DNA of Tishman Speyer, and the Proponent recognizes that activation of the publicly accessible open space will be key to the long-term success of the Project which is why Tishman Speyer facilitate and operate the open space programming. The Proponent looks forward to facilitating further dialogue with the local public arts organizations and the local arts and music community for programming opportunities as the Project progresses.

Comment 10.8

In addition to the open space within this project, I would like to see Tishman Speyer, Harvard, and Samuels & Associates team up to help improve Smith Field. Recent renovations to the park have been incredible for our local community, especially our local youth. Unfortunately it is not a park that the city is budgeting a 365 vision for. There is no snow removal in winter, and they do not put lights on at night year round. I would like to see these developers team up to fund snow removal and year round lighting for the park so our local community has an outdoor place to socialize year round.

Response

The Proponent and Harvard intend to make a sizeable investment in the design, construction, maintenance, and year-round programming of the publicly accessible open spaces of the Project within PDA Area.

Comment 10.9

Opportunities for artists: This project should look into more opportunities for artist work, performance, or gallery space.

Response

The Proponent looks forward to ongoing dialogue for how the performative and visual arts can be incorporated into the Project, particularly in the publicly accessible open spaces where there could be opportunities for art displays, musical performances, etc.

Comment 10.10

The project should have a LEED score of at least 70 (LEED GOLD). If the developer can't achieve that, explain why not and what LEED score it does achieve.

Response

Refer to Section 5.3.1 in Chapter 5, *Sustainability and Climate Change Resiliency* for the LEED approach for the Project. Refer to Figures 5.1a-d for updated LEED checklists by building typology. The Lab/Office, Hotel and Conference Center checklists each now reflect anticipated achievement of 71 points and the Residential checklist reflects anticipated achievement of 66 points, an increase of 6 points from the PNF.

Comment 10.11

The project should be Zero Net Carbon. If not, what % of energy will come from on-site renewable energy sources? If less than 30%, how much in renewable energy credits will be purchased?

Response

Refer to Section 5.4.2 in Chapter 5, *Sustainability and Climate Change Resiliency* for the emissions reduction approach and renewable energy strategy for the project. The Proponent has committed to Fossil Fuel Neutral by 2026 aligned with Harvard University's commitments.

The Master Plan Project's proposed design demonstrates a 74% anticipated reduction in natural gas energy and GHG emissions, representing a savings to approximately 2,621 tons per year compared to the Base Case. With these significant reductions in fossil fuel use, the Project's primary energy source is electricity (approximately 82%) which positions the Project for a pathway to carbon neutrality.

Coupled with the Proponent's new off-site renewable electricity procurement in collaboration with Harvard University, the GHG emissions reduction has been increased from 19% to 91% compared to the Base Case, representing a savings of approximately 8,734 tons per year. These immediate reductions in electricity GHG emissions are far ahead of the Massachusetts electrical grid decarbonization.

Comment 10.12

The project should use an integrated surface system of green infrastructure to: reduce stormwater and pollutant run-off, reduce urban heat island effects, improve air quality, and create healthy natural habitats and greenspace for residents, workers, and community members.

Response

The Project put together a comprehensive stormwater storage and infiltration plan for the Project. 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 Project Greenway will contribute a significant landscape presence through a robust canopy, plantings, and visible green infrastructure where possible and appropriate. These interventions will help in establishing a rich native habitat and performative landscape. Refer to Section 7.3.2 and Figure 7.5 in Chapter 7, *Infrastructure Systems* for information on green infrastructure and the stormwater design.

Task Force

Comment 11.1

We want first of all to ask what sort of residential community will take shape within the ERC. We want to understand how an extensive and inclusive mixed-income community will be fostered. To that end we want to see a commitment from the university for much greater standards of affordability, with opportunities for home ownership, which are not sufficiently in evidence in this initial PNF.

Response

The Proponent shares the community's commitment to creating a diverse and inclusive community at the ERC. While the Proponent cannot comment on housing outside of the PDA Area is not proposing any for-sale housing on-site, the Proponent's affordable housing program is outlined in Section 1.3.5 of Chapter 1, *Project Description*. As outlined in that chapter, the Proponent is committing to approximately 18% on-site affordability in aggregate across Phase A and Phase B, providing critical supply to the Allston neighborhood with the residential units being delivered as early as 2024.

Comment 11.2

We want to know how the research and manufacturing uses, as well as such sectors as hospitality, retail and property management, will offer economic opportunities to the larger Allston-Brighton community.

Response

The Project will create job opportunities throughout each stage of the development, from pre-construction, through construction, and into operations after the project opens. Jobs will be created by the Project across multiple industries including, architecture, engineering, finance, construction, marketing, and leasing, as well as in retail, hospitality, life sciences and others. The Proponent is committed to developing a workforce development strategy that is designed to help area residents prepare for and gain access to jobs created by the Project, and is interested in feedback from the community to better understand the community's interests and priorities in these areas. Information regarding the Project's workforce development strategy is included in Section 1.3.2 of Chapter 1, *Project Description*, and the Proponent looks forward to continuing the conversation with the community to further develop the Project's workforce development strategy.

Comment 11.3

We need to know how in both the innovative methods of sustainable construction and in the advanced technological research proposed for the ERC there will be opportunities for A-B youth and adults to gain knowledge and training to pursue careers in the economic sectors of the future.

Response

Please refer to response to Comment 11.2.

Comment 11.4

We need to know more about the sustainability of this campus, and how it intends to realize its intentions with regard to carbon neutrality and climate resilience.

Response

The Proponent 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.

Refer to Chapter 5, *Sustainability and Climate Change Resiliency*, for a description of the proposed sustainable and resilient elements of the Project intended to be implemented during planning, design, construction and operations.

Comment 11.5

We are particularly interested to know how a localized power grid might serve the interests of both the ERC and the adjacent Allston neighborhoods.

Response

Section 5.4.4 in Chapter 5, *Sustainability and Climate Change Resiliency* describes the Proponent's work underway to complete a district energy and microgrid feasibility study.

Comment 11.6

We want to understand the overall proportions of actual green space (not just open space or public realm), and how that green space will address issues of hydrology and storm water management, how the anticipated increase in storm and flood waters will be reflected in green space planning.

Response

Refer to Section 7.3 in Chapter 7, *Infrastructure Systems* for a description of the proposed stormwater management system and Section 7.3.2 for a description of impervious area. The proposed roadways are expected to be approximately 22% pervious with street trees, planter beds and permeable pavers, and will deploy a system of green infrastructure to manage stormwater. The Project Greenway is expected to be approximately 30% pervious with an extensive performative landscape including landscaped areas, trees, stormwater retention, and a bioswale that will provide additional stormwater storage. Green space will be maximized as much as possible to help reduce runoff.

Comment 11.7

We furthermore want to discuss how the entire ERC might offer its residents and users some sense of encounter with the particular ecology of this swath of the natural environment and especially with the Charles river and its historic wetlands on this site.

Response

A bioswale retention area has been incorporated into the Project Greenway, which will provide both stormwater storage and will serve as an educational feature that highlights the ecology of the site, providing educational opportunities surrounding stormwater and climate resiliency.

Comment 11.8

We need to consider mobility and transportation modalities within the ERC in light of the complex regional systems of which it will be a central nexus. We need to know more about projected traffic volumes, transit usage, support for other modalities, and impacts on existing neighborhoods and transportation systems.

Response

Chapter 3, *Transportation*, presents a comprehensive examination of mobility and transportation systems, including the predicted traffic volumes on the regional system, public transit ridership, and multi-modal approach to support travel to/from the Project.

Comment 11.9

We want to consider how the ERC might enhance mobility rather than adding to the traffic burden.

Response

Starting with good design principles, the Project is incorporating sustainable transportation modes into its planning and design. The street network is designed with a Complete Streets approach that accommodates all users of the roadways, while creating pedestrian-friendly sidewalks and urban design. Bicyclists will travel on protected, separated bicycle lanes and off-street paths, to support safe, low-stress travel within the Project site. These facilities will connect to planned infrastructure, increasing the bicycling and walking network in Allston. 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.

Refer to Section 3.5.3 for a detailed description of existing pedestrian and bicycle facilities in the Study Area. Sections 3.4.5 and 3.12.1 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/future/proposed walking and bicycling networks in the neighborhood.

The Proponent is engaged with the City and the MBTA on supportive public transit strategies to serve the Site and the neighborhood. Additionally, the Proponent is coordinating with Harvard University to develop a transit service plan that supports Project transit demand to/from Harvard Square as well as Harvard University's own needs. Finally, the Proponent is in conversation with the Allston-Brighton TMA on exploring additional transit services to serve the Project and the neighborhood.

Refer to Chapter 3, *Transportation*, for the details regarding multi-modal aspects of the Project.

Comment 11.10

We therefore are calling on the BPDA to request that Harvard desist from advancing with the ERC as a series of discrete projects, and start with a larger visioning process that would emerge from a discussion in which Harvard University and the Allston-Brighton community are the principal interlocutors.

Response

The Proponent cannot respond on behalf of the BPDA. Tishman Speyer is enthusiastic to become an active and responsive member of the community and is hopeful that the Project can become an integral and welcome component of the Allston neighborhood, with the delivery of a vibrant, world-class, mixed-use project as early as 2024.

Comment 11.11

We would request the BPDA to underwrite a third-party facilitator for such a comprehensive community-based discussion so that the vision that results will be compatible with both our aspirations and Harvard's. Only then can we serve our proper review function on behalf of our A-B communities, which will be fundamentally and irrevocably transformed by Harvard's ERC in its full extension.

Response

The Proponent cannot respond on behalf of the BPDA, but as detailed in Section 1.2 of Chapter 1, *Project Description*, the Proponent believes the Project entails a comprehensive and desirable mitigation and public benefits package, which will manifest in a vibrant, world-class, mixed-use project that we be an amenity and destination for all of Allston.

Comment 11.12

As an integral part of that larger discussion, we call attention to the several letters already submitted by Task Force and community members. We encourage the BPDA, Harvard, and Tishman Speyer to look carefully at the lengthy and detailed comments in those letters, which begin to lay out some specific elements of the community's vision for what the ERC can and should be.

Response

The Proponent has carefully reviewed all comment letters submitted in connection with the PNF to help inform and improve the Project and looks forward to continuing dialogue with the Harvard Allston Task Force, community, and other stakeholders. As noted in this Chapter 8 of the DPIR, the Proponent has responded to all questions and comments to the PNF that were submitted.

City Councilor Liz Breadon

Comment 12.1

The Proponent has indicated that they plan to include more than the required 13% of income-restricted units within the residential portion of this project; however, the exact percentage of income-restricted units that the Proponent plans to include is not stated. Exclusion of this information from a PNF is not acceptable. For community members to best evaluate this project, the Proponent must specify the exact number of IDP units to be included in this development, as well as the unit types and the AMI levels at which these income-restricted units will be made available.

Response

The Proponent plans to include approximately 17% of units as in Phase A, with a mix of unit types including studio, 1-bedroom and 2-bedroom apartments. The unit mix reflect the data included in the City of Boston's *Housing and Household Composition Community Profile Map and Report Generation Tool*. The Project currently anticipates that 15% of Phase A's onsite 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 2% greater than under the City's IDP policy. An additional 2% of Phase A's onsite units will be affordable units allocated to additional below-market workforce housing for families earning up to 100% of AMI. The Proponent is open to offering units with deeper levels of affordability, but recognizes that, to balance the units with deeper affordability, some units would need to be offered at higher AMIs. The Proponent is interested in understanding whether the community is interested in the Project including units at both lower and higher AMI levels.

Comment 12.2

I expect the Proponent to include a significant number of income-restricted units at a percentage above and beyond that required by the City's IDP Policy in both phases of this project. These units must be made available at a range of AMIs, including AMIs below that of the standard 70%. In collaboration with HALC, the Proponent must also explore potential opportunities to contribute to the creation of offsite affordable housing units- this contribution must be made in addition to on-site affordable housing.

Response

The Proponent is committed to providing approximately 18% on-site affordability in aggregate across Phase A and Phase B, with 17% of units in Phase A being affordable, and 19%-20% of units in Phase B being affordable, significantly above the 13% required by the City's IDP Policy. The Proponent anticipates that the Phase A affordable units will be available as early as 2024. The Project currently anticipates that 15% of Phase A's onsite 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 2% greater than under the City's IDP policy. An additional 2% of Phase A's onsite units will be affordable units allocated to additional below-market workforce housing for families earning up to 100% of AMI. The Proponent is open to offering units with deeper levels of affordability, but recognizes that, to balance the units with deeper affordability, some units would need to be offered at higher AMIs. The Proponent is interested in understanding whether the community is interested in the Project including units at both lower and higher AMI levels.

Comment 12.3

The Proponent must specify the following information in regards to the residential component of the development in the project's DPIR:

› *Proposed unit mix for the residential component of the project*

Response

The proposed unit mix for the Project is detailed in Section 1.3.5 of Chapter 1, *Project Description* as well as below.

Unit Type	% of Units
Studio	38%
One-bedroom	48%
Two-bedroom	14%
Total	**100%**

Comment 12.4

› *Proposed percentage of IDP units to be included in the development, including unit sizes and proposed AMI levels*

Response

Please refer to response to comments 12.1,12.2, and 12.3. The Proponent is still in the process of designing the residential component of the Project, so cannot speak to average unit sizes cannot be determined at this time.

Comment 12.5

I appreciate the Proponent's stated desire to "foster local, small, and/or Minority and Women-owned ("MBE" and "WBE") retailers via reserved square footage on the ground floors of the Project…" I ask that the Proponent make a significant commitment to the inclusion of such businesses within this development.

Response

As detailed in Section 1.3.2 of Chapter 1, *Project Description*, the Proponent's vision for the Project retail 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.

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 to operate at the Project.

Comment 12.6

In regards to retail/commercial space, I expect the Proponent to:

› *Commit to specific, long-term measures that will serve to reduce the cost of retail space located within the ERC so as to make these spaces accessible to MBE, WBE, and other local businesses that would not otherwise be able to afford such space. Strategies might include: provision of subsidized retail space to selected retailers; provision of built-out retail space to selected retailers; and/or the provision of pop-up, temporary space to selected retailers. Selected strategies must be specified in the project's DPIR.*

Response

As detailed in the response to comment 12.5 above, the Proponent is committed to work, as necessary, with local, small, MBE, and/or WBE retailers to provide advantageous lease terms.

Comment 12.7

› *Work with Allston Main Streets, the City's Office of Economic Development, and other Boston-based organizations to identify MBE and WBE businesses that may be interested in retail space in the ERC*

Response

The Proponent has held two meetings to date with Allston Village Main Streets (AVMS), and will continue to work with AVMS, the City, and other Boston-based organizations to identify and attract local, small, MBE, and/or WBE retailers to the Project.

Comment 12.8

The Proponent must specify the following information in regards to retail/commercial spaces in the project's DPIR:

- *The exact amount of ground-floor retail space that will be reserved for local MBE and WBE-owned business in the completed development*

Response

Please refer to response to comment 12.5 and 12.6 above.

Comment 12.9

In regards to on-site parking, I expect the Proponent to:

- *Maintain or reduce the parking ratios currently proposed for Phase A of the ERC in the development of Phase B of this project*

Response

Refer to Section 3.11 of Chapter 3, *Transportation*, for a summary of the shared parking analysis for both Phase A and Full Build (Phases A and Phase B). At this stage of planning, the parking ratios are consistent across both Phase A and Phase B. The parking rates deployed reflect the City's desire to use parking management as an important tool to manage vehicular demands and encourage alternative modes of travel to the Project. The Proponent remains committed to the promotion of sustainable modes of travel to/from the site, will monitor the use of parking as site development progresses, and will refrain from building more parking than what is needed over time.

Comment 12.10

- *Prohibit project tenants dwelling in the residential component of this development from accessing Allston-Brighton resident parking permits via lease restrictions*

Response

The Proponent is committed to prohibiting tenants dwelling in the residential component of this development from accessing Allston-Brighton resident parking permits via lease restrictions.

Comment 12.11

- *Unbundle the cost of residential parking*

Response

Refer to Section 3.12.5 of Chapter 3, *Transportation*, for a summary of TDM measures. The Proponent will provide unbundled parking leases priced at market rates.

Comment 12.12

- *Equip a significant number of garage parking spots with EV charging accommodations, above that percentage which is required by the City (25%)*

Response

Consistent with the City of Boston's Electric Vehicle Readiness Policy, the Project will equip 25% of garage spaces with electrical supply and the remaining 75% will be EV ready for the future.

Comment 12.13

- *Allow Allston-Brighton residents free access to the proposed below-grade parking garage during and for the entire duration of City-declared snow emergencies*

Response

During City-declared snow emergency events, the Proponent will work with the City to facilitate access to local residents, free of charge, to the Project's below-grade parking, to the extent that there is available garage capacity.

Comment 12.14

I ask that the Proponent clarify the following information in their DPIR:

- *Provision of further details in regards to the proposed on-street parking spots and its management*

Response

Refer to Section 3.10 of Chapter 3, *Transportation*, for a summary of the curbside activity and on-street curb lane allocation. Curb allocation and use is envisioned to be a mix of accessible parking, transit stops, pick-up and drop-off zones, urban logistics/loading areas, and short-term parking. The Proponent is committed to accommodating the anticipated pick-up/drop-off activity along designated curb space to minimize the potential disruption to non-Project traffic.

Comment 12.15

- *Provision of further detail in regards to the overall parking management system*

Response

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 3-6.

Refer to Sections 3.4.6 and 3.4.4 of Chapter 3, *Transportation*, for a summary of the on-site parking supply and access.

Comment 12.16

I ask that the Proponent clarify the following in the DPIR:

- *The PNF states that a "generous central drop-off point for vehicles [will be] integrated into the road layout" along Western Ave as the primary arrival point to the ERC. How will this drop-off point interact with the planned bike lanes along Western Ave?*

Response

Refer to Figure 3.41 (a and b) presented in Section 3.12.1.1 of Chapter 3, *Transportation*, for a graphic of the proposed Western Avenue cross-section along the Site frontage. Drop-off activity along Western Avenue will be accommodated in a curbside lane and the bicycle lane will be at sidewalk level with a buffer provided between the curbside lane and the bicycle lane.

Comment 12.17

- *In the PNF, the ERC conference center is proposed as the project's 'gateway.' While it is understandable that the Proponent would like to welcome the rest of Harvard's campus in this manner, neighborhood residents will not access the project via a gateway that faces away from Allston. I ask the Proponent to consider utilizing design strategies to ensure that there is an alternate 'gateway' that welcomes neighborhood residents to the site.*

Response

The Project is organized and designed around the Project Greenway which will serve as the major gateway that welcomes neighborhood residents from the west to the site, with Cattle and East Drives serving demands from the north and south. All major design decision and massing always return to the desire to make street level spaces as accessible as possible, including providing both Greenway and street entries from Cattle and East Drives. At its western-most edge, the Project Greenway will incorporate a shared use path leading to and from Allston, as well as programmed outdoor spaces. The intersection between the Project Greenway and Cattle Drive is being imagined as an urban square with activation all around, and pedestrian and bicycle traffic integrated within the design. Refer to Section 4.4.1 and Figure 4.18 in Chapter 4, *Urban Design* for additional information on the multiple entry points and accessibility of the Project uses.

Comment 12.18

- *Provision of cross-sections for all streets planned within the project site*

Response

Cross-sections for all Complete Streets planned within the Project Site are presented in Section 3.4.4 of Chapter 3, *Transportation*.

Comment 12.19

The Proponent may consider the following:

- *Inclusion of income-restricted artist live/work studios within the residential component of this development. Please note that these units do not have to be located on the ground floor of the proposed residential building.*

Response

The Proponent's has considered the inclusion of affordable live/work studios in the Project. However, given (i) a desire for all affordable units to be available to applicants of all backgrounds and (ii) the potential delivery of affordable live/work studios as proposed in other projects in the Allston area, the Project has not proposed artist live/work studios at this time. The Proponent believes that the Project can offer non-housing support to artists through multiple opportunities for programming and activation throughout the extensive publicly accessible open spaces.

Comment 12.20

- *Contributions towards ongoing efforts to establish an Arts Districts within Allston*

Response

As noted in Section 1.2 of Chapter 1, *Project Description*, the Proponent is committed to fostering an Arts District at the Project. The Proponent looks forward to engaging with local artists and arts organizations to develop a robust performative and visual arts plan and program. The Project Greenway has been designed with these aspirations in mind, and anticipates arts comprising a significant component of the Project's programming strategy.

Comment 12.21

I ask that the Proponent work with local artist organizations to identify appropriate measures.

Response

Please refer to response to comment 12.20 above.

Comment 12.22

I have the following questions in regards to the Greenway that I ask the Proponent to answer:

- *Provide more information on the proposed location of stormwater management systems within the project site, including those within the Greenway*

Response

The Project Greenway is expected to feature an extensive performative landscape including landscaped areas, trees, stormwater retention, and a bioswale that will provide additional stormwater storage. The streetscape will feature green infrastructure to further manage stormwater runoff. Refer to Section 7.3.2 and Figure 7.5 in Chapter 7, *Infrastructure Systems* for information on green infrastructure and the stormwater design.

Comment 12.23

- *I ask that the Proponent consider the inclusion of separate paths for bicyclists and pedestrians within the Greenway space. If a shared use path is preferred, I ask the Proponent to ensure that the path is of appropriate width to accommodate both pedestrians and bicyclists and ensure safety for all.*

Response

Refer to Figure 4.18 in Chapter 4, *Urban Design*, for reference to site circulation in and around the project site. Through the Greenway, a well-designed shared use path will be utilized for non-motorized circulation on site. This path will be supported by separated sidewalks and cycle tracks along Western Avenue as well as on Cattle and East Drives.

Comment 12.24/12.25/12.26/12.27

In regards to transit, I expect the Proponent to:

- *Commit to significant transportation mitigation measures to ensure that the ERC is adequately served by public transit service, particularly the existing bus lines that operate adjacent or near to the project site. The ERC cannot rely on the eventual construction of West Station to serve the site's transit needs. These mitigation measures are to be coordinated with the BPDA and BTD.*
- *Coordinate with Harvard University to ensure that ERC site is adequately served by Harvard's shuttle system*

Participation in the Harvard Shuttle Service in and of itself is not adequate transit mitigation, and the Proponent is expected to commit to both measures specified above.

I do not support the implementation of a separate shuttle service operated by Tishman Speyer specifically for the ERC site.

Response

Refer to Section 3.12.2 of Chapter 3, *Transportation*, for a comprehensive description of the proposed transit mitigation, including exploring bus priority treatments to improve MBTA service, stop improvements, and implementation of publicly-accessible transit services in cooperation with Harvard University, Allston-Brighton TMA, and other Allston-area stakeholders. The Proponent is coordinating with Harvard University to develop a transit service plan that supports Project transit demand to/from Harvard Square as well as Harvard University's own needs. The Proponent 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 Proponent is also committed to becoming a member of the Allston-Brighton TMA (ABTMA).

Comment 12.28

As stated in the PNF, the Proponent plans to outline project TDM measures in their DPIR. Due to the project's size and expected impact, the Proponent must commit to a robust set of TMD measures. Though I encourage the Proponent to participate in the Allston-Brighton TMA's commuter programs, I also ask the Proponent to explore whether they might participate in Harvard University's CommuterChoice program.

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 and are outlined in Section 3.12.5 of Chapter 3, *Transportation*.

Comment 12.29

I expect the Proponent to commit to the following:

- *Commit to the inclusion of rooftop solar PV arrays across project buildings, where feasible*

Response

The Proponent is still evaluating the feasibility of solar-PV for the Project and has presented the work done to date in Section 5.4.6 of Chapter 5*, Sustainability and Climate Change Resiliency*. The Proponent has committed to making building rooftops solar-ready with the appropriate structural capacity and electrical infrastructure to support a PV system.

Given the very limited solar PV potential on-site 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 Conference Center as the design develops as this is the most favorable site.

Comment 12.30

- *Commit to the inclusion of green roof areas across project buildings, where feasible*

Response

The Project is evaluating the ability to include green roof areas on one-third of the hotel/residential building roofs and 15% of the conference center roof.

Comment 12.31

- *Commit to the inclusion of shower and changing facilities within the ERC Center to encourage further bicycle use. The Proponent must also ensure that retail employees have access to these planned facilities.*

Response

Lab/office building design and planning will incorporate shower and changing facilities to be accessed by building users, including retail employees. These amenities will promote and facilitate commuting via bicycle and contribute to the development as a place promoting health and wellness.

Comment 12.32

The Proponent must specify the following information in the project's DPIR:

- *Was a passive house feasibility study conducted for the project? Has there been a commitment to passive house certification?*

Response

The Proponent has performed an extensive evaluation of electrification and Passive House alternatives, as provided in Appendix D. Additionally, the Carbon Neutral Building Assessment described in Section 5.44 of Chapter 5, *Sustainability and Climate Change Resiliency* and Appendix D considers building cases with systems and envelope arrangements that are comparable to Passive House (PHIUS) guidelines. While the Proponent has not committed to implementing these measures, they will continue to be evaluated throughout the design phases of the buildings.

Comment 12.33

- *Will the Proponent utilize all-electric options for provision of heating and hot water?*

Response

See response to Comment 12.32. Additionally, the Carbon Neutral Building Assessment described in Section 5.4.4 of Chapter 5, *Sustainability and Climate Change Resiliency* and Appendix D considers all-electric building scenarios for each typology, including electrification of space heating and domestic water heating components.

Comment 12.34

- *Has the Proponent committed to the inclusion of stormwater capture and reuse technologies within the project site?*

Response

The Proponent is committed to stormwater capture and reuse technologies within the Site development. Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for information on the Project's plan for re-use of stormwater.

Comment 12.35

- *Will the ERC site be served by Harvard University's microgrid?*

Response

Refer to section 7.6.2 and 7.7.2 in Chapter 7, *Infrastructure Systems,* for reference to electrical service and District Energy system envisioned for the Site.

Comment 12.36

Hotel Labor: The Proponent must commit to employment of unionized labor for the planned hotel component of the ERC project. This commitment must be made before the project moves forward in the review process.

Response

The Proponent is in active discussion with Local 26 regarding the operation of the proposed hotel at the Project.

Comment 12.37

Labor: The Proponent must commit to working with contractors and subcontractors that comply with the Boston Residents Jobs Policy; additionally, the Proponent must actively monitor the project to ensure that all standards of this Policy are met. I strongly support the Boston Residents Jobs Policy and the employment of people of color, women, and other Boston residents in Boston construction projects.

Response

The Proponent shares the Counselor's support of and commitment to the Boston Residents Jobs Policy (BRJP), and the employment of people of color, women and other Boston residents in the construction of the Project, and the Proponent will comply with the BRJP.

Charles River Watershed Association

Comment 13.1

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 infiltrate 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 7.3.2 in Chapter 7, *Infrastructure Systems* for more information.

Comment 13.2

› *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

Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for more information on the stormwater management system's ability to handle future rainfall events.

Comment 13.3

› *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

The Proponent has reduced the amount of parking to be provided since the PDA Master Plan approval (from approximately 800 to 620 spaces) and will be placing one level of parking under all buildings. No surface parking (other than on-street parking) is anticipated as part of the Project at this time. Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for more information on reduction in impervious cover.

Comment 13.4

› *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

The Project will strive to promote utilities and infrastructure that are easier to build, maintain and upgrade, and will aim to make utilities more affordable and efficient for residents and businesses. The completed Smart Utilities Checklist is provided in Appendix B. Refer to Section 7.3.2 and Figure 7.5 in Chapter 7, *Infrastructure Systems* for more information on the proposed green infrastructure systems.

Comment 13.5

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

The proposed green infrastructure will include a wide range of strategies including the use of porous pavement, green roofs, capture and water re-use technologies, and demand reduction measures. Refer to Section 7.3.2 and Figure 7.5 in Chapter 7, *Infrastructure Systems* for more information on the innovative stormwater management strategies.

Comment 13.6

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

Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for more information on pollutant reduction to meet TMDL requirements. 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.

Comment 13.7

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 design of the proposed stormwater management systems on site is preliminary and more detailed plans can be provided as the design progresses. Green infrastructure for the proposed roadways is noted in Figure 7.5 in Chapter 7, *Infrastructure Systems* and more detailed plans can be made available.

Comment 13.8

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 Sections 5.4.2 through 5.4.5 in Chapter 5, *Sustainability and Climate Change Resiliency,* for detailed information on energy modeling building assessment and renewable energy evaluations.

Comment 13.9

Further detail about how the project will specifically address these climate concerns should be provided in the EIR.

Response

Refer to Section 5.5 in Chapter 5, *Sustainability and Climate Change Resiliency,* for information on strategies being deployed to address climate change resiliency.

Comment 13.10

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

The Proponent shares the goal of minimizing impervious areas and has continued to refine the design to achieve this. Refer to Section 7.3.2 in Chapter 7, *Infrastructure Systems* for updates on tree canopy and reduction in impervious cover. The Project Greenway will contribute a significant landscape presence through a robust canopy, plantings, and visible green infrastructure where possible and appropriate, drawing inspiration from the site's natural history of riverine salt marshes and mud flats and establishing a rich native habitat and performative landscape.

Comment 13.11

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 7.3 in Chapter 7, *Infrastructure Systems* for the proposed NASDEP route and Figure 7.4 for the interim NASDEP connection to Cambridge Street.

Comment 13.12

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

Please refer to Chapter 7.3.2 Stormwater Management Approach in Chapter 7, *Infrastructure Systems*, for more information on how the Project will be mitigating its impact on the downstream drainage system.

Comment 13.13

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 7.5.2 in Chapter 7, *Infrastructure Systems* for proposed water demand and Section 7.4.2 for proposed wastewater flows.

Comment 13.14

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 13.15

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 6.7.2.2 in Chapter 6, *Environmental Protection,* for review of the Project's subsurface construction and temporary dewatering plan.

Comment 13.16

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 7.3.2 in Chapter 7, *Infrastructure Systems* for information on the proposed drainage system. Maintenance and operation plans will be developed by the design team and maintenance will be the responsibility of the owner.

Comment 13.17

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 (see Section 1.1). This effort will continue through construction and the Proponent will continue to provide information to local residents and businesses impacted by construction.

Allston Brighton Health Collaborative

Comment 14.1

Proponent be required to adopt the City of Boston's Complete Streets guidelines for the development. Anything that is done on the street that does not follow these guidelines must apply for an exemption from the City.

Response

All new roadways will be designed based on the City of Boston's Complete Streets guidelines. Refer to Section 3.4.4 of Chapter 3, *Transportation*, for a description of each new roadway, including graphical cross-sections of each street.

Comment 14.2/14.3

As mitigation and community benefit, and upon board approval, Proponent must first be required to fund public transit improvements before approval for study or creation/expansion of a private shuttle service. Transit improvements include increasing the bus fleet, bus lanes, bus shelters, and signal replacement to allow for transit signal priority. This is particularly important for a project of this size; investing in the MBTA will improve Campus resident's, employee's, and visitor's ability to access the campus safely and equitably. Even adding a shuttle service won't provide nearly the geographic reach in benefit that an accessible MBTA system would. With the campus connected to key bus routes, MBTA investment is paramount. Should a shuttle be implemented or expanded, it must be open and free to the public.

As mitigation and community benefit, and upon board approval, Proponent be required to fund safety and accessibility improvements for all bus stops within 0.5 mile radius. Improvements include bus shelters, lighting, garbage cans, bike racks, and real-time countdowns.

Response

The Proponent kicked off its collaboration with the MBTA relative to the need for local transit services on April 30, 2021 and looks forward to continuing this dialog during the review of this DPIR. Refer to Section 3.12.2 of Chapter 3, *Transportation*, for a description of the proposed transit mitigation, including exploring bus priority treatments to improve MBTA service, stop improvements, and implementation of transit services in cooperation with other Allston-area stakeholders.

Comment 14.4

As mitigation, Proponent be required to partner with Boston Bikes to help fund at least three additional Bluebikes bike-sharing station anywhere in Allston or Brighton.

Response

Refer to Section 3.4.5.2 of Chapter 3, *Transportation*, for a summary of the proposed bike sharing stations based on BTD's Bike Parking Guidelines. Based on the BTD guidelines, the Proponent expects to include a new 19-dock Bluebikes station within the PDA Area in Phase A and anticipates a second station in conjunction with Phase B.

Comment 14.5

Proponent's parking ratio may not exceed 0.45 per unit. All parking spaces must be EV ready.

Response

Refer to Section 3.11 of Chapter 3, *Transportation*, for a summary of the shared parking analysis. The actual rate for the residential uses at the peak shared demand point is anticipated to be less than 0.45 spaces per unit. All permanent parking spaces will be built to be EV ready.

Comment 14.6

Proponent be required to set commercial/institutional parking rates (including educational and medical), to be greater than an MBTA monthly pass.

Response

Refer to Section 3.12.5 of Chapter 3, *Transportation*, for a summary of TDM measures. The Proponent will provide unbundled parking leases that are priced at market rates.

Comment 14.7

Proponent is encouraged to contract for already available public parking in lieu of on-site parking. (E.g., night parking on lots that have low evening usage.)

Response

Refer to Section 3.11 of Chapter 3, *Transportation*, for a detailed description of the shared parking demand analysis. The amount of total parking provided was determined based on the anticipated parking demand for each use and is approximately 37-percent below the City of Boston's recommended maximum parking requirements.

Comment 14.8/14.9

Proponent be required to contract with and provide space for car-sharing vehicles (e.g. Zipcar).

Proponent be required to contract with and provide space for Electric Vehicle rentals with charging stations on-site and additional charging stations for private vehicles.

Response

The Project will include a set of TDM measures including on-site car share parking space and as consistent with the City of Boston's Electric Vehicle Readiness Policy, the project will equip 25% with electrical supply and the remaining 75% will be EV ready for the future. Refer to Section 3.12.5 of Chapter 3, *Transportation*, for a summary of all the proposed TDM measures.

Comment 14.10

Proponent be required to provide covered and secured spots and charging capabilities for bikes and micro-mobility devices (eg. e-scooters, e-bikes) at a minimum 1.0 ratio.

Response

Refer to Section 3.4.5.2 of Chapter 3, *Transportation*, for a summary of the proposed on-site bike parking accommodations. For residential units, the Proponent will provide a minimum of one covered and secured bike parking space per each residential unit.

Comment 14.11

Proponent be required to provide discounts or free monthly MBTA passes and Bluebikes yearly passes to residents who do not use their parking spots.

Response

Refer to Section 3.12.4 of Chapter 3, *Transportation*, for a summary of TDM measures. The Proponent will participate in the MBTA's Perq corporate pass program to offer pre-tax transit benefits to all tenants and a subsidized bike share membership per the City's Bike Share Corporate Program will be offered to each tenant.

Comment 14.12

Proponent be required to build curbside allotment, designated pick-up drop off locations.

Response

The Proponent is committed to accommodating the anticipated pick-up/drop-off activity along designated curb space to minimize the potential disruption to non-Project traffic.

Refer to Section 3.10 of Chapter 3, *Transportation*, for a summary of the curbside activity and on-street curb lane allocation.

Tim McHale

Comment 15.1

Connect the greenway through the Genzyme site to the river.

Response

While the Project is confined to the PDA Area, the portion of the greenway east of the Project is part of the broader greenway plan included in the Framework Plan and is anticipated to be developed in phases over time. Prior to the completion of that phase of the greenway, access toward the Charles River will be provided via sidewalks along East Drive to Western Avenue and across to the river.

Comment 15.2

What does the Greenway look like when it's 100% completed?

Response

Refer to Section 4.4.1 in Chapter 4, *Urban Design,* for reference to the Project Greenway and related design approach. As noted, this project will exist in the context of the larger Framework Plan, including with respect to open space areas, which the Framework Plan currently contemplates future phases connecting existing Rena Park toward the Charles River.

Comment 15.3

What is the ratio of hardscape to green space?

Response

Refer to Section 7.3 in Chapter 7, *Infrastructure Systems* for a description of the proposed stormwater management system and impervious area. The proposed roadways are expected to be approximately 22% pervious with street trees, planter beds and permeable pavers. The Project Greenway is expected to be approximately 30% pervious with landscaped areas, trees, and bioswale.

Comment 15.4

In light of the recent BWSC/NASDEP meeting on 4/26, there were many comments on bringing the storm water to daylight via open channel and/or pond, thus making an attractive water feature on the site. This feature could also extend to the remaining area of the ERC. What would be options for this?

Response

A bioswale retention area has been incorporated into the Project Greenway, which will both provide stormwater storage and act as an aesthetic design feature. The bioswale will allow for educational opportunities surrounding stormwater and climate resiliency.

Comment 15.5

Where does the open space lead to in the Framework?

Response

Refer to Section 4.4.1 in Chapter 4, *Urban Design,* for reference to the Project Greenway and related design approach. As noted, this project will exist in a larger framework of the greenway, which will include future phases connecting existing Rena Park to the Charles River.

Comment 15.6

Consider adjusting the layout of the buildings in such a way that the 2-acre open greenspace is rotated 180 degrees and the buildings adjusted accordingly. This would open up the greenspace to the Community, the sun and sunsets. The ERC buildings would frame the east end, not Genzyme. The residential buildings and hotel would have a better view of the River. The space could feel more like a destination. Explain rationale for current design.

Response

The current design of Phase A has taken into consideration the Framework Plan and the strong desire from the community to have greater connectivity between Allston and the Charles River.

The suggested configuration was tested and studied by the design team and it yielded several undesirable results. From a Framework Plan perspective, it truncated the planned Allston to Charles River connection of the greenway, creating a terminus at the Sanofi site on East Drive rather than enhancing continuity and connection to the Charles River and Cambridge. In terms of the experience of being in the alternative layout, the design team found that such a configuration would funnel the dominant NW wind into the site and make many areas of the Project Greenway undesirable to be in, even during warmer months.

The current Project design provides a direct and expansive greenway connection that is part of a larger network linking Allston toward the Charles River, a formal gesture that opens up to the river and positions users along the greenway to directly connect to the Esplanade at the Western Ave Bridge. In comparison, if mirrored, the plan will create a focal point around the Sanofi Genzyme Building, disconnecting the greenway 'Hub' room from the greenway 'Connect + View' Rooms, and making the connection to the river difficult and unclear. Per the 2018 PDA Master Plan, Cattle Drive is intended to be a pedestrian-focused, green urban street. In the proposed plans for the Project, Cattle Drive has a strong urban edge that frames the street. This ensures that active program on the ground floor, can spill out and activate the street. If mirrored, Cattle Drive will have no urban edges towards Western Ave in phase A, creating a vast and undefined streetscape, and making activation and placemaking difficult. This is further exacerbated by required utility offsets and limited tree planting area moving south and is not desirable for an active and defined urban streetscape.

The Project scheme is more compact at the western edge than at the eastern edge, at the intersection with Cattle, where the scale and intensity of the public realm creates an active urban plaza condition and square-like crossing. To the east, where the Project Greenway intersects East Drive, the Project Greenway opens up and hosts a sunny and larger space that can accommodate tree growth, lawn, and planting areas that convey a true feeling of green and immersion.

The Treehouse Conference Center is positioned at Western Ave and East Drive, across from Kresge Way, a major urban and pedestrian connection into the Harvard Business School. This positions the building as a 'gateway' building when arriving from the east and connects the Treehouse Conference Center to strong existing pedestrian flows from the campus. If mirrored, the Treehouse Conference Center would sit away from the main urban and pedestrian flows northbound, making pedestrian flows less obvious, and would 'hide' the Treehouse Conference Center when arriving from the East on Western Ave.

As currently contemplated, the wider east side of the Project Greenway wraps the Treehouse Conference Center, and expands the feeling of the Project Greenway and a porous public realm to directly connect with Western Ave and the pedestrian corridor to the Western Ave Bridge and Charles River Esplanade.

Additionally, the current design takes into account the particular wind conditions of the Project Site, sheltering the Project Greenway from the dominant NW winds. If mirrored, the scheme would open up to the NW, creating a windy plaza at the intersection of Cattle and Western Ave, and would offer less sheltered areas in the Project Greenway, effectively reducing the level of comfort and habitability of the Project Greenway year-round.

Comment 15.7

What makes the public realm plaza a destination for a diverse group of residents? Is this a high-end gallery of expensive shops or a walking mall of affordable retail? How do people get there easily?

Response

Frontage areas of the lab, residential, and Treehouse Conference Center facing the Project Greenway may host outdoor restaurant or café seating, or other retail and cultural programs extending from the building interior onto the outdoor space. These are proposed as a natural extension of the Project Greenway space with the intent and supporting an active and successful retail edge, while Project Greenway areas such as the grove, plaza, lawn, and stormwater retention basin are intended for wide public use, with no expectation of participation in retail activities.

Additionally, the Proponent does not envision the Project retail as a high-end gallery of expensive shops and has made commitments to foster local, small, MBE, and/or WBE retailers as detailed in Section 1.3.2 of Chapter 1, *Project Description*

Comment 15.8

All buildings could be stepped back at the fourth or fifth story along the greenspace and Western Ave to heighten the human experience.

Response

As part of the development of the Project master plan design, the lab/office buildings were designed to step back from the Project Greenway in order to enhance access to sunlight and to create a more human-scaled experience. The buildings on the north side of the Project Greenway will have minimal impact from a daylighting standpoint, but their architecture (from massing, to façade design) will work to enhance the pedestrian experience from both a scale and climate perspective.

Comment 15.9

What is timeline for phase 2?

Response

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. Please refer to Chapter 2, *Phase B* for further details regarding the timing of that component.

Comment 15.10/15.11

Funding to improve public transit improvements before approval for study or creation of a private shuttle service. Transit improvements include bus lanes, bus shelters, and signal replacement to allow for transit signal priority. Should a shuttle be implemented it be open and accessible to the public.

Funding for safety and accessibility improvements for all bus stops within 0.5 mile radius. Improvements include bus shelters, lighting, garbage cans, bike racks, and real-time countdowns.

Response

See response to Comment 14.2/14.3 and refer to Section 3.12.2 of Chapter 3, *Transportation*, for a description of the proposed transit mitigation program.

Comment 15.12

Work with the MBTA's Sales Network team include Charlie Card sales locations (vending machines and/or retail)

Response

The Proponent intends to coordinate with the MBTA regarding this topic.

Comment 15.13

Provide covered and secured storage and charging capabilities for bicycles and other micro-mobility devices (e.g., scooter and e-bikes)

Response

Refer to Section 3.4.5.2 of Chapter 3, *Transportation*, for a summary of the proposed on-site bike parking accommodations.

Comment 15.14

Provision of electric vehicle charging stations in the parking garage

Response

Consistent with the City of Boston's Electric Vehicle Readiness Policy, the project will equip 25% with electrical supply and the remaining 75% will be EV ready for the future.

Comment 15.15

Provide discounts or free monthly MBTA passes and Bluebikes yearly passes to residents who do not use their parking spots

Response

Refer to Section 3.12.5 of Chapter 3, *Transportation*, for a summary of planned TDM measures. The Proponent will participate in the MBTA's Perq corporate pass program to offer pre-tax transit benefits to all tenants and a subsidized bike share membership per the City's Bike Share Corporate Program will be offered to each tenant.

Comment 15.16

We would like to see a minimum 20% IDP units at range of area median income between 50 and 100%, 20% of the 2- and 3-bedroom units should be IDP with a range between 50 and 70% AMI with average less than 70%

Response

The Proponent is committed to providing approximately 18% on-site affordability in aggregate across Phase A and Phase B, with 17% of units in Phase A being affordable, and 19%-20% of units in Phase B being affordable, significantly above the 13% required by the City's IDP Policy. The Proponent anticipates that the Phase A affordable units will be available as early as 2024. The Project currently anticipates that 15% of Phase A's onsite 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 2% greater than under the City's IDP policy. An additional 2% of Phase A's onsite units will be affordable units allocated to additional below-market workforce housing for families earning up to 100% of AMI. The Proponent is open to offering units with deeper levels of affordability, but recognizes that, to balance the units with deeper affordability, some units would need to be offered at higher AMIs. The Proponent is interested in understanding whether the community is interested in Project including units at both lower and higher AMI levels.

Comment 15.17

Special consideration should be given to families, seniors, persons with disabilities

Response

Further detail regarding housing and housing affordability are noted in Section 1.3.5 of Chapter 1, *Project Description*.

Comment 15.18

Condensed unit size seems to discourage family occupancy

Response

The Proponent is not proposing Compact Living units at the Project. A summary of the types of units proposed is provided below:

Unit Type	% of Units
Studio	38%
One-bedroom	48%
Two-bedroom	14%
Total	**100%**

Comment 15.19

Rental priority should be given to current Allston Brighton residents

Response

The Proponent is supportive of providing rental priority to current Allston Brighton residents, however, the Proponent needs to further explore whether this is legally permissible.

Comment 15.20

Is the project currently designed geared toward students as opposed to long term residents?

Response

The Project is designed to attract a diverse range of potential residents, including long-term residents.

Comment 15.21

The rental costs should be disclosed. The proponent's stated goal is inclusivity, which included affordability and diversity. Please explain the socio-demographic market targets for this project for residents and businesses.

Response

The rent charged for affordable residential units will be established based on the requirements of the City's IDP program and detailed on the BPDA's website. The mix of unit types and the mix of affordable and market-rate units will attract residents with a range of incomes and with different household compositions, and the Proponent has agreed to comply, voluntarily, with the City's recently enacted AFFH program, which was created to support the development of diverse and inclusive projects.

Comment 15.22

Address new Affirmatively Furthering Fair Housing (AFFH) zoning documentation requirements in Draft Environmental Impact Report

Response

The Proponent will voluntarily comply with the AFFH program recently approved by the City of Boston, with further detail provided in Section 1.4 of Chapter 1, *Project Description*.

Comment 15.23

The proposed project includes a substantial amount of retail space. We would like these spaces to support local small businesses including those owned by women and minorities, including offering spaces at below market rents.

Response

As detailed in Section 1.3.2 of Chapter 1, *Project Description*, the Proponent's vision for the Project retail 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.

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 to operate at the Project.

Comment 15.24

It will also be important to design these spaces to be a size that would be affordable to a small local business, rather than larger spaces that only a chain would be able to afford.

Response

The Proponent agrees that a range of retail spaces need to be and will be included to accommodate smaller retailers, and tailoring the size of retail spaces is one of the tools available to the Proponent to support the Project's commitment to attract local, small, MBE, and/or WBE retailers.

Comment 15.25

The developer must also commit to working with contractors and subcontractors that comply with the Boston Residents Jobs Policy; additionally, the Proponent must actively monitor the project to ensure that all standards of this Policy are met. We strongly support the Boston Residents Jobs Policy and the employment of people of color, women, and other Boston residents in Boston construction projects.

Response

The Proponent shares the community's support of and commitment to the Boston Residents Jobs Policy, and the employment of people of color, women and other Boston residents in the construction of the Project, and the Proponent will comply with the BRJP.

Comment 15.26

The Community Benefit package for this project should be negotiated with Harvard, not Tishman Speyer. The community benefits associated with the three Harvard properties under consideration for development (180 Western, 176 Lincoln, and ERC) should all be addressed together with Harvard. The relationship Harvard and the Community enjoy will streamline the process instead of inserting three separate entities in the mix.

Response

The Proponent is the developer of the Project, and cannot address the community benefits of other projects. The Project includes significant community benefits as outlined in Chapter 1, *Project Description*, and look forward to discussing the Project and its benefits with the City and the community.

APPENDIX A: Metes and Bounds

LEGAL DESCRIPTION OF
PROPOSED PLANNED DEVELOPMENT AREA (PDA)

A parcel of land in the Allston district of the City of Boston, County of Suffolk, Commonwealth of Massachusetts, being shown as Proposed Planned Development Area on a plan titled "Proposed PDA Parcel, 100 Western Avenue, Boston (Allston), Massachusetts, Prepared for Harvard Planning Office", dated October 9, 2017 by WSP and recorded with Suffolk County Registry of Deeds in Plan Book 2017 Plan No.____ further bounded and described as follows:

Commencing from a concrete bound on the southerly sideline of Western Avenue, said concrete bound being 119± feet west of Soldiers Field Road; thence, S 83°29'59" W, a distance of 329.02 feet along the southerly sideline of Western Avenue to the point of beginning, said point being the northeast corner of the parcel herein described; thence,

S 02º30'04" E	a distance of six hundred twenty-eight and seventy-six hundredths feet (628.76') to a point; thence,
S 87º29'56" W	a distance of three hundred twenty-two and nighty-eight hundredths feet (322.90') to a point; thence,
S 06º29'33" E	a distance of two hundred seventy-one and sixty-five hundredths feet (271.65') to point; thence,
S 87º29'56" W	a distance of four hundred sixty-six and sixty-five hundredths feet (466.65') to a point; thence,
N 06º39'10" W	a distance of eight hundred forty-two and seventy-four hundredths feet (842.74') to a point on the southerly sideline of Western Avenue; thence,
N 83º20'50" E	a distance of four hundred seven and thirty-six hundredths feet (407.36') along the southerly sideline of Western Avenue to a point; thence,
N 83º29'59" E	a distance of four hundred twenty-six and forty hundredths feet (426.40') along the southerly sideline of Western Avenue to the point of beginning.

Containing an area of 613,305± square feet or 14.08± acres.

APPENDIX B: BPDA Checklists

Contents:

ARTICLE 80 – ACCESSIBILITY CHECKLIST

A Requirement of the Boston Planning & Development Agency (BPDA)
Article 80 Development Review Process

The Mayor's Commission for Persons with Disabilities works to reduce architectural barriers that impact accessibility in Boston's built environment. This Checklist is intended to ensure that accessibility is planned at the beginning of projects, rather than after a design is completed. It aims to ensure that projects not only meet minimum MAAB/ADA requirements, but that they create a built environment which provides equitable experiences for all people, regardless of age or ability.

All BPDA Small or Large Project Review, including Institutional Master Plan modifications, must complete this Checklist to provide specific detail and data on accessibility. An updated Checklist is required if any project plans change significantly.

For more information on compliance requirements, best practices, and creating ideal designs for accessibility throughout Boston's built environment, proponents are strongly encouraged to meet with Disability Commission staff prior to filing.

Accessibility Analysis Information Sources:

1. Age-Friendly Design Guidelines - Design features that allow residents to Age in Place https://www.enterprisecommunity.org/download?fid=6623&nid=3496
2. Americans with Disabilities Act – 2010 ADA Standards for Accessible Design http://www.ada.gov/2010ADAstandards_index.htm
3. Massachusetts Architectural Access Board 521 CMR http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/aab/aab-rules-and-regulations-pdf.html
4. Massachusetts State Building Code 780 CMR http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/csl/building-codebbrs.html
5. Massachusetts Office of Disability – Disabled Parking Regulations http://www.mass.gov/anf/docs/mod/hp-parking-regulations-summary-mod.pdf
6. MBTA Fixed Route Accessible Transit Stations http://www.mbta.com/riding_the_t/accessible_services/
7. City of Boston – Complete Street Guidelines http://bostoncompletestreets.org/
8. City of Boston – Mayor's Commission for Persons with Disabilities http://www.boston.gov/disability
9. City of Boston – Public Works Sidewalk Reconstruction Policy http://www.cityofboston.gov/images_documents/sidewalk%20policy%200114_tcm3-41668.pdf
10. City of Boston – Public Improvement Commission Sidewalk Café Policy http://www.cityofboston.gov/images_documents/Sidewalk_cafes_tcm3-1845.pdf
11. International Symbol of Accessibility (ISA) https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/guide-to-the-ada-standards/guidance-on-the-isa
12. LEED – Pilot Credits for Social Equity and Inclusion https://www.usgbc.org/articles/social-equity-pilot-credits-added-leed-nd-and-leed-om

Glossary of Terms:

1. ***Accessible Route*** – A continuous and unobstructed path of travel that meets or exceeds the dimensional requirements set forth by MAAB 521 CMR: Section 20
2. ***Accessible Guestrooms*** – Guestrooms with additional floor space, that meet or exceed the dimensional requirements set forth by MAAB 521 CMR: Section 8.4
3. ***Age-Friendly –*** Implementing structures, settings and polices that allow people to age with dignity and respect in their homes and communities
4. ***Housing – Group 1 Units –*** Residential Units that contain features which can be modified without structural change to meet the specific functional needs of an occupant with a disability, per MAAB 521 CMR: Section 9.3
5. ***Housing – Group 2 Units –*** Residential units with additional floor space that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 9.4
6. ***Ideal Design for Accessibility –*** Design which meets, as well as exceeds, compliance with AAB/ADA building code requirements
7. ***Inclusionary Development Policy (IDP)*** – Program run by the BPDA that preserves access to affordable housing opportunities in the City. For more information visit: http://www.bostonplans.org/housing/overview
8. ***Public Improvement Commission (PIC)*** – The regulatory body in charge of managing the public right of way in Boston. For more information visit: https://www.boston.gov/pic
9. ***Social Equity LEED Credit –*** Pilot LEED credit for projects that engage neighborhood residents and provide community benefits, particularly for persons with disabilities
10. ***Visitability*** – A structure that is designed intentionally with no architectural barriers in its common spaces (entrances, doors openings, hallways, bathrooms), thereby allowing persons with disabilities who have functional limitations to visit

Today's Date:	**Your Name and Title:**			
1. Project Information: *If this is a multi-phased or multi-building project, fill out a separate Checklist for each phase/building.*				
Project Name:	**Enterprise Research Campus Project**			
Project Address(es):	**100 Western Avenue**			
Total Number of Phases/Buildings:	**Phase A, 5 Buildings**			
Primary Contact: (Name / Title / Company / Email / Phone):	**Rustom Cowasjee / Managing Director / Tishman Speyer / rcowasjee@tishmanspeyer.com / 202-420-2123**			
Owner / Developer:	**Tishman Speyer**			
Architect:	**Henning Larsen, Studio Gang (Master Planners)_**			
Civil Engineer:	**Nitsch Engineering**			
Landscape Architect:	**Scape Landscape Architecture**			
Code Consultant:	**Code Red Consultants**			
Accessibility Consultant (*If you have one)*:	**N/A**			
What stage is the project on the date this checklist is being filled out?	SPRA / PNF / Expanded PNF Submitted	**Draft** / Final Project Impact Report Submitted	BPDA Board Approved or other: ___________	
2. Building Classification and Description: *This section identifies preliminary construction information about the project including size and uses.*				
What are the dimensions of the project? See below:				
Site Area:	*260, 246 SF*	Building Area:	*900,000 GSF*	
First Floor Elevation:	+18 – 19.5 ft. BCB	Any below-grade space	***Yes*** */ No*	
What is the construction classification?	**New Construction**	Renovation	Addition	Change of Use
Do you anticipate filing any variances with the MAAB (Massachusetts Architectural Access Board) due to non-compliance with 521 CMR?	YES **NO**			
If yes, is the reason for your MAAB variance: (1) technical infeasibility, **OR** (2) excessive and unreasonable cost without substantial benefit for persons with disabilities? Have you met with an accessibility consultant or Disability Commission to try to achieve compliance rather than applying for a variance? Explain:	**(1) OR (2)**			
What are principal building uses? (using IBC definitions, select all appropriate that apply):	**Residential – One - Three Unit**	**Residential - Multi-unit, Four+**	Institutional	Educational
	Business	Mercantile	Factory	**Hospitality**
	Laboratory / Medical	Storage, Utility and Other	Other: **Conference Center**	
List street-level uses of the building:	Lab/Office, Retail/Restaurant, Hotel, Conference Center			

3. Accessibility of Existing Infrastructure: *This section explores the proximity to accessible transit lines and institutions. Identify how the area surrounding the development is accessible for people with mobility impairments, and analyze the existing condition of the accessible routes to these sites through sidewalk and pedestrian ramp reports*.	
Provide a description of the neighborhood where this development is located and its identifying topographical characteristics:	The Project is the first phase of the Harvard Enterprise Research Campus Project located in Allston, roughly bounded by Soldiers Field Road and the Charles River to the east, Western Ave to the north, an existing Allston small-scale residential neighborhood to the west, and Cambridge St to the south. Within the Phase 1 PDA boundary, the topography ranges from ~18’ BCB on Western Ave to ~16’ BCB by the District Energy Facility.
List the surrounding accessible MBTA transit lines and their proximity to development site, including commuter rail, subway stations, and bus stops:	The MBTA bus line route 70 is located on Western within 100 feet to the east and 500 feet to the west. The MBTA bus line route 64 is located on Cambridge Street to the south of the Project Site, within approximately 1,000 feet. The MBTA Commuter Rail Boston Landing station on the Framingham/Worcester Line is located within approximately 5,000 feet to the southwest.
List surrounding institutions and their proximity: hospitals, public housing, elderly and disabled housing, educational facilities, others:	The Harvard Business School campus to the immediate north; the Harvard Business Athletics campus further north; the Harvard main academic campus to the east beyond the Charles River; the Harvard Science and Engineering Complex to the west; the Harvard Innovation Labs, Harvard Launch Labs, and the Harvard Education Portal down Western Avenue; and the Harvard Grad Apartments to the east.
List surrounding government buildings and their proximity: libraries, community centers, recreational facilities, and related facilities:	The Honan-Allston Branch of the Boston Public Library is located to the southwest. The City of Boston School Department, the Gardner Pilot Academy, and the Josephine Fiorentino Community Center are located to the west.
4. Surrounding Site Conditions – Existing: *This section identifies current condition of the sidewalks and pedestrian ramps at the development site.*	
Is the development site within a formally recognized historic district? ***If yes,*** which one?	**NO**
Are there existing sidewalks and pedestrian ramps at the development site? ***If yes***, list the existing sidewalk and pedestrian ramp slopes, dimensions, materials, and physical condition:	**YES** A sidewalk currently exists along the south side of Western Avenue through the length of the Project Site. The sidewalk is approximately 8 to 9 feet wide and is made of cast-in-place concrete with a granite curb. The sidewalk is in adequate condition. No other sidewalks or ramps currently exist around the Project Site.
Are the sidewalks and pedestrian ramps existing-to-remain? ***If yes,*** have they been verified as ADA/MAAB compliant (with yellow composite detectable warnings, cast in concrete)? ***If yes,*** provide description and photos. If ***no,*** explain plans for compliance:	**NO** ADA/MAAB-compliant sidewalks will be provided along all roadways around the Project Site, including Western Avenue, East Drive, DEF Drive, and Cattle Drive. Specific materials and dimensions have not yet been determined; however, all materials and dimensions will comply with ADA/MAAB requirements.
5. Surrounding Site Conditions – Proposed *This section identifies the proposed condition of the sidewalks and pedestrian ramps around the development site. Ideal sidewalk width contributes to lively pedestrian activity, allowing people to walk side by side and pass each other comfortably walking alone, in pairs, or using a wheelchair or walker.*	

Are the proposed sidewalks consistent with Boston Complete Streets? ***If yes***, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, or Boulevard. Explain:	**YES** The proposed sidewalks are consistent with Boston Complete Streets. Sidewalk design and anticipated pedestrian volumes along Western Avenue are compatible with a Neighborhood Connector. Similarly, East Drive and Cattle Drive are compatible with a Neighborhood Connector, while DEF Drive is compatible with an Industrial Street. Except for DEF Drive, all other streets surrounding the Project Site will have a continuous street wall and will be activated with retail, building lobbies, and other active uses.
What are the total dimensions and slopes of the proposed sidewalks? List the widths of each proposed zone: Frontage, Pedestrian and Furnishing Zone:	Western Avenue: Frontage: ranges between 2' and 30' Pedestrian: 6' Furnishing: 4'-5" Bike lane: 6'-5" Cross slope for drainage 1%-2% East Drive: Frontage: ranges between 2' and 22'6" Pedestrian: ranges between 7'-6" and 12'-6" Furnishing: 5' (Shuttle Drop-off area ranges between 4'6" and 9'-6") Bike lane: 6' Cross slope for drainage 1%-2% DEF Drive: Frontage: 2' Pedestrian: 6' Furnishing: 2'-6" on south side, 7'-6" on north side Cross slope for drainage 1%-2% Cattle Drive: Frontage: ranges between 2' and 9' Pedestrian: 8'-6" Furnishing: 5' Bike lane: 6' Cross slope for drainage 1%-2%
List the proposed materials for each Zone. Will the proposed materials be on private property or will the proposed materials be on the City of Boston pedestrian right-of-way?	Specific materials within the Project Site have not yet been identified. It is anticipated that materials will include cast-in-place concrete paving, permeable unit pavers, and porous bituminous paving within City of Boston pedestrian right-of-way. Materials for frontage zone on private property have not yet been identified.
Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way? ***If yes,*** what are the proposed dimensions of the sidewalk café or furnishings and what will the remaining right-of-way clearance be?	**YES** Sidewalk cafés and other furnishings are planned for the frontage zones along Western Avenue, East Drive, and Cattle Drive. The full dimensions of frontage zones have not yet been determined. The minimal remaining right of way clearances are as follows: Western Avenue: 6' East Drive: 7'-6" Cattle Drive: 8'-6"

If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the Public Improvement Commission (PIC)?	N/A
Will any portion of this project be going through the Public Improvement Commission (PIC)? If yes, identify PIC actions and provide details:	**YES** The following PIC actions may be required: • Line and Grade (if the roadways are expected to be public ways) • Layout (if the roadways are expected to be private ways) • Specific Repairs (for proposed improvements) • Pedestrian Easement (for Western Avenue only if additional sidewalk width is needed) • Earth Retention Systems (For Western Avenue, if temporary earth retention is required in the public way during construction) • Projections (if any canopies or awnings are expected over the public way) • Sidewalk Café (if any outdoor restaurant cafes are expected to use public way sidewalk)
6. Building Entrances, Vertical Connections, Accessible Routes, and Common Areas: *The primary objective in ideal accessible design is to build smooth, level, continuous routes and vertical connections that are integrated with standard routes, not relocated to alternate areas. This creates universal access to all entrances and spaces, and creates equity for persons of all ages and abilities by allowing for "aging in place" and "visitability" (visiting neighbors)*.	
Are all of the building entrances accessible? Describe the accessibility of each building entrance: flush condition, stairs, ramp, lift, elevator, or other. If all of the building entrances are ***not accessible***, explain:	**YES** Refer to Figure 4.19a for a preliminary site accessibility diagram. It is anticipated that all building entrances will be accessible via a combination of flush conditions and ramps.
Are all building entrances well-marked with signage, lighting, and protection from weather?	**TBD** Signage, lighting, and protection from weather have yet to be determined at this time. Additional details will be provided as the design advances.
Are all vertical connections located within the site (interior and exterior) integrated and accessible? Describe each vertical connection (interior and exterior): stairs, ramp, lift, elevator, or other. If all the vertical connections are ***not integrated and accessible***, explain:	**YES** It is anticipated that all vertical connections located within the site (both interior and exterior) are integrated and accessible. Exterior vertical connections will be integrated via accessible ramps and sloped surfaces. Interior vertical connections will be integrated via accessible ramps and elevators. Refer to Figure 4.19a for a preliminary site accessibility.
Are all common spaces in the development located on an accessible route? Describe:	**YES** All common spaces in the development will be located on an accessible route. Additional details will be provided as the design advances.
Are all of the common spaces accessible for persons with mobility impairments? (Examples: community rooms, laundry areas, outdoor spaces, garages, decks/roof decks):	**YES** All common spaces in the Project will be accessible for persons with mobility impairments. Additional details will be provided as the design advances.

What built-in features are provided in common public spaces? (Examples: built-in furnishings such as tables, seating; countertop heights, outdoor grills and benches). Are these accessible? Do benches and seats have armrests? Describe:	Built-in features in common public spaces have yet to be determined at this time. Additional details will be provided as the design advances. Built-in features will be accessible where required.
If this project is subject to Large Project Review/Institutional Master Plan, describe the accessible routes way-finding / signage package:	While the Project is subject to the Large Project Review, the accessible routes way-finding / signage package has yet to be determined at this time. Additional details will be provided as the design advances.
7. Accessible Housing Units (If applicable) – Residential Group 1, Group 2, and Hospitality Guestrooms *In order to create accessible housing and hospitality rooms, this section addresses the number of accessible units that are proposed for barrier-free housing and hotel rooms in this development.*	
What is the total number of proposed housing units or hotel rooms for this development?	This development proposes 345 housing units and a hotel with 250 keys.
If a residential development, how many units are for sale? How many are for rent? What is the breakdown of market value units vs. IDP (Inclusionary Development Policy) units?	The breakdown of residential units has not yet been determined.
If a residential development, will all units be constructed as MAAB Group 1* units, which have blocking and other built-in infrastructure that makes them adaptable for access modifications in the future? *(*this is required in all new construction)*:	**YES**
If a residential development, how many fully built-out ADA (MAAB Group 2) units will there be? (*requirement is 5%*):	Approximately 19 units will be accessible representing 5% of the 345 total residential units.
If a residential development, how many units will be built-out as ADA/MAAB sensory units? (*requirement is 2%):*	Approximately 7 units will be built-out as ABA/MAAB sensory units representing 2% of the 345 total residential units.
If a residential development, how many of the fully built-out ADA (MAAB Group 2) units will also be IDP units? ***If none***, explain:	5% of the IDP residential units will also be Group 2A.
If a hospitality development, how many of the accessible units will feature a wheel-in shower? Will accessibility features and equipment be built in or provided (built-in bench, tub seat, etc.)? ***If yes,*** provide details and location of equipment:	For a hotel of 250 rooms, at least 3 rooms with wheel-in showers will be provided. Wheel-in showers will have hinged seats and handled shower heads.
Do the proposed housing and hotel units that are standard, non-ADA units (MAAB Group 1) have any architectural barriers that would prevent entry or use of the space by	The Proponent is still in the process of confirming the interior design of the hotel rooms. The Proponent will continue to evaluate the standard hotel room designs and try to minimize possible mobility impairments.

persons with mobility impairments? (Example: stairs or thresholds within units, step up to balcony, etc.). ***If yes,*** explain:	
8. Accessible Parking: *See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirements and the Massachusetts Office of Disability Disabled Parking Regulations*.	
What is the total number of parking spaces provided at the development site? Will these be in a parking lot or garage? Will they be mechanically stacked? Explain:	A total of approximately 620 parking spaces are proposed for the Project. Of these, approximately 300 spaces will be in a 1-level basement garage (refer to Figures 4.19b and 4.19c), approximately 40 spaces will be on-street/managed curb space, and the remaining 280 will be located in a temporary surface lot, the location of which is TBD. Additionally, there will be on-street parking along East and Cattle Drives. Mechanically stacked spaces are not considered at this time.
How many of these parking spaces will be designated as Accessible Parking Spaces? How many will be "Van Accessible" spaces with an 8 foot access aisle? Describe:	There will be a total of seven accessible parking spaces in the basement garage and a total of seven accessible parking spaces in the surface lot. Within each parking lot, two will be "van accessible." The location of these accessible spaces has yet to be determined. Additional details will be provided as the design advances.
Will visitor parking be provided? If ***yes,*** where will the accessible visitor parking be located?	**TBD** Visitor parking and location has not yet been determined at this time.
Has a drop-off area been identified? ***If yes,*** where is it located, and is it wheelchair accessible?	**YES** Refer to Figure 3.7 for drop-off locations. It is anticipated that there will be four drop-off areas. Drop-off for the hotel tower, residential tower, and the ERC Center will be combined and located along Western Avenue. Additional drop-off will be located along East Drive, adjacent the ERC Center. Drop-off for the east lab building will be located along East Drive, adjacent the building. Drop-off for the west lab building will be located along Cattle Drive, adjacent the building. It is anticipated that these will be wheelchair accessible.
9. Community Impact: *Accessibility and inclusion extend past required compliance with building codes to providing an overall development that allows full and equal participation of persons with disabilities and older adults.*	
Has the proponent looked into either of the two new LEED Credit Pilots for (1) Inclusion, or (2) Social Equity – with a proposal that could increase inclusion of persons with disabilities? ***If yes,*** describe:	**NO** The LEED checklists for each building typology have not yet identified either of these innovation credits in the ID credit category, but the Project Team will review the credit criteria for Social Equity within the operations and maintenance staff, for consideration. Comprehensive composting has been identified as a pilot credit for achievement.
These new LEED Pilot Credits may be awarded for filling out this checklist and evaluating ways to add features to your design that will increase equity for persons with disabilities. Have you looked at this list to assess the feasibility of adding any of these features?	**YES** The Project will explore opportunities to implement universal design principles that seek to provide a built environment for the widest range of ages and abilities and exceeds the minimal ADA/MAAB requirements.
Is this project providing funding or improvements to the surrounding neighborhood or to adjacent MBTA Station infrastructure? (Examples: adding street	**NO, not at this time.**

trees, building or refurbishing parks, adding an additional MBTA elevator or funding other accessibility improvements or other community initiatives)? ***If yes,*** describe:	
Will any public transportation infrastructure be affected by this development, during and/or post-construction (Examples: are any bus stops being removed or relocated)? ***If yes***, has the proponent coordinated with the MBTA for mitigation? Explain:	**YES** The Project is considering a possible relocation of an MBTA bus stop on Western Avenue. Coordination with the MBTA has not taken place at this time. The Proponent will engage with the MBTA regarding proposed changes to Western Avenue, if needed.
During construction, will any on-street accessible parking spaces be impacted (during and/or post-construction)? **If yes,** what is the plan for relocating the spaces?	**NO**
Has the proponent reviewed these plans with the City of Boston Disability Commission Architectural Access staff? ***If no,*** will you be setting up a meeting before filing?	**NO**

10. Attachments *Include a list of all documents you are submitting with this Checklist – drawings, diagrams, photos, or any other materials that describe the accessible and inclusive elements of this project.*
Provide a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations, including route distances. **Refer to Figures 4.19b and 4.19c for a preliminary site accessibility plan. Additional details will be provided as the design advances.**
Provide a diagram of the accessible route connections through the site, including distances. **Refer to Figure 4.19a for a preliminary site accessibility plan. Additional details will be provided as the design advances.**
Provide a diagram the accessible route to any roof decks or outdoor space (if applicable). **Public roof decks and outdoor spaces have not yet been determined. Additional details will be provided as the design advances.**
Provide a plan and diagram of the accessible Group 2 units, including locations and route from accessible entry. **Location of Group 2 units have not yet been determined. Additional details will be provided as the design advances.**
Provide any additional drawings, diagrams, photos, or any other material that describes the inclusive and accessible elements of this project. **Refer to Figure 4.19a for a preliminary site accessibility plan. Additional detail will be provided as the design advances.**

This completes the Article 80 Accessibility Checklist required for your project. Prior to and during the review process, Commission staff are able to provide technical assistance and design review, in order to ensure that all buildings, sidewalks, parks, and open spaces are welcoming and usable to Boston's diverse residents and visitors, including those with physical, sensory, and other disabilities.

For questions about this checklist, or for more information on best practices for improving accessibility and inclusion, visit www.boston.gov/disability, or contact our Architectural Access staff at:

ADA@boston.gov | patricia.mendez@boston.gov | sarah.leung@boston.gov |
617-635-3682 (phone) | 617-635-2726 (fax) | 617-635-2541 (tty)

The Mayor’s Commission for Persons with Disabilities
Boston City Hall, One City Hall Square, Room 967, Boston MA 02201

Updated: October, 2019

boston planning & development agency

Climate Resiliency Checklist

NOT FOR FILING

NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

A.1 - Project Information

Project Name:	Enterprise Research Campus Project			
Project Address:	100 Western Avenue			
Project Address Additional:				
Filing Type (*select*)	*Initial (**PNF**, EPNF, NPC or other substantial filing)* *Design / Building Permit (prior to final design approval), or* *Construction / Certificate of Occupancy (post construction completion)*			
Filing Contact	*Name* Rustom Cowasjee	*Company:* Tishman Speyer	*Email* rcowasjee@tishmanspeyer.com	*Phone* 202-420-2123
Is MEPA approval required	Yes/*no*		*Date* To be obtained	

A.3 - Project Team

Owner / Developer:	Tishman Speyer ERC Developer, L.L.C.
Architect:	Henning Larsen, Studio Gang
Engineer:	Nitsch Engineering
Sustainability / LEED:	Arup, LEVEL
Permitting:	VHB
Construction Management:	TBD

A.3 - Project Description and Design Conditions

List the principal Building Uses:	Lab / Office
List the First Floor Uses:	Retail and Restaurant space
List any Critical Site Infrastructure and or Building Uses:	At this time, no critical infrastructure or building uses have been identified.

Site and Building:

Site Area:	*260,246 SF*	Building Area:	*440,000 SF*
Building Height:	*140 Ft*	Building Height:	*9 Stories*
Existing Site Elevation – Low:	*13.0 Ft BCB*	Existing Site Elevation – High:	*20.7 Ft BCB*
Proposed Site Elevation – Low:	*17.0 Ft BCB*	Proposed Site Elevation – High:	*19.5 Ft BCB*
Proposed First Floor Elevation:	*19.5 Ft BCB*	Below grade levels:	*1 Story*

Article 37 Green Building:

LEED Version - Rating System :	*LEED-Core & Shell (LEED-CS) v4*	LEED Certification:	Yes / *No*
Proposed LEED rating:	*Certified/Silver/* Gold*/Platinum*	Proposed LEED point score:	*71 points*

Building Envelope

When reporting R values, differentiate between R discontinuous and R continuous. For example, use "R13" to show R13 discontinuous and use R10c.i. to show R10 continuous. When reporting U value, report total assembly U value including supports and structural elements.

Refer to Chapter 4 of the PNF for building typology specific building envelope criteria definition.

Roof:	*R-40*	Exposed Floor:	*R-30 all typologies*
Foundation Wall:	*R-7.5 c.i*	Slab Edge (at or below grade):	*F-0.51 (Unheated slab)*

Vertical Above-grade Assemblies (%'s are of total vertical area and together should total 100%):

Area of Opaque Curtain Wall & Spandrel Assembly:	*10%*	Wall & Spandrel Assembly Value:	*U-0.05 opaque U-0.1 spandrel*
Area of Framed & Insulated / Standard Wall:	*49%*	Wall Value	*R-20 opaque R-10 spandrel*
Area of Vision Window:	*41%*	Window Glazing Assembly Value:	*U-0.32*
		Window Glazing SHGC:	*SHGC 0.3*
Area of Doors:	*3-5%*	Door Assembly Value:	*U-0.500*

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined	Preliminary energy modeling has been completed to determine the energy impacts of the Base Case and Proposed Design for each building typology, using IES-VE software. Additional options will be included in the next filing. The results stated below represent the Project. Refer to Chapter 4 of the PNF for building typology specific energy results.		
Annual Electric:	*15,509 MWh*	Peak Electric:	*4,334 kW*
Annual Heating Energy (Space Heating & DHW Components Energy):	*12,918 MMBtu*	Peak Heating Load:	*12 MMBtu/hr*
Annual Cooling: (Cooling Components Energy)	*7,286 MMBtu*	Peak Cooling Load:	*460 Tons*
Energy Use - Below ASHRAE 90.1 - 2013:	*30%*	Have the local utilities reviewed the building energy performance?:	*Yes /* no, not at this time
Energy Use - Below Mass. Code:	*30%*	Energy Use Intensity:	*117 kBtu/SF*

Back-up / Emergency Power System

Electrical Generation Output:	*2500 kW*	Number of Power Units:	*2 (estimated 1 per building)*
System Type:	*See above*	Fuel Source:	*Diesel*

Emergency and Critical System Loads (in the event of a service interruption)

Electric:	*At this time, no critical system loads have been identified.*	Heating:	*- (MMbtu/hr)*
		Cooling:	*- (Tons/hr)*

B – Greenhouse Gas Reduction and Net Zero / Net Positive Carbon Building Performance

Reducing GHG emissions is critical to avoiding more extreme climate change conditions. To achieve the City's goal of carbon neutrality by 2050 new buildings performance will need to progressively improve to net carbon zero and positive.

B.1 – GHG Emissions - Design Conditions

For this Filing - Annual Building GHG Emissions for the Project: *5,578 tpy*

For this filing - describe how building energy performance has been integrated into project planning, design, and engineering and any supporting analysis or modeling:

Preliminary energy modeling has been completed to determine the energy impacts of the Base Case and Proposed Design for the Project, using IES-VE software. Results are provided in Chapter 5 of the DPIR. At the earliest design phase of the project, energy and GHG emissions performance have been prioritized and analyzed.

Describe building specific passive energy efficiency measures including orientation, massing, envelop, and systems:

The Project has focused attention on first principles of an energy efficient design to reduce loads (and energy demand) for the buildings by optimizing the building envelope and daylight design 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 UxA calculation per the Stretch Energy Code Enhancements to building envelope design will be explored and assessed for cost effeteness via life cycle cost analysis in the DPIR as part of the Zero Carbon Building Assessment.

Describe building specific active energy efficiency measures including equipment, controls, fixtures, and systems:

The proposed design was based on several key energy efficiency and electrification strategies, which include:
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. Descriptions of the energy efficient systems and equipment are provided in Chapter 4 of the PNF.

The Project is estimated to reduce energy consumption by 33% and GHG emissions 21% from the Base Case. Further enhancements to building systems and electrification strategies will be explored and assessed for cost effeteness via life cycle cost analysis in the DPIR as part of the Zero Carbon Building Assessment. This includes a low carbon district energy feasibility study.

Describe building specific load reduction strategies including on-site renewable, clean, and energy storage systems:

The Project will consider the feasibility for installing roof-top solar photovoltaic (PV) systems at an individual building level. As part of the district energy feasibility study, thermal energy storage will be analyzed.

Describe any area or district scale emission reduction strategies including renewable energy, central energy plants, distributed energy systems, and smart grid infrastructure:

Renewable energy has been discussed above. The Proponent is committed to completing a District Energy Microgrid feasibility study for the Project as part of the DPIR submission to explore low carbon options to further reduce GHG emissions. 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.

Describe any energy efficiency assistance or support provided or to be provided to the project:

The Proponent will reach out to the various private utility companies to discuss opportunities for energy efficiency incentives as well as demand response once the HVAC system and lighting design have been refined further.

B.2 - GHG Reduction - Adaptation Strategies

Describe how the building and its systems will evolve to further reduce GHG emissions and achieve annual carbon net zero and net positive performance (e.g. added efficiency measures, renewable energy, energy storage, etc.) and the timeline for meeting that goal (by 2050):

The Project is committed to constructing a building that exceeds minimum energy code, optimizes GHG emissions reduction and develop a viable and practical pathway to carbon neutrality by 2050. The Project is currently being designed and constructed towards this goal by reducing energy demand through incorporation of an efficient building envelope, systems and making electricity the predominant energy source (87%) of energy demand. The Project's proposed design demonstrates a 82% reduction in natural gas energy and 82% reduction in natural gas GHG emissions. 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.

C - Extreme Heat Events

Annual average temperature in Boston increased by about 2˚F in the past hundred years and will continue to rise due to climate change. By the end of the century, the average annual temperature could be 56° (compared to 46° now) and the number of days above 90° (currently about 10 a year) could rise to 90.

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low:	0 Deg.	Temperature Range - High:	95 Deg.
Annual Heating Degree Days:	5596	Annual Cooling Degree Days	750

What Extreme Heat Event characteristics will be / have been used for project planning

Days - Above 90°:	30 days	Days – Above 100°:	2 days
Number of Heatwaves / Year:	3-5 /year	Average Duration of Heatwave (Days):	3 days

Describe all building and site measures to reduce heat-island effect at the site and in the surrounding area:

The Project will have a significant amount of green space resulting from the Greenway that will run through the middle of the site. In addition, the Project will consider additional ways to reduce urban heat island impacts through the use of hardscape materials with low solar reflectance, introduction of green space in the open space associated with each of the buildings and evaluating opportunities for the use of white membranes and green roofs. All buildings are targeting to achieve LEED SS Heat Island Reduction Credit, which addresses roof and non-roof areas . The tree canopy planned for the project will cover approximately 51,855 SF, which amounts to 20% of the site area.

C.2 - Extreme Heat – Adaptation Strategies

Describe how the building and its systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heatwaves, and longer heatwaves:

The Project will utilize first principles of an energy efficient design to reduce loads (energy demands) through passive design strategies of a high performance building envelope, daylighting and reduction in urban heat island effects. Refer to Chapter 5 of the DPIR for full details on energy performance.

Active systems will be designed to be energy efficient and exceed the stretch energy code. The HVAC system capacity will be designed for higher temperatures.

At equipment end of life, the opportunity to increase cooling capacity can be considered to further adapt to increased temperatures.

Describe all mechanical and non-mechanical strategies that will support building functionality and use during extended interruptions of utility services and infrastructure including proposed and future adaptations:

Generator power will be reviewed to provide additional capacity in excess of life safety requirements. A solar PV system will be assessed for its feasibility and could contribute to the project resilience strategy if implemented.

D - Extreme Precipitation Events

From 1958 to 2010, there was a 70 percent increase in the amount of precipitation that fell on the days with the heaviest precipitation. Currently, the 10-Year, 24-Hour Design Storm precipitation level is 5.25”. There is a significant probability that this will increase to at least 6” by the end of the century. Additionally, fewer, larger storms are likely to be accompanied by more frequent droughts.

D.1 – Extreme Precipitation - Design Conditions

10 Year, 24 Hour Design Storm: The Project is designing for 6.65” of rainfall

Describe all building and site measures for reducing storm water run-off:

The available site area between the buildings, known as the Greenway, will be used to provide stormwater storage and promote infiltration via underground chambers. Runoff from building roofs will be collected internally and directed to the infiltration systems. The new roadways surrounding the buildings will also be collected by catch basins and directed to the infiltration systems.

The Project is evaluating the potential for onsite stormwater reuse as well as opportunities for green roofs. Green space and planting are also being introduced throughout the site, as part of the large central Greenway and in the open space areas associated with each building. These strategies not only reduce stormwater generation but also reduce peak flow during events.

The Project will be designed to manage the 32-year storm, 6.65 inches of rainfall within its site boundary and designed to infiltrate 2.75" of rainfall, which is in excess of the 1.25" infiltration requirement from BWSC.

D.2 - Extreme Precipitation - Adaptation Strategies

Describe how site and building systems will be adapted to efficiently accommodate future more significant rain events (e.g. rainwater harvesting, on-site storm water retention, bio swales, green roofs):

The Project will be designed to manage the 32-year storm, 6.65" inches of rainfall within its site boundary. See reply D1 above.

E – Sea Level Rise and Storms

Under any plausible greenhouse gas emissions scenario, sea levels in Boston will continue to rise throughout the century. This will increase the number of buildings in Boston susceptible to coastal flooding and the likely frequency of flooding for those already in the floodplain.

Is any portion of the site in a FEMA SFHA?	*Yes* / No	What Zone:	A, AE, AH, AO, AR, A99, V, VE
		Current FEMA SFHA Zone Base Flood Elevation:	N/A

Is any portion of the site in a BPDA Sea Level Rise - Flood Hazard Area? Use the online BPDA SLR-FHA Mapping Tool to assess the susceptibility of the project site.	*Yes* / No

---

If you answered YES to either of the above questions, please complete the following questions.
Otherwise you have completed the questionnaire; thank you!

E.1 – Sea Level Rise and Storms – Design Conditions

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented on the BPDA Sea Level Rise - Flood Hazard Area (SLR-FHA) map, which depicts a modeled 1% annual chance coastal flood event with 40 inches of sea level rise (SLR). Use the online BPDA SLR-FHA Mapping Tool to identify the highest Sea Level Rise - Base Flood Elevation for the site. The Sea Level Rise - Design Flood Elevation is determined by adding either 24" of freeboard for critical facilities and infrastructure and any ground floor residential units OR 12" of freeboard for other buildings and uses.

