PROJECT NOTIFICATION FORM

Enterprise Research Campus Project

Boston, Massachusetts

FEBRUARY 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
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One City Hall Square, 9th Floor
Boston, MA 02201

PROPONENT **Tishman Speyer ERC Developer, L.L.C.**
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Level Agency for Infrastructure
Nelson Nygaard
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RWDI Consulting Engineers and Scientists
Scape
Utile

February 2, 2021

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Project Description

Tishman Speyer ERC Developer, L.L.C. (the "Proponent"), working in conjunction with Studio Gang and Henning Larsen as Master Planners, is pleased to submit this Project Notification Form (PNF) to initiate review by the Boston Redevelopment Authority, d/b/a/ 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-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 "PDA"). 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 PDA (the "Project).

The Project, as proposed by the Proponent, will consist of approximately 6 acres of developable area (the "Project Site"). The Project will be supported by various streets, sidewalks, and other utility infrastructure elements which are to be constructed by Harvard Allston Land Company (HALC) (the "Enabling Infrastructure"). The Project will contain approximately 900,000 square feet of mixed-use development consisting of residential, office/lab, hotel, conference center, restaurant, and retail use, along with over two acres of public open space which is materially higher than the goal of 20% of the developable area as set forth in the existing PDA.

The central focal point of the Project will be a 1.4 acre portion of a future public open space network intended to eventually connect the Honan-Allston Library and the Allston neighborhood all the way to the Charles River (the "Project Greenway"). The Project Greenway and other publicly accessible open space, as described further within, will contain active programming, including: public art exhibits, family-oriented events, health and wellness classes, community-focused programs, and music concerts and festivals. The Proponent envisions that the Project Greenway will provide a vibrant, dynamic, and activated public space that will benefit 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 area which has been approved as a PDA, as defined and described in further detail in the Master Plan for PDA No. 115 approved by the Boston Zoning Commission on March 15, 2018. As described further below, the Proponent has planned for the Project to integrate within the broader district planning

detailed in a document entitled, "Enterprise Research Campus Framework Plan dated March 15, 2018" (the "Framework Plan") and currently advanced within the context of the University's Framework plans. In addition to the Project, the Proponent has secured the right to pursue entitlements and develop approximately 4.5 acres within the PDA which were envisioned as surface parking lot in the PDA ("Phase B"). The Proponent has only conducted preliminary, conceptual plans for Phase B. As such, approvals for Phase B are not being requested at this time, and more detailed planning for Phase B is beyond the scope of this PNF; however, the Proponent recognizes that understanding the integration of the Project and Phase B provides important context. The Proponent does not have rights to develop any other geographic areas noted in the Framework Plan or any other areas that are outside of PDA No. 115.

Through the design and development of the Project, the Proponent strives to achieve the following goals:

- **Create a vibrant and inclusive mixed-use project** consistent with the parameters of PDA, with an enhanced focus on creating activated, publicly-accessible open space, as informed by ongoing collaboration with the greater Allston community, the Harvard Allston Task Force ("Task Force"), and the City of Boston (the "City"), as well as local elected officials;
- **Prioritize diversity, equity and inclusion ("DEI")** by designing and implementing DEI strategies at multiple levels of the Project lifecycle and in key development team roles;
- **Implement an inclusive capital strategy** with 5% of the Project ownership reserved for minority investors;
- **Foster local, small, and/or Minority and Women-owned ("MBE" and "WBE") retailers** via reserved square footage on the ground floors of the Project, which will help the Project to integrate and reflect the fabric of the Allston neighborhood, particularly in a COVID-19 impacted retail environment;
- **Provide a place where highly innovative businesses can flourish** and merge into the fabric of the Allston community through a permeable, inclusive project on the doorstep of Harvard University, a world-leading research institution;
- **Focus on forward-thinking buildings and open spaces** that emphasize sustainability, carbon reduction, resiliency, permeability, sensitivity to human scale, and timeless architecture;
- **Deliver a world-class Project Greenway and other public realm spaces** totaling over 2 acres which is well in excess of the 20% open space requirement per the approved PDA, and will provide an activated amenity for use by the entire Allston community;
- **Create residential units near a myriad of amenities**, such as the Project Greenway and Charles River, and provide a diverse range of for-rent housing options, with an inclusionary housing program which will be in excess of the 13% requirement set forth in the City's Inclusionary Development Policy ("IDP");
- **Incorporate diverse and inclusive public realm elements**, including programmed greenspaces, landscaped plazas, bike and pedestrian-friendly pathways, and interactive, dynamic public art installations;

- **Provide a master plan that is pedestrian- and community-focused** with the physical orientation of the Project's buildings configured to create a comfortable micro-climate in order to extend the seasonal usage of the Project Greenway;
- **Activate ground floors uses** that include restaurants and other active uses**,** with the goal of creating a seamless, permeable interaction between the publicly accessible open space and the ground level of the proposed buildings;
- **Construct a conference center made with a focus on sustainability** (the "ERC Center") as the "front door" of the Project, which will not only provide conference functions but will also serve as an activity hub and amenity for the Project;
- **Deliver leading sustainability and resiliency initiatives**, including a minimum commitment of LEED Gold for all project components, to be fossil fuel-neutral by 2026 and fossil-fuel free by 2050, energy conservation measures and reduced GHG emissions, and stormwater management solutions;
- **Deliver a network of new street connections**, largely consistent with the PDA, with a focus on creating vibrant, pedestrian and bicycle-friendly thoroughfares, consistent with the City of Boston's complete streets guidelines; and
- **Create new jobs,** including an estimated 2,000 new construction jobs and an estimated 2,500 new permanent jobs.

The Proponent has, and will continue to, work collaboratively with the BPDA staff, the Task Force, the Allston community, and local elected officials to envision the plans for the Project. As part of this process, the Proponent has worked to create an inclusive, thoughtful development plan within the framework of the PDA. Additionally, although not the specific focus of this PNF, the planning of the Project was designed to integrate into the broader Framework Plan developed by Harvard, which Harvard intends to evolve and update in conjunction with this permitting process and periodically in the future. However, the Proponent has also designed the Project to stand on its own, regardless of whether the other areas included in the Framework Plan are developed in the future.

This PNF presents details regarding the Project and provides preliminary analyses of traffic/transportation, potential environmental impacts, and infrastructure needs to inform the review of various agencies and the community about the potential impacts and corresponding mitigation initiatives to address those impacts associated with the Project.

1.1 Project History and Background

The Project Site is located in an area that has historically been utilized for transportation-related industrial uses. The introduction of a major railroad line, the Boston and Worcester Railroad, in the area during the mid-Nineteenth Century resulted in the utilization of properties flanking the railroad line, including the area of the Project, as support sites for freight operations of the railroad. Due largely to the availability of freight rail service, several industrial uses were established within the PDA.

During the early 1960's, the area underwent a fundamental change in ownership that strongly influenced its future utilization. The Massachusetts Turnpike Authority (MTA) used

its eminent domain powers to assemble an assortment of privately owned parcels into a single property, preparing for the land's use for highway and associated facilities (including relocating rail yards). Subsequently, the MTA constructed the Massachusetts Turnpike Extension (the "Turnpike") and its associated ramps to serve the Allston area, which enabled trucking services to supplement the railroad's freight delivery services. Construction of the Turnpike ramps reinforced the vehicular orientation of the area and facilitated significant heavy truck operations along Western Avenue and Cambridge Street, some of which spilled over into the adjacent neighborhood along Windom Street.

The areas of the PDA were utilized, via easement, by CSX Transportation (CSXT) who later subleased to Romar Transportation System (Romar). Romar primarily utilized the PDA for warehousing and freight forwarding. Refer to Figure 1.3 for an image of the recent historically industrial usage of the Project Site.

Harvard University (Harvard) purchased the underlying land of the PDA in 2000 from the then MTA, while CSXT continued its control of the area until December 2015. At that time, CSXT relinquished its rights in the area, including the PDA. In December 2017, Harvard filed an application to create PDA No. 115 with the BPDA. The PDA covered approximately 14.2 acres, including the Project Site, and was approved by the BPDA and adopted by the City of Boston in the spring of 2018.

On June 14, 2019, a subsidiary of Harvard, the Harvard Allston Land Company (HALC), issued a Request for Proposals for a private developer who would lease and develop the Project Site under one or more long-term ground leases (the "RFP"). In July of 2019, in response to the RFP, several developers, including the Proponent, submitted proposals to ground lease and develop the Project Site. HALC selected the Proponent's submittal as a finalist and invited the Proponent, along with certain other developers, to submit a second, final proposal for the Project in response to the RFP. The Proponent submitted a second proposal on September 30, 2019 and was subsequently selected by the HALC in December 2019 to lease and develop the Project Site.

1.2 Existing Site Conditions

When CSXT relinquished its rights in the area of the PDA in 2015, then-existing structures were demolished and removed. Since that time, the Project Site has been utilized as a construction laydown and staging area for construction of Harvard University's District Energy Facility (DEF) and School of Engineering and Applied Sciences (SEAS). The Project Site remains in a temporary, construction staging condition.

As shown in Figure 1.4, the PDA encompasses approximately 14.2 acres of land. As previously noted, within the PDA, the Project occupies the approximately 6-acre Project Site that is shown on Figure 1.4. The existing Project Site is entirely previously disturbed land and presently serves as a laydown/stockpile area for Harvard-related construction projects. There is currently no active closed drainage system on-site for storage, treatment, or groundwater recharge on the Project Site. Refer to Figure 1.5 for photographs of the existing site conditions.

1.3 Site Ownership

As per the terms of the ground lease agreements between HALC and the Proponent, HALC will construct the Enabling Infrastructure to support the Project, including the construction of Cattle Drive, East Drive, and DEF Drive.

As described further below in Section 1.4 and illustrated in the proposed conditions site plan on Figure 1.6, the Project consists of the following key elements:

- The hotel, residential, and lab/office components of the Project (the "Project Buildings"). Various areas immediately adjacent to (but outside of) the building footprints will be considered a part of the Project Buildings as frontage zones. The Project Buildings will be developed and owned by the Proponent pursuant to a long-term ground lease with HALC.
- The ERC Center will be developed by the Proponent on behalf of HALC who will retain ownership of the land, ERC Center facility, and its surrounding plaza.
- The Project Greenway will be constructed by the Proponent on behalf of HALC who will retain ownership of the Project Greenway following its completion.

Refer to Figure 1.7 for a plan noting the delineation of the various components, ownership interests, and responsibilities.

The remaining acreage of the PDA that is not planned to be utilized for the Project Buildings, Project Greenway, ERC Center, and/or Enabling Infrastructure, will remain in a temporary condition until it is redeveloped and/or improved in the future. The Proponent has secured rights from HALC to pursue the entitlement and development of the remaining areas of the PDA under long-term ground lease similar to that for the Project (i.e. Phase B). The Proponent plans to pursue a separate entitlement and permitting process for Phase B, entailing a PDA Master Plan Amendment to PDA No. 115 that would then be followed be an Article 80 process separate and apart from the scope of this PNF.

1.4 Project Description

Consistent with the City's and community's goals for the PDA, 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 is intended to create a new district, which complements and integrates into the fabric of the Allston neighborhood while providing a place where innovation and discoveries can be made. The Proponent is proposing to largely retain the mix of uses as detailed in PDA, but with a reimagined orientation of buildings within the Project Site that prioritizes the Project Greenway and pedestrian experience. 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 1.6 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. While the Proponent is developing the various components of the Project, HALC will facilitate the construction of the Enabling Infrastructure that will be necessary to support and provide access to the Project.

As noted, the areas within the PDA not utilized for the Project Buildings, Project Greenway, ERC Center, and Enabling Infrastructure 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 the Project.

1.4.1 Development Program

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

Table 1-1 Proposed Project Development Program Summary

Project Element	Size/Quantity
Project Site	**±6 acres**
Building Uses[1]	
Lab / Office	440,000 SF
Residential	250,000 SF (330 units)
Hotel / Conference	135,000 SF (250 keys)
Conference	75,000 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 & FAR[3]	
Lab / Office	Up to 140 feet
Residential, Hotel / Conference	Up to 190 feet
FAR	3.5

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).
FAR Floor Area Ratio calculation based on GFA.

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 As defined by Article 2A of the Boston Zoning Code, as the vertical distance from grade to the top of the structure of the last occupied floor.

1.4.2 Uses and Building Design Approach

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

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

Refer to Section 3.3 of Chapter 3, *Urban Design*, for additional information as it relates to building design for the Project.

1.4.3 Public Realm Improvements and Open Space

The public realm improvements proposed for the Project aim to create new connections, including for users such as Allston residents, students and faculty of the Harvard Business and Engineering & Applied Sciences Schools, users of the Harvard Athletics Complex, and new employees, residents, and visitors of the Project. Through a range of inviting and engaging public spaces, the Project intends to establish strong connections with existing communities and outlines the potential for a future connection from the existing Allston neighborhood to Soldiers Field Road and the Charles River. A key element of the open space concept plan is the approximately 1.4-acre Project Greenway proposed at the heart of the Project Site, which is consistent with, and enhances, the vision established in the PDA and creating a new publicly accessible open space destination for Allston and the surrounding communities.

Refer to Section 3.4 of Chapter 3, *Urban Design*, for additional information as it relates to public realm and open space improvements proposed as part of the Project.

1.4.4 Site Access and Circulation

The key vehicular access point to the Project Site is off Western Avenue, via two proposed new roadways, Cattle Drive and East Drive. 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 (as shown on Figure 5.7 of Chapter 5, *Transportation*). The Project will include three new complete streets: East Drive; Cattle Drive; and DEF Drive (Figure 1.6). Refer to Section 5.3 of Chapter 5, *Transportation*, for additional details on site access and circulation.

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 5.3 of Chapter 5, *Transportation*, for additional details on site vehicular, pedestrian and bicycle access and circulation.

1.4.5 Overview of Sustainability and Resiliency Approach

The Project consists of the development of an underutilized previously-developed 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. Based on conceptual design, the Project will commit to certifiability at a Gold level using the LEEDv4 rating system for all building typologies, exceeding the City's requirements under Article 37 - Green Buildings. Additionally, the Proponent will commit that the Project be fossil-fuel neutral by 2026 and fossil fuel-free by 2050.

Each building of the Project will be designed with energy-efficient HVAC and lighting equipment and systems, and incorporate other potential energy conservation measures, as reasonable and feasible. Based on conceptual design, preliminary energy modeling demonstrates that collectively, all of the buildings proposed in the Project (with parking) could exceed the minimum requirements for energy performance with an overall reduction of energy usage by approximately 25 percent (compared to the 10 percent baseline reduction required by the Massachusetts Stretch Energy Code) and reducing stationary source Greenhouse Gas (GHG) emissions by approximately 21 percent (Table 4-9).

The Project Site is not within a FEMA floodplain; however, the Proponent recognizes the importance of resiliency for the neighborhood of Allston, so the Project will go above-and-beyond current resiliency standards and be designed and engineered to manage the 32-year storm (6.7 inches of rainfall). Site design elements to improve on-site stormwater management and reduce risk of precipitation-based flooding are being considered, 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. 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, and will design building HVAC system capacity to handle higher predicted temperatures and infection-mitigation strategies.

Refer to Chapter 4, *Sustainability and Climate Change Resiliency*, for further details on the sustainability and resiliency approach for the Project.

1.4.6 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. These initiatives will include, but not limited to:

- Reserving 5% of the Project's ownership for minority investors.
- Commit to maximizing diversity and inclusion during all phases of the Project's development and in key development team roles.
- A portion of the retail areas within the Project will be specifically reserved for local, small, MBE and/or WBE retailers.

1.5 Summary of Public Benefits

The Project Site currently and historically has not provided access or public benefit to the Allston community or the broader public, having been primarily utilized for industrial transportation and construction staging. The Proponent has envisioned that the Project will transform the Project Site into a pedestrian-focused urban district that will provide tremendous public benefits and create a destination for the Allston community and broader region.

Urban Design

- The Proponent has selected a world-class Project Team to design the Project, including renowned architects Studio Gang and Henning Larsen serving as Master Planners along with SCAPE as landscape architects (collectively the "Design Team").
- The Proponent and the Design Team have reimagined the configuration of the Project within the PDA to stand proudly on its own while functioning within the broader Framework Plan.
- The Proponent and its Project Team envisions that the Project will contain forward-thinking architecture that will integrate seamlessly into a network of new publicly accessible open spaces.
- The ERC Center will be designed by Jeanne Gang of Studio Gang and will incorporate timeless architecture with forward thinking sustainability measures.

Public Realm

- The Project will include a total of over two acres of new public open space, including an approximately 1.4-acre Project Greenway as the centerpiece.

- In addition to the Project Greenway, various laneways will create an intimate, porous urban environment that welcomes pedestrians and will contain diverse elements including programmed greenspaces, landscaped plazas, and dynamic public art installations.
- The proposed publicly accessible open space areas are planned to be heavily programmed, including with public art exhibits, community-oriented events, health and wellness classes, music concerts, and other festivals.
- 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.
- Activated and diverse retail will line the publicly accessible open spaces and facilitate the Project Greenway to function as a vibrant "town square" at the heart of the Project.
- 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 potential future connection from the Allston neighborhood to the west with the Charles River to the east.
- In addition to providing traditional conference functions, the ERC Center will serve as a welcoming "front door" for the Project with an activated and permeable ground floor.
- The Project's loading and back of house zones have been strategically located within the building footprints, preventing the need for service alleyways that would otherwise reduce publicly accessible open space.

Sustainability and Resiliency

- The Proponent and the Design Team have focused on forward-thinking buildings and public spaces that emphasize sustainability, carbon reduction, and resiliency.
- The Project entails a comprehensive stormwater management system.
- The Project will integrate sustainable construction methods throughout the development
- The Project will exceed compliance with Article 37 of the Code by obtaining LEED Gold certification.
- The Proponent will commit to making the Project fossil fuel-neutral by 2026 and fossil-fuel-free by 2050.

Transportation

- The trips generated by the Project will be accommodated through the implementation of planned transportation improvements and services as part of the Project.
- The parking needs for the Project will be accommodated by a proposed parking supply of up to 620 spaces, including approximately 300 spaces below-grade, approximately 40 spaces of street parking, and 280 spaces in surface parking. The surface parking will be replaced with an above-grade garage as part of Phase B.
- Transportation improvements proposed as part of the Project have been designed to accommodate pedestrian, bicycle, and vehicular traffic.

- The Project will provide a pedestrian-friendly environment with wide sidewalks to be constructed along streets abutting the Project Site and through the Project Greenway and other laneways and plazas. All sidewalks constructed in the PDA will be consistent with the Boston Complete Streets guidelines.
- The Project is designed to prioritize bicycle use, including separated bikes lanes along Western Avenue, Cattle Drive, and East Drive, and a bike-friendly multi-modal path through the Project Greenway.
- The Project will include implementation of a Transportation Demand Management (TDM) Plan with specific measures to promote and encourage residents, employees, and visitors to use alternative transportation modes.

Social and Economic

- A sizeable proportion of the ground floor retail throughout the Project will be reserved for business which are local to the area, MBE and/or WBE.
- Five percent of the Project's ownership will be reserved for minority investors.
- The Proponent has fostered a commitment to diversity at all levels of the Project and in key development team roles.
- The Project will provide new affordable housing units in excess of the 13% minimum set forth in the City of Boston's Inclusionary Development Policy.
- The Project is anticipated to an estimated 2,400 on-site jobs relating to the office/R&D/lab, life sciences, hotel, retail, and parking uses, and an estimated 2,000 construction jobs in a variety of trades.

1.6 Community Outreach

The Proponent has conducted early community outreach, including public meetings with the Harvard Allston Task Force on January 19, 2021 and the Allston Civic Association (ACA) on January 20, 2021, along with various other meetings with leaders of local community groups. Additionally, the Proponent has met numerous times with local area elected officials to provide an overview of the Project and discuss community benefits. Additional outreach, public meetings, and community engagement will be conducted as part of the Article 80 review process.

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.

1.7 Anticipated Project Schedule and Phasing

The Project is intended to be developed in a single phase over the coming years. The Proponent is undertaking a comprehensive review of the Project's impacts in accordance with Article 80B of the Code so that these impacts can be mitigated to the maximum extent

feasible at completion. As presented in greater detail in Chapter 5, *Transportation,* and Chapter 6, *Environmental Protection*, preliminary impact analysis has been completed and additional analysis will be included in subsequent filings.

HALC intends to begin initial enabling of the construction for the Enabling Infrastructure in early 2021, which will involve some site preparation work in the PDA area. The Proponent then intends to begin construction on the Project Buildings, the ERC Center, and the Project Greenway in the first half of 2022.

1.8 Phase B

As previously noted, the Proponent has secured the right to pursue entitlements and develop the approximately 4.5 acres of the PDA that are not being developed as part of the Project, Project Greenway, ERC Center, or the Enabling Infrastructure (the "Phase B Site"). The currently approved PDA identifies the Phase B portion of the PDA as an area for temporary surface parking lots that may be developed for additional buildings based on future planning, review and approvals. At this time, the Proponent is presenting a conceptual plan for Phase B to provide context to inform the review of the Project and discussions about potential future development with community groups, elected officials, and government agencies. Refer to Figure 1.8 for a proposed conceptual site plan of the full build-out of the entire PDA, including the Project, the Enabling Infrastructure, and Phase B (collectively, the "Full Build"). The development of Phase B will require a master plan amendment of the PDA, as well as a separate Article 80 review and community process and approval of a PDA Development Plan for Phase B.

Similar to the Project, HALC will deliver additional Enabling Infrastructure in support of Phase B. For the purposes of understanding the geographic breakdown of the PDA, refer to Figure 1.9.

Based on the Proponent's preliminary study and plans, Phase B is currently anticipated to entail the following:

- Development of the remaining approximately 4.5 acres within the PDA into a seamless expansion of the Project, which will replace temporary parking and underutilized land. Phase B is currently envisioned to contain approximately 1 million square feet of total development;
- Additional residential and lab/office buildings, with residential constituting a higher proportion of the overall Phase B gross floor area as compared to the PDA;
- Extension of the Project Greenway westward to integrate further with the envisioned greenway system (the "Phase B Greenway");
- Over one acre of additional public open space, to be composed of the Phase B Greenway and various expansive plazas and activated frontage zones;
- Continuing commitment to the same diversity initiatives associated with the Project, including a reserved 5% ownership for minority investors, diversity and inclusions at all stages of the Phase B development, and allocation of retail areas to small, local MBE and/or WBE retailers;

- Further enhancement to affordable housing offering within the residential components of Phase B; and
- Development of an above grade garage that will contain sufficient parking to satisfy demand for both the Project and Phase B not already accommodated below grade in the Project (the "Phase B Garage").

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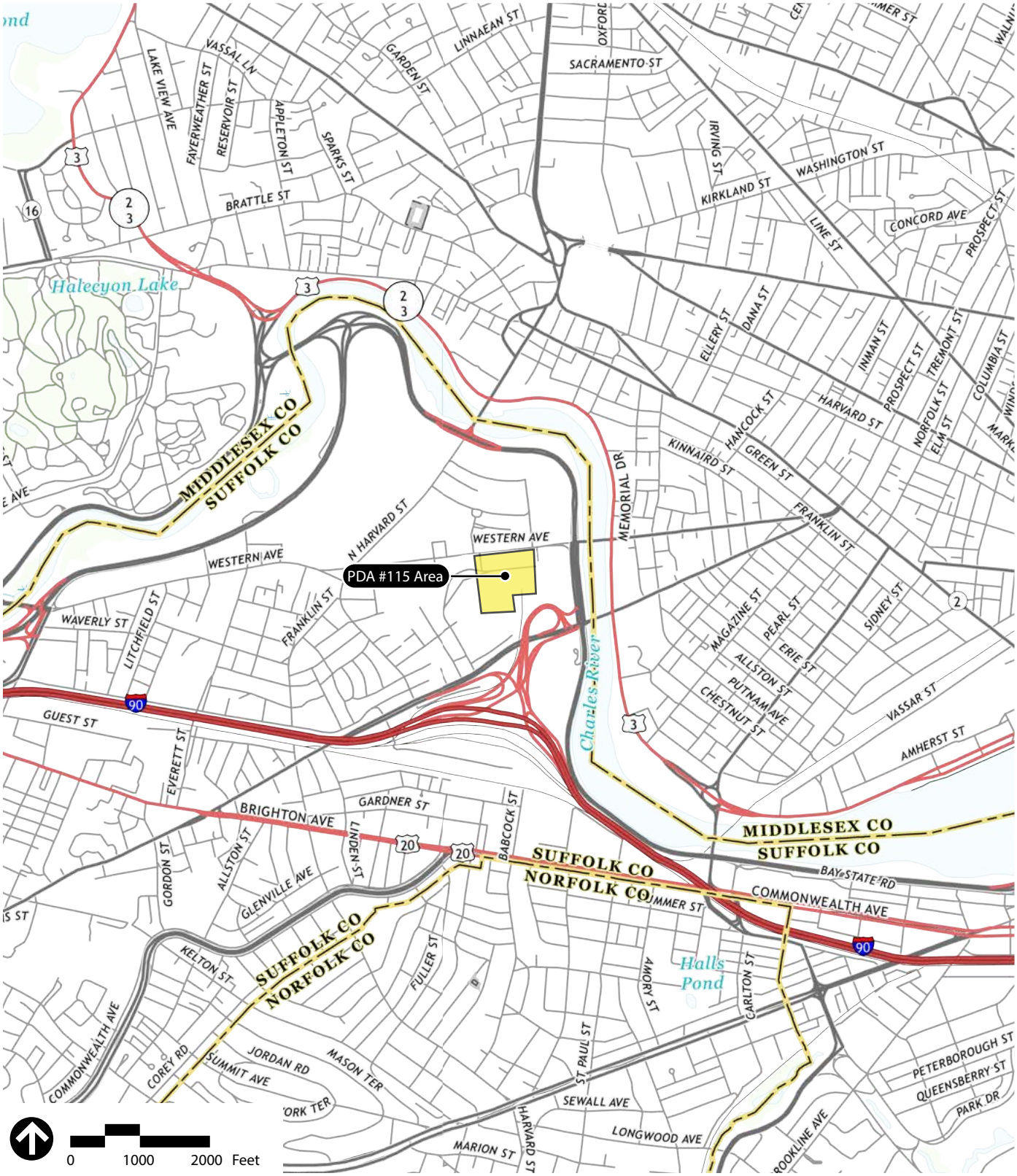


Source: USGS

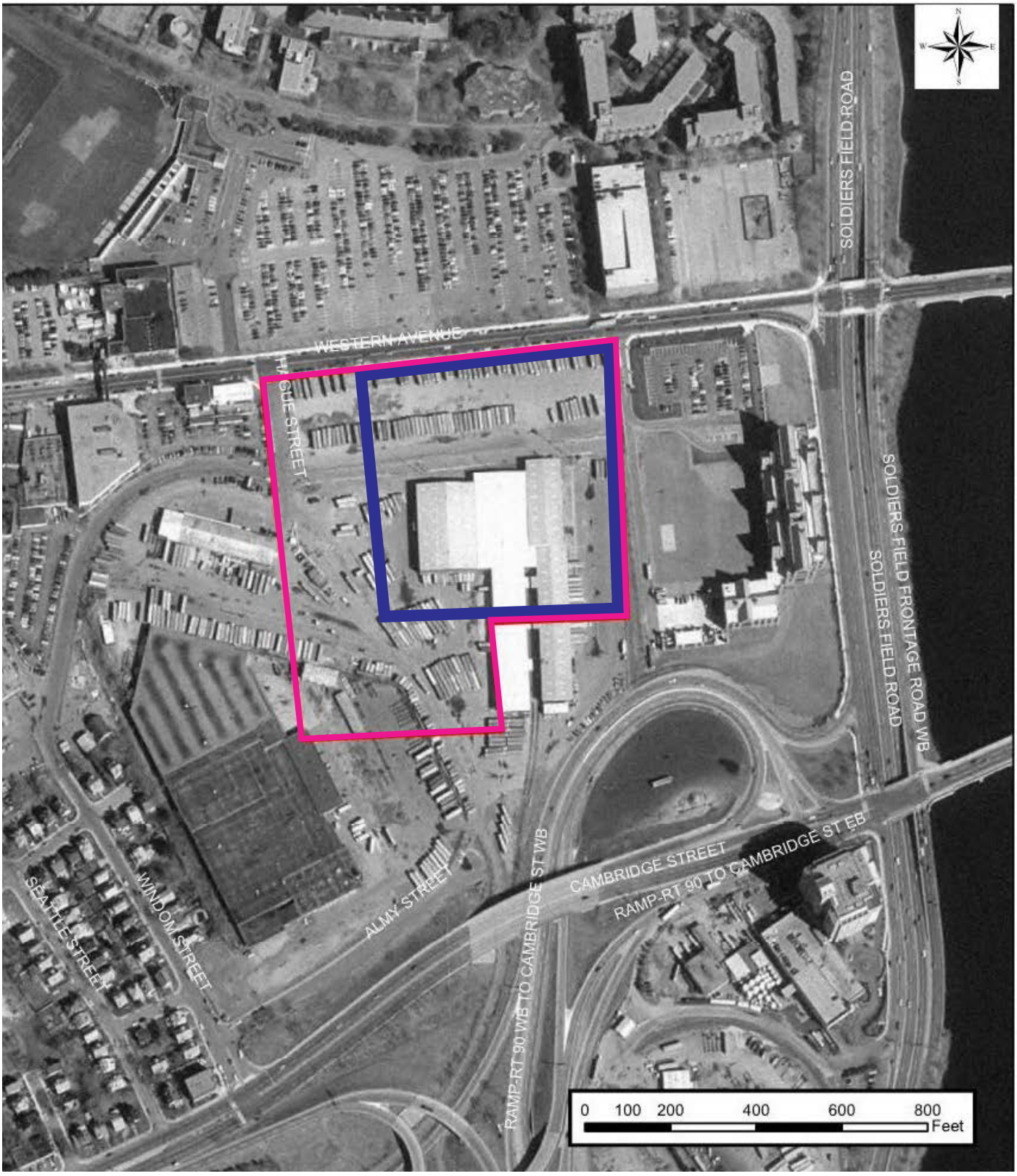
Figure 1.1
Site Location Map

Enterprise Research Campus Project
Boston, MA

Base map aerial image: Nearmap Aerial (2020)

Figure 1.2
Project Site Context

Enterprise Research Campus Project
Boston, MA



Project Site Boundary

PDA Area Boundary

Figure 1.3

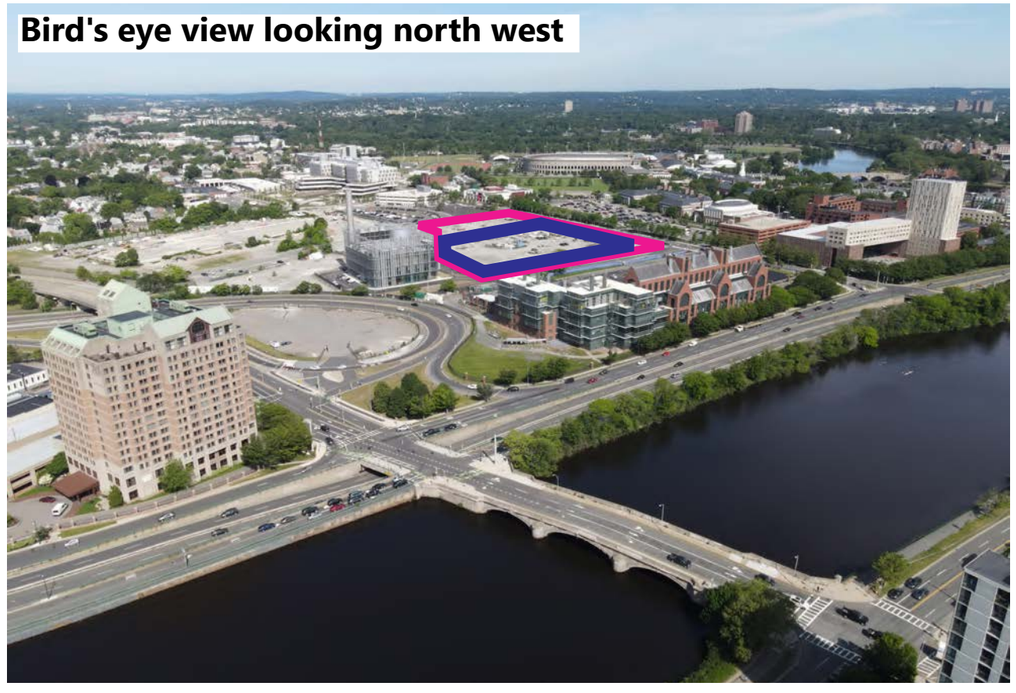
Previous Use Condition Plan (1995)

Enterprise Research Campus Project
Boston, MA

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

Figure 1.4
Existing Site Conditions Plan

Enterprise Research Campus Project
Boston, MA



Project Site Boundary

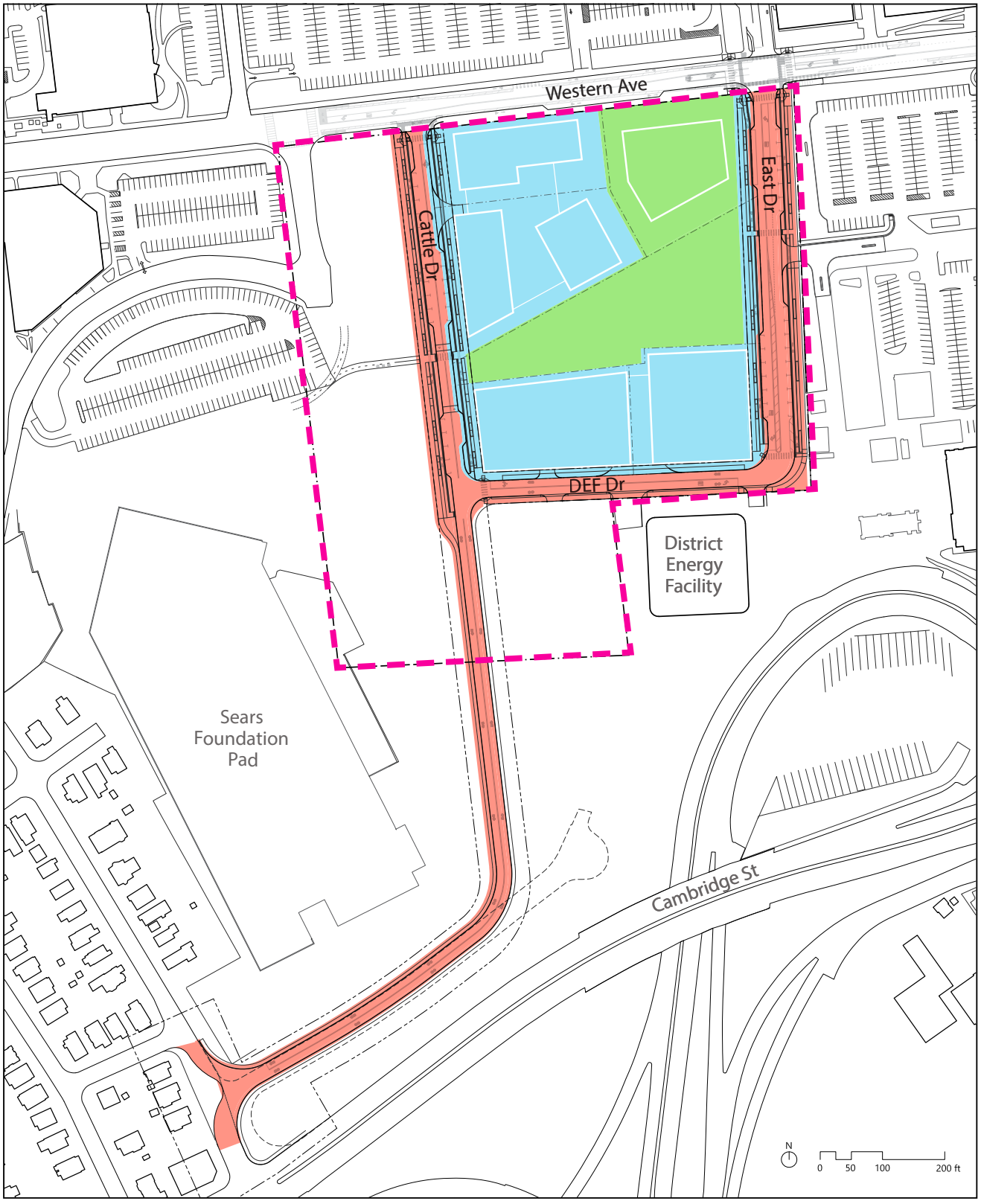
PDA Area Boundary

Figure 1.5
Existing Site Photos

Enterprise Research Campus Project
Boston, MA

Figure 1.6
Proposed Project Conditions Plan

Enterprise Research Campus Project
Boston, MA



Source: Utile

- PDA Area Boundary
- Areas designed, built, and owned by Harvard
- Areas designed, built, and leased by Tishman Speyer
- Areas designed and built by Tishman Speyer, but owned by Harvard

Figure 1.7

Project Site Ownership and Responsibility Plan

Enterprise Research Campus Project
Boston, MA

Figure 1.8
Full Build Proposed Conditions Plan

Enterprise Research Campus Project
Boston, MA

2

General and Legal Information/Regulatory Context

This chapter presents the development team and provides the required legal information associated with the Project. It also lists the anticipated permits and approvals, and describes the federal, state, and local regulatory controls applicable to the Project.

2.1 Proponent Information and Project Team

Table 2-1 identifies the members of the Project Team and provides their primary contact information.

Table 2-1 Project Team Contact Information

Proponent	
Tishman Speyer ERC Developer, L.L.C. c/o Tishman Speyer 125 High Street Boston, MA 02110 617.342.7500	Jessica Hughes Rustom Cowasjee Steve Morris Max Cassidy
Master Planner/Architect	
Henning Larsen 250 West Broadway, 2nd Floor New York, NY 10013 212.231.9326	Daniel Baumann Veronica Varela Miguel Sanchez-Enkerlin
Executive Architects	
Studio Gang 50 Broad Street, Suite 1003 New York, NY 10004 212.231.9326 Utile 115 Kingston Street Boston, MA 02111 617.423.7200	Jeanne Gang Abraham Bendheim Spencer Hayden Weston Walker Timothy Love Jessy Yang
Landscape Architect	
Scape Landscape Architecture 277 Broadway, 9th Floor New York, NY 10007 212.462.2628	Gena Wirth Lee Altman

Legal Counsel	
DLA Piper LLP (US) 33 Arch Street Boston, MA 02110 617.406.6000	Richard Rudman Brian Hochleutner Eric Skeffington
Permitting, Transportation/Traffic Consultant, and Cultural Resources Consultant	
VHB 99 High Street, 10th Floor Boston, MA 02110 617-728-7777	Elizabeth Grob Lauren DeVoe Lourenço Dantas Nicole Benjamin-Ma
Transportation Planning	
Nelson\Nygaard Consulting Associates, Inc. 77 Franklin Street, 10th Floor Boston, MA 02110 617.521.9404	Jason Novsam Matthew Smith
Civil Engineer	
Nitsch Engineering 2 Center Plaza, Suite 430 Boston, MA 02108 617.338.0063	John M. Schmid
Geotechnical and Environmental Consultant	
Haley & Aldrich 465 Medford Street, Suite 2200 Boston, MA 02129 617.886.7400	Michael Atwood Joel Mooney
Acoustical Engineer	
Acentech Incorporated 33 Moulton Street Cambridge, MA 02138 617.499.8000	Michael Bahtiarian Ioana Pieleanu
Sustainability/Resiliency and Mobility Consultant, and Master Plan Engineer	
Arup 60 State Street Boston, MA 02109 617.864.2987	Brian Swett Rebecca Hatchadorian
Infrastructure Master Planner	
Level Agency for Infrastructure 45 Main Street, Suite 721 Brooklyn, NY 11201 212.321.0852	Byron Stigge
Code Consultant	
Code Red Consultants 154 Turnpike Road, Suite 200 Southborough, MA 01772 617.500.7633	Peter Harrod Christopher Lynch
Wind and Solar Glare Consultant	
RWDI Consulting Engineers and Scientists 85 Broad Street, 16th Floor New York, NY 10004 954.431.6800	Derek Kelley

2-2 General and Legal Information/Regulatory Context

2.2 Legal Information

2.2.1 Legal Judgments / Actions Pending

The Proponent is not aware of any legal judgments or pending legal actions concerning the Project.

2.2.2 History of Tax Arrears

The Proponent is not in tax arrears on any property it owns within the City of Boston.

2.2.3 Evidence of Site Control / Nature of Public Easements

The entire Project Site will be owned by Harvard University, which has agreed, on certain terms and conditions and through its subsidiary, HALC, to ground lease the building sites within the Project Site to the Proponent. The Proponent will also have the right to develop the balance of the areas of the PDA but is not being granted any rights by HALC or Harvard University to improve or develop land outside the PDA. The Proponent is not aware of any public easements into, through or affecting the Project Site (or areas of the PDA) other than easement rights in connection with a deep water tunnel (approximately 300 feet below grade) and a sanitary sewer line, both owned by the Massachusetts Water Resource Authority (MWRA), typical drainage and utility easements, and adjacent public rights of way. The Project is being designed to accommodate the proposed NASDEP stormwater infrastructure project and will be subject to any easements required for the NASDEP. Refer to Figure 1.4 for an existing site conditions plan.

2.3 List of Anticipated Regulatory Controls, Approvals, and Permits

Table 2-2 below sets forth a preliminary list of permits and approvals from governmental agencies and authorities that are expected to be required for the Project. It is possible that only some of these permits and approvals will be required, or that additional permits or approvals will be required. The Proponent does not intend to seek state or federal funding for the Project.

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

Agency Name	Permit, Approval, or Amendment
Federal	
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
Department of Environmental Protection	› Sewer Extension and Connection Permit (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) Permit › MWRA Sewer Use Discharge Permit (to the extent it may be required for specific waste discharges by the tenant/users) › Construction Site Dewatering Discharge Permit (if necessary)
Massachusetts Historic Commission	› Determination of No Adverse Effect (if necessary)
Department of Conservation and Recreation	› Construction and Access Permit (if necessary)
Massachusetts Department of Transportation	› Vehicular Access Permit (if necessary)
City	
Boston Redevelopment Authority	› Review under Article 80B, Large Project Review › PDA Master Plan Amendment (if necessary) › PDA Development Plan Approval
Boston Zoning Commission	› 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 › Certificate of Compliance
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
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 › License for earth retention system (all as applicable)
Boston Department of Public Works	› Curb cut permit(s), as applicable

2.3.1 Federal

2.3.1.1 Federal Aviation Administration

All projects subject to Federal Aviation Administration (FAA) jurisdiction are subject to requirements respecting issuance of Determinations of Non-Hazard to Air Navigation from the FAA. Both the construction cranes required for the Project and the proposed buildings will comply with all applicable requirements of the FAA.

2.3.1.2 U.S. Environmental Protection Agency

The Project will comply with all applicable requirements of the U.S. Environmental Protection Agency (EPA) and will file for such applications and/or self-certifications as are required under the National Pollutant Discharge Elimination System (NPDES) permit program.

2.3.2 Commonwealth of Massachusetts

2.3.2.1 Massachusetts Environmental Policy Act

The Project will require 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 the filing of an Environmental Notification Form (ENF) for public review under the Massachusetts Environmental Protection Act (MEPA). Concurrent with the filing of this PNF the Proponent has also filed an ENF with MEPA to initiate review of the Full Build. The Proponent has had preliminary discussions with MEPA to introduce the Project and has informed MEPA that such ENF filing is forthcoming.

2.3.2.2 Massachusetts Water Resources Authority and Department of Environmental Protection

The construction of the proposed site infrastructure improvements does not require a state permit related to wastewater. The Project will comply with all applicable requirements of the MWRA. An 8(m) permit will be required from MWRA with respect to construction activities near or over one or both MWRA water and sewer line easements located on the Project Site. A Construction Site Dewatering Discharge Permit may be required. It is also possible that an MWRA Industrial Waste Discharge Permit and/or a MassDEP Sewer Connection Permit may be required for one or more individual tenants if a tenant leases space for laboratory use that will discharge industrial waste to the sewer system.

The Project will comply with all applicable requirements of MassDEP, which may include approvals related to fossil fuel burning equipment, if necessary, and the filing of a Notice of Construction/Demolition.

2.3.2.3 Massachusetts Historic Commission

The Massachusetts Historic Commission (MHC) has jurisdiction to review and approve any "action, activity, program, construction, or land modification, including, but not limited to, a building or structure, either directly undertaken by a state body, or which if undertaken by a

private project proponent, in whole or in part, seeks the provision of financial assistance by a state body, or, in whole or in part, requires the issuance of a license by a state body." Such review is limited to whether the project in question will have an adverse effect on districts, sites, buildings, or objects determined eligible for listing or listed in the National Register of Historic Places, local historic districts established pursuant to G.L. c. 40C or a special law of the Commonwealth of Massachusetts, and certain other landmarks and sites (collectively, "Historic Resources"). For projects which are subject to MEPA review, filing under MEPA also constitutes a filing with MHC.

As described in Chapter 8, *Historic Resources,* there are no designated or inventoried historic properties located on the Project Site or within the PDA. Within one-quarter mile of the PDA, there is one National Register of Historic Places-listed historic district and two properties included in the Historic and Archaeological Assets of the Commonwealth (refer to Figure 8.1). There are no anticipated impacts to historic resources resulting from the Project.

2.3.2.4 Department of Conservation and Recreation

The Massachusetts Department of Conservation and Recreation (DCR) has jurisdiction to review and approve proposed changes to DCR-owned parkways. At this time, the only improvements being made in connection with the Project that potentially would require DCR approval are traffic signal timing improvements to Soldiers Field Road. The Project will seek such approval, to the extent necessary, and will comply with all other applicable DCR requirements.

2.3.3 City of Boston

2.3.3.1 Zoning and PDA Development Plan

The Project Site and PDA are located within the Allston Landing North Economic Development Area, which is a subdistrict within the Allston-Brighton Zoning District. Pursuant to Section 51-44 of the Code, PDAs are permitted within the Allston Landing North Economic Development Area, provided that the total floor area ratio (FAR) within any single Planned Development Area cannot exceed 4.0.

In December of 2017, the President and Fellows of Harvard College, acting as Harvard University, filed a Master Plan for Planned Development Area No. 115 with the Boston Redevelopment Authority d/b/a the Boston Planning & Development Agency (BPDA). PDA No. 115 covers the Project Site, and was approved by the BPDA and adopted by the City of Boston in March 2018. The currently approved PDA contemplates the development of the Project Site to include multiple buildings containing, in total, 400,000 square feet of office/lab space, 250,000 square feet of hotel/conference center space, 250,000 square feet of residential space, a network of open spaces, and a total of between 800 and 900 parking spaces in a combination of below-grade and surface spaces. The PDA also states that ground floor uses may be commercial or institutional, and envisions that two public spaces will be located on the south side of the office/lab buildings to connect to the westerly network of open spaces beginning behind the Honan-Allston Branch Library at Ray Mellone Park and

extending eastward through Rena Park to the green courtyard spaces of Harvard's School of Engineering and Applied Sciences.

The Proponent intends to seek approval of a PDA Development Plan that more-specifically describes and permits the Project. The PDA Development Plan will reflect certain limited changes from the description of the Project as set forth in the PDA Master Plan Amendment, including a larger central open space area, relocation of several buildings to form a more coherent urban block around the central open space, and shift a nominal amount of approved commercial space from the hotel/conference center use to office/lab use, in the amount of approximately 40,000 square feet (less than 5% of the approved gross floor area of the PDA). The Proponent will also seek an amendment to the PDA, to the extent such an amendment is required to reflect changes to the proposed development within the area since the PDA was approved.

2.3.3.2 Article 80 Review

Prior to approval of any zoning relief, including through the PDA, the Project will be required to undergo Large Project Review under Article 80 of the Code. Under Article 80B of the Code, which governs Large Project Review, a comprehensive public review is required at the early design stage, to evaluate project impacts and require appropriate mitigation measures, for projects that add 50,000 SF or more of GFA (or 100,000 SF or more for rehabilitation work or change in use). Large Project Review begins with the filing of this PNF with the BPDA. After a public and agency comment period, the BPDA issues a Scoping Determination, setting forth elements of the Project that the Proponent must study, analyze, and mitigate. After the issuance of the Scoping Determination, the Proponent must prepare a Draft Project Impact Report (DPIR) that details the Project's anticipated impacts and proposed measures to mitigate, limit or minimize those impacts, and the BPDA must publish notice of receipt of the DPIR and allow for public comments. Thereafter, based on its review of the DPIR and any public comments, the BPDA issues a Preliminary Adequacy Determination (PAD), which may waive the need for further review. If further review is required following the PAD, the Proponent may submit a Final Project Impact Report (FPIR), and the BPDA must publish notice of receipt of the FPIR and allow for public comments. Based on its review of the FPIR and any comments received, the BPDA will issue a Final Adequacy Determination (FAD).

Language Access Plan

As part of the Article 80 review process and in furtherance of fostering an inclusive process, the Proponent is also committed to facilitating access to persons with limited English proficiency, including through 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.

Boston Civic Design Committee

Pursuant to the PDA and Article 80 of the Code, the Project is subject to review under Article 28 of the Code, which establishes the Boston Civic Design Commission (BCDC). The BCDC is

comprised of City-appointed design professionals and serves as an advisor to the BPDA with respect to the schematic design of projects that are subject to Large Project Review.

Article 80 Mitigation Requirements

Following completion of the Article 80 process, the design development and construction documents for the Project are subject to BPDA review and approval and the Proponent will enter into agreements with the BPDA and the Boston Transportation Department (as described below), reflecting various mitigation commitments made during the Article 80 process. Agreements for compliance with the City of Boston's construction employment policies are also required.

Building Permit Issuance

Under the Code, the Commissioner of Inspectional Services will only issue a building permit for a project subject to Large Project Review after the Director of the BPDA has issued a Certification of Compliance pursuant to Section 80B-6 of the Code, which is a finding that the construction plans and specifications for the project comply with the terms of the FAD, agreements executed with City agencies, and other provisions of the Code.

