Parcel 12

PREPARED FOR

Boston Redevelopment Authority
d/b/a Boston Planning & Development Agency

SUBMITTED BY

S&A P-12 Property LLC
c/o Samuels & Associates

November 2018

PREPARED BY

vhb

IN ASSOCIATION WITH:

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November 1, 2018

Brian Golden, Director
Boston Planning & Development Agency
One City Hall Square, 9th Floor
Boston, MA 02201

Re: Expanded Project Notification Form, Parcel 12

Dear Director Golden:

S&A P-12 Property LLC (the "Proponent"), is pleased to submit the enclosed Expanded Project Notification Form (EPNF) to initiate the Large Project Review process in accordance with Article 80B of the Boston Zoning Code (the "Code"). The project will be constructed on a vacant site, known as Parcel 12, comprised of both land and air rights parcels above and adjacent to the Massachusetts Turnpike (the "Turnpike", or "I-90"), and bounded by Boylston Street, Massachusetts Avenue, and Newbury Street (the "Project Site").

The Massachusetts Department of Transportation (MassDOT) has designated the Proponent as the developer of Parcel 12 and, in connection with such designation, MassDOT and the Proponent have entered into a Development Agreement regarding the development of Parcel 12. Parcel 12 offers an important opportunity to repair a barren section of Boylston Street and Massachusetts Avenue disrupted by the Turnpike, and to knit together distinct Boston neighborhoods: the Back Bay and the Fenway, and the South End and the City of Cambridge by creating a mix of dynamic mixed use development with ground-floor uses that will activate the street, repair the discontinuity in the urban street wall left behind by the Turnpike Extension, and improve the experience for pedestrians, bicyclists and motorists, as well as those using the wide array of nearby public transit options. Designed holistically to address nearby public infrastructure needs, the project has the capacity to improve a long overlooked swath of Boston's urban fabric.

The Proponent has consulted with neighborhood stakeholders, the Citizen Advisory Committee (CAC), MassDOT and BTD among others in refining its vision for the Site. The Project design has also been guided by the following critical urban design and transportation goals specific to the site, the neighborhood, and the Civic Vision for Turnpike Air Rights in Boston, which include:

- Repairing the discontinuity in the urban street walls bordering the Turnpike to link together the Back Bay, Fenway, and South End neighborhoods, and Cambridge;
- Transforming the Newbury Street and Massachusetts Avenue intersection from a highway ramp into an urban intersection, realizing significant safety and comfort improvements for pedestrians, cyclists and drivers.
- Rebuilding the Massachusetts Avenue frontage to create an important intermodal hub for Green Line transit and bus users, drivers, and cyclists with connections to Cambridge, Boston's South End and the full MBTA transit system;
- Enlivening the public realm with quality architecture, generous sidewalks and ground floor uses that engage pedestrians and activate the street and provide; and
- Respecting the scale and character of the urban street wall and the Back Bay Architectural District by placing the lower-scale elements of the Project closest to Massachusetts Avenue, Boylston Street, and Newbury Street.

The Project will include a mix of uses that will complete the ends of Boylston and Newbury Street by providing a vibrant hub on Parcel 12 that will consist of approximately 325,000 square feet of office uses, 70,000 square feet of retail and restaurant uses, and 150,000 square feet of residential or hotel uses, as well as a below-grade parking garage with approximately 150 parking spaces (collectively, the "Project").

The Proponent's vision for the Project will deliver significant social, economic and public realm improvements, representing further significant commitment by Samuels & Associates to the City of Boston. The Proponent looks forward to continuing to work collaboratively with you, interested members of the community, the CAC, your staff, and other City agencies.

Requests for copies of the EPNF should be directed to Kyle Greaves, AICP at (617) 607-2988 or via email at kgreaves@vhb.com.

Sincerely,

Douglas M. Husid

DMH/lg
Enclosure

Parcel 12

Boston, Massachusetts

SUBMITTED TO **Boston Redevelopment Authority**
d/b/a Boston Planning & Development Agency
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November, 2018

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Project Description

Samuels & Associates, through its subsidiary, S&A P-12 Property LLC (the "Proponent") submits this Expanded Project Notification Form ("EPNF") to the Boston Redevelopment Authority ("BRA"), d/b/a the Boston Planning and Development Agency ("BPDA"). The EPNF is being filed to initiate the Large Project Review process in accordance with Article 80B of the Boston Zoning Code (the "Code").

The project will be constructed on a vacant site, known as Parcel 12, comprised of both land and air rights parcels above and adjacent to the Massachusetts Turnpike (the "Turnpike", or "I-90"), and bounded by Boylston Street, Massachusetts Avenue, and Newbury Street (the "Project Site"). Refer to Figure 1.1 for a site location map, and Figure 1.2 for a site context map.

Massachusetts Avenue and Boylston Street are two of the most critical corridors in the city of Boston (the "City"), connecting the vibrant and diverse neighborhoods of Fenway, Back Bay, the South End and Cambridge together with thousands of pedestrians, cyclists, transit users and drivers. When the Turnpike was built, it severed the urban fabric, creating barren edges facing the highway along Massachusetts Avenue and Boylston Street on the Project's boundaries, and a highway ramp beginning at the end of Newbury Street. The project will reconnect these neighborhoods and repair the urban fabric by providing safe connections and engaging experiences for pedestrians, bicyclists, transit users, and vehicles through revitalized streetscapes and significant public realm improvements outlined below. The Proponent proposes a mixed-use project that will complete the ends of Boylston and Newbury Street by providing a vibrant hub of approximately 545,000 gross square feet of office, residential/hotel and retail activity (the "Project").

The Project design is guided by the following critical urban design and transportation goals specific to the Project Site, the neighborhood, and the Civic Vision, which include:

- Repair the discontinuity in the urban street walls bordering the Turnpike to link together the Back Bay, Fenway, and South End neighborhoods, and Cambridge;
- Transform the Newbury Street and Massachusetts Avenue intersection from a highway ramp into an urban intersection, realizing significant safety and comfort improvements for pedestrians, cyclists and drivers.
- Knit together distinct Boston neighborhoods: the Back Bay and the Fenway, and the South End and the City of Cambridge.
- Rebuild the Massachusetts Avenue frontage to create an important intermodal hub for Green Line transit and bus users, drivers, and cyclists with connections to

Cambridge, Boston's South End and the full Massachusetts Bay Transportation System (MBTA) transit system;

- Enliven the public realm with quality architecture, generous sidewalks and ground floor uses that engage pedestrians and activate the street; and
- Respect the scale and character of the urban street wall and the Back Bay Architectural District by placing the lower-scale, two-floor podium closest to the Massachusetts Avenue frontage.

This chapter provides an overview of the Project background and history, describes existing site conditions and the Project, and summarizes Project-related public benefits. This chapter also summarizes the community outreach conducted prior to filing the EPNF.

1.1 Project Overview

The Project will reduce the physical and visual impacts of the highway overpass and the westbound I-90 Turnpike Westbound On-Ramp (the "I-90 Westbound On-Ramp"), will provide a new gateway to the Back Bay neighborhood from Massachusetts Avenue, and new connections to Newbury Street and the Fenway neighborhood. The Project will also create a new termination for the Newbury Street and Boylston Street retail corridors, which begin at the Boston Public Garden and currently end at the I-90 Westbound On-Ramp.

Massachusetts Avenue is among the busiest transportation corridors in the City. Thousands of pedestrians pass the Project Site daily, and its frontage serves as an important intermodal hub for the MBTA Green Line and bus users, cars, and cyclists with connections to Cambridge, Boston's South End, Fenway and the full MBTA transit system. The Project represents a substantial design and functional upgrade to this important site, and proposes to significantly improve the streetscape, address vehicular and pedestrian circulation and safety and in conjunction with the proposed shifting of the I-90 westbound on-ramp further from Massachusetts Avenue by MassDOT, increase sidewalk capacity along Massachusetts Avenue and Boylston Street, and offer substantial benefits to the public transit infrastructure on and adjacent to the Project Site. The following is a summary of the key public realm and urban design benefits:

- Provide a podium base that extends across the entire Project Site, creating approximately 500 linear feet of high-quality continuous street frontage on sidewalks currently bordering the Turnpike, activated by vibrant and engaging ground floor uses, such as retail and restaurant spaces, as well as office and residential/hotel building lobbies.
- Provide a greatly improved street-level experience, activated by approximately 70,000 square feet of first and second-floor retail and restaurant space facing Massachusetts Avenue.
- Address significant pedestrian and bicycle safety problems at the Massachusetts Avenue/Newbury Street Intersection by creating the opportunity for the

Massachusetts Department of Transportation ("MassDOT") to relocate the existing I-90 Westbound On-Ramp to the west by shifting it away from Massachusetts Avenue. Relocating the I-90 Westbound On-Ramp will narrow the existing curb cut from 70' to approximately 30' providing an improved street level experience and urban design benefits in addition to pedestrian safety improvements.

- Provide a significantly upgraded streetscape, including: new, wider sidewalks; an off-street cycle track; street lighting; street trees and landscaping; and other public amenities along Massachusetts Avenue, Boylston Street and Newbury Street, consistent with the Boston Transportation Department's ("BTD") Boston Complete Streets guidelines, wherever feasible.
- Provide wider sidewalks on the west side of Massachusetts Avenue and the north side of Boylston Streets, and accommodate potential expansion of the sidewalk on the East side of Massachusetts Avenue, from Newbury Street to Boylston Street.
- Improve pedestrian safety and bus operations by creating a dedicated bus lane, off-street cycle track, and bus shelter located on new, wider sidewalks. These improvements will create an important intermodal hub for rapid transit and bus users, drivers, and cyclists.
- Reopen and renovate the currently closed Hynes Convention Center Station (the "Hynes Station") pedestrian tunnel under Massachusetts Avenue, creating a new accessible headhouse within the Podium from street level to the existing pedestrian tunnel, providing for a weather-protected connection to the Hynes Station from the west side of Massachusetts Avenue, thus significantly improving accessibility and connectivity to the Station, and improving public safety within the district. The Proponent is working with MassDOT and the MBTA to ensure the headhouse and connection are designed in coordination with the proposed renovation of the Hynes Station as part of the Parcel 13 project.
- Reduce existing unsafe and inhospitable wind conditions along Massachusetts Avenue by adding building massing, thus, creating a buffer from the Turnpike traffic below.

The Project will also generate many positive neighborhood benefits, including increased jobs, new residential units or hotel rooms, and additional shopping opportunities. The City and the region as a whole will also benefit from the additional City and State tax revenues associated with the Project. Refer to Section 1.5 for a complete list of public benefits associated with the Project.

The Proponent is driven by a company mandate to unify its entire portfolio under a 'green umbrella.' The Proponent believes that improving the sustainability of each real estate project improves both the environment in which the buildings operate and the economic value of the assets. Sustainability will be integrated across this Project as well. It will use land efficiently through the revitalization of an underutilized site in a dense urban setting, use state-of-the-art energy conservation measures in its design, promote the use of alternative modes of transportation, encourage pedestrian activity, and improve water quality. Because the Project Site is

so well served by public transportation, many of the employees, residents or hotel guests, and customers will rely on alternative means of transportation to travel to/from the Project. In accordance with Article 37 – Green Buildings of the Code, the Proponent intends to incorporate state-of-the-art sustainable features into the design of the Project, where feasible and reasonable under the U.S. Green Building Council (USGBC) Leadership in Environmental and Energy Design (LEED®) Green Building Rating System. Project components will pursue a minimum of a LEED Silver Certification.

1.2 Project History and Background

For more than 17 years, the Project Site, along with the remainder of the air rights corridor over the Boston Extension of the Turnpike, has been the subject of extensive planning and review by the BPDA, as well as by MassDOT and its predecessor agency. In 1998, the City commissioned a group of residents, business owners, elected officials, and design and planning experts to craft a vision for the air rights over the Boston Extension of the Turnpike (the "Turnpike Extension"). The "Civic Vision for Turnpike Air Rights in Boston", issued in June 2000, (the "Civic Vision"), outlined the vision for 23 air rights parcels. Parcels 11-15, as depicted on Figure 1.3, were described as the area from Charlesgate to the Hynes Convention Center. Developments in this area were encouraged to re-establish the broader sidewalk widths across the Turnpike, have multiple entrances and windows at street level, and find ways to incorporate parking in air rights projects.

Due to economic and engineering constraints (no project has successfully been constructed on air rights over the Turnpike since Copley Place in the mid 1980's), which benefited from federal grant assistance. In September 2008, the Massachusetts Turnpike Authority issued a Request for Proposals ("RFP") for Air Rights Parcels 12, 13, 14, and 15. The aspiration of the RFP was that the air rights projects would help relink the Fenway and Back Bay neighborhoods, ending a separation established by railroad tracks and widened by the Turnpike Extension.

In 2008, four proponents submitted proposals in response to the RFP, but the recession caused MassDOT to put the process on hold until early 2011. Between August 2011 and May 2012, nine Community Advisory Committee ("CAC") meetings were held. The Proponent submitted a response to the RFP for Parcel 12, on March 13, 2012. This proposal received favorable recommendation by the CAC on June 29, 2012 and favorable comment by the BRA on August 1, 2012. On March 4, 2013, the Proponent was designated as the Developer for Air Rights Parcel 12. A Development Agreement was executed between MassDOT and the Proponent on June 19, 2014 for Parcel 12, which anticipated that a ground lease, a form of which was attached to the Development Agreement, would be executed at a later date subsequent to the satisfaction of various conditions set forth in the Development Agreement.

Over the past several years, the Proponent has worked with neighborhood stakeholders, the City and the State to fully evaluate the infrastructure deficiencies and safety problems in the vicinity of the Project site and to evaluate the complex

technical issues associated with air rights development over the Turnpike and railroad tracks. These deficiencies include sidewalks and roads that are difficult to navigate and create public safety hazards. As a result of these discussions, the Project has been reconfigured to achieve a more comprehensive approach to more complex infrastructure deficiencies than originally envisioned, resulting in the proposals to reconfigure the I-90 Westbound On-Ramp, rebuild the Massachusetts Avenue/Newbury street intersection, provide pedestrian, bicycle and bus improvements along Massachusetts Avenue, and reopen and renovate the pedestrian connection underneath Massachusetts Avenue to the Hynes Station.

Based on these considerations and the economic and engineering challenges of making this air-rights Project economically viable in an environment with significant cost escalation, the Project proposed modifications to the original proposal that have been presented at two CAC meetings. These adjustments are the basis of the current Project.

1.3 Site Context and Existing Conditions

1.3.1 Project Site Context

As illustrated in Figures 1.1 and 1.2, the Project Site, known as MassDOT Air Rights Parcel 12, is prominently located at the intersection of Boylston Street and Massachusetts Avenue, a vital seam between the Back Bay and the Fenway neighborhoods and along an important north south connection from Cambridge to the South End. The majority of the Project Site is an undeveloped air rights parcel that exists as a major rupture in the urban fabric resulting from the construction of the Turnpike Extension in the early 1960's, and is the unfortunate outcome of an area planned around the automobile. The physical gaps created in the streetscape along Massachusetts Avenue and Boylston Street, combined with the Turnpike onramp configuration at Newbury Street, separate neighborhoods while creating one of the worst pedestrian experiences amidst one of Boston's most lively and walkable districts.

The Project Site is located only steps from the Hynes Station, is proximate to the nearby Hynes Convention Center and Prudential Center, the shops and residences of the Back Bay, the bustling corridor of Massachusetts Avenue, the Berklee College of Music and the Christian Science Center Plaza (Figure 1.2). As described further in Chapter 3, *Urban Design*, large-scale development ongoing in this area includes construction along the so-called "high spine", which includes the Project Site, and generally follows the Turnpike right-of-way from the Prudential Center and Copley Place eastward to the Fenway area along Beacon Street and Boylston Street.

1.3.2 Existing Site Conditions

Figure 1.4 includes the existing conditions site plan and Figure 1.5 presents photographs of the existing site conditions. The approximately 1.81-acre Project Site

is bounded on the north by Newbury Street Extension on the east by Massachusetts Avenue, on the south by Boylston Street and on the west by the Turnpike.

The Project Site is currently well served by transportation infrastructure and is in close proximity to public transit, including the Hynes Station and multiple bus routes. The preponderance of existing infrastructure is to the detriment of the public realm adjacent to the Project Site, as several serious conflicts exist for pedestrians and cyclists:

- The 70' wide curb cut at the I-90/Newbury Street intersection is a treacherous crossing for both pedestrians and bicyclists, resulting in multiple accidents in recent years;
- The split I-90/Newbury Street intersection is confusing for drivers;
- Buses and bicyclists compete for the same lanes along Massachusetts Avenue;
- Difficult pedestrian connection from the Station to the MBTA bus stop on the west side of Massachusetts Avenue;
- The existing median along Massachusetts Avenue encourages illegal mid-block pedestrian crossings;
- Narrow sidewalks and heavy pedestrian traffic in front of the Station creates conflicts.

The current configuration of the Project proposes to address the myriad of conflicts summarized above.

1.3.3 I-90 Westbound On-Ramp Realignment

The Project Site currently contains the I-90 Westbound On-Ramp, which is accessed from Massachusetts Avenue and from Newbury Street. The I-90 Westbound On-Ramp results in a wide and challenging pedestrian crossing at the Massachusetts Avenue/Newbury Street intersection.

Given the challenges presented by the I-90 Westbound On-Ramp's current location and configuration, MassDOT, in close coordination with the Proponent and BTD, is pursuing the feasibility of relocating the I-90 Westbound On-Ramp to the west by shifting it away from Massachusetts Avenue. Relocating the I-90 Westbound On-Ramp will simplify the existing configuration of the intersection and help improve driver and pedestrian safety. The Project has been designed to create the opportunity for MassDOT to relocate the I-90 Westbound On-Ramp. The proposal to realign the ramp also will result in extending the street wall along Massachusetts Avenue to Newbury Street Extension, reducing the visual, physical and commercial impacts of the highway ramp on the end of Newbury Street.

1.4 Project Description

The Project will be a transformative development, vastly improving the public realm along its frontage, repairing a barren section of Massachusetts Avenue and Boylston

Street disrupted by the Turnpike, and connecting together the ends of the Newbury and Boylston Street retail and pedestrian corridors.

The Project includes a vibrant mixed-use office and residential/hotel development with ground-floor uses, which will activate the street and repair the discontinuity in the urban street wall left behind by the Turnpike Extension, most dramatically along Massachusetts Avenue. It will dramatically improve the pedestrian realm by providing active ground floor uses along Boylston Street and Massachusetts Avenue, one of Boston's most heavily traveled streets, and will knit together distinct Boston neighborhoods: the Back Bay and the Fenway, and the South End and the City of Cambridge.

By introducing a mix of uses in appropriate and carefully considered density, the Project will reinforce the existing mixed-use character of the area, while also creating a sustainable development.

1.4.1 Proposed Development Program

The Proponent is proposing a mixed-use redevelopment project consisting of one new office building, and one new building that could be either residential or hotel use,[1] rising from a podium base with first and second-story retail and restaurant space fronting Massachusetts Avenue and Boylston Street, comprising up to approximately 545,000 square feet. This transformational development will deliver up to approximately:

- 325,000 square feet of commercial office use;
- 150,000 square feet of residential or hotel use;
- 70,000 square feet of retail use on the first and second floors, and
- Project-related parking, loading and service uses.

Notably, the Project will also significantly improve access to the existing Station on the east side of Massachusetts Avenue by reopening and renovating the currently closed pedestrian tunnel. The Project will also provide a roof-top terrace of approximately 20,000 square feet on top of the Podium (level 3), with access for office tenants and residential/hotel occupants.

The proposed development program is presented in Table 1-1 below. (Note: all dimensions are approximate.)

[1] As documented in Table 1-1, depending on economic conditions and market opportunities, the second building could include residential or hotel uses. The environmental analyses herein use the larger residential building massing, and the more impactful hotel use as described in Table 1-1.

Table 1-1 Proposed Development Program

Project Element	Approximate Program	Quantity	Building Height[1]
Retail Podium	70,000 SF	NA	2 stories (Levels 1 and 2), 40 feet
Building 1 – Office	325,000 SF	NA	14 stories above the Podium 237 ft. to the top of the structural roof
Building 2 – Residential	150,000 SF	approx. 150 units	11 stories 154 ft. to the top of the structural roof
Building 2 – Hotel (Alternative)	125,000 SF	TBD[2]	11 stories 154 ft. to the top of the structural roof
Hotel Alternative Total SF Gross Floor Area (GFA)	**520,000 SF[4]**	TBD[2]	**NA**
Residential Alternative Total SF Gross Floor Area (GFA)	**545,000 SF[4]**	**Up to 150 Units**	**NA**
Parking Garage[3]	NA	Up to 150 spaces	2 stories below-grade
Office and Hotel Amenity Space	24,000 SF	NA	
Floor Area Ratio[5]	5	NA	NA

NA = Not Applicable

SF = square feet of site or lot area

GFA = gross floor area of building, as defined in Article 2A of the Code and as applicable to a Planned Development Area (PDA).

1 In accordance with the Code, building heights are measured from "Grade", as that term is defined in Article 2A of the Code. Because of the air rights nature of the site, standard methodologies for calculating "Grade" are infeasible. The Proponent's surveyor has determined that the site has an average site elevation of approximately 14.7 feet above Boston City Base (BCB) and such elevation has been used as the site's "Grade" for purposes of calculating the building heights set forth in Table 1-1

2 The final key count will be dependent on the type of hotel and will be determined by the hotel operator. It is anticipated that a hotel would be limited service.

3 Excluded from GFA calculations in Table 1-1.

4 Excluding rooftop amenities.

5 Because of the air rights nature of the site, standard methodologies for calculating Floor Area Ratio (FAR) are infeasible. The FAR provisions in Table 1-1 are based on an anticipated lot area of 79,050 SF and otherwise in accordance with the provisions of the Boston Zoning Code.

1.4.2 Summary of Public Ream Improvements

The site design strategy for the Project focuses on creating pedestrian-oriented streets and sidewalks and reimagining the Project Site as a 21st century multi-modal transit hub, offering convenient rail and bus access, as well as direct connections to bicycle accommodations, ride share and taxis.

The Project will provide approximately 70,000 square feet of first and second-floor retail and restaurant space facing Boylston Street and Massachusetts Avenue, which will enhance pedestrian activity around the Project Site and provide amenities to neighbors and building residents. The public realm around the Project Site will be significantly upgraded to provide a number of conveniences and amenities, including new, wider sidewalks, an off-street cycle track, street lighting, street trees and landscaping, street furniture and other public amenities along Massachusetts

Avenue and Boylston Street, consistent with the BTD's Boston Complete Streets guidelines.

The Project will also reopen and renovate the currently closed Hynes Convention Center Station pedestrian tunnel under Massachusetts Avenue, creating a new accessible headhouse within the Podium from street level to the existing pedestrian tunnel, providing for a weather-protected connection to the Hynes Station from the west side of Massachusetts Avenue, thus significantly improving accessibility and connectivity to the Station, and improving public safety within the district.

Refer to Section 1.5, and Chapter 3, *Urban Design*, for additional details on proposed public realm improvements.

1.4.3 Access and Loading

As described more fully in Chapter 5, *Transportation,* and illustrated on Figure 3.34, vehicular access to the Project's parking, and service and loading will be from Boylston Street. The Proponent anticipates a valet attendant parking system with two below-grade parking levels.

An off-street loading area for the Project is also proposed to be accessed from Boylston Street. The service and loading for the office building, retail podium and the residential/hotel building will be combined there. Trash collection will be from the same location.

Although no on-street parking is anticipated, a new accessible short-term drop-off area, dedicated bus lane, and bus stop are proposed to be provided along Massachusetts Avenue, subject to applicable approvals. This location is intended to provide convenience for retail/restaurant patrons and residents as well as the general public.

The Project will be supported by up to 150 parking spaces below grade beneath the office building. The parking garage will accommodate Electric Vehicle (EV) charging stations in accordance with City guidelines. Provisions will be made to increase the number of EV charging stations over time based on growth in demand.

1.4.4 Anticipated Project Schedule

The Proponent submitted a Letter of Intent (LOI) to the BPDA on May 17, 2018. Since that time, the Proponent has met with the community, as discussed in Section 1.7 below, and with the City and State agencies as discussed further in Section 2.3 of Chapter 2, *Regulatory Context and General Information*. The Proponent will continue to work diligently with the CAC, the community, and with City departments to complete the Article 80B Large Project Review.

The Project is currently anticipated to be constructed in a single phase, although it is possible that as a result of market conditions one building could be deferred to a Phase 2. The Proponent anticipates commencing site preparation work in 2019. The deep foundation work for the podium, hotel/residential, and office buildings will

follow the completion of the site preparation and utility work. Work on the podium and office and residential/hotel building is expected to be complete in 2021.

1.5 Summary of Project Benefits

Public benefits for the surrounding neighborhoods and the City as a whole will include, but not be limited to, the following:

Urban Design and Public Realm Benefits

Contribute to the Cohesiveness of the City – The Project will span and cover a portion of the existing undeveloped highway overpass, knitting together the Back Bay and Fenway neighborhoods and eliminating an undeveloped, vacant highway overpass amidst one of Boston's most lively and walkable districts.

Improve Street and Pedestrian Environment – The Proponent will work with the City and MassDOT to provide safety and accessibility improvements along Massachusetts Avenue:

Pedestrians & Bicycles

- The Project will provide wider sidewalks on its frontage on Boylston and Massachusetts Avenue, and accommodate expansion of the sidewalks on the east side of Massachusetts Avenue, with landscaping and other amenities and consistent with the BTD's Complete Street guidelines. Refer to Section 3.5 for specific details on proposed pedestrian realm improvements.
- The Project will improve pedestrian safety at the Massachusetts Avenue/Newbury Street Intersection and provide separate bicycle and bus operations along Massachusetts Avenue by creating a dedicated bus lane, off-street cycle track, and bus shelter on wider sidewalks.
- The Podium will extend across the entire Project Site and create a high-quality continuous street frontage activated by vibrant and engaging ground and second-floor uses, including retail and restaurant spaces and building lobbies.
- Using glass façades at ground level wherever possible, the Project will provide transparency and create an inviting and safe ground-level experience for pedestrians.

Public Transit

- The Project will reopen and renovate the currently closed Hynes Convention Center Station pedestrian tunnel under Massachusetts Avenue, creating a new accessible headhouse within the Podium from street level to the existing pedestrian tunnel, providing for a weather-protected connection to the Hynes Station from the west side of Massachusetts Avenue, thus significantly improving accessibility and connectivity to the Station, and improving public safety within the district.

Vehicle

- The Project has been designed to create the opportunity for MassDOT to relocate the existing I-90 Westbound On-Ramp, which will simplify the existing configuration of the Massachusetts Avenue/Newbury Street/I-90 westbound on-ramp intersection, and improve driver and pedestrian safety;
- The Project will create a new accessible short-term drop-off area, dedicated bus lane and bus stop that can accommodate two buses simultaneously along Massachusetts Avenue.

New Retail –The Project will provide approximately 70,000 square feet of first and second-floor retail and restaurant space facing Boylston Street and Massachusetts Avenue, which will enhance pedestrian activity around the Project Site and provide amenities to neighbors and building residents.

Architecture –

- The Project complement the height and massing in the area, while designing the office and residential/hotel buildings to minimize wind and shadow impacts on surrounding neighborhood public space resources.
- The Project proposes high quality architecture that is responsive to the surrounding context, while creating signature buildings that contribute to the City's progressive architecture.
- The Project will create an iconic gateway to downtown Boston from points west, both entering the city via the Turnpike, and on the MBTA's commuter rail system.
- The Project will create a new termination, for the Newbury Street and Boylston Street retail corridors, which begin at the Boston Public Garden and currently ends at the I-90 Westbound On-Ramp.

Open Space - The Project will provide wide plaza areas on its Massachusetts Avenue frontage. Roof-top terrace amenity space is planned on top of the podium (level 3), with access for office tenants and residential/hotel occupants. The roof terrace will feature paved areas for outdoor dining, event gatherings, and small group meet-ups. A sculptural green roof with raised berms will be planted with small trees, shrubs, and perennials, providing a sense of enclosure on the roof, while additionally being visible from the surrounding streetscape as a lush garden. The Roof Terrace will reduce contributions to the urban heat island and provide accessible open and green amenity space. Additional amenity space is proposed for tenants and occupants on level 17 of the office building, and on level 14 of the residential/hotel building.

Sustainability/Environmental Benefits

Area Revitalization –The Project will revitalize an underutilized and uninviting urban site and uses land efficiently by incorporating density within the urban core.

Stormwater Management – The Project will improve the quality and quantity of site stormwater runoff compared to existing conditions, including consideration for groundwater recharge in accordance with provisions applicable to the Groundwater

Conservation Overlay District ("GCOD"). Additionally, the proposed stormwater management systems will comply with the 2008 Massachusetts Department of Environmental Protection ("MassDEP") Stormwater Management Policy and Standards.

LEED-Certification – In addition to compliance with the City of Boston Article 37 Green Building and Climate Resiliency Guidelines ("Article 37"), the Project will certify each building under the LEED rating system which provides verification of green building design. Through the incorporation of a variety of sustainable design strategies, the Project will improve water quality and reduce the urban heat island effect, among other environmental benefits. As the design and engineering of the Project is further advanced, the Proponent will aspire to achieve a minimum of certifiability at LEED-CS Silver level, to the extent feasible. This is discussed more extensively in Chapter 4, *Sustainability/Green Building and Climate Change Resiliency*.

Resource Conservation – By utilizing sustainable design strategies and exceeding the minimum building energy code requirements, the Project will maximize the conservation of energy and water, and minimize impacts to regional infrastructure and water resources. The Project will exceed the requirements of the Massachusetts Stretch Energy Code under the 9th Edition.

Greenhouse Gas Emissions –

- Based on preliminary building energy models, the Project will achieve an estimated 17 percent reduction in stationary source CO_2 emissions by reducing overall energy consumption by approximately 20.6 percent through the implementation of energy optimizing building design and systems. (Note, the percentages of energy use are different than emission reductions due to emissions conversion factors.)
- The proposed Travel Demand Management (TDM) measures are anticipated to result in a reduction in Vehicle Miles Travelled from Project-generated trips.

Renewable Energy – The Proponent and design team will continue to evaluate the feasibility of clean and renewable energy sources, as the design progresses, including solar photovoltaic (PV) panels. This is discussed more extensively in Section 4.4.2 of Chapter 4, *Sustainability/Green Building Design and Climate Change Resiliency*.

Improved Wellness – Through a variety of design strategies, the Project will promote health and wellness, assist in improving indoor air quality, and reduce the urban heat island effect. The Project will provide pedestrian facilities and bicycle accommodations to support heathy alternate modes of transport.

Climate Resilience – By designing for resilience, the Project seeks to integrate climate change adaptations that reduce vulnerability given future changes in climate scenarios and natural events, such as severe weather. This is discussed more extensively in Chapter 4, *Sustainability/Green Building and Climate Change Resiliency*.

Social and Economic Benefits

Enhanced Tax Revenues – The Project will generate more than $4.5 million annually in new real estate tax revenues for the City of Boston and significant State sales, hotel, and business tax revenue to the Commonwealth upon stabilization.[2]

Affordable Housing – To the extent applicable, the Proponent will work with the BPDA to be in compliance with the Inclusionary Development Policy

Innovative Office Space – The Project will provide innovative new workplace opportunities for a variety of business types.

Enhanced Retail Opportunities / Visibility –

- The Project will provide new and diverse retail opportunities for neighborhood residents, transit customers and the public at large.
- Transform Project Site from undeveloped highway overpass into a front door address anchored by new retail visible from Boylston Street, Massachusetts Avenue, Newbury Street, and from points west, both entering the city via the Turnpike and on the MBTA's commuter rail system.

New Job Creation –

- The Project will enhance the economy by creating over 2,250 permanent, transit-accessible jobs on-site relating to the office, retail, restaurant, parking and residential administration uses.
- The Project will create over 1,100 construction jobs in a variety of trades.
- The Project will create a transit-accessible employment center, office and retail employees will have multiple options to commute to work via public transportation.

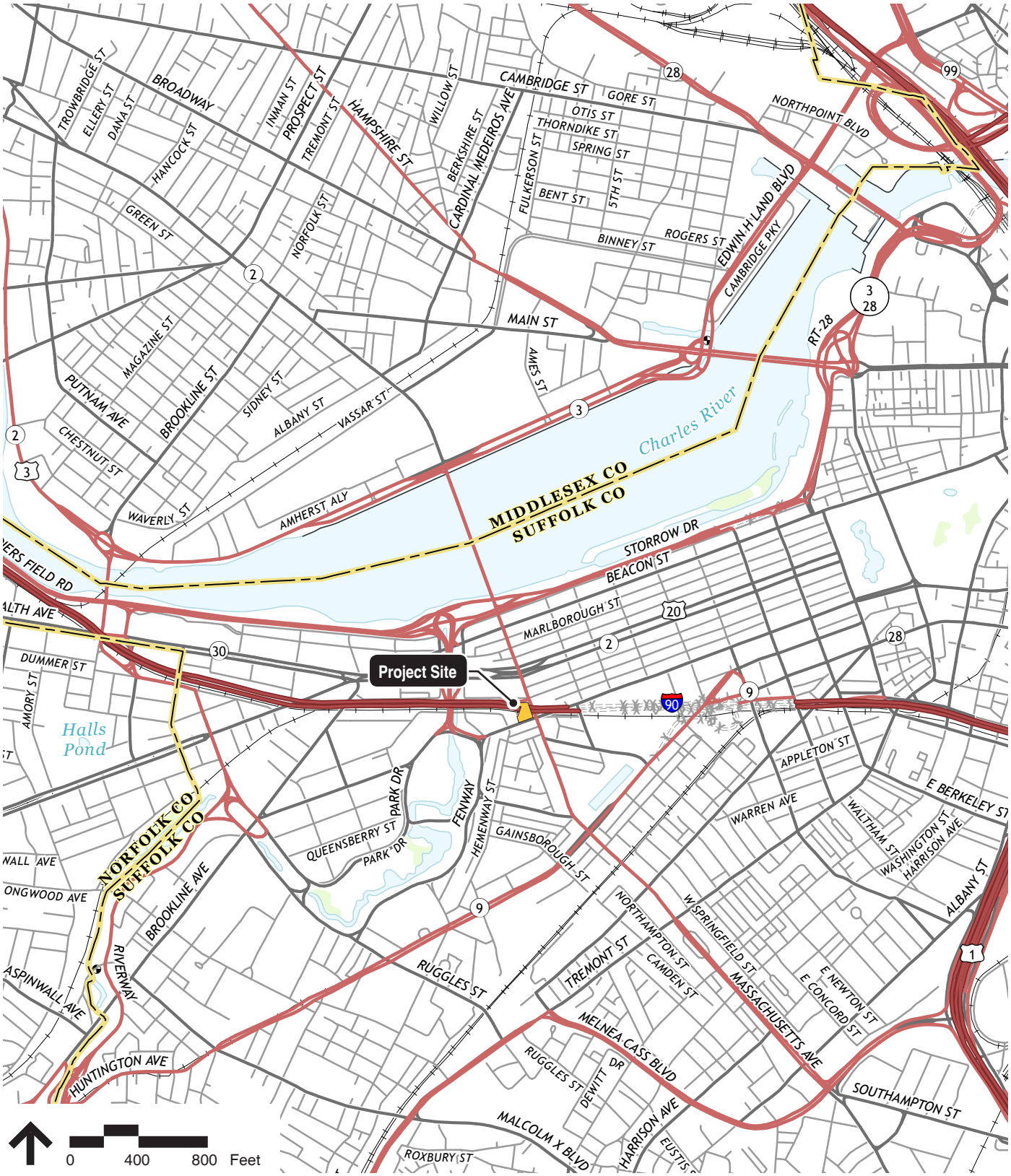
1.6 Community Outreach Overview

Since 2011, the Proponent and CAC have met numerous times regarding the Project. Prior to filing the EPNF, the Proponent and members of the Project team met with City and State agencies, elected officials, members of the CAC, abutting owners, neighborhood groups, community leaders, business owners, area residents, and other stakeholders to seek input and feedback on the development plan as it progressed. Most recently, on April 4, 2018, a community pre-filing meeting with the CAC was held to discuss the Project, and the CAC encouraged the Proponent to begin the Article 80 process.

The Proponent will continue to meet with City and State agencies, elected officials, the CAC, abutting owners, neighborhood groups, community leaders, business owners, area residents and other stakeholders regarding this EPNF during its review

[2] This estimate assumes stabilization of all four Project Components in 2022

period and will continue to interface and consult with such parties during review and implementation of the Project.

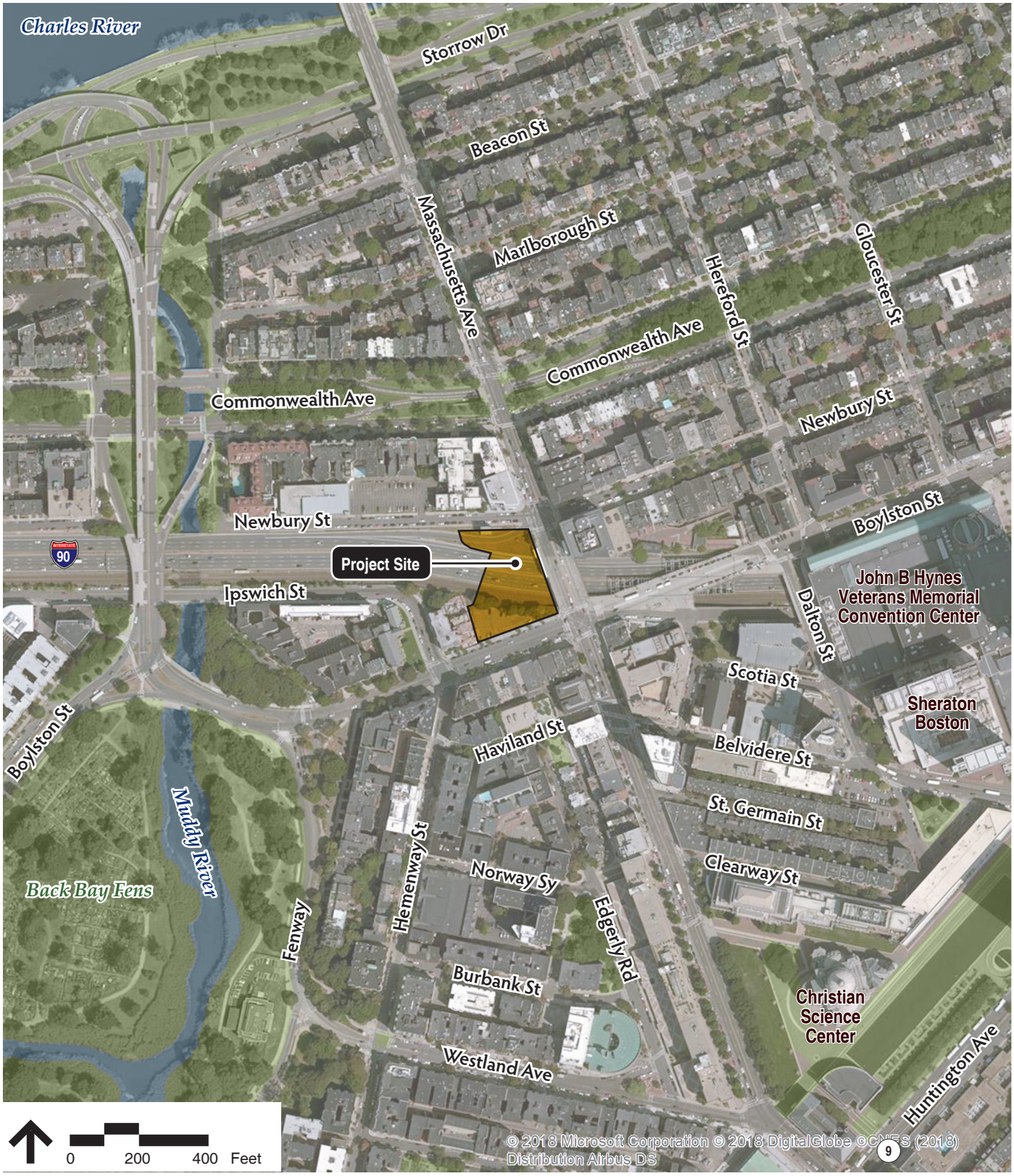


Source: USGS US Topo, Boston South

Site Locus Map

Figure 1.1

Air Rights Parcel 12
Boston, Massachusetts



Source: Bing Aerial, MassGIS

Project Site Context

Figure 1.2

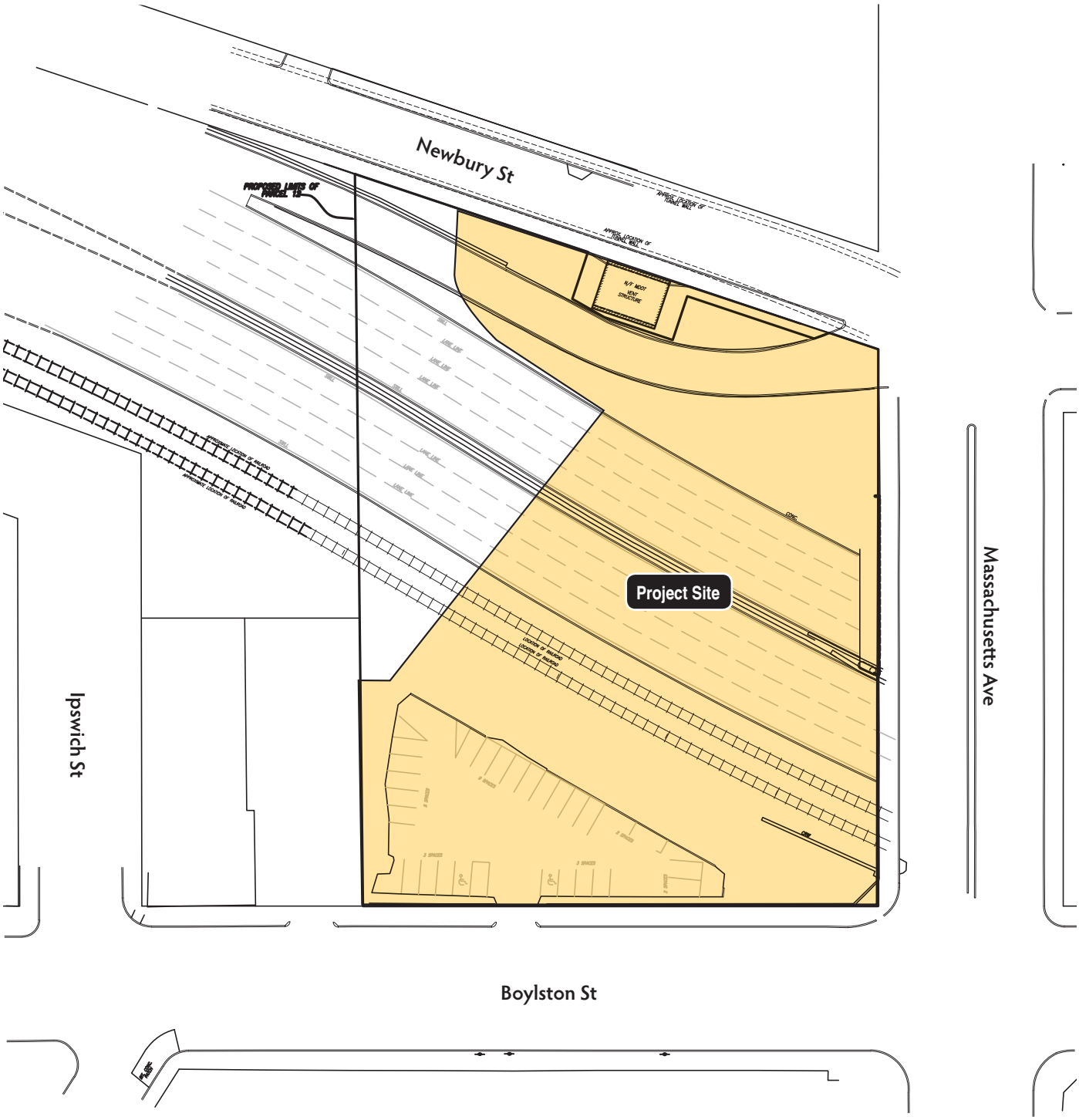
Air Rights Parcel 12
Boston, Massachusetts

Aerial Image Source: Google Earth

ELKUS | MANFREDI ARCHITECTS

MASS DOT Air Rights Parcels
Air Rights Parcel 12
Boston, Massachusetts

Figure 1.3



0 25 50 Feet

Source: Feldman Land Surveyors

Existing Conditions Plan

Figure 1.4

Air Rights Parcel 12
Boston, Massachusetts

OVER MBTA COMMUTER RAIL TRACKS LOOKING EAST

PARKING LOT ALONG BOYLSTON ST. LOOKING EAST

NW CORNER OF BOYLSTON ST. & MASS AVE. LOOKING NORTH

NE CORNER OF NEWBURY ST. & MASS AVE. LOOKING SOUTH

BUS SHELTER ALONG BOYLSTON ST. LOOKING NORTH

NEWBURY ST LOOKING EAST TOWARDS MASS AVE.