Sea Level Rise - Base Flood Elevation:	*Ft BCB*		
Sea Level Rise - Design Flood Elevation:	*Ft BCB*	First Floor Elevation:	*Ft BCB*
Site Elevations at Building:	*Ft BCB*	Accessible Route Elevation:	*Ft BCB*

Describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Describe how the proposed Building Design Flood Elevation will be achieved including dry / wet flood proofing, critical systems protection, utility service protection, temporary flood barriers, waste and drain water back flow prevention, etc.:

While the site is not in the current FEMA floodplain and does not have a designated SLR-BFE from the City of Boston, the project is being proactive and evaluating opportunities for flood protection on site. The site will be re-graded, which will result in raising the ground level in some areas of the Project Site. In addition, consideration for elevating critical building systems and the potential for installing flood barriers have also been discussed. Currently, all critical mechanical and electrical rooms are elevated above the ground floor. Some systems, such as the fire pump room and fuel oil tank, are planned for the basement and will be further evaluated against the building's flood risk to identify opportunities to either elevate or protect-in-place. These considerations will be further refined throughout the design phase.

Describe how occupants might shelter in place during a flooding event including any emergency power, water, and waste water provisions and the expected availability of any such measures:

Describe any strategies that would support rapid recovery after a weather event:

E.2 – Sea Level Rise and Storms – Adaptation Strategies

Describe future site design and or infrastructure adaptation strategies for responding to sea level rise including future elevating of site areas and access routes, barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Describe future building adaptation strategies for raising the Sea Level Rise Design Flood Elevation and further protecting critical systems, including permanent and temporary measures:

A pdf and word version of the Climate Resiliency Checklist is provided for informational use and off-line preparation of a project submission. NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

For questions or comments about this checklist or Climate Change best practices, please contact: John.Dalzell@boston.gov

Climate Resiliency Checklist

NOT FOR FILING

NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

A.1 - Project Information

Project Name:	Enterprise Research Campus Project
Project Address:	100 Western Avenue
Project Address Additional:	
Filing Type (*select*)	*Initial (**PNF**, EPNF, NPC or other substantial filing)* *Design / Building Permit (prior to final design approval), or* *Construction / Certificate of Occupancy (post construction completion)*

Filing Contact	*Name* Rustom Cowasjee	*Company:* Tishman Speyer	*Email* rcowasjee@tishmanspeyer.com	*Phone* 202-420-2123
Is MEPA approval required	Yes/*no*		*Date* To be obtained	

A.3 - Project Team

Owner / Developer:	Tishman Speyer ERC Developer, L.L.C.
Architect:	Henning Larsen, Studio Gang
Engineer:	Nitsch Engineering
Sustainability / LEED:	Arup, LEVEL
Permitting:	VHB
Construction Management:	TBD

A.3 - Project Description and Design Conditions

List the principal Building Uses:	Residential
List the First Floor Uses:	Residential Lobby, Retail and Restaurant space
List any Critical Site Infrastructure and or Building Uses:	At this time, no critical infrastructure or building uses have been identified.

Site and Building:

Site Area:	*260,246 SF*	Building Area:	*263,500 SF*
Building Height:	*185 Ft*	Building Height:	*16 Stories*
Existing Site Elevation – Low:	*13.0 Ft BCB*	Existing Site Elevation – High:	*20.7 Ft BCB*
Proposed Site Elevation – Low:	*17.0 Ft BCB*	Proposed Site Elevation – High:	*19.5 Ft BCB*
Proposed First Floor Elevation:	*19.5 Ft BCB*	Below grade levels:	*1 Story*

Article 37 Green Building:

LEED Version - Rating System :	*LEED for New Construction and Major Renovations (LEED-NC) v4*	LEED Certification:	**Yes** / *No*
Proposed LEED rating:	*Certified/Silver/* **Gold**/*Platinum*	Proposed LEED point score:	*66 points*

Building Envelope

When reporting R values, differentiate between R discontinuous and R continuous. For example, use "R13" to show R13 discontinuous and use R10c.i. to show R10 continuous. When reporting U value, report total assembly U value including supports and structural elements.

Refer to Chapter 4 of the PNF for building typology specific building envelope criteria definition.

Roof:	*R-40*	Exposed Floor:	*R-30 all typologies*
Foundation Wall:	*R-7.5 c.i*	Slab Edge (at or below grade):	*F-0.51 (Unheated slab)*

Vertical Above-grade Assemblies (%'s are of total vertical area and together should total 100%):

Area of Opaque Curtain Wall & Spandrel Assembly:	*10%*	Wall & Spandrel Assembly Value:	*U-0.05 opaque U-0.1 spandrel*
Area of Framed & Insulated / Standard Wall:	*49%*	Wall Value	*R-20 opaque R-10 spandrel*
Area of Vision Window:	*41%*	Window Glazing Assembly Value:	*U-0.32*
		Window Glazing SHGC:	*SHGC 0.3*
Area of Doors:	*3-5%*	Door Assembly Value:	*U-0.500*

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined	Preliminary energy modeling has been completed to determine the energy impacts of the Base Case and Proposed Design for each building typology, using IES-VE software. Additional options will be included in the next filing. The results stated below represent the Project. Refer to Chapter 5 of the DPIR for building typology specific energy results.		
Annual Electric:	*3,392 MWh*	Peak Electric:	*696 kW*
Annual Heating Energy (Space Heating & DHW Components Energy):	*1,085 MMBtu*	Peak Heating Load:	*2 MMBtu/hr*
Annual Cooling: (Cooling Components Energy)	*1,242 MMBtu*	Peak Cooling Load:	*79 Tons*
Energy Use - Below ASHRAE 90.1 - 2013:	*30%*	Have the local utilities reviewed the building energy performance?:	*Yes* / ***no, not at this time***
Energy Use - Below Mass. Code:	*30%*	Energy Use Intensity:	*58 kBtu/SF*

Back-up / Emergency Power System

Electrical Generation Output:	*500 kW*	Number of Power Units:	*5 (estimated 1 per building)*
System Type:	*See above*	Fuel Source:	*Diesel*

Emergency and Critical System Loads (in the event of a service interruption)

Electric:	*At this time, no critical system loads have been identified.*	Heating:	*- (MMbtu/hr)*
		Cooling:	*- (Tons/hr)*

B – Greenhouse Gas Reduction and Net Zero / Net Positive Carbon Building Performance

Reducing GHG emissions is critical to avoiding more extreme climate change conditions. To achieve the City's goal of carbon neutrality by 2050 new buildings performance will need to progressively improve to net carbon zero and positive.

B.1 – GHG Emissions - Design Conditions

For this Filing - Annual Building GHG Emissions for the Project: *1,400 tpy*

For this filing - describe how building energy performance has been integrated into project planning, design, and engineering and any supporting analysis or modeling:

Preliminary energy modeling has been completed to determine the energy impacts of the Base Case and Proposed Design for the Project, using IES-VE software. Results are provided in Chapter 5 of the DPIR. At the earliest design phase of the project, energy and GHG emissions performance have been prioritized and analyzed.

Describe building specific passive energy efficiency measures including orientation, massing, envelop, and systems:

The Project has focused attention on first principles of an energy efficient design to reduce loads (and energy demand) for the buildings by optimizing the building envelope and daylight design to provide building envelope by typology that exceed minimum energy code performance for building envelope. 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 UxA calculation per the Stretch Energy Code Enhancements to building envelope design will be explored and assessed for cost effeteness via life cycle cost analysis in the DPIR as part of the Zero Carbon Building Assessment.

Describe building specific active energy efficiency measures including equipment, controls, fixtures, and systems:

Energy efficient HVAC systems are being considered for the buildings as applicable to each typology in the Project. Descriptions of the energy efficient systems and equipment are provided in Chapter 5 of the DPIR. The Project is estimated to reduce energy consumption by 20% and GHG emissions 13% from the Base Case. Further enhancements to building systems and electrification strategies will be explored and assessed for cost effeteness via life cycle cost analysis in the DPIR as part of the Zero Carbon Building Assessment. This includes a low carbon district energy feasibility study.

Describe building specific load reduction strategies including on-site renewable, clean, and energy storage systems:

The Project will consider the feasibility for installing roof-top solar photovoltaic (PV) systems at an individual building level. As part of the district energy feasibility study, thermal energy storage will be analyzed.

Describe any area or district scale emission reduction strategies including renewable energy, central energy plants, distributed energy systems, and smart grid infrastructure:

Renewable energy has been discussed above. The Proponent is committed to completing a District Energy Microgrid feasibility study for the Project as part of the DPIR submission to explore low carbon options to further reduce GHG emissions.

Describe any energy efficiency assistance or support provided or to be provided to the project:

The Proponent will reach out to the various private utility companies to discuss opportunities for energy efficiency incentives as well as demand response once the HVAC system and lighting design have been refined further.

B.2 - GHG Reduction - Adaptation Strategies

Describe how the building and its systems will evolve to further reduce GHG emissions and achieve annual carbon net zero and net positive performance (e.g. added efficiency measures, renewable energy, energy storage, etc.) and the timeline for meeting that goal (by 2050):

The Project is committed to constructing a building that exceeds minimum energy code, optimizes GHG emissions reduction and develop a viable and practical pathway to carbon neutrality by 2050. The Project is currently being designed and constructed towards this goal by reducing energy demand through incorporation of an efficient building envelope, systems and making electricity the predominant energy source (70%) of energy demand. The Project's proposed design demonstrates a 49% reduction in natural gas energy and 49% reduction in natural gas GHG emissions.

C - Extreme Heat Events

Annual average temperature in Boston increased by about 2˚F in the past hundred years and will continue to rise due to climate change. By the end of the century, the average annual temperature could be 56° (compared to 46° now) and the number of days above 90° (currently about 10 a year) could rise to 90.

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low:	0 Deg.	Temperature Range - High:	95 Deg.
Annual Heating Degree Days:	5596	Annual Cooling Degree Days	750

What Extreme Heat Event characteristics will be / have been used for project planning

Days - Above 90°:	30 days	Days – Above 100°:	2 days
Number of Heatwaves / Year:	3-5 /year	Average Duration of Heatwave (Days):	3 days

Describe all building and site measures to reduce heat-island effect at the site and in the surrounding area:

The Project will have a significant amount of green space resulting from the Greenway that will run through the middle of the site. In addition, the Project will consider additional ways to reduce urban heat island impacts through the use of hardscape materials with low solar reflectance, introduction of green space in the open space associated with each of the buildings and evaluating opportunities for the use of white membranes and green roofs. All buildings are targeting to achieve LEED SS Heat Island Reduction Credit, which addresses roof and non-roof areas . The tree canopy planned for the project will cover approximately 60,000 SF.

C.2 - Extreme Heat – Adaptation Strategies

Describe how the building and its systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heatwaves, and longer heatwaves:

The Project will utilize first principles of an energy efficient design to reduce loads (energy demands) through passive design strategies of a high performance building envelope, daylighting and reduction in urban heat island effects. Refer to Chapter 4 of the PNF for full details on energy performance.

Active systems will be designed to be energy efficient and exceed the stretch energy code. The HVAC system capacity will be designed for higher temperatures.

At equipment end of life, the opportunity to increase cooling capacity can be considered to further adapt to increased temperatures.

Describe all mechanical and non-mechanical strategies that will support building functionality and use during extended interruptions of utility services and infrastructure including proposed and future adaptations:

Generator power will be reviewed to provide additional capacity in excess of life safety requirements. A solar PV system will be assessed for its feasibility and could contribute to the project resilience strategy if implemented.

D - Extreme Precipitation Events

From 1958 to 2010, there was a 70 percent increase in the amount of precipitation that fell on the days with the heaviest precipitation. Currently, the 10-Year, 24-Hour Design Storm precipitation level is 5.25”. There is a significant probability that this will increase to at least 6” by the end of the century. Additionally, fewer, larger storms are likely to be accompanied by more frequent droughts.

D.1 – Extreme Precipitation - Design Conditions

10 Year, 24 Hour Design Storm: The Project is designing for 6.65” of rainfall

Describe all building and site measures for reducing storm water run-off:

The available site area between the buildings, known as the Greenway, will be used to provide stormwater storage and promote infiltration via underground chambers. Runoff from building roofs will be collected internally and directed to the infiltration systems. The new roadways surrounding the buildings will also be collected by catch basins and directed to the infiltration systems.

The Project is evaluating the potential for onsite stormwater reuse as well as opportunities for green roofs. Green space and planting are also being introduced throughout the site, as part of the large central Greenway and in the open space areas associated with each building. These strategies not only reduce stormwater generation but also reduce peak flow during events.

The Project will be designed to manage the 32-year storm (combined with the BWSC drainage system capacity), 6.65 inches of rainfall within its site boundary and designed to infiltrate 2.75” of rainfall, which is in excess of the 1.25” infiltration requirement from BWSC.

D.2 - Extreme Precipitation - Adaptation Strategies

Describe how site and building systems will be adapted to efficiently accommodate future more significant rain events (e.g. rainwater harvesting, on-site storm water retention, bio swales, green roofs):

The Project will be designed to manage the 32-year storm, 6.65” inches of rainfall within its site boundary. See reply D1 above.

E – Sea Level Rise and Storms

Under any plausible greenhouse gas emissions scenario, sea levels in Boston will continue to rise throughout the century. This will increase the number of buildings in Boston susceptible to coastal flooding and the likely frequency of flooding for those already in the floodplain.

Is any portion of the site in a FEMA SFHA?	*Yes* / No	What Zone:	A, AE, AH, AO, AR, A99, V, VE
		Current FEMA SFHA Zone Base Flood Elevation:	N/A

Is any portion of the site in a BPDA Sea Level Rise - Flood Hazard Area? Use the online BPDA SLR-FHA Mapping Tool to assess the susceptibility of the project site.	*Yes* / No

If you answered YES to either of the above questions, please complete the following questions.
Otherwise you have completed the questionnaire; thank you!

E.1 – Sea Level Rise and Storms – Design Conditions

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented on the BPDA Sea Level Rise - Flood Hazard Area (SLR-FHA) map, which depicts a modeled 1% annual chance coastal flood event with 40 inches of sea level rise (SLR). Use the online BPDA SLR-FHA Mapping Tool to identify the highest Sea Level Rise - Base Flood Elevation for the site. The Sea Level Rise - Design Flood Elevation is determined by adding either 24” of freeboard for critical facilities and infrastructure and any ground floor residential units OR 12” of freeboard for other buildings and uses.

Sea Level Rise - Base Flood Elevation:	*Ft BCB*		
Sea Level Rise - Design Flood Elevation:	*Ft BCB*	First Floor Elevation:	*Ft BCB*
Site Elevations at Building:	*Ft BCB*	Accessible Route Elevation:	*Ft BCB*

Describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Describe how the proposed Building Design Flood Elevation will be achieved including dry / wet flood proofing, critical systems protection, utility service protection, temporary flood barriers, waste and drain water back flow prevention, etc.:

While the site is not in the current FEMA floodplain and does not have a designated SLR-BFE from the City of Boston, the project is being proactive and evaluating opportunities for flood protection on site. The site will be re-graded, which will result in raising the ground level in some areas of the site. In addition, consideration for elevating critical building systems and the potential for installing flood barriers have also been discussed. Currently, all critical mechanical and electrical rooms are elevated above the ground floor. Some systems, such as the

fire pump room and fuel oil tank, are planned for the basement and will be further evaluated against the building's flood risk to identify opportunities to either elevate or protect-in-place. These considerations will be further refined throughout the design phase.

Describe how occupants might shelter in place during a flooding event including any emergency power, water, and waste water provisions and the expected availability of any such measures:

Describe any strategies that would support rapid recovery after a weather event:

E.2 – Sea Level Rise and Storms – Adaptation Strategies

Describe future site design and or infrastructure adaptation strategies for responding to sea level rise including future elevating of site areas and access routes, barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Describe future building adaptation strategies for raising the Sea Level Rise Design Flood Elevation and further protecting critical systems, including permanent and temporary measures:

A pdf and word version of the Climate Resiliency Checklist is provided for informational use and off-line preparation of a project submission. NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

For questions or comments about this checklist or Climate Change best practices, please contact: John.Dalzell@boston.gov

boston planning & development agency

Climate Resiliency Checklist

NOT FOR FILING

NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

A.1 - Project Information

Project Name:	Enterprise Research Campus Project			
Project Address:	100 Western Avenue			
Project Address Additional:				
Filing Type (*select*)	*Initial (**PNF**, EPNF, NPC or other substantial filing)* *Design / Building Permit (prior to final design approval), or* *Construction / Certificate of Occupancy (post construction completion)*			
Filing Contact	*Name* Rustom Cowasjee	*Company:* Tishman Speyer	*Email* rcowasjee@tishmanspeyer.com	*Phone* 202-420-2123
Is MEPA approval required	Yes/*no*		*Date* To be obtained	

A.3 - Project Team

Owner / Developer:	Tishman Speyer ERC Developer, L.L.C.
Architect:	Henning Larsen, Studio Gang
Engineer:	Nitsch Engineering
Sustainability / LEED:	Arup, LEVEL
Permitting:	VHB
Construction Management:	TBD

A.3 - Project Description and Design Conditions

List the principal Building Uses:	Hotel
List the First Floor Uses:	Hotel Lobby, Retail and Restaurant space
List any Critical Site Infrastructure and or Building Uses:	At this time, no critical infrastructure or building uses have been identified.

Site and Building:

Site Area:	*260,246 SF*	Building Area:	*135,000 SF*
Building Height:	*180 Ft*	Building Height:	*17 Stories*
Existing Site Elevation – Low:	*13.0 Ft BCB*	Existing Site Elevation – High:	*20.7 Ft BCB*
Proposed Site Elevation – Low:	*17.0 Ft BCB*	Proposed Site Elevation – High:	*19.5 Ft BCB*
Proposed First Floor Elevation:	*19.5 Ft BCB*	Below grade levels:	*1 Story*

Article 37 Green Building:

LEED Version - Rating System :	*LEED-New Construction for Hospitality (LEED-NC) v4*	LEED Certification:	**Yes** / *No*
Proposed LEED rating:	*Certified/Silver/* **Gold**/*Platinum*	Proposed LEED point score:	*71 points*

Building Envelope

When reporting R values, differentiate between R discontinuous and R continuous. For example, use "R13" to show R13 discontinuous and use R10c.i. to show R10 continuous. When reporting U value, report total assembly U value including supports and structural elements.

Refer to Chapter 4 of the PNF for building typology specific building envelope criteria definition.

Roof:	*R-40*	Exposed Floor:	*R-30 all typologies*
Foundation Wall:	*R-7.5 c.i*	Slab Edge (at or below grade):	*F-0.51 (Unheated slab)*

Vertical Above-grade Assemblies (%'s are of total vertical area and together should total 100%):

Area of Opaque Curtain Wall & Spandrel Assembly:	*10%*	Wall & Spandrel Assembly Value:	*U-0.05 opaque U-0.1 spandrel*
Area of Framed & Insulated / Standard Wall:	*49%*	Wall Value	*R-20 opaque R-10 spandrel*
Area of Vision Window:	*41%*	Window Glazing Assembly Value:	*U- 0.32 (fixed) 70% of installed glazing; U- 0.36 (operable) 30% of installed glazing*
		Window Glazing SHGC:	*SHGC 0.3*
Area of Doors:	*3-5%*	Door Assembly Value:	*U-0.500*

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined	Preliminary energy modeling has been completed to determine the energy impacts of the Base Case and Proposed Design for each building typology, using IES-VE software. Additional options will be included in the next filing. The results stated below represent the Project. Refer to Chapter 4 of the PNF for building typology specific energy results.		
Annual Electric:	*1,564 MWh*	Peak Electric:	*244 kW*
Annual Heating Energy (Space Heating & DHW Components Energy):	*1,364 MMBtu*	Peak Heating Load:	*1.1 MMBtu/hr*
Annual Cooling: (Cooling Components Energy)	*430 MMBtu*	Peak Cooling Load:	*30 Tons*
Energy Use - Below ASHRAE 90.1 - 2013:	*30%*	Have the local utilities reviewed the building energy performance?:	*Yes / no, not at this time*
Energy Use - Below Mass. Code:	*30%*	Energy Use Intensity:	*37 kBtu/SF*

Back-up / Emergency Power System

Electrical Generation Output:	*800 kW*	Number of Power Units:	*5 (estimated 1 per building)*
System Type:	*See above*	Fuel Source:	*Diesel*

Emergency and Critical System Loads (in the event of a service interruption)

Electric:	*At this time, no critical system loads have been identified.*	Heating:	*- (MMbtu/hr)*
		Cooling:	*- (Tons/hr)*

B – Greenhouse Gas Reduction and Net Zero / Net Positive Carbon Building Performance

Reducing GHG emissions is critical to avoiding more extreme climate change conditions. To achieve the City's goal of carbon neutrality by 2050 new buildings performance will need to progressively improve to net carbon zero and positive.

B.1 – GHG Emissions - Design Conditions

For this Filing - Annual Building GHG Emissions for the Project: *447 tpy*

For this filing - describe how building energy performance has been integrated into project planning, design, and engineering and any supporting analysis or modeling:

Preliminary energy modeling has been completed to determine the energy impacts of the Base Case and Proposed Design for the Project, using IES-VE software. Results are provided in Chapter 3 of the DPIR. At the earliest design phase of the project, energy and GHG emissions performance have been prioritized and analyzed.

Describe building specific passive energy efficiency measures including orientation, massing, envelop, and systems:

The Project has focused attention on first principles of an energy efficient design to reduce loads (and energy demand) for the buildings by optimizing the building envelope and daylight design to provide building envelope by typology that exceed minimum energy code performance for building envelope. The efficient building envelope 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 Enhancements to building envelope design will be explored and assessed for cost effeteness via life cycle cost analysis in the DPIR as part of the Zero Carbon Building Assessment.

Describe building specific active energy efficiency measures including equipment, controls, fixtures, and systems:

Energy efficient HVAC systems are being considered for the buildings as applicable to each typology in the Project. Descriptions of the energy efficient systems and equipment are provided in Chapter 3 of the DPIR. The proposed design was based on several key energy efficiency strategies, which include:
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 lighting control systems.
The Project is estimated to reduce energy consumption by 21% and GHG emissions 11% from the Base Case. Further enhancements to building systems and electrification strategies will be explored and assessed for cost effeteness via

life cycle cost analysis in the DPIR as part of the Zero Carbon Building Assessment. This includes a low carbon district energy feasibility study.

Describe building specific load reduction strategies including on-site renewable, clean, and energy storage systems:

The Project will consider the feasibility for installing roof-top solar photovoltaic (PV) systems at an individual building level. As part of the district energy feasibility study, thermal energy storage will be analyzed.

Describe any area or district scale emission reduction strategies including renewable energy, central energy plants, distributed energy systems, and smart grid infrastructure:

Renewable energy has been discussed above. The Proponent is committed to completing a District Energy Microgrid feasibility study for the Project as part of the DPIR submission to explore low carbon options to further reduce GHG emissions.

Describe any energy efficiency assistance or support provided or to be provided to the project:

The Proponent will reach out to the various private utility companies to discuss opportunities for energy efficiency incentives as well as demand response once the HVAC system and lighting design have been refined further.

B.2 - GHG Reduction - Adaptation Strategies

Describe how the building and its systems will evolve to further reduce GHG emissions and achieve annual carbon net zero and net positive performance (e.g. added efficiency measures, renewable energy, energy storage, etc.) and the timeline for meeting that goal (by 2050):

The Project is committed to constructing a building that exceeds minimum energy code, optimizes GHG emissions reduction and develop a viable and practical pathway to carbon neutrality by 2050. The Project is currently being designed and constructed towards this goal by reducing energy demand through incorporation of an efficient building envelope, systems and making electricity the predominant energy source (67%) of energy demand. The Project's proposed design demonstrates a 54% reduction in natural gas energy and 54% reduction in natural gas GHG emissions.

C - Extreme Heat Events

Annual average temperature in Boston increased by about 2˚F in the past hundred years and will continue to rise due to climate change. By the end of the century, the average annual temperature could be 56° (compared to 46° now) and the number of days above 90° (currently about 10 a year) could rise to 90.

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low:	0 Deg.	Temperature Range - High:	95 Deg.
Annual Heating Degree Days:	5596	Annual Cooling Degree Days	750

What Extreme Heat Event characteristics will be / have been used for project planning

Days - Above 90°:	30 days	Days – Above 100°:	2 days
Number of Heatwaves / Year:	3-5 /year	Average Duration of Heatwave (Days):	3 days

Describe all building and site measures to reduce heat-island effect at the site and in the surrounding area:

The Project will have a significant amount of green space resulting from the Greenway that will run through the middle of the site. In addition, the Project will consider additional ways to reduce urban heat island impacts through the use of hardscape materials with low solar reflectance, introduction of green space in the open space associated with each of the buildings and evaluating opportunities for the use of white membranes and green roofs. All buildings are targeting to achieve LEED SS Heat Island Reduction Credit, which addresses roof and non-roof areas . The tree canopy planned for the project will cover approximately 51,855 SF, which amounts to 20% of the site area.

C.2 - Extreme Heat – Adaptation Strategies

Describe how the building and its systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heatwaves, and longer heatwaves:

The Project will utilize first principles of an energy efficient design to reduce loads (energy demands) through passive design strategies of a high performance building envelope, daylighting and reduction in urban heat island effects. Refer to Chapter 3, Sustainability and Climate Change Resiliency, of the DPIR for full details on energy performance.

Active systems will be designed to be energy efficient and exceed the stretch energy code. The HVAC system capacity will be designed for higher temperatures.

At equipment end of life, the opportunity to increase cooling capacity can be considered to further adapt to increased temperatures.

Describe all mechanical and non-mechanical strategies that will support building functionality and use during extended interruptions of utility services and infrastructure including proposed and future adaptations:

Generator power will be reviewed to provide additional capacity in excess of life safety requirements. A solar PV system will be assessed for its feasibility and could contribute to the project resilience strategy if implemented.

D - Extreme Precipitation Events

From 1958 to 2010, there was a 70 percent increase in the amount of precipitation that fell on the days with the heaviest precipitation. Currently, the 10-Year, 24-Hour Design Storm precipitation level is 5.25”. There is a significant probability that this will increase to at least 6” by the end of the century. Additionally, fewer, larger storms are likely to be accompanied by more frequent droughts.

D.1 – Extreme Precipitation - Design Conditions

10 Year, 24 Hour Design Storm: The Project is designing for 6.65” of rainfall

Describe all building and site measures for reducing storm water run-off:

The available site area between the buildings, known as the Greenway, will be used to provide stormwater storage and promote infiltration via underground chambers. Runoff from building roofs will be collected internally and directed to the infiltration systems. The new roadways surrounding the buildings will also be collected by catch basins and directed to the infiltration systems.

The Project is evaluating the potential for onsite stormwater reuse as well as opportunities for green roofs. Green space and planting are also being introduced throughout the site, as part of the large central Greenway and in the open space areas associated with each building. These strategies not only reduce stormwater generation but also reduce peak flow during events.

The Project will be designed to manage the 32-year storm, 6.65 inches of rainfall within its site boundary and designed to infiltrate 2.75” of rainfall, which is in excess of the 1.25” infiltration requirement from BWSC.

D.2 - Extreme Precipitation - Adaptation Strategies

Describe how site and building systems will be adapted to efficiently accommodate future more significant rain events (e.g. rainwater harvesting, on-site storm water retention, bio swales, green roofs):

The Project will be designed to manage the 32-year storm, 6.65” inches of rainfall within its site boundary. See reply D1 above.

E – Sea Level Rise and Storms

Under any plausible greenhouse gas emissions scenario, sea levels in Boston will continue to rise throughout the century. This will increase the number of buildings in Boston susceptible to coastal flooding and the likely frequency of flooding for those already in the floodplain.

Is any portion of the site in a FEMA SFHA?	*Yes* / No	What Zone:	A, AE, AH, AO, AR, A99, V, VE
		Current FEMA SFHA Zone Base Flood Elevation:	N/A

Is any portion of the site in a BPDA Sea Level Rise - Flood Hazard Area? Use the online BPDA SLR-FHA Mapping Tool to assess the susceptibility of the project site.	*Yes* / No

---

If you answered YES to either of the above questions, please complete the following questions.
Otherwise you have completed the questionnaire; thank you!

E.1 – Sea Level Rise and Storms – Design Conditions

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented on the BPDA Sea Level Rise - Flood Hazard Area (SLR-FHA) map, which depicts a modeled 1% annual chance coastal flood event with 40 inches of sea level rise (SLR). Use the online BPDA SLR-FHA Mapping Tool to identify the highest Sea Level Rise - Base Flood Elevation for the site. The Sea Level Rise - Design Flood Elevation is determined by adding either 24” of freeboard for critical facilities and infrastructure and any ground floor residential units OR 12” of freeboard for other buildings and uses.

Sea Level Rise - Base Flood Elevation:	*Ft BCB*		
Sea Level Rise - Design Flood Elevation:	*Ft BCB*	First Floor Elevation:	*Ft BCB*
Site Elevations at Building:	*Ft BCB*	Accessible Route Elevation:	*Ft BCB*

Describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Describe how the proposed Building Design Flood Elevation will be achieved including dry / wet flood proofing, critical systems protection, utility service protection, temporary flood barriers, waste and drain water back flow prevention, etc.:

While the Project Site is not in the current FEMA floodplain and does not have a designated SLR-BFE from the City of Boston, the project is being proactive and evaluating opportunities for flood protection on site. The site will be re-graded, which will result in raising the ground level in some areas of the Project Site. In addition, consideration for elevating critical building systems and the potential for installing flood barriers have also been discussed. Currently, all critical mechanical and electrical rooms are elevated above the ground floor. Some systems, such as the fire pump room and fuel oil tank, are planned for the basement and will be further evaluated against the building's flood risk to identify opportunities to either elevate or protect-in-place. These considerations will be further refined throughout the design phase.

Describe how occupants might shelter in place during a flooding event including any emergency power, water, and waste water provisions and the expected availability of any such measures:

Describe any strategies that would support rapid recovery after a weather event:

E.2 – Sea Level Rise and Storms – Adaptation Strategies

Describe future site design and or infrastructure adaptation strategies for responding to sea level rise including future elevating of site areas and access routes, barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Describe future building adaptation strategies for raising the Sea Level Rise Design Flood Elevation and further protecting critical systems, including permanent and temporary measures:

A pdf and word version of the Climate Resiliency Checklist is provided for informational use and off-line preparation of a project submission. NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

For questions or comments about this checklist or Climate Change best practices, please contact: John.Dalzell@boston.gov

boston planning & development agency

Climate Resiliency Checklist

NOT FOR FILING

NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

A.1 - Project Information

Project Name:	Enterprise Research Campus Project			
Project Address:	100 Western Avenue			
Project Address Additional:				
Filing Type (*select*)	*Initial (**PNF**, EPNF, NPC or other substantial filing)* *Design / Building Permit (prior to final design approval), or* *Construction / Certificate of Occupancy (post construction completion)*			
Filing Contact	*Name* Rustom Cowasjee	*Company:* Tishman Speyer	*Email* rcowasjee@tishmanspeyer.com	*Phone* 202-420-2123
Is MEPA approval required	Yes/*no*		*Date* To be obtained	

A.3 - Project Team

Owner / Developer:	Tishman Speyer ERC Developer, L.L.C.
Architect:	Henning Larsen, Studio Gang
Engineer:	Nitsch Engineering
Sustainability / LEED:	Arup, LEVEL
Permitting:	VHB
Construction Management:	TBD

A.3 - Project Description and Design Conditions

List the principal Building Uses:	Conference
List the First Floor Uses:	Conference Center lobby
List any Critical Site Infrastructure and or Building Uses:	At this time, no critical infrastructure or building uses have been identified.

Site and Building:

Site Area:	*260,246 SF*	Building Area:	*61,500 SF*
Building Height:	*86 Ft*	Building Height:	*5 Stories*
Existing Site Elevation – Low:	*13.0 Ft BCB*	Existing Site Elevation – High:	*20.7 Ft BCB*
Proposed Site Elevation – Low:	*17.0 Ft BCB*	Proposed Site Elevation – High:	*19.5 Ft BCB*
Proposed First Floor Elevation:	*19.5 Ft BCB*	Below grade levels:	*1 Story*

Article 37 Green Building:

LEED Version - Rating System :	*LEED-New Construction v4*	LEED Certification:	**Yes** */ No*
Proposed LEED rating:	*Certified/Silver/* **Gold***/Platinum*	Proposed LEED point score:	*71 points*

Building Envelope

When reporting R values, differentiate between R discontinuous and R continuous. For example, use "R13" to show R13 discontinuous and use R10c.i. to show R10 continuous. When reporting U value, report total assembly U value including supports and structural elements.

Refer to Chapter 4 of the PNF for building typology specific building envelope criteria definition.

Roof:	*R-40*	Exposed Floor:	*R-30 all typologies*
Foundation Wall:	*R-7.5 c.i*	Slab Edge (at or below grade):	*F-0.51 (Unheated slab)*

Vertical Above-grade Assemblies (%'s are of total vertical area and together should total 100%):

Area of Opaque Curtain Wall & Spandrel Assembly:	*10%*	Wall & Spandrel Assembly Value:	*U-0.05 opaque U-0.1 spandrel*
Area of Framed & Insulated / Standard Wall:	*49%*	Wall Value	*R-20 opaque R-10 spandrel*
Area of Vision Window:	*41%*	Window Glazing Assembly Value:	*U- 0.32 (fixed) 70% of installed glazing; U- 0.36 (operable) 30% of installed glazing*
		Window Glazing SHGC:	*SHGC 0.3*
Area of Doors:	*3-5%*	Door Assembly Value:	*U-0.500*

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined	Preliminary energy modeling has been completed to determine the energy impacts of the Base Case and Proposed Design for each building typology, using IES-VE software. Additional options will be included in the next filing. The results stated below represent the Project. Refer to Chapter 4 of the PNF for building typology specific energy results.		
Annual Electric:	*533 MWh*	Peak Electric:	*252 kW*
Annual Heating Energy (Space Heating & DHW Components Energy):	*866 MMBtu*	Peak Heating Load:	*1 MMBtu/hr*
Annual Cooling: (Cooling Components Energy)	*298 MMBtu*	Peak Cooling Load:	*37 Tons*
Energy Use - Below ASHRAE 90.1 - 2013:	*30%*	Have the local utilities reviewed the building energy performance?:	*Yes / no, not at this time*
Energy Use - Below Mass. Code:	*30%*	Energy Use Intensity:	*47 kBtu/SF*

Back-up / Emergency Power System

Electrical Generation Output:	*100 kW*	Number of Power Units:	*1 (estimated 1 per building)*

System Type: *See above* Fuel Source: *Diesel*

Emergency and Critical System Loads (in the event of a service interruption)

Electric:	*At this time, no critical system loads have been identified.*	Heating:	- *(MMbtu/hr)*
		Cooling:	- *(Tons/hr)*

B – Greenhouse Gas Reduction and Net Zero / Net Positive Carbon Building Performance

Reducing GHG emissions is critical to avoiding more extreme climate change conditions. To achieve the City's goal of carbon neutrality by 2050 new buildings performance will need to progressively improve to net carbon zero and positive.

B.1 – GHG Emissions - Design Conditions

For this Filing - Annual Building GHG Emissions for the Project: *233 tpy*

For this filing - describe how building energy performance has been integrated into project planning, design, and engineering and any supporting analysis or modeling:

Preliminary energy modeling has been completed to determine the energy impacts of the Base Case and Proposed Design for the Project, using IES-VE software. Results are provided in Chapter 4 of the PNF. At the earliest design phase of the project, energy and GHG emissions performance have been prioritized and analyzed.

Describe building specific passive energy efficiency measures including orientation, massing, envelop, and systems:

The Project has focused attention on first principles of an energy efficient design to reduce loads (and energy demand) for the buildings by optimizing the building envelope and daylight design to provide building envelope by typology that exceed minimum energy code performance for building envelope. Efficient building envelope 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. Enhancements to building envelope design will be explored and assessed for cost effeteness via life cycle cost analysis in the DPIR as part of the Zero Carbon Building Assessment.

Describe building specific active energy efficiency measures including equipment, controls, fixtures, and systems:

Energy efficient HVAC systems are being considered for the buildings as applicable to each typology in the Project. Descriptions of the energy efficient systems and equipment are provided in Chapter 4 of the PNF. The Project is estimated to reduce energy consumption by 17% and GHG emissions 18% from the Base Case. Further enhancements to building systems and electrification strategies will be explored and assessed for cost effeteness via life cycle cost analysis in the DPIR as part of the Zero Carbon Building Assessment. This includes a low carbon district energy feasibility study.

Describe building specific load reduction strategies including on-site renewable, clean, and energy storage systems:

The Project will consider the feasibility for installing roof-top solar photovoltaic (PV) systems at an individual building level. As part of the district energy feasibility study, thermal energy storage will be analyzed.

Describe any area or district scale emission reduction strategies including renewable energy, central energy plants, distributed energy systems, and smart grid infrastructure:

Renewable energy has been discussed above. The Proponent is committed to completing a District Energy Microgrid feasibility study for the Project as part of the DPIR submission to explore low carbon options to further reduce GHG emissions.

Describe any energy efficiency assistance or support provided or to be provided to the project:

The Proponent will reach out to the various private utility companies to discuss opportunities for energy efficiency incentives as well as demand response once the HVAC system and lighting design have been refined further.

B.2 - GHG Reduction - Adaptation Strategies

Describe how the building and its systems will evolve to further reduce GHG emissions and achieve annual carbon net zero and net positive performance (e.g. added efficiency measures, renewable energy, energy storage, etc.) and the timeline for meeting that goal (by 2050):

The Project is committed to constructing a building that exceeds minimum energy code, optimizes GHG emissions reduction and develop a viable and practical pathway to carbon neutrality by 2050. The Project is currently being designed and constructed towards this goal by reducing energy demand through incorporation of an efficient building envelope, systems and making electricity the predominant energy source (65%) of energy demand. The Project's proposed design demonstrates a 5% reduction in natural gas energy and 5% reduction in natural gas GHG emissions.

C - Extreme Heat Events

Annual average temperature in Boston increased by about 2˚F in the past hundred years and will continue to rise due to climate change. By the end of the century, the average annual temperature could be 56° (compared to 46° now) and the number of days above 90° (currently about 10 a year) could rise to 90.

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low:	0 Deg.	Temperature Range - High:	95 Deg.
Annual Heating Degree Days:	5596	Annual Cooling Degree Days	750

What Extreme Heat Event characteristics will be / have been used for project planning

Days - Above 90°:	30 days	Days – Above 100°:	2 days
Number of Heatwaves / Year:	3-5 /year	Average Duration of Heatwave (Days):	3 days

Describe all building and site measures to reduce heat-island effect at the site and in the surrounding area:

The Project will have a significant amount of green space resulting from the Greenway that will run through the middle of the site. In addition, the Project will consider additional ways to reduce urban heat island impacts through the use of hardscape materials with low solar reflectance, introduction of green space in the open space associated with each of the buildings and evaluating opportunities for the use of white membranes and green roofs. All buildings are targeting to achieve LEED SS Heat Island Reduction Credit, which addresses roof and non-roof areas . The tree canopy planned for the project will cover approximately 60,000 SF.

C.2 - Extreme Heat – Adaptation Strategies

Describe how the building and its systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heatwaves, and longer heatwaves:

The Project will utilize first principles of an energy efficient design to reduce loads (energy demands) through passive design strategies of a high performance building envelope, daylighting and reduction in urban heat island effects. Refer to Chapter 4 of the PNF for full details on energy performance.

Active systems will be designed to be energy efficient and exceed the stretch energy code. The HVAC system capacity will be designed for higher temperatures.

At equipment end of life, the opportunity to increase cooling capacity can be considered to further adapt to increased temperatures.

Describe all mechanical and non-mechanical strategies that will support building functionality and use during extended interruptions of utility services and infrastructure including proposed and future adaptations:

Generator power will be reviewed to provide additional capacity in excess of life safety requirements. A solar PV system will be assessed for its feasibility and could contribute to the project resilience strategy if implemented.

D - Extreme Precipitation Events

From 1958 to 2010, there was a 70 percent increase in the amount of precipitation that fell on the days with the heaviest precipitation. Currently, the 10-Year, 24-Hour Design Storm precipitation level is 5.25”. There is a significant probability that this will increase to at least 6” by the end of the century. Additionally, fewer, larger storms are likely to be accompanied by more frequent droughts.

D.1 – Extreme Precipitation - Design Conditions

10 Year, 24 Hour Design Storm: The Project is designing for 6.65” of rainfall

Describe all building and site measures for reducing storm water run-off:

The available site area between the buildings, known as the Greenway, will be used to provide stormwater storage and promote infiltration via underground chambers. Runoff from building roofs will be collected internally and directed to the infiltration systems. The new roadways surrounding the buildings will also be collected by catch basins and directed to the infiltration systems.

The Project is evaluating the potential for onsite stormwater reuse as well as opportunities for green roofs. Green space and planting are also being introduced throughout the site, as part of the large central Greenway and in the open space areas associated with each building. These strategies not only reduce stormwater generation but also reduce peak flow during events.

The Project will be designed to manage the 32-year storm (when combined with the BWSC system’s capacity), 6.65 inches of rainfall within its site boundary and designed to store 2.75” of rainfall, which is in excess of the 1.25” infiltration requirement from BWSC.

D.2 - Extreme Precipitation - Adaptation Strategies

Describe how site and building systems will be adapted to efficiently accommodate future more significant rain events (e.g. rainwater harvesting, on-site storm water retention, bio swales, green roofs):

The Project will be designed to manage the 32-year storm, 6.65” inches of rainfall within its site boundary. See reply D1 above.

E – Sea Level Rise and Storms

Under any plausible greenhouse gas emissions scenario, sea levels in Boston will continue to rise throughout the century. This will increase the number of buildings in Boston susceptible to coastal flooding and the likely frequency of flooding for those already in the floodplain.

Is any portion of the site in a FEMA SFHA?	*Yes* / No	What Zone:	A, AE, AH, AO, AR, A99, V, VE
		Current FEMA SFHA Zone Base Flood Elevation:	N/A

Is any portion of the site in a BPDA Sea Level Rise - Flood Hazard Area? Use the online BPDA SLR-FHA Mapping Tool to assess the susceptibility of the project site.	*Yes* / No

---

If you answered YES to either of the above questions, please complete the following questions.
Otherwise you have completed the questionnaire; thank you!

E.1 – Sea Level Rise and Storms – Design Conditions

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented on the BPDA Sea Level Rise - Flood Hazard Area (SLR-FHA) map, which depicts a modeled 1% annual chance coastal flood event with 40 inches of sea level rise (SLR). Use the online BPDA SLR-FHA Mapping Tool to identify the highest Sea Level Rise - Base Flood Elevation for the site. The Sea Level Rise - Design Flood Elevation is determined by adding either 24” of freeboard for critical facilities and infrastructure and any ground floor residential units OR 12” of freeboard for other buildings and uses.

Sea Level Rise - Base Flood Elevation:	*Ft BCB*		
Sea Level Rise - Design Flood Elevation:	*Ft BCB*	First Floor Elevation:	*Ft BCB*
Site Elevations at Building:	*Ft BCB*	Accessible Route Elevation:	*Ft BCB*

Describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Describe how the proposed Building Design Flood Elevation will be achieved including dry / wet flood proofing, critical systems protection, utility service protection, temporary flood barriers, waste and drain water back flow prevention, etc.:

While the Project Site is not in the current FEMA floodplain and does not have a designated SLR-BFE from the City of Boston, the Project is being proactive and evaluating opportunities for flood protection on site. The site will be re-graded, which will result in raising the ground level in some areas of the Project Site. In addition, consideration for elevating critical building systems and the potential for installing flood barriers have also been discussed. Currently, all critical mechanical and electrical rooms are elevated above the ground floor. Some systems, such as the fire pump room and fuel oil tank, are planned for the basement and will be further evaluated against the building's flood risk to identify opportunities to either elevate or protect-in-place. These considerations will be further refined throughout the design phase.

Describe how occupants might shelter in place during a flooding event including any emergency power, water, and waste water provisions and the expected availability of any such measures:

Describe any strategies that would support rapid recovery after a weather event:

E.2 – Sea Level Rise and Storms – Adaptation Strategies

Describe future site design and or infrastructure adaptation strategies for responding to sea level rise including future elevating of site areas and access routes, barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Describe future building adaptation strategies for raising the Sea Level Rise Design Flood Elevation and further protecting critical systems, including permanent and temporary measures:

A pdf and word version of the Climate Resiliency Checklist is provided for informational use and off-line preparation of a project submission. NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

For questions or comments about this checklist or Climate Change best practices, please contact: John.Dalzell@boston.gov

Boston Smart Utilities Checklist

<u>This template is intended to help development teams organize their responses. Please use the information here to complete the online form when the checklist is ready for submission.**</u>**

Date Submitted:	July 28, 2021
Submitted by:	Samantha Dolabany

Background

The Smart Utilities Checklist will facilitate the Boston Smart Utilities Steering Committee's review of:

a) compliance with the Smart Utilities Policy for Article 80 Development Review, which calls for the integration of five (5) Smart Utility Technologies (SUTs) into Article 80 developments

b) integration of the Smart Utility Standards

More information about the Boston Smart Utilities Vision project, including the Smart Utilities Policy and Smart Utility Standards, is available at: bostonplans.org/smart-utilities

Note: Any documents submitted via email to manuel.esquivel@boston.gov will not be attached to the pdf form generated after submission, but are available upon request.

Part 1 - General Project Information

1.1 Project Name	**Enterprise Research Campus Project**
1.2 Project Address	**100 Western Avenue**
1.3 Building Size (square feet) **For a multi-building development, enter total development size (square feet)*	**±900,000 SF (Phase A)**

Boston Smart Utilities Checklist

1.4 Filing Stage	**Project Notification Form (PNF)**

1.5 Filing Contact Information

1.5a Name	**Jessica Hughes, Managing Director**
1.5b Company	**Tishman Speyer ERC Developer, L.L.C.**
1.5c E-mail	**jhughes@tishmanspeyer.com**
1.5d Phone Number	**617-771-1150**

1.6 Project Team

1.6a Project Owner/Developer	**Tishman Speyer**
1.6b Architect	**Henning Larsen, Studio Gang**
1.6c Permitting	**VHB**
1.6d Construction Management	**TBD**

Part 2 - District Energy Microgrids

Fill out this section if the proposed project's total development size is equal to or greater than 1.5 million square feet.

Note on submission requirements timeline:

Feasibility Assessment Part A should be submitted with PNF or any other initial filing.

Feasibility Assessment Part B should be submitted with any major filing during the Development Review stage (i.e., DPIR)

District Energy Microgrid Master Plan Part A should be submitted before submission of the Draft Board Memorandum by the BPDA Project Manager (Note: Draft Board Memorandums are due one month ahead of the BPDA Board meetings)

District Energy Microgrid Master Plan Part B should be submitted before applying for a Building Permit

Please email submission to manuel.esquivel@boston.gov

Boston Smart Utilities Checklist

2.1 Consultant Assessing/Designing District Energy Microgrid (if applicable)	Arup USA Inc.
2.2 Latest document submitted	The analysis will be submitted to the City of Boston for review in August 2021
2.3 Date of latest submission	The analysis will be submitted to the City of Boston for review in August 2021
2.4 Which of the following have you had engagement/review meetings with regarding District Energy Microgrids? (select all that apply)	Since the PNF filing, the Proponent has held an initial meeting with the City of Boston on March 31, 2021 to review the approach and proposed systems to be studied in the District Energy Microgrid Feasibility Study.
2.5 What engagement meetings have you had with utilities and/or other agencies (i.e., MA DOER, MassCEC) regarding District Energy Microgrids? (Optional: include dates)	No meetings have been held with the utilities, MA DOER or MassCEC to date since the district energy analysis has not been completed. The Proponent intends to meet with the relevant entities in relation to the district system options included in the analysis. A pre-filing meeting has been held with DOER and MEPA July 21, 2021 to discuss energy and GHG emissions performance and certificate scoping.
2.6 Additional Information	At the meeting March 31st meeting, it was agreed the district systems to be studied would include an ambient water loop served by a combination of air to water heat pumps, ground source and electric boilers in incremental steps to reduce natural gas consumption in buildings for heating and domestic hot water demands.

Boston Smart Utilities Checklist

Part 3 - Telecommunications Utilidor

Fill out this section if the proposed project's total development size is equal to or greater than 1.5 million square feet OR if the project will include the construction of roadways equal to or greater than 0.5 miles in length.

Please submit a map/diagram highlighting the sections of the roads on the development area where a Telecom Utilidor will be installed, including access points to the Telcom Utilidor (i.e., manholes)

Please email submission to manuel.esquivel@boston.gov

3.1 Consultant Assessing/Designing Telecom Utilidor (if applicable)	**VHB, Harvard, (HUIT) for planned utilities**
3.2 Date Telecom Utilidor Map/Diagram was submitted	**Refer to DPIR Figure 6.2for the Project conceptual utility diagram.**
3.3 Dimensions of Telecom Utilidor (include units)	
3.3a Cross-section (i.e., diameter, width X height)	**Cattle Drive North (planned)** (2x2) 4" independent ductbank (1.5'W x 1.5'H) (2x4) 4" HUIT joint trench telecom ductbank (1.5'W x 2.3'H) **Cattle Drive South (planned)** (3x2) 4" HUIT Cross-connection telecom ductbank (1.8'W x 1.5'H) (2x5) 4" HUIT-LED joint trench telecom ductbank (1.5''W x 2.6'H) (2x2) 4" independent telecom ductbank (1.5'W x 1.5'H) **DEF Drive (installed)** (3x2) 4" cross-connection telecom ductbank (1.8'W x 1.5'H), part of HU Thermals utility corridor) **East Drive (installed)** 10-way (2x5) 4" HUIT-LED Joint Trench Telecom ductbank (1.0'Wx2.6'H)

Boston Smart Utilities Checklist

	Note: Dimensions are approximate and subject to change.
3.3b Length	**Cattle Drive ~610 l.f. (planned)** **DEF Drive ~ 540 l.f. (existing)** **East Drive ~ 640 l.f. (existing)**
3.4 Capacity of Telecom Utilidor (i.e., number of interducts, 2 inch (ID) pipes, etc.)	**Listed in Section 3.3.**
3.5 Which of the following have you had engagement/review meetings with regarding the Telecom Utilidor? (select all that apply)	**No meetings have been held. The Proponent intends to meet with the relevant entities in relation to the Telecom Utilidor after submission of the DPIR.**
3.6 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding the Telecom Utilidor? (Optional: include dates)	**No meetings have been held with utilities. The Proponent intends to meet with the relevant entities in relation to the Telecom Utilidor after submission of the DPIR.**
3.7 Additional Information	**Proposed building demand, service connection locations, and capacity of planned telecom infrastructure in the surrounding roadways will be coordinated during design.**

Part 4 - Green Infrastructure

Fill out this section if the proposed project's total development size is equal to or greater than 100,000 square feet.

Please submit a map/diagram highlighting where on the development Green Infrastructure will be installed.

Please email submission to manuel.esquivel@boston.gov

Boston Smart Utilities Checklist

4.1 Consultant Assessing/Designing Green Infrastructure (if applicable)	Nitsch Engineering, VHB, WSP
4.2 Date Green Infrastructure Map/Diagram was submitted	Refer to PNF Figure 6.5.
4.3 Types of Green Infrastructure included in the project (select all that apply)	Stormwater infiltration chambers on-site Roadway Green Infrastructure: Bioinfiltration cells in sidewalk, stone reservoirs, rain gardens, porous pavement bike lanes, pervious pavers in sidewalk. Building infrastructure: green roofs and storage tanks in buildings for re-use.
4.4 Total impervious area of the development (in square inches)	47,988,720 square inches (333,255 square feet)
4.5 Volume of stormwater that will be retained (in cubic inches)* **Note: Should equal to at least "Total impervious area (entered in section 4.4)" times "1.25 inches"*	131,968,980 cubic inches (76,371 cubic feet) – 2.75” of storage over impervious areas.
4.6 Which of the following have you had engagement/review meetings with regarding Green Infrastructure? (select all that apply)	No meetings have been held. The Proponent intends to meet with the relevant entities in relation to the Green Infrastructure after submission of the DPIR.
4.7 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding Green Infrastructure? (Optional: include dates)	Meeting with BWSC 3/10/2021 Meeting with Smart Utilities 3/31/2021 The Proponent intends to continue to meet with the relevant entities in relation to the Green Infrastructure as the design progresses.
4.8 Additional Information	The current plans show stormwater infiltration systems sized for 1.25-inches of runoff (per BPDA/BWSC requirement) + 1.50-inches of runoff (per Project requirement). The systems are sized for the proposed buildings and surrounding

Boston Smart Utilities Checklist

	roadways based on the in-progress site plan.

Part 5 - Adaptive Signal Technology (AST)

Fill out this section if as part of your project BTD will require you to install new traffic signals or make significant improvements to the existing signal system.

Please submit a map/diagram highlighting the context of AST around the proposed development area, as well as any areas within the development where new traffic signals will be installed or where significant improvements to traffic signals will be made.

Please email submission to manuel.esquivel@boston.gov

5.1 Consultant Assessing/Designing Adaptive Signal Technology (if applicable)	**VHB**
5.2 Date AST Map/Diagram was submitted	**The DPIR documentation includes the evaluation of intersection capacity impacts, a signal warrant analysis for unsignalized intersections, and proposed improvement measures.**
5.3 Describe how the AST system will benefit/impact the following transportation modes	
5.3a Pedestrians	**An AST system has not been evaluated yet. The expectation for its implementation is to improve safety and efficiency of pedestrians crossing.**
5.3b Bicycles	**An AST system has not been evaluated yet. The expectation for its implementation is to improve safety and efficiency of bicyclists.**
5.3c Buses and other Public Transportation	**An AST system with Transit Signal Priority has not been evaluated yet. The expectation for its implementation is to improve reliability and efficiency of MBTA bus routes.**
5.3d Other Motorized Vehicles	**An AST system has not been evaluated yet. The**

Boston Smart Utilities Checklist

	expectation for its implementation is to improve safety and efficiency of traffic operations, minimizing delay while accommodating other modal activity.
5.4 Describe the components of the AST system (including system design and components)	The system has not been designed yet, as the signalization improvements are currently only a proposal, to be reviewed by the City of Boston.
5.5 Which of the following have you had engagement/review meetings with regarding AST? (select all that apply)	No meetings have been held on this matter. The Proponent intends to meet with the relevant entities in relation to the AST after submission and review of the DPIR by BPDA and BTD.
5.6 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding AST? (Optional: include dates)	None. The Proponent intends to meet with the relevant entities in relation to the AST after submission and review of the DPIR.
5.7 Additional Information	The DPIR documentation includes the evaluation of intersection capacity impacts and a signal warrant analysis for unsignalized intersections. The proposed improvements include the signalization of East Drive / Kresge Way at Western Avenue with an underground interconnect conduit and cable connecting this intersection to the existing signal system at Batten Way / Hague Street. Transit signal priority is recommended for this location and at four DCR-managed intersections. Proposed geometric improvements at the intersection of East Drive / Kresge Way at Western Avenue are depicted in Figure 3.45a of the DPIR.

Boston Smart Utilities Checklist

Part 6 - Smart Street Lights

Fill out this section if as part of your project PWD and PIC will require you to install new street lights or make significant improvements to the existing street light system.

Please submit a map/diagram highlighting where new street lights will be installed or where improvements to street lights will be made.

Please email submission to manuel.esquivel@boston.gov

6.1 Consultant Assessing/Designing Smart Street Lights (if applicable)	Scape
6.2 Date Smart Street Lights Map/Diagram was submitted	Refer to DPIR Figures 6.2, 6.6, and 6.7 for preliminary street light locations. Western Avenue locations will be developed as design progresses.
6.3 Which of the following have you had engagement/review meetings with regarding Smart Street Lights? (select all that apply)	No meetings have been held. The Proponent intends to meet with the relevant entities in relation to the Smart Street Lights after submission of the DPIR.
6.4 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding Smart Street Lights? (Optional: include dates)	No meetings have been held with utilities. The Proponent intends to meet with the relevant entities in relation to the Smart Street Lights after submission of the DPIR.
6.5 Additional Information	NA

Part 7 - Smart Utility Standards

The Smart Utility Standards set forth guidelines for planning and integration of SUTs with existing utility infrastructure in existing or new streets, including cross-section, lateral, and intersection diagrams. The Smart Utility Standards are intended to serve as guidelines for

Boston Smart Utilities Checklist

developers, architects, engineers, and utility providers for planning, designing, and locating utilities. The Smart Utility Standards will serve as the baseline for discussions on any deviations from the standards needed/proposed for any given utility infrastructure.

Please submit typical below and above grade cross section diagrams of all utility infrastructure in the proposed development area (including infrastructure related to the applicable SUTs).

Please submit typical below and above grade lateral diagrams of all utility infrastructure in the proposed development area (including infrastructure related to the applicable SUTs).

Please email submission to manuel.esquivel@boston.gov

7.1 Date Cross Section Diagram(s) was submitted	**Refer to Roadway Cross Sections DPIR Figures 6.6 and 6.7.**
7.2 Date Lateral Diagram(s) was submitted	**Refer to DPIR Figures 6.2, 6.6, and 6.7.**
7.3 Additional Information	**NA**

ARTICLE 80 DESIGN REVIEW

BROADBAND READY BUILDINGS QUESTIONNAIRE

The City of Boston is working to cultivate a broadband ecosystem that serves the current and future connectivity needs of residents, businesses, and institutions. The real estate development process offers a unique opportunity to create a building stock in Boston that enables this vision. In partnership with the development community, the Boston Planning and Development Authority and the City of Boston will begin to leverage this opportunity by adding a broadband readiness component to the Article 80 Design Review. This component will take the form of a set of questions to be completed as part of the Project Notification Form. Thoughtful integration of future-looking broadband practices into this process will contribute to progress towards the following goals:

1. Enable an environment of competition and choice that results in all residents and businesses having a choice of 2 or more wireline or fixed wireless high-speed Internet providers
2. Create a built environment that is responsive to new and emerging connectivity technologies
3. Minimize disruption to the public right of way during and after construction of the building

The information that is shared through the Project Notification Form will help BPDA and the City understand how developers currently integrate telecommunications planning in their work and how this integration can be most responsive to a changing technological landscape.

Upon submission of this online form, a PDF of the responses provided will be sent to the email address of the individual entered as Project Contact. Please include this PDF in the Project Notification Form packet submitted to BPDA.

SECTION 1: GENERAL QUESTIONS

Project Information

- Project Name: **Enterprise Research Campus**
- Project Address Primary: **100 Western Avenue**
- Project Address Additional: **None**
- Project Contact (name / Title / Company / email / phone): **Max Cassidy, Senior Director, Tishman Speyer, mcassidy@tishmanspeyer.com**
- Expected completion date: **2025**

Team Description

- Owner / Developer **Tishman Speyer**
- Architect **Master Planners: Henning Larsen and Studio Gang**
- Engineer (building systems): **ARUP, for Master Planning**
- Permitting: **VHB**
- Construction Management: **TBD**

SECTION 2: RIGHT OF WAY TO BUILDING

#1: Please provide the following information for your building's point of entry planning (conduits from building to street for telecommunications). Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

Number of Points of Entry **One**

Locations of Points of Entry **To be determined**

Quantity and size of conduits **It is estimated that each entrance will be provided with a 2x2 4 inch connection to a transition point just outside the building.**

Location where conduits connect (e.g. building-owned manhole, carrier-specific manhole or stubbed at property line) **Manholes by private/public utilities**

Other information/comments

#2: Do you plan to conduct a utility site assessment to identify where cabling is located within the street? This information can be helpful in determining the locations of POEs and telco rooms. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

- Yes YES
- No
- Unknown

SECTION 3: INSIDE OF THE BUILDING

Riser Planning

Riser capacity can enable multiple telecom providers to serve tenants in your building.

#3: Please provide the following information about the riser plans throughout the building. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

- Number of risers **One**
- Distance between risers (if more than one) **N/A**
- Dimensions of riser closets **Unknown**
- Riser or conduit will reach to top floor **Yes**
- Number and size of conduits or sleeves within each riser **Unknown**
- Proximity to other utilities (e.g. electrical, heating) **Unknown**
- Other information/comments

Telecom Room

A well designed telecom room with appropriate security and resiliency measures can be an enabler of tenant choice and reduce the risk of service disruption and costly damage to telecom equipment.

#4: Please provide the following information about the telecom room plans. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

- What is the size of the telecom room? **The Project anticipates following BICSI guidelines.**

- Describe the electrical capacity of the telecom room (i.e. # and size of electrical circuits) **Unknown**
- Will the telecom room be located in an area of the building containing one or more load bearing walls? **Unknown**
- Will the telecom room be climate controlled?
    - Yes
    - No
    - Unknown **Unknown**
- If the building is within a flood-prone geographic area, will the telecom equipment will be located above the floodplain?
    - Yes
    - No
    - Unknown **Unknown**
- Will the telecom room be located on a floor where water or other liquid storage is present?
    - Yes
    - No
    - Unknown **Unknown**
- Will the telecom room contain a flood drain?
    - Yes
    - No
    - Unknown **Typically there is no need for a floor drain when BICSI guidelines are followed.**
- Will the telecom room be single use (telecom only) or shared with other utilities?
    - Telecom only **Telcom only**
    - Shared with other utilities
    - Unknown
- Other information/comments

Delivery of Service Within Building (Residential Only)

Please enter ‘unknown’ if these decisions have not yet been made or you are presently unsure. Questions 5 through 8 are for residential development only.

#5: Will building/developer supply common inside wiring to all floors of the building?

- Yes
- No
- Unknown **Unknown**

#6: If so, what transmission medium (e.g. coax, fiber)? Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

#7: Is the building/developer providing wiring within each unit?

- Yes
- No
- Unknown **Unknown**

#8: If so, what transmission medium (e.g. coax, fiber)? Please enter 'unknown' if these decisions have not yet been made or you are presently unsure. **Unknown**

SECTION 4: ACCOMMODATION OF NEW AND EMERGING TECHNOLOGIES

Cellular Reception

The quality of cellular reception in your building can have major impacts on quality of life and business operations.

Please provide the following information on your plans to facilitate high quality cellular coverage in your building. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

#9: Will the building conduct any RF benchmark testing to assess cellular coverage?

- Yes
- No
- Unknown **Unknown**

#10: Will the building allocate any floor space for future in-building wireless solutions (DAS/small cell/booster equipment)?

- Yes
- No

- Unknown **Unknown**

#11: Will the building be providing an in-building solution (DAS/ Small cell/ booster)?

- Yes
- No
- Unknown **Unknown**

#12: If so, are you partnering with a carrier, neutral host provider, or self-installing?

- Carrier
- Neutral host provider
- Self-installing

Rooftop Access

Building rooftops are frequently used by telecommunications providers to install equipment critical to the provision of service to tenants.

Please provide the following information regarding your plans for roof access and usage. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

#13: Will you allow cellular providers to place equipment on the roof?

- Yes
- No
- Unknown **Unknown**

#14: Will you allow broadband providers (fixed wireless) to install equipment on the roof?

- Yes
- No
- Unknown **Unknown**

SECTION 5: TELECOM PROVIDER OUTREACH

Supporting Competition and Choice

Having a choice of broadband providers is a value add for property owners looking to attract tenants and for tenants in Boston seeking fast, affordable, and reliable broadband service. In addition to enabling tenant choice in your building, early outreach to telecom providers can also reduce cost and disruption to the public right of way. The following questions focus on steps that property owners can take to ensure that multiple wireline or fixed wireless broadband providers can access your building and provide service to your tenants.

#15: (Residential Only) Please provide the date upon which each of the below providers were successfully contacted, whether or not they will serve the building, what transmission medium they will use (e.g. coax, fiber) and the reason they provided if the answer was 'no'.

No outreach has yet occurred to providers.

- Comcast
- RCN
- Verizon
- NetBlazr
- Starry

#16: Do you plan to abstain from exclusivity agreements with broadband and cable providers?

- Yes
- No
- Unknown **Unknown**

#17: Do you plan to make public to tenants and prospective tenants the list of broadband/cable providers who serve the building?

- Yes
- No
- Unknown **Unknown**

SECTION 6: FEEDBACK

The Boston Planning and Development Agency looks forward to supporting the developer community in enabling broadband choice for resident and businesses.

Please provide feedback on your experience completing these questions.

The project is too early in the process to answer most of the questions in this document.

APPENDIX C: Transportation

This appendix is provided under a separate cover due to file size.

APPENDIX D: Sustainability Supporting Documentation

Contents:

- Envelope Calculations
- Zero Carbon Building Assessment

Envelope Calculations

Appendix: Envelope UA Calculation

This appendix serves as a complement to the Draft Project Impact Report (DPIR) 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 typically across similar building types.

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

	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	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**

Zero Carbon Building Analysis

Appendix D: Zero Carbon Building Assessment

This document describes the Zero Carbon Building Assessment (ZCBA) for the Enterprise Research Campus Project.

According to the City of Boston Climate Action Plan 2019 Update, buildings account for 71 percent of Boston's greenhouse emissions and of that number, commercial buildings contribute over 50 percent of Boston's greenhouse emissions. Therefore, buildings are crucial to achieving the City and State's commitments to carbon neutrality by 2050.

In the City's Climate Action Plan update released October 2019, Action #3 is to strengthen green building zoning requirements to a zero net carbon standard with an immediate timeline of 2020-2021. The City has defined Net Zero Carbon as "A ZNC building is a low-energy fossil fuel-free building that meets its annual energy needs from a mix of on- and off-site renewable energy assets. Even with on-site renewable energy generation, larger and more energy-intensive buildings, like medical or laboratory facilities, may require off-site renewable energy delivered by the grid to be ZNC."

In support of that action, as part of the Article 37 zoning process, the City has recently incorporated a requirement for a Zero Carbon Building Assessment (ZCBA) that includes a highly energy efficient and all-electric building systems feasibility study. It requires that all projects being reviewed under Article 80B not only evaluate the proposed design against an energy code baseline, but also include a net zero carbon version of the building design.

Since the PNF filing, the Proponent has committed to additional electrification of space heating in the Lab/Office buildings which represent 70% of the masterplan's energy use. Additionally, the Proponent has committed to joining Harvard University in their renewable energy contracts to achieve fossil fuel neutral by 2026. 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.

As a result of this procurement, in the proposed design, the GHG emissions reduction increases from 19% to 90% compared to the Base Case, representing a savings of 8,728 tons per year. These immediate reductions in electricity GHG emissions are far ahead of the Massachusetts electrical grid decarbonization. Additional off-site purchases in collaboration with Harvard will address and offset scope 1 emissions to achieve Fossil Fuel Neutral by 2026.

Additional electrification within the Residential, Hotel and Conference Center are being considered in conjunction with the district energy study, whose results will be complete in August 2021.

The ZCBA includes energy modeling for each of the four primary typologies on the Project—Laboratory/Office, Multifamily Residential, Hotel, and Conference Center—and includes updates to envelope performance and HVAC systems per the City of Boston ZCBA guidance document. Detailed modeling inputs and results are summarized for each typology in the following sections.

Per City of Boston guidelines, the report is organized on the four components of the ZCBA; low energy (low carbon) buildings, renewable and clean energy, annual net performance calculation and first and life cycle cost assessment.

1. Low Energy (Low Carbon) Buildings

The City of Boston guidance on ZCBA suggests enhanced building envelope design characterized by high insulation (R-values) and air tightness, passive system strategies to reduce energy loads, and all-electric high efficiency space conditioning, equipment, and lighting.

The ZCBA described in this report involves HVAC enhancements (including full electrification of all space heating and domestic hot water equipment) and improved envelope performance

The sections below provide a summary of the building energy model input assumptions and results for the ZCBA, comparing the proposed design model ('Design Case') with the zero carbon building assessment model ('Zero Carbon Building') for each of the four typologies assessed in the Project. Energy, GHG emissions, and cost results are provided using the referenced conversion factors from regional sources. Electricity emission rates are assumed to be 658 lbs/MWh (specific to the Commonwealth of Massachusetts),[1] while natural gas emission rates are assumed to be 117 lbs/MMBtu.[2] Electricity costs are assumed to be 16.27 cents/kWh.[3] Natural gas is assumed to cost 10.57/thousand cubic feet.[4]

[1] Electricity-based emissions calculations assume 658 lbs CO2e/MWh. Source: 2018 ISO New England Electric Generator Air Emissions Report. Accessed 2021-01-15. https://www.iso-ne.com/static-assets/documents/2020/05/2018_air_emissions_report.pdf

[2] Natural gas-based emissions calculations assume 117 lbs CO2e/MMBtu natural gas stationary combustion. Source: EPA Center for Corporate Climate Leadership, Emission Factors for Greenhouse Gas Inventories. Accessed 2021-01-14. https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf

[3] Per EIA, "Massachusetts State Energy Profile," accessed 2021-05-06. https://www.eia.gov/state/print.php?sid=MA

[4] 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

Laboratory/Office Typology

For the Laboratory/Office typology, a summary of the key energy modeling inputs, including the additional measures and systems modeled for the Zero Carbon Building, are presented in Table D-1. The model outputs for energy consumption, emissions, and cost are summarized in Table D-2.

Table D-1 Summary of Zero Carbon Building Energy Modeling Inputs – Laboratory/Office Typology

	Design Case	Zero Carbon Building
Building Envelope		
Roof Insulation	U- 0.025 (R-40)	U- 0.02 (R-60)
Wall Assembly – Opaque	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel	U- 0.05 (R-36 c.i.) opaque U-0.1 (R-20) spandrel
Slab Insulation	F- 0.51 (Unheated slab)	Same as Design Case
Air Infiltration Rate	0.25 cfm/ft2 façade at 75 Pa	0.06 cfm/ft2 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 (%)	41%	40%
HVAC		
Primary HVAC System	Dedicated outside air system (DOAS) with heat recovery and fan coil units	Same as Design Case
Exhaust Air Energy Recovery	Water-based exhaust heat recovery (50% sensible effectiveness)	Same as Design Case
Primary Cooling	High-efficiency water-cooled centrifugal chillers + heat pump chiller	Same as Design Case
Primary Heating	ASHP (sized for 15% of peak building heating load) + waste heat from heat pump chiller + high-efficiency gas-fired condensing boiler plant	ASHP (sized for 50% of peak building heating load) + waste heat from heat pump chiller + Electric resistance heating backup [5]
Service Hot Water Type	High-efficiency gas storage water heater	Central ASHP water heating
Lighting		
Lighting Power Density (LPD)	Lab spaces: 1.20 W/ft2 Office spaces: 0.55 W/ft2	Same as Design Case

[5] Energy modeling results indicate that with the ASHP sized for 50% of peak building heating capacity, electric resistance supplemental heating comprises just 5% of total heating energy and less than 1% of total building energy.

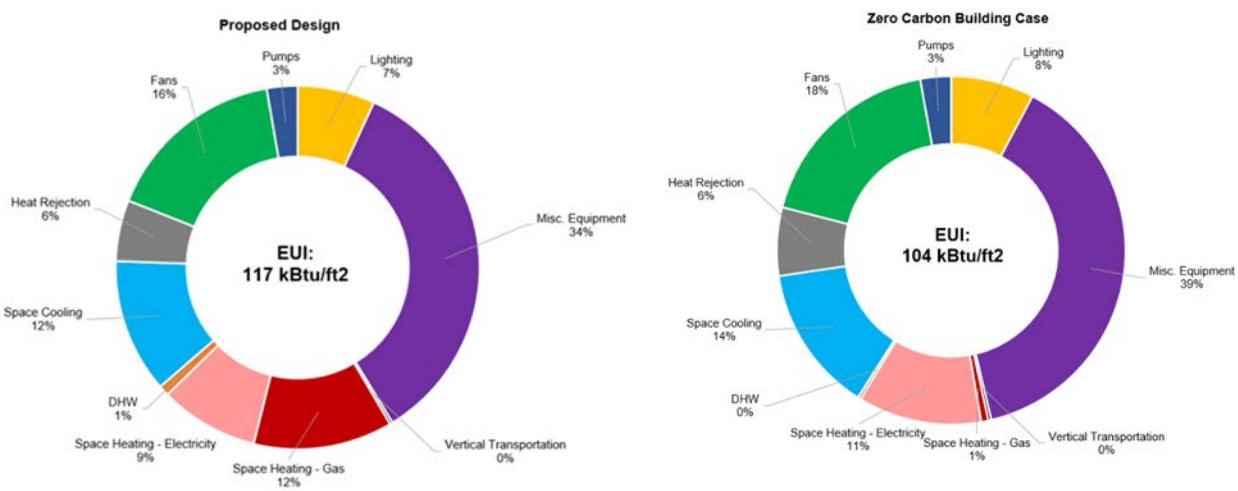
Table D-2 Preliminary Energy Model Results: Laboratory/Office Typology

	Energy Consumption			GHG Emissions			Energy Cost	EUI
	Electricity (MWh/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	($/yr)	(kBtu/ft2/yr)
Design Case	15,509	8,121	61,039	5,103	475	5,578	$2,606,159	116
Zero Carbon	15,946	0	54,408	5,246	0	5,246	$2,594,425	104
End-Use Savings	-437	8,121	6,631	-144	475	331	11,734	-
Percent Savings	**-3%**	**100%**	**11%**	**-3%**	**100%**	**6%**	**< 1%**	**11%**

As shown in Table D-2, with the proposed building design and system improvements, the Zero Carbon Building model for the Laboratory/Office typology demonstrates a 11% reduction in energy and a 6% reduction (331 tpy) in emissions in comparison to the Design Case. Due to the price of electricity being higher than that of natural gas, the Zero Carbon Building model shows negligible cost savings (<1%).

The graphs below present a breakdown of the Laboratory/Office typology energy consumption by end use for both the Design Case and Zero Carbon Building.

Figure D-1 Laboratory**/Office Energy End Use**



Incentive Analysis – Laboratory/Office

Alternative Energy Credits (AECs)

The Laboratory/Office typology Zero Carbon Building design includes air-source heat pumps for the primary heating. With the metered calculation approach, the Laboratory/Office typology is eligible for a total incentive of $983,146 over a ten-year period.

Alternative Energy Credit (AEC)			
	Area	524,013	sf
	G - Grid Supplied Electricity	1980.70	MWh
	COP	3.10	
	Enet out (premultiplier)	1639	MHW/yr
	Multiplier	**3**	
	Enet out (postmultiplier)	4,916	MHW/yr
	Enet out (for 10 year strip)	49,157	MHW/10 yr
	Incentive/AEC	$20	
	AEC total per 10 years	**$983,146**	per metered calculation
	AEC payments	**$24,579**	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 Zero Carbon Case to the MA Stretch Code 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	$655,016
Zero Carbon Case	104	40.3%	$1.25	$655,016

[6] https://www.masssave.com/en/saving/business-rebates/new-buildings-and-major-renovations/whole-building-energy-use-intensity-reduction

Residential Typology

For the Residential typology, a summary of the key energy modeling inputs, including the additional measures and systems modeled for the Zero Carbon Building, are presented in Table D-3. The model outputs for energy consumption, emissions, and cost are summarized in Table D-4 based on the emissions and cost factors referenced above.

Table D-3 Summary of Zero Carbon Building Energy Modeling Inputs – Residential Typology

	Design Case	Zero Carbon Building
Building Envelope		
Roof Insulation	U- 0.025 (R-40)	U- 0.02 (R-60)
Wall Assembly – Opaque	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel	U- 0.05 (R-36 c.i.) opaque U-0.1 (R-20) spandrel
Slab Insulation	F- 0.51 (Unheated slab)	Same as Design Case
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 (fixed) U- 0.36 (operable)	U-0.15 (fixed and operable)
Vertical Glazing SHGC	0.3	0.28
Window to Wall Ratio (%)	Whole building 41%	30%
HVAC		
Primary HVAC System	Energy recovery ventilator (ERV) + WSHP units	Energy recovery ventilator (ERV) + Air-source VRF
Exhaust Air Energy Recovery	Energy recovery ventilator; 70% total effectiveness	Energy recovery ventilator; 80% total effectiveness
Primary Cooling	ERV: DX cooling coils; WSHP / hydronic loop with cooling towers	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)
Primary Heating	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)
Service Hot Water Type	Condensing gas storage water heater (95% thermal eff.)	Central ASHP water heating, UEF 3.45
Lighting		
Lighting Power Density (LPD)	Apartments: 0.37 W/SF	Same as Design Case

Table D-4 Preliminary Energy Model Results: Residential Typology

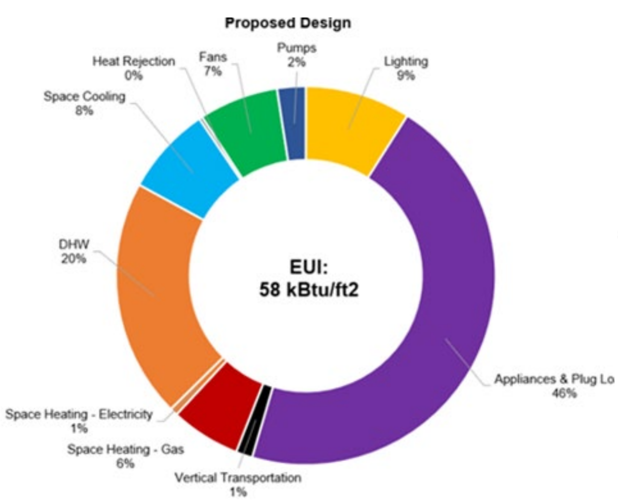
	Energy Consumption			GHG Emissions			Energy Cost	EUI
	Electricity (MWh/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	($/yr)	(kBtu/ft2/yr)
Design Case	3,392	4,852	16,425	1,116	284	1,400	$601,306	58
Zero Carbon	3,546	0	12,098	1,167	0	1,167	$576,907	43
End-Use Savings	-154	4,852	4,326	-51	284	233	$24,399	-
Percent Savings	**-5%**	**100%**	**26%**	**-5%**	**100%**	**17%**	**4%**	**26%**

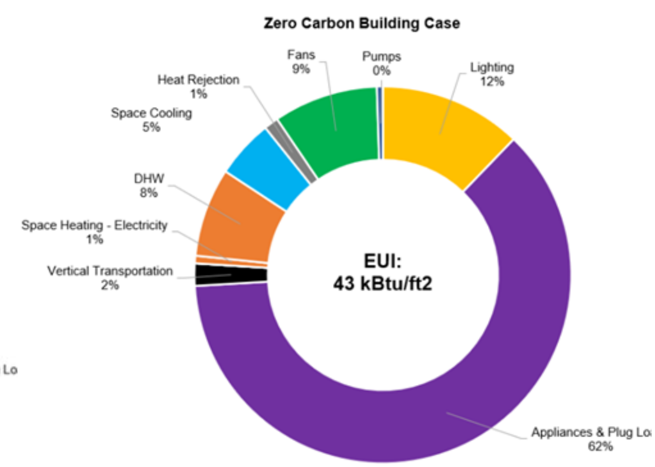
As shown in Table D-4, with the proposed building design and system improvements, the Zero Carbon Building model for the Residential typology demonstrates a 26% reduction in energy and a 17% reduction in emissions (233 tpy) in comparison to the Design Case. The Zero Carbon model demonstrates cost savings of 4% ($24,399 per year). The energy, emissions, and cost savings of the Zero Carbon Building are derived from the energy efficient VRF heating and cooling system and envelope improvements.

The Design Case has incorporated the C406.9 reduced air-infiltration additional ECM to further enhance building envelope performance and the Proponent is considering further electrification of space heating using VRF system.

The graphs below present a breakdown of the Residential typology energy consumption by end use for both the Design Case and Zero Carbon Building.

Figure D-2 Residential Energy End Use





Incentive Analysis – Residential

Alternative Energy Credits (AECs)

The residential typology Zero Carbon Building design includes air-source VRF heating, serving 100% of the building heating load. The AEC incentives for residential typologies fall under the unmetered calculation, and therefore are driven by the unit count. With 345 residential units, a maximum incentive of $621,000 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	345	Residential units
	AECs for whole building	**$621,000**	per unmetered calculation

The Residential Zero Carbon Building case considered in this report is not assumed to achieve the Passive House rating. However, if a Passive House Certification were achieved, the multiplier is increased from 3 to 5. This results in a total AEC incentive of $1,035,000. In addition to AEC incentives, if the project is Passive House Certified, it will qualify for Mass Save Passive House incentives for an additional $1,035,000.

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	345	Residential units
	AECs for whole building	**$1,035,000**	per unmetered calculation

MassSave Passive House Incentive

Mass Save	Pre-certified PH incentive	$500	per unit
	Passive House Incentive	$2,500	per unit
	# of units	345	Residential units
	Total Passive House Incentive	**1,035,000**	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.[7] The following table compares the EUI of the Design Case and Zero Carbon Case to the MA Stretch Code 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	$174,059
Zero Carbon Case	43	40.9%	$1.25	$355,625

[7] https://www.masssave.com/en/saving/business-rebates/new-buildings-and-major-renovations/whole-building-energy-use-intensity-reduction

Hotel Typology

For the Hotel typology, a summary of the key energy modeling inputs, including the building envelope improvements modeled for the Zero Carbon Building, are presented in Table D-5. The model outputs for energy consumption, emissions, and cost are summarized in Table D-6 based on the emissions and cost factors referenced above.