Article 37, Green Buildings

The Project will comply with Article 37 of the Code, which was enacted to ensure "…that major building projects are planned, designed, constructed, and managed to minimize adverse environmental impacts; to conserve natural resources; to promote sustainable development; and to enhance the quality of life in Boston." As described in Chapter 4, *Sustainability and Climate Change Resiliency*, the Proponent and project team have conducted a preliminary assessment of green building design, including energy conservation measures, and assessed the projected climate change conditions, in compliance with the requirements of Article 37.

Inclusionary Development Policy

The Inclusionary Development Policy (IDP), approved by the BPDA in December 2015, established as City of Boston policy that any residential project seeking zoning relief under the Boston Code must set aside a number of residential units at least equal to 13 percent of the total number of units as affordable to households at specified levels of income within a project. The Proponent intends to work with the BPDA and community on the appropriate mix of affordable housing units in accordance with the requirements of the IDP.

2.3.3.3 Boston Transportation Department

As noted above, the Proponent will enter into agreements reflecting various mitigation commitments made during the Article 80 process. It is expected that these will include a Transportation Access Plan Agreement (TAPA) and an agreement respecting a Construction Management Plan (CMP) with the BTD. The Proponent will also seek BTD permits and approvals for curb cuts, street opening/closing, and street lighting. The Project will comply with all applicable requirements of BTD.

2.3.3.4 Boston Water and Sewer Commission Site Plan Review

The Project will comply with all applicable requirements of the Boston Water and Sewer Commission (BWSC), which are expected to approve Sewer Connections and Cross Connections and Extension Permits, Water Permits, Hydrant Permits, and Site Plan Approvals in connection with the Project.

HALC will undertake certain water and sewer infrastructure work for the Project Site in coordination with BWSC and will obtain all approvals necessary from BWSC.

2.3.3.5 Public Improvement Commission

Approval from the Public Improvement Commission (PIC) is required to discontinue existing public ways and to lay out new public ways. The Project will require the discontinuance of Hague Street and, potentially, a section of Rotterdam Street. The Project also contemplates the creation of new City-standard roadways and access driveways serving the Project Site, which will be developed by HALC as private ways open to public travel, pursuant to approvals obtained by HALC from PIC and any other applicable City agencies.

PIC approval is required for any proposed work or improvements in, on, or under public sidewalks and ways. Depending on the Project's final design, certain PIC approvals may be required for: (i) earth retention systems beneath public sidewalks or ways; (ii) canopies that overhang public sidewalks or ways; (iii) groundwater recharge or groundwater monitoring wells in public sidewalks or ways; and/or (iv) certain specific repairs to portions of public sidewalks or ways. The Proponent will obtain such approvals and licenses to the extent necessary in connection with the Project and will comply with all other applicable PIC requirements.

2.3.3.6 Other City Requirements

The Project will comply with all other applicable City requirements. Depending on the final design of the Project and the means and methods of the Project's construction, licenses and/or approvals may be required from various City agencies, departments, boards and commissions for the installation of storage tanks, storage of flammable materials, the construction of a parking garage, the installation and use of life safety systems, curb cuts, public street tree removal and street opening.

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3

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 sustainable buildings and welcoming, leafy open spaces that will grow and spread outward to remediate a former industrial site, turning it into a fertile new ground for exchange of ideas, innovation, and connection. The Project is integrated into the 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 largest publicly accessible open space in a network of public realm connections that will stretch from the Lower Allston neighborhood to the Charles River. The open space network creates a pedestrian connection from Allston to Cambridge, which will link the surrounding communities to the river and a range of programmable spaces. The expansive open spaces, together with the proposed buildings and streets, make the Project a transformational 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.

3.1 Summary of Key Findings

The Project will provide a range of public and community benefits, including usable new publicly accessible open space, economic activity, improved circulation, and a mix of uses and housing options. Through a thoughtful planning and massing of buildings around the open spaces, the Project stands to redefine the standard for mixed-use, innovation focused developments in Massachusetts. 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:

› Expands Boston's network of innovation with a focus on connectivity, transit, accessibility, and inviting urban design to seamlessly merge local, regional, and global innovation clusters.

- Transforms an underutilized urban site into a vibrant mixed-use district that will connect the Project to the Allston neighborhood.
- Enriches the architectural characteristics of the surrounding neighborhood by providing articulated, varied massing and distinctive architecture.
- Improves the area's urban design character through the provision of a human-scaled, mixed-use development, acting as a neighborhood hub for local cultural institutions and commercial activity within a live/work/play district.
- Prioritizes a human-scale experience at street level with a network of laneways that break up building heights and proportions to create a playful urban profile.
- Provides robust publicly accessible open space totaling over two acres, which is well in excess of the 20% goal set forth in the existing PDA. This public open space will be enhanced with programming and amenities for a safe, secure, and inviting shopping, dining, and residential experiences.
- Integrates 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.
- Configures buildings and open spaces to maximize user comfort, ease of maintenance and operation, and a diverse mix of program potentials in response to environmental considerations including solar access, shade, wind protection, and acoustics.
- Provides accessible walkways along all streets within the Project Site.

3.2 Neighborhood Context

Figure 3.1 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 a transitional area of Lower Allston, where the immediately surrounding existing uses are few and the Project Site itself is currently an undeveloped parcel used for construction staging by Harvard. The Project will play a crucial role in reviving this context, both by bringing new building uses, but also 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 1.8 of Chapter 1, *Project Description*, the Project, as well as the future Phase B, will strive to integrate into the existing neighborhood by designing inviting spaces, creating a destination with active ground floor uses and cultivating a public realm that responds to community feedback. By doing so, it will celebrate and promote Allston's art scene, multicultural character and provide easy access to the Project and Harvard campus.

To the north of the Project Site is Harvard University's 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 the existing Harvard Business School buildings. 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 PDA, 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 Lower Allston residential neighborhood and the Charles River.

3.3 Proposed Building Design Development and Concept

3.3.1 Site Design Approach, Consistency with PDA Master Plan

Figures 3.2a and 3.3 illustrate the building and site orientations. The Project is generally consistent with the overall objectives, heights and program set forth in the approved PDA. The Project re-orients the buildings illustrated in the existing PDA in order to form a complete, self-sufficient block day one. The Lab/Office buildings are now placed on the south side of the Project Site, and act as a buffer between the Project Greenway and public open space and the adjacent to the 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. The residential buildings are accessed from Cattle Drive, the laneway, and the Project Greenway. The hotel/conference center uses have been separated in order to better pair the complimentary service and loading needs of the Hotel and Residential, and to allow the ERC Center to become a focal point of the Project at the corner of Western Avenue and East Drive. The ERC Center and its surrounding plaza are envisioned as a center of gravity for the Project, with increased visibility along Western Avenue. Services are shared between the residential, hotel, and conference uses, minimizing curb cuts and loading zones. By terminating Science Drive at the Cattle Drive intersection, the Project creates a consolidated block, creates more pedestrian-friendly open space, and orients development around a completed portion of the Project Greenway at its center. This arrangement will allow for the establishment of a critical mass and activate the space to create a lively environment in the early phases of development.

A key goal of the site design for the existing PDA was the creation of publicly accessible open space. In this regard, the Project exceeds the existing PDA goal of 20% open space by providing over two acres of the Project Site for publicly accessible open space (i.e. open space area that is primarily pedestrian focused).

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 and services and loading between buildings, as shown in Figure 3.2a. The Project recognizes the importance of making connections between current residents, future residents, students, researchers, and visitors, and, as such, is sited to create generous spaces to gather and meet around the buildings and within them. To further enhance the character and usability of the provided open spaces, buildings are sited to account for wind conditions, daylight access, and sources of sound pollution.

In order to facilitate movement to, from and within the Project Site, pedestrian, bicycle, vehicular, and service access are carefully coordinated. The four streets surrounding the Project 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 ERC Center with its corresponding plaza space.
- Cattle Drive, running north-south, will be an important pedestrian connector down to Cambridge Street and beyond to the future West Station. This street is designed to incorporate vehicles, transit, cycling, and an active pedestrian realm. Building lobbies and retail 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.
- East Drive, also running north-south, will be an important connector for vehicular traffic. It incorporates street parking, as well as a potential shuttle stop. Along the edge of East Drive, the ERC 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 ERC Center frames the widest dimension of the Project Greenway.
- DEF Drive completes the block perimeter and will primarily be a street providing access to the existing DEF facility, entry to the Project's underground parking garage, and 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 block 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.

3.3.2 Height and Massing

Figure 3.3 illustrates the planned Project building height and massing, and Figures 3.4a-f and 3.5a-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 Western Avenue,

the Charles River, Cambridge Street, neighboring residential areas, 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. 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 tower placed in the inner part of the block. The ERC Center holds an important edge of the Project Site along Western Avenue, with direct adjacency to Harvard Business School and creates a welcoming plazas and laneways provide access from Western Avenue to the Project Greenway.

The Lab/Office building is proposed to be strategically placed on the south end of the block along DEF Drive, shielding the more sensitive uses from the existing District Energy Facility. The planned stepped height of the Lab/Office building is responsive to the need for daylight access on the Project Greenway - as the Project Greenway narrows, the height of the adjacent Lab/Office building reduces in order to maximize access to sunlight in the publicly accessible open space. The Lab/Office building will also serve to shield the Project Greenway, Residential and Hotel uses from noise generated by the existing District Energy Facility.

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

- Building 1 - ERC 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.

3.3.3 Character and Materials

Figure 3.6 presents a conceptual rendering of the Project. The character of the building design and materials to be used on the buildings' exterior have yet to be determined at this early stage of conceptual design. As building design advances, a more detailed narrative and supporting graphics will be provided as part of the subsequent DPIR filing.

3.3.4 Views and Vistas

The proposed site plan is arranged to ensure a rich pedestrian experience. The shape of the Project Greenway gestures toward the Allston neighborhood and the Charles River. Visual connections to the Harvard Business School are possible along Cattle Drive, East Drive, and the pedestrian focused Laneway between Buildings 5 and Building 1.

The building massing has been arranged so as to provide the Hotel and Residential towers views to Cambridge, the Charles River, the HBS campus, and pivotally, Allston. The two Residential buildings will enjoy an adjacency to the Project Greenway, maximizing this access to views down the open space, and granting them preferred daylight access.

3.4 Public Realm Improvements and Open Space

The proposed improvements create an open and inviting public realm that aims to connect Allston residents with the Harvard community, new employees, residents, and visitors of the Project. 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 advances towards a future continuous green open space connecting the Honan-Allston Public Library to Soldiers Field Road and the Charles River.

The Project's overall public realm and publicly accessible open space area totals over two acres of the Project Site, including the approximately 1.4-acre Project Greenway, as well as building frontage zones, and planned "sidewalk rooms." The sidewalk rooms are areas intended to provide expanded sidewalk space to allow for publicly accessible areas that provide greenery, art or some other visual and physical amenity. They provide pockets of resting space and respite in an urban environment, such as along Cattle Drive, building frontage zones, laneways and urban plazas, and an improved streetscape along Western Avenue. Figure 3.7 delineates the different components of the public realm, and Figure 3.8 presents the conceptual open space plan for the Project.

Allston has a long history as a place with an experimental arts community, and a 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 development's public realm areas. Figure 3.9 presents the proposed pedestrian access and circulation.

3.4.1 Streetscape Improvements and Building Frontage Zones

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 space adjacent to the building frontage zones, which may include flexible retail and restaurant seating, designed to help activate the street and create a lively and engaging environment. Street lighting along Western Avenue will continue the established pattern and maintain Boston standards for light levels and ground cut-off.

Planting will include native or adapted urban-tested street trees selected from the Boston Parks & Recreation Department-approved list and set in structural soil with sufficient root space to minimize compaction of soils.

3.4.2 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 ERC 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 Greenway.

The plazas surrounding the ERC Center will be characterized by continuous tree canopy and will maintain public and inviting character.

3.4.3 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 bolster the area's connective, pedestrian fabric.

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. These interventions will help in establishing a rich native habitat and performative landscape.

Alongside the Office/Lab building which line the southern edge of the Project Greenway, the Project is planned to include outdoor seating in a comfortable and shaded environment. This area of groves will welcome visitors arriving from the west and create an inviting gateway into the Project Greenway.

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 the heat island effect.

3.4.4 Shared Use Path

A continuous and accessible pedestrian and bicycle path will traverse the Project Greenway between East Drive and Cattle Drive, contributing to a continuous future connection from the Lower Allston neighborhood to the Charles River.

3.4.5 Urban Design Approach to Cattle Drive

Envisioned as the Framework Plan's main street, a refined approach is proposed for Cattle Drive that further strengthens its promenade character. A series of publicly accessible outdoor "sidewalk rooms" are envisioned, creating a dynamic series of sidewalk expansions on opposite sides of the street, which add interest and preserve a human-scaled street section. One of these sidewalk rooms is included within the Project Site, located near the intersection of Cattle Drive and Western Avenue. Sidewalk rooms will have a distinct

character, as each sidewalk room will contain a specific program, increasing the range of available public activities and the level of pedestrian interest along the street. In addition to activating pedestrian realm, the sidewalk rooms offer flexibility and opportunity to include canopy trees and greenery along the street, where sub-surface utilities might otherwise preclude.

3.5 Accessibility

The Project Site is effectively flat at the north, south, west, and east property lines along which there is complete pedestrian accessibility off-site and to the proposed programs within the Project Site limits. The proposed public accessible walkways along all streets will have pedestrian barrier-free accessibility to and from the Project Site. Refer to Figure 3.10 for a diagram of the accessible ground level for the Project.

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.

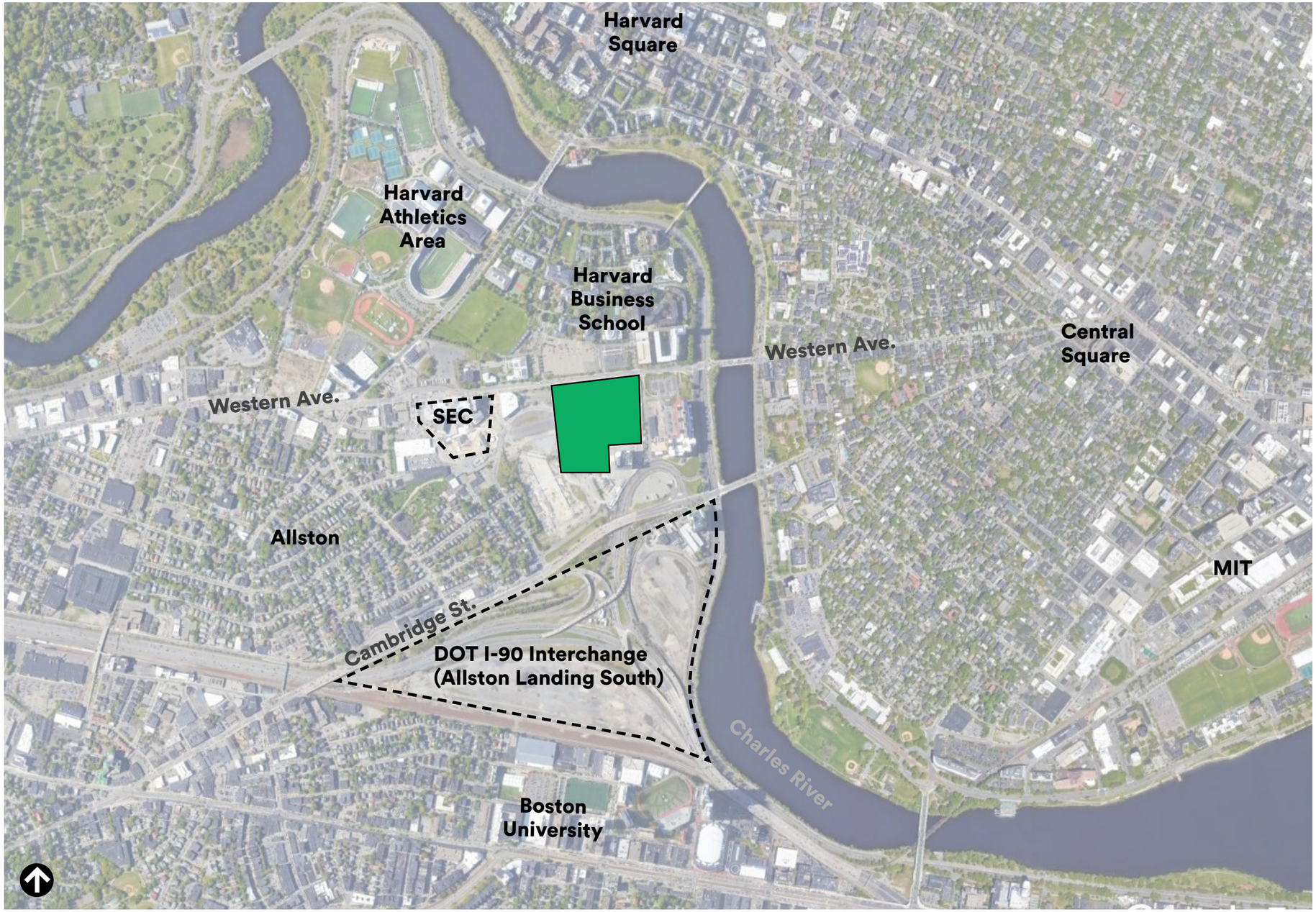


Figure 3.1
Neighborhood Context Plan

Enterprise Research Campus Project
Boston, MA

- Active Ground Floor Uses
- Lobby
- Hotel Lobby
- Residential Lobby
- ERC Center
- Back of House
- Building Entry
- Project Site Boundary

Figure 3.2a

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

Figure 3.2b

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

Residential
Lab/Office
Hotel
Conference

N

0 25 50 100 200

Figure 3.2c

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

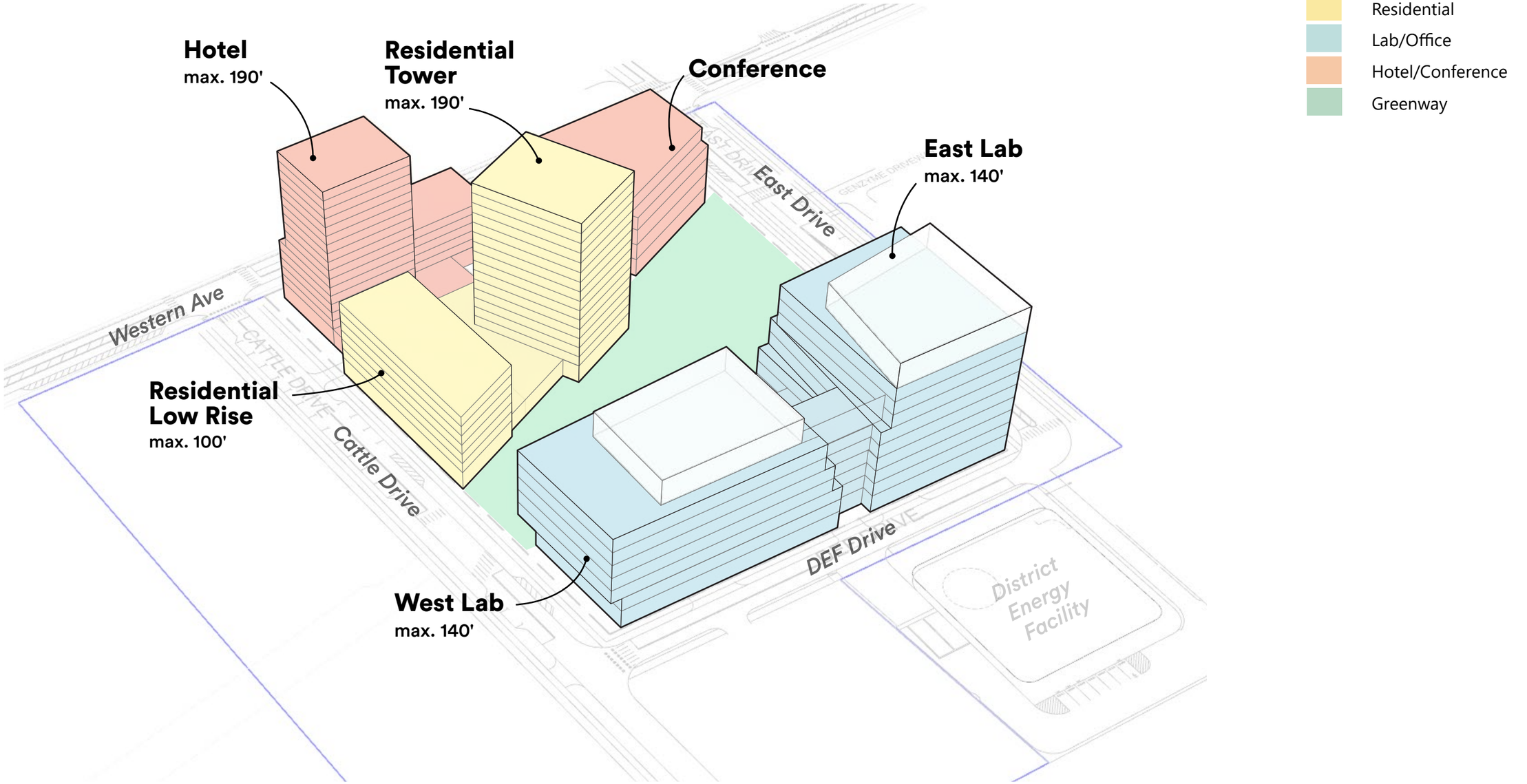
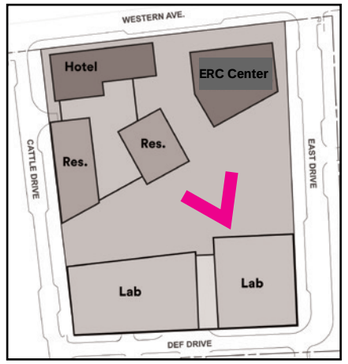


Figure 3.3
Massing Diagram

Enterprise Research Campus Project
Boston, MA



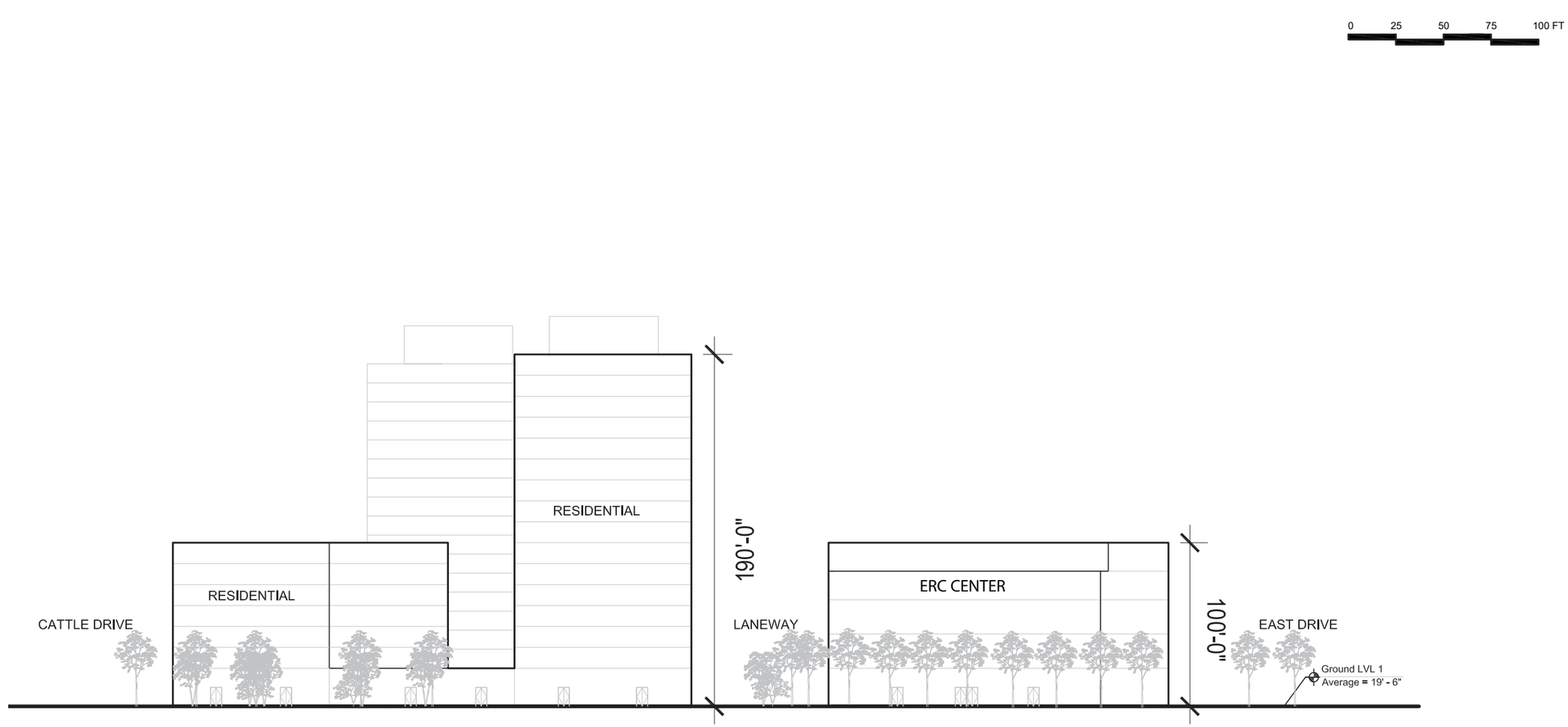
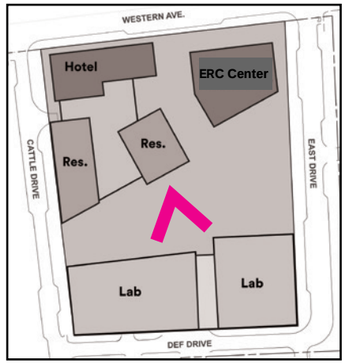


Figure 3.4a
Building Elevations - Greenway North

Enterprise Research Campus Project
Boston, MA



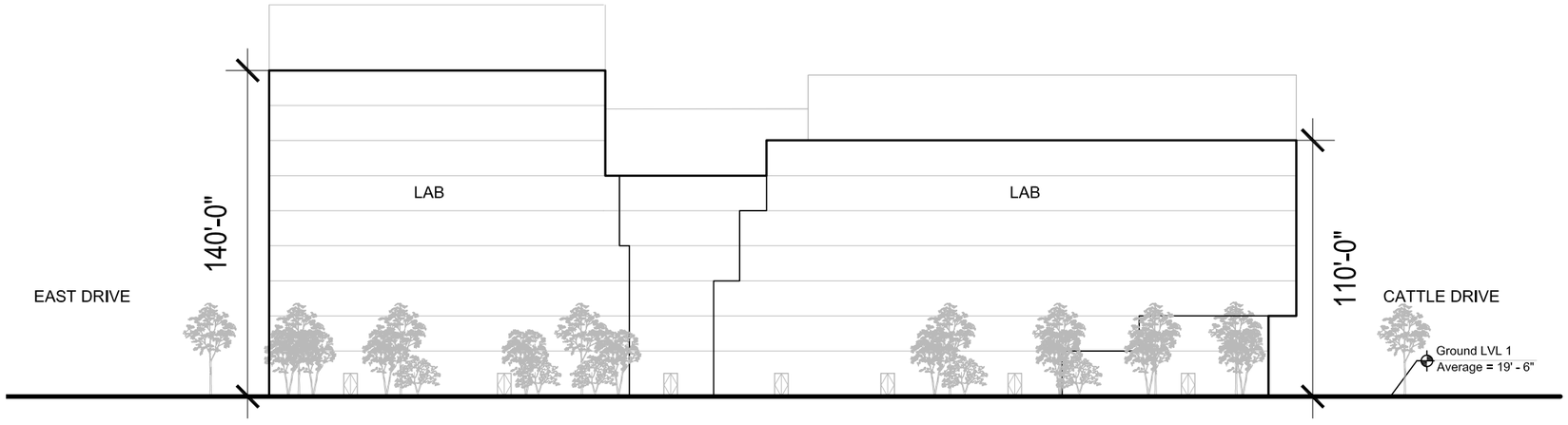
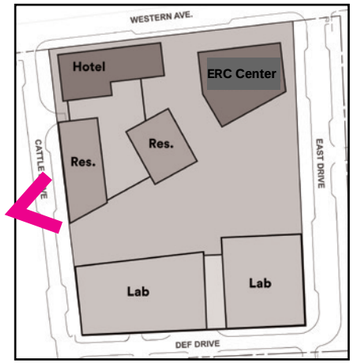


Figure 3.4b
Building Elevations - Greenway South

Enterprise Research Campus Project
Boston, MA



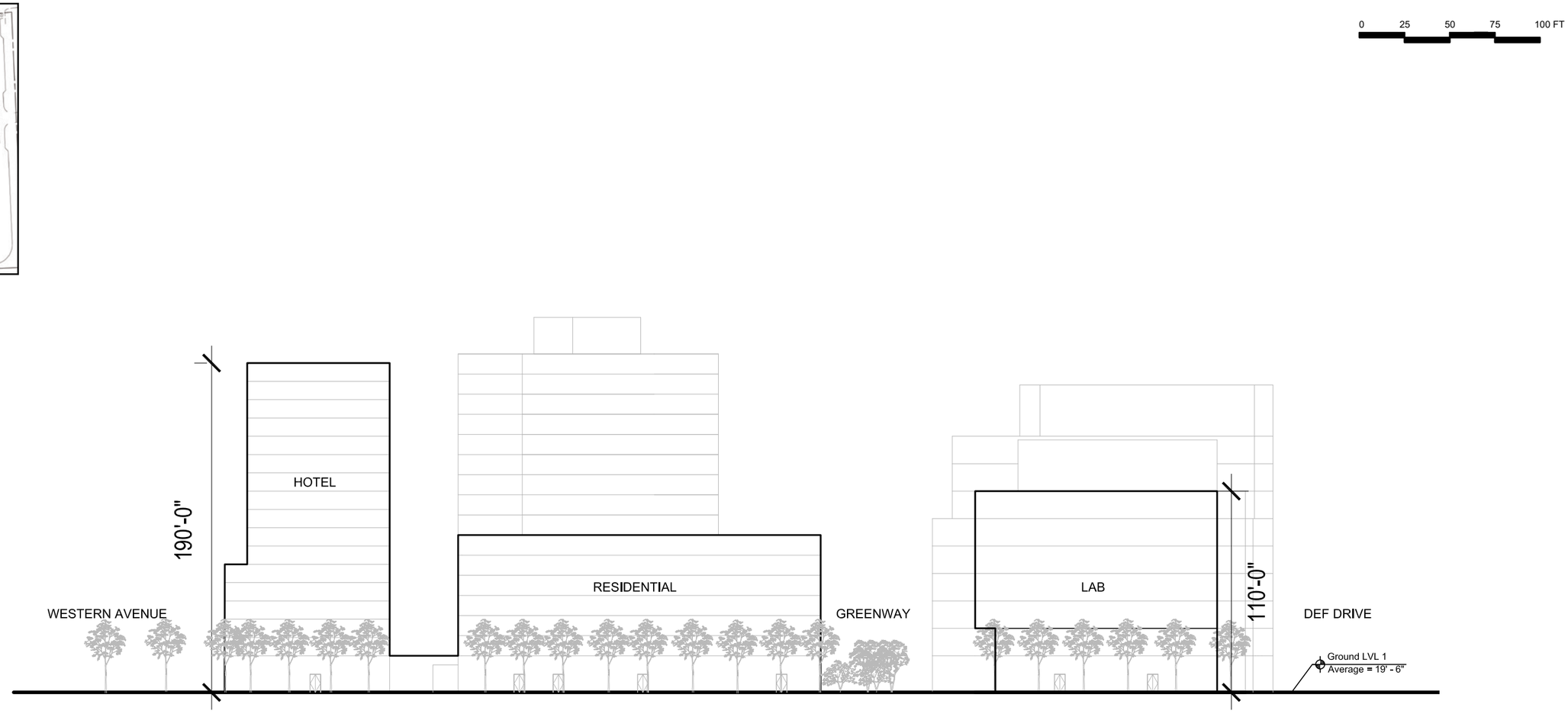
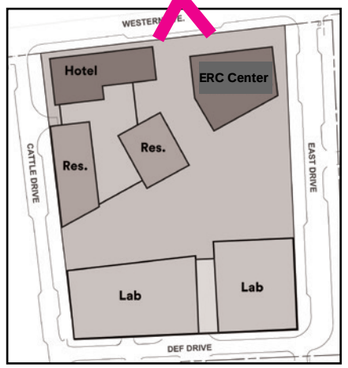


Figure 3.4c
Building Elevations - Cattle Drive

Enterprise Research Campus Project
Boston, MA



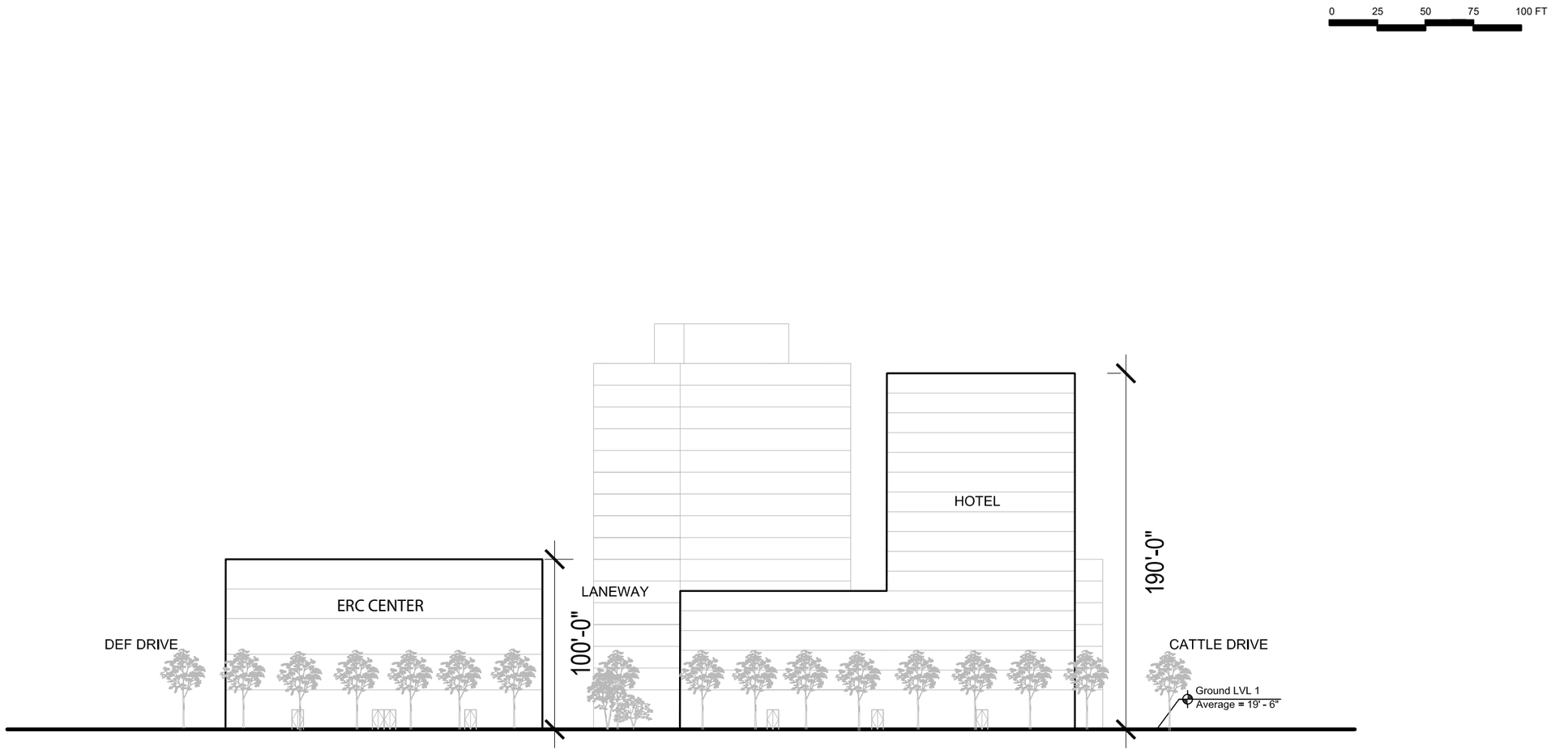
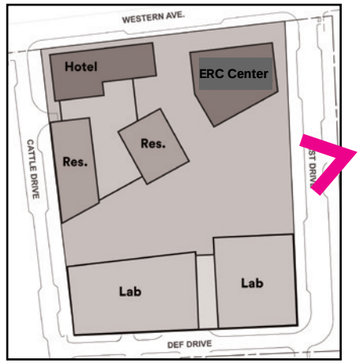


Figure 3.4d
Building Elevations - Western Avenue

Enterprise Research Campus Project
Boston, MA



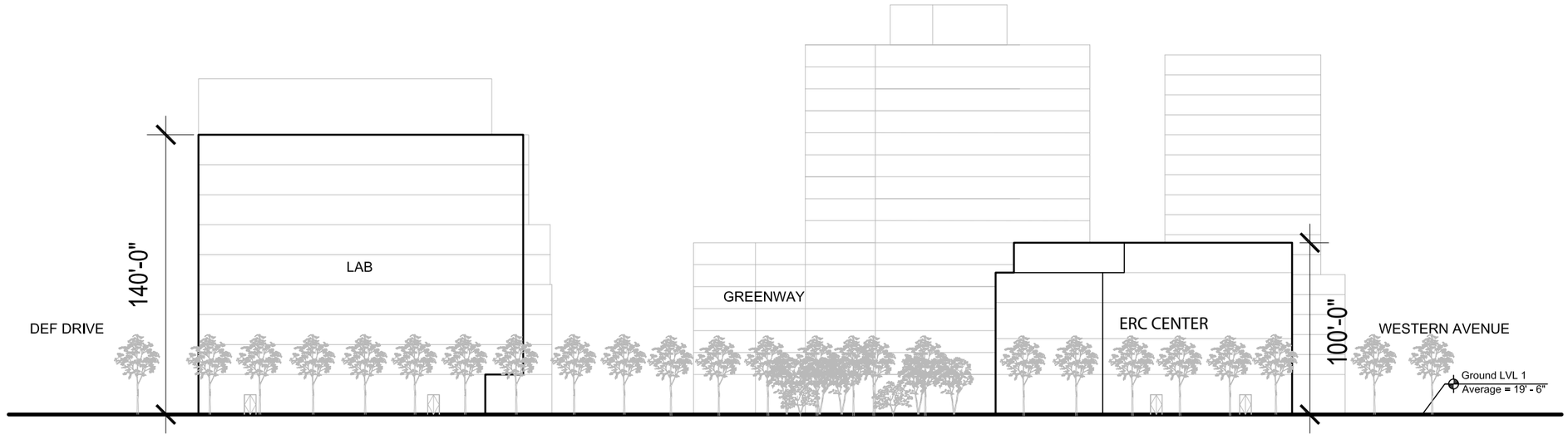
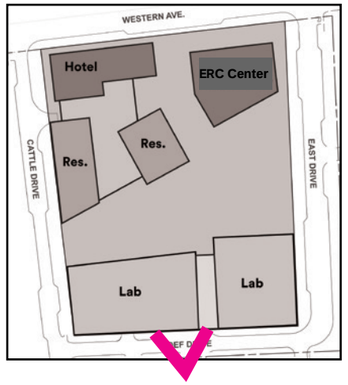


Figure 3.4e
Building Elevations - East Drive

Enterprise Research Campus Project
Boston, MA



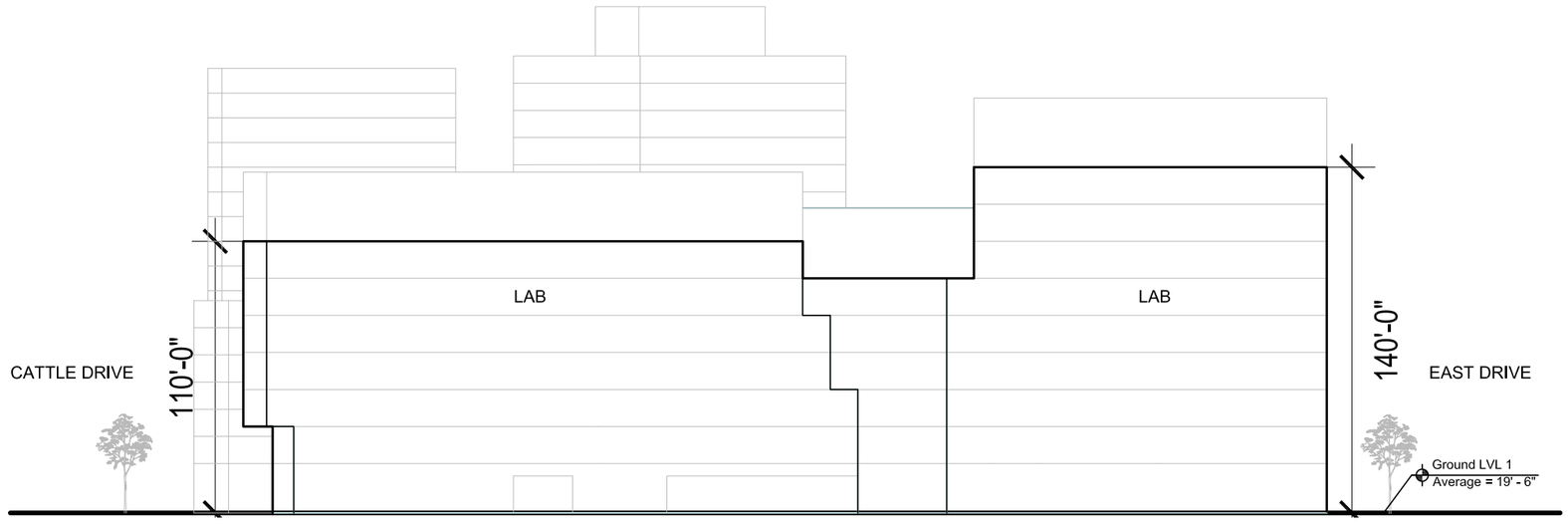
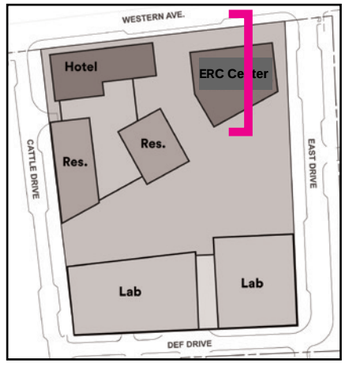


Figure 3.4f
Building Elevations - DEF Drive

Enterprise Research Campus Project
Boston, MA



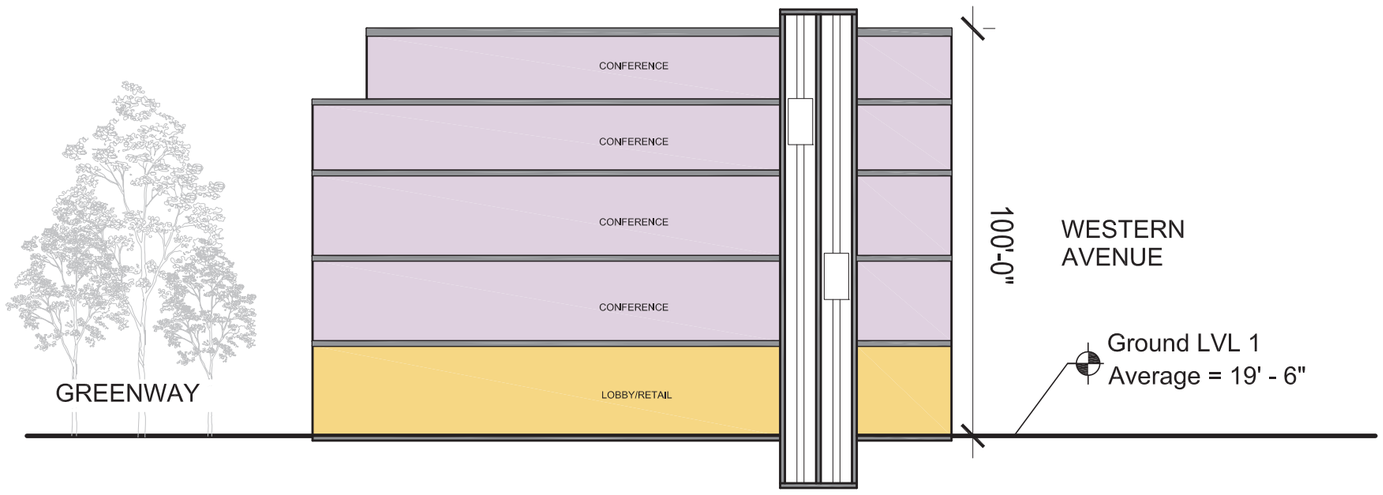
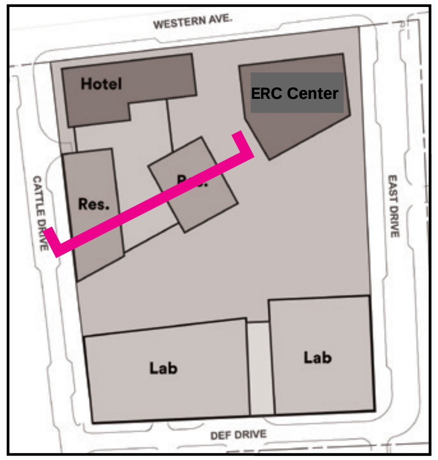


Figure 3.5a
Building Sections - Conference Center

Enterprise Research Campus Project
Boston, MA



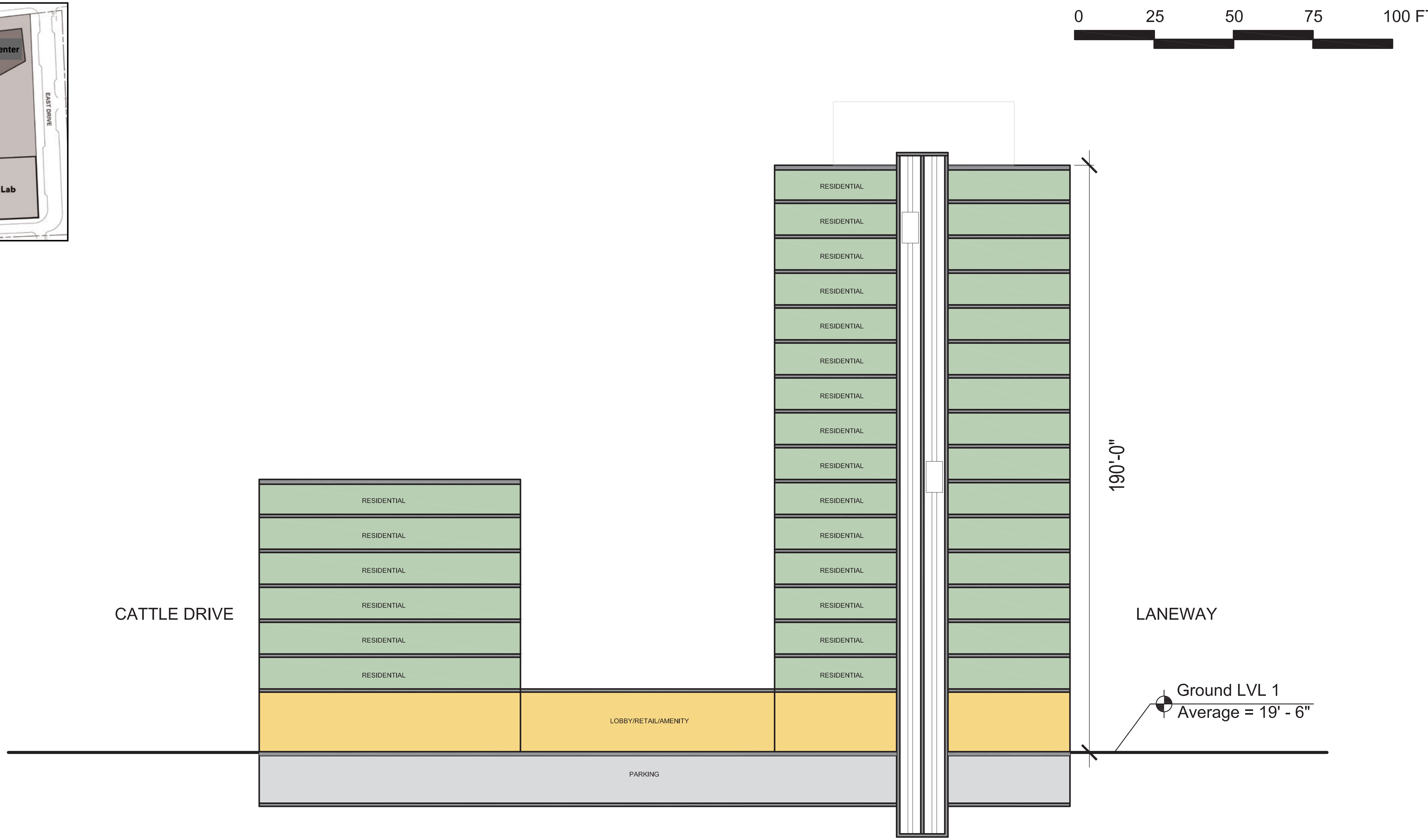
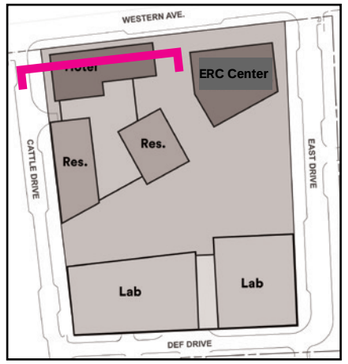


Figure 3.5b
Building Sections - Residential

Enterprise Research Campus Project
Boston, MA



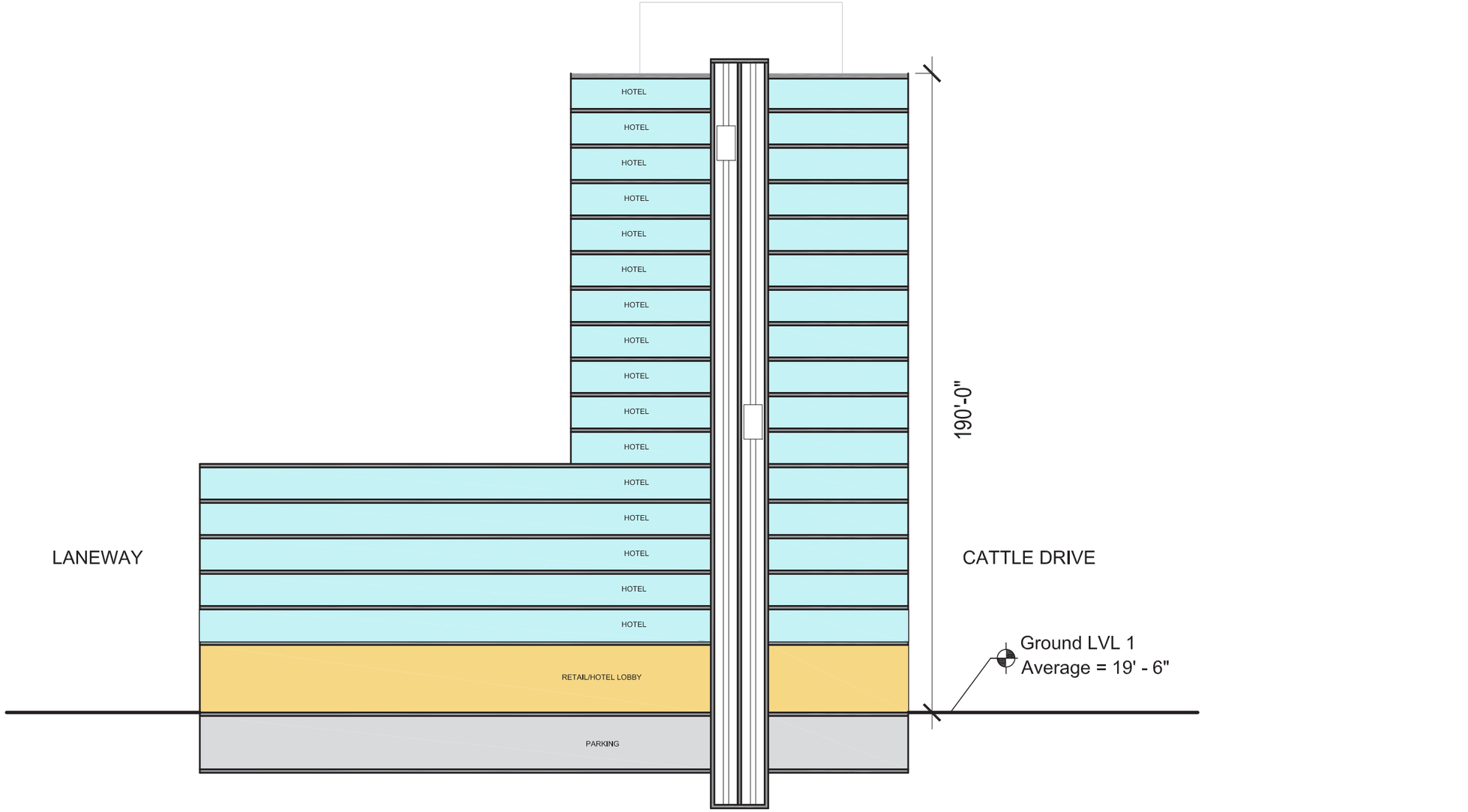
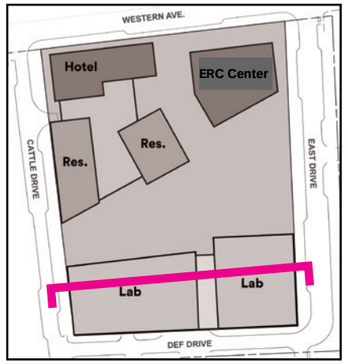


Figure 3.5c
Building Sections - Hotel

Enterprise Research Campus Project
Boston, MA



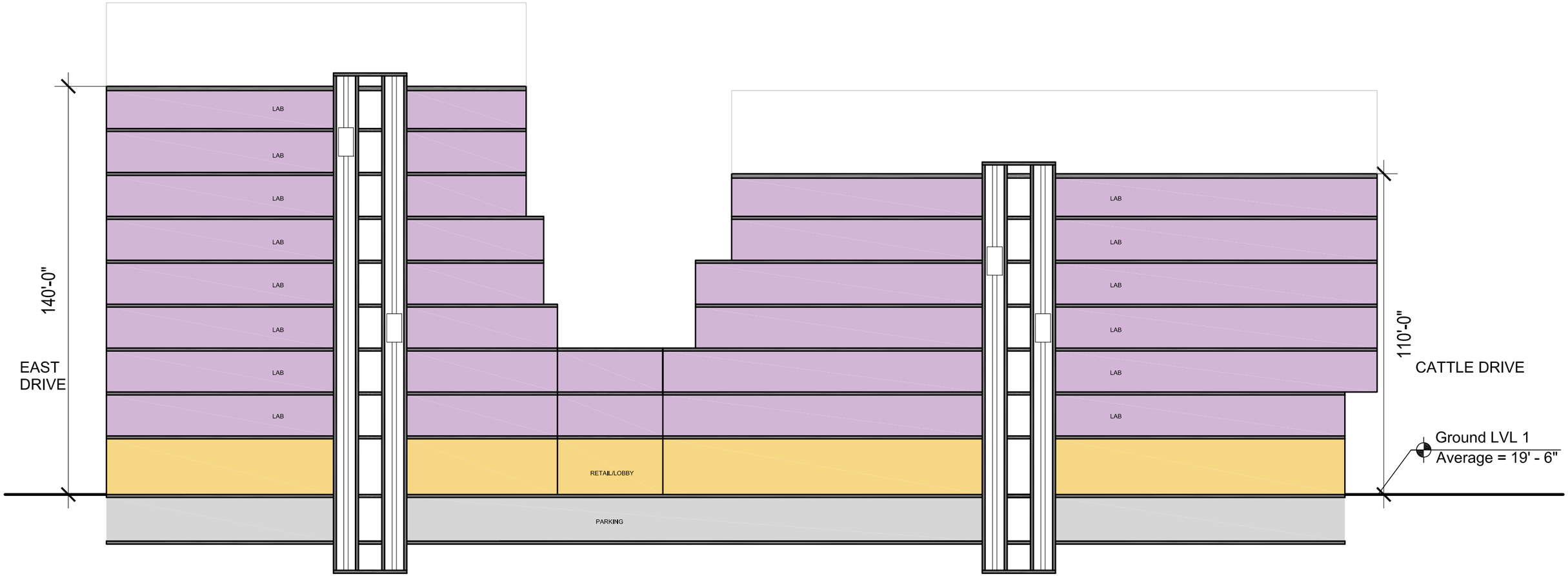


Figure 3.5d
Building Sections - Labs

Enterprise Research Campus Project
Boston, MA

Figure 3.6
Laneway Rendering

Enterprise Research Campus Project
Boston, MA

Primarily Planted

Combination of Hardscape and Canopy

Combination of Hardscape and Planting

Note: Illustrative purposes only. Subject to change.