ELKUS | MANFREDI ARCHITECTS

Project Site Development Parcels
Air Rights Parcel 12
Boston, Massachusetts

Figure 1.6

2

Regulatory Context and General Information

This chapter identifies the anticipated required permits and approvals, and describes how the Project will meet applicable regulatory requirements and standards. This chapter also provides a summary of ongoing public agency coordination and community outreach, identifies the development team, and provides relevant legal information regarding the Proponent and the Project Site.

2.1 Regulatory Context

This section lists the anticipated permits and approvals as well as the local planning and regulatory controls applicable to the Project.

2.1.1 City of Boston Zoning Code

As shown on Map 1 of the City of Boston Zoning Maps, the Project Site is located within three different underlying zoning districts: (1) the northwest and southeast portions of the Project Site are located within the B-2 Business District; (2) the northeast portion of the Project Site is located within the B-8-120b Business District; and, (3) the southwest portion of the Project Site is located within the H-3 Residential District. The entire Project Site is also located within the GCOD established by Article 32 of the Code and the Restricted Parking Overlay District established by Section 3-1A.c of the Code.

The Project Site is located within an area of the City in which Planned Development Area ("PDA") designations are allowed pursuant to Section 3-1A.a. of the Code. The Proponent intends to seek approval for a Planned Development Area Development Plan ("PDA Development Plan") for the Project. If the PDA Development Plan is approved, the use, bulk, dimensional, parking, loading and design requirements set forth in the PDA Development Plan will control in lieu of those otherwise applicable within the underlying zoning districts in which the Project Site is located.

The Proponent will seek designation of the Project Site as a PDA Special Purpose Overlay Disrict, together with the adoption of a PDA Development Plan for the Project, all pursuant to Article 80C of the Code. The approval process for the PDA Development Plan and associated Code map amendment require public hearing and approval by both the BPDA and the City of Boston Zoning Commission.

2.1.2 Article 80B - Large Project Review

Because the Project exceeds 50,000 square feet of gross floor area, it is subject to Large Project Review by the BPDA pursuant to Article 80B of the Code. The Large Project Review process was commenced by the filing of a Letter of Intent with the BPDA on May 17, 2018, a copy of which is included in Appendix A.

The Proponent has prepared this EPNF to meet the standards of Article 80B, Large Project Review, of the Code by presenting details about the Project and providing a thorough impact analysis of transportation, environmental protection, infrastructure, and other components of the Project in order to inform City agencies and neighborhood residents about the Project, its potential impacts and mitigation proposed to address potential impacts. Based on a comprehensive approach to address potential impacts similar to the level of information normally presented in a Draft Project Impact Report, the Proponent requests that the BPDA, after reviewing public and agency comments on this EPNF and any further responses to comments made by the Proponent, issue a Scoping Determination Waiving Further Review pursuant to the Article 80B-5 process.

2.1.3 Groundwater Conservation Overlay District

Under Article 32 of the Code, a conditional use permit is required for projects within the GCOD involving paving or other surfacing of lot area, extension of a structure occupying more than 50 square feet of lot area, and construction of a structure involving excavation below-grade to a depth of seven (7) or more feet below Boston City Base. The PDA Development Plan will mirror the requirements of Section 32-6 of the Code (and described further in Chapter 9, *Infastructure*). Accordingly, the Project will endeavor to infiltrate not less than one (1) inch of rainfall across the portion of the Project Site to be occupied by the Project and will not have a negative effect on existing groundwater levels on the Project Site or adjacent lots. It is anticipated that the PDA Development Plan will include a mechanism for demonstration of compliance with the requirements of Article 32.

2.1.4 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 with ten (10) or more units of housing and which requires zoning relief must set aside at least thirteen percent (13 percent) of its market rate units as affordable to households at specified levels of income within a project. Alternatively, in the Zone A within which the Project Site is located, a project can create new affordable units at a separate location or through the purchase, rehabilitation and restriction of existing units within the vicinity of such project in an amount equivalent to eighteen percent (18%) of the total number of residential units in such project, or contribute to a housing creation fund at a per-unit subsidy equal to eighteen percent (18%) of the total number of residential units in such project. The Project will comply with the IDP In the event the Project includes a residential component.

2.1.5 Development Impact Project

The Project is a Development Impact Project ("DIP"), as defined in Article 80B-7 of the Code, because it requires Zoning Relief and will erect a structure or structures having a total gross floor area of more than one hundred thousand (100,000) square feet devoted to "Development Impact Uses", as that term is defined in Article 80B-7 of the Code. Projects that qualify as a DIP must pay into the linkage fund, which is a fund that assists with the creation and preservation of housing and job training. The Project will comply with the DIP requirements of Article 80B-7 of the Code.

2.1.6 Massachusetts Environmental Policy Act

The Project is subject to a Mandatory Environmental Impact Report (EIR) under MEPA and meets the following review thresholds:

- 11.03(6)(a)(6): Generation of 3,000 or more new ADT on roadways providing access to a single location.
- 11.03(6)(b)(14): Generation of 1,000 or more new ADT on roadways providing access to a single location and creation of 150 or more new parking spaces at a single location.

2.1.7 Federal Aviation Administation

The Project Site is located approximately 2.9 nautical miles from the nearest runway at Boston's Logan International Airport (Runway 14/32). The most recently issued Logan Airspace Map, published by the Massachusetts Port Authority ("Massport") in December 2011 identifies a Composite of Critical Airspace Surfaces above the Project Site at an elevation of 1,000 feet Above Mean Sea Level (AMSL). The current design proposes a structure with a maximum height of approximately 257 feet above the existing site grade of approximately 32 FT (NAVD88) on Massachusetts Avenue, corresponding to a maximum elevation of approximately 289 FT AMSL, approximately 711 feet below the published Massport limit.

The Project requires the filing of one or more Notices of Proposed Construction or Alteration (Form 7460-1) with the Federal Aviation Administration (FAA) because the proposed structure exceeds the criteria at 14 CMR Part 77.9(a) "any construction or alteration that is more than 200 ft. AGL…" The development team anticipates filing one or more notices for the building following the completion of the Article 80B review processe. Furthermore, a notice will be filed for the anticipated temporary construction crane when sufficient information is available.

2.2 Anticipated Permits and Approvals

Table 2-1 lists the anticipated permits and approvals from state and local governmental agencies, which are presently expected to be required for the Project, based on information currently available. It is possible that not all of these permits or actions will be required, or that additional permits or actions may be needed, depending upon the outcome of the community review process.

TABLE 2-1 - LIST OF ANTICIPATED PERMITS AND APPROVALS

Agency/Department	Permit/Approval/Action
City of Boston	
Boston Planning and Development Agency	▪ Article 80B, Large Project Review and Execution of Related Agreements ▪ Recommendation of PDA Designation (include certification of compliance with GCOD standards) and Map Amendment ▪ Comprehensive Sign Design Approval ▪ Design Review
Boston Civic Design Commission	▪ Schematic Design Review
Boston Zoning Commission / Mayor	▪ Approval of PDA Designation and Map Amendment
Boston Transportation Department	▪ Transportation Access Plan Agreement ▪ Construction Management Plan
Boston Water and Sewer Commission	▪ Site Plan Review and Approval ▪ Water and Sewer Connection Permits ▪ Temporary Construction Dewatering Permit (issued jointly with MWRA) ▪ Groundwater Conservation Overlay District recharge system approval
Public Improvement Commission / Public Works Department	▪ Specific Repair Plan / Curb Cut Permit ▪ Widening and Relocation of Newbury Street ▪ Permits/Canopy Licenses for signs and awnings (if required) ▪ Agreement for Temporary Earth Retention System, Tie-Back Systems and Temporary Support of Subsurface Construction (if required)
Public Safety Commission/Boston Committee on Licenses	▪ Permit to Erect and Maintain Parking Structure ▪ Inflammables License
Boston Air Pollution Control Commission	▪ Parking Freeze Permit (Confirmation of Exemption from Parking Freeze)
Boston Parks Department	▪ Approval of construction within 100' of park (if required) ▪ Approval of Cutting of Public Shade Tree (if required)
Boston Fire Department	▪ Plan review ▪ Approval of fire safety equipment
Boston Inspectional Services Department	▪ Building Permit ▪ Other construction-related permits ▪ Certificate of Occupancy
Commonwealth of Massachusetts	
Executive Office of Energy and Environmental Affairs (MEPA Office)	▪ Review under Massachusetts Environmental Policy Act
Massachusetts Historical Commission	▪ State Register Review (through MEPA process)
Massachusetts Department of Transportation	▪ Development Agreement and Air Rights Lease ▪ Design Review ▪ Construction Management Plan ▪ Approval under M.G.L. c. 40, s. 54A (if

Agency/Department	Permit/Approval/Action
	applicable) ▪ Access Permit(s) (as applicable)
MBTA	▪ Air Rights Conveyance ▪ Design Review ▪ Construction Management Plan ▪ Approval under M.G.L. c. 40, s. 54A (if applicable) ▪ License Rights (as applicable)
Department of Public Utilities	▪ Approval of Rail Vertical Clearance under M.G.L. c. 160, s. 98
Office of Public Safety and Inspections	▪ Building Permit for construction on land owned by MassDOT (as required) ▪ Certificates of Occupancy
Massachusetts Water Resources Authority	▪ Temporary Construction Dewatering Permit (issued jointly with BWSC)
Federal	
Federal Aviation Administration	▪ Determination of No Hazard to Air Navigation
Environmental Protection Agency	▪ NPDES Permit (if applicable)

2.3 Agency Coordination

As the development plan has progressed, the Proponent and members of the Project design and consulting team have met and will continue to meet with State and City Agencies, elected officials, abutters and community stakeholders, including but not limited to MassDOT, the MBTA, MEPA, the Department of Energy Resources (DOER), BPDA, and BTD.

The filing of this EPNF will initiate formal the agency coordination and community outreach process. The Proponent is fully committed to maintaining an open dialogue and will continue to engage the City and State agencies throughout the review and approval processes.

2.3.1 Massachusetts Turnpike Tunnel Improvements

The air rights portion of the Project includes the extension of the existing commuter rail tunnel, triggering life safety and other related infrastructure improvements. Upon completion of projects on adjacent Parcels 13-15 by other developers, the Project will also be part of the tunnel spanning the Turnpike. The Proponent is working with MassDOT and the MBTA on the evaluation and implementation of necessary life safety and infrastructure improvements relating to such tunnels.

2.4 Project Information/Project Team

Table 2-2 identifies the members of the design and consulting team (the "Project Team") and provides their primary contact information.

Table 2-2 Project Team

Proponent	S&A P-12 Property LLC c/o Samuels & Associates 136 Brookline Ave Boston, MA 02215 617-247-3434 *Contacts:* Abe Menzin
Legal Counsel	Goulston & Storrs 400 Atlantic Avenue Boston, MA 02110 617-482-1776 *Contacts:* Doug Husid Adam Hundley William Dillon Brian Judge
Architect	Elkus Manfredi Architects 25 Drydock Ave Boston, MA 02210 617-426-1300 *Contacts:* David Manfredi Kevin Lennon
Permitting, Site/Civil Engineering, Transportation, and Historic Resources	VHB 99 High Street, 10th Floor Boston, MA 02110 617-728-7777 *Contacts:* David Bohn, PE, ENV SP, Senior Principal/ Transportation/Traffic Engineer Kyle G. Greaves, AICP, Project Manager/ Environmental Planner Brian Fairbanks, Senior Project Manager/Civil Engineer Maureen Cavanaugh, Director of Cultural Resources
Mechanical, Plumbing, Electrical Engineer and Sustainability Consultant	WSP 88 Black Falcon Avenue, Suite 210, Boston, MA 02210 617-210-1735 *Contacts:* Tom Burroughs, PE, LEED AP, Senior Vice President Building Systems
Geotechnical and Hazardous Materials	Haley & Aldrich 465 Medford Street, Suite 2200 Boston, MA 02129 617-886-7408 *Contact:* Marya Gorczyca, P.E., Senior Vice President
Wind and Solar Consultant	RWDI 600 Southgate Drive Guelph, Canada N1G 4P6 519-823-1311 *Contact:* Derek Kelly, M.Eng., P.Eng., Project Manager/Principal

Construction Manager	Suffolk Construction *160 Federal Street, 5th Floor* *Boston, MA 02110* *617-737-0040* *Contact: Scott Menard, Vice President Preconstruction*

2.5 Legal Information

2.5.1 Legal Judgments or Actions Pending Concerning the Proposed Project

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

2.5.2 History of Tax Arrears on Property Owned in Boston by the Proponent

The Proponent does not own any property which is in arrears on the payment of taxes due and owing to the City of Boston.

2.5.3 Evidence of Site Control

Parcel 12 is owned by the MassDOT. The Proponent and MassDOT are parties to a Development Agreement pursuant to which the Proponent has been designated by MassDOT as the developer of Parcel 12 and MassDOT has agreed to enter into a long-term lease with respect to Parcel 12 to allow the Proponent to construct the Project. A portion of the Project Site consists of air rights over a small parcel of land on Newbury Street owned by the MBTA and currently improved with a vent building. Rights with respect to such air rights have not been secured by the Proponent, nor has the impact of the Project on the operation of the vent building been reviewed by the Proponent with the MBTA. The Proponent intends to work with MassDOT and the MBTA to (a) acquire rights to construct a portion of the Project within such air rights, and (b) to review with and obtain the approval of MassDOT and the MBTA of the design of the Project as it may impact on the vent building and to implement such modifications to the vent building as may be required to insure the continued proper functioning thereof, including such upgrades to the vent building as may be required by applicable law or the requirements of the MBTA.

2.5.4 Public Easements

The Project Site will be made subject to certain easements in favor of MassDOT and the MBTA to the extent necessary to ensure the continued operation and maintenance of the Turnpike and adjacent railroad tracks within the boundaries of the Project Site.

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3

Urban Design

This chapter describes the existing urban context of the Project Site and discusses the planning principles and design goals for the Project. It also describes urban design characteristics (i.e., height and massing) and public realm improvements proposed as part of the Project. Supporting graphics are provided, including massing diagrams, building floorplans, building sections, building elevations and view perspectives.

3.1 Summary of Key Findings and Benefits

The Project benefits both the immediate neighborhoods and the City at large by improving retail vitality, enhancing the public realm, and providing high quality office, retail and residential/hotel space in a highly visible and accessible Back Bay location. The Project design will dramatically improve the character of the public realm and neighborhood access, and the area will be significantly enhanced by the urban design and architectural character of the Project. The following is a summary of the key urban design benefits:

Improved Street and Pedestrian Environment –

- The Project will knit together the Back Bay and Fenway neighborhoods by constructing buildings spanning and covering the open areas of the Turnpike.
- The Project will provide a podium base that extends across the entire Project Site, creating approximately 500 feet of new high-quality continuous street frontage activated by vibrant and engaging ground floor uses, such as retail and restaurant spaces, as well as office and residential/hotel building lobbies.
- Provide a greatly improved street-level experience, activated by approximately 70,000 square feet of first and second-floor retail and restaurant space facing Massachusetts Avenue.
- Address significant pedestrian and bicycle safety problems at the Massachusetts Avenue/Newbury Street Intersection by creating the opportunity for the Massachusetts Department of Transportation ("MassDOT") to relocate the existing westbound I-90 Westbound On-Ramp to the west by shifting it away from Massachusetts Avenue. Relocating the I-90 Westbound On-Ramp will narrow the existing curb cut from 70' to approximately 30' providing an improved street level experience and urban design benefits in addition to safety improvements.
- The Project will provide a significantly upgraded streetscape, including new sidewalks, street lighting, landscaping where feasible and other public amenities along Massachusetts Avenue, Boylston Street and Newbury Street, consistent with the BTD's Boston Complete Streets guidelines.

- Provide wide sidewalks on Massachusetts Avenue and Boylston Streets, and accommodate potential expansion of the sidewalk on the East side of Massachusetts Avenue, from Newbury Street to Boylston Street, to allow for wider sidewalks along Massachusetts Avenue.
- The Project will improve pedestrian safety and bus operations by creating a dedicated bus lane, off-street cycle track, and bus shelter located on new, wider sidewalks. These improvements will create an important intermodal hub for rapid transit and bus users, drivers, and cyclists.
- The Project will reduce unsafe and inhospitable wind conditions along Massachusetts Avenue by creating a buffer from the Turnpike traffic below.
- The Project will reopen and renovate the currently closed Hynes Convention Center Station pedestrian tunnel under Massachusetts Avenue, creating a new accessible headhouse within the Podium, and a new, weather-protected connection to the Station from Massachusetts Avenue, thus significantly improving accessibility and connectivity to the Station, and improving public safety within the district.

Improved Accessibility –

- The Project will create a new accessible drop-off lane along Massachusetts Avenue for the residential/hotel building.
- The Project will provide wider sidewalks on the west side of Massachusetts Avenue and the north side of Boylston Streets, and accommodate potential expansion of the sidewalk on the East side of Massachusetts Avenue, from Newbury Street to Boylston Street.
- The parking ingress/egress on Boylston Street will incorporate a flush sidewalk condition giving priority to the pedestrian over the vehicle.

Architecture –

- The Project proposes high quality architecture that is responsive to the surrounding context, while creating signature buildings that contribute to the City's progressive architecture.
- The Project will create a new termination, for the Newbury Street and Boylston Street retail corridors, which begin at the Boston Public Garden and currently ends at the I-90 Westbound On-Ramp.
- The Project creates an iconic gateway to downtown Boston from points west, both entering the city via the Turnpike and on the MBTA's commuter rail system.

3.2 Neighborhood Context

As described in Chapter 1, *Project Description and Alternatives,* and illustrated in Figure 3.1, The Project Site is comprised of both land and air rights parcels above and adjacent to the Turnpike and bounded by Massachusetts Avenue, Boylston Street, and Newbury Street in Boston's Back Bay neighborhood.

The Project will transform an undeveloped highway overpass into a vibrant hub of approximately 545,000 gross square feet of office, residential/hotel and retail activity, which will help reduce the physical and visual impacts of the highway overpass, and the I-90 Westbound On-Ramp at this important downtown Boston intersection. The Project will provide a new front door to the Back-Bay neighborhood from Massachusetts Avenue, and new connections to Newbury Street and to the Fenway neighborhood. The Project will also create a new termination for the Newbury Street and Boylston Street retail corridors, which begin at the Boston Public Garden and currently ends at the Turnpike On-Ramp.

Massachusetts Avenue is among the busiest transportation corridors in the City. Thousands of pedestrians pass the Project Site daily, and its frontage serves as an important intermodal hub for the MBTA Green Line and bus users, drivers, and cyclists with connections to Cambridge, Boston's South End, Fenway and the full MBTA transit system. The Project will significantly improve the streetscape, address vehicular and pedestrian circulation and safety, increase sidewalk capacity, construct a dedicated bus lane and a new cycle track, reopen and renovate the currently closed Station pedestrian tunnel under Massachusetts Avenue, and create a new accessible headhouse within the podium to reduce unsafe pedestrian street crossings.

The architectural character of the Back Bay is typified by three- to five-story brownstones flanking tree-lined streets. Two linear green spaces give the Back Bay further distinction: the Commonwealth Avenue Mall that links the Public Garden and the Fens in Boston's Emerald Necklace; and the Esplanade along the Charles River. There are a number of historical architectural landmarks in the neighborhood, including Trinity Church, the Boston Public Library, and Old South Church, as well as modern icons of the City, such as the Prudential and new Hancock Tower south of Boylston. Copley Square provides a proper civic foreground to the Public Library, Trinity Church, and the new Hancock Tower. Figures 3.2a and 3.3 illustrate the existing Urban Context and existing land uses near the Project Site.

The Project has been designed to be respectful of the history and spirit of the Back Bay by:

- Designing buildings to minimize wind and shadow impacts on the surrounding neighborhood and civic and historic resources;
- Creating a vibrant street-level pedestrian experience; and
- Enhancing connectivity between the surrounding Back Bay, Fenway, and South End neighborhoods, and the City of Cambridge by improving the pedestrian experience and pedestrian and transit accessibility around the Site.

Boylston Street is an important and lively thoroughfare of the Back Bay. The pedestrian nature of the street is reinforced by the presence of commercial uses, institutions, such as the Boston Public Library, Berklee College of Music, and Trinity Church, and a well-developed street wall. As seen in Figure 3.2b, under existing conditions the street wall at the Project Site does not exist, diminishing the pedestrian experience. This breach in the street wall along Boylston Street is caused

by the Turnpike and the rail tracks that run beneath the Project Site. Along with the adjacent Parcel 13, the Project represents an opportunity to build and activate the street edge to be consistent with the rest of Boylston Street east of the Project Site.

The Project Site consists of two terra firma areas separated by the Turnpike and the MBTA railroad tracks. An existing surface parking lot occupies the southern area, while the existing westbound Turnpike on-ramp and MBTA ventilation building occupy the northern area. The two proposed buildings will use these areas to the fullest extent possible to minimize the impact on the transportation infrastructure below. Figure 1.5 provide photographs of the existing site and surrounding context.

3.3 Planning Principles and Design Goals

The Project is planned to be a vibrant mixed-use development, combining high-quality sustainable architecture with a design that complements the urban fabric at multiple scales - city, district and pedestrian.

The Project design embodies several key urban design principles specific to the Project Site, and the Back Bay and Fenway neighborhoods, as well as the Civic Vision, which include:

- Repair the discontinuity in the urban street wall left behind by the Turnpike Expansion to provide a cohesive link between the Back Bay, Fenway, and South End neighborhoods, and the City of Cambridge;
- Simplify the existing configuration, and help improve driver and pedestrian safety at the intersection of Newbury Street, Massachusetts Avenue and the Turnpike;
- Promote the use of public transportation by reducing parking provisions
- Position the Project as an important intermodal hub for rapid transit and bus users, drivers, and cyclists with connections to Cambridge, Boston's South End and the full MBTA transit system;
- Improve vehicular and pedestrian circulation and safety by separating pedestrian, bicycle and vehicular uses, and by improving access to the Station;
- Enliven the public realm with generous sidewalks and ground floor uses that engage pedestrians and activate the street; and
- Respect the scale and character of the urban street wall and the Back Bay Architectural District by placing the lower-scale elements of the Project closest to Massachusetts Avenue, Boylston Street, and Newbury Street.

3.4 Design Concept Development

As illustrated in Figure 3.4 and 3.5, the Project design consists of three component parts: an office building and a residential/hotel building set atop a two-story Podium. The Podium, which is approximately 40 feet, will provide up to approximately 70,000 square feet of retail and restaurant space on two levels fronting Massachusetts Avenue and Boylston Street, and up to approximately 150 below-grade parking spaces on two levels of parking accessible from Boylston

Street. The Podium will span the entirety of the Project Site, but maintain sufficient clearance below for vehicular and commuter rail train traffic on and adjacent to the Turnpike.

Rising out of the Podium, the curving office building and slender residential/hotel building are set apart from each other, and are separated by a third-level roof terrace and garden that preserves views of the sky and Fenway studios from the east, as well as views of 360 Newbury and the Boston skyline from the west, while additionally being visible from the surrounding streetscape as a lush garden.

From the west, the three massing volumes will be distinct and clearly recognizable. The horizontal, two-story glass podium spans across the turnpike with the two vertical buildings rising above it, separated by the third-level roof terrace. The articulation of the three masses is further emphasized by the cantilevering of the office floor plates and the projection of the residential/hotel building beyond the western edge of the podium over the Turnpike, supported by a single, sculptural column.

3.4.1 Height and Massing

The office building is set primarily on terra firma to the south of the Turnpike along Boylston Street, and will rise 14 stories above the podium, up to approximately 237 feet tall from average grade to the top of the highest occupiable floor. The residential/hotel building is set entirely on terra firma to the north of the Turnpike and will rise 11 stories above the podium, up to approximately 154 feet tall from average grade to the top of the highest occupiable floor. Both buildings will incorporate a single level of mechanical penthouse space as well as rooftop amenity spaces.

The top of the Podium will feature outdoor amenity space consisting of terraces and greenery, which will be shared by the office and residential/hotel tenants, while additionally being visible from the surrounding streetscape (Figure 3.6e).

Figure 3.4 illustrates the existing site constraints and overarching concepts which have guided the development of the Project. Figure 3.5 illustrates the vertical stacking of the Project program elements.

A series of bird's eye, skyline and pedestrian-level views, from multiple viewpoints in the City were studied to inform the design and form of the office and residential/hotel buildings, as illustrated in Figures 3.10 through 3.19.

The Podium

The Podium provides an approximately 40-foot tall continuous street wall on Boylston Street and Massachusetts Avenue, and is consistent with the general scale of the street wall created by other buildings in the vicinity of the Project. The Podium aims to complete the urban block, and is set back approximately twenty feet from the eastern property line to form a generous 30-foot wide sidewalk along its Massachusetts Avenue Frontage, which is an increase of approximately 20 feet as compared to existing conditions. The Project will provide also provide a dedicated

bus lane and off-street cycle track to separate bicycle and bus operations. Refer to Figure 3.24.

The podium extends approximately 250 feet along Boylston Street, and approximately 250 feet along Massachusetts Avenue. The two podium floor plates are approximately 57,000 square feet.

Within the Podium, the Project will create a new accessible headhouse with an elevator to the tunnel grade, and will reopen and renovate the currently closed Station pedestrian tunnel under Massachusetts Avenue to improve accessibility and multimodal connectivity and to reduce unsafe pedestrian street crossings across Massachusetts Avenue. Refer to Figure 3.6a for lower level plans.

Access to the loading docks and parking garage will be located discreetly on Boylston Street, far removed from the busy intersection at Boylston Street and Massachusetts Avenue (Figures 3.6b. 3.22 and 3.25). Figures 3.20 to 3.21 provide pedestrian level perspective views of the Podium.

The Office Building

As described above, the office building will rise 14 stories above the podium, up to approximately 237 feet tall from average grade to the top of the highest occupiable floor. The office building extends approximately 250 feet along Boylston Street, and approximately 70 feet along Massachusetts Avenue. The typical office building floor plate is approximately 25,200 square feet.

The office building is aligned to Boylston Street on its south side and the Turnpike on its north side, giving it a tapered overall shape that points toward Massachusetts Avenue. This results in a very slender profile facing the Back Bay neighborhood. The office building's corners have been rounded to improve sightlines and views to and from surrounding buildings and streets. The massing steps in at the third level roof-terrace that provides access to the amenity space, in order to separate the volume from the retail podium below. At the twelfth level, the massing again peels away to further reduce the overall presence and size of the building. To break up the overall volume of the tower, large recessed balconies climb up the façade in a diagonal pattern, between levels five and fourteen.

Refer to Figures 3.6a through 3.6g for the building floor plans, Figures 3.7a through 3.7d for the building elevations, and Figures 3.8a-3.8c for building sections. Figure 3.9 shows the neighborhood section. Figure 3.21 provides pedestrian level perspective views of the office building.

The Residential/Hotel Building

As described above, the residential/hotel building will rise 11 stories above the podium, up to approximately 154 feet tall from average grade to the top of the highest occupiable floor. The residential/hotel building extends approximately 55 feet along Massachusetts Avenue, and approximately 220 feet along Newbury Street Extension. The typical residential/hotel building floor plate is approximately 11,500 square feet.

The residential/hotel building is an orthogonal, rectangular glass volume that emphasizes the grid and module of the units within. The building is oriented parallel to Newbury Street Extension, creating a destination and appropriate termination to the Newbury Street retail corridor, which begins at the Boston Public Garden and currently ends at the Turnpike On-Ramp.

Refer to Figures 3.6a through 3.6g for the building floor plans, Figures 3.7a through 3.7d for the building elevations, and Figures 3.8a and 3.8c for building sections. Figure 3.9 shows the neighborhood section. Figures 3.20 and 3.21 provide pedestrian level perspective views of the residential/hotel building.

3.4.2 Character and Exterior Materials

While the office building, the residential/hotel building, and the Podium will each have distinct facades and expressions tailored to its particular role, there will be a relationship between them, including shared materials that convey a sense of harmony and unify the entire Project into a cohesive whole.

The Podium

Through the use of glass facades, all three volumes will demonstrate transparency and openness in different ways. As shown in figures 3.20 – 3.22, the Podium along Boylston Street includes an office and residential/hotel lobby on the ground-floor, retail and restaurant uses on the first and second floors, and a roof-top terrace and tenant amenities on the third floor between the two buildings. The architectural expression of the Podium will be a horizontal glass box on which the two buildings sit above. The two levels of retail are distinguished by separate curvilinear ribbons along Massachusetts Avenue, anchored by a rectangular glass and a live wall at the corner of Boylston Street and Massachusetts Avenue.

Unique, quality and organic materials will be used to distinguish individual retail and lobby entries along the length of the podium glass on Massachusetts Avenue. On the west side of the Project along the Turnpike, the Podium will incorporate a two-story glass wall that will provide opportunities for signage, and will create transparent views into the retail/restaurant spaces within as you approach Boston from the west.

The Office Building

The exterior walls of the office building will consist of a high-performance enclosure, which likely will include a more traditional glass skin as shown in Figure 3.20. In addition to the tall vision glass and shadowbox cladding, a grid of projected fins will add richness to the office building, which will give it a classic look but will also emphasize its rounded corners and diverging curves. Vision glass will have high-performance coatings and will be high in light transmittance, while balancing reflectivity and energy performance requirements in order to minimize glare.

The Residential/Hotel Building

The exterior walls of the residential/hotel building will consist of a high-performance enclosure, which likely will include a highly textured glass skin as shown in Figures 3.20 and 3.21. The module of the units within will be expressed in an alternating pattern of oversized glass panels, angled out to pick up varied reflections and colors from the surrounding city.

3.5 Site Design

The Project will construct a Podium base that extends across the entire Project Site and creates a high-quality continuous street wall activated by vibrant and engaging ground and second floor uses, including retail and restaurant spaces, and lobbies associated with the office and residential/hotel uses.

To reinforce the connection between the new building and the surrounding context, the Project will rehabilitate the perimeter sidewalks and enhance the public realm to incorporate the BTD Boston Complete Streets design principles, where feasible. These principles include clearly defined pedestrian routes, bicycle facilities and landscaping, where feasible. These strategies will improve public accessibility and strengthen the connection between the Back Bay and its surrounding neighborhoods. Refer to Figures 3.22 – 3.25 for the site access and circulation plan, and streetscape improvement plans.

3.5.1 Pedestrian Realm

As described above, and illustrated in Figures 3.20 through 3.26, the Project will infill the existing highway overpass and repair the urban fabric on the west side of Massachusetts Avenue from Boylston Street to Newbury Street. New public realm will be created through the construction of a continuous street wall along the west side of Massachusetts Avenue and the north side of Boylston Street. A mix of active ground floor retail uses and generous pedestrian-friendly sidewalks will be introduced to transform the area into a vibrant retail corridor, creating a new front door to the Back Bay neighborhood from Massachusetts Avenue, and new connections to Newbury Street and the Fenway neighborhood. The Project will also create a new termination for the Newbury Street and Boylston Street retail corridors, which begin at the Boston Public Garden and currently ends at the westbound Turnpike On-Ramp.

As illustrated in Figures 3.20 and 3.21, the street wall along Boylston Street and Massachusetts Avenue is designed to complement the character and quality of the nearby pedestrian realm along Massachusetts Avenue and Newbury Street. By incorporating ground floor uses that enliven the public realm, embracing the notion of a podium and a distinct setback of the building above, reinforcing the prevailing scale of nearby buildings, and significantly improving intermodal connectivity and safety for rapid transit and bus users, drivers, and cyclists, with connections to Cambridge, Boston's South End and the full MBTA transit system. New accessible

curb ramps with tactile surfaces will be incorporated into the sidewalks to allow for barrier-free connections along the major pedestrian corridors.

Massachusetts Avenue

The Project will make significant improvements to the Massachusetts Avenue frontage and its adjacent sidewalks to create an active and engaging pedestrian realm that reflects the goals and visions of Boston's Complete Streets, as illustrated in Figures 3.22 through 3.24. Within the Project area, portions of Massachusetts Avenue will be repaved and striped to accommodate a vehicle thru lane, a dedicated bus lane that can accommodate two busses at one-time, and a drop-off area on the west side of the street adjacent the residential/hotel lobby, subject to applicable approvals.

Dynamic and generous pedestrian sidewalks along Massachusetts Avenue provide pedestrian and bicyclist connections to Newbury and Boylston Streets. The sidewalk along the west side Massachusetts Avenue will be increased in width by approximately 20 feet to a dimension of 30 feet. The width of the sidewalk varies and becomes wider at points to accommodate zones with heavy pedestrian activity. The design of the sidewalk along Massachusetts Avenue will include a 2'-0" Frontage Zone, a generous and uninterrupted wide Pedestrian Zone, and a sinuous Greenscape/Furnishing Zone which will include: bike racks, trash receptacles, lighting, street trees in raised planters, and a new MBTA bus shelter. The sidewalk along Massachusetts Avenue fronting the Project Site will also include a 6'-0" off-street cycle track. Street trees, furnishings, and paving materials will provide physical and visual cues for separating pedestrians and bicyclists along the Massachusetts Avenue sidewalk.

The Project will also reopen and renovate the currently closed Hynes Convention Center Station pedestrian tunnel under Massachusetts Avenue, creating a new accessible headhouse within the Podium from street level to the existing pedestrian tunnel, providing for a weather-protected connection to the Hynes Station from the west side of Massachusetts Avenue, thus significantly improving accessibility and connectivity to the Station, and improving public safety within the district.

A consistent family of materials; new signage, paving, street furniture, bike parking, lighting, trash receptacles, and landscaping will provide an enhanced and activated streetscape. Furnishings reflect contemporary materials and design standards will be selected to provide a cohesive palette. Ground-level entrances for the office and residential/hotel lobbies, restaurant and retail uses will include carefully designed display windows, canopies, and signage to add texture and scale.

Boylston Street

The Project will also make improvements to the Boylston Street frontage and its adjacent sidewalks, as illustrated in Figures 3.22, 3.23 and 3.25. Within the Project area, portions of Boylston Street will be repaved and striped to accommodate a

vehicle thru lane, a valet drop-off area on the north side of the street, and a new entrance to two levels of below-grade parking, subject to applicable approvals.

Enhanced pedestrian sidewalk improvements along the Boylston Street frontage respond to the active outdoor dining streetscape on the south side of the street. The sidewalk along Boylston Street frontage will be increased in width by approximately 10 feet to a dimension of 20 feet. The design of the sidewalk along Boylston Street will include a Frontage Zone, a generous and uninterrupted Pedestrian Zone and a Greenscape/Furnishing Zone which will include: trash receptacles, lighting, and street trees in raised planters. Light fixtures and poles will respect the scale, character, and spacing as found within the Back Bay Architectural District. Lighting will adhere to the Back Bay Architectural Standards for commercial zones through low-height lighting and a downward cast of illumination.

The parking garage entrance will include visual and audible warning devices and a flush pedestrian condition with tactile surfaces will be incorporated to warn pedestrians of the crossing, ensuring that pedestrians have the priority at the crossing. To further emphasize pedestrian priority, the material and patterning of the sidewalk will continue across the garage driveway.

Newbury Street Extension

In conjunction with the proposed relocation of the existing I-90 westbound on-ramp, a new pedestrian sidewalk along Newbury Street will visually serve as a continuation of the pedestrian realm along Newbury Street. This stretch of sidewalk will include street trees and lighting and will respect the scale and character found within the Back Bay Architectural District.

3.5.2 Landscape Design

Proposed landscaping will incorporate trees and plants species that provide interest year-round and are well suited for urban conditions and the New England climate. Where necessary, raised planters will be utilized to accommodate appropriate soil volumes and drainage for the proposed plantings.

Lighting is integral to pedestrian safety, and for an active and vibrant evening and night streetscape. A variety of different light sources, including vehicular light poles, pedestrian light poles, illuminated bollards and accent lighting will be provided throughout the streetscape furnishings zone and within the plaza areas.

3.5.3 Complete Streets

The proposed design provides safe and attractive sidewalks abutting the Project Site along Massachusetts Avenue, Boylston Street, and Newbury Street, meeting the minimum width for a pedestrian zone under the Boston Complete Streets guidelines for a downtown commercial streetscape. As described in Section 3.5.1, the proposed pedestrian realm improvements exceed the minimum recommended dimensions for the Pedestrian Zone in Downtown Commercials Zones; in fact, in most areas,

particularly along Massachusetts Avenue and Boylston Streets, the Project exceeds the *maximum* dimension recommended for the Pedestrian Zone to account for the pedestrian volumes in and around the Project Site. In addition, the Project meets the minimum and preferred dimensions for the furnishing and frontage zones throughout the Project Site.

3.5.4 Accessibility

The Project will significantly improve accessibility around the Project Site by creating generous barrier-free pedestrian zones along Massachusetts Avenue and Boylston Street. Care will be taken to select materials and consider key elements to address the goals outlined in the Accessibility Checklist provided in Appendix C.

The Project will implement the following:

- A new accessible drop-off area will be created along Massachusetts Avenue in front of the residential/hotel building entrance.
- The sidewalk on Massachusetts Avenue will be widened to create a generous, barrier-free pedestrian zone along the entire Project frontage. Curb ramps will be provided to allow for connections to adjacent sidewalks and nearby bus stops.
- The parking ingress/egress on Boylston Street will incorporate a flush sidewalk condition giving priority to the pedestrian over the vehicle.

3.5.5 On-Street Drop-Off

Although no on-street parking is anticipated on Massachusetts Avenue, a new short-term drop-off area is proposed to be provided along Massachusetts Avenue proximate to the residential/hotel entry lobby, as illustrated in Figure 3.24. This location is intended to provide convenience for retail/restaurant patrons and residential/hotel occupants alike. The Project also proposes a short-term valet drop-off area along the north side of Boylston Street near the office lobby, as illustrated in Figure 3.25.

3.6 Open Space

The Project creates open space at grade through the pedestrian realm improvements including:

- Opportunities for outdoor dining will be accommodated along Massachusetts Avenue and Boylston Street, contributing to an activated streetscape and complimentary to the outdoor dining on the south side of Boylston Street.
- An area of approximately 5,000 square feet behind the residential/hotel building will be planted with shrubs and groundcovers, partially above structure, beside I-90 along the Newbury Street frontage.

Additionally, a roof terrace will be located on top of the podium (level 3) with access for office tenants and residential/hotel occupants. The terrace will feature paved

areas for outdoor dining, event gatherings, and small group meet-ups. A sculptural green roof with raised berms will be planted with small trees, shrubs, and perennials, providing a sense of enclosure on the roof, while additionally being visible from the surrounding streetscape as a lush garden. Additional amenity space is proposed for tenants and occupants on level 17 of the office building, and on level 14 of the residential/hotel building.