Table D-5 Summary of Zero Carbon Building Energy Modeling Inputs – Hotel Typology

	Design Case	Zero Carbon Building
Building Envelope		
Roof Insulation	U- 0.025 (R-40)	U- 0.02 (R-60)
Wall Assembly – Opaque	U- 0.05 (R-20) opaque	U- 0.05 (R-36 c.i.) opaque U-0.1 (R-20) spandrel
Slab Insulation	F- 0.51 (Unheated slab)	Same as Design Case
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 (fixed) U- 0.36 (operable)	U-0.15 (fixed and operable)
Vertical Glazing SHGC	0.3	0.28
Window to Wall Ratio (%)	41%	30%
HVAC		
Primary HVAC System	Energy recovery ventilator (ERV) + WSHP units	Energy recovery ventilator (ERV) + Air-source VRF
Exhaust Air Energy Recovery	Energy recovery ventilator; 70% total effectiveness	Energy recovery ventilator; 80% total effectiveness
Primary Cooling	ERV: DX cooling coils; WSHP / hydronic loop with cooling towers	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)
Primary Heating	ERV: High-efficiency condensing gas furnace heating; WSHP w/ condensing gas boilers (95% thermal eff.)	Air-source VRF heating (COP 3.3 at 90.1-2013 reference conditions)
Service Hot Water Type	Condensing gas storage water heater (95% thermal eff.)	Central ASHP water heating, UEF 3.45
Lighting		
Lighting Power Density (LPD)	Guestrooms: 0.37 W/SF	Same as Design Case

Table D-6 Preliminary Energy Model Results: Hotel Typology

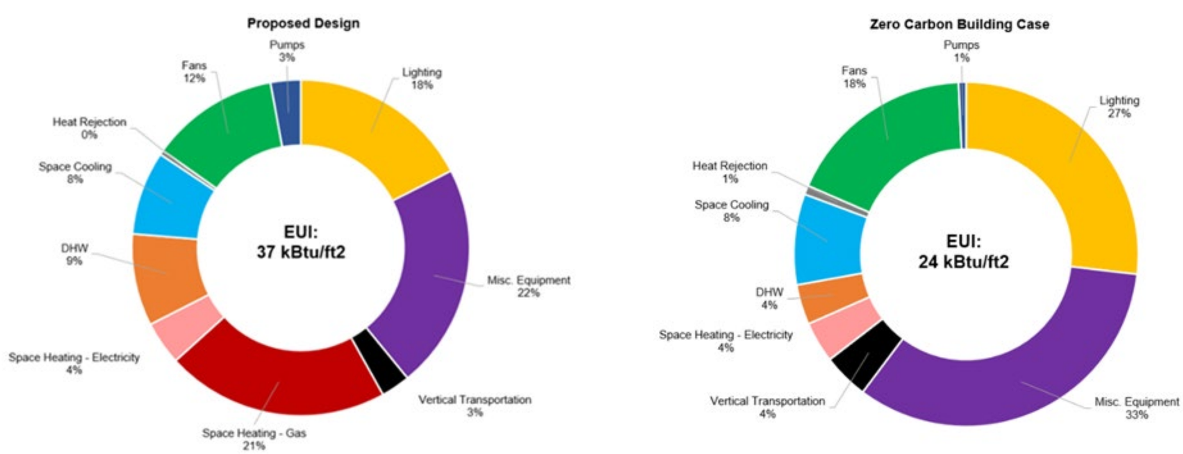
	Energy Consumption			GHG Emissions			Energy Cost	EUI
	Electricity (MWh/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	($/yr)	(kBtu/ft2/yr)
Design Case	1,041	1,785	5,337	343	104	447	$187,574	37
Zero Carbon	1,016	0	3,465	334	0	334	$165,232	24
End-Use Savings	26	1,785	1,872	8	104	113	$22,342	-
Percent Savings	**2%**	**100%**	**35%**	**2%**	**100%**	**25%**	**12%**	**35%**

As shown in Table D-6, with the proposed building design and building envelope and domestic water improvements, the Zero Carbon Building model for the Hotel typology demonstrates a 35% reduction in energy and a 12% reduction (113 tpy reduction) in emissions in comparison to the Design Case. The Zero Carbon model demonstrates cost savings of 12% ($22,342 per year). The energy and emissions savings of the Zero Carbon Building are derived from the high-performance envelope and energy-efficient air-source heat pump domestic water heating.

The Design Case has incorporated the C406.9 reduced air-infiltration additional ECM to further enhance building envelope performance and the Proponent is considering further electrification of space heating using VRF system.

The graphs below present a breakdown of the Hotel typology energy consumption by end use for both the Design Case and Zero Carbon Building.

Figure D-3 Hotel Energy End Use



Incentive Analysis – Hotel

Alternative Energy Credits

The hotel typology Zero Carbon Building design includes air-source VRF heating, serving 100% of the building heating load. The AEC incentives for hotel typologies fall under the unmetered calculation, and therefore are driven by the unit count. With 250 hotel 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

The Hotel Zero Carbon Building case considered in this report is not assumed to achieve the Passive House rating. However, if a Passive House Certification were achieved, the multiplier is increased from 3 to 5. This results in a total AEC incentive of $750,000.

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	250	Hotel units
	AECs for whole building	**$750,000**	per unmetered calculation

MassSave Passive House

MassSave Passive House incentives are not applicable for Hotel uses since they are not classified as residential uses.

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.[8] The following table compares the EUI of the Design Case and Zero Carbon Case to the MA Stretch Code 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	21.0%	$0.64	$93,580
Zero Carbon Case	24	48.7%	$1.25	$181,950

Conference Typology

For the Conference typology, a summary of the key energy modeling inputs, including the building envelope improvements modeled for the Zero Carbon Building, are presented in Table D-7. The model outputs for energy consumption, emissions, and cost are summarized in Table D-8 based on the emissions and cost factors referenced above.

Table D-7 Summary of Zero Carbon Building Energy Modeling Inputs – Conference Typology

	Design Case	Zero Carbon Building
Building Envelope		
Roof Insulation	U- 0.025 (R-40)	U- 0.02 (R-60)
Wall Assembly – Opaque	U- 0.05 (R-20) opaque U-0.1 (R-10) spandrel	U- 0.05 (R-36) opaque U-0.1 (R-20) spandrel
Slab Insulation	F- 0.51 (Unheated slab)	Same as Design Case
Air Infiltration Rate	0.25 cfm/ft2 façade at 75 Pa	0.06 cfm/ft2 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 (%)	41%	40%
HVAC		
Primary HVAC System	VAV dedicated outside air system (DOAS) with energy recovery	Same as Design Case
Exhaust Air Energy Recovery	Total energy recovery wheel (70% total effectiveness)	Total energy recovery wheel (80% total effectiveness)
Primary Cooling	On-site water-cooled chiller plant	Air-source VRF cooling (COP 3.5 at 90.1-2013 reference conditions)

[8] https://www.masssave.com/en/saving/business-rebates/new-buildings-and-major-renovations/whole-building-energy-use-intensity-reduction

Primary Heating	Condensing natural gas boilers	Air-source VRF heating (COP 3.3 at 90.1-2013 reference conditions)
Service Hot Water Type	Condensing gas storage water heater (95% thermal eff.)	Central ASHP water heating, UEF 3.45
Lighting		
Lighting Power Density (LPD)	0.76 W/ft2	Same as Design Case

Table D-8 Preliminary Energy Model Results: Conference Typology

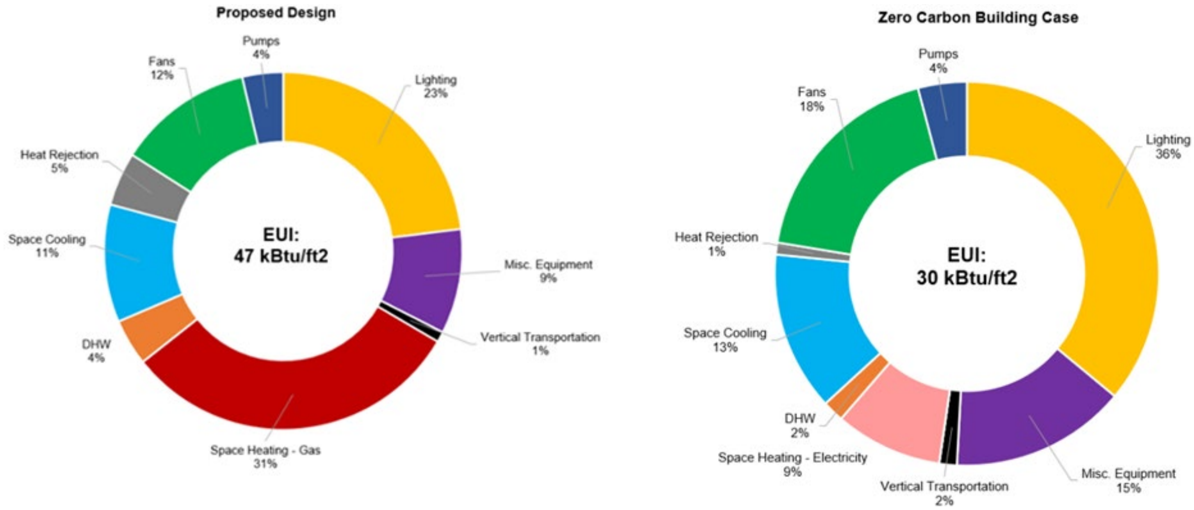
	Energy Consumption			GHG Emissions			Energy Cost	EUI
	Electricity (MWh/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	($/yr)	(kBtu/ft2/yr)
Design Case	533	984	2,804	175	58	233	$96,805	47
Zero Carbon	526	0	1,793	173	0	173	$85,513	30
End-Use Savings	8	984	1,011	3	58	60	$11,292	-
Percent Savings	**1%**	**100%**	**36%**	**1%**	**100%**	**26%**	**12%**	**36%**

As shown in Table D-8, with the proposed building design and building envelope improvements, the Zero Carbon Building model for the Conference typology demonstrates a 36% reduction in energy and a 26% reduction (60 tpy reduction) in emissions in comparison to the Design Case. The Zero Carbon model demonstrates cost savings of 12% ($11,292 per year). The energy and emissions savings of the Zero Carbon Building are derived from the high-performance envelope.

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.

The graphs below present a breakdown of the Conference typology energy consumption by end use for both the Design Case and Zero Carbon Building.

Figure D-4 **Conference Energy End Use**



Incentive Analysis – Conference

Alternative Energy Credits

The Conference typology Zero Carbon Building design is served by ASHP sized for 100% of the space heating loads. The Conference Center is eligible for a total AEC incentive of $35,194 over a ten-year period.

Alternative Energy Credit (AEC)	Area	60,000	sf
	G - Grid Supplied Electricity	57.1	MWh
	COP	3.30	
	Enet out (premultiplier)	59	MHW/yr
	Multiplier	**3**	
	Enet out (postmultiplier)	176	MHW/yr
	Enet out (for 10 year strip)	1,760	MHW/10 yr
	Incentive/AEC	$20	
	AEC total per 10 years	**$35,194**	per metered calculation
	AEC payments	**$880**	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.[9] The following table compares the EUI of the Design Case and Zero Carbon Case to the MA Stretch Code 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	16.5%	$0.52	$31,471
Zero Carbon Case	30	46.7%	$1.25	$75,000

The Project

The following provides a summary of the aggregate results for the Zero Carbon Building models and Design Case models for all buildings and proposed area included in the Project, including the Laboratory/Office, Residential, Hotel, and Conference typologies. The emissions and cost calculations are based on the emissions and cost factors referenced above.

Table D-9 Project Energy Usage and Stationary Source CO_2 Emissions – Zero Carbon Buildings vs. Design Case Buildings

	Total Energy Consumption			Total GHG Emissions			Energy Cost
	Electricity (MWh/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	($/yr)
Design Case	20,476	15,742	85,605	6,736	921	7,657	$3,491,845
Zero Carbon	21,033	0	71,765	6,920	0	6,920	$3,422,077
End-Use Savings	-557	15,742	13,840	-183	921	738	$69,768
Percent Savings	**-3%**	**100%**	**16%**	**-3%**	**100%**	**10%**	**2%**

In aggregate for all typologies, the Zero Carbon Buildings demonstrate an additional energy savings of 16%, emissions savings of 10% and energy cost savings of 2%.

The energy savings are derived from improved HVAC system efficiency for the ASHP and VRF heating and cooling systems and improved envelope performance for all typologies. The emissions savings are derived from elimination of most of the natural gas consumption on site (apart from a small amount of natural gas assumption associated with commercial restaurant operation).

2. Renewable and Clean Energy

Renewables are a critical step in a carbon neutral approach that provide carbon free electricity to meet the building energy demand. The Project is limited in the available area for on-site renewables, i.e. solar photovoltaics, given the small size of the Project Site, shading from adjacent buildings, and the overall building area to roof area ratio. The project has provided preliminary feasibility analysis of onsite PV systems

[9] https://www.masssave.com/en/saving/business-rebates/new-buildings-and-major-renovations/whole-building-energy-use-intensity-reduction

in the Draft Project Impact Report (DPIR). As described in that report, the assessment used the online software Helioscope and considered PV installations on 5 building rooftops with assumed high-efficiency 223W solar PV panels. The analysis determined a total predicted solar energy generation of 259 MWh/year (85 tons emissions/year) offsetting between 1-3% of annual electricity consumption for most buildings, and up to 10.5% of electricity for the Conference building.

The Project will design all buildings to be solar ready so that a solar PV system could be installed or expanded at a future time.

To achieve carbon neutrality, off-site renewables, i.e. Renewable energy certificates (RECS) for Scope 2 emissions and limited carbon offsets for Scope 1 emissions will need to be purchased to offset building emissions for respective typologies. The Proponent has committed to joining Harvard University in their renewable energy contracts to achieve fossil fuel neutral by 2026l. 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.

3. Annual Net Performance Calculation

As summarized in the preceding section, the Design Case energy simulation indicates an annual electrical demand of 20,476 MWh for the Design Case and 20,829 MWh for the Zero Carbon Buildings case. This analysis assumes that the full electrical load will be offset via off-site renewable energy (RECs), and any natural gas-based emissions in the Design Case buildings will also be offset with RECs in collaboration with Harvard University's procurement. With these strategies, the Project will achieve Fossil Fuel Neutral.

For the Design Case buildings, the annual net emissions are calculated as follows:

6,736	tons/year electricity-based emissions
+ 921	tons/year natural gas-based emissions
- 0	tons/year offset by onsite renewable energy sources
- 6,736	tons/year offset by offsite RECs
- 921	offset by carbon offsets
= 0	tons/year net GHG emissions

For the Zero Carbon buildings, the annual net emissions are calculated as follows:

6,920	tons/year electricity-based emissions
+ 0	tons/year natural gas-based emissions
- 85	tons/year offset by onsite renewable energy sources
- 6,835	tons/year offset by offsite RECs
- 0	offset by carbon offsets
= 0	tons/year net GHG emissions

4. First and Life Cycle Cost Assessment

The final element of the Zero Carbon Building Assessment involves a life cycle cost assessment (LCCA) of the measures included in the Zero Carbon Building case.

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. The Proponent has committed to a 74% reduction in natural gas/scope 1 emissions, and a 90% reduction in GHG emissions from the base case including off-site renewable electricity. The remaining 10% of scope 1 emissions will also be offset by RECs in collaboration with Harvard University.

APPENDIX E: Environmental Protection Supporting Documentation

Contents:

REPORT

HARVARD ENTERPRISE RESEARCH CAMPUS (ERC) PROJECT

BOSTON, MA

PEDESTRIAN WIND STUDY
RWDI # 2100586
May 20, 2021

SUBMITTED TO

Max Cassidy
Senior Director – Design & Construction
mcassidy@tishmanspeyer.com

Tishman Speyer
125 High Street
Boston, MA 02110
M: 617.631.4417

SUBMITTED BY

Leo (Yi) Zeng, M.Eng.
Technical Coordinator
Yi.Zeng@rwdi.com

Neetha Vasan, M.A.Sc., LEED AP
Senior Microclimate Scientist
Neetha.Vasan@rwdi.com

Derek Kelly, M.Eng., P.Eng.
Project Manager - Principal
Derek.Kelly@rwdi.com

RWDI
600 Southgate Drive
Guelph, Ontario, Canada N1G 4P6
T: 519.823.1311

EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian wind assessment for the proposed Harvard Enterprise Research Campus (ERC) project in Boston, MA. The assessment was conducted for the No Build, Build and Full Build configurations, in accordance with the requirements of the Boston Planning and Development Agency (BPDA). The results for the three configurations, assessed against the BPDA mean speed and effective gust criteria, are presented in Figures 1A through 2C, as well as in Tables 1 and 2. The key findings are summarized as follows:

Effective Gust

- In the No Build and Build configurations, wind speeds are expected to meet the effective gust criterion at all areas assessed annually.
- In the Full Build configuration, the effective gust criterion is expected to be met at all locations annually, except one location at the northeast corner of the southwest Phase B future building.

Mean Speed

- No areas with dangerous wind conditions are expected on an annual basis for all three configurations.
- Mean speeds in the No Build configuration are generally comfortable for walking on an annual basis.
- In the Build configuration, mean speeds are predicted to be reduced around the proposed building perimeters. Wind conditions at most areas are expected to be appropriate for the intended pedestrian use on an annual basis. High wind speeds and conditions that are uncomfortable for walking are expected at the northwest and northeast corners of the Hotel, at the west end between the Residential Low Rise and the West Lab and at the southwest corner of the West Lab and the southeast corner of the East Lab.
- The addition of the Phase B future surrounding buildings in the Full Build configuration is anticipated to improve wind conditions in the area between the Residential Low Rise and the West Lab. However, the addition is expected to result in increased wind speeds along the west façade of the Hotel-Residential block.
- Appropriate wind control strategies are discussed in the report. The effectiveness of these mitigation solutions can be quantified through further wind tunnel testing.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

RWDI was retained to conduct a pedestrian wind assessment for the proposed Harvard Enterprise Research Campus (ERC) Project in Boston, MA. This report presents the project objectives, background, RWDI's approach and a discusses of the results. It also provides conceptual wind control measures, where necessary.

1.1 Project Description

The project site is located between Western Avenue and Cambridge Street, south of the Harvard Business School (Image 1). The site is currently undeveloped and surrounded by low buildings and open spaces like stadiums, parks and parking lots. The focus of this study is Phase 1A of the development that will consist of six (6) buildings:

1. 100' Low Rise Residential Building
2. 190' Residential Tower
3. Conference Building
4. 190' Hotel Tower
5. 140' West Lab Building
6. 140' East Lab Building

1.2 Objectives

The objectives of the study were to assess the effect of the proposed development on local conditions in pedestrian areas on and around the study site and provide recommendations for minimizing adverse effects. This quantitative assessment was based on wind speed measurements on a scale model of the project and its surroundings in one of RWDI's boundary-layer wind tunnels. These measurements were combined with the local wind records and compared to the BPDA criteria for gauging wind comfort and safety in pedestrian areas. The assessment focused on critical pedestrian areas, including building entrances and public sidewalks.

Image 1: Aerial View of the Project Site and Surroundings (Photo Courtesy of Google™ Earth)

2 BACKGROUND AND APPROACH

2.1 Wind Tunnel Study Model

To assess the wind environment around the proposed project, a 1:300 scale model of the project site and surroundings was constructed for the wind tunnel tests of the following configurations:

A – No-Build Condition:	Represents the existing site with existing surroundings without the Project (Image 2A),
B – Build Condition:	Represents the initial phase of development (Phase A) of Project with future surroundings (Image 2B); and,
C – Full-Build Condition:	Represents the full build out of the Project Site (Phases A and B) with future surroundings (Image 2C).

The wind tunnel model included all relevant surrounding buildings and topography within an approximately 1200 ft radius of the study site. The wind and turbulence profiles in the atmospheric boundary layer beyond the modelled area were also simulated in RWDI's wind tunnel. The wind tunnel model was instrumented with 153 specially designed wind speed sensors to measure mean and gust speeds at a full-scale height of approximately 5 ft above local grade in pedestrian areas throughout the study site. Wind speeds were measured for 36 directions in a 10-degree increment. The measurements at each sensor location were recorded in the form of ratios of local mean and gust speeds to the mean wind speed at a reference height above the model. The placement of wind measurement locations was based on our experience and understanding of the pedestrian usage for this site and was reviewed by the project team and BPDA.

Image 2A: Wind Tunnel Study Model – No Build Configuration

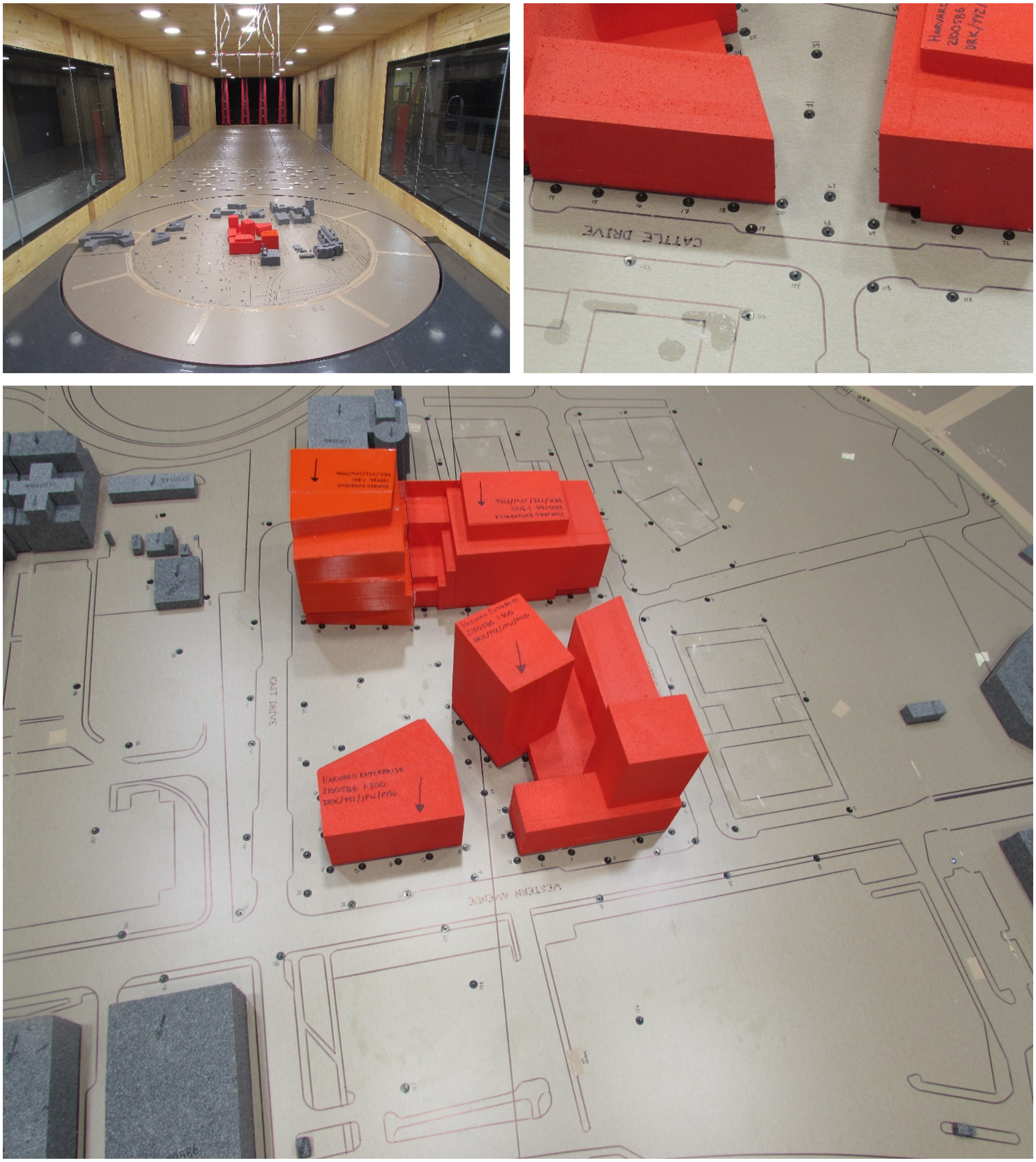


Image 2B: Wind Tunnel Study Model – Build Configuration

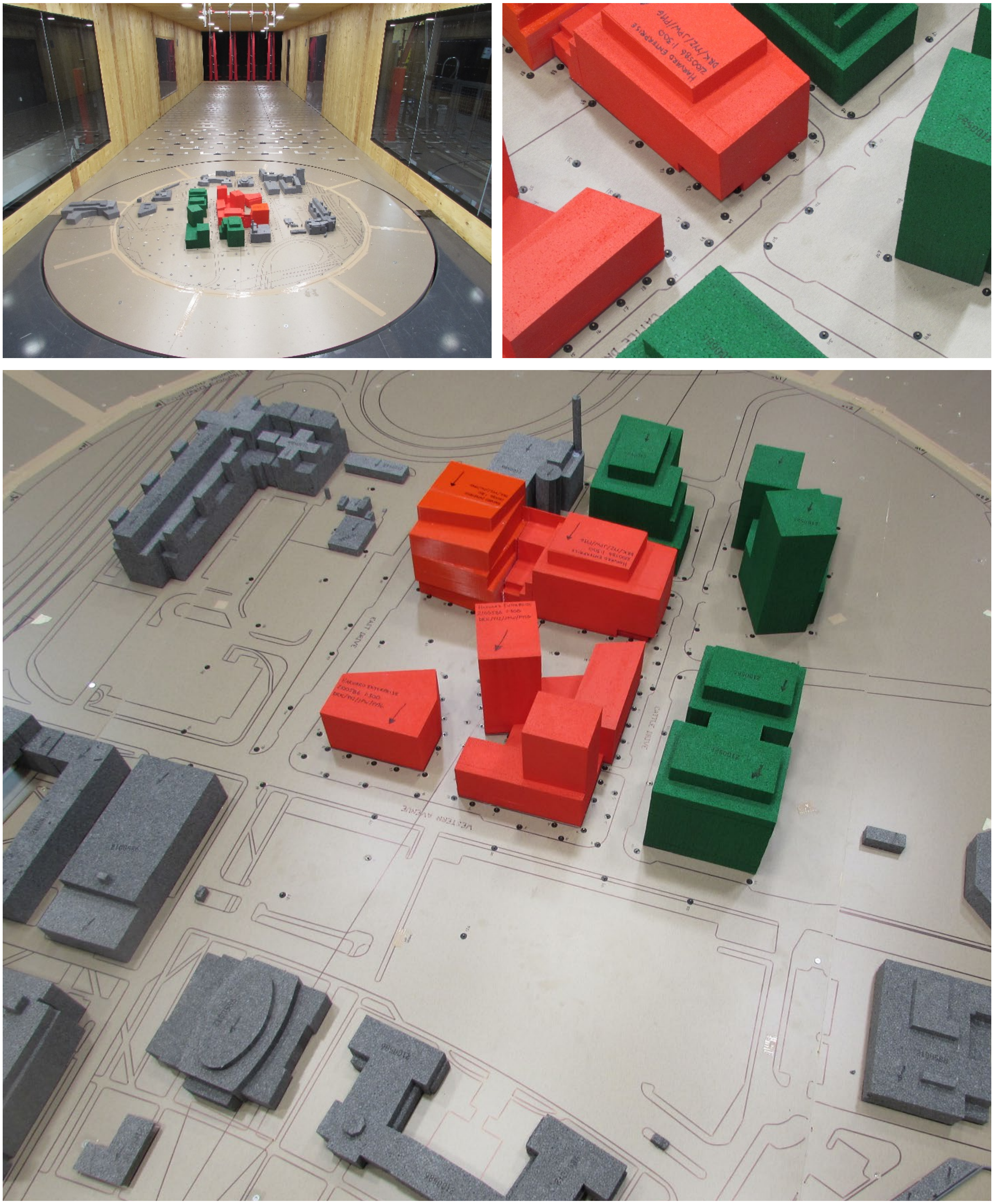
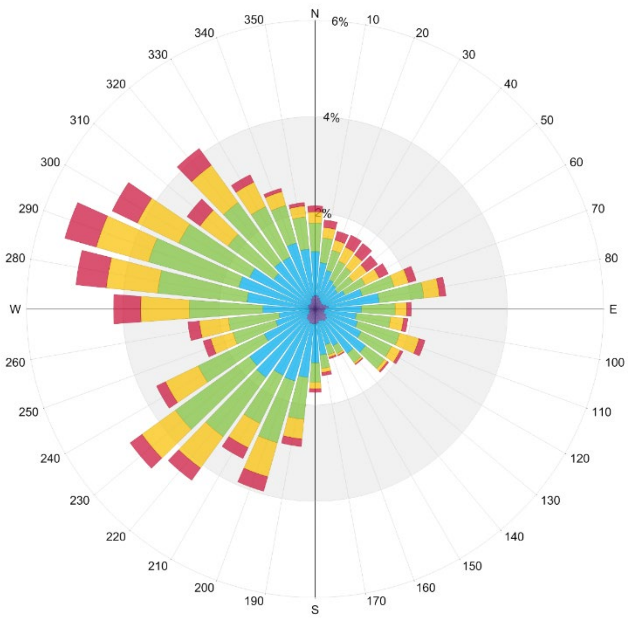


Image 2C: Wind Tunnel Study Model – Full Build Configuration

2.2 Meteorological Data

The results were then combined with long-term meteorological data, recorded during the years 1995 through 2018 at Boston's Logan International Airport to predict full scale wind conditions. The analysis was performed separately for the entire year and for each of the four seasons. Images 3 and 4 present "wind roses", summarizing the annual and seasonal wind climates in the Boston area respectively, based on the data from Logan Airport.

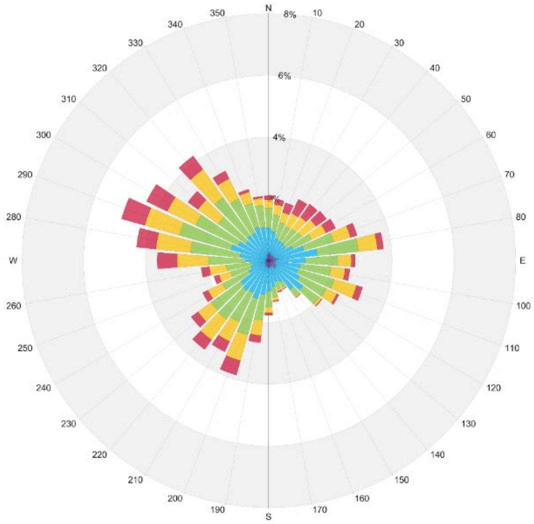
On an annual basis, the most common wind directions are those between south-southwest and northwest. Winds from east-northeast through east-southeast are also relatively common. In the case of strong winds, west-northwest, northwest, west and northeast are the dominant wind directions.



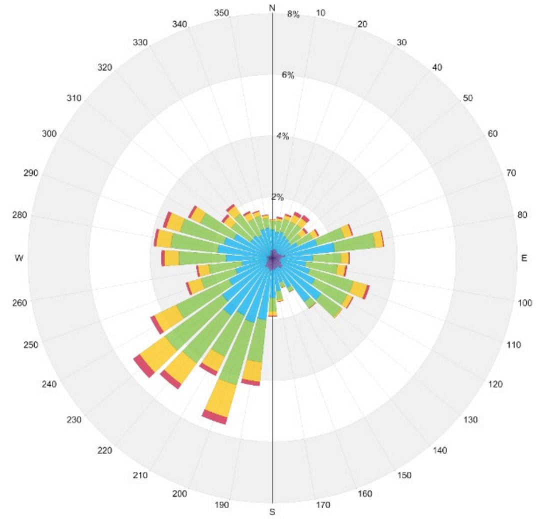
Wind Speed (mph)	Probability (%) Annual
Calm	3.0
1-5	7.9
6-10	32.5
11-15	32.4
16-20	16.3
>20	7.9

Image 3: Annual Directional distribution of winds approaching Boston Logan International Airport from 1995 through 2018

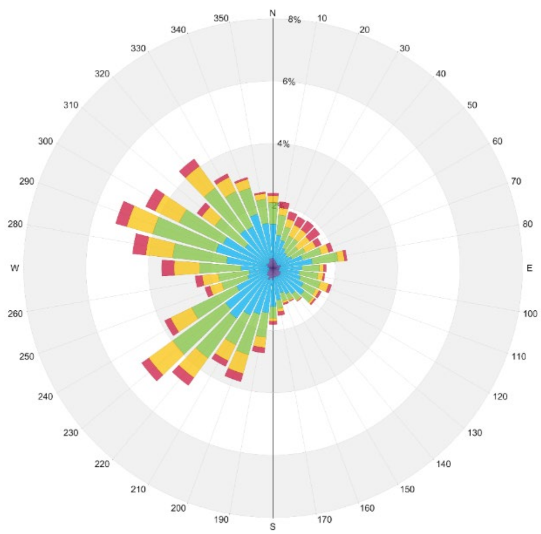
The first wind rose in Image 4, for example, summarizes the spring (March, April, and May) wind data which, in general, indicate prevailing winds occurring from the northwest to south-southwest and northeast to east-southeast directions and strong winds (red bands) primarily occurring from the west-northwest, northwest, south-southwest, west and northeast directions.



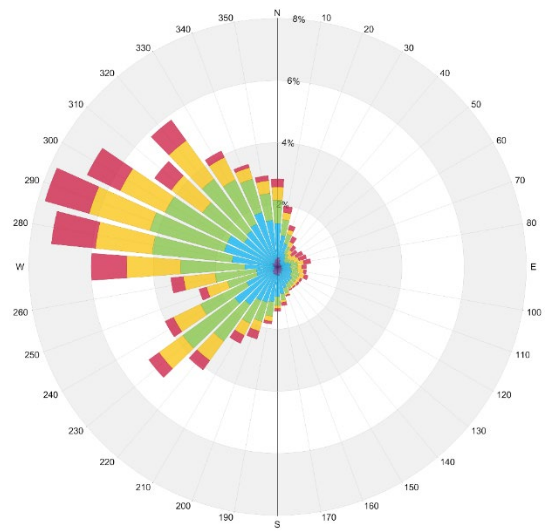
Spring (March – May)



Summer (June – August)



Fall (September – November)



Winter (December – February)

Wind Speed (mph)	Probability (%) Spring	Summer	Fall	Winter
Calm	2.8	3.0	3.4	2.6
1-5	6.8	9.4	8.7	6.5
6-10	28.9	38.8	34.6	27.9
11-15	32.3	34.4	32.0	30.9
16-20	19.2	11.8	14.5	19.7
>20	10.1	2.6	6.8	12.4

Image 4: Seasonal Directional Distribution of Winds Approaching Boston Logan International Airport from 1995 through 2018

2.3 BPDA Wind Criteria

The BPDA has adopted two standards for assessing the relative wind comfort of pedestrians. First, the BPDA wind design guidance criterion states that an effective gust velocity (hourly mean wind speed +1.5 times the root-mean-square wind speed) of 31 mph should not be exceeded more than 1% of the time.

The second set of criteria used by the BPDA to determine the acceptability of specific locations is based on the work of Melbourne. This set of criteria is used to determine the relative level of pedestrian wind comfort for activities such as sitting, standing, or walking. The criteria are expressed in terms of benchmarks for the 1-hour mean wind speed exceeded 1% of the time.

Wind Acceptability	Effective Gust Speed (mph)
Acceptable	≤ 31
Unacceptable	> 31
Comfort Category	**Mean Wind Speed (mph)**
Comfortable for Sitting	≤12
Comfortable for Standing	≤ 15
Comfortable for Walking	≤ 19
Uncomfortable for Walking	> 19
Dangerous	> 27

**Effective gust and mean wind speeds are based on a 1% exceedance or 99 percentile wind speeds.

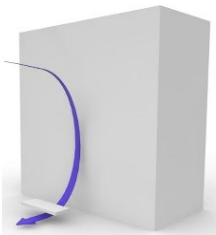
The consideration of wind in planning outdoor activity areas is important since high winds in an area tend to deter pedestrian use. For example, winds should be light or relatively light in areas where people would be sitting, such as outdoor cafes or playgrounds. For bus stops and other locations where people would be standing, somewhat higher winds can be tolerated. For frequently used sidewalks, where people are primarily walking, stronger winds are acceptable. For infrequently used areas, the wind comfort criteria can be relaxed even further. The actual effects of wind can range from pedestrian inconvenience, due to the blowing of dust and other loose material in a moderate breeze, to severe difficulty with walking due to the wind forces on the pedestrian.

The wind climate found in a typical downtown location in Boston is generally comfortable for the pedestrian use of sidewalks and thoroughfares and meets the BPDA effective gust velocity criterion of 31 mph. However, without any mitigation measures, this wind climate is likely to be frequently uncomfortable for more passive activities such as sitting.

This study involved state-of-the-art measurement and analysis techniques to predict wind conditions. Nevertheless, some uncertainty remains in predicting wind comfort, and this must be kept in mind. For example, the sensation of comfort among individuals can be quite variable. Variations in age, individual health, clothing, and other human factors can change a particular response of an individual. The comfort limits used in this report represent an average for the total population. Also, unforeseen changes in the project area, such as the construction or removal of buildings, can affect the conditions experienced at the site. Finally, the prediction of wind speeds is necessarily a statistical procedure. The wind speeds reported are for the frequency of occurrence stated (1% of the time). Higher wind speeds will occur but on a less frequent basis.

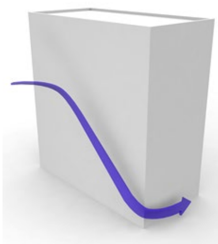
2.4 Generalized Wind Flows

In our discussion of wind conditions, reference may be made to the following generalized wind flow patterns (Image 5):



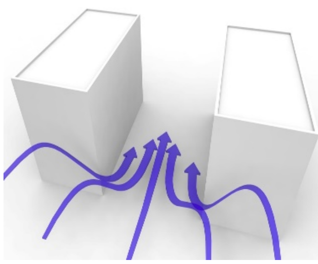
DOWNWASHING

Tall buildings tend to intercept the stronger winds at higher elevations and redirect them to the ground level. This is often the main cause for wind accelerations around large buildings at the pedestrian level.



CORNER ACCELERATION

When winds approach at an oblique angle to a tall façade and are deflected down, a localized increase in the wind activity or corner acceleration can be expected around the exposed building corners at pedestrian level.



CHANNELING EFFECT

When two buildings are situated side by side, wind flow tends to accelerate through the space between the buildings due to channeling effect caused by the narrow gap.

Image 5: Generalized Wind Flows

If these building/wind combinations occur for prevailing winds, there is a greater potential for increased wind activity. Design details such as setting back a tower from the edges of a podium, deep canopies close to ground level, wind screens, tall trees with dense landscaping, etc. (Image6) can help reduce wind speeds. The choice and effectiveness of these measures would depend on the exposure and orientation of the site with respect to the prevailing wind directions and the size and massing of the proposed buildings.

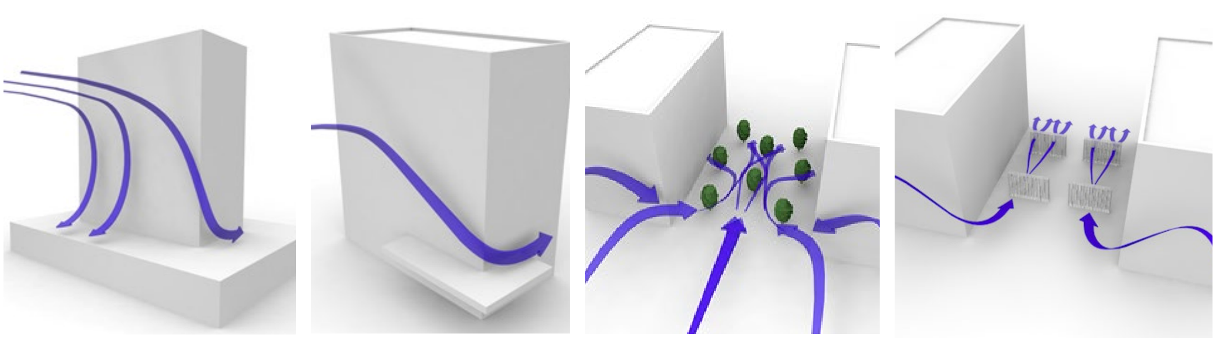


Image 6: Common Wind Control Measures:
Tower Setback, Canopy, Landscaping and Wind Screen (left to right)

3 RESULTS AND DISCUSSION

The predicted wind conditions in terms of mean and effective gust speeds pertaining to the assessed configurations are graphically depicted on site plans in Figures 1A through 2C located in the "Figures" section of this report. These conditions and the associated wind speeds are presented in Tables 1 and 2, located in the "Tables" section. The following is a detailed discussion of the suitability of the predicted wind conditions for the anticipated pedestrian use of each area of interest on an annual basis. Typically, the summer and fall winds tend to be more comfortable than the annual winds while the winter and spring winds are less comfortable than the annual winds.

In general, wind conditions comfortable for walking are appropriate for sidewalks and walkways as pedestrians will be active and less likely to remain in one area for prolonged periods of time. Lower wind speeds conducive to standing are preferred at main entrances where pedestrians are apt to linger.

3.1 No Build Configuration

Mean wind speeds on and around the existing project site in the No Build configuration are generally comfortable for walking (Figure 1A). Wind speeds higher than those comfortable for walking occur south of the site (Locations 92, 147 and 148 in Figure 1A).

There are no areas with mean speeds categorized as dangerous on an annual basis (Figure 1A and Table 2). The effective gust criterion of 31 mph is also met at most areas assessed on both annual and seasonal bases (Figure 2A and Table 2). On a seasonal basis, winds at one area near the southwest corner of the existing building south of the project site are categorized as dangerous in the winter and the effective gust criterion is exceeded in the spring and winter (see Location 148 in Table 2).

3.2 Build Configuration

The addition of the proposed buildings to the site in the Build configuration is not expected to impact mean wind speeds in the extended surrounding areas in a negative way (Figure 1B). Reduced mean speeds and conditions comfortable for sitting or standing are predicted at most areas around the perimeters of the proposed buildings, (Figure 1B). However, wind speeds higher than those comfortable for walking are expected at the northwest and northeast corners of the Hotel, at the west end between the Residential Low Rise and the West Lab and at the southwest corner of the West Lab and the southeast corner of the East Lab (Locations 6, 7, 38, 65, 66, 68, 72, 78, 90, 145 and 153 in Figure 1B).The high wind activity at these areas are due to the increased building-wind interactions, in the form of redirection of predominant winds to the ground level and their subsequent acceleration around the corners and also the channeling of westerly winds between Residential Low Rise and West Lab.

The uncomfortable wind conditions at Location 148 preexist the addition of the project to the site. Also, note that the uncomfortable mean wind speeds at Locations 147 and 92 in the No Build configuration are expected to be improved and become comfortable for walking in the Build configuration.

The predicted wind speeds are considered appropriate for the intended use of various pedestrian areas, including sidewalks, north-south passage between the Conference Building and Hotel-Residential block and the landscaped area to the south of the conference Building. Suitable wind conditions, comfortable for sitting or standing, are also predicted at most entrances (Locations 4, 9, 13-17, 20-23, 25, 29, 31, 33, 37, 43, 45-47, 49, 55, 56, 69, 71, 79, 81, 83, 84, 87 and 89 in Figure 1B). However, wind speeds at entrances near the northeast corner of Hotel Tower, along the west façade and near the northeast corner of Conference Building, and near the northeast corner of the West Lab Building are predicted to be higher than desired for entrance use (Locations 1, 41, 54 and 91 in Figure 1B).

No areas with mean wind speeds categorized as dangerous are predicted either annually or seasonally (Figure 1B and Table 2). The annual effective gust criterion of 31 mph is predicted to be met at all locations both annually and seasonally (Figure 2B), exception is an area near the southwest corner of the existing building south of the project where the effective gust criterion is expected to be exceeded in the winter (see Location 148 in Table 2). Note that the spring seasonal exceedance at Location 148 in the No Build configuration is anticipated to be eliminated with the addition of the proposed project.

3.3 Full Build Configuration

The addition of the future Phase B buildings across Cattle Drive and Def Drive in the Full Build configuration is expected to lower mean wind speeds in the area between the Residential Low Rise and the West Lab and near the northwest corner of the Hotel and the southeast corner of the East Lab. Mean wind speeds around the project perimeter are generally expected to remain similar to those in the Build configuration. However, an overall increase in the wind activity along the west façade of the Hotel-Residential block is predicted, which is due to the prevailing northwesterly and southwesterly winds channeling between the Hotel-Residential block and the future building to the west. As a result of this increase in wind speeds, conditions at some locations are predicted to be categorized uncomfortable for walking (Locations 8-11 and 15 in Figure 1C) and wind speeds at most entrances along this façade are expected to be higher than the recommended sitting/standing category (Locations 9, 13-16 in Figure 1C). Wind speeds higher than those comfortable for walking are predicted at the northeast corner of the Hotel (Location 38), the southwest corner of the West Lab (Location 72) and several corners of the future buildings (Locations 92, 97, 98, 102, 104, 106, 115, 116, 118 and 119 in Figure 1C).

No areas with mean wind speeds categorized as dangerous are predicted either annually or seasonally (Figure 1C and Table 2), with the exception of the northeast corner of the southwest Phase B future building where dangerous conditions are expected on a seasonal basis during the winter (see Location 106 in Table 2). The effective gust criterion of 31 mph is predicted to be exceeded at this location as well, both on an annual and seasonal basis (Location 106 in Figure 2C and Table 2). More areas with seasonal effective gust exceedances are predicted relative to the Build configuration (see Locations 8, 10, 72, 97, 102, 106, 116 and 119 in Table 2).

3.4 Wind Control Solutions

Wind control solutions can be implemented to moderate the wind impact of the proposed project, as it relates to the pedestrian safety and comfort. These measures should be aimed at deflecting the downwashing winds and diffusing the energy of accelerating and channeling flows. In this regard, installing a canopy along the north façade of the Hotel Building wrapping around the northwest and northeast corners can be considered to divert the downwashing winds from reaching the ground level and accelerating around the corners. Alternatively, the team may consider implementing wind screens or landscaping features near the corners to disrupt the accelerating winds. Corner canopies and/or vertical wind control features can also be considered near the windy corners of the lab buildings. Note that for vertical wind mitigation elements to be effective, a minimum height of 6-8 ft tall and 20-30% porosity is recommended. To extend the benefits of landscaping to the winter season, when winds are the strongest, evergreen species should be considered. Strategic distribution of landscaping/hardscaping elements along the east sidewalk of Cattle Drive can also help moderate the channeling impact in the Future configuration.

For the entrances where wind speeds are higher than desired, additional mitigation in the form of screens or planter can be implemented perpendicular to the façade on both sides of the entrances. Alternatively, the entrances could be recessed behind the respective façades to create a sheltered doorway.

Examples of the features discussed above are shown in Image 7. The effectiveness of these mitigation strategies can be quantified through further wind tunnel testing.

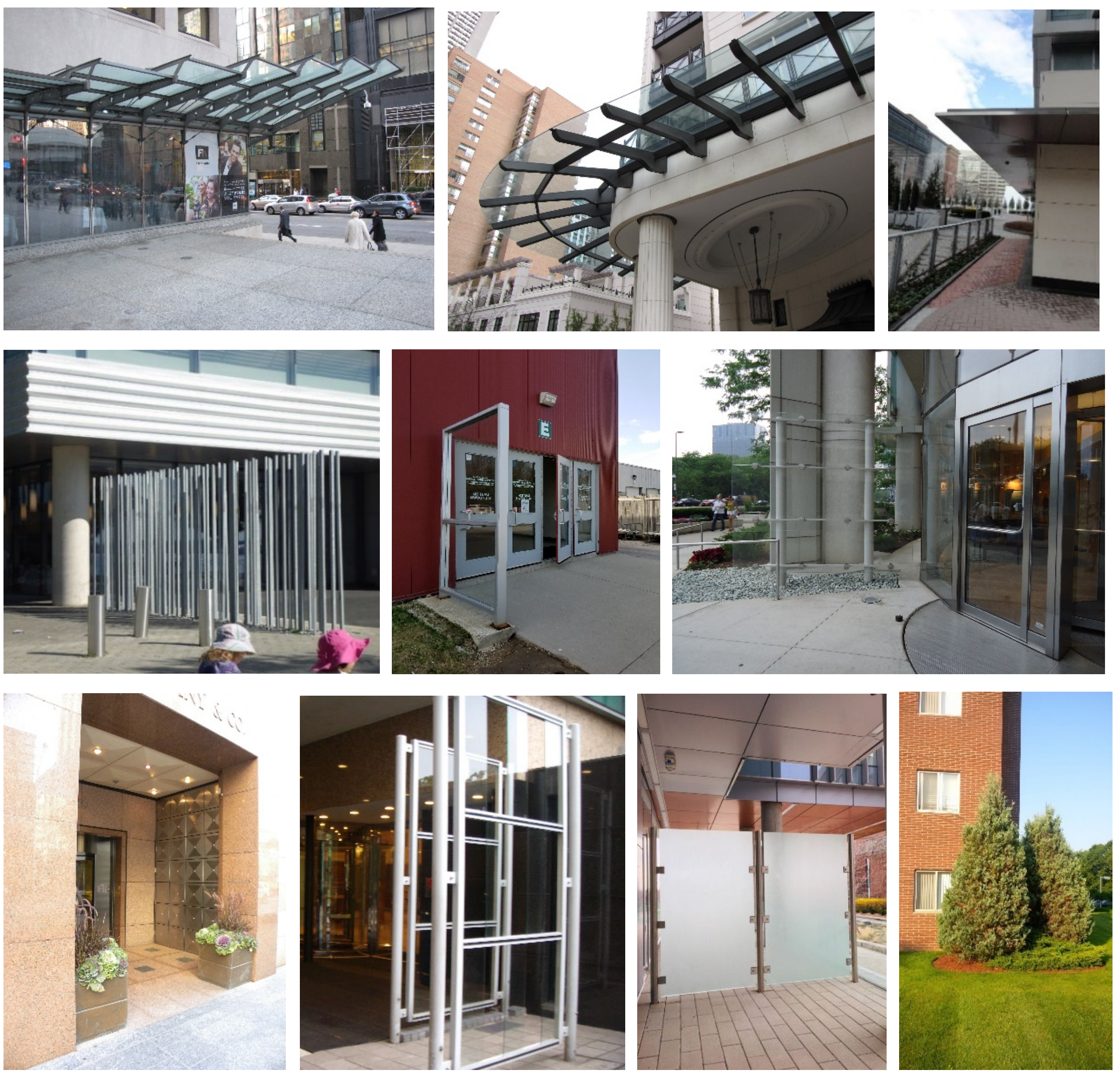


Image 7: Examples of Wind Mitigation Strategies for Wind Control

4 APPLICABILITY OF RESULTS

The wind conditions presented in this report pertain to the model of the Harvard Enterprise Research Campus (ERC) project constructed using the drawings and information listed below. Should there be any design changes that deviate from this list of drawings, the wind condition predictions presented may be affected. Therefore, if changes in the design are made, it is recommended that RWDI be contacted and requested to review their potential impact on wind conditions.

File Name	File Type	Date Received (dd/mm/yyyy)
210114_Harvard ERC_Massing Model - interim condition	Rhino	11/02/2021
ERC_PNF_Figure3.2a_building entries	PDF	16/03/2021

FIGURES

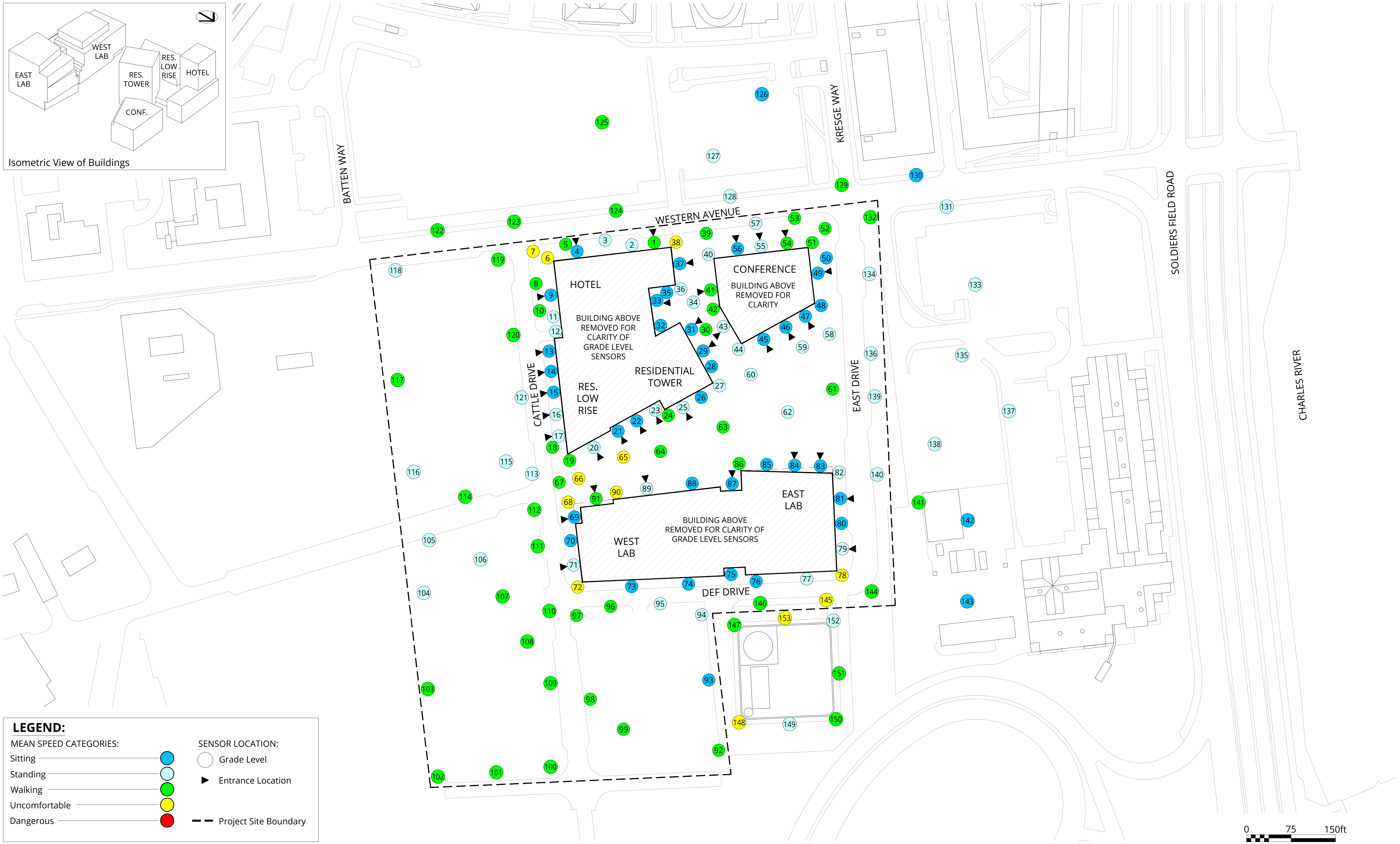
Pedestrian Wind Conditions - Mean Speed
No Build
Annual

Harvard Enterprise Research Campus Project - Boston, MA

True North

Project #2100586

Drawn by:	GRE	Figure:	1A
Approx. Scale:	1"=150'		
Date Revised:	May 17, 2021		



Pedestrian Wind Conditions - Mean Speed
Build
Annual

True North

Drawn by: GRE | Figure: 1B
Approx. Scale: 1"=150'

Harvard Enterprise Research Campus Project - Boston, MA

Project #2100586 | Date Revised: May 17, 2021

Pedestrian Wind Conditions - Mean Speed
Full Build
Annual

Harvard Enterprise Research Campus Project - Boston, MA

True North

Project #2100586

Drawn by: GRE	Figure: 1C
Approx. Scale:	1"=150'
Date Revised:	May 17, 2021

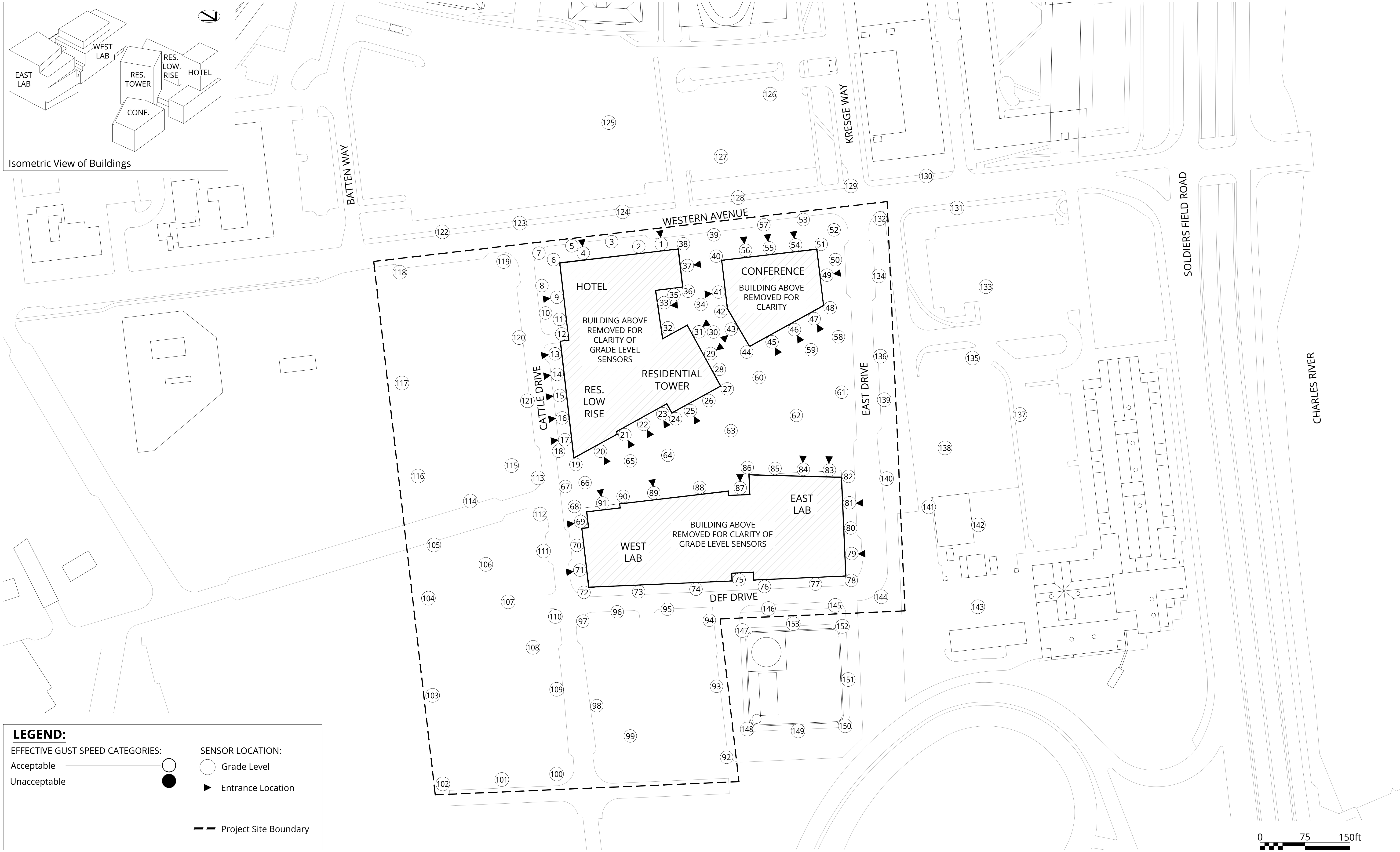
Pedestrian Wind Conditions - Effective Gust Speed
No Build
Annual

Harvard Enterprise Research Campus Project - Boston, MA

True North

Project #2100586

Drawn by: GRE	Figure: 2A
Approx. Scale:	1"=150'
Date Revised:	May 17, 2021



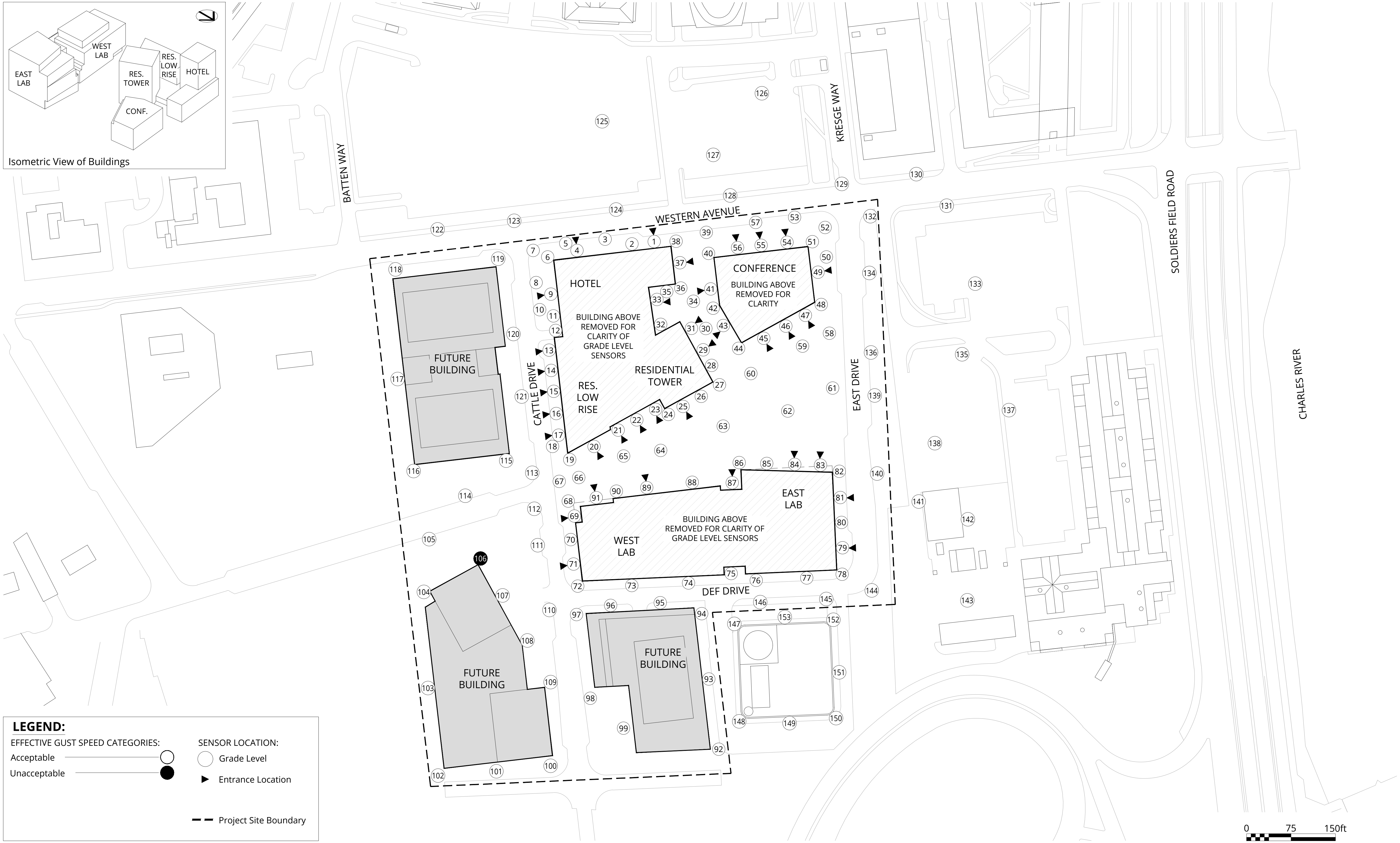
Pedestrian Wind Conditions - Effective Gust Speed
Build
Annual

Harvard Enterprise Research Campus Project - Boston, MA

True North

Project #2100586

Drawn by: GRE | Figure: 2B
Approx. Scale: 1"=150'
Date Revised: May 17, 2021



Pedestrian Wind Conditions - Effective Gust Speed
Full Build
Annual

Harvard Enterprise Research Campus Project - Boston, MA

True North

Project #2100586

Drawn by: GRE	Figure: 2C
Approx. Scale:	1"=150'
Date Revised:	May 17, 2021

TABLES

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
1	A	Annual	16		Walking	21		Acceptable
	B	Annual	16		Walking	24	14%	Acceptable
	C	Annual	18	12%	Walking	25	19%	Acceptable
2	A	Annual	16		Walking	22		Acceptable
	B	Annual	14	-12%	Standing	21		Acceptable
	C	Annual	17		Walking	24		Acceptable
3	A	Annual	15		Standing	21		Acceptable
	B	Annual	13	-13%	Standing	20		Acceptable
	C	Annual	15		Standing	22		Acceptable
4	A	Annual	15		Standing	21		Acceptable
	B	Annual	11	-27%	Sitting	17	-19%	Acceptable
	C	Annual	13	-13%	Standing	20		Acceptable
5	A	Annual	16		Walking	21		Acceptable
	B	Annual	18	12%	Walking	27	29%	Acceptable
	C	Annual	14	-12%	Standing	22		Acceptable
6	A	Annual	16		Walking	22		Acceptable
	B	Annual	20	25%	Uncomfortable	28	27%	Acceptable
	C	Annual	17		Walking	24		Acceptable
7	A	Annual	16		Walking	22		Acceptable
	B	Annual	20	25%	Uncomfortable	27	23%	Acceptable
	C	Annual	16		Walking	23		Acceptable
8	A	Annual	16		Walking	22		Acceptable
	B	Annual	18	12%	Walking	26	18%	Acceptable
	C	Annual	23	44%	Uncomfortable	30	36%	Acceptable
9	A	Annual	16		Walking	22		Acceptable
	B	Annual	11	-31%	Sitting	18	-18%	Acceptable
	C	Annual	20	25%	Uncomfortable	28	27%	Acceptable
10	A	Annual	16		Walking	22		Acceptable
	B	Annual	16		Walking	24		Acceptable
	C	Annual	23	44%	Uncomfortable	31	41%	Acceptable
11	A	Annual	16		Walking	22		Acceptable
	B	Annual	13	-19%	Standing	20		Acceptable
	C	Annual	20	25%	Uncomfortable	27	23%	Acceptable
12	A	Annual	16		Walking	22		Acceptable
	B	Annual	13	-19%	Standing	22		Acceptable
	C	Annual	10	-38%	Sitting	16	-27%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
13	A	Annual	16		Walking	22		Acceptable
	B	Annual	12	-25%	Sitting	19	-14%	Acceptable
	C	Annual	16		Walking	25	14%	Acceptable
14	A	Annual	16		Walking	22		Acceptable
	B	Annual	11	-31%	Sitting	17	-23%	Acceptable
	C	Annual	18	12%	Walking	25	14%	Acceptable
15	A	Annual	17		Walking	22		Acceptable
	B	Annual	12	-29%	Sitting	19	-14%	Acceptable
	C	Annual	21	24%	Uncomfortable	29	32%	Acceptable
16	A	Annual	16		Walking	22		Acceptable
	B	Annual	13	-19%	Standing	21		Acceptable
	C	Annual	19	19%	Walking	26	18%	Acceptable
17	A	Annual	16		Walking	22		Acceptable
	B	Annual	14	-12%	Standing	21		Acceptable
	C	Annual	12	-25%	Sitting	19	-14%	Acceptable
18	A	Annual	16		Walking	22		Acceptable
	B	Annual	17		Walking	24		Acceptable
	C	Annual	14	-12%	Standing	20		Acceptable
19	A	Annual	16		Walking	22		Acceptable
	B	Annual	18	12%	Walking	26	18%	Acceptable
	C	Annual	17		Walking	26	18%	Acceptable
20	A	Annual	16		Walking	22		Acceptable
	B	Annual	14	-12%	Standing	22		Acceptable
	C	Annual	11	-31%	Sitting	18	-18%	Acceptable
21	A	Annual	16		Walking	22		Acceptable
	B	Annual	11	-31%	Sitting	16	-27%	Acceptable
	C	Annual	8	-50%	Sitting	13	-41%	Acceptable
22	A	Annual	17		Walking	22		Acceptable
	B	Annual	12	-29%	Sitting	20		Acceptable
	C	Annual	8	-53%	Sitting	14	-36%	Acceptable
23	A	Annual	16		Walking	22		Acceptable
	B	Annual	14	-12%	Standing	23		Acceptable
	C	Annual	11	-31%	Sitting	17	-23%	Acceptable
24	A	Annual	16		Walking	22		Acceptable
	B	Annual	18	12%	Walking	28	27%	Acceptable
	C	Annual	15		Standing	23		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
25	A	Annual	15		Standing	21		Acceptable
	B	Annual	14		Standing	22		Acceptable
	C	Annual	11	-27%	Sitting	18	-14%	Acceptable
26	A	Annual	16		Walking	21		Acceptable
	B	Annual	12	-25%	Sitting	20		Acceptable
	C	Annual	10	-38%	Sitting	17	-19%	Acceptable
27	A	Annual	16		Walking	21		Acceptable
	B	Annual	15		Standing	23		Acceptable
	C	Annual	14	-12%	Standing	21		Acceptable
28	A	Annual	16		Walking	21		Acceptable
	B	Annual	9	-44%	Sitting	15	-29%	Acceptable
	C	Annual	9	-44%	Sitting	15	-29%	Acceptable
29	A	Annual	16		Walking	21		Acceptable
	B	Annual	10	-38%	Sitting	16	-24%	Acceptable
	C	Annual	10	-38%	Sitting	16	-24%	Acceptable
30	A	Annual	16		Walking	22		Acceptable
	B	Annual	16		Walking	24		Acceptable
	C	Annual	17		Walking	25	14%	Acceptable
31	A	Annual	16		Walking	21		Acceptable
	B	Annual	12	-25%	Sitting	17	-19%	Acceptable
	C	Annual	12	-25%	Sitting	18	-14%	Acceptable
32	A	Annual	16		Walking	22		Acceptable
	B	Annual	7	-56%	Sitting	12	-45%	Acceptable
	C	Annual	6	-62%	Sitting	11	-50%	Acceptable
33	A	Annual	16		Walking	22		Acceptable
	B	Annual	11	-31%	Sitting	16	-27%	Acceptable
	C	Annual	10	-38%	Sitting	16	-27%	Acceptable
34	A	Annual	16		Walking	22		Acceptable
	B	Annual	15		Standing	23		Acceptable
	C	Annual	15		Standing	24		Acceptable
35	A	Annual	15		Standing	21		Acceptable
	B	Annual	9	-40%	Sitting	14	-33%	Acceptable
	C	Annual	8	-47%	Sitting	13	-38%	Acceptable
36	A	Annual	16		Walking	21		Acceptable
	B	Annual	14	-12%	Standing	21		Acceptable
	C	Annual	13	-19%	Standing	20		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
37	A	Annual	16		Walking	21		Acceptable
	B	Annual	10	-38%	Sitting	16	-24%	Acceptable
	C	Annual	10	-38%	Sitting	16	-24%	Acceptable
38	A	Annual	16		Walking	22		Acceptable
	B	Annual	20	25%	Uncomfortable	27	23%	Acceptable
	C	Annual	21	31%	Uncomfortable	28	27%	Acceptable
39	A	Annual	16		Walking	22		Acceptable
	B	Annual	17		Walking	25	14%	Acceptable
	C	Annual	17		Walking	25	14%	Acceptable
40	A	Annual	16		Walking	22		Acceptable
	B	Annual	15		Standing	22		Acceptable
	C	Annual	16		Walking	23		Acceptable
41	A	Annual	16		Walking	21		Acceptable
	B	Annual	16		Walking	25	19%	Acceptable
	C	Annual	18	12%	Walking	26	24%	Acceptable
42	A	Annual	16		Walking	21		Acceptable
	B	Annual	17		Walking	25	19%	Acceptable
	C	Annual	18	12%	Walking	26	24%	Acceptable
43	A	Annual	16		Walking	21		Acceptable
	B	Annual	15		Standing	22		Acceptable
	C	Annual	15		Standing	22		Acceptable
44	A	Annual	16		Walking	21		Acceptable
	B	Annual	15		Standing	22		Acceptable
	C	Annual	16		Walking	23		Acceptable
45	A	Annual	16		Walking	22		Acceptable
	B	Annual	9	-44%	Sitting	15	-32%	Acceptable
	C	Annual	9	-44%	Sitting	15	-32%	Acceptable
46	A	Annual	15		Standing	21		Acceptable
	B	Annual	9	-40%	Sitting	15	-29%	Acceptable
	C	Annual	8	-47%	Sitting	14	-33%	Acceptable
47	A	Annual	16		Walking	21		Acceptable
	B	Annual	10	-38%	Sitting	17	-19%	Acceptable
	C	Annual	9	-44%	Sitting	15	-29%	Acceptable
48	A	Annual	15		Standing	21		Acceptable
	B	Annual	12	-20%	Sitting	20		Acceptable
	C	Annual	12	-20%	Sitting	19		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
49	A	Annual	16		Walking	22		Acceptable
	B	Annual	8	-50%	Sitting	13	-41%	Acceptable
	C	Annual	8	-50%	Sitting	13	-41%	Acceptable
50	A	Annual	16		Walking	22		Acceptable
	B	Annual	12	-25%	Sitting	19	-14%	Acceptable
	C	Annual	12	-25%	Sitting	19	-14%	Acceptable
51	A	Annual	16		Walking	22		Acceptable
	B	Annual	19	19%	Walking	27	23%	Acceptable
	C	Annual	19	19%	Walking	26	18%	Acceptable
52	A	Annual	16		Walking	22		Acceptable
	B	Annual	19	19%	Walking	26	18%	Acceptable
	C	Annual	19	19%	Walking	26	18%	Acceptable
53	A	Annual	15		Standing	21		Acceptable
	B	Annual	16		Walking	23		Acceptable
	C	Annual	16		Walking	22		Acceptable
54	A	Annual	16		Walking	22		Acceptable
	B	Annual	17		Walking	25	14%	Acceptable
	C	Annual	17		Walking	25	14%	Acceptable
55	A	Annual	15		Standing	21		Acceptable
	B	Annual	13	-13%	Standing	21		Acceptable
	C	Annual	13	-13%	Standing	21		Acceptable
56	A	Annual	15		Standing	21		Acceptable
	B	Annual	10	-33%	Sitting	17	-19%	Acceptable
	C	Annual	10	-33%	Sitting	17	-19%	Acceptable
57	A	Annual	16		Walking	22		Acceptable
	B	Annual	14	-12%	Standing	22		Acceptable
	C	Annual	14	-12%	Standing	21		Acceptable
58	A	Annual	16		Walking	21		Acceptable
	B	Annual	14	-12%	Standing	22		Acceptable
	C	Annual	13	-19%	Standing	20		Acceptable
59	A	Annual	16		Walking	22		Acceptable
	B	Annual	13	-19%	Standing	21		Acceptable
	C	Annual	12	-25%	Sitting	19	-14%	Acceptable
60	A	Annual	16		Walking	22		Acceptable
	B	Annual	14	-12%	Standing	21		Acceptable
	C	Annual	15		Standing	23		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
61	A	Annual	16		Walking	21		Acceptable
	B	Annual	16		Walking	24	14%	Acceptable
	C	Annual	14	-12%	Standing	21		Acceptable
62	A	Annual	14		Standing	20		Acceptable
	B	Annual	14		Standing	23	15%	Acceptable
	C	Annual	11	-21%	Sitting	19		Acceptable
63	A	Annual	17		Walking	22		Acceptable
	B	Annual	19	12%	Walking	28	27%	Acceptable
	C	Annual	17		Walking	25	14%	Acceptable
64	A	Annual	16		Walking	22		Acceptable
	B	Annual	19	19%	Walking	27	23%	Acceptable
	C	Annual	15		Standing	23		Acceptable
65	A	Annual	17		Walking	23		Acceptable
	B	Annual	20	18%	Uncomfortable	29	26%	Acceptable
	C	Annual	15	-12%	Standing	24		Acceptable
66	A	Annual	17		Walking	22		Acceptable
	B	Annual	22	29%	Uncomfortable	29	32%	Acceptable
	C	Annual	19	12%	Walking	26	18%	Acceptable
67	A	Annual	16		Walking	22		Acceptable
	B	Annual	18	12%	Walking	25	14%	Acceptable
	C	Annual	16		Walking	23		Acceptable
68	A	Annual	16		Walking	22		Acceptable
	B	Annual	21	31%	Uncomfortable	28	27%	Acceptable
	C	Annual	18	12%	Walking	25	14%	Acceptable
69	A	Annual	17		Walking	23		Acceptable
	B	Annual	10	-41%	Sitting	18	-22%	Acceptable
	C	Annual	9	-47%	Sitting	17	-26%	Acceptable
70	A	Annual	16		Walking	21		Acceptable
	B	Annual	12	-25%	Sitting	18	-14%	Acceptable
	C	Annual	12	-25%	Sitting	19		Acceptable
71	A	Annual	17		Walking	23		Acceptable
	B	Annual	14	-18%	Standing	20	-13%	Acceptable
	C	Annual	14	-18%	Standing	22		Acceptable
72	A	Annual	17		Walking	23		Acceptable
	B	Annual	21	24%	Uncomfortable	28	22%	Acceptable
	C	Annual	20	18%	Uncomfortable	28	22%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
73	A	Annual	16		Walking	21		Acceptable
	B	Annual	11	-31%	Sitting	17	-19%	Acceptable
	C	Annual	14	-12%	Standing	20		Acceptable
74	A	Annual	16		Walking	22		Acceptable
	B	Annual	12	-25%	Sitting	18	-18%	Acceptable
	C	Annual	12	-25%	Sitting	18	-18%	Acceptable
75	A	Annual	16		Walking	22		Acceptable
	B	Annual	6	-62%	Sitting	10	-55%	Acceptable
	C	Annual	7	-56%	Sitting	12	-45%	Acceptable
76	A	Annual	18		Walking	24		Acceptable
	B	Annual	12	-33%	Sitting	18	-25%	Acceptable
	C	Annual	11	-39%	Sitting	18	-25%	Acceptable
77	A	Annual	16		Walking	22		Acceptable
	B	Annual	15		Standing	21		Acceptable
	C	Annual	9	-44%	Sitting	13	-41%	Acceptable
78	A	Annual	17		Walking	22		Acceptable
	B	Annual	21	24%	Uncomfortable	28	27%	Acceptable
	C	Annual	17		Walking	23		Acceptable
79	A	Annual	16		Walking	21		Acceptable
	B	Annual	13	-19%	Standing	19		Acceptable
	C	Annual	13	-19%	Standing	18	-14%	Acceptable
80	A	Annual	16		Walking	21		Acceptable
	B	Annual	10	-38%	Sitting	17	-19%	Acceptable
	C	Annual	10	-38%	Sitting	16	-24%	Acceptable
81	A	Annual	16		Walking	21		Acceptable
	B	Annual	9	-44%	Sitting	15	-29%	Acceptable
	C	Annual	9	-44%	Sitting	14	-33%	Acceptable
82	A	Annual	16		Walking	21		Acceptable
	B	Annual	15		Standing	23		Acceptable
	C	Annual	14	-12%	Standing	22		Acceptable
83	A	Annual	15		Standing	21		Acceptable
	B	Annual	11	-27%	Sitting	17	-19%	Acceptable
	C	Annual	10	-33%	Sitting	16	-24%	Acceptable
84	A	Annual	16		Walking	21		Acceptable
	B	Annual	10	-38%	Sitting	16	-24%	Acceptable
	C	Annual	9	-44%	Sitting	15	-29%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
85	A	Annual	16		Walking	21		Acceptable
	B	Annual	12	-25%	Sitting	19		Acceptable
	C	Annual	11	-31%	Sitting	17	-19%	Acceptable
86	A	Annual	16		Walking	21		Acceptable
	B	Annual	18	12%	Walking	26	24%	Acceptable
	C	Annual	17		Walking	24	14%	Acceptable
87	A	Annual	16		Walking	22		Acceptable
	B	Annual	12	-25%	Sitting	19	-14%	Acceptable
	C	Annual	11	-31%	Sitting	17	-23%	Acceptable
88	A	Annual	17		Walking	22		Acceptable
	B	Annual	12	-29%	Sitting	19	-14%	Acceptable
	C	Annual	10	-41%	Sitting	16	-27%	Acceptable
89	A	Annual	16		Walking	22		Acceptable
	B	Annual	15		Standing	22		Acceptable
	C	Annual	13	-19%	Standing	19	-14%	Acceptable
90	A	Annual	16		Walking	22		Acceptable
	B	Annual	20	25%	Uncomfortable	28	27%	Acceptable
	C	Annual	13	-19%	Standing	19	-14%	Acceptable
91	A	Annual	17		Walking	22		Acceptable
	B	Annual	16		Walking	22		Acceptable
	C	Annual	10	-41%	Sitting	16	-27%	Acceptable
92	A	Annual	20		Uncomfortable	26		Acceptable
	B	Annual	18		Walking	24		Acceptable
	C	Annual	21		Uncomfortable	27		Acceptable
93	A	Annual	17		Walking	22		Acceptable
	B	Annual	10	-41%	Sitting	16	-27%	Acceptable
	C	Annual	10	-41%	Sitting	16	-27%	Acceptable
94	A	Annual	16		Walking	22		Acceptable
	B	Annual	13	-19%	Standing	20		Acceptable
	C	Annual	10	-38%	Sitting	16	-27%	Acceptable
95	A	Annual	16		Walking	22		Acceptable
	B	Annual	14	-12%	Standing	21		Acceptable
	C	Annual	11	-31%	Sitting	19	-14%	Acceptable
96	A	Annual	16		Walking	22		Acceptable
	B	Annual	17		Walking	26	18%	Acceptable
	C	Annual	13	-19%	Standing	22		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
97	A	Annual	16		Walking	22		Acceptable
	B	Annual	19	19%	Walking	25	14%	Acceptable
	C	Annual	22	38%	Uncomfortable	31	41%	Acceptable
98	A	Annual	17		Walking	23		Acceptable
	B	Annual	18		Walking	24		Acceptable
	C	Annual	20	18%	Uncomfortable	27	17%	Acceptable
99	A	Annual	17		Walking	22		Acceptable
	B	Annual	18		Walking	23		Acceptable
	C	Annual	9	-47%	Sitting	15	-32%	Acceptable
100	A	Annual	17		Walking	23		Acceptable
	B	Annual	17		Walking	22		Acceptable
	C	Annual	16		Walking	22		Acceptable
101	A	Annual	17		Walking	23		Acceptable
	B	Annual	17		Walking	23		Acceptable
	C	Annual	12	-29%	Sitting	19	-17%	Acceptable
102	A	Annual	17		Walking	23		Acceptable
	B	Annual	17		Walking	22		Acceptable
	C	Annual	24	41%	Uncomfortable	31	35%	Acceptable
103	A	Annual	17		Walking	23		Acceptable
	B	Annual	16		Walking	22		Acceptable
	C	Annual	15	-12%	Standing	22		Acceptable
104	A	Annual	17		Walking	23		Acceptable
	B	Annual	15	-12%	Standing	21		Acceptable
	C	Annual	21	24%	Uncomfortable	28	22%	Acceptable
105	A	Annual	17		Walking	23		Acceptable
	B	Annual	15	-12%	Standing	21		Acceptable
	C	Annual	18		Walking	26	13%	Acceptable
106	A	Annual	17		Walking	23		Acceptable
	B	Annual	15	-12%	Standing	21		Acceptable
	C	Annual	25	47%	Uncomfortable	32	39%	Unacceptable
107	A	Annual	17		Walking	23		Acceptable
	B	Annual	16		Walking	21		Acceptable
	C	Annual	12	-29%	Sitting	19	-17%	Acceptable
108	A	Annual	17		Walking	23		Acceptable
	B	Annual	17		Walking	23		Acceptable
	C	Annual	16		Walking	24		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
109	A	Annual	17		Walking	23		Acceptable
	B	Annual	18		Walking	23		Acceptable
	C	Annual	18		Walking	26	13%	Acceptable
110	A	Annual	17		Walking	22		Acceptable
	B	Annual	17		Walking	23		Acceptable
	C	Annual	17		Walking	26	18%	Acceptable
111	A	Annual	17		Walking	23		Acceptable
	B	Annual	16		Walking	21		Acceptable
	C	Annual	18		Walking	26	13%	Acceptable
112	A	Annual	17		Walking	22		Acceptable
	B	Annual	18		Walking	24		Acceptable
	C	Annual	16		Walking	23		Acceptable
113	A	Annual	17		Walking	22		Acceptable
	B	Annual	15	-12%	Standing	21		Acceptable
	C	Annual	17		Walking	24		Acceptable
114	A	Annual	17		Walking	23		Acceptable
	B	Annual	16		Walking	21		Acceptable
	C	Annual	18		Walking	27	17%	Acceptable
115	A	Annual	17		Walking	22		Acceptable
	B	Annual	14	-18%	Standing	20		Acceptable
	C	Annual	21	24%	Uncomfortable	27	23%	Acceptable
116	A	Annual	16		Walking	22		Acceptable
	B	Annual	15		Standing	21		Acceptable
	C	Annual	22	38%	Uncomfortable	30	36%	Acceptable
117	A	Annual	16		Walking	22		Acceptable
	B	Annual	16		Walking	21		Acceptable
	C	Annual	15		Standing	22		Acceptable
118	A	Annual	16		Walking	22		Acceptable
	B	Annual	15		Standing	21		Acceptable
	C	Annual	20	25%	Uncomfortable	29	32%	Acceptable
119	A	Annual	16		Walking	22		Acceptable
	B	Annual	17		Walking	23		Acceptable
	C	Annual	22	38%	Uncomfortable	29	32%	Acceptable
120	A	Annual	17		Walking	22		Acceptable
	B	Annual	16		Walking	23		Acceptable
	C	Annual	16		Walking	23		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
121	A	Annual	16		Walking	22		Acceptable
	B	Annual	14	-12%	Standing	21		Acceptable
	C	Annual	14	-12%	Standing	21		Acceptable
122	A	Annual	16		Walking	22		Acceptable
	B	Annual	16		Walking	21		Acceptable
	C	Annual	16		Walking	25	14%	Acceptable
123	A	Annual	16		Walking	22		Acceptable
	B	Annual	17		Walking	23		Acceptable
	C	Annual	16		Walking	24		Acceptable
124	A	Annual	16		Walking	22		Acceptable
	B	Annual	16		Walking	24		Acceptable
	C	Annual	16		Walking	23		Acceptable
125	A	Annual	15		Standing	21		Acceptable
	B	Annual	16		Walking	22		Acceptable
	C	Annual	15		Standing	20		Acceptable
126	A	Annual	12		Sitting	18		Acceptable
	B	Annual	12		Sitting	18		Acceptable
	C	Annual	11		Sitting	17		Acceptable
127	A	Annual	15		Standing	21		Acceptable
	B	Annual	15		Standing	21		Acceptable
	C	Annual	15		Standing	21		Acceptable
128	A	Annual	16		Walking	21		Acceptable
	B	Annual	15		Standing	21		Acceptable
	C	Annual	16		Walking	22		Acceptable
129	A	Annual	17		Walking	23		Acceptable
	B	Annual	17		Walking	22		Acceptable
	C	Annual	17		Walking	22		Acceptable
130	A	Annual	13		Standing	20		Acceptable
	B	Annual	11	-15%	Sitting	17	-15%	Acceptable
	C	Annual	11	-15%	Sitting	17	-15%	Acceptable
131	A	Annual	15		Standing	21		Acceptable
	B	Annual	14		Standing	21		Acceptable
	C	Annual	13	-13%	Standing	20		Acceptable
132	A	Annual	18		Walking	23		Acceptable
	B	Annual	17		Walking	23		Acceptable
	C	Annual	17		Walking	23		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
133	A	Annual	17		Walking	22		Acceptable
	B	Annual	14	-18%	Standing	21		Acceptable
	C	Annual	13	-24%	Standing	19	-14%	Acceptable
134	A	Annual	17		Walking	22		Acceptable
	B	Annual	13	-24%	Standing	20		Acceptable
	C	Annual	12	-29%	Sitting	20		Acceptable
135	A	Annual	15		Standing	21		Acceptable
	B	Annual	13	-13%	Standing	19		Acceptable
	C	Annual	13	-13%	Standing	19		Acceptable
136	A	Annual	16		Walking	21		Acceptable
	B	Annual	15		Standing	23		Acceptable
	C	Annual	13	-19%	Standing	20		Acceptable
137	A	Annual	15		Standing	21		Acceptable
	B	Annual	15		Standing	21		Acceptable
	C	Annual	15		Standing	21		Acceptable
138	A	Annual	15		Standing	20		Acceptable
	B	Annual	13	-13%	Standing	20		Acceptable
	C	Annual	13	-13%	Standing	20		Acceptable
139	A	Annual	15		Standing	21		Acceptable
	B	Annual	14		Standing	22		Acceptable
	C	Annual	13	-13%	Standing	20		Acceptable
140	A	Annual	15		Standing	20		Acceptable
	B	Annual	15		Standing	23	15%	Acceptable
	C	Annual	15		Standing	22		Acceptable
141	A	Annual	11		Sitting	16		Acceptable
	B	Annual	17	55%	Walking	25	56%	Acceptable
	C	Annual	12		Sitting	18	12%	Acceptable
142	A	Annual	10		Sitting	16		Acceptable
	B	Annual	11		Sitting	16		Acceptable
	C	Annual	10		Sitting	16		Acceptable
143	A	Annual	9		Sitting	14		Acceptable
	B	Annual	10	11%	Sitting	16	14%	Acceptable
	C	Annual	10	11%	Sitting	15		Acceptable
144	A	Annual	17		Walking	23		Acceptable
	B	Annual	18		Walking	26	13%	Acceptable
	C	Annual	16		Walking	22		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
145	A	Annual	19		Walking	26		Acceptable
	B	Annual	20		Uncomfortable	27		Acceptable
	C	Annual	16	-16%	Walking	24		Acceptable
146	A	Annual	19		Walking	26		Acceptable
	B	Annual	19		Walking	26		Acceptable
	C	Annual	13	-32%	Standing	20	-23%	Acceptable
147	A	Annual	20		Uncomfortable	27		Acceptable
	B	Annual	18		Walking	25		Acceptable
	C	Annual	10	-50%	Sitting	17	-37%	Acceptable
148	A	Annual	24		Uncomfortable	31		Acceptable
	B	Annual	24		Uncomfortable	30		Acceptable
	C	Annual	19	-21%	Walking	25	-19%	Acceptable
149	A	Annual	13		Standing	20		Acceptable
	B	Annual	13		Standing	20		Acceptable
	C	Annual	11	-15%	Sitting	18		Acceptable
150	A	Annual	19		Walking	26		Acceptable
	B	Annual	17	-11%	Walking	23	-12%	Acceptable
	C	Annual	19		Walking	25		Acceptable
151	A	Annual	13		Standing	19		Acceptable
	B	Annual	17	31%	Walking	24	26%	Acceptable
	C	Annual	16	23%	Walking	23	21%	Acceptable
152	A	Annual	19		Walking	26		Acceptable
	B	Annual	14	-26%	Standing	21	-19%	Acceptable
	C	Annual	12	-37%	Sitting	18	-31%	Acceptable
153	A	Annual	18		Walking	27		Acceptable
	B	Annual	20	11%	Uncomfortable	29		Acceptable
	C	Annual	18		Walking	24	-11%	Acceptable