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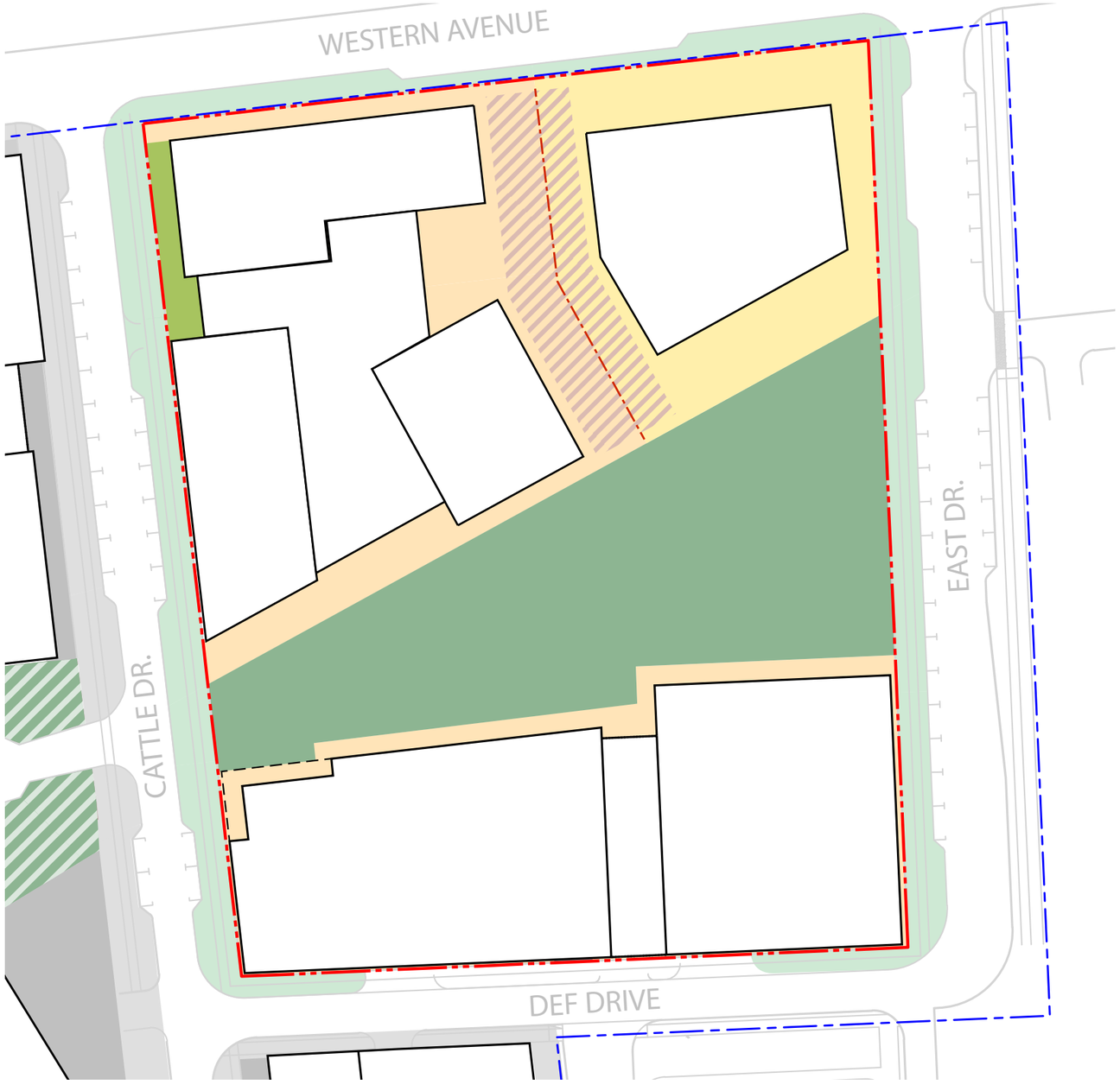
Figure 3.7

Public Realm/Streetscape Improvement Plan

Enterprise Research Campus Project
Boston, MA



Project Site

Note:

- Building face-to-building face along Cattle Drive is a minimum of 98' and includes the promenade/street room program elements.
- Open space areas shown are approximate.
- Laneway area occupies portions of the Hotel/Residential and Conference frontages.

Note: Illustrative purposes only. Subject to change.

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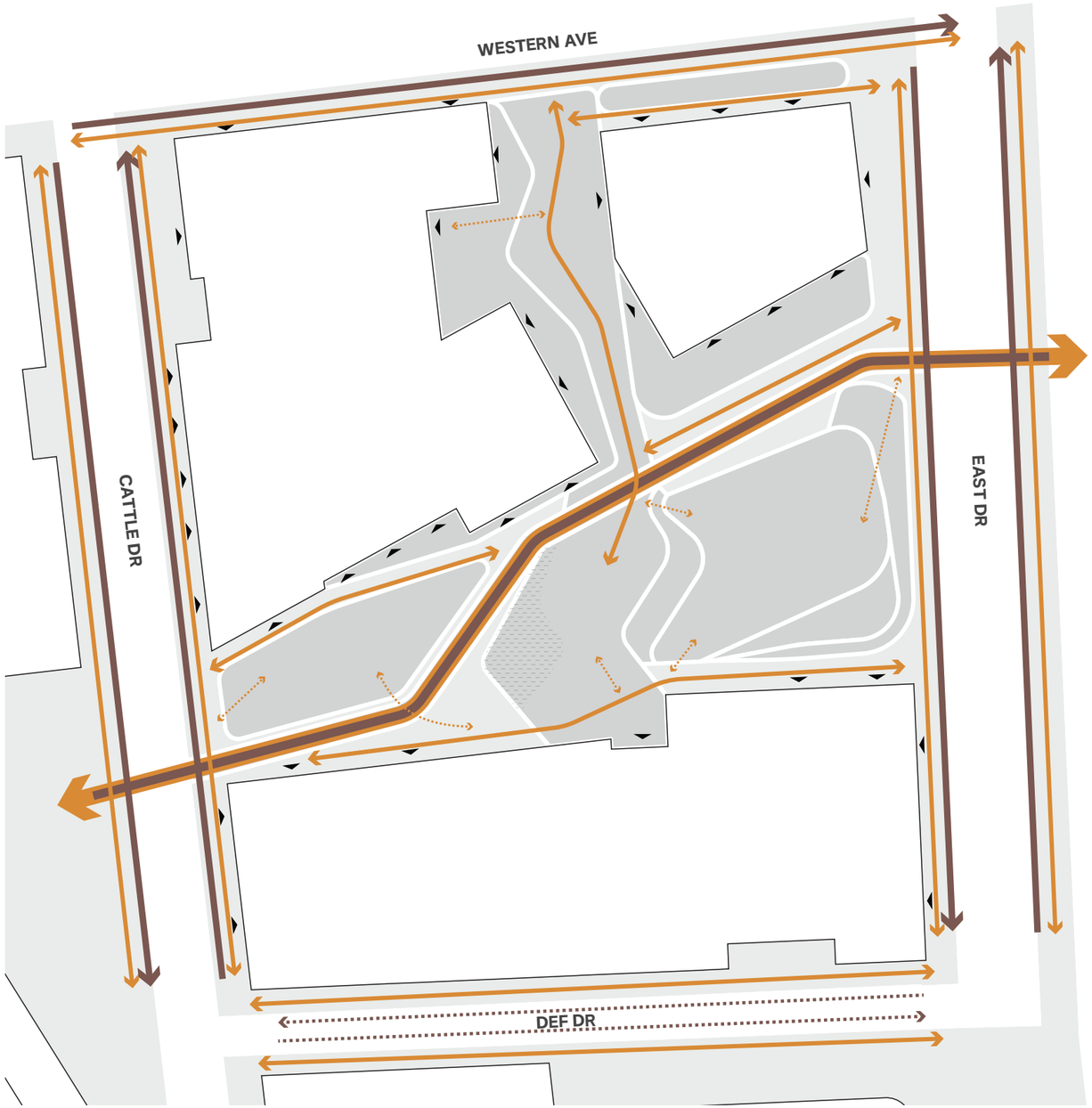
Figure 3.8
Conceptual Open Space Plan

Enterprise Research Campus Project
Boston, MA



Bike Circulation

Primary Pedestrian Circulation

Secondary Pedestrian Circulation

Note: Illustrative purposes only. Subject to change.

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Figure 3.9
Pedestrian Access and Circulation

Enterprise Research Campus Project
Boston, MA

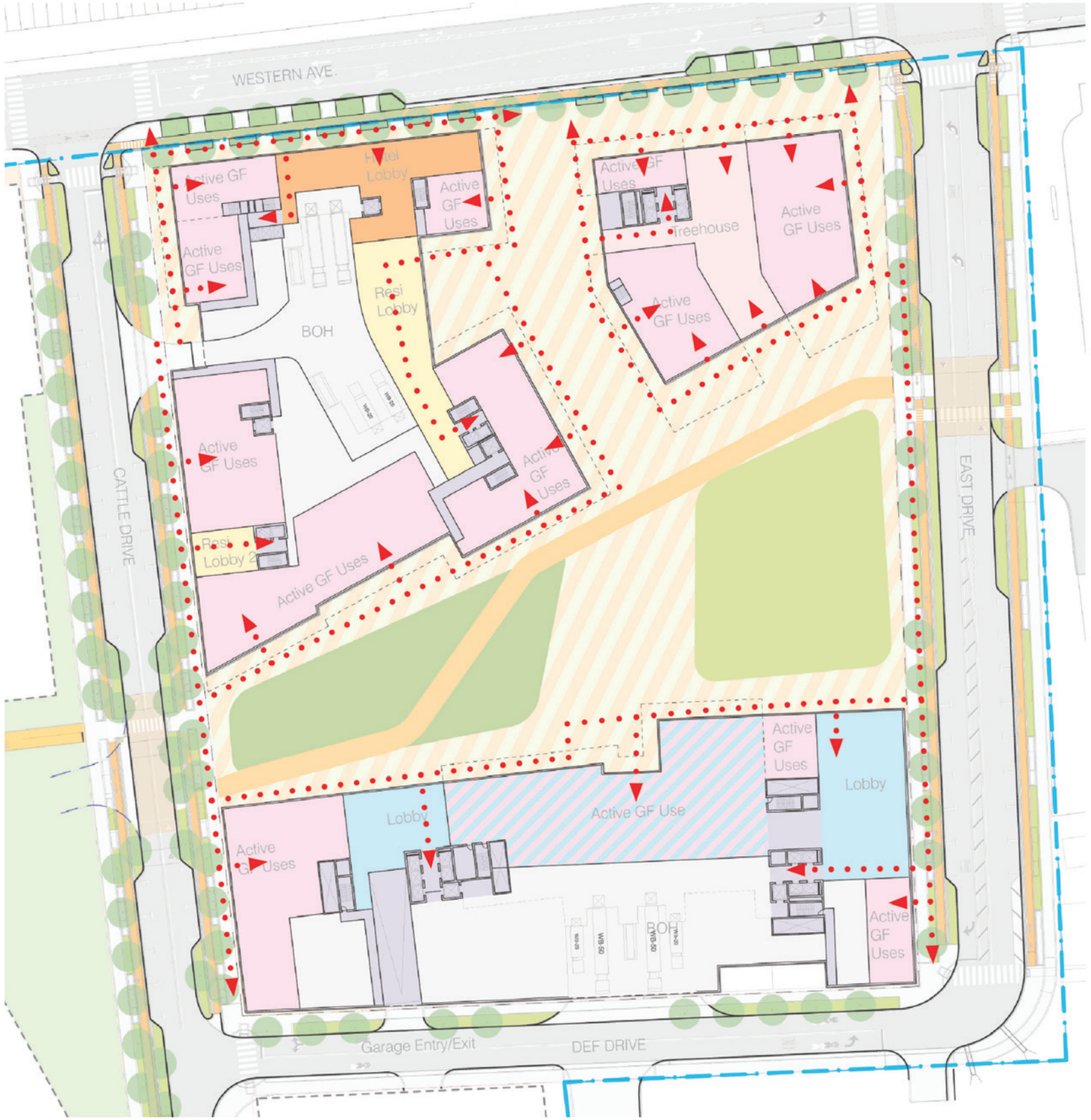


Figure 3.10
Ground Level Accessibility Diagram

Enterprise Research Campus Project
Boston, MA

4

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.

4.1 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 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 Proponent will utilize energy-efficient HVAC and lighting equipment and systems, and incorporate other potential energy conservation measures, as reasonable and feasible.
- The Proponent will consider any available utility incentive programs in coordination with representatives of local utility companies serving the Project Site.
- Based on conceptual design, preliminary energy modeling demonstrates the overall estimated energy use reduction for all buildings proposed as part of the Project (with parking) is approximately 25% compared to the Base Case[1] (as described in Section 4.4.1.1 below), which equates to an approximately 21% reduction in Greenhouse Gas ("GHG") emissions as compared to the Base Case.

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

The Project's proposed design demonstrates an approximately 40% reduction in natural gas energy and natural gas GHG emissions. With these significant reductions in fossil fuel use, the Project's primary energy source is electricity (approximately 59%) which will contribute considerably to its pathway to carbon neutrality and the Commonwealth's electricity emissions factor continues to decline.

- The Project will incorporate design elements to improve on-site stormwater management and reduce risk of precipitation-based flooding, such as reducing impervious surfaces, increasing the amount of greenery and green infrastructure strategies, and exploring the feasibility and cost-effectiveness for stormwater capture and reuse for cooling tower make-up water. 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 3.4 of Chapter 7, *Infrastructure*, for additional details in relation to stormwater infiltration.
- The Project Site is not within a current FEMA floodplain and is also located outside the boundary for the 2070 1% annual chance event used in Climate Ready Boston. First floor elevations are proposed to be between 18-20.5 feet Boston City Base (BCB).
- To address other aspects of climate change resiliency, the site design will aim to reduce urban heat island impacts to the extent feasible by using greenery, trees, green infrastructure, shading structures, and materials with high solar reflectance/albedo, and building designs will accommodate HVAC system capacity for more extreme design conditions.

4.2 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.

4.2.1 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[2], 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

[2] 780 CMR, Ninth Edition, Chapter 13: Energy Efficiency Amendments as of 8/7/2020

standard of 10 percent better than ASHRAE 90.1-2013[3] 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.

4.2.2 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.

4.2.3 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").[4] 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 building 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.

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*

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

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

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."[5]

The Project will be subject to the requirements of BERDO. A discussion of energy and GHG emissions performance is provided in Section 4.4.

4.2.4 Harvard Green Building Standards

Harvard University's Green Building Standards[6] (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[7]; Fossil Fuel Neutral by 2026 and Fossil Fuel Free by 2050[8].

The Project would be classified as Tier 1 and will align with Harvard's Green Building Standards. Tier 1 projects at Harvard are required to achieve LEED v4 Gold certification, conduct a Living Building Challenge and Net Zero Energy Feasibility Study, and achieve enhanced levels of energy performance compared to a LEED baseline, i.e. ASHRAE 90.1-2010.

Additionally, Tier 1 projects must meet Harvard's requirements for addressing specific chemical classes of concern in furniture, carpet, wall base, and non-blackout window shades as well as LEED Building Product Disclosure and Optimization (BPDO) credits.

The Standards also include requirements for achieving LEED credits for integrated design process, indoor and outdoor water use, enhanced commissioning, and construction and demolition waste management.

The Proponent has committed to meeting Harvard's Green Building Standards and is aligned with and in support of Harvard's Fossil Fuel-Neutral by 2026 and Fossil Fuel-Free by 2050 goals.

4.3 Sustainability/Green Building Design

The Project proposes to redevelop an underutilized urban 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

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

[6] https://green.harvard.edu/sites/green.harvard.edu/files/HarvardGreenBuildingStandards2017.pdf

[7] 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.

[8] https://green.harvard.edu/campaign/harvards-climate-action-plan

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 receive LEED Gold certification at a minimum and are proposed to be highly energy efficient, exceeding the minimum requirements of the new Stretch Energy Code, and having building envelope designs that exceed minimum prescriptive requirements. The Proponent is committed to studying all-electric options for heating and domestic hot water in all buildings to assess cost effectiveness (through a life cycle cost analysis) and opportunities for reduction in GHG emissions. The Proponent is also committed to studying whether any low-carbon district energy systems can be incorporated in lieu of traditional combined heat and power ("CHP").

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.

4.3.1 Compliance with Article 37 – Green Buildings

This section demonstrates how 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 49% of total gross floor area[9] and 2 buildings;
- **Multi-Family Residential**: LEED for New Construction and Major Renovations, which represents approximately 28% of total gross floor area and 2 buildings; and
- **Hotel**: LEED-NC for Hospitality, which represents approximately 15% of total gross floor area and 1 building.
- **Conference Center:** LEED -NC, which represents approximately 8% of total gross floor area and 1 building.

Refer to Figures 4.1a-d for preliminary 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, as discussed further below. The following sections describe all typologies by credit category and identifies any building typology-specific differences.

[9] Excluding parking garage area

4.3.1.1 LEED Master Site Credit Approach

The LEED Certifiable compliance approach for the Project includes an overall LEED Master Site approach that identifies and addresses applicable Master Site-wide credits across the Project's buildings. This approach is useful in streamlining LEED credit documentation for projects that include multiple new buildings with shared infrastructure, pedestrian-oriented circulation, and extensive open space. Under this approach, each proposed building would then automatically achieve the Master Site-wide credits, as applicable to each building-specific rating system. The "Master Site" in this context would be defined as the area of the PDA.

4.3.1.2 Integrative Process

All building typologies will achieve IPc1: Integrative Process by working in an integrated manner to define sustainability, LEED, and energy and GHG emissions goals for each individual building. The Proponent has conducted conceptual energy modeling across all building typologies to establish energy goals and will develop a water budget. The initial approach will target at least a 50% reduction in outdoor water use and 25-35% reduction in indoor water use depending on the building typology.

As the design for each building moves forward, the Proponent will continue to work in an integrated manner by conducting regular sustainability focused design workshops through the schematic design phase to confirm the Project's sustainability goals and metrics, identify strategies for further analysis, and integrate optimal strategies into the design, should they prove cost effective. Typically, this includes additional analysis where building models are shared between the team members in addition to specification coordination. Additionally, the Proponent has engaged a sustainability/LEED consultant, Arup, to lead the LEED certification process, monitor and track the goals established in the schematic design phase, and finalize that the buildings are eligible to receive LEED Gold certification at a minimum.

4.3.1.3 Location and Transportation

The Project will seek to encourage low-carbon, non-automobile transportation by encouraging walking, biking, and public transit to access the Project Site. The following strategies are expected to be applicable to all building typologies except where noted:

- The Project is on previously developed land (LTc2).
- The Project will provide for dense, mixed-use development with access to numerous diverse uses recognized by LEED, while retaining a significant amount area for open space (LTc4).
- The Project Site is in an area served by public transportation, including the MBTA 70 bus line and Harvard University Shuttle within a ¼ -mile walk of the Project (LTc5).
- The Project intends to provide options for low-carbon transportation mobility, as well as encourage use of public transportation through improved access, the implementation of a Transportation Demand Management ("TDM") Plan and minimized demand for on-site infrastructure for single occupancy automobiles through a shared parking approach.

- 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. Shower and Changing facilities will be installed in Office/Lab building and explored for the ERC Center (LTc6).
- The Project will pursue Option 2: Reduce Parking to reduce the number of parking spaces provided by 30% from the LEED baseline and the Project will not exceed minimum local code requirements (LTc7).
- The Project will incorporate electric vehicle (EV) parking in alignment with the City's requirements for 25% of parking spaces, which far exceeds the LEED requirement for 2% of parking spaces. These spaces will be clearly identified and reserved for plug-in EVs (LTc8).

4.3.1.4 Sustainable Sites

The Project will be developed with Low Impact Development (LID) principles and Best Management Practices (BMPs). The following strategies are applicable to all building typologies, except where noted.

- The Project will develop and implement an erosion and sedimentation control plan for all construction activities during construction (SSp1).
- The Proponent will conduct a site assessment per LEED criteria, to address topography, hydrology, climate, vegetation, species, soils, human use, and human health effects (SSc1).
- The Project intends to take a Master Site credit approach for achievement of Restore Habitat, Open Space, Rainwater Management, Heat Island Reduction, and Light Pollution Reduction (SSc2, SSc3, SSc4, SSc5 and SSc6). 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.
  - Utilize native and adapted species for plant selection to restore soils on-site that have been disturbed or to replace all soils removed by current construction activities that will later serve as the final vegetated area.
  - Provide at least 30% of total site area as a combination of landscape greenery and pedestrian oriented paving for outdoor social activities.
  - Reduce the urban heat island effect through a combination of strategies, including the use of hardscape materials with a low solar reflectance and high-albedo roofing materials. Green roof areas will also be evaluated for feasibility.
  - Design Project Site lighting to meet the uplight and light trespass requirements for all applicable exterior luminaires to comply with all internally-illuminated signage requirements.
- The Project's Core & Shell Lab/Office typology has also targeted the achievement of SSc7 Tenant Design and Construction Guidelines per LEED requirements (LEED-CS only SSc7).

4.3.1.5 Water Efficiency

The Project will be developed so that potable water will be used efficiently both outdoors and indoors, and for process uses. The following strategies are expected to be applicable to all building typologies, except where noted.

- The Project will reduce outdoor water use for landscape requirements by over 50 percent through selection of drought-tolerant, native and adapted plantings and water-efficient irrigation systems. It is anticipated that some irrigation will be required (WEp1 and WEc1).
- The Project will reduce indoor potable water use using WaterSense-labelled, low- and ultra-low flow water fixtures to achieve a 25-35% reduction in indoor potable water use from the base case (WEp2 and WEc2).
  - Core & Shell Lab/Office and Conference Center typologies have targeted a 35% reduction in indoor water use.
  - Residential and Hotel typologies have targeted a 25% reduction in indoor water use from the base case. The savings is more limited in these buildings because they will not include as many urinals, but these buildings will have targeted low flow showerheads to the reduce domestic hot water demand and associated energy consumption.
  - All typologies will incorporate Energy Star-certified or equivalent appliances, as applicable for clothes washers, dishwashers, and/or ice machines.
- The Project will install building water meters and water metering to sub-meters for two water end uses. The end uses to sub-meter will vary per typology and may include irrigation, cooling tower make-up, and/or domestic hot water (WEp3 and WEc4).
- Cooling towers will be designed in a water-efficient manner in order to achieve two points under LEED. This can be achieved through a minimum of 10 cycles without exceeding the filtration levels of the five LEED-defined parameters for water quality or in combination with at least 20% non-potable water (WEc3).
- The Project will study the feasibility and cost effectiveness of reusing stormwater for cooling tower make-up water for the Core & Shell Lab/Office buildings and as part of a future District Energy Feasibility Study (refer to Section 4.3.3).

4.3.1.6 Energy and Atmosphere

The Project will be designed to be highly energy efficient, which will minimize GHG emissions associated with building energy usage. The following strategies are expected to be applicable to all building typologies, except where noted.

- The Project will implement enhanced commissioning activities and, potentially, monitoring-based commissioning (EAp1 and EAC1).
- The Project will incorporate passive design strategies and multiple energy conservation measures (ECMs) into building designs to exceed the Stretch Energy Code and pursue Option 1: Whole-Building Energy Simulation. Refer to Section 4.4 for energy performance details (EAp2 and EAc2). Preliminary energy modeling has indicated the following energy cost reduction from a LEED baseline (ASHARE 90.1-2010):

- **Core & Shell Lab/Office:** 26% energy cost reduction, 12 points + 3 maybe points or 35% energy cost reduction.
- **Residential:** 20% energy cost reduction, 8 points + 3 maybe points or 26% energy cost reduction.
- **Hotel:** 20% energy cost reduction, 8 points + 3 maybe points or 26% energy cost reduction.
- **Conference Center:** 32% energy cost reduction, 13 points + 3 maybe points or 42% energy cost reduction.

› The Project will install building energy metering for all energy sources (EAp3). Lab/Office and Conference Center typologies will explore the feasibility and benefits to installing energy sub-metering for major end uses per LEED criteria (EAc3).

› Residential buildings will implement unit-level metering for electricity and potentially water, such that tenants will receive bills and pay directly for their own consumption.

› The Project will incorporate refrigerants that are non-ozone depleting and have low global warming potential (EAp4 and EAc6).

› The Project will evaluate the economic, engineering, and business case feasibility of on-site renewable energy systems, such as rooftop solar photovoltaics (PV) on a building by building basis. A preliminary analysis is provided in Section 4.4.2 (EAc5).

› The Project will purchase renewable energy certificates and carbon offsets for qualified resources that have come available since January 1, 2005, as applicable, for 100% of energy consumption per energy model results for a period of at least five years (EAc7).

4.3.1.7 Materials and Resources

Materials for the Project will be selected based on their health and life cycle environmental impacts, and recycling will be required in the Project's operation and for construction activities. The following strategies are expected to be applicable to all building typologies.

› The Project will provide storage and collection of recyclables within its buildings for mixed paper, corrugated cardboard, glass, plastics, and metals, and will provide for safe collection, storage, and disposal of batteries and electronic waste (MRp1).

› The Proponent will require the Contractor to develop and implement a construction and demolition waste management plan that defines waste diversion goals, whether materials will be comingled, diversion strategies, at least five materials targeted for diversion, and estimated diversion rates. Further, the Project will pursue Option 1 Diversion to divert and/or recycle 75% of the applicable construction and demolition material and track material streams per the chosen path. Requirements for this credit will be included in Project specifications in Section 017419 Construction and Demolition Waste Management and Disposal (MRp2 and MRc5).

› The Project will conduct an LCA per LEED requirements, MRc1 Option 4, for structure and enclosure to account for embodied carbon in each building. Buildings have targeted being able to demonstrate a 10% reduction in embodied carbon from a comparable baseline, and LEED points resulting therefrom are currently being tracked as "maybe" points. The ERC Center will explore the use of a mass timber structure which would

contribute to reducing embodied carbon and achievement of the maybe LEED points for this credit.

- The Project will select materials with product-specific Environmental Product Declarations (EPDs), at least 20 in total from five different manufacturers, to enable the Proponent and its Project Team to make informed decisions about the environmental impacts of products and support the LCA calculation (MRc2).
- The Project will select materials with high levels of recycled content, considered to be regional materials, and Forestry Stewardship Council (FSC)-certified wood (MRc3).
- The Project will select materials with transparency declarations, such as health product declarations, declare labels and/or cradle to cradle certifications to enable the Proponent and its Project Team to make informed decisions about chemicals of concern and health impacts of building products, with a focus on interior finish materials (MRc4).
- The Project has targeted an additional point by being able to achieve Option 2: Material Ingredient Optimization. This requires specifying at least 10 ILFI Red List Free[10] materials from at least three different manufacturers for permanently installed products. Red List Free materials are 3rd party certified to not include the worst in class materials prevalent in the building industry that are polluting the environment, bio-accumulating up the food chain until they reach toxic concentrations, and harming construction and factory workers.

4.3.1.8 Indoor Environmental Quality

The following strategies to provide a healthy and comfortable indoor environment and good indoor air quality are expected to be applicable to all building typologies

- The Project will be designed per ASHRAE 62.1 and will not allow smoking inside the building or within 25 feet of entrances, air intakes, operable windows, and other openings that could contaminate indoor air quality (EQp1 and p2).
- To enhance indoor air quality, the Project will incorporate entryway systems, MERV 13 or higher filters, and/or will minimize cross-contamination, as applicable, and will install carbon dioxide (CO_2) monitoring in densely occupied spaces to enhance indoor air quality (EQc1).
- The Project will specify low-emitting materials that meet low-Volatile Organic Compounds (VOCs) content and general emissions testing requirements for at least three product categories. The Project has targeted being able to achieve a fourth product category, and LEED points resulting from such a fourth product category are currently being tracked as a 'maybe'. Product categories initially targeted include paints and coatings, flooring, ceilings, composite wood, and furniture, where applicable (EQc2).
- During construction, the Contractor will be required and responsible for developing and implementing an indoor air quality management plan during construction and pre-occupancy that meets Sheet Metal and Air Conditioning Contractors' National Association

[10] https://living-future.org/declare/declare-about/red-list/

guidelines and LEED requirements. Requirements for this credit will be included in Project specifications in "Section 018120 Construction Indoor Air Quality Management" (EQc3).

- The Project will conduct air quality testing after construction ends/before occupancy begins, per LEED requirements (EQc4). Note: this credit is not applicable to the LEED-CS rating system and will not be pursued by the Lab/Office typology. As part of the tenant design guidelines and standards, the Proponent will recommend tenants conduct air quality testing prior to occupancy per LEED requirements. The Project will be designed to thermal comfort standards per ASHRAE 55 for all building typologies and comfort controls, where feasible. It is anticipated the Residential and Hotel typologies will achieve this credit. The ERC Center requires further development to confirm compliance with the thermal comfort standards, and LEED points resulting from such compliance are currently being tracked as a 'maybe' (EQc5). Note: this credit is not applicable to the LEED-CS rating system and will not be pursued by the Lab/Office typology.
- The Project will design lighting for quality and control per LEED requirements and strategy options. It is anticipated the Residential and Hotel typologies will achieve "Option 1 Lighting Control", Although it is currently unclear and requires further development to confirm (i) the conference center typology lighting may achieve "Option 1 Lighting Control", and (ii) residential, hotel, and the conference center typologies may comply with "Option 2 Lighting Quality". Accordingly, resulting points therefrom are currently being tracked this as a 'maybe' (EQc6). We note that this credit is not applicable to the LEED-CS rating system and will not be pursued by the lab/office typology.
- It is not anticipated any typologies will achieve the LEED daylight credit, but Residential and Hotel typologies may achieve such credit, and accordingly those LEED points are currently being tracked this as a 'maybe' to be confirmed once plans are further developed (EQc7 and EQc8 and EQc4 and EQc5 in LEED-CS).

4.3.1.9 Innovation in Design

As design develops for each building, the Proponent and its Project Team will explore Innovation & Design Process ("ID") credits. The preliminary LEED checklists have identified likely applicable ID credits, including green building education for future users, purchasing – lamps, O+M Starter Kits, including green cleaning policy and program, and an integrated pest and waste management and an occupant comfort survey for Lab/Office and Residential buildings. The lab/office and conference center typologies have identified the LEED Pilot credit for Comprehensive Composting and the Residential and Hotel typologies will explore the pilot credit further (currently tracking it as a 'maybe' ID credit). Additionally, a LEED AP BD+C accredited professional will be a part of the design team.

4.3.1.10 Regional Priority

The Regional Priority Credits ("RPCs") applicable to the Project include:

- Rainwater Management;
- Energy Performance (a minimum energy cost efficiency of 17%);
- Indoor Water Use Reduction (a 40% reduction);

- High Priority Site; and
- Renewable Energy (a minimum 3% of overall energy usage).

The Project will achieve the Rainwater Management RPC for all building typologies (dependent on detailed stormwater management calculations). Based on preliminary energy modeling, all building typologies will achieve the Energy Performance RPC.

4.3.2 Other Green Building Design Certifications Under Consideration

In addition to LEED, there are numerous green building rating systems available for building and master plan projects. In addition to pursuing eligibility for LEED Gold certification at a minimum, the Proponent has committed to studying additional certification schemes for applicable building typologies. The identified certifications are complementary to the holistic sustainability approach in LEED and address specific sustainability aspects such as health and wellness, ultra-low energy design, and source energy use balance of zero, annually. Each is described below for the applicable building typology.

4.3.2.1 Fitwel

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.

- Core & Shell Lab/Office – Multi-Tenant Base Building Scorecard;
- Residential – Multifamily Residential Scorecard;
- Hotel – Single Tenant Scorecard; and
- Conference Center - Single Tenant Scorecard.

4.3.2.2 Passive House

Passive House is a performance-based certification scheme focused on ultra-low energy design with an emphasis on building envelope performance for high insulation and air tightness. It is comprised of three criteria:

- Source Energy Use Intensity (kBtu/sf/yr) Limit;
- Air Infiltration Rate; and
- Space Conditioning Criteria, which establishes maximum thresholds for annual space heating and cooling demand and peak heating and cooling load.

As part of the Zero Carbon Building Assessment, the Residential and Hotel typologies will evaluate the feasibility and cost-effectiveness via life cycle cost analysis achievement of all-electric Passive House certification.

4.3.2.3 LEED Zero Energy

LEED Zero Energy[11] projects must achieve a source energy use balance of zero for the previous year of performance data. The net zero energy balance is based on the quantity of source (not site) energy delivered and the quantity of renewable energy that displaces the non-renewable grid energy. Renewable energy used to displace grid energy can be generated on-site or off-site through procurement, only if off-site Renewable Energy Credits (RECs) are Green-e Energy certified or equivalent.

In order to achieve LEED Zero Energy certification, a project must be LEED certified under the appropriate rating system. The certifications are based on one year of performance data rather than modeled results. LEED Zero certification is valid for three years from the date of certification acceptance. Projects must submit performance data annually for the duration of the three-year period when LEED Zero certification is valid. Projects are required to recertify every three years.

As indicated in the preliminary LEED checklists (Figures 4.1a-d), all buildings have committed to pursue EAc7 Green Power and Carbon Offset credit. Achievement of LEED Zero Energy will be explored for its feasibility in subsequent filings.

4.3.2.4 Living Building Challenge for all building typologies

The International Living Future Institute's (ILFI) Living Building Challenge (LBC) is the most stringent holistic green building certification and is based on two principles:

- Compliance is based on actual, rather than modeled or anticipated, performance. Therefore, projects must be operational for at least twelve consecutive months prior to audit to verify Imperative compliance.
- All LBC projects must be holistic, defined as addressing aspects of all seven Petals through the Core Imperatives.

The seven Petals include PLACE, WATER, ENERGY, HEALTH + HAPPINESS, MATERIALS, EQUITY AND BEAUTY and comprise a total of 20 imperatives. LBC certification will be evaluated for its feasibility for each building type as required by Harvard's Green Building Standards prior to the end of schematic design phase.

4.3.2.5 Boston Green Building Credits

Appendix A of Article 37 lists Boston Green Building Credits, which are credits that may be included in the calculation toward achieving a LEED certifiable project. These credits were developed by the City and are intended to address local issues unique to development within Boston. The credits include the following categories: Modern Grid, Historic Preservation, Groundwater Recharge, and Modern Mobility and a discussion of each is provided below.

[11] https://www.usgbc.org/sites/default/files/2020-04/LEED_Zero_Program%20Guide_April%202020.pdf

The Project is exploring the achievement of one of the Boston Green Building Credits to support Article 37 compliance. Two of the credits are not applicable to the project.

- Modern Grid: The Proponent will not explore combined heat and power systems as this is not aligned with the City's Climate Action Plan and commitment to carbon neutrality.
- Groundwater Recharge: The Project Site is located outside the City's Groundwater Conservation Overlay District as created by Article 32 of the Zoning Code, and opportunities for infiltration may be limited due to site conditions. However, the Project will be designed and engineered to manage the 32-year storm (6.7 inches of rainfall), exceeding Boston Water and Sewer Commission (BWSC) requirements.
- Modern Mobility: A transportation study will be completed for the DPIR and TDM measures will be identified. The project will attain the prerequisites.
- Historic Preservation: The Project is not associated with any historic assets.

4.4 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. The Proponent has also committed to procurement of off-site renewable electricity and carbon offsets aligned with LEED criteria to offset remaining GHG emissions associated with the Project.

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 and conventional natural gas heating. 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.

4.4.1 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 in Section 4.4.1.1 below. 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.

4.4.1.1 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. The model estimates buildings' electricity and gas usage based on building design and system assumptions using Appendix G of ASHRAE 90.1-2013[12] with MA Amendments. The amount of consumed energy is then converted into the amount of CO_2 emitted using the standardized conversion factors. An electricity emissions factor of 658 lbs/MWh was used in the calculations specific to the Commonwealth.

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

[12] American National Standards Institute/American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., *ASHRAE 90.1-2013-Energy Standard for Buildings Except* Low-*Rise Residential Buildings*, Appendix G, 2013.

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. Refer to Section 4.4.3 for discussion of the future District Energy Feasibility Study.

4.4.2 Preliminary Energy Model Results by Building Typology

4.4.2.1 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 420,000 SF of lab/office space, combined with 20,000 SF of ground-floor retail and restaurant space.

Descriptions of the noteworthy building improvements and resulting building energy savings are presented below. Specific improvements may be subject to design modification, as needed, to achieve the desired energy reductions for the final building program and design. The proposed design was based on several key energy efficiency strategies, which include:

- Efficient building envelope that exceeds minimum code values for glazing (i.e. both U-value and solar heat gain coefficient (SHGC));
- High efficiency condensing boilers to meet heating demands;
- Dedicated outside air-cooled chiller plant;
- High efficiency water-cooled chiller plant with variable frequency drives;
- Low lighting power densities to be achieved from LED lighting and lighting control systems; and
- Konvekta[13] energy recovery system on return air.

A summary of the various energy modeling inputs, including the energy conservation measures listed above, are presented in Table 4-1.

[13] https://www.konvekta.ch/high-performance-energy-recovery-systems.html

Table 4-1 Summary of Energy Modeling Inputs – Laboratory/Office Typology

Modeling Parameter	Base Case[14]	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- 0.055 (R-18)
Slab Insulation	F- 0.51 (Unheated slab)	F- 0.51 (Unheated slab)
Air Infiltration Rate	0.4 cfm/SF façade at 0.3 in WC (75 Pa)	0.4 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%	45%
HVAC		
HVAC System	Laboratory: System Type 7 – VAV with Reheat Office/retail: System 3 – Packaged single-zone air-conditioner	VAV Dedicated outside air system (DOAS) with energy recovery
Exhaust Air Energy Recovery	50% (sensible only when required by code) for lab spaces; Not required for office spaces	70% effective energy recovery system for lab/office spaces (sensible only when required by code)
Primary Cooling	Laboratory: Water-cooled centrifugal chillers Office/retail: Direct expansion	High-efficiency water-cooled centrifugal chillers
Primary Heating	Gas-fired hot water boilers	High-efficiency gas-fired hot water boilers
Service Hot Water Type	Gas storage water heater	High-efficiency gas storage water heater
Lighting		
Lighting Power Density (LPD)	Predominant space type (Lab/Office): 0.94 W/sf	Predominant space type (Lab/Office): 0.94 W/sf

[14] 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 4-2 Preliminary Energy Model Results: Core & Shell – Lab/Office Typology

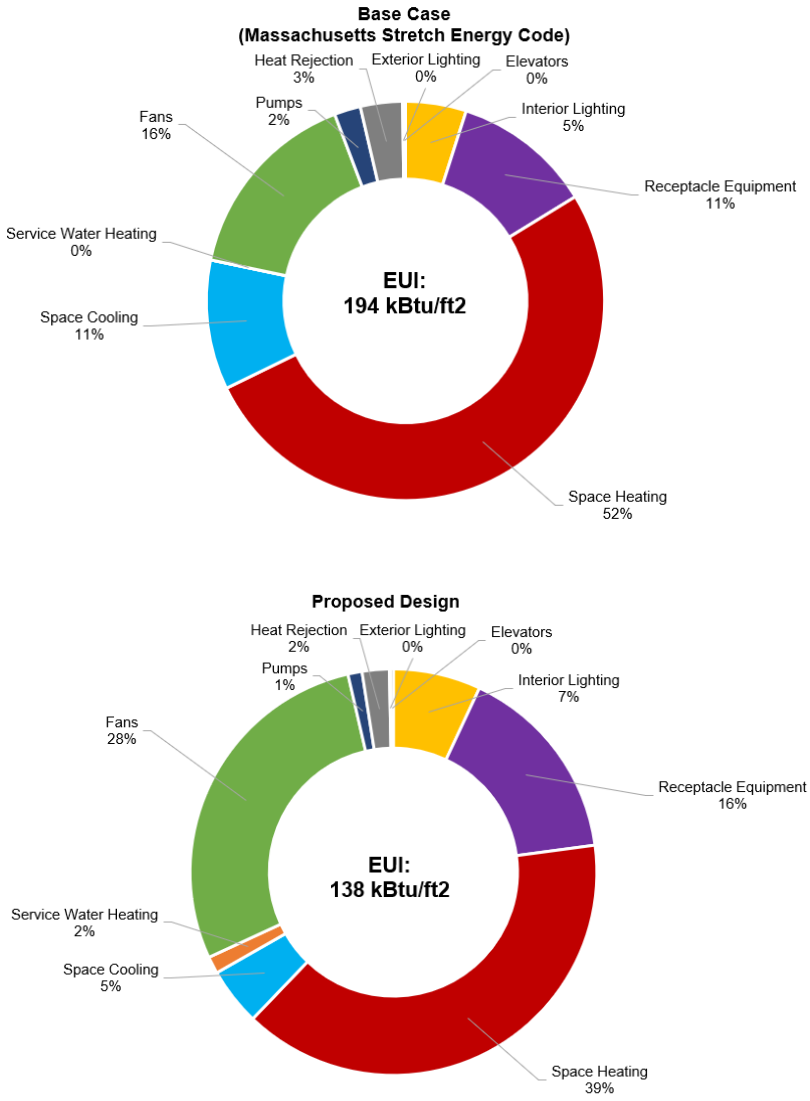
	Total Energy Consumption			
	Electricity (MWh/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Energy Use Intensity (kBtu/sf/yr)
Base Case	14,413	52,269	101,445	194
Design Case	12,547	29,315	72,125	138
End-Use Savings	1,866	22,954	29,320	
Percent Savings	**13%**	**44%**	**29%**	**29%**

	Total GHG Emissions			
	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	GHG Intensity (tons CO2e/sf/yr)
Base Case	4,742	3,063	7,805	0.0149
Design Case	4,128	1,718	5,846	0.0112
End-Use Savings	614	1,345	1,959	
Percent Savings	**13%**	**44%**	**25%**	**25%**

As shown in Table 4-2, with the proposed building design and system improvements, the estimated energy use reduction for the Core & Shell Lab/Office typology is approximately 29% compared to the Base Case or 19% better than Stretch Code, which equates to an approximately 25% percent reduction (1,959 tpy) in stationary source CO_2 emissions.

The graphs 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 4-1 Lab/Office Typology Energy End Use



4.4.2.2 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 231,306 SF of residential space, combined with approximately 18,694 SF of ground-floor retail and restaurant space, across two buildings.

Descriptions of the noteworthy building improvements and resulting building energy savings are presented below. Specific improvements may be subject to design modification, as needed, to achieve the desired energy reductions for the final building program and design. 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.
- Dedicated outside air system with fan coil units serving spaces and energy recovery. Note additional systems options are being considered as an alternate to fan coil units including a water source heat pump and air source heat pump system.
- High-efficiency condensing natural gas boilers for space heating.
- Low lighting power densities to be achieved from LED lighting and lighting control systems.

A summary of the various energy modeling inputs, including the energy conservation measures listed above, are presented in Table 4-3.