0 200 400 Feet

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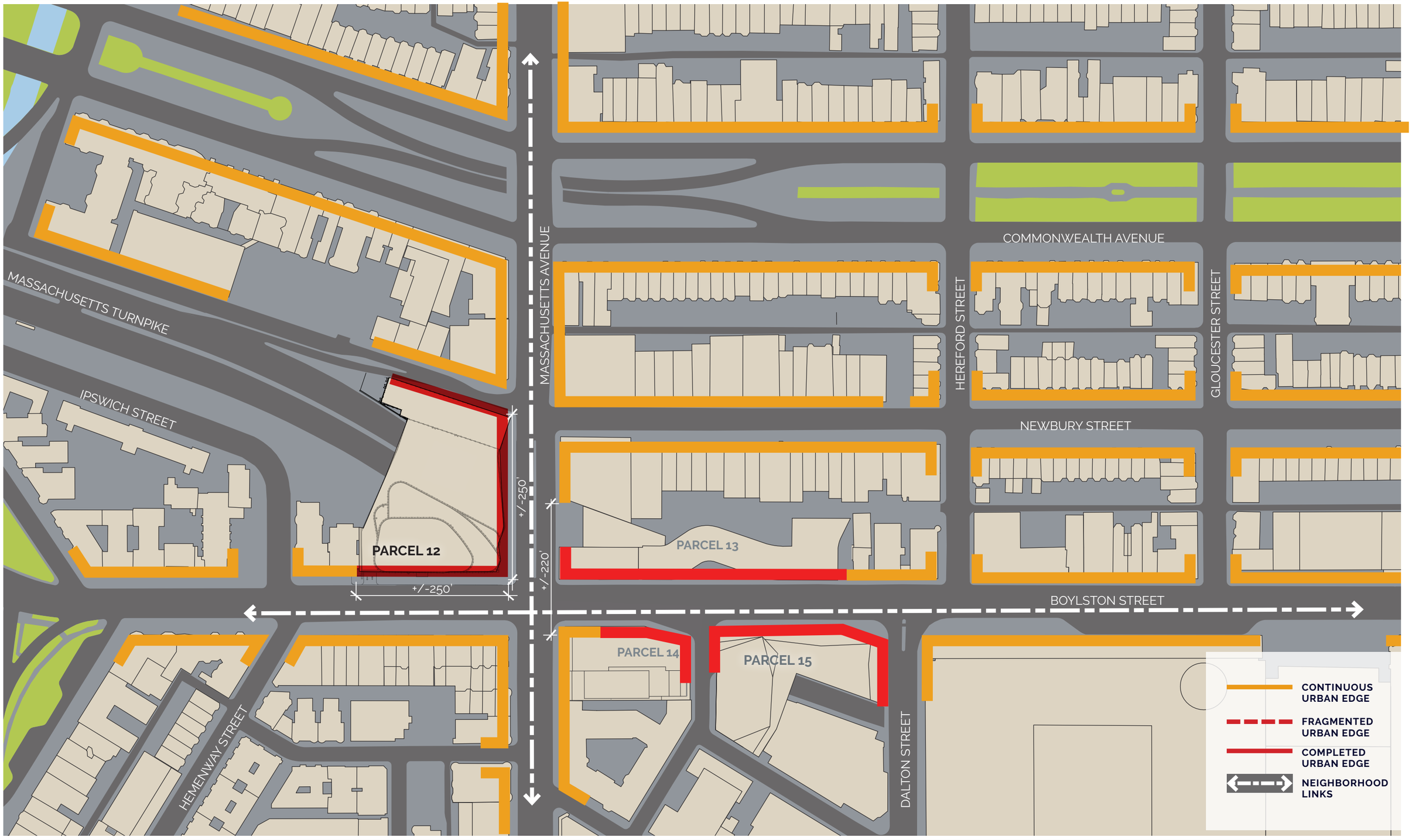
Neighborhood Context Plan
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.1

ELKUS | MANFREDI ARCHITECTS

Existing Urban Context
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.2a



0 75 150 Feet

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Urban Context | Completed Blocks Figure 3.2b
Air Rights Parcel 12
Boston, Massachusetts

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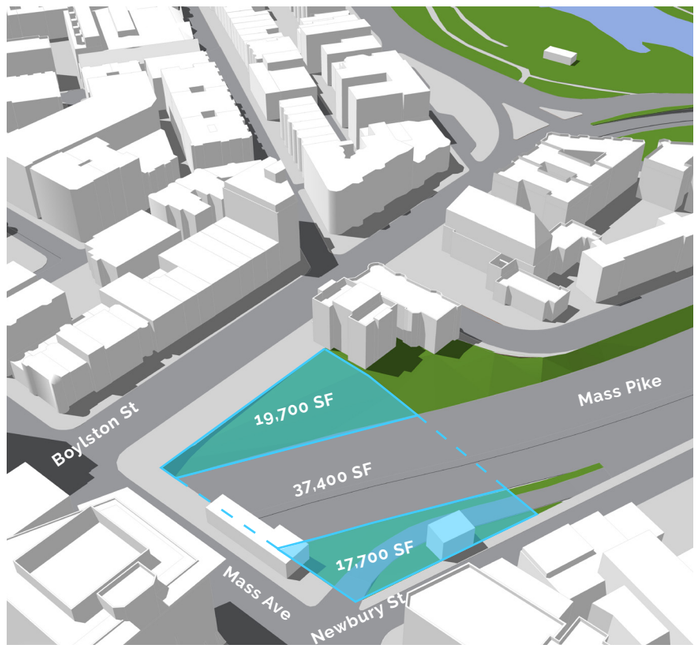
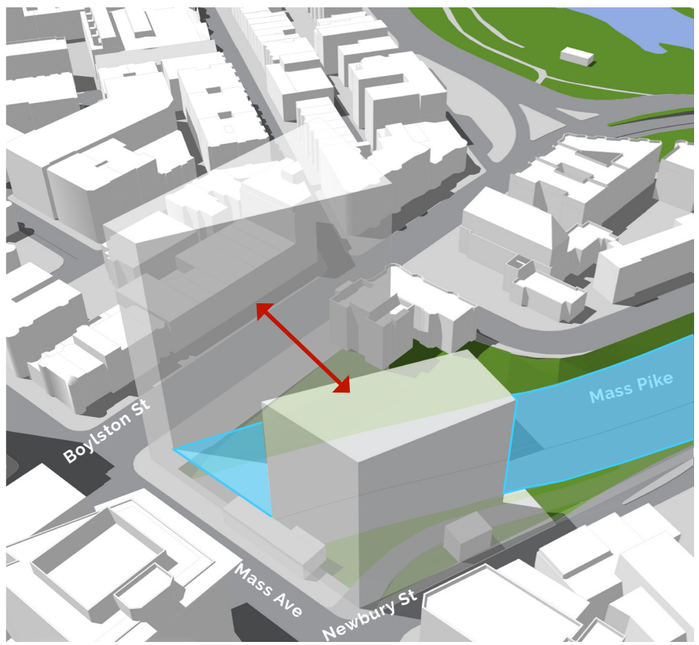
Existing Use Plan
Air Rights Parcel 12
Boston, Massachusetts

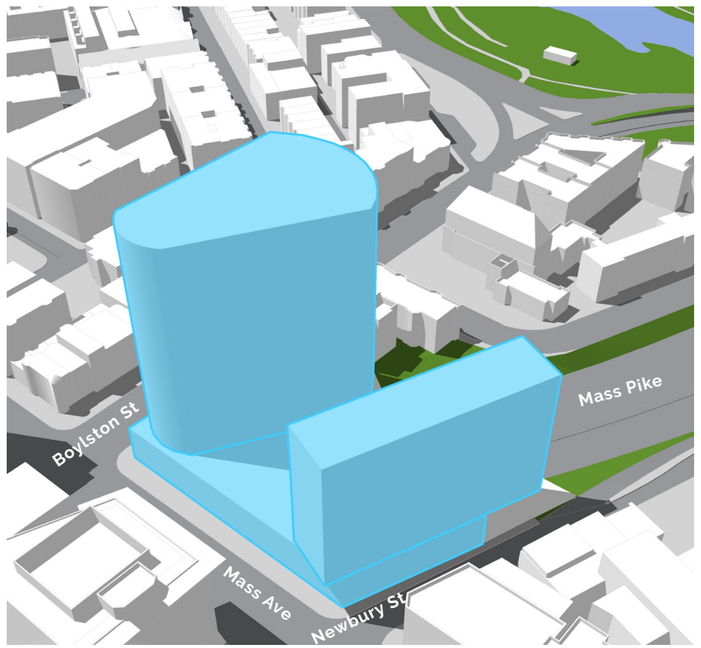
Figure 3.3



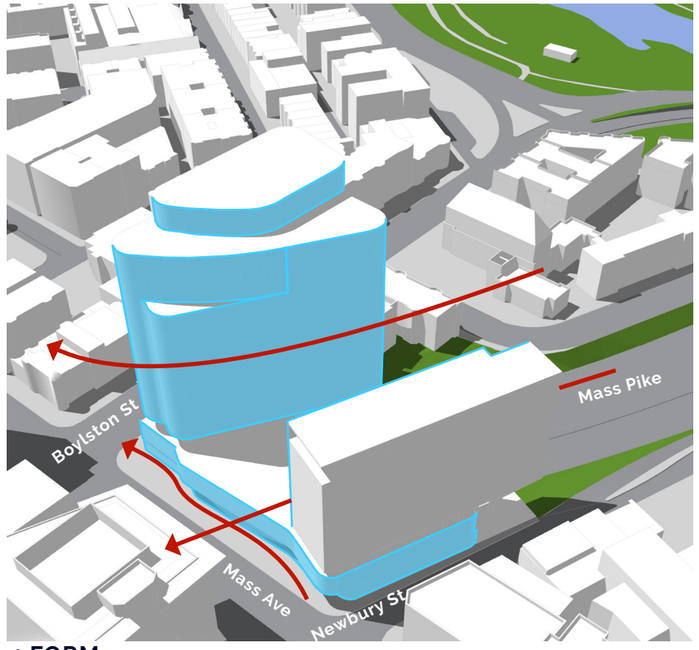
1 PARCEL



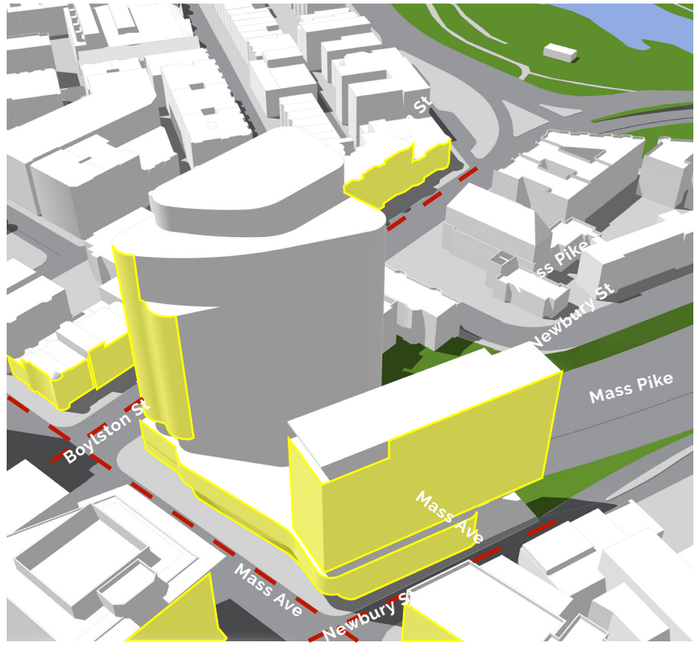
2 STRUCTURES



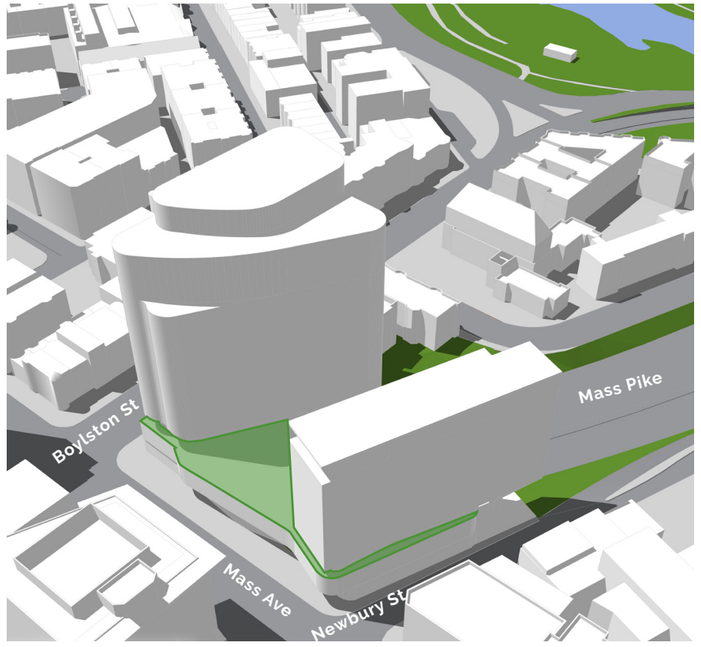
3 MASSING



4 FORM



5 URBAN STREET WALL



6 GREEN ROOF

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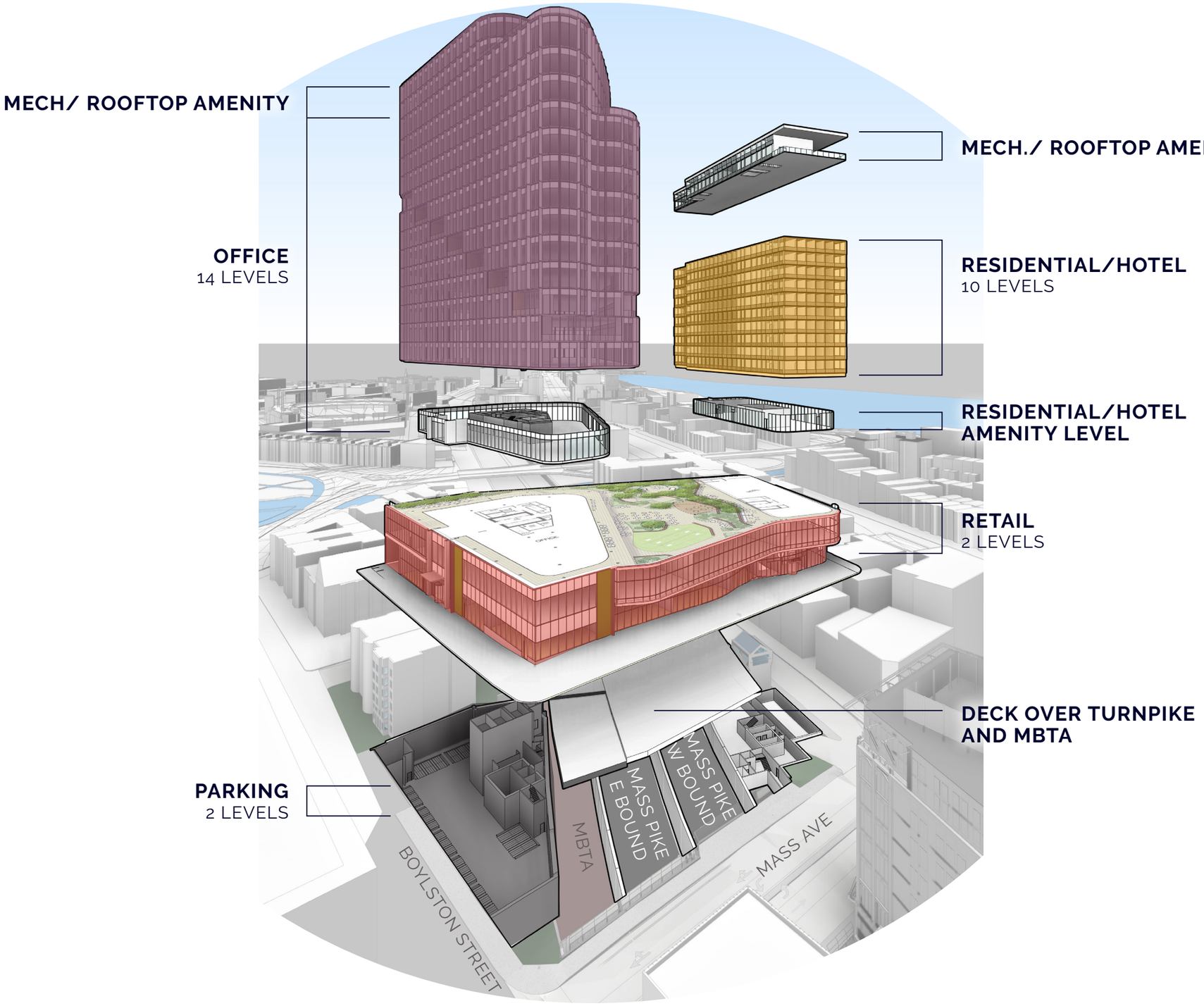
Massing Concept Diagram
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.4



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Program Stacking Diagram
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.5

RETAIL
HOTEL/RESIDENTIAL
COMMON AREA
AMENITY
PARKING
BOH/MECHANICAL
OFFICE
MBTA

ON-RAMP
I-90 MASS PIKE WESTBOUND
I-90 MASS PIKE EASTBOUND
MBTA
IPSWICH ST
FENWAY STUDIOS
MASSACHUSETTS AVENUE
NEWBURY STREET
MBTA VENT
BOH
NEW ELEVATOR AND STAIR
EXISTING PEDESTRIAN TUNNEL
MBTA GREEN LINE STATION
VEHICLE LIFTS
MANAGED PARKING
BOYLSTON STREET

0 40 80 Feet

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Lower Level Plan - Green Line Tunnel Figure 3.6a
Air Rights Parcel 12
Boston, Massachusetts

RETAIL
HOTEL/RESIDENTIAL
COMMON AREA
AMENITY
PARKING
BOH/MECHANICAL
OFFICE
MBTA

ON-RAMP
I-90 MASS PIKE WESTBOUND
I-90 MASS PIKE EASTBOUND
MBTA
IPSWICH ST
FENWAY STUDIOS
MASSACHUSETTS AVENUE
NEWBURY STREET
MBTA VENT
RETAIL
LOBBY
32'
30'
13'
RETAIL
LOADING DOCK
PARKING
OFFICE LOBBY
360 NEWBURY
PROPOSED PARCEL 13 DEVELOPMENT
BOYLSTON STREET
BOYLSTON STREET
PROPOSED BERKLEE IMP DEVELOPMENT
PROPOSED PARCEL 15 DEVELOPMENT

0 40 80 Feet

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First Floor Plan
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.6b

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Second Floor Plan
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.6c

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Third Floor Plan
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.6d

RETAIL
HOTEL/RESIDENTIAL
COMMON AREA
AMENITY
PARKING
BOH/MECHANICAL
OFFICE
MBTA

ON-RAMP
I-90 MASS PIKE WESTBOUND
I-90 MASS PIKE EASTBOUND
MBTA
IPSWICH ST
FENWAY STUDIOS
MASSACHUSETTS AVENUE
NEWBURY STREET
360 NEWBURY
PROPOSED PARCEL 13 DEVELOPMENT
BOYLSTON STREET
BOYLSTON STREET
PROPOSED BERKLEE IMP DEVELOPMENT
PROPOSED PARCEL 15 DEVELOPMENT

0 40 80 Feet

ELKUS | MANFREDI ARCHITECTS

Typical Tower Plan - Lower Levels Figure 3.6e
Air Rights Parcel 12
Boston, Massachusetts

RETAIL
HOTEL/RESIDENTIAL
COMMON AREA
AMENITY
PARKING
BOH/MECHANICAL
OFFICE
MBTA

ON-RAMP
I-90 MASS PIKE WESTBOUND
I-90 MASS PIKE EASTBOUND
MBTA
IPSWICH ST
FENWAY STUDIOS
MASSACHUSETTS AVENUE
NEWBURY STREET
360 NEWBURY
PROPOSED PARCEL 13 DEVELOPMENT
BOYLSTON STREET
BOYLSTON STREET
PROPOSED BERKLEE IMP DEVELOPMENT
PROPOSED PARCEL 15 DEVELOPMENT

0 40 80 Feet

ELKUS | MANFREDI ARCHITECTS

Typical Tower Plan - Upper Levels Figure 3.6f
Air Rights Parcel 12
Boston, Massachusetts

RETAIL
HOTEL/RESIDENTIAL
COMMON AREA
AMENITY
PARKING
BOH/MECHANICAL
OFFICE
MBTA

ON-RAMP
I-90 MASS PIKE WESTBOUND
I-90 MASS PIKE EASTBOUND
MBTA
IPSWICH ST
FENWAY STUDIOS
MASSACHUSETTS AVENUE
NEWBURY STREET
AMENITY
ROOF TERRACE
ROOF TERRACE
AMENITY
360 NEWBURY
PROPOSED PARCEL 13 DEVELOPMENT
BOYLSTON STREET
BOYLSTON STREET
PROPOSED BERKLEE IMP DEVELOPMENT
PROPOSED PARCEL 15 DEVELOPMENT

0 40 80 Feet

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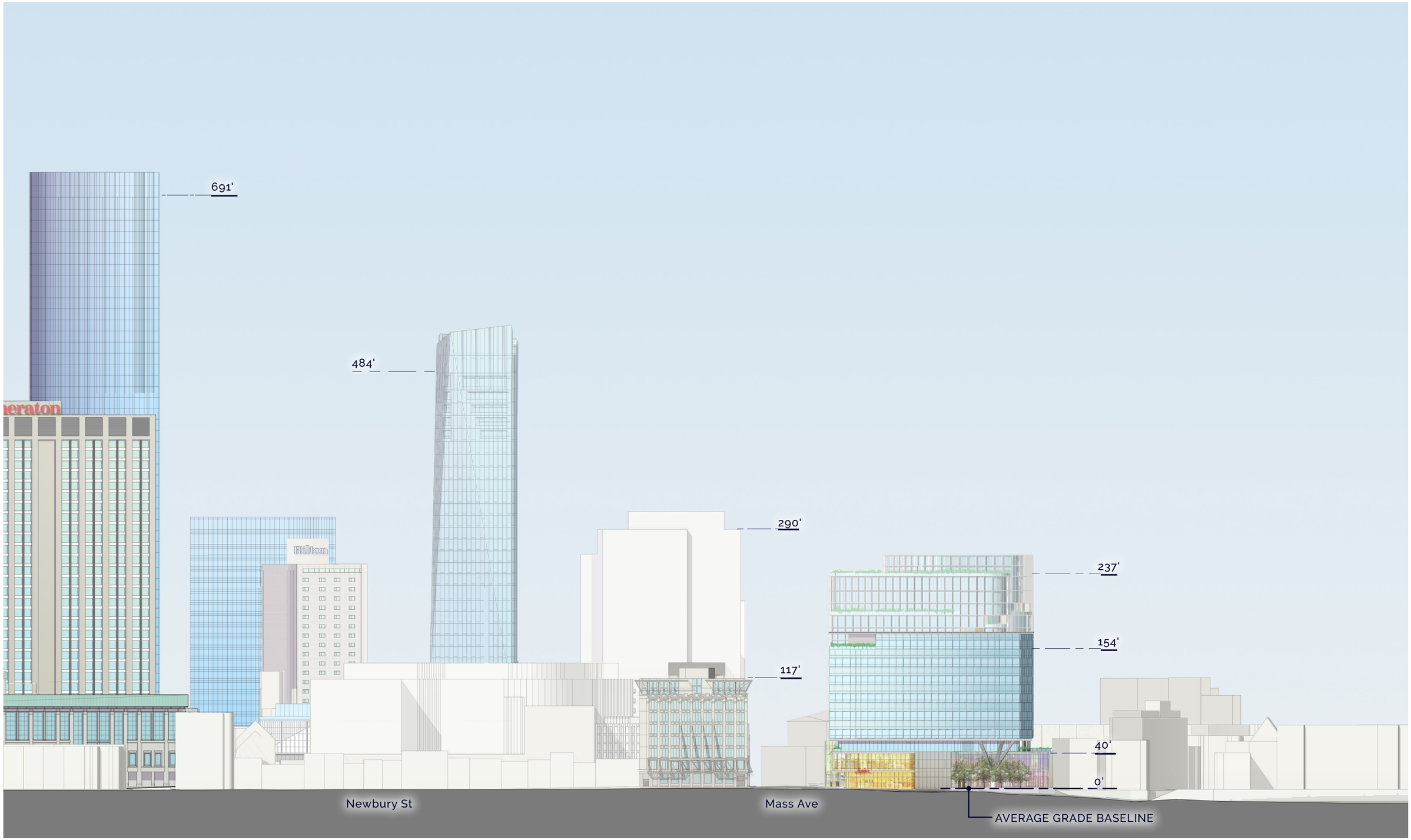
Penthouse Level Plan
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.6g



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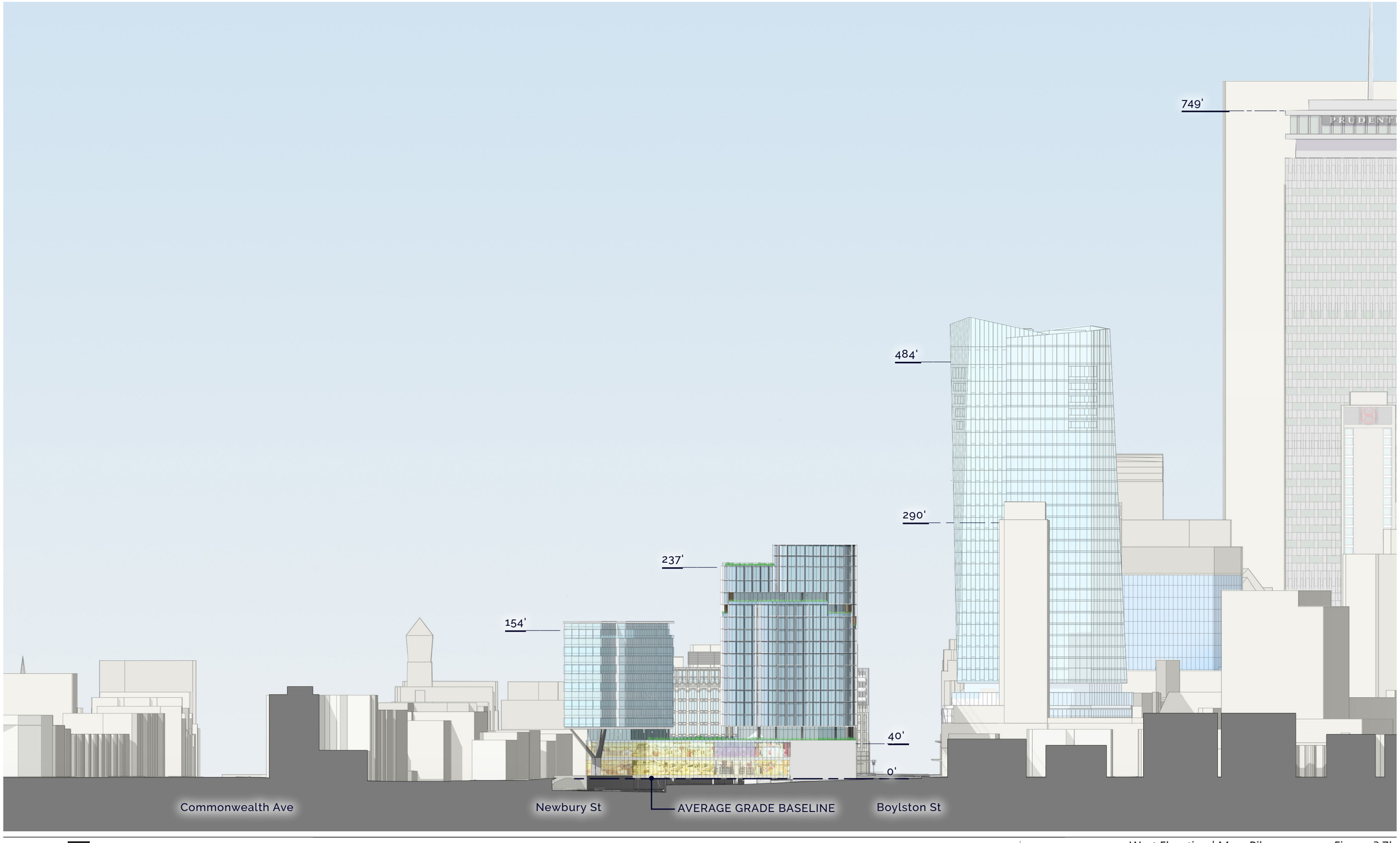
North Elevation | Newbury Street
Air Rights Parcel 12
Boston, Massachusetts

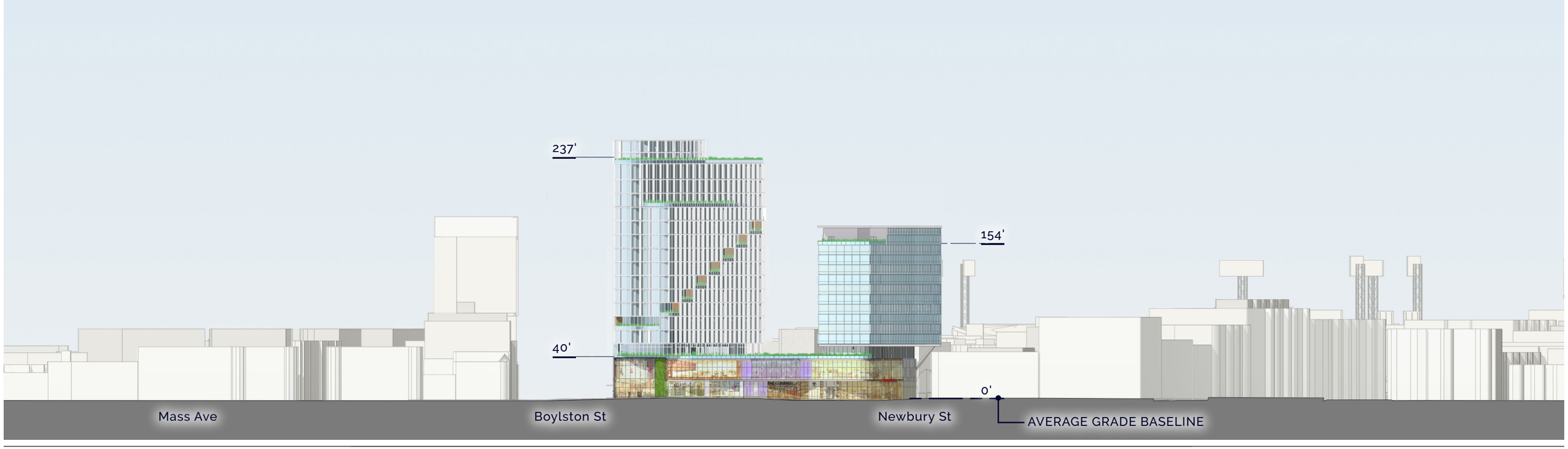
Figure 3.7a



ELKUS | MANFREDI ARCHITECTS

West Elevation | Mass Pike
Air Rights Parcel 12
Boston, Massachusetts

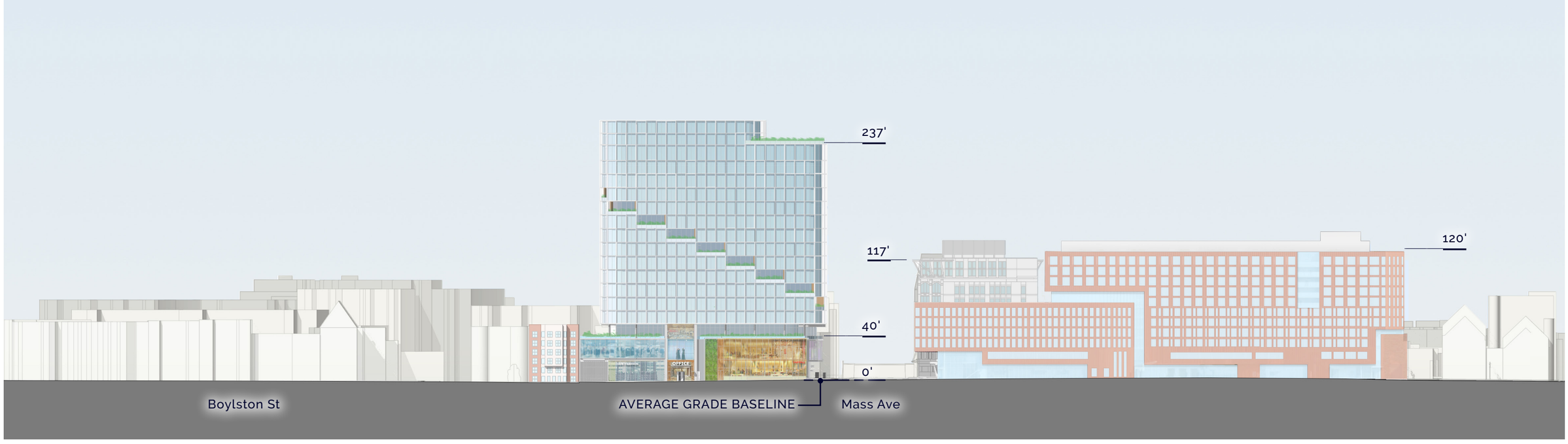
Figure 3.7b



0 50 100 Feet

ELKUS | MANFREDI ARCHITECTS

East Elevation | Massachusetts Ave Figure 3.7c
Air Rights Parcel 12
Boston, Massachusetts

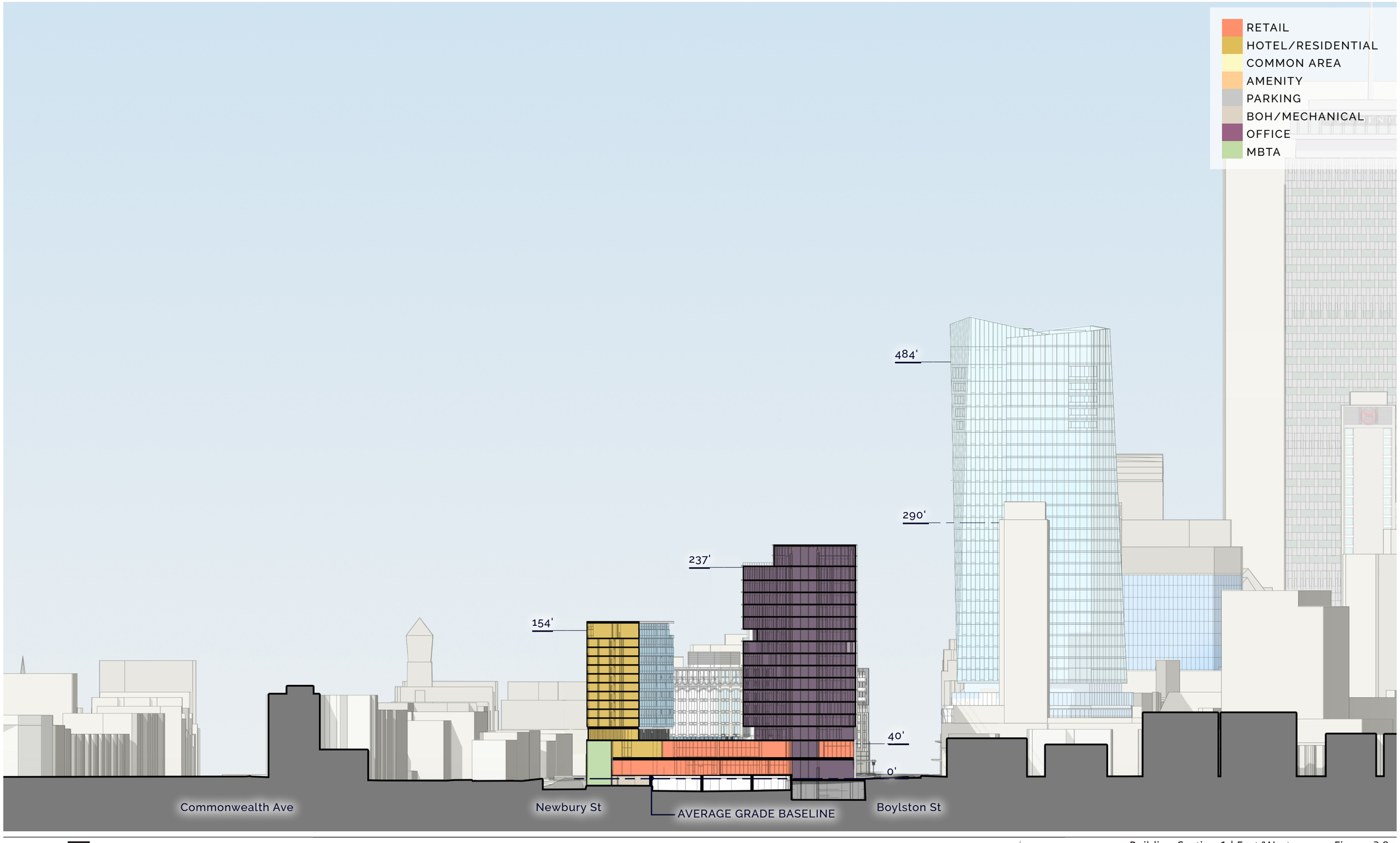


0 50 100 Feet

ELKUS | MANFREDI ARCHITECTS

South Elevation | Boylston Street
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.7d

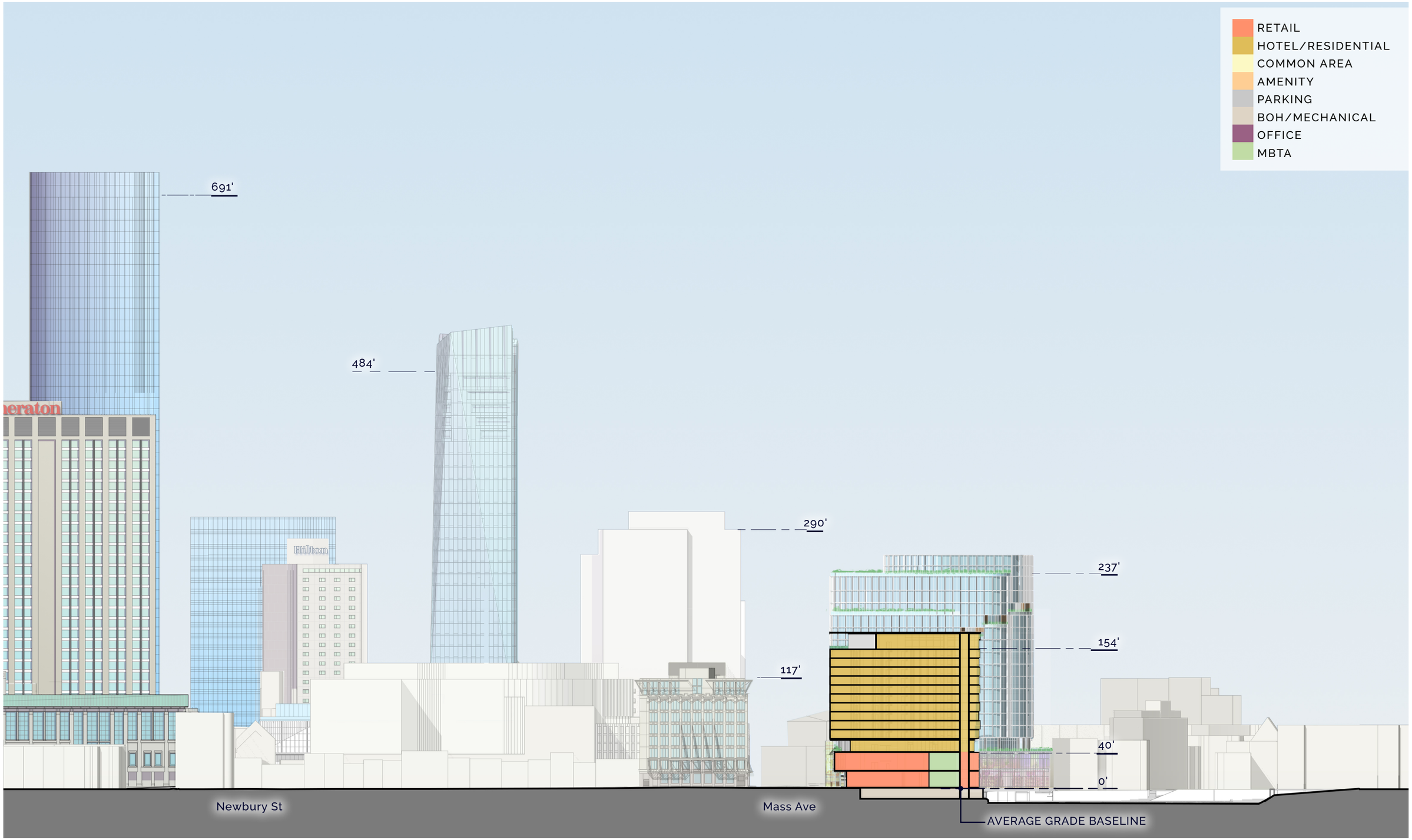


0 50 100 Feet

ELKUS | MANFREDI ARCHITECTS

Building Section 1 | East/West
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.8a

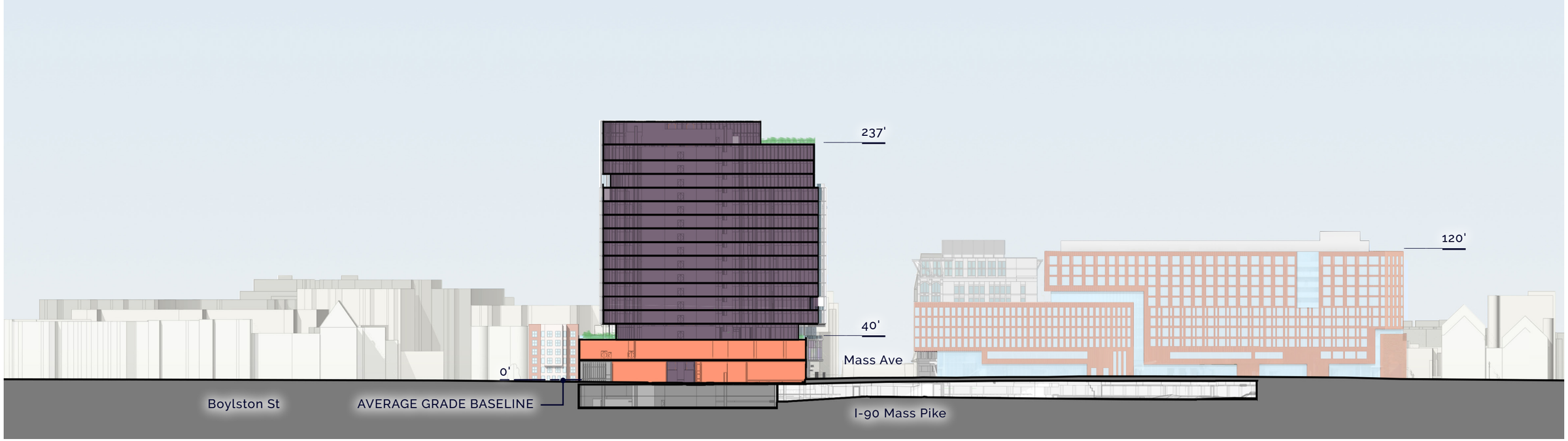


0 50 100 Feet

ELKUS | MANFREDI ARCHITECTS

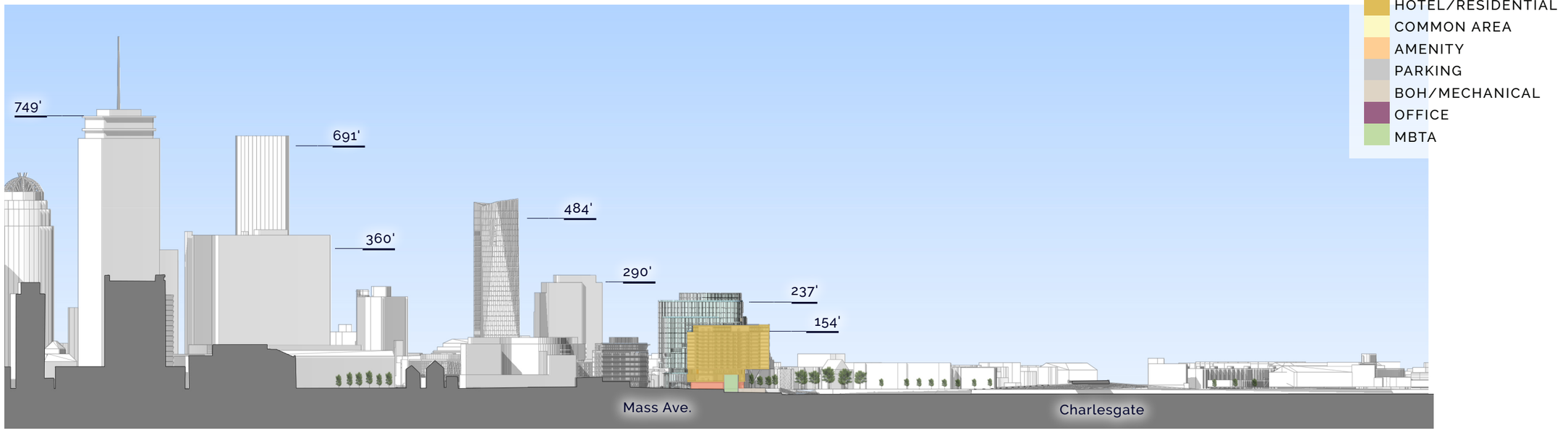
Building Section 2 | North/South 1 Figure 3.8b
Air Rights Parcel 12
Boston, Massachusetts