Configurations	Mean Wind Criteria Speed (mph)		Effective Gust Criteria (mph)	
A: No Build	< 12	Comfortable for Sitting	< 31	Acceptable
Existing site and surroundings	13 - 15	Comfortable for Standing	> 31	Unacceptable
B: Build	16 - 19	Comfortable for Walking		
Project with existing surroundings	20 - 27	Uncomfortable for Walking		
C: Full Build	> 27	Dangerous Conditions		
Project with future surroundings				

Notes

1) Wind Speeds are for a 1% probability of exceedance

2) % Change is based on comparison with Configuration A

3) % changes less than 10% are excluded

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
1	A	16	13	15	17	22	17	20	23
	B	17	12	15	18	24	18	22	26
	C	18	13	16	20	26	19	23	27
2	A	16	13	15	17	22	18	21	23
	B	15	11	13	16	22	16	20	24
	C	18	13	16	19	25	18	22	27
3	A	16	12	15	17	22	17	21	23
	B	14	10	12	15	21	16	19	22
	C	16	11	14	17	23	16	20	24
4	A	16	12	15	16	22	17	20	23
	B	11	8	10	11	18	13	17	19
	C	13	9	11	14	21	15	19	23
5	A	16	13	15	17	22	17	21	23
	B	19	14	18	20	28	21	26	30
	C	15	11	14	16	23	17	21	25
6	A	17	13	15	17	22	17	21	23
	B	22	17	20	22	30	23	28	30
	C	19	13	17	18	26	19	24	25
7	A	17	13	15	17	23	17	21	23
	B	21	17	20	21	28	22	26	28
	C	17	12	15	17	24	18	22	25
8	A	17	13	16	18	23	18	21	24
	B	19	15	17	19	27	21	25	28
	C	24	17	22	25	31	23	29	32
9	A	17	13	16	18	23	18	21	24
	B	12	10	11	12	19	16	18	19
	C	21	15	19	23	28	21	25	31
10	A	17	13	16	17	23	18	21	24
	B	17	14	15	17	25	20	23	26
	C	24	17	21	25	32	24	29	34
11	A	17	13	16	17	23	18	21	24
	B	14	12	13	14	20	18	19	21
	C	20	15	18	22	27	20	24	30
12	A	17	13	16	17	23	17	21	23
	B	13	11	13	14	22	19	21	23
	C	10	8	9	11	17	13	15	18

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
13	A	16	13	16	17	22	17	21	23
	B	12	11	12	13	19	16	18	20
	C	17	13	15	18	25	20	23	27
14	A	17	13	16	17	23	18	21	24
	B	12	10	11	12	18	15	16	18
	C	18	16	17	19	26	23	25	27
15	A	17	14	16	18	23	18	21	24
	B	12	10	11	12	19	16	18	20
	C	22	20	21	23	30	27	29	31
16	A	17	13	16	17	23	17	21	24
	B	14	10	12	14	21	16	19	23
	C	20	18	19	21	27	24	26	28
17	A	17	13	16	17	22	17	21	23
	B	15	11	13	16	22	16	20	24
	C	13	11	12	13	20	16	18	21
18	A	17	14	16	18	23	18	21	24
	B	17	12	15	18	25	18	23	27
	C	14	12	13	14	21	17	19	22
19	A	17	13	16	18	23	18	22	24
	B	18	15	17	19	26	21	25	28
	C	17	15	17	18	26	23	25	28
20	A	17	13	16	18	23	18	21	24
	B	15	13	14	15	23	21	22	23
	C	11	10	11	11	18	16	17	19
21	A	17	13	16	18	23	18	21	24
	B	11	9	10	11	17	14	16	17
	C	9	7	8	9	13	11	13	14
22	A	17	14	16	18	23	18	21	24
	B	13	10	12	13	21	17	20	22
	C	8	7	8	9	14	11	13	15
23	A	17	13	16	18	22	18	21	24
	B	15	11	14	16	23	18	22	25
	C	11	9	10	11	18	14	17	19
24	A	17	14	16	18	22	18	21	24
	B	18	15	17	20	28	23	26	30
	C	15	11	14	17	23	17	21	26

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
25	A	16	13	15	17	22	17	20	22
	B	14	10	13	15	23	17	21	24
	C	12	9	11	12	19	14	17	20
26	A	16	13	15	17	22	17	20	23
	B	12	9	11	13	20	15	19	21
	C	11	8	10	11	18	13	16	18
27	A	16	13	15	18	22	17	21	23
	B	17	12	16	16	25	18	23	24
	C	16	11	15	15	23	17	22	22
28	A	16	13	15	17	22	18	20	23
	B	10	7	9	10	16	12	15	16
	C	9	7	9	9	16	11	14	15
29	A	16	13	15	17	22	17	21	23
	B	11	9	10	11	17	14	16	17
	C	11	9	10	11	17	13	16	17
30	A	17	13	15	18	22	17	21	24
	B	17	13	16	18	24	18	22	26
	C	17	13	16	19	25	19	23	27
31	A	16	13	15	17	22	17	21	23
	B	13	11	11	12	18	14	17	18
	C	13	11	12	13	18	15	17	19
32	A	17	14	16	18	22	18	21	24
	B	7	6	7	7	12	10	12	13
	C	7	5	6	7	12	9	11	12
33	A	16	13	15	18	22	17	21	23
	B	12	8	11	12	17	12	16	17
	C	11	8	10	11	17	12	15	17
34	A	16	13	15	17	22	18	21	23
	B	16	12	14	16	24	18	22	25
	C	16	12	14	17	24	18	22	26
35	A	16	13	15	17	21	17	20	23
	B	10	7	9	10	15	12	14	15
	C	9	6	8	9	14	10	13	14
36	A	16	13	15	17	22	17	20	23
	B	15	12	14	15	22	17	21	22
	C	13	11	12	13	21	16	19	21

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
37	A	16	13	15	17	22	17	20	23
	B	11	9	10	11	17	14	16	17
	C	11	9	10	10	17	14	15	16
38	A	16	13	15	17	22	17	21	24
	B	20	15	18	21	28	21	26	29
	C	22	16	19	23	28	22	26	30
39	A	17	13	16	18	23	17	21	24
	B	17	13	15	19	26	19	23	28
	C	17	13	16	19	26	19	23	27
40	A	16	13	15	17	22	17	21	24
	B	16	12	14	16	23	17	21	24
	C	16	12	15	17	23	17	22	25
41	A	16	12	15	17	22	17	20	23
	B	16	12	15	17	26	19	23	27
	C	18	14	16	19	27	20	24	28
42	A	16	13	15	17	22	18	21	23
	B	18	13	16	19	26	20	24	28
	C	19	15	17	20	27	21	25	28
43	A	16	13	15	17	22	17	21	23
	B	15	12	14	16	22	18	20	23
	C	15	11	14	16	23	18	21	24
44	A	16	13	15	17	22	17	20	23
	B	16	13	15	16	23	19	22	24
	C	16	13	15	17	24	19	22	26
45	A	17	13	15	18	22	17	21	24
	B	9	8	9	9	16	14	15	16
	C	9	7	8	9	15	12	15	16
46	A	16	12	15	17	21	17	20	23
	B	9	8	9	9	16	15	15	15
	C	9	7	8	8	15	13	14	14
47	A	16	13	15	18	22	17	20	23
	B	11	10	10	10	19	16	17	17
	C	10	8	9	9	16	14	15	15
48	A	16	12	15	17	22	17	20	23
	B	13	11	12	13	21	17	19	21
	C	12	10	11	12	20	16	18	20

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
49	A	16	13	15	17	22	18	21	24
	B	8	7	8	9	14	11	13	14
	C	8	7	8	8	14	11	13	14
50	A	16	13	15	18	22	17	21	24
	B	12	10	12	13	20	15	19	21
	C	12	10	12	13	20	16	19	21
51	A	16	12	15	17	22	17	21	24
	B	20	15	18	21	27	20	25	29
	C	20	15	18	21	27	21	25	29
52	A	16	12	15	17	22	17	21	24
	B	19	14	18	21	27	20	25	28
	C	19	14	18	20	26	20	24	28
53	A	16	12	14	17	21	17	20	23
	B	16	12	15	18	23	18	22	25
	C	16	12	15	17	23	17	21	24
54	A	16	13	15	18	22	17	21	24
	B	17	13	15	19	26	19	23	27
	C	17	13	15	19	26	19	23	27
55	A	16	12	15	17	21	17	20	23
	B	14	10	12	15	21	16	19	23
	C	14	10	12	15	22	16	19	23
56	A	15	12	14	17	21	17	20	23
	B	11	8	9	11	18	13	16	19
	C	10	8	9	11	18	13	16	19
57	A	16	13	15	18	22	17	21	24
	B	15	11	13	16	22	16	20	24
	C	14	11	13	16	22	16	20	23
58	A	16	13	15	17	22	17	20	23
	B	15	12	14	15	23	19	21	23
	C	14	11	12	14	21	16	19	22
59	A	17	13	15	18	22	18	21	24
	B	14	12	13	14	23	19	20	22
	C	13	10	11	13	20	16	18	20
60	A	16	13	15	18	22	17	21	24
	B	14	11	13	15	22	17	21	22
	C	15	11	14	16	23	17	21	25

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
61	A	16	13	15	17	22	17	20	23
	B	17	14	15	17	25	21	23	26
	C	14	12	13	15	22	17	20	23
62	A	14	11	13	15	20	16	19	22
	B	15	12	13	15	24	20	21	24
	C	12	9	10	13	20	16	18	21
63	A	17	14	16	18	23	18	21	24
	B	19	14	18	21	29	21	26	30
	C	18	13	16	19	26	20	24	28
64	A	17	14	16	18	23	18	21	24
	B	20	16	18	20	28	22	26	29
	C	16	12	15	16	24	18	22	25
65	A	17	14	16	18	23	18	22	25
	B	21	19	20	21	30	26	28	30
	C	16	12	15	16	24	19	23	26
66	A	17	14	16	18	23	18	22	24
	B	23	19	21	24	30	25	28	31
	C	19	15	18	20	27	21	25	29
67	A	17	14	16	18	23	18	21	24
	B	19	15	17	19	26	21	24	27
	C	16	13	15	17	23	19	22	24
68	A	17	13	16	18	22	18	21	23
	B	23	18	21	23	30	24	28	30
	C	19	14	18	19	27	20	25	28
69	A	18	14	16	19	24	19	22	26
	B	10	9	10	11	18	14	17	20
	C	9	7	9	10	17	13	16	19
70	A	16	13	15	17	21	17	20	23
	B	13	11	11	12	19	16	17	19
	C	13	11	12	13	20	18	19	20
71	A	17	14	16	18	23	18	22	24
	B	14	11	13	15	21	16	19	22
	C	14	12	13	15	22	18	21	24
72	A	17	14	16	18	23	18	22	24
	B	22	16	20	24	29	21	27	31
	C	20	15	18	22	28	21	26	32

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
73	A	16	13	15	17	22	17	21	23
	B	11	9	10	12	17	14	16	19
	C	15	13	14	15	21	18	20	21
74	A	17	14	16	17	23	18	21	23
	B	12	11	11	13	19	16	18	20
	C	13	11	12	13	19	16	18	20
75	A	17	14	16	17	22	18	21	23
	B	6	5	6	7	10	8	10	11
	C	7	5	6	7	12	9	11	13
76	A	18	16	18	20	25	21	24	26
	B	12	11	12	13	19	16	18	19
	C	12	9	11	12	19	14	17	19
77	A	17	13	16	18	23	18	21	25
	B	16	14	15	17	21	18	20	22
	C	9	7	8	9	14	11	13	14
78	A	17	13	16	19	23	17	21	25
	B	23	18	21	22	30	23	27	29
	C	19	13	17	17	26	18	24	24
79	A	16	12	15	18	22	16	20	24
	B	15	10	13	14	21	15	19	20
	C	14	10	13	13	20	14	18	19
80	A	16	12	15	17	22	17	20	23
	B	11	8	10	11	18	13	17	18
	C	11	8	10	10	17	12	16	17
81	A	16	12	15	17	22	17	20	23
	B	10	8	9	10	16	12	15	16
	C	10	8	9	10	15	12	14	15
82	A	16	12	15	17	22	17	20	23
	B	15	12	14	16	24	18	22	25
	C	15	12	14	15	23	17	21	24
83	A	16	12	15	17	22	17	20	23
	B	11	8	10	12	18	13	16	19
	C	10	8	9	11	17	12	15	18
84	A	16	13	15	17	22	17	20	23
	B	11	8	10	11	17	13	16	17
	C	10	7	9	10	16	12	15	17

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
85	A	16	13	15	17	22	17	20	23
	B	14	10	12	13	21	15	19	20
	C	12	9	11	12	19	14	17	18
86	A	16	13	15	17	22	17	20	23
	B	20	15	18	19	28	21	25	28
	C	18	13	16	18	26	18	23	26
87	A	17	13	16	18	22	18	21	24
	B	14	10	13	13	21	15	19	20
	C	13	9	12	11	19	13	18	17
88	A	17	14	16	18	23	18	21	24
	B	12	9	11	13	20	15	18	20
	C	10	8	9	11	17	13	15	18
89	A	17	13	16	18	23	18	21	24
	B	16	12	15	15	24	17	21	23
	C	14	10	13	13	21	15	19	21
90	A	17	13	16	18	22	18	21	24
	B	21	15	18	22	29	21	26	31
	C	14	10	13	13	21	15	19	20
91	A	17	14	16	18	23	18	21	24
	B	16	12	14	17	23	17	21	24
	C	11	8	10	10	17	12	15	17
92	A	21	15	19	22	26	20	24	28
	B	19	14	17	21	24	18	22	27
	C	22	20	21	22	28	25	27	28
93	A	17	14	17	18	24	18	22	24
	B	10	8	9	10	16	12	15	17
	C	11	9	10	10	17	14	16	16
94	A	17	14	16	17	23	18	21	23
	B	13	11	13	14	21	17	20	22
	C	11	9	10	10	16	14	16	17
95	A	17	13	16	17	23	17	21	23
	B	14	12	14	15	22	19	21	22
	C	12	10	11	12	19	16	18	20
96	A	17	13	16	17	23	17	21	23
	B	17	13	16	19	26	20	25	29
	C	14	10	12	15	23	17	20	24

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
97	A	17	14	16	18	23	18	21	23
	B	20	14	18	21	26	19	24	28
	C	22	17	21	25	31	23	29	34
98	A	18	14	16	19	23	18	22	24
	B	19	14	17	20	24	18	22	26
	C	21	18	19	21	28	23	26	30
99	A	17	13	16	18	23	17	21	24
	B	18	13	16	20	23	18	21	25
	C	10	9	10	10	15	14	15	16
100	A	18	13	16	19	23	17	22	25
	B	17	13	16	19	23	17	21	24
	C	16	15	15	17	22	19	21	23
101	A	18	13	17	19	23	18	22	25
	B	17	13	16	19	23	17	21	25
	C	13	11	12	13	19	16	18	20
102	A	18	14	17	19	24	18	22	25
	B	17	13	16	18	23	17	21	24
	C	24	18	22	26	31	23	29	35
103	A	18	14	17	19	24	18	22	25
	B	16	13	16	18	22	17	21	24
	C	16	12	14	16	23	17	21	24
104	A	18	14	17	18	24	18	22	25
	B	16	13	15	17	22	17	21	23
	C	22	19	20	22	29	25	27	30
105	A	17	13	17	18	23	18	22	24
	B	16	13	15	16	22	17	21	23
	C	19	16	18	20	27	22	25	28
106	A	17	14	17	18	23	18	22	25
	B	16	13	15	16	21	17	20	22
	C	25	19	23	28	33	24	30	36
107	A	18	14	17	19	23	18	22	25
	B	16	13	15	17	22	17	21	23
	C	13	10	12	12	20	16	19	21
108	A	18	14	17	19	24	18	22	25
	B	17	13	16	19	23	17	21	25
	C	17	15	16	17	24	21	23	25

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
109	A	18	14	17	19	24	18	22	25
	B	18	13	17	20	24	18	22	25
	C	19	16	18	20	27	22	26	27
110	A	17	14	16	18	23	18	22	24
	B	17	13	16	19	23	18	22	25
	C	18	13	16	18	27	20	25	29
111	A	17	14	16	18	23	18	22	24
	B	16	14	15	16	22	19	21	23
	C	18	13	17	20	27	20	25	28
112	A	17	14	16	18	23	18	22	24
	B	19	14	17	18	26	20	24	26
	C	18	13	16	17	24	19	23	25
113	A	17	14	16	18	23	18	22	24
	B	15	12	14	16	22	17	20	23
	C	17	15	16	18	25	21	23	25
114	A	18	14	17	19	24	18	22	25
	B	16	13	15	17	22	17	21	23
	C	19	15	18	20	27	21	25	29
115	A	17	14	16	18	23	18	22	24
	B	15	12	14	15	20	16	19	21
	C	21	19	20	21	28	25	27	28
116	A	17	13	16	18	23	18	22	24
	B	16	13	15	16	22	17	21	22
	C	22	16	20	24	30	22	28	33
117	A	17	14	16	17	23	18	21	23
	B	17	13	16	17	22	17	21	22
	C	16	13	14	16	23	19	21	24
118	A	16	13	15	17	23	18	21	23
	B	17	13	15	16	22	17	21	22
	C	21	15	19	21	30	22	28	31
119	A	17	13	16	17	23	18	21	24
	B	18	15	17	18	24	19	23	24
	C	22	17	20	24	30	22	27	32
120	A	17	14	16	18	23	18	22	24
	B	17	13	16	17	25	18	23	25
	C	18	13	17	17	26	18	24	24

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
121	A	17	13	16	17	23	18	22	24
	B	14	11	13	15	21	16	20	22
	C	15	11	14	14	23	16	21	22
122	A	16	13	15	16	23	18	21	23
	B	17	14	16	17	23	18	21	22
	C	17	12	15	18	25	19	24	27
123	A	17	13	16	17	23	18	21	24
	B	18	15	17	18	24	20	22	24
	C	17	12	15	18	25	18	22	27
124	A	17	13	15	18	23	17	21	24
	B	16	12	15	18	24	19	22	26
	C	16	12	14	18	23	17	21	25
125	A	16	12	15	17	22	17	20	23
	B	16	14	16	17	23	20	22	24
	C	15	11	14	16	20	15	19	22
126	A	13	11	12	13	18	15	17	19
	B	12	9	11	13	18	14	17	20
	C	12	8	11	13	18	13	17	19
127	A	16	12	15	17	22	17	20	23
	B	15	11	14	17	21	16	20	23
	C	15	11	14	17	21	16	19	23
128	A	16	12	15	17	22	17	20	24
	B	15	11	14	17	22	16	20	24
	C	16	11	14	17	22	16	20	24
129	A	18	13	16	19	24	18	22	26
	B	17	13	16	19	23	17	21	25
	C	17	13	16	19	23	17	21	25
130	A	14	12	13	14	20	17	19	21
	B	11	9	10	12	18	14	17	19
	C	11	8	10	12	18	14	17	19
131	A	15	13	15	17	21	17	20	24
	B	14	11	13	15	21	17	20	23
	C	14	10	13	15	21	15	19	23
132	A	18	13	16	19	24	18	22	26
	B	18	13	16	19	23	17	21	25
	C	18	13	16	19	23	17	21	25

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
133	A	17	13	16	18	23	18	21	24
	B	15	12	13	15	22	18	20	22
	C	14	10	12	14	20	15	18	21
134	A	17	13	16	18	22	17	21	24
	B	13	11	12	14	22	18	20	22
	C	13	10	12	13	21	16	19	22
135	A	16	12	15	16	22	16	20	23
	B	14	10	13	14	21	16	19	21
	C	13	10	12	13	20	15	18	20
136	A	16	13	15	17	22	17	20	23
	B	15	13	14	15	24	20	22	24
	C	13	11	12	14	21	17	19	22
137	A	17	12	15	14	24	17	21	21
	B	17	12	15	15	24	17	21	22
	C	17	11	15	14	23	16	21	21
138	A	15	11	14	16	21	16	19	22
	B	13	10	12	14	21	16	19	22
	C	14	10	12	14	21	16	19	22
139	A	15	12	15	17	21	16	20	23
	B	15	12	14	15	23	19	21	24
	C	13	11	12	14	21	17	19	22
140	A	15	11	14	16	21	16	20	22
	B	16	12	15	17	23	18	21	25
	C	16	12	14	17	23	17	21	24
141	A	11	9	10	11	17	14	16	17
	B	18	16	17	18	26	23	25	26
	C	12	9	11	13	19	15	18	20
142	A	11	8	10	11	18	12	16	17
	B	12	8	11	11	18	13	16	17
	C	11	8	10	10	17	12	16	16
143	A	9	8	9	10	15	12	14	15
	B	10	9	10	11	16	14	16	17
	C	10	8	9	10	16	13	15	17
144	A	18	13	16	19	23	17	22	25
	B	20	16	18	20	27	22	25	27
	C	17	12	16	16	24	18	22	24

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
145	A	19	15	18	21	26	20	24	28
	B	21	17	20	21	29	22	27	29
	C	18	13	17	17	26	19	24	25
146	A	19	16	18	20	26	22	25	27
	B	19	16	18	20	27	21	25	28
	C	15	11	14	14	22	16	20	21
147	A	21	17	20	21	29	23	27	29
	B	18	15	17	20	25	20	24	28
	C	11	9	10	11	18	14	16	18
148	A	25	18	23	28	32	24	29	35
	B	24	18	22	26	30	23	29	34
	C	20	17	19	20	27	22	25	27
149	A	14	12	13	14	20	17	20	22
	B	13	12	13	14	20	17	19	21
	C	12	10	11	12	19	16	17	18
150	A	20	18	19	20	27	24	26	27
	B	17	15	17	18	24	21	23	25
	C	20	17	18	20	26	23	25	26
151	A	14	10	13	13	21	15	20	20
	B	19	13	17	17	27	19	24	25
	C	18	12	16	16	26	18	23	24
152	A	20	15	18	20	26	21	24	28
	B	15	13	14	15	22	18	20	22
	C	13	11	12	13	19	16	18	19
153	A	18	13	17	20	27	20	25	31
	B	22	16	20	21	31	22	28	31
	C	20	14	18	17	27	18	24	24

Seasons	Months	Mean Wind Criteria Speed (mph)		Effective Gust Criteria (mph)	
Spring	March - May	≤ 12	Comfortable for Sitting	≤ 31	Acceptable
Summer	June - August	13 - 15	Comfortable for Standing	> 31	Unacceptable
Fall	September - November	16 - 19	Comfortable for Walking		
Winter	December - February	20 - 27	Uncomfortable for Walking		
Annual	January - December	> 27	Dangerous Conditions		

Configurations	
A: No Build	Existing site and surroundings
B: Build	Project with existing surroundings
C: Full Build	Project with future surroundings

REPORT

HARVARD - ENTERPRISE RESEARCH CAMPUS

DETAILED SOLAR REFLECTION ANALYSIS

APRIL 9, 2021
PROJECT #2100586

SUBMITTED TO
Max Cassidy
Senior Director – Design & Construction
mcassidy@tishmanspeyer.com

Tishman Speyer
125 High Street
Boston, MA 02110
M: 617.631.4417

SUBMITTED BY
Derek Kelly, M.Eng., P.Eng.
Project Manager/Principal
derek.kelly@rwdi.com

Ryan Danks, B.A.Sc., P.Eng.
Senior Engineer/Associate
ryan.danks@rwdi.com

Matthew Riediger
Technical Coordinator
Matthw.riediger@rwdi.com

RWDI
600 Southgate Drive,
Guelph, Canada, N1G 4P6
T: 519.823.1311
F: 519.823.1316

EXECUTIVE SUMMARY

RWDI was retained to investigate the impact that solar reflections emanating from the initial design of the proposed Harvard Enterprise Research Campus development will have on the surrounding urban realm. Note that facade details are currently not defined, and as such RWDI has assumed a generic layout of glazing based on supplied window-to-wall ratios.

Thermal Impacts on People

The planar nature of the facades of the proposed development ensure that reflected sunlight will not focus (multiply) in any particular area. Therefore, RWDI does not expect any significant thermal impacts (i.e., risks to human safety or property damage) to occur either on the site or in the surrounding neighborhood.

Visual Glare Impact on Drivers

As with the addition of any glazed building, drivers travelling in the vicinity of the buildings were predicted to experience an increased level of visual glare impact. Drivers along Western Avenue, Harvard Business School's parking lot exit, DEF Drive and the ramp coming from Soldiers Field Road were predicted to experience reflections from the buildings which can cause a high level of impact. However, the majority of these impacts were predicted at times where the sun would also be within the driver's field-of-view, which would likely act to reduce the perceived impact on drivers.

Visual Glare Impact on Pedestrians and Facades

Typical levels of visual glare were predicted for pedestrians and building occupants in the vicinity of the development. These types of reflections represent at worst a visual nuisance, as viewers can safely look away or close blinds. These potential impacts were predicted to be possible in a small fraction of the year (at most 13% of the daytime annually). Reflections may also impact phase B of the development and the nearby green spaces, however, these results are typical of impacts seen in any urban space.

Thermal Impact on Facades

At all studied facade areas, reflections were predicted to be low intensity and short duration. Hence, RWDI would not expect these reflections to lead to a significant additional cooling load for a building. Should an individual choose to expose themselves to the reflected energy, they may feel warm, however this would be a temporary experience and one which would easily be remedied by closing window treatments.

Overall Impact of Reflections

Based on the assumed glazing layout, the predicted impacts of this development on its surrounds are typical of any modern building of this size. Additional details on when reflections were predicted to occur throughout the year, as well as predicted durations and intensities can be found in Appendix A.

TABLE OF CONTENTS

INTRODUCTION

This report provides the computer modeling results of reflected sunlight from Phase A of the proposed Harvard Enterprise Research Campus Buildings in Boston, MA. The proposed residential, conference, hotel and lab buildings will be located at the intersection of Western Avenue and East Drive (as shown in Figure 1). It is our understanding that the development will be surrounded by typical urban spaces such as busy roadways, and other buildings.

RWDI was retained to investigate the impact that solar reflections emanating from the proposed development will have on the surrounding urban terrain.

A preliminary set of simulations was conducted to determine peak reflection intensities and the frequency of reflection occurrence for a broad area around the development. This served to identify areas which may experience high intensity or very frequent reflections. This information informed the selection of 18 points for a more detailed analysis.

These receptor points represent drivers, pedestrians, and building facades and the detailed results allow us to quantify the frequency, intensity and duration of glare events at the receptors as well as the sources of those reflections.

Figure 1: Location of Phase A Buildings of the Harvard Enterprise Research Campus Buildings (Blue) (Map Credit: Google Earth)

Urban Reflections

While a common occurrence, solar reflections from buildings can lead to numerous visual and thermal issues.

Visual glare can:

- Impair the vision of motorists and others who cannot easily look away from the source;
- Cause nuisance to pedestrians or occupants of nearby buildings; and,
- Create undesirable patterns of light throughout the urban fabric.

Heat gain can:

- Affect human thermal comfort;
- Be a safety concern for people and materials, particularly if multiple reflections are focused in the same area; and
- Create increased cooling needs in conditioned spaces affected by the reflections.

The most significant safety concerns with solar reflections occur with concave facades (Figure 2) which act to focus the reflected light in a single area. RWDI does not expect this to be a concern given the form of the project.

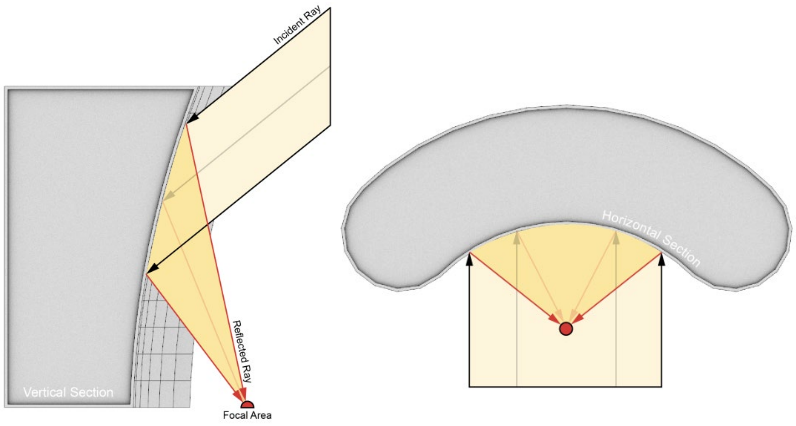


Figure 2: Illustration of Reflection Focusing Due to a Concave Facade

Methodology

RWDI assessed the potential reflection issues using RWDI's in-house proprietary *Eclipse* software, in two phases as per the steps outlined below:

- The Phase 1 'Screening' assessment began with the development of a 3D model of the area of interest (as shown in Figure 3). This was then subdivided into many smaller triangular patches (see Figure 4).
- For each hour in a year, the expected solar position was determined, and "virtual rays" were drawn from the sun to each triangular patch of the 3D model. Each ray that was considered to be "unobstructed" was reflected from the building surface and tracked through the surrounding area. The study domain included the entire pedestrian realm within 1,200 feet of the proposed building.
- The total reflected energy at that hour from all of the patches was computed and its potential for visual and thermal impacts assessed.
- Finally, a statistical analysis was performed to assess the frequency, and intensity of the glare events occurring throughout the year in the vicinity of the project. The criteria used to assess the level of impact can be found in Appendix B of this report.

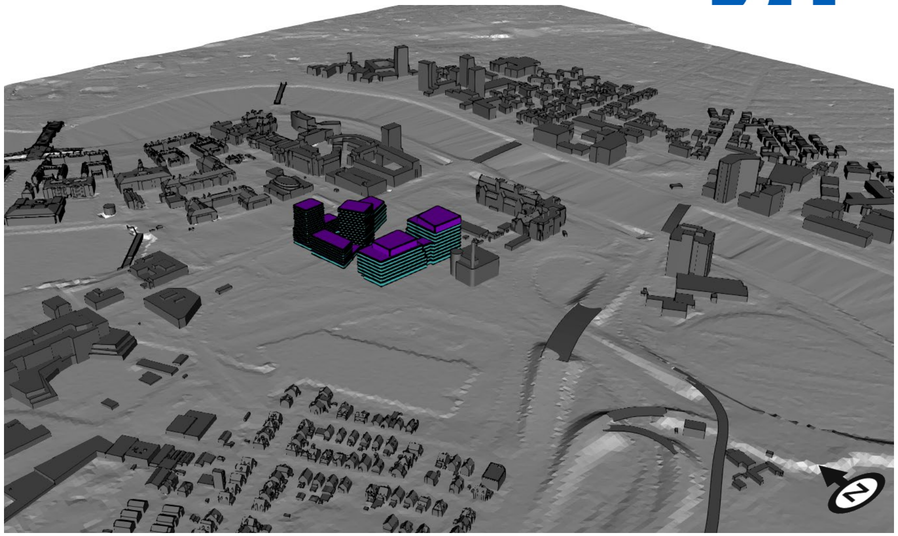


Figure 3: 3D Computer Model of the Proposed Development and Surrounding Context

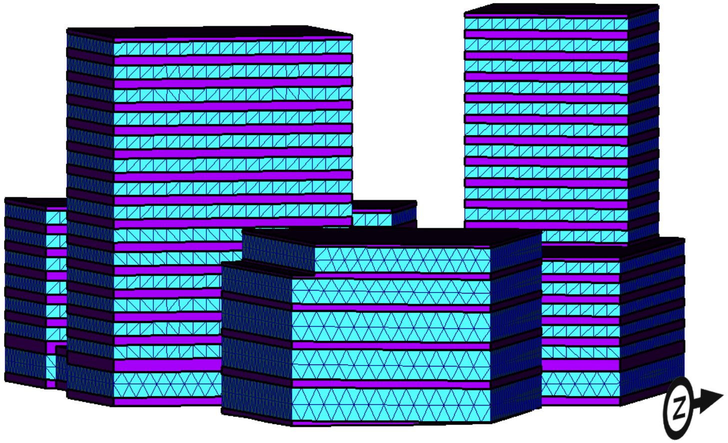


Figure 4: Close-up View of the Model, Showing Surface Subdivisions

Methodology (cont'd)

- Based on the findings of the Screening analysis, multiple representative 'receptor points' were selected to undergo the Phase 2 'Detailed' analysis.

- The points were chosen to understand in greater detail how reflections from the building will impact drivers, pedestrians and the rest of the built environment. The selected locations of the points are discussed further in the Detailed Analysis section this report.

- The Detailed analysis process is similar to the Screening analysis, except reflections are analyzed at one-minute increments for the entire year and the source of the reflections is stored for each receptor point.

- In addition to the frequency and duration of reflection impacts, the Detailed analysis allows for the prediction of when impacts can occur, how long they can occur for and the locations of problematic glare sources.

Assumptions and Limitations

Meteorological Data

This analysis used 'clear sky' solar data computed at the location of Logan International Airport. This approach uses mathematical algorithms to derive solar intensity values for a given location, ignoring local effects such as cloud cover. This provides an assessment of a complete year showing the full extent of when and where glare could ever occur.

Radiation Model

RWDI's analysis is only applicable to the thermal and visual impacts of solar radiation (i.e., ultraviolet, visible and infrared wavelengths) on people and property in the vicinity of the development. It does not consider the impact of the building related to any other forms of radiation, such as cellular telephone signals, RADAR arrays, etc.

Study Building and Surrounds Models

The analysis was conducted based on a 3D massing model and window to wall ratios for the glazing of the proposed development which was provided by Henning Larsen to RWDI up to February 17, 2021. As no detailed facade model was available, RWDI has assumed that glazing is evenly distributed across the buildings' facades.

The surroundings model was developed based on data made available by the City of Boston. The surrounds model includes all buildings which currently exist or are approved for construction by the BPDA.

The ground surface and the surrounding buildings were topographically corrected based on a high-resolution LiDAR survey conducted by the National Oceanic and Atmospheric Administration (NOAA) in 2013-2014. NOAA states that the horizontal accuracy of this data set is 16.5 inches at a 95% confidence level. Its vertical accuracy is stated as 4.8 inches at a 95% confidence level.

Potential reductions of solar reflections due to the presence of Vegetation or other non-architectural obstructions were not included, nor are reflections from other buildings. Light that has reflected off several surfaces is assumed to have a negligible impact. As such, only a single reflection from the development was included in the analysis.

Assumptions and Limitations (cont'd)

Facade Material Reflectance

Based on correspondence with Henning Larsen to RWDI on February 17, 2021, it is RWDI's understanding that the glazing used in this project will have an assumed nominal reflectance of approximately 21%.

The reflectance properties of the reflective elements are summarized in Table 1. Figure 5 illustrates the location of the reflective materials on the facades.

Applicability of Results

The results presented in this report are highly dependent on both the form and materiality of the facade. Should there be any changes to the design, it is recommended that RWDI be contacted and requested to review their potential effects on the findings of this report.

This analysis also assumes reasonable and responsible behaviour on the part of people in the vicinity of the project. A reasonable and responsible person would not purposely look towards a bright reflection, purposely prolong their exposure to reflected light or heat, or otherwise intentionally try to cause discomfort/harm to themselves or others and/or damage to property.

This report has endeavored to provide a robust and suitably conservative analysis of the potential effects of reflected sunlight, contextualized based on current industry and academic research, and common best practices. Regulation and enforcement of performance requirements is the responsibility of the relevant regional regulatory authority.

Assumptions and Limitations (cont'd)

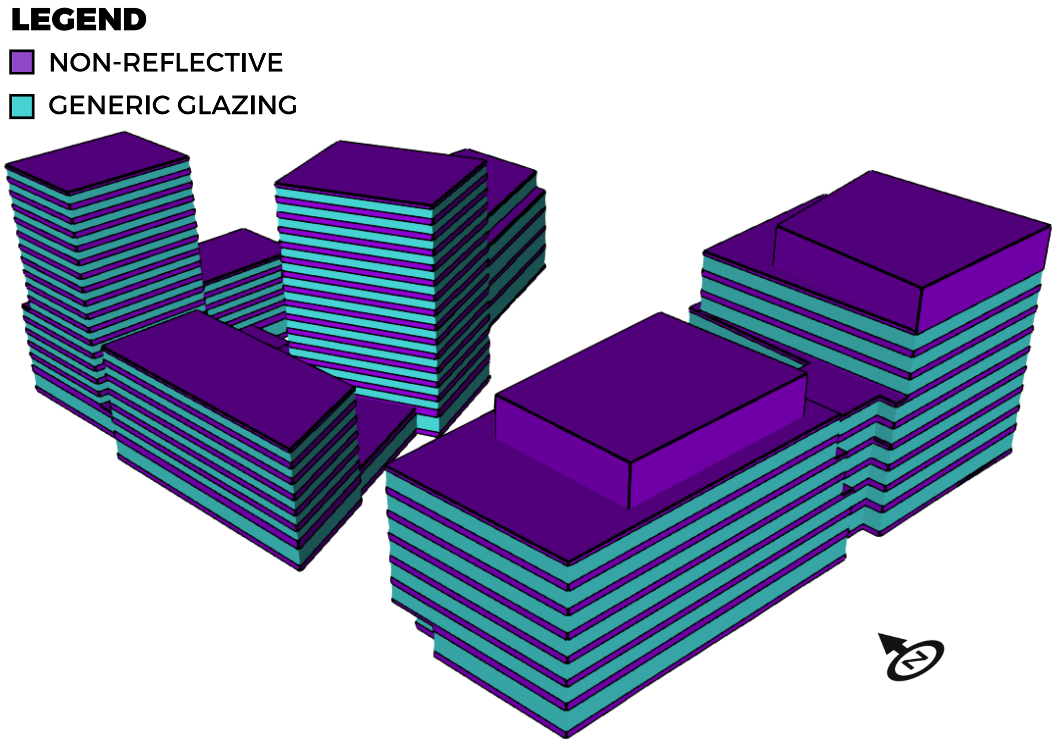


Figure 5: Locations of Reflective Building Elements (Surrounding Context removed for Clarity)

Table 1: Nominal Visible and Full Spectrum Reflectance Values of the Reflective Building Elements

Location	Material	Visible Reflectance	Full Spectrum Reflectance
Facade	Generic Glazing	21%	21%

Presentation of Results

This section presents the screening results pertaining to the solar impacts of the development on the surrounding urban area. The following plots are presented:

Peak Annual Reflected Irradiance
This plot displays the annual peak intensity of visible reflections (visible glare) emanating from the development at a typical pedestrian height (5 feet) above local grade. This plot (Figure 6a) displays the intensity of reflected visible light only. Depending on the ambient conditions, reflection intensities as low as 50 W/m^2 could be visible to people outdoors.

Frequency of Significant Visual Reflections
This plot (Figure 6b) identifies the locations of the most frequent significant reflections emanating from the facades. In this context a 'significant' reflection is one that is at least 50% as intense as one that would cause after imaging on a viewer (refer to Appendix B).

As this criteria is visually based, the visible reflectance of the facades was used.

In order to attain a complete understanding of the impact that reflections may have on drivers, other factors must be considered, including the duration of the reflections and when they occur. The following plots serve to illustrate the general characteristics of reflections from the development and inform the locations of the receptor points used in the detailed phase of work which will analyze these factors in greater detail.

Peak Annual Reflected Irradiance - Visible Reflectance (Visual Glare)

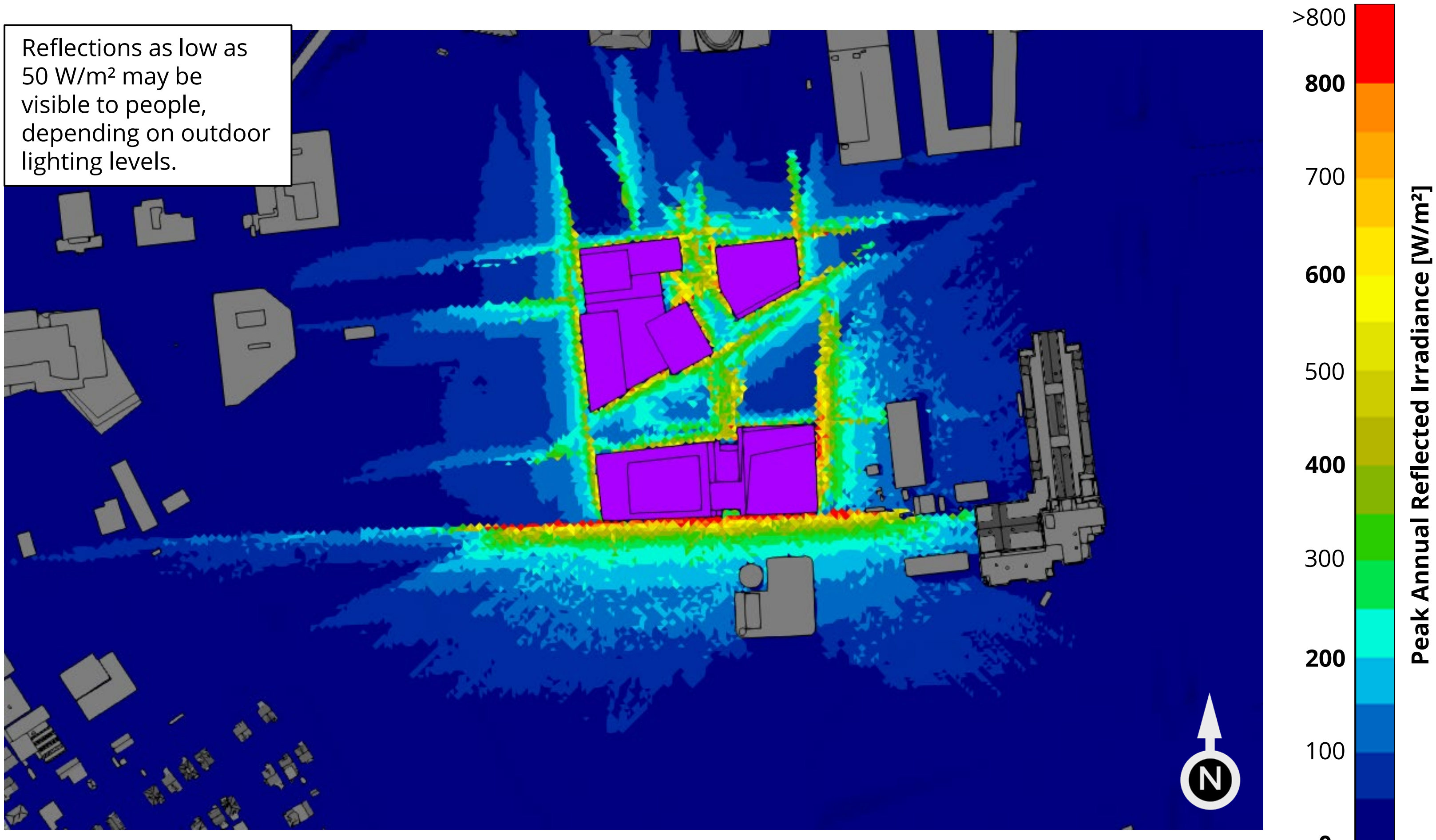


Figure 6a: Maximum Annual Intensity of Visible Reflections at Pedestrian Height

Frequency of Significant Visible Reflections

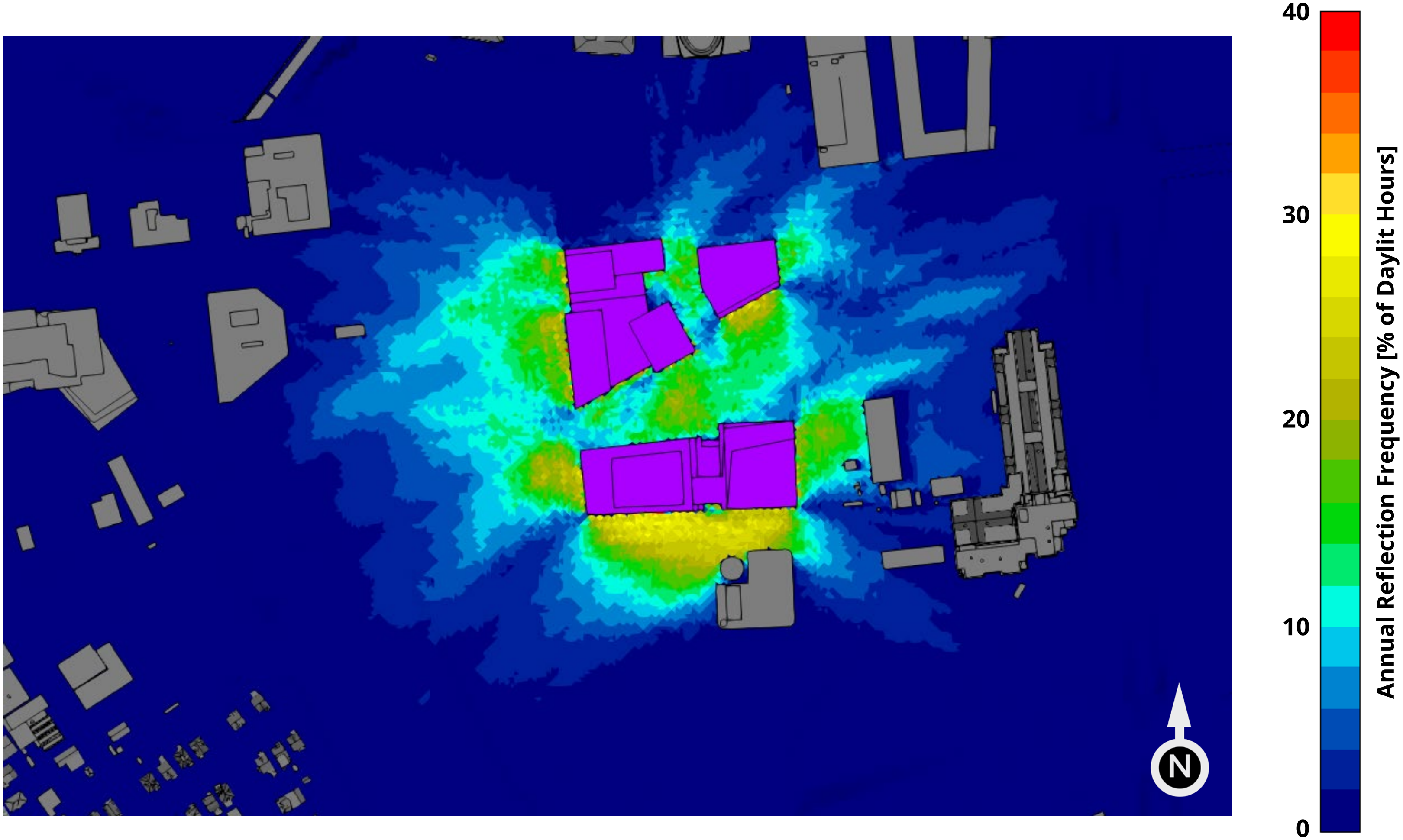


Figure 6b: Frequency (% of Daylit Hours) Where Significant Visible Reflections Can Occur

SCREENING ANALYSIS OBSERVATIONS

1. Like any contemporary building, the reflective surfaces of the proposed development are naturally causing solar reflections in the surrounding neighborhood.

2. The planar nature of the facades of the buildings prevent reflections from focusing (concentrating) in any particular area. Thus, RWDI does not anticipate any heat gain issues on people or property.

3. At pedestrian level, reflections were predicted to fall most frequently onto the area immediately south and west of Phase A of the ERC buildings. The maximum frequency of glare occurrence found at pedestrian level is approximately 37% of daytime hours.

4. Reflections from the development were predicted to be generally confined within 600 feet of the buildings and may impact east and westbound drivers on Western Avenue and DEF Drive as well as south and northbound drivers on East Drive and Cattle Drive.

5. The occupants of the buildings located close to the development were predicted to experience visible reflections from the development. That being said, the reflections are unlikely to pose a risk to safety. They are likely a nuisance at worst, as the occupants can look away or close blinds.

6. Pedestrians in the outdoor amenity spaces between the buildings were also predicted to have the potential to experience intermittent reflections. Though, this condition is common in many urban centers, it is unlikely to present a significant safety risk.

7. Given the reflection patterns RWDI would expect that the future Phase B development, which is southwest of Phase A, could serve to reduce the frequency and duration of reflections compared to what was predicted here.

8. The exact nature of these impacts are explored further in the following detailed analysis section.

Based on the findings of the Screening Analysis and the risk levels associated with reflections effecting specific areas, 16 representative points were selected for the Detailed Analysis. These points are described in Tables 2 and 3 and illustrated in Figures 7 and 8.

Table 2: Receptor Descriptions

Receptor Number	Receptor Description
D1-D2	Eastbound drivers on Western Avenue
D3	Westbound drivers on Western Avenue
D4	Southbound drivers on the Harvard Business schools parking lot exit
D5	Southbound drivers on East Drive
D6	Westbound drivers on DEF Drive
D7	Eastbound drivers on DEF Drive
D8	Northbound drivers on Cattle Drive
D9	Southbound drivers on Cattle Drive
D10	Northbound drivers on side street approaching DEF Drive
D11	Northbound drivers on East Drive
D12	Westbound drivers on Western Avenue
D13	Drivers travelling west on ramp from Soldiers Field Road

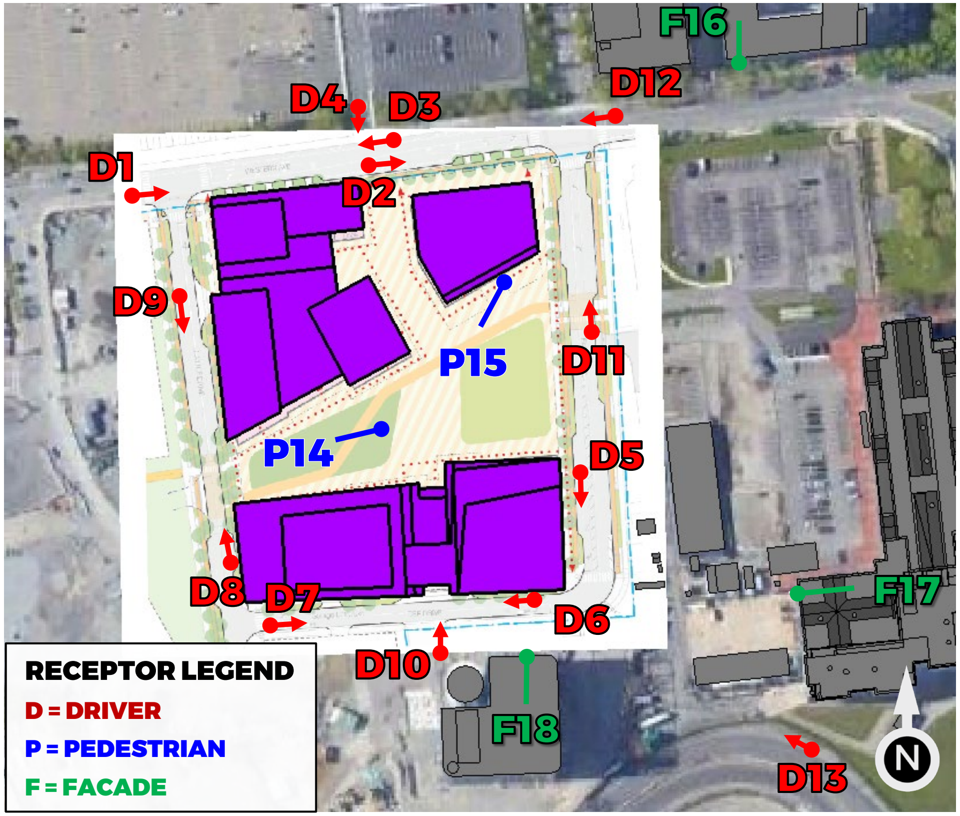


Figure 7: Receptor Locations (Map Underlay Credit: Microsoft Bing Maps)

Table 3: Receptor Descriptions (continued)

Receptor Number	Receptor Description
P14,P15	Pedestrians in the Harvard Enterprise Research Campus greenspaces
F16	Occupants of One Western Avenue (Approximately the 3rd floor)
F17	Occupants of Sanofi-Genzyme Building (Approximately the 2nd floor)
F18	Occupants of District Energy Facility (Approximately the 3rd floor)

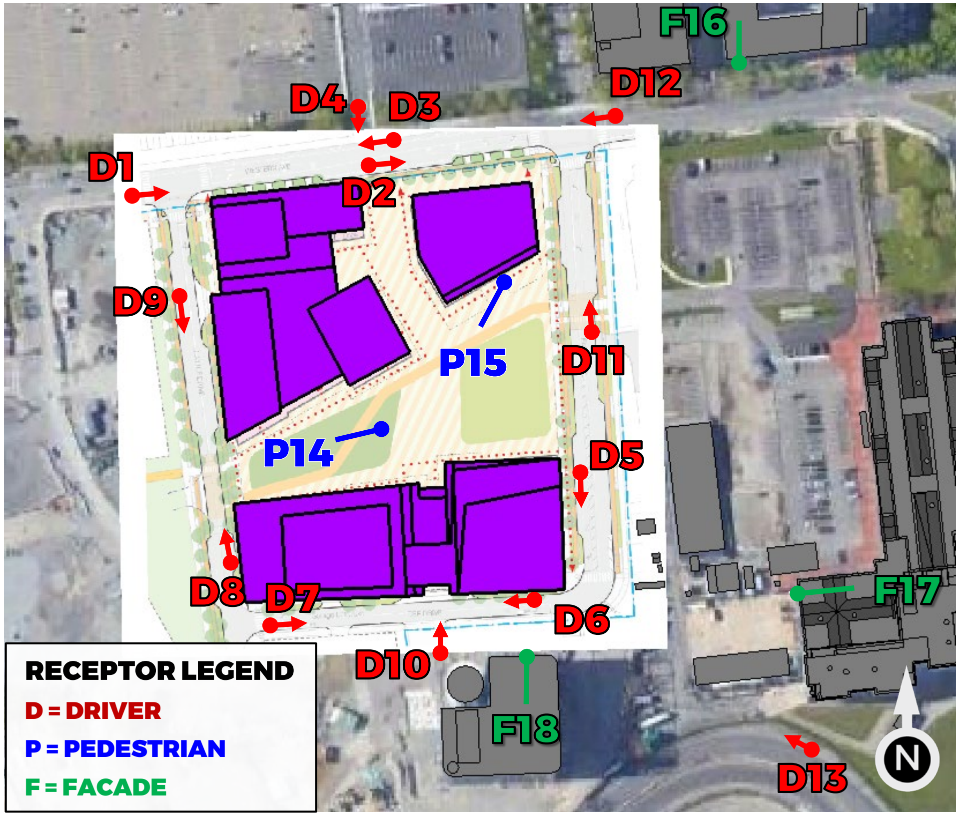


Figure 8: Receptor Locations (Map Underlay Credit: Microsoft Bing Maps) (continued)

DETAILED ANALYSIS RESULTS

Table 3 summarizes the level of visual and thermal impact from the development's reflections at each of the studied locations. For each category (visual impact, thermal impacts on people, thermal impacts on facades/property) the point is classified as experiencing one of four impact levels:

- **Low** impacts indicate that either no reflections reach the receptor, or that reflections which do reach the location are unlikely to lead to visual or thermal concerns.
- **Moderate** impacts indicate the potential for visual nuisance, minor thermal discomfort to people, or minor heating of materials. Moderate impacts do not indicate a significant safety risk and are common in urban areas. They represent effects such as intermittent visual glare on pedestrians or occupants of adjacent buildings which can be safely self-mitigated.
- **High** impacts indicate the potential for risks to safety, either through impairing the visual acuity of a vehicle operator or through reflection intensities high enough to cause injury or property damage. When the sun is also in a driver's field of view, RWDI would expect that brightness of the sun to dominate over the less intense reflected light, likely reducing the perceived effect of high impact reflections. This situation is noted in Table 3 where applicable, as are notes on high impact reflection frequencies and durations.
- **Very High/Damaging** impacts indicate the potential for extreme risks to safety, either due to reflected energy intensities well in excess of RWDI's ceiling exposure limit or visual glare bright enough to damage the retina faster than an individual can blink.

The minute-by-minute results for each point are presented as 'Annual Reflection Impact Diagrams' which distill an entire year's worth of data into a single diagram. The diagrams for each of the receptor points as well as an explanation for how to read the diagrams are provided in Appendix A.

For further detail on RWDI's criteria refer to Appendix B.

The level of mitigation required (discussed further in the Overall Observations and Conclusions section), is determined based on a combination of factors including the predicted level of impact, the frequency and duration of the impacts, and the risk level associated with activities likely to be engaged in at the location.

DETAILED ANALYSIS RESULTS

Table 4: Summary of Overall Predicted Impacts on Receptors

Receptor Number	Receptor Type	Assumed Activity Risk Level	Assumed Ability to Self-Mitigate	Peak Reflected Light Visual Impact	Duration / Number of Days with High Impact Reflection	Percentage of High Impacts Where the Sun Is Also Visible	Peak Reflected Solar Thermal Impact on People	Peak Reflected Solar Thermal Impact on Facade
D1	Driver	High	Low	***High***	Longest Duration: **26 minutes** Average Duration: **9 minutes** No. of days: **255**	***36%***	***Low***	N/A
D2	Driver	High	Low	***High***	Longest Duration: **14 minutes** Average Duration: **7 minutes** No. of days: **102**	***28%***	***Low***	N/A
D3	Driver	High	Low	***High***	Longest Duration: **11 minutes** Average Duration: **6 minutes** No. of days: **80**	***21%***	***Low***	N/A
D4	Driver	High	Low	***High***	Longest Duration: **9 minutes** Average Duration: **6 minutes** No. of days: **108**	***0%***	***Low***	N/A
D5	Driver	High	Low	***Moderate***	N/A	N/A	***Low***	N/A
D6	Driver	High	Low	***High***	Longest Duration: **28 minutes** Average Duration: **9 minutes** No. of days: **131**	***99%***	***Low***	N/A
D7	Driver	High	Low	***High***	Longest Duration: **34 minutes** Average Duration: **13 minutes** No. of days: **107**	***38%***	***Low***	N/A
D8-D11	Driver	High	Low	***Moderate***	N/A	N/A	***Low***	N/A

Table 4: Summary of Overall Predicted Impacts on Receptors

Receptor Number	Receptor Type	Assumed Activity Risk Level	Assumed Ability to Self-Mitigate	Peak Reflected Light Visual Impact	Duration / Number of Days with High Impact Reflection	Percentage of High Impacts Where the Sun Is Also Visible	Peak Reflected Solar Thermal Impact on People	Peak Reflected Solar Thermal Impact on Facade
D12	Driver	High	Low	***High***	Longest Duration: **21 minutes** Average Duration: **8 minutes** No. of days: **94**	***43%***	***Low***	N/A
D13	Driver	High	Low	***High***	Longest Duration: **59 minutes** Average Duration: **18 minutes** No. of days: **99**	***0%***	***Low***	N/A
P14-15	Pedestrian	Low	High	***Moderate***	N/A	N/A	***Low***	N/A
F16	Façade	Low	High	***Moderate***	N/A	N/A	N/A	***Low***
F17	Façade	Low	High	***Low***	N/A	N/A	N/A	***Low***
F18	Facade	Low	High	***Moderate***	N/A	N/A	N/A	***Low***

Thermal Impacts on People

1. The planar facades of the proposed development ensure that reflected sunlight will not focus (multiply) in any particular area. Therefore, RWDI does not expect any significant thermal impacts (i.e., risks to human safety or property damage) to occur either on the site of the development or in the surrounding neighborhood.

Visual Glare Impact on Drivers

2. As with the addition of any glazed building, drivers travelling in the vicinity of the buildings are expected to experience an increased level of visual glare impact. Some reflections with a high visual impact potential were predicted. Some of these impacts may alter a driver's experience since the glare occurs at times when the sun would not be within a driver's field-of-view. In particular, a driver's experience could be altered when:

    - Travelling south at the Harvard Business School parking lot exit (receptor D4); and
    - Travelling west around the ramp (receptor D13)

    The high impact reflections predicted here can last up to 59 minutes, but on average lasts between 6 and 18 minutes. The impacts on the parking lot exit were predicted between 7:30 am EST and 9:30 am EST from January to mid-February and again from late-October to December. The impacts on the ramp were predicted between 3:00 pm EST and 4:15 pm EST from early-January to late-February and again from mid-October to early-December. This equates to high impact glare events being possible at the parking lot exit and the ramp for 0.66% and 1.2% of the daytime respectively, on an annual basis.

3. The other high impact glare events predicted in this analysis occur at times when the sun would also be in a driver's field-of-view. This represents a situation where a driver would already experience intense glare from the sun, likely reducing the perceived impact of any reflected light due to both the intensity of the sun compared to the reflection, but also because a driver would already expect glare to occur at that time from that location. This analysis predicts the potential for such impacts to occur when:

    - Eastbound drivers on Western Avenue (receptor D1-D2);
    - Westbound drivers on Western Avenue (receptor D3);
    - Westbound drivers on DEF Drive (receptor D6);
    - Eastbound drivers on DEF Drive (receptor D7); and
    - Westbound drivers on Western Avenue (receptor D12)

Impacts at these receptors were predicted to last 11 to 34 minutes at most and on average last between 6 and 13 minutes. These reflections are possible up to 1.5% of the daytime annually. It is important to note that for some of the receptors, reflections can also occur when the sun is not in the field-of-view. For instance, the sun was predicted to be in the driver's field-of-view for 21% of the high impact reflections at receptor D3 meaning that for 79% of the time the sun is not in the field-of-view.

4. For the remainder of the driver receptors, visual glare impacts were predicted to be moderate at worst, and therefore are not expected to pose a significant safety concern to drivers. For further details refer to the visual impact diagrams for all driver receptors (D1-D13) illustrated in Appendix A.

Visual Glare Impacts on Pedestrians and Facades

5. Moderate levels of visual impact were predicted to fall on most of the pedestrian and facade receptors studied in this analysis.

6. The potential impacts predicted on the facade facing Western Avenue (F16) and DEF road (F17) were predicted to be minor. Any reflections that do reach these areas are expected to be short in duration (20 minutes or less) and are possible at most 0.5% of the daytime annually.

7. The potential impacts predicted at the District Energy Facility can last 214 minutes at most, but on average last 16 minutes. These reflections were predicted mainly between 9:30 am EST and 5:00pm EST from October through to mid-March. This equates to glare being possible 13% of the daytime annually.

8. The potential visual impacts noted above do not present a safety risk, but rather a temporary nuisance at worst which can be mitigated by briefly closing blinds or looking away from the glare source.

Visual Glare Impacts on Phase B Facades

9. The potential visual impacts emanating from phase A onto Phase B do not present a safety risk. The majority of the reflections are minor, being intermittent and short in duration and can be mitigated by briefly closing blinds or looking away from the glare source.

OVERALL OBSERVATIONS AND CONCLUSIONS

Thermal Impacts on Facades

10. The majority of reflected solar energy at the studied facade areas was predicted to be low intensity (less than 300 W/m^2) and short duration. Hence, RWDI would not expect these reflections to lead to a significant additional cooling load for a building. Should an individual choose to expose themselves to the reflected energy, they may feel warm however this would be a temporary experience and once which would easily be remedied by closing window treatments.

Overall

11. The impacts described above are not atypical for a contemporary building, though the degree of some impacts will depend on the final façade design.

12. The geometry of the current design is such that significantly focused reflections are unlikely. This means that the thermal impacts to people and property described above are unlikely to significantly change should the positions of the glazing be altered.

13. Both visual and thermal effects are likely to become more noticeable as the visible and full spectrum reflectance of the glazing units increase beyond what was assumed here.

14. Figures 8 through 12 illustrate the sources of the high impact reflections noted above. While the predicted impacts of reflections from this project are not excessive in RWDI's experience, this assessment is based on an assumed distribution of glazing. As the design of the façade progresses more additional assessments may be warranted to better quantify the impact of reflections.

SOURCES OF HIGH IMPACT REFLECTIONS

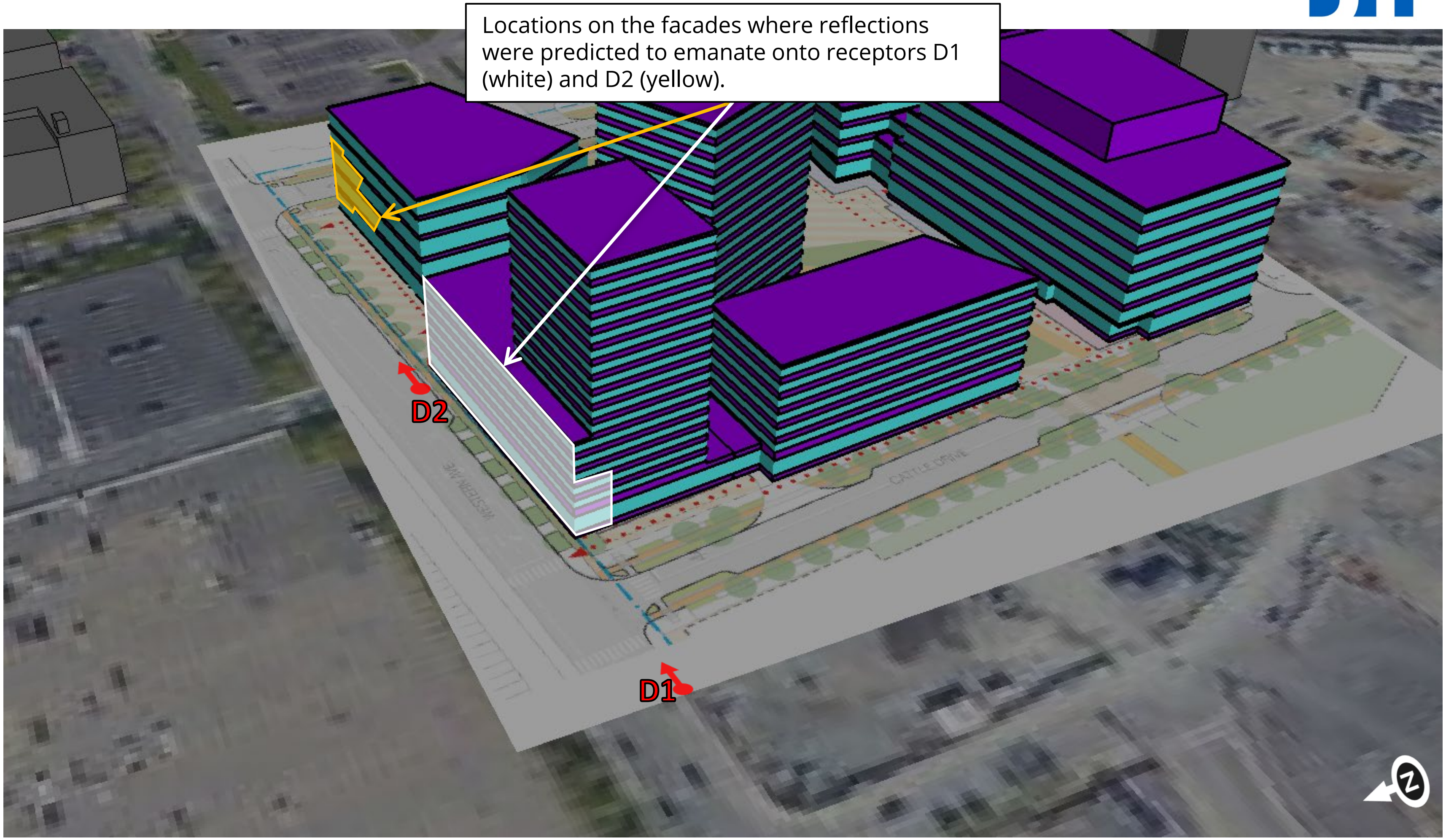


Figure 9: Markup of Facade Locations Reflections are Emanating onto D1 and D2

SOURCES OF HIGH IMPACT REFLECTIONS

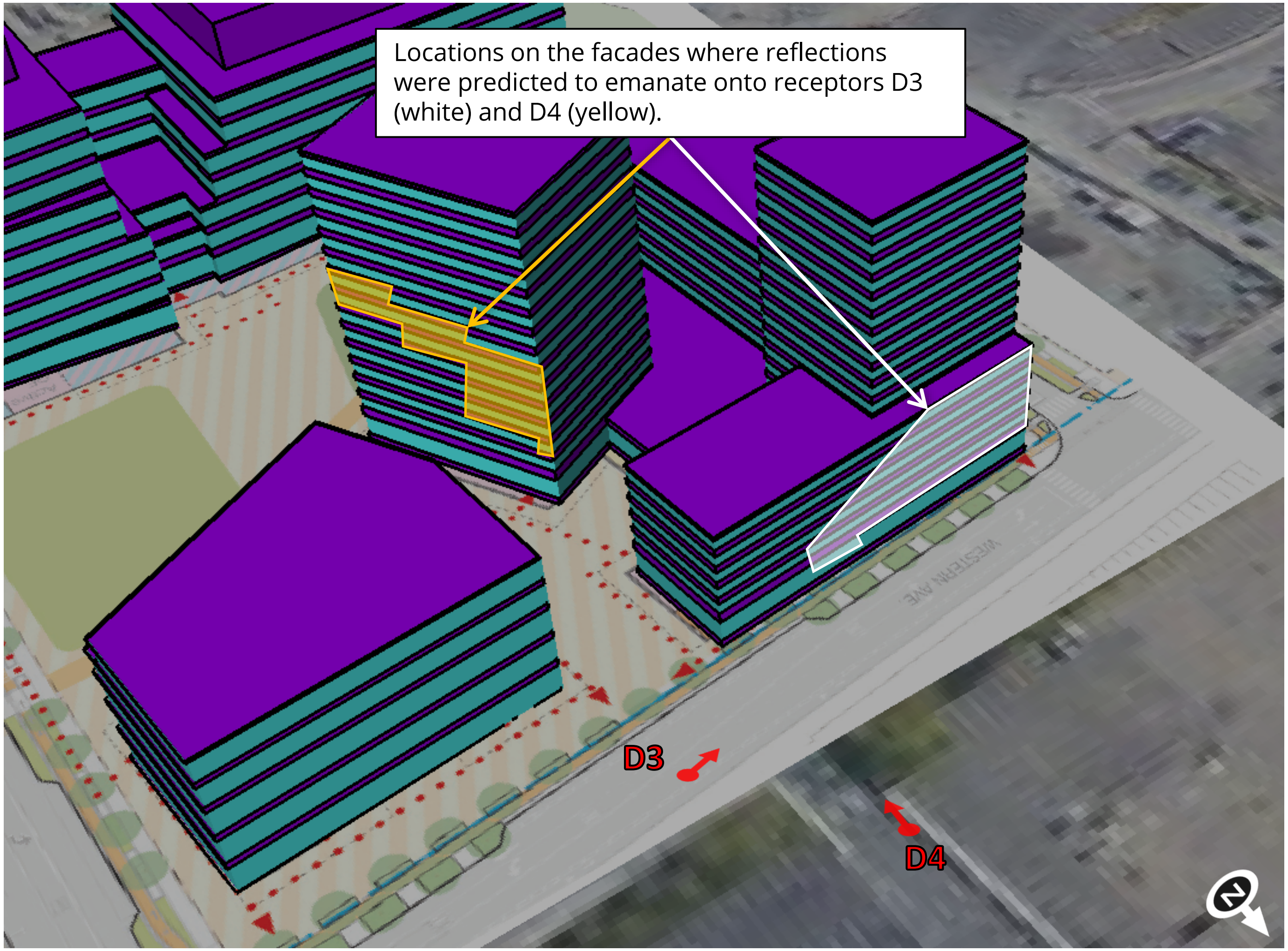


Figure 10: Markup of Facade Locations Reflections are Emanating onto D3 and D4

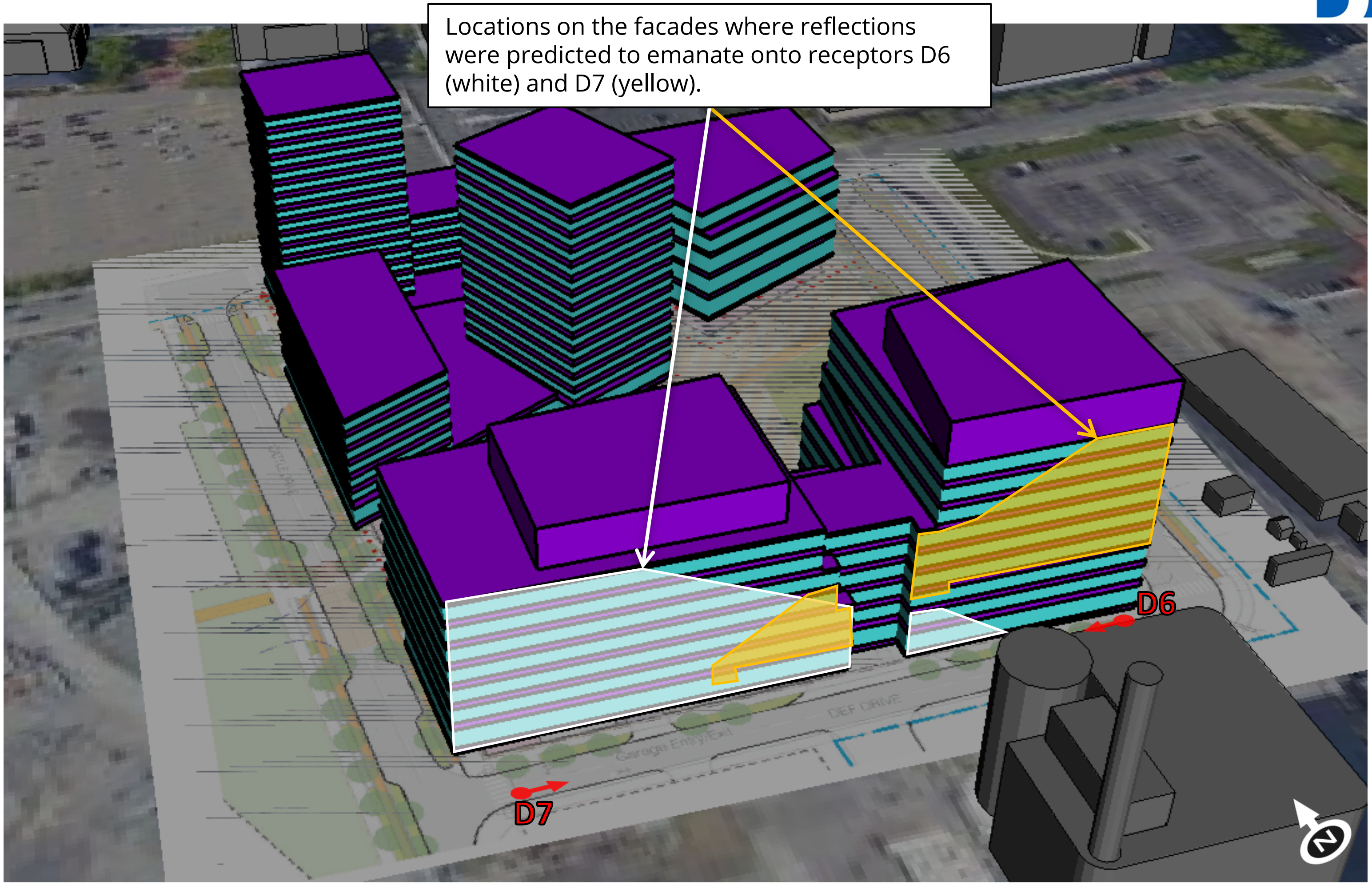


Figure 11: Markup of Facade Locations Reflections are Emanating onto D6 and D7

SOURCES OF HIGH IMPACT REFLECTIONS

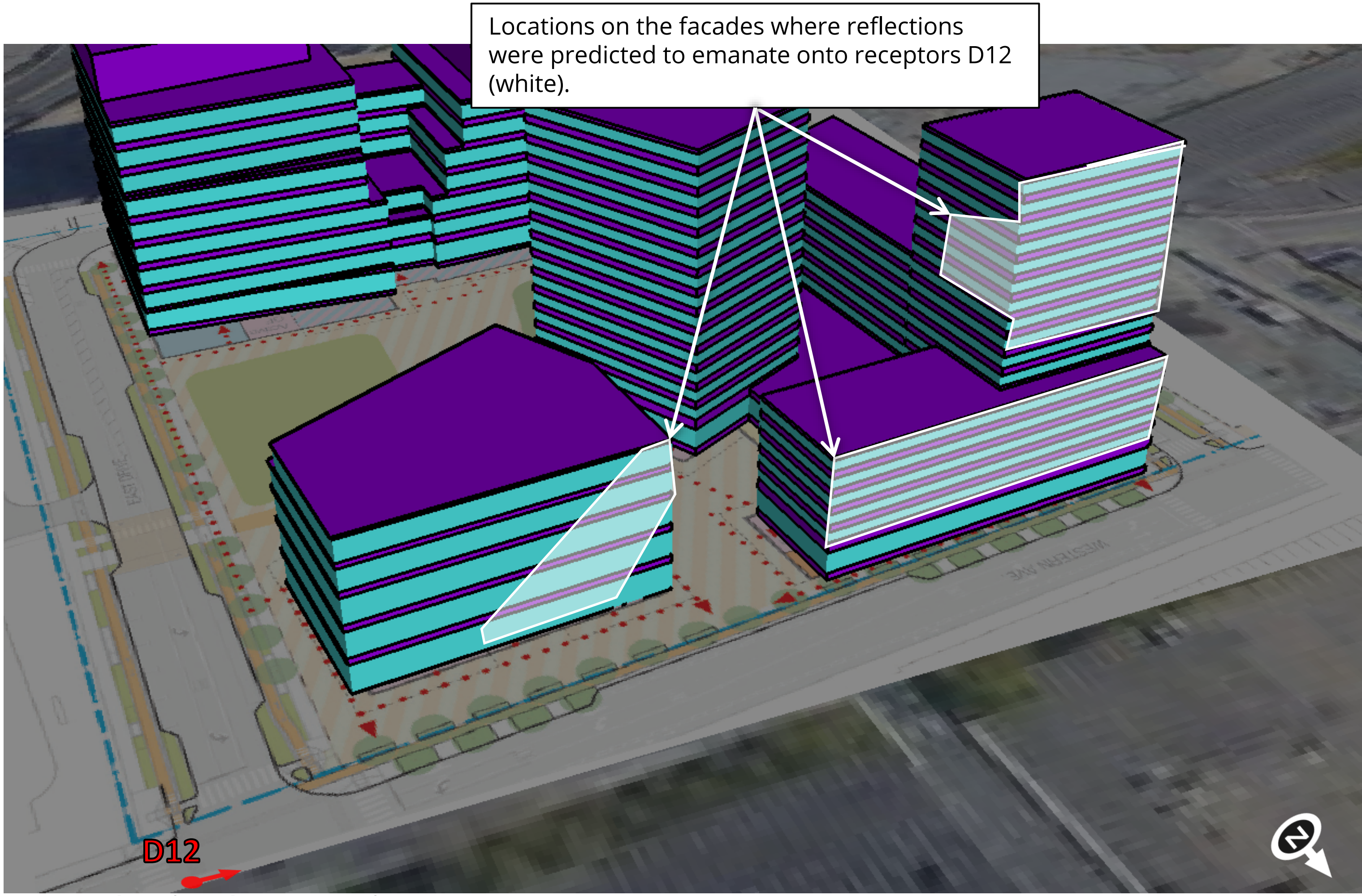


Figure 12: Markup of Facade Locations Reflections are Emanating onto D12

Locations on the facades where reflections were predicted to emanate onto receptors D13 (white).