Table 4-3 Summary of Energy Modeling Inputs – Residential Typology

Modeling Parameter	Base Case[15]	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- 0.055 (R-18)
Slab Insulation	F- 0.51 (Unheated slab)	F- 0.51 (Unheated slab)
Air Infiltration Rate	0.4 cfm/SF façade at 0.3 in WC (75 Pa)	0.4 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)
	U- 0.50 (operable)	U- 0.38 (operable)
Vertical Glazing SHGC	0.4	0.3
Overall % Window to Wall Ratio	24%	30%
HVAC		
HVAC System	System Type 1 – Packaged Terminal Air Conditioner (PTAC)	Fan-coil units served by DOAS
Exhaust Air Energy Recovery	Not required	Total energy recovery wheel
Primary Cooling	Direct Expansion	On-site air-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 (residential units):	Predominant space type (residential units):
	0.37 W/SF	0.37 W/SF

[15] 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 4-4 Preliminary Energy Model Results – Residential Typology

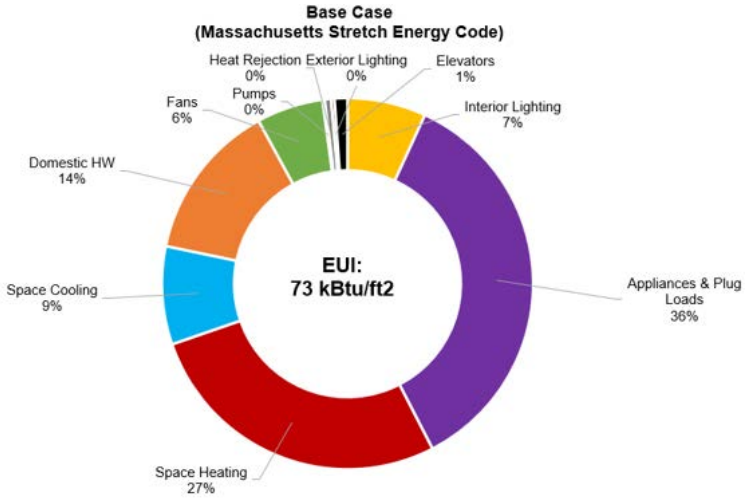
	Total Energy Consumption			
	Electricity (MWh/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Energy Use Intensity (kBtu/sf/yr)
Base Case	2,939	9,514	19,543	73
Design Case	3,139	6,014	16,726	62
End-Use Savings	-200	3,500	2,817	
Percent Savings	**-7%**	**37%**	**14%**	**14%**

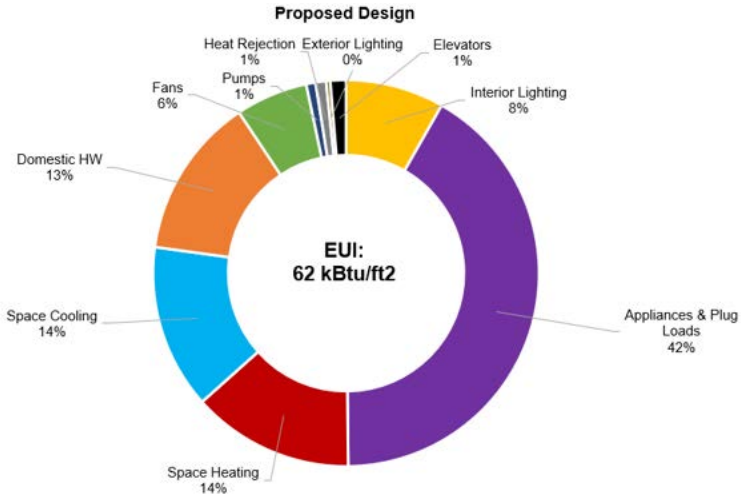
	Total GHG Emissions			
	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	GHG Intensity (tons CO2e/sf/yr)
Base Case	967	558	1,525	0.0057
Design Case	1,033	352	1,385	0.0051
End-Use Savings	-66	205	139	
Percent Savings	**-7%**	**37%**	**9%**	**9%**

As shown in Table 4-4, with the proposed building design and system improvements, the estimated energy use reduction for the Residential typology is approximately 14% compared to the Base Case or 4% better than Stretch Code, which equates to an approximately 9% reduction (139 tpy) in stationary source CO_2 emissions.

The graphs below present a breakdown of the Residential typology energy use by end use for both the Base Case and the Design Case.

Graph 4-2 Residential Typology Energy End Use





4.4.2.3 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 126,925 SF of hotel guest room/circulation space, along with approximately 8,075 SF of 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. Specific improvements may be subject to design modification, as needed, to achieve the desired energy reductions for the final building program and design. 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)
- Dedicated outside air system with fan coil units and energy recovery
- High efficiency air-cooled chiller plant
- High-efficiency condensing natural gas boilers for space heating
- Low lighting power densities to be achieved from LED lighting and lighting control systems.

A summary of the various energy modeling inputs, including the energy conservation measures listed above, are presented in Table 4-5.

Table 4-5 Summary of Energy Modeling Inputs – Hotel Typology

Modeling Parameter	Base Case[16]	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- 0.055 (R-18)
Slab Insulation	F- 0.51 (Unheated slab)	F- 0.51 (Unheated slab)
Air Infiltration Rate	0.4 cfm/SF façade at 0.3 in WC (75 Pa)	0.4 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)
	U- 0.50 (operable)	U- 0.38 (operable)
Vertical Glazing SHGC	0.4	0.3
Overall % Window to Wall Ratio	34%	34%
HVAC		
HVAC System	System Type 1 – Packaged Terminal Air Conditioner (PTAC)	Fan-coil units served by dedicated outside air system (DOAS)
Exhaust Air Energy Recovery	Not required	Total energy recovery wheel
Primary Cooling	Direct Expansion	On-site air-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 (hotel guest rooms):	Predominant space type (hotel guest rooms):
	0.37 W/SF	0.37 W/SF

[16] 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 4-6 Preliminary Energy Model Results – Hotel Typology

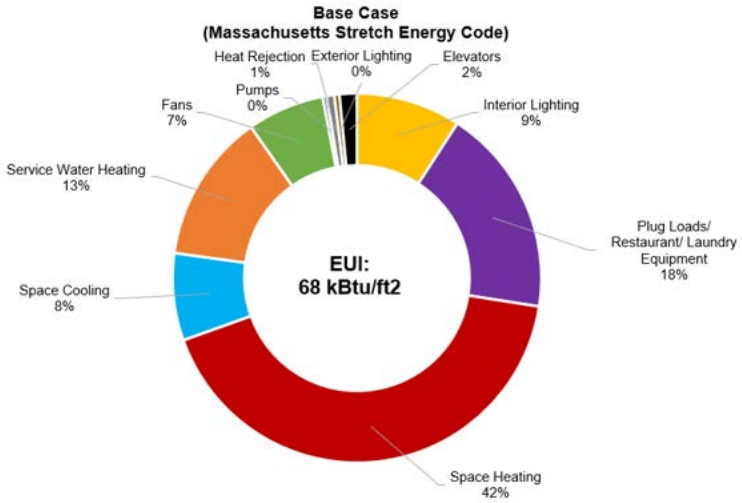
	Total Energy Consumption			
	Electricity (MWh/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Energy Use Intensity (kBtu/sf/yr)
Base Case	826	6,686	9,504	68
Design Case	1,034	4,676	8,203	58
End-Use Savings	-208	2,010	1,301	
Percent Savings	**-25%**	**30%**	**14%**	**14%**

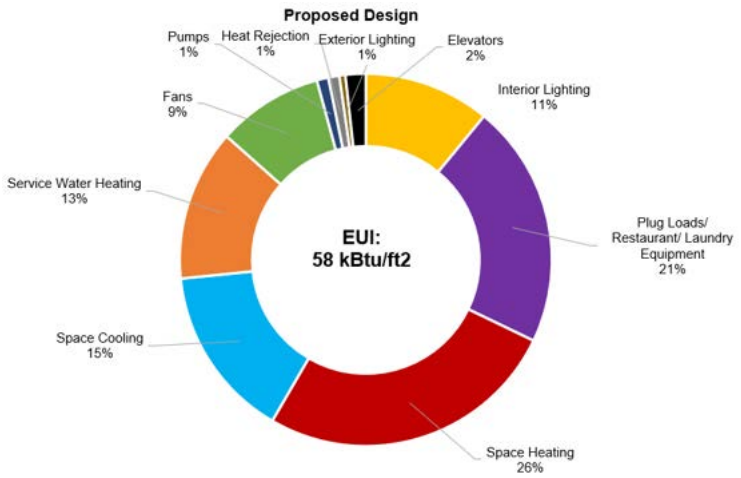
	Total GHG Emissions			
	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	GHG Intensity (tons CO2e/sf/yr)
Base Case	272	392	664	0.0047
Design Case	340	274	614	0.0044
End-Use Savings	-68	118	49	
Percent Savings	**-25%**	**30%**	**7%**	**7%**

As shown in Table 4-6, with the proposed building design and system improvements, the estimated energy use for the Hotel typology is approximately 14% less than the Base Case or 4% better than Stretch Code, which equates to an approximately 7% percent reduction (49 tpy) in stationary source CO_2 emissions.

The graphs below present a breakdown of the Hotel typology energy use by end use for both the Base Case and the Design Case.

Graph 4-3 Hotel Typology Energy End Use





4.4.2.4 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 75,000 SF gross floor area.

Descriptions of the noteworthy building improvements and resulting building energy savings are presented below. Specific improvements may be subject to design modification, as needed, to achieve the desired energy reductions for the final building program and design. 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.
- High efficiency water-cooled chiller plant
- High-efficiency condensing natural gas boilers for space heating
- Low lighting power densities to be achieved from LED lighting and lighting control systems.

A summary of the various energy modeling inputs, including the energy conservation measures listed above, are presented in Table 4-7.

Table 4-7 Summary of Energy Modeling Inputs – Conference Center Typology

Modeling Parameter	Base Case[17]	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- 0.055 (R-18)
Slab Insulation	F- 0.51 (Unheated slab)	F- 0.51 (Unheated slab)
Air Infiltration Rate	0.4 cfm/SF façade at 0.3 in WC (75 Pa)	0.4 cfm/SF façade at 0.3 in WC (75 Pa)
Fenestration and Shading		
Vertical Glazing U-Factor	U- 0.42 (fixed)	U- 0.26 (fixed)
Vertical Glazing SHGC	0.4	0.3
Overall % Window to Wall Ratio	40%	65%
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

[17] 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 4-8 Preliminary Energy Model Results – Conference Center Typology

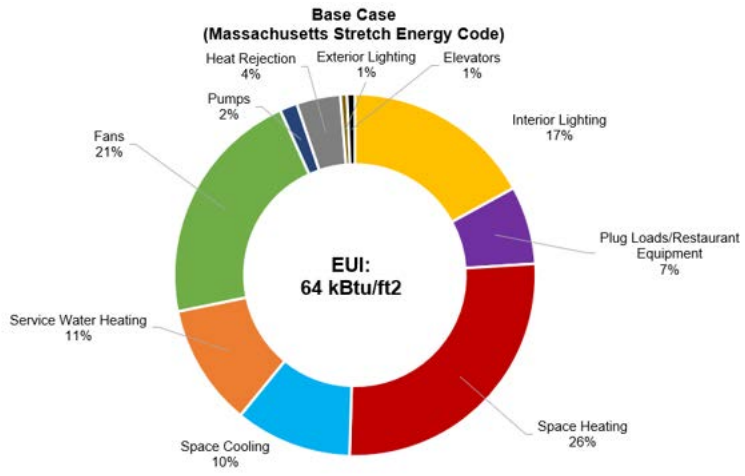
	Total Energy Consumption			
	Electricity (MWh/yr)	Natural Gas (MMBtu/yr)	Total (MMBtu/yr)	Energy Use Intensity (kBtu/sf/yr)
Base Case	933	1,897	5,079	64
Design Case	659	2,022	4,271	53
End-Use Savings	274	-126	808	
Percent Savings	**29%**	**-7%**	**16%**	**16%**

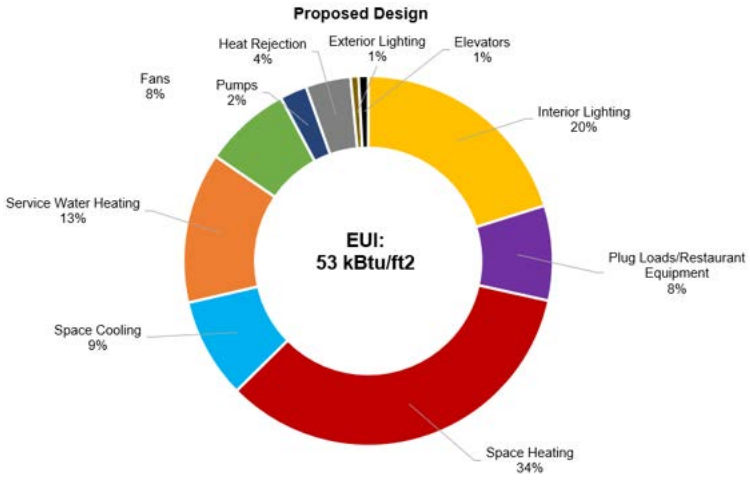
	Total GHG Emissions			
	Electricity (tons/yr)	Natural Gas (tons/yr)	Total (tons/yr)	GHG Intensity (tons CO2e/sf/yr)
Base Case	307	111	418	0.0052
Design Case	217	119	335	0.0042
End-Use Savings	90	-7	83	
Percent Savings	**29%**	**-7%**	**20%**	**20%**

As shown in Table 4-8, with the proposed building design and system improvements, the estimated energy use reduction for the conference center typology is approximately 16% compared to the Base Case or approximately 6% better than Stretch Code, which equates to an approximately 20% percent reduction (83 tpy) in stationary source CO_2 emissions.

The graphs below present a breakdown of the Conference Center typology energy use by end use for both the Base Case and the Design Case.

Graph 4-4 Conference Center Typology Energy End Use





4.4.2.5 The Project

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 4-9 below provides results for the buildings, parking, and buildings with parking.

Table 4-9 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	65,205	70,366	135,571	6,287	4,123	10,411
Design Case	59,298	42,027	101,325	5,718	2,463	8,181
End-Use Savings	5,907	28,339	34,245	570	1,661	2,230
Percent Savings	**9%**	**40%**	**25%**	**9%**	**40%**	**21%**
Project Parking only						
Base Case	1,119	0	1,119	108	0	108
Design Case	746	0	746	72	0	72
End-Use Savings	373	0	373	36	0	36
Percent Savings	**33%**	**0.0%**	**33%**	**33%**	**0.0%**	**33%**
Project with Parking						
Base Case	66,324	70,366	136,690	6,395	4,123	10,519
Design Case	60,044	42,027	102,071	5,790	2,463	8,252
End-Use Savings	6,280	28,339	34,618	606	1,661	2,266
Percent Savings	**9%**	**40%**	**25%**	**9%**	**40%**	**22%**

The Project demonstrates considerable energy and stationary source GHG emissions reduction as compared to the Base Case, i.e. approximately 25% for energy (corresponding to a 15% energy reduction from the Stretch Code) and approximately 22% for emissions.

The Project's proposed design demonstrates an approximately 40% reduction in natural gas energy and GHG emissions. With these significant reductions in fossil fuel use, the Project's primary energy source is electricity (approximately 59%) which will contribute considerably to its pathway to carbon neutrality and the Commonwealth's electricity emissions factor continues to decline.

4.4.3 Zero Carbon Building Assessment

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 and its 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. The Zero Carbon Building design takes into account low energy design, 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 will provide the Zero Carbon Building Assessment for each of the four building typologies as part of subsequent filings.

It is anticipated the Residential and Hotel Zero Carbon Building Assessments will be based on an all-electric Passive House certifiable design performance using heat pump systems. As described in Section 4.3.2.2, Passive House is a performance-based certification scheme focused on ultra-low energy design with an emphasis on building envelope performance for high insulation and air tightness.

It is anticipated the Conference Center and Lab/Office typologies will be based on an all-electric equipment for thermal end uses and improved building envelope performance, as identified in the Zero Carbon Building Assessment methodology from BPDA.

A key assumption to the approach to Zero Carbon buildings for the Project will be that the long-term emissions intensity of the electric grid serving the site will be 80% renewable per the Global Warming Solutions Act. Until the point that the electricity grid becomes 100% renewable, off-site carbon offsets and/or renewable energy credits would be required to offset emissions from consumption of electricity.

4.4.4 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 as part of a subsequent filing. The study will assess the viability of a District Energy system, distributed energy resources (DER), and/or microgrid for clusters of buildings. The Proponent will work with local utilities (Eversource) and the City of Boston to confirm the specific requirements for the systems to be analyzed as part of the study within the greater context of the Project.

4.4.5 Preliminary Clean and Renewable Energy Evaluation

A preliminary rooftop solar PV system feasibility analysis has been conducted for buildings proposed for the Project. 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, in addition to mechanical area, the available roof area for PV systems is dramatically reduced.

Accordingly, the preliminary solar PV analysis was then conducted for the lab/office, hotel, and residential buildings. The ERC Center rooftop area was considered but is not a good candidate for rooftop solar PV since it predicted to be in shadow for a large part of the afternoon. Therefore, it was excluded from this evaluation.

The online software PV Watts Calculator was used for the analysis, which was developed by the National Renewable Energy Laboratory.

Table 4-10 Estimated Energy and Greenhouse Gas Savings for Solar Analysis

	Building Electricity Consumption (MWh/yr)	Solar Energy Production (MWh/yr)	CO_2 Reduction (tons/yr)	Electricity Savings	CO_2 Savings
Lab/Office	12,547	236	78	2%	2%
Hotel	1,034	43	14	4%	2%
Residential	3,139	49	16	2%	1%
Total	**16,720**	**327**	**108**	**2%**	**2%**

The solar system would be projected to produce approximately 327 MWh per year of energy, which is equivalent to approximately 108 tons per year of greenhouse gas emissions savings. A simple payback analysis indicates paybacks of approximately 15.6 years. The analysis has included the federal tax incentive at 10% per the current phase out structure. The Solar Massachusetts Renewable Target ("SMART") program in Massachusetts has not been included, as the Proponent will seek to retain the renewable energy attribute of any on-site solar installed on the Project. A more detailed solar PV analysis will be completed for subsequent filings once roof layouts are further developed.

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.

4.4.6 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[18] 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.

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

4.5.1 Sea Level Rise and Extreme Storms / Flooding

The Project is not anticipated to be impacted by coastal flooding. It is located outside the existing 1% annual chance FEMA flood zone (100-year flood zone), as depicted in Figure 4.2, and is also located outside the boundary for the 2070 1% annual chance event used in Climate Ready Boston.

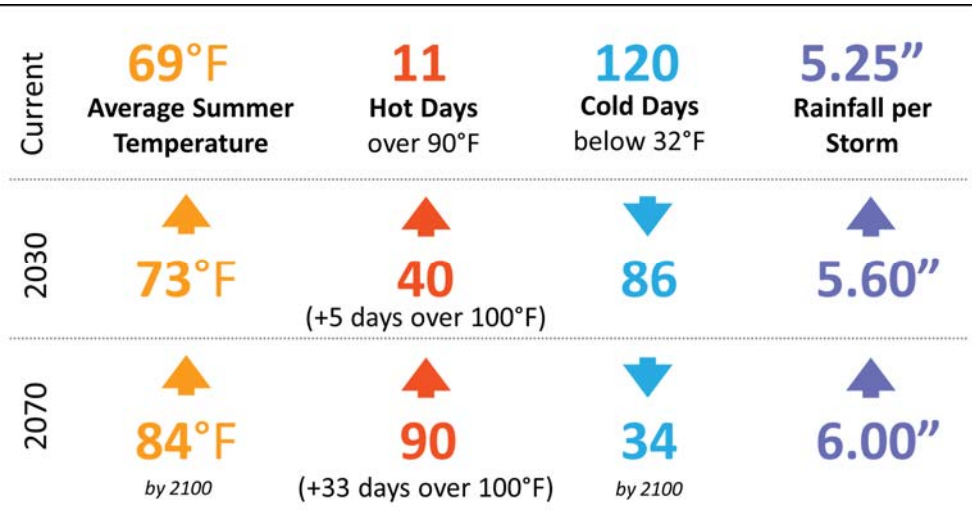
The Proponent understands that the Commonwealth of Massachusetts is working with Woods Hole Group to update the coastal flood mapping for the Commonwealth of Massachusetts. The results of the forthcoming Massachusetts Coastal Flood Risk Model (MC-FRM) data will be reviewed when it becomes available to assess any new coastal flood impacts identified for the Project Site.

[18] 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.

4.5.2 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 4-11 Current and Projected Temperatures and Rainfall



Source: Climate Ready Boston Projections

The Project is also considering potential risks from more extreme precipitation-based 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).

4.5.3 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 severe rainfall events and warming temperatures. In addition, the Project Team will pay attention to any changes to future sea level rise and storm surge projections as a result of the forthcoming MC-FRM maps and adapt the design, as needed, to accommodate any coastal flood risks that are identified. The following sections further describe how climate change has been considered in the early stages of the Project's design.

4.5.3.1 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. These volumes result in a planned total of 2.75-inches of stormwater storage for the Project.

Additionally, the Project will reduce the urban heat island impacts using greenery, trees, green infrastructure, shading structures, and materials with high solar reflectance/albedo.

4.5.3.2 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 flooding.

LEED v4 for BD+C: Core and Shell

Project Checklist

Project Name: Enterprise Research Campus - Lab/Office Typology
Date: February-2021
PNF/ENF 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				
10	**1**	**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
2	1		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	**1**	**3**		**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	1	2	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	**5**	**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	3	3	D	Credit 2	Optimize Energy Performance (26% = 12pts)	18
	1		D	Credit 3	Advanced Energy Metering	1
		2	D	Credit 4	Demand Response	2
		3	D	Credit 5	Renewable Energy (2pts = 5% RP)	3
1			D	Credit 6	Enhanced Refrigerant Management	1
2			C	Credit 7	Green Power and Carbon Offsets	2

Y	?	N				
5	**4**	**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: 20	2
	1	1	C	Credit 3	4.1 BPDO - Sourcing of Raw Materials (20% + 40% cost)	2
1	1		C	Credit 4	4.1 BPDO - Material Ingredients (Option 1: 10 Materials w/HPD)	2
2			C	Credit 5	C&D Waste Management (Option 1: Diversion)	2

Y	?	N				
6	**1**	**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
2	1		C	Credit 2	Low-Emitting Materials (3 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				
2	**1**	**1**		**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

66	**16**	**28**		**TOTALS**	Possible Points:	**110**

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

Figure 4.1a

Preliminary LEED Scorecard - Lab/Office Typology

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: February-2021
PNF/ENF Filing

Y	?	N				
1			D	Credit	Integrative Process	1

Y	?	N				
8	4	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
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				
9	1	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
2	1		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				
5	1	5		**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	1	4	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				
14	4	15		**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
8	3	7	D	Credit 2	Optimize Energy Performance (20% =8 pts)	18
		1	D	Credit 3	Advanced Energy Metering	1
		2	C	Credit 4	Demand Response	2
		3	D	Credit 5	Renewable Energy (2pts = 5% RP)	3
1			D	Credit 6	Enhanced Refrigerant Management	1
2			C	Credit 7	Green Power and Carbon Offsets	2

D = Design submission & C = Construction Submission

Y	?	N				
5	4	4		**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	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: 20	2
	1	1	C	Credit 3	4.1 BPDO - Sourcing of Raw Materials (20% + 40% cost)	2
1	1		C	Credit 4	4.1 BPDO - Material Ingredients (Option 1: 20 Materials w/HPD)	2
2			C	Credit 5	C&D Waste Management (Option 1: Diversion)	2

Y	?	N				
10	3	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
2	1		C	Credit 2	4.1 Low-Emitting Materials (3 or 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	Interior Lighting (option 1: control + quality)	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 - 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				
2	2	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			
60	19	31		**TOTALS**	Possible Points: **110**

Figure 4.1b

Preliminary LEED Scorecard - Residential Typology

Enterprise Research Campus Project
Boston, MA

LEED v4 for BD+C: Hospitality

Project Checklist

Project Name: Enterprise Research Campus - Hotel Typology
Date: February-2021
PNF/ENF Filing

Y	?	N				
1			D	Credit	Integrative Process	1

Y	?	N		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		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
2	1		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		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	1	4	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		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
8	3	7	D	Credit 2 Optimize Energy Performance (20% =8 pts)	18
		1	D	Credit 3 Advanced Energy Metering	1
		2	C	Credit 4 Demand Response	2
		3	D	Credit 5 Renewable Energy (2pts = 5% RP)	3
1			D	Credit 6 Enhanced Refrigerant Management	1
2			C	Credit 7 Green Power and Carbon Offsets	2

Y	?	N		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: 20 materials)	2
	1	1	C	Credit 3 4.1 BPDO - Sourcing of Raw Materials (20% + 40% cost)	2
1	1		C	Credit 4 4.1 BPDO - Material Ingredients (Option 1: 20 Materials w/HPD)	2
2			C	Credit 5 C&D Waste Management (Option 1: Diversion)	2

Y	?	N		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
2	1		C	Credit 2 4.1 Low-Emitting Materials (3 or 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 Interior Lighting (option 1: control + quality)	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
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		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		TOTALS	Possible Points:	39
60	19	31				

Figure 4.1c

Preliminary LEED Scorecard - Hotel Typology

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 Typology
Date: February-2021
PNF/ENF Filing

Y	?	N				
1			D	Credit	Integrative Process	1

Y	?	N				
8	4	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				
9	1	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
2	1		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				
7	2	2		**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	1	2	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				
19	5	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
13	3	2	D	Credit 2	Optimize Energy Performance (32% = 13 pts)	18
	1		D	Credit 3	Advanced Energy Metering	1
		2	C	Credit 4	Demand Response	2
		3	D	Credit 5	Renewable Energy (2pts = 5% RP)	3
1			D	Credit 6	Enhanced Refrigerant Management	1
2			C	Credit 7	Green Power and Carbon Offsets	2

D = Design submission & C = Construction Submission

Y	?	N				
5	5	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: 20	2
	1	1	C	Credit 3	4.1 BPDO - Sourcing of Raw Materials (20% + 40% cost)	2
1	1		C	Credit 4	4.1 BPDO - Material Ingredients (Option 1: 20 Materials w/HPD)	2
2			C	Credit 5	C&D Waste Management (Option 1: Diversion)	2

Y	?	N				
7	5	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
2	1		C	Credit 2	4.1 Low-Emitting Materials (3 or 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	Interior Lighting (option 1: control + quality)	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				
5	1	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

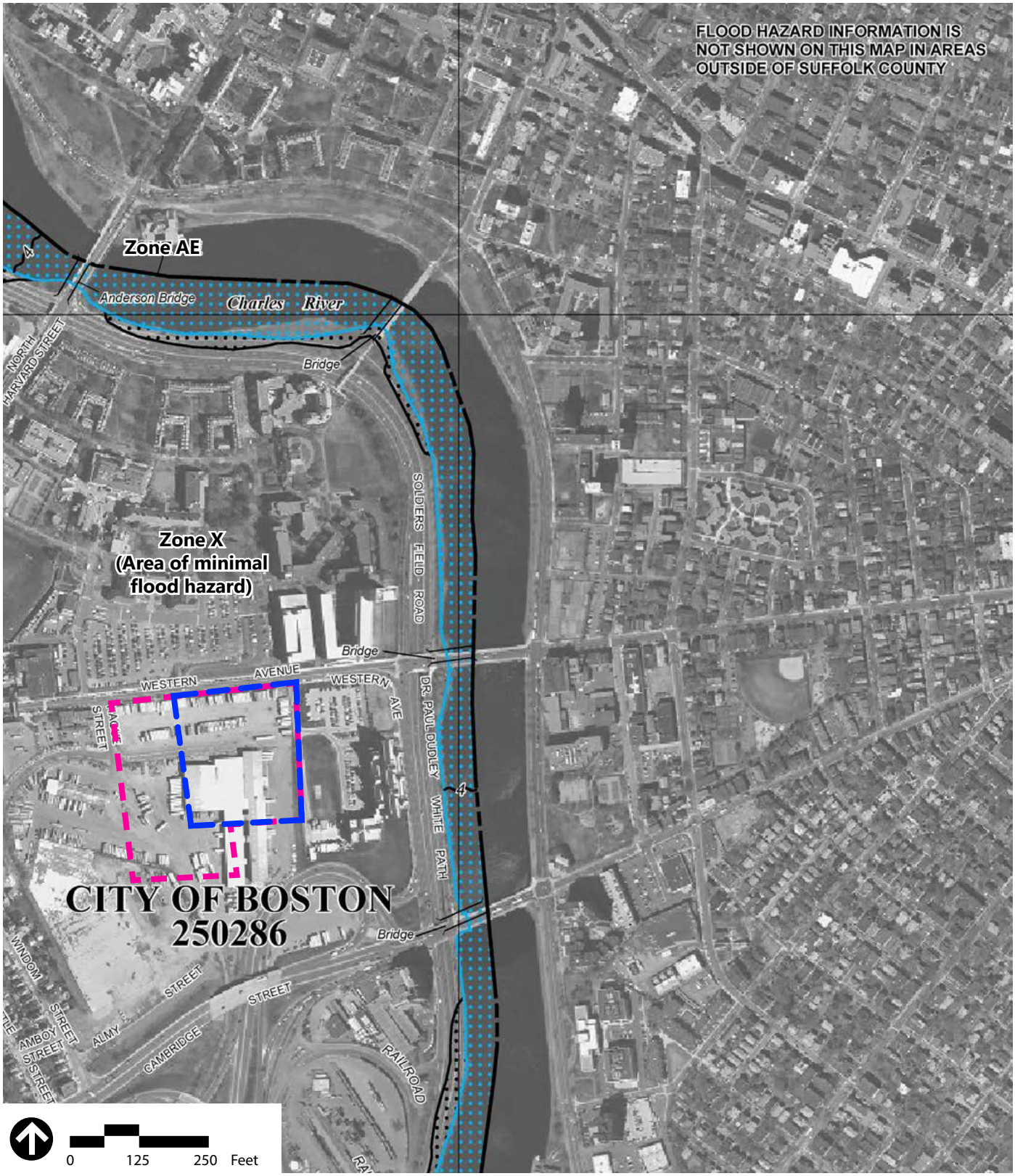
Y	?	N				
2	2	0		**Regional Priority**		**4**
1			D	Credit 1	Regional Priority: SS 4 Rainwater Management (2 points)	1
1			D	Credit 2	Regional Priority: EA 2 Energy Performance (8pt)	1
	1		D	Credit 3	Regional Priority: MRc1 Building Life-cycle Impact Reduction (2 pts)	1
	1		D	Credit 4	Regional Priority: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

Y	?	N			
63	25	22		**TOTALS**	Possible Points: **110**

Figure 4.1d

Preliminary LEED Scorecard - Conference Center Typology

Enterprise Research Campus Project
Boston, MA



Source: FEMA Flood Insurance Rate Map 25025C0076G, September 2009

- Project Site Boundary
- PDA Area Boundary
- Zone AE: 1% annual chance floodplain boundary
- Zone X: 0.2% annual chance floodplain boundary

Figure 4.2

FEMA Floodplain Map

Enterprise Research Campus Project
Boston, MA

5

Transportation

This chapter provides a summary of existing transportation infrastructure supporting the Project Site and PDA, as well as an overview of the Project's transportation characteristics, including a preliminary estimate of Project trip generation. A comprehensive assessment of Project-related transportation impacts within the study area, as defined herein, will be provided in the subsequent DPIR filing, based on further discussion with the BPDA, BTD, MassDOT, and DCR, as needed. This is a general update of the Project-related transportation impacts that were detailed in the Transportation Impact Study (TIS) completed as part of the 2018 PDA approval, while adding the context of the PDA Full-Build.

As discussed in Chapter 1, *Project Description*, this PNF filing describes and analyzes the Project as the initial development phase for the PDA (i.e., Phase B will be subject to a separate Article 80 review process). However, in support of approval of the PDA Master Plan Amendment, this transportation analysis considers both the Project and Phase B representing a Full Build program. Thus, the PNF and subsequent DPIR will present a comprehensive transportation analysis that considers the development for the entire PDA.

Section 5.1 summarizes key findings and benefits with respect to the Project. Section 5.2 features a description of the transportation context/setting, including site access by all modes of transportation and parking. Section 5.3 presents the Project and Full Build travel characteristics, including trip generation by mode. Section 5.3 also includes the transportation impact study area and the methods/assumptions proposed for the DPIR analysis. Section 5.4 presents the proposed build conditions and Section 5.5 provides an overview of the anticipated transportation initiatives.

5.1 Summary of Key Findings and Benefits

The development of the Project is an opportunity to improve Lower Allston by activating underdeveloped former industrial land along Western Ave with a welcoming urban, mixed-use environment. The Project and the Full Build will introduce transportation improvements for all users, including new, multimodal connections that currently do not exist. 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.

Preliminary transportation findings and benefits of the Project include the following:

- The PDA enjoys excellent access to the local and regional roadway network.
- The Project will leverage the construction of a system of new on-site streets to accommodate all roadway users consistent with the objectives of BTD's Complete Street Guidelines. These will improve connections between the surrounding neighborhoods.
- The Project will incorporate bicycle accommodations, facilities, and amenities consistent with the objectives of BTD's Complete Streets Guidelines to encourage bicycling, walking, and transit as primary transportation modes used to access the Project Site. 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 along around Harvard University's Science and Engineering Complex (SEC).
- The Project Site is served by MBTA local bus routes that connect to various nearby neighborhoods and the MBTA Red Line. These strong connections are expected to result in a higher proportion of trips via sustainable transportation modes than via vehicle trips.
- The proposed multi-use development allows for the capture of internal trips between the different uses within the PDA, 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 provides opportunities to limit parking through the sharing of parking spaces by different users at different times of day.
- The parking needs of the Project are being met by about 620 parking spaces and active parking management.
- The Proponent is evaluating the need to provide a shuttle system to/from the Project Site to supplement and/or integrate with existing MBTA transit services in the area.
- 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.

5.2 Existing Conditions (Transportation Context)

This section includes a description of the existing study area roadway network, bicycle facilities, pedestrian facilities, public transportation services, and curb allocation/usage (including on-street parking).

5.2.1 Transportation Network

As shown in Figure 5.1, the Project Site has direct access to major roadway arterials connecting Lower Allston to surrounding neighborhoods and downtown Boston, a system of sidewalks and bike facilities, and several MBTA and Harvard shuttle bus routes. The following provides a description of area transportation resources.

5.2.1.1 Roadway Network

The main vehicular access point to the Project Site is off Western Avenue, via two proposed new roadways, Cattle Drive and East Drive. Western Avenue is connected to the regional highway network via Soldiers Field Road to the east. The Project Site has good indirect

access to Interstate-90 (I-90) via off-site ramps on Cambridge Street south of the Project Site.

Proposed vehicle access to the Project from the north will be from Western Avenue and from the south from Cambridge Street via Almy Street (refer to Figure 5.7). The Project will include three new complete streets: currently referred to as East Drive; Cattle Drive; and DEF Drive.

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

- **Western Avenue** is an east/west urban minor arterial roadway extending from North Harvard Street to Soldiers Field Road next to the Project Site. Access to the PDA is provided by two new streets being planned by Harvard: Cattle Drive and East Drive (see Planned Transportation Improvements). Western Avenue carries two-way traffic with one travel lane in each direction, plus curbside dedicated bike lanes in each direction between the Watertown town line to the west and Central Square in Cambridge to the east. West of Hague Street, ongoing construction has 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.

  Additional Western Avenue streetscape improvements are being planned that are expected to increase bicycling safety and improve bus transit access.
- **Soldiers Field Road** is a two-way four lane roadway to the east of the Project Site, classified as an urban principal arterial. 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 to the east to Storrow Drive and just to the west just past North Harvard Street. 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 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, located between North Harvard Street and Western Avenue.
- **North Harvard Street** accommodates two-way traffic, with one lane in each direction from the Anderson Memorial Bridge crossing the Charles River into Cambridge to Cambridge Street. 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 miles per hour (“mph”).
- **Cambridge Street** is an east/west urban principal arterial from Washington Square in Brighton to Soldiers Field Road that carries two-way traffic in two travel lanes in each direction. The road provides access to I-90 via ramps located just west of Soldiers Field Road.

- **Hague Street** is a north/south two-way two-lane local street off Western Avenue. 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 westbound bridge, with eastbound Western Ave traffic passing the Project Site funneled onto Soldiers Field Road southbound. Sidewalks are provided on both sides of the street.
- **River Street Bridge** is a one-way three-lane eastbound bridge from Cambridge Street south of the Project Site. 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.

5.2.1.2 Bicycle Facilities

Bicycle accommodations, in the form of bike lanes, shared bike lanes, or cycle tracks, are provided in both directions on all major arterial streets surrounding the Project Site. Refer to Figure 5.2 for these facilities.

- Along Western Ave there are dedicated bike lanes along in both directions between Spurr Street to the west (near Barry's Corner) to Soldiers Field Road to the east. West of Hague Street, recent construction has created physically separated bike lanes and bus stop boarding islands as far as the John A. Paulson School of Engineering and Applied Sciences. Additional connections are being added as part of bicycle path improvements around Harvard University's SEC and its new roadways. These will connect to Rena Park path, which leads to North Harvard Street to the west, connecting to the neighborhood near the Honan-Allston Branch of the Boston Public Library.
- The Dr. Paul Dudley White Bike Path extends along the Charles River on the east side of Soldiers Field Road and connects to the Western Ave bike lanes. The Dudley White Bike Path provides a public recreational and commuter off-street facility through the

Esplanade into downtown Boston in one direction and to downtown Waltham in the other direction.

- Curbside bike lanes are striped in both directions along North Harvard Street from the City of Cambridge across the Anderson Bridge to Cambridge Street south of the Project Site.
- Curbside separated bike lanes are striped in both directions along Cambridge Street from the bridge over I-90 to Soldiers Field Road.

Observed bicycle volume activity at the study area's intersections will be detailed in the DPIR.

As shown in Figure 5.2, two BlueBikes stations are provided within a quarter mile of the Project Site, including:

- Innovation Lab – 125 Western Ave at Batten Way (15 docks)
- Soldiers Field Park – 111 Western Ave (15 docks)

Another two BlueBikes stations are within a half mile of the Project Site:

- 175 North Harvard Street (18 docks)
- Honan Library on North Harvard Street (15 docks)

5.2.1.3 Pedestrian Facilities

As noted in Sections 5.2.1.1 and 5.2.1.2, and shown in Figure 5.3, the study area roadways have sidewalks and crosswalks are present at most signalized and unsignalized intersections. Sidewalks are included along Western Avenue, North Harvard Street, Cambridge Street, and the west side of Soldiers Field Road. Additional connections were recently added as part of path improvements around Harvard University's SEC and its new roadways. These connect to Rena Park path, which leads to North Harvard Street to the west, connecting to the neighborhood near the Honan-Allston Branch of the Boston Public Library.

Observed pedestrian volume activity at the study area's intersections will be detailed in the DPIR.

5.2.1.4 Public Transit Services

As shown in Figure 5.4, the Project Site is currently served by several Massachusetts Bay Transportation Authority's (MBTA) bus routes: Route 70 serves the Project Site directly, 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 Genzyme Driveway and Western Ave, 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 5-1. Schedule characteristics refer to Winter 2020 schedule (which was in place prior to emergency operations changes undergone by the MBTA as part of subsequent COVID-19 responses).

Table 5-1 MBTA Bus Services

Bus Route	Origin / Destination	AM Peak Period (Inbound) Headway (minutes)
Route 64	Oak Square – University Park or Kendall/MIT	10
Route 66	Harvard Square – Nubian Station	9-10
Route 70	Market Place Drive - University Park	10-25
Route 86	Sullivan Square Station - Reservoir Station (Cleveland Circle)	8-19

Source: MBTA Winter 2020 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 Shuttle and MBTA Routes 66 and 86.

The Red Line's Central station (stop serving Cambridge's Central Square) is located one mile east of the Project via Western Avenue; it's served by the area's MBTA Route 64 and 70.

The Boston Landing Commuter Rail station on the Framingham/Worcester Line is the closest existing commuter rail stop to the Project Site, located 1.4 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 Ave on the B branch, also a 1.4-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 5:31 AM and 1:13 AM with 13-20 minute headways during AM peak hours and 20-30 minute headways during PM peak hours. On weekends, Saturday service runs hourly between 5:20 AM and 1:15 AM and Sunday service every 58-70 minutes between 8:18 AM and 6:59 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 N. Harvard Street and Cambridge Street north and west of the Project Site, with the closest

stops located at *N Harvard St @/opp Gate 2 Harvard Stadium* and *N Harvard St @ Western Ave* (stops that the Route 86 also serves). Three additional stops are located along N. Harvard Street south of Western Ave.

Route 66 operates seven days a week. On weekdays, the route operates from 5:00 AM to 1:30 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 minutes during the PM Peak. On Saturdays, service operates between 4:40 AM and 1:00 AM every 16-20 minutes. On Sundays, service operates between 6:25 AM and 1:00 AM every 17-19 minutes.

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

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

Route 70 operates seven days a week. On weekdays, the route operates from 5:09 AM to 12:36 AM with relatively frequent but irregular service from the early AM through the end of the evening. Headways are every 10-25 minutes during the AM Peak and every 10-20 minutes during the PM Peak. On Saturdays, service operates between 5:45 AM and 12:45 AM every 10-30 minutes. On Sundays, service operates between 6:50 AM and 12:38 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 stops at *N Harvard St @ Gate 2 Harvard Stadium* and *N Harvard St @ Western Ave* along N. Harvard Street (stops that the Route 66 also serves).

On weekdays, the route operates from 5:00 AM to 12:04 AM with relatively frequent and generally regular service from the early AM through the end of the evening. Headways are every 8-19 minutes during the AM Peak and every 17 minutes during the PM Peak. On Saturdays, service operates between 5:00 AM and 1:00 AM every 16-20 minutes. On Sundays, service operates between 6:25 AM and 12:00 AM roughly every 30 minutes.

5.2.1.5 Harvard University Shuttles

Harvard University shuttle services provide access to, from, and within Harvard University campus areas including connections between Allston and Harvard Square. The following Harvard University shuttle routes provide service adjacent to the Project Site.

Allston Campus Express Route – Harvard University Shuttle System

Harvard University Transit Services operates a looping clockwise shuttle route between the Allston Campus, Harvard Square, and Memorial Hall on weekdays and weekends during the

academic year. Buses head westbound on Western Ave past the Project Site and return to Harvard Square northeast-bound on N. Harvard Street. Stops closest to the Project Site are located at 1 Western Ave and the Harvard Innovation Lab (i-Lab). Due to construction at the Harvard Innovation Lab, the Allston Campus Express Route stop moved in early June farther east on Western Ave in front of the Business School parking lot, before the traffic light at the Batten Way/Hague Street intersection.

On weekdays, buses depart from 1 Western Ave roughly every 15 minutes between 7:30 AM and 10:15 PM. On weekends, buses depart from 1 Western Ave every 15 minutes between 7:30 AM and 10:15 PM.

Barry's Corner Shuttle Route – Harvard University Shuttle System

Harvard University Transit Services operates a shuttle route between the Harvard Square, the Kennedy School, and the Continuum building Barry's Corner in Lower Allston on weekday morning and evening peak periods during the academic year. Buses make four stops and run every 2 minutes between 7:00 AM and 10:00 AM and 4:20 PM and 7:20 PM.

5.2.2 Existing Area Parking

As shown in Figure 5.5, 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.

5.3 Planned Transportation Improvements and Future Conditions

The Project's initial development will be supported by three new roadways: currently referred to as East Drive; Cattle Drive; and DEF Drive being planned and developed by the Harvard Allston Land Company.

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 Sanofi Genzyme access-controlled driveway off Western Avenue will be eliminated and replaced by a new access driveway from East Drive.

"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 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.

"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.

Currently planned to support Phase B of the PDA, Science Drive would be extended from Stadium Road at the Science and Engineering Complex to connect to Cattle Drive on the west side of the PDA area, north of DEF Drive. The full build cross-section of Cattle Drive will be extended south to the southern limits of the PDA boundary.

5.3.1 Pedestrian and Bicycle Access and Circulation

The Project Site will be surrounded by new bicycle infrastructure connecting visitors to protected lanes along Western Avenue. As the "front door" to the Project, Western Avenue streetscape improvements are being explored that will enhance the experience by bicyclists, pedestrians, and transit riders traveling along this corridor.

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. Sharrow lane markings will be painted on DEF Drive and Interim Cattle Drive, south of DEF Drive. Proposed bicycle infrastructure is displayed in Figure 5.8.

A multi-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 Project Greenway that will eventually connect the N. Harvard Street neighborhoods to 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 recently constructed multi-use path which provides pedestrian and bicycle access between the SEC and the Project. East Drive will include a mid-block crosswalk north of the relocated Sanofi Genzyme driveway entrance. Proposed pedestrian infrastructure is displayed in Figure 5.9.

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

5.3.2 Enhanced Public Transit Access

Transit access to the Project will be provided by the existing MBTA Routes 64, 66, 70, and 86. No changes to existing transit route alignments are anticipated.

Transit stops on Western Avenue are suggested to shift to coincide with new activity centers and intersections created by the Project. For example, the existing MBTA Route 70 and Harvard Shuttle Allston Campus Express Route stop located just west of Soldier's Field Road could shift west to the new intersection of Western Avenue and East Drive to provide ease and direct access both to the Project and adjacent uses.

The Proponent will assess capacity impacts to existing MBTA bus routes to determine the need for additional vehicles or services to accommodate Project demand. (The proposed analysis methodology is detailed in Section 5.4.4.) The Proponent will also explore the need for supplemental shuttle services to enhance access from key area transit nodes and the opportunities to provide this access.

5.3.3 Parking

The total vehicle parking supply of approximately 620 spaces, actively managed, 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 parking, and 40 on-street parking spaces. Access to the below-grade parking garage is planned on the north side of DEF Drive.

Consistent with the 2018 PDA, the Project will initially rely on surface parking within or adjacent to the PDA boundary. The use of valet operations in the below-grade parking facilities will optimize the number of functional parking spaces and also serve the hotel use.) This "interim parking" supply condition will be replaced for the Full Build condition by a structured parking garage.

Parking supply will be constrained, and fair market parking pricing will be deployed to minimize dependence on automobile travel and encourage the use of alternative means of accessing the Project Site, consistent with the goals of the Project. The Proponent will collaborate with BPDA and BTD to determine final parking ratios for the Project that are aligned with the City's guidelines and goals.

Parking will be shared between commercial and residential users to achieve desired parking ratios but minimize the number of spaces needed physically at peak occupancy times of day. This will allow commuters to use residential spaces that may be un-occupied during the day, and commuter spaces will be available for retail/restaurant and recreational visitors during evenings and weekends.

The DPIR will include a detailed analysis of shared parking and an evaluation of changes in parking demand/supply expected between the two phases, along with proposed electric vehicle charging accommodations.

5.3.4 On-Street Parking and Curbside

The Project will result in the creation of substantial new on-site roadway grids, as described above. Curbside use will be allocated to accommodate transit stops, passenger drop-off/pick-up/valet needs, as well as limited loading (each building will include an appropriate off-street loading area) and parking.

On-street areas for ride-hail (Transportation Network Company, or TNC) services, such as Uber and Lyft, will be designated, building upon BTD's current initiatives to manage TNC activity and reduce its impact on traffic flow and other curbside needs.

Some on-street parking 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.

5.3.5 Building Service and Loading

Consolidated building service and loading areas are planned to accommodate all buildings. 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 northeast 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.

5.4 Proposed Transportation Impact Study Scope

The following sections outline the scope of the proposed Transportation Impact Study, presenting the Project's preliminary trip generation estimate, the proposed traffic study area, and analysis methodologies and assumptions for the full build-out of the PDA. As noted above, this PNF proposes an analysis of transportation impacts for both the Project and Full Build (the Project and Phase B in the aggregate) in order to present a comprehensive analysis and allow for transportation planning that considers the proposed development of the entire PDA. In essence, this is a general update of the Project-related transportation impacts that were detailed in the TIS completed as part of the 2018 PDA approval.

5.4.1 Program Summary

The Project and Full Build program summaries are provided in Table 5-2. The PDA Full Build program is inclusive of the Project and Phase B, and thus, represents the potential full build out of the PDA.

Table 5-2 Project and PDA Full Build Program Summary: Inputs Applied for Trip Generation Estimates

Program	Project	Full Build
Building Uses	Size/Quantity	Size/Quantity
Commercial: Lab / Office	420,000 SF	1,054,000 SF
Residential	330 units	750 units
Hotel & Conference Center	250 keys	250 keys
Ground Floor Retail / Restaurant	47,000 SF	69,000 SF

NOTE: All measurements are approximate – rounded for use in the analysis. Full Build program is inclusive of the Project (Phase A) and Phase B programs, representing the PDA buildout. Phase B development program is approximate and not proposed at this time.

5.4.2 Analysis Conditions

The Project will be constructed by 2025, whereas with the remaining development program of the Full Build is anticipated to be constructed and completed by 2030. Recognizing this, we propose that the DPIR analysis reflect the following analysis scenarios to identify any Project impacts:

- 2020 Existing Condition (applying pre-COVID19 traffic volumes)
- 2025 No-Build (includes background development and transportation projects)
- 2025 Build (the Project)
- 2030 No-Build (includes background development and transportation projects)
- 2030 Build (the Full Build development of the PDA)
- 2030 Build with Mitigation

Mode share assumptions and background projects associated with these analysis scenarios (conditions) are presented in subsequent sections.

5.4.3 Preliminary Project Trip Generation

Estimating the demand for movement 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 four steps, which are presented below and detailed in the following sections:

1. Applying trip rates based on standard data from the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th Edition 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;
2. Converting unadjusted vehicle trips into total person trips using an average vehicle occupancy;
3. Determining the shared trips between Project's land uses, referred to herein as "Internal Capture", which do not impact the area's transportation network; and
4. Calculating trips by each mode of travel (*adjusted* trips), by applying expected mode shares and vehicle occupancy.

5.4.3.1 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

- 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 & 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 ERC Center was not analyzed separately.[1] Additionally, special events that may happen at the ERC Center are not expected to be typical daily occurrences and are expected to happen outside of peak traffic hours; thus, the center will not have a measurable impact on the morning and evening traffic analysis beyond the estimated activity under the hotel land use code and other program uses.[2] Guests attending the ERC Center are assumed to be staying at the hotel for such events.

5.4.3.2 Vehicle Occupancy Assumptions

A national Average Vehicle Occupancy (AVO) is used to convert ITE's unadjusted trips into person trips, as a first step in estimating Project-generated trips. Vehicle occupancy (the number of persons in a vehicle) are based on the Federal Highway Administration Summary of Travel Trends: 2017 National Household Travel Survey. An AVO of 1.18 persons per vehicle for peak hour work-based trips (office, office/research 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 trips. In that calculation, the analysis applies local, rather than national, AVO characteristics to derive adjusted Project vehicle trips.

5.4.3.3 Internal Trip Capture

Because the Project will comprise a variety of uses within the development, a portion of generated trips are expected to be "captured" internally to the Project Site (i.e. shared between the various land uses in the Project program or "Internal Capture"), rather than generating trips off-site that may impact the area's transportation network. For example, some office employees are expected to live on-site, or some employees and residents are expected to walk or ride a bike to the on-site retail/restaurant locations rather than leaving the Project Site.