RETAIL
HOTEL/RESIDENTIAL
COMMON AREA
AMENITY
PARKING
BOH/MECHANICAL
OFFICE
MBTA

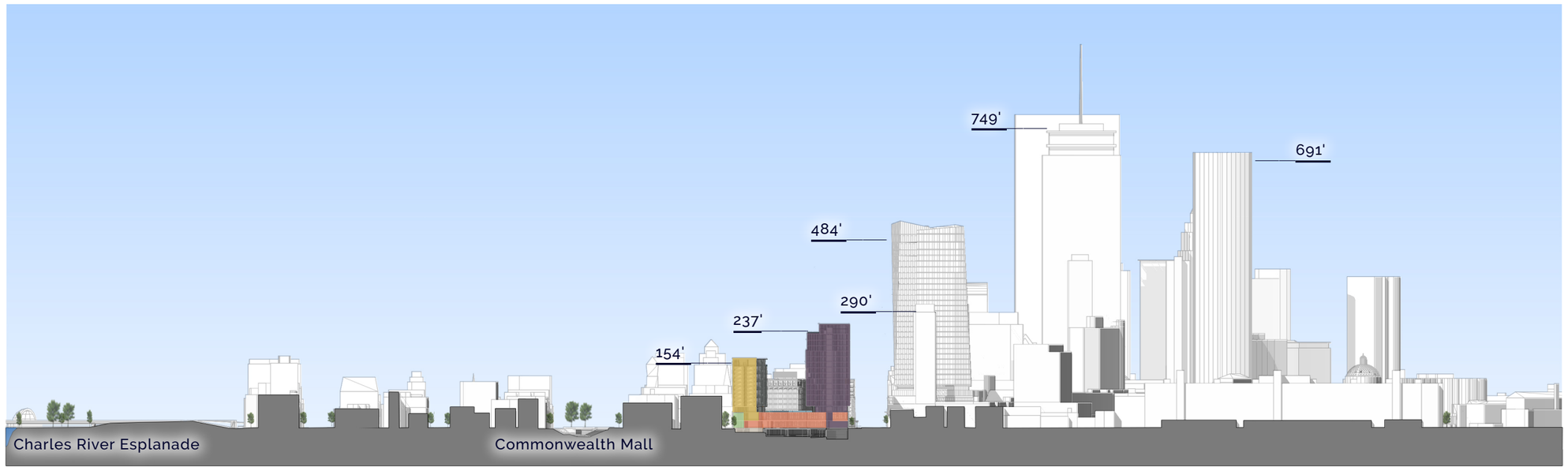


ELKUS | MANFREDI ARCHITECTS

Building Section 3 | North/South 2 Figure 3.8c
Air Rights Parcel 12
Boston, Massachusetts



EAST-WEST NEIGHBORHOOD SECTION LOOKING SOUTH



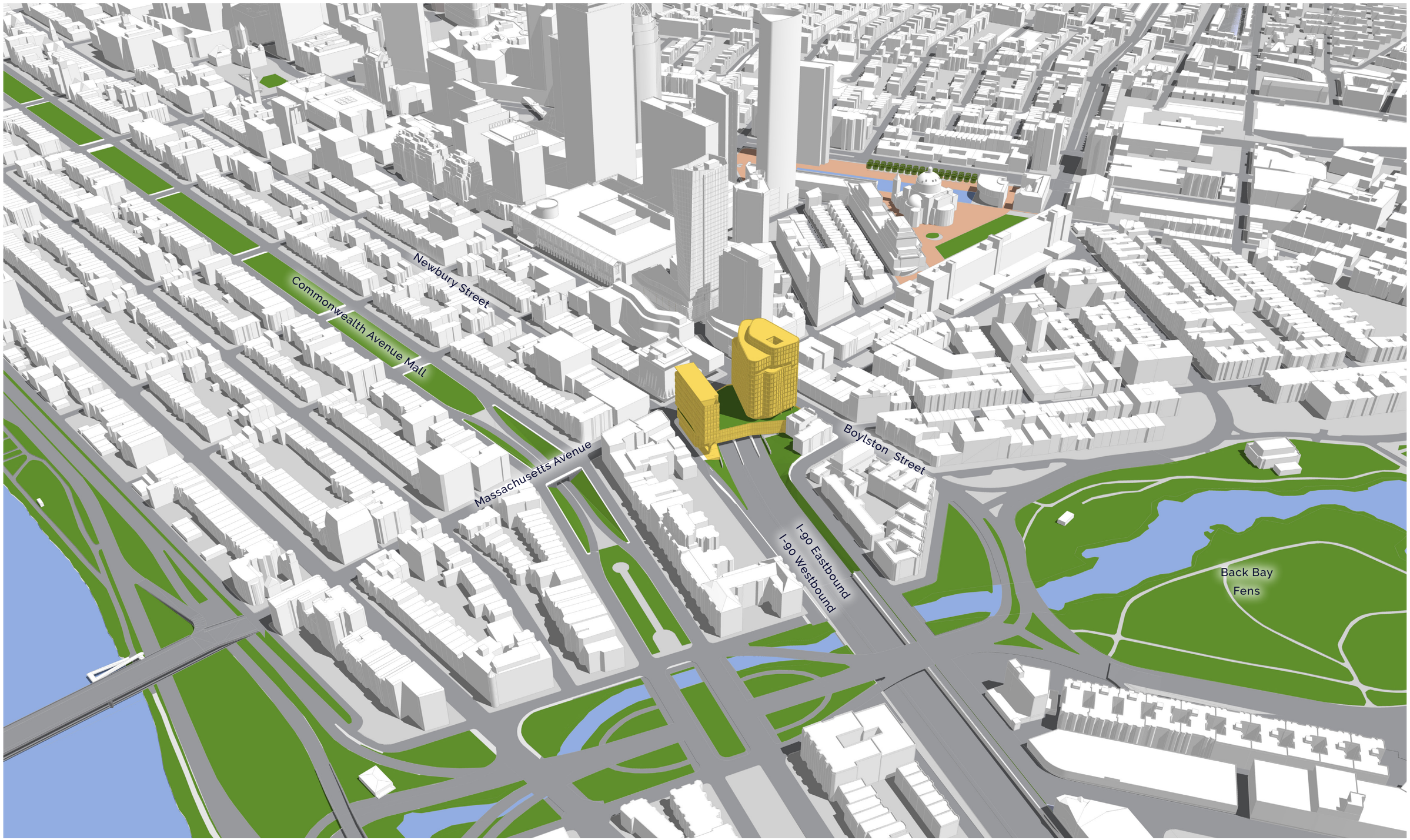
NORTH-SOUTH NEIGHBORHOOD SECTION LOOKING EAST

0 150 300 Feet

ELKUS | MANFREDI ARCHITECTS

Neighborhood Sections
Air Rights Parcel 12
Boston, Massachusetts

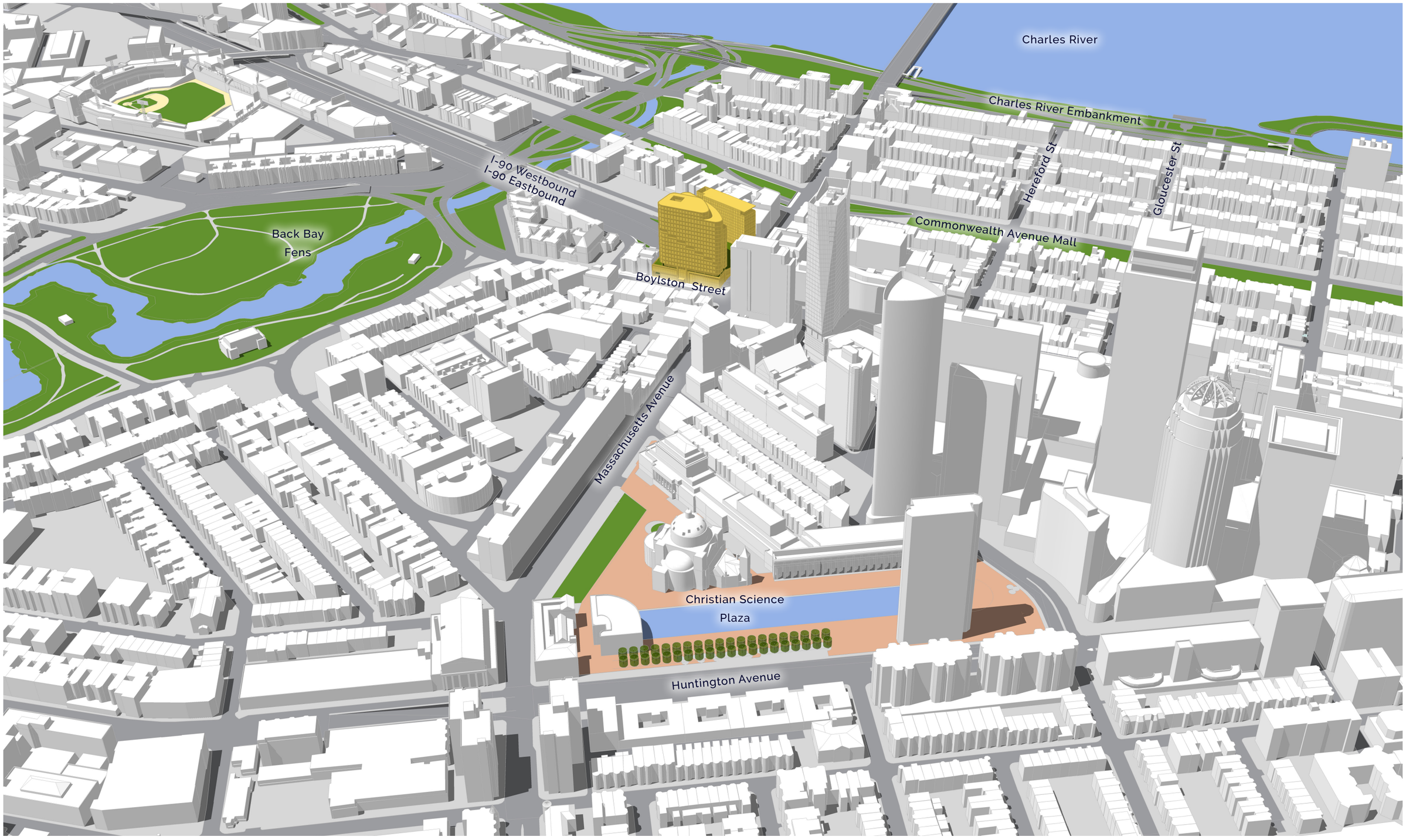
Figure 3.9



ELKUS | MANFREDI ARCHITECTS

3D model view from Northwest
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.10a



ELKUS | MANFREDI ARCHITECTS

3D model view from Southeast
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.10b

ELKUS | MANFREDI ARCHITECTS

3D model view from Northeast
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.10c

ELKUS | MANFREDI ARCHITECTS

Existing View - BU Bridge
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.11a

ELKUS | MANFREDI ARCHITECTS

Proposed View - BU Bridge
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.11b

ELKUS | MANFREDI ARCHITECTS

Existing View - Mass Ave Bridge
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.12a

ELKUS | MANFREDI ARCHITECTS

Proposed View - Mass Ave Bridge Figure 3.12b
Air Rights Parcel 12
Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Existing View - Cambridge
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.13a

ELKUS | MANFREDI ARCHITECTS

Proposed View - Cambridge
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.13b

ELKUS | MANFREDI ARCHITECTS

Existing View - Newbury | Arlington Figure 3.14a
Air Rights Parcel 12
Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Proposed View - Newbury | Arlington Figure 3.14b
Air Rights Parcel 12
Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Existing View - Copley Square
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.15a

ELKUS | MANFREDI ARCHITECTS

Proposed View - Copley Square
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.15b

ELKUS | MANFREDI ARCHITECTS

Existing View - Boston Symphony
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.16a

ELKUS | MANFREDI ARCHITECTS

Proposed View - Boston Symphony Figure 3.16b
Air Rights Parcel 12
Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Existing View - Fenway | Boylston Figure 3.17a
Air Rights Parcel 12
Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Proposed View - Fenway | Boylston Figure 3.17b
Air Rights Parcel 12
Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Existing View - Charlesgate West
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.18a

ELKUS | MANFREDI ARCHITECTS

Proposed View - Charlesgate West Figure 3.18b
Air Rights Parcel 12
Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Bird's Eye Perspective North
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.19

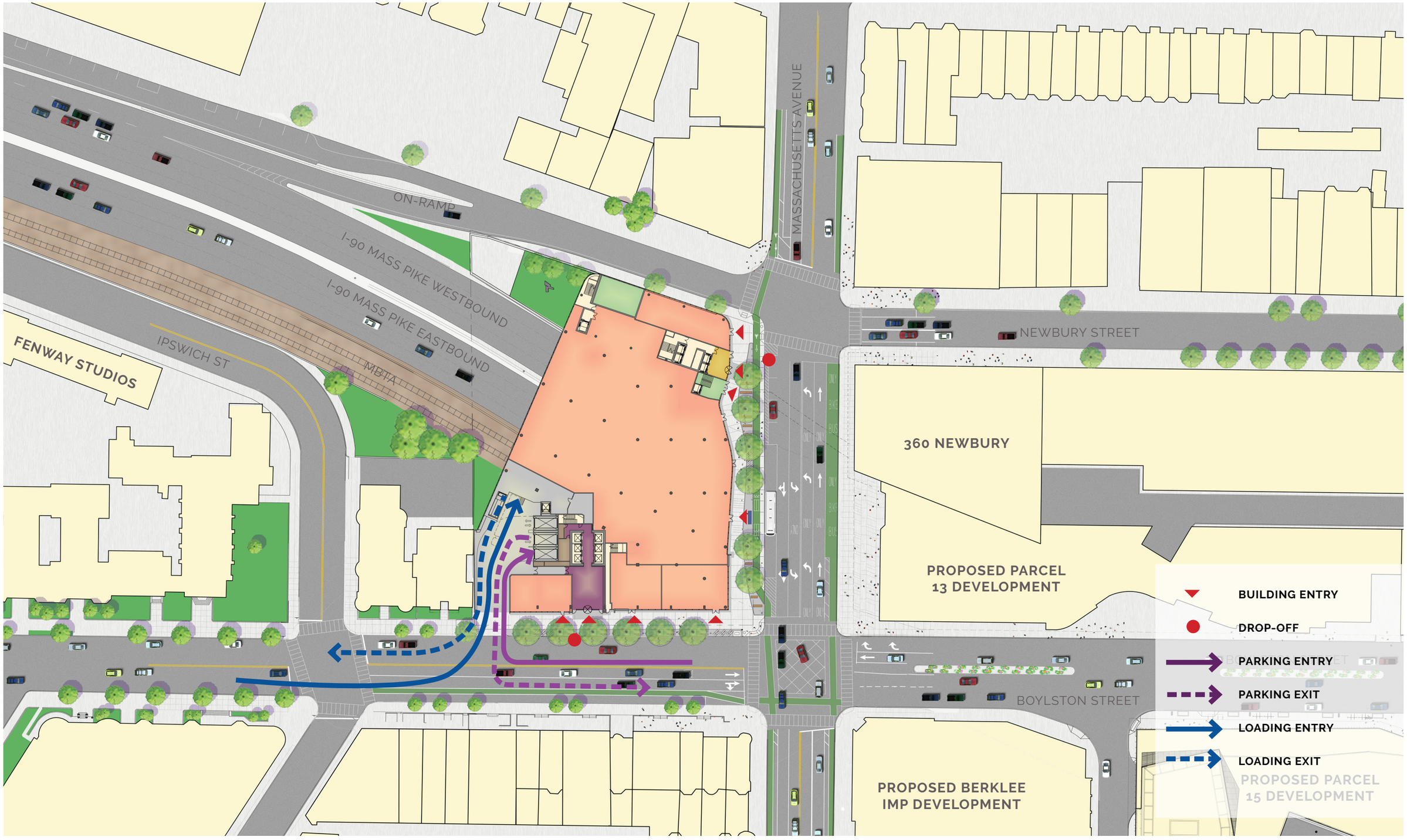
ELKUS | MANFREDI ARCHITECTS

Pedestrian View from Newbury St Figure 3.20
Air Rights Parcel 12
Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Pedestrian View from Boylston St
Air Rights Parcel 12
Boston, Massachusetts

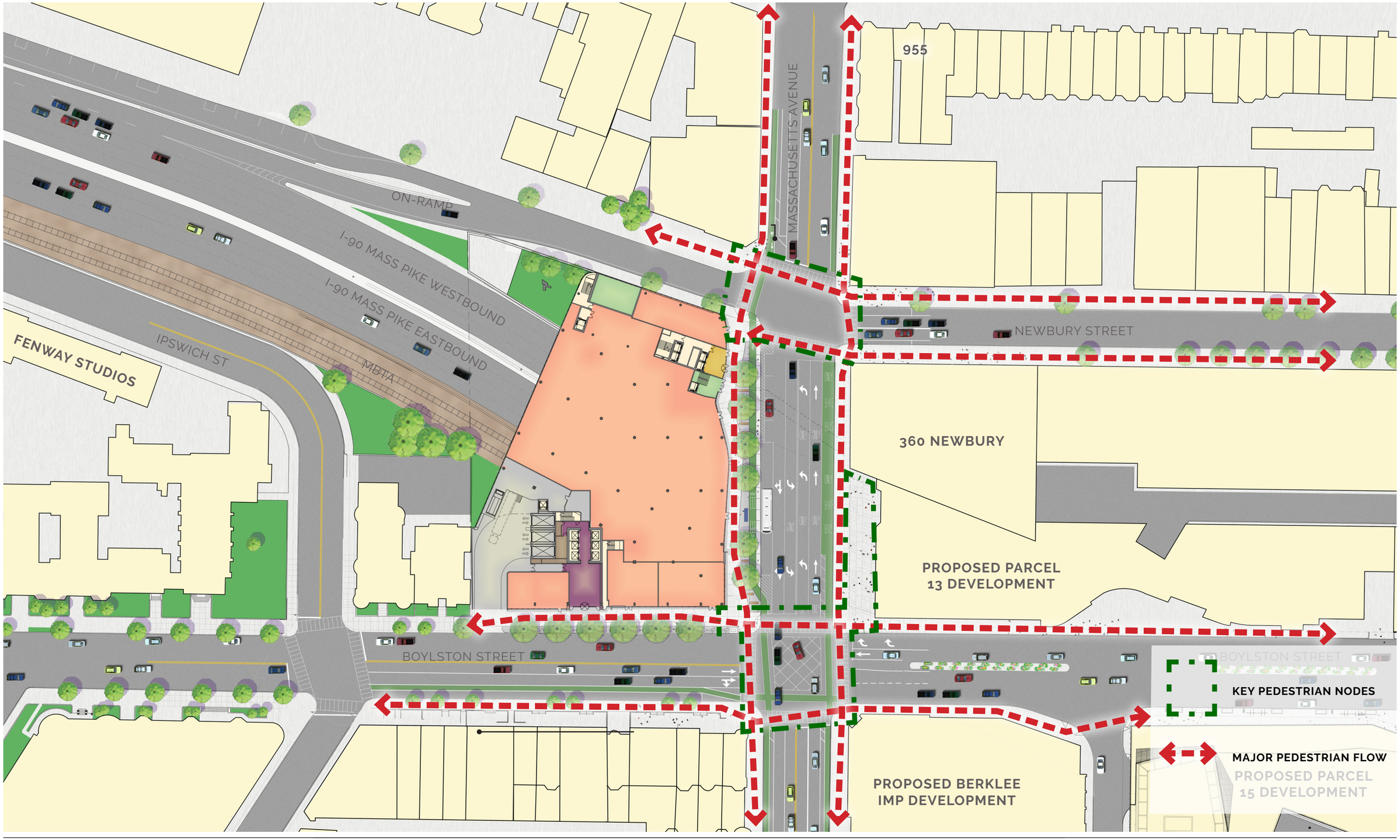
Figure 3.21



ELKUS | MANFREDI ARCHITECTS

Circulation Diagram
Air Rights Parcel 12
Boston, Massachusetts

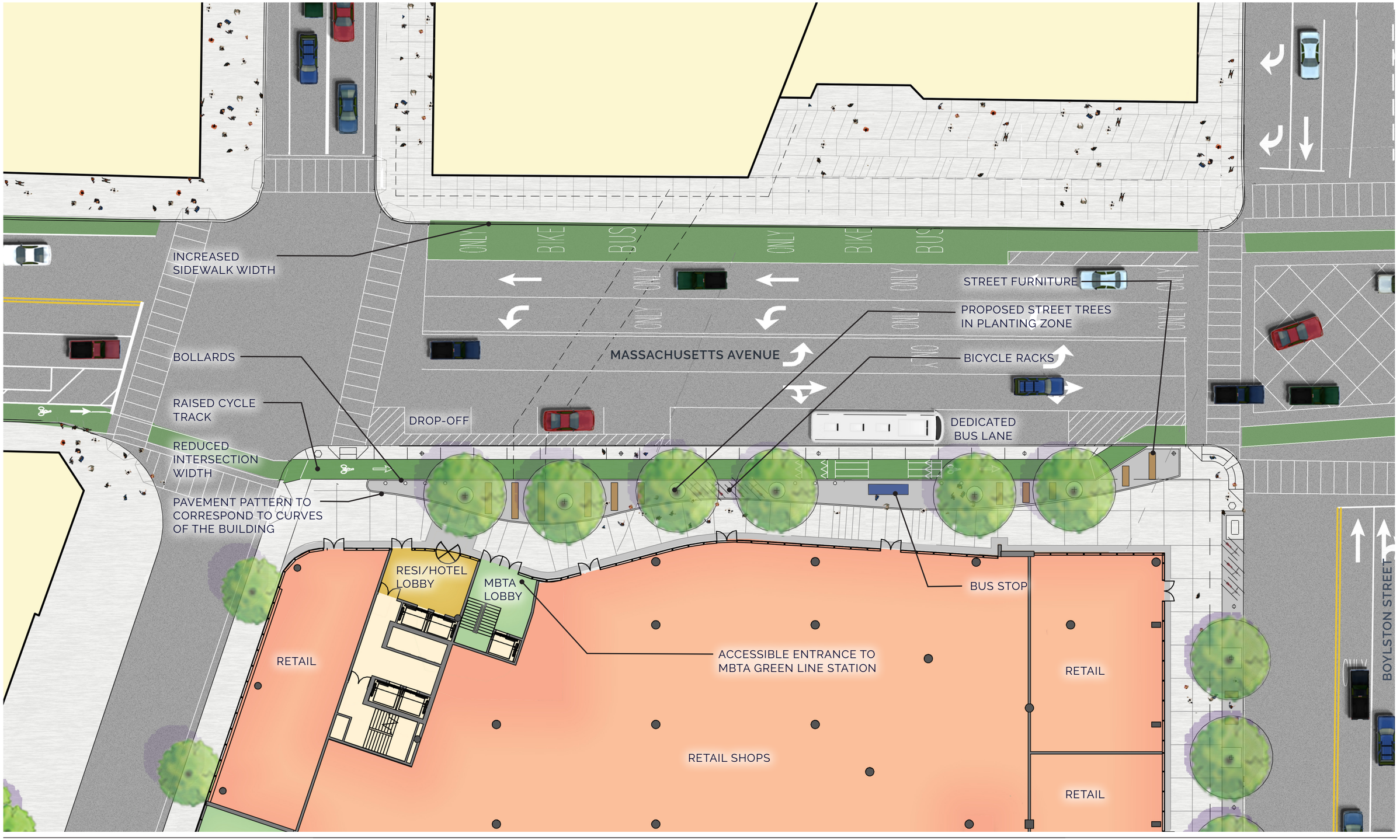
Figure 3.22



ELKUS | MANFREDI ARCHITECTS

Streetscape Improvement Plan
Air Rights Parcel 12
Boston, Massachusetts

Figure 3.23



0 10 20 Feet

ELKUS | MANFREDI ARCHITECTS

Enlarged Streetscape Plan - Mass Ave Figure 3.24
Air Rights Parcel 12
Boston, Massachusetts

PROPOSED STREET TREES IN PLANTING ZONE

BICYCLE RACKS

BOYLSTON STREET

DROP-OFF

RAISED CYCLE TRACK

24

RETAIL SHOPS

RETAIL

RETAIL

OFFICE LOBBY

RETAIL

PARKING/ LOADING ENTRY

RETAIL

MASSACHUSETTS AVENUE

ONLY

BUS

BIKE

0 10 20 Feet

ELKUS | MANFREDI ARCHITECTS

Enlarged Streetscape Plan - Boylston St Figure 3.25
Air Rights Parcel 12
Boston, Massachusetts

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4

Sustainability/Green Building Design and Climate Change Resiliency

The following chapter provides an overview of the Project's proposed sustainable design elements at this time of preliminary design, to demonstrate that the Project will meet the requirements of Article 37 of the Code relative to the City's Green Building policies and procedures.

This chapter also discusses the approach to preparing for changes in climate change, in accordance with the BPDA Climate Resiliency - Review Policy Update (the "Resiliency Policy Update"). The required Climate Change Resiliency and Preparedness Checklist (the "Resiliency Checklist") has been completed for the Proposed Project and is provided in Appendix D.

4.1 Summary of Key Findings and Benefits

- Targets a high level of sustainability by designing the Project Site and buildings using the LEEDv4 rating system to demonstrate compliance with Article 37, Green Buildings of the Code.[1]
- In support of Boston's Greenhouse Gas (GHG) emissions reductions goals, the Project Team has considered and will continue to evaluate energy conservation measures to reduce overall building energy usage and reduce associated GHG emissions.
- The preliminary energy model study provides an evaluation of building system and alternative energy options, and demonstrates that the proposed building designs meet the Massachusetts Stretch Energy Code requirement to be 10 percent better than ASHRAE 90.1-2013.
  - Reduces overall annual energy consumption by an estimated 20.6 percent through the implementation of energy optimizing building design and systems.
  - With the proposed design, the energy consumption is expected to result in an estimated GHG emissions of 1,868 tons per year, which represents a 17 percent reduction from the baseline.
- Potential impacts associated with climate changes, such as predicted future sea level rise, increased frequency and intensity of precipitation events, and extreme heat events have been considered during early stages of design.

[1] The residential/hotel building will be registered under LEED v4 for New Construction, and the office building has been registered under LEED v2009, but will comply with v4 prerequisites and credits to demonstrate a minimum of certifiability.

4.2 Regulatory Context

The following section provides an overview of the state and local regulatory context related to energy efficiency and GHG emissions

4.2.1 Article 37 Green Buildings

Through Article 37 – Green Buildings, the City encourages major building projects to be "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." Any project that is subject to Article 80B, Large Project Review is also subject to the requirements of Article 37.

Article 37 requires all projects over 50,000 square feet to meet LEED certification standards by either certifying the proposed project or demonstrating that the project would meet the minimum requirements to achieve a LEED Certified level (i.e., all LEED pre-requisites and at least 40 points associated with credits listed on the LEED project checklist) without registering the project with the USGBC ("LEED certifiable"). With the LEEDv4 rating system effective as of October 31, 2016, the BPDA requires initial Article 80B Large Project Review submissions on or after November 1st to demonstrate LEED certifiability using LEEDv4.

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 LEEDv4 certifiable project. These credits along with the prerequisites 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.

4.2.2 BPDA Climate Change Preparedness and Resiliency Policy

In conformance with the Mayor's 2011 Climate Action Leadership Committee's recommendations, the BPDA requires projects subject to Boston Zoning Article 80 Small and Large Project Review to complete a Resiliency Checklist to assess potential adverse impacts that might arise under future climate conditions, and any project resiliency, preparedness, and/or mitigation measures identified early in the design stage. The Resiliency Checklist is reviewed by the Interagency Green Building Committee ("IGBC").

4.2.3 Massachusetts Stretch Energy Code

As part of the Green Communities Act of 2008, Massachusetts developed an optional building code, known as the "Stretch Energy Code," that gives cities and towns the ability to choose stronger energy performance in buildings than otherwise required under the state building code. Codified by the Board of Building Regulations and Standards as 780 CMR Appendix 115.AA of the 9th edition Massachusetts Building Code, the Stretch Energy Code is an appendix to the

Massachusetts Building Code, based on further amendments to the International Energy Conservation Code (IECC). The Stretch Energy Code increases the energy efficiency code requirements for new construction and major residential renovations or additions in municipalities that adopt it. The Stretch Energy Code applies to new commercial buildings over 5,000 square feet and multi-family residential buildings over three (3) stories. The City adopted the Stretch Energy Code, which became mandatory on July 1, 2011.

On July 1, 2014, the IECC 2009 and ASHRAE 90.1-2007 ceased to be a code option for non-Stretch Energy Code communities, and the IECC 2012 and ASHRAE standard 90.1-2010 became the new/updated state-wide energy code.

Effective January 1, 2017, the IECC 2015/ASHRAE 90.1-2013 standard became the new/updated state-wide energy code as an amendment to the 9th edition of the State Building Code, and the Stretch Energy Code was amended to require 10 percent greater energy efficiency compared to ASHRAE 90.1-2013. Given the adoption of the most-recently revised Stretch Energy Code, the Project has incorporated these new requirements into its basis of design.

4.2.4 BPDA Climate Change Preparedness and Resiliency Policy

On October 12, 2017, the BPDA Board approved the the Resiliency Policy Update replacing the prior Climate Change Resiliency and Preparedness policy and related Checklist that was adopted in 2011.

In conformance with the Resiliency Policy Update's recommendations, the BPDA requires projects subject to Boston Zoning Article 80 Small and Large Project Review to complete a Resiliency Checklist to assess potential adverse impacts that might arise under future climate conditions, and any project resiliency, preparedness, and/or mitigation measures identified early in the design stage. The Resiliency Checklist is reviewed by the IGBC.

4.3 Sustainability/Green Building Design Approach

While the sustainability goals of the Project are in the development phase, the Proponent has identified sustainability as one of the design team's priorities for the Project. In support of the City's energy conservation and GHG emissions reduction goals, the Proponent and design team are working to provide an energy efficient building. The sustainability goals for the Project include enhancing the neighborhood, minimizinge environmental impacts, and maximizing occupant health and comfort. These goals will continue to be a major guide for decisions regarding design and operations for the Project.

Each Project component will separately show LEED compliance, as required by Article 37 of the Code. The residential/hotel building will show compliance using the LEED V4 New Construction rating system, while the office will comply with the LEED V4 Core and Shell rating system. Both Project components will pursue a minimum of a LEED Silver Certification, as shown in the LEED Scorecards included at the end of

this section (Figures 4.2a-b). The residential/hotel building and office building will continue to pursue additional performance criteria as the Project design advances.

In addition to LEED, the Project design team will continue to investigate alternative certifications to further enhance the environmental and human health of the building. The WELL Building Standard and FitWel certifications, for example, focus on occupant health, comfort, and productivity, while alternative certifications such as the Living Building Challenge and Passive House put an emphasis on energy efficiency through improvements to the building envelope, passive strategies, and renewables.

The design team for the Project includes several LEED Accredited Professionals (AP), including Executive Vice President – Development, Abe Menzin, LEED AP with Samuels & Associates and the Architect of Record, Kevin Lennon, AIA, LEED AP with Elkus Manfredi Architects. Other team members with LEED accreditation include the MEP Principal in Charge, Thomas Burroughs, PE, the sustainability consultant, Audrey Ng, LEED AP+, WSP's Built Ecology Group, and Lauren DeVoe, AICP, LEED AP, Senior Environmental Planner with VHB. The Proponent and Project design team will continue to evaluate and incorporate sustainable design and energy conservation as the design process continues.

4.3.1 Residential/Hotel Building

The residential/hotel building will be a new construction project on a previously developed site. The Project will be registered with the USGBC under the LEED v4 New Construction (NC) rating system, and is is targeting a LEED Gold Certification. To reduce the ecological footprint of the Project, the design team has focused their attention on sustainability during the design process on community connectivity, encouraging the use of alternative transportation, reducing overall electricity and water consumption, and designing for occupant well-being.

The Project is currently targeting 56 LEED v4 points, and has identified 45 additional potential targets. Based on the current target credits, a LEED Gold rating is anticipated, although the Project Team is still working to determine which 6-8 "maybe" credits will be pursued. The Project incorporates a holistic approach to sustainability, while mitigating the environmental impacts of energy, water and material use. The LEED Gold certification is contingent on the final design, outcome of calculations, material procurement, and the Project Team decisions. A summary on the preliminary approach to the credit categories are outlined below, and shown in Figure 4.2a, the preliminary the LEED checklist provided at the end of this section.

Location and Transportation (LT)

The Project Team has identified 14 achievable points within the Location and Transportation credit category along with two (2) points that may be feasible with additional investigation. The Project Site is in the fast-growing, densely populated Back Bay neighborhood that offers a range of amenities, and convenient intermodal public transportation options. The diversity in public transportation options

encourages building occupants and visitors to utilize these modes, as opposed to taking single occupant vehicles. Facilitating public transportation access reduces the number of vehicles traveling to and from the building, reduces mobile source greenhouse gas emissions linked to this building, and can reduce commuting costs which can help attract and retain occupants.

Additionally, the Project will provide ample bicycle storage and changing facilities, along with a reduced amount of on-site parking to further encourage occupants and visitors to chose sustainable transportation alternatives.

Sustainable Sites (SS)

The Project Team has identified five (5) achievable points within the Sustainable Sites category. The Project is designed to minimize rainwater runoff and reduce the impact of highly absorptive surfaces contributing to the urban heat island effect. The Project will also include a roof-top terrace on the third level, which will reduce contributions to the urban heat island effect and provide accessible open and green amenity space. The Project Team has also identified two (2) points that may be feasible, and require further investigation to determine achievability. The team will track and continue to evaluate the potential to pursue the "maybe" credits related to the Project's continued rainwater management strategy, incorporating pedestrian oriented open space, and reduce external light pollution on Site.

Water Efficiency (WE)

The Project Team identified five (5) points that are attainable, along with an additional four (4) points that may be feasible and require additional investigation. The residential/hotel building is designed to incorporate high-efficiency water fixtures to reduce indoor water consumption and incorporate advanced water meters to help the Project consistently track water usage data. The team will track and continue to evaluate the potential to pursue the "maybe" credits to achieve additional water savings through the reduction of irrigation and indoor water use demands.

Energy & Atmosphere (EA)

The Project Team has identified 13 points within the Energy and Atmosphere category that are attainable, and another five (5) points that may be feasible with some further investigation.

The 13 attainable credits in the Energy and Atmosphere category will be sought through reductions in overall energy consumption by cost, enhanced commissioning strategies, and advanced metering of energy subsystems to help the Project understand and reduce consumption. To support the claimed savings for the Project, the Alternative Energy Performance Metric was utilized. This metric allows the comparison of source energy, GHG emissions, and time-dependent valuation (TDV) energy in addition to energy cost.

The potential "maybe" credits will be monitored by the Project Team to determine if additional improvements to energy performance and renewable energy production strategies can be utilized for the residential/hotel building.

Materials and Resources (MR)

The Project Team has identified four (4) points that are attainable within the Materials and Resources category, and an additional nine (9) points as potential target credits. The Project will reduce the overall footprint of the materials and resources by utilizing sustainable waste management strategies and maximizing the declarations of environmental products and chemical ingredients of the permanently installed products. The Project Team will continue to investigate the possibilities for maximizing points under Building Product Disclosure Optimization credits and the feasibility of performing a Life Cycle Assessment.

Indoor Environmental Quality (IEQ)

The Project Team has recognized five (5) points in this category that are likely to be attainable for the Project, and 11 points that may be feasible. Strategies such as enhanced indoor air quality control strategies, construction indoor air quality management plan, and low-emitting materials are incorporated to provide a healthy indoor environment for all occupants and visitors. The Project Team will continue to investigate the possibilities of pursuing daylight and incorporation of low emitting material to further enhance the indoor environment of the space.

Innovation in Design (ID)

All version 4 projects must pursue at least one (1) Pilot Credit, one (1) Innovation Credit, and no more than two (2) exemplary performance credits. The Innovation in Design Credits may include: designing a walkable Project Site to encourage visitors to walk; increasing health and environmental benefits; purchasing lamps that contain minimal-to-zero mercury to reduce toxic materials onsite; and one ID credit for having a LEED Accredited Professional on the Project Team.

Regional Priority (RP)

The four (4) points available in the Regional Priority credit category are contingent on the Project meeting certain thresholds for credits in previous categories as determined by the USGBC. The Project has the Regional Priority credit for Rainwater Management listed as "maybe", as it is dependent on the Project's ability to achieve the credit requirements and minimum point thresholds. The four (4) points in this category are automatically awarded pending the award of the original credits to which they are linked.

Boston Green Building Credits

The Project Team is investigating the feasibility of complying with the prerequisites and pursuing credits under the Boston Green Building Credit system. This system supplements LEED certification and allows projects to comply with unique credits developed by the City that can then be included in the calculation towards achieving a LEED Certification.

4.3.2 Office Buiding

The office building will be a new construction project on a previously developed site. The Project will be registered with the USGBC under the LEED v4 NC rating system, and is achieving LEED Silver, but targeting a LEED Gold Certification. To reduce the ecological footprint of the Project, the Project Team has focused their attention during the design process on community connectivity, encouraging the use of alternative transportation, reducing overall electricity and water consumption, and designing for occupant well-being.

The Project is targeting 60 LEED v4 points and has identified 43 additional potential targets. Based on the current target credits, a LEED Gold rating is anticipated, although the Project Team is still working to determine which 63-4 "maybe" credits will be pursued. The Project incorporates a holistic approach to sustainability, while mitigating the environmental impacts of energy, water and material use. The LEED Gold certification is contingent on the final design, outcome of calculations, material procurement, and the Project Team decisions. A summary on the preliminary approach to the credit categories are outlined below and shown in the LEED checklist provided at the end of this section (Figure 4.2b).

Location and Transportation (LT)

The Project Team has identified 17 achievable points within the Location and Transportation credit category along with three (3) points that may be feasible with additional investigation. The Project Site is in the fast-growing, densely populated Back Bay neighborhood that offers a range of amenities, and convenient intermodal public transportation options. The diversity in public transportation options encourages building occupants and visitors to utilize these modes, as opposed to taking single occupant vehicles. Facilitating public transportation access reduces the number of vehicles traveling to and from the building, reduces mobile source greenhouse gas emissions linked to this building, and can reduce commuting costs, which can help attract and retain employees.

Additionally, the Project will provide ample bicycle storage and changing facilities, along with a reduced amount of on-site parking to further encourage occupants and visitors to chose sustainable transportation alternatives.

Sustainable Sites (SS)

The Project Team has identified six (6) achievable points within the Sustainable Sites category. The project is designed to minimize rainwater runoff and reduce the

impact of highly absorptive surfaces contributing to the urban heat island effect. The project will also include a roof-top terrace, which will reduce contributions to the urban heat island and provide open and accessible green space for building occupants and tenants. The Project Team has also identified five (5) points that may be feasible and require further investigation to determine achievability. The team will track and continue to evaluate the potential to pursue the "maybe" credits related to the Project's continued rainwater management strategy, incorporating pedestrian oriented open space, and reduce external light pollution on Site.

Water Efficiency (WE)

The Project Team identified four (4) points that are attainable, along with an additional seven (7) points that may be feasible and requires additional investigation. The office building is designed to incorporate high-efficiency water fixtures to reduce indoor water consumption and incorporate advanced water meters to help the project consistently track water usage data. The team will track and continue to evaluate the potential to pursue the "maybe" credits to achieve additional water savings through the reduction of irrigation and indoor water use demands.

Energy and Atmosphere (EA)

The Project Team has identified 18 points within the Energy and Atmosphere category that are attainable, and another 11 points that may be feasible with some further investigation.

The 18 attainable credits in the Energy and Atmosphere category will be sought through reductions in overall energy consumption by cost, enhanced commissioning strategies, and advanced metering of energy subsystems to help the Project understand and reduce consumption. To support the claimed savings for the Project, the Alternative Energy Performance Metric was utilized. This metric allows the comparison of source energy, GHG emissions, and TDV energy in addition to energy cost.

The potential maybe credits will be monitored by the Project Team to determine if additional improvements to energy performance and renewable energy production strategies can be utilized for the office building.

Materials and Resources (MR)

The Project Team has identified four (4) points that are attainable within the Materials and Resources category and an additional 9 points as potential target credits. The Project will reduce the overall footprint of materials and resources by utilizing sustainable waste management strategies and maximizing the declarations of environmental products and chemical ingredients of the permanently installed products. The Project will continue to investigate the possibilities for maximizing points under Building Product Disclosure Optimization credits, and the feasibility of performing a Life Cycle Assessment.

Indoor Environmental Quality (IEQ)

The Project Team has recognized four (4) points in this category that are likely to be attainable for the Project, and seven (7) points that may be feasible. Strategies such as enhanced indoor air quality control strategies, construction indoor air quality management plan and low-emitting materials are incorporated to design to provide a healthy indoor environment for all occupants and visitors. The Project Team will continue to investigate the possibilities of pursuing daylight, and incorporation of low emitting materials to further enhance the indoor environment of the space.