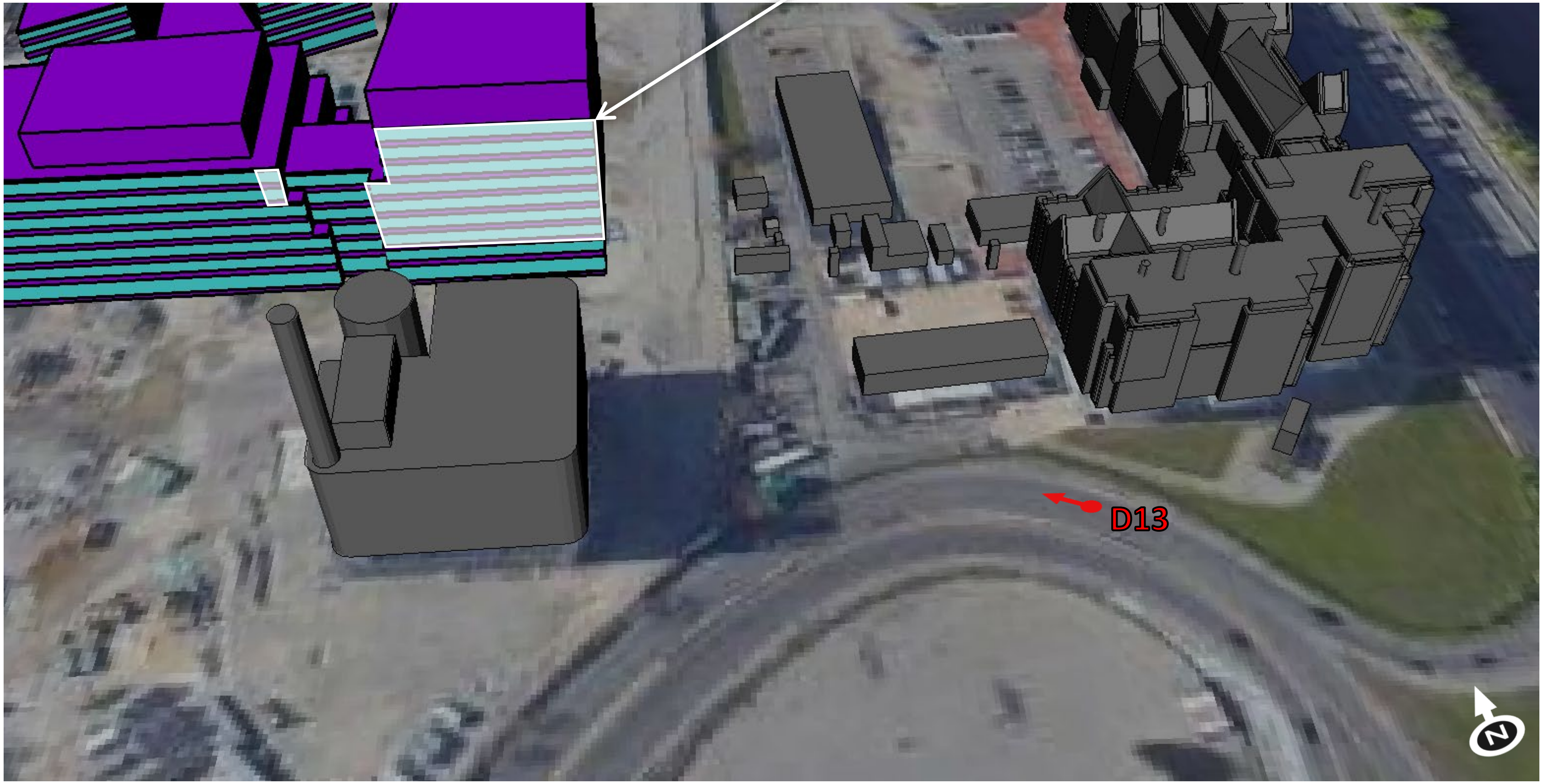


Figure 13: Markup of Facade Locations Reflections are Emanating onto D13

APPENDIX A

ANNUAL REFLECTION IMPACT DIAGRAMS

Presentation of Results

The frequency, duration, and intensity of glare events throughout the year is illustrated using "annual impact diagrams" (see Figure A1 below for the general layout of these plots). The color of the plot for a given combination of date and time indicates the relative impact of any glare sources found. The horizontal axis of the diagram indicates the day of the year, and the vertical axis indicates the hour of the day.

We note that the referenced times are in local standard time, so in jurisdictions where Daylight Savings Time is used, the time should be shifted by an hour when appropriate.

The following pages present the impact categories for three types of Annual Impact Diagrams: Visual Impact, Thermal Impact on People, and Thermal Impact on Property. More information on RWDI's criteria is available in Appendix B.

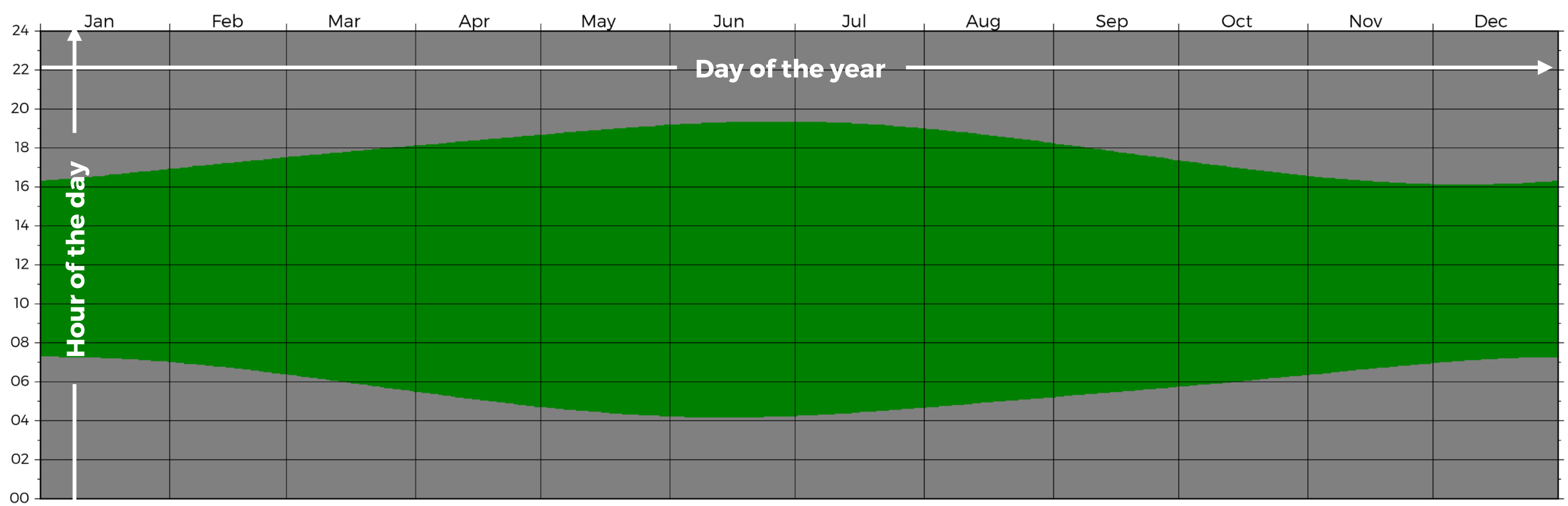


Figure A1: Layout of Annual Reflection Impact Diagram

Visual Impact Categories

Low: Either no significant reflections occur or the reflections will have a minimal effect on a viewer, even when looking directly at the source.

Moderate: The reflections can cause some visual nuisance only to viewers looking directly at the source.

High: The reflections can reduce visual acuity for viewers operating vehicles or performing other high-risk tasks who are unable to look away from the source, posing a significant risk of distraction.

Damaging: The brightest glare source is bright enough to permanently damage the eye for a viewer looking directly at the source.

Hatched areas indicate times and dates when the sun would also be in a driver's field of view.

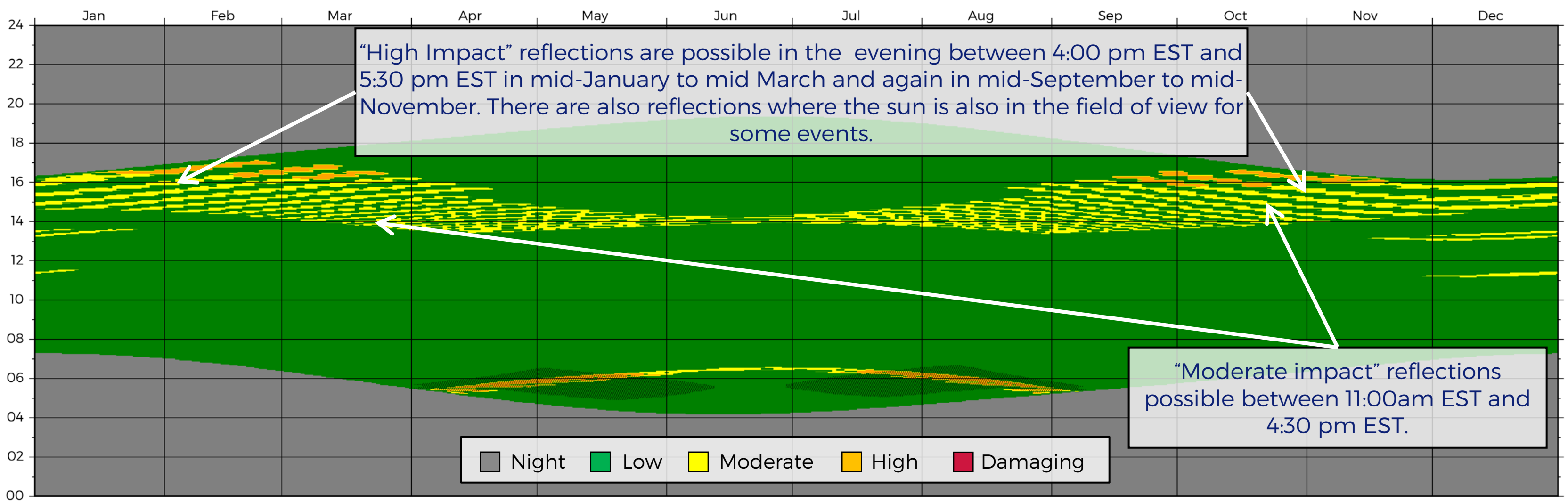


Figure A2: Example of Annual Visual Glare Impact Diagram – Receptor D1

Thermal Impact Categories for People

Low: Either no significant reflections occur or the reflection intensity is below the short-term exposure threshold of 1500 W/m².

Moderate: The reflection intensity is above the short-term exposure threshold of 1500 W/m² but below the safety threshold of 2500 W/m². Such reflections would quickly cause thermal discomfort in people.

High: The reflection intensity is above the safety threshold of 2500 W/m² but below 3500 W/m². This level of exposure to bare skin would lead to the onset of pain within 30 seconds.

Very High: Reflection intensity exceeds 3500 W/m². This level of exposure leads to second degree burns on bare skin within 1 minute.

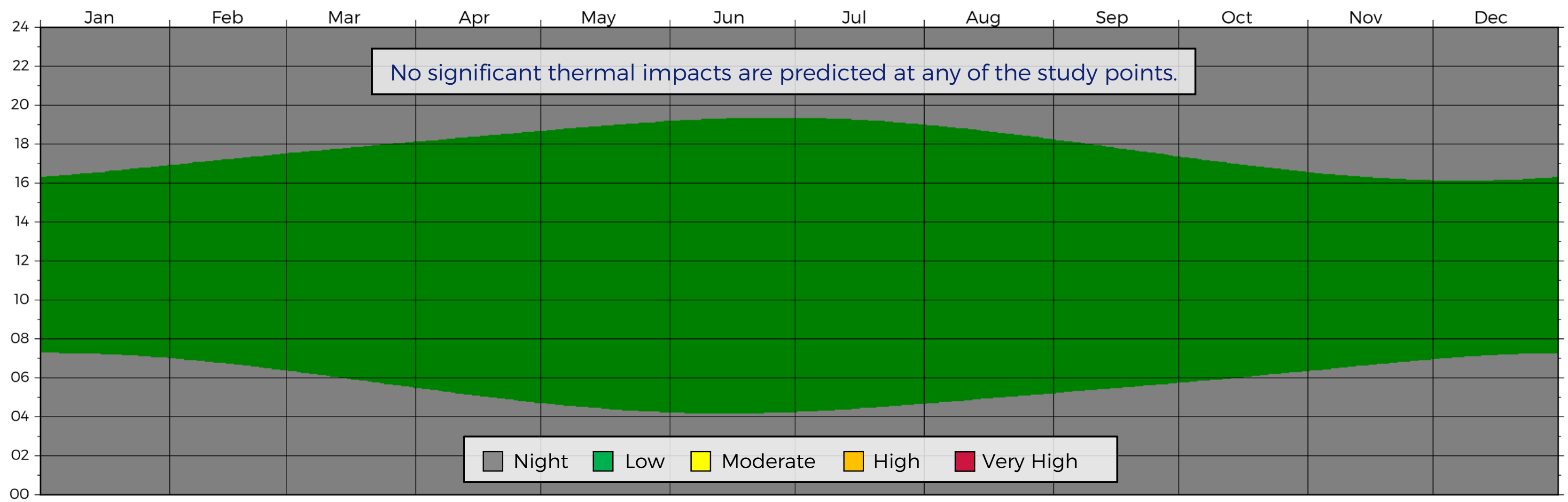


Figure A3: Example of Annual Pedestrian Thermal Impact Diagram – Receptor P15

Thermal Impact Categories for Property

A different scale is used to illustrate the reflected thermal energy on facades in order to provide further clarity on the potential for heat gain issues. The diagrams illustrate the irradiance levels of all predicted reflection events along with their frequency and duration.

The format of the diagram is similar to the diagrams described in the previous pages. The color of the plot for a given combination of date and time indicates the intensity of the reflected light at that point in time.

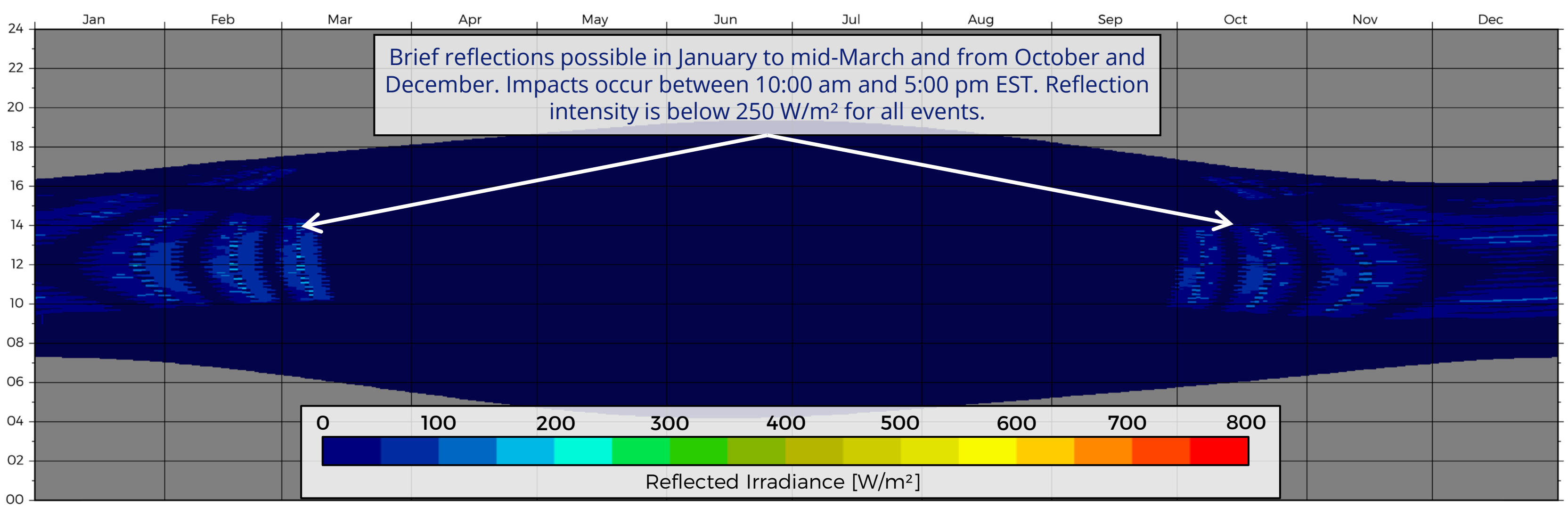
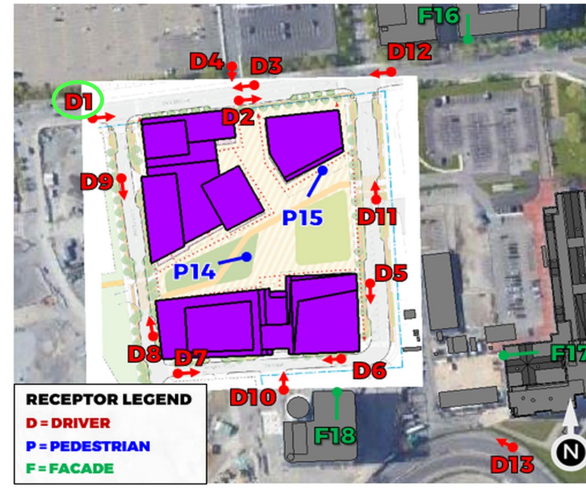


Figure A4: Example of Annual Property Thermal Impact Diagram – Receptor F18

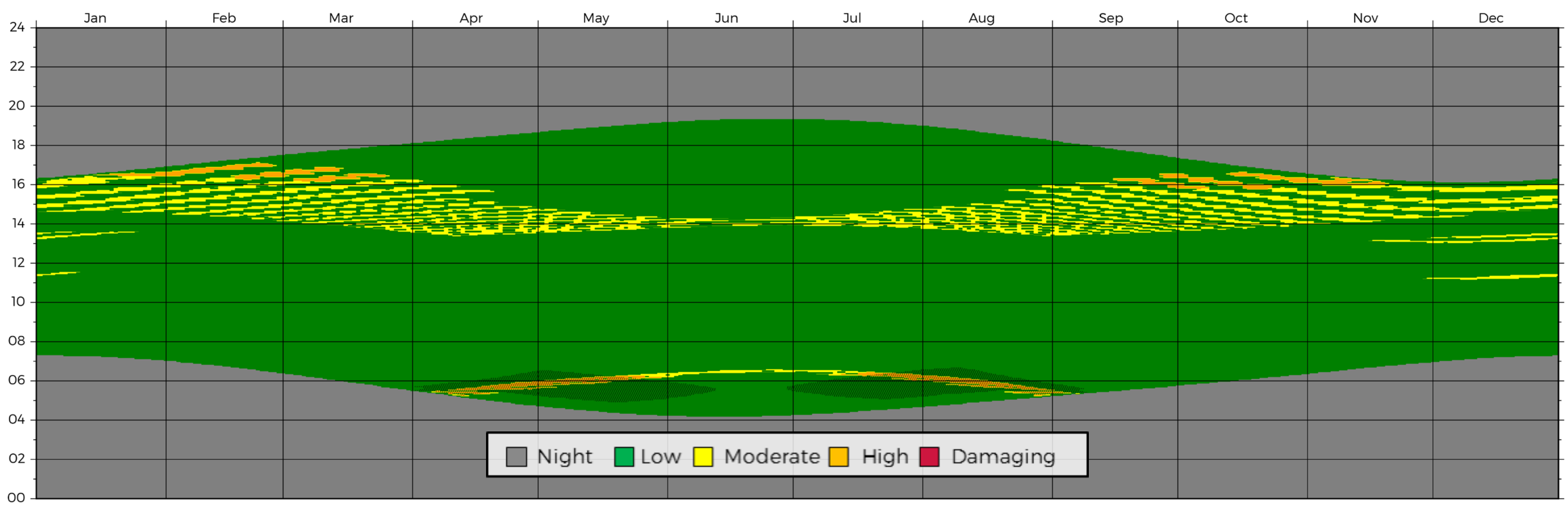
ANNUAL VISUAL IMPACT

Driver Receptor D1

Receptor D1 was chosen to assess the visual impact associated with solar reflections affecting eastbound drivers on Western Avenue.



Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

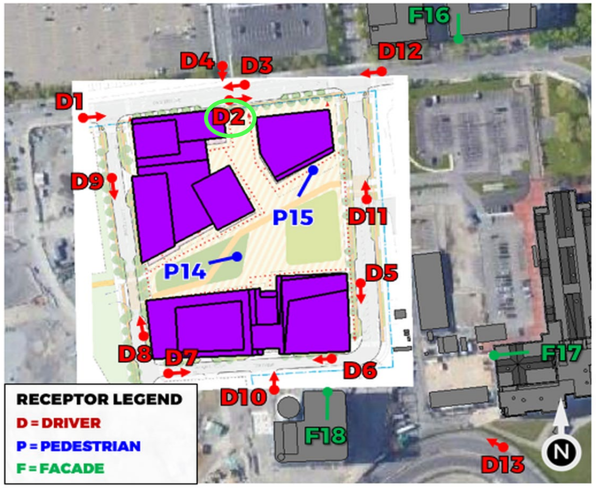


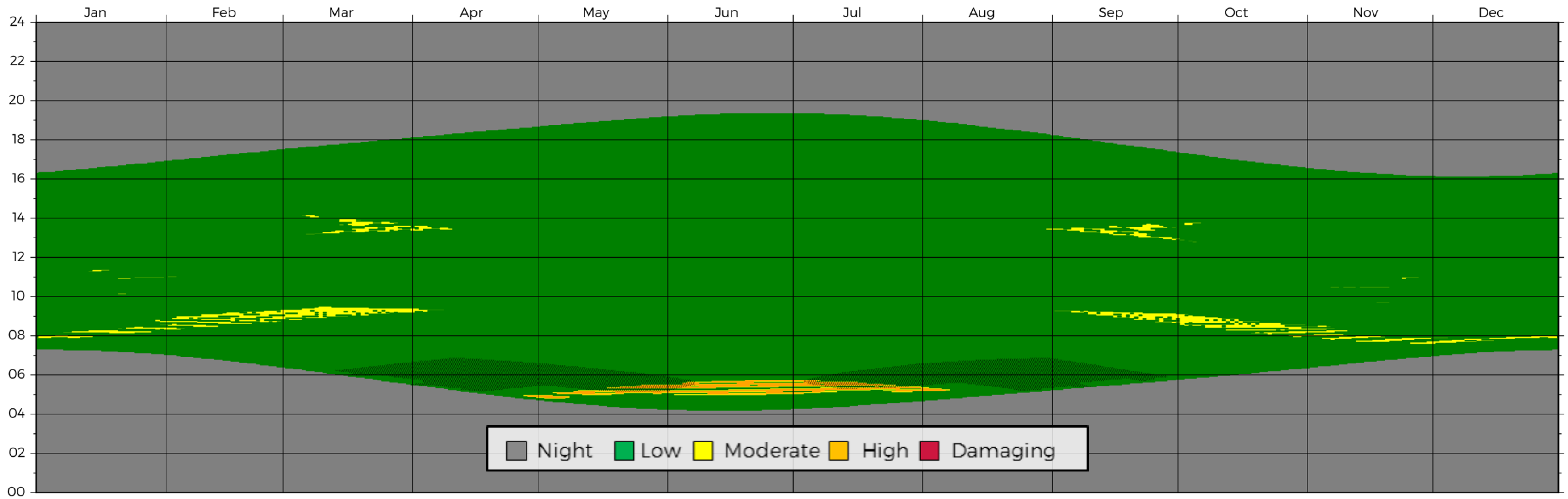
ANNUAL VISUAL IMPACT

Driver Receptor D2

Receptor D2 was chosen to assess the visual impact associated with solar reflections affecting eastbound drivers on Western Avenue.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

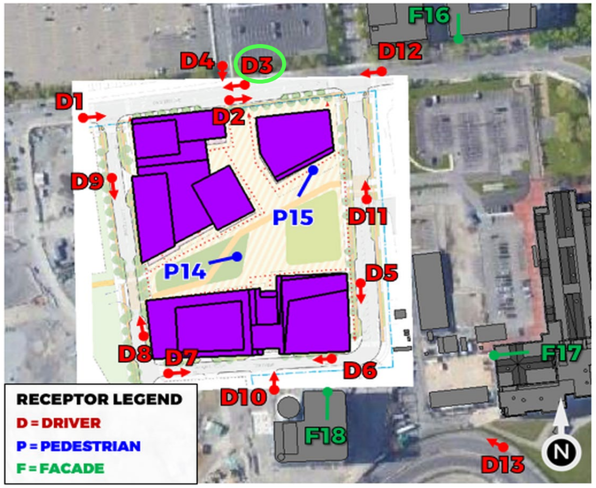


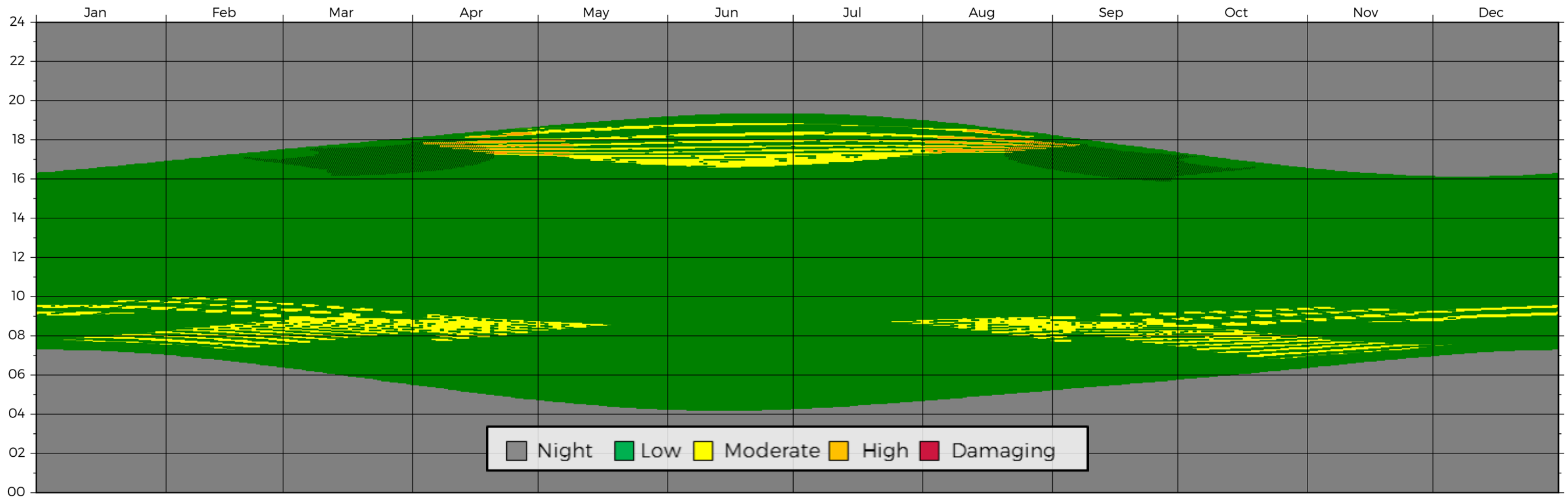


Driver Receptor D3

Receptor D3 was chosen to assess the visual impact associated with solar reflections affecting westbound drivers on Western Avenue.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

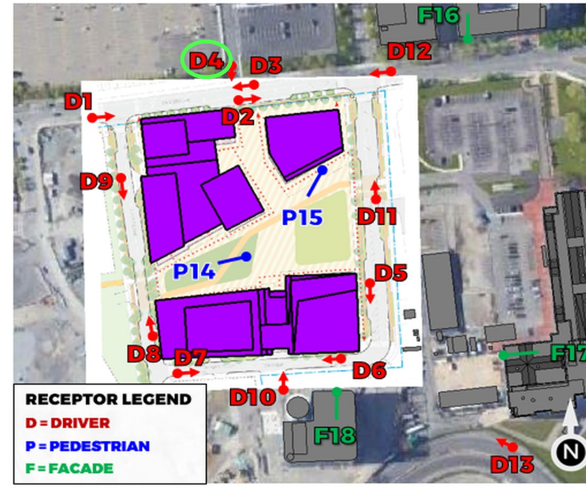


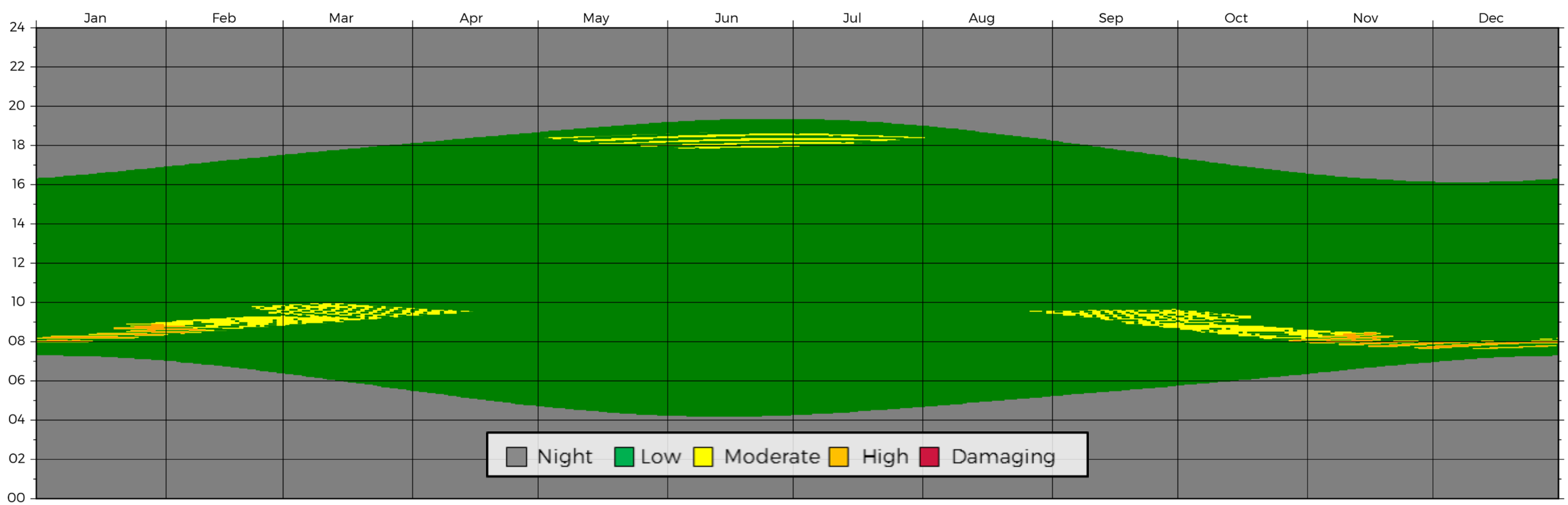


Driver Receptor D4

Receptor D4 was chosen to assess the visual impact associated with solar reflections affecting southbound drivers on Harvard Business School parking lot exit.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



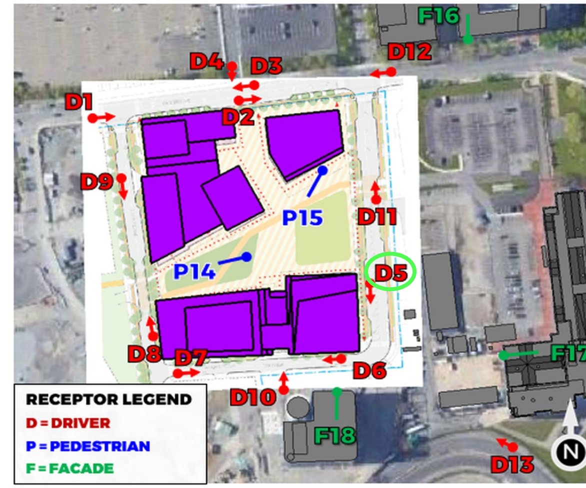


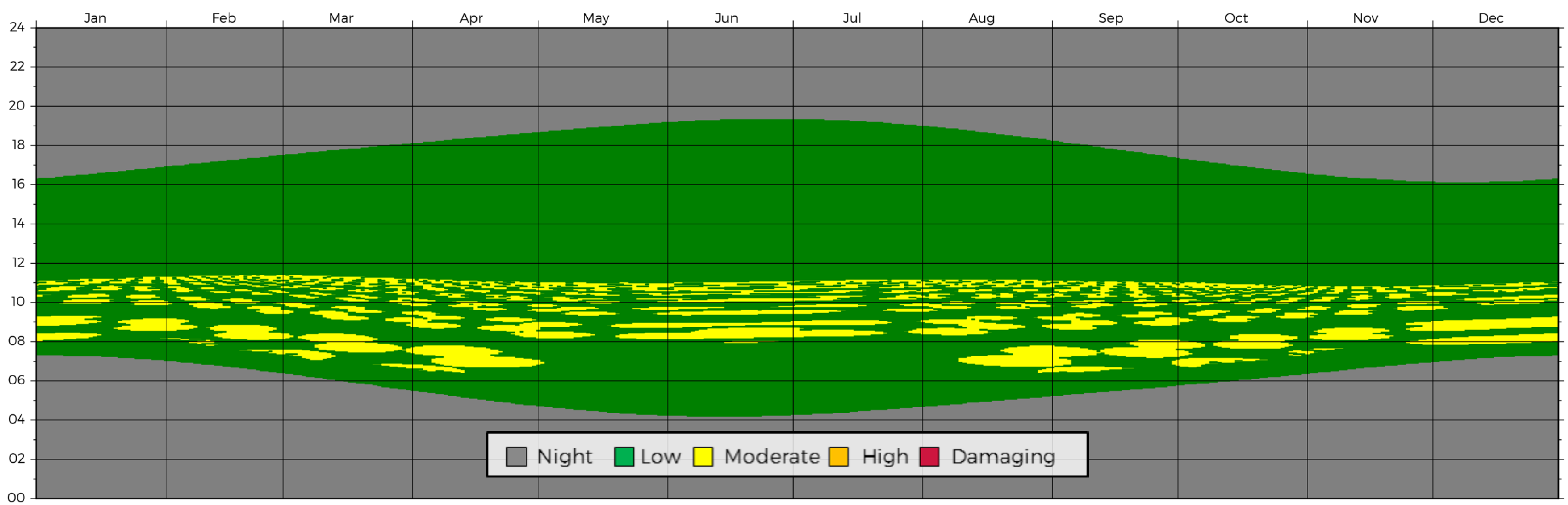
ANNUAL VISUAL IMPACT

Driver Receptor D5

Receptor D5 was chosen to assess the visual impact associated with solar reflections affecting southbound drivers on East Drive.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

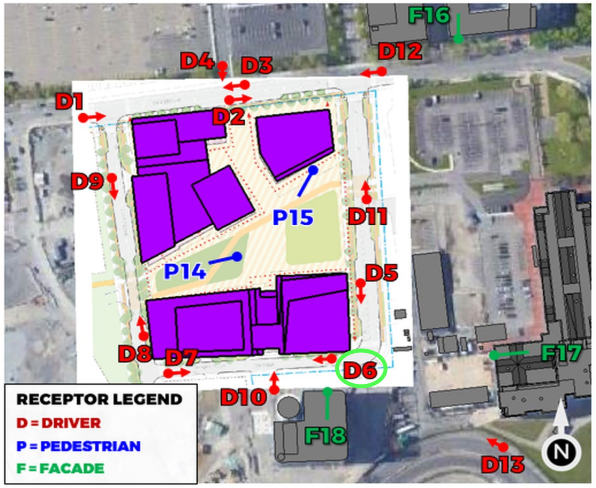


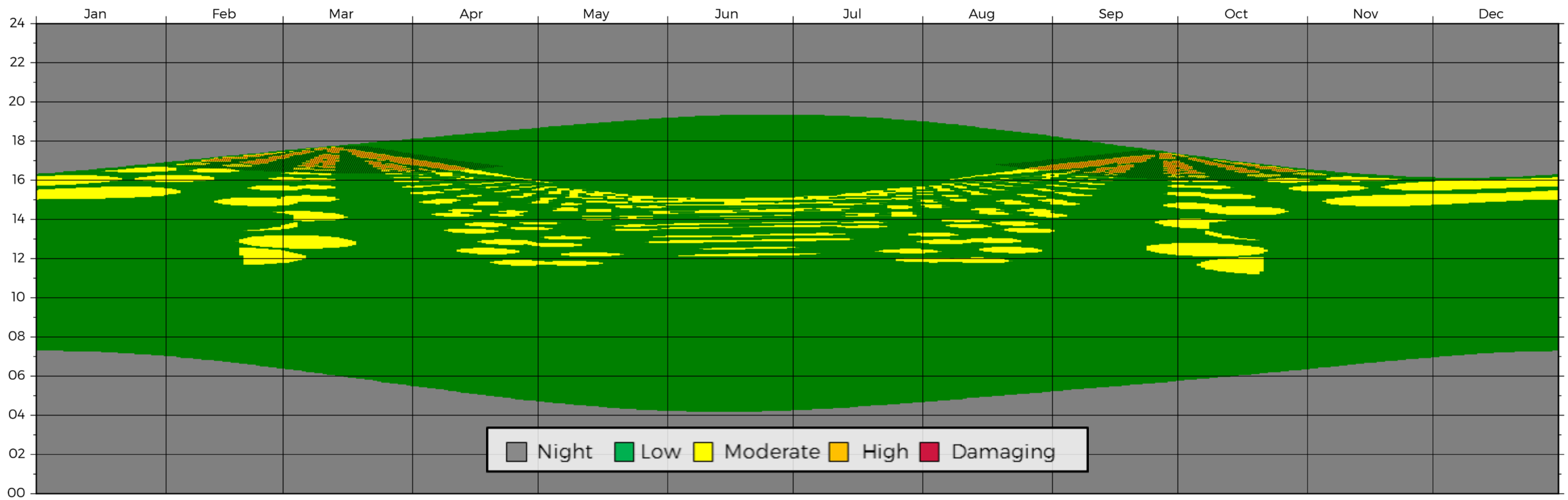


Driver Receptor D6

Receptor D6 was chosen to assess the visual impact associated with solar reflections affecting westbound drivers on DEF Drive.

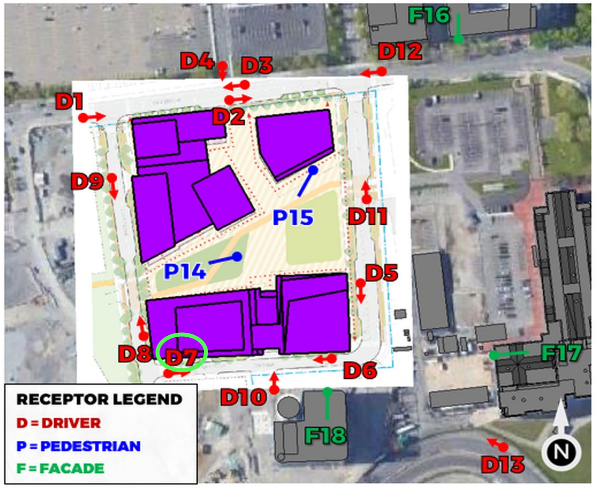
Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



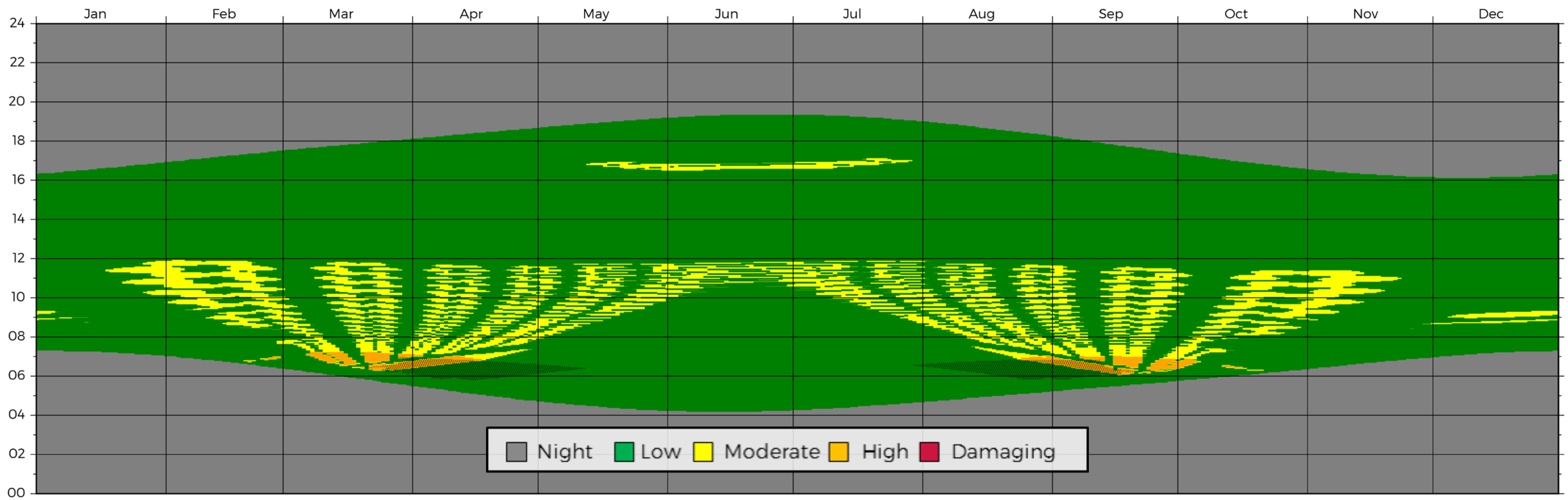


Driver Receptor D7

Receptor D7 was chosen to assess the visual impact associated with solar reflections affecting eastbound drivers on DEF Drive.



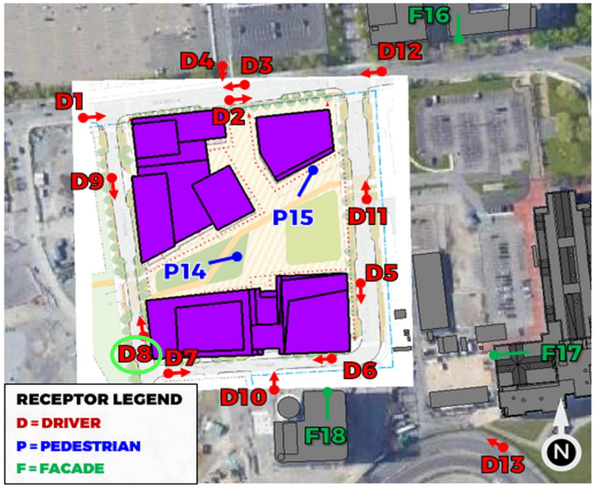
Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

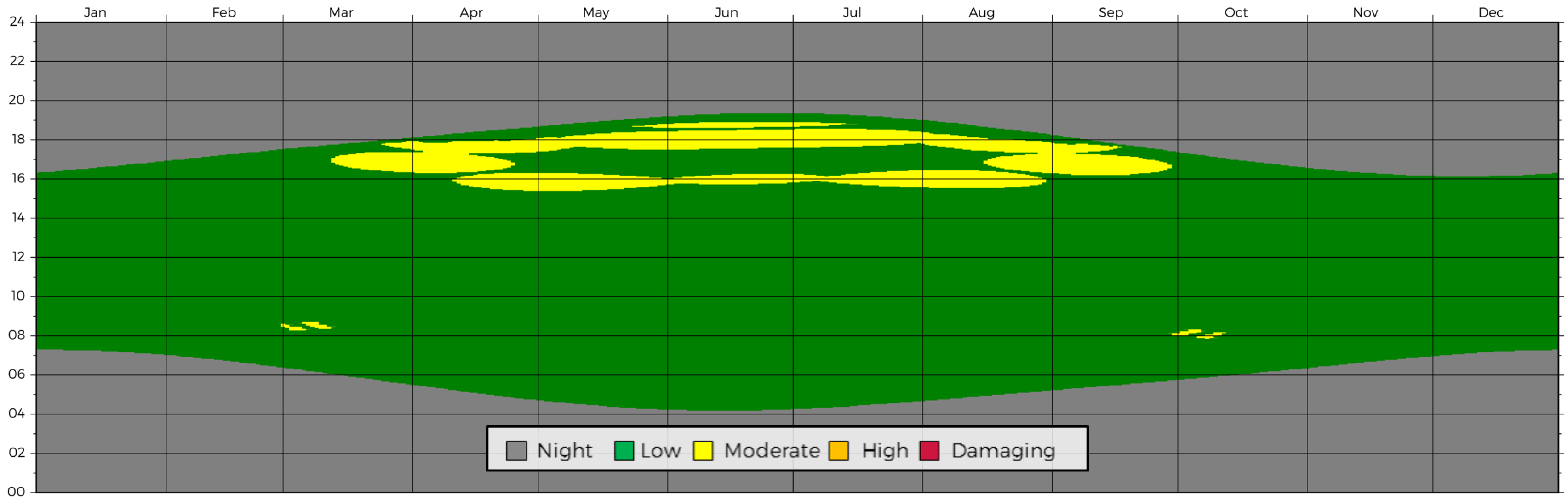


Driver Receptor D8

Receptor D8 was chosen to assess the visual impact associated with solar reflections affecting northbound drivers on Cattle Drive.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



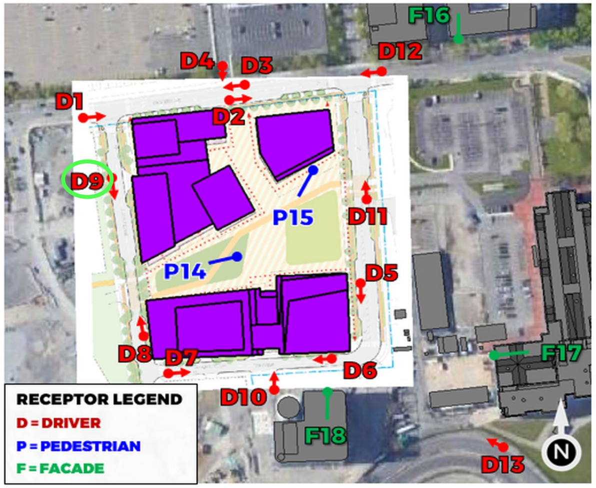


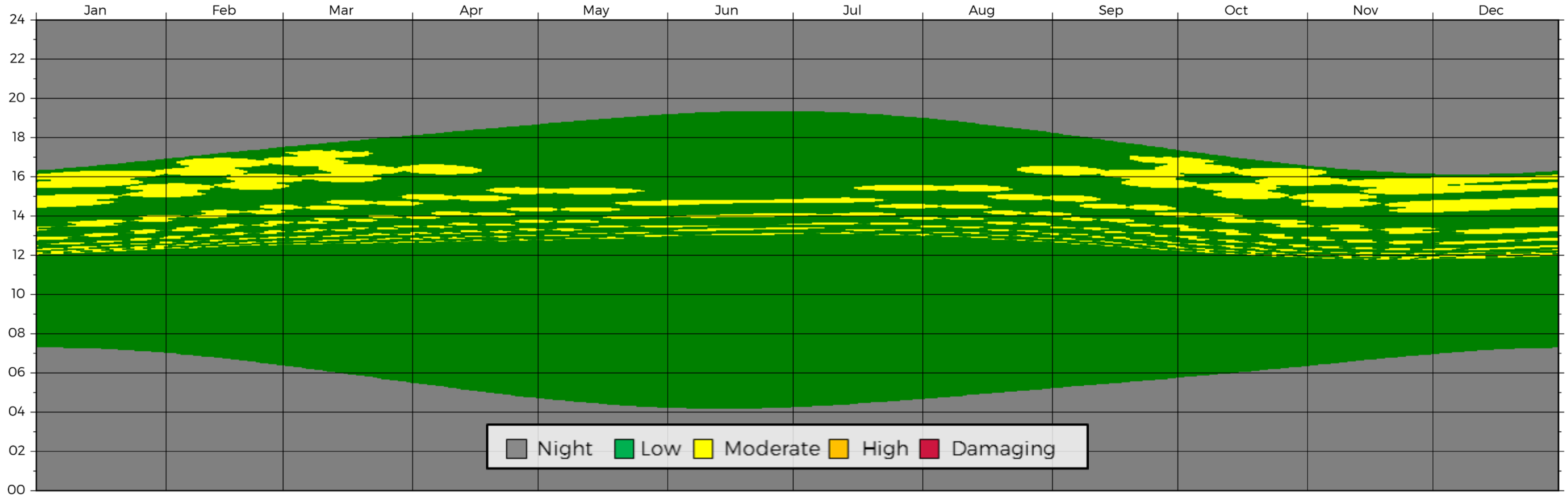
ANNUAL VISUAL IMPACT

Driver Receptor D9

Receptor D9 was chosen to assess the visual impact associated with solar reflections affecting southbound drivers on Cattle Drive.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

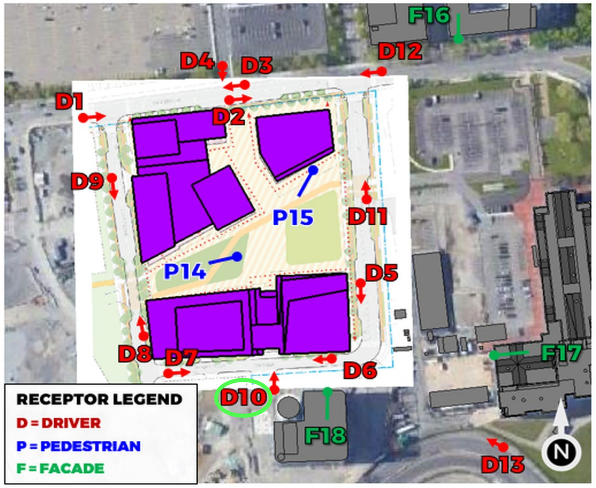


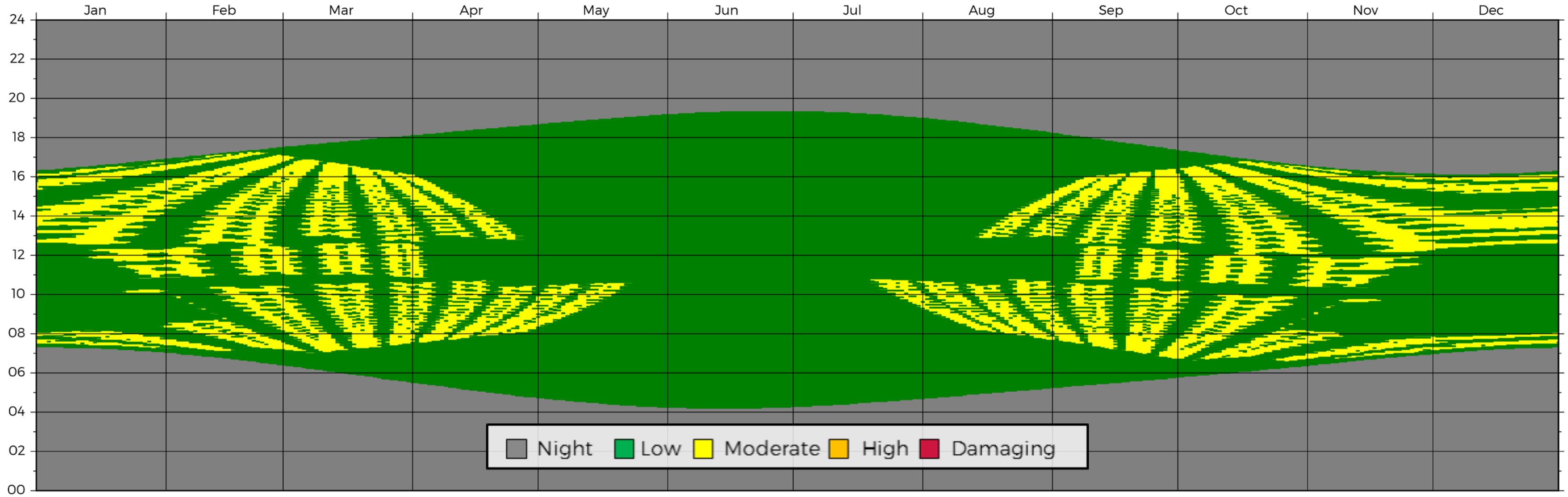


Driver Receptor D10

Receptor D10 was chosen to assess the visual impact associated with solar reflections affecting northbound drivers on side street approaching DEF Drive.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

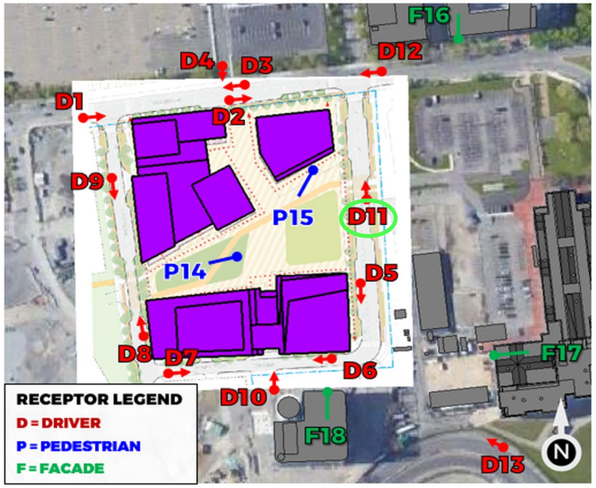


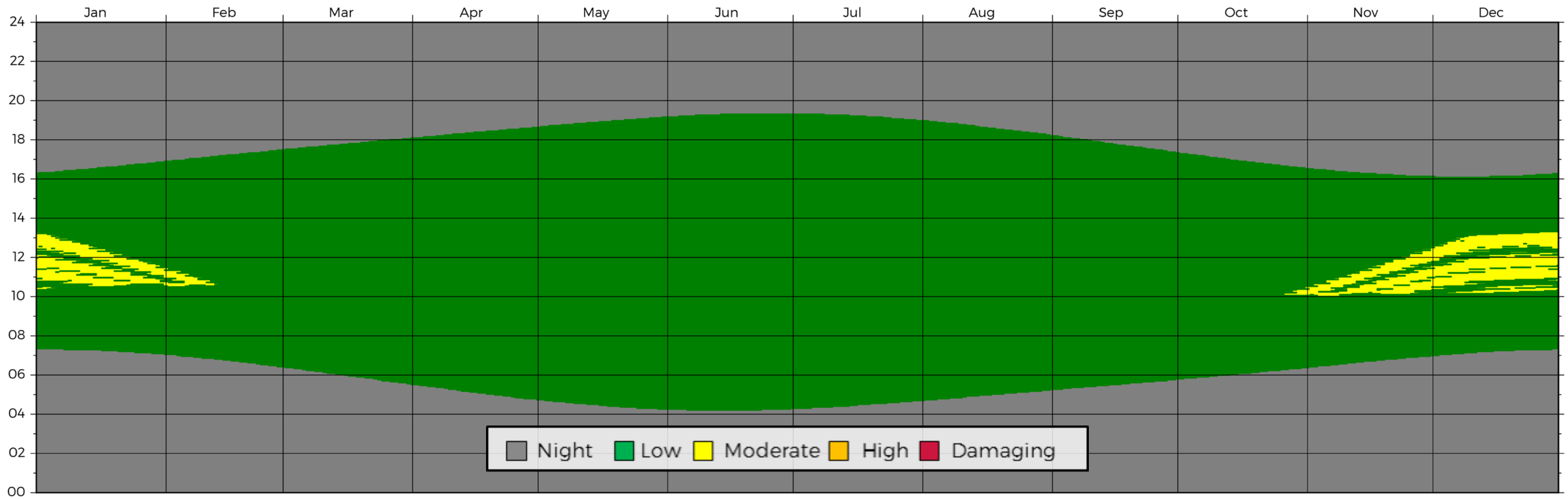


Driver Receptor D11

Receptor D11 was chosen to assess the visual impact associated with solar reflections affecting northbound drivers on East Drive.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



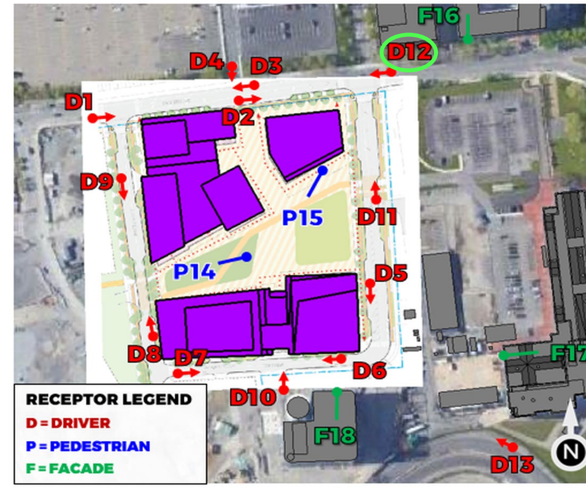


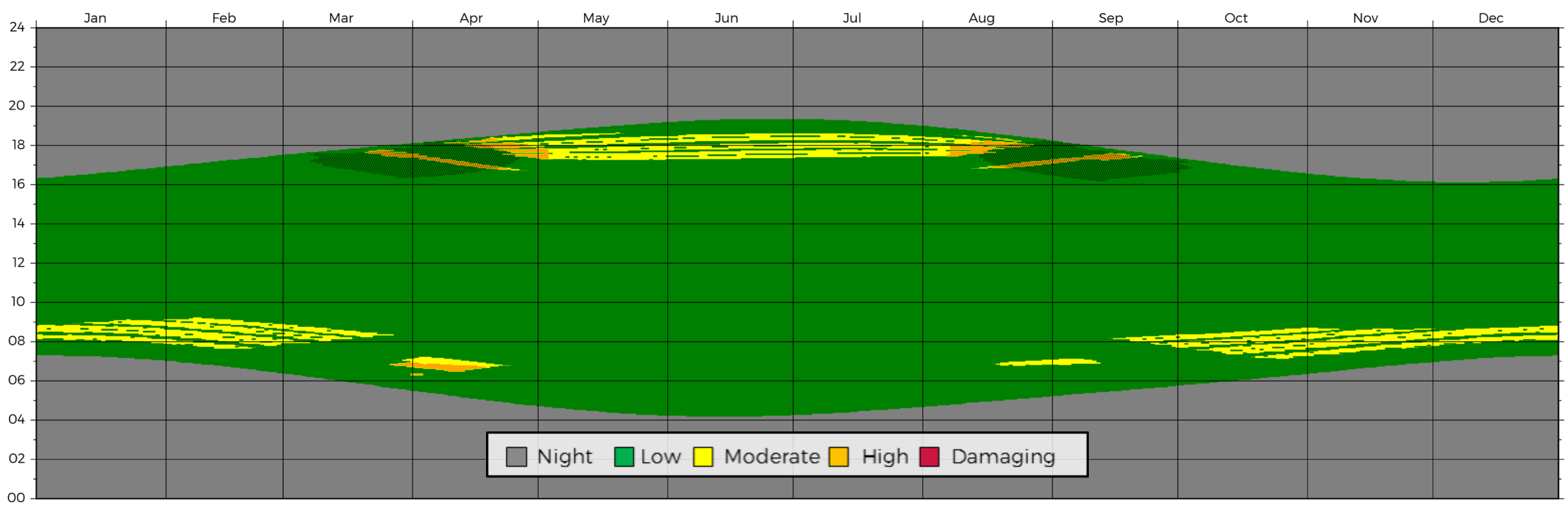
ANNUAL VISUAL IMPACT

Driver Receptor D12

Receptor D12 was chosen to assess the visual impact associated with solar reflections affecting westbound drivers on Western Avenue.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

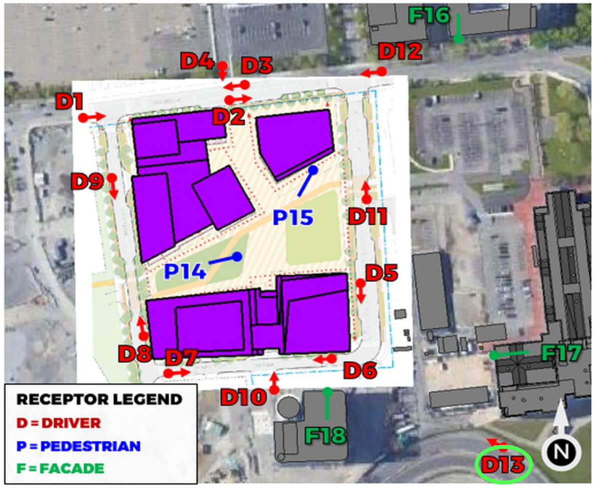




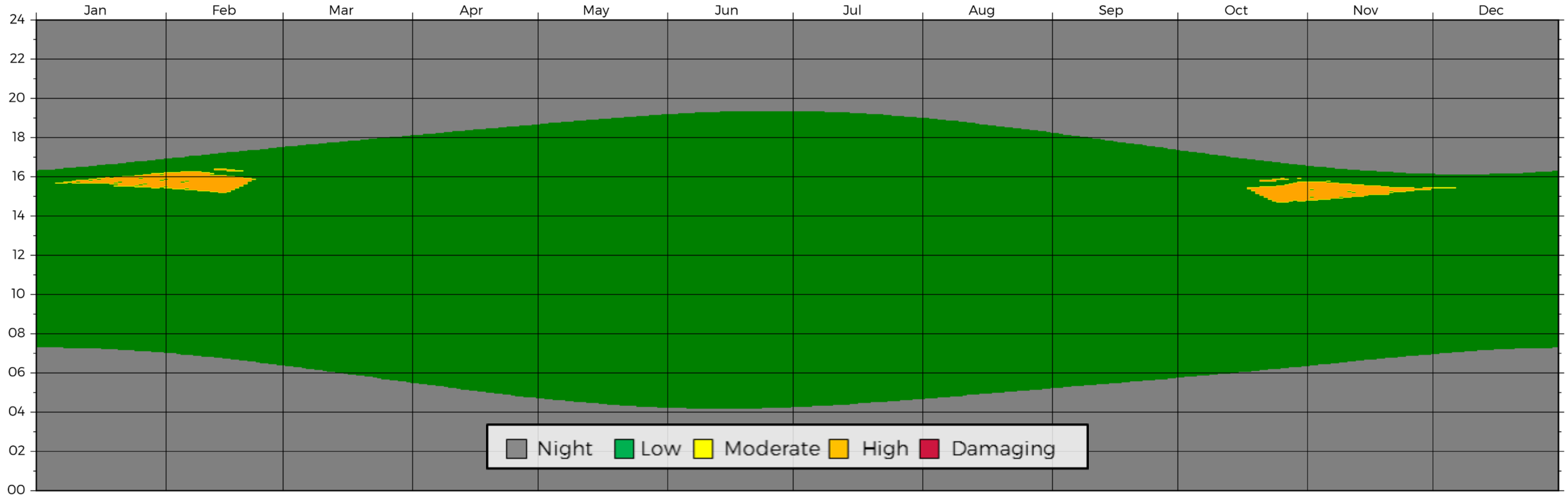
ANNUAL VISUAL IMPACT

Driver Receptor D13

Receptor D13 was chosen to assess the visual impact associated with solar reflections affecting drivers travelling west on the ramp.



Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

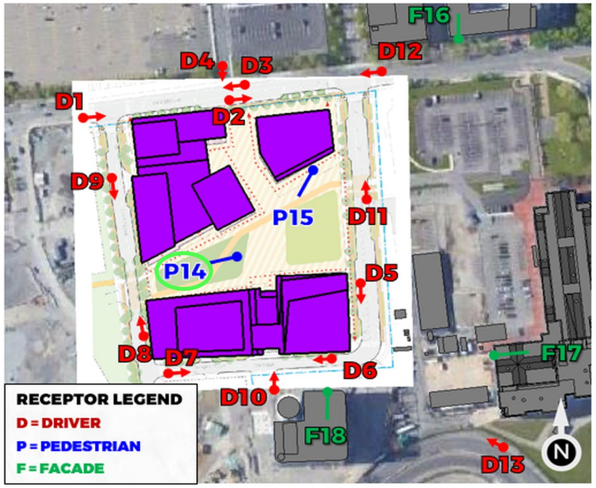


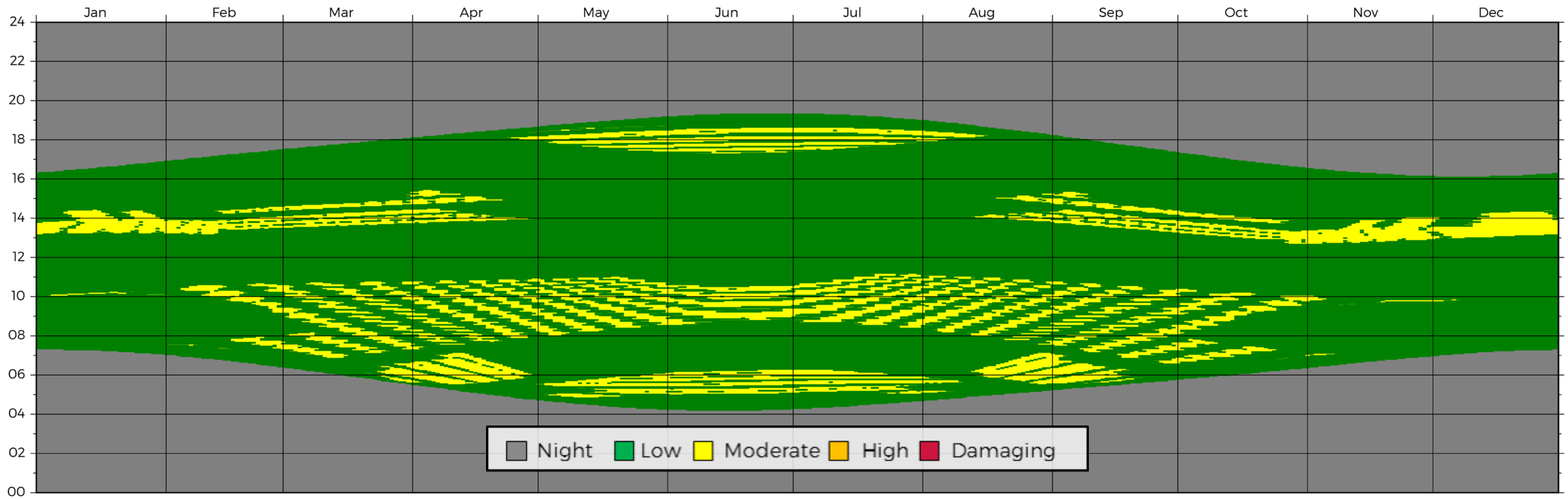
ANNUAL VISUAL IMPACT

Pedestrian Receptor P14

Receptor P14 was chosen to assess the visual impact associated with solar reflections affecting pedestrians in the Harvard Enterprise Research Campus greenspaces.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

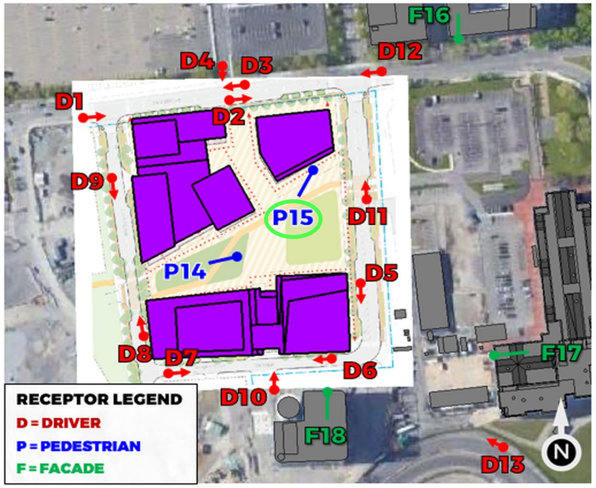




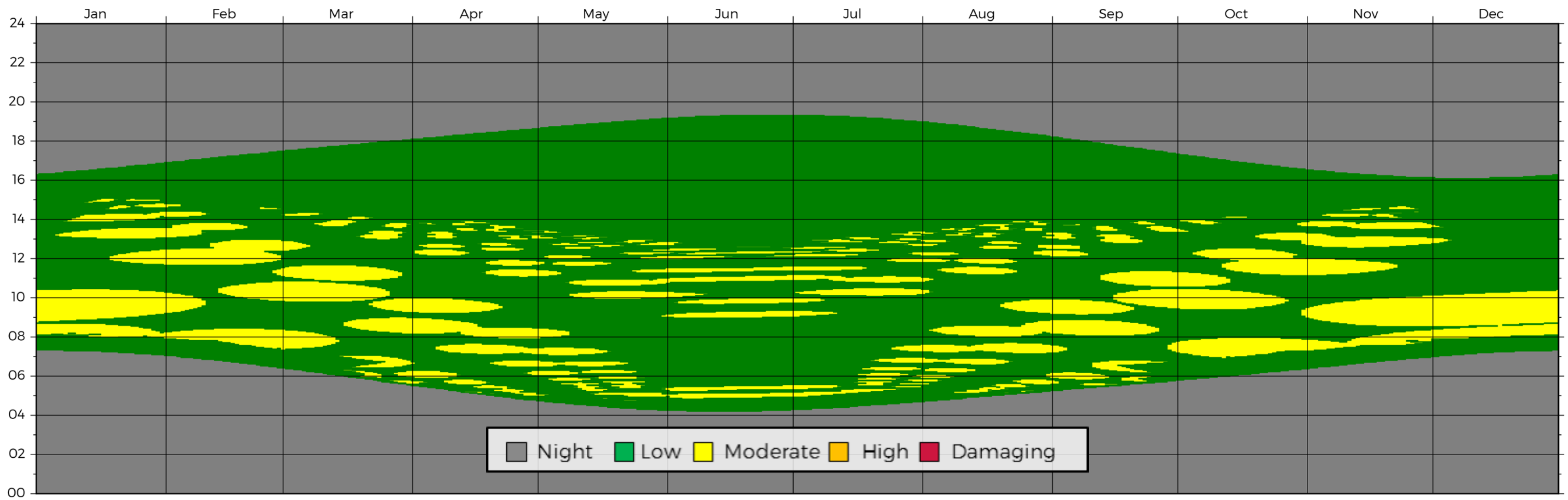
ANNUAL VISUAL IMPACT

Pedestrian Receptor P15

Receptor P15 was chosen to assess the visual impact associated with solar reflections affecting pedestrians in the Harvard Enterprise Research Campus greenspaces.



Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

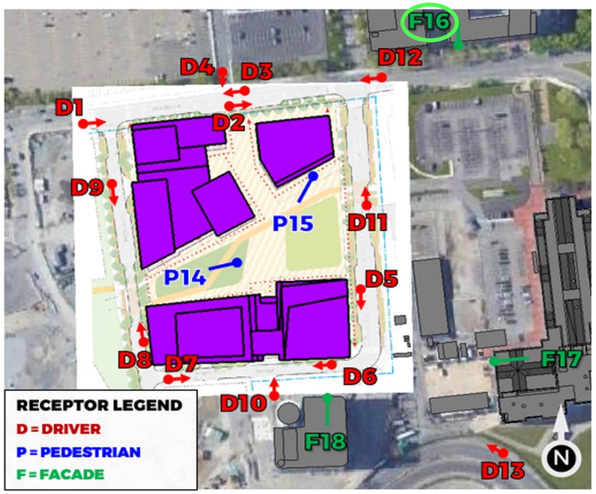


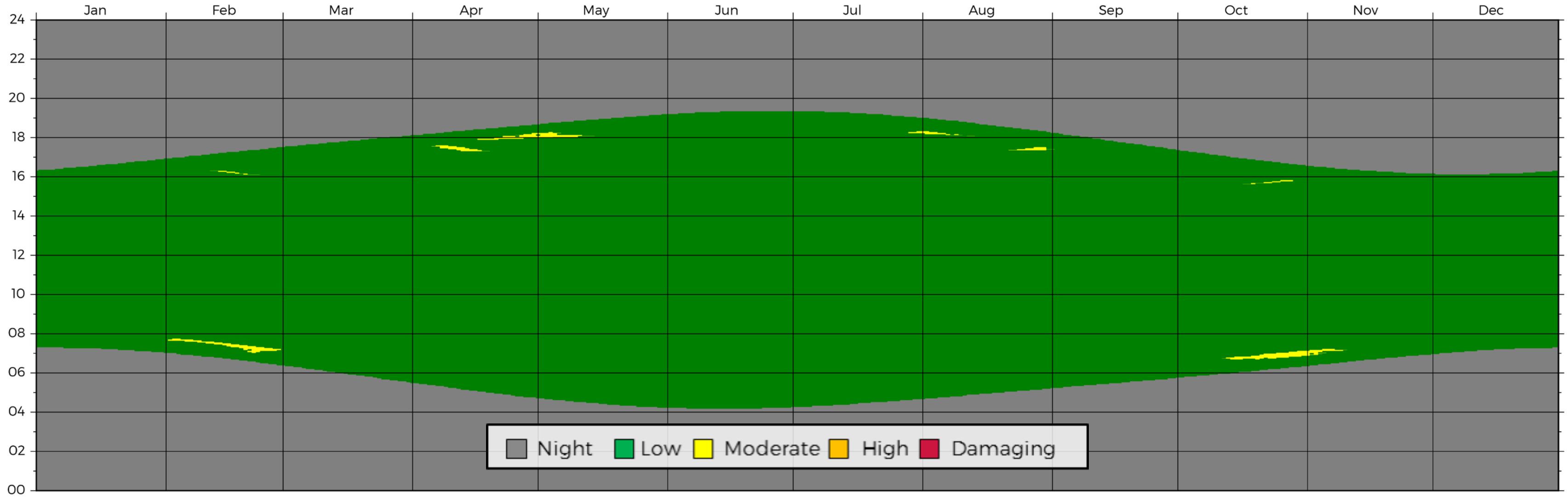
ANNUAL VISUAL IMPACT

Facade Receptor F16

Receptor F16 was chosen to assess the visual impact associated with solar reflections affecting occupants of One Western Avenue(Approximately the 3rd floor).

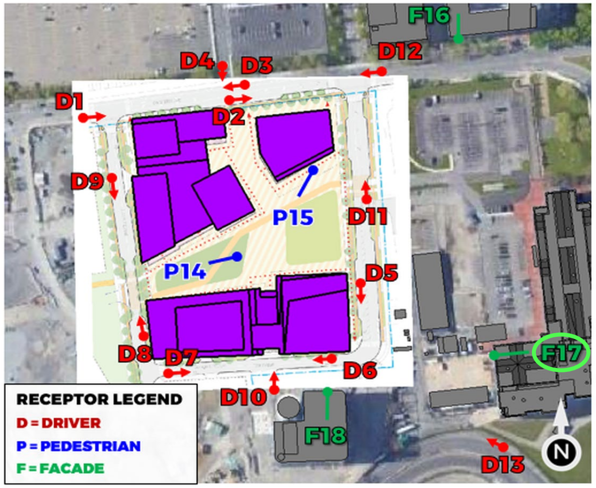
Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



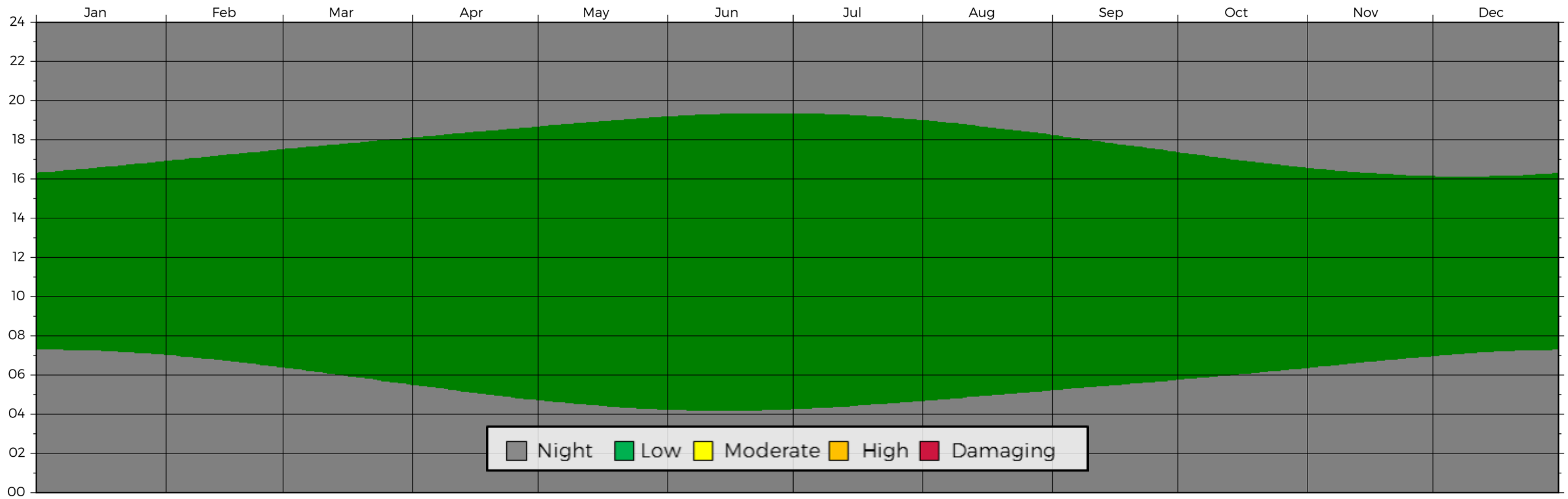


Facade Receptor F17

Receptor F17 was chosen to assess the visual impact associated with solar reflections affecting occupants of Soldiers Field Rd Building (Approximately the 1st floor).

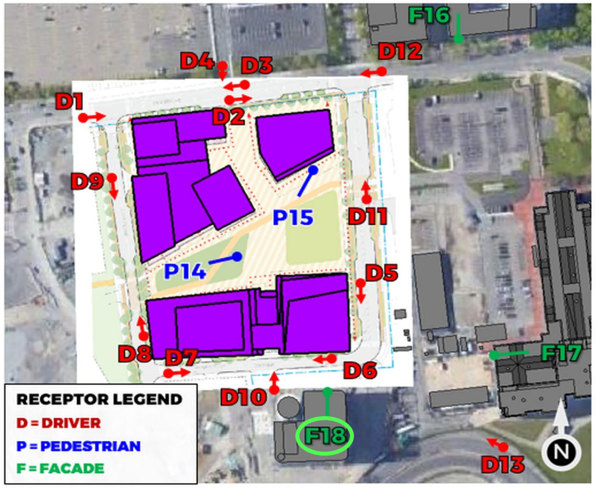


Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

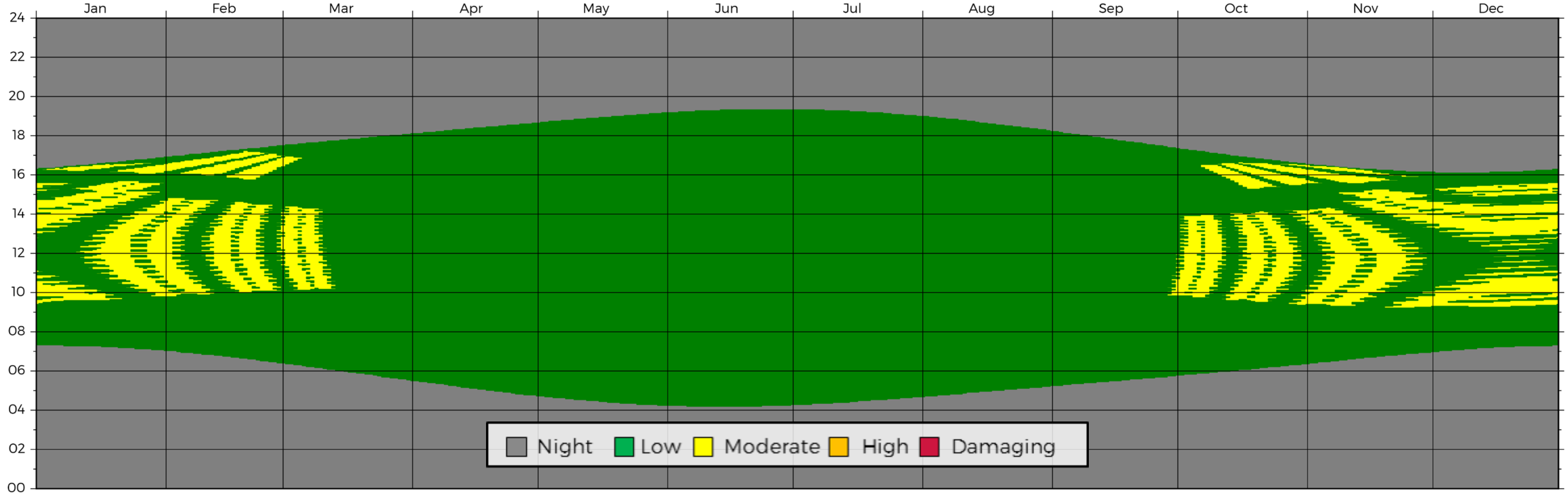


Facade Receptor F18

Receptor F18 was chosen to assess the visual impact associated with solar reflections affecting occupants of District Energy Facility (Approximately the 1st floor).



Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

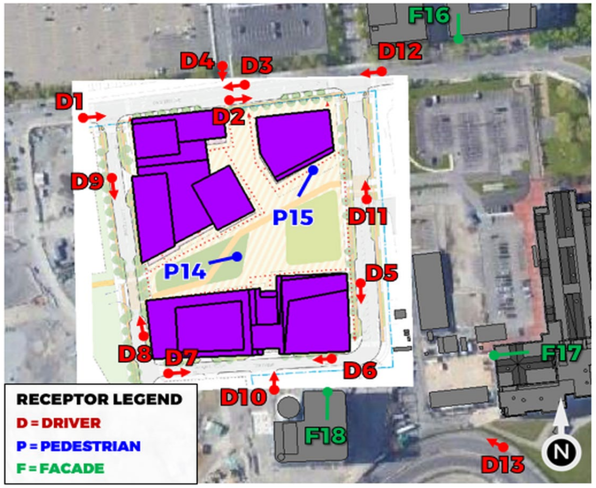


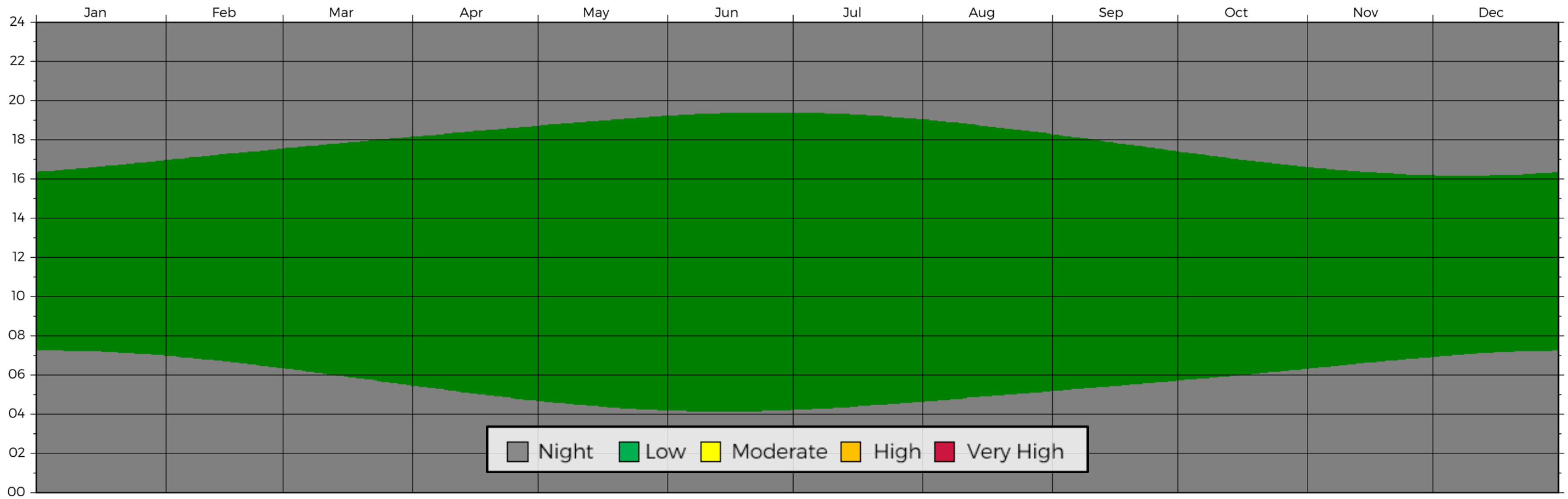
ANNUAL THERMAL IMPACT - PEOPLE

All Receptors

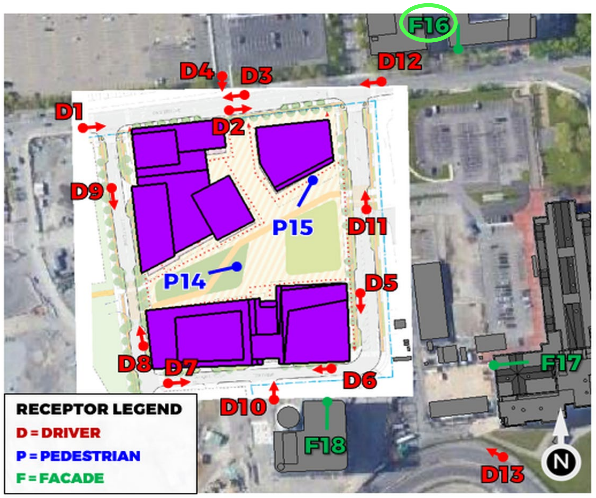
All reflection impacts at all receptors were found to have intensities below RWDI's short-term and human safety threshold values.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



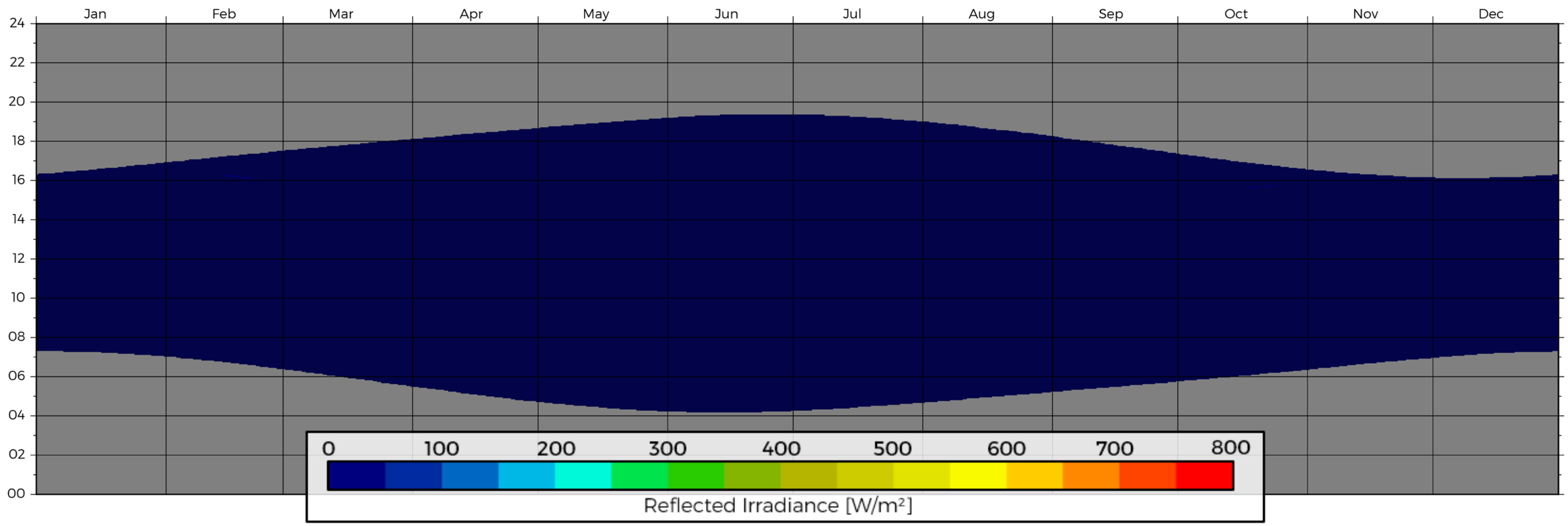


Facade Receptor F16



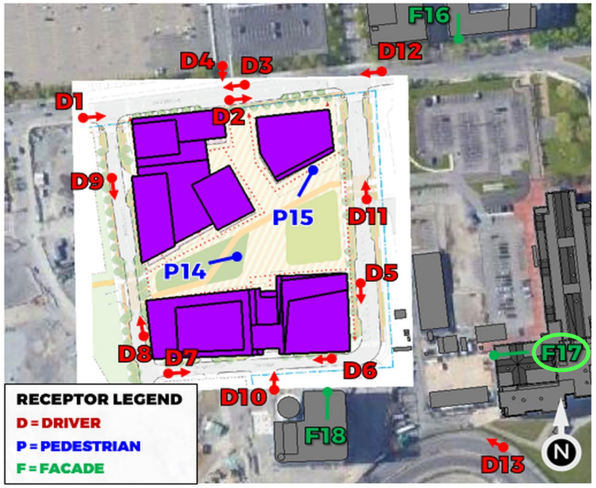
Receptor F16 was chosen to assess the thermal impact associated with solar reflections affecting occupants of One Western Avenue(Approximately the 3rd floor).

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

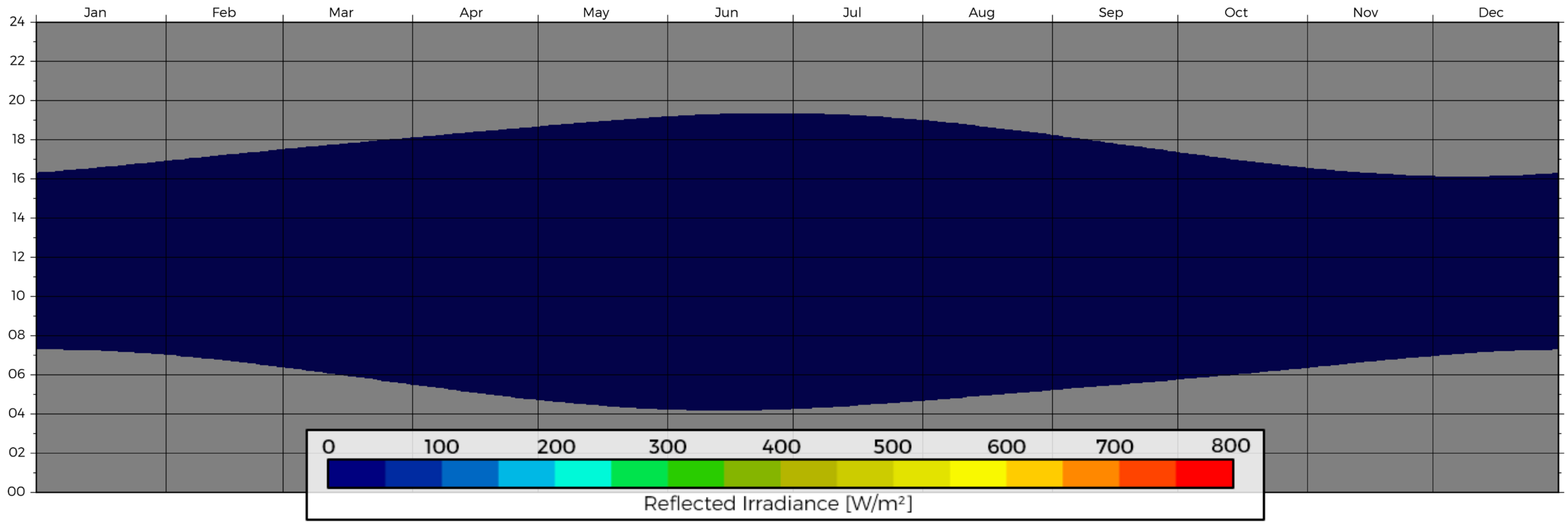


Facade Receptor F17

Receptor F17 was chosen to assess the thermal impact associated with solar reflections affecting occupants of Soldiers Field Rd Building (Approximately the 1st floor).

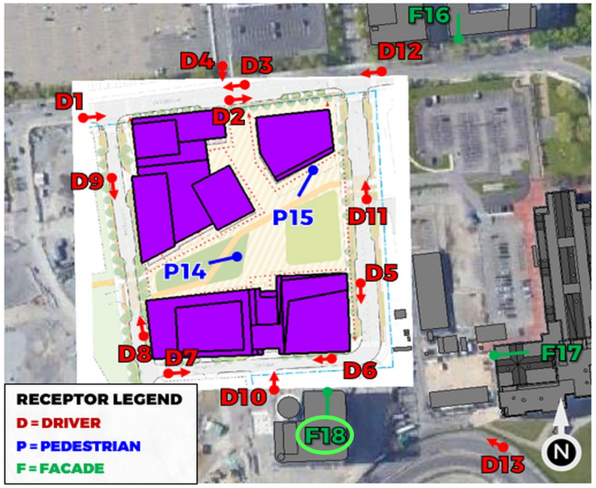


Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

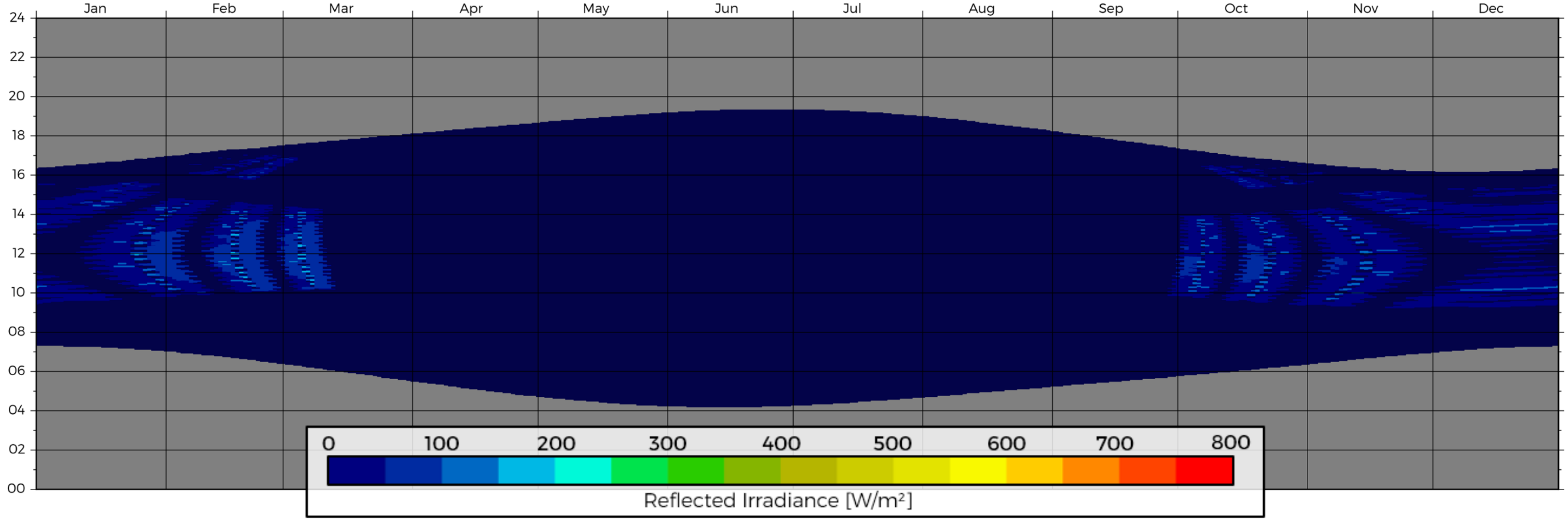


Facade Receptor F18

Receptor F18 was chosen to assess the thermal impact associated with solar reflections affecting occupants of District Energy Facility (Approximately the 1st floor).



Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



APPENDIX B

RWDI REFLECTION CRITERIA

Visual Glare

There are currently no criteria or standards that define an “acceptable” level of reflected solar radiation from buildings. RWDI has conducted a literature review of available scientific sources[1] to determine levels of solar radiation that could be considered acceptable to individuals from a visual standpoint.

Many glare metrics are designed for interior use and have been found to not correlate well with the glare impact humans perceive from direct sun or in outdoor environments. RWDI uses the methodology of Ho et al[2], which defines glare impact based on a physical reaction rather than on a preference based correlation.

Based on the intensity of the glare source and the size of the source in the field of view (Figure B1), the risk of that source causing temporary flash blindness (i.e. the after images visible after one is exposed to a camera flash in a dark room) faster than a person can reflexively close their eyes can be determined.

If this ‘after-imaging’ can occur faster than the human blink reflex, it presents an unavoidable effect on a person based on physiology rather than preference. This forms the basis of how we determine if a reflection is ‘significant’.

This methodology has also been adopted by the United States Federal Aviation Administration (FAA) for determining the risk of glare to pilots and other airport staff under FAA Interim Policy 78 FR 63276.

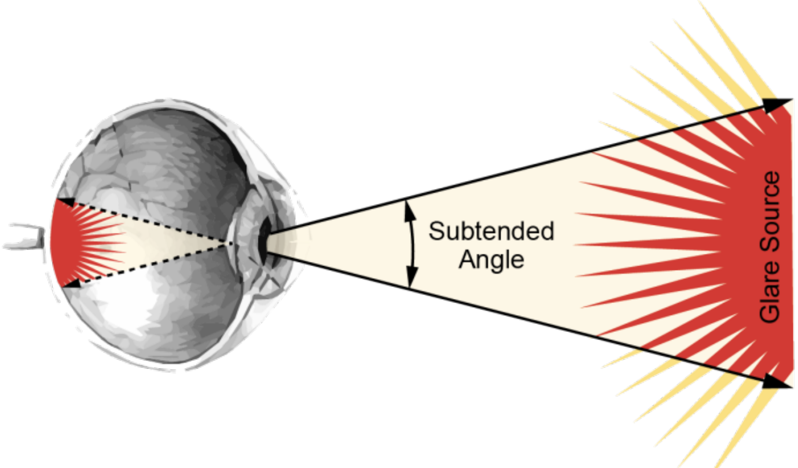


Figure B1: Schematic Illustrating the Subtended Angle of a Glare Source

Visual Glare (cont'd)

At the screening level, we conservatively take any reflections at least 50% of the intensity required to cause after-images as a "significant" reflection to be counted in the frequency analysis. In the detailed phase of work, we use the typical threshold level.

As a reference, point 1 on Figure B2 illustrates where looking directly at the sun falls in terms of irradiance on the retina (the back of the eye) and the size of the angle that the sun subtends in the sky. This puts it just at the border of causing serious damage before the blink reflex can close the eye.

The other points in Figure B2 correspond to the following:

2. Direct viewing of high-intensity car headlamp from 50 feet / 15 m
3. Direct viewing of typical camera flash from 7 feet / 2 m
4. Direct viewing of high-intensity car headlamp from 5 feet / 1.5 m
5. Direct viewing of frosted 60W light bulb from 5 feet / 1.5 m
6. Direct viewing of average computer monitor from 2 feet / 0.6 m

Note that the retinal irradiances described on this page are significantly higher than the irradiance levels discussed elsewhere in this report. This is because the human eye focuses the energy on to the retina. The magnitude of the increase is dependent on the geometry of the human eye and the source of the glare, both of which are computed per the Ho et al methodology.

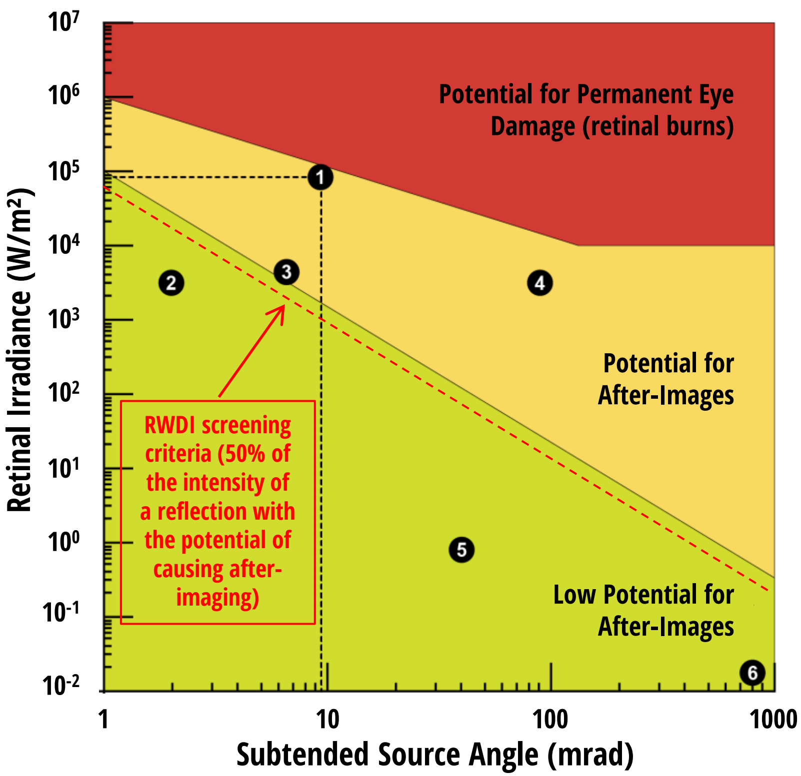


Figure B2: After-Imaging Potential From Various Glare Sources

Visual Glare (cont'd)

Significant glare impacts on the operators of vehicles or heavy equipment pose a particular risk to public safety due to operator distraction or reduction in their visual acuity. Thus, in the detailed analysis, RWDI assigns an assumed view direction to those engaged in "high-risk" activities (e.g. driving a car or flying a plane) as well as an assumed field of view.

The assigned directions and fields of view acknowledge that an operator is particularly sensitive to reflections emanating from the direction in which they are travelling (and therefore cannot safely look away from) and also that the opaque elements of the vehicle will act to obstruct reflections beyond a given angle.

For drivers the critical angle is taken to be 20° away from the direction of view[3]. Thus, any reflections emanating from within this 20° field of view are considered 'high' impacts, whereas reflections emanating from outside this cone are classified as 'moderate' impacts. This angle is adjusted as needed for impacts on other vehicles such as aircraft[4], trains[5], and other heavy equipment[6].

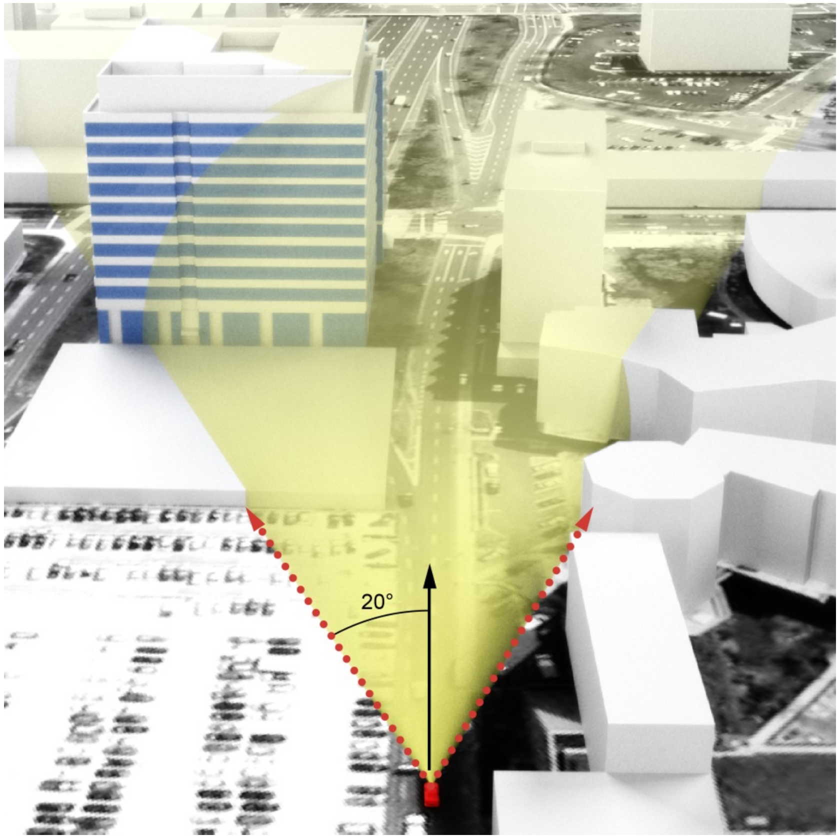


Figure B3: Illustration of a Driver's 20° Field of View

Thermal Impact (Heat Gain) on People

The primary sources for exposure limits to thermal radiation come from fire protection literature. However, there is currently inconsistency between different bodies regarding what level of exposure can be reasonably tolerated by people.

The U.S. National Fire Protection Association (NFPA) defines 1,700 W/m² as an upper limit for a tenable egress environment[7]; i.e., an individual could escape through such an environment successfully, though they would not necessarily emerge unscathed. The British Standards Institution[8] sets their limit at 2,000 W/m², which "…*is tolerable for ~ 5 min[utes]…*". Other researchers[9] have found that higher irradiance levels (3,500 – 5,000 W/m²) can be tolerated in outdoor environments for several minutes without issue.

The only current quantitative guideline specific to reflections comes from the City of London's Planning Note on 'Solar Convergence'[10]. Produced in conjunction with the UK Building Research Establishment (BRE), this document indicates that no areas should receive 10,000 W/m² or more for any duration, exposures above 2,500 W/m² should be limited to less than 30 seconds; and that "*…areas with reflected irradiances above 1,500 W/m², and preferably those above 1000 W/m², should be minimized.*"

It should be noted that all these thresholds are guideline values only, and that in reality many factors (skin color, age, clothing choice, etc.) influence how a person reacts to thermal radiation.

Clearly, there are currently no definitive guidelines or criteria with respect to the issue of thresholds for exposure to thermal irradiance in an urban setting. We know this criterion should be lower than the thresholds set in the context of an individual escaping from a fire and greater than typical peak solar noon levels of 1,000 W/m² which people commonly experience.

Therefore, RWDI's opinion at this time, is that reasonable criteria is to establish 2,500 W/m² as a ceiling exposure limit, which reflection intensity should not exceed for any length of time; and 1,500 W/m² as a short term (10 minutes or less) exposure limit.

Thermal Impact (Heat Gain) on Property

The impact of solar irradiance on different materials is primarily based on the temperature gains to the material which can cause softening, deformation, melting, or in extreme cases, combustion. These temperature gains are difficult to predict as they are highly dependent on the convective heat transfer from air movement around the object and long-wave radiative heat transfer to the surroundings.

Generally, irradiance levels at or above 10,000 W/m² for more than 10 minutes are required to ignite common building and automotive materials in the presence of a pilot flame. That value increases to 25,000 W/m² when no pilot flame is present[11,12,13]. However, some materials like plastics and even some asphalts may begin to soften and deform at lower temperatures. For example, some plastics can deform at a temperature of 140°F (60°C), or lower if force is applied. The applied force typically comes from the thermal expansion of the material, the force of gravity acting on the material or an external mechanical force (i.e., someone or something pushing or pulling on it).

Aside from the risk of damage to the material itself, a hot surface poses a safety risk to any person who may come into contact with it. This is particularly important in an urban context as the individual may not expect the object to be heated. NASA[14] defines an upper limit of 111°F (44°C) for surfaces that require extended contact time with bare skin. Surface temperatures below this limit can be handled for any length of time without causing pain.

That said, surfaces within the urban realm are routinely exposed to reflections from windows, metal panels and bodies of water without causing material damage or excessive heating.

Therefore, as this time, RWDI takes a conservative approach and **uses a value of 1,000 W/m², consistent with a single (i.e. non-focused) reflection of the sun's peak intensity, as a baseline threshold for reflected irradiance on stationary objects.**

However, this is simply a starting point. As noted, depending on the environmental conditions and material properties of the object/assembly other values may be used instead.

References

1. Danks, R., Good, J., and Sinclair, R., "Assessing reflected sunlight from building facades: A literature review and proposed criteria." *Building and Environment*, 103, 193-202, 2016.

2. Ho, C., Ghanbari, C. and Diver, R., "Methodology to Assess Potential Glint and Glare Hazards From Concentrating Solar Power Plants: Analytical Models and Experimental Validation," *Journal of Solar Energy Engineering,* vol. 133, no. 3, 2011.

3. Vargas-Martin, F., and Garcia-Perez, M.A., "Visual fields at the wheel." *Optometry and Vision Science* 82, no. 8 (2005): 675-681.

4. Rogers, J.A., et al, "Evaluation of Glare as a Hazard for General Aviation Pilots on Final Approach." *Federal Aviation Administration* (2015).

5. Jenkins, D.P., et al, "A practical approach to glare assessment for train cabs." *Applied Ergonomics* 47 (2015): 170-180.

6. Hinze, J.W., and Teizer J., "Visibility-related fatalities related to construction equipment." *Safety Science* 49, no. 5 (2011): 709-718.

7. National Fire Protection Association. (2017). NFPA 130: standard for fixed guideway transit and passenger rail systems. NFPA.

8. The application of fire safety engineering principles to fire safety design of buildings – Part 6: Human Factors' PD 7974-6:2019, British Standards Institution, 2019.

9. Raj, P.K., "Field tests on human tolerance to (LNG) fire radiant heat exposure, and attenuation effects of clothing and other objects", *Journal of Hazardous Materials,* vol. 157 no. 2-3, 2008.

10. Department of the Built Environment. (2017). Solar Convergence Planning Advice Note. City of London Corporation.

11. Building Research Establishment: 'Fire spread in car parks' BD2552, Department of Communities and Local Government 2010.

12. SFPE Handbook of Fire Protection Engineering 4th Edition NFPA/SPFE 2008 USA

13. V. Babrauskas 'Ignition Handbook' Fire Science Publishers + SFP, 2003

14. E Ungar, K Stroud 'A New Approach to Defining Human Touch Temperature Standards' National Aeronautics and Space Agency , 2010

Microscale Analysis
Input and Output Files

```
'Harvard ERC'  60.0  100.0  0.0  0.0  51  1  0  0  'PPM'
'NW'  325128.12  4691836.61  1.8
'NW'  325124.66  4691845.99  1.8
'NW'  325121.19  4691855.37  1.8
'NW'  325117.72  4691864.75  1.8
'NE'  325132.03  4691864.41  1.8
'NE'  325135.49  4691855.03  1.8
'NE'  325138.96  4691845.65  1.8
'NE'  325142.42  4691836.27  1.8
'S'  325146.03  4691809.62  1.8
'S'  325136.92  4691805.51  1.8
'S'  325127.8  4691801.4  1.8
'S'  325118.68  4691797.3  1.8
'S'  325109.56  4691793.19  1.8
'S'  325100.45  4691789.08  1.8
'S'  325091.33  4691784.97  1.8
'S'  325082.21  4691780.87  1.8
'S'  325073.1  4691776.76  1.8
'S'  325063.98  4691772.65  1.8
'S'  325054.86  4691768.54  1.8
'NW'  325043.07  4691788.57  1.8
'NW'  325052.18  4691792.67  1.8
'NW'  325061.3  4691796.78  1.8
'NW'  325070.42  4691800.89  1.8
'NW'  325079.54  4691805.0  1.8
'NW'  325088.65  4691809.1  1.8
'NW'  325097.77  4691813.21  1.8
'NW'  325106.89  4691817.32  1.8
'NW'  325116.01  4691821.43  1.8
'NW'  325125.12  4691825.53  1.8
'NE'  325143.22  4691834.97  1.8
'NE'  325151.45  4691840.65  1.8
'NE'  325159.68  4691846.33  1.8
'NE'  325167.91  4691852.01  1.8
'NE'  325176.14  4691857.69  1.8
'NE'  325184.37  4691863.37  1.8
'NE'  325192.6  4691869.05  1.8
'NE'  325200.83  4691874.73  1.8
'NE'  325209.06  4691880.41  1.8
'NE'  325217.29  4691886.09  1.8
'S'  325230.93  4691868.53  1.8
'S'  325222.7  4691862.85  1.8
'S'  325214.47  4691857.17  1.8
'S'  325206.24  4691851.49  1.8
'S'  325198.01  4691845.81  1.8
'S'  325189.78  4691840.13  1.8
'S'  325181.55  4691834.45  1.8
'S'  325173.32  4691828.77  1.8
'S'  325165.09  4691823.09  1.8
'S'  325156.86  4691817.41  1.8
'S'  325148.63  4691811.73  1.8
'NW'  325131.0  4691828.3  1.8
'No Build'  7  1  1  'C'
```

```
1                   CAL3QHC - (DATED 95221)

           CAL3QHC  PC (32 BIT) VERSION 3.0.0
          (C) COPYRIGHT 1993-2000, TRINITY CONSULTANTS

 Run Began on  5/21/2021 at 15:10:00

     JOB: Harvard ERC                              RUN: No Build

     DATE : 05/21/   0
     TIME : 15:10:00

       The MODE flag has been set to C for calculating CO averages.

      SITE & METEOROLOGICAL VARIABLES
      -------------------------------
      VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 100. CM
       U =  1.0 M/S        CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  0.0 PPM

      LINK VARIABLES
      --------------
       LINK DESCRIPTION     *        LINK COORDINATES (M)          *    LENGTH  BRG TYPE   VPH    EF     H
W    V/C QUEUE
                      *   X1       Y1       X2       Y2    *     (M)   (DEG)          (G/MI)   (M) (M)      (VEH)
     ------------------------*-----------------------------------------*------------------------------------------------------------
      1. WindomSt@Cambridge_F* 325141.3  ********  325101.5  ******** *     115.   340. AG    205.   1.4   0.0 13.3
      2. CambridgeStEB@Windom* 325141.3  ********  324947.5  ******** *     212.   246. AG   2775.   1.2   0.0
23.1
      3. CambridgeStWB@Windom* 325141.3  ********  325290.5  ******** *     181.    55. AG   2900.   1.9   0.0
22.2
      4. CambridgeEB_LT@Windo* 325136.2  ********  325134.0  ******** *       2.   243. AG      8. 100.0   0.0  3.0
0.13   0.4
      5. CambridgeEB_T@Windom* 325138.3  ********  325088.7  ******** *      55.   244. AG      4. 100.0   0.0  6.1
0.41   9.2
      6. CambridgeWB@Windom_Q* 325163.7  ********  327249.9  ******** *    2552.    55. AG      5. 100.0   0.0
6.7 1.57 425.4
      7. WindomSB@Cambridge_Q* 325133.3  ********  325125.5  ******** *      22.   340. AG      8. 100.0   0.0  1.2
0.78   3.7
                                                                     PAGE  2
     JOB: Harvard ERC                              RUN: No Build

     DATE : 05/21/   0
     TIME : 15:10:00

      ADDITIONAL QUEUE LINK PARAMETERS
      --------------------------------
       LINK DESCRIPTION     *    CYCLE    RED     CLEARANCE  APPROACH  SATURATION   IDLE   SIGNAL
ARRIVAL
                      *    LENGTH   TIME    LOST TIME    VOL     FLOW RATE   EM FAC   TYPE      RATE
                      *     (SEC)   (SEC)    (SEC)      (VPH)      (VPH)    (gm/hr)
     ------------------------*--------------------------------------------------------------------------------
      4. CambridgeEB_LT@Windo*     110       98       2.0        15       1600       3.46      2        3
      5. CambridgeEB_T@Windom*     110       48       2.0       690       3200       3.46      2        3
```

```
'HARVARD ERC'  60.0  100.0  0.0  0.0  51  1  0  0  'PPM'
'NW'  325128.12  4691836.61  1.8
'NW'  325124.66  4691845.99  1.8
'NW'  325121.19  4691855.37  1.8
'NW'  325117.72  4691864.75  1.8
'NE'  325132.03  4691864.41  1.8
'NE'  325135.49  4691855.03  1.8
'NE'  325138.96  4691845.65  1.8
'NE'  325142.42  4691836.27  1.8
'S'  325146.03  4691809.62  1.8
'S'  325136.92  4691805.51  1.8
'S'  325127.8  4691801.4  1.8
'S'  325118.68  4691797.3  1.8
'S'  325109.56  4691793.19  1.8
'S'  325100.45  4691789.08  1.8
'S'  325091.33  4691784.97  1.8
'S'  325082.21  4691780.87  1.8
'S'  325073.1  4691776.76  1.8
'S'  325063.98  4691772.65  1.8
'S'  325054.86  4691768.54  1.8
'NW'  325043.07  4691788.57  1.8
'NW'  325052.18  4691792.67  1.8
'NW'  325061.3  4691796.78  1.8
'NW'  325070.42  4691800.89  1.8
'NW'  325079.54  4691805.0  1.8
'NW'  325088.65  4691809.1  1.8
'NW'  325097.77  4691813.21  1.8
'NW'  325106.89  4691817.32  1.8
'NW'  325116.01  4691821.43  1.8
'NW'  325125.12  4691825.53  1.8
'NE'  325143.22  4691834.97  1.8
'NE'  325151.45  4691840.65  1.8
'NE'  325159.68  4691846.33  1.8
'NE'  325167.91  4691852.01  1.8
'NE'  325176.14  4691857.69  1.8
'NE'  325184.37  4691863.37  1.8
'NE'  325192.6  4691869.05  1.8
'NE'  325200.83  4691874.73  1.8
'NE'  325209.06  4691880.41  1.8
'NE'  325217.29  4691886.09  1.8
'S'  325230.93  4691868.53  1.8
'S'  325222.7  4691862.85  1.8
'S'  325214.47  4691857.17  1.8
'S'  325206.24  4691851.49  1.8
'S'  325198.01  4691845.81  1.8
'S'  325189.78  4691840.13  1.8
'S'  325181.55  4691834.45  1.8
'S'  325173.32  4691828.77  1.8
'S'  325165.09  4691823.09  1.8
'S'  325156.86  4691817.41  1.8
'S'  325148.63  4691811.73  1.8
'NW'  325131.0  4691828.3  1.8
'BUILD'  7  1  1  'C'
```

```
1  1
'WINDOMST@CAMBRIDGE_FF'  'AG'  325141.29  4691820.15  325101.53  4691927.77  685  1.42  0.0  13.3
1  1
'CAMBRIDGESTEB@WINDOM_FF'  'AG'  325141.29  4691820.15  324947.52  4691732.85  2770  1.17  0.0  23.1
1  1
'CAMBRIDGESTWB@WINDOM_FF'  'AG'  325141.29  4691820.15  325290.47  4691923.11  3195  1.9  0.0  22.2
2  1
'CAMBRIDGEEB_LT@WINDOM_Q'  'AG'  325136.2  4691816.36  325088.45  4691792.96  0.0  3.0  1
110  98  2  80  3.46  1600  2  3
2  1
'CAMBRIDGEEB_T@WINDOM_Q'  'AG'  325138.32  4691812.58  325078.92  4691783.5  0.0  6.1  1
110  48  2  690  3.46  3200  2  3
2  1
'CAMBRIDGEWB@WINDOM_Q'  'AG'  325163.73  4691840.12  325268.0  4691913.74  0.0  6.7  1
110  60  2  2380  3.46  3200  2  3
2  1
'WINDOMSB@CAMBRIDGE_Q'  'AG'  325133.32  4691836.18  325118.79  4691875.21  0.0  1.2  1
110  94  2  175  3.46  1600  2  3
1.0  0  4  1000.0  0.0  'Y'  10  0  35
** BREEZE
** PROJECTN  0 104 7 -177 0 0.9996 500000 0
** OUTFILE  C:\RDS\Erc\HarvardERC_BD.lst
** RAWFILE
```

```
 6. CambridgeWB@Windom_Q*    110      60      2.0      2100      3200      3.46     2      3
 7. WindomSB@Cambridge_Q*    110      94      2.0       135      1600      3.46     2      3

 RECEPTOR LOCATIONS
 ------------------
                   *        COORDINATES (M)        *
   RECEPTOR        *     X        Y        Z       *
-------------------------*---------------------------------*
 1. NW              *   325128.1   ********      1.8   *
 2. NW              *   325124.7   ********      1.8   *
 3. NW              *   325121.2   ********      1.8   *
 4. NW              *   325117.7   ********      1.8   *
 5. NE              *   325132.0   ********      1.8   *
 6. NE              *   325135.5   ********      1.8   *
 7. NE              *   325139.0   ********      1.8   *
 8. NE              *   325142.4   ********      1.8   *
 9. S               *   325146.0   ********      1.8   *
10. S               *   325136.9   ********      1.8   *
11. S               *   325127.8   ********      1.8   *
12. S               *   325118.7   ********      1.8   *
13. S               *   325109.6   ********      1.8   *
14. S               *   325100.4   ********      1.8   *
15. S               *   325091.3   ********      1.8   *
16. S               *   325082.2   ********      1.8   *
17. S               *   325073.1   ********      1.8   *
18. S               *   325064.0   ********      1.8   *
19. S               *   325054.9   ********      1.8   *
20. NW              *   325043.1   ********      1.8   *
21. NW              *   325052.2   ********      1.8   *
22. NW              *   325061.3   ********      1.8   *
23. NW              *   325070.4   ********      1.8   *
24. NW              *   325079.5   ********      1.8   *
25. NW              *   325088.7   ********      1.8   *
26. NW              *   325097.8   ********      1.8   *
27. NW              *   325106.9   ********      1.8   *
28. NW              *   325116.0   ********      1.8   *
29. NW              *   325125.1   ********      1.8   *
30. NE              *   325143.2   ********      1.8   *
31. NE              *   325151.4   ********      1.8   *
32. NE              *   325159.7   ********      1.8   *
33. NE              *   325167.9   ********      1.8   *
34. NE              *   325176.1   ********      1.8   *
35. NE              *   325184.4   ********      1.8   *
36. NE              *   325192.6   ********      1.8   *
37. NE              *   325200.8   ********      1.8   *
38. NE              *   325209.1   ********      1.8   *
39. NE              *   325217.3   ********      1.8   *
40. S               *   325230.9   ********      1.8   *
41. S               *   325222.7   ********      1.8   *
                                                                  PAGE  3
 JOB: Harvard ERC                              RUN: No Build

 DATE : 05/21/   0
 TIME : 15:10:00
```

RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
42. S	325214.5	********	1.8
43. S	325206.2	********	1.8
44. S	325198.0	********	1.8
45. S	325189.8	********	1.8
46. S	325181.6	********	1.8
47. S	325173.3	********	1.8
48. S	325165.1	********	1.8
49. S	325156.9	********	1.8
50. S	325148.6	********	1.8
51. NW	325131.0	********	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
10.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
20.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
30.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
40.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0
50.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
60.	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1
70.	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2
80.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
90.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
100.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
110.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
120.	0.1	0.1	0.1	0.1	0.1	0.1	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	0.1
130.	0.1	0.1	0.1	0.1	0.1	0.1	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	0.1
140.	0.1	0.1	0.1	0.1	0.1	0.1	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	0.1
150.	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
160.	0.1	0.0	0.0	0.0	0.1	0.1	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	0.1
170.	0.1	0.1	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	0.0	0.0	0.0	0.0	0.1
180.	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

190. *	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
200. *	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
210. *	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
220. *	0.1	0.1	0.1	0.0	0.0	0.1	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	0.1
230. *	0.1	0.1	0.0	0.0	0.0	0.1	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	0.1
240. *	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
250. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
260. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.0
270. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
280. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
290. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
300. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
310. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
320. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
330. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
340. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
350. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
MAX *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
DEGR. *	60	70	70	80	70	70	60	60	40	30	40	30	40	40	50	50	50	50	60	70

JOB: Harvard ERC RUN: No Build

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
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	0.2
10. *	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	0.2
20. *	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	0.2
30. *	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	0.2
40. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
50. *	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
60. *	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1
70. *	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1
80. *	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
90. *	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
100. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
110. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
120. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
130. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
140. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0

150. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
160. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
170. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.0
180. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
190. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
200. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
210. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
220. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1
230. *	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.1
240. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2
250. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2
260. *	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	0.2
270. *	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	0.2
280. *	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	0.2
290. *	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	0.2
300. *	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	0.2
310. *	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	0.1
320. *	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	0.2
330. *	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	0.2
340. *	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	0.1
350. *	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	0.2
MAX *	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
DEGR. *	60	60	60	60	60	60	70	70	60	70	70	70	70	70	70	60	60	60	60	0

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51
0. *	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
10. *	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
20. *	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
30. *	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
40. *	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.0
50. *	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.1
60. *	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2
70. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
80. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
90. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
100. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
110. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

120.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
130.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
140.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
150.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
160.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
170.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
180.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
190.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
200.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
210.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
220.	*	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
230.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.2
240.	*	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1
250.	*	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1
260.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.0
270.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
280.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
290.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.0
300.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.0
310.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.0
320.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
330.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
340.	*	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.0
350.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
MAX	*	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
DEGR.	*	0	0	40	40	40	40	40	40	40	40	60

THE HIGHEST CONCENTRATION OF 0.30 PPM OCCURRED AT RECEPTOR REC10.

PAGE 7

JOB: Harvard ERC RUN: No Build

DATE : 05/21/ 0
TIME : 15:10:00

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

	*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
LINK #	*	60	70	70	80	70	70	60	60	40	30	40	30	40	40	50	50	50	50	60	70
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	0.0	0.0	0.0	0.0
2	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4	*	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
5	*	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
6	*	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	*	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

PAGE 8

JOB: Harvard ERC RUN: No Build

DATE : 05/21/ 0
TIME : 15:10:00

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM) * ANGLE (DEGREES) *	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
LINK # *	60	60	60	60	60	60	70	70	60	70	70	70	70	70	70	60	60	60	60	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	0.0	0.0	0.0	0.0
2 *	0.1	0.1	0.1	0.1	0.1	0.1	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
3 *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
4 *	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
5 *	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
6 *	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 *	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

DATE : 05/21/ 0
TIME : 15:10:00

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM) * ANGLE (DEGREES) *	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51
LINK # *	0	0	40	40	40	40	40	40	40	40	60
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0
3 *	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
4 *	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

```
1  1
'WindomSt@Cambridge_FF'  'AG'  325141.29  4691820.15  325101.53  4691927.77  205  1.42  0.0  13.3
1  1
'CambridgeStEB@Windom_FF'  'AG'  325141.29  4691820.15  324947.52  4691732.85  2775  1.17  0.0  23.1
1  1
'CambridgeStWB@Windom_FF'  'AG'  325141.29  4691820.15  325290.47  4691923.11  2900  1.9  0.0  22.2
2  1
'CambridgeEB_LT@Windom_Q'  'AG'  325136.2  4691816.36  325088.45  4691792.96  0.0  3.0  1
110  98  2  15  3.46  1600  2  3
2  1
'CambridgeEB_T@Windom_Q'  'AG'  325138.32  4691812.58  325078.92  4691783.5  0.0  6.1  1
110  48  2  690  3.46  3200  2  3
2  1
'CambridgeWB@Windom_Q'  'AG'  325163.73  4691840.12  325268.0  4691913.74  0.0  6.7  1
110  60  2  2100  3.46  3200  2  3
2  1
'WindomSB@Cambridge_Q'  'AG'  325133.32  4691836.18  325118.79  4691875.21  0.0  1.2  1
110  94  2  135  3.46  1600  2  3
1.0  0  4  1000.0  0.0  'Y'  10  0  35
** BREEZE
** PROJECTN  0 104 7 -177 0 0.9996 500000 0
** OUTFILE  C:\RDS\Erc\HarvardERC_NB.lst
** RAWFILE
```

```
1                  CAL3QHC - (DATED 95221)

           CAL3QHC  PC (32 BIT) VERSION 3.0.0
          (C) COPYRIGHT 1993-2000, TRINITY CONSULTANTS

 Run Began on  5/21/2021 at 15:14:59

     JOB: HARVARD ERC                              RUN: Build

     DATE : 05/21/   0
     TIME : 15:14:59

       The MODE flag has been set to C for calculating CO averages.

      SITE & METEOROLOGICAL VARIABLES
      -------------------------------
      VS =   0.0 CM/S      VD =   0.0 CM/S      Z0 = 100. CM
       U =  1.0 M/S        CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  0.0 PPM

      LINK VARIABLES
      --------------
       LINK DESCRIPTION     *        LINK COORDINATES (M)          *    LENGTH  BRG TYPE   VPH    EF      H
W    V/C QUEUE
                      *   X1       Y1       X2       Y2    *    (M)   (DEG)          (G/MI)   (M) (M)      (VEH)
     ------------------------*--------------------------------------*-------------------------------------------------------
      1. WINDOMST@CAMBRIDGE_F* 325141.3  ********  325101.5  ******** *     115.   340. AG    685.   1.4
0.0 13.3
      2. CAMBRIDGESTEB@WINDOM* 325141.3  ********  324947.5  ******** *     212.   246. AG   2770.   1.2
0.0 23.1
      3. CAMBRIDGESTWB@WINDOM* 325141.3  ********  325290.5  ******** *     181.    55. AG   3195.   1.9
0.0 22.2
      4. CAMBRIDGEEB_LT@WINDO* 325136.2  ********  325124.2  ******** *      13.   244. AG      8. 100.0   0.0
3.0 0.69   2.2
      5. CAMBRIDGEEB_T@WINDOM* 325138.3  ********  325088.7  ******** *      55.   244. AG      4. 100.0
0.0  6.1 0.41   9.2
      6. CAMBRIDGEWB@WINDOM_Q* 325163.7  ********  327965.6  ******** *    3428.    55. AG      5. 100.0
0.0  6.7 1.78 571.3
      7. WINDOMSB@CAMBRIDGE_Q* 325133.3  ********  325117.6  ******** *      45.   340. AG      8. 100.0
0.0  1.2 1.01   7.5
```


```
     JOB: HARVARD ERC                              RUN: Build

     DATE : 05/21/   0
     TIME : 15:14:59

      ADDITIONAL QUEUE LINK PARAMETERS
      --------------------------------
       LINK DESCRIPTION     *    CYCLE    RED    CLEARANCE  APPROACH  SATURATION   IDLE   SIGNAL
ARRIVAL
                      *    LENGTH   TIME    LOST TIME    VOL     FLOW RATE   EM FAC   TYPE     RATE
                      *     (SEC)   (SEC)    (SEC)      (VPH)      (VPH)    (gm/hr)
     ------------------------*--------------------------------------------------------------------------------
      4. CAMBRIDGEEB_LT@WINDO*     110       98       2.0       80       1600       3.46     2       3
```

5. CAMBRIDGEEB_T@WINDOM* 110 48 2.0 690 3200 3.46 2 3
6. CAMBRIDGEWB@WINDOM_Q* 110 60 2.0 2380 3200 3.46 2 3
7. WINDOMSB@CAMBRIDGE_Q* 110 94 2.0 175 1600 3.46 2 3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. NW	325128.1	********	1.8
2. NW	325124.7	********	1.8
3. NW	325121.2	********	1.8
4. NW	325117.7	********	1.8
5. NE	325132.0	********	1.8
6. NE	325135.5	********	1.8
7. NE	325139.0	********	1.8
8. NE	325142.4	********	1.8
9. S	325146.0	********	1.8
10. S	325136.9	********	1.8
11. S	325127.8	********	1.8
12. S	325118.7	********	1.8
13. S	325109.6	********	1.8
14. S	325100.4	********	1.8
15. S	325091.3	********	1.8
16. S	325082.2	********	1.8
17. S	325073.1	********	1.8
18. S	325064.0	********	1.8
19. S	325054.9	********	1.8
20. NW	325043.1	********	1.8
21. NW	325052.2	********	1.8
22. NW	325061.3	********	1.8
23. NW	325070.4	********	1.8
24. NW	325079.5	********	1.8
25. NW	325088.7	********	1.8
26. NW	325097.8	********	1.8
27. NW	325106.9	********	1.8
28. NW	325116.0	********	1.8
29. NW	325125.1	********	1.8
30. NE	325143.2	********	1.8
31. NE	325151.4	********	1.8
32. NE	325159.7	********	1.8
33. NE	325167.9	********	1.8
34. NE	325176.1	********	1.8
35. NE	325184.4	********	1.8
36. NE	325192.6	********	1.8
37. NE	325200.8	********	1.8
38. NE	325209.1	********	1.8
39. NE	325217.3	********	1.8
40. S	325230.9	********	1.8
41. S	325222.7	********	1.8

TIME : 15:14:59

RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
42. S	325214.5	********	1.8
43. S	325206.2	********	1.8
44. S	325198.0	********	1.8
45. S	325189.8	********	1.8
46. S	325181.6	********	1.8
47. S	325173.3	********	1.8
48. S	325165.1	********	1.8
49. S	325156.9	********	1.8
50. S	325148.6	********	1.8
51. NW	325131.0	********	1.8

COORDINATES (M)

JOB: HARVARD ERC RUN: Build

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
0.	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
10.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
20.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
30.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
40.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0
50.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
60.	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
70.	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2
80.	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
90.	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
100.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
110.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
120.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
130.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
140.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
150.	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
160.	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
170.	0.1	0.1	0.0	0.0	0.0	0.1	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	0.1

180.	*	0.1	0.1	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	0.0	0.0	0.0	0.0	0.1
190.	*	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
200.	*	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
210.	*	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
220.	*	0.1	0.1	0.1	0.0	0.0	0.1	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	0.1
230.	*	0.1	0.1	0.0	0.0	0.0	0.1	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	0.1
240.	*	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
250.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
260.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.0
270.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
280.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
290.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
300.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
310.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
320.	*	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
330.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
340.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
350.	*	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
MAX	*	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
DEGR.	*	70	0	0	80	70	70	80	70	40	30	40	50	40	40	50	50	50	50	50	60

JOB: HARVARD ERC RUN: Build

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)	*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
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	0.2
10.	*	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	0.2
20.	*	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	0.2
30.	*	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	0.2
40.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3
50.	*	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2
60.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1
70.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.1
80.	*	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.0
90.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
100.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
110.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
120.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
130.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0

140. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
150. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
160. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
170. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
180. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
190. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
200. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
210. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.0
220. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.1
230. *	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1
240. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2
250. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.3
260. *	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	0.3
270. *	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	0.2
280. *	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	0.2
290. *	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	0.2
300. *	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	0.2
310. *	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	0.2
320. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
330. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
340. *	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	0.2
350. *	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	0.2
MAX *	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
DEGR. *	60	60	60	60	60	60	70	70	60	60	60	60	60	60	70	70	70	70	70	40

JOB: HARVARD ERC RUN: Build

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-350.

WIND ANGLE (DEGR) *	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51
0. *	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1
10. *	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
20. *	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
30. *	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.0
40. *	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.0
50. *	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.1
60. *	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
70. *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3
80. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
90. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
100. *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2

110.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
120.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
130.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
140.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
150.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
160.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
170.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
180.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
190.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
200.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
210.	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
220.	*	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
230.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.2
240.	*	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1
250.	*	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1
260.	*	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.0
270.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.1	0.0
280.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
290.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.0
300.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
310.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0
320.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
330.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
340.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
350.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1
MAX	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
DEGR.	*	30	30	30	30	30	30	30	30	30	30	70

THE HIGHEST CONCENTRATION OF 0.30 PPM OCCURRED AT RECEPTOR REC10.

JOB: HARVARD ERC RUN: Build

DATE : 05/21/ 0
TIME : 15:14:59

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

	*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
LINK #	*	70	0	0	80	70	70	80	70	40	30	40	50	40	40	50	50	50	50	50	60
1	*	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	0.0
2	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3	*	0.2	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4	*	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
5	*	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
6	*	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	*	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

JOB: HARVARD ERC RUN: Build

DATE : 05/21/ 0
TIME : 15:14:59

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
LINK # *	60	60	60	60	60	60	70	70	60	60	60	60	60	60	70	70	70	70	70	40
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	0.0	0.0	0.0	0.0
2 *	0.1	0.1	0.1	0.1	0.1	0.1	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
3 *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4 *	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
5 *	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
6 *	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 *	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

PAGE 9

JOB: HARVARD ERC RUN: Build

DATE : 05/21/ 0
TIME : 15:14:59

RECEPTOR - LINK MATRIX FOR THE ANGLE PRODUCING
THE MAXIMUM CONCENTRATION FOR EACH RECEPTOR

* CO/LINK (PPM)
* ANGLE (DEGREES)

*	REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51
LINK # *	30	30	30	30	30	30	30	30	30	30	70
1 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0
3 *	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
4 *	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 *	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

APPENDIX F: PNF Comments

Contents:

boston planning & development agency

May 14, 2021

Ms. Jessica Hughes
Managing Partner
Tishman Speyer
125 High Street
Boston, MA 02110

Re: **Scoping Determination for the proposed Harvard Enterprise Research Campus (ERC) project at 100-112 Western Ave, Allston**

Dear Ms. Hughes,

Please find enclosed the Scoping Determination for the proposed Harvard Enterprise Research Campus (ERC) project at 100-112 Western Ave., Allston ("Project"). The Scoping Determination describes information required by the Boston Planning & Development Agency in response to the Project Notification Form ("PNF"), which was submitted under Article 80B of the Boston Zoning Code on February 2nd, 2021 by Tishman Speyer ERC Developer, L.L.C. ("Proponent"). Additional information may be required during the course of the review of the proposal.

If you have any questions regarding the Scoping Determination or the review process, please contact me at Nupoor.Monani@boston.gov.

Sincerely,

Nupoor Monani

Nupoor Monani
Senior Institutional Planner and Project Manager

CC: Jonathan Greeley, BPDA
Michael Christopher, BPDA
Aisha Miller, Mayor's Office of Neighborhood Services
Conor Newman, Mayor's Office of Neighborhood Services
Mark Handley, Government Affairs and Community Relations, Harvard University

BOSTON REDEVELOPMENT AUTHORITY
D/B/A BOSTON PLANNING & DEVELOPMENT AGENCY

SCOPING DETERMINATION FOR
HARVARD ENTERPRISE RESEARCH CAMPUS (100-112 WESTERN AVENUE, ALLSTON)

AND

SUBMISSION REQUIREMENTS FOR
DRAFT PROJECT IMPACT REPORT ("DPIR")

PROPOSED PROJECT	HARVARD ENTERPRISE RESEARCH CAMPUS (ERC)
PROJECT SITE	14-ACRE PARCEL AT 100-112 WESTERN AVENUE, ALLSTON BOUNDED BY WESTERN AVENUE, SANOFI GENZYME FACILITY, HARVARD UNIVERSITY DISTRICT ENERGY FACILITY ("DEF"), AND HARVARD PROPERTY WEST OF HAGUE STREET
PROPONENT	TISHMAN SPEYER ERC DEVELOPER, L.L.C.
DATE	MAY 14, 2021

The Boston Redevelopment Authority ("BRA"), d/b/a the Boston Planning & Development Agency ("BPDA") is issuing this Scoping Determination pursuant to Section 80B-5 of the Boston Zoning Code ("Code"), in response to a Project Notification Form ("PNF"), which the Tishman Speyer ERC Developer, L.L.C. ("Proponent") filed on February 2, 2021 for the proposed Harvard Enterprise Research Campus project ("Proposed Project") in the Allston neighborhood of Boston within the area designated as Planned Development Area (PDA) No. 115 ("PDA Master Plan"). Notice of the receipt by the BPDA of the PNF was published in the Boston Herald on February 3, 2021, which initiated a public comment period with a closing date of March 3, 2021. Pursuant to Section 80A-2 of the Code, the PNF was sent to the City's public agencies/departments and elected officials on February 19, 2021. Hard copies of the PNF were also sent to all members of the Harvard-Allston Task Force ("Task Force") which serves as the Impact Advisory Group for this project. The initial public comment period was subsequently extended until March 15, 2021, through mutual consent between the BPDA and the Proponent to allow more time for the general public to provide comments and feedback.

Prior to receiving the PNF, on January 21, 2021, the Proponent filed a Letter of Intent ("LOI") in accordance with the Mayor's Executive Order Regarding Provision of Mitigation by Development Projects in Boston for the proposed development of the Harvard Enterprise

Campus in the Allston neighborhood of Boston within the area designated as Planned Development Area (PDA) No. 115 (“PDA Master Plan”).

The Harvard-Allston Task Force (“Task Force”) which was originally created in 2006 and updated in November 20, 2019 was identified to serve as the Impact Advisory Group for this project. The updated membership of the Task Force reflects a merger of active members on the Task Force with active members who served on a previously appointed Impact Advisory Group for during the process to review and approve the PDA Master Plan which concluded in 2018.

The following is a list of members of the Harvard Allston Task Force which serves as the Impact Advisory Group for this project:

- Anthony D’Isidoro
- Barbara Parmenter
- Brent Whelan
- Bruce Houghton
- Christine Varriale
- Cindy Marchando
- Dan Daly
- Ed Kotomori
- John Cusak
- Lea Beaulieu
- Michael Hanlon
- Millie McLaughlin
- Rita DiGesse
- Tim McHale
- Troy Brogan

The BPDA appreciates the efforts of the Task Force and the members should be applauded for their commitment to the review of the Proposed Project.

Pursuant to Section 80B-5.3 of the Code, a Scoping Session was held on February 25, 2021 with the City of Boston’s public agencies/departments at which time the Proposed Project was reviewed and discussed. A BPDA-sponsored meeting of the Task Force was conducted in anticipation of receiving the PNF on January 19, 2021. An additional BPDA-sponsored publicly advertised meeting of the Task Force and general public was conducted on March 4, 2021. Both meetings were held virtually using Zoom.gov in line with the BPDA’s policy on virtual meetings as a response to the COVID-19 pandemic.

Included in the Scoping Determination are written comments that were received by the BPDA in response to the PNF, from BPDA staff, public agencies/departments, elected officials, the general public, and Task Force members, all of which are included in Appendices A, B, and C and must be answered in their entirety.

- **Appendix A** includes written comments from **BPDA staff, public agencies or departments, and elected officials**. Specifically, they are:
    - BPDA Planning and Urban Design
    - BPDA Transportation Planning
    - BPDA Infrastructure Planning and Smart Utilities
    - BPDA Environment
    - City of Boston Parks and Recreation Commission
    - Boston Water and Sewer Commission
    - Boston Public Works Department
    - Boston Interagency Green Building Committee
    - Elizabeth Breadon, Boston City Councilor, District 9
- **Appendix B** includes comments received by the BPDA from the Harvard-Allston Task Force ("Task Force") and its membership
- **Appendix C** includes comments from the public

Based on review of the PNF, related comments, as well as a Scoping Session, Task Force meetings, and public meeting, the BPDA hereby issues its written Scoping Determination ("Scope"). As part of the BPDA's Article 80 review, the Proponent is required to prepare and submit to the BPDA a proposed Draft Project Impact Report ("DPIR") pursuant to Section 80B of the Code. The document must set forth in sufficient detail the planning framework of the Proposed Project and the cumulative impacts of the Proposed Project to allow the BPDA to make a determination about the merits of the Proposed Project. SD.1

The Proponent is requested to respond to the specific elements outlined in this Scope. SD.2
Written comments mentioned above constitute an integral part of the Scope and should be responded to in DPIR or in another appropriate manner over the course of the review process. At other points during the public review of the DPIR, the BPDA and other City agencies may require additional information to assist in the review of the Proposed Project and DPIR.

The proposed DPIR shall contain the information necessary to meet the specifications of Article 80 as well as any additional information requested below. SD.3

Along with the specific submission requirements outlined in the sections below and the attached comment letters, please note the following **general comments** on the Proposed Project.

- Throughout this initial phase of review, the Proponent has taken steps to meet with community members, elected officials, and various City agencies / departments. SD.4

Regular conversations and meetings with all interested parties must continue through the duration of the public review process, ensuring that what is presented in the DPIR is beneficial to the respective neighborhood and the City of Boston as a whole. SD.4

- The Proposed Project will be the first major development in the implementation of Harvard's Enterprise Research Campus Framework Plan ("Framework Plan") on a site that is currently vacant. As such, it is of the utmost importance that the Proposed Project creates a strong sense of place for the community through the articulation of its design, programming, and community benefits. SD.5

- A central goal dating back to the 2005 North Allston Strategic Framework for Planning through today has been the creation of a Harvard campus (whether academic or commercial in nature) that is welcoming to the public. The Proposed Project proposal does much to implement this goal. This aim of creating a new neighborhood that is integrated with the rest of North Allston physically and that draws in all residents and visitors must continue to inform design and programming decisions. SD.6

- It is expected that the Proposed Project will be responsive to recent and ongoing planning in the neighborhood including the Allston Brighton Mobility Study and the Western Ave. Corridor Rezoning Study. SD.7

- The Framework Plan, while not a regulatory document, is a key component of the planning, design, and review process. While the Framework Plan is developed by Harvard and not controlled by the Proponent, it must continue to evolve in parallel with the DPIR and other regulatory documents submitted by the Proponent in order to provide the BPDA with critical long-term context for the Proposed Project. SD.8

- It is expected that the Proponent will work with Harvard and define specific strategies for achieving the goals of the broader Framework Plan within the Proposed Project, including but not limited to affordable housing, workforce development, sustainability and resilience, transportation, and public realm, and in conjunction with BPDA staff as well as the Task Force and community. SD.9

- While the PNF address a 6-acre site referred to in the PNF as "Phase A", it will be important to understand and present this in the context of the Proponent's vision for the entire 14-acre site identified in the PDA Master Plan. It is expected that design development of the remainder of this parcel known as "Phase B" will continue in parallel with the DPIR with special attention paid to the seams between Phases A and B and edges where Phases A and B intersect with the existing neighborhood and larger Framework Plan. SD.10

- The DPIR should include the most up-to-date information the Proponent's collaboration and reviews the Massachusetts Environmental Protection Act Office and any other public agencies as relevant. Throughout the review process for the DPIR, the BPDA encourages the Proponent to keep the City of Boston and the community apprised of those reviews. SD.11

- The size of the Proposed Project and degree of change envisioned at the site have generated excitement but also confusion during the initial review process. While the DPIR will contain additional information, it will be important to ground the public's understanding of the project in concrete and contextual terms. It is expected that the Proponent will a combination of drawings, renderings, videos, and other creative approaches to anchor the understanding of the Proposed Project in relation to the surrounding neighborhood and comparable areas elsewhere in the city. Please refer to the letter from BPDA Urban Design and Planning in Appendix A for more information. SD.12

- The BPDA appreciates the community benefits outlined in the PNF. However, it is expected that the DPIR will include detailed proposals elaborating on the nature of these benefits with clear quantifiable commitments from the Proponent on all fronts. SD.13

- Housing affordability and the effect of the Proposed Project on the neighborhood have been subjects of great interest and concern during the initial review process. The BPDA expects the Proponent to provide a range of rental opportunities and explore creative approaches to accommodate homeownership opportunities, including income-restricted units that exceed the threshold stipulated by the Inclusionary Development Policy. SD.14 Further, the BPDA expects that the project will investigate and apply strategies outlined in the Affirmatively Furthering Fair Housing zoning amendment and comply with the procedures and requirements of this regulation. SD.15

- With a significant portion of the Proposed Project dedicated to office, retail, hospitality, and research and life-sciences manufacturing uses, the Proposed Project presents an opportunity to have a meaningful impact on workforce development for the neighborhood and the city. It is expected that the DPIR will include detailed strategies for growing the participation of diverse populations in these sectors and creating employment opportunities at all skill levels. SD.16 It is also expected that Harvard's involvement in the Proposed Project will enable greater and long-lasting community participation through innovative models like the Ed Portal. SD.17

- The nature of the Proposed Project's retail strategy was similarly a subject of interest during the initial review process. Commenters and members of the Task Force expressed a desire for neighborhood-scale retail, opportunities for local SD.18

businesses to rent space, incubator space for small business startups, and increased participation of MBE/WBE tenants who would otherwise not be able to afford such space. The Proponent should be prepared to discuss its strategies for attracting neighborhood-serving retail and fostering small local businesses and identify quantifiable targets. SD.18

- Greater outreach to the Allston/Brighton artists' community will be important as the review of the Proposed Project continues. The BPDA looks forward to working with the Proponent, local elected officials, the Mayor's Office of Neighborhood Services, Mayor's Office of Arts and Culture, and local civic groups to develop strategies that will enable this community to have active participation in shaping the Proposed Project and using it once completed. SD.19

- The Proposed Project includes a central Greenway that has the promise to provide many benefits to North Allston by enhancing connectivity from the residential neighborhood to the Charles river. The Greenway has constituted a central organizing element of Harvard's planning for years, and one that has been embraced by community and the BPDA alike. The Proponent must continue working with the BPDA and community address how the Greenway is designed especially at key nodes where it intersects with Cattle Drive, East Drive, and opens up to create an entrance on Western Ave. SD.20 In addition, the BPDA encourages the Proponent to continue to engage the Task Force and community to determine what types of new public open space best address the programmatic and environmental needs and goals of the community. SD.21

- Given the location, size, and impact of the of the Proposed Project, it is crucial that the Proponent identify and commit to transit mitigation measures and TDM measures in coordination with Harvard. SD.22

- The BPDA appreciates the Proposed Project's commitment to sustainability and looks forward to working with the Proponent to identify specific strategies to advance goals outlined in the PNF. SD.23

- All development projects have construction impacts. As with any urban development, there needs to be a balance of construction related inconveniences with the daily activities that will continue to occur adjacent to the Proposed Project site. A detailed approach to the construction management must be included in the DPIR, including strategies for construction management over the Proposed Project's multiple phases and community involvement in developing construction management plans. SD.24

- The Proponent must take into account all BPDA approved and under review proposals in the Allston/Brighton neighborhoods, scheduled infrastructure SD.25

improvements in the general area, and nearby large-scale developments in the City of Boston while conducting the DPIR's required studies (transportation, infrastructure, open space, etc.). SD.25

- The Proponent must clearly describe the overall phasing of the Proposed Project. The buildings to be constructed in each phase of the Proposed Project should be specified along with an anticipated timeline for each phase. The BPDA acknowledges that project timelines are subject to change due to market conditions and other factors. SD.26

SUBMISSION REQUIREMENTS FOR
DRAFT PROJECT IMPACT REPORT ("DPIR")

I. PROJECT SITE

The Proposed Project will be located on a portion of a 6-acre portion of an approximately 14-acre parcel located at 100-112 Western Avenue in the Allston neighborhood, a site bounded generally by Western Avenue on the north, the Harvard property which is ground-leased to Sanofi Genzyme on the east, the Harvard University District Energy Facility ("DEF") on the southeast, and Harvard property west of Hague Street on the west, within the area designated as Planned Development Area (PDA) No. 115 ("PDA Master Plan") that is currently being utilized as a laydown and staging area for the construction of Harvard-related projects ("Project Site").

II. PROJECT DESCRIPTION

The Proposed Project described in the PNF consists of a mixed-use development of approximately 900,000 square feet containing a mix of approximately 440,000 square feet of office/lab space, 135,000 square feet of hotel/conference center space, additional 75,000 square feet of conference space, 250,000 square feet of residential space (approximately 330 units, and a total of approximately 620 parking spaces in a combination of below-grade and at-grade surface spaces. The Proposed Project will also include a 1.4-acre central public open space that is envisioned to tie into a network of open spaces connecting the Honan-Allston Library and the Allston neighborhood with the Charles River ("Greenway"). A larger vision for this Greenway as described in the Enterprise Research Campus Framework Plan ("Framework Plan").

III. PREAMBLE

The Proposed Project is being reviewed pursuant to Article 80, Development Review and Approval, which sets forth a comprehensive procedure for project review of the following components: transportation, environmental protection, urban design, historic resources, infrastructure systems, site plan, tidelands, and Development Impact Project applicability. The Proponent is required to prepare and submit to the BPDA a Draft Project Impact Report ("DPIR") that meets the requirements of the Scoping Determination by detailing the Proposed Project's impacts and proposed measures to mitigate, limit or minimize such impacts. The DPIR shall contain the information necessary to meet the specifications of Section 80B-3 (Scope of Large Project Review; Content of Reports) and Section 80B-4 (Standards for Large Project Review Approval), as required by the Scoping Determination. After submitting the DPIR, the Proponent shall publish notice of such submittal as required by Section 80A-2. Pursuant to Section 80B-4(c) (i) (3), the BPDA shall issue a written Preliminary Adequacy Determination ("PAD") within ninety (90) days. Public comments, including the comments of public agencies, shall be transmitted in writing to the BPDA no later than fifteen (15) days prior to the date by which the BPDA must issue its PAD. The PAD shall indicate the additional steps, if any, necessary for the Proponent to satisfy the requirements of the Scoping Determination. If the BPDA determines that the DPIR adequately describes the Proposed Project's impacts and, if appropriate, propose measures to mitigate, limit or minimize such impacts, the PAD will announce such a determination and that the requirements of further review are waived pursuant to Section 80B-5.4(c) (iv). Section 80B-6 requires the Director of the BPDA to issue a Certification of Compliance indicating the successful completion of the Article 80 development review requirements before the Commissioner of Inspectional Services can issue any building permit for the Proposed Project.

IV. SUBMISSION REQUIREMENTS

In addition to full-size scale drawings, ten (10) copies of a bound booklet and an electronic copy (PDF format) containing all submission materials reduced to size 8-1/2" x 11", except where otherwise specified, are required. The booklet should be printed on both sides of the page. Bound booklets should be mailed directly to all of the Task Force members, community groups, and other interested parties in support of the public review process. A copy of this Scoping Determination should be included in the booklet for reference. SD.27

1. GENERAL INFORMATION

- **Applicant/Proponent Information.** Pursuant to Article 80B, the DPIR should provide the following information:
  - Development Team
    - Names of developer(s), including description of development entity(ies), attorney, project consultants and architects.
    - Business address, telephone number, fax number and e-mail, where available, for each. SD.28
    - Designated contact for each.

- Legal Information
  - Legal judgments or actions pending concerning the Proposed Project
  - History of tax arrears on property owned in Boston by Applicant.
  - Evidence of site control over project area, including current ownership and purchase options of all parcels in the Proposed Project, all restrictive covenants and contractual restrictions affecting the Proponent's right or ability to accomplish the Proposed Project, and the nature of the agreements for securing parcels not owned by the Applicant. SD.29
  - Nature and extent of any and all public easements into, through, or surrounding the site.

- **Disclosure of Beneficial Interests.** Disclosure of Beneficial Interests in the Proposed Project must be provided pursuant to Section 80B-8 of the Boston Zoning Code. SD.30
- **Regulatory Controls and Permits.** The DPIR shall include an up-to-date listing of all anticipated permits or approvals required from other municipal, state or federal agencies, including a proposed application schedule. SD.31 A statement on the applicability of the Massachusetts Environmental Policy Act ("MEPA") should be provided. If the Proposed Project is subject to MEPA, all required documentation should be provided to the BPDA, including but not limited to, copies of the Environmental Notification Form, decisions of the Secretary of Environmental Affairs, and the proposed schedule for coordination with BPDA procedure. SD.32

2. PROJECT DESCRIPTION

- **Project Site.** The DPIR shall include a complete description of the Project Site including, at minimum, square footage of the sites, a map indicating the boundaries, a legal description including metes and bounds, existing site conditions, and the surrounding development context, i.e., a description of the surrounding environment including the height, other dimensions, use, and other relevant characteristics of existing nearby buildings, SD.33 as well as an inventory of surrounding proposed projects. Only projects that have completed or are currently undergoing Article 80 review should be included and should be included as proposed in their filings at the Boston Planning & Development Agency. SD.34 The Project Site, as defined in the DPIR, must be utilized for each Project Description and for any calculations or comparisons. SD.35
- **Project Description.** The DPIR shall contain a full description of the Proposed Project and any alternative(s) and their elements, including size, physical characteristics, FAR (utilizing the definition for calculation as provided for in the Boston Zoning Code), and proposed uses, including any uses planned or considered for all elements of the project during the summer months. SD.36

3. PROJECT ALTERNATIVES

The analyses as provided for in the Transportation Component, Environmental Protection Component, and Urban Design Component sections of this Scoping Determination, as well as any additional analysis specified by the BPDA, shall be required for the following alternatives:

- **Alternative 1.** No build as a means of measuring the baseline. SD.37
- **Alternative 2.** The Proposed Project as set forth in EPNF or as modified via formal notification to the BRA in advance of submission of the DPIR.
- **Alternative 3.** Any additional alternative or alternatives defined by the BPDA. The BPDA reserves the right to extend the requirement of any and all elements of the analysis described herein to an additional alternative.

4. TRANSPORTATION COMPONENT

The DPIR shall include a detailed traffic and transportation analysis that examines the Proposed Project's impact on the transportation network and proposes measures intended SD.38 to mitigate, limit, or minimize any adverse impact reasonably attributable to the Proposed Project. The scope of the analysis must utilize as its framework the Transportation Access Plan guidelines to be further defined in consultation with the Boston Transportation SD.39 Department ("BTD"). Pursuant to Section 80B-3.1 of the Boston Zoning Code, this section of the DPIR should contain, at a minimum, the following elements. Additional questions and required submissions have been added to the baseline requirements of Article 80 based on SD.40 concerns specific to the project and on comment letters. Not all items will apply to the Proposed Project. Please reach out to the Boston Transportation Department to discuss attached comment letter.

- **Traffic Management Element.** The Proponent shall work with BTD to identify applicable items of study:
    - Identify the Proposed Project's impact on the transportation network from expected travel volumes, vehicle trip generation, and directional distribution; the location of loading and unloading activities, including service and delivery; the Proposed Project's impact on the vehicular and circulation systems within the SD.41 impact area, including the number and type of vehicles, pedestrians, and bicyclists, vehicle occupancy rates (VOR), and the Proposed Project's impact on road corridors and intersection capacities, including Levels of Service and intersection delays from 6:00 a.m. to 8:00 p.m. and for any other times of day that significant activity is anticipated in the Proposed Project.
    - Inventory, map, and discuss on- and off-street loading, provide estimates of the level of loading and delivery activity, and describe in detail any special loading SD.42 policies and procedures to be implemented.
    - Identify mitigation procedures that are intended to mitigate, limit, or minimize the number of vehicle trips generated by the development, and the Proposed SD.43 Project's interference with the safe and orderly operation of the transportation

network; such measures may include an on-site traffic circulation plan, flexible employee work hours, dissemination of transit information, changes in traffic patterns, and full or partial subsidies for public mass transit. SD.43

- The DPIR shall describe Transportation Demand Management ("TDM") measures that are being considered for the Proposed Project. SD.44
- Review provisions for service and emergency vehicle access to the proposed dormitory building. SD.45

- **Parking Management Element.** The Proponent shall work with BTD to:
  - Identify the location of proposed drop-off/pick-up, short-term parking, loading, and queuing for both autos and trucks. If no queuing area is available for trucks, identify steps to be taken to avoid negative impacts, referencing the projected frequency of delivery activity and any operational procedures to ensure that deliveries are adequately timed and spaced out. SD.46
  - Identify the demand created by the Proposed Project for tenant, commuter, and short- and long-term visitor parking; non-tenant and other parking needs within the Impact Area; and evening and weekend parking needs SD.47
  - Include operational policies and strategies for the Proposed Project that addresses the location, cost, and number of public, private, high-occupancy vehicle, and special-needs parking demand; short-term and long-term space availability; pricing structure of parking rates; location and type of off-site parking; and methods of transporting people to the site from off-site parking SD.48
  - Document parking impacts of the Proposed Project. Describe alternative off-street parking locations for displaced parkers as necessary. SD.49

- **Article 80 Construction Management Element.** The Construction Management Element shall, at a minimum: SD.50
  - Identify the impact from the timing and routes of truck movement and construction deliveries for the Proposed Project; proposed street closings; and the need for employee parking.
  - Identify, and provide a plan for implementing, mitigation measures that are intended to mitigate, limit, or minimize, to the extent economically feasible, the construction impact of the Proposed Project by limiting the number of construction vehicle trips generated by the Proposed Project, the demand for construction-related parking (both on-site and off-site), and the interference of building construction with the safe and orderly operation of the Transportation Network, such measures to include the use of alternative modes of transport for employees and materials to and from the site; appropriate construction equipment, including use of a climbing crane; staggered hours for vehicular movement; traffic controllers to facilitate equipment and trucks entering and exiting the site; covered pedestrian walkways; alternative construction networks and construction planning; and restrictions of vehicular movement SD.51
  - Designate a liaison between the Proposed Project, public agencies, and the surrounding residential and business communities. SD.52

- **Pedestrian Analysis.** Address the adequacy of sidewalks and other pedestrian infrastructure in the area of the Proposed Project and potential safety issues at pedestrian crossings. Propose improvements to facilitate pedestrian circulation to and around the Proposed Project and ways that development can improve the overall pedestrian circulation system of the neighborhood. SD.53
- **Mitigation.** Identify measures to mitigate any transportation impacts identified in the preceding sections. SD.54

5. ENVIRONMENTAL PROTECTION COMPONENT

The DPIR shall contain an Environmental Protection Component as outlined below. Opportunities for sustainable design, as well as other issues, are described in the written comments from public agencies. These comments are included in Appendix 2 and are incorporated herein by reference and made a part hereof. The analyses as provided for in the Environmental Protection Component section of this Scoping Determination shall be required for each of the alternatives. SD.55

- **Wind.** A quantitative wind tunnel analysis of the potential pedestrian level wind impacts shall be required for the DPIR. This analysis shall determine potential pedestrian level winds adjacent to and in the vicinity of the project site and shall identify the projected annual wind speeds for each season at each location. SD.56 Expected wind levels should be reported using the amended Melbourne scale. SD.57 The DPIR shall identify any areas where wind velocities are expected to exceed acceptable levels, including the BRA's guideline of an effective gust velocity of 31 mph not to be exceeded more than 1% of the time. SD.58

  Particular attention shall be given to areas of pedestrian use, including, but not limited to, the entrances to the proposed buildings and existing buildings in the vicinity of the Proposed Project, the sidewalks and walkways within and adjacent to the Proposed Project's development and in the vicinity of the proposed development. Specific locations to be evaluated shall be determined in consultation with the BRA and the City of Boston Environment Department. SD.59

  For areas where wind speeds are projected to exceed acceptable levels, measures to reduce wind speeds and to mitigate potential adverse impact shall be identified and tested in the wind tunnel to quantify the expected benefit. SD.60 Should the qualitative analysis indicate the possibility of excessive or unacceptable pedestrian level wind speeds, additional study may be required. SD.61

  The wind tunnel testing shall be conducted in accordance with the following guidelines and criteria:
  - Data shall be presented for both the existing (no-build) and for the future build scenario(s) (see above). SD.62
  - The analysis shall include the mean velocity exceeded 1% of the time and the effective gust velocity exceeded 1% of the time. The effective gust velocity shall be computed as the hourly average velocity plus 1.5 x root mean square variation SD.63

about the average. An alternative velocity analysis (e.g., equivalent average) may SD.63
be presented with the approval of the Authority.

- Wind direction shall include the sixteen compass points. Data shall include the
  percent or probability of occurrence from each direction on seasonal and annual SD.64
  bases.
- Results of the wind tunnel testing shall be presented in miles per hour (mph). SD.65
- Velocities shall be measured at a scale equivalent to an average height of 4.5-5
  feet. SD.66
- The model scale shall be such that it matches the simulated earth's boundary and SD.67
  shall include all buildings within at least 1,600 feet of the project site. All buildings
  taller than 25 stories and within 2,400 feet of the project site should be placed at SD.68
  the appropriate location upstream of the project site during the test. The model
  shall include all buildings recently completed, under construction, and planned SD.69
  within 1,500-2,000 feet of the project site. Prior to testing, the model shall be
  reviewed by the Authority. Photographs of the area model shall be included in SD.70
  the written report.
- The written report shall include an analysis which compares mean and effective
  gust velocities on annual and seasonal bases, for no-build and build conditions, SD.71
  and shall provide a descriptive analysis of the wind environment and impacts for
  each sensor point, including such items as the source of the winds, direction,
  seasonal variations, etc., as applicable. The report shall also include an analysis
  of the suitability of the locations for various activities (e.g., walking, sitting, SD.72
  standing, driving etc.) as appropriate, in accordance with Melbourne comfort
  categories.
- The report also shall include a description of the testing methodology and the
  model, and a description of the procedure used to calculate the wind velocities SD.73
  (including data reduction and wind climate data). Detailed technical information
  and data may be included in a technical appendix but should be summarized in
  the main report.
- The pedestrian level wind impact analysis report shall include, at a minimum, the
  following maps and tables: SD.74
  - Maps indicating the location of the wind impact sensors, for the existing
    (no-build) condition and future build scenario(s).
  - Maps indicating mean and effective gust wind speeds at each sensor
    location, for the existing (no-build) condition and each future build SD.75
    scenario, on an annual basis and seasonally. Dangerous and unacceptable
    locations shall be highlighted.
  - Maps indicating the suitability of each sensor location for various
    pedestrian-related activities (comfort categories), for the existing (no-build)
    condition and each future build scenario, on an annual basis and
    seasonally. To facilitate comparison, comfort categories may be SD.76
    distinguished through color coding or other appropriate means. In any
    case, dangerous and unacceptable conditions shall be highlighted.