[1] Harvard University's 2013 Institutional Master Plan for its Campus in Allston included a hotel/conference center of approximately 250,000 square feet as a Proposed Institutional Project. The hotel/conference center is incorporated into this Project's transportation analysis.

[2] 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."

The standard method for applying this capture of internal trips is outlined in the ITE *Trip Generation Handbook* (3rd Edition) and is applied to this development program.[3]

5.4.3.4 Mode Share Assumptions

For reference, the BTD mode share data by trip purpose for Zone 17 (the zone for the Allston area), as published in its *Access Boston* Development Review Guidelines, are presented in Table 5-3a. Recent mode shares from the 2012-2016 American Community Survey (ACS) of the U.S. Census for Allston area Census Tracts are presented in Table 5-3b.

The peak hour/peak direction mode share estimates, by land use, that are applied to the transportation impact analysis are presented in Tables 5-3c and 5-3d. Mode shares for the 2025 Build program (the Project) (Table 5-3c) were established from the recent ACS data. The 2030 Full Build program mode shares, by land use (Table 5-3d) represent future expected mode shares. Over the next ten years, the dependence on private vehicles for trip making is anticipated to be reduced with the many transit, bicycle, and pedestrian improvements happening in the Allston area (and City Boston). Thus, for the 2030 Build Condition analysis, the 2025 condition mode shares for residential and commercial trips were adjusted according to the projected change in mode share for Allston, as stated in the *Go Boston 2030* plan (Boston Transportation Department, March 2017, p. 107).

Table 5-3a BTD Allston Area (Zone 17) Mode Shares by Trip Purpose

Trip Purpose	Vehicle	Transit	Walk	Bike
Home	43%	21%	27%	9%
Work	59%	18%	17%	6%
Other	43%	11%	35%	11%

Notes: BTD's *Access Boston* published mode share data by trip purpose for Allston Area Zone 17, AM/PM peak, primary direction of travel (either to or from the Project Site). Assumes a 75 percent/25 percent split between walk/bike trips. Trip purpose refers to the activity occurring in the zone.

Table 5-3b Census Mode Shares – Adjusted for Peak Hour Analysis

	Vehicle	Transit	Walk	Bike
Residents	31%	34%	27%	8%
Commuters	53%	30%	15%	3%

Notes: U.S. Census Bureau, American Community Survey 2012-2016 Five-year estimates, Means of Transportation. Special Tabulation: Census Transportation Planning Product. Weighted aggregation for Place of Residence within Census Tracts 1, 8.02, & 8.03; Place of Work in Census Tracts 8.02 & 8.03. Daily/overall shares are adjusted to represent peak hour of travel based on BTD Zone 17 ratio of daily to peak hour shares.

[3] As stated in the ITE *Trip Generation Handbook*, "A basic premise behind the data presented in the *Trip Generation Manual* is that data was collected at single-use, free-standing sites […] while trip generation rates for individual uses on such sites may be the same […] there is potential for interactions among the uses within the multi-use site, particularly where trips can be made by walking. As a result, the total trip generation of [unadjusted] vehicle trips […] may be reduced."

Table 5-3c Mode Shares by Land Use - 2025 Build Program (Project)

Land Use	Vehicle	Transit	Walk	Bike
Residential	31%	34%	27%	8%
Office	53%	30%	15%	2%
Lab/R&D	53%	30%	15%	2%
Hotel	43%	11%	35%	11%
Retail & Restaurant	43%	11%	35%	11%

Notes: **Peak hour/peak direction mode share** estimates for Residential, Office, and Lab/R&D are based on ACS data for representative Allston area Census Tracts. BTD's *Access Boston* Allston Zone 17 mode share data for *Other* trip purpose applied to Hotel, Retail, and Restaurant. Numbers may not add up due to rounding.

Table 5-3d Mode Shares by Land Use - 2030 Build Program (PDA Full Build)

Land Use	Vehicle	Transit	Walk	Bike
Residential	26%	38%	27%	8%
Office	48%	34%	15%	3%
Lab/R&D	48%	34%	15%	3%
Hotel	43%	11%	35%	11%
Retail & Restaurant	43%	11%	35%	11%

Notes: **Peak hour/peak direction mode share** estimates for Residential, Office, and Lab/R&D are based on *Go Boston 2030* mode share trends for Allston. For the purpose of the analysis, no change to mode shares is applied to Hotel, Retail, and Restaurant between 2025 and 2030 condition. Numbers may not add up due to rounding.

The resulting projected peak hour project trips by mode are presented in the next section for the two future conditions for the Project and Full Build, respectively.

5.4.3.5 Trip Generation by Mode

Under the 2025 Build Condition, the Project is expected to generate approximately 331 vehicle trips in the morning peak hour and 408 vehicle trips in the evening peak hour. Refer to Table 5-4a below for these results and the trip generation estimates for other transportation modes.

Table 5-4a Project-Generated Trips by Mode – 2025 Build Condition

	Vehicle	Transit	Bike	Walk
Weekday Morning Peak Hour				
Enter	234	161	41	161
Exit	97	55	31	103
AM Peak Hour Total	**331**	**216**	**72**	**264**
Weekday Evening Peak Hour				
Enter	130	59	44	151
Exit	278	196	39	165
PM Peak Hour Total	**408**	**255**	**83**	**316**

Under the 2030 Build Condition, the Full Build of the PDA, under the assumed development program, is anticipated to generate approximately 679 total morning peak hour vehicle trips and 821 total evening peak hour vehicle trips. Refer to Table 5-4b below for these results and the trip generation estimates for other transportation modes.

Table 5-4b Full Build-Generated Trips by Mode – 2030 Build Condition

	Vehicle	Transit	Bike	Walk
Weekday Morning Peak Hour				
Enter	489	408	89	338
Exit	190	131	58	210
AM Peak Hour Total	**679**	**539**	**147**	**548**
Weekday Evening Peak Hour				
Enter	246	133	86	298
Exit	575	507	85	338
PM Peak Hour Total	**821**	**640**	**171**	**636**

5.4.3.1 Trip Comparison to PDA No. 115 (2018 Program)

PDA No. 115 (approved in March of 2018) proposed the construction of multiple buildings that were conceptually defined. The Proponent has since refined the development details while largely retaining the mix of uses that were defined in PDA No. 115 and setting an objective to maintain vehicle trip generation at comparable levels for the Project.

A comparison of the two programs and their estimated trip generation is provided in Table 5-5. The Project is shown to be generally consistent, in terms of its program and the peak-hour number of vehicle trips on the study area's roadway network, with the previously reviewed and approved the PDA No. 115 Project.

Table 5-5 Project-Generated Vehicle Trips: Comparison to 2018 Program/PDA No. 115

	2018 PDA No. 115 (2017 TIS) (2022 Condition)[1]	Project (2025 Condition)		
Land Use	**Program Size (KSF)**	**Program Size (KSF)**		
Office/Lab/R&D	400	420		
Retail/Restaurant	n/a	47		
Residential	250 (250 units)	231 (330 units)		
Hotel/Conference Center	250 (200 keys)	202 (250 keys)		
Total	**900,000 SF**	**900,000 SF**		
Vehicle Trips	*see notes*	*see notes*	*Change*	*Difference*
AM Peak	395	331	-16.2%	-64
PM Peak	408	408	0.0%	0
Parking				
Vehicle Spaces	800 to 900	620	-31%	-280

Notes: applied ITE 9th Ed. rates applied ITE 10th Ed. rates

1. Source: *Transportation Impact Study, Harvard Enterprise Research Campus Planned Development Area*, Table 9, December 2017.

5.4.4 Proposed Analysis Study Area

The Study Area envisioned for the transportation analysis is illustrated in Figure 5.6.

5.4.4.1 Study Area Intersections

The proposed study area for the traffic analysis, as shown in Figure 5.6, consists of 10 existing intersections:

- Western Avenue at Soldiers Field Road (signalized)
- Western Avenue at Kresge Way/Sanofi Genzyme Driveway (unsignalized)
- Western Avenue at Batten Way/Hague Street (signalized)
- North Harvard Street at Soldiers Field Road (signalized)
- North Harvard Street at Western Avenue (signalized)
- North Harvard Street at Franklin Street/Kingsley St (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)

Construction of Harvard University's Science and Engineering Complex enabling infrastructure in the vicinity of the Project Site results in three additional intersections, which will be included in the future conditions analyses:

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

Under a Build condition analysis, the Enabling Infrastructure will be introduced, including the new intersections on Western Ave (at Cattle Drive and at East Drive), the intersection of Interim Cattle Drive at Windom Street, and the intersection internal to the Project Site, DEF Drive at Cattle Drive.

5.4.4.2 Analysis Methods

An intersection capacity analysis will be provided to evaluate how well the roadway facilities serve the traffic demands placed upon them. The analysis applies existing traffic volumes and projected future traffic volumes to the traffic flows within the study area. It results in an assessment of the intersections under the traffic volume levels observed and expected during the busiest (peak) hour in the morning and in the afternoon/evening. Both 2025 and 2030 conditions will be analyzed.

Intersection operations are classified by levels of service based on how well an intersection can process traffic volumes with minimal delay to motorists. This analysis will be completed using Synchro software for the study intersections listed above.

In addition to an intersection capacity analysis, crash data will be reviewed and documented for the study intersections and the nearby roadways. This will be completed using the MassDOT database, Boston's Vision Zero database, and the interactive MassDOT Highway Safety Improvement (HSIP) database/map.

5.4.4.3 Transportation Data Sources and Analysis Assumptions

Traffic Volume Data

Representative traffic counts under existing conditions cannot be conducted due to COVID-19 impacts to travel and activity. Thus, historical vehicle, bicycle, and pedestrian counts from 2017 will be used to establish an existing 2020 condition, in accordance with the newly established MassDOT guidelines and established adjustment factors for count year and seasonality. As appropriate, traffic volumes from projects that may have been built/occupied since the time of the traffic counts will be added to reflect the 2020 condition (see table below).

To reflect future 2025 and 2030 traffic levels, the anticipated traffic from known background projects will be added to the existing condition traffic volumes (see table below). The 2020 vehicle counts will not be adjusted/increased any further than incorporating those background projects.

5.4.4.4 Background Development Projects

Many background projects will be incorporated into the No-Build conditions, including Harvard University's 2013 Institutional Master Plan ("IMP") and non-IMP projects around the

Project Site. Depending on the date of the traffic counts used for the analysis, some projects may need to be incorporated as part of the 2020 existing conditions. Table 5-6 lists the background projects for which their respective vehicle trips will be used in the proposed analysis scenarios, either under existing conditions or future conditions.

Table 5-6 Background Projects: Trips Incorporated by Analysis Scenario

	2020 Existing	2025 & 2030 No-Build and Build
Harvard IMP Projects		
Harvard Business School (HBS) Faculty & Administrative Office Building		✓
Harvard Gateway Project		✓
Harvard Mixed Use Project		✓
Harvard Science and Engineering Complex (SEC)		✓
Harvard Business School Klarman Hall/G2 Pavilion	✓	✓
Non-IMP Projects		
Telford 180 *(completed June 2018)*	✓	✓
Continuum *(completed March 2018 – Retail component to be added only)*	✓	✓
530 Western Avenue Residential *(completed May 2019)*	✓	✓
Boston Landing NPC (the original project is reflected in collected traffic counts)		✓
125 Guest Street	✓	✓
Allston Yards Phase 1		✓
WBZ-TV (1170-1200 Soldiers Field Road)		✓
Skating Club of Boston (1234-1240 Soldiers Field Road)		✓
Nexus at the Allston Innovation Corridor		✓
180 Western Avenue (LOI Estimate)		✓
176 Lincoln Street		✓

IMP = Institutional Master Plan; NPC = Notice of Project Change; LOI = Letter of Intent

5.4.4.5 Background Transportation Projects

The future conditions will also incorporate significant planned roadway or transportation infrastructure changes. Table 5-7 shows when these planned changes will be incorporated into the analysis scenarios.

Table 5-7 Background Transportation Projects by Analysis Scenario

Project / Improvement	2020 Existing	2025 & 2030 No-Build and Build
Harvard University Science & Engineering Complex (SEC) Project (expected 2021 implementation) › Western Avenue streetscape improvements (Barry's Corner to Hague Street) › Academic Way (intersects Western Ave.) › Stadium Road (intersects Western Ave.) › Mobility Hub	X	✓
› Science Drive (Cattle Drive to Stadium Road)		✓
Pedestrian and Bike Improvements at Western Avenue at Soldiers Field Road (expected 2020 implementation)	✓	✓

For the year 2030 condition, the analysis assumes that MassDOT will not have completed the proposed Massachusetts Turnpike/I-90 Interchange reconstruction (and West Station), also known as the Allston Multimodal Project. MassDOT and its design team are currently working to establish a preferred alternative and file an FEIR and applicable corresponding federal environmental documentation. Although MassDOT has indicated plans to begin construction by 2023,[4] 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.[5] MassDOT expects a construction period of 8 to 10 years, lasting into the next decade.

5.4.5 Proposed Transit Capacity Analysis

The Project is expected to promote the use of public transportation in its extensive Transportation Demand Management ("TDM") program offerings and incentives. Understanding the impact that Project Site-generated transit trips will have on existing MBTA public transportation services and Harvard shuttle services will help determine future capacity constraints and potential transit mitigation.

5.4.5.1 Scenarios

Transit capacity will be analyzed under Fall 2019 conditions (representing the baseline existing conditions), in 2025 under both a No-Build and a Build Condition, and in 2030 under both a No-Build and Build Condition. To examine future scenarios, the existing Fall 2019 ridership will be expanded with a 0.84 percent annual growth rate, a value derived from the

[4] www.mass.gov/doc/allston-multimodal-project-fact-sheet/download

[5] *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

City's population projections between 2020 and 2030. New trips generated by other projects in the area, and by the Project in the Build condition, will be added and distributed according to relevant transportation impact studies.

5.4.5.2 Analysis Method

The transit analysis in the DPIR will examine the impact of Project trips (transit riders) assigned to all the MBTA local bus services identified earlier in the chapter, as well as shuttle bus services, that provide service within a half mile of the Project Site. Baseline ridership data will be derived from the Fall 2019 season, prior to COVID-19 impacts and shutdown-related reductions in ridership.

The transit capacity analyses will be performed in a manner consistent with MassDOT Office of Performance Management and Innovation methods that are used to evaluate MBTA service. The capacity analysis includes a comparison of the expected demand for transit to the existing and planned capacity of the service. The capacity threshold of the bus routes is based on the MBTA's *Service Delivery Policy*, which is based on the design of the vehicle, the number of riders aboard, and the time period during the service day. During peak periods, the passenger comfort standard has a higher capacity threshold than off-peak periods. Average peak passenger loads are compared against the policy capacity.

For each route and each direction, the approximate time buses arrive at the Project Site will be computed by adding running time to the start time of each trip. Travel time applied will be uniform across all trips on a given route in the same direction during service periods. The passenger load will be determined for each bus trip as buses reach the first stop serving the Project Site.

Ridership demand by the Project will be assigned by bus route and direction, using the distribution patterns applied in the traffic study. The daily transit trips generated by the Project are distributed by time of day to each of the scheduled bus trips, matching the existing ridership patterns observed on the area routes. Per MBTA's analysis method, the Project-generated transit trips are assumed to travel via the peak load point for each analysis segment: the connection between the Project Site and the next rapid transit station or end/start-of-line. The peak passenger load (which includes background growth in riders added to the existing levels, plus the Project-generated transit riders) for each trip is compared against the policy capacity for the bus service.

5.5 Proposed Transportation Initiatives

5.5.1 Transportation Demand Management (TDM)

Consistent with the City's goals to reduce automobile dependency, the Project will include a robust set of TDM strategies to encourage sustainable (non-vehicular) modes of transportation and enhance mobility by non-automobile travelers. These TDM strategies are built off the initiatives outlined in the PDA. The implementation of TDM measures will enable the Project to fully support the multimodal transportation options provided by the area's bicycle infrastructure, pedestrian sidewalks and walkways, and transit services.

All Project Site transportation infrastructure improvements and TDM measures will be reflected in a Transportation Access Plan Agreement (TAPA) to be executed between the Proponent and Boston Transportation Department (BTD) in accordance to the City of Boston guidelines.

5.5.1.1 Bicycle Accommodations

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* (January 2020).

The Project will encourage and support bicycle use through expansion of the Bluebikes bikeshare network by providing a BlueBikes bikeshare station on-site.

5.5.1.2 Transit Accommodations

The Project will support the following physical improvements to transit and shuttle services to manage transportation demand and enhance non-auto mobility:

- Relocation of shuttle and MBTA bus stops on Western Avenue to coincide with improved pedestrian treatments at the intersections of Western Avenue and East Drive, and Western Avenue and Stadium Road
- The addition of bus shelters, maps, and additional stop amenities at key bus and shuttle stops along Western Avenue

The Proponent is evaluating the need to provide a shuttle system to/from the Project to supplement and/or integrate with existing MBTA transit services in the area. This potential shuttle system would likely orient around providing access to and from the Red Line at Harvard Square and/or Central Square. Shuttle services could potentially be operated as part of the Allston / Brighton TMA, independently, or in coordination with Harvard University. Shuttle services would not be intended to replicate MBTA service. If additional capacity is needed on existing MBTA routes to support Project trips, expansion of MBTA service would be preferable to implementation of a new and independent service. Upon the completion of these evaluations, if more effective non-shuttle transit initiatives are identified, the Proponent will consider those alternatives.

5.5.1.3 TDM Incentives

A detailed TDM Plan will be presented in the DPIR, which will assign responsibilities for strategy implementation to the Proponent, tenants, residents and other stakeholders. The TDM programs will complement the improved pedestrian, bicycle, and transit infrastructure provided around the Project Site to ensure high non-automobile transportation mode shares. It is anticipated that membership in the Allston/Brighton Transportation Management Association will be the primary means to facilitate and manage TDM initiatives by all existing and future stakeholders and help to accomplish the transportation goals of the Plan.

5.5.2 Freight and Logistics

The Project will detail logistics needs and expected goods and waste generation at the building, neighborhood, and campus scales and incorporate design and management strategies that reduce the number of truck trips to and around the campus, reduce conflicts between trucks and pedestrians and other modes, and reduce emissions associated with delivery and waste vehicles. Developing a holistic and integrated logistics and waste framework will mitigate negative externalities associated with high volumes of truck trips and achieve a sustainable, safe, efficient, and secure site with a high-quality public realm.

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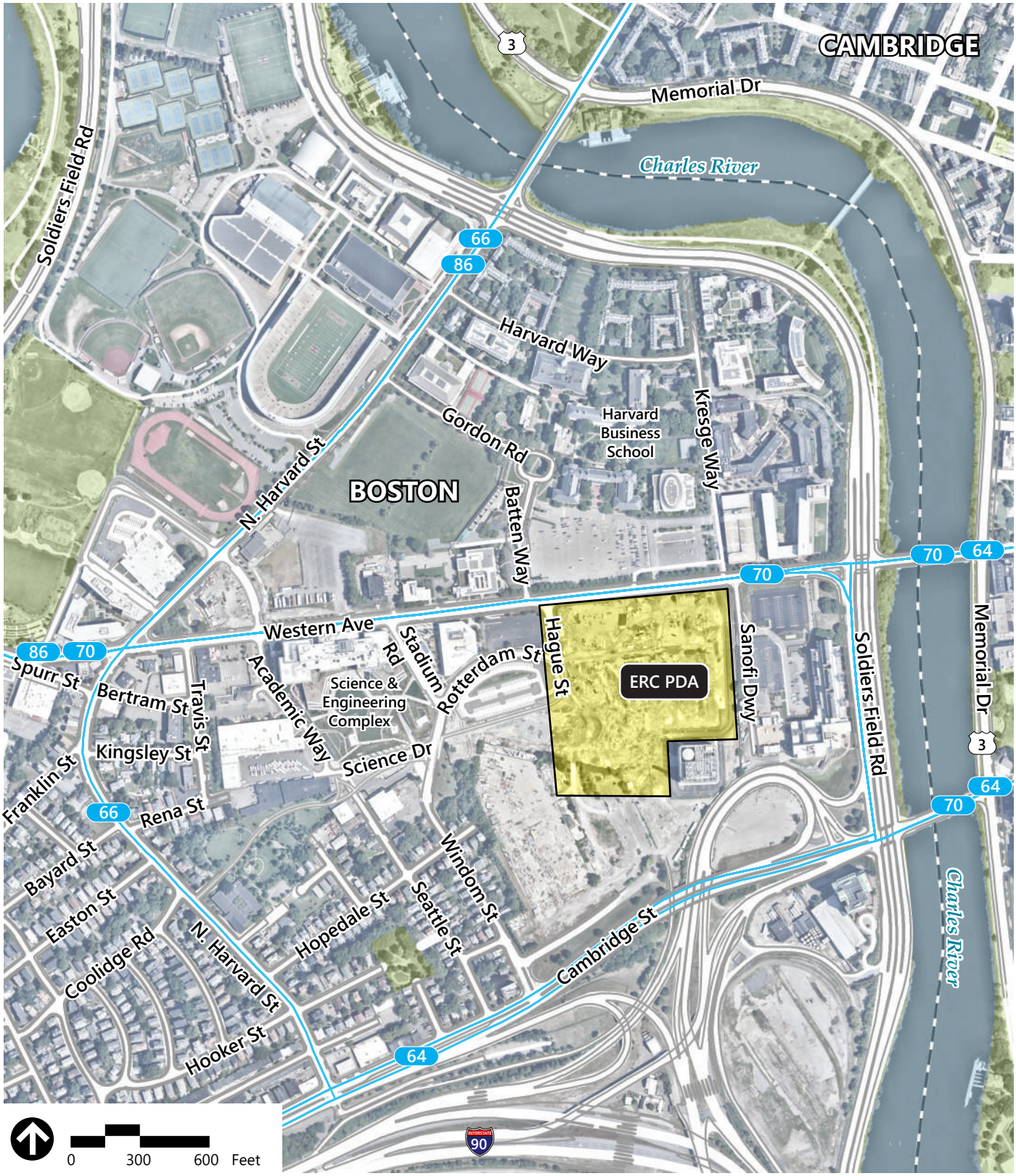


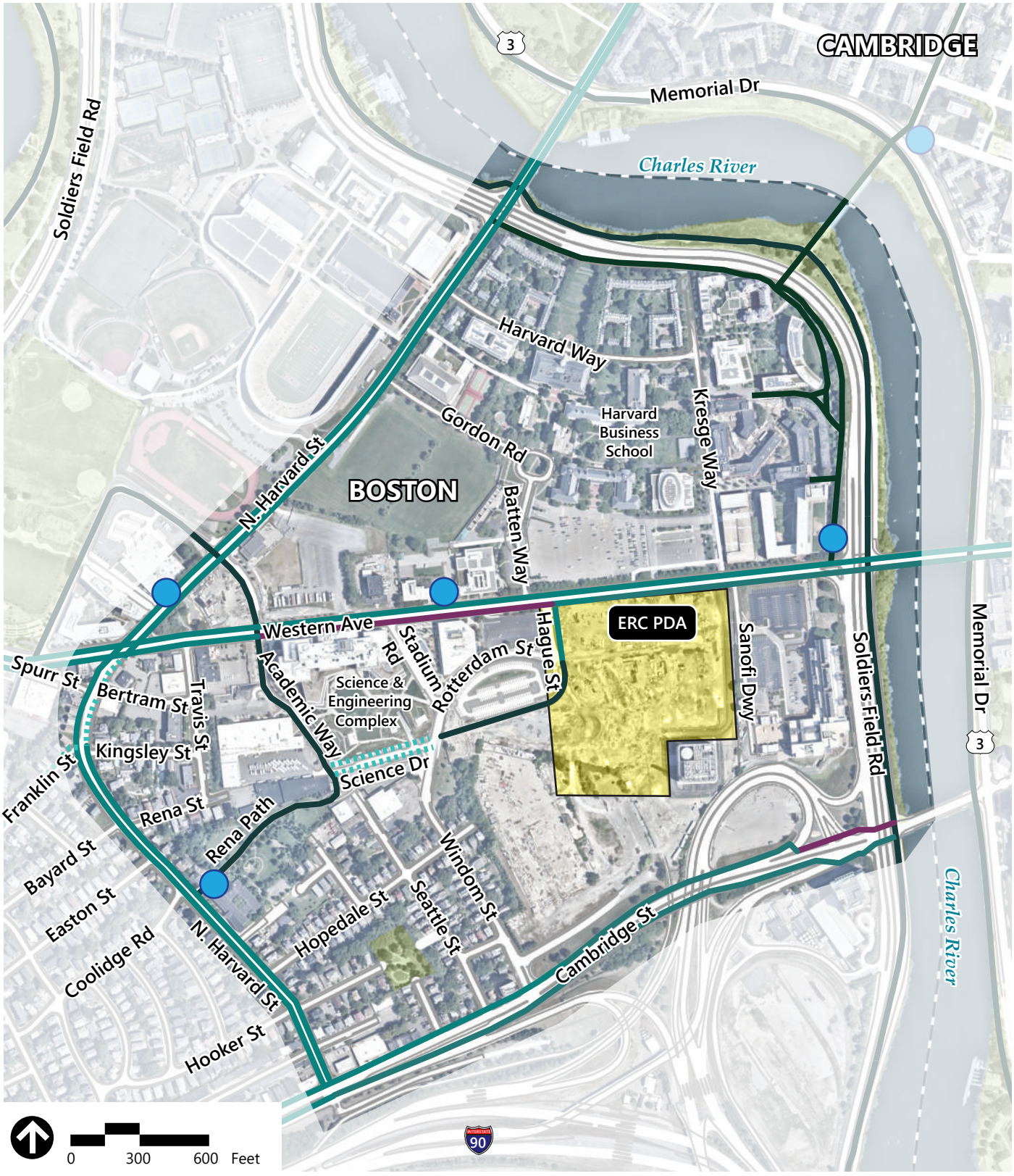
Base map aerial image: Nearmap Aerial (2020)

XX MBTA Bus Route

Figure 5.1

Transportation Context / Neighborhood

Enterprise Research Campus Project
Boston, MA



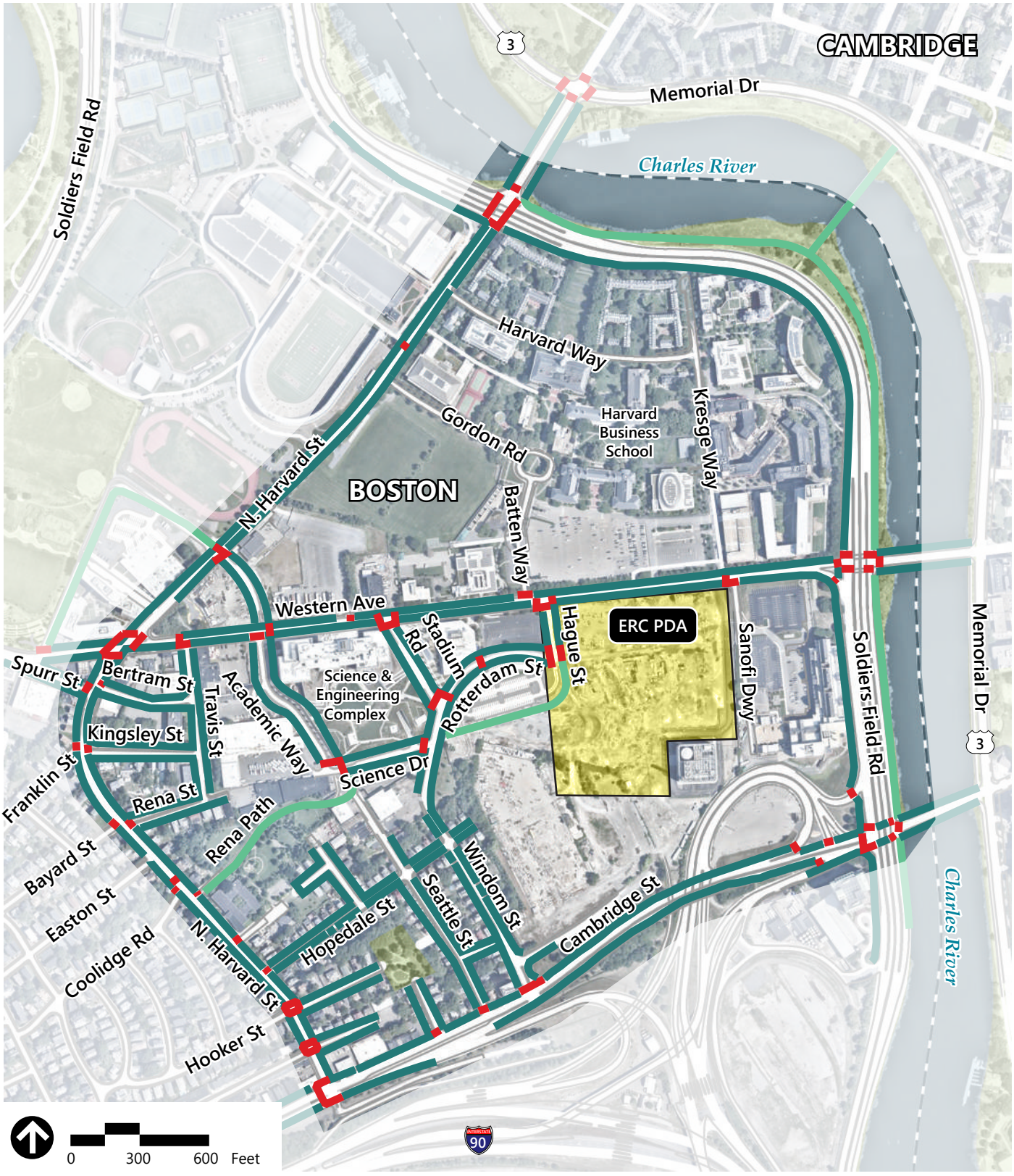
Base map aerial image: Nearmap Aerial (2020)

- Blue Bikes Station
- Bicycle Lane
- Shared Bike Lane
- Cycle Track
- Multi-Use Path

Figure 5.2

Existing Bike Infrastructure

Enterprise Research Campus Project
Boston, MA



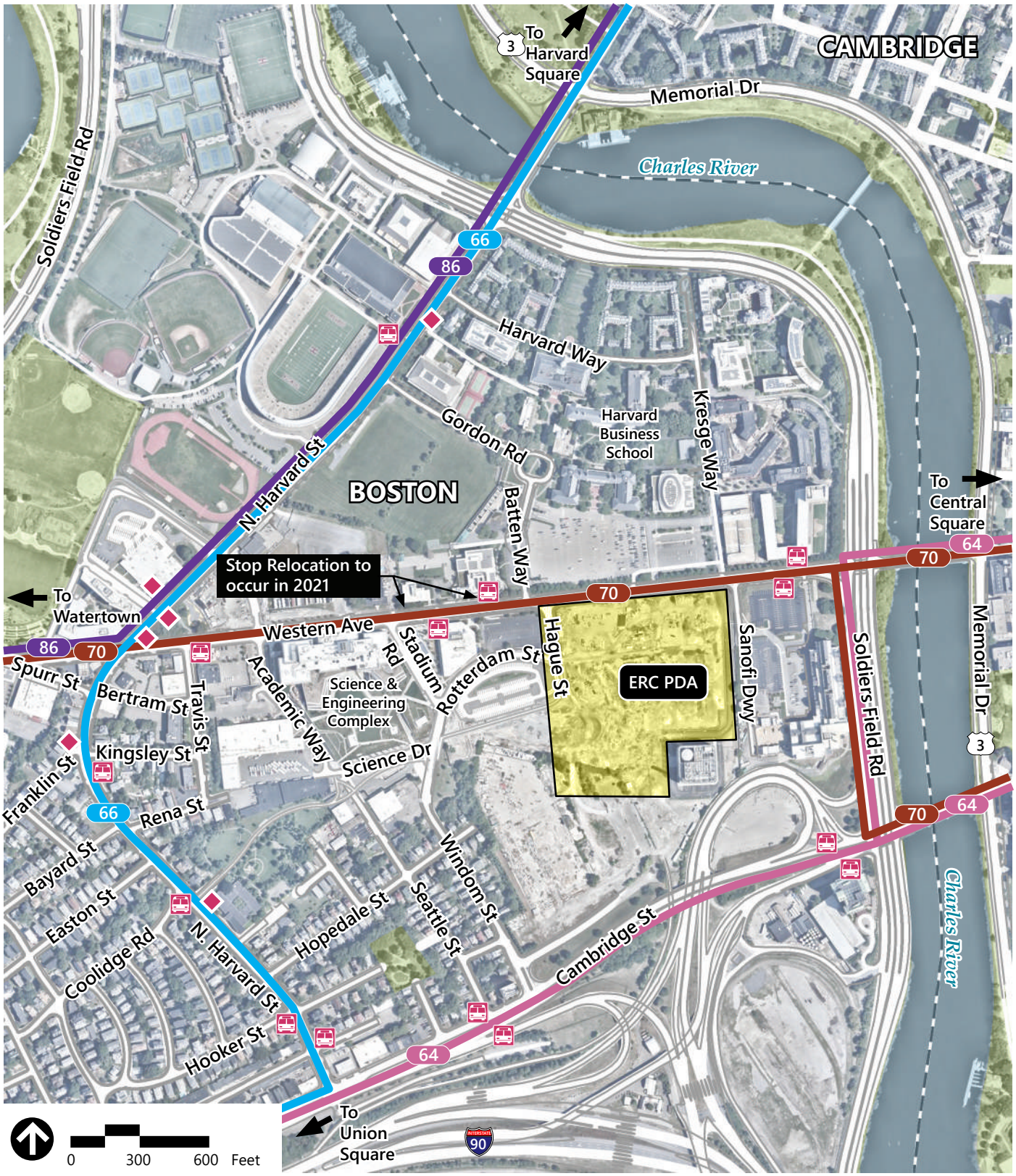
Base map aerial image: Nearmap Aerial (2020)

- Sidewalk
- Multi-Use Path
- Crosswalk

Figure 5.3

Existing Pedestrian Infrastructure

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

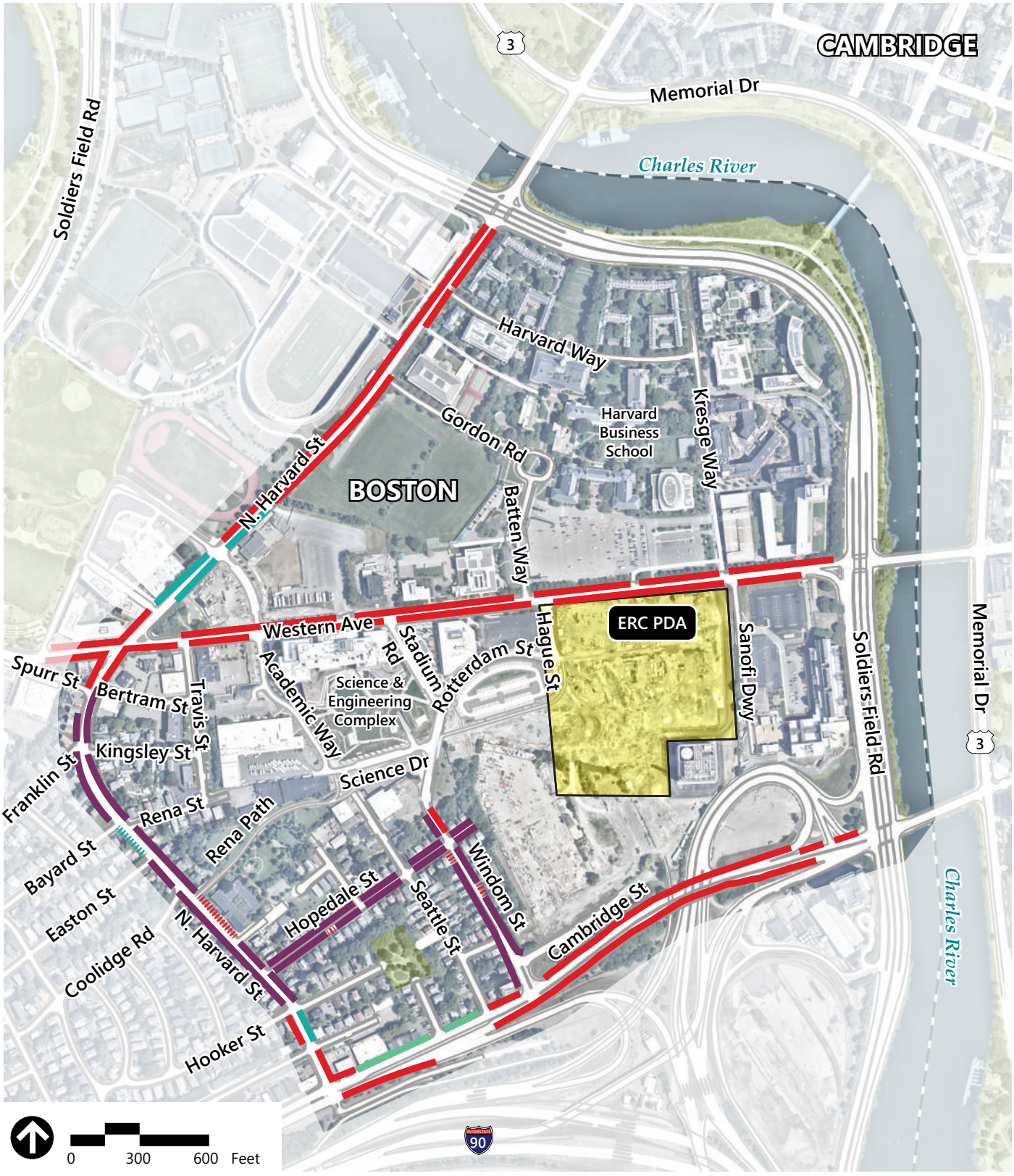
MBTA Bus Stop

MBTA Bus Shelter

Figure 5.4

Existing Transit Services and Stops

Enterprise Research Campus Project
Boston, MA



Base map aerial image: Nearmap Aerial (2020)

- No Stopping
- Unregulated
- 2-Hour Parking
- 2-Hour Parking M-F 8am-6pm
- Resident Permit Parking M-F 8am-6pm
- Accessible Parking

Figure 5.5

Existing On-Street Parking and Curbside Regulations

Enterprise Research Campus Project
Boston, MA

1. North Harvard Street at Soldiers Field Road
2. North Harvard Street at Western Avenue
3. North Harvard Street at Franklin Street/Kingsley St
4. Cambridge Street at North Harvard Street
5. Cambridge Street at Windom Street
6. Cambridge Street at I-90 Ramps/Double Tree Hotel
7. Cambridge Street at Soldiers Field Road
8. Western Avenue at Soldiers Field Road
9. Western Avenue at Kresge Way/Genzyme Driveway
10. Western Avenue at Batten Way/Hague Street
11. Western Avenue at Academic Way
12. Western Avenue at Stadium Way
13. N. Harvard Street at Academic Way

9. East Drive at Western Ave
14. Cattle Drive at Western Ave
15. Cattle Drive at DEF Drive
16. Cattle Drive/Almy at Windom St

Base map aerial image: Nearmap Aerial (2020)

Existing and No-Build Intersection

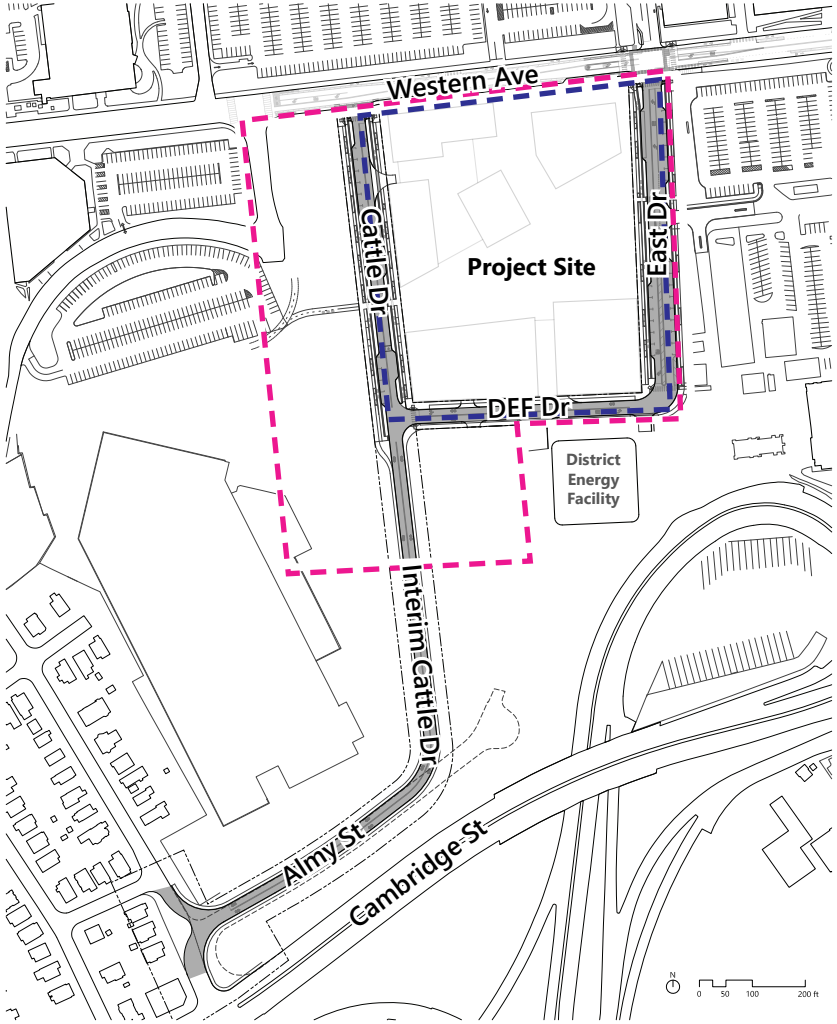
ERC Intersection

Figure 5.6

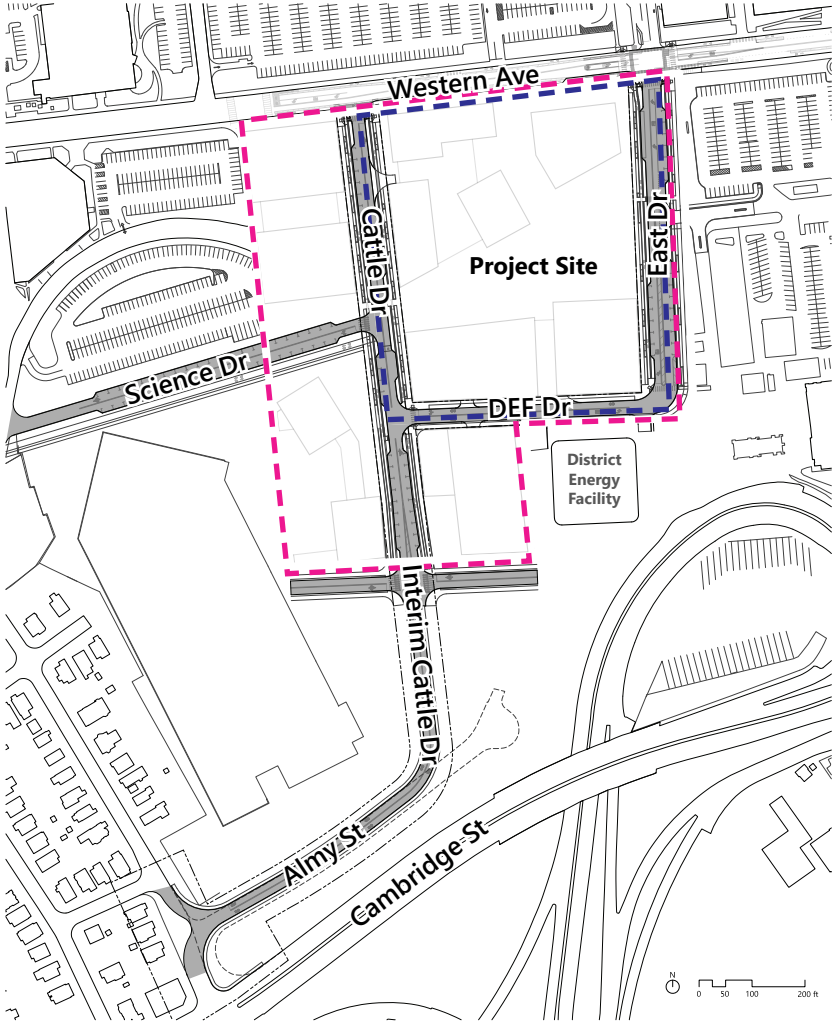
Proposed Traffic Study Area Intersections

Enterprise Research Campus Project
Boston, MA

Project Site



PDA Full Build Condition



Note: Street designs are under City of Boston review. These may not reflect final configuration.

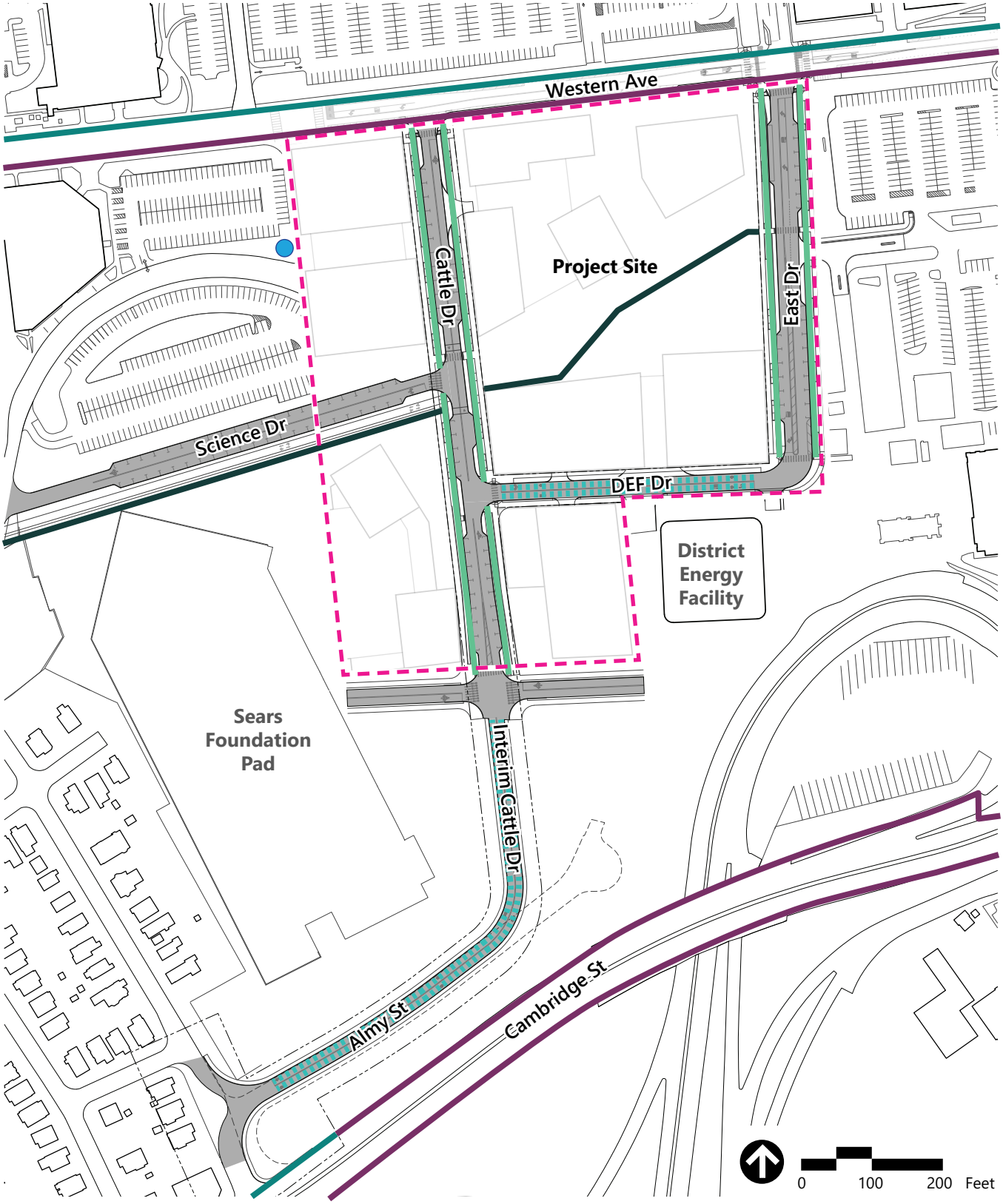
Project Site Boundary

PDA Area Boundary

Figure 5.7

ERC Enabling Streets

Enterprise Research Campus Project
Boston, MA



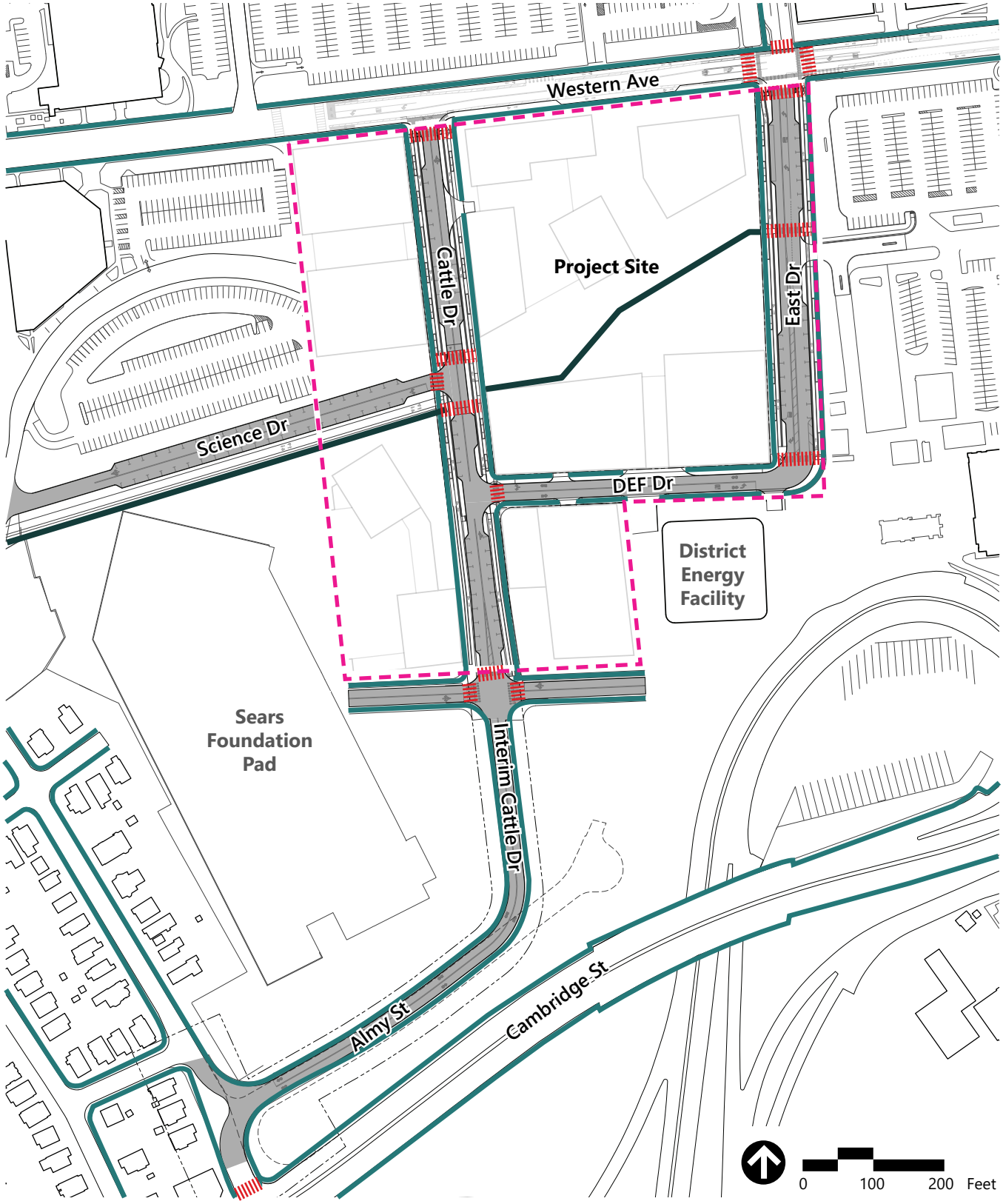
Note: Street designs are under City of Boston review.
These may not reflect final configuration.