Innovation in Design (ID)

All version 4 projects must pursue at least one (1) Pilot Credit, one (1) Innovation Credit, and no more than two (2) exemplary performance credits. The Innovation in Design credits being explored may include: designing a walkable Project Site to encourage visitors to walk; increasing health and environmental benefits; purchasing lamps that contain minimal-to-zero Mercury to reduce toxic materials onsite; and one ID credit for having a LEED Accredited Professional on the Project Team.

Regional Priority (RP)

The four (4) points available in the Regional Priority category are contingent on the Project meeting certain thresholds for credits in previous categories as determined by the USGBC. The Project has the Regional Priority credit for Rainwater Management listed as "maybe", as it is dependent on the Project's ability to achieve the credit requirements and minimum point thresholds. The four (4) points in this category are automatically awarded pending the award of original credits to which they are linked.

4.4 Preliminary Energy Conservation/GHG Emissions Reduction Approach

In alignment with regional efforts to reduce GHG emissions and in support of Boston's specific GHG emissions reduction targets, the Proponent will continue to evaluate energy efficiency measures (EEMs) for possible inclusion in the Project. The EEMs may include low-flow plumbing fixtures, as well as high efficiency mechanical and ventilation systems. Whole building energy modeling was used for a preliminary analysis of possible energy efficient measures.

The residential/hotel and office buildings meet the updated code requirement to have energy consumption a minimum of 10 percent below an ASHRAE 90.1-2013 baseline. As currently designed the estimated energy usage for the residential/hotel building is reduced by approximately 21.9 percent compared to the baseline (as presented in Table 4-1a), while energy usage for the office is reduced by 20.2

percent compared to the baseline (as presented in Table 4-2a).[2] Together, the overall Project is estimated to reduce energy consumption by approximately 20.6 percent compared to the baseline. With the proposed design, the energy consumption of the overall Project is expected to result in an estimated GHG emissions of 1,868 tons per year, which represents an approximately 17 percent reduction from the baselilne. The high performance of the Project buildings is proposed to be achieved through improvements such as the incorporation of high efficiency heating and cooling systems, heat rejection system improvements, improved lighting and envelope options. The energy consumption broken down by end use for the base code and proposed design for the residential/hotel building and the office building are presented in Exhibits 4-1 and 4-2, herein.

Table 4-1a Preliminary Energy Model Results (Residential/Hotel Building)

	Energy Consumption		
	Electricity (MMBtu)	**Natural Gas (MMBtu)**	**Total (kBtu/sf)**
Base Case (ASHRAE 90.1-2013)	3,539 (56%)	2,731 (44%)	43
Design Case	3,272 (67%)	1,627 (33%)	33
Savings	268	1,104	9
Savings Target	-	-	10%
Percent Savings	8%	40%	**21.9%**

[2] Energy usage percent savings is different from energy cost, which is dependant on different energy sources and associated utility rates.

Exhibit 4-1 Residential/Hotel Projected End Use

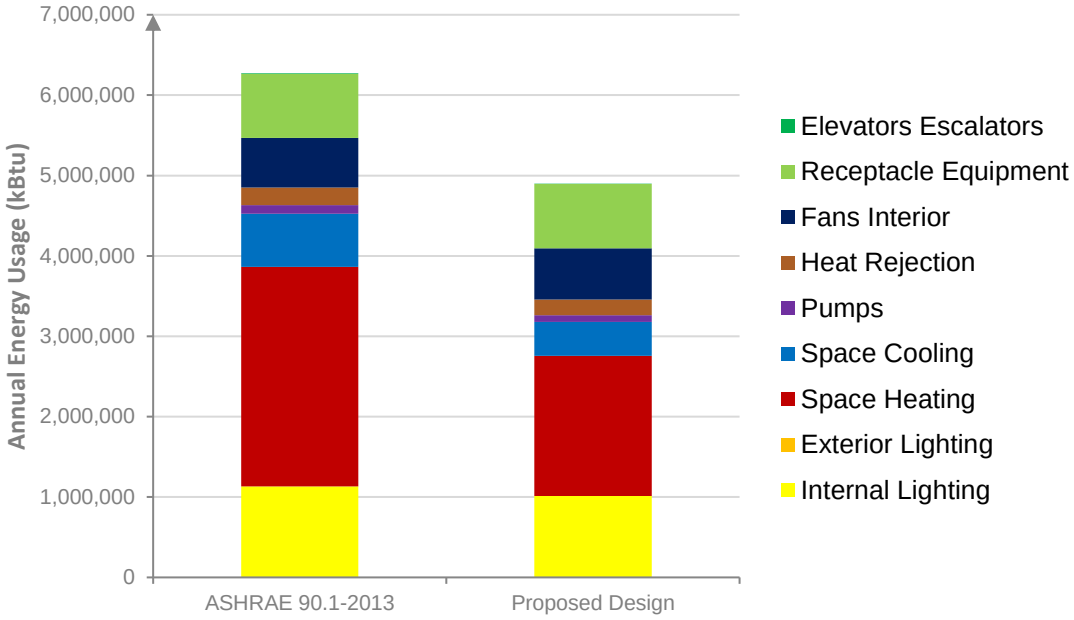

Table 4-1b Greenhouse Gas Analysis (Residentail/Hotel Building)

	Greenhouse Gas (CO_2) Emissions		
	Electricity (short tons)	**Natural Gas (short tons)**	**Total (short tons)**
Base Case (ASHRAE 90.1-2013)	368 (70%)	160 (30%)	528
Design Case	340 (78%)	95 (22%)	436
Savings	28	65	92
Percent Savings	8%	40%	**18%**

Note: 710 lb CO2/MWh was used to convert electricity consumption into the amount of CO2 emissions (2016 ISO-New England Marginal Emissions Report). 117.08 lb CO2/Mbtu was used to convert gas consumption into the amount of CO2 emissions (The Energy Information Administration Documentation for Emissions for GHG).

Table 4-2a Preliminary Energy Model Results (Office Building)

	Energy Consumption		
	Electricity (MMBtu)	**Natural Gas (MMBtu)**	**Total (kBtu/sf)**
Base Case (ASHRAE 90.1-2013)	13,279 (70%)	5,762 (30%)	43
Design Case	11,934 (79%)	3,262 (21%)	34
Savings	1,345	2,500	9
Savings Target	-	-	10%
Percent Savings	10%	43%	**20.2%**

Exhibit 4-2 Office Projected End Use

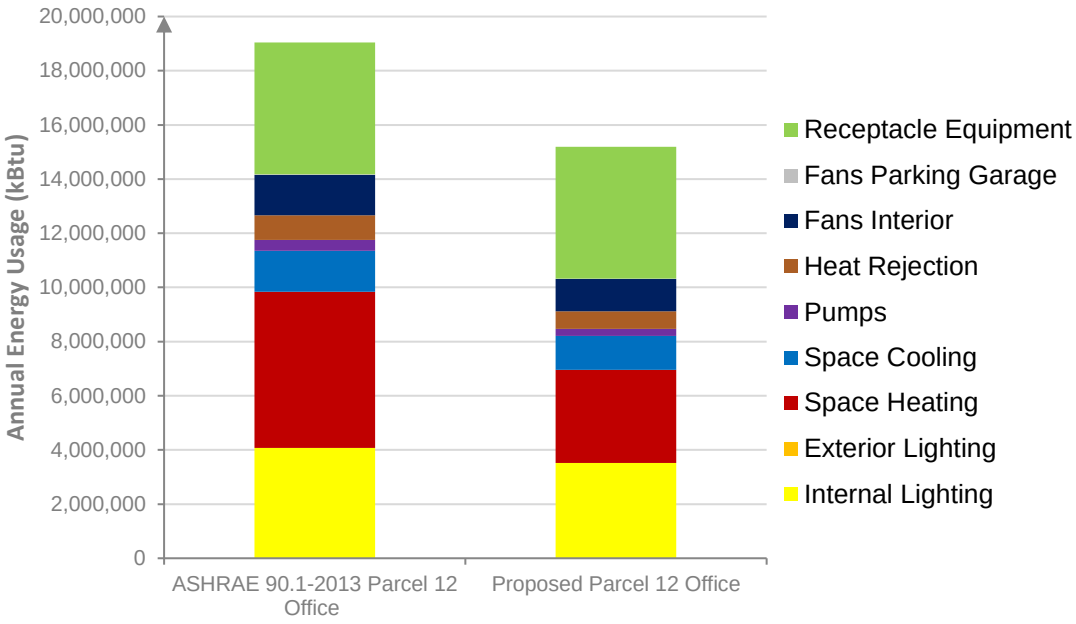

Table 4-2b Greenhouse Gas Analysis (Office Building)

	Greenhouse Gas (CO_2) Emissions		
	Electricity (short tons)	**Natural Gas (short tons)**	**Total (short tons)**
Base Case (ASHRAE 90.1-2013)	1,382 (80%)	337 (20%)	1,719
Design Case	1,242 (87%)	191 (13%)	1,433
Savings	140	146	286
Percent Savings	10%	43%	**17%**

Note: 710 lb CO2/MWh was used to convert electricity consumption into the amount of CO2 emissions (2016 ISO-New England Marginal Emissions Report). 117.08 lb CO2/Mbtu was used to convert gas consumption into the amount of CO2 emissions (The Energy Information Administration Documentation for Emissions for GHG).

4.4.1 Energy Efficiency Measures

The energy savings calculated in the preliminary energy model were based on several key energy conservation measures for the Project that include:

- High-performance glazing and efficient building materials (walls and windows);
- Condenser water plant that exceeds base energy code efficiency with variable speed technology;
- High-efficiency chillers with variable speed compressors;
- Low lighting power density;
- Ventilation air heat recovery;
- Commissioning to help ensure major energy-using equipment is installed correctly.

As the Project's design develops, the Project Team will consider further load reduction where possible through additional strategies.

4.4.2 Clean and Renewable Energy Analysis Evaluation

A variety of clean and renewable energy sources are being considered including solar, solar thermal, and cogeneration in the form of CHP. Based on the energy and payback analysis, roof-mounted solar PV panels is the most cost-effective potential strategy. These systems typically require space on the roof that may or may not be available pending detailed design of the building mechanical systems. While not included in the base design assumptions of the preliminary energy models, these systems will continue to be evaluated as the Project design advances. In other words, the base design is able to achieve the proposed energy savings and GHG reductions shown here without these systems included in the preliminary energy models.

Combined Heat and Power (CHP)

CHP systems are most efficient when there is a hot water demand year-round, making it applicable for residential projects. The Project Team will continue to explore the benefits of implementing CHP for the residential/hotel building for use in heating domestic hot water and providing power. As design advances the team will continue to assess the viability of including small scale CHP systems for the Project. The feasibility of such systems often hinges on the efficiency of the CHP during the summer months, which will be considered in the future study. The benefits of CHP are minimal for the office building due to the lack of a significant year-round hot water demand.

A CHP system was investigated and deemed infeasible under the current Eversource policy.

The Proponent is committed to investing in energy conservation measures through design, which, based on preliminary building energy modeling, is expected to

exceed the Stretch Energy Code requirements in effect as of January 1, 2017. In addition, given the project phasing timeframe, it is anticipated that energy conservation technologies will advance providing additional, potentially more viable, options than a CHP system.

Solar Photovoltaic (PV) Systems

An evaluation of incorporating both roof-mounted solar PV systems has been conducted for the Project (Appendix G). The system would result in an annual energy cost savings of $12,400 and a payback of 11.2 years, after incentives but without federal tax credits considered. Rooftop spce available for this system needs to be studied pending detailed design of the building mechanical systems. The buildings will, at a minimum, be designed to be solar-ready however, the Proponent will continue to pursue a PV system for the Project as the design progresses.

Steam

Based on the current Veolia steam maps, steam is not available to the Project site. The Project Team will reach out to Veolia regarding future expansion of steam infrastructure and availability to the project site.

Solar Thermal

The feasibility of generating thermal energy from solar thermal was assessed and rejected for the following reasons:

- Competing roof area for mechanical equipment, vegetated roofs and amenities; and
- Roof area is very small relative to high hot water demands in residential buildings.

Geothermal (Ground Source Heat Pumps)

The feasibility of generating electricity from geothermal sources was assessed and rejected for the following reasons:

- The Project is building over the Turnpike and adjacent rail corridor and there are significant space constraints for foundations and services;
- The lack of available terra firma below the Project cannot provide any significant geothermal capacity relative to the Project heating and cooling demand; and
- Relatively low cost of natural gas and relatively high cost of electricity makes geothermal much less cost-effective compared with other clean energy technologies.

Energy Efficiency Utility Assistance

The Project Team will meet with representatives of local utility companies serving the area to discuss the utility incentives programs available. By working with these utility companies throughout the design process, the Proponent will evaluate

additional energy conservation strategies and, therefore, additional energy savings and associated GHG emissions reductions that may be achieved. The Project will likely participate in the MassSave New Construction Program, which is designed to target energy efficiency opportunities in new commercial facilities. The program provides financial incentives and technical assistance to developers, customers and design professionals to encourage the use of design features and equipment that optimize energy efficiency in the new construction projects.

4.5 Climate Change Preparadness and Resiliency

This section discusses the approach to preparing for anticipated changes in climate, in accordance with Appendix 7 of the BPDA Development Review Guidelines. The required Climate Change Resiliency and Preparedness Checklist has been completed for the Project and is provided in Appendix D.

4.5.1 Sea Level Rise and Extreme Storm Flooding

New England is expected to experience greater localized sea level rise due to climate change. There are many sources which have quantified the expected sea level rise and evaluated the various scenarios in the context of the City of Boston. The Massachusetts Office of Coastal Zone Management (CZM) has prepared the document *Sea Level Rise: Understand and Applying Trends and Future Scenarios for Analysis and Planning*, which provides projections of expected sea level rise for Boston at several points in the future under different emission scenarios: Lowest; Intermediate Low; Intermediate High; and Highest.

The CZM document gives planners and designers a resource for 'bathtub model' evaluations of assets and infrastructure. These elevations can be added to flood elevations provided by resources, such as the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) program. These maps provide the 1- and 0.2-percent annual exceedance probability flood event (i.e., 100-year and 500-year flood elevations along U.S. waterways and coasts). These maps, when combined with sea level rise, can provide a basic flood elevation evaluation tool.

MassDOT and the Federal Highway Administration (FHWA) have taken the CZM sea level rise information one step further than the 'bathtub' model, by creating a dynamic flooding model. The *MassDOT-FHWA Pilot Project Report: Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Options for the Central Artery* provides flood elevations generated by a hydrodynamic model coupled with a wave simulation model, over the topography and bathymetry of the greater Boston area. To some, this model seems to provide the most accurate publicly available site-specific flooding model with sea level rise in Boston for certain planning years and emission scenarios.

Based on this report, the Project Site is not at high risk of inundation from sea level rise during its design life (approximately 50 years). Figure 4.3 shows the FEMA FIRM, and Figures 4.4 and 4.5 show the 2030 and 2070 inundation probabilities from the

high emissions scenario of the same flood risk model, developed by the Woods Hole Group. These figures show that there will be no flooding due to sea level rise in 2030 at or near the Project Site. In 2070, the projections show minimal risk to the immediate Project Site despite the potential flooding of the Turnpike, which could result in substantial flooding of regional transportation systems and the surrounding area. The Turnpike below the Project Site has a low point of approximately 12.5 feet Boston City Base (BCB), and the street level above ranges from 28 feet to 32 feet BCB. The *Climate Ready Boston* report, released in December 2016, indicated no change in sea level rise projections. A further study will be conducted to determine the risk of inundation of the vent building from sea level rise and/or storm surges during the design life of that building.

To protect against flood risk, however minimal, the Project is studying locating critical building systems above-grade and may consider physical measures, such as removable flood barriers, if deemed necessary at the appropriate future time.

4.5.2 Extreme Weather Events/Temperatures

This section examines how the Project may be affected by and will prepare for climate change-induced extreme weather events.

The 2011 *Massachusetts Climate Change Adaptation Report* projects an increase in extreme weather events which could consist of drought, tropical rainfall patterns (i.e., increased precipitation), extreme heat and cold stretches, an increase in the number of days with extreme heat (i.e., temperatures greater than 90°F and 100°F), and increased winter precipitation, yet fewer days of snow.

To understand the potential impacts of extreme weather conditions, the Project Team will use Whole Building Energy Simulation to analyze the performance of heating and cooling equipment under extreme cold (0°F) and heat events (95°F) and will assess occupant thermal comfort under extreme conditions lasting up to three consecutive days, including thermal comfort in the event of a power outage and loss of heating and cooling capacity.

Please refer to the Preparedness and Resiliency Checklist in Appendix C for additional details on how the Project will respond to extreme weather conditions.

4.5.3 Potential Resiliency Strategies

The Proponent and Project Team plan to evaluate potential design elements to mitigate the effects of climate change as the design of each Project component progresses. Potential Project sustainability and resiliency measures are summarized in Figures 4.1a-b.

Site Design Resiliency Strategies

› The Project looks to provide correctly sized stormwater conveyance infrastructure to effectively remove stormwater from the Project Site.

› Due to the nature of an air-rights development and the existing bridge decking associated with Massachusetts Avenue adjacent to the Project Site, the implementation of low impact development (LID) stormwater management techniques are limited. Various techniques will be considered to help reduce stormwater runoff as the project design progresses.

Building Design Resiliency Strategies

› The Proponent will continue to consider elevating critical equipment through the design phase to protect from extreme flooding conditions. If placing sensitive building mechanical equipment is determined to be cost-prohibitive, ground-mounted equipment will include waterproofing measures, such as setting equipment on pads, curbs at equipment room entrances, and/or floor drains.

The following additional design and planning measures will be explored to mitigate for rising temperature impacts:

› Employing reflective roof materials and/or vegetated roofs;

› The HVAC system has been evaluated for performance during extreme weather events and anthropogenic future climate change.

› High performance glazing will reduce cooling loads in the summer, and heat loss during the winter.

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HVAC SYSTEM
Evaluated for performance during extreme weather events and anthropogenic future climate change

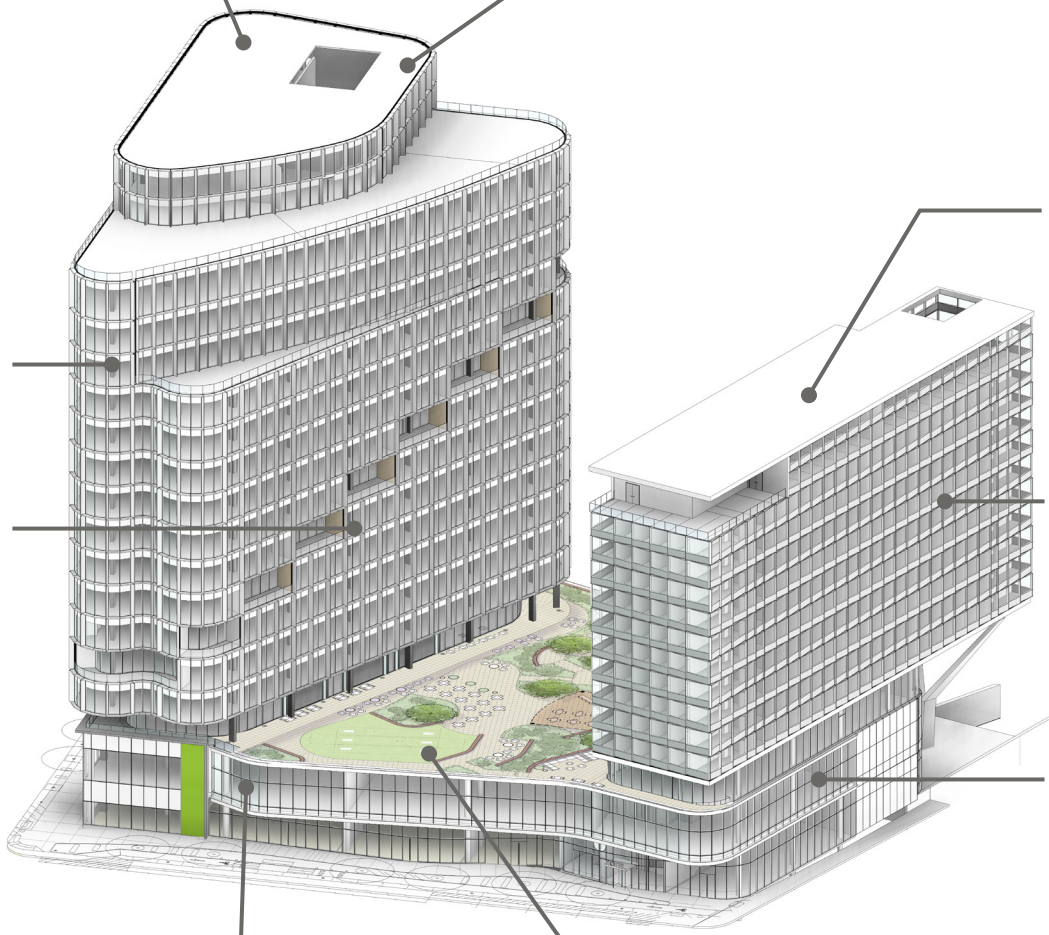
MEASUREMENT & VERIFICATION SYSTEM AND TENANT SUBMETERING
Help manage long-term performance and promote accountability and conservation.

LOW-FLOW FIXTURES
Reduce water demand

DAYLIGHTING
Clear glazing on the north facade promotes daylighting

HIGHLY URBAN LOCATIONS
Provides access to public transportation and reduces car dependance.

SECURE BICYCLE STORAGE
Helps promote alternatives to cars.



OUTSIDE AIR MONITORING
Ensures adequate ventilation is provided to all areas of the building

COMBINED HEAT & POWER
The design team will study the feasibility. Can provide utility grid relief and resilient back-up power generation

HIGH EFFICIENCY CONDENSING BOILERS AND MAGNETIC BEARING CHILLERS
Reduce energy costs and GHG emissions

HIGH PERFORMANCE GLAZING
low-E coating and low solar shading coefficient reduce cooling loads during the summer and heat loss during the winter

RECYCLED and REGIONAL MATERIALS
Reduce environmental impacts from development and transportation

VEGETATED ROOFS
Help reduce storm water discharge rates and urban heat island effect.

Sustainability and Resiliency Infographic

Figure 4.1

Air Rights Parcel 12
Boston, Massachusetts

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

Project Checklist

Y	?	N			
		N	Credit	Integrative Process	1

14	2	0	Location and Transportation		16
		N	Credit 1	LEED for Neighborhood Development Location	16
1			Credit 2	Sensitive Land Protection	1
	2		Credit 3	High Priority Site	2
5			Credit 4	Surrounding Density and Diverse Uses	5
5			Credit 5	Access to Quality Transit	5
1			Credit 6	Bicycle Facilities	1
1			Credit 7	Reduced Parking Footprint	1
1			Credit 8	Green Vehicles	1

5	5	0	Sustainable Sites		10
Y			Prereq 1	Construction Activity Pollution Prevention	Required
	1		Credit 1	Site Assessment	1
1	1		Credit 2	Site Development - Protect or Restore Habitat	2
	1		Credit 3	Open Space	1
2	1		Credit 4	Rainwater Management	3
2			Credit 5	Heat Island Reduction	2
	1		Credit 6	Light Pollution Reduction	1

5	4	2	Water Efficiency		11
Y			Prereq 1	Outdoor Water Use Reduction	Required
Y			Prereq 2	Indoor Water Use Reduction	Required
Y			Prereq 3	Building-Level Water Metering	Required
1	1		Credit 1	Outdoor Water Use Reduction	2
3	1	2	Credit 2	Indoor Water Use Reduction	6
	2		Credit 3	Cooling Tower Water Use	2
1			Credit 4	Water Metering	1

18	11	4	Energy and Atmosphere		33
Y			Prereq 1	Fundamental Commissioning and Verification	Required
Y			Prereq 2	Minimum Energy Performance	Required
Y			Prereq 3	Building-Level Energy Metering	Required
Y			Prereq 4	Fundamental Refrigerant Management	Required
6			Credit 1	Enhanced Commissioning	6
8	6	4	Credit 2	Optimize Energy Performance	18
1			Credit 3	Advanced Energy Metering	1
	2		Credit 4	Demand Response	2
	3		Credit 5	Renewable Energy Production	3
1			Credit 6	Enhanced Refrigerant Management	1
2			Credit 7	Green Power and Carbon Offsets	2

4	9	0	Materials and Resources		13
Y			Prereq 1	Storage and Collection of Recyclables	Required
Y			Prereq 2	Construction and Demolition Waste Management Planning	Required
	5		Credit 1	Building Life-Cycle Impact Reduction	5
1	1		Credit 2	Building Product Disclosure and Optimization - Environmental Product Declarations	2
	2		Credit 3	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit 4	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit 5	Construction and Demolition Waste Management	2

5	11	0	Indoor Environmental Quality		16
Y			Prereq 1	Minimum Indoor Air Quality Performance	Required
Y			Prereq 2	Environmental Tobacco Smoke Control	Required
1	1		Credit 1	Enhanced Indoor Air Quality Strategies	2
1	2		Credit 2	Low-Emitting Materials	3
1			Credit 3	Construction Indoor Air Quality Management Plan	1
	2		Credit 4	Indoor Air Quality Assessment	2
1			Credit 5	Thermal Comfort	1
1	1		Credit 6	Interior Lighting	2
	3		Credit 7	Daylight	3
	1		Credit 8	Quality Views	1
	1		Credit 9	Acoustic Performance	1

4	0	0	Innovation		16
1			Credit 1	Innovation	5
1			Credit 2	Innovation	5
1			Credit 3	Innovation	5
1			Credit 4	Innovation	5
1			Credit 5	Innovation	5
1			Credit 6	LEED Accredited Professional	1

1	3	0	Regional Priority		4
	1		Credit 1	High Priority Site (2 point threshold)	1
	1		Credit 2	Optimize Energy Performance (8 point threshold)	1
1			Credit 3	Rainwater Management (2 point threshold)	1
	1		Credit 4	Cooling Tower Water Use (2 point threshold)	1

56	45	6	TOTALS	Possible Points:	120

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

LEED v4 for BD+C: Core and Shell

Project Checklist

Y	?	N			
		N	Credit 1	Integrative Process	1

17	3	0	**Location and Transportation**		20
		N	Credit 1	LEED for Neighborhood Development Location	20
2			Credit 2	Sensitive Land Protection	2
	3		Credit 3	High Priority Site	3
6			Credit 4	Surrounding Density and Diverse Uses	6
6			Credit 5	Access to Quality Transit	6
1			Credit 6	Bicycle Facilities	1
1			Credit 7	Reduced Parking Footprint	1
1			Credit 8	Green Vehicles	1

6	5	0	**Sustainable Sites**		11
Y			Prereq 1	Construction Activity Pollution Prevention	Required
	1		Credit 1	Site Assessment	1
1	1		Credit 2	Site Development - Protect or Restore Habitat	2
	1		Credit 3	Open Space	1
2	1		Credit 4	Rainwater Management	3
2			Credit 5	Heat Island Reduction	2
	1		Credit 6	Light Pollution Reduction	1
1			Credit 7	Tenant Design and Construction Guidelines	1

5	4	2	**Water Efficiency**		11
Y			Prereq 1	Outdoor Water Use Reduction	Required
Y			Prereq 2	Indoor Water Use Reduction	Required
Y			Prereq 3	Building-Level Water Metering	Required
1	1		Credit 1	Outdoor Water Use Reduction	2
3	1	2	Credit 2	Indoor Water Use Reduction	6
	2		Credit 3	Cooling Tower Water Use	2
1			Credit 4	Water Metering	1

18	11	4	**Energy and Atmosphere**		33
Y			Prereq 1	Fundamental Commissioning and Verification	Required
Y			Prereq 2	Minimum Energy Performance	Required
Y			Prereq 3	Building-Level Energy Metering	Required
Y			Prereq 4	Fundamental Refrigerant Management	Required
6			Credit 1	Enhanced Commissioning	6
8	6	4	Credit 2	Optimize Energy Performance	18
1			Credit 3	Advanced Energy Metering	1
	2		Credit 4	Demand Response	2
	3		Credit 5	Renewable Energy Production	3
1			Credit 6	Enhanced Refrigerant Management	1
2			Credit 7	Green Power and Carbon Offsets	2

4	9	0	**Materials and Resources**		14
Y			'Prereq 1	Storage and Collection of Recyclables	Required
Y			'Prereq 2	Construction and Demolition Waste Management Planning	Required
	5		Credit 1	Building Life-Cycle Impact Reduction	6
1	1		Credit 2	Building Product Disclosure and Optimization - Environmental Product Declarations	2
	2		Credit 3	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	1		Credit 4	Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit 5	Construction and Demolition Waste Management	2

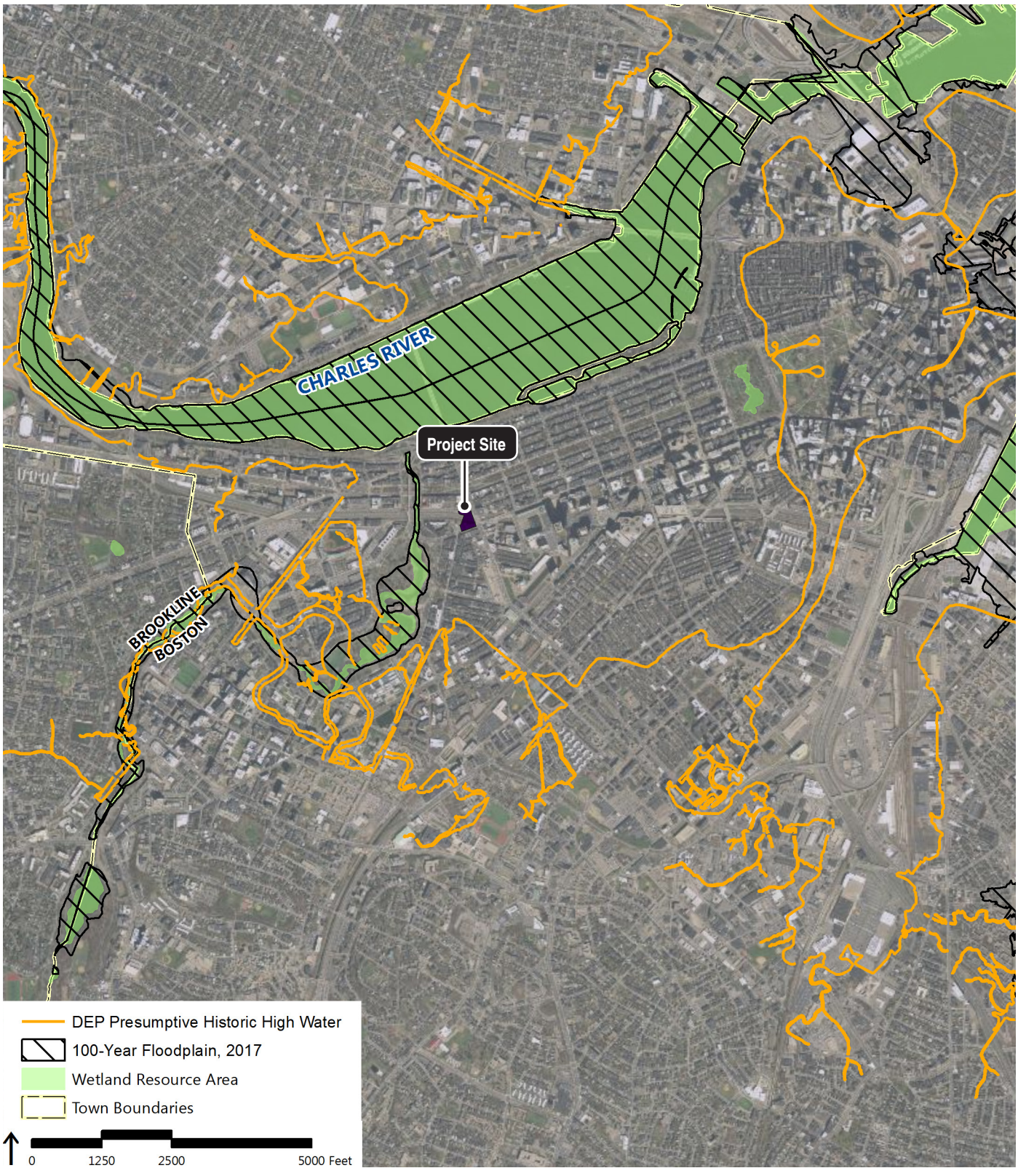
3	8	0	**Indoor Environmental Quality**		10
Y			Prereq 1	Minimum Indoor Air Quality Performance	Required
Y			Prereq 2	Environmental Tobacco Smoke Control	Required
1	2		Credit 1	Enhanced Indoor Air Quality Strategies	2
1	2		Credit 2	Low-Emitting Materials	3
1			Credit 3	Construction Indoor Air Quality Management Plan	1
	3		Credit 4	Daylight	3
	1		Credit 5	Quality Views	1

6	0	0	**Innovation**		6
5			Credit 1-5	Innovation	5
1			Credit 6	LEED Accredited Professional	1

1	3	0	**Regional Priority**		4
	1		Credit 1	High Priority Site (2 point threshold)	1
	1		Credit 2	Optimize Energy Performance (8 point threshold)	1
1			Credit 3	Rainwater Management (2 point threshold)	1
	1		Credit 4	Cooling Tower Water Use (2 point threshold)	1

60	43	10	**TOTALS**	Possible Points:	110

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

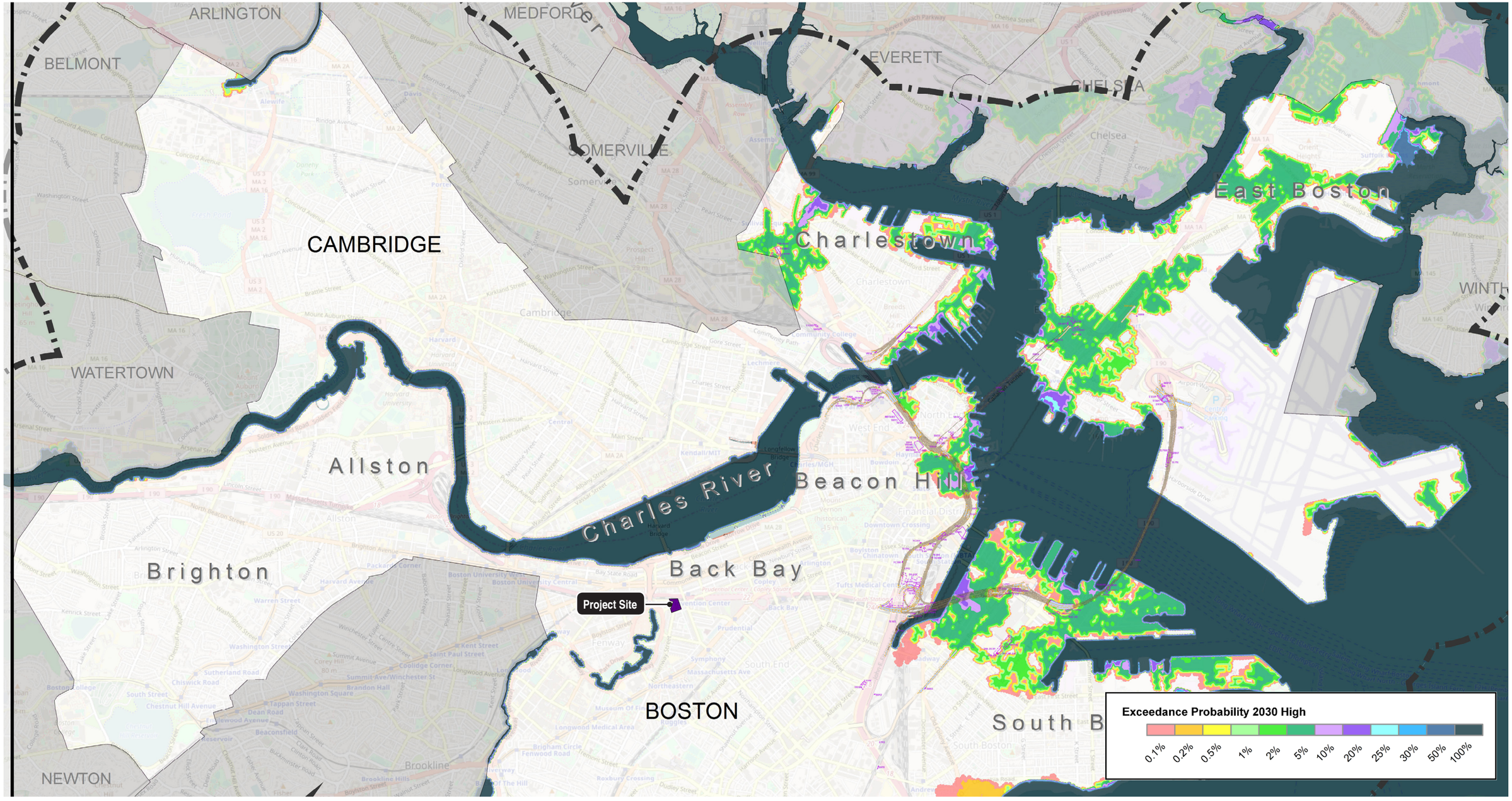


Source: MassGIS

FEMA Flood Map

Figure 4.3

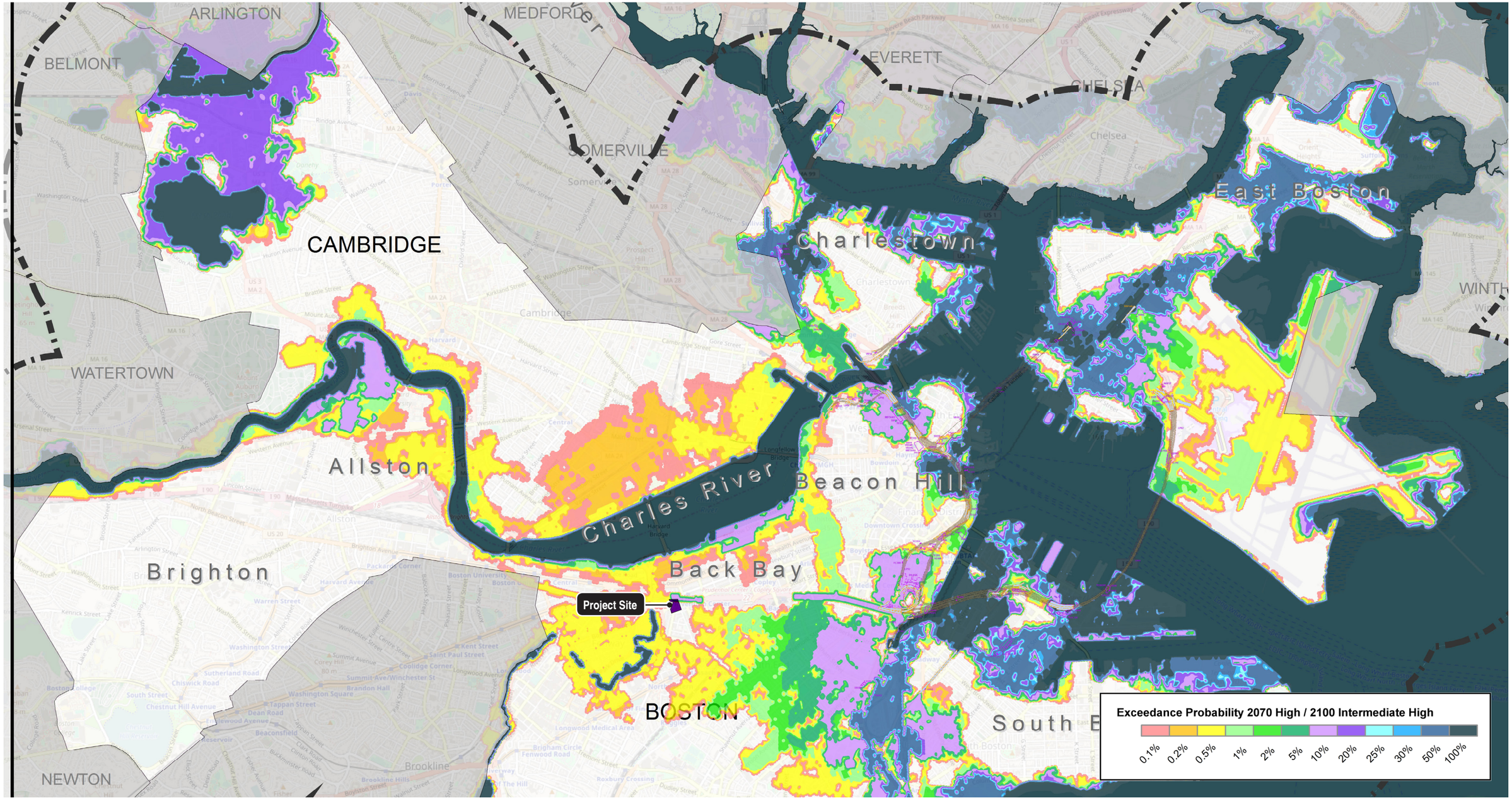
Air Rights Parcel 12
Boston, Massachusetts



Source: MassDOT

2030 Coastal Flood Exceedance Probabilities (High Scenario)
Air Rights Parcel 12
Boston, Massachusetts

Figure 4.4



Source: MassDOT

2070 Coastal Flood Exceedance Probabilities (High Scenario)
Air Rights Parcel 12
Boston, Massachusetts

Figure 4.5

5

Transportation

This chapter provides a comprehensive evaluation of the existing and proposed transportation conditions in the study area and identifies the potential traffic impacts as a result of the Project. The analysis captures in detail the operational characteristics of the Project, and provides a basis for determining to what extent, if any, Project-related transportation demands are likely to affect the wider transportation network.

A Transportation Scoping Letter was submitted to MassDOT on May 14, 2018. Within this letter, the proposed study area, analysis methodology, trip generation, mode split, trip distribution, background projects, and the Project's preliminary transportation demand management program, were described in detail. MassDOT submitted a comment letter on June 1, 2018, that confirmed the analytic approach and it included a request for additional information to be included in the analysis. The Boston Transportation Department (BTD) also issues a letter that generally agreed with the MassDOT scoping; it also included a request that the project study area be expanded to include more nearby intersections.

This study has also been developed to conform with the BTD's Transportation Access Plans Guidelines. It uses standard methodologies, including the Institute of Transportation Engineers' Trip Generation Manual (10th Edition) and local travel characteristics as defined in *Access Boston 2000-2010*. The study analyzes the following as part of the evaluation of 2018 Existing Conditions:

- Vehicular traffic on study area roadways and intersections;
- Parking conditions;
- Loading and service activities;
- Pedestrian and bicycle operations; and
- Public transportation services.

In addition, this study quantifies and assesses the transportation impacts that are expected under future conditions. The purposes of these analyses are to define and quantify existing transportation conditions in the Project study area and estimate the transportation impacts on vehicular traffic and public transportation that will be generated under future conditions based on the anticipated building program for the Project. Finally, this document summarizes the planned set of mitigation strategies and improvement measures which will help manage the transportation effects of the Project.