- Tables indicating mean and effective gust wind speeds and the comfort category at each sensor location, for the existing (no build) condition and for each future build scenario, on an annual basis and seasonally. SD.77
- Tables indicating the percentage of wind from each of the sixteen compass points at each sensor location, for the existing (no-build) condition and for each future build scenario, on an annual basis and seasonally. SD.78
- All maps should include a north arrow and be oriented and of the same scale as shadow diagrams. SD.79

- **Shadow.** A shadow analysis shall be required for existing and build conditions for the hours 9:00 a.m., 12:00 noon, and 3:00 p.m. for the vernal equinox, summer solstice, autumnal equinox, and winter solstice and for 6:00 p.m. during the summer and autumn. SD.80 This analysis should use the same metrics as applied by Mass. DEP for Chapter 91 shadow analyses and include documentation of net new shadows lasting more than one hour. SD.81 It should be noted that due to time differences (daylight savings vs. standard), the autumnal equinox shadows would <u>not</u> be the same as the vernal equinox shadows and therefore separate shadow studies are required for the vernal and autumnal equinoxes. SD.82 Shadows shall be determined using the Boston Altitude and Azimuth data (Sun Altitude/Azimuth Table, Boston, Massachusetts). SD.83

  The shadow impact analysis must include net new shadow as well as existing shadow. Diagrams must clearly show the incremental impact of the proposed new buildings. For purposes of clarity, new shadow should be shown in a dark, contrasting tone distinguishable from existing shadow. SD.84 The shadow impact study area shall include, at a minimum, the entire area to be encompassed by the maximum shadow expected to be produced by the Proposed Project (i.e., at the winter solstice). SD.85 The build condition shall include all buildings under construction and any proposed buildings anticipated to be completed prior to completion of the Proposed Project. SD.86 Shadow from all existing buildings within the shadow impact study area shall be shown. SD.87 A North arrow shall be provided on all figures and street names, doorways, bus stops, open space and areas where pedestrians are likely to congregate (in front of historic resources or other tourist destinations, for example) should be identified. SD.88

  Particular attention shall be given to areas of pedestrian use, including, but not limited to, the entrances to the project buildings and existing buildings in the vicinity of the Proposed Project, the sidewalks and walkways within and adjacent to the Proposed Project development. SD.89

  The DPIR should propose mitigation measures to minimize or avoid any adverse shadow impact. SD.90

- **Combined Wind and Shadow Impacts.** Figures depicting no-build and build wind monitoring locations should be of an orientation and scale consistent with that used for shadow diagrams so that the cumulative effect of wind and shadow can be determined. SD.91
- **Daylight.** A daylight analysis for both build and no-build conditions shall be conducted by measuring the percentage of skydome that is obstructed by the Proposed Project and evaluating the net change in obstruction. SD.92 The study should treat two elements as controls for data comparisons: existing conditions and context examples. Daylight SD.93

analyses should be taken for each major building facade fronting these essentially public SD.94
ways or open spaces. The midpoint of each public accessway or roadway should be taken SD.95
as the study point. The BRADA program must be used for this analysis. SD.96

- **Solar Glare.** Please refer to the BRA's Environmental Review comment letter. SD.97
- **Air Quality.** Please refer to the BRA's Environmental Review Comment letter. SD.98

- **Solid and Hazardous Wastes.** The presence of any contaminated soil or groundwater
and any underground storage tanks at the project site shall be evaluated and SD.99
remediation measures to ensure their safe removal and disposal shall be described. Any
assessment of site conditions pursuant to the requirements of M.G.L. Chapter 21E that
has been or will be prepared for the site shall be included in the DPIR (reports may be SD.100
included in an appendix but shall be summarized in detail, with appropriate tables and
figures, within the main text). Materials in the building to be demolished should be
characterized and measures to mitigate impacts during demolition should be identified. SD.101

  The DPIR shall quantify and describe the generation, storage, and disposal of all solid SD.102
wastes from the construction and operation of the Proposed Project. The DPIR shall
identify the specific nature of any hazardous wastes that may be generated and their SD.103
quantities and shall describe the management and disposal of these wastes. In addition,
measures to promote the reduction of waste generation and recycling, particularly for SD.104
paper, glass, plastics, metals, and other recyclable products, and compliance with the
City's recycling program, shall be described in the DPIR.

- **Noise.** The DPIR shall establish the existing noise levels at the project site and vicinity
based upon a noise-monitoring program and shall calculate future noise levels after
project completion based on appropriate modeling and shall demonstrate compliance SD.105
with the Design Noise Levels established by the U.S. Department of Housing and Urban
Development for residential and other sensitive receptors and with all other applicable
Federal, State, and City of Boston noise criteria and regulations. Any required mitigation SD.106
measures to minimize adverse noise impacts shall be described.

  An analysis of the potential noise impacts from the project's mechanical and exhaust
systems, including emergency generators, and compliance with applicable regulations of SD.107
the City of Boston shall be required. A description of the project's mechanical and SD.108
exhaust systems and their location shall be included. Measures to minimize and
eliminate adverse noise impacts on nearby sensitive receptors, including the project SD.109
itself, from mechanical systems and traffic shall be described.

  The DPIR should identify the potential for adverse noise impacts stemming from
building activities and occupants, referencing any noise impacts from THE PROPONENT's SD.110
other buildings and any relevant similarities or differences between those facilities and
the Proposed Project, e.g., operable windows.

- **Nighttime Lighting.** The DPIR should explain, in text or graphics as appropriate: SD.111

- The type of exterior lighting to be used on each façade or other portion of the building and the elements of the design that mitigate nighttime lighting impacts of the building on surrounding areas. SD.111
- The DPIR should specify the type of interior lighting (i.e. fluorescent vs. incandescent, recessed or not) to be used in each portion of the building and, in the case of the common areas and non-residential portions of the program, the hours that the lighting will be on. The DPIR should also discuss the measures being taken to minimize the impact of interior lighting on the surrounding areas. SD.112 SD.113

- **Stormwater Management/Water Quality.** Stormwater management requirements and suggestions are included in the section on environmental sustainability below. SD.114
- **Flood Hazards/Wetlands.** Describe any affected flood hazard zones or wetlands and proposed actions. SD.115
- **Tidelands/Chapter 91.** Demonstrate that the Projects are in compliance with Massachusetts' Chapter 91 Tidelands Program. SD.116
- **Geotechnical Impact/Groundwater.** A description and evaluation analysis of existing sub-soil conditions at the project site, groundwater levels, potential for ground movement and settlement during excavation and foundation construction, and potential impact on adjacent buildings, utility lines, and the roadways shall be required. This analysis shall also include a description of the foundation construction methodology, the amount and method of excavation, and measures to prevent any adverse effects on adjacent buildings, utility lines, and roadways. Measures to ensure that groundwater levels will be maintained and will not be lowered during or after construction also shall be described. In addition, the geotechnical analysis shall evaluate the earthquake potential in the project area and shall describe measures to be implemented to mitigate any adverse impacts from an earthquake event. SD.117 SD.118 SD.119 SD.120
- **Construction Impacts.** A construction impact analysis shall include a description and evaluation of the following:
  - Measures to protect the public safety.
  - Potential dust and pollutant emissions and mitigation measures to control these emissions.
  - Potential noise generation and mitigation measures to minimize increase in noise levels.
  - Location of construction staging areas and construction worker parking; measures to encourage carpooling and/or public transportation use by construction workers. SD.121
  - Construction schedule, including hours of construction activity.
  - Access routes for construction trucks and anticipated volume of construction truck traffic.
  - Construction methodology (including foundation construction), amount and method of excavation required, disposal of the excavate, description of foundation support, maintenance of groundwater levels, and measures to prevent any adverse effects or damage to adjacent structures and infrastructure.

- Method of demolition of the existing building on the project site and disposal of the demolition debris.
- Potential for the recycling of construction and demolition debris, including asphalt from the existing parking lots.
- Measures to make construction fencing as attractive as possible to ensure the visual character of the streetscape. SD.121
- Identification of best management practices to control erosion and to prevent the discharge of sediments and contaminated groundwater or stormwater runoff into the City's drainage system during the construction period.
- Impact of project construction on rodent populations and description of the proposed rodent control program, including frequency of application and compliance with applicable City and State regulatory requirements.

6. URBAN DESIGN COMPONENT

The Proponent will be expected to undertake design review on the Proposed Project in accordance with standard BPDA procedure. In addition to the BPDA's Urban Design Department, the Boston Civic Design Commission (BCDC) will review the Proposed Project. The DPIR should also respond to the following elements.

- **Signage and Lighting.** The Proponent will be required to perform design review with SD.122
  the BPDA Urban Design Department on any current and future plans for signage and lighting.
- **Views.** The DPIR shall present views of the Proposed Project from locations to be SD.123
  determined through consultation with the BPDA's Urban Design Department.
- **Relationship to Surrounding Context.** The DPIR should describe the design of the
  Proposed Project in relationship to the surrounding urban context, including adjacent SD.124
  buildings, streets, and plazas.
- **Design Submission Requirements.** The following urban design materials for each Proposed Project schematic design must be submitted for the DPIR. Materials must be
  at the required scale and in a printed form that is reproducible, as well as in electronic SD.125
  file form:
  - A written description of program elements and space allocation for each element.
  - Black and white 8"x10" photographs of the site and neighborhood. SD.126
  - Plans and sections for the area surrounding the project at an appropriate scale (1"=100' or larger) showing relationships of the Proposed Project to the
    surrounding area and district regarding massing, building height, open space, SD.127
    major topographic features, pedestrian and vehicular circulation, and land use.
  - Sketches and diagrams of alternative proposals to clarify design issues and SD.128
    massing options.
  - Eye-level perspectives showing the proposal in the context of the surrounding
    area; views should display a particular emphasis, on important viewing areas such SD.129

as key intersections, accessways, or public parks/attractions. Long-ranged (distanced) views of the Proposed Project must also be studied to assess the SD.130
impact on the skyline or other view lines. At least one bird's-eye perspective SD.131
should also be included. All perspectives should show (in separate comparative SD.132
sketches) both the build and no-build conditions. The BPDA must approve the view locations before analysis is begun. View studies should be cognizant of light SD.133
and shadow, massing and bulk.

- Aerial views of the project in perspective or isometric form. SD.134
- A site plan at 1 "= 16' or larger showing:
    - Relationships of proposed and existing adjacent buildings and open spaces.
    - Open spaces defined by buildings on adjacent parcels and across streets.
    - Location of pedestrian ways, driveways, parking, service areas, streets, and major landscape features. SD.135
    - Accessible pedestrian, vehicular, and service access and flow through the parcel and to adjacent areas.
    - Phasing possibilities clearly indicating the scheme for completing the improvements.
    - Construction limits.
- Site sections at 1"=16' or larger showing relationships to adjacent buildings and spaces. SD.136
- A massing model at 1"=40' showing all buildings in the area and a study model at 1"=16' showing facade design. SD.137
- Drawings at an appropriate scale (e.g., 1"=8') describing architectural massing, facade design, and proposed materials including:
    - Site plans before and after construction. SD.138
    - Elevations in the context of the surrounding area.
    - Sections showing organization of functions and spaces.
    - Building plans showing ground floor and typical upper floor.
- A site survey at 1"=40' showing nearby structures, utilities and benchmarks. SD.139
- A written and/or graphic description of the building materials and its texture, color, and general fenestration patterns is required for the proposed development. SD.140
- Electronic files describing the site and Proposed Project at Representation Levels one and two ("Streetscape" and "Massing") as described in the document Boston "Smart Model": CAD & 3D Model Standard Guidelines. SD.141
- The schedule for submittal of Design Development materials. SD.142

7. ENVIRONMENTAL SUSTAINABILITY

New development of the size and complexity of the Proposed Project presents opportunities for sustainable design and construction to prevent damage to the environment, consistent with the goals of Executive Order 385 and recent initiatives of the Mayor and the BPDA. Opportunities for sustainable design are described below and are incorporated herein by reference and made a part hereof. Not all the topics below need be addressed in the DPIR; rather, some of them constitute suggestions that can be discussed through the design process in conjunction with the BPDA and the Environment Department.

- **Building Orientation, Envelope, and Façade Design.** Reduce thermal loads entering SD.143
the building as much as possible. Consider the building orientation, envelope, and design SD.144
carefully, including glazing selection, window and door shading, wall construction, roof
color, and building shape. Make use of thermal mass to absorb heat and shift peak SD.145
heating to off-peak hours. Building massing and façade treatment should respond to SD.146
microclimate conditions and enhance appropriate solar control. The DPIR should SD.147
describe any simulation designed to quantify the effects of these design choices.
- **Energy.** Energy conservation strategies should be explored at an early stage in the design and should include such approaches as taking advantage of natural day lighting, passive solar gain, passive cooling and ventilation which tie into HVAC systems, use of SD.148
alternative energy strategies (including making the building design adaptable for the future inclusion of innovative energy and environmental technologies as they develop over time), in addition to properly sized efficient heating and ventilating systems, with
heat recovery and other conservation strategies. Siting, orientation and massing of SD.149
building should optimize passive strategies for light and energy management and design
for natural and displacement ventilation. Building design should specify energy efficient SD.150
HVAC and lighting systems, appliances, and other equipment, and solar preheating of
makeup air. Early quantification and cost-benefit analysis through iterative energy SD.151
simulation is helpful and would provide feedback on size of systems and envelope design early enough to impact those decisions.
- **Water Management.** Sustainable water management practices should be considered
early in the site and building design process, and the process should explore integrated SD.152
approaches to stormwater retention, treatment, and reuse, building and landscape water needs, and groundwater recharge. To the extent possible, the systems put in place
should strive to work with the natural hydrology of the area, and the building should SD.153
incorporate additional opportunities to conserve water beyond water-saving technologies required by law.

  Possibilities for using graywater for functions that are conventionally served by
potable water should be explored. Stormwater captured from impervious areas or from SD.154
roofs and hardscapes can be used for non-potable water uses.

  The DPIR shall contain an evaluation of the project site's existing and future SD.155
stormwater drainage and stormwater management practices. The DPIR shall illustrate
existing and future drainage patterns from the project site and shall describe and SD.156
quantify existing and future stormwater runoff from the site and the Proposed Project's impacts on site drainage. The Proposed Project's stormwater management system,
including best management practices to be implemented, measures proposed to control SD.157

and treat stormwater runoff and to maximize on-site retention of stormwater, measures to prevent groundwater contamination, and compliance with the Commonwealth's Stormwater Management Policies, also shall be described. SD.157 The DPIR shall describe the project area's stormwater drainage system to which the project will connect, including the location of stormwater drainage facilities and ultimate points of discharge. SD.158

The DPIR shall respond to the comments from the Boston Water and Sewer Commission, which are contained in Appendix 2 and incorporated herein by reference. SD.159

8. HISTORIC RESOURCES COMPONENT

The DPIR should summarize any historic resources that will be affected by the Proposed Project, the position of public agencies on those resources (including any necessary regulatory process) and present a plan to minimize the adverse impact of the Proposed Project. SD.160

9. INFRASTRUCTURE SYSTEMS COMPONENT

The DPIR must include an infrastructure impact analysis. SD.161

The discussion of the Proposed Project's impacts on infrastructure systems should be organized system-by-system as suggested below. The DPIR must include an evaluation of the Proposed Project's impact on the capacity and adequacy of existing water, sewerage, energy (including gas and steam), and electrical communications (including telephone, fire alarm, computer, cable, etc.) utility systems, and the need reasonably attributable to the Proposed Project for additional systems or facilities. SD.162 Thorough consultation with the planners and engineers of the utilities will be required and should be referenced in the Infrastructure Component section. SD.163

Any system upgrading or connection requiring a significant public or utility investment, creating a significant disruption in vehicular or pedestrian circulation, or affecting any public or neighborhood park or streetscape improvements, constitutes an impact which must be mitigated. SD.164

- **Water and Sewer.** Provide the following information on the Proposed Project's impacts on water and sewer infrastructure and on water quality. As appropriate, this information can be integrated with the sustainability sections of the IMP and the DPIR.
    - Estimated water consumption and sewage generation from the Proposed Project and the basis for each estimate. Include separate calculations for air conditioning system make-up water. SD.165
    - Description of the capacity and adequacy of water, sewer, and storm drain systems and an evaluation of the impacts of the Proposed Project on those systems. SD.166

- Description of the Proposed Project's impacts on the water quality of Boston Harbor or other water bodies that could be affected by the projects, if applicable. SD.167
- Description of mitigation measures to reduce or eliminate impacts on water quality. SD.168
- Description of impact of on-site storm drainage on water quality; if this is described more fully in another section, reference that analysis here. SD.169
- Detail methods of protection proposed for infrastructure conduits and other artifacts, including BSWC sewer lines and water mains, during construction. SD.170
- Detail the energy source of the interior space heating; how obtained, and, if applicable, plans for reuse of condensate. SD.171
- Identification of measures to conserve resources, including any provisions for water recycling. SD.172

- **Energy Systems.** The DPIR should discuss the Proposed Project's approach to energy systems and conservation. As appropriate, this information can be integrated with the sustainability sections of the IMP Amendment and the DPIR. The discussion should include at a minimum the following: SD.173
  - Description of all energy (heat, electrical, cooling, etc.) requirements of the project and evaluation of the Proposed Project's impacts on resources and supply. SD.174
  - Description of measures to conserve energy usage and consideration of the feasibility of including solar energy provisions or other on-site energy provisions. SD.175
- **Other Systems.** The DPIR should also discuss emergency systems, gas, steam, optic fiber, cable, and any other systems impacted by the Proposed Project. The location of transformer and other vaults required for electrical distribution or ventilation must be chosen to minimize disruption to pedestrian paths and public improvements both when operating normally and when being serviced and must be described. SD.176

OTHER

- **Public Notice.** The Proponent will be responsible for preparing and publishing in one or more newspapers of general circulation in the city of Boston a Public Notice of the submission of the DPIR to the BRA as required by Section 80A-2. This Notice shall be published within five (5) days after the receipt of the DPIR by the BRA. In accordance with Article 80, public comments on the DPIR shall be transmitted to the BRA within forty-five (45) days of the publication of this notice. A sample form of the Public Notice is attached as Appendix 3. Following publication of the Public Notice, The Proponent shall submit to the BRA a copy of the published Notice together with the date of publication. SD.177

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?

Mode Shift

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.

Expanding Access

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. 1.1

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. 1.2

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. 1.3

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. 1.4

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 1.4
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 1.5
the bike parking rooms.

Bikeshare Requirements

In accordance with [BTD's Bike Parking Guidelines] the Proponent will be asked to make a 1.6
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 1.7
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 1.8
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 1.9
consolidated where possible. Further, the sidewalk must continue flush across the
driveway to maintain pedestrian accessibility. 1.10

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. 1.11

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 1.12
developed by BTD.

boston planning & development agency

To: Nupoor Monani, Senior Institutional Planner and Project Manager
From: BPDA Urban Design
Date: May 3, 2021
RE: Harvard Enterprise Research Campus Phase A

At the Harvard Enterprise Research Campus, Tishman Speyer proposes a 900,000 sf mixed-use complex of hotel, residential, lab, conference, and retail/restaurant buildings on a site on Western Avenue. The proposal reorients the approved Planned Development Area from both sides of the future Cattle Drive to fill the space roughly bordered by Western Avenue, Cattle Drive, East Drive, and DEF Drive.

BPDA Planning and Urban design have appreciated working thus far with the development team on their proposal for Phase A of the Harvard ERC. The project's scale and significant location as the beginning of modern development south of Western Avenue will be transformative for the neighborhood. The scoping comments below reflect some of the early issues pertaining to site design, access and circulation, and urban design. Due to the scale of the proposal and its significant location in a developing neighborhood, the BPDA will continue to provide feedback throughout an iterative and collaborative process with the development team, the community, and other City agencies.

Urban Design and Planning Comments

In addition to the more detailed comments below, it is important to underscore some of the overarching goals that should continue to inform the design process.

- The Framework Plan, while not a regulatory document, is a key component of the planning, design, and review process for this area. While the Framework Plan is Harvard's product, not Tishman Speyer's, the ERC must evolve with the Framework Plan to provide a strong, new context for the further development of the area covered by the Framework Plan. 2.1
- For years the Greenway has constituted a central organizing element of Harvard's planning, and one that has been embraced by residents and the BPDA alike. The Greenway should drive the placement and design of buildings, not vice versa. 2.2
- A central goal from the time of the 2005 Strategic Framework for Planning through today has been the creation of a Harvard campus (whether academic or commercial in nature) that is welcoming to the public. The current proposal does much to implement this goal; however, the aim of creating a new neighborhood that is integrated with the rest of North Allston physically and that draws in all residents and visitors must continue to inform design and programming decisions. 2.3

We would like to note that we will expect detailed design drawings for the DPIR stage in
order to provide in-depth comments on site, landscape, and architectural design, as well as
access and circulation. To this point we have not seen as much development in the project 2.4
as we would typically expect to by this point in the process, which means there are likely to
be additional rounds of comment. Issues listed below are grouped by topic area:

Site Design

- Detailed landscape plan, illustrating existing and proposed trees, and topography 2.5
  should be provided.
- The primary objective of the site design should be creating an environment that is 2.6
  open to the public and setting up the rest of the Framework plan area for successful
  development.
- A site design that puts focus on the public realm, hierarchy of public and private
  open spaces and the pedestrian connections on the site with respect to 2.7
  programming of the ground floor of all proposed and existing buildings is
  encouraged.
- Locations of buildings should frame designed public spaces that are accessible and 2.8
  welcoming to both current and future residents of the neighborhood.
- The buildings should relate to each other on the site, creating various scale plazas 2.9
  and open spaces for the public enjoyment.
- Open space should be designed as such. Currently, the plan shows spaces that feel
  like the areas leftover once building footprints were determined. How can the 2.10
  building footprints be adjusted to help make the open spaces intentional.
- The greenway devolves to a very narrow dimension at the intersection of Cattle
  Drive. What is the design expression here -- does it read as being part of the
  Greenway, Cattle Drive, or is there a third vernacular (perhaps, a square?) that
  defines the intersection of these two systems? And if a square, how can the design 2.11
  and shape of the adjacent buildings help to define this new public square as a place
  in its own right, separate from the Cattle Drive street room and Greenway
  experiences?
- What is the expression of the Greenway north of Science Drive given that there is a
  thermal utility running alongside it? Will street trees be feasible, what is the planting 2.12
  strategy?
- What is the expression of the street rooms along Cattle Drive and what are the
  strategies or elements being used to ensure that they read as a continuous network 2.13
  of spaces? How will these set up future development south of the ERC.
- What is the expression of the Greenway at its widest dimension on the eastern
  edge? Given that there are no utility constraints in this area, we would like to see 2.14
  this being used for trees and other planting.
    - East Drive has been intended as a major vehicle route. How will the
      greenway and multi use path be designed to safely cross it? 2.15
- Provide a drawing that has dimensions of the Greenway and identifies elements
  that will help to establish its various intended programs. 2.16

- Pedestrian paths should provide safe, well lit, and welcoming access throughout the site. Provide sufficient dimension for separated bicycle and pedestrian pathways. 2.17

Urban Design

- The massing strategy that results in a major loading entrance on Cattle Drive and a wide-open space around the Conference Center on East Drive is still curious, even understanding the desired association with the Business School. How does this massing reinforce the Framework plan of a major traffic corridor on East Drive and the primary retail spine on Cattle Drive. 2.18
- The amount of proposed ground floor activation/retail in Phase A seems high for what we know about retail in the area. This combined with much of the retail access and visibility being located away from Cattle Drive may be pulling the center of gravity into the site and away from the street. Provide more information about how the project will support the level of proposed retail and the location. 2.19
- The exposed parking garage at the western edge of Phase B is not desirable. Can this be screened with additional residential uses? If the existing PDA boundary poses a dimensional constraint, please explore a potential redefinition of the PDA Master Plan Area that shows the boundary realignment that would be needed to accommodate a fully covered parking garage. 2.20
- Please provide a detailed drawing showing drop offs, entrances, and driveways to the project from Western Ave. and Cattle Drive. 2.21
- Care should be taken to minimize the impact of the proposed service entries on Cattle Drive and Science Drive to keep the continuity of the pedestrian public realm (at the street rooms and the Greenway, respectively) 2.22
- Continue to explore secondary streets like DEF Drive that can be the location of services. 2.23
- Provide detailed information about each building proposal, including access, program locations, loading, and more information on design strategy. 2.24
- Provide renderings of the edges of Phase A and of all open spaces. 2.25
- Architectural expression of all facades should be clarified. 2.26

We reserve the right to add additional comments and concerns during the course of the process of combined BPDA and BCDC review, which may affect the responses detailed in DPIR. The following urban design materials for the Proposed Project's schematic design must be submitted for the DPIR: 2.27

- Written description of program elements and space allocation for each element.
- Detailed site plan with topography, circulation both pedestrian and vehicular, existing and proposed buildings, and all open space. In particular show/explain the edges of the project and how these are setting up future development. 2.28
- Detailed landscape plan, illustrating proposed trees, and topography. 2.29
- Elevations, sections (at different scales including extending well beyond the site to show the context/lack of context) and 3D views illustrating the relationships of the 2.30

proposed structures to the neighborhood, especially along existing and proposed streets. 2.30

- Eye-level perspectives showing the proposal, including public areas and plazas. 2.31
- Project phasing diagram. 2.32

Article 37 Interagency Green Building Committee

April 2, 2021

Tishman Speyer ERC Developer, L.L.C.
Jessica Hughes, Managing Director
C/o Tishman Speyer
125 High Street
Boston, MA 02110

Re: Harvard Enterprise Research Campus, 100-110 Western Avenue, Allston
Article 37, Green Buildings – Initial Filing Comment Letter

Dear Ms. Hughes:

The Boston Interagency Green Building Committee (IGBC) has reviewed the Project Notification Form (PNF) and Climate Resiliency Checklist submitted in conjunction with this project for compliance with Boston Zoning Article 37, Green Buildings. The project is 900,000 square feet of mixed-use development consisting of residential, office, research and development/lab, hotel, conference center, restaurant, retail, parking and service use in six buildings, with over two acres of public open space. It will be sited on Planned Development Area (PDA) 115, which is owned by Harvard University. The Harvard Allston Land Company (HALC), a subsidiary of Harvard University, executed the lease with Tishman Speyer for the development.

The PNF indicates that the project will seek LEED v4 Gold eligibility as follows:

- **Core & Shell Lab/Office**: LEED for Core & Shell Developments (LEED-CS), with 66 points and 16 'Maybe' points in the Scorecard typology for two buildings;
- **Multi-Family Residential**: LEED for New Construction and Major Renovations, with 60 points and 19 'Maybe' points in the Scorecard typology for two buildings;
- **Hotel**: LEED-NC for Hospitality, with 60 points and 19 'Maybe' points in the Hotel typology Scorecard; and
- **Conference Center:** LEED -NC, with 63 points and 25 'Maybe' points in the Conference Center typology Scorecard.

The IGBC accepts the proposed rating system selections. The high number of possible additional points in typology suggests that Platinum may be achievable for several buildings. We encourage Tishman Speyer to set a bold example for all of Allston Landing. 3.1

<u>Greenhouse Gas Emissions</u>

In support of the City of Boston's Resiliency and GHG emissions reduction goals, including
Carbon Neutral by 2050, the IGBC requests: 3.2

- Maximized Solar Energy System – optimize roof design and height for installed Solar PV systems.
- Enhanced Building Envelope – reduced air infiltration (ACH below 0.6), increased opaque curtain wall insulation (below U-0.05), improved vision curtain wall performance (below U-0.20), improved window performance (below U-0.20), tuned glazing with Solar Heat Gain Coefficient (below SGHC 0.30), and increased insulation levels for roof (R-60 c.i.), wall (R-30+ with c.i.), and slab (R-7.5 c.i.) conditions. 3.3
- Optimized Building Systems – smaller, more efficient and alternative heating, cooling, dedicated fresh air with ERV and hot water systems that fully consider the improved envelope performance. 3.4
- An all electrical building with state-of-the-art energy management systems. 3.5

The energy model in the PNF compares a base and design case. The next step is the Carbon
Neutral Building Assessment that details a potential high-performance net zero carbon building 3.6
design. An updated model should include multiple solution packages for achieving carbon 3.7
neutral and all electric building performance. Upon preparation of the Carbon Neutral Building
Assessment please contact us through Nupoor Monani of the BPDA to schedule an IGBC
meeting to review the assessment, discuss the District Energy Microgrid Feasibility Study and to 3.8
finalize mitigation strategies.

Please identify utility and state energy efficiency and renewable/clean energy assistance resources, including energy modeling and MassSave Passive House programs, and provide information on any support that will be afforded to the project. 3.9

A Resiliency Report Summary should be generated and updated online for each building. 3.10

Please follow up with Ms. Monani in responding to IGBC comments and the provision of the requested information and items. 3.11

Please let me know if you have any questions or if I can be of assistance.

Maura T. Zlody, LEED AP: BD+C
On behalf of the Interagency Green Building Committee

Cc: Nupoor Monani, Project Manager, BPDA
Benjamin Silverman, CPHC, LEED AP: BD+C
Manuel Esquivel

TO: Nupoor Monani, Senior Institutional Planner
FROM: John (Tad) Read, Senior Deputy Director for Transportation & Infrastructure Planning
Manuel Esquivel, Senior Infrastructure & Energy Planner
Anna Demina, Smart Utilities Program - Associate
DATE: March 9, 2021
SUBJECT: Harvard Enterprise Research Campus – **Smart Utilities Comments – PNF**

BOSTON SMART UTILITIES

Comments and request for additional information:

Thank you for submitting a preliminary Utility Site Plan. Below you can find our comments and requests for the additional information necessary for the on-going Smart Utilities Review. Please send the information to Manuel Esquivel via smartutilities@boston.gov and include it in any future filings.

1) **Utility Site Plan**:
   a) Smart Street Lights:
      i) Thank you for identifying the location of street lighting and shadow conduit on Cattle Drive. Please include a line to represent the conduit and label it appropriately in the Key of the diagram. The conduit should extend to the limits of work. 4.1
      ii) Will you carry out significant sidewalk reconstruction along Western Avenue? If so, please also add sidewalk shadow conduit along Western Avenue. 4.2
      iii) For any sidewalks where you identify shadow conduit, please also identify the following:
         (1) Where this conduit could receive power/fiber from the respective electrical utility and telecom utility on the ROW. (Note: the tie-in into the utility service is not required, but we are interested in making sure that planning for the interconnection of both utilities has taken place as part of the design.) 4.3
         (2) Where the handholes for these two conduits would be located. Handholes should be located at least at the nodes of the conduit, where the conduit will connect to the utility service, and at the base of any pertinent street lights. (Note: PIC is currently recommending one dual handhole for these conduits.) 4.4
   b) Green Infrastructure:
      i) Thank you for identifying the location of the infiltration chamber. Please identify the corresponding volume of the infiltration chamber on the Utility Site Plan. 4.5
      ii) Thanks for identifying the location of additional green infrastructure on the sidewalks. Please also show existing and proposed trees. 4.6
      iii) Please begin a Smart Utilities Checklist by filling out Part 1 (basic project information) and Part 4 (Green Infrastructure). Specify the types of Green Infrastructure that will be included. 4.7

c) Telecom Ductbank:
   i) Will the proposed telecom ductbank include shadow conduit for the City? 4.8
   ii) Does the proposed duct bank have enough capacity for future developments in the PDA area? 4.9

d) Other:
   i) Gas meters: Show the location of the gas meters and whether they are located inside or outside the building. 4.10
   ii) Electrical Transformers: Please include the proposed location of any electrical transformers on site. 4.11
   iii) Please include in your USP any infrastructure needed to comply with the City of Boston EV Readiness Policy for New Developments. This may include EV chargers, additional electrical services, transformers, empty conduit, etc. 4.12

2) District Energy Microgrid Feasibility Assessment and Master Plan:

a) As identified in the PNF, this project should prepare a District Energy Microgrid Feasibility Assessment that leads to a District Energy Microgrid Master Plan. We will soon request a kick-off meeting with the project proponent in order to lay the ground for the first part of the study, the Screening Analysis. 4.13
b) The technologies to be prioritized in the Screening Analysis include: 4.14
   i) Swear heat recovery
   ii) Ground-source heat pumps (study potential wells located on both the private parcels and under public streets).
   iii) PV + Battery Storage for the site as a whole.
c) The Screening Analysis should look at the phasing of the development, including *buildings, streets, and applicable infrastructure*. 4.15
d) The screening analysis should estimate available energy from the three technologies identified above and well as building energy loads. 4.16

3) Report of Potential Conflicts:

a) Please provide the report of potential conflicts generated by entering your project into the City of Boston Utility Coordination Software (COBUCS). If any conflicts are identified, we would then request information on how the team plans to address these conflicts with the relevant entities. 4.17

4) Smart Utilities Checklist:

a) Please begin a Smart Utilities Checklist (basic information) for your project and fill out Part 4 of the Checklist (as requested above) 4.18
b) After receiving and reviewing the other information requested above, we may ask that some of the design elements for the other items (i.e., design of sidewalk shadow conduit) are memorialized by submitting an update to the Smart Utilities Checklist. We can guide the team more efficiently towards the section(s) of the Checklist that would be necessary after the information above has been received and reviewed. 4.19

If you would like to discuss any updates of your project or specific aspects of the Smart Utilities Program that are applicable to your project, please feel free to contact Manuel Esquivel via smartutilities@boston.gov.

****

Smart Utilities Program Background and Context:

On June 14, 2018 the BPDA Board adopted the *Smart Utilities Policy for Article 80 Development Review*. The policy (attached) calls for the incorporation of five (5) Smart Utility Technologies (SUTs) into new Article 80 developments. Table 1 describes these five (5) SUTs. Table 2 summarizes the key provisions and requirements of the policy, including the development project size thresholds that would trigger the incorporation of each SUT.

In general, conversations about and review of the incorporation of the applicable SUTs into new Article 80 developments will be carried out by the BPDA and City staff during every stage (as applicable) of the review and permitting process, including a) prefile stage; b) initial filing; c) Article 80 development review prior to BPDA Board approval; d) prior to filing an application for a Building Permit; and e) prior to filing an application for a Certificate of Occupancy.

In conjunction with the SUTs contemplated in the *Smart Utilities Policy,* the BPDA and City staff will review the installation of SUTs and related infrastructure in right-of-ways in accordance with the *Smart Utility Standards* ("SUS"). The SUS set forth guidelines for planning and integration of SUTs with existing utility infrastructure in existing or new streets, including cross-section, lateral, and intersection diagrams. The *Smart Utility Standards* are intended to serve as guidelines for developers, architects, engineers, and utility providers for planning, designing, and locating utilities.

In order to facilitate the review of integration of the SUTs and the SUS, the BPDA and the Smart Utilities Steering Committee has put together a *Smart Utilities Checklist* that can be filled out and updated during the review process. Please fill out the parts of the *Checklist* that apply to your project. Make sure to review this *template* first, before submitting the *Smart Utilities Checklist.*

After submission, you will receive:

1. A confirmation email with a PDF of your completed checklist. Please include a copy of this document with your next filing with the BPDA.
2. A separate email with a link to update your initial submission. Please use ONLY this link for updating the Checklist associated with a specific project.

Note: Any documents submitted via email to smartutilities@boston.gov will not be attached to the PDF form generated after submission, but are available upon request.

The *Smart Utilities Policy for Article 80 Development Review*, the *Smart Utility Standards*, the *Smart Utilities Checklist*, and further information regarding the *Boston Smart Utilities Vision* project are available on the project's website: http://www.bostonplans.org/smart-utilities.

Manuel Esquivel, BPDA Senior Infrastructure and Energy Planning Fellow, will soon follow up to schedule a meeting with the proponent to discuss the *Smart Utilities Policy*. For any questions, you can contact Manuel Esquivel at manuel.esquivel@boston.gov or 617.918.4382.

Table 1 - Summary description of 5 Smart Utility Technologies (SUTs) included in the *Smart Utilities Policy for Article 80 Development Review*

Smart Utility Technology (SUTs)	Summary Description
District Energy Microgrid	Energy system for clusters of buildings. Produces electricity on development site and uses excess "heat" to serve heating/cooling needs. By combining these two energy loads, the energy efficiency of fuel consumed is increased. The system normally operates connected to main electric utility grid, but can disconnect ("island") during power outages and continue providing electric/heating/cooling needs to end-users.
Green Infrastructure	Infrastructure that allows rainwater to percolate into the ground. Can prevent storm runoff and excessive diversion of stormwater into the water and sewer system.
Adaptive Signal Technology	Smart traffic signals and sensors that communicate with each other to make multimodal travel safer and more efficient.
Smart Street Lights	Traditional light poles that are equipped with smart sensors, wifi, cameras, etc. for health, equity, safety, traffic management, and other benefits.
Telecom Utilidor	An underground duct bank used to consolidate the wires and fiber optics installed for cable, internet, and other telecom services. Access to the duct bank is available through manholes. Significantly reduces the need for street openings to install telecom services.

Table 2 - Summary of size threshold and other specifications for the 5 SUTs advanced in the *Smart Utilities Policy for Article 80 Development Review* (**Note: This table is only for informational purposes. Please refer to the complete *Smart Utilities Policy for Article 80 Development Review* to review the details**.)

	Article 80 Size Threshold	Other specifications
District Energy Microgrid	>1.5 million SF	Feasibility Assessment; if feasible, then Master Plan & District Energy Microgrid-Ready design

Green Infrastructure	>100,000 SF	Install to retain 1.25" rainfall on impervious areas (Increase from 1" currently required by BWSC)
Adaptive Signal Technology	All projects requiring signal installation or improvements	Install AST & related components into the traffic signal system network
Smart Street Lights	All Projects requiring street light installation or improvements	Install additional electrical connection & fiber optics at pole
Telecom Utilidor	>1.5 million SF of development, or >0.5 miles of roadway	Install Telecom Utilidor

Boston Planning & Development Agency Memorandum

TO: Nupoor Monani

FROM: Katie Pedersen

DATE: March 1, 2021

RE: Enterprise Research Campus Project
Boston, Massachusetts
Project Notification Form

I have reviewed the Project Notification Form (the "PNF") dated February 2, 2021 and submit the following comments for the Environmental Protection component. Tishman Speyer ERC Developer, L.L.C (the "Proponent") proposes development of a portion of an approximately 14-acre parcel located at 100 Western Avenue in the Allston neighborhood of Boston within the area designated as Planned Development Area (PDA) No. 115 (the "Proposed Project").

Wind

The Proponent shall be required to conduct a quantitative analysis (wind tunnel) of the
pedestrian level wind impacts. The analysis shall determine the potential pedestrian level
winds adjacent to and in the vicinity of the Proposed Project and identify the wind
velocities that are expected to exceed acceptable levels, including the Boston Planning & 5.1
Development Agency's (the "BPDA") guideline of an effective gust velocity of 31 miles
per hour (mph) not to be exceeded more than 1% of the time.

Particular attention shall be given to public and other areas of pedestrian use, including,
but not limited to, entrances to the Proposed Project and existing and proposed buildings
in the vicinity of the Proposed Project, on the existing and proposed open spaces, 5.2
dedicated public parklands and publicly accessible open spaces, as well as sidewalks and
pedestrian walkways adjacent to and in the vicinity of the Proposed Project site. In
particular, the Proponent shall be required to study the west-facing building bases and
corners of Building 4 along Western Avenue, and between Building 3 and Building 2 5.3
where wind conditions are predicted to be uncomfortable.

The following conditions shall be evaluated:

1. Existing (No Build) – this configuration represents existing and all in-construction projects.

2. Build Condition – this configuration existing, all in-construction projects and the Proposed Project. 5.4

3. Full Build –this configuration includes existing, all in-construction buildings, the Proposed Project, all BPDA approved projects not yet under construction.

The Proponent has submitted a wind sensor plan that has been reviewed and approved. 5.5

The model scale shall be 1:300 and shall include all buildings within 1,200 feet of the Proposed Project site. 5.6

The Proponent shall be required to work with the Urban Design team to refine the Proposed Project design to reduce adverse pedestrian level wind impacts. 5.7

Shadow

The Proponent has conducted a shadow analysis for the hours of 9:00 a.m., 12:00 noon, and 3:00 p.m. for the vernal equinox, summer solstice, autumnal equinox, and winter solstice and for 6:00 p.m. in the summer solstice and autumnal equinox. 5.8

The shadow impact analysis examined the existing shadows and the incremental effects of the Proposed Project, on the existing and proposed open spaces, including but not limited to dedicated public parkland and publicly accessible open spaces, as well as sidewalks and pedestrian walkways adjacent to and in the vicinity of the Proposed Project. 5.9

Results of the shadow analysis demonstrate that during the fourteen time periods studied, no adverse shadow impacts are anticipated to be generated. However, as the Proposed Project design advances the Proponent shall be required to conduct an additional shadow analysis. The Proponent shall be required to demonstrate future refinements to the Proposed Project design shall not create adverse shadow impacts. 5.10

Solar Glare

The Proponent shall be required to conduct a solar glare analysis. The analysis shall measure potential reflective glare from the Proposed Project onto potentially affected streets and public open spaces as well as the sidewalk areas in order to determine the likelihood of visual impairment or discomfort due to reflective spot glare. If deemed necessary, mitigation measures to eliminate any adverse reflective glare shall be identified and included. 5.11

Daylight

(Please refer to Urban Design's comments) 5.12

Air Quality

A microscale analysis predicting localized carbon monoxide concentrations shall be performed, including identification of any locations projected to exceed the National or Massachusetts Ambient Air Quality Standards, for projects in which: 1) project traffic would impact intersections or roadway links currently operating at Level of Service 5.13

("LOS") D, E, or F or would cause LOS to decline to D, E, or F; 2) project traffic would increase traffic volumes on nearby roadways by 10% or more (unless the increase in traffic volume is less than 100 vehicles per hour); or, 3) the project will generate 3,000 or more new average daily trips on roadways providing access to a single location. 5.13

The Proponent shall not be required to conduct a mesoscale analysis predicting the change in regional emissions of volatile organic compounds ("VOCs") and nitrogen oxides ("NOx") shall be performed, as the Proposed Project is anticipated to generate approximately 5,121 vehicle trips per day. 5.14

<u>Noise</u>

The Proponent conducted a noise analysis of potential noise impacts associated with the Proposed Project's anticipated mechanical equipment and service activities. The analysis demonstrates that the Proposed Project will be in compliance with the Regulations for the Control of Noise in the City of Boston, MassDEP noise limits and the HUD interior design noise level standards. 5.15

<u>Sustainable Design/Green Buildings</u>

(Please Interagency Green Building Committee comment letter) 5.16

Boston Water and
Sewer Commission

980 Harrison Avenue
Boston, MA 02119-2540
617-989-7000

March 2, 2021

Ms. Nupoor Monani
Boston Planning and Development Agency
One City Hall Square
Boston, MA 02201

Re: Enterprise Research Campus Project at 100 Western Avenue PNF

Dear Ms. Monani:

The Boston Water and Sewer Commission (Commission) has reviewed the Project Notification Form (PNF) 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 PNF, 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 PNF, 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 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. 6.1

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. 6.2

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. 6.3

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. 6.4

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. 6.5

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/ 6.6

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 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 6.7

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. 6.7

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. 6.8

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. 6.9

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. 6.10

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. 6.11

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. 6.12

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. 6.13

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. 6.14

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.

    - 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. 6.15

    - 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. 6.16

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. 6.17

Water

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. 6.18

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. 6.19

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. 6.20

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

To: Nupoor Monani, BPDA

From: Jeffrey Alexis, PWD

Date: March 9, 2021

Subject: Harvard Enterprise Research Campus PNF - Boston Public Works Department Comments

Included here are Boston Public Works Department (PWD) comments for Harvard Enterprise Research Campus PNF.

Project Coordination:
The developer should work with PWD and PIC regarding the newly proposed streets: Cattle Drive, East Drive, Def Drive, and Science Drive. Should the developer want to petition these streets to be converted to public streets, note that newly proposed streets need to be built according to PWD design standards. 7.1
Roadway Design Standards – Typical Plans and Cross Sections.

Site Plan:
The developer must provide an engineer's site plan at an appropriate engineering scale that shows curb functionality on both sides of all streets that abut the property. 7.2

Construction Within the Public Right-of-Way (ROW):
All proposed design and construction within the Public ROW shall conform to PWD Design Standards (https://www.boston.gov/departments/public-works/public-works-design-standards). Any non-standard materials (i.e. pavers, landscaping, bike racks, etc.) proposed within the Public ROW will require approval through the Public Improvement Commission (PIC) process and a fully executed License, Maintenance and Indemnification (LM&I) Agreement with the PIC. 7.3
Please note that the comments below are specific to proposed work within the Public ROW. 7.4

Sidewalks:
The developer is responsible for the reconstruction of the sidewalks abutting the project and, wherever possible, to extend the limits to the nearest intersection to encourage and compliment pedestrian improvements and travel along all sidewalks within the ROW within and beyond the project limits. 7.5
The reconstruction effort also must meet current American's with Disabilities Act (ADA)/ Massachusetts Architectural Access Board (AAB) guidelines, including the installation of new or reconstruction of existing pedestrian ramps at all corners of all intersections abutting the project site if not already constructed to ADA/AAB compliance per Code of Massachusetts Regulations Title 521, Section 21 (https://www.mass.gov/regulations/521-CMR-21-curb-cuts). This includes converting apex ramps to perpendicular ramps at intersection corners and constructing or reconstructing reciprocal pedestrian ramps where applicable. 7.6
Plans showing the extents of the proposed sidewalk improvements associated with this project must be submitted to the PWD Engineering Division for review and approval. Changes to any curb geometry will need to be reviewed and approved through the PIC. 7.7

Please note that at signalized intersections, any alteration to pedestrian ramps may also require upgrading the traffic signal equipment to ensure that the signal post and pedestrian push button locations meet current ADA and Manual on Uniform Traffic Control Devices (MUTCD) requirements. Any changes to the traffic signal system must be coordinated and approved by BTD. 7.8

PUBLIC WORKS DEPARTMENT
Boston City Hall • 1 City Hall Sq Rm 714 • Boston MA 02201-2024
CHRIS OSGOOD • Chief of Streets, Transportation, and Sanitation
Phone (617) 635-2854 • Fax (617) 635-7499

All proposed sidewalk widths and cross-slopes must comply to both City of Boston and ADA/AAB standards. 7.9

The developer is encouraged to contact the City's Disabilities Commission to confirm compliant accessibility within the Public ROW. 7.10

Driveway Curb Cuts:
Any proposed driveway curb cuts within the Public ROW will need to be reviewed and approved by the PIC. All existing curb cuts that will no longer be utilized shall be closed. 7.11

Discontinuances:
Any discontinuances (sub-surface, surface or above surface) within the Public ROW must be processed through the PIC. 7.12

Easements:
Any easements within the Public ROW associated with this project must be processed through the PIC. 7.13

Landscaping:
The developer must seek approval from the Chief Landscape Architect with the Parks and Recreation Department for all landscape elements within the Public ROW. The landscaping program must accompany a LM&I with the PIC. 7.14

Street Lighting:
The developer must seek approval from the PWD Street Lighting Division, where needed, for all proposed street lighting to be installed by the developer. All proposed lighting within the Public ROW must be compatible with the area lighting to provide a consistent urban design. The developer should coordinate with the PWD Street Lighting Division for an assessment of any additional street lighting upgrades that 7.15
are to be considered in conjunction with this project. All existing metal street light pull box covers within 7.16
the limits of sidewalk construction to remain shall be replaced with new composite covers per PWD Street
Lighting standards. Metal covers should remain for pull box covers in the roadway. For all sections of 7.17
sidewalk that are to be reconstructed in the Public ROW that contain or are proposed to contain a City-owned street light system with underground conduit, the developer shall be responsible for installing shadow conduit adjacent to the street lighting system. Installation of shadow conduit and limits should be coordinated through the BPDA Smart Utilities team. 7.18

Roadway:
Based on the extent of construction activity, including utility connections and taps, the developer will be responsible for the full restoration of the roadway sections that immediately abut the property and, in some cases, to extend the limits of roadway restoration to the nearest intersection. A plan showing the extents and methods for roadway restoration shall be submitted to the PWD Engineering Division for review and approval. 7.19

Additional Project Coordination:
All projects must be entered into the City of Boston Utility Coordination Software (COBUCS) to review for any conflicts with other proposed projects within the Public ROW. The developer must coordinate with any existing projects within the same limits and receive clearance from PWD before commencing work. 7.20

Green Infrastructure:

The developer shall work with PWD and the Boston Water and Sewer Commission (BWSC) to determine appropriate methods of green infrastructure and/or stormwater management systems within the Public ROW. The ongoing maintenance of such systems shall require an LM&I Agreement with the PIC. Effects of water infiltration with respect to the adjacent underpass structure and underground MBTA tunnels that may be negatively impacted by infiltration may impact the ability to install such systems and should be considered. Coordination with PWD and MBTA will be required. 7.21 7.22 7.23

Resiliency:
Proposed designs should follow the Boston Public Works Climate Resilient Design Guidelines (https://www.boston.gov/environment-and-energy/climate-resilient-design-guidelines) where applicable. 7.24

Please note that these are the general standard and somewhat specific PWD requirements. More detailed comments may follow and will be addressed during the PIC review process. If you have any questions, please feel free to contact me at jeffrey.alexis@boston.gov or at 617-635-4966.

Sincerely,

Jeffrey Alexis
Principal Civil Engineer
Boston Public Works Department
Engineering Division

CC: Zachary Wassmouth, PWD
Para Jayasinghe, PWD
Todd Liming, PIC

BOSTON

March 15, 2021

Theresa Polhemus
Boston Redevelopment Authority
One City Hall Square
Boston, MA 02201

RE: PNF for Phase A of the Enterprise Research Campus PDA No. 115 in Allston

Dear Ms. Polhemus;

The Boston Parks and Recreation Department (BPRD) has reviewed the PNF for Phase A of *Planned Development Area No. 115: Harvard University's Enterprise Research Campus* at 100 Western Avenue in Allston. The PDA is 14.2 acres total, sited within the 36 acre Enterprise Research Campus. This PNF is for the development of the first of two phases of the PDA.

Phase A will consist of six acres of developable land with 900,000 sf of mixed-use with 330 residential units. It will include over two acres of open space with a 1.4 acre central landscaped plaza. Phase B is not currently under review but could encompass 4.5 acres and include an additional one million sf of development with 420 residential units, and one acre of open space.[1]

The PNF includes conceptual plans and descriptive narrative that states that the open space will serve as a "multi-constituency, multi-seasonal focal point of public realm space and programming as well as building frontage zones, and 'sidewalk rooms' that are areas intended to provide expanded sidewalk space." The open space is intended to serve as a link in the linear greenway corridor that Harvard has envisioned from Ray V. Mellone Park to the Charles River.

The central landscaped plaza will be developed by the proponent and owned by Harvard. The comments below are therefore directed to both entities. The project is considered in the context of the *Institutional Master Plan for Harvard University's Campus in Allston (2013)*; the *Harvard Greenway Planning Memorandum (2014)*; the *Enterprise Research Campus Framework Plan (2018)*; and the *Master Plan for Planned Development Area No. 115 (2018).*

Context

The PNF site is in one of four contiguous areas totaling hundreds of acres that are controlled by Harvard. These future neighborhoods are north of the I-90 corridor and west of the Charles River, in the northeast section of Allston: Soldier's Field Road Athletic Area; Harvard Business School; ERC (including Allston Landing North, and the Science and Engineering Complex); and the MassDOT I-90 Interchange Improvement Project (including Allston Landing South).

[1] *Developer eyes another million square feet of labs, offices, and apartments for Harvard project*. By Jon Chesto. Boston Globe, 01/21/21.

Harvard's IMP was approved in 2013. The BPDA notes it is a planning and zoning mechanism for institutional (academic) projects. It does not include the Enterprise Research Campus which receives its zoning and entitlements from the BPDA through separate mechanisms. Harvard owns other significant additional land in Allston that is also not included in the IMP.[2] Therefore, the open space framework needed to serve hundreds of acres under the control of Harvard is not planned as a cohesive whole and site plans for projects are reviewed discreet from each other.

The four adjacent areas are controlled by one entity, so there is a unique opportunity to create a comprehensive system of open spaces that relate to one another and serve as the framework around which the new neighborhoods can develop. Together with the BPDA's *Western Avenue Corridor Study*, there is an opportunity to provide a world-class open space system for a large area of the city on a scale not seen in Boston since the creation of the Emerald Necklace.

In advance of the renewal of its IMP in 2023, Harvard should provide an open space plan that connects all four neighborhoods around a comprehensive framework of green infrastructure. The plan should be based on an analysis of current needs and future buildout, and an impact assessment on public parks. It should provide for the passive and active recreational needs of the communities it will create, as well as the existing neighborhoods that are currently underserved. 8.1

The proponent should explain how the open space meets the needs of the buildout, or mitigate the impacts offsite, as well as contribute to the larger open space planning for the entire area. 8.2

Site Configuration and Open Space Acreage

The PNF states that the open space acreage is approximate but well in excess of the requirement in the PDA that 20% of the total developable area be provided as publicly accessible open space. Phase A will be six acres of developable land and Phase B could be 4.5 acres (presumably the remaining 3.7 acres will be streets and sidewalks). The open space in the PNF is therefore in excess of the 2.1 acres that would be required at full buildout of Phases A and B.

However, providing open space as a percentage of developable land area does not necessarily address the demand for open space created by the development. Further, Phase B would occur on areas that were approved as surface parking lots in the PDA. The full buildout could be more than twice the mix of uses, with more than double the residential units, as was approved in the PDA.[3] This has significant implications for the need and demand for open space within the PNF.

Further, the open space in the PNF appears to be less than that which was approved in the IMP. Harvard's presentation to the BCDC in 2018 included a comparison of the open space in the 2013 IMP, the 2018 ERC Framework Plan and the 2018 PDA.[4] The IMP provides greater open space acreage in larger contiguous parcels than the later plans.[5] The Framework and PDA include open space acreage that appears to be reduced and reoriented compared to the IMP.[6]

2 http://www.bostonplans.org/planning/institutional-planning/higher-ed/harvard-university-allston-campus

3 Figure 1.8 Full Build Proposed Conditions Plan, *PNF, Harvard Enterprise Research Campus*, 2021

4 Enterprise Research Campus presentation to the Boston Civic Design Commission Subcommittee, 01/23/18

The proponent should provide detailed design of the open space that will serve the passive and active recreational needs of the development; meet the needs of the existing neighborhood; and contribute to a framework plan that will serve Harvard's holdings in Allston at full buildout. 8.3

The full buildout plan shows two phases, but the acreage that is delineated in the text is difficult to discern on the plan.[7] *The proponent should clarify how the open space is being measured. Streets, sidewalks, parking etc. are public realm and should not be conflated with open space.* 8.4

The 20% open space acreage that was negotiated related to the developable area should be defined and confirmed. The difference in open space at this site between the 2013 IMP, the 2018 PDA and the 2021 PNF should be quantified, including new development proposed in Phase B. A reduction in total open space since the 2013 IMP, combined with a significant increase in full buildout, should be mitigated elsewhere in the Allston neighborhood. 8.5

Harvard's open space network should increase in relation to projected buildout across the neighborhoods is controls. It should be planned and implemented in the near term so that it serves as an amenity to the existing neighborhood and a framework for future development. That includes the phases of open space proposed in the PNF. This will ensure that the open space is implemented as planned, and is not impacted by revisions to the IMP or amendments to PDAs. 8.6

Needs Analysis and Impact Assessment

The City's *Open Space and Recreation Plan 2015-2021* notes that there is currently a need for permanently protected public open space in Allston. This rapidly developing neighborhood will require significant new park land to be set aside in master plans or transferred to public entities in order to meet the needs of current and future residents. At a minimum, there is a need for the creation of a publicly owned park of a regional scale with multiple athletic fields.

Harvard has created a plan for a greenway that knits together publicly owned and privately owned open spaces that will eventually connect the campus to the Charles River. This concept should be based on an analysis of the open space demand and active recreational needs at full buildout of the neighborhoods that Harvard intends to create. It should assess the development impacts of hundreds of acres of property on the existing publicly owned open space in Allston.

The full buildout of the PNF could create almost two million square feet of development and 750 new households – served by 2-3 acres of landscaped plaza space. The unit count was not clear in the PDA but the traffic impact study anticipated 250 units. However, the eventual buildout of both phases could result in 750 units of housing - triple that which was included in the PDA.

---

[5] Figure 48: Pedestrian Realm Concept Plan, IMP, 2013

[6] Figure 24: Long-Term Illustrative Plan, IMP 2013; and Figure 30: Long-Term Open Space Network, IMP, 2013

[7] Figure 1.8 Full Build Proposed Conditions Plan, *PNF, Harvard Enterprise Research Campus*, 2021

The anticipated number of residents was not readily available in the PDA or PNF, but can be reasonably estimated at 750 to 3000 people. With only a landscaped plaza onsite, the 750 new households will seek nearby publicly owned open space to meet their active recreational needs.

The proponent should confirm the maximum projected population of residents and other users of the mixed use development, and relevant demographics. The significant increase in projected households since the approved PDA should be considered towards the provision of open space.

This assessment will inform the demand for open space for active recreation use at buildout, 8.7
compared to the amount of open space to be provided by the project, the resulting impacts to existing public open space in the neighborhood, and the appropriate mitigation of this impact.

The proponent should explain how it is addressing the public open space needs outlined in the City's Imagine Boston 2030, which includes the Open Space and Recreation Plan 2015-2021.
The active recreation needs of this new population should be provided for onsite or mitigated 8.8
offsite so as not to impact already overburdened public parks.

Harvard should address how the proposed greenway meets the public open space needs outlined
in the City's Imagine Boston 2030, which includes the Open Space and Recreation Plan 2015- 8.9
2021. A comprehensive needs analysis and impact assessment should be conducted in order to
determine the amount of active and passive open space that Harvard should provide in order to
serve its own development; provide amenity to the existing neighborhood which is currently
underserve; provide for sustainable development and climate resiliency and set an example for a 8.10
world-class framework of open space to serve its future development.

This open space planning is beyond the scope of this PNF, but within the scope of the ERC
Framework, the pending update to the IMP and the comprehensive planning for land controlled
by Harvard. Active recreational space of a regional scale should be integrated throughout the 8.11
open space framework, along with corridors on the north-south as well as east-west axis.

Diversity, Equity and Inclusion

Recent events in American culture have underlined the need for permanently-protected, publicly-owned and accessible open space that provides for the social justice, environmental equity and public health needs of a community. Projects that retain private ownership of open spaces impact the public's rights inherent in the use of public space. Open space that is privately owned but publicly accessible does not provide the same sense of rights as publicly owned civic space.

The PNF includes a goal to prioritize diversity, equity and inclusion particularly in relation to the planning and design, with a 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 PNF notes that the project will create an open and inviting public realm that aims to connect Allston residents with the Harvard community, employees, residents, and visitors.

Physical and psychological permeability and connections to existing neighborhoods are critical to inclusivity. The ERC Framework notes that the plan is organized by streets and open spaces which break down impenetrable areas into blocks that guide future growth. However, it is unclear how permeable the PNF superblock will feel from points beyond the site.

Harvard and the proponent should provide detailed information about how DEI strategies will be implemented in the public realm if it is privately owned. 8.12

The most effective way to make the open space feel inclusive would be to transfer the ownership to a public entity so that it is owned by all. 8.13

The open space in the PNF plan should be designed to be visible and accessible from multiple points outside of the site. 8.14

Permanent Protection /Public Ownership and Private Management

Harvard will own the 1.4 acre landscaped plaza at the center of the property.

Open space that is required, negotiated or proposed as impact mitigation for increased zoning or development rights in a PDA, or as a public benefit under regulatory requirements, should be protected in perpetuity through a gift in fee to a public entity or a conservation restriction approved through the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA). Please note that an easement for public access is not the same level of permanent protection as fee simple ownership or a conservation restriction. 8.15

Publicly owned open space may be managed privately. A relevant example is the A Street Park in Fort Point which was created as a public benefit in exchange for development rights in PDA 69. The ownership was transferred to BPRD thereby ensuring permanent protection of the park. A long term agreement was created for the proponents to maintain and improve the park.

There may be subsurface development below open spaces that may occur due to utilities easements, parking garages or private facilities. *Multiple examples exist in Boston of parks built over subsurface uses such as tunnels, parking garages and medical facilities. This should not be a hindrance to the permanent protection of surface level open space.*

Shadows

The PDA allows commercial scale building footprints and heights up to 180 feet. The buildings are immediately adjacent to the full length of the open space, aligned to the north, south and west of the central plaza. The shadows of the height and massing will create year round impact. The creation of open space in exchange for zoning should be evaluated in terms of the desirability to be in the space, and the ability to include a landscape that is more than an impervious plaza.

The shadow impacts on open space should be assessed year round, dawn to dusk and mitigated. 8.16

Stormwater

The Charles River Consent Decree requires mitigation of stormwater, of which green infrastructure can play a role. BPDA has identified the PNF site as a priority area for stormwater best management practices.[8] The IMP and Framework Plan note that at function of the greenway will be to manage stormwater. *The central landscaped plaza should maximize this potential.*

Pets

If pets are to be allowed, they should be accommodated onsite so to not burden the public realm. 8.17

Mitigation

The Harvard Public Realm Flexible Fund has made significant contributions to publicly owned parks in Allston as part of its community commitment negotiated during planning and development review. The fund recently contributed to the design and construction of Phase 1 improvements at Smith Field. The second phase will begin in the spring of 2021.

During the IMP renewal in 2023, Harvard should conduct an open space needs assessment and impact analysis for its full buildout. It should evaluate the potential to expand the greenway framework to include north-south orientations, and implement these linear corridors in advance of development. It should assess the opportunity to allocate funding or property to create a new publicly owned park of a regional scale including athletic fields suitable for active recreation. 8.18

The proponent should complete an open space needs assessment and impact analysis specific to its project, and mitigate any impacts through a contribution to the City's Fund for Parks. This contribution should be at a level commensurate with the scale of the development. 8.19

Sincerely,

Carrie M. Dixon

Carrie Marsh Dixon, Executive Secretary
Boston Parks and Recreation Commission

cc: Ryan Woods, Commissioner, Boston Parks and Recreation Department
Liza Meyer, Chief Landscape Architect, Boston Parks and Recreation Department
Michael Cannizzo, Deputy Urban Designer, Boston Planning and Development Agency
Jill Zick, Landscape Architect, Boston Planning and Development Agency
Nupoor Monani, Senior Planner, Boston Planning and Development Agency

[8] BPDA *Final Report: Green Infrastructure Concept Plan and Design Strategies North Allston Sub-watershed Restoration Plan* , 2017

BOSTON

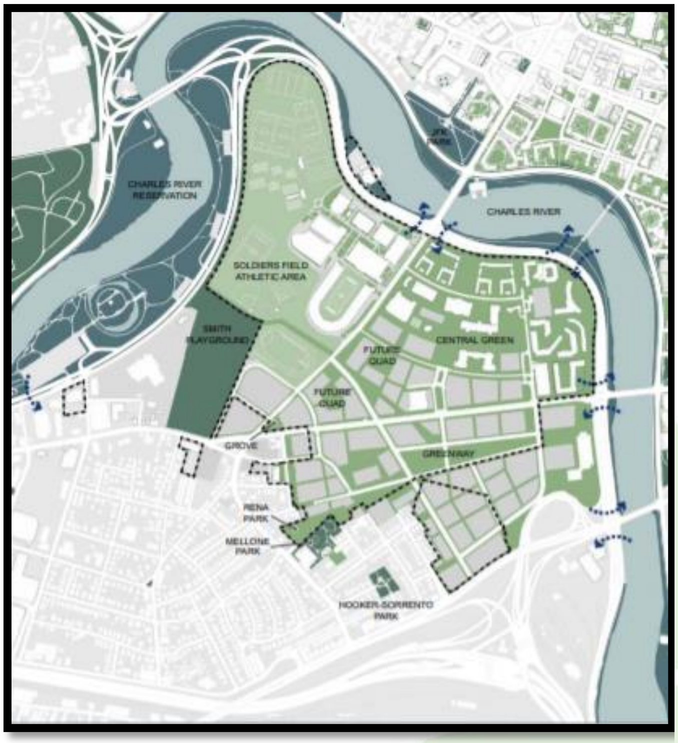


Figure 30 Long Term Open Space,
IMP for Harvard University Campus in Allston, 2013

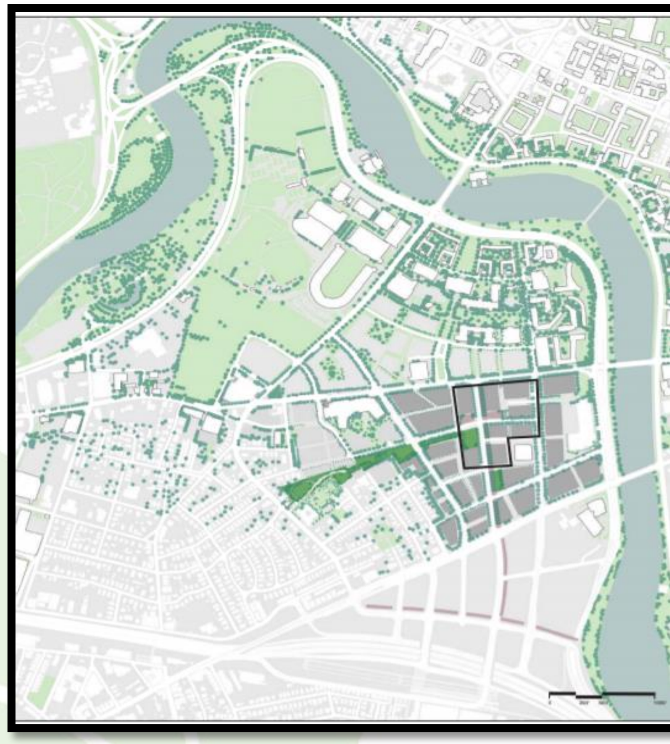


Figure Depicting Framework Plan Area and PDA Area,
Master Plan for Planned Development Area No. 115, 2018

Figure 48: Pedestrian Realm Concept Plan,
IMP for Harvard University Campus in Allston, 2013

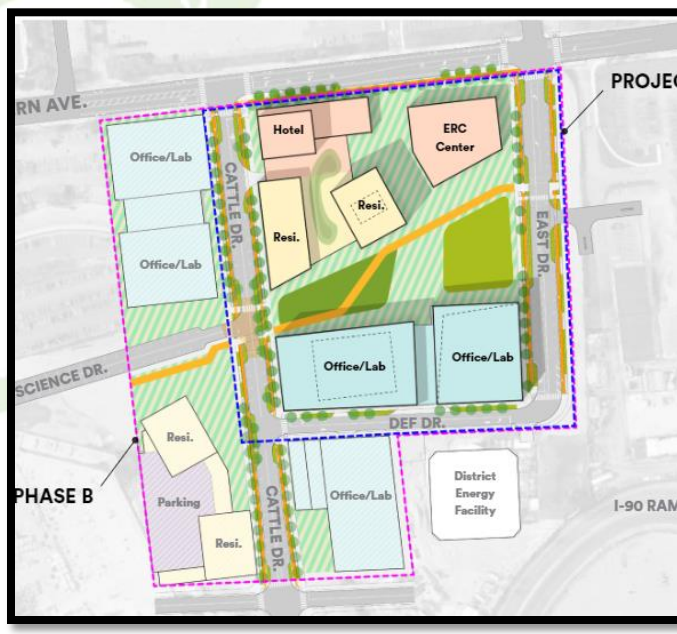


Figure 1.8 Full Build Proposed Conditions Plan,
PNF, Harvard Enterprise Research Campus, 2021

Comments regarding the Harvard ERC project notification proposal - March 2021
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

Dear Ms. Monani and the Harvard ERC development team,

Below are my comments concerning the Project Notification Form from Tishman Speyer for Harvard's Enterprise Research Campus. Thank you for this opportunity to comment. I will also be working with the Harvard Allston Task Force (HATF) in a joint letter.

First, I think this project has enormous potential to create a vibrant urban/university district in North Allston and a vital connective urban realm that opens up access to the Charles River, the Harvard Allston campus, Western Avenue and from there to Brighton, Watertown, Cambridge, and downtown Boston. I applaud the focus given to having the development be open and accessible to the public at large in order to make it a center of community activity.

Nevertheless, the proposed project is underwhelming in many of its details, which conflict with the overall stated goals of having a world-class development project that is a model for our region, our nation, and the world. I so want to see Harvard and Tishman Speyer create a place that draws people to understand the past, present, and future possibilities in our urban world. There is so much potential for this site, its location, and its owners/developers. Just a few examples:

- **Provide a sense of the Charles River's natural and human history** - its marshland, indigenous and colonial past, its industrial-age uses, and its restorative future- using green infrastructure to create humanized nature that mitigates flooding and pollution in a way that echos the work of Frederick Law Olmsted along the Fenway, Muddy River, and other parts of the Emerald Necklace
- **Build using passive house or other model principles to be a showcase** of how we can achieve a fossil-fuel free future NOW, drawing people from around the country and globe
- **Develop a local district energy grid** (solar, geothermal) that that benefits the entire North Allston neighborhood, offering resiliency and low-cost energy as a showcase for what others can be doing
- **Partner with housing organizations** to support an innovative housing program (on-site/off-site) that actually meets the needs of its neighbors and the city at large, providing a model on how to make a substantial dent in our region's pressing housing crisis.

- With Boston being promoted as a living laboratory for aging, and a neighborhood full of family-size houses, consider innovative possibilities, like a program that **helps seniors downsize while preserving the homes they leave as affordable housing** for new families
- **Think big on alternative mobility approaches** with the aim of a future car-free district that shows us that such a future is possible sooner rather than later (including the potential of elder-friendly mobility innovations)
- **Invest in youth and young adults** to prepare them for successful careers in all of the above, plus other new fields this project will support.

These are all things that are being done elsewhere in the world. Why not be a leader here in Boston when you have this incredible opportunity at hand?

Below I provide a brief checklist summary of my comments, followed by a more detailed narrative.

Recommendations summary check list

Create housing opportunities that meet the needs of people in the community
- Report on housing cost burden by race/ethnicity/age/family status in Allston Brighton, outreach to hard to reach communities, and a plan for how the ERC will address housing inequities 9.1
- Complete AFFH Zoning documentation and requirements 9.2
- Provide 25% IDP units at 50-100% AMI 9.3
- Working with housing organizations to substantially expand affordable home ownership
- Explore with housing advocates innovative programs to preserve existing family housing in the community (perhaps as part of a community land trust model) while helping seniors downsize 9.4

Institute energy plans that are global and regional models 9.5
- Move towards zero net carbon earlier than 2050
- Commit to more substantial reduction in GHG emissions at the start and on a more accelerated pace that will meet and ideally exceed Boston's Climate Action Plan 9.6
- Move to 100% electric as soon as is feasible and explain any case where this is not feasible 9.7
- Use ASHRAE 90.1 2019 as the pertinent standard for baseline energy model and other performance metrics 9.8
- Commit to LEED Platinum / Passive House without purchasing Renewable Energy Certificates (RECs) 9.9
- Provide detailed results, explanations, and rational for your decisions concerning the certifications you have committed to study: Fitwel, Passive House, LEED Zero Energy, Living Building Challenge, and Boston Green Building Credits 9.10

- Back up other statements with detailed explanations of your decisions and the data you are basing these decisions on (e.g., commitment to explore energy conservation measures as feasible) 9.11
- Develop a plan for a district energy grid than can benefit the site and the neighborhood 9.12

Foster mobility improvements that make getting around BETTER not worse

- Design the mobility network to connect to the wider city and region - Boston, Cambridge, Watertown - by working with other agencies, planning initiatives, developers, and communities. This includes biking, pedestrian, and transit infrastructure and services. 9.13
- Provide a traffic analysis that takes into account all the area developments and your vision of mobility across the larger area, in addition to the specific impacts of the ERC 9.14
- Protect neighborhood streets from increases in traffic 9.15
- Plan for a future of all electric vehicles 9.16
- Substantially reduce the amount of interim surface parking 9.17
- Carry out the recommendations of the Allston Brighton Health Collaborative's Transportation Committee 9.18

Enlarge green space that is extensive and ecologically functional 9.19

- Reduce impervious cover (currently 97%), incorporate more actual green space
- Design so as to remind and instruct people of the area's natural marshland past 9.20
- Be true to the commitment to creating "a rich natural habitat" and make that greenspace have real ecological functions that can connect us to nature - past, present and future. 9.21
- Think beyond the project site to how this fits into the larger development area and neighborhood 9.22
- Provide actual metrics, dimensions, etc. to green vs. non-green open space, functions of the different elements (planters, permeable pavement, vegetated areas, green infrastructure, gray infrastructure, etc.) 9.23
- Provide details, data, explanations, and rationales for Sustainable Sites credit considerations and decisions 9.24
- Commit to minimizing light pollution and to bird-safe environments 9.25

Plan for a changing climate and protect the Charles River

- Provide more specific information and explanations regarding specific climate change risks and how the project addresses these 9.26
- Explain the rationale for choosing a 32-year storm event for stormwater design - the plan should accommodate a 100-year storm event 9.27
- Commit to reduce impervious cover and increase the use of green infrastructure, or at a minimum, analyze alternatives for increased use of green infrastructure and provide the results of these analyses 9.28
- Provide details about the specific components and location of green infrastructure and stormwater treatment 9.29

- Provide more details about how the project will manage and prevent additional pollution of the Charles River, including TMDLs / phosphorus. 9.30

Make this a model of economic opportunity and development for Allston / Brighton / Boston residents and businesses

- Commit to renewable energy/climate resiliency workforce education and training during the construction phase 9.31
- Prepare an analysis of all possible careers that this project will support, the skill sets and education required for each of these, and a plan to help prepare area residents for these careers. 9.32
- Explain and increase your commitment to 5% investor ownership for Black, Latinx, and/or women 9.33
- Provide more specifics about your commitment to local/MBE/WBE retail businesses and commit to below-market rents for these businesses 9.34
- Commit to Local 26 union labor for jobs in the proposed hotel 9.35

Narrative of comments and explanations

Create housing opportunities that meet the needs of people in the community

Allston and other Boston neighborhoods are in the midst of an agonizing and brutal housing crisis. Many people are living in dangerously unsafe housing, others are just barely hanging on, some have lost any kind of shelter, and still others have left in search of more affordable living at the price of a long and expensive commute to jobs and opportunities. Individuals and families crowd into apartments, many of which are in poor repair and/or poorly maintained by absentee landlords. Our city is still segregated by race and ethnicity, as well as by family status. More luxury housing in the midst of our community does not seriously improve on these conditions. Just using the “compact living” guidelines to cut square footage, and thus reduce rent by a small fraction does not make it affordable or livable to people in our community. Nor does having 13% IDP units at 70% AMI. Meeting minimum standards that themselves don’t match the real need is not acceptable.

Especially given that this is a project undertaken by one of the top universities in the world, on
land it has owned for years, how will this development show that Harvard <u>both understands and</u> 9.36
<u>will seriously address</u> the critical housing crisis we face? How will it foster a more equitable
multi-racial, multi-ethnic, multi-age community that welcomes families? Those questions are 9.37
specific. I would like Harvard (perhaps through its professional schools or research centers) to
report on housing conditions and cost burdens in the Allston Brighton area disaggregated by 9.38
race, ethnicity, age, and family status. I would like to see serious efforts to engage community
members outside of the usual formal public meeting process, and to work with neighborhood
service organizations to reach out in particular to people who speak languages other than 9.39
English at times and places convenient to them to understand the housing-related burdens they

face. The results of both these should be reported to the HATF and to the community at large as 9.40
soon as possible, prior to the Draft Environmental Impact Report (DEIR), and it should be
included in that report. The DEIR should also adhere to the new Boston Affirmatively Furthering
Fair Housing (AFFH) reporting requirements, and use the AFFH process and consultations with 9.41
housing experts to plan a strategy that truly meets the needs of our community for fair and
affordable housing.

The findings of these reports should then go into the planning and design of the ERC project for 9.42
its housing, retail, and office spaces. We need housing that reflects the needs of our community
members, along with small business and other entrepreneurial opportunities, as well as 9.43
community spaces that will benefit a wide array of people. In particular, the % of Inclusionary
Development Program (IDP) units should be at least 25% of all units, and these should include 9.44
a mix of units at the 50-100% Area Median Income (AMI). There should be no compact units,
and the share of studios and 1-bedrooms should be small, with a larger share of 2 and 9.45
3-bedroom units.

Harvard needs to address the dire need for home-ownership opportunities in Allston Brighton.
Most of the current projects are rental units, over 1,000 rental units currently proposed. We need
substantial funding for affordable home-ownership that reflects the needs of families in Boston 9.46
and Allston Brighton. Work with housing organizations and advocates to develop an innovative
approach to home ownership for families. Looking at Boston as a "living lab for aging," this could
also foster innovative approaches to helping seniors downsize and opening up neighborhood
housing to families.

We have learned from the COVID pandemic that many of our most essential workers live extremely vulnerable lives and that we depend on them in ways we never really acknowledged. There is no excuse now to "go back" to the way things were. Harvard should be leading the charge and showing Boston and the world by example how to create a more just, equitable, and resilient urban community.

<u>Housing Summary:</u>

- Report on housing cost burden by race/ethnicity/age/family status in Allston Brighton, outreach to hard to reach communities, and a plan for how the ERC will address housing inequities
- Complete AFFH Zoning documentation
- 25% IDP units at 50-100% AMI
- Working with housing organizations to substantially expand affordable home ownership
- Explore with housing advocates innovative programs to preserve existing family housing in the community (perhaps as part of a community land trust model) while helping seniors downsize

Institute energy plans that are global and regional models

As with housing, although the proponents and Harvard aspire to creating a world-class model of sustainability, the actual plans are aspirational at this point, and even then aim low given the possibilities of this project and the opportunities and resources at hand.

The proponents consider exploring the feasibility of a district energy grid, but we'd like to see it actually happen. This could be a game-changing model of how an urban/lab/commercial/residential district can create a resilient, affordable energy environment, and an educational opportunity for the rest of the region. 9.47

The project proponents commit LEED Gold "certifiability" but not to actual certification. This meets the City of Boston requirements but why not get certified? And why not LEED Platinum to be a global example? Or commit to Passive House certification rather than just exploring it? 9.48

Given that Boston's Climate Action Plan calls for 50% reduction of GHG emissions by 2030 and 100% by 2050, and that it is very likely that these buildings will be around in 2050, the proposed plan builds in failure to meet those goals. In order to meet those goals, buildings need to have 27% less emissions by 2021. The goal for the project GHG emissions is 22% reduction in GHG emissions, so it is short of the goal as planned. Please provide a modified plan that will meet and ideally exceed the City's CAP. Again, this is a project that has ambitions to be a regional, national, and global exemplar. 9.49

Likewise the statement that in the end, electricity will supply 59% of energy needs and gas 40% is very odd at this point in 2021 when we are aiming for the complete electrification of our buildings. Why is a brand new project of this size and scope still using such a large percentage of natural gas for energy? What other alternatives has the proponent considered? And why have these choices been made? 9.50

The proponents state (4.1) that they will "utilize energy-efficient HVAC and lighting equipment and systems, and incorporate other potential energy conservation measures, *as reasonable and feasible"* (emphasis added). We would like to see the quantified results of an analysis into the feasibility of and the rationale for their choices in these determinations when this investigation is completed, ideally by the next report (DEIR). 9.51

The project references the ASHRAE 90.1 2013 and proposes to be 15% lower than the Stretch Code, which also references ASHRAE 90.1 2013. The PND also references the Harvard Green Building Standard which references ASHRAE 90.1-2010. The baseline energy model and other performance metrics should reference the new ASHRAE 90.1 2019 as the pertinent Standard. 9.52

The proponents promise to study and consider a number of green building design certifications, including Fitwel, Passive House, LEED Zero Energy, Living Building Challenge, and Boston 9.53

Green Building Credits. Please present the detailed results for each of these analyses in your 9.53
next report (DEIR) and the rationale for why you will or will not seek certification.

In the next report (DEIR), we also need to see the details of what is meant by “fossil fuel neutral” 9.54
by 2026 and “fossil fuel free” by 2050. First, is that the same as carbon neutral and carbon free?
Secondly is that achieved by on-site renewable, off-site renewable purchases, and if a 9.55
combination, how much of each within each time period. And the final 100% mark should be
moved up considerably in time - this is a new project, ideally build it to be fossil fuel free from
the beginning or at least show us the plan for how you will get there quickly. Why take nearly 30
more years to 2050? For a project of this size and global reach, consider using Passive House 9.56
technology or Net Zero construction without purchasing Renewable Energy Credits.

Energy Summary:

- Commit to LEED Platinum / Passive House with no REC purchases, or similar truly global model of energy efficient, sustainable building - this should be the place people come to see what is possible
- Move towards zero net carbon earlier than 2050
- Commit to more substantial reduction in GHG emissions at the start and on a more accelerated pace that will meet and ideally exceed Boston’s Climate Action Plan
- Move to 100% electric as soon as is feasible and explain any case where this is not feasible
- Use ASHRAE 90.1 2019 as the pertinent standard for baseline energy model and other performance metrics
- Provide detailed results, explanations, and rational for your decisions concerning the certifications you have committed to study: Fitwel, Passive House, LEED Zero Energy, Living Building Challenge, and Boston Green Building Credits
- Back up other statements with detailed explanations of your decisions and the data you are basing these decisions on (e.g., commitment to explore energy conservation measures as feasible)
- Develop a plan for a district energy grid than can benefit the site and the neighborhood

Foster mobility improvements that make getting around BETTER not worse

The city and community need transit, bike, and zero GHG emissions mobility alternatives, and plans that REDUCE current private car emissions and congestion, taking into account other large developments in Allston/Brighton and Watertown. The problems we have in Allston Brighton with development by development planning processes is that it is hard to solve the larger mobility issues that go beyond any given project. This is an opportunity for a truly transformative approach to mobility, given the ongoing Western Ave re-zoning project, the Allston Brighton Mobility Study, the Allston I90 Multimodal project, and the development of Arsenal Street in Watertown which will connect with Western Ave, the ERC, and Kendall Square beyond. Ensure that you are working in tandem with other developers AND the Allston Brighton Mobility Study team. Think CONNECTIVITY across all these spaces, not just for this 14.5 acre parcel. Note that VHB did the Arsenal Street Corridor Study and they are the transportation consultants on this project.

In light of the above, please provide a report of increased traffic along Western Ave from all new 9.57
developments along Western Ave, Lincoln Street, Allston Yards, and Watertown's Arsenal Street
Corridor. Incorporate these figures into your own planning and explain how Harvard and
Tishman Speyer will work with other new developers in the area to ensure that transit, bicyclists, 9.58
pedestrians, and cars can travel safely and efficiently within the corridor and Allston
neighborhood and easily connect to points beyond. And please provide your vision of how the
local neighborhood will be enhanced by your mobility planning and designs, rather than unduly 9.59
burdened.

Specifically, please address how cars/trucks traversing the development between Cambridge St. 9.60
and Western Ave. will be managed. How will Windom Street and Seattle Street be impacted, 9.61
and what will be done to eliminate these impacts?

Increase the 25% share of Electric Vehicle parking in light of the Governor's commitment and
other recent commitments to be selling only EVs by 2035. Or at least plan for 100% of parking 9.62
spaces to be EV ready.