- Bicycle Lane
- Off-street Bicycle Lane
- Shared Bike Lane
- Cycle Track
- Blue Bikes Station
- PDA Area Boundary
- Multi-Use Path

Figure 5.8

Proposed Bicycle Infrastructure (Full Build)

Enterprise Research Campus Project
Boston, MA



Note: Street designs are under City of Boston review.
These may not reflect final configuration.

- Sidewalk
- Crosswalk
- Multi-Use Path
- PDA Area Boundary

Figure 5.9

Proposed Pedestrian Infrastructure (Full Build)

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
- Water Quality
- Flood Hazard
- Daylight
- Air Quality
- Noise
- Geotechnical
- Subsurface and Groundwater
- Solid & Hazardous Waste
- Construction

A complete wind tunnel and solar glare analysis will be provided in the subsequent DPIR filing, as required based on the methodologies described in Sections 6.2 and 6.3, respectively. 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 increase wind speeds around neighboring buildings. The addition of the Project will disrupt the otherwise fast-flowing wind on the existing Project Site, particularly to the east and southeast of the Project Site.
- **Solar Glare** - A solar glare study will be conducted for the Project, the results of which will be presented in any subsequent Article 80 filing. The methodology for the solar glare study is described in this chapter.
- **Shadow** – 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.

- **Water Quality** – The Project will not affect the water quality of nearby water bodies during or after construction. The Project will comply with Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards and will improve water quality by collecting and treating stormwater runoff through structural Best Management Practices (BMPs).
- **Flood Hazard** –The Project Site is not located in a designated Flood Hazard Zone based on the FEMA Flood Insurance Rate Map (FIRM).
- **Daylight** – The viewpoint along Western Avenue is expected to experience an increase in skydome obstruction to 27.4% due to the increase height and massing of the new buildings as a part of the Project. This is to be expected since there are no existing buildings on-site.
- **Air Quality** – The potential carbon monoxide (CO) concentrations from motor vehicle traffic and construction related to the Project will be considered in conjunction with background concentrations to demonstrate that the Project will comply with the National Ambient Air Quality Standards (NAAQS). If any CO violations are predicted, mitigation measures will be developed and tested to meet the State Implementation Plan (SIP) and Clean Air Act Amendments (CAAA) criteria.
- **Noise** – The mechanical systems would be strategically located on the rooftop, utilizing the height of the building in providing noise attenuation or in mechanical rooms of the proposed building. During the design and selection process, the appropriate low-noise mechanical equipment will be selected, including potential noise mitigation measures, such as acoustical enclosures, and/or acoustical silencers. As such, the sound levels associated with the Project's mechanical equipment are expected to be minimal and comply with the City of Boston's noise standards at the surrounding sensitive receptor locations. Additionally, the proposed residential buildings will be designed and incorporate constructing material and techniques to achieve the Department of Housing and Urban Development (HUD) requirements.
- **Geotechnical** – The buildings proposed for the Project will be supported on either shallow conventional footings or deeper foundations. The underground garage parking slab, beneath all buildings except for the ERC Center, is planned to be at approximately 14 feet below future site grades. Based on the design and construction methodology developed for the Project, potential impacts to abutting facilities from excavation and foundation construction such as ground movement, vibration, and groundwater lowering are anticipated to be inconsequential. The Project will coordinate with abutters to develop criteria and instrumentation monitoring for vibration-sensitive structures.
- **Subsurface and Groundwater** – Previous subsurface investigations were undertaken at and adjacent to the Project Site and have been reviewed and evaluated to define subsurface conditions. While the Project is not located within a Groundwater Conservation Overlay District (GCOD), Project Site and Project design criteria will be established to reduce any potential lowering of the area's groundwater levels.

- **Solid and Hazardous Waste** – There are no existing buildings with the Project Site that require demolition for construction of the Project. Handling, removal, reuse, recycling, or disposal of construction debris will be in conformance with the City of Boston, Harvard, and the MassDEP regulations for solid waste. Any potential soil and groundwater contamination encountered during site excavation will be managed during construction, in accordance with applicable local, State and Federal regulations.
- **Construction** – The Proponent will develop a detailed Construction Management Plan (CMP) for approval by Harvard and Boston Transportation Department (BTD) prior to construction, which will outline logistics and public protection 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 study methodology and presents a wind sensor plan (Figure 6.1). Refer to Appendix C for the complete pedestrian wind comfort assessment.

6.2.1 Methodology

Wind flows were simulated using Orbital Stack, an in-house computational fluid dynamics (CFD) tool, for the Project Site's configuration with the existing surroundings. CFD is a numerical modeling technique for simulating wind flow in complex environments. For urban wind modeling, CFD techniques are used to generate a virtual wind tunnel where flows around the site, surroundings and the study building are simulated at full scale. For the purpose of this computational study, the 3D models were simplified to include only the necessary building and terrain details that would affect the local wind flows in the area and around the Project Site. Landscaping and other smaller architectural and accessory features were not included in the computer model in order to provide more conservative wind conditions. The measurements at each of the sensor locations, as shown on Figure 6.1, were recorded in the form of ratios of local mean and gust speeds to the reference wind speed in the free stream above the model. Refer to the complete study in Appendix C for further details on the wind speed profiles.

6.2.1.1 Analysis Conditions and Criteria

A CFD technique was utilized to assess pedestrian wind conditions for the following:

- **No-Build Condition** – This condition includes the existing Project Site with the existing surroundings; and
- **Build Condition (the Project)** – This condition includes the No-Build Condition with the addition of the Project.

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, as shown in Table 6-1.

Table 6-1 BPDA Mean Wind Criteria*

Comfort Category	Mean Wind Speed (mph)
Dangerous	> 27
Uncomfortable for Walking	> 19 and ≤ 27
Comfortable for Walking	> 15 and ≤ 19
Comfortable for Standing	> 12 and ≤ 15
Comfortable for Sitting	≤ 12

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

The wind climate found in a typical 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, while windier conditions may be expected near the corners of taller buildings exposed to the prevailing winds. However, without any mitigation measures, this wind climate is likely to be frequently uncomfortable for more passive activities. Typically, the summer and fall winds tend to be more comfortable than the annual winds while the winter and spring winds are less comfortable.

6.2.2 Existing Site Wind Conditions

The existing Project Site is unoccupied and immediately surrounded by open land, roadways, and low buildings. There are no significant features on-site that would redirect winds, which leads wind to flow very fast and unobstructed through the empty Project Site.

Wind conditions at most areas in the existing scenario are considered Comfortable for walking on an annual basis (green regions shown in Image 7a of the study provided in Appendix C) and are expected to meet the effective gust criterion. In the winter, seasonally higher wind speeds will result in conditions that will be Uncomfortable for walking at most areas. During the winter, the effective gust criterion may also be exceeded near the existing DEF.

6.2.3 Proposed Site Wind Conditions

The addition of the Project will disrupt the otherwise fast-flowing wind on-site and, in general, is expected to slow winds down within the project area. The Project is not predicted to increase wind speeds around neighboring buildings; wind conditions near neighboring buildings are predicted to remain similar to those in the existing conditions (as shown in Image 7 of the wind study provided in Appendix C). In some areas, the Project is expected to provide shelter from wind, and even reduce wind speeds to the east and southeast of the Project Site.

Mean wind conditions on-site along the perimeters of the proposed buildings are predicted to be Comfortable for sitting and standing, which is appropriate for pedestrian activities, including passive uses like at an entrance or waiting area. Localized on-site wind accelerations to an Uncomfortable condition are predicted around the west-facing building bases and corners of Building 4 (hotel use) along Western Avenue, and between Building 3 (residential use) and Building 2 (lab use), as identified in Image 7b of the wind study (Appendix C).

6.2.3.1 Wind Mitigation Considerations

As building design develops, the Design Team will consider and test as part of the wind tunnel study massing and facade articulations at the building corners facing the western winds in order to minimized the potential for high wind speeds predicted at those areas. Wind screens in the areas between the buildings and along sidewalks may also be considered and/or tested to diffuse wind flowing around the areas.

6.3 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, 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 will be conducted for the Project, the results of which will be presented in any subsequent Article 80 filing. The proposed methodology for the solar glare study is described below.

6.3.1 Methodology

A computer model of the Project and its surrounding urban area will be 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.

Several receptor locations will be identified to study the potential for visual glare impacts on drivers, pedestrians, and building facades.

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.

6.3.1.1 Visual Glare 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.

6.3.1.2 Thermal Impact Criteria

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

- **Low**: Either no significant reflections occur, or the reflection intensity is below the short-term exposure threshold of 1500 W/m^2.
- **Moderate:** The reflection intensity is above the short-term exposure threshold of 1500 W/m^2 but below the safety threshold of 2500 W/m^2. Such reflections would quickly cause thermal discomfort in people.
- **High:** The reflection intensity is above the safety threshold of 2500 W/m^2 but below 3500 W/m^2. This level of exposure to bare skin would lead to the onset of pain within 30 seconds.
- **Very High:** The reflection intensity is above 3500 W/m^2. This level of exposure would lead to second degree burns on bare skin within 1 minute.

6.4 Shadow

A preliminary shadow impact assessment was conducted for the Project as required by Section 80B-2(c) of the Code. It should be noted that the architecture will be refined and shaped as building design progresses. Therefore, the results of this shadow analysis are preliminary and approximate based on conceptual design.

6.4.1 Methodology

The shadow analysis presented herein provides a comparison of the No-Build and Build Conditions. It was prepared in accordance with the requirements of Section B.2 of the BPDA Development Review Guidelines. The analysis is based on the BPDA's 3D massing model for Allston and includes planned and currently approved projects. Using "clear sky" solar data at Boston's Logan International Airport (meaning the assumption that no cloud cover ever occurs; therefore, providing a "worst case" scenario showing the full extent of when and

where shadow could occur), the shadow study was completed using standard sun altitude and azimuth data for each study date estimated to occur at N 42 degrees 21'23.05" latitude and W 71 degrees 8'21.709" longitude. Shadows cast by the proposed buildings have been plotted for three time intervals (9:00AM, 12:00PM, 3:00PM) and are represented for the Vernal Equinox (March 21st), Summer Solstice (June 21st), Autumnal Equinox (September 21st) and Winter Solstice (December 21st), and 6:00PM for June 21st and September 21st. These shadows are compared to shadows from all surrounding existing buildings and permitted projects (shown in gray) at the same times to create illustrations of net new shadow (shown in blue on Figures 6.2a through 6.2d). The analysis focuses on the net new shadow cast onto public ways, open space, above-grade public transit stops/stations and historic resources adjacent to and in the vicinity of the Project Site.

6.4.2 Shadow Analysis Findings

The shadow study results are presented in Figures 6.2a through 6.2d. 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 the Charles River or Soldiers Field Road. A summary of the shadow analysis results for each representative period is provided below.

6.4.2.1 March 21 – Vernal Equinox

As shown on Figure 6.2a, at 9AM, net new shadow from the Project would extend over the parcels and a portion of the existing building to the northwest of the Project Site and over a portion of Western Avenue. By 12PM, the net new shadow remains mostly on-site, with a small amount of shadow cast to the north of the Project Site over a portion of Western Avenue. By 3PM, the net new shadow would be cast to the North of the Project Site over Western Avenue and over a portion of the road to the east of the Project Site. By 6PM, the shadow would extend towards the northeast of the Project Site, within the Project Site, and over a portion of the parcel to the east of the Project Site. The cumulative shadow impacts during the Vernal Equinox are depicted on Figure 6.2b.

6.4.2.2 June 21 – Summer Solstice

Shadows are generally shorter during the summer months. As shown on Figure 6.2c, at 9AM, a small portion of new net shadow would be cast over part of the adjacent parcels and the associated roads to the west of the Project Site. By 12PM, the new net shadow remains mostly on-site, and only a small portion of the shadow would be cast over Western Avenue. By 3PM, the net new shadow remains mostly on-site, and only a small portion of the shadow would be cast on the sidewalk to the east of the Project Site. By 6PM, net new shadow would extend east across the Project Site and the sidewalk and adjacent parcel to the east of the Project Site, reaching just shy of the Sanofi-Genzyme building. The cumulative shadow impacts during the Summer Solstice are depicted on Figure 6.2d.

6.4.2.3 September 21 – Autumnal Equinox

As shown on Figure 6.2e, at 9AM, net new shadow would extend over the parcels and a portion of the existing building on the northern side of Western Avenue and to the northeast of Stadium Way. By 12PM, the new net shadow remains mostly on-site, and only a small portion of the shadow would be cast over Western Avenue. By 3PM, the net new shadow would be cast to the north of the Project Site over Western Avenue and over a portion of the road to the east of the Project Site. By 6PM, the shadow would extend towards the northeast of the Project Site, within the Project Site, and over a portion of the parcel to the east of the Project Site, reaching just shy of the Sanofi-Genzyme building**.** The cumulative shadow impacts during the Autumnal Equinox are depicted on Figure 6.2f.

6.4.2.4 December 21 – Winter Solstice

Shadows are generally longest during the winter months. As shown on Figure 6.2g, at 9AM net new shadow would extend over the parcels and a portion of the existing building on the northern side of Western Avenue and to the northeast of Stadium Way. By 12PM the net new shadow continues to extend northward, casting over pieces of Western Avenue and over a portion of the undeveloped parcels to the north of the Project Site. By 3PM, the net new shadow would be cast to the north of the Project Site over Western Avenue and over a portion of the road to the east of the Project Site. By 4:15PM, which is sunset on the winter solstice, the shadow would extend towards the northeast of the Project Site, within the Project Site, and over a portion of the parcel to the east of the Project Site. The cumulative shadow impacts during the Winter Solstice are depicted on Figure 6.2h.

6.5 Water Quality

The Project will not affect the water quality of nearby water bodies during or after construction. The Project will comply with the MassDEP Stormwater Management Standards, as described in Chapter 7, *Infrastructure*. The Project will comply with the Massachusetts Stormwater Handbook and stormwater BMPs will be used where applicable.

Erosion and sediment control measures will be implemented during construction to minimize the transport of site soils to off-site areas and the BWSC storm drain system. Existing catch basins will be protected with filter fabric, straw bales, and/or crushed stone to provide for sediment removal from runoff. These controls will be inspected and maintained throughout the construction phase until the areas of disturbance have been stabilized through the placement of pavement, structure, or landscape cover.

The Project will strive to improve the water quality of stormwater runoff from the constructed site by incorporating on-site stormwater management and treatment systems that reduce runoff volumes and rates of discharge compared to the existing condition. Stormwater from building roofs will be collected and directed to on-site infiltration systems. Stormwater will be collected by catch basins with deep sumps and hoods for pre-treatment and then directed to infiltration systems. Stormwater treatment on-site will reduce the quantity of Total Suspended Solids (TSS), pathogens, and phosphorus in runoff. Excess stormwater runoff that is not contained on-site will overflow to the existing BWSC storm

drain system but will have been treated by the on-site stormwater management and treatment systems. If it is determined that infiltration systems are infeasible due to Project Site constraints, the Proponent will treat the stormwater runoff to adequately capture TSS, pathogens, and phosphorus prior to discharging to the BWSC system. The existing Project Site does not appear to provide treatment or storage of runoff. Therefore, the stormwater management and treatment systems part of the constructed Project will improve the quality of stormwater compared to the existing condition.

Drainage within garages will be directed to oil/water separator structures, then directed to the BWSC sanitary sewer system.

All necessary dewatering will be conducted in accordance with applicable MWRA and BWSC discharge permits. Once construction is complete, the Project will be in compliance with local and state stormwater management policies, as described below.

6.6 Flood Hazard Zone

Based on the FEMA FIRM, Map Number 250250076G, dated September 25, 2009, the entire PDA is located outside of a designated Flood Hazard Zone. As shown in Figure 4.2, the Project Site falls within the "Zone X" Areas, which are determined to be outside the 0.2% annual chance floodplain. In addition, the PDA is located outside of the Climate Ready Boston coastal flood risk flood map through 2070.

6.7 Daylight

The following section describes the anticipated effect on daylight coverage at the Project Site as a result of the Project. Article 80 requires an analysis of the percentage of skydome anticipated to be obstructed under the Existing/No-Build and Build Conditions (Section 80B-2(c)). The daylight analysis was prepared using the BPDA's Daylight Analysis Program ("BRADA") and has been completed in accordance with the requirements of Article 80.

6.7.1 Methodology

The daylight analysis was conducted using the BRADA program developed in 1985 by the Massachusetts Institute of Technology to estimate the pedestrian's view of the skydome taking into account building massing and building materials used. The software approximates a pedestrian's view of a site based on input parameters such as: location of viewpoint; length and height of buildings and the relative reflectivity of the building façades. The model typically uses the midpoint of an adjacent right-of-way or sidewalk as the analysis viewpoint. Based on these data, the model calculates the perceived skydome obstruction and provides a graphic depicting the analysis conditions.

The model inputs used for the study presented herein were taken from a combination of the BPDA's City of Boston model data, an existing conditions survey, and schematic design plans prepared by the Project Architect. As described above, the BRADA software considers the relative reflectivity of building façades when calculating perceived daylight obstruction. Highly reflective materials are thought to reduce the perceived skydome obstruction when

compared to non-reflective materials. For the purposes of this daylight analysis, the building façades are considered non-reflective, resulting in a conservative estimate of daylight obstruction.

6.7.1.1 Viewpoints

The following viewpoint was studied in the daylight analysis:

› **Western Avenue** – This viewpoint is located on the centerline of Western Avenue, centered on the northern side of the Project Site.

This point represents the Project's building façades when viewed from the adjacent public way.

6.7.2 Daylight Analysis Findings

6.7.2.1 Daylight Existing/No-Build Conditions

Under the Existing/No-Build Condition, the skydome is moderately obstructed. The existing skydome obstruction at Western Avenue, based on the viewpoint, is 0%. This is the result of the current lack of development on the Project Site.

6.7.2.2 Daylight Build Conditions

Under the Proposed Conditions, the viewpoint along Western Avenue is expected to experience an increase in skydome obstruction to 27.4% due to the increase height and massing of the new buildings, as would be expected when increasing the density of an urban site. The increase in skydome obstruction will be offset by improvements to the public realm, which are anticipated to improve the overall pedestrian experience as compared to existing underutilized conditions.

Table 6-2 below presents the percentage of skydome that is expected to be obstructed along Western Avenue with and without the Project. Figure 6.3 graphically shows the Project-related daylight impacts from the same viewpoint.

Table 6-2 Existing/No-Build and Build Daylight Conditions

Viewpoint	Existing/No-Build Condition Skydome Obstruction	Build Condition Skydome Obstruction
Western Avenue	0%	27.4%

6.8 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 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 future microscale and mesoscale requirements to be analyzed in the DEIR and DPIR filing.

6.8.1 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 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.

6.8.2 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 6-3 presents the NAAQS for carbon monoxide.

Table 6-3 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 6-4.

Table 6-4 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.

6.8.3 Microscale Air Quality Analysis

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."

The objective of the microscale analysis will be to determine if the Project will interfere with the attainment or maintenance of the Massachusetts and/or National Ambient Air Quality Standards established by the Federal Clean Air Act Amendments. Massachusetts has developed a SIP to demonstrate compliance with the CAAA. The SIP contains project-level criteria that require that an adequate air quality study be prepared in consultation with the air quality regulatory agencies and that the results of the study demonstrate that:

- Proposed projects will not result in new CO violations; and
- Proposed projects will not result in any existing CO violations being increased.

It is anticipated that a qualitative or quantitative assessment of the air quality impacts of the Project will be conducted once the traffic impacts are determined using the BPDA Development Review Guidelines. If any CO violations are predicted, mitigation measures will be developed and tested to meet the SIP and CAAA criteria.

6.8.4 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 5, *Transportation*, the Project is anticipated to generate approximately 5,121 vehicle trips per day, therefore this analysis is not required for the BPDA. MEPA requires that all projects filing an environmental impact report (EIR) assess GHG and Ozone Precursors (for projects in an Ozone non-attainment area) in a mesoscale analysis. Accordingly, a quantitative mesoscale air quality analysis consistent with EPA and DEP guidelines would be conducted for an EIR filing.

6.9 Noise

The noise assessment evaluated the potential noise impacts associated with the Project's activities, including potential mechanical equipment and service activities. This section discusses the fundamentals of noise, noise impact criteria, noise analysis methodology, and potential noise impacts. Existing ambient conditions were determined based on measurements conducted near the Project Site. A qualitative analysis demonstrates that the Project will comply with City of Boston noise regulations.

6.9.1 Noise Fundamentals

Noise is defined as unwanted or excessive sound. Sound becomes unwanted when it interferes with normal activities such as sleep, communication, work, or recreation. How people perceive sound depends on several measurable physical characteristics, which include the following:

- Intensity: Sound intensity is often equated to loudness.
- Frequency: Sounds are comprised of acoustic energy distributed over a variety of frequencies. Acoustic frequencies, commonly referred to as tone or pitch, are typically measured in Hertz. Pure tones have all energy concentrated in a narrow frequency range.

Sound levels are most often measured on a logarithmic scale of decibels (dB). The decibel scale compresses the audible acoustic pressure levels which can vary from the threshold of hearing (zero dB) to the threshold of pain (120 dB). Because sound levels are measured in dB, the addition of two sound levels is not linear. Adding two equal sound levels creates a 3 dB increase in the overall level. Research indicates the following general relationships between sound level and human perception:

- A 3 dB increase is a doubling of acoustic energy and is the threshold of perceptibility to the average person.
- A 10 dB increase is a tenfold increase in acoustic energy but is perceived as a doubling in loudness to the average person.

The human ear does not perceive sound levels from each frequency as equally loud. To compensate for this phenomenon in perception, a frequency filter known as A-weighted [dB(A)] is used to evaluate environmental noise levels.

Table 6-5 presents a list of common outdoor and indoor sound levels.

Table 6-5 Common Outdoor and Indoor Sound Levels

Outdoor Sound Levels	Sound Pressure (μPa)*	Sound Level dB(A)**	Indoor Sound Levels
Jet Over Flight at 300 m	6,324,555	110	Rock Band at 5 m
		105	
	2,000,000	100	Inside New York Subway Train
Gas Lawn Mower at 1 m		95	
	632,456	90	Food Blender at 1 m
Diesel Truck at 15 m		85	
Noisy Urban Area - Daytime	200,000	80	Garbage Disposal at 1 m
		75	Shouting at 1 m
Gas Lawn Mower at 30 m	63,246	70	Vacuum Cleaner at 3 m
Suburban Commercial Area		65	Normal Speech at 1 m
	20,000	60	
Quiet Urban Area - Daytime		55	Quiet Conversation at 1 m
	6,325	50	Dishwasher Next Room
Quiet Urban Area - Nighttime		45	
	2,000	40	Empty Theater or Library
Quiet Suburb - Nighttime		35	
	632	30	Quiet Bedroom at Night
Quiet Rural Area - Nighttime		25	Empty Concert Hall
Rustling Leaves	200	20	
		15	Broadcast and Recording Studios
	63	10	
		5	
Reference Pressure Level	20	0	Threshold of Hearing

* μPA – MicroPascals, which describe pressure. The pressure level is what sound level monitors measure.

** dB(A) – A-weighted decibels, which describe pressure logarithmically with respect to 20 μPa (the reference pressure level).

A variety of sound level indicators can be used for environmental noise analysis. These indicators describe the variations in intensity and temporal pattern of the sound levels. The following is a list of common sound level descriptors used for environmental noise analyses:

› L90 is the sound level which is exceeded for 90 percent of the time during the time period. The L90 is generally considered to be the ambient or background sound level.

› Leq is the A-weighted sound level, which averages the background sound levels with short-term transient sound levels and provides a uniform method for comparing sound levels that vary over time.

› Ldn is a 24-hour weighted average sound level, with a nighttime penalty that accounts for increased annoyance during these hours.

6.9.2 Methodology

The noise evaluation includes a discussion of existing ambient background sound levels and a qualitative assessment of potential noise impacts associated with the anticipated mechanical equipment (e.g., HVAC units, exhaust ventilation systems) and service activities. The study area was evaluated and sensitive receptor locations near the Project were identified and examined. The site layout and building design, as it relates to the service area and management of deliveries at the Project Site were also considered. The assessment considered sound level reductions due to distance, proposed building design, and obstructions from surrounding structures. In addition, the assessment will evaluate the proposed residential units following the City of Boston and United States Department of Housing and Urban Development (HUD) guidelines.

6.9.2.1 City of Boston Noise Impact Criteria

The City of Boston has developed noise standards that establish noise thresholds deemed to result in adverse impacts. The noise analysis for the Project used these standards to evaluate whether the proposed development will generate sound levels that result in potential adverse impacts.

Under Chapter 40 Section 21 of the General Laws of the Commonwealth of Massachusetts and Title 7 Section 50 of the Boston Code, the Air Pollution Control Commission of the City of Boston has adopted Regulations for the Control of Noise in the City of Boston. These regulations establish maximum allowable sound levels based upon the land use affected by the proposed development. Table 6-6 summarizes the allowable sound levels that should not be exceeded.

Table 6-6 City of Boston Noise Standards by Zoning District, dB(A)

Land Use Zone District	Daytime (7:00 AM – 6:00 PM)	All Other Times (6:00 PM – 7:00 AM)
Residential	60	50
Residential/Industrial	65	55
Business	65	65
Industrial	70	70

Source: Regulations for the Control of Noise in the City of Boston, Air Pollution Control Commission.

For a residential zoning district, the maximum noise level affecting residential uses shall not exceed the Residential Noise Standard. The residential land use noise standard is 60 dB(A) for daytime periods (7:00 AM to 6:00 PM) and 50 dB(A) for nighttime conditions (6:00 PM to 7:00 AM).

6.9.2.2 Department of Housing and Urban Development Noise Goal

The HUD standard is intended to protect residential receptor locations from noise sources, such as highways, rail lines, and airports that may cause interference with normal activities, such as sleep and conversation.

HUD uses a day-night average sound level (DNL or Ldn) as the value for establishing goals for determining acceptable sound levels. The DNL levels are based on a multitude of factors and provides a noise indicator of a 24-hour weighted average sound level. The DNL is derived from hourly sound level values and includes a nighttime penalty that accounts for increased annoyance during these hours. Studies have shown that additional annoyance occurs during the nighttime since background sound levels are typically at their minimum and many people are more noise sensitive while trying to sleep.

HUD considers a DNL of 65 decibels or lower as an acceptable exterior sound level and 45 decibels as an acceptable interior goal. Exterior sound levels above 65 decibels but not exceeding 75 decibels is normally unacceptable. However, a waiver may be granted if noise attenuation measures (such as noise barriers and/or special building construction material) are provided. Residential buildings are generally constructed such that the walls are expected to reduce the outdoor sound levels by a minimum of 20 decibels. Therefore, indoor sound levels for residential buildings of 45 decibels or less are considered acceptable.

6.9.2.3 Receptor Locations

The noise assessment included an evaluation of the study area to identify nearby sensitive receptor locations. The noise assessment identified two noise sensitive areas near the Project Site. As shown on Figure 6.4, the receptor locations include the following:

- R1 – One Western Avenue (Harvard University Housing); and
- R2 – Windom Street/Hopedale Street residential neighborhood.

These receptor locations, selected based on land use considerations, represent the most sensitive locations near the Project Site.

6.9.3 Existing Noise Conditions

Sound level measurements were conducted at three locations to establish existing ambient sound levels in vicinity of the Project Site. Measurements were conducted continuously from September 14, 2020 to September 21, 2020 to capture sound levels representative of typical existing daytime and nighttime ambient conditions.

The measured L90 sound levels range from approximately 41 dB(A) to approximately 69 dB(A) during the daytime period (7:00 AM to 6:00 PM) in the vicinity of the Project Site. The higher sound levels may be attributed to roadway construction activity near the intersection of Western Avenue and Soldiers Field Road at the time of the measurements. During the other time period (6:00 PM to 7:00 AM), the area surrounding the Project Site experience sound levels ranging from approximately 39 dB(A) to approximately 60 dB(A). The result of the ambient noise measurements indicates that sound levels in the area of the Project Site are greater than the City's standards for a Residential District during certain periods of a typical day. The Project Site is located in an active urban area with vehicular traffic noise dominating the ambient sound levels during the daytime period. The existing measured sound level data are included in Appendix C.

6.9.4 Proposed Noise Sources

Since the Project is in the early stages of the design process, the specific details related to the final selection of mechanical equipment are not confirmed at the time of this noise assessment. Based on preliminary design plans, the anticipated mechanical equipment associated with the Project may include the following:

- Condensing boilers;
- Air cooled chiller plant;
- Water-cooled chiller plant; and
- Energy recovery units.

The mechanical systems would be strategically located on the rooftop, utilizing the height of the building in providing noise attenuation or in mechanical rooms of the proposed building. During the design and selection process, the appropriate low-noise mechanical equipment will be selected, including potential noise mitigation measures, such as acoustical enclosures, and/or acoustical silencers. As such, the sound levels associated with the Project's mechanical equipment are expected to be minimal and comply with the City of Boston's noise standards at the surrounding sensitive receptor locations.

A quantitative noise assessment of potential noise impacts associated with the Project's mechanical equipment will be conducted once the details of the mechanical equipment are known and will be included in subsequent filings.

6.9.5 Potential Noise Impacts on Proposed On-Site Residential Uses

Conformance with HUD interior design noise level is a requirement for applicable residential projects under the BPDA Development Review Guidelines. HUD requires an assessment of noise sources that are located within certain distances of major transportation facilities, such as major roadways, rail lines, and airports. The Project is located in an active urban area with major roadways, such as Soldiers Field Road.

The proposed residential buildings will be designed and incorporate constructing material and techniques to achieve HUD's interior noise goal of 45 dBA. The window glazing and associated framing system will be designed to control sound levels transmitted from the exterior to the interior of the residential units.

6.10 Geotechnical

6.10.1 Foundation Construction Methodology

The buildings proposed for the Project will be supported on either shallow conventional footings or deeper foundations. Feasible deep foundation types include pressure injected footings and driven piles. The underground garage parking slab, beneath all buildings except for the ERC Center, is planned to be at approximately 14 feet below future site grades. The underground garage will be below the Project Site's groundwater level and will

be constructed with a groundwater cut-off system and fully waterproofed basement foundations walls. An underdrain/pressure relief drainage system will be installed below the parking slab. The ERC Center is planned to be constructed with a structural slab on grade. Where possible, resiliency measures – as described in Section 4.5.3 of Chapter 4, *Sustainability and Climate Change Resiliency* – will be incorporated into the foundation design for the Project.

6.10.2 Considerations for Off-Site Impacts and Mitigation Measures

Based on the design and construction methodology developed for the Project, potential impacts to abutting facilities from foundation construction such as ground movement, vibration, and groundwater lowering are anticipated to be inconsequential. Although impacts to adjacent structures are anticipated to be nominal, the Proponent will perform a geotechnical monitoring program prior to and during below-grade construction for documentation purposes.

6.11 Subsurface and Groundwater

6.11.1 Subsurface Soil Characteristics

Previous subsurface investigations were undertaken at and adjacent to the Project Site and have been reviewed and evaluated to define subsurface conditions. In general, the subsurface soil profile at the Project Site consists of approximately 3.5 to nine feet of fill over thin layers of organics and fluvial sands, as well as a thick layer of marine clay underlain by glacial deposits and bedrock at depths exceeding 100 feet. Table 6-7 summarizes the subsurface conditions encountered in the borings that have been completed to date and those that are anticipated at the Project Site, in order of increasing depth below the ground surface. Existing ground surface grades are on average elevation 15 Boston City Base (BCB) datum and range between elevation 13.5 to 18.5.

Table 6-7 Subsurface Soil Profile

Generalized Description	Depth to Top of Layer (feet)	Thickness of Layer (feet)
Fill	-	3.5 to 9 feet
Organic Deposits	4 to 9 feet (where encountered)	2 to 5 feet (where encountered)
Fluvial Sands	6.5 to 11 feet	7.5 to 12.5 feet
Marine Clay	16 to 23.5 feet	74.5 feet (where penetrated)
Glaciofluvial Deposits	90.5 feet	27.5 feet
Glacial Till	98.5 to 117 feet	3.5 to 20.5 feet (where penetrated)
Bedrock	118 feet	-

6.11.2 Groundwater Conditions

Since 2010, groundwater levels have been monitored at or in the vicinity of the Project Site. Groundwater level measurements range from about three to 12 feet below the surface, corresponding to approximately elevation 11 to elevation 7 BCB.

Excavation for the underground garage construction will be conducted within a temporary earth support system that will be designed and constructed as a groundwater seepage and impervious 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 Boston Water and Sewer Commission (BWSC).

Groundwater levels at the Project Site will fluctuate naturally due to seasonal variation and factors such as precipitation and the level of the Charles River, which is typically controlled at elevation 8. Area groundwater levels may be influenced by local construction activity, pumping from foundation drains, leakage into or out of sewers, storm drains, and water lines in proximity of the Project Site.

6.11.3 Groundwater Conservation Overlay District

The Project is not located within a GCOD and therefore the specific requirements of Article 32 are not applicable. Project design criteria will be established to mitigate any negative impact by potentially lowering area groundwater levels.

It is currently planned to install rain gardens and stormwater recharge systems as part of the Project to provide storage and passive, or gravity-driven, on-site infiltration of stormwater and potentially garage sub-slab pressure relief. Refer to Section 7.2.2 of Chapter 7, *Infrastructure,* for more details on these systems.

6.12 Solid and Hazardous Wastes

In 2010, the MassDEP assigned Release Tracking Number (RTN) 3-29441 to the Project Site for compounds detected in soil and/or groundwater samples above applicable Massachusetts Contingency Plan (MCP) reportable concentrations. Site compounds from historic filling and industrial operations include chlorinated volatile organic compounds (VOCs), semi-VOCs, petroleum, pesticides, polychlorinated biphenyls (PCBs), metals in the soil, and chlorinated VOCs, semi-SVOCs, and dissolved phase petroleum in the groundwater. In addition, potential asbestos containing material (PACM) is present in debris found in fill soils. In addition, methane has been detected at the Project Site; however, the source is naturally occurring in the organic soils.

Remedial response actions have resulted in the Project Site achieving regulatory closure with a Permanent Solution with Conditions Statements in May 2020. Closure relies on MCP regulatory conditions that includes a vapor intrusion evaluation by a Licensed Site Professional (LSP) prior to any new building construction, and best management practices for commercial gardening, and an Activity and Use Limitation (AUL) that includes restoration and maintenance of protective ground covers, marker layers, and fencing, as well as the prohibition of single-family residential use in limited areas. The Project does not include single-family residential use. All work will be conducted in accordance with the MCP and the requirements of the regulatory conditions and AUL for RTN 3-29441.

Excavation for below-grade foundation construction for the new buildings, underground parking garages, site utilities, and other improvements will generate excess soil that will require off-site transport. Chemical testing of the material will be undertaken during the design of the Project to define environmental quality and provide data required by appropriate facilities prior to accepting the material. Materials leaving the Project Site will be legally transported in accordance with local, State, and Federal requirements. Receiving facilities for excess soil will be as identified on Harvard's Approved Disposal Facility List or subject to approval by Harvard. All work will be conducted in accordance with the MCP, the requirements of the regulatory conditions and AUL for RTN 3-29441, and all other MassDEP requirements.

There are no buildings at the Project Site 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.

6.13 Construction

Impacts associated with the Proposed Project construction activities are temporary in nature and are typically related to truck traffic, air (dust), noise, stormwater runoff, solid waste, and vibration. The Proponent will develop a detailed Construction Management Plan (CMP) for approval by BTD prior to construction. Each CMP will be developed to reflect the input of the regulatory authorities having jurisdiction over such plans, including the Boston Fire Department and BTD. The CMP will include detailed information on construction activities, specific construction mitigation measures, and vehicle routing, work hours and staging to minimize impact on the surrounding neighborhood and the Turnpike. If any buildings within the Project Site will be occupied before all major construction is completed, the CMP will include provisions to avoid unnecessary impacts on occupied buildings and protect the safety of any employees, residents and visitors at the Project Site.

6.13.1 Logistics and Public Protection

Measures, such as barricades, temporary walkways, scaffolding, and signage will be employed to ensure public safety and protect nearby residents. These measures will be

reviewed closely with BTD. Construction management and scheduling, such as identifying truck and materials delivery routes, and controlling noise 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.

6.13.2 Air Quality

The Proponent will mitigate temporary impacts to air quality 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.

6.13.3 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.

6.13.4 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 Green Building Standards.[1]

6.13.5 Rodent Control

The Proponent will maintain a service contract with a professional pest control firm during the construction of the Project. The Project Site will be inspected on a regular basis and adjustments will be made to the implementation of service, if needed.

[1] Harvard Green Building Standards, 2017. https://green.harvard.edu/sites/green.harvard.edu/files/HarvardGreenBuildingStandards2017.pdf

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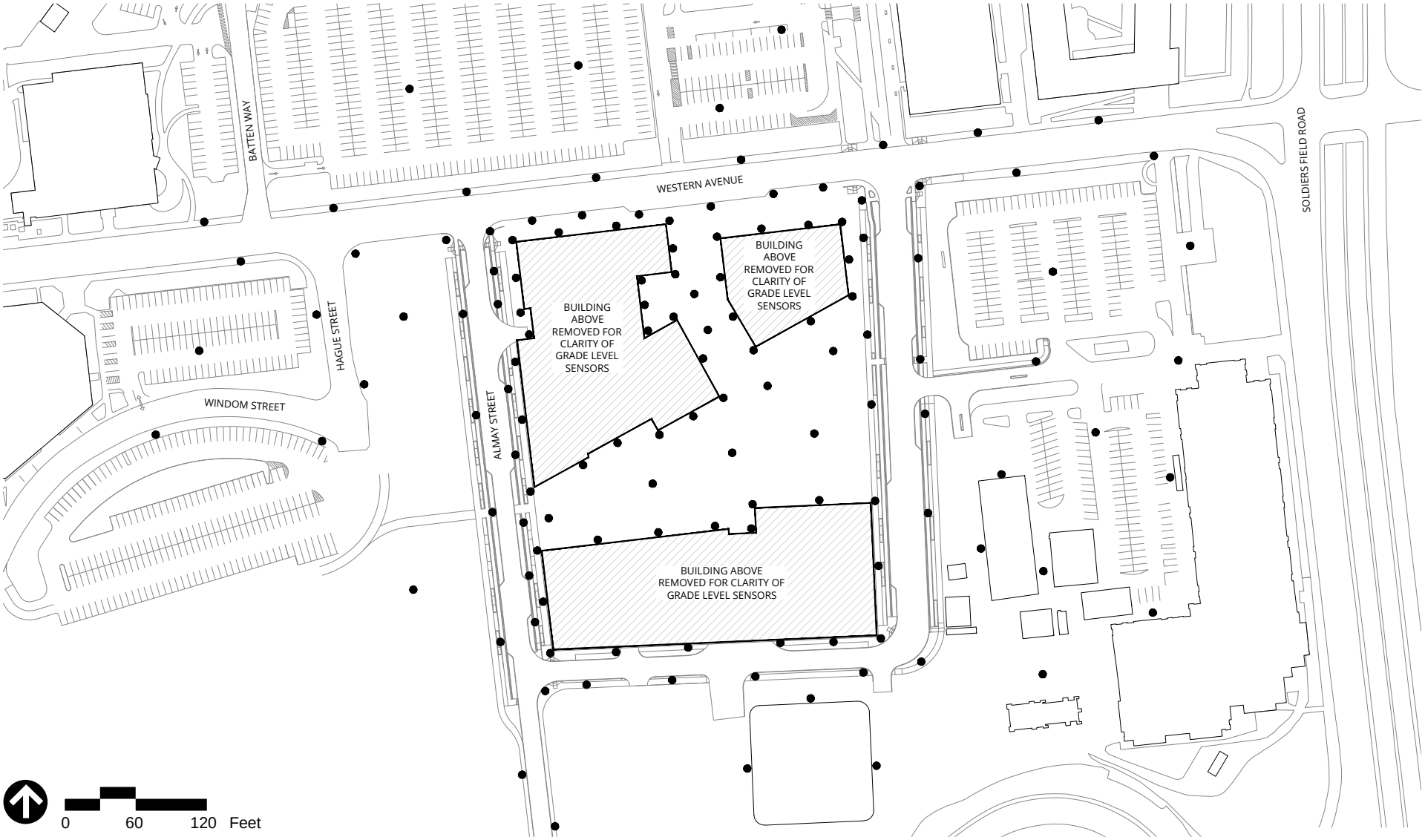


Source:

● Wind Sensor Location - Grade Level

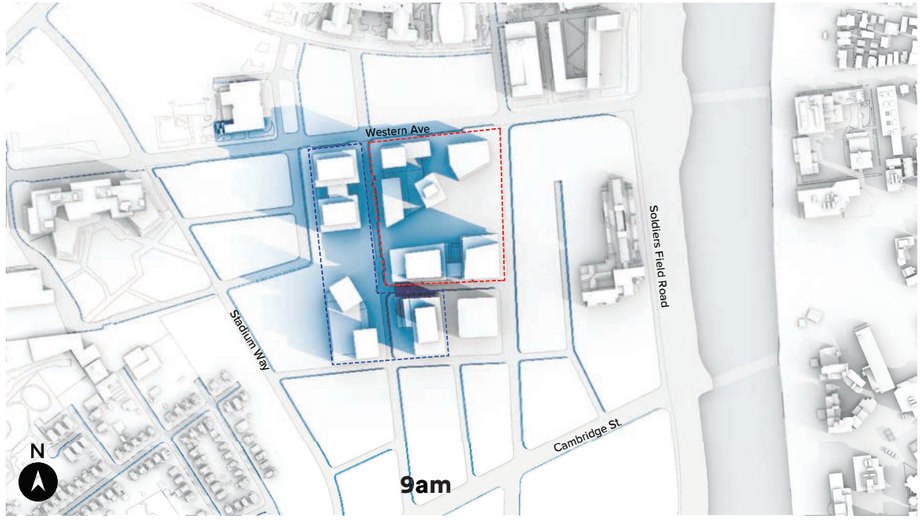
Figure 6.1
Preliminary Wind Sensor Plan

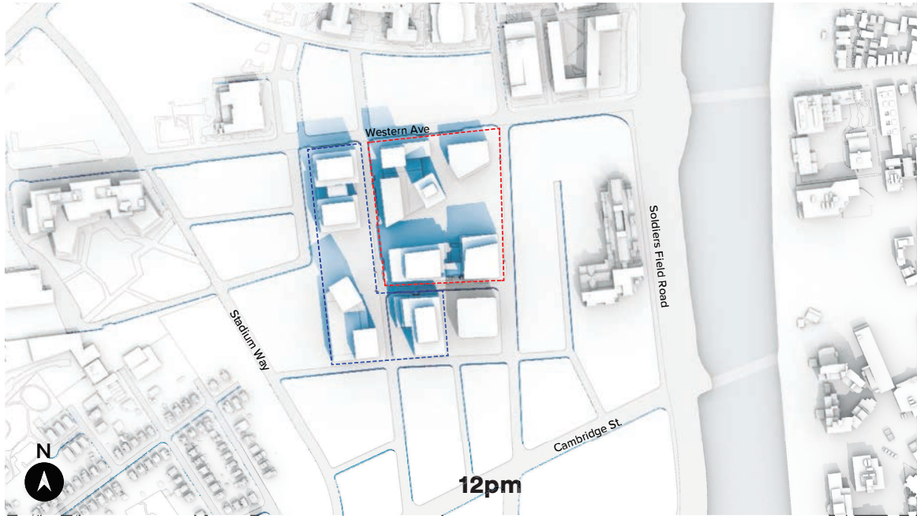
Enterprise Research Campus
Project Boston, MA

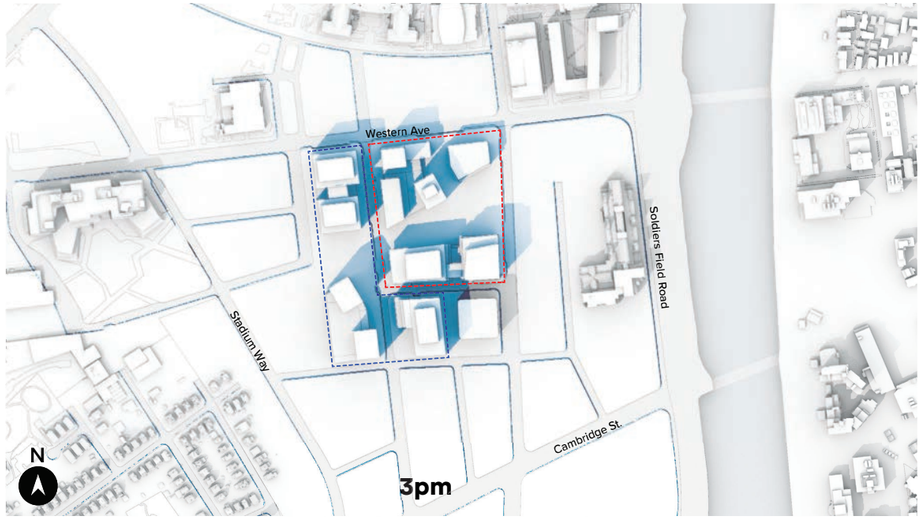
Vernal Equinox
March 20: 9am - 6 pm Shadows