5.1 Summary of Key Findings and Benefits

The Project is a transit-oriented development which will rely on its urban setting to encourage the tenants and visitors to utilize alternative modes of transportation. Further, parking at the Project Site will be limited to a maximum of approximately 150 parking spaces. As a result of this parking limitation, the development is expected to have minimal and limited impacts on the area's peak period traffic operations. The Back Bay area of Boston has low auto mode shares, and it is expected that the majority of the trips entering and exiting the Project will take advantage of the nearby public transportation options or will be walk or bike trips.

The Project is expected to generate 180 vehicle trips (142 entering, 38 exiting) during the morning peak hour and 276 vehicle trips (96 entering, 180 exiting) during the evening peak hour. Because of the very limited amount of parking that is being provided (up to approximately 150 spaces), some of these project-generated trips are expected to be made to other public parking facilities in the area. The results of the analysis indicate that there will be only modest changes in level of service ("LOS") in the study area from Project-related traffic. As part of the Project design, an extensive set of public realm improvements which will enhance access to the site for pedestrians, transit users and bicyclists are planned. These will include a major upgrade to the area's streetscape, intersection improvements tied to supplement MassDOT's proposed realignment of the I-90 Westbound On-Ramp, reconnecting to the Hynes Station via an underground pedestrian tunnel, and a cycle track and bus stop improvements.

The Proponent plans to implement a proactive Transportation Demand Management (TDM) program, along with a host of site amenities detailed in Chapter 3, *Urban Design*, (including an improved bus stop, wider sidewalks and a cycle track) to encourage use of alternative transportation modes.

Vehicle parking will be allocated only for office uses in the building. Secure, covered bicycle storage for project tenants and outdoor public bike parking will be provided at the Project Site consistent with City of Boston Bike Parking Guidelines.

The site is along two very important pedestrian corridors in the City with over 1,000 pedestrians at peak hour and has a history of crashes and safety concerns. The Project has been configured to help resolve these issues and will provide many key benefits to the Back Bay area including:

- Significantly improving pedestrian safety at the heavily traveled intersection of Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp. Crossings will be significantly shortened and the number of conflicts between pedestrians, cyclists, busses and vehicles will be greatly reduced.
- Providing a safe, underground pedestrian connection via a tunnel between the site and the MBTA's Hynes Green Line Station ("Hynes Station").
- Completing the missing streetscape on Massachusetts Avenue at the Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp intersection.

- Significantly improving the experience for pedestrians travelling along Boylston Street.
- The addition of office space in a very accessible commuter location within the City's Back Bay neighborhood.
- The Project is creating the opportunity for MassDOT to realign the I-90 Westbound On-Ramp. In concert with MassDOT's proposed realignment , major pedestrian, bus, and bicycle improvements will be constructed at this intersection and along the Project Site's Massachusetts Avenue and Boylston Street frontages.

5.2 Project Description

The southern portion of the Project Site is currently comprised of a 28-space surface parking lot at the corner of Massachusetts Avenue and Boylston Street; the remainder of the Project Site spans the Turnpike and extends northward to Newbury Street. The Project is located along the segment of Massachusetts Avenue that is bounded by Newbury Street on the north, Massachusetts Avenue on the east, and Boylston Street on the south. The Project includes construction of a 16-story, office building with 325,000 square feet and up to approximately 150 underground parking spaces, an attached 2-story restaurant/retail component with 70,000 square feet, and a 13-story residential/hotel building. Because the residential/hotel component has not been finalized in the Project design process, the hotel alternative represents the higher transportation demand generating alternative, so it has been used throughout this transportation analysis. Should a residential building be constructed instead of the hotel, its transportation impacts will be lower.

A summary of the proposed uses for the Project that were used in this transportation evaluation are provided in Table 5-1.

Table 5-1 Parcel 12 Project Development Program

Land Use	Size
Restaurant	23,000 gsf
Residential/Hotel	TBD[1]
Office	325,000 gsf
Retail	47,000 gsf
Parking	up to approximately 150 spaces
Bicycle Parking	
Secured/Covered	119 spaces
Outdoor	18 spaces

Note: gsf – gross square feet

1 As noted above, a decision has not yet been made on this use. If a hotel is selected, the final key count would be dependent on the type of hotel and would be determined by the hotel operator. It is anticipated that the proposed hotel would offer limited services.

5.2.1 Site Access and Circulation

The Project will be primarily served by Boylston Street and Massachusetts Avenue with access to the underground parking garage from Boylston Street. The parking garage driveway will be located at the western end of the site and will provide access to below-grade parking with a single, shared entry lane and exit lane. Loading and trash removal will be via this same driveway.

As noted elsewhere is this document, MassDOT is pursuing the realignment of the I-90 Westbound On-Ramp by moving it to the west and the separate ramp entry at Massachusetts Avenue will be closed and replaced with the new ramp. The Project has been designed to create the opportunity for MassDOT to relocate the I-90 Westbound On-Ramp. The intention of this change is to help improve safety, particularly for pedestrians at this heavily travelled location. The Project's circulation plan (and its public realm plan) have been developed with this change in mind. Moving the ramp will allow major improvements including enhanced pedestrian and bicycle safety on Massachusetts Avenue, reducing conflicts at the intersection of Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp , a significantly improved bus stop, wider sidewalks for pedestrians and creation of a cycle track on Massachusetts Avenue along the site's frontage.

5.3 Study Methodology

The analysis presented in this chapter provides a detailed description of the Project's transportation characteristics and evaluates key impacts to the transportation infrastructure. The transportation analysis presented in this chapter conforms to BTD Guidelines.

The transportation analysis includes the projection of Project-related trips based on the Institute of Transportation Engineers ("ITE") *Trip Generation Manual 10th* Edition and the application of local travel characteristics established through the *Access Boston 2000-2010* initiative. Synchro 9 software was used to facilitate the evaluation of traffic operations based on the Highway Capacity Manual ("HCM") methodologies.

5.3.1 Traffic Study Area

Based on the Project program, surrounding vehicular network, and scoping letter from MassDOT, 14 study intersections were identified. As shown in Figure 5.1, the following intersections were included in the study area for the analysis:

1. Beacon Street at Charlesgate West/Bay State Road (signalized)
2. Commonwealth Avenue at Charlesgate West (signalized)
3. Commonwealth Avenue at Charlesgate East (signalized)
4. Boylston Street at Charlesgate (signalized)
5. Boylston Street at Fenway (signalized)

6. Boylston Street at Ipswich Street/Hemenway Street (signalized)
7. Massachusetts Avenue at Commonwealth Avenue (signalized)
8. Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp (signalized)
9. Massachusetts Avenue at Boylston Street (signalized)
10. Massachusetts Avenue at Belvidere Street (signalized)
11. Massachusetts Avenue at Westland Avenue/St Stephen Street/Falmouth Street (signalized)
12. Massachusetts Avenue at Huntington Avenue (signalized)
13. Boylston Street at Dalton Street/Hereford Street (signalized)
14. Newbury Street at Hereford Street (unsignalized)
15. Boylston Street at Site Driveway (unsignalized—build condition only)

5.3.2 Analysis Conditions

The transportation analysis considers the following analysis scenarios:

- **2018 Existing Condition** – Based on traffic data conducted within the study area in 2017 and grown by one-half (1/2) percent per year to reflect 2018 conditions.
- **2025 No-Build Condition** – Future conditions for the seven-year time horizon as expected to occur if the Project was not constructed.
- **2025 Build Condition** – Future conditions for a seven-year time horizon assuming construction and full occupancy of the Project.

5.4 2018 Existing Conditions

This section describes existing transportation conditions, including an overview of the area's roadways, public transportation, pedestrian and bicycle facilities, parking, and general site conditions.

5.4.1 Roadways

The site is located along Boylston Street to the south, Massachusetts Avenue to the east, and Newbury Street to the north. It is located above the Massachusetts Turnpike (I-90).

- **Boylston Street** – Boylston Street is an east/west roadway south of the Project Site that extends from Boston's Fenway neighborhood on the west to the Boston Common. Adjacent to the Project Site, Boylston Street accommodates two-way traffic. Two travel lanes and metered parking are provided on each side. East of the Project Site, Boylston Street eventually becomes one-way eastbound. Sidewalks are provided along both sides of the street, and crosswalks are available at all of the signalized intersections.
- **Massachusetts Avenue** – Massachusetts Avenue is a north/south roadway east of the Project Site that extends from Boston's Dorchester neighborhood on the

south through Cambridge on the north. Adjacent to the Project Site, Massachusetts Avenue accommodates two-way traffic separated by a raised median. Both the northbound and southbound directions have a bike/bus only lane, a through lane, and a left turn only lane. There is no parking allowed on this segment of Massachusetts Avenue, and there are MBTA bus stops located on both sides of the street. The Hynes Station is located on the east side of Massachusetts Avenue, across the street from the Site. Sidewalks are provided along both sides of the street, and crosswalks are available at all of the signalized intersections.

- **Newbury Street** – Newbury Street is an east/west roadway just north of the Project Site that connects the Fenway neighborhood on the west to the Boston Common. Adjacent to the Project Site, Newbury Street accommodates one-way westbound traffic with metered parking spaces along both sides of the street. Sidewalks are provided along Newbury Street, and crosswalks are available where other streets intersect Newbury Street. Access to the Massachusetts Turnpike westbound is provided by the I-90 Westbound On-Ramp which begins at the intersection of Massachusetts Avenue at Newbury Street.

5.4.2 Study Area Intersections

The study area consists of 14 study intersections previously shown in Figure 5.1 and described below. Traffic operations and LOS analysis are presented later in this chapter.

5.4.3 Data Collection

To assess the traffic conditions of the surrounding street network, turning movement counts ("TMCs") were collected at three different dates at the study area intersections. TMCs from the City of Boston's traffic database[1] from September 2017, new counts from June 2018, and the 1000 Boylston project's counts from February 2017 were used for the analysis. The counts completed in June 2018 were taken in response to MassDOT's request to include additional intersections to the proposed study area that was submitted in the Transportation Scoping Letter. These traffic data were collected during a typical weekday morning commuter period (7:00 AM - 9:00 AM) and evening peak commuter period (4:00 PM - 6:00 PM).

The TMCs were used to establish the study area network peak hour volumes for the 2018 Existing Condition analysis. The weekday morning peak hour was determined to be 8:00 AM to 9:00 AM and the weekday evening peak hour from 4:45 PM to 5:45 PM. At the intersection of Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp, adjacent to the site the turns from Massachusetts Avenue to the I-90 Westbound On-Ramp are a heavy turning movement in both directions. Approximately 180 vehicles at the Massachusetts northbound approach turn left onto the I-90 Westbound On-Ramp while approximately 170 vehicles turn right from

[1] https://data.boston.gov/dataset/traffic-related-data

Massachusetts Avenue's southbound approach onto the I-90 Westbound On-Ramp during the morning peak hour. During the evening peak hour, 235 vehicles turn left at the northbound approach onto the I-90 Westbound On-Ramp and 195 vehicles turn right at the southbound approach onto the I-90 Westbound On-Ramp. The intersection of Massachusetts Avenue at Boylston Street adjacent to the Project site is another heavily traveled intersection. The intersection experiences approximately 2,110 vehicles during the morning peak hour and 2,300 during the evening peak hour. For all of the intersection volumes, the existing morning and evening peak hour volumes are shown in Figures 5.2a and 5.2b, respectively.

In addition to supplement the TMCs, two additional automatic traffic recorder (ATRs) counts were completed in June 2018 at two locations adjacent to the Site—on Boylston Street (west of Massachusetts Avenue) and on Massachusetts Avenue (north of Boylston Street). Boylston Street carries an average of approximately 11,736 daily vehicles, and Massachusetts Avenue carries nearly double the amount of traffic at approximately 20,416 daily vehicles.

5.4.4 Pedestrian Environment and Accessibility

The study area has an extensive network of pedestrian accommodations with sidewalks along the surrounding roadways and crosswalks provided at the intersections. Pedestrian volumes at the study area intersections were collected in conjunction with the TMCs. For the counts completed at locations in February 2017, they may represent lower numbers than typical in warmer months. Figures 5.3a and 5.3b present the 2018 Existing Condition pedestrian volumes—a mix of counts based on the TMCs described previously. The highest pedestrian volumes in the study area were observed at the intersection of Massachusetts Avenue and Boylston Street with a total of 1,850 pedestrians crossing in the morning peak hour and 2,180 pedestrians crossing in the evening peak hour. A considerable amount of this activity is driven by Berklee College of Music and the adjacent MBTA Hynes Station.

5.4.5 Bicycles

Bicycle volumes, shown in Figures 5.4a and 5.4b, at the study area intersections were collected simultaneously with the vehicle turning movement counts. Within the immediate study area, there are dedicated bicycle lanes along both sides of Massachusetts Avenue and along the eastbound side of Boylston Street between Hemenway Street and Massachusetts Avenue. Further east of Massachusetts Avenue, the dedicated bicycle lane turns into a shared eastbound bicycle lane. Bicycle activity within the study area is heaviest along Massachusetts Avenue and Commonwealth Avenue. According to the TMC data from February 2017, on Massachusetts Avenue adjacent to the Site, approximately 85 cyclists travel southbound and 62 cyclists travel northbound during the morning peak hour. During the evening peak hour on this segment of Massachusetts Avenue, approximately 50 cyclists travel southbound and 57 travel northbound. The ATR data, however, shows updated June 2018 counts on Massachusetts Avenue north of Boylston Street, there are approximately 200 bicyclists traveling northbound and 230 bicyclists traveling

southbound during the morning peak hour. During the evening peak hour, there are approximately 160 bicyclists traveling northbound and 250 bicyclists traveling southbound. Massachusetts Avenue is a key part of the existing bicycle network and is especially useful for bicyclists in the area who are traveling to and from Cambridge via the Massachusetts Avenue bridge. The existing bicycle network for the area surrounding the Site is shown in Figure 5.4c

There is currently a Blue Bike Station (formerly Hubway) located at the Project Site on the corner of Massachusetts Avenue at Boylston Street with 12 bicycle docks. The bicycle docks are located in the street so that the sidewalk is not blocked for pedestrians. The second closest location is approximately a five-minute walk east of the Project Site at the intersection of Newbury Street at Hereford Street with 23 bicycle docks. These two locations are shown in Figure 5.4d.

5.4.6 Public Transportation

The Project Site is well served by public transportation, including the following:

- MBTA Green Line/Hynes Station
- MBTA Bus Routes 1, 39, 55, CT1

The transit services are summarized in Table 5-2. Figure 5.5 shows the Project Site in the context of the wider MBTA system. At the Hynes Station, three Green Line branches are available for inbound and outbound travel (B, C, and D Branches). The E Branch is located southeast of the Project Site along Huntington Avenue. The Green Line provides transportation to many neighborhoods such as Brighton, Brookline, Newton, and Chestnut Hill. The Green Line also stops at popular commuter destinations such as the Longwood Medical and Academic Area, Boston University, Boston College, Copley Square, and Government Center. A short walk from the Project Site is the Back Bay Station which provides multiple commuter rail connections including the Franklin Line, Needham Line, Providence/Stoughton Line, and Framingham/Worcester Line. Additionally, the Back Bay Station serves Amtrak trains.

Table 5-2 Project Area MBTA Service

Service	Origin / Destination	Peak-Hour Frequency (minutes)
Route 1	Harvard/Holyoke Gate/Dudley Station via Massachusetts Avenue	8 – 10
Route 39	Forest Hills Station – Back Bay Station	6 – 8
Route 55	Jersey & Queensberry streets – Copley Square or Park & Tremont Streets	17 – 34
Route CT1	Central Square, Cambridge – BU Medical Center/Boston Medical Center via MIT	24 – 29
Green Line B Branch	Boston College – Park Street	6
Green Line C Branch	Cleveland Circle – North Station	6 – 7
Green Line D Branch	Riverside – Park Street	6

Source: MBTA, Spring Schedule 2018

5.4.7 Existing Parking and Carshare Locations

The Project Site currently provides surface parking for public use with the capacity to hold 28 vehicles in striped parking spaces. The spaces are served by a parking payment kiosk, and there is posted signage that states vehicles that are not in striped parking spaces will be towed. Figure 5.6a shows the existing off-street parking facilities and Figure 5.6b shows the existing on-street parking surrounding the Project Site. There are several off-street parking options available in the immediate area with the nearest two locations at the Harvard Club of Boston and at the Somerset Garage along the Newbury Street. The on-street parking regulations along Massachusetts Avenue, Boylston Street, and Newbury Street are a mix of metered parking and restricted parking.

There are two carsharing locations near the Site. The 1085 Boylston Street Zipcar location, directly west of the Project Site, stores seven vehicles. The Edgerly Road/Norway Street Church Park Apartments Zipcar location, approximately a quarter-mile to the south, stores four vehicles. These locations are shown in Figure 5.6c.

5.4.8 Crash Analysis

A detailed crash analysis was conducted to identify potential vehicle accident trends and/or roadway deficiencies in the traffic study area. The most current vehicle accident data for the traffic study area intersections for the latest five years were obtained from MassDOT for the years 2010 to 2014. A summary of the study area intersections vehicle accident history is presented in Table 5-3a.

Readers should recognize that the MassDOT database may not fully account for all crashes reported to the Boston Police Department (BPD) or Boston Emergency Medical Services (EMS). A request for additional data from these sources has been made but, as of the time of filing this document, additional information has been received for only one intersection.

MassDOT has six districts within Massachusetts, and the study area falls under District 6[2]. The District 6 average crash rate, per million entering vehicles, for signalized intersections is 0.71, and the average crash rate for unsignalized intersections is 0.52. Using the data from the MassDOT database only, all of the study area intersections have a calculated crash rate that falls below the District 6 average values for signalized and unsignalized intersections.

Additionally, the study area intersections were compared to the MassDOT Highway Safety Improvement Plan (HSIP) map of the Commonwealth's top crash locations. The MassDOT data indicates that there are two 2013-2015 HSIP vehicle clusters on

[2] MassDOT District 6 includes the following cities and towns as defined on the MassDOT website: Boston, Braintree, Brookline, Cambridge, Canton, Chelsea, Dedham, Dover, Milton, Needham, Newton, Quincy, Randolph, Watertown, Wellesley, Weston, Westwood, Weymouth, Winthrop

the surface streets near the Project and three 2006-2015 HSIP bicycle clusters within the study area. The vehicle clusters appear at the intersection of Charlesgate East at Commonwealth Avenue westbound and the intersection of Charlesgate West at Commonwealth Avenue westbound. At Charlesgate East at Commonwealth Avenue westbound, 23 crashes occurred; eight (8) involved non-fatal injuries and in 15, there were no injuries. At the intersection of Charlesgate West at Commonwealth Avenue westbound, 29 crashes occurred 12 involved non-fatal injuries and in 17 there were no injuries.

The bicycle cluster captures the three study area intersections of Massachusetts Avenue at Commonwealth Avenue, Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp, and Massachusetts Avenue at Boylston Street. The HSIP Bicycle Cluster is an area where a high number of bicycle crashes occurred, and strategies may need to be implemented to reduce bicycle crashes and improve bicycle safety. According to MassDOT data, during these ten years, the cluster experienced 29 crashes, with 19 crashes resulting in non-fatal injuries, nine (9) injuries, and one fatality. Over the last few years, the City has improved the area along Massachusetts Avenue through the addition of bicycle facilities for both the northbound and southbound directions. Additionally, bicycle boxes are provided at the Commonwealth Avenue approach to the Massachusetts Avenue to help increase bicyclist visibility and protect bicyclists from turning vehicles. The Proponent recognizes that additional evaluations of the HSIP Bicycle Cluster will be required as the project advances.

The crash analysis based on the MassDOT data shows a relatively low number of crashes in the immediate area surrounding the Project Site. After receiving supplemental information from the Boston Police Department regarding only the intersection of Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp, it is evident that more crashes occur than the crashes contained in the MassDOT database. The information received for that intersection showed that 34 crashes occurred over the course of five years (2013-2017) many of which resulted in an injured party (driver, pedestrian, or bicyclist). Data for these crashes are shown in Table 5-3b. With approximately seven (7) crashes per year, this information will play an important role in the redesign of the intersection and the proposed improvements that will occur as part of the Project. Nonetheless, the location of the ramp at the intersection of Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp requires attention to improve conditions for bicyclists and pedestrians.

At the nearby intersection of Massachusetts Avenue at Boylston Street, only one (1) crash out of six (6) listed crashes occurred during the weekday morning peak hour; the remaining five (5) crashes occurred on a weekday during off-peak hours. Two (2) of the crashes involved a non-motorist, and none of the reported crashes resulted in a fatal injury. At the intersection of Boylston Street at Dalton and Hereford streets, only one (1) non-fatal injury was reported from 2010-2014, and this crash occurred on a weekday during off-peak hours.

Crash analysis worksheets are provided in Appendix D.

Table 5-3a Vehicular Crash Summary (2011-2015) Based on Information Obtained from the MassDOT Crash Portal

	Beacon St/ Charlesgate West/ Bay State Rd	Commonwealth Ave/ Charlesgate West	Commonwealth Ave/ Charlesgate East	Boylston St/ Charlesgate	Boylston St/ Fenway/ Charlesgate East	Massachusetts Ave/ Commonwealth Ave	Massachusetts Ave at Newbury St/I-90 Westbound On-Ramp	Massachusetts Ave/ Boylston St	Massachusetts Ave/ Belvidere St/ Haviland St	Massachusetts Ave/ Westland Ave/St Stephen St/Falmouth St	Massachusetts Ave/ Huntington Ave	Newbury St/ Hereford St
Signalized?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
MassDOT Average Crash Rate	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.52
Calculated Crash Rate	1.18	0.93	0.66	0.03	0.25	0.05	0.05	0.13	0.03	0.05	0.02	0.09
Exceeds Average?	Yes	Yes	No	No	No	No	No	No	No	No	No	No
Year												
2011	9	9	3	1	1	1	0	3	0	1	0	1
2012	15	10	5	1	1	0	1	1	1	1	0	0
2013	4	9	9	0	3	0	0	2	0	0	0	0
2014	10	7	9	0	3	0	0	0	0	0	0	0
2015	5	14	7	1	3	1	1	0	0	0	1	0
Total	43	49	33	3	11	2	2	6	1	2	1	1
Collision Type												
Angle	25	37	21	0	2	0	0	1	0	0	1	1
Head-on	0	0	1	0	0	0	0	0	0	0	0	0
Rear-end	2	4	4	1	6	0	1	1	0	1	0	0
Sideswipe, opposite direction	0	2	0	0	1	0	0	1	0	0	0	0
Sideswipe, same direction	13	3	7	2	1	0	0	1	1	0	0	0
Single Vehicle Crash	2	2	0	0	1	1	1	0	0	0	0	0
Not reported	1	1	0	0	0	1	0	2	0	1	0	0
Severity												
Fatal Injury	0	0	0	0	0	0	0	0	1	0	0	0
Non-Fatal Injury	5	21	10	1	3	0	1	4	0	1	0	0
Property Damage Only	34	26	22	2	8	2	0	0	0	0	1	0
Not Reported	4	2	1	0	0	0	1	2	0	1	0	1
Time of Day												
Weekday, 7:00 AM – 9:00 AM	2	4	2	0	3	0	0	0	0	0	0	0
Weekday, 4:00 – 6:00 PM	7	3	3	0	1	0	0	1	0	0	0	0
Saturday 11:00 AM – 2:00 PM	0	1	6	0	0	0	0	0	0	0	0	0
Weekday, other time	23	26	16	2	4	2	1	5	1	0	1	1
Weekend, other time	11	15	6	1	3	0	1	0	0	2	0	0
Pavement Conditions												
Dry	40	33	26	2	9	0	2	3	1	1	1	0
Wet	3	11	6	1	2	0	0	1	0	0	0	1
Snow	0	1	1	0	0	0	0	0	0	0	0	0
Other	0	1	0	0	0	0	0	0	0	0	0	0
Not reported	0	1	0	0	0	2	0	2	0	1	0	0
Non-Motorist (Bike, Pedestrian)	0	4	0	0	1	1	0	2	0	0	0	0
Ambient Light												
Daylight	31	32	24	2	6	0	1	0	0	0	1	0
Dusk	1	0	2	0	0	0	0	1	0	0	0	0

Dark – lighted roadway	11	16	7	1	5	0	1	3	1	1	0	1
Not Reported	0	1	0	0	0	2	0	2	0	1	0	0
Weather Condition												
Clear	24	15	18	1	4	0	2	1	1	1	1	0
Clear/Cloudy	2	0	0	0	0	0	0	0	0	0	0	0
Cloudy	6	14	7	0	3	0	0	2	0	0	0	0
Cloudy/Rain	1	5	1	0	1	0	0	0	0	0	0	1
Cloudy/Snow	0	0	1	0	0	0	0	0	0	0	0	0
Rain	0	3	3	0	0	0	0	1	0	0	0	0
Sleet, hail (freezing rain or drizzle)	0	1	0	0	0	0	0	0	0	0	0	0
Not Reported	10	10	3	2	3	2	0	2	0	1	0	0

Table 5-3b Vehicular Crash Summary (2013 – 2017) Based on Information Obtained from the Boston Police Department

	Massachusetts Ave at Newbury St/I-90 Westbound On-Ramp
Year	
2013	7
2014	6
2015	5
2016	3
2017	13
Total	34
Severity	
Injury Involving Pedestrian	5
Injury Involving Bicyclist	4
No Injury Involving Bicyclist	1
Personal Injury	10
Property Damage Only	11
Police Vehicle	1
Other	2
Time of Day	
Weekday, 7:00 AM – 9:00 AM	1
Weekday, 4:00 – 6:00 PM	5
Saturday 11:00 AM – 2:00 PM	1
Weekday, other time	17
Weekend, other time	10

5.5 Future Transportation Conditions

Two future conditions scenarios were evaluated for a seven-year time horizon (2025) to assess the potential Project-related traffic impacts: the No-Build and Build conditions. These future conditions are summarized in the sections below.

5.5.1 2025 No-Build Condition

The 2025 No-Build Condition was developed to evaluate future transportation conditions in the traffic study area without consideration of the Project. In accordance with BTD Guidelines, this future analysis year represents a seven-year horizon (2025) from existing conditions (2018). The No-Build Condition provides insight into future traffic conditions resulting from regional growth and traffic generated by specific planned projects that are expected to affect the local roadway network.

General Background Growth

A background growth rate of one-quarter (0.25) percent per year was applied to the 2018 Existing Condition traffic volumes to account for population growth and smaller projects that cannot be specifically identified. This background growth rate is consistent with other traffic studies recently completed for this area of the City.

Area Development Projects

In addition to the background growth rate, traffic projections for several specific planned or approved projects were also incorporated into the development of the 2025 No-Build Condition. These include the following development projects:

- **One Dalton** – This project is currently under construction. The project includes approximately 290,000 square feet of hotel use (250 keys) and 422,500 square feet of residential space (188 units). Up to 400 parking spaces will be made available in the existing Christian Science Plaza underground garage and in the basement of 101 Belvidere Street.
- **40 Trinity Place** – This proposed project is located at the corner of Trinity Place and Stuart Street, adjacent to the Back Bay MBTA Station. The proposed project includes 115 residential units, 227 hotel keys, 11,300 square feet of restaurant use, 5,550 square feet of University Club expansion, and 100 parking spaces. The project will also demolish the existing Boston Common Hotel and Conference Center building.
- **Back Bay/South End Gateway Project** – This proposed project includes an expansion of the Back Bay MBTA Station and 165 Dartmouth Street Garage. It will consist of approximately 1.26 million square feet of mixed-use redevelopment—office, ground floor retail, residential. As part of the project, the Back Bay MBTA Station will undergo station concourse and wayfinding improvements.

- **1000 Boylston Street** – This proposed project is located east of the Project Site and is bound by Boylston Street, St. Cecilia Street, and Dalton Street. The Project is proposed to include 108 condominium units and approximately 45,500 square feet of retail with 170 seat restaurant. The proposed project includes the addition of 175 parking spaces to support the development.
- **Viola (Air Rights Parcel 13)** – The proposed Viola project is located directly north of the proposed Project Site along the westbound side of Boylston Street. This project is proposed to include 85 apartment units, 88 condo units, a hotel with 156 keys, and 20,000 square feet of retail space. The Viola has not advanced in the permitting process, and there has not been a traffic study yet. (Note: For both 1000 Boylston Street (Parcel 15) and this development (Parcel 12), the agencies requested that the development program for Parcel 13 be included as a background project). Trip generation and distribution methodology was followed in accordance with the BTD guidelines to account for potential future trips from this project for the 2025 No-Build Condition.
- **Berklee Crossroads** – As proposed in the Berklee College of Music Institutional Master Plan/Project Notification Form dated February 18, 2011, Berklee Crossroads is located directly west of and adjacent to the Project Site and it encompasses Air Rights Parcel 14. The project is proposed to include a renovated 65,000 square foot theater space to replace the existing Berklee Performance Center (seating count to remain 1,200 seats), the addition of a dormitory with approximately 450 beds, and an approximately 45,000 square foot student life and academic space. According to the IMP, the additional on campus housing will reduce commuter trips to campus, and only four (4) net-new faculty/staff trips will be created during the morning and evening peak hours. These trips were accounted for in the future analysis conditions.
- **2 Charlesgate West** – This proposed project is located west of the Project Site and is bounded by Charlesgate West, Ipswich Street, and Private Alley 938. Trans National Properties currently occupies the existing site, and new office space would be created for them as part of this Project. The project includes 295 residential units (with a mix of rental and ownership), approximately 10,000 square feet of restaurant space, and approximately 7,500 square feet of office space (for Trans National Properties).

The 2025 No-Build Condition peak hour traffic volumes were developed by increasing the 2018 Existing Condition volumes to include general background traffic growth, as previously described, and adding traffic volumes associated with known traffic forecasts projected for other development projects in the area.

Figures 5.7a and 5.7b present the 2025 No-Build Condition traffic volumes for the weekday morning and evening, respectively.

5.5.2 2025 Build Condition

The 2025 Build Condition includes the 2025 No-Build Condition background traffic growth with the addition of the Project-generated trips. The Project will construct the Project Site driveway off Boylston Street.

Project-Generated Trips

To assess the traffic impacts of the Project, trip estimates were based on standard rates from the latest ITE Trip Generation Handbook[3]. Trip generation for the Project was estimated based on the ITE Land Use Codes as shown in Table 5-4 below.

Table 5-4 Trip Generation Land Use Codes

			Trip Rates		
Land Use	ITE Land Use Code (LUC)	Independent Variable	Daily	AM Peak Hour	PM Peak Hour
Hotel	310 – Hotel	rooms	8.36	0.47	0.60
Office	710 – Office	ksf	10.24	1.02	1.07
Retail	820 – Shopping Center	ksf	37.75	0.94	3.81
Restaurant	931 – Quality Restaurant	ksf	83.84	0.73	7.80

Source: Trip Generation; Tenth Edition, Institute of Transportation Engineers; Washington, D.C.; 2017.

To account for alternative modes of transportation, mode shares for the area, based on BTD guidelines for Area 4 (the area of Boston covering the Back Bay and Fenway neighborhoods, see Figure 5.8), were applied to the unadjusted ITE trip results. Mode shares are presented in Table 5-5.

3 Trip Generation; Tenth Edition, Institute of Transportation Engineers; Washington, D.C.; 2017.

Table 5-5 Mode Shares

			AM Peak		PM Peak	
	Mode	Daily	IN	OUT	IN	OUT
Hotel	Automobile	24%	19%	21%	21%	19%
	Public Transportation	19%	22%	15%	15%	22%
	Walk/Bike/Other	57%	59%	63%	64%	59%
Office	Automobile	44%	37%	43%	43%	37%
	Public Transportation	32%	38%	28%	28%	38%
	Walk/Bike/Other	24%	25%	29%	29%	25%
Retail/Restaurant	Automobile	33%	33%	22%	22%	33%
	Public Transportation	21%	31%	15%	15%	31%
	Walk/Bike/Other	46%	36%	63%	63%	36%

Source: BTD Area 4 Mode Shares

Vehicle Occupancy Rates ("VOR") were also applied to the ITE trip generation to convert the ITE estimated unadjusted vehicle trips to person trips. A VOR for each land use was based on the 2009 National Household Travel Survey. Office land uses have a VOR of 1.13 people per vehicle, retail has a VOR of 1.78 people per vehicle, and hotel/restaurant has a VOR of 2.2 people per vehicle. After the VOR is applied to the ITE unadjusted vehicle trips to produce person trips, these trips are split into modes based on the mode splits shown previously in Table 5-5. The VOR is again applied to the person trips to produce adjusted vehicle trips. The Project trips for all modes are shown in Table 5-6.

Table 5-6 Project-Generated Trips

Time Period/ Direction	Public Transportation	Walk/Bike/ Other	Vehicle
Daily			
Enter	2,052	4,172	1,730
Exit	2,052	4,172	1,730
Total	**4,104**	**8,344**	**3,460**
AM Peak			
Enter	200	249	142
Exit	43	143	38
Total	**243**	**392**	**180**
PM Peak			
Enter	121	448	97
Exit	270	336	180
Total	**391**	**784**	**277**

Source: Trip Generation, 10th Edition, Institute of Transportation Engineers, Washington D.C. (2017).

Vehicle Trip Distribution

Trip distribution was based on BTD's guidelines for Area 4. The Area 4 trip distribution rates are based on the 2000 Census data about where residents work

and where employees live. The Project-generated vehicle trips were assigned to the roadway network accordingly. A summary of the regional trip distribution results is presented in Table 5-7 and shown graphically in Figure 5.9.

Table 5-7 Project Trip Distribution

Corridor	In	Out
Boylston Street	4%	9%
Columbus Avenue	4%	4%
Commonwealth Avenue	3%	3%
Massachusetts Avenue	17%	17%
Huntington Avenue	11%	7%
Storrow Drive	30%	30%
Tremont Street	8%	8%
Mass. Turnpike (I-90)	23%	22%
Total	**100%**	**100%**

Source: BTD Area 4 Trip Distribution

Since the Project will only provide up to approximately 150 parking spaces on-site, two key assumptions were incorporated into the traffic analysis. The analysis assumes that the hotel trips will be drop-off/pick-up only at the site on Massachusetts Avenue. These trips were therefore subtracted from the number of vehicle trips entering the Project's garage. For the remaining entering trips during the morning peak hour, it was assumed that approximately 40% of the site's spaces would be occupied during the morning peak hour. This means that approximately 60 vehicles are expected to enter the on-site garage during the morning peak hour. The remaining vehicle trips were distributed to nearby parking garages. Field work, observations, and conversations with garage attendants were conducted in June 2018 to determine the best methodology for distributing trips to these locations. The majority of the trips are expected to use the Hynes Auditorium Garage, the Prudential Center Garage, 425 Newbury (Somerset) Garage, and a few will use the Haviland Street Garage. The garage trip assignment was based on the trip distribution percentages shown previously in Table5-7. For example, if a vehicle destined for a garage was traveling from the I-90 eastbound off-ramp at Copley, they would likely drive to the Hynes Auditorium Garage or the Prudential Center Garage as they would be on the driver's travel path. The same general approach was followed for the evening peak hour trips.

The Project-generated vehicle trips were added to the 2025 No-Build Condition traffic networks using the local trip distribution patterns described above. The Project-generated trips are shown in Figures 5.10a and 5.10b for the weekday morning and evening peak hours, respectively. The 2025 Build Condition vehicle volumes are shown in Figures 5.11a and 5.11b for the weekday morning and evening peak hours, respectively.

Pedestrian Environment

There will be multiple access points for pedestrians with the Project. The main office entrance for pedestrians will be located at the corner of Massachusetts Avenue and Boylston Street, the retail access will be located along Massachusetts Avenue, and the hotel access will be located on Massachusetts Avenue toward Newbury Street.

The sidewalk along Massachusetts Avenue will be widened significantly to accommodate the pedestrian activity along this side of the street as well as to better serve the passengers waiting at the bus shelter.

Bicycle Access

The Project will provide covered and secured bicycle spaces within the building, and the Project will also provide outdoor, public bike racks around the building to provide parking for visitors to the Site. Bicycle parking will conform to the City of Boston's Bicycle Parking Guidelines, and Table 5-8 shows the necessary bicycle parking for the Project according to these guidelines. A total of 119 secured/covered bicycle parking spaces and 18 outdoor bicycle parking spaces will be provided. The City of Boston Bicycle Parking Guidelines do not currently have recommendations for bicycle parking ratios for hotels. The Proponent believes that the proximity of area Blue Bike facilities will more than adequately meet the needs of any hotel guests seeking to use a bicycle.

Table 5-8 Project Bicycle Parking Spaces

	Secured/Covered Bicycle Parking		Outdoor Bicycle Parking	
Land Use	**Ratio**	**Spaces**	**Ratio**	**Spaces**
Restaurant & Retail	0.3 per ksf	21	1 per 5 ksf	14
Office	0.3 per ksf	98	no fewer than 4	4
Hotel	-	-	-	-
Total		**119**		**18**

Source: City of Boston Bicycle Parking Guidelines

Loading and Service

Truck loading for the Project is planned to be accessed from Boylston Street. As currently planned, one curb cut/driveway will serve both the Project's parking and loading needs. The loading dock is being planned to accommodate large tractor-trailer trucks (WB-40 vehicles) and smaller, single unit trucks as well as deliveries by vans and passenger vehicles. The Proponent intends to require urban package deliveries to be completed through the loading dock. There are no plans to receive deliveries at curbside on either Boylston Street, Newbury Street, or Massachusetts Avenue at the Project Site.

Trash collection will occur in this same location. A single large trash compactor will be located at one of the two loading docks. All truck maneuvering will occur on Boylston Street. Service and delivery trucks will access the Project site primarily relying on designated truck routes and major arterial streets, as outlined by the City of Boston. Regionally, trucks will use the Turnpike (I-90), I-93, Massachusetts Avenue, and Boylston Street.

The Project proposes a designated pick-up/drop-off area on Massachusetts Avenue south of the intersection of Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp. This planned curb use will be large enough to serve approximately four vehicles. By providing a designated pick-up/drop-off area, this will encourage rideshare services and private vehicles to use this space rather than blocking a travel lane or the bus stop on Massachusetts Avenue. It is important to note that the plans developed for Massachusetts Avenue include space for two buses to queue curbside. While this is an infrequent condition today, it represents good planning to provide for the additional space for the future.

5.6 Traffic Operations Analysis

Consistent with BTD Guidelines, Synchro 9 software was used to model LOS operations at the study area intersections. LOS is a qualitative measure of control delay at an intersection providing an index to the operational qualities of a roadway or intersection.

LOS designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. LOS D is considered acceptable. LOS E indicates vehicles experience significant delay while LOS F suggests unacceptable delay for the average vehicle. LOS thresholds differ for signalized and unsignalized intersections. Longer delays at signalized intersections than at unsignalized intersections are perceived as acceptable.

Table 5-9 below presents the level of service delay threshold criteria as defined in the 2000 Highway Capacity Manual ("HCM").

Table 5-9 Level of Service Criteria

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

Source: 2000 Highway Capacity Manual (HCM)

Adjustments were made to the Synchro model to include characteristics of the study area such as heavy vehicles, bus operations, parking activity, and pedestrian crossings. The capacity analysis results are summarized in the following sections.

5.6.1 Signalized Capacity Analysis

The LOS results of the signalized capacity analyses are summarized in Table 5-10 and Table 5-11 for the 2018 Existing, 2025 No-Build, and 2025 Build Condition peak hours.