And please substantially reduce the amount of interim surface parking in your current plan.
Providing that much surface parking is harmful in terms of impervious cover, stormwater, and
heat, and comes at the expense of potential greenspace. Why in the world encourage that level 9.63
of parking in 2021? Start finding ways to reduce automobile commuting to this site from the
start.

In addition, I support the requests by the *Allston Brighton Health Collaborative's Transportation Committee.*

Mobility Summary:

- Design the mobility network to connect to the wider city and region - Boston, Cambridge, Watertown by working with other planning initiatives, developers, and communities. This includes biking, pedestrian, and transit infrastructure and services.
- Provide a traffic analysis and your vision of mobility across the larger area, in addition to the specific impacts of the ERC
- Protect neighborhood streets from increases in traffic
- Plan for a future of all electric vehicles
- Carry out the recommendations of the Allston Brighton Health Collaborative's Transportation Committee
- Consider innovations that address the specific mobility needs of seniors, again, as part of the idea of Boston being a "living lab for aging"
- Substantially reduce the amount of interim surface parking

Allston Brighton Health Collaborative's Transportation Committee recommendations:

- Proponent be required to adopt the City of Boston's Complete Streets guidelines for the development. Anything that is done on the street that does not follow these guidelines must apply for an exemption from the City. 9.64
- As mitigation and community benefit, and upon board approval, Proponent must first be required to fund public transit improvements before approval for study or creation of a private shuttle service. Transit improvements include bus lanes, bus shelters, and signal replacement to allow for transit signal priority. Should a shuttle be implemented it be open and accessible to the public. 9.65
- As mitigation and community benefit, and upon board approval, Proponent be required to fund safety and accessibility improvements for all bus stops within 0.5 mile radius. Improvements include bus shelters, lighting, garbage cans, bike racks, and real-time countdowns. 9.66
- As mitigation, Proponent be required to partner with Boston Bikes to help fund at least one additional Bluebikes bike-sharing station anywhere in Allston or Brighton. 9.67
- Proponent's parking ratio may not exceed 0.45 per unit. 9.68
- Proponent be required to contract with and provide space for car-sharing vehicles (e.g. Zipcar). 9.69
- Proponent be required to contract with and provide space for Electric Vehicle rentals with charging stations on-site and additional charging stations for private vehicles. 9.70
- Proponent be required to provide covered and secured spots and charging capabilities for bikes and micro-mobility devices (eg. e-scooters, e-bikes) at a minimum 1.0 ratio. 9.71
- Proponent be required to provide discounts or free monthly MBTA passes and Bluebikes yearly passes to residents who do not use their parking spots. 9.72
- Proponent be required to build curbside allotment, designated pick-up drop off locations. 9.73
- Proponent be required to set commercial/institutional parking rates (including educational and medical), to be greater than an MBTA monthly pass. 9.74
- Proponent is encouraged to contract for already available public parking in lieu of on-site parking. (E.g., night parking on lots that have low evening usage.) 9.75

Enlarge green space that is extensive and ecologically functional

The ERC's commitment to being open and inviting to the general public, and the attention by the developers given to this is commendable. This truly can be a wonderful new district in our community, one that offers a draw in itself and a connection to other places and destinations. However, the current design misses an opportunity to make this a special place in terms of nature and natural history. Recall that this area was once a marsh, and most likely an important place for Native Americans. It was filled and developed for industrial uses as the PNF explains. We can never recreate a natural world here, but we can create something of a bridge to this past world, one that could educate today's users, offer a natural balm for hectic lives, and 9.76
provide a more functional ecosystem. We need to think in innovative ways that would be worthy of Frederick Law Olmsted's approach to solving environmental issues in the Fenway, Muddy River and other parts of Boston's famous Emerald Necklace. This could be an outstanding

model for climate resiliency, greenspace, and urban ecosystem functioning, and would be an incredible educational resource for Boston's universities, the metropolitan community, and visitors from around the world. 9.76

By expanding the area's vegetated greenspace and using green infrastructure, the project could create a place for nature and quiet reflection. Keep in mind both the natural marsh past of this space, the current stormwater flooding potential (which will be increasing due to climate change), and the need for a truly green environment for human physical and mental health. 9.77

In the PNF, it states that the Project Greenway "will establish a rich native habitat and performative landscape." But how this is done is not at all clear. Can you explain what that means? What species, and what ecological functions are you are seeking to design into the Greenway? What are your performance expectations? 9.78

The flip side of this is that the PNF states that the project will have 97% impervious cover. Additional permeable green vegetated areas are necessary for stormwater management. Directing stormwater to an underground system of pipes and tanks misses a unique opportunity to create humane surface green areas that echo the marshland past. 9.79

As is, while the Project Greenway is exciting, it doesn't seem very green. For example the Harvard ERC PNF, while promising to promote natural ecological diversity, shows that much of the proposed "open space" is hardscape with planters. While clearly there is a need for pedestrian areas, more actual functional green space is necessary. In the DEIR, please provide the dimensions of proposed green, vegetated areas disaggregated from the hardscape/planter areas, and don't color the hardscape areas as green - this is misleading. What will the specific functions of the various spaces be in terms of stormwater management, urban temperature mitigation, air quality, habitat, and mental health? 9.80

"Sustainable Sites" section 4.3.1.4 sounds very aspirational (you say we will do x, y, and z in terms of the LEED Sustainable Sites credits). We need to see details, including clear explanations of alternatives and potential impacts of chosen approach versus alternatives (including planning for 100-year storm events - see below). 9.81

The site is located on a major continental bird migration flyway. For the sake of both humans and birds, the developer should commit to preventing additional light pollution following International Dark Sky guidance and work with Mass Audubon to ensure lighting and habitat that is safe for migrating and resident birds. 9.82

<u>Green Space / Green Infrastructure Summary:</u>

- Provide a sense of the Charles River's natural and human history - its marshland indigenous and colonial past, its industrial age uses, and its restorative future- using green infrastructure to create humanized nature that mitigates flooding and pollution in a way that echos the work of Frederick Law Olmsted along the Fenway, Muddy River, and other parts of the Emerald Necklace

- Reduce impervious cover (currently 97%), incorporate much more actual green space
- Design so as to remind and instruct people of the area's natural marshland past
- Be true to the commitment to creating "a rich natural habitat" and make that greenspace have real ecological functions that can connect us to nature - past, present and future.
- Think beyond the project site to how this fits into the larger development area and neighborhood
- Provide actual metrics, dimensions, etc. to green vs. non-green open space, functions of the different elements (planters, permeable pavement, vegetated areas, green infrastructure, gray infrastructure, etc.)
- Provide details, data, explanations, and rationales for Sustainable Sites credit considerations and decisions
- Commit to minimizing light pollution and to bird-safe environments

Plan for a changing climate and protect the Charles River

There is little discussion in the PNF regarding how this project will address key climate change risks, including increased precipitation, increased flooding, increased heat, increased drought periods, and increased intensity and frequency of storm events. The DEIR should discuss how the project will address each of these specific climate concerns. 9.83

Also explain your rationale for choosing a 32-year storm event for your stormwater design. Due to likelihood of increased frequency, intensity, and duration of storms, the proximity to the Charles River, and the propensity of this zone for increasing stormwater flooding, the drainage plan should be able to accommodate an 100-year storm event. 9.84

Please provide the details of the commitments to reduce impervious cover, increase greenery and green infrastructure, and the feasibility studies concerning stormwater capture and re-use for cooling tower make-up water. 9.85

At present in the PNF, the green infrastructure commitments are vague. Green infrastructure should be extensively incorporated into the overall design of this project. The developers should provide details about the different types and locations of green infrastructure elements, and how and how much stormwater these components will capture and treat. 9.86

What alternatives have been considered for managing stormwater through green infrastructure? 9.87

Given the proximity to the Charles River, please provide more details about how will the project address potential pollutants including the Total Maximum Daily Load (TMDLs) that apply to the Charles River. 9.88

<u>Charles River Protection and Climate Resiliency Summary:</u>

- More specific information and explanations regarding specific climate change risks and how the project addresses these
- Rationale for choosing a 32-year storm event for stormwater design - the plan should accommodate a 100-year storm event
- Commitment to reduce impervious cover and increase the use of green infrastructure, or at a minimum, analyze alternatives for increased use of green infrastructure and provide the results of these analyses
- Details about the specific components and location of green infrastructure and stormwater treatment
- More details about how the project will manage and prevent additional pollution of the Charles River, including TMDLs / phosphorus.

Make this a model of economic opportunity and development for Allston/Brighton/Boston residents and businesses

The project promises a large number of jobs that will result from the project but does not provide any information about workforce development and job training. This project provides an excellent opportunity for jobs training and career development in careers that will be critical to our sustainable urban future.

During the construction phase, given that you are committing to world-class energy and green infrastructure goals, use your expertise and the construction process itself to educate and train community youth and adults in these important climate-related growth opportunity areas. This is such a fabulous opportunity to engage young people and young adults in a new and exciting field. There are ongoing programs in the Boston area that you could connect with in this regard that could help organize this kind of initiative. 9.89

In the operational phase, there are multitudes of career possibilities. Please do a careful analysis and report of the various potential careers that will be generated by this development, identify the skill sets and education needed for each of these, and commit to educating/training people in our community for these careers. Again, you could connect to existing partnerships that would help you achieve this mission. These would include lab/office jobs, but also property management, resilient landscaping, hospitality, event planning, convention operations, etc. Please present this report as part of your next planning document. 9.90

It is vital that Black, Latinx, and women owned businesses have a substantial role in this project. I believe that 5% is not an adequate proportion of investors. Please explain how you derived this figure and your rationale for using it. I would like to see a much higher share of Black, Latinx, and women investors. They are the majority in our city, not the minority. 9.91

You also state that a “sizable proportion” of ground-floor retail space will be reserved for businesses which are local, MBE or WBE. Please DEFINE what that “sizable” share will be,and 9.92

make sure it includes all three groups. And please commit to offering below-market rents to these spaces to our local, MBE, AND WBE businesses. 9.92

Finally, the developers should commit to Local 26 (the hotel employees union) for jobs at the proposed hotel. 9.93

Workforce / Career Opportunity Summary:

- Commit to renewable energy/climate resiliency workforce education and training during the construction phase
- Prepare an analysis of all possible careers that this project will support, the skill sets and education required for each of these, and a plan to help prepare area residents for these careers.
- Explain and increase your commitment to 5% investor ownership for Black, Latinx, and/or women
- Provide more specifics about your commitment to local/MBE/WBE retail businesses and commit to below-market rents for these businesses
- Commit to Local 26 union labor for jobs in the proposed hotel

Gerald Autler and Nupoor Monani
Project Managers
Boston Planning and Development Agency
One City Hall Square, Boston, MA 02201

March 15, 2020

Dear Gerald Autler, Nupoor Monani, and the Harvard Enterprise Research Campus development team,

Thank you to the Proponent Tishman Speyer and the BPDA for taking our feedback on this project to revitalize and develop an underutilized plot within Harvard's land on Western Ave. The team has put together a great starting point for the project that sets this development on the right track, but a few adjustments need to be done to get my full support. I am writing this comment letter as a nearby resident down Western Ave and a member of the Harvard Allston Task Force that is acting as the Impact Advisory Group for this proposal.

__Affordability:__ **We have an affordable housing shortage in the neighborhood and residents who wish to stay in the neighborhood are unable to do so.** This section of Allston is being besieged by development along Western Ave. A majority of this new housing will be luxury/upper-middle income rentals, with only the minimum required as affordable. Tishman Speyer has committed to exceeding the 13% required minimum within their proposal, but they have not set an exact number. **Due to the density and height of this project and its location within Harvard-owned land, the proponent should set aside 20% of their apartments as affordable under the city's inclusionary development policy.** 10.1 The median household income in Allston is around $58,000 a year. Most of us living in Allston cannot afford all of the new, luxury developments, and even at 13% of units at 70% AMI, it is tough for us to make ends meet. I would like to see the developer use the 20% IDP units to offer a tiered mix of affordable and workforce housing. Most can be at 70% AMI, but please also include some at 50% or 60% AMI and some at 100% AMI. 10.2 27.9% of Allston lives under the poverty line, and several thousand people are on wait lists at privately owned low income housing developments like Charlesview and the ABCDC properties. This data was acquired here through the BPDA's research.

We want neighborhood stabilization in Allston, and this will give people the opportunity to call Allston home in the long run. **In order to receive my support as a neighbor, a greater percentage of the overall units need to be affordable**.

__Height:__ **I do not believe that the height needs to come down. We need the height in this project to acquire more affordable units through IDP.** The height of this project seems appropriate to me as it is set away from most of the lower height housing of the neighborhood.

__Transit, Parking, and Traffic:__ **I am pro the lower parking ratio and would like to see a higher bike parking ratio within the project.** I would also like to see the developers commit to providing a 10.3

$20/month transit subsidy to residents in the rental building that can go through an MBTA pass, 10.3
ZipCar membership, or BlueBike pass. The development team should also work closely with the 10.4
MBTA to improve service on the 86, 70, and 66 bus routes within the project area. I would also like to
see a specific loading zone with pick-up and drop-off for rideshare vehicles within the property. We 10.5
do not need these cars blocking traffic and the bike lane.

**Harvard Business School also has a shuttle service that runs from Barry's Corner to Harvard
Square, stopping within the business school. I would like to see this shuttle service
re-oriented to accommodate this development.** This shuttle service is publicly accessible to the 10.6
community and will do a great job to curb the use of single occupancy vehicles entering and exiting
the development site.

<u>Green/Open Space:</u> **Thank you to the developer for holding significant green and open space
within the project, even the potential for open performance space.** I would like to see plans laid
out by Tishman Speyer on who will be running the programming for the open space. They should 10.7
commit to partnering with a local public arts organization and look to support the local arts and music
community here in Boston.

In addition to the open space within this project, I would like to see Tishman Speyer, Harvard, and
Samuels & Associates team up to help improve Smith Field. Recent renovations to the park have
been incredible for our local community, especially our local youth. Unfortunately it is not a park that
the city is budgeting a 365 vision for. **There is no snow removal in winter, and they do not put** 10.8
**lights on at night year round. I would like to see these developers team up to fund snow
removal and year round lighting for the park so our local community has an outdoor place to
socialize year round.**

<u>Opportunities for artists:</u> **This project should look into more opportunities for artist work,** 10.9
performance, or gallery space. I am heavily involved in the art and music community here in Allston, and we are running out of affordable spaces for us to showcase our work, especially after the closing of a few music venues in Boston and Cambridge. It would be great to have another space here.

<u>Sustainability:</u> **Climate action is crucial within all aspects of our lives, especially within new**
building construction. The project should have a LEED score of at least 70 (LEED GOLD). If 10.10
the developer can't achieve that, explain why not and what LEED score it does achieve. **The project**
should be Zero Net Carbon. If not, what % of energy will come from on-site renewable energy 10.11
sources? If less than 30%, how much in renewable energy credits will be purchased? **The project**
should use an integrated surface system of green infrastructure to: reduce stormwater and
pollutant run-off, reduce urban heat island effects, improve air quality, and create healthy 10.12
natural habitats and greenspace for residents, workers, and community members.

Thank you for reading my comments on the Harvard Enterprise Research Campus development. I look forward to continuing the conversation with the developers and the BPDA moving forward.

Sincerely,

Christine Varriale
219 Western Ave Apt S317
Allston, MA 02134

Ms. Nupoor Monani Senior Project Manager, BPDA

Dear Ms. Monani,

We the members of the Harvard-Allston Task Force appreciate the opportunity to respond to the PNF recently filed by Harvard University's development partner Tishman, Speyer for the first phase of Harvard's Enterprise Research Campus.

As members of the Allston-Brighton community we are excited that Harvard University is moving forward with its plans for a vast new campus in Allston. When the university purchased these underused industrial tracts more than a quarter-century ago, we imagined that the world's most distinguished—and wealthiest—university would seize the occasion to create a model for the pluralistic urban campus district of the future.

We therefore want first of all to register our disappointment that Harvard itself does not come forward as the proponent for this first installment of its Enterprise Research Campus, choosing instead to delegate responsibility to its development partner Tishman Speyer. We are further concerned that this PNF presents just four building projects involving less than 20% of the ERC's overall acreage.

Rather than engage in piecemeal review of a few projects at a time we therefore call upon the university and the BPDA to reconsider this review process, in a way that understands the immediate proposal in the context of a larger concept or vision for what Harvard's campus community in Allston will be. Here are some essential components of that overall vision which as yet are not sufficiently addressed:

- We want first of all to ask what sort of residential community will take shape within
the ERC. We want to understand how an extensive and inclusive mixed-income
community will be fostered. To that end we want to see a commitment from the 11.1
university for much greater standards of affordability, with opportunities for home
ownership, which are not sufficiently in evidence in this initial PNF.
- We want to know how the research and manufacturing uses, as well as such sectors as 11.2
hospitality, retail and property management, will offer economic opportunities to the
larger Allston-Brighton community. We need to know how in both the innovative
methods of sustainable construction and in the advanced technological research proposed 11.3
for the ERC there will be opportunities for A-B youth and adults to gain knowledge and
training to pursue careers in the economic sectors of the future.
- We need to know more about the sustainability of this campus, and how it intends to 11.4
realize its intentions with regard to carbon neutrality and climate resilience. We are
particularly interested to know how a localized power grid might serve the interests of 11.5
both the ERC and the adjacent Allston neighborhoods.
- We want to understand the overall proportions of actual green space (not just open
space or public realm), and how that green space will address issues of hydrology and 11.6
storm water management, how the anticipated increase in storm and flood waters will be
reflected in green space planning. We furthermore want to discuss how the entire ERC
might offer its residents and users some sense of encounter with the particular ecology of
this swath of the natural environment and especially with the Charles river and its historic 11.7
wetlands on this site.

- We need to consider mobility and transportation modalities within the ERC in light of the complex regional systems of which it will be a central nexus. We need to know more about projected traffic volumes, transit usage, support for other modalities, and impacts on existing neighborhoods and transportation systems. We want to consider how the ERC might enhance mobility rather than adding to the traffic burden. 11.8 11.9

In sum, as a Task Force responsible for evaluating the impacts and opportunities the ERC presents to our adjacent communities, we need to start from a much fuller appreciation for the underlying vision that informs the Enterprise Research Campus. We take seriously the reality that a whole new sector of urban fabric is being added to Allston-Brighton. That process will involve many more project submissions, but it starts with this one before us. Is this immediate project properly aligned with that larger overall vision? We can't say because the shaper of that vision, Harvard University, is not sufficiently visible to us, and its vision remains opaque.

We therefore are calling on the BPDA to request that Harvard desist from advancing with the ERC as a series of discrete projects, and start with a larger visioning process that would emerge from a discussion in which Harvard University and the Allston-Brighton community are the principal interlocutors. 11.10 We would request the BPDA to underwrite a third-party facilitator for such a comprehensive community-based discussion so that the vision that results will be compatible with both our aspirations and Harvard's. Only then can we serve our proper review function on behalf of our A-B communities, which will be fundamentally and irrevocably transformed by Harvard's ERC in its full extension. 11.11

As an integral part of that larger discussion, we call attention to the several letters already submitted by Task Force and community members. We encourage the BPDA, Harvard, and Tishman Speyer to look carefully at the lengthy and detailed comments in those letters, which begin to lay out some specific elements of the community's vision for what the ERC can and should be. 11.12

The members of the Task Force appreciate the intentions of Harvard University and its development partners to create a distinguished campus in Allston that will serve as a model nationally and internationally. We understand Harvard's desire to be a constructive environmental neighbor, and to contribute solutions to the affordable housing crisis, the dislocations of the new economy, and the transportation demands that confront our communities. We look forward to discussing these enormous opportunities with Harvard, and remain confident that an enhanced plan for the Enterprise Research Campus and a stronger Allston community will emerge from our mutual discussions.

Respectfully submitted,

The Harvard-Allston Task Force May 3, 2021

- John Cusack
- Tony D'Isidoro
- Dan Daly
- Rita DeGesse
- Michael Hanlon
- Bruce Houghton

- Ed Kotomori
- Cindy Marchando
- Tim McHale
- Millie McLaughlin
- Barbara Parmenter
- Christine Varriale
- Brent Whelan

BOSTON CITY COUNCIL

March 26th, 2020

Ms. Nupoor Monani
Project Manager
Boston Planning and Development Agency (BPDA)
One City Hall Plaza
Boston, MA 02201

SENT VIA EMAIL

RE: Harvard Enterprise Research Center Project Notification Form

Dear Ms. Monani:

This is a letter of comment on the Project Notification Form filed by Tishman Speyer ERC Developer, LLC (the 'Proponent') on February 2nd, 2021 for the proposed Harvard Enterprise Research Center project (the 'Project').

I do not support this project as currently proposed.

As submitted, this project's PNF does not contain sufficient information to allow for adequate evaluation of the project. The Proponent is expected to further articulate all aspects of this development in their DPIR, including specific commitments in regards to project benefits.

The following provides an overview of the specific topics that the Proponent must address:

Residential Component:

The Proponent has indicated that they plan to include more than the required 13% of income-restricted
units within the residential portion of this project; however, the exact percentage of income-restricted
units that the Proponent plans to include is not stated. Exclusion of this information from a PNF is not
acceptable. For community members to best evaluate this project, the Proponent must specify the exact 12.1
number of IDP units to be included in this development, as well as the unit types and the AMI levels at
which these income-restricted units will be made available.

I expect the Proponent to include a significant number of income-restricted units at a percentage above
and beyond that required by the City's IDP Policy in both phases of this project. These units must be
made available at a range of AMIs, including AMIs below that of the standard 70%. In collaboration with
HALC, the Proponent must also explore potential opportunities to contribute to the creation of offsite 12.2
affordable housing units- this contribution must be made in addition to on-site affordable housing.

The Proponent must specify the following information in regards to the residential component of the development in the project's DPIR: 12.3

- Proposed unit mix for the residential component of the project
- Proposed percentage of IDP units to be included in the development, including unit sizes and proposed AMI levels 12.4

Retail:

I appreciate the Proponent's stated desire to "foster local, small, and/or Minority and Women-owned ("MBE" and "WBE") retailers via reserved square footage on the ground floors of the Project…" I ask 12.5
that the Proponent make a significant commitment to the inclusion of such businesses within this development.

In regards to retail/commercial space, I expect the Proponent to:

- Commit to specific, long-term measures that will serve to reduce the cost of retail space located within the ERC so as to make these spaces accessible to MBE, WBE, and other local businesses that would not otherwise be able to afford such space. 12.6 Strategies might include: provision of subsidized retail space to selected retailers; provision of built-out retail space to selected retailers; and/or the provision of pop-up, temporary space to selected retailers. Selected strategies must be specified in the project's DPIR.
- Work with Allston Main Streets, the City's Office of Economic Development, and other Boston-based organizations to identify MBE and WBE businesses that may be interested in retail 12.7 space in the ERC

The Proponent must specify the following information in regards to retail/commercial spaces in the project's DPIR:

- The exact amount of ground-floor retail space that will be reserved for local MBE and WBE-owned business in the completed development 12.8

Proposed Parking:

As stated in the PNF, the Proponent proposes to include approximately 620 parking spots within this development. I believe that the number of parking spots currently proposed is appropriate, and would not support any increase in parking.

In regards to on-site parking, I expect the Proponent to:

- Maintain or reduce the parking ratios currently proposed for Phase A of the ERC in the development of Phase B of this project 12.9
- Prohibit project tenants dwelling in the residential component of this development from accessing Allston-Brighton resident parking permits via lease restrictions 12.10
- Unbundle the cost of residential parking 12.11
- Equip a significant number of garage parking spots with EV charging accommodations, above that percentage which is required by the City (25%) 12.12

- Allow Allston-Brighton residents free access to the proposed below-grade parking garage during and for the entire duration of City-declared snow emergencies 12.13

I ask that the Propopent clarify the following information in their DPIR:

- Provision of further details in regards to the proposed on-street parking spots and its management 12.14
- Provision of further detail in regards to the overall parking management system 12.15

Urban Design:

I ask that the Proponent clarify the following in the DPIR:

- The PNF states that a "generous central drop-off point for vehicles [will be] integrated into the road layout" along Western Ave as the primary arrival point to the ERC. How will this drop-off point interact with the planned bike lanes along Western Ave? 12.16
- In the PNF, the ERC conference center is proposed as the project's 'gateway.' While it is understandable that the Proponent would like to welcome the rest of Harvard's campus in this manner, neighborhood residents will not access the project via a gateway that faces away from Allston. I ask the Proponent to consider utilizing design strategies to ensure that there is an alternate 'gateway' that welcomes neighborhood residents to the site. 12.17
- Provision of cross-sections for all streets planned within the project site 12.18

Artist Community:

As stated in the PNF, the Proponent has proposed to include art created by local Allston artists throughout the project site. Though this is a welcome initiative, the Proponent must take additional measures to support Allston's artist community, particularly those measures that will serve this community in the long term. The Proponent may consider the following:

- Inclusion of income-restricted artist live/work studios within the residential component of this development. Please note that these units do not have to be located on the ground floor of the proposed residential building. 12.19
- Contributions towards ongoing efforts to establish an Arts Districts within Allston 12.20

I ask that the Proponent work with local artist organizations to identify appropriate measures. 12.21

Greenway:

I appreciate the attention that the Proponent has given to the design of the proposed Greenway, and believe that this open space will serve as a fantastic amenity for the neighborhood once complete. I expect that the Proponent will provide additional detail on the exact design of the Greenway in their DPIR.

I have the following questions in regards to the Greenway that I ask the Proponent to answer:

- Provide more information on the proposed location of stormwater management systems within the project site, including those within the Greenway 12.22
- I ask that the Proponent consider the inclusion of separate paths for bicyclists and pedestrians within the Greenway space. If a shared use path is preferred, I ask the Proponent to ensure that 12.23

the path is of appropriate width to accommodate both pedestrians and bicyclists and ensure safety for all. 12.23

Mobility/Transit:

Based on the project's PNF, the Proponent's current commitments to transit mitigation measures is grossly inadequate given the project's size and expected impact on area public transit. It is in the Proponent's best interest to ensure the ERC is accessible by efficient public transit options.

In regards to transit, I expect the Proponent to:

- Commit to significant transportation mitigation measures to ensure that the ERC is adequately served by public transit service, particularly the existing bus lines that operate adjacent or near to the project site. The ERC cannot rely on the eventual construction of West Station to serve the site's transit needs. These mitigation measures are to be coordinated with the BPDA and BTD. 12.24
- Coordinate with Harvard University to ensure that ERC site is adequately served by Harvard's shuttle system 12.25

Participation in the Harvard Shuttle Service in and of itself is not adequate transit mitigation, and the Proponent is expected to commit to both measures specified above. 12.26

I do not support the implementation of a separate shuttle service operated by Tishman Speyer specifically for the ERC site. 12.27

Transportation Demand Management:

As stated in the PNF, the Proponent plans to outline project TMD measures in their DPIR. Due to the project's size and expected impact, the Proponent must commit to a robust set of TMD measures. Though I encourage the Proponent to participate in the Allston-Brighton TMA's commuter programs, I also ask the Proponent to explore whether they might participate in Harvard University's CommuterChoice program. 12.28

Sustainability:

I appreciate the Proponent's current commitment to achieve LEED Gold Certification for all proposed buildings within this project.

I expect the Proponent to commit to the following: 12.29

- Commit to the inclusion of rooftop solar PV arrays across project buildings, where feasible
- Commit to the inclusion of green roof areas across project buildings, where feasible 12.30
- Commit to the inclusion of shower and changing facilities within the ERC Center to encourage further bicycle use. The Proponent must also ensure that retail employees have access to these planned facilities. 12.31

The Proponent must specify the following information in the project's DPIR:

- Was a passive house feasibility study conducted for the project? Has there been a commitment to passive house certification? 12.32

- Will the Proponent utilize all-electric options for provision of heating and hot water? 12.33
- Has the Proponent committed to the inclusion of stormwater capture and reuse technologies within the project site? 12.34
- Will the ERC site be served by Harvard University's microgrid? 12.35

Hotel Labor: The Proponent must commit to employment of unionized labor for the planned hotel component of the ERC project. This commitment must be made before the project moves forward in the review process. 12.36

Labor: The Proponent must commit to working with contractors and subcontractors that comply with the Boston Residents Jobs Policy; additionally, the Proponent must actively monitor the project to ensure that all standards of this Policy are met. I strongly support the Boston Residents Jobs Policy and the employment of people of color, women, and other Boston residents in Boston construction projects. 12.37

Sincerely,

Elizabeth Breadon

Liz Breadon
Boston City Councilor
District 9- Allston-Brighton

Charles River Watershed Association

March 24, 2021

Via Email

Nupoor Monani
Boston Planning & Development Agency
One City Hall, Ninth Floor
Boston, Massachusetts 02201
nupoor.monani@boston.gov

Re: Comments on Harvard Enterprise Research Campus Project, located at 100-112 Western Avenue, Allston

Nupoor Monani,

Charles River Watershed Association (CRWA) submits the enclosed comments on the Enterprise Research Campus Project located at 100 - 112 Western Avenue, Allston, ("Project") to the Boston Planning and Development Agency (BPDA). These comments were previously submitted to the Massachusetts Environmental Policy Agency (MEPA) Office on March 2, 2021, regarding the Environmental Notification Form (ENF) filed for the Project on February 1, 2021. CRWA believes these comments are relevant to BPDA's review and approval process.

Thank you for considering these comments.

Sincerely,

Janet Moonan, PE
Stormwater Program Director

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:

- 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. 13.1

[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). 13.2

- 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. 13.3

- 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. 13.4

- 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. 13.5

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. 13.6
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. 13.7

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. 13.8

The 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan[5] or "SHMCAP" outlines the following climate projections:

- <u>Precipitation</u>. 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.

- <u>Flooding</u>. 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.

- <u>Heat</u>. 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.

- <u>Drought</u>. 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.

- <u>Storms</u>. 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. 13.9

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 13.10 recommend use of native species and drought tolerant plantings in all cases.

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 13.11
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 13.12
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 13.13
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 13.14
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 13.15

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. 13.15

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. 13.16

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. 13.17

Thank you for considering these comments.

Sincerely,

Janet S.A. Moon

Janet Moonan, PE
Stormwater Program Director

allston brighton health collaborative

18R Shepard Street, Suite 100
Brighton, MA 02135

March 23, 2021

Increased development in Allston and Brighton is straining the neighborhood's existing infrastructure and public transit opportunities. Meanwhile the neighborhood has unique and diverse transportation needs that include the **highest percentage of cyclists** per total vehicles of any neighborhood in the city, according to City of Boston 2017 counts; and **two of the MBTA's 15 total key priority bus routes**.

The health and success of our neighborhood depends on integrated and connected systems that provide safe, equitable, and accessible transportation to all people. Yet we frequently experience developers funding transportation mitigations that solely benefit their future residents or their immediate geographic area. Allston and Brighton do not exist in isolation and neither do transportation systems. Additionally, developers are increasingly relying on the existing functionality of our transportation infrastructure without investing in its upkeep or growth; by building near public transit, developers can claim their housing is "transit-oriented" without contributing to its improvement.

The Harvard Enterprise Research Campus is an unparalleled opportunity to enhance a transportation and mobility network to the benefit of the project and all the networks that connect to it. Bus routes, bike lanes, roadways, and walking areas within the project area **all** connect to other networks and systems; to focus on improving these mobility options solely within the project footprint is akin to cleaning up one area of water after an oil spill. The project team must work in concert with the projects and teams planning enhancements in Cambridge (Central Square), Watertown (Arsenal St), the I-90 Interchange, Western Ave rezoning, and of course the AB Mobility Study. Any analysis of traffic patterns or transportation uses must include the other use increases that would occur in the same timeframe. Additionally, please request that the BPDA host at least one meeting between all developments occurring within a 1.0 mile radius of the campus and under review, in order to assess your collective mobility impact, needs, and mitigations. With the BPDA Project Managers and IAGs, this is an opportunity to create a collective plan of additive mitigations prior to approval.

Please consider this list of recommendations to be included as part of the project's Transportation Access Plan Agreement:

1. Proponent be required to adopt the City of Boston's Complete Streets guidelines for the development. Anything that is done on the street that does not follow these guidelines must apply for an exemption from the City. 14.1
2. As mitigation and community benefit, and **upon board approval**, Proponent must first be required to fund public transit improvements before approval for study or creation/expansion of a private shuttle service. Transit improvements include increasing the bus fleet, bus lanes, bus shelters, and signal replacement to allow for transit signal priority. This is particularly important for a project of this size; investing in the MBTA will improve Campus resident's, employee's, and 14.2 visitor's ability to access the campus safely and equitably. Even adding a shuttle service won't provide nearly the geographic reach in benefit that an accessible MBTA system would. With the

campus connected to key bus routes, MBTA investment is paramount. Should a shuttle be implemented or expanded, it must be open and free to the public. 14.2

3. As mitigation and community benefit, and **upon board approval,** Proponent be required to fund safety and accessibility improvements for all bus stops within 0.5 mile radius. Improvements 14.3 include bus shelters, lighting, garbage cans, bike racks, and real-time countdowns.
4. As mitigation, Proponent be required to partner with Boston Bikes to help fund at least three additional Bluebikes bike-sharing station anywhere in Allston or Brighton. 14.4
5. Proponent's parking ratio may not exceed 0.45 per unit. All parking spaces must be EV ready. 14.5
6. Proponent be required to set commercial/institutional parking rates (including educational and medical), to be greater than an MBTA monthly pass. 14.6
7. Proponent is encouraged to contract for already available public parking in lieu of on-site parking. (E.g., night parking on lots that have low evening usage.) 14.7
8. Proponent be required to contract with and provide space for car-sharing vehicles (e.g. Zipcar). 14.8
9. Proponent be required to contract with and provide space for Electric Vehicle rentals with 14.9 charging stations on-site and additional charging stations for private vehicles.
10. Proponent be required to provide covered and secured spots and charging capabilities for bikes 14.10 and micro-mobility devices (eg. e-scooters, e-bikes) at a minimum 1.0 ratio.
11. Proponent be required to provide discounts or free monthly MBTA passes and Bluebikes yearly passes to residents who do not use their parking spots. 14.11
12. Proponent be required to build curbside allotment, designated pick-up drop off locations. 14.12

Please let us know if you have any questions or concerns regarding these recommendations. We welcome the opportunity to speak with your team and advise impactful mitigations and benefits. We take seriously the proponent's commitment to sustainability and resiliency; the Campus will not be sustainable or resilient with a disconnected, privatized, and congested mobility system. These recommendations will improve transportation equity and public health in Allston-Brighton and beyond.

Sincerely,

Anna Leslie, MPH
Director
Allston Brighton Health Collaborative

The Transportation Committee of the Allston Brighton Health Collaborative (ABHC) is composed of community residents and organizations who recognize that transportation is a strong indicator and essential component of community health. We advocate to improve equity, access, and safety of all mobility modes in Allston and Brighton. Since 2016, this committee has worked closely with residents and stakeholders to address barriers to safe, reliable and accessible mobility and has become a ***leading neighborhood-wide voice on multi-modal transportation interests.***

5-5-21

To: Nupoor Nomani, Planner BPDA

Fr: Tim McHale, Allston Brighton Resident, HATF Chair

Re: ERC Harvard University – Comment Letter

CC: Brian Golden, Gerald Autler, Mark Handley, Councilor Breadon, Senators Brownsberger and DiDomenico, Representatives Honan and Moran

---

These are my personal comments for the Harvard ERC project. This is a great project, and I would like to see it proceed with success. However, at this time, I cannot support it until the resolution of some major items.

Being part of the original PDA Master Plan and Framework process in 2018, and on the IAG, I voted against this project for the very same reasons I have today. I reference some comments from the 2018 BRA Board meeting below:

1) The project is constructed on superblocks. Two neighborhood approved studies prior to the 2018 PDA show four-story structures in a neighborhood scale grid. This superblock plan goes against previous neighborhood planning.
2) The Community did not understand the Framework, the 40 acre mega site and its relationship to the PDA Master Plan. They were skeptical about it, so was the BRA Board.
3) The Community asked, and too the BRA Board, for more information on the Framework – for Harvard to be more collaborative, and to take the time before the next filing to help the Community understand the Framework. In the three years between the filings, the Community did not receive any correspondence from Harvard about the ERC. Why didn't the University come to the Community before this filing and work in a collaborative way as requested? Inserting a third party, developer Tishman Speyer, in the relationship between Harvard and the Community is stressing the Community/Harvard relationship we worked very hard at restoring..
4) During discussion at the Board meeting, the BRA Board was dismissive of this proposal on grounds there just wasn't enough information to adequately evaluate the project and if and when Harvard came back again to file, the proponent would have higher hurdles and much more scrutiny than before. As we know the project passed, but not without the unity of the BRA Board, the

elected officials, and the Community stating in unison, there isn't enough information in this filing.

Fast forward to present day and we have the same proposal in front of us. Yes, we have charts and footprints, models and dimensions, but no Framework. There is no more information on the Framework than there was in 2018. We have no building designs. A 3-D concept of the PDA and Framework would take us light years into the future in understanding the planning that is afoot.

The Framework and its 40+ acres is a project that dwarfs the 2013 IMP. Why are the rules changing for a corporate development? An institutional development requires much more planning information, yet this PDA is sailing through without the same scrutiny. Please show the Community some early thinking on what the Framework might look like. In 2018, the BRA Board was critical of Harvard about having a president who is a planner and is silent in the Community where he wants to develop. Where is Mr. Bacow on this? This is the most impressive planning project undertaken by the University and he has not connected with the Community. It's time for Mr. Bacow to meet the Community!

Given the above comments, we hope for substantial responses at our upcoming Task Force meetings.

When the project begins its earnest journey through the approval process, I offer these comments on the plan:

Open Space

1) Connect the greenway through the Genzyme site to the river. 15.1
2) What does the Greenway look like when it's 100% completed? 15.2
3) What is the ratio of hardscape to green space? 15.3
4) In light of the recent BWSC/NASDEP meeting on 4/26, there were many comments on bringing the storm water to daylight via open channel and/or 15.4 pond, thus making an attractive water feature on the site. This feature could also extend to the remaining area of the ERC. What would be options for this?
5) Where does the open space lead to in the Framework? 15.5

Massing of Buildings, Planning:

1) Consider adjusting the layout of the buildings in such a way that the 2-acre open greenspace is rotated 180 degrees and the buildings adjusted accordingly. This would open up the greenspace to the Community, the sun and sunsets. The ERC 15.6 buildings would frame the east end, not Genzyme. The residential buildings and

hotel would have a better view of the River. The space could feel more like a destination. Explain rationale for current design. 15.6

2) What makes the public realm plaza a destination for a diverse group of residents? Is this a high-end gallery of expensive shops or a walking mall of affordable retail? How do people get there easily? 15.7
3) All buildings could be stepped back at the fourth or fifth story along the greenspace and Western Ave to heighten the human experience. 15.8
4) What is timeline for phase 2? 15.9

Mobility, parking, and transportation

Remember that this is just one development among many, but it has its own center of gravity. There needs to be a vision for well-designed connections - for people and bicyclists - to the proposed Greenway and to all points on the compass. People and bicyclists need to safely and easily get around this area.

Because of this and the numerous other development projects occurring in the area, we ask that the BPDA host a meeting with Harvard, and other developers along Western Ave to assess their collective mobility impact, needs, and mitigations and, with BPDA Project Managers and IAGs, create a collective plan of additive mitigations prior to approval.

We also make the following requests:

- Funding to improve public transit improvements before approval for study or creation of a private shuttle service. Transit improvements include bus lanes, bus shelters, and signal replacement to allow for transit signal priority. Should a shuttle be implemented it be open and accessible to the public. 15.10
- Funding for safety and accessibility improvements for all bus stops within 0.5 mile radius. Improvements include bus shelters, lighting, garbage cans, bike racks, and real-time countdowns. 15.11
- Work with the MBTA's Sales Network team include Charlie Card sales locations (vending machines and/or retail) 15.12
- Provide covered and <u>secured storage and charging capabilities for</u> bicycles and other micro-mobility devices (e.g., scooter and e-bikes) 15.13
- Provision of electric vehicle charging stations in the parking garage 15.14
- Provide discounts or free monthly MBTA passes and Bluebikes yearly passes to residents who do not use their parking spots 15.15

Affordable housing

We continue to have serious concerns regarding the affordability of the rental units to people who live in Allston. We still have serious concern about the lack of home ownership opportunities. Home ownership is a coveted concept and one sorely needed in this neighborhood of 90% renters and 10% homeowners. Adding 200+ rental units does not serve the community stabilization plan. The City's average is about 47% home ownership. If the proponent does not see home ownership in the project, other land in the neighborhood and in Harvard's control could be developed into home ownership. This is a topic that we will continue to emphasize.

In addition, we would like Harvard as necessary to respond to our concerns:

- We would like to see a minimum 20% IDP units at range of area median income between 50 and 100%, 20% of the 2 and 3 bedroom units should be IDP with a range between 50 and 70% AMI with average less than 70% 15.16
- Special consideration should be given to families, seniors, persons with disabilities 15.17
- Condensed unit size seems to discourage family occupancy 15.18
- Rental priority should be given to current Allston Brighton residents 15.19
- Is the project currently designed geared toward students as opposed to long term residents? 15.20
- The rental costs should be disclosed. The proponent's stated goal is inclusivity, which included affordability and diversity. Please explain the socio-demographic market targets for this project for residents and businesses. 15.21
- Address new Affirmatively Furthering Fair Housing (AFFH) zoning documentation requirements in Draft Environmental Impact Report 15.22

Support for local small business development and local workers

The proposed project includes a substantial amount of retail space. We would like these spaces to support local small businesses including those owned by women and 15.23
minorities, including offering spaces at below market rents. It will also be important to design these spaces to be a size that would be affordable to a small local business, rather than larger spaces that only a chain would be able to afford. 15.24

The developer must also commit to working with contractors and subcontractors that comply with the Boston Residents Jobs Policy; additionally, the Proponent must actively monitor the project to ensure that all standards of this Policy are met. We strongly support the Boston Residents Jobs Policy and the employment of people of color, women, and other Boston residents in Boston construction projects. 15.25

A Community Benefits Package Negotiated with Harvard University

The Community Benefit package for this project should be negotiated with Harvard, not Tishman Speyer. The community benefits associated with the three Harvard properties under consideration for development (180 Western, 176 Lincoln, and ERC) should all be addressed together with Harvard. The relationship Harvard and the Community enjoy will streamline the process instead of inserting three separate entities in the mix. 15.26

Construction Mitigation

We will have further comments on this as the pan unfolds.

The project has enormous potential to create a fantastic public realm, lively community spaces, gathering areas to linger and socialize, connections to a rich array of neighboring sites, a walking mall and courtyard, café's, retail, and the Greenway with a potential water feature.. We ask that the development team refresh their view through this lens. Thank you for the opportunity to submit this comment letter.

APPENDIX G: AFFH and LAP Supporting Documentation

Contents:

- Affirmative Furthering Fair Housing Assessment Tool and Attachments
- Language Access Plan Checklist

Article 80 - Affirmative Furthering Fair Housing Assessment Tool

Proponents of Large Projects, Planned Development Areas (PDAs), and Planned Development Area Master Plans that feature a housing component must submit this form with each Project Notification Form and/or Notice of Project Change. If this is a multi-building and/or multiphase project you must submit a separate assessment for each building and/or phase. For PDAs you must submit an assessment for the entire PDA as well as for each Proposed Project within the PDA.

For more information on how to complete this form see The AFFH Assessment and Submission Guide. To complete this form electronically as a Google Form visit: https://bit.ly/38qXmh0. If completing this form as a Word Doc (i.e. not electronically using the Google Form) please submit this form with the rest of your Article 80 filings. For questions about this form please email Michelle McCarthy, Housing Policy Manager at michelle.mccarthy@boston.gov.

Please remember to include all necessary and/or required attachments.

Section 1: Submission Information-Primary Contact			
Date:	7/28/2021		
Name:	Kate Bicknell	Title:	Managing Director
Company:	Tishman Speyer		
Email:	Kbicknell@tishmanspeyer.com	Phone:	(617) 748-7548
What type of project is this submission for?	☐ Large Project: Single building/phase ☒ Large Project: Multi-building/phase ☐ Planned Development Area ☒ Project located within a Planned Development Area ☐ Other (please explain):		
At what stage in the Development Review process is this submission being made?	☐ Project Notification Form ☐ Notice of Project Change ☐ Response to a Supplemental Information Request ☒ Other (please explain): Voluntary submission		

Section 2: Development Team Information-Primary Contact			
Proponent/Owner			
Name:	Kate Bicknell	Title:	Managing Director
Company:	Tishman Speyer		
Email:	Kbicknell@tishmanspeyer.com	Phone:	(617) 748-7548
Attorney			
Name:	Richard Rudman	Title:	Partner
Company:	DLA Piper		
Email:	Richard.rudman@dlapiper.com	Phone:	(617) 406-6027
Marketing Agent			
Name:	Amy Medugno	Title:	Senior Vice President
Company:	Bozzuto		
Email:	Amedugno@bozzuto.com	Phone:	(781) 330-2121

BPDA Staff			
Project Manager:	Nupoor Monani	Planner:	

Article 80 - Affirmative Furthering Fair Housing Assessment Tool

Section 3: Proposed Project Overview	
A. Proposed Project Information	
Project Name	Enterprise Research Campus – Phase A
Project Address(es)	100-112 Western Avenue, Allston MA
What is the square footage of the Proposed Project Site?	The square footage of the Proposed Project Site is 410,582 SF (±9.42 acres)
Purchase Date of Proposed Project Site	N/A
Is the Proposed Project located in a Planning Area or subject to a Planning Initiative? If, yes please describe.	☐ No ☒ Yes (please describe): Located in PDA 115
Is the Proposed Project located within a Landmark District or an Architectural Conservation District? If yes, please describe.	☒ No ☐ Yes (please describe):
Are there any current or expiring affordability restrictions, special property tax agreements, or similar (e.g. Urban Renewal, Section 8, 121A, etc.) on any existing building within the Proposed Project Site	☒ No ☐ Yes (please describe):
B. Proposed Project Description	
What is the construction classification of the Proposed Project?	☒ New Construction ☐ Rehabilitation ☐ Other (please describe):
Total anticipated number Phases and/or Buildings	5 buildings / single-phase 2 residential buildings
What is the anticipated residential square footage at the Proposed Project?	~263,500 GFA ~205,000 - ~215,000 net rentable square feet
How many residential units are anticipated at the Proposed Project?	~345
Are residential units anticipated to be rentals or homeownership units? If there will be a mix, please describe.	☒ Rentals: ☐ Homeownership Units: ☐ Mix (please describe):
Indicate how many units of each bedroom size are anticipated at the Proposed Project.	Studio: ~131 1 Bed: ~166 2 Bed: ~48 3 Bed: N/A 4+ Bed: N/A
Indicate how many units accessible to persons with disabilities (i.e. fully built-out Group 2 units) are anticipated at the Proposed Project.	~19

Article 80 - Affirmative Furthering Fair Housing Assessment Tool

How many total units will be financially available to tenants with Housing Choice Vouchers (i.e. Section 8 vouchers) and/or other state or local housing vouchers? Payment standards for Boston Housing Authority Vouchers are here.	~58
Are any units anticipated to be Compact Living units? If yes, list the total number of compact units.	☒ No ☐ Yes-Total Number of Compact Units:
Indicate how many compact units of each bedroom size are anticipated at the Proposed Project.	Studio: 0 1 Bed: 0 2 Bed: 0 3 Bed: 0 4+ Bed: 0
Are there non-residential uses anticipated at the Proposed Project Site? If yes, please describe.	☐ No ☒ Yes (please describe): The Proposed project includes various non-residential uses, including lab/office, hotel, conference center, and supporting ground floor retail uses.
Is the Proposed Project anticipated to be subject to Development Impact Project Exactions (i.e.: Linkage)? If yes, please indicate the anticipated amount of each exaction.	☐ No ☒ Yes: Anticipated Housing Exaction: ~$4,750,000 - $5,000,000 Anticipated Jobs Exaction: ~$950,000 – $1,000,000

Section 4: Displacement Risk at the Proposed Project Site

A. Previous and Current Uses of the Proposed Project Site

Have there been any buildings on the Proposed Project Site at any time in past two years or, if applicable, since zoning relief was granted at the Proposed Project Site, whichever is longer?	☒ No (**Skip to Section 5: Inclusionary Development Policy**) ☐ Yes
Are there any buildings on the Proposed Project Site currently? Choose the one option that best applies.	☐ Yes, and some or all are currently occupied. ☐ Yes, they are all currently vacant and have been vacant for the past two years. **(Skip to Section 5: Inclusionary Development Policy.)** ☐ Yes, they are all currently vacant but have not been vacant for all the past two years. ☐ No, but there were buildings at the site in the past two years.

	☒ No, there have been no buildings at the site in the past two years. (**<u>Skip to Section 5: Inclusionary Development Policy)</u>**
To the best of your knowledge, describe all uses, including temporary uses at the Proposed Project Site within the past two years. If you are unable to answer this question, please explain why.	The Project Site, currently and historically, has not provided access for or public benefits to the Allston community or broader public, having been utilized primarily for industrial transportation uses and construction staging.
What types of tenants and/or occupants are currently present at the Proposed Project Site?	☐ Residential Only ☐ Commercial Only (**<u>Skip to Section 4.C Past and Current Residential Use Details</u>**) ☐ Both residential and commercial ☐ Other (please describe): ☒ None (**<u>Skip to Section 5: Inclusionary Development Policy)</u>**
B. Past and Current Residential Use Details	
How many residential buildings at the Proposed Project Site are currently occupied?	
How many residential units currently exist at the Proposed Project Site? List the number of vacant units and the number of occupied units.	Vacant Units: Occupied Units:
For each unit vacated within the past two years list the vacancy date for each unit, to the best of your knowledge**. <u>Please indicate if you are attaching a separate list</u>**.	
Of the units vacated within the past two years, were any occupied by subsidized housing voucher holders (i.e. Section 8, MRVP, CoC PSH, etc.)?	☐ No ☐ Yes (please describe):

Of the currently occupied units, are any occupied by subsidized voucher holders (i.e. Section 8, MRVP, CoC PSH, etc.)?	☐ No ☐ Yes (please describe):
Of the units vacated within the past two years, were any occupied by persons with disabilities?	☐ No ☐ Yes (please describe):
Of the currently occupied units, are any occupied by persons with disabilities?	☐ No ☐ Yes (please describe):
Which of the following tenancy actions have taken place at the Proposed Project Site within the past two years? Indicate the number of times each action has taken place within that time period, to the best of your knowledge.	☐ Tenant voluntarily vacated unit at expiration of lease or tenancy at will period: ☐ Tenant vacated unit due to a rent increase: ☐ Notice to Quit issued for cause (i.e. non-payment of rent; lease violation): ☐ Notice to Quit issued for no cause: ☐ Tenant formally evicted for cause: ☐ Tenant formally evicted for no cause: ☐ Tenant vacated unit because of change in ownership and/or intent to develop: ☐ Other (please describe):
Have residential tenants been informed of any ownership changes?	☐ No ☐ Yes (please provide date, and attach a representative example of the notice)
If condominiums are anticipated within the Proposed Project, have current tenants been informed of their rights under the Condominium Conversion Act?	☐ No, the Proposed Project is 100% rental units. ☐ No, tenants have not yet been informed. ☐ Yes (please provide date and attach a copy of the notification):
Provide the date on which the Department of Neighborhood Development Office Housing Stability was informed of intent to develop the Proposed Project Site, as applicable. **Please attach a copy of the notification.**	
Please provide information on what types of permanent relocation and/or financial assistance has been provided to tenants. If none, what assistance	

do you plan to provide to tenants to assure housing stability?	
If you have been unable to answer any of the questions in Section 4.B-especially those questions relating to use and/or occupancy of the Proposed Project Site within the past two years-please explain why.	
C. Past and Current Commercial Use Details	
How much commercial square footage is currently present at the Proposed Project Site?	Vacant: Occupied:
In a separate attachment for each commercial space currently occupied or occupied within the past two years, please provide the following information, as available: ● Current status (i.e. vacant or occupied) ● Square Footage ● Name of business or organization ● Type of business or organization ● If the tenant is or was a minority or woman owned business ● Length of time the business or organization has or had been at the Proposed Project Site ● The preferred language of tenant	
Are there any specific commercial tenants expected after development?	☐ No ☐ Yes (please describe):
Are there any specific minority or woman owned business tenants anticipated after development?	☐ No ☐ Yes (please describe):

Section 5: Inclusionary Development Policy (IDP)						
Is the IDP anticipated to apply to the Proposed Project?	☒ Yes ☐ No (please explain why and then skip to **Section 6: Strategy for Addressing AFFH Goals**):					
In which IDP Zone is the Proposed Project Located?	☐ Zone A ☒ Zone B ☐ Zone C					
	☒	On-site units	Number anticipated:	~58	Percent of total	17%
	☐	Off-site units	Number anticipated:		Percent of total	

<table>
<tr><td>How is the Proposed Project anticipated to meet IDP obligations? Check all that apply.</td><td>☐</td><td>Payment into IDP fund</td><td>Amount anticipated</td><td>$</td></tr>
<tr><td>How many IDP units are anticipated as rental units and how many units are anticipated as homeownership units?</td><td colspan="4">On-site rental: ~58
Off-site rental:
On-site homeownership:
Off-site homeownership:</td></tr>
<tr><td rowspan="2">What is the total anticipated square footage for all on-site IDP units?</td><td>Rental Square Footage:</td><td>~31,500 – 36,500 net rentable square feet</td><td>Percent of total square footage:</td><td>~15.5% - 17.0%</td></tr>
<tr><td>Homeownership Square Footage:</td><td></td><td>Percent of total square footage:</td><td></td></tr>
<tr><td rowspan="5">Indicate the anticipated number IDP units by bedroom size at the Proposed Project site, including the number of Compact Living IDP units for each bedroom size.</td><td>Total IDP Studio:</td><td>~22</td><td>Compact IDP Studio:</td><td></td></tr>
<tr><td>Total IDP 1 Bed:</td><td>~28</td><td>Compact IDP 1 Bed:</td><td></td></tr>
<tr><td>Total IDP 2 Bed:</td><td>~8</td><td>Compact IDP 2 Bed:</td><td></td></tr>
<tr><td>Total IDP 3 Bed:</td><td></td><td>Compact IDP 3 Bed:</td><td></td></tr>
<tr><td>Total IDP 4+ Bed:</td><td></td><td>Compact IDP 4+ Bed</td><td></td></tr>
<tr><td>Indicate the number of anticipated IDP units that will be made accessible to persons with disabilities (fully built-out MAAB Group 2 units).</td><td colspan="4">3</td></tr>
<tr><td rowspan="2">Indicate the number of anticipated IDP units by AMI at the Proposed Project Site</td><td colspan="2">Rental Units</td><td colspan="2">Homeownership Units</td></tr>
<tr><td colspan="2">30% AMI:
40% AMI:
50% AMI:
60% AMI:
70% AMI: ~51 (6 units greater than IDP requirement)
Other (please describe): ~7 at 100% AMI</td><td colspan="2">60% AMI:
70% AMI:
80% AMI:
90% AMI:
100% AMI:
Other (please describe):</td></tr>
<tr><td>If off-site units are anticipated, please describe host site, partnerships, anticipated funding, and development timeline.</td><td colspan="4"></td></tr>
<tr><td>If you are unable to provide the specific details for any question in Section 5, please explain when these details are expected to be available for review.</td><td colspan="4">Proponent is early in the design process and does not yet have floorplans available. Therefore, it has provided ranges for the rentable square footage.</td></tr>
</table>

<table>
<tr><th colspan="3">Section 6: Strategy for Addressing AFFH Goals</th></tr>
<tr><td colspan="3">Proponents must consult the Housing and Household Composition Community Profile Report and the Department of Neighborhood Development Displacement Risk Index and Maps in order to complete this section. For more information on how to complete this section see The AFFH Assessment and Submission Guide. The Boston Interagency Fair Housing Development Committee (BIFDC) may request Proponents to consider different or additional Intervention Options after submission of this form and prior to its recommendation to the BPDA Board.</td></tr>
<tr><td colspan="3">A. Intervention Options & Intervention Enhancements</td></tr>
<tr><td rowspan="10">Indicate which Article 80 Intervention Options will be incorporated into the Proposed Project. All projects must select at least one option. Selection(s) must be proportional to the size, scope, and impact of the Proposed Project. Certain projects may be required to select more than one option as an Intervention Enhancement.</td><td>☒</td><td>Provide an additional percentage of IDP units than required:</td></tr>
<tr><td>☐</td><td>Deepen the affordability of IDP units</td></tr>
<tr><td>☒</td><td>Provide all IDP units on-site</td></tr>
<tr><td>☐</td><td>Provide higher proportion of 2+ bedroom IDP units than required</td></tr>
<tr><td>☐</td><td>Meet or exceed proportion of market rate 2+ bedroom units in the community</td></tr>
<tr><td>☐</td><td>Increase the number fully built-out Group 2 units accessible to persons with disabilities</td></tr>
<tr><td>☐</td><td>Increase building density to directly increase affordable units for and available to people in protected classes</td></tr>
<tr><td>☐</td><td>Agree to apply to host Project Based Vouchers or Rental Assistance Demonstration units onsite, in addition to meeting IDP</td></tr>
<tr><td>☐</td><td>Partner with a non-profit developer, land trust, housing authority, or other entity to provide land or bear some capital costs to enable affordable housing construction, in addition to fulfilling IDP requirements</td></tr>
<tr><td>☒</td><td>Other (please describe): As noted above, the Proposed Project will include a significant amount of Development Impact uses that will generate Development Impact project Exactions, including Housing Exactions.</td></tr>
<tr><td>For each Article 80 Intervention Option selected, describe how many units the proposed Intervention options will apply to. Please distinguish between market-rate and IDP units. Refer to the AFFH Submission Guidance document for more information on what information should be included for each Article 80 Intervention Option.</td><td colspan="2">Provide an additional percentage of IDP units than required: Proponent will provide ~58 IDP units (17% of total units), ~13 units more than required (IDP requirement is ~45 units / 13% of total units).

Provide all IDP units on-site: All ~58 IDP units will be onsite.</td></tr>
<tr><td rowspan="2">Indicate which Marketing & Housing Access Intervention Options will be incorporated into the Proposed Project. All projects must select at least one option. Selection(s)must be</td><td>☐</td><td>Provide a preference for an agreed upon percentage of units to rental voucher-holders and develop marketing and tenant selection policies and procedures that are least likely to exclude voucher-holders.</td></tr>
<tr><td>☐</td><td>Provide preference for an agreed percentage of units to families that are currently rent-burdened, have experienced a no-fault eviction, or have experienced eviction but now display the ability to pay and develop</td></tr>
</table>

<table>
<tr><td rowspan="7">proportional to the size, scope, and impact of the Proposed Project.</td><td></td><td>marketing and tenant selection policies and procedures that least likely to exclude preferred tenants.</td></tr>
<tr><td>☐</td><td>In the case of homeownership units, provide a preference to first-time/generation Homebuyers and develop marketing policies and procedures that are least likely to exclude preferred homebuyers.</td></tr>
<tr><td>☐</td><td>Allow last month's rent and security deposit to be paid in installments for an agreed upon percentage of units or by renters up to a certain income level</td></tr>
<tr><td>☒</td><td>Agree to follow best practices related to the use of CORI, eviction, and credit records in the tenant screening and selection process</td></tr>
<tr><td>☐</td><td>Agree to follow progressive practices related to the use of CORI, eviction, and credit records in the tenant screening and selection process, and in marketing of units, for example following Fair Chance Housing guidelines, and/or waiving eviction and credit checks for affordable units and/or housing voucher-holders.</td></tr>
<tr><td>☒</td><td>Agree to best practices in marketing the market-rate units that are inclusive of and welcoming to members of protected classes</td></tr>
<tr><td>☐</td><td>Other (please describe);</td></tr>
<tr><td>For each Marketing & Housing Access Intervention Option selected, describe how many units the proposed Intervention options will apply to. Please distinguish between market-rate and IDP units. Refer to the AFFH Submission Guidance document for more information on what information should be included for each Marketing & Housing Access Intervention Option.</td><td colspan="2">Agree to follow best practices related to the use of CORI, eviction, and credit records in the tenant screening and selection process: All units

Agree to best practices in marketing the market-rate units that are inclusive of and welcoming to members of protected classes: All units</td></tr>
<tr><td colspan="3">Supplemental Process Options: These are <u>optional</u> Intervention Options a Proponent may propose as an Intervention Enhancement. Supplemental Process options must be legal feasible and must clearly be linked to AFFH goals. Supplemental Process Options will be reviewed by the BIFDC as well as any relevant City departments and/or Agencies before they can be recommended and/or implemented. Examples of Supplemental Process Options are:
• Establishing a housing stabilization fund
• Entering into voluntary deed restriction granting tenants the right of first refusal to purchase property upon conversion or sale
• Establishing and/or contributing to a neighborhood housing Acquisition Opportunity Program
• Restricting the percentage of non-owner-occupied units
• Providing flexible lease options to local, small business tenants in mixed-use developments
• Agreeing to support cooperative housing units

Proponents choosing to pursue one or more Supplemental Process Options should attach a description of the proposed Supplement Process Option(s) that describes the scope of the proposed option(s) and how the option is</td></tr>
</table>

anticipated to be implemented. The BPDA Project Manager and/or BIFDC will follow up with the Proponent requesting any different or additional information necessary to review the proposed Supplemental Option(s).

If required, indicate which Intervention Enhancements will be incorporated into the Proposed Project. Note: The Boston Interagency Fair Housing Development Committee may determine that the Proposed Project is in an Area of High Displacement Risk and/or Area of High Historical Exclusion after submission of this form.	***Areas of High Displacement Risk must select one of the following:***	
	☐	Diversity Preservation Preferences (if permitted at Proposed Project Site)
	☐	Additional Article 80 Option(s)
	☐	One or more Supplement Process Options
	Areas of High Historical Exclusion must select one of the following:	
	☐	Build all IDP units on-site
	☐	Additional Article 80 Option(s)
	☐	One or more Supplement Process Options
	Planned Development Areas (PDA) must select one of the following	
	☒	Additional Article 80 Option(s)
	☒	One or more Supplement Process Options

B. Discussion of the Impact of Intervention Options on Displacement Risk – To complete this section Proponent must reference specific answers provided throughout this form, as well as information form the Housing and Housing Composition Community Profile Report which details the racial, ethnic, economic characteristics of the community within ¼ mile of the Proposed Project Site as well as the characteristics of the housing within the same radius, to discuss how selected intervention Options mitigate Displacement Risk. For more information on Displacement Risk throughout the City, Proponents should review the DND Displacement Risk Index and Maps.

Displacement Risk Analysis: Using the answers provided in **Section 4: Displacement Risk at the Proposed Project Site** the information provided in the Housing and Household Composition Community Profile Report and DND's Displacement Risk Index and Map, please discuss the displacement pressures at the Proposed Project Site and within the surrounding community and how the selected Intervention Options mitigate those pressures and create	There are no buildings or housing units at the Proposed Project Site currently, so there is no direct displacement risk from the Project. Additionally, according to the DND's Displacement Risk Index and Map, the displacement risk of the area the Project is located in is low.

opportunities for members of protected classes. Please address how proposed Intervention Options are proportional to the size, scope, and impact of the Proposed Project on the surrounding community.	
IDP Programming: Using the answers provided **Section 5: Inclusionary Development Policy (IDP)** and the information provided in the Housing and Housing Composition community Profile Report and DND's Displacement Risk Index and Map, describe how IDP commitments will contribute to a more inclusive community, including how unit sizes and AMI targets meet the needs of residents in the surrounding community, especially members of protected classes.	67.0% of households in the Project Area spend more than 30% of their income on rent, and 41.5% spend more than 50% of their income on rent. By providing ~58 IDP units (~13 more than required), Proponent will be creating housing opportunities for households overburdened by rent. By providing all IDP units onsite, Proponent will be creating an inclusive community in what is a moderate historical exclusion area. The Project represents one of the largest opportunities to increase the affordable housing supply in the neighborhood in the near team, as ~58 IDP units are anticipated to deliver as early as 2024. 73.5% of the Project Area's households consist of two people or fewer, and 87.2% consist of three people or fewer. However, only 60% of the Project Area's housing units are studios, one bedroom, and two bedrooms. The Project's addition of studio, one bedroom, and two bedroom apartments will help address this need in the community.
Please describe any additional efforts undertaken to address Displacement Risk at and within ¼ mile of the Proposed Project Site that have not already been discussed.	
C. Discussion of the Impact of Intervention Options on Historical Exclusion – to complete this section Proponent must use the Historical Exclusion Map to discuss how selected Intervention Options assure that the Proposed Project is an inclusive, integrated, and welcoming place and that the Proposed Project contributes to making the neighborhood more inclusive by creating opportunities for residency for members of protected classes, especially those that have been Historically Excluded	
Historical Exclusion Analysis: Using the Historical Exclusion map please discuss the factors contributing to Historical Exclusion surrounding the Proposed Project Site how the selected Intervention Options attempt to mitigate Historical Exclusion at the Proposed	Historical exclusion factors surrounding the project site include a below-average percent of units that are income restricted, and an above average percent of households spending more than 50% of household income on rent. The Project's Area has a mismatch between the household size makeup of the neighborhood and the size of units in the housing stock. The Project will address those factors by building ~58 affordable units (~13 units above the IDP requirement) to add income restricted unit supply to the neighborhood and ensure that the households renting those units are paying a manageable share of their income in rent. The Project will focus on building

Project Site and are inclusive of members of protected classes.	studios, one bedroom, and two bedroom units to increase housing supply for smaller households, who make up the majority of the neighborhood.
Integration and Inclusivity: Considering the extent of Historical Exclusion surrounding the Proposed Project Site please discuss all efforts-including housing, commercial, and programmatic efforts-that will be taken to make the Proposed Project an inclusive, integrated, and welcoming place and how the Proposed Project will contribute to making the neighborhood more inclusive.	The Project will include nearly three acres of new, publicly accessible open space, including a ~1.4-acre Greenway. The Proponent will partner with local artists and organizations as part of its programming strategy to ensure the programming and its partners are diverse and inclusive. The Proponent's vision for the Project retail 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. As described in Section 4.4 of Chapter 4 of the DPIR, *Urban Design*, 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 to operate at the Project.
D. Discussion of Marketing and Tenant Selection – to complete this section the Proponent should reference how Marketing Intervention Options will be used and incorporated into occupancy and tenant selection policies in order to reach protected classes.	
Describe efforts that will be made to reach out to neighborhood residents-especially members of protected classes-when marketing residential units, keeping in mind language access and channels through which units are marketed.	The Proponent will work with its marketing team to implement a marketing and tenant selection plan that promotes inclusivity to members of protected classes and takes into consideration language access.
Describe efforts that will be made to assure residential unit marketing will meet the requirements of the Fair Housing	The Proponent will work with its residential marketing team to ensure compliance with the Fair Housing Act. The marketing team's employees will be trained in Fair Housing practices, and the Leasing Office will include a posting of the Fair Housing statement.

Act of 1968 and promote an inclusive and diverse community.	
For Proposed Projects anticipated to have rental units, describe tenant selection and occupancy policies regarding tenant eligibility (i.e.: use of CORI history, credit reports, eviction history, etc.), application fees, payment of first last/month rent and security deposits. **You may attach sample policies to complete this question**.	These practices will be further developed as the Project is developed. The Proponent agrees to follow best practices relating to the use of CORI, eviction, and credit records in the tenant screening and selection process for both market-rate and IDP units.

Section 7: Attachments

Please indicated that the following attachments have been included with this form (* indicates the attachment is required). If you are including attachments other than those listed here please describe the attachment.

1.	Housing and Household Composition Community Profile Report for Proposed Project Site*	☒
2.	Condominium Conversion Notice to tenants (representative example)	☐
3.	Vacant unit by vacancy date list	☐
4.	Notice of intent to develop sent to Department of Neighborhood Development Office of Housing Stability	☐
5.	Representative example of each notice sent to tenants about redevelopment at the Proposed Project Site	☐
6.	Commercial tenant information	☐
7.	Supplemental Process Option(s) description	☒
8.	Sample tenant selection and occupancy policies	☐
9.	Other (please describe):	☐

Section 8: Acknowledgements

By submitting this form, I acknowledge that the information provided is true and correct to the best of my knowledge and is subject to review by the Boston Interagency Fair Housing Development Committee (BIFDC) and that a recommendation by the BIFDC that AFFH strategies are appropriate for the Proposed Project must be made to the BPDA Board as part of seeking approval for the Proposed Project.

I further acknowledge that Intervention Options and other strategies for the meeting AFFH goals will be memorialized in Housing Agreements and/or Cooperation agreements which will restrict who may live in a particular unit of housing, how much rent may be charged for a particular unit of housing, the maximum sales price for a particular unit of housing, as allowed under local, state, and of federal laws.

I further acknowledge that some or all housing units shall be marketed in accordance with the policies and procedures established by the City of Boston's Affirmative Fair Housing Marketing Program and outlined in an Affirmative Fair Marketing Plan.		
Kate Bicknell	Managing Director, Tishman Speyer	7/28/2021
Name	**Title**	**Date**

Enterprise Research Campus – Phase A – Affirmatively Furthering Fair Housing ("AFFH")

Supplemental Process Option Descriptions

Supplemental Process Option #1 – Fostering and Cultivation of Local/MBE/WBE Retailers:

The Proponent's vision for the Project retail 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. As described in Section 4.4 of Chapter 4 of the DPIR, *Urban Design*, 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 to operate at the Project.

Supplemental Process Option #2 – 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's 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, 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 of Boston.

Supplemental Process Option #3 – 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 help facilitate 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.

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.

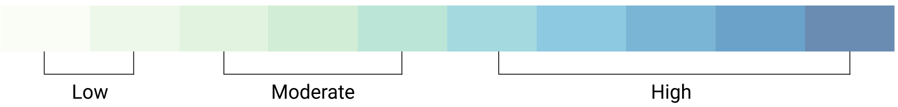
boston planning & development agency

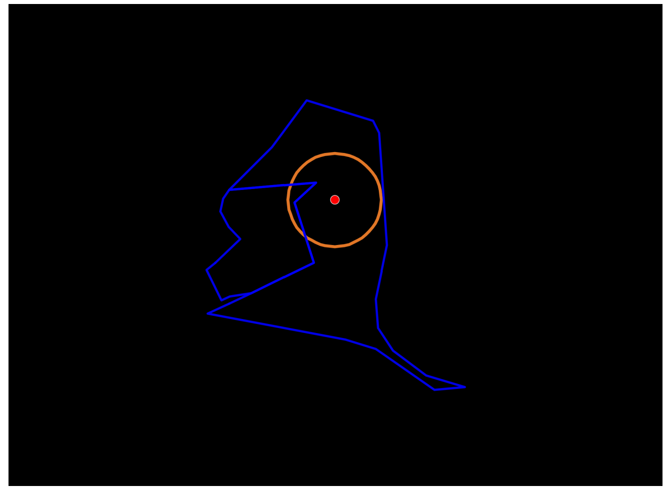
Housing and Household Composition Community Profile

Project Address: North Allston, Boston, Massachusetts

Total Households in Project Area: 1106

Historical Exclusion Level: Moderate

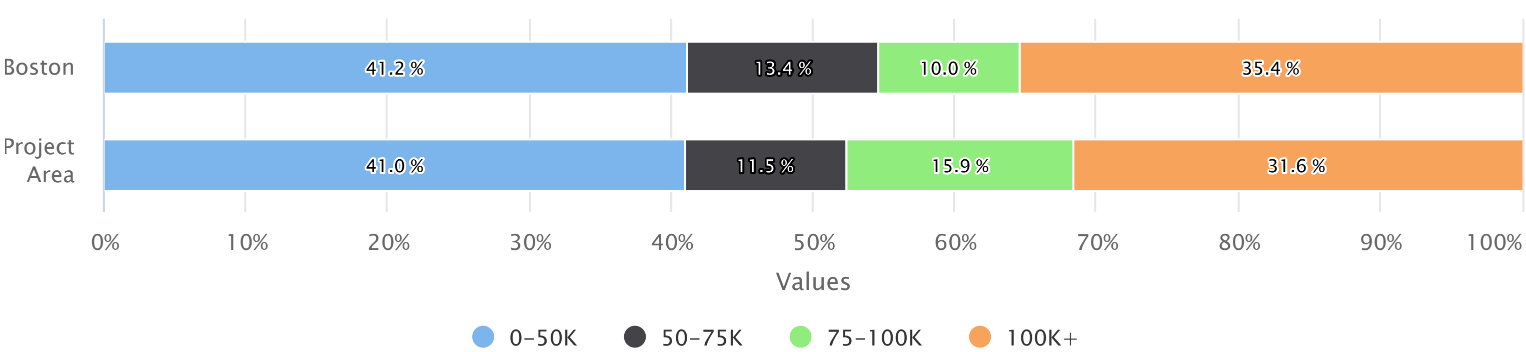




Boston Household Characteristics

	Percent of Housing Units that are Renter Occupied	Percent of Households spending 30% or more of Household Income on rent	Percent of Households spending more than 50% of Household Income on rent	Percent of Housing Units that are Income-Restricted	Percent of Households Using Mobile Housing Vouchers, BHA
Project Area	85.8%	67.0%	41.5%	0.0%	0.6%
Boston	65.9%	48.9%	25.8%	20.6%	4.7%

Household Income Buckets



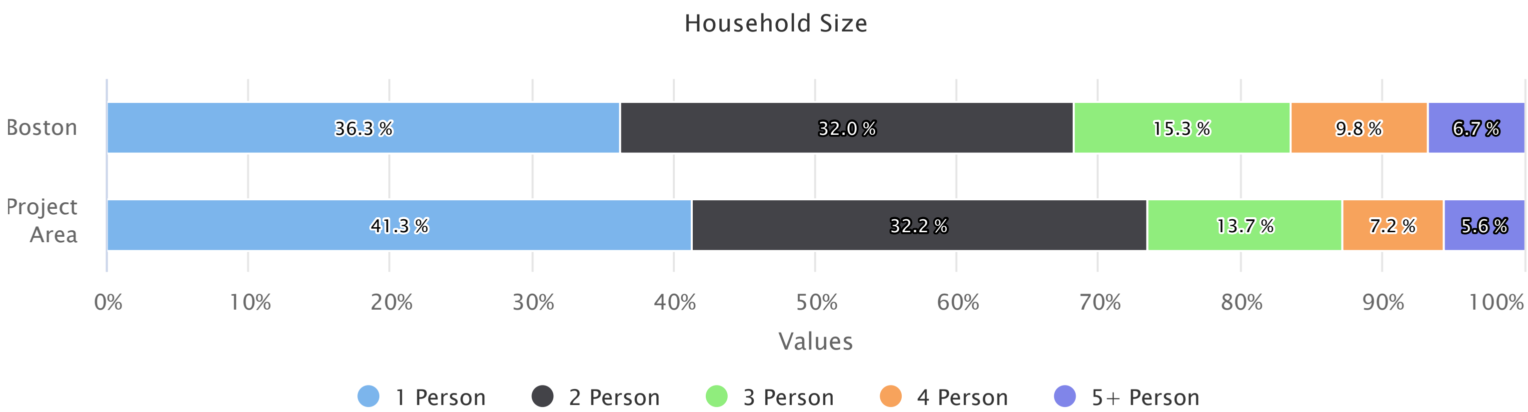
Household Composition Characteristics

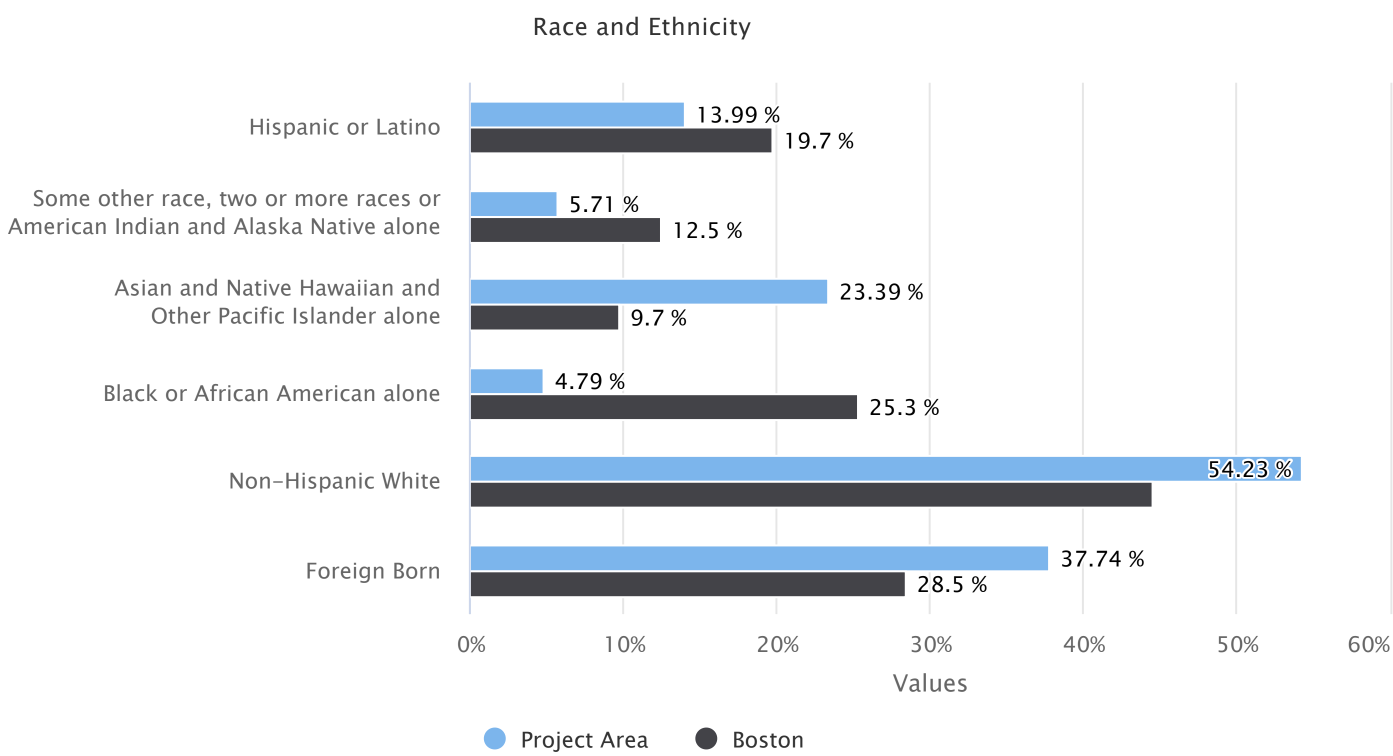
Household Type	Married couple families	Other families	Non-family, householder living alone	Non-family, householder not living alone	Households with Children under 18	Households with a member with a disability
Project Area	18.3%	4.5%	41.3%	35.9%	9.8%	9%

Household Type	Married couple families	Other families	Non-family, householder living alone	Non-family, householder not living alone	Households with Children under 18	Households with a member with a disability
Boston	28.0%	20.2%	36.3%	15.5%	22.4%	22.7%

Unit Sizes

Mix of Units	Studio or 1-Bedroom	2-Bedroom	3-Bedroom	4+ Bedroom
Project Area	39.5%	20.5%	25.5%	14.6%
Boston	31.7%	34.6%	23.1%	10.7%





This report was generated using publicly available American Community Survey data (except for mobile housing voucher data which is provided by the Boston Housing Authority) and is intended for informational purposes only.

Data Source: American Community Survey 5-Year Estimates (2014-2018), Boston Department of Neighborhood Development, and Boston Planning & Development Agency Research Division Analysis.

Project-specific Language Access Plan Checklist

By submitting this form, the Proponent commits to meeting the standards of the BPDA's Language Access Plan throughout the Article 80 process for this Proposed Project. The Proponent understands that the Project-specific Language Access Plan may need to change after submission to reflect the Language Access needs of the community and will take the necessary steps to adjust their practices if needed.

Project
- Name: Enterprise Research Campus - Phase A
- Filing Type: DPIR

Location
- Address: 100-112 Western Ave.
- Neighborhood: Allston

Proponent Name
- Tishman Speyer ERC Developer, L.L.C.

Proponent Contact
- Phone: 617-748-7548
- Email: kbicknell@tishmanspeyer.com

LAP Point of Contact *(if different from Proponent Contact)*
- Name: N/A
- Company / Affiliation: N/A
- Phone: N/A
- Email: N/A

Threshold Languages
- Spanish, Simplified Chinese, Brazilian Portuguese

Engagement and Language Access Strategy

Please describe your strategy for providing Language Access at public meetings. (200 words)

In connection with the Proponent's emphasis on inclusive community engagement, the proponent will work with the BPDA to continue to offer translation services, as needed, for public presentations at Public Meetings. The Proponent will work with the BPDA to provide further 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 these efforts as part of the public review process for the Project.

If applicable, please describe your strategy for engaging any LEP groups or communities who may not be represented in the Threshold Languages determined for your project. (200 words)

The Proponent has provided Fact Sheet translations for three threshold languages: Spanish, Simplified Chinese, and Brazilian Portuguese. Based on community feedback and in order to facilitate greater community outreach, the Proponent has provided for additional, elective translation of the Fact Sheet into Russian and Korean.

If applicable, please describe your team's prior experience with Language Access. (200 words)

While the Language Access Program is new, from the beginning of the public approval process for the Project and the filing of the Project Notification Form, the Proponent has worked, in coordination with the BPDA, to support the engagement of non-native English speakers. A summary of the PNF was translated into the Threshold Languages, and in each subsequent notice of a Public Meeting, translation services have been offered.

Translation and Interpretation Providers

Threshold Language 1

Language	Spanish
Name / Company	Linguistic Systems
Email	lsujanani@linguist.com
Address	260 Franklin Street, Suite 230, Boston, MA 02110
Phone	617-528-7443
Certification or Past Experience	ISO Certified:: ISO 9001 • ISO 17100 • ISO 18587 • ISO 27001

Threshold Language 2
(if applicable)

Language	Simplified Chinese
Name / Company	Linguistic Systems
Email	lsujanani@linguist.com
Address	260 Franklin Street, Suite 230, Boston, MA 02110
Phone	617-528-7443
Certification or Past Experience	ISO Certified:: ISO 9001 • ISO 17100 • ISO 18587 • ISO 27001

Threshold Language 3
(if applicable)

Language	Brazilian Portuguese
Name / Company	Linguistic Systems
Email	lsujanani@linguist.com
Address	260 Franklin Street, Suite 230, Boston, MA 02110
Phone	617-528-7443
Certification or Past Experience	ISO Certified:: ISO 9001 • ISO 17100 • ISO 18587 • ISO 27001

Threshold Language 4
(if applicable)

Language	Korean
Name / Company	Linguistic Systems
Email	lsujanani@linguist.com
Address	260 Franklin Street, Suite 230, Boston, MA 02110
Phone	617-528-7443
Certification or Past Experience	ISO Certified: : ISO 9001 • ISO 17100 • ISO 18587 • ISO 27001

Threshold Language 5
(if applicable)

Language	Russian
Name / Company	Linguistic Systems
Email	lsujanani@linguist.com
Address	260 Franklin Street, Suite 230, Boston, MA 02110
Phone	617-528-7443
Certification or Past Experience	ISO Certified: : ISO 9001 • ISO 17100 • ISO 18587 • ISO 27001