Blue Shadows = Phase 1 Buildings
Grey Shadows = Existing Context Buildings

Phase 1A
Phase 1B







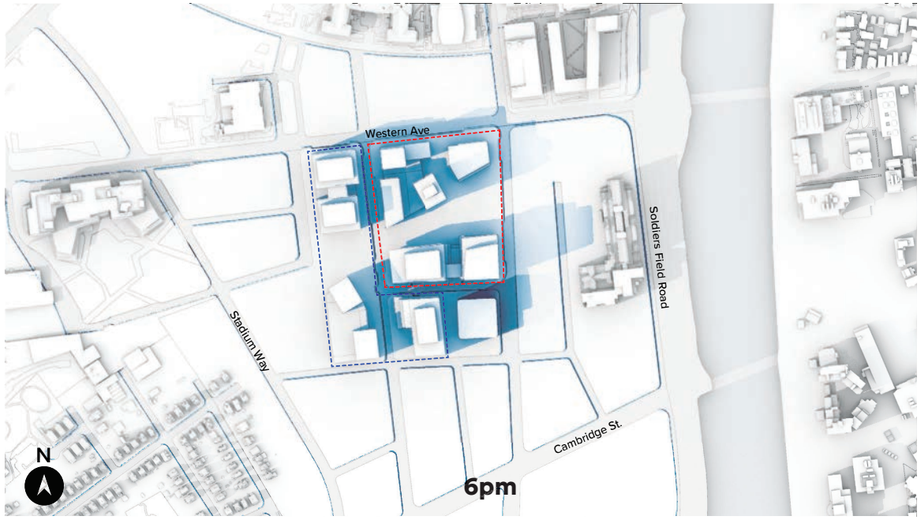


Figure 6.2a

Shadow Analysis
Vernal Equinox

Enterprise Research Campus Project
Boston, MA

Vernal Equinox
March 20: 9am - 6 pm Shadows

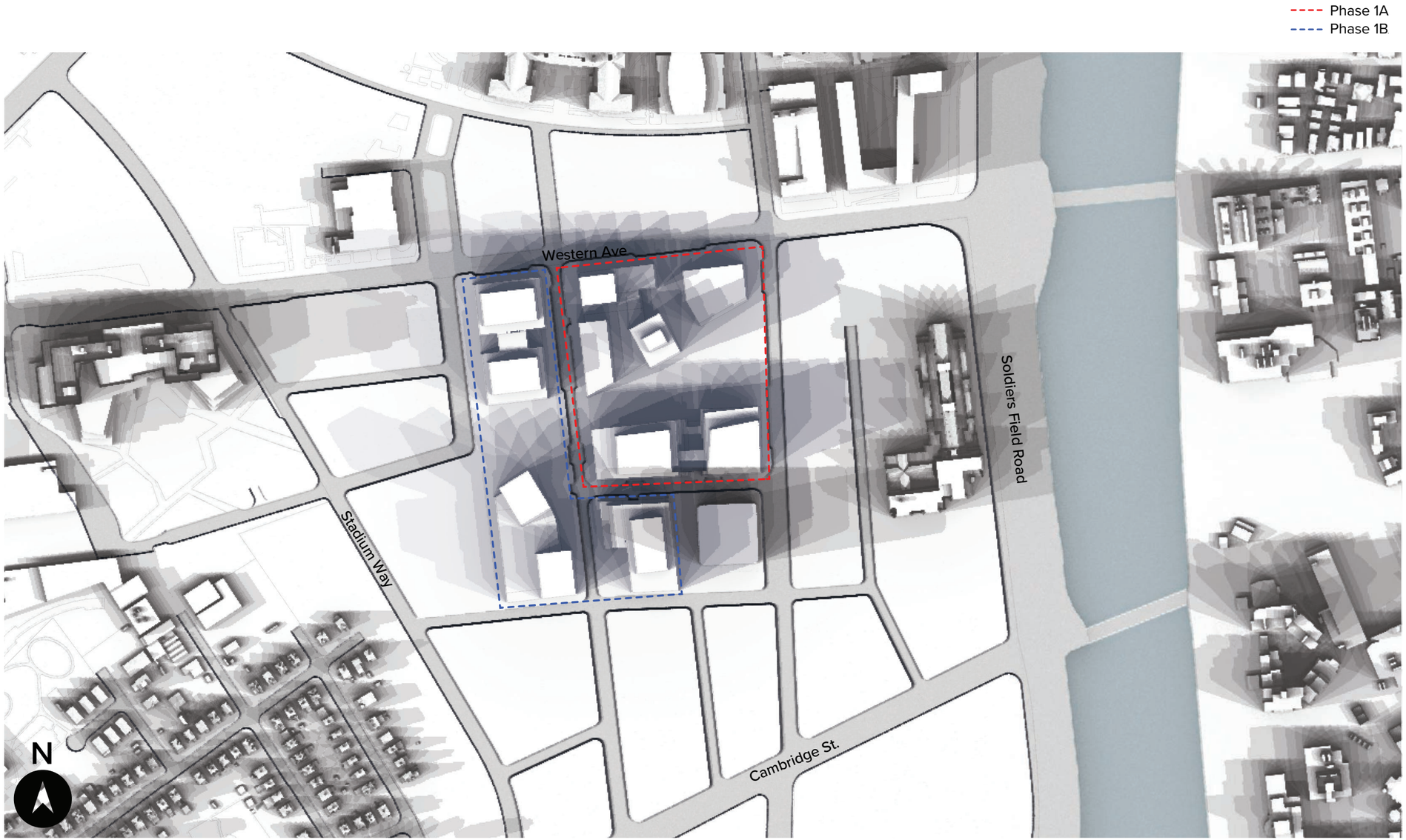


Figure 6.2b

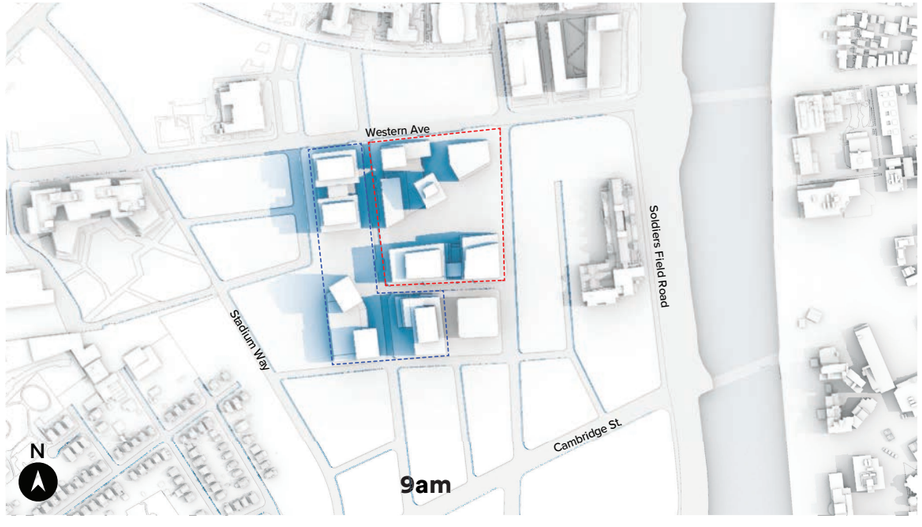
Shadow Analysis
Vernal Equinox

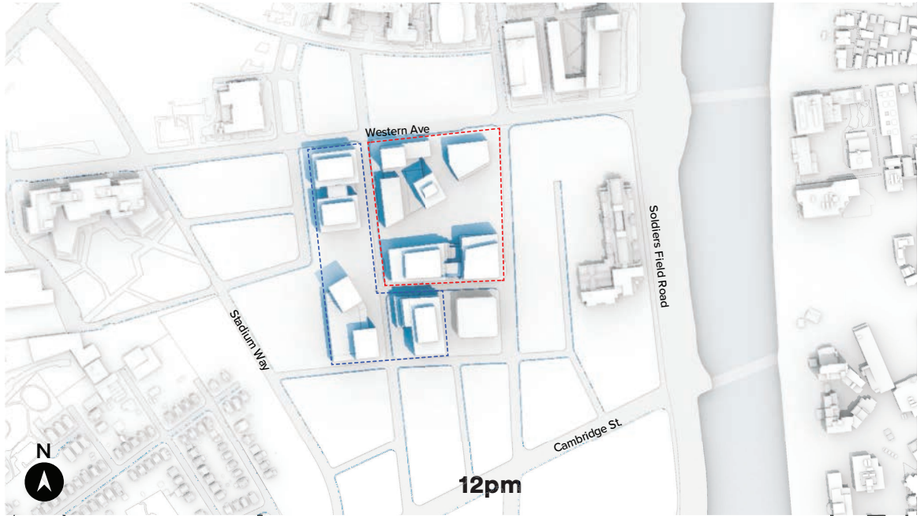
Enterprise Research Campus Project
Boston, MA

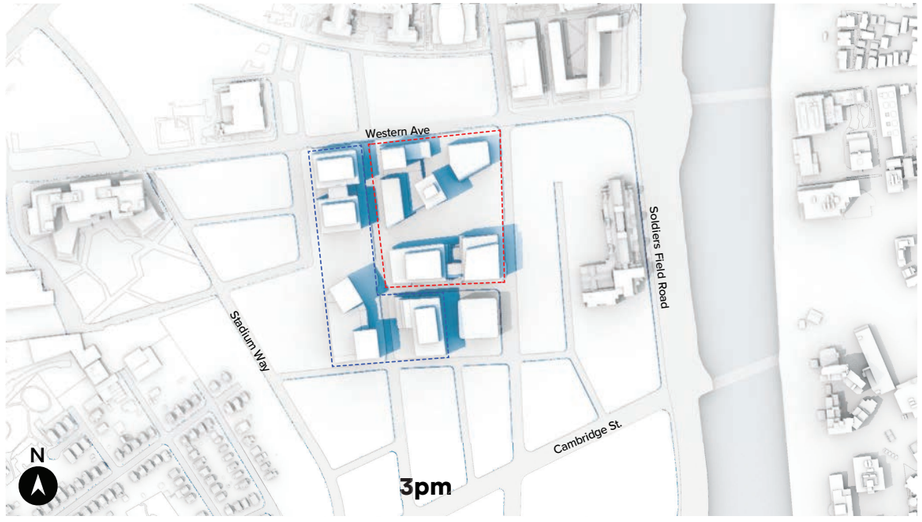
Summer Solstice
June 21: 9am - 6 pm Shadows

Blue Shadows = Phase 1 Buildings
Grey Shadows = Existing Context Buildings

Phase 1A
Phase 1B







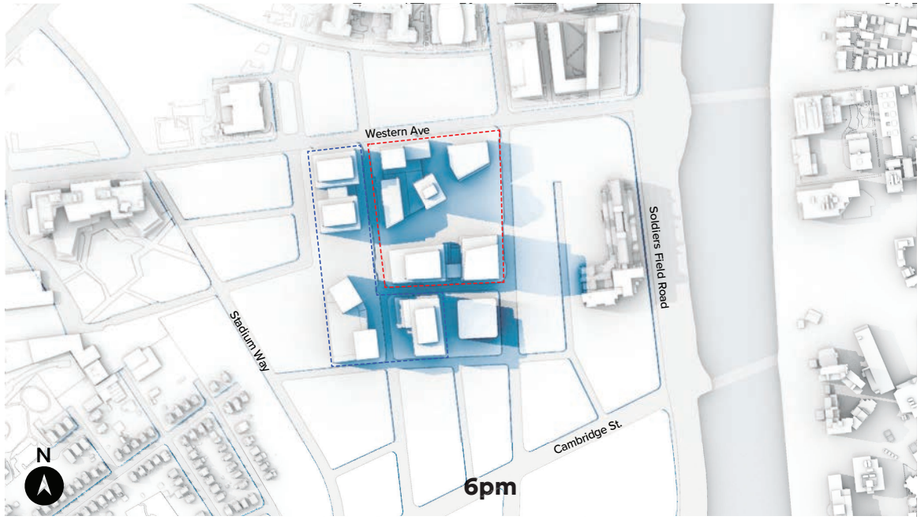


Figure 6.2c

Shadow Analysis
Summer Solstice

Enterprise Research Campus Project
Boston, MA

Summer Solstice
June 21: 9am - 6 pm Shadows

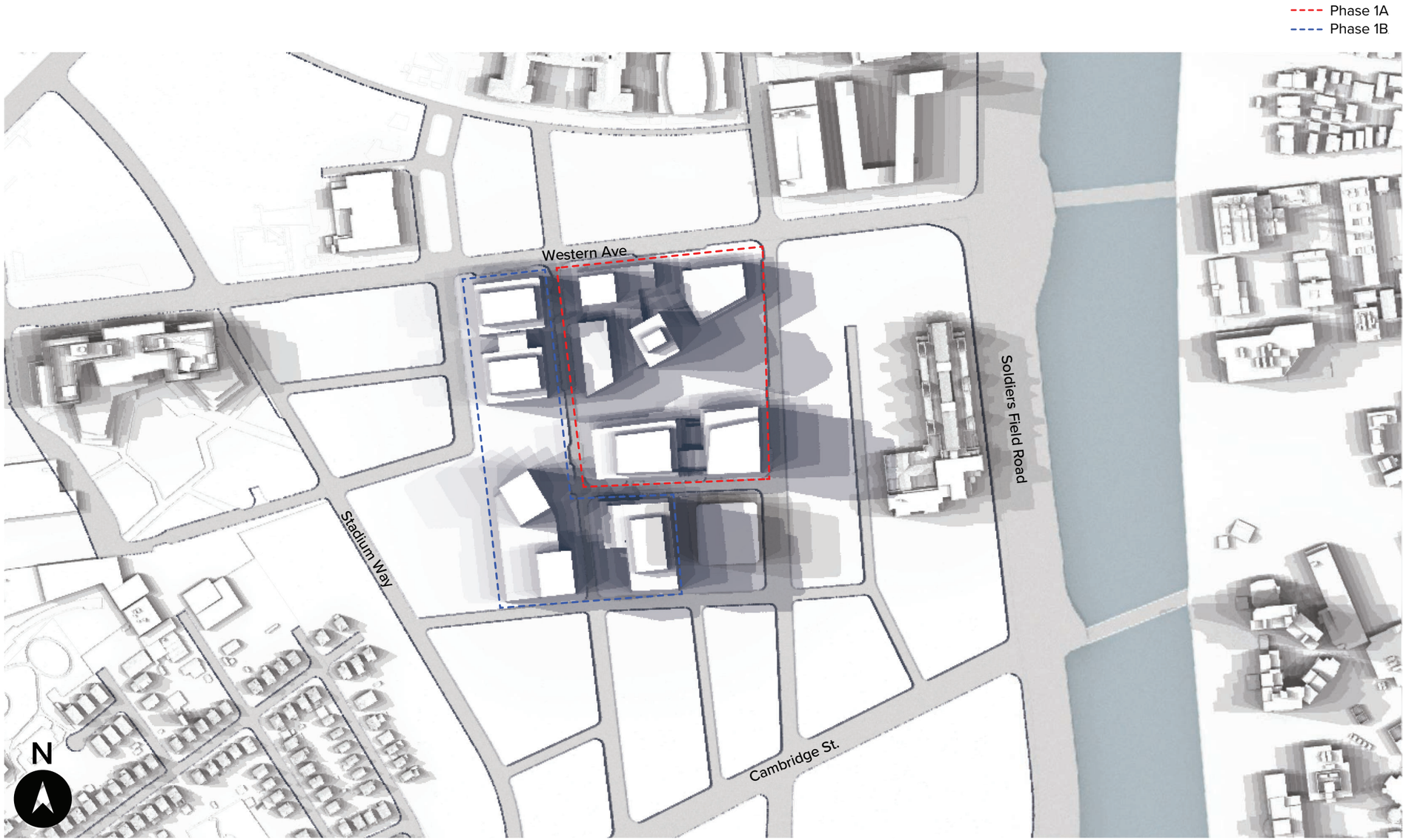


Figure 6.2d

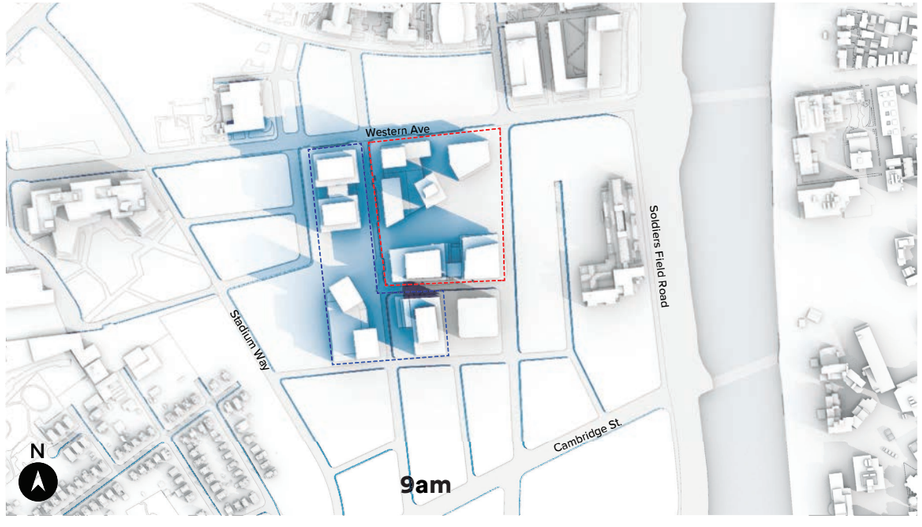
Shadow Analysis
Summer Solstice

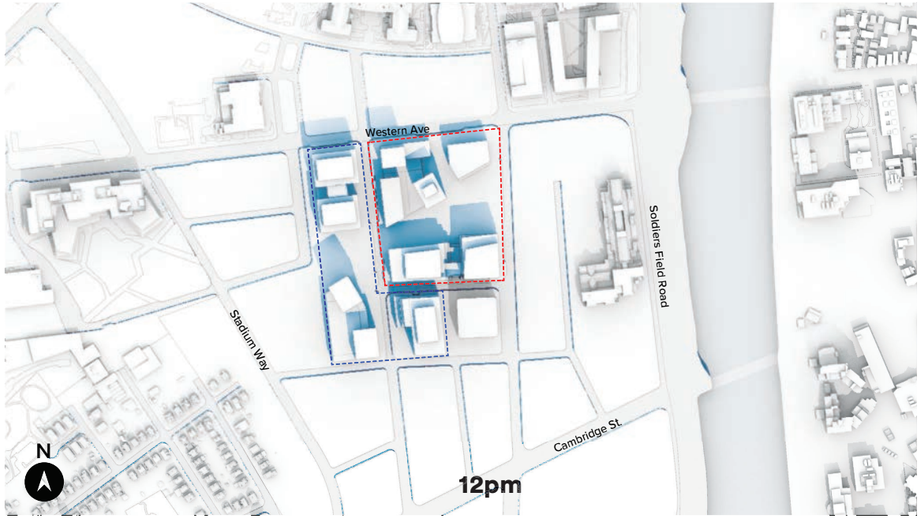
Enterprise Research Campus Project
Boston, MA

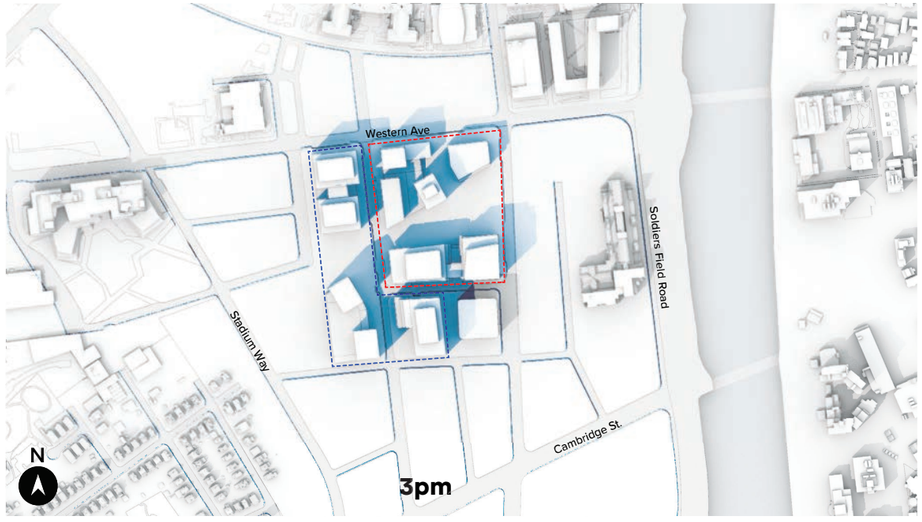
Autumnal Equinox
Sept 22: 9am - Sunset Shadows

Blue Shadows = Phase 1 Buildings
Grey Shadows = Existing Context Buildings

Phase 1A
Phase 1B







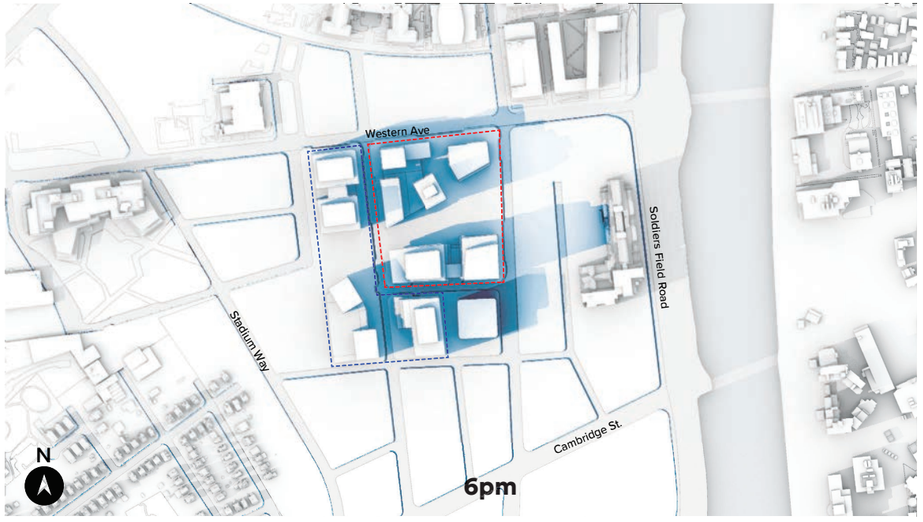


Figure 6.2e

Shadow Analysis
Autumnal Equinox

Enterprise Research Campus Project
Boston, MA

Autumnal Equinox
Sept 22: 9am - Sunset Shadows

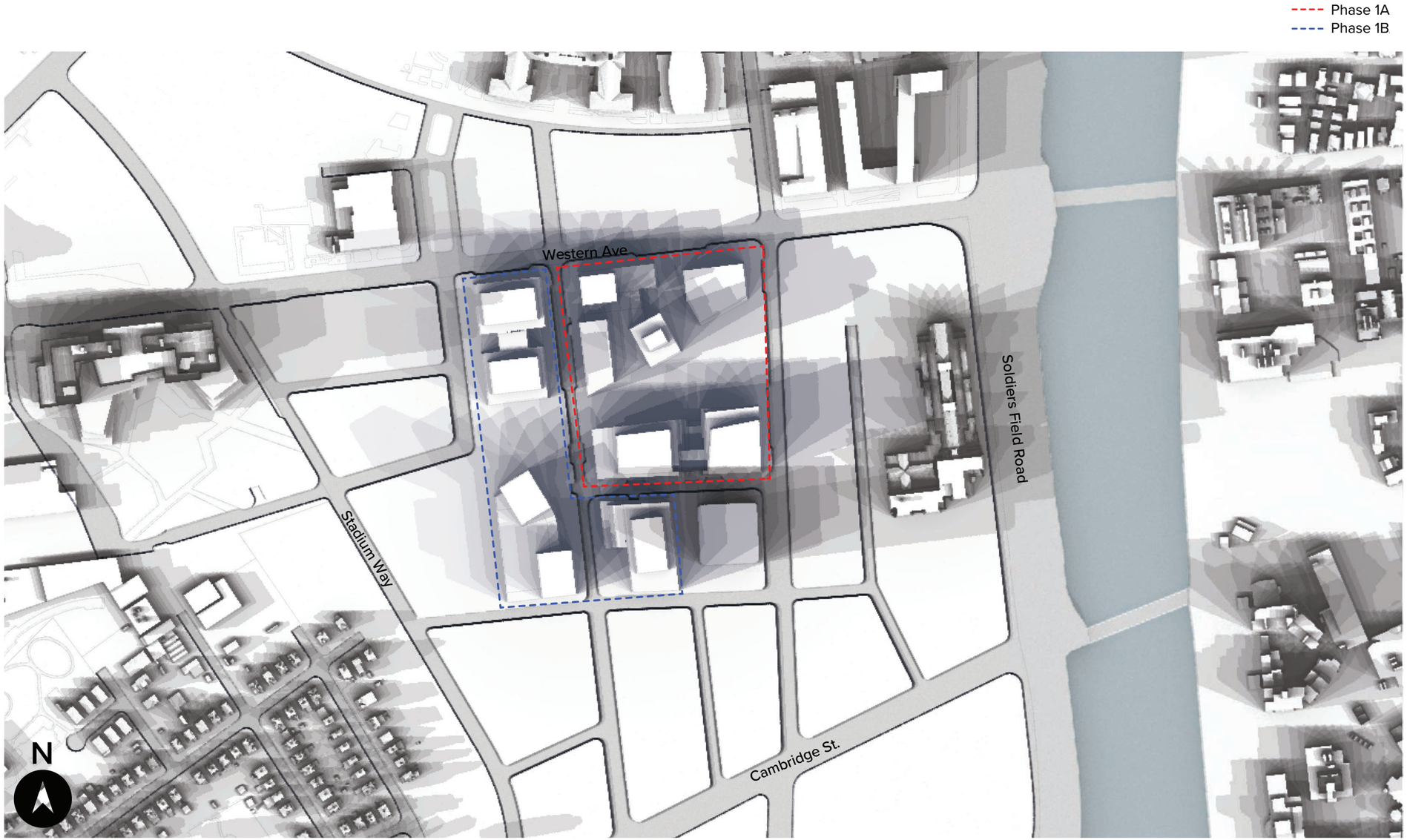


Figure 6.2f

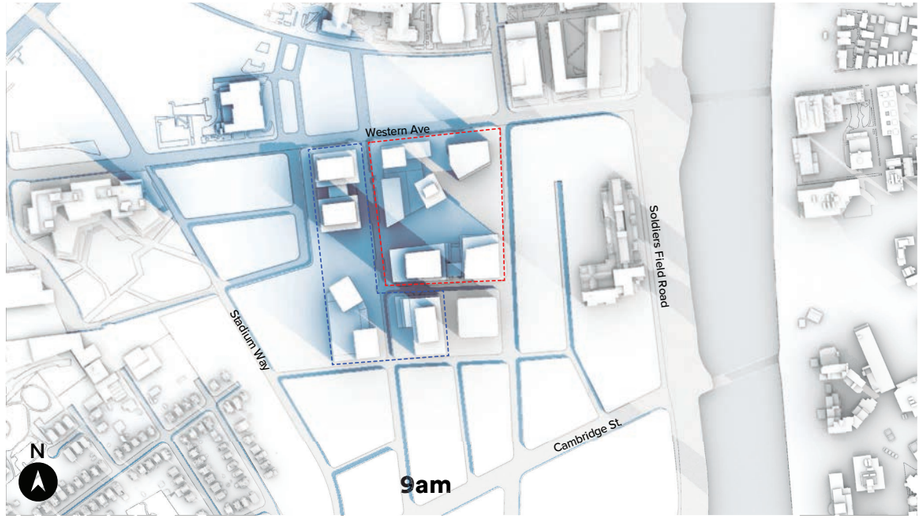
Shadow Analysis
Autumnal Equinox

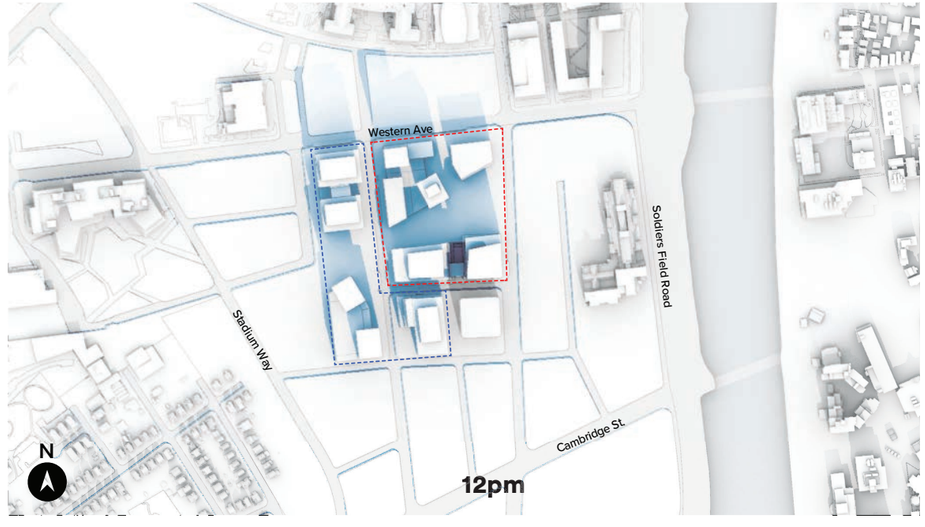
Enterprise Research Campus Project
Boston, MA

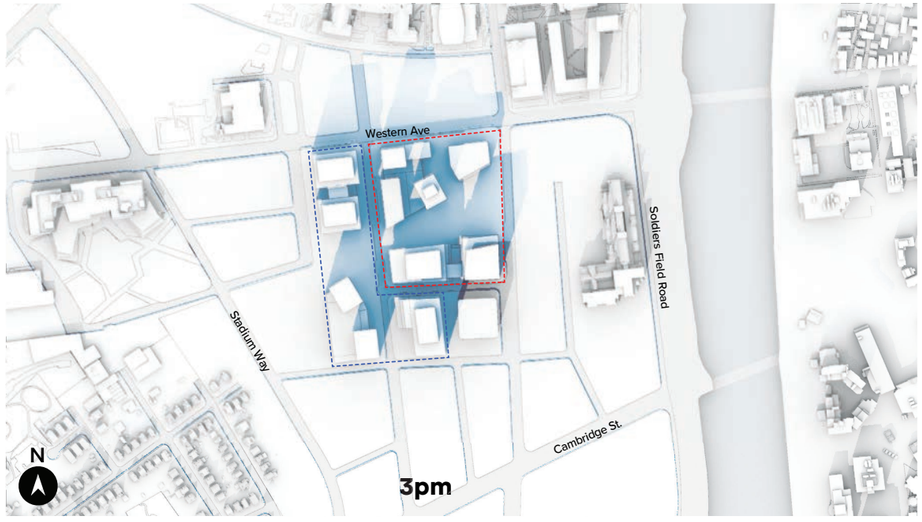
Winter Solstice
Dec 21: 9am - Sunset Shadows

Blue Shadows = Phase 1 Buildings
Grey Shadows = Existing Context Buildings

Phase 1A
Phase 1B







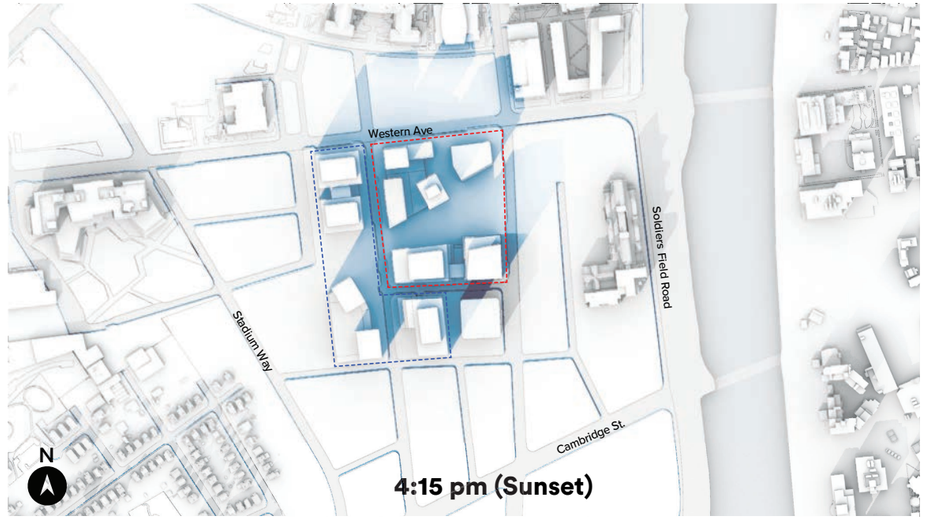


Figure 6.2g

Shadow Analysis
Winter Solstice

Enterprise Research Campus Project
Boston, MA

Winter Solstice
Dec 21: 9am - Sunset Shadows

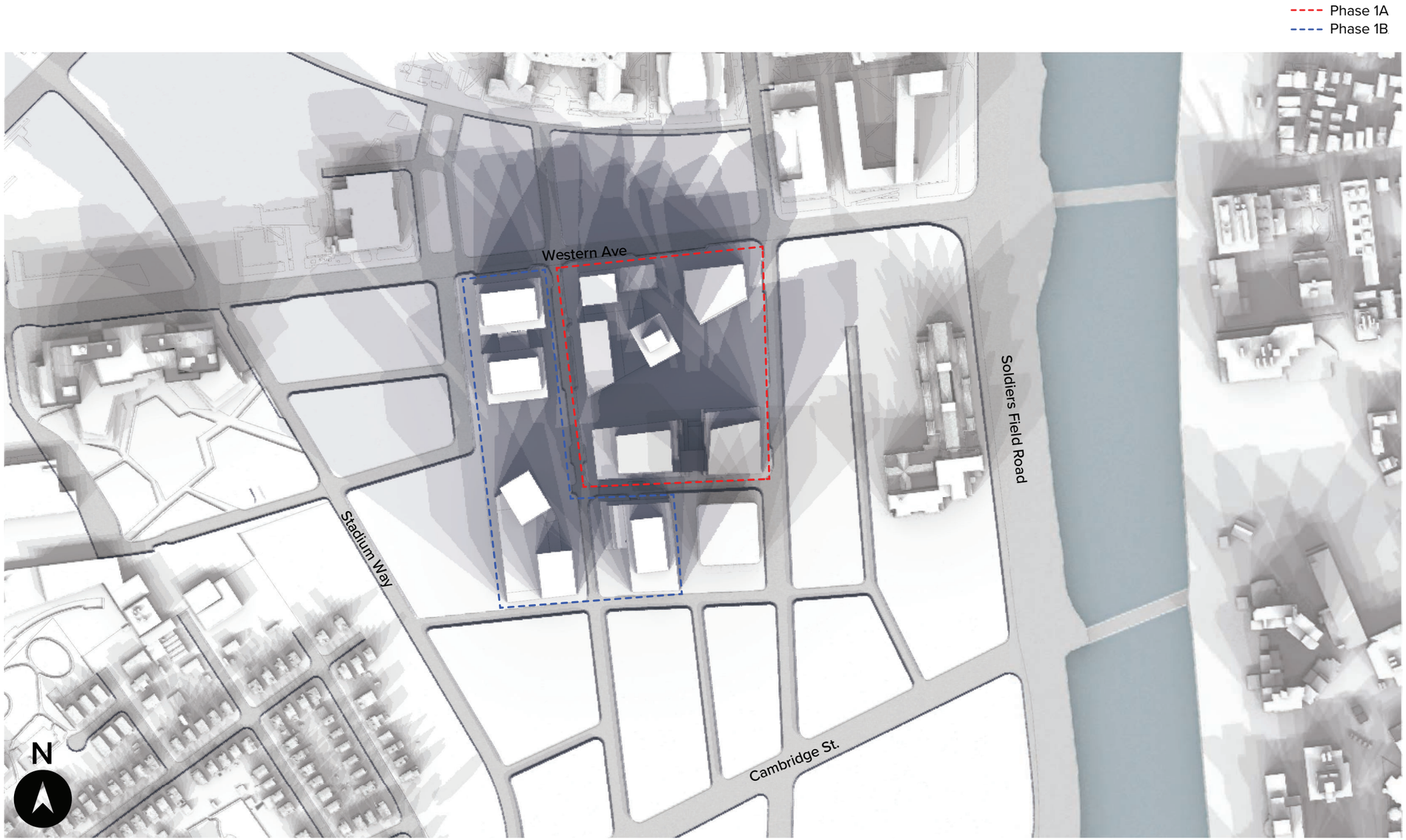


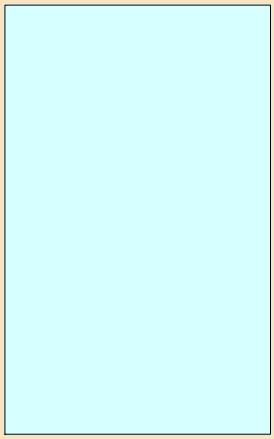
Figure 6.2h

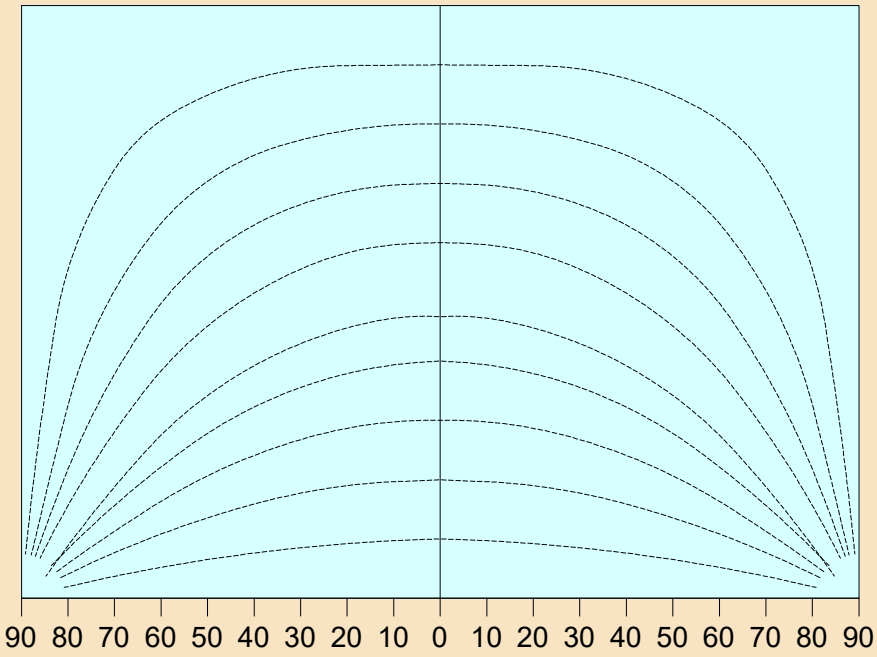
Shadow Analysis
Winter Solstice

Enterprise Research Campus Project
Boston, MA

Existing

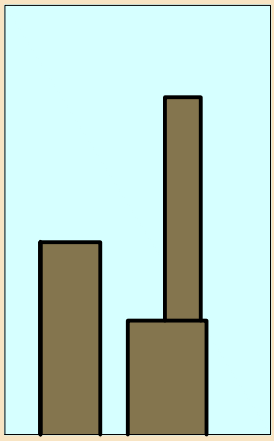
Obstruction of
Skyplane = 0%





Proposed

Obstruction of
Skyplane = 27.4%



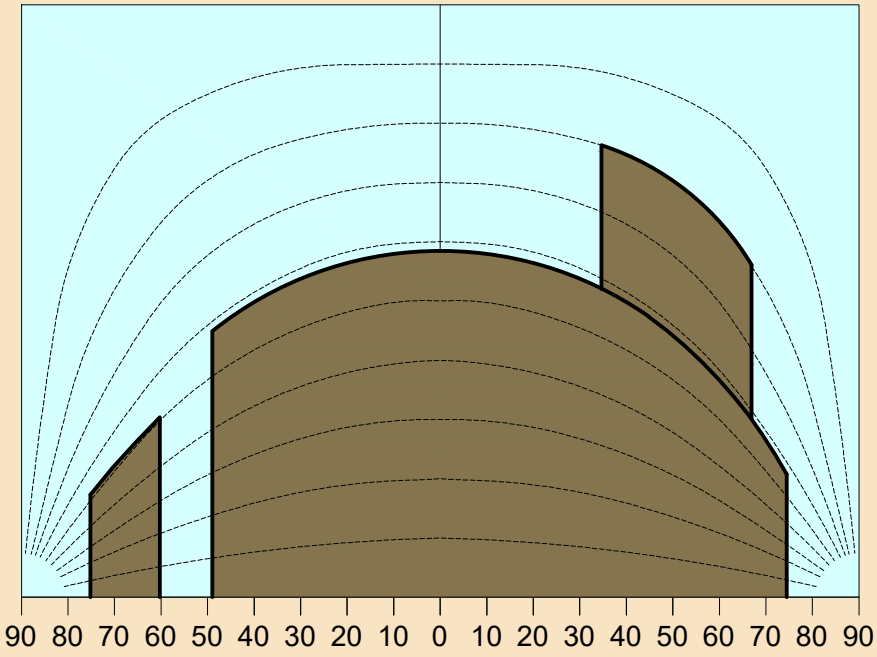


Figure 6.3

Daylighting Analysis

Center of Western Avenue

Enterprise Research Center
Allston, Massachusetts

Source: Bing Aerial (2020)

M1 Noise Monitoring Location

R1 Receptor Location

Figure 6.4

Noise Monitoring and Receptor Locations

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, broadband, and 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 adjacent 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 and planned utilities.

7.1 Summary of Key Findings and Benefits

The key impact assessment findings 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, 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.

- 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 173,489 gallons per day (GPD) of sanitary sewage and will require approximately 190,838 GPD 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 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.

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, and 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/stockpile area for Harvard-related construction projects. It includes approximately 28% impervious cover totaling approximately 2.48 acres. Historically, the Project Site was nearly 100% impervious and served as a parking lot and warehouse until as recently as 2013. There is currently no active closed drainage system on-site for storage, treatment, or groundwater recharge on the Project Site. The following sections describe the existing and planned stormwater management infrastructure surrounding the Project Site, as shown on Figure 7.1.

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.

7.3.1.2 East Drive

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 be reconnected to the BWSC drainage system in the future. Refer to section 7.3.1.5 for more information.

7.3.1.3 DEF Drive

There is an existing underground infiltration system off-site within the temporary roadway currently serving the DEF, installed by Harvard. Overflow is directed to the 48-inch storm drain main in East Drive where it currently discharges to the MassDOT drainage system. It will eventually be reconnected to the BWSC drainage system. Refer to section 7.3.1.5 for more information.

7.3.1.4 Cattle Drive

There is a planned 30-inch storm drain main off-site within Cattle Drive that will flow south to the intersection of Science Drive. The planned 30-inch storm drain main in Cattle Drive turns and flows easterly through the proposed Project Greenway and will then connect to the 48-inch storm drain main in East Drive. 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 from the Project will flow to the Boston Water & Sewer Commission (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 BWSC trunk drain through Rena Park, and extending through the Allston Landing North area, to a new submerged outfall into the Charles River.

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 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.

7.3.2 Proposed Stormwater Management Approach

As described in Chapter 1, *Project Description*, the Project Site will be developed with six new buildings, paved roadways with sidewalks, walkways and plazas, and landscaping. It is anticipated to be approximately 97% impervious for a total of 8.69 acres, which is an increase of 69% from the present condition.

The Project is evaluating, in coordination with Harvard, the siting of stormwater infiltration systems. The infiltration systems will be used to provide storage and promote infiltration via groundwater recharge. The infiltration systems for the Project will be sized based on the site area. Runoff from building roofs will be collected internally and directed to the infiltration systems. Site runoff will be collected by catch basins, area drains, and trench drains, and directed to the infiltration systems. . The infiltration systems will be designed to capture 1.25-inches of water quality volume from the impervious site areas to meet BWSC and BPDA requirements, along with an additional 1.5-inches of runoff as required by HALC. The 1.5-inches equals the additional amount of runoff anticipated from a 32-year storm event when compared to the 10-year storm. 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.

Stormwater infiltration systems and other green infrastructure measures are anticipated within the roadways and, in that case, the on-site infiltration systems may be downsized. Other on-site green infrastructure, such as green/vegetated roofs or water re-use will be explored by the Proponent as the design progresses, which could further minimize the size of the stormwater chambers.

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.

The Project will strive to improve the water quality of the stormwater that is not contained on-site and overflows to the existing BWSC system. If future geotechnical investigation shows that there is higher groundwater in specific locations that cannot be treated 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 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 2.2.2, 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 Project will comply with this standard.

Standard #4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of TSS. This Standard is met when:

1. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
2. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and
3. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

- **Compliance**: The proposed design will comply with this standard. Within the Project's limit of work, there will be mostly building roof, paved sidewalk, and roadways. Runoff from paved private areas that would contribute unwanted sediments or pollutants to the existing storm drain system will be collected and

conveyed through groundwater recharge systems before discharging into the BWSC system.

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**: The Project will comply with this standard as applicable.

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.

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. There is also a 12-inch MWRA sanitary sewer main in Western Avenue that flows easterly.

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 7.1. 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 32.5 GPD per 1,000 square feet was used.

The Project will consist of six new mixed-use buildings, five of which will be connected by an underground garage and one that will stand-alone. The proposed uses include the ERC Center (meeting space, restaurant catering, bar, wellness studio, café, and retail), lab/office, restaurant, retail, 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 127,651 GPD in wastewater flows. Table 7-1 describes the proposed sewage generation in GPD due to the Project.

Table 7-1 Estimated Future Sewer Generation

Building Use	Units[1]	310 CMR Value	Total Flow
Building 1			
Function Hall	667 users	15 GPD/seat	10,005 GPD
Meeting/Convener Space	1,634 Users	3 GPD/Seat	4,902 GPD
Destination Bar	105 Seats	20 GPD/seat	2,100 GPD
Demo Kitchen	13 seats	20 GPD/seat	260 GPD
Wellness Studio	60 users	25 GPD/user	1,500 GPD
Café	147 seats	20 GPD/seat	2,940 GPD
Retail	8,500 SF	50 GPD/1000 SF	425 GPD
Building 2			
Lab/Office	420,000 SF	32.5 GPD/1,000 SF	13,650 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 – 1 Bed (251 units)	251 beds	110 GPD/bedroom	27,610 GPD
Residential – 2 Bed (63 units)	126 beds	110 GPD/bedroom	13,860 GPD
Residential – 3 Bed (16 units)	48 beds	110 GPD/bedroom	5,280 GPD
Restaurant	188 seats	35 GPD/seat	6,580 GPD
Retail	9,347 SF	50 GPD/1,000 SF	467 GPD
Building 4			
Hotel	250 keys	110 GPD/key	27,500 GPD
Restaurant	82 seats	35 GPD/seat	2,870 GPD
Retail	4,037 SF	50 GPD/1,000 SF	202 GPD
TOTAL			**127,651 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.

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 127,651 GPD, or 0.128 MGD, a peak flow factor of 3 is applied for times of higher flow, resulting in 0.383 MGD (0.128 MGD x 3 = 0.384 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 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 Inflow and Infiltration (I/I) mitigation. Since the increase in sewage flows is expected to be greater than 15,000 GPD, the BWSC will likely 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 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 and planned water work are illustrated in Figure 7.1.

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 (commonly known as low service and abbreviated SL), Southern High (commonly known as high service and abbreviated SH), Northern Low, and Southern Extra-High 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)). 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 new 12-inch water main in DEF Drive, installed by Harvard, which connects to the 12-inch main in East Drive and extends to Cattle Drive for future connection. It is intended for the 12-inch main to eventually be accepted as a BWSC-owned main. The water main will be located within a BWSC easement.

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 12-inch BWSC water main in Western Avenue and extend down to Science Drive near the proposed Project Greenway. It is intended for the 12-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 through the Project Greenway (running in the east-west direction), and connecting to Cattle Drive, where a stub will be provided for a connection to a future extension. A portion of the water main through the Project Greenway will pass through the below-grade parking on the west side (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 7.3.2. A conservative factor of 11 (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 140,416 GPD.

The Project will require domestic water and fire protection service connections. These services will connect to the existing or planned water mains in Western Avenue, East Drive, DEF Drive, Cattle Drive, and/or running through the Project Greenway.

The number of proposed connections for domestic water and fire protection services will depend on the breakout of the lease parcels within the Project Site. The ERC Center (noted as Building 1) will be constructed by the Proponent and owned by HALC, and it may have a separate domestic water and fire protection services. Buildings 2-5 will be connected by an underground parking garage. Therefore, these buildings may be served by one domestic service and one fire service for distribution throughout the other buildings, or each building may have its own services.

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 hydrant 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 existing and 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 public roadways. A conceptual layout for new services to the proposed buildings is shown in Figure 7.1.

7.6.1.1 Western Avenue

There is an existing 6-inch gas main in Western Avenue.

7.6.1.2 East Drive

There is a newly constructed 12-inch gas main in East Drive, installed by Harvard, which connects to the 6-inch gas main in Western Avenue and extends down to provide a building service connection to the DEF.

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 4-inch gas main in Cattle Drive that will connect from the existing 6-inch gas main in Western Avenue. At the Cattle Drive and Science Drive intersection, there is a 4-inch gas stub extending to the Project Site for future building service connection. 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 needed 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. Conceptual electrical connections to the proposed buildings is shown in Figure 7.1.

7.6.3 Telecommunications

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

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.

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 strive to retain an additional 1.5 inches of storm water runoff from the impervious areas of the Project Site into the ground to the greatest extent possible. This will be provided by stormwater infiltration systems in the Project Greenway and in the roadway. Additional green infrastructure measures are being evaluated by HALC. Refer to Figure 7.1 for the potential green infrastructure in the roadways.

7.7.2 District Energy System / Microgrid

As discussed in Section 4.4.3 of Chapter 4, *Sustainability and Climate Change Resiliency*, the Proponent is committed to completing a District Energy Microgrid Feasibility Study for Full Build of the PDA (the Project and Phase B) and is subject to Part 2 – District Energy Microgrids of the Smart Utilities Policy. The study will assess the viability of a District Energy system and/or microgrid for clusters of buildings. The Proponent will work with the City to assess specific requirements for the systems to be analyzed as part of the study.

7.7.3 Adaptive Signal Technologies

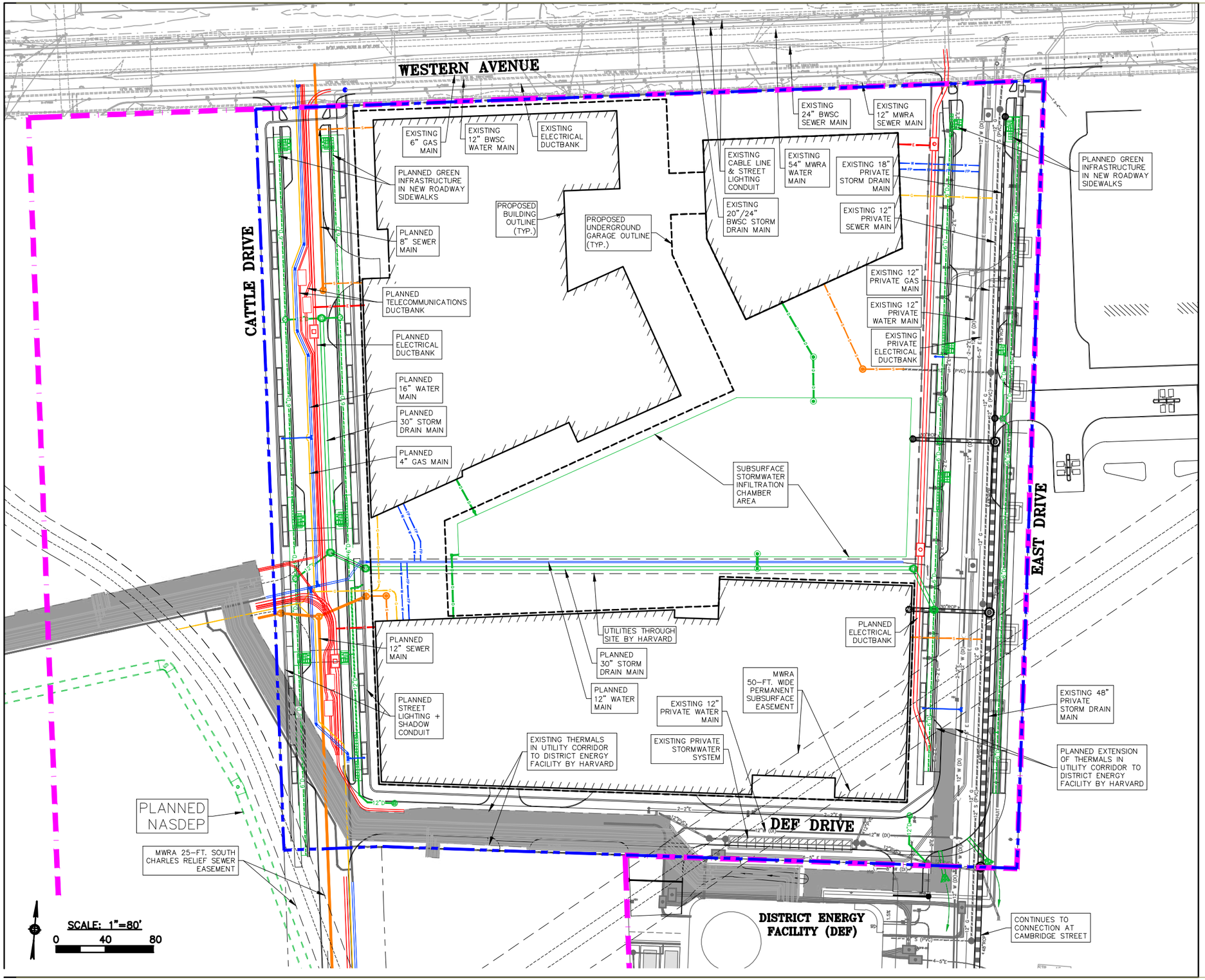
The need to provide new or improve signals as a result of the Project will be identified as part of the DPIR upon completion of the signal warrant analysis.