Table 5-10 Signalized Intersection Level of Service (LOS) Summary – Morning Peak Hour

	2018 Existing Condition			2025 No-Build Condition			2025 Build Condition		
Location	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
Beacon Street at Charlesgate West/Bay State Road									
Beacon Street WB Hard Left	0.08	31.9	C	0.08	31.9	C	0.08	31.9	C
Beacon Street WB Left	0.77	56.4	E	0.78	58.1	E	0.78	58.1	E
Beacon Street WB Left/Thru	0.77	57.6	E	0.80	59.9	E	0.80	59.9	E
Charlesgate West SB Thru/Right	0.86	26.3	C	0.88	27.0	C	0.88	28.4	C
Charlesgate West SB Right/Hard Right	0.87	42.1	D	0.89	44.6	D	0.89	44.6	D
OVERALL	0.58	37.1	D	0.60	38.5	D	0.60	38.9	D
Charlesgate West at Commonwealth Avenue WB									
Commonwealth Avenue WB Left	0.05	10.2	B	0.05	10.2	B	0.05	10.2	B
Commonwealth Avenue WB Thru	0.23	13.2	B	0.25	13.2	B	0.23	13.2	B
Charlesgate SB Thru/Right	0.25	7.0	A	0.26	7.3	A	0.29	7.7	A
OVERALL	0.24	9.4	A	0.25	9.6	A	0.26	9.7	A
Charlesgate West at Commonwealth Avenue EB									
Commonwealth Avenue EB Thru/Right	0.43	11.4	A	0.44	11.5	B	0.44	11.5	B
Charlesgate West SB Left/Thru	0.34	23.5	C	0.35	23.6	C	0.38	24.1	C
OVERALL	0.40	14.7	B	0.41	14.8	B	0.42	15.2	B
Charlesgate East at Commonwealth Avenue WB									
Commonwealth Avenue WB	0.26	22.9	C	0.27	23.0	C	0.27	23.0	C
Charlesgate East NB Left/Thru	0.39	14.4	B	0.40	14.5	B	0.40	14.5	B
OVERALL	0.34	16.7	B	0.35	16.7	B	0.35	16.8	B
Charlesgate East Off-Ramp at Newbury Street/Charlesgate East and Commonwealth Avenue EB									
Commonwealth Avenue EB Left	0.17	17.4	B	0.17	17.5	B	0.17	17.6	B
Commonwealth Avenue EB Thru	0.57	14.3	B	0.59	14.5	B	0.59	14.6	B
Charlesgate East NB Thru/Right	0.61	40.8	D	0.63	41.2	D	0.64	42.0	D
Charlesgate Off-Ramp NEB Left/Right	0.50	34.4	C	0.51	34.6	C	0.51	34.6	C
OVERALL	0.56	0.56	C	0.57	20.5	C	0.58	20.7	C

	2018 Existing Condition			2025 No-Build Condition			2025 Build Condition		
Location	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
Boylston Street at Charlesgate									
Boylston Street EB Left	0.62	16.4	B	0.63	16.6	B	0.63	16.6	B
Boylston Street EB Thru	0.16	11.9	B	0.16	11.9	B	0.17	12.0	B
Boylston Street WB Right	1.27	148.4	F	1.32	170.4	F	1.33	176.8	F
Charlesgate SB Left	0.96	47.5	D	0.99	54.4	D	1.03	64.9	E
Charlesgate SB Right	0.69	6.9	A	0.70	7.2	A	0.70	7.2	A
OVERALL	0.98	52.9	D	1.01	60.5	E	1.02	64.7	E
Boylston Street at Fenway									
Boylston Street EB Thru	0.33	19.6	B	0.35	20.0	B	0.40	20.3	C
Boylston Street EB Right	0.98	54.3	D	1.01	60.7	E	1.01	59.4	E
Boylston Street WB Thru	0.14	18.5	B	0.16	18.9	B	0.17	19.0	B
Fenway NB Left	0.85	31.6	C	0.86	31.8	C	0.86	31.8	C
Fenway NB Right	0.16	18.9	B	0.19	18.9	B	0.20	19.0	B
OVERALL	0.98	35.8	D	1.00	37.7	D	1.00	36.9	D
Boylston Street at Hemenway Street/Ipswich Street									
Boylston Street EB Left/Thru	0.47	10.3	B	0.52	11.9	B	0.58	13.0	B
Boylston Street WB Thru/Right	0.23	20.3	C	0.26	21.5	C	0.29	9.3	A
Hemenway Street NB Left/Thru	0.58	35.4	D	0.56	33.6	C	0.56	33.6	C
Hemenway Street NB Right	0.05	28.6	C	0.05	27.2	C	0.06	27.3	C
Ipswich Street SB Left/Thru/Right	0.90	72.5	E	0.90	69.8	E	0.90	69.8	E
OVERALL	0.59	28.1	C	0.63	28.4	C	0.67	25.7	C
Massachusetts Avenue at Commonwealth Avenue WB									
Commonwealth Avenue WB Left	0.13	22.6	C	0.13	22.7	C	0.14	22.8	C
Commonwealth Avenue WB Thru/Right	0.18	23.5	C	0.19	23.6	C	0.19	23.6	C
Massachusetts Avenue NB Thru	0.53	11.1	B	0.55	11.2	B	0.55	11.2	B
Massachusetts Avenue SB Thru/Right	0.55	21.3	C	0.57	21.7	C	0.58	21.8	C
OVERALL	0.42	16.9	B	0.43	17.1	B	0.43	17.2	B
Massachusetts Avenue at Commonwealth Avenue EB									
Commonwealth Avenue EB Left/Thru	0.45	28.1	C	0.46	28.3	C	0.47	28.3	C
Commonwealth Avenue EB Right	0.62	35.9	D	0.64	36.6	D	0.64	36.8	D
Massachusetts Ave NB Thru/Right	0.52	18.2	B	0.54	18.4	B	0.54	18.4	B
Massachusetts Avenue SB Left/Thru	0.73	10.9	B	0.77	12.1	B	0.78	12.7	B
OVERALL	0.73	18.3	B	0.76	19.0	B	0.77	19.2	B
Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp									
Newbury Street WB Left	0.65	43.8	D	0.67	44.3	D	0.75	49.6	D
Newbury Street WB Thru/Right	0.27	35.4	D	0.28	35.5	D	0.27	34.8	C
Massachusetts Avenue NB Left	0.67	47.0	D	0.74	49.7	D	0.80	53.5	D
Massachusetts Avenue NB Thru	0.54	15.4	B	0.57	15.9	B	0.57	16.5	B
Massachusetts Avenue SB Thru/Right	0.68	14.0	B	0.70	15.0	B	0.72	15.4	B
OVERALL	0.67	21.7	C	0.70	22.8	C	0.74	24.4	C
Massachusetts Avenue at Boylston									

Location	2018 Existing Condition v/c[1]	2018 Existing Condition Delay[2]	2018 Existing Condition LOS[3]	2025 No-Build Condition v/c	2025 No-Build Condition Delay	2025 No-Build Condition LOS	2025 Build Condition v/c	2025 Build Condition Delay	2025 Build Condition LOS
Street									
Boylston Street EB Thru/Right	0.82	43.2	D	0.85	44.8	D	0.88	46.0	D
Boylston Street WB Thru	0.26	28.5	C	0.29	28.6	C	0.34	29.0	C
Boylston Street WB Right	0.26	14.2	B	0.29	14.4	B	0.29	14.3	B
Massachusetts Avenue NB Thru/Right	0.85	18.2	B	0.89	22.9	C	0.91	25.4	C
Massachusetts Avenue SB Left	0.55	35.4	D	0.58	36.2	D	0.60	36.1	D
Massachusetts Avenue SB Thru/Right	0.57	11.0	B	0.59	11.5	B	0.62	12.1	B
OVERALL	0.75	25.3	C	0.79	27.4	C	0.82	28.7	C
Massachusetts Avenue at Belvidere Street/Haviland Street									
Belvidere Street WB Left/Thru/Right	0.62	45.8	D	0.64	46.8	D	0.64	46.8	D
Massachusetts Avenue NB Left/Thru	0.47	11.0	B	0.49	12.4	B	0.51	13.2	B
Massachusetts Avenue SB Thru/Right	0.39	6.7	A	0.40	6.9	A	0.41	7.7	A
OVERALL	0.39	12.0	B	0.41	13.0	B	0.42	13.6	B
Massachusetts Avenue at Westland Avenue/St Stephen Street/Falmouth Street									
Westland Avenue EB Thru/Right	0.53	32.6	C	0.53	32.2	C	0.52	32.0	C
Massachusetts Avenue WB Left/Thru	0.70	46.4	D	0.70	45.1	D	0.70	44.7	D
Massachusetts Avenue WB Right	0.41	2.3	A	0.43	2.5	A	0.44	2.6	A
Massachusetts Avenue SB Left/Right	0.59	24.5	C	0.62	25.3	C	0.63	26.0	C
Falmouth Street SWB Left/Thru/Right	0.02	37.6	D	0.02	37.6	D	0.02	37.6	D
OVERALL	0.53	21.7	C	0.54	21.6	C	0.55	21.7	C
Massachusetts Avenue at Huntington Avenue WB									
Massachusetts Avenue SEB Thru/Right	1.17	114.5	F	1.21	130.2	F	1.23	138.7	F
Massachusetts Avenue NWB Left	0.04	41.6	D	0.04	41.4	D	0.04	41.4	D
Massachusetts Avenue NWB Thru	0.66	26.1	C	0.68	26.9	C	0.70	27.7	C
Huntington Avenue SWB Left/Thru	0.49	37.1	D	0.59	39.4	D	0.59	39.4	D
Huntington Avenue SWB Right	0.06	33.8	C	0.07	33.7	C	0.07	33.7	C
OVERALL	0.77	68.1	E	0.81	75.2	E	0.82	79.1	E
Massachusetts Avenue at Huntington Avenue EB									
Massachusetts Avenue SEB Thru	0.54	0.6	A	0.55	0.7	A	0.56	0.8	A
Massachusetts Avenue NWB Thru/Right	0.50	20.2	C	0.53	20.7	C	0.54	21.0	C
Huntington Avenue NEB Left/Thru/Right	0.31	36.8	D	0.37	37.2	D	0.36	37.0	D
OVERALL	0.56	12.6	B	0.59	13.2	B	0.60	13.4	B
Boylston Street at Dalton Street									
Boylston Street EB Thru/Right	0.72	35.3	D	0.78	37.9	D	0.83	41.1	D
Dalton Street NB Left	0.65	38.5	D	0.73	42.4	D	0.77	45.6	D
Dalton Street NB Right	1.01	91.1	F	1.07	106.6	F	1.10	116.9	F
OVERALL	0.59	51.1	D	0.63	57.0	E	0.66	61.6	E

1 volume to capacity ratio
2 delay in seconds
3 level of service

During the morning peak hour, it is anticipated that the Project-generated trips will have only limited impacts on the study area intersections as the Level of Service at most intersections is not forecast to change from the 2025 No-Build Condition to the 2025 Build Condition. Due to the constrained supply of parking at the site, there will be less concentration of vehicles at the Site driveway and a wider distribution of vehicles to the nearby parking garages and intersections. The directly adjacent intersections of Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp and Massachusetts Avenue at Boylston Street are expected to continue to operate at the same LOS from the 2018 Existing Conditions to the 2025 Build Conditions, during the morning peak hour. The addition of the Project-generated trips is not expected to reduce the intersections' performance.

The signalized intersection of Boylston Street at Charlesgate operates at a LOS D during the morning peak hour under 2018 Existing Conditions, and it changes to LOS E in the 2025 No-Build Condition. This LOS drop is due to growth in background trips, not by project-generated traffic.

Table 5-11 Signalized Intersection Level of Service (LOS) Summary – Evening Peak Hour

	2018 Existing Condition			2025 No-Build Condition			2025 Build Condition		
Location	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
Beacon Street at Charlesgate West/Bay State Road									
Beacon Street WB Hard Left	0.11	36.3	D	0.11	36.4	D	0.11	36.4	D
Beacon Street WB Left	1.12	136.4	F	1.15	144.9	F	1.15	144.9	F
Beacon Street WB Left/Thru	1.19	159.2	F	1.21	168.5	F	1.21	168.5	F
Charlesgate West SB Thru/Right	0.64	22.9	C	0.67	23.6	C	0.69	24.2	C
Charlesgate West SB Right/Hard Right	0.68	27.3	C	0.69	28.0	C	0.69	28.0	C
OVERALL	0.59	61.2	E	0.61	63.8	E	0.61	63.5	E
Charlesgate West at Commonwealth Avenue WB									
Commonwealth Avenue WB Left	0.07	3.3	A	0.07	3.2	A	0.07	3.2	A
Commonwealth Avenue WB Thru	0.33	9.6	A	0.34	9.7	A	0.34	9.7	A
Charlesgate SB Thru/Right	0.29	7.4	A	0.31	7.4	A	0.33	7.3	A
OVERALL	0.31	8.0	A	0.32	7.9	A	0.33	7.9	A
Charlesgate West at Commonwealth Avenue EB									
Commonwealth Avenue EB Thru/Right	0.51	12.4	B	0.52	12.6	B	0.52	12.6	B
Charlesgate West SB Left/Thru	0.46	13.7	B	0.49	14.1	B	0.51	14.3	B
OVERALL	0.49	12.8	B	0.51	13.0	B	0.52	13.1	B
Charlesgate East at Commonwealth Avenue WB									
Commonwealth Avenue WB	0.56	31.5	C	0.57	31.7	C	0.57	31.7	C
Charlesgate East NB Left/Thru	0.48	15.9	B	0.49	16.2	B	0.49	16.3	B
OVERALL	0.50	21.2	C	0.51	21.4	C	0.51	21.5	C
Charlesgate East Off-Ramp at Newbury Street/Charlesgate East and Commonwealth Avenue EB									

Location	2018 Existing Condition			2025 No-Build Condition			2025 Build Condition		
	v/c[1]	Delay[2]	LOS[3]	v/c	Delay	LOS	v/c	Delay	LOS
Commonwealth Avenue EB Left	0.24	10.6	B	0.24	10.3	B	0.24	12.1	B
Commonwealth Avenue EB Thru	0.69	19.1	B	0.71	19.6	B	0.73	20.5	C
Charlesgate East NB Thru/Right	0.63	46.2	D	0.64	46.8	D	0.71	50.1	D
Charlesgate Off-Ramp NEB Left/Right	0.45	32.3	C	0.45	32.4	C	0.45	32.4	C
OVERALL	0.61	19.7	B	0.62	19.9	B	0.64	21.4	C
Boylston Street at Charlesgate									
Boylston Street EB Left	0.75	22.8	C	0.77	23.3	C	0.77	23.3	C
Boylston Street EB Thru	0.16	14.5	B	0.18	174.6	B	0.18	14.7	B
Boylston Street WB Right	1.25	148.3	F	1.30	172.7	F	1.37	199.9	F
Charlesgate SB Left	0.81	32.6	C	0.85	34.8	C	0.87	36.5	D
Charlesgate SB Right	0.70	7.7	A	0.72	8.0	A	0.72	8.0	A
OVERALL	1.05	1.05	D	1.09	59.3	E	1.12	68.0	E
Boylston Street at Fenway									
Boylston Street EB Thru	0.28	25.9	C	0.32	26.3	C	0.35	26.5	C
Boylston Street EB Right	0.80	41.7	D	0.82	42.7	D	0.82	42.3	D
Boylston Street WB Thru	0.22	14.0	B	0.25	14.1	B	0.30	14.9	B
Fenway NB Left	0.83	36.8	D	0.84	36.7	D	0.84	36.7	D
Fenway NB Right	0.22	24.6	C	0.27	24.9	C	0.29	25.1	C
OVERALL	0.85	33.2	C	0.87	33.2	C	0.87	32.7	C
Boylston Street at Hemenway Street/Ipswich Street									
Boylston Street EB Left/Thru	0.42	6.9	A	0.47	7.6	A	0.51	8.2	A
Boylston Street WB Thru/Right	0.23	22.2	C	0.26	22.4	C	0.34	20.9	C
Hemenway Street NB Left/Thru	0.74	41.7	D	0.75	42.6	D	0.75	41.9	D
Hemenway Street NB Right	0.08	27.6	C	0.08	27.4	C	0.09	27.3	C
Ipswich Street SB Left/Thru/Right	0.75	49.3	D	0.81	56.5	E	0.80	54.9	D
OVERALL	0.52	25.0	C	0.57	26.2	C	0.60	25.0	C
Massachusetts Avenue at Commonwealth Avenue WB									
Commonwealth Avenue WB Left	0.14	25.6	C	0.15	25.7	C	0.16	25.9	C
Commonwealth Avenue WB Thru/Right	0.31	29.0	C	0.33	29.4	C	0.33	29.4	C
Massachusetts Avenue NB Thru	0.46	7.6	A	0.48	7.6	A	0.49	8.0	A
Massachusetts Avenue SB Thru/Right	0.52	18.3	B	0.55	18.7	B	0.55	18.8	B
OVERALL	0.45	15.1	B	0.48	15.4	B	0.48	15.5	B
Massachusetts Avenue at Commonwealth Avenue EB									
Commonwealth Avenue EB Left/Thru	0.61	27.9	C	0.62	28.8	C	0.64	30.2	C
Commonwealth Avenue EB Right	0.94	59.2	E	0.96	64.1	E	1.00	72.6	E
Massachusetts Ave NB Thru/Right	0.49	20.1	C	0.51	19.3	B	0.51	18.7	B
Massachusetts Avenue SB Left/Thru	0.61	5.5	A	0.64	6.8	A	0.65	6.7	A
OVERALL	0.77	20.3	C	0.80	21.1	C	0.82	22.3	C
Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp									
Newbury Street WB Left	0.78	49.1	D	0.78	49.8	D	0.94	73.5	E
Newbury Street WB Thru/Right	0.19	32.8	C	0.20	32.8	C	0.20	31.6	C

	2018 Existing Condition			2025 No-Build Condition			2025 Build Condition		
Location	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
Massachusetts Avenue NB Left	1.08	112.2	F	1.20	150.1	F	1.31	197.9	F
Massachusetts Avenue NB Thru	0.53	16.1	B	0.55	17.6	B	0.57	19.9	B
Massachusetts Avenue SB Thru/Right	0.73	17.7	B	0.76	18.1	B	0.78	18.6	B
OVERALL	0.82	35.3	D	0.86	42.2	D	0.93	53.3	D
Massachusetts Avenue at Boylston Street									
Boylston Street EB Thru/Right	0.77	39.0	D	0.80	39.0	D	0.86	41.5	D
Boylston Street WB Thru	0.23	26.7	C	0.26	26.1	C	0.32	25.8	C
Boylston Street WB Right	0.39	16.1	B	0.44	16.0	B	0.44	15.1	B
Massachusetts Avenue NB Thru/Right	0.79	39.0	D	0.86	44.7	D	0.91	51.8	D
Massachusetts Avenue SB Left	0.64	40.0	D	0.71	42.2	D	0.74	41.9	D
Massachusetts Avenue SB Thru/Right	0.65	14.5	B	0.69	16.2	B	0.75	18.2	B
OVERALL	0.75	30.6	C	0.79	32.7	C	0.85	35.6	D
Massachusetts Avenue at Belvidere Street/Haviland Street									
Belvidere Street WB Left/Thru/Right	0.75	55.0	E	0.76	54.6	D	0.76	54.6	D
Massachusetts Avenue NB Left/Thru	0.47	16.2	B	0.50	17.0	B	0.52	17.3	B
Massachusetts Avenue SB Thru/Right	0.46	15.7	B	0.48	16.3	B	0.50	16.7	B
OVERALL	0.43	20.5	C	0.45	21.1	C	0.46	21.3	C
Massachusetts Avenue at Westland Avenue/St Stephen Street/Falmouth Street									
Westland Avenue EB Thru/Right	0.52	33.5	C	0.53	33.3	C	0.52	33.1	C
Massachusetts Avenue WB Left/Thru	0.92	73.8	E	0.92	72.1	E	0.92	71.1	E
Massachusetts Avenue WB Right	0.37	0.4	A	0.39	0.4	A	0.39	0.4	A
Massachusetts Avenue SB Left/Right	0.68	27.8	C	0.71	28.8	C	0.74	30.1	C
Falmouth Street SWB Left/Thru/Right	0.08	36.5	D	0.08	36.5	D	0.08	36.5	D
OVERALL	0.64	28.5	C	0.65	28.3	C	0.67	28.5	C
Massachusetts Avenue at Huntington Avenue WB									
Massachusetts Avenue SEB Thru/Right	1.19	118.2	F	1.25	145.9	F	1.31	169.3	F
Massachusetts Avenue NWB Left	0.08	42.6	D	0.08	42.6	D	0.08	42.8	D
Massachusetts Avenue NWB Thru	0.60	24.3	C	0.63	25.3	C	0.64	25.8	C
Huntington Avenue SWB Left/Thru	0.72	46.5	D	0.81	55.3	E	0.81	55.3	E
Huntington Avenue SWB Right	0.09	34.8	C	0.09	34.3	C	0.09	34.3	C
OVERALL	0.84	71.0	E	0.89	84.5	F	0.91	96.3	F
Massachusetts Avenue at Huntington Avenue EB									
Massachusetts Avenue SEB Thru	0.59	1.0	A	0.61	1.2	A	0.63	1.4	A
Massachusetts Avenue NWB Thru/Right	0.48	19.0	B	0.51	19.8	B	0.51	19.9	B
Huntington Avenue NEB Left/Thru/Right	0.31	37.2	D	0.35	37.4	D	0.35	37.4	D
OVERALL	0.61	11.9	B	0.63	12.6	B	0.65	12.7	B
Boylston Street at Dalton Street									
Boylston Street EB Thru/Right	0.74	37.9	D	0.81	41.6	D	0.91	49.8	D
Dalton Street NB Left	0.68	36.8	D	0.80	43.5	D	0.87	51.3	D

	2018 Existing Condition			2025 No-Build Condition			2025 Build Condition		
Location	v/c[1]	Delay[2]	LOS[3]	v/c	Delay	LOS	v/c	Delay	LOS
Dalton Street NB Right	1.16	129.1	F	1.21	149.3	F	1.28	178.4	F
OVERALL	0.66	67.9	E	0.70	76.3	E	0.76	89.9	F

1 volume to capacity ratio
2 delay in seconds
3 level of service

During the evening peak hour, it is anticipated that the Project-generated trips will again have only limited impacts on the study area intersections as the Level of Service at most intersections is not forecast to change from the 2025 No-Build Condition to the 2025 Build Condition during the morning peak hour. Due to the constrained supply of parking at the site there will be less concentration of vehicles at the Site driveway and a wider distribution of vehicles to the nearby parking garages and intersections. The directly adjacent intersection of Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp is expected to continue to operate at the same LOS from the 2018 Existing Conditions to the 2025 Build Conditions during the evening peak hour. The intersection of Massachusetts Avenue at Boylston Street is expected to decline from LOS C to LOS D from the 2018 Existing Conditions to the 2025 Build Conditions during the evening peak hour.

Some other signalized intersections are expected to see decreases in LOS from the 2018 Existing Condition to the 2025 No-Build Condition, but this is not forecast to be caused by Project-generated vehicle trips. For example, the signalized intersection of Boylston Street at Charlesgate operates at a LOS D in the 2018 Existing Conditions, and it changes to LOS E in the 2025 No-Build Condition. Massachusetts Avenue at Huntington Avenue WB operates at LOS E in the 2018 Existing Conditions but is expected to drop to LOS F in the 2025 No-Build and Build Conditions. The other study area intersections are expected to be only minimally affected by the additional traffic volumes from background growth and surrounding projects.

5.6.2 Unsignalized Capacity Analysis

The LOS results of the unsignalized capacity analyses are summarized in Table 5-12 and Table 5-13 for the 2018 Existing, 2025 No-Build, and 2025 Build Condition peak hours.

Table 5-12 Unsignalized Intersection Level of Service (LOS) Summary – Morning Peak Hour

	2018 Existing Condition			2025 No-Build Condition			2025 Build Condition		
Location	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
Newbury Street at Hereford Street									
Newbury Street WB	-	7.9	A	-	8.0	A	-	8.4	A
Hereford Street NB	-	8.3	A	-	8.4	A	-	9.3	A
Boylston Street at Proposed Site Driveway									
Proposed Site Driveway SB	-	-	-	-	-	-	0.02	12.2	B

1 volume to capacity ratio
2 delay in seconds
3 level of service

Table 5-13 Unsignalized Intersection Level of Service (LOS) Summary – Evening Peak Hour

	2018 Existing Condition			2025 No-Build Condition			2025 Build Condition		
Location	**v/c[1]**	**Delay[2]**	**LOS[3]**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
Newbury Street at Hereford Street									
Newbury Street WB	-	8.5	A	-	8.6	A	-	8.9	A
Hereford Street NB	-	9.0	A	-	9.2	A	-	10.5	B
Boylston Street at Proposed Site Driveway									
Proposed Site Driveway SB	-	-	-	-	-	-	0.16	13.1	B

1 volume to capacity ratio
2 delay in seconds
3 level of service

The proposed Site driveway on Boylston Street is forecast operate at LOS B during both the morning and evening peak hours. The queues from the adjacent Massachusetts Avenue at Boylston Street intersection (Boylston Street westbound approach) may reach this driveway 50% of the time during the morning and evening peak hours. These queues may affect the ability for some drivers to turn left out of the driveway.

The unsignalized intersection of Newbury Street at Hereford Street will experience minimal changes in operation due to background project volumes and Project-generated trips. The Newbury Street westbound approach remains LOS A under all conditions in the morning and evening peak hour. The Hereford Street northbound approach remains LOS A under all conditions except for the 2025 Build Condition where it changes to LOS B in the evening peak hour.

5.7 I-90 Westbound On-Ramp Merge Analysis

As requested by MassDOT, an operational analysis for the I-90 merge west of the intersection of Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp

was conducted for the existing, no-build, and build conditions. The analysis is based on the procedures presented in the Highway Capacity Manual (HCM) Chapter 13, *Freeway Merge and Diverge Segments*. Merging maneuvers create turbulence as a result of high-lane changing rates which can affect operations along the freeway. The methodology presented in the HCM predicts the operating characteristics of a ramp, and Table 5-14 summarizes the LOS criteria, based on the density or passenger cars per mile per lane, for freeway merge segments as defined by the HCM.

Table 5-14 Level of Service Criteria

Level of Service	Density (pc/mi/ln)'
LOS A	0 – 10
LOS B	>10 – 20
LOS C	>20 – 28
LOS D	>28 – 35
LOS E	>35
LOS F	Demand exceeds capacity

'passenger cars per mile per lane

The capacity analysis for this merging section was conducted using Highway Capacity Software (HCS) 2010. This software is based on the methodology defined by the HCM 2010.

To analyze the 2018 Existing Conditions, inputs such as the ramp length, merge lane length, ramp volume per hour, I-90 vehicles per hour, percentage of heavy vehicles, speed, and others were used for the calculations. These calculations were completed for the morning and evening peak hours, and the results for the 2018 Existing Conditions are shown in Table 5-15 below. The analysis shows that the ramp operates at LOS C during both the morning and the evening peak hours.

Table 5-15 Merge Analysis for I-90 Westbound On-Ramp – 2018 Existing Conditions

Peak Hour	Ramp Volume (veh/hr)	Density (pc/mi/ln)	LOS
AM Peak Hour	425	25.7	C
Evening Peak Hour	530	26.6	C

For the 2025 No-Build Condition analysis, the volumes were grown based on the background growth and the background project growth as previously discussed in Section 5.5.1 for the 2025 No-Build Condition traffic operations analysis. Additionally, the I-90 volumes were grown by 0.25 percent per year to also account for background growth. The results for the 2025 No-Build Conditions are shown in Table 5-16 below. It is again expected that there will be no change in LOS from the 2018 Existing Conditions to the 2025 No-Build Conditions during both the morning and evening peak hours.

Table 5-16 Merge Analysis for I-90 Westbound On-Ramp – 2025 No-Build Conditions

Peak Hour	Ramp Volume (veh/hr)	Density (pc/mi/ln)	LOS
AM Peak Hour	451	26.4	C
Evening Peak Hour	562	27.2	C

For the 2025 Build Condition analysis, the 2025 No-Build volumes were added to the Project-generated volumes that are forecast to travel down the I-90 Westbound On-Ramp. The results for the 2025 Build Conditions are shown in Table 5-17 below. It is expected that there will be no change in LOS from the 2025 No-Build Conditions to the 2025 Build Conditions during both the morning and evening peak hours.

Table 5-17 Merge Analysis for I-90 Westbound On-Ramp – 2025 Build Conditions

Peak Hour	Ramp Volume (veh/hr)	Density (pc/mi/ln)	LOS
AM Peak Hour	460	26.4	C
Evening Peak Hour	602	27.5	C

The 2018 Existing Conditions, 2025 No-Build Conditions, and 2025 Build Conditions merge analysis HCS outputs are provided in Appendix D

5.8 2025 Build Mitigated Condition

Based on the vehicle level of service analysis presented herein, there are two intersections that are expected to experience a decline in level of service as a result of the addition of new Project traffic. To address these future impacts, possible traffic mitigation improvements have been identified as potential actions for further evaluation. The following two locations have been identified as locations for implementing roadway or signal improvement mitigation measures:

- Reconstruction of the Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp and corresponding signal improvements and retiming
- Signal timing/phasing improvements at the intersection of Boylston Street at Dalton Street

These roadway improvement mitigation measures for these two locations were evaluated, and the results are presented in detail below.

5.8.1 Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp

In its existing condition, the intersection of Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp has a complex geometry. On the west side of the

intersection, Newbury Street and the I-90 Westbound On-Ramp exist next to each other. This creates a wide west side of the intersection, and it has proven to be a difficult location for pedestrians and bicyclists traveling along Massachusetts Avenue. As part of MassDOT's proposed ramp realignment, this intersection will be simplified. The I-90 Westbound On-Ramp will be relocated further west on Newbury Street, west of Massachusetts Avenue. The reconstruction of the west side of this intersection will create a single roadway departure leg, significantly simplifying and narrowing the pedestrian crossing from 70 feet to approximately 30 feet. With the shortened pedestrian crossing width there will also be fewer vehicle conflict points.

In addition to the I-90 Westbound On-Ramp reconfiguration, signal timing modifications will improve the intersection LOS. Using Synchro, the splits and cycle lengths for each signal phase were adjusted. Since the intersection redesign is still at a conceptual level, it is undetermined whether the Newbury Street approach will have a left-only and a shared through/right lane (Scenario A) or a shared left/through and a through/right lane (Scenario B). Both scenarios were analyzed for the signal optimization. A summary of the analysis of these signal timing changes is shown in Table 5-18.

Table 5-18 Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp – Proposed Signal Timing Mitigation

	Morning Peak Hour			Evening Peak Hour		
Phase	Existing Signal Timing Splits	Proposed Mitigation Signal Timing Splits (Scenario A)	Proposed Mitigation Signal Timing Splits (Scenario B)	Existing Signal Timing Splits	Proposed Mitigation Signal Timing Splits (Scenario A)	Proposed Mitigation Signal Timing Splits (Scenario B)
Massachusetts Avenue NB/SB	51	44	44	50	36	35
Newbury Street WB	28	29	28	28	28	28
Massachusetts Avenue NB	21	27	28	22	26	27
Cycle Length	100	100	100	100	90	90

With the proposed signal timings and intersection geometry modifications, the intersection will be expected to operate according to the results shown in Tables 5-19 and 5-20. With signal timing improvements, the overall intersection delay can be reduced, and this is more evident in the evening peak hour analysis with a reduction of up to 17.6 seconds comparing the 2025 Build Condition to the 2025 Build Mitigated Condition (Scenario B). The major movement at this intersection is the Massachusetts Avenue northbound left-turn which is given a longer leading green time of 27 seconds compared to the existing 22 seconds.

Table 5-19 Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp – 2025 Build Mitigated Condition Intersection Operation (Morning Peak Hour)

	2025 Build Condition			2025 Build Mitigated Condition (Scenario A)			2025 Build Mitigated Condition (Scenario B)		
Approach	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp									
Newbury Street WB Left	0.75	49.6	D	0.33	35.3	D	-	-	-
Newbury Street WB Thru/Right	0.27	34.8	C	0.75	49.5	D	-	-	-
Newbury Street WB Left/Thru/Right	-	-	-	-	-	-	0.57	38.7	D
Massachusetts Avenue NB Left	0.80	53.5	D	0.60	41.7	D	0.58	40.4	D
Massachusetts Avenue NB Thru	0.57	16.5	B	0.57	16.4	B	0.56	15.9	B
Massachusetts Avenue SB Thru/Right	0.72	15.4	B	0.79	20.6	C	0.79	20.3	C
OVERALL	**0.74**	**24.4**	**C**	**0.73**	**25.3**	**C**	**0.68**	**24.0**	**C**

Table 5-20 Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp – 2025 Build Mitigated Condition Intersection Operation (Evening Peak Hour)

	2025 Build Condition			2025 Build Mitigated Condition (Scenario A)			2025 Build Mitigated Condition (Scenario B)		
Approach	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
Massachusetts Avenue at Newbury Street/I-90 Westbound On-Ramp									
Newbury Street WB Left	0.94	73.5	E	0.40	29.7	C	-	-	-
Newbury Street WB Thru/Right	0.20	31.6	C	0.82	47.1	D	-	-	-
Newbury Street WB Left/Thru/Right	-	-	-	-	-	-	0.63	33.0	C
Massachusetts Avenue NB Left	1.31	197.9	F	0.90	60.1	E	0.86	51.8	D
Massachusetts Avenue NB Thru	0.57	19.9	B	0.58	11.1	B	0.58	10.9	B
Massachusetts Avenue SB Thru/Right	0.78	18.6	B	0.93	44.9	D	0.94	47.2	D
OVERALL	**0.93**	**53.3**	**D**	**0.89**	**37.6**	**D**	**0.83**	**35.7**	**D**

5.8.2 Boylston Street at Dalton Street

During the evening peak hour, in this analysis, the intersection of Boylston Street at Dalton Street is forecast to experience a decrease in Level of Service from LOS E in the 2025 No-Build Condition to LOS F in the 2025 evening peak hour Build Condition. Through signal timing modifications, it is possible to bring the LOS F in the 2025 Build Condition back to LOS E in the 2025 Build Mitigated Condition. The detailed Synchro outputs results for the evening peak hour are shown in Table 5-21.

Table 5-21 Boylston Street at Dalton Street – 2025 Build Mitigated Condition Intersection Operation (Evening Peak Hour)

	2025 Build Condition			2025 Build Mitigated Condition		
Approach	**v/c**	**Delay**	**LOS**	**v/c**	**Delay**	**LOS**
Boylston Street at Dalton Street						
Boylston Street EB Thru/Right	0.91	49.8	D	1.01	72.4	E
Dalton Street NB Left	0.87	51.3	D	0.70	34.8	C
Dalton Street NB Right	1.28	178.4	F	1.03	81.5	F
OVERALL	0.76	89.9	F	0.74	65.6	E

5.9 Parking

5.9.1 Project Parking Supply

The Site currently has approximately 28 parking spaces in a surface parking lot on the terra firma portion of the parcel. The parking needs for the Project will be accommodated by up to approximately 150 total spaces in a below-ground parking garage. This will result in up to 122 net-new parking spaces. Due to nearby availability of public bus and rapid transit service, and amenities within the Project Site that will promote bicycle and pedestrian travel, the need for parking will be reduced, and is the parking supply is intentionally being kept low to encourage people to take advantage of the alternative transportation that is available. Additionally, alternate means of travel such as taxi, transportation network companies (such as Uber and Lyft) will also help continue to reduce the parking needs for this area.

5.9.2 Project Parking Demand

The parking supply calculations in an urban, transit-oriented location presents certain challenges because the available parking supply methodologies are generally based on data from situations where there is low transit availability and limited alternative mode choice. This description does not accurately reflect the Site's location in the Back Bay where transit and alternative transportation options are plentiful.

As requested in the MassDOT comment letter dated June 1, 2018, "The TIA should clarify how the parking needs of the project were determined and explain the methodology used to determine the total parking required." To respond to this request, the option to use the ITE *Parking* Generation methodology was explored. Unfortunately, the ITE process does not incorporate the concept of shared parking and time-of-day parking demand for an urban mixed-use project like Parcel 12, and the shared parking cannot properly beaccounted for in the analysis. Therefore, an analysis was performed for the Project parking demand instead using the Urban Land Institute's Shared Parking approach.

The parking analysis was conducted generally following the standard practices suggested in the Urban Land Institute's (ULI) Shared Parking report, second edition (2015, latest available report). The current standard practices suggested in the ULI Shared Parking report use specific parking demand rates (a ratio of the number of parking spaces needed over a standard measure, e.g. per unit, per 1,000 square feet, etc.) needed to support a similar stand-along use. Table 5-22 shows the base parking rates documented in the Shared Parking report by land use for employees and visitors. These rates are associated with weekday peak period conditions, as parking demand in the area will be highest during the weekday due to the office land use.

Table 5-22 ULI Shared Parking Ratios

Land Use	Units	Employees	Visitors
Restaurant	ksf	2.75	15.25
Hotel	room	0.25	1
Office	ksf	2.6	0.2
Retail	ksf	0.7	2.9

Based on the standard ULI methodology these base factors were adjusted using three factors: 1) mode split (percent drive), 2) non-captive parking demand reductions, and 3) temporal variations (hourly and seasonal).

Mode split (percent drive) represents the percentage of users that drive to the Site. The mode splits used for this analysis are based on the mode shares previously presented in Section 5.5.2.

Non-captive factors represent the decrease in parking demand due to users visiting multiple uses on-site during a single visit and therefore only one parking space is needed for multiple trips to different land uses. These factors are based on percentages provided in the ULI Shared Parking report.

Temporal variations are parking demand variations that happen throughout the day and the year. The ULI Shared Parking report provides hourly and seasonal adjustments used for this analysis.

This analysis addresses multiple times of the day during the month of October, a typically busy time of the year. Tables 5-23a and 5-23b provide the adjustment factors used for each land use and the calculated shared parking demand for the Project based on the ULI Shared Parking methodology. As indicated in the table, a limited number of additional adjustments were made in this analysis to more closely model the planned mix of uses and to better reflect the characteristics of this particular mixed-use project over the course of the day.

Table 5-23a Estimated Weekday Parking Demand

Land Use	Size (ksf or rooms)	ULI Parking Ratio	Unadjusted Demand	Mode Split	Unshared Demand	Non-Captive Factor	Monthly Adjustment (October)
Restaurant – Employee	23 ksf	2.75	63	33%	21	100%	100%
Restaurant – Visitor	23 ksf	15.25	351	33%	116	90%	93%
Hotel – Employee	TBD	0.25	96	24%	23	100%	100%
Hotel – Visitor	TBD	1	385	24%	92	80%*	93%
Office – Employee	325 ksf	2.6	845	44%	372	100%	100%
Office – Visitor	325 ksf	0.2	65	44%	29	100%	100%
Retail – Employee	47 ksf	0.7	33	33%	11	100%	80%
Retail – Visitor	47 ksf	2.9	136	33%	45	90%	66%
Total Parking Space Demand			**1,974**		**709**		

Table 5-23b Estimated Weekday Parking Demand (Continued)

	AM Peak Hour		Mid-Day Peak		PM Peak Hour		Late Night Peak Hour	
Land Use	Peak Hour Adjustment (8 AM)	Shared Parking Demand	Peak Hour Adjustment (2 PM)	Shared Parking Demand	Peak Hour Adjustment (5 PM)	Shared Parking Demand	Peak Hour Adjustment (10 PM)	Shared Parking Demand
Restaurant – Employee	50%	11	90%	19	100%	21	40%*	21
Restaurant – Visitor	0%	0	20%*	19	75%	73	30%*	92
Hotel – Employee	90%	21	100%	23	70%	16	20%	5
Hotel – Visitor	80%	55	30%*	21	50%*	34	95%	65
Office – Employee	50%*	186	80%*	298	25%*	93	1%	4
Office – Visitor	20%	6	100%	29	10%	3	0%	0
Retail – Employee	10%*	1	100%	9	95%	8	40%	1
Retail – Visitor	15%	4	95%	25	95%	25	30%	8
Total Parking Space Demand		**284**		**443**		**273**		**196**

* Adjusted from ULI values to match the specific Project characteristics

The ULI Shared Parking analysis estimates the peak for parking demand to be for up to approximately 443 spaces at 2:00 PM on a weekday. During the beginning and end of a traditional work day, the analysis estimates that the parking demand would be for 284 spaces at 8:00 AM and for 273 spaces at 5:00 PM. The parking demand at 10:00 PM would be mainly hotel and restaurant parking with a few office and retail employees.

Based on the preceding analysis, the parking demand estimates for the Project as a whole indicate a peak parking demand of approximately 443 spaces vs. a proposed on-site supply of up to approximately 150 spaces. The transportation analysis assumed that some to the project's traffic and the resultant parking demand would be accommodated in nearby, publicly available parking facilities. Because the Proponent is committed to a strong travel demand management program and project employees will be encouraged and incentivized to rely on the many alternative transportation options available including as public transportation, walking, and biking, and because of the growth and reliance on transportation network companies, it is very likely that the actual parking demands will be considerably lower than those indicated in Table 5-23.

To provide an alternative perspective, BTD's parking ratio guidelines published for use by the Zoning Board of Appeal were reviewed. These guidelines provide recommended maximum district-based parking goals for the different neighborhoods in Boston. For the Back Bay, BTD's recommended parking ratio for office/non-residential and hotel uses is 0.4 spaces per ksf or per unit. Applying these ratios, the BTD guidelines suggest a maximum of 312 parking spaces. This total of 312 spaces compares favorably with the Project's planned parking supply of up to approximately 150 spaces and is considerably lower than the estimate made using the ULI Shared Parking analysis.

The Proponent recognizes that the limited parking supply serving the project will discourage people from driving to both the Site and the area. The Proponent is committed to not overbuilding the amount of parking that will be provided as part of the Project.

5.10 Transit Analysis

As discussed in section 5.4.6 – Public Transportation, the Project is well-served by public transportation and has the added benefit of its adjacency to the Hynes Station. As a result, the surrounding transit system will move many people and from the Project Site. The Project trip generation analysis assumed, for example, that approximately 32 percent of the office trip generation would be via public transportation. Applying the mode split estimates for each use, as indicated in earlier sections of this chapter indicates that the Project will generate a total of 3,934 daily trips (1,967 entering, 1,967 exiting). During the morning peak hour, 240 public transportation trips are anticipated (198 entering, 42 exiting), and 376 public transportation trips are anticipated (113 entering, and 263 exiting) during the evening peak hour.

5.10.1 MBTA Analysis Methodology

To understand the Project trip impacts on the existing and future transit system, an in-depth transit analysis was conducted. The analysis involved a three-step approach described below, and this is the same methodology that was used for the nearby 1000 Boylston project[4].

1. Describing Existing Transit System Capacity (ridership and utilization)
2. Present 2025 No-Build Condition (background growth & background project trips)
3. Evaluate 2025 Build Future Condition (Project-generated trips)

2018 Existing Condition

For each transit line/route the existing capacity and ridership was quantified using existing data provided by the MBTA. The capacity of a transit line depends on the number of trains or buses operating during a specified time period (frequency), the number of people that can be accommodated on a bus, and the number of individual cars in each train.

The study period for this transit analysis includes the morning and evening transit peak hours defined as 8:00 AM to 9:00 AM and 4:45 PM to 5:45 PM, respectively. Train and bus frequencies were compiled using the latest published MBTA schedules[5] and MBTA Bus ridership data from fall 2017. For the purposes of this study, the vehicle load standards (i.e. number of people safely and comfortably riding on a train car or bus) are based on the MBTA's Service Delivery Policy[2] and the MBTA Blue Book 14th Edition data (Green Line policy capacity of 101 passengers per car, with a standard operation of 2-car trains;[6] MBTA Bus policy capacity of 54 passengers per vehicle).

- **Policy Capacity** refers to the load standards or passengers per car volume defined by the MBTA's Service Delivery Policy which states the standards "establish the average maximum number of passengers allowed per vehicle to provide a safe and comfortable ride." Each vehicle type in the MBTA fleet has a defined "policy capacity" and is published in the MBTA Blue Book.
- **On-Time Performance (OTP)** refers to the MBTA's measure of Green Line Performance reliability – that is "the percentage of customers who wait no longer than the scheduled time between trains. OTP was incorporated into the Green Line analysis. Bus OTP data is not yet available through the MBTA.

Fall 2017 bus ridership data and Green Line ridership data were obtained from the MBTA to estimate peak hour ridership volumes at the impacted bus stops and stations.

4 1000 Boylston DEIR/DPIR, http://www.bostonplans.org/getattachment/6d41a411-ffb6-4e0b-a594-a1842180da04

5 MBTA Summer 2018 schedules accessed from mbta.com

6 VHB observed AM peak hour operations on Tuesday, August 8, 2017, to quantify the number of cars per peak hour Green Line train

A volume to capacity (V/C) ratio was calculated to determine the existing utilization of the line/route.

2025 No-Build Condition

Hub and Spoke,[7] an MBTA ridership resource, addresses core transit congestion and the future of transit and development in Greater Boston. The MBTA has forecast ridership growth that suggests a moderate growth rate of 1.5% annually. These rates were applied to the existing condition ridership numbers to estimate the future 2025 ridership, without the Project. A volume/capacity ratio (V/C) was calculated to determine the estimated 2025 future utilization of each line/route without the Project (the 2025 No-Build Condition). To determine the percent of transit trips that are likely to choose the bus vs. the subway, data from the 2006-2010 Census was used to calculate transit ridership for residents in this area of the Back Bay. According to the Census data, it was calculated that, out of the respondents who take transit, approximately 30% ride busses and 70% ride the subway system. Utilizing this information and the same list of background projects from the vehicle analysis, background projects were assigned to their respective mode (using 30% bus trips, 70% subway trips) and incorporated into the 2025 No-Build conditions for the transit analysis. Within the bus routes, ridership was distributed based on the existing ridership trends to one of the three bus routes (Route 1, Route 55, Route CT1) serving the area, and as requested by MassDOT in its scoping determination letter dated June 1, 2018. An analysis of the Route 39 service was not requested. The directional distribution on the Green Line was based on vehicle distribution patterns. The 2025 No-Build V/C ratios provide a baseline to which the Project impacts can be compared.

2025 Build Condition

The estimated Project transit trips were assigned to a transit mode based on local mode split data. These trips were assigned to the Inbound and Outbound transit directions based on existing transit volumes and were added to the 2025 No-Build ridership numbers to generate the 2025 Build ridership estimates. The capacity of each line/route was consistent with the capacity projected under the 2018 Existing Conditions and the 2025 No-Build Conditions. The V/C ratio and utilization of each line/route with the Project was calculated.

Project Impact Assessment

The 2025 Build Condition V/C ratio was compared to the 2025 No-Build Condition V/C ratio to understand the Project's impact on each line/route.

[7] Hub and Spoke, June 2012. http://www.mbta.com/uploadedfiles/About_the_T/Panel/HubandSpoke.pdf

5.10.2 Existing Transit System Capacity – Step 1

Following the methodology explained previously the resulting system capacities for the Green Line and Bus Lines based on MBTA provided data is provided in Table 5-24. The Green Line runs approximately 30 vehicles inbound and outbound during the morning and evening peak hours at the Hynes Station. A combination of two-car trains and three-car trains are used along this portion of the Green Line. Field observations conducted in August 2017 recorded the number of Green Line trains and the number of cars per train arriving at the station during the peak hours. The resulting cars per train was calculated to be 2.07 as most of the trains only had two cars with an occasional three-car train.

Table 5-24 System Peak Hour Capacity (per MBTA data)

Mode	AM Frequency[1]	PM Frequency[1]	OTP Factor[2]	# Passengers/ Vehicle[3]	# Cars / Train	AM Resulting Capacity[4] (# Passengers/ Peak Hour)	PM Resulting Capacity[4] (# Passengers/ Peak Hour)
Green Line at Hynes Convention Station							
Inbound	30	30	0.88	101	2.07	5,519	5,519
Outbound	30	30	0.88	101	2.07	5,519	5,519
MBTA Bus							
Route 1 Inbound	7	8	n/a	54	n/a	378	432
Route 1 Outbound	7	8	n/a	54	n/a	378	432
Route 55 Inbound	3	2	n/a	54	n/a	162	108
Route 55 Outbound	3	2	n/a	54	n/a	162	108
Route CT1 Inbound	4	3	n/a	54	n/a	216	162
Route CT1 Outbound	3	2	n/a	54	n/a	162	108

1 Number of vehicles or trains per hour, per MBTA published schedules, MBTA Ridership Fall 2017 (Green Line), and MBTA Ridership Fall 2017 (Buses)
2 On-Time Performance Factor from MBTA Dashboard (Green Line) as of October 31, 2017 (average OTP for the previous 30 days of service)
3 Number of policy level capacity per MBTA Blue Book 14th Edition (Green Line and Buses)
4 Calculated Capacity = # of Trains x OTP Factor x # passengers per vehicle x # of cars – shown as number of passengers per peak hour

The existing system capacity was developed using the provided MBTA ridership data for Green Line and bus routes (fall 2017) for the morning peak hour of 8:00 – 9:00 AM and evening peak hour of 4:45 - 5:45 PM. The system's utilization rates, or volume to capacity ratios, for each route entering and exiting the Project Site area were calculated and are presented in Table 5-25.

The data shows that existing transit system ridership volumes at the stops servicing the Project Site do not exceed operating capacity of either the bus system or Green Line. Most of the V/C ratios for buses are low to moderate during both the morning and evening peak hours. The Green Line outbound movement during the evening

peak hour shows the heaviest directional demand. The analysis indicates that the outbound movement currently operates under capacity as it enters the Hynes Station with a V/C ratio of 0.65. With the boarding and alighting that takes place in the station, the outbound movement is at a reduced V/C ratio of 0.63.

Table 5-25 Existing Transit Service Utilization (per MBTA data)

Mode	AM Capacity	PM Capacity	Morning Peak Hour Ridership	Evening Peak Hour Ridership	Morning Peak Hour V/C	Evening Peak Hour V/C
Green Line at Hynes Station						
Inbound Entering Hynes	5,519	5,519	2,812	2,668	0.51	0.48
Inbound Exiting Hynes	5,519	5,519	2,846	2,872	0.52	0.52
Outbound Entering Hynes	5,519	5,519	2,081	3,570	0.38	0.65
Outbound Exiting Hynes	5,519	5,519	1,820	3,471	0.33	0.63
MBTA Bus						
Route 1 Inbound Entering	378	432	292	274	0.77	0.63
Route 1 Inbound Exiting	378	432	216	234	0.57	0.54
Route 1 Outbound Entering	378	432	221	207	0.58	0.48
Route 1 Outbound Exiting	378	432	267	262	0.71	0.61
Route 55 Inbound Entering	162	108	111	22	0.68	0.20
Route 55 Inbound Exiting	162	108	111	21	0.68	0.20
Route 55 Outbound Entering	162	108	22	33	0.14	0.31
Route 55 Outbound Exiting	162	108	22	34	0.14	0.32
Route CT1 Inbound Entering	216	162	108	55	0.50	0.34
Route CT1 Inbound Exiting	216	162	101	47	0.47	0.29
Route CT1 Outbound Entering	162	108	48	46	0.30	0.43
Route CT1 Outbound Exiting	162	108	76	59	0.47	0.54

5.10.3 2025 No-Build Condition – Step 2

The next step of the transit analysis included an evaluation of the 2025 No-Build Condition. To distribute background project-generated transit trips, the bus and subway data was further broken down to assign these trips to specific routes and directions. The bus ridership distribution was calculated based on the existing ridership and utilization trends. To determine Green Line outbound vs. inbound trips, the vehicle distribution from Section 5.5.2 was used to determine approximate origin-destination trends. Approximately 50% of Green Line users travel inbound to destinations east of BTD Area 4, and the remaining 50% travel outbound on the Green Line to destinations west of BTD Area 4 during the morning and evening peak

hours. Table 5-26 provides a summary of the estimated transit trips distributions by mode, direction, and peak hour.

Table 5-26 Transit Trip Distribution

	Morning Peak Hour		Evening Peak Hour	
Route and Direction	**% Exiting**	**% Entering**	**% Exiting**	**% Entering**
Green Line at Hynes Station				
Inbound	50%	50%	50%	50%
Outbound	50%	50%	50%	50%
MBTA Bus				
Route 1 Inbound	21%	63%	23%	51%
Route 1 Outbound	41%	13%	56%	28%
Route 55 Inbound	1%	1%	0%	1%
Route 55 Outbound	0%	0%	1%	0%
Route CT1 Inbound	16%	19%	7%	13%
Route CT1 Outbound	21%	4%	13%	7%
Total	**100%**	**100%**	**100%**	**100%**

Using these calculated transit distributions, the transit trips from background projects in the area that are planned to come on-line during the eight-year period were assigned to the respective routes. The same background projects that were incorporated into the 2025 No-Build Condition for the traffic volume analysis were used for this transit analysis condition. The morning and evening peak hour transit trips and the corresponding background projects are provided in Table 5-27.

Table 5-27 Background Project Trips

	Morning Peak Hour			Evening Peak Hour		
Project	**Entering**	**Exiting**	**Total**	**Entering**	**Exiting**	**Total**
One Dalton	18	35	53	38	24	62
40 Trinity	75	9	84	10	74	84
Back Bay/South End Gateway	28	10	38	18	41	59
1000 Boylston	14	15	29	63	54	117
Viola Parcel 13	10	15	25	31	28	59
Berklee Crossroads	6	6	12	6	6	12
2 Charlesgate West	12	15	27	23	24	47
TOTAL	**163**	**105**	**268**	**189**	**251**	**440**

As previously discussed, the MBTA fall 2017 existing transit data were grown by 1.5% per year, for eight years, and added to the background trips to produce the 2025 No-Build Condition transit trips. The distributed 2025 No-Build Condition transit trips are provided in Table 5-28.

Table 5-28 2025 No-Build Condition Transit Trips

Mode	AM Capacity	PM Capacity	Morning Peak Hour Ridership	Evening Peak Hour Ridership	Morning Peak Hour V/C	Evening Peak Hour V/C
Green Line at Hynes Station						
Inbound Entering Hynes	5,519	5,519	3,228	3,071	0.58	0.56
Inbound Exiting Hynes	5,519	5,519	3,243	3,322	0.59	0.60
Outbound Entering Hynes	5,519	5,519	2,405	4,088	0.44	0.74
Outbound Exiting Hynes	5,519	5,519	2,087	3,997	0.38	0.72
MBTA Bus						
Route 1 Inbound Entering	378	432	355	335	0.94	0.89
Route 1 Inbound Exiting	378	432	251	279	0.66	0.74
Route 1 Outbound Entering	378	432	254	247	0.67	0.65
Route 1 Outbound Exiting	378	432	308	331	0.81	0.88
Route 55 Inbound Entering	162	108	125	26	0.77	0.16
Route 55 Inbound Exiting	162	108	132	24	0.81	0.15
Route 55 Outbound Entering	162	108	26	43	0.16	0.27
Route 55 Outbound Exiting	162	108	32	55	0.20	0.34
Route CT1 Inbound Entering	216	162	130	69	0.60	0.32
Route CT1 Inbound Exiting	216	162	121	57	0.56	0.26
Route CT1 Outbound Entering	162	108	56	56	0.35	0.35
Route CT1 Outbound Exiting	162	108	92	74	0.57	0.46

In the resulting 2025 No-Build Condition, ridership volumes at the stops servicing the Project Site increase. The bus and Green Line operations remain under their individual route capacities. The Green Line is forecast to increase utilization during the evening peak hour with a V/C ratio of 0.74 on the outbound route entering the Hynes Station, and the ratio improves slightly to 0.73 exiting the station in the continued outbound direction. The 2025 No-Build Condition shows V/C ratios maintaining a low to moderate utilization as all routes will eventually approach the MBTA policy capacity, but do not yet exceed capacity under this condition.

5.10.4 2025 Build Condition – Step 3

To create the 2025 Build Condition, the Project-generated trips were distributed to the transit lines using the same methodology as the 2025 No-Build Condition. The Project-generated trips were split into bus and subway trips and then assigned to the respective route and direction based on existing ridership and utilization, as shown previously in Table 5-26. The Project-generated transit trip distribution is presented in Table 5-29.

Table 5-29 Project-Generated Transit Trips by Line

	Morning Peak Hour			Evening Peak Hour		
Route and Direction	Trips Exiting (Boardings)	Trips Entering (Alightings)	Trips Total	Trips Exiting (Boardings)	Trips Entering (Alightings)	Trips Total
Green Line at Hynes Station						
Inbound	15	69	84	92	40	132
Outbound	14	70	84	92	39	131
MBTA Bus						
Route 1 Inbound	3	37	40	18	17	35
Route 1 Outbound	5	8	13	44	10	54
Route 55 Inbound	0	1	1	0	0	0
Route 55 Outbound	0	0	0	1	0	1
Route CT1 Inbound	2	11	13	6	4	10
Route CT1 Outbound	3	2	5	10	3	13
Total[1]	**13**	**59**	**72**	**79**	**34**	**113**

1 Total trips rounded to nearest whole number

The distributed Project-generated trips were then added to the 2025 No-Build Condition trips. The resulting 2025 Build Condition morning and evening peak hour capacity calculations are shown in Table 5-30.

By adding the Project-generated trips to the 2025 No-Build Condition transit system ridership volumes, the 2025 Build Condition transit volumes at the stops servicing the Project Site are forecast to increase slightly. The Green Line outbound utilization is forecast to grow to 0.75 entering the Hynes Station. Leaving the station, the outbound V/C ratio is calculated to grow to 0.74. The bus routes do not exceed capacity during the morning or evening peak hours, although, the Route 1 bus traveling in peak directions is expected to exceed capacity. The Route 1 inbound (headed towards the South End) during the morning peak hour is expected to be over capacity with a V/C ratio of 1.04. The Route 1 outbound (headed towards Cambridge) during the evening peak hour is expected nearly reach capacity with a V/C ratio of 0.99. This bus is a key route, and it travels inbound along Massachusetts Avenue from Cambridge to Boston and down to Dudley Square.

Table 5-30 2025 Build Condition Transit Trips

Mode	AM Capacity	PM Capacity	Morning Peak Hour Ridership	Evening Peak Hour Ridership	Morning Peak Hour V/C	Evening Peak Hour V/C
Green Line at Hynes Station						
Inbound Entering Hynes	5,519	5,519	3,297	3,111	0.60	0.56
Inbound Exiting Hynes	5,519	5,519	3,258	3,414	0.59	0.62
Outbound Entering Hynes	5,519	5,519	2,475	4,127	0.45	0.75
Outbound Exiting Hynes	5,519	5,519	2,101	4089	0.38	0.74
MBTA Bus						
Route 1 Inbound Entering	378	432	392	352	1.04	0.93
Route 1 Inbound Exiting	378	432	254	297	0.67	0.79
Route 1 Outbound Entering	378	432	262	257	0.69	0.68
Route 1 Outbound Exiting	378	432	313	375	0.83	0.99
Route 55 Inbound Entering	162	108	126	26	0.78	0.16
Route 55 Inbound Exiting	162	108	132	24	0.81	0.15
Route 55 Outbound Entering	162	108	26	43	0.16	0.27
Route 55 Outbound Exiting	162	108	32	56	0.20	0.35
Route CT1 Inbound Entering	216	162	141	73	0.65	0.34
Route CT1 Inbound Exiting	216	162	123	63	0.57	0.29
Route CT1 Outbound Entering	162	108	58	59	0.36	0.36
Route CT1 Outbound Exiting	162	108	95	84	0.59	0.52

5.10.5 Summary of Transit Analysis

Assuming that the transit system does not experience any supply changes that increase capacity between now and 2025, the bus system will be able to accommodate for the additional trips caused by growth, background, and Project-generated trips, but the Green Line may experience conditions that are slightly over capacity during the evening peak hour while entering and exiting the Hynes Station.

In comparison to the transit analysis completed in the 1000 Boylston DEIR/DPIR, the results fall within a similar range of values. The major differences are seen in the Green Line analysis, and this is due to the change in on-time performance. In spring 2016, the Green Line on-time performances was at 0.74 compared to 0.88 for fall 2017. This improvement significantly increased the capacity in the morning and evening peak hours by approximately 1,000 passengers. This led to a lower V/C ratio in the Parcel 12 analysis vs. in the 1000 Boylston analysis. The bus routes show similar V/C ratios with the Route 1 showing the highest V/C in the 2025 Build Condition.

A set of important transit improvements will be completed as part of the Project. A new bus shelter will be constructed along Massachusetts Avenue and a much wider sidewalk will be established. The currently closed underground pedestrian tunnel between the west side of Massachusetts Avenue and the Hynes Station will be

renovated and reopened to allow pedestrians to travel from the bus stop on the west side of Massachusetts Avenue to the Hynes Station on the east side and vice versa without crossing Massachusetts Avenue illegally mid-block. The current pattern where some riders choose to cross illegally by jay-walking is both hazardous and disruptive. The proposed tunnel reopening will provide a better, more direct, and safer alternative to people crossing Massachusetts Avenue.

5.11 Mitigation Measures

5.11.1 Physical and Operational Transportation Improvements

Chapter 3, *Urban Design*, provides information on the planned public realm improvements associate with the Project. They include new ADA compliant sidewalks, street furniture, crosswalks and signage, enlarged pedestrian areas along Massachusetts Avenue and Boylston Street adjacent to the Project.

The Project will provide new, wider sidewalks along the Project's frontage on Boylston Street and Massachusetts Avenue, and accommodate expansion of the sidewalks on the east side of Massachusetts Avenue. Not only will they support the expected increase in pedestrian activity, wider sidewalks will help create a much more favorable environment for people walking and cycling through the area. The existing but currently closed underground pedestrian connection from the Massachusetts Avenue bus shelter to the Hynes Station will be reopened and renovated. A new bus shelter will be constructed as will a dedicated bicycle lane (in a cycle track configuration) for the southbound travelers. A designated pick-up/drop-off area will also be established on Massachusetts Avenue north of the new bus stop.

In addition, a series of traffic signalization timing changes were proposed and analyzed in Section 5.7. To supplement these and other planned construction-related actions, an extensive Travel Demand Management (TDM) program is outlined in the following section.

5.11.2 Transportation Demand Management (TDM)

Consistent with the City's goals to reduce auto-dependency, the Project and its Proponent will incorporate proactive TDM measures to encourage alternative modes of transportation. Building management will provide transit information (schedules, maps, fare information) in the building lobbies. Management will also work with tenants as they move in to raise awareness of public transportation options.

The following discusses an array of TDM measures that are expected to be implemented. A description of the TDM elements is presented in this section along with information on how those elements aid Project tenants. Measures being considered as part of the Project include:

- The Proponent will designate an on-site Transportation Coordinator. In addition to other building-related duties, the Transportation Coordinator will be responsible for:
  - Overseeing parking;
  - Serving as the point person for managing, communicating, and promoting the use of alternative transportation measures with building employees and staff;
  - Developing an orientation packet to inform residents or hotel visitors, office employees, and restaurant/retail employees about all available transportation options; and
  - Designation of a loading dock manager responsible for overseeing loading/delivery operations.
- Membership in the A Better City Transportation Management Agency (TMA) that was established in 1996 to serve downtown Boston's financial district, Back Bay and Fenway/Kenmore Square areas. The ABC TMA is a nonprofit transportation management association working to improve economic vitality in the district by supporting sustainable commute options through advocacy and commuter services.
- Transit information including a Transit Screen will be provided in the office building lobby.
- With the assistance of MassRIDES, a website application will be employed to encourage use of alternative commuting modes to provide ride matching services.
- Approximately 18 short-term public bicycle parking spaces will be provided. In addition, the Proponent intends to provide 119 secure bicycle parking spaces for building employees/staff.
- The Proponent will establish a Blue Bike corporate membership and will consider providing subsidies for its staff. Further the Proponent will encourage its tenants to offer their staff the same benefit.
- The Proponent will encourage the building's tenants to offer a carshare corporate membership.
- Amenities for commuters who walk and bike to work will include on-site lockers and showers for building and tenant staff.
- As noted above, The Proponent, in coordination with the City, plans to install a cycle track along the west side of Massachusetts Avenue adjacent to the Site.
- The Proponent will work with the City regarding the most appropriate way to provide a Blue Bike station to replace the one currently located at Massachusetts Avenue at Boylston Street.
- The Proponent will offer a transit pass subsidy to its own employees who will work in the building and will encourage building tenants to subsidize transit passes for their staffs.

- Initially provide up to eight (8) on-site vehicle ("EV") EV charging spaces in the garage with 15 additional parking spaces constructed as EV-ready to expand over time as the demand grows.
- The Proponent will charge market rates for on-site parking.
- The Proponent will support the City to provide improved pedestrian access to the Project from the surrounding area, including MassDOT's proposed realignment of the I-90 Westbound On-Ramp.

5.11.3 Monitoring Program

The Proponent is committed to conducting transportation monitoring and producing annual reports following the completion of the Project. The purpose of the City-required Transportation Monitoring and Annual Report is to provide the Boston Transportation Department a regular update on transportation-related issues, such as the Project's performance on Travel Demand Management (TDM) measures. Elements of the Transportation Monitoring and Annual Report typically include counts or surveys to determine peak period travel patterns. This would typically include people who walk, use transit, are picked up or dropped off, those who drive and park on-site and those who drive and park off-site. The Proponent would also be expected to report on parking patterns and other issues that are relevant to the Project's transportation plan.

The Proponent recognizes that MassDOT too has monitoring requirements for projects that it issues permits for. The Proponent intends to comply with those requirements as well.

5.11.4 Transportation Access Plan Agreement (TAPA)

The Proponent will enter into a Transportation Access Plan Agreement (TAPA) with the BTD. The TAPA will codify and document each of the Project's transportation mitigation commitments.

The Project's mitigation commitments are the result of the detailed transportation analyses and identification of Project impacts, as documented in this chapter, and specific agreements made between the Proponent, the City of Boston and MassDOT. Upon the City's review and acceptance of the findings and conclusions of this transportation analysis and assessment of Project impacts and its acceptance of the Project's commitments and TDM actions, the TAPA will be executed.

5.11.5 Construction Management

The Proponent will develop a detailed evaluation of potential short-term construction-related transportation impacts including construction vehicle traffic, parking supply and demand, and pedestrian access. Detailed Construction Management Plans ("CMP") will be developed and submitted to the BTD, MassDOT, and the MBTA for their approval, and the Proponent will work closely with the MBTA to address any construction-related impacts on railroad operations and

infrastructure. These plans will detail construction vehicle routing, staging, and lane closures that will require both BTD and MassDOT approval.

Construction vehicles will be necessary to move construction materials to and from the Project Site. Every effort will be made to reduce the noise, control fugitive dust, and minimize other disturbances associated with construction traffic. Truck staging and laydown areas for the Project will be carefully planned. The need for street occupancy (lane closures) along roadways adjacent to the Project Site is not known at this time.

Contractors will be encouraged to devise access plans for their personnel that de-emphasize auto use (such as seeking off-site parking, provide transit subsidies, on-site lockers, etc.). Construction workers will also be encouraged to use public transportation to access the Project Site because no new parking will be provided for them. Because of the construction workers early arrival/departure (typically 7:00 AM – 3:00 PM) schedule, a conflict for on-street parking is not anticipated.

During the construction period, pedestrian activity adjacent to the site may be impacted by sidewalk closures. A variety of measures will be considered and implemented to protect the safety of pedestrians. Temporary walkways, appropriate lighting, and new directional and informational signage to direct pedestrians around the construction sites will be provided. After construction is complete, finished pedestrian sidewalks will be permanently reconstructed to meet ADA standards around the new facilities. Any damage as a result of construction vehicles or otherwise will be repaired per City standards.

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Signalized Intersection

Unsignalized Intersection

1 Beacon St/Charlesgate West/Bay State Rd
2 Commonwealth Ave/Charlesgate West
3 Commonwealth Ave/Charlesgate East
4 Boylston St/Charlesgate
5 Boylston St/Fenway
6 Boylston St/Ipswich St/Hemenway St
7 Massachusetts Ave/Commonwealth Ave
8 Massachusetts Ave/Newbury St/I-90 WB On-Ramp
9 Massachusetts Ave/Boylston St
10 Massachusetts Ave/Belvidere St/Haviland St
11 Massachusetts Ave/Westland Ave/St Stephen St/Falmouth St
12 Massachusetts Ave/Huntington Ave
13 Newbury St/Commonwealth Ave
14 Newbury St/Hereford St

0 250 500 Feet

Source: BWSC Street Map

Study Area Intersections

Figure 5.1

Air Rights Parcel 12
Boston, Massachusetts

Figure 5.2a

2018 Existing Condition Volumes
AM Peak Hour (8:00 AM - 9:00 AM)

Air Rights Parcel 12
Boston, Massachusetts

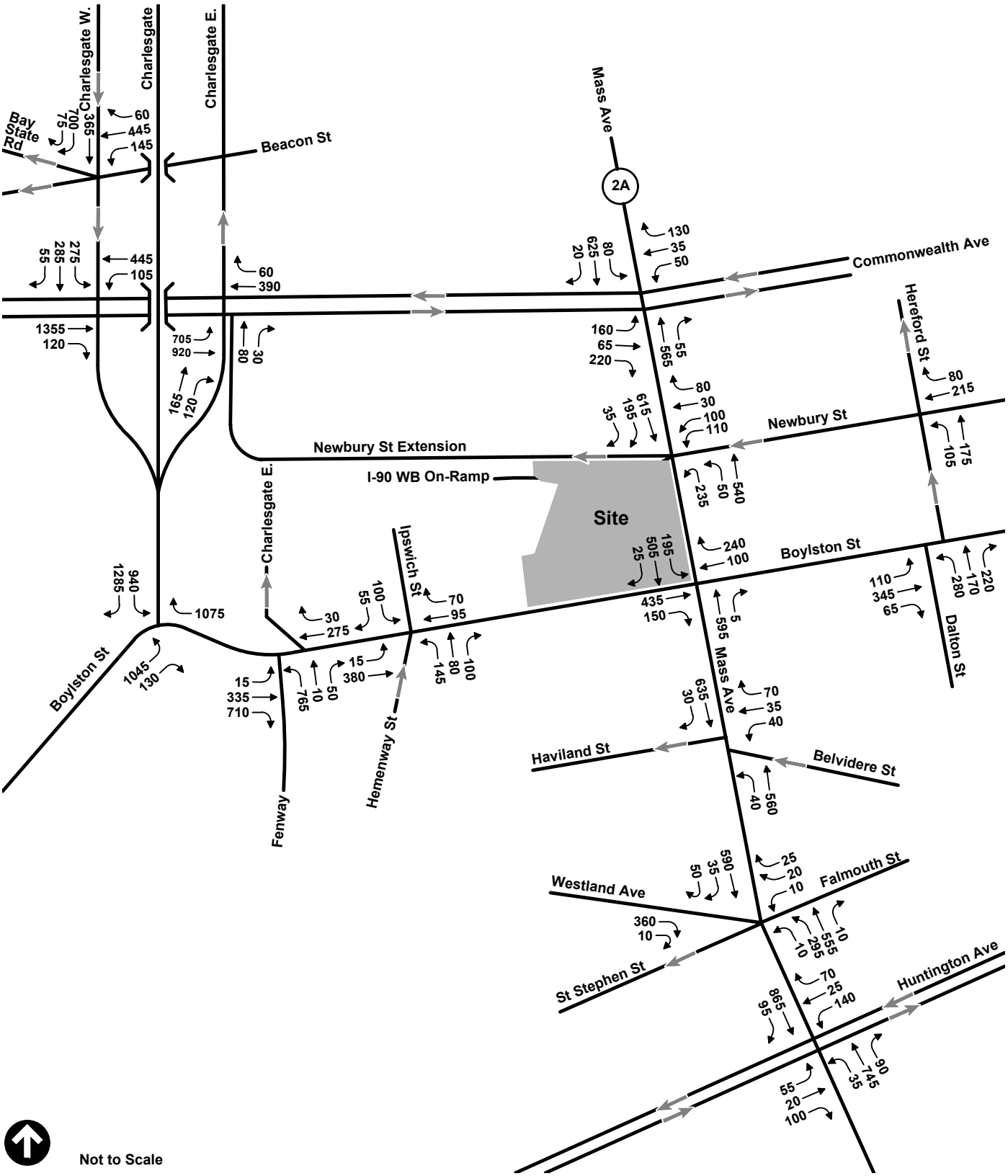


Figure 5.2b

2018 Existing Condition Volumes
PM Peak Hour (4:45 PM - 5:45 PM)

Air Rights Parcel 12
Boston, Massachusetts

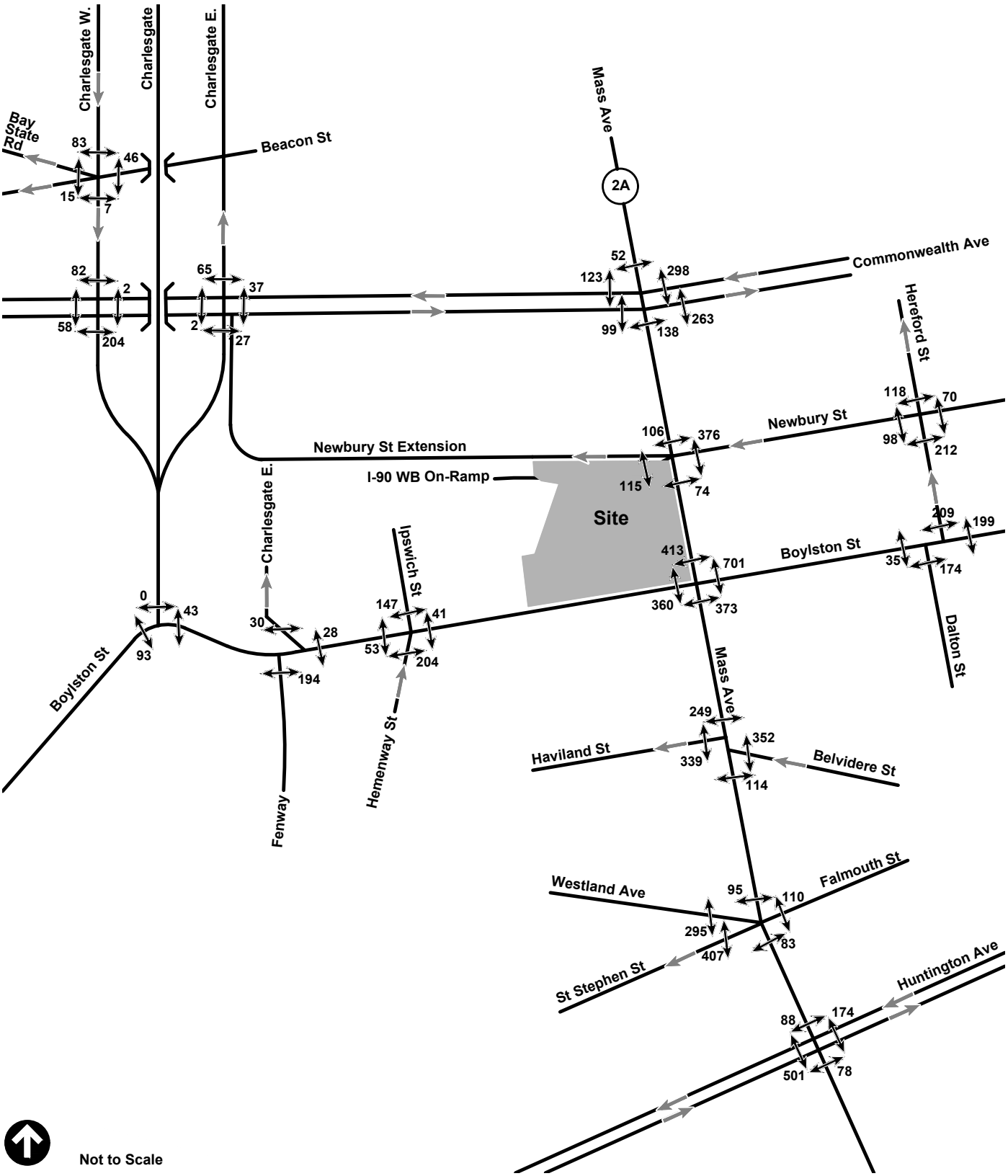


Figure 5.3a

2018 Existing Condition Pedestrian Volumes
AM Peak Hour (8:00 AM - 9:00 AM)

Air Rights Parcel 12
Boston, Massachusetts

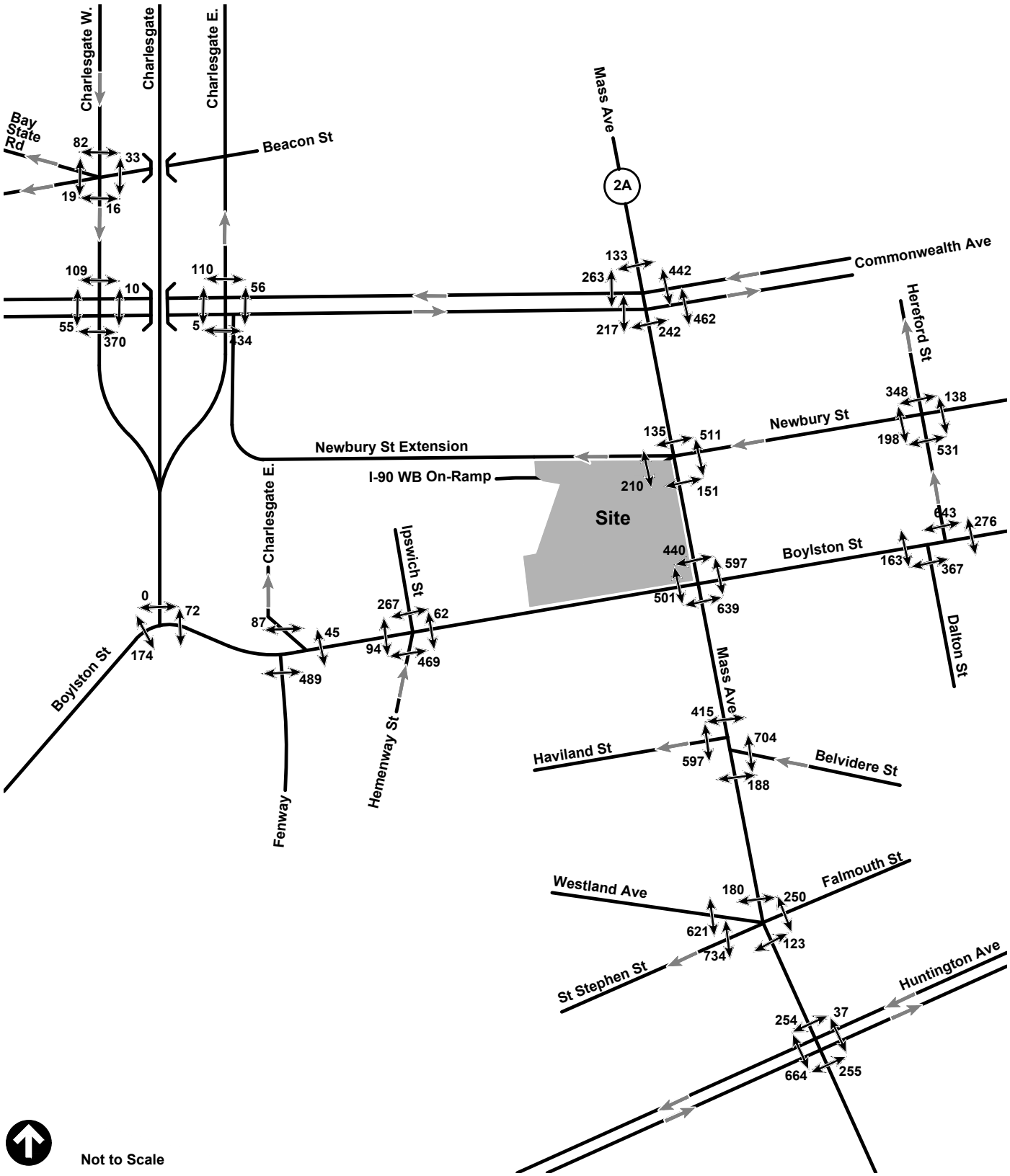


Figure 5.3b

2018 Existing Condition Pedestrian Volumes
PM Peak Hour (4:45 PM - 5:45 PM)

Air Rights Parcel 12
Boston, Massachusetts

Figure 5.4a

2018 Existing Condition Bicycle Volumes
AM Peak Hour (8:00 AM - 9:00 AM)

Air Rights Parcel 12
Boston, Massachusetts

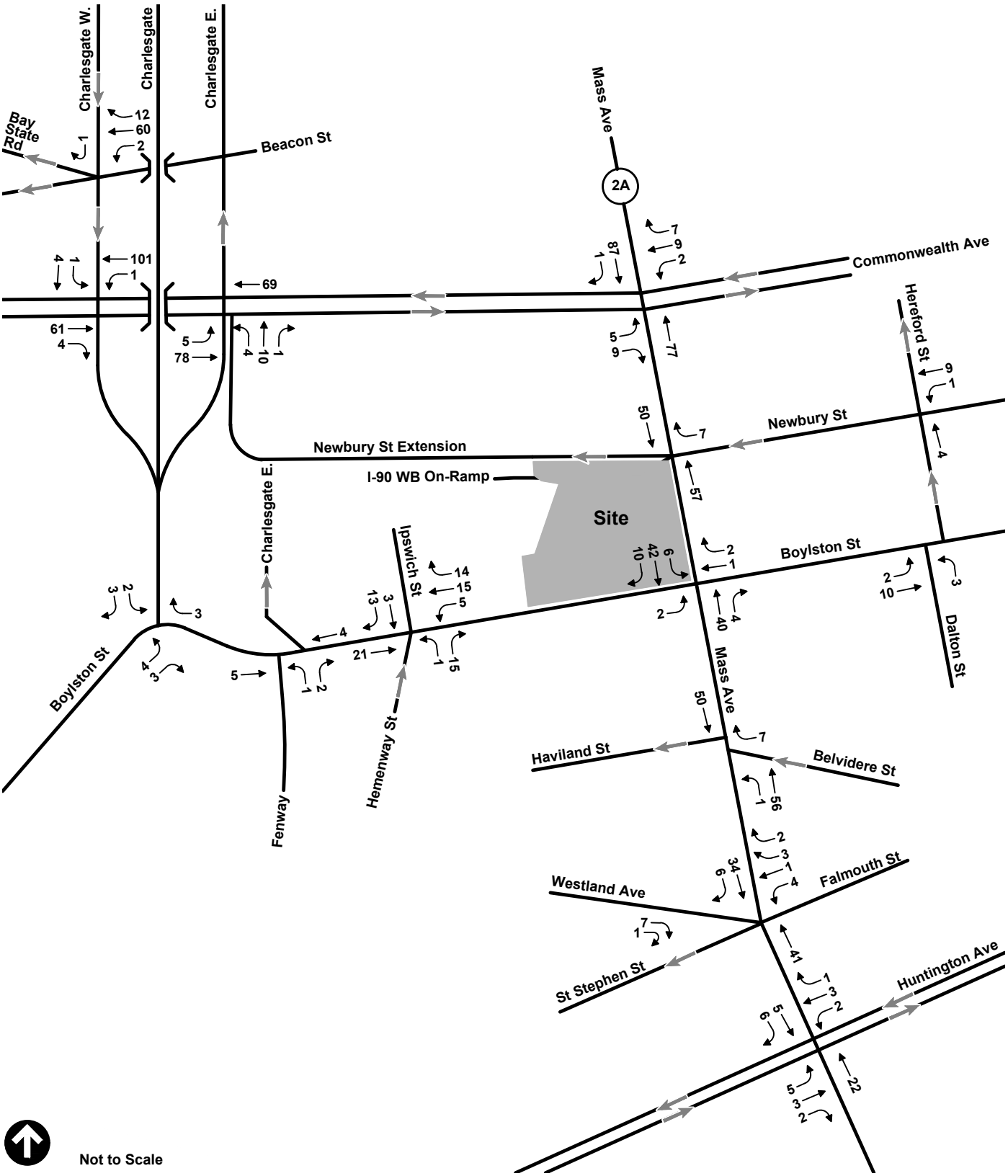
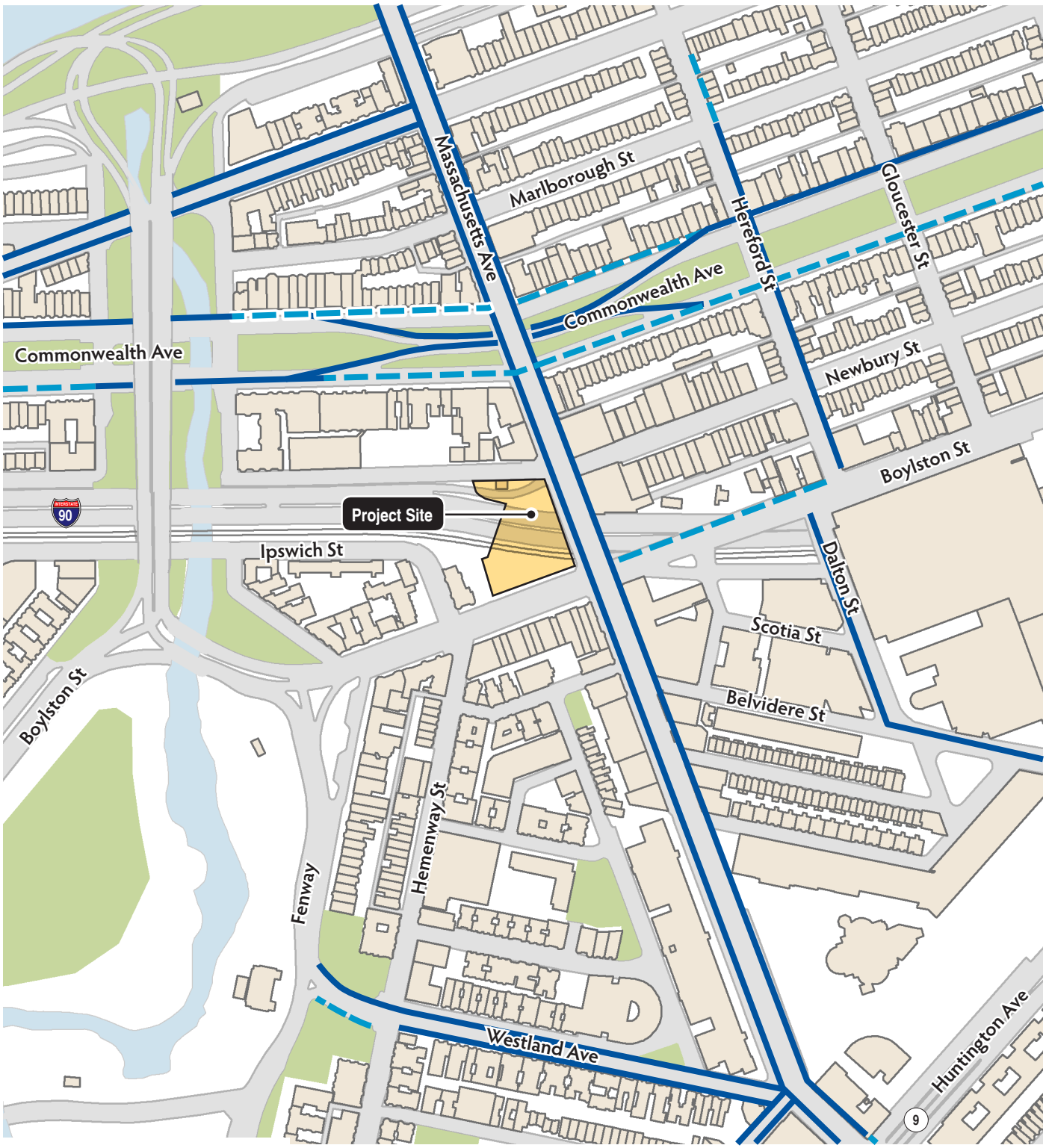


Figure 5.4b

2018 Existing Condition Bicycle Volumes
PM Peak Hour (4:45 PM - 5:45 PM)

Air Rights Parcel 12
Boston, Massachusetts



0 200 400 Feet

Source: BWSC Street Map