7.7.4 Streetlight Installation

New streetlights will be installed as part of HALC's work with respect to the roadways. Streetlight locations will be evaluated as part of the Project design and will be further developed in the DPIR submission. New composite pullboxes and street lighting conduits will be installed as required for the Project. Shadow conduits for future fiber optic service will be evaluated as part of the Project. 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.



- Project Site Boundary
- PDA Area Boundary
- Existing Utilities
- Planned Water
- Planned Sewer
- Planned Drain
- Planned Gas
- Planned Electrical/Telecommunications

Figure 7.1

Existing and Planned Utilities

Enterprise Research Campus Project
Boston, MA

8

Historic Resources

This chapter identifies properties that are either in the Inventory of Historic and Archaeological Assets of the Commonwealth (the "Inventory") or listed in the National or State Registers of Historic Places that are within or in close proximity to the Project Site. This chapter also describes any effects to these properties and proposed mitigation, if required, and Project-related benefits.

A search of the Massachusetts Historical Commission's (MHC) Massachusetts Cultural Resource Information System (MACRIS) database and mapping tool was completed to identify previously recorded above-ground and archaeological resources located on or within a one-quarter mile radius of the Project Site. Figure 8.1 shows the location and the proximity of these properties to the Project Site, which are summarized in Table 8-1.

8.1 Summary of Key Findings and Benefits

The key findings and benefits of the Project related to historic resources include:

- There are no designated or inventoried historic properties located on the Project Site.
- There are no anticipated impacts to historic properties resulting from the Project.
- The Project Site is previously developed/disturbed and currently does not consists of any buildings; all former structures on the Project Site were recently demolished.
- Within one-quarter mile of the Project Site, there is one National Register-listed historic district and two properties included in the Inventory.

8.2 Historic Context

This Project Site is in a relatively isolated and less dense section of Allston that is separated from the rest of Boston by the Massachusetts Turnpike (the "Turnpike") and from neighboring cities by the Charles River. Since the mid-nineteenth century, the areas to the north and south of Western Avenue were primarily industrial with few buildings and large expanses of land used for storage yards. In the early twentieth century, a fire burned through one of the larger industrial complexes along the south side of Western Avenue, leaving a large nearly vacant stretch between the river and present-day Hague Street. In the mid-twentieth century, areas on the south side of Western Avenue near the Project Site were developed into a rail yard with a spur from the Beacon Yard Park. As described in Section 1.1 of Chapter 1, *Project Description,* leasehold interests in the Project Site were held by CSX

Transportation (CSXT), through the mid-20th century and into the 21st century, which in turn subleased the property to Romar Transportation Co. for trucking operations. Based upon review of historic maps and photographs, the Project Site was used for warehouse and distribution purposes and was not used for railroad right-of-way purposes. Harvard purchased the underlying land of the Project Site in 2000 from the Massachusetts Turnpike Authority (MTA), a predecessor agency to MassDOT, and CSXT agreed to demolish structures on the Project Site as part of the transaction.

8.3 Historic Resources

The history of the area surrounding the Project Site has been heavily documented, and nearly the entire east half of the one-quarter mile study radius adjacent to the Project Site contributes to a National Register historic district focused on the river and its immediate environs. The radius also includes two inventoried areas with no official designation. Designated resources are listed in Table 8-1 and discussed below.

Table 8 -1 Historic Resources in the Vicinity (1/4-mile) of the Project Site

Map No.	Resource Name	Location	MHC Inventory No.	Designation
NA	Charles River Basin Historic District	Charles River, Boston and Cambridge	BOS.CA/ CAM.AJ	NRDIS
NA	Harvard Business School	Soldiers' Field Road, Boston	BOS.JL	INV
NA	Harvard Riverfront	Memorial Drive, Cambridge	CAM.AN	INV
1	Harvard Stadium	60 North Harvard Street, Boston	BOS.8286/ BOS.CA	NHL, NRIND
2	B&B Chemical Company	780 Memorial Drive, Cambridge	CAM.257	NRIND, NRMRA

NA not applicable
NRDIS National Register of Historic Places, District Listing
NRIND National Register of Historic Places, Individual Listing
NRIND National Register of Historic Places, Multiple Resource Area
NHL National Historic Landmark
INV Inventory of Historic and Archaeological Assets of the Commonwealth

8.3.1 Charles River Basin Historic District (BOS.CA/CAM.AJ/NR #78000436)

The Charles River Basin National Historic District incorporates the Charles River Basin and the parkways and landscaped areas on both banks in Boston and Cambridge for approximately six miles upstream from the Charles River Dam to the Eliot Bridge, covering roughly 820 acres in extent. The district includes Memorial Drive and the Cambridge Parkway in Cambridge; Embankment Road, the James J. Storrow Memorial Drive, and Soldiers' Field Road in Boston; the Charles River dam; two canals; seven bridges that cross the Charles River; the freshwater Basin itself; the parkland surrounding the Basin; and numerous miscellaneous structures. The Project Site is not included in this historic district.

8.3.2 Harvard Stadium (BOS.8286/BOS.CA/NR #87000757)

Constructed in 1903 as the first collegiate stadium in the United States, Harvard Stadium is a reinforced concrete structure with Classical Revival features thought to have been influenced by the revival of the Olympic Games in 1896. It was designed by renowned architect Charles F. McKim, with Harvard Professor Lewis Jerome Johnson providing engineering services along with Ira N. Hollis and Joseph R. Worcester. The stadium features a U-shaped footprint and a pioneering structural system using cold twisted steel bars, both of which influenced subsequent college stadiums constructed in the twentieth century. As the national rules of football were being rewritten to curb injuries just after construction of the stadium was complete, the dimensions of the stadium ended up having a lasting effect on the sport. While one of the leading proposals for the changed rules included a wider field, this couldn't be accommodated in Harvard's new stadium; therefore, the forward pass was introduced instead. The building is also a contributing feature to inventoried area BOS.CA, the Harvard Business School.

8.3.3 B & B Chemical Company (CAM.257/NR #82001918)

The former B&B Chemical Company building is located across the Charles River in Cambridge. This four-story building was completed in 1937 by the firm Coolidge, Shepley, Bulfinch & Abbott, designed in a Streamline Moderne style. The steel-framed building has glazed brick and glass block cladding interrupted by expansive bands of windows and a rounded bay entirely of windows above the main entrance. The building was listed in the National Register as part of the Cambridge Multiple Resource Area.

8.4 Archaeological Resources

There are no known archaeological resources within the Project Site that are listed in the State and National Registers or included in the Inventory. The entire Project Site was redeveloped in the mid-twentieth century; therefore, it is unlikely that the Project will affect previously unidentified archaeological resources.

8.5 Evaluation of Potential Impacts to Historic Resources

The following section describes the potential impacts to nearby historic resources as a result of the Project related to urban and building design/visual, pedestrian-level wind, shadow and geotechnical.

8.5.1 Visual Impacts to Nearby Historic Resources

The Project is located west of the Charles River and South of the Harvard Business School, between the Allston and Cambridge neighborhoods. The Project Site is a transitional area of Lower Allston, adjacent to Western Avenue and Soldiers Field Road where existing uses are few and is made up mostly of empty lots and surface parking. As described in Chapter 3, *Urban Design,* the Project's location, adjacent to the neighborhood of Allston, provides an opportunity to integrate into the existing neighborhood by developing this vacant site. The

Project will align with the human scale of the neighborhood context with sensitivity to the street widths and building heights of Allston, Western Avenue, the Charles River, Cambridge Street, Cambridge, and the ERC's neighboring residential areas, creating connectivity between Cambridge and Allston and public open spaces.

Emphasis will be placed on massing and scale by placing the tallest of the proposed buildings farthest away from the residential neighborhood and the Charles River in the middle of the Project. The height of the buildings is also responsive to the need for daylight access on the Project Greenway and the views and vistas of the Charles River, Charles River, the HBS Campus, and Allston, as well as the Project Greenway from the Hotel and Residential towers.

8.5.2 Pedestrian-Level Wind Impacts to Nearby Historic Resources

A computer-based pedestrian wind comfort assessment was conducted for the Project, as presented in Section 6.2 of Chapter 6, *Environmental Protection*. Because the existing site is unoccupied and immediately surrounded by open land, roadways, and low buildings wind flows fairly fast and unobstructed through the empty Project Site. In the winter, seasonally higher wind speeds result in an Uncomfortable condition for walking at most areas. During the winter months, the effective gust criterion may also be exceeded near the existing DEF.

The addition of the Project is predicted to disrupt the otherwise fast-flowing wind on-site and, in general, is expected to slow winds down within the project area. The Project is not predicted to increase wind speeds around neighboring buildings, including historic resources. Wind conditions near neighboring buildings are predicted to remain similar to those in the existing conditions. In some areas, the Project is expected to provide shelter from wind, and even reduce wind speeds to the east and southeast of the Project Site.

8.5.3 Shadow Impacts to Nearby Historic Resources

As presented in Section 6.4 of Chapter 6, *Environmental Protection*, shadow impact analysis was conducted for the Project consistent with both Section 80B-2(c) and Section 41-16(1) of the Code. Shadow studies were conducted for three-hour intervals on the dates of March 21, June 21, September 21, and December 21, representing the days in the year when the midday sun is at its highest (June 21) and lowest point (December 21), and the dates when shadows are midway through a period of lengthening (March 21 and September 21).

The results of the shadow analysis are discussed in detail in Section 6.4 of Chapter 6, *Environmental Protection*. The Project will result in no new shadow on identified historic resources.

8.5.4 Geotechnical Impacts to Nearby Historic Resources

Section 6.11 of Chapter 6, *Environmental Protection*, details the measures to be taken into consideration due to the urban environment, abutting infrastructure, and proximity to nearby historic resources. The geotechnical design and performance criteria are based on a thorough analysis of subsurface geotechnical conditions, as well as experience with

successful implementation of projects that have protected nearby historic resources. A preconstruction survey of abutting structures will be conducted to establish a baseline of geotechnical conditions. Although impacts to adjacent structures are anticipated to be nominal, the Proponent will perform a geotechnical monitoring program during below-grade construction for documentation purposes.

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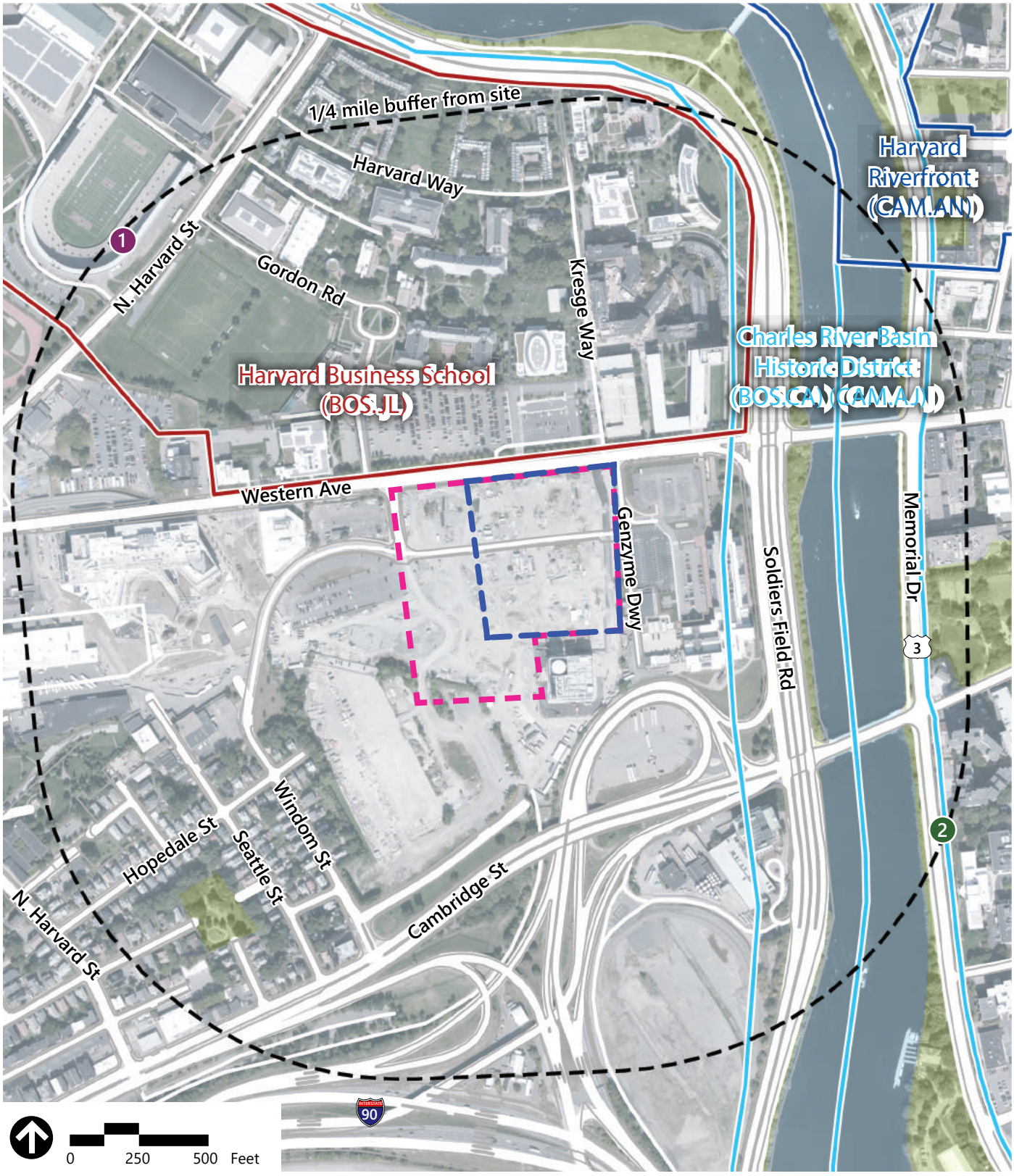

Source: Bing Aerial (2020), MassGIS Cultural Resources (2020)

- Project Site Boundary
- PDA Area Boundary
- 1 Harvard Stadium (BOS.8286)
- 2 B & B Chemical Company (CAN.25)
- Harvard Business School Area (BOS.JL)
- Harvard Riverfront Area (BOS.JL)
- Charles River Basin Historic District (BOS.CA)(CAM.AJ)

Figure 8.1

Historic Resources within the Vicinity of the Project

Enterprise Research Campus Project
Boston, MA

APPENDIX A: Letter of Intent

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TISHMAN SPEYER

BRA

January 21, 2021

'21 JAN 21 PM3:23:43

Mr. Brian Golden, Director
Boston Planning and Development Agency
One City Hall Plaza, 9th Floor
Boston, MA 02201

Re: Letter of Intent to File a Project Notification Form for the Enterprise Research Campus Project at 100 Western Avenue in Allston

Dear Director Golden:

On behalf of Tishman Speyer ERC Developer, L.L.C. (the "Proponent"), we are pleased to submit this Letter of Intent to file a Project Notification Form ("PNF") for the Enterprise Research Campus (ERC) Project located on a 14-acre parcel at 100 Western Avenue in the Allston neighborhood (the "Project Site"). This Letter of Intent is being submitted in accordance with the Mayor's Executive Order dated October 10, 2000, as amended on April 3, 2001, and Article 80 of the City of Boston Zoning Code. The Project Site is located within Planned Development Area No. 115 that was approved as a Master Plan PDA by the Boston Zoning Commission on March 15, 2018 (the "PDA"). The Proponent intends to develop a portion of the Project Site into a mixed-use development of 900,000 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 (the "Project").

The Project Site has historically contained industrial and transportation uses, and since 2015 has been utilized as a laydown and staging area for the construction of Harvard-related projects. The Proponent intends to transform the underutilized site into a vibrant, inclusive mixed-use project that will complement the surrounding area and adjacent neighborhood. The Proponent, working with the architectural master-planning team of Studio Gang and Henning Larsen, has planned the Project to contain a mix of office and laboratory uses totaling approximately 440,000 square feet, two residential buildings totaling 250,000 square feet and approximately 330 units with an enhanced affordable component, a 135,000 square foot hotel with approximately 250 keys, and an up to 75,000 square foot conference center, along with activated ground floor uses. The parking needs of the Project will be served primarily by a below-grade garage.

The Project will feature a network of more than two acres of dynamic, welcoming public open spaces. The central focal point of the Project will be a 1.4-acre portion of the greenway that is envisioned to eventually connect the Honan-Allston Library, and the Allston neighborhood, with the Charles River (the "Project Greenway"). In addition to the Project Greenway, the other public open spaces will contain laneways, urban plazas, and building frontage areas, which will help create an intimate, porous urban environment that places a focus on the pedestrian experience. The public open spaces of the Project will also contain active programming, including public art exhibits, community-oriented programs, health & wellness classes, and music concerts & festivals. The Proponent has designed the Project around the public open space, acknowledging that an activated and exciting public realm will be a key amenity for the Project and the entire Allston community.

The Project is proposed to be constructed in accordance with the Master Plan for Planned Development Area No. 115, but with a reimagined orientation of buildings within the Project Site that prioritizes the Project Greenway and the public realm. Areas within the PDA that are outside of the Project Site will remain undeveloped over the near term and will be utilized for purposes such as construction staging and/or surface parking. The Proponent is conducting a preliminary study of development options, and intends to present a conceptual plan for those areas, which are within the boundaries of the PDA, during the Article 80 process to solicit community input and allow the Project to be considered in context. Given the early stage of planning, the Proponent is not seeking approvals at this time for additional development beyond the level currently approved in the PDA.

In addition to world-class architecture and public realm improvements, the Proponent is committed to providing forward-thinking resiliency & sustainability measures. The Proponent also has a fundamental commitment to robust diversity, equity, and inclusion ("DE&I") initiatives. In furtherance of its DE&I initiatives, the Proponent intends to reserve 5% of the Project ownership for minority investors, maintain a commitment to diversity during all phases of the Project and in key development team roles, and create an inclusive, welcoming community.

On behalf of the Proponent, Tishman Speyer has conducted a number of preliminary meetings with the Harvard Allston Task Force, Allston-Brighton residents, BPDA staff, local elected officials, and City of Boston Agencies to discuss the Project and prepare for a robust public review process under Article 80. We anticipate commencing that process shortly by filing the PNF, and look forward to working collaboratively with all interested parties to help transform a long-underutilized portion of Allston into a vibrant mixed-use project that will provide tremendous benefits to the community and the Boston area as a whole.

Thank you for your time and attention to this letter and your consideration of the Project.

Sincerely,

Jessica Hughes
Managing Director

cc: Jonathan Greeley, BPDA Director of Development Review and Policy
Michael Christopher, BPDA Intergovernmental Liaison
Nupoor Monani, BPDA Senior Institutional Planner and Project Manager
Gerald Autler, BPDA Senior Project Manager / Planner

APPENDIX B: BPDA Checklists

Contents:

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ACCESSIBILITY CHECKLIST

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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:	**2-3 Phases (1A and 1B/1C)** **11 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**
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 larger 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 40’ Pedestrian: 6’ Furnishing: 5’ Bike lane: 5’-6” Cross slope for drainage 1%-2% East Drive: Frontage: ranges between 2’ and 20’ Pedestrian: 7’-6” Furnishing: 5’ Bike lane: 6’ Cross slope for drainage 1%-2% DEF Drive: Frontage: 1’ Pedestrian: 6’ Furnishing: 8’ Cross slope for drainage 1%-2% Cattle Drive: Frontage: 2’ 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	N/A

pedestrian easement with the Public Improvement Commission (PIC)?	
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 3.10 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 3.10 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 330 housing units and a hotel with 300 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 17 units will be fully ADA representing 5% of the 330 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 330 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:	The number of IDP units has not yet been determined. A count will be provided at a future date.
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:	Based on the currently contemplated hotel program, the hospitality portion of the Project will include at minimum 3 rooms with roll in showers. Further details will be provided at a future date.
Do the proposed housing and hotel units that are standard, non-ADA units (MAAB Group 1) have any architectural barriers that	The design of these units has not been detailed. However, the current configuration does not anticipate architectural barriers within any residential or hotel units that would prevent entry or use of the space by persons with mobility impairments.

would prevent entry or use of the space by 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 Figure 3.2b), 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 3.2a 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	**NO, not at this time.**

infrastructure? (Examples: adding street 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 Figure 3.10 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 3.10 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, if any, 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 3.10 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

CLIMATE RESILIENCY CHECKLIST

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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:	**Residential; Lab / Office; Hotel; Conference; Retail/Restaurant**
List the First Floor Uses:	**Residential and Hotel Lobbies, 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:	***900,000 SF***
Building Height:	***190 Ft***	Building Height:	***5-17 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:	***18-20.5 Ft BCB***	Below grade levels:	***1 Story (parking garage no basements)***

Article 37 Green Building:

LEED Version - Rating System :	***LEED-Core & Shell v4 (lab/office); LEED-New Construction v4 (residential, conference center); LEED-Hospitality v4 (hotel)***	LEED Certification:	**Yes** */ No Buildings will be eligible to receive LEED Gold certification at a minimum.*
Proposed LEED rating:	*Certified/Silver/* **Gold***/Platinum*	Proposed LEED point score:	***Lab/Office: 66 points; Residential: 60 points' Conference: 63 points Hotel: 60 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-30 all typologies***	Exposed Floor:	***R-30 all typologies***
Foundation Wall:	***R-7.5 c.i all typologies***	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:	***0 – 15%***	Wall & Spandrel Assembly Value:	***U-0.1***
Area of Framed & Insulated / Standard Wall:	***25 – 70%***	Wall Value	***R-18 all typologies***
Area of Vision Window:	***30 – 65%***	Window Glazing Assembly Value:	***U-0.26 – U-0.38***
		Window Glazing SHGC:	***SHGC 0.4***
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:	***17,379 MWh***	Peak Electric:	***5,070 kW***
Annual Heating:	***39,095 MMBtu***	Peak Heating:	***16 MMBtu/hr***
Annual Cooling:	***7,218 MMBtu***	Peak Cooling:	***3,933 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:	*53 – 122 kBtu/SF per specific building typology; 89 kBtu/SF overall*

Back-up / Emergency Power System

Electrical Generation Output:	*Lab/Office: 2500 kW Residential: 500 kW Hotel: 800 kW Conference Center: 100 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 systems 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:	*8,181 tpy without parking 8,252 tpy with parking*

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. 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 30% and GHG emissions 25% 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 Project represents a total of 900,000 GFA of the 1,940,000 GFA PDA. 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 (59%) of energy demand. The Project's proposed design demonstrates a 40% reduction in natural gas energy and 40% 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.

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, Sustainability and Climate Change Resiliency, 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, 6.65 inches of rainfall within its site boundary.

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.:

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

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SMART UTILITIES CHECKLIST

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Boston Smart Utilities Checklist

****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.****

Date Submitted:	February 2, 2021
Submitted by:	Catherine McCandless

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**

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)

Boston Smart Utilities Checklist

District Energy Microgrid Master Plan Part B should be submitted before applying for a Building Permit

Please email submission to manuel.esquivel@boston.gov

2.1 Consultant Assessing/Designing District Energy Microgrid (if applicable)	**Arup USA Inc.**
2.2 Latest document submitted	**The analysis will be submitted with the DPIR**
2.3 Date of latest submission	**The analysis will be submitted with the DPIR**
2.4 Which of the following have you had engagement/review meetings with regarding District Energy Microgrids? (select all that apply)	**No meetings have been held with the BPDA to discuss the scoping of the District Energy Microgrid Study. The Proponent intends to meet with the BPDA following the PNF filing.**
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 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.**
2.6 Additional Information	**No additional information is provided at this time.**

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.

Boston Smart Utilities Checklist

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 PNF Figure 7.2 for the Project conceptual utility diagram. Telecom utilities will be defined further within the DPIR.**
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) 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)**

Boston Smart Utilities Checklist

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 PNF.**
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 PNF.**
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

4.1 Consultant Assessing/Designing Green Infrastructure (if applicable)	**Nitsch Engineering, VHB, WSP**

Boston Smart Utilities Checklist

4.2 Date Green Infrastructure Map/Diagram was submitted	**Refer to PNF Figure 7.2, the design will be developed further with the DPIR submission.**
4.3 Types of Green Infrastructure included in the project (select all that apply)	**Stormwater infiltration chambers. Possible roadway infrastructure: Bioinfiltration areas in sidewalk, stone reservoirs, swales. Possible building infrastructure: green roofs**
4.4 Total impervious area of the development (in square inches)	**86,400,000 square inches (600,000 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"*	**108,000,000 cubic inches (62,500 cubic feet)**
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 PNF.**
4.7 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding Green Infrastructure? (Optional: include dates)	**No meetings have been held with utilities. The Proponent intends to meet with the relevant entities in relation to the Green Infrastructure after submission of the PNF.**
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 Harvard requirement). The systems are sized for the proposed buildings and surrounding roadways.**

Part 5 - Adaptive Signal Technology (AST)

Boston Smart Utilities Checklist

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	**To be provided with DPIR upon completion of the signal warrant analysis.**
5.3 Describe how the AST system will benefit/impact the following transportation modes	
5.3a Pedestrians	**To be provided with DPIR upon completion of the signal warrant analysis.**
5.3b Bicycles	
5.3c Buses and other Public Transportation	
5.3d Other Motorized Vehicles	
5.4 Describe the components of the AST system (including system design and components)	**To be provided with DPIR upon completion of the signal warrant analysis.**
5.5 Which of the following have you had engagement/review meetings with regarding AST? (select all that apply)	**No meetings have been held. The Proponent intends to meet with the relevant entities in relation to the AST after submission of the PNF.**

Boston Smart Utilities Checklist

5.6 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding AST? (Optional: include dates)	**No meetings have been held with utilities. The Proponent intends to meet with the relevant entities in relation to the AST after submission of the PNF.**
5.7 Additional Information	

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	**Not yet developed; to be provided with DPIR submission.**
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 PNF.**
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 PNF.**
6.5 Additional Information	

Boston Smart Utilities Checklist

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 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	Cross Section Diagrams will be submitted with the DPIR.
7.2 Date Lateral Diagram(s) was submitted	Lateral Diagrams will be submitted with the DPIR.
7.3 Additional Information	

BROADBAND READY BUILDINGS QUESTIONNAIRE

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CITY of BOSTON | boston planning & development agency

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: **2024**

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
- No
- Unknown **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) **NA**
- 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.

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APPENDIX C: Environmental Protection Supporting Documentation

HARVARD - ENTERPRISE RESEARCH CAMPUS (ERC) PROJECT

BOSTON, MA

PEDESTRIAN WIND COMFORT ASSESSMENT

PROJECT #2100586

JANUARY 7, 2021

SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI was retained to provide an assessment of the potential pedestrian level wind impact of the proposed Harvard - Enterprise Research Campus (ERC) Project in Boston, MA. Our assessment was based on the local wind climate, the current design of the proposed development, the existing surrounding buildings, and computational modeling and simulation of wind flow around the development. Our findings are summarized as follows:

- The addition of the proposed project will disrupt the otherwise fast-flowing wind on the existing open site. The turbulence thus created will slow winds down in the adjacent area around the buildings.
- Wind speeds at most areas around the proposed buildings are predicted to be appropriate for pedestrian use on an annual basis.
- While a reduction in wind activity is expected in a large area around the development, owing to the height and form of the buildings, localized wind accelerations are expected around the building bases and corners.
- Wind speeds at the western corners of the Hotel-Residential complex and the West Lab building are predicted to be higher than desirable for frequent pedestrian use.
- The proposed development is not predicted to increase wind speeds around neighboring buildings but are expected to shelter areas and reduce wind speeds to the east and southeast of the development.

Strategies for wind control have been provided for the design team to consider as the massing design advances. RWDI can help guide the placement of wind control features, including landscaping, to achieve appropriate levels of wind comfort based on the programming of the various outdoor spaces. Wind tunnel testing is recommended at an advanced design stage in order to quantify and refine the predicted wind conditions and optimize the level of wind mitigation required.

1. INTRODUCTION

Rowan Williams Davies & Irwin Inc. (RWDI) was retained to assess the potential wind conditions at pedestrian levels on and around the proposed Harvard - Enterprise Research Campus (ERC) Project in Boston, MA. The objective of this assessment is to provide an evaluation of the potential wind impact of the proposed development.

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 of varying heights:

1. 90' Low Rise Residential Building
2. 190' Residential Tower
3. Conference Building
4. 190' Hotel Tower
5. 140' West Lab Building
6. 160' East Lab Building

The conceptual massing of the development is shown in Image 2. The assessment has been done for two site configurations:

- No Build: Existing site with the existing surroundings; and,
- Build: Proposed Phase 1A with the existing surroundings.

Image 1: Aerial view of the existing site and surroundings
Credit: Google Maps

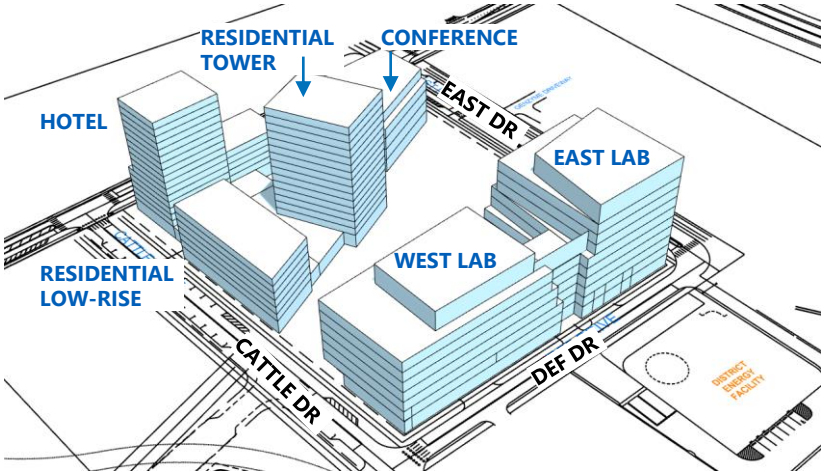


Image 2: Conceptual Massing

2. METHODOLOGY

2.1 Objective

The objective of this assessment is to provide an evaluation of the potential wind impact of the proposed development on pedestrian areas around it. The assessment is based on the following:

- A review of the regional long-term meteorological data from Boston Logan International Airport;
- 3D e-model of the proposed project received on November 17, 2020;
- The use of *Orbital Stack*, an in-house computational fluid dynamics (CFD) tool, to aid in the assessment of wind comfort levels;
- The use of RWDI's proprietary tool WindEstimator[1] for estimating the potential wind conditions around generalized building forms;
- The Boston Planning and Development Agency (BPDA) wind criteria;
- Wind tunnel studies completed by RWDI for similar projects in Boston; and,
- Our engineering judgment, experience, and expert knowledge of wind flows around buildings[1-3].

Note that other microclimate issues such as those relating to cladding and structural wind loads, door operability, building air quality, snow impact, noise, vibration, etc. are not part of the scope of this assessment

2.2 CFD in Urban Wind Modeling

CFD is a numerical modeling technique for simulating wind flow in complex environments. For urban wind modeling, CFD techniques are used to generate a virtual wind tunnel where flows around the site, surroundings and the study building are simulated at full scale. The computational domain that covers the site and surroundings are divided into millions of small cells where calculations are performed, which allows for the "mapping" of wind conditions across the entire study domain. CFD excels as a tool for urban wind modeling for providing early design advice, resolving complex flow physics, and helping diagnose problematic wind conditions. It is useful for the assessment of complex buildings and contexts and provides a good representation of general wind conditions which makes it easy to judge or compare designs and site scenarios.

Gust conditions are infrequent but deserve special attention due to their potential impact on pedestrian safety. The computational modeling method used in the current assessment does not quantify the transient behavior of the wind, including wind gusts. The effect of gust is predicted qualitatively in this assessment and the assessment has been conducted by experienced engineers in order to provide an accurate prediction of wind conditions.

If it becomes necessary to quantify the transient behavior of wind and refine any conceptual mitigation measures, physical scale-model tests in a boundary-layer wind tunnel or more detailed transient computational modeling would typically be required.

2. METHODOLOGY

2.3 Simulation Model

Wind flows were simulated using Orbital Stack, an in-house computational fluid dynamics (CFD) tool, for the proposed site configuration with the existing surroundings.

The computer models of the site in the No Build and Build scenarios are shown in Image 3 and the proximity model is shown in Image 4. For the purpose of this computational study, the 3D models were simplified to include only the necessary building and terrain details that would affect the local wind flows in the area and around the site. Landscaping and other smaller architectural and accessory features were not included in the computer model in order to provide more conservative wind conditions (as is the norm for this level of assessment).

The wind speed profiles in the atmospheric boundary, approaching the modeled area were simulated for 16 directions (starting at 0°, at 22.5° increments around the compass). Wind data in the form of ratios of wind speeds at approximately 5 ft above concerned levels, to the mean wind speed at a reference height were obtained. The data was then combined with meteorological records obtained from Boston Logan International Airport to determine the wind speeds and frequencies in the simulated areas.

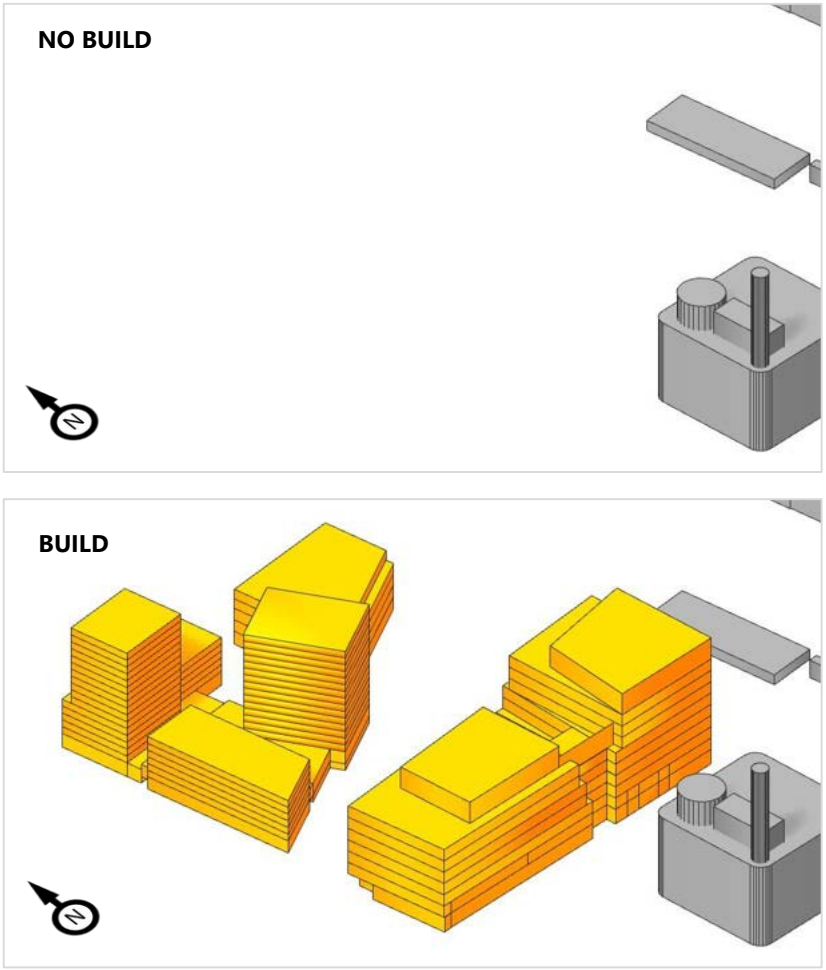


Image 3: Computer model of the site; No Build and Build scenarios

2. METHODOLOGY

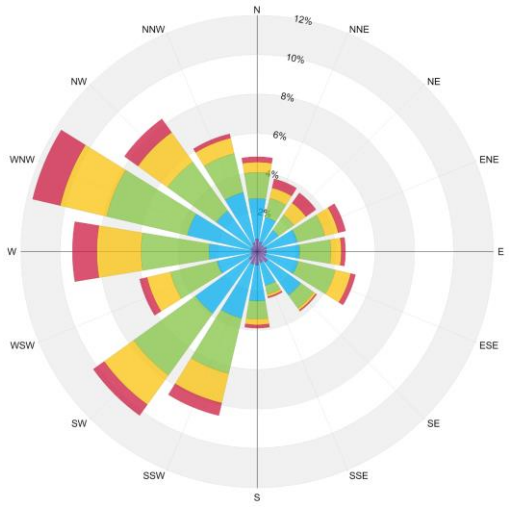
Image 4: Computer model of the extended surroundings

2. METHODOLOGY

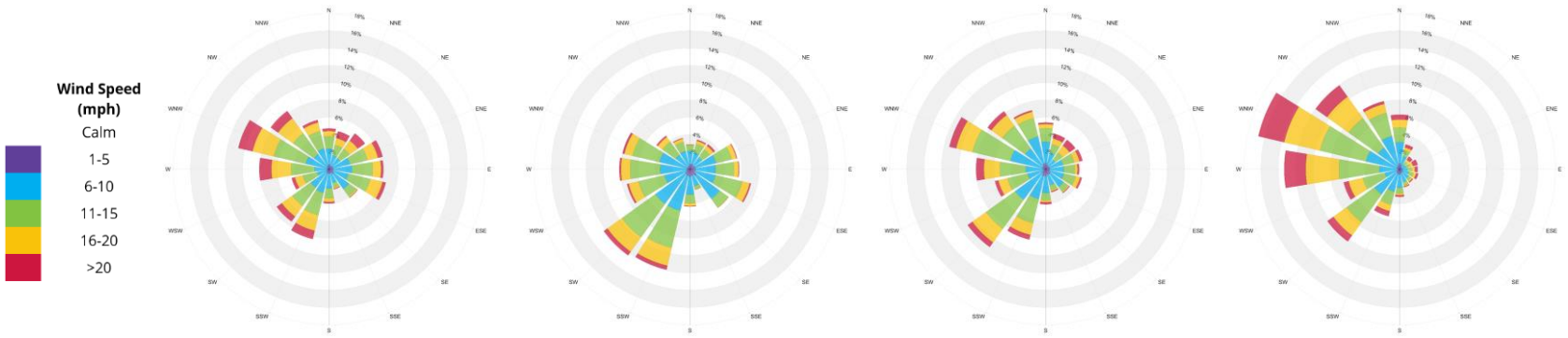
2.4 Meteorological Data

Wind statistics at Boston Logan International Airport between 1995 and 2018, inclusive, were analyzed for the spring (March to May), summer (June to August), fall (September to November) and winter (December to February) seasons. Image 5 graphically depicts the distributions of wind frequency and directionality for the seasonal and annual periods.

Winds from the northwest and southwest quadrants are predominant. Strong winds with mean speeds greater than 20 mph (red bands in the images) occur primarily from the northwesterly directions throughout the year, and from the southwesterly and northeasterly directions in the spring, fall and winter.



Annual



Spring
(March - May)

Summer
(June - August)

Fall
(September - November)

Winter
(December - February)

Image 5: Directional distribution of winds approaching Boston Logan International Airport (1995 – 2018)

3. WIND CRITERIA

The Boston Planning and Development Agency (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. This criterion is hereby referred to as the "effective gust criterion".

The second set of criteria used by the BPDA to determine the acceptability of specific locations is based on the work of Melbourne[4]. 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. They are as follows:

Table 1: BPDA mean wind criteria*

Comfort Category	Mean Wind Speed (mph)
Dangerous	> 27
Uncomfortable for Walking	> 19 and ≤ 27
Comfortable for Walking	> 15 and ≤ 19
Comfortable for Standing	> 12 and ≤ 15
Comfortable for Sitting	< 12

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

Pedestrians on sidewalks and parking lots will be active and wind speeds comfortable for walking are appropriate. Lower wind speeds comfortable for standing are desired for building entrances and bus stops where people are apt to linger. For any outdoor amenity space, low wind speeds comfortable for sitting are desired in the summer, when it is typically in use.

The wind climate found in a typical location in Boston is generally comfortable for the pedestrian use of sidewalks and thoroughfares and meets the BPDA effective gust criterion of 31 mph at most areas, while windier conditions may be expected near the corners of taller buildings exposed to the prevailing winds. However, without any mitigation measures, this wind climate is likely to be frequently unsuitable for more passive activities such as sitting.

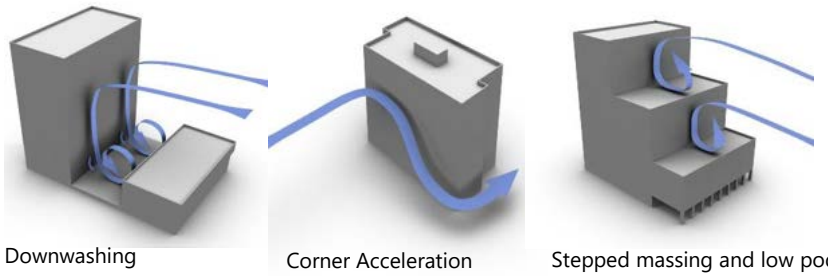
Discussions related to pedestrian wind comfort and safety will be based on the annual wind climate. Typically, the summer and fall winds tend to be more comfortable than the annual winds while the winter and spring winds are less comfortable than the annual winds.

4. RESULTS AND DISCUSSION

4.1 Wind Flow Around the Project

Wind generally tends to flow over buildings of uniform height, without disruption. Buildings that are taller than their surroundings tend to intercept and redirect winds around them. The mechanism in which winds are directed down the height of a building is called *Downwashing*. These flows subsequently move around exposed building corners, causing a localized increase in wind activity due to *Corner Acceleration*. Stepped massing, low podiums and canopies diffuse downwash and reduce the potential wind impact on the ground level. These flow patterns are illustrated in Image 6.

The buildings in the proposed development will be taller than the buildings that exist in the surrounding area. The project is expected to redirect winds around it. The stepped massing, large podium and gaps between buildings are positive towards reducing the overall potential for severe wind impact.



Downwashing | Corner Acceleration | Stepped massing and low podiums

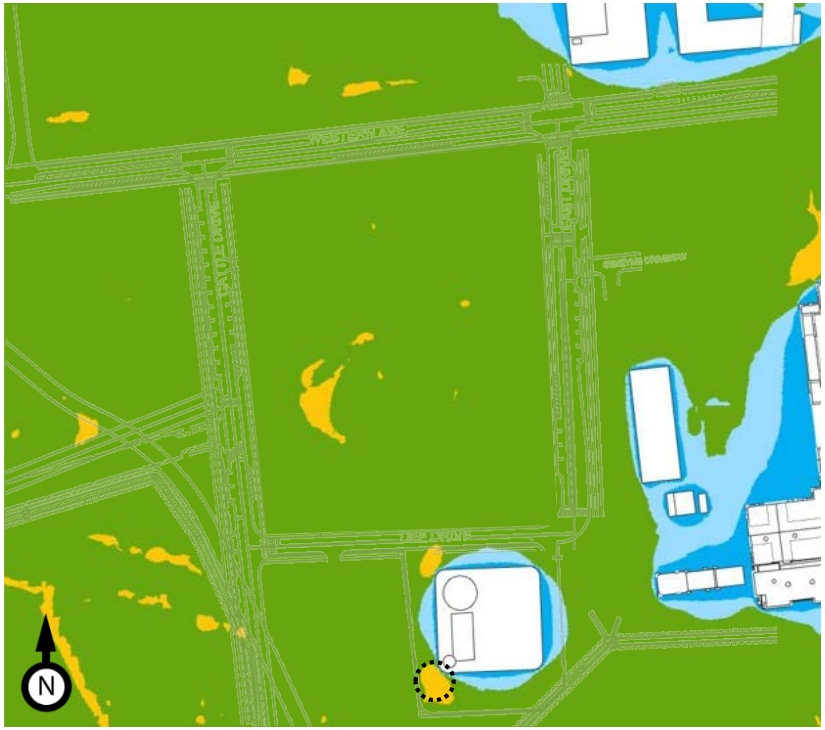
Image 6: General wind flow patterns

4.2 Simulation Results

The predicted annual wind conditions for the No Build and Build scenarios are presented in Image 7. The results are presented as color contours of mean speeds corresponding to a horizontal plane approximately 5 ft above the ground level and the contours represent mean speed categories based on the BPDA criteria detailed in Section 3. The assessment against the gust criterion was done separately and areas where the gust criterion is expected to be exceeded are indicated in Image 7, where applicable.

A detailed discussion of the expected wind conditions with respect to the prescribed criteria and applicability of the results follows in Sections 4.3. and 4.4. The discussion includes recommendations for wind control to reduce the potential for high wind speeds for the design team's consideration.

4. RESULTS AND DISCUSSION



7(a) NO BUILD

7(b) BUILD

MEAN SPEED: SITTING | STANDING | WALKING | UNCOMFORT-ABLE | DANGEROUS

EFFECTIVE GUST: Areas where the gust criterion is likely to be exceeded

Image 7: Predicted wind conditions - Annual

RWDI Project #2100586
January 7, 2021

4.3 Existing Scenario

The existing site is unoccupied and immediately surrounded by open land, roads and low buildings. There are no significant features that would redirect winds, but this also leads wind to flow very fast and unobstructed through the empty site.

Wind conditions at most areas in the existing scenario are considered comfortable for walking on an annual basis (green regions in Image 7a) and are expected to meet the effective gust criterion. In the winter, seasonally higher wind speeds will result in conditions that will be uncomfortable for walking at most areas. During the winter, the effective gust criterion may also be exceeded near the existing District Energy Facility.

4.4 Proposed Scenario

The addition of the proposed project will disrupt the otherwise fast-flowing wind on the site. The turbulence thus created will slow winds down in the area around the buildings. However, owing to the height and form of the buildings, localized wind accelerations are expected around the building bases and corners. The proposed development is not predicted to increase wind speeds around neighboring buildings; wind conditions near neighboring buildings are predicted to remain similar to those in the existing scenario, as shown in Image 7.

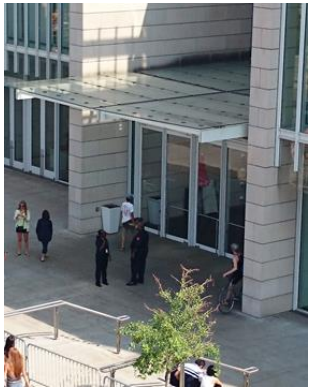
Mean wind conditions along the perimeters of the proposed buildings are predicted to be comfortable for sitting or standing, which is appropriate for pedestrian activities, including passive uses like at an entrance or waiting area. Similar conditions are also expected in the north-south passage between the conference center and the residential tower and in a large area to the east and southeast of the development. The low wind speeds are a result of wind sheltering afforded by the development from the prevailing northwestern winds.

Localized wind accelerations at the west end of the development are expected to result in conditions that are uncomfortable for walking at the western corners of the Hotel-Residential complex and the West Lab building on an annual basis and seasonally in the winter period. Wind conditions at the western corners of the Hotel-Residential complex will also likely exceed the effective gust criterion both on an annual basis and seasonally in the winter. It is recommended not to place entrances or other passive use amenities at these locations.

As the design develops, the design team is advised to consider massing and facade articulations at the building corners facing the western winds in order to minimized the potential for high wind speeds at those areas. The team may also consider wind screens in the areas between the buildings and along sidewalks to diffuse wind flowing around the areas. Examples of features to be considered are provided in Image 8. Wind tunnel tests should be conducted at an advanced design stage to quantify the predicted wind conditions and to optimize the level of wind mitigation required.

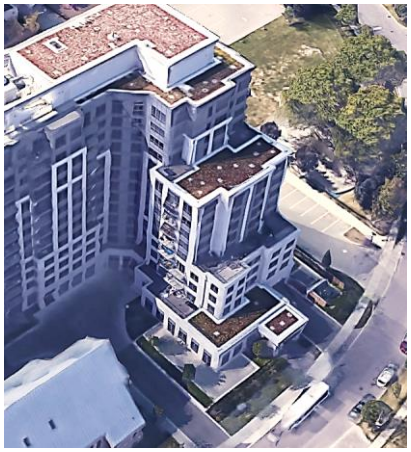
4. RESULTS AND DISCUSSION

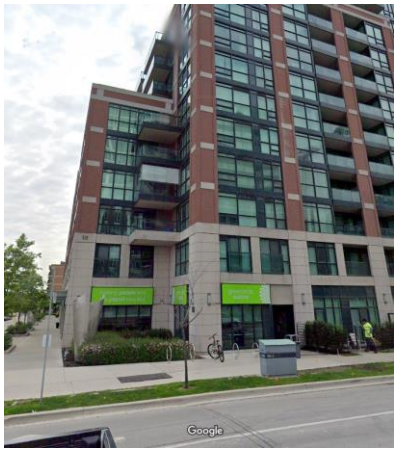
Building façade set back using colonnade



Recessed entrance with side walls and canopy

Wind screens near building corners and entrances





Stepped massing and Reentrant corners

Image 8: Design strategies for wind control

5. APPLICABILITY OF RESULTS

The assessment presented in this report is for the proposed Harvard - Enterprise Research Campus (ERC) Project in Boston, MA, based on the information provided by design team on November 17, 2020. In the event of any significant changes to the design, construction or operation of the building or addition of surroundings in the future, RWDI could provide an assessment of their impact on the pedestrian wind conditions discussed in this report. It is the responsibility of others to contact RWDI to initiate this process.

6. REFERENCES

1. H. Wu, C.J. Williams, H.A. Baker and W.F. Waechter (2004), "Knowledge-based Desk-Top Analysis of Pedestrian Wind Conditions", *ASCE Structure Congress 2004,* Nashville, Tennessee.

2. H. Wu and F. Kriksic (2012). "Designing for Pedestrian Comfort in Response to Local Climate", *Journal of Wind Engineering and Industrial Aerodynamics*, vol.104-106, pp.397-407.

3. C.J. Williams, H. Wu, W.F. Waechter and H.A. Baker (1999), "Experience with Remedial Solutions to Control Pedestrian Wind Problems", *10th International Conference on Wind Engineering*, Copenhagen, Denmark.

4. Melbourne, W.H., 1978, "Criteria for Environmental Wind Conditions", Journal of Industrial Aerodynamics, 3(1978) 241-249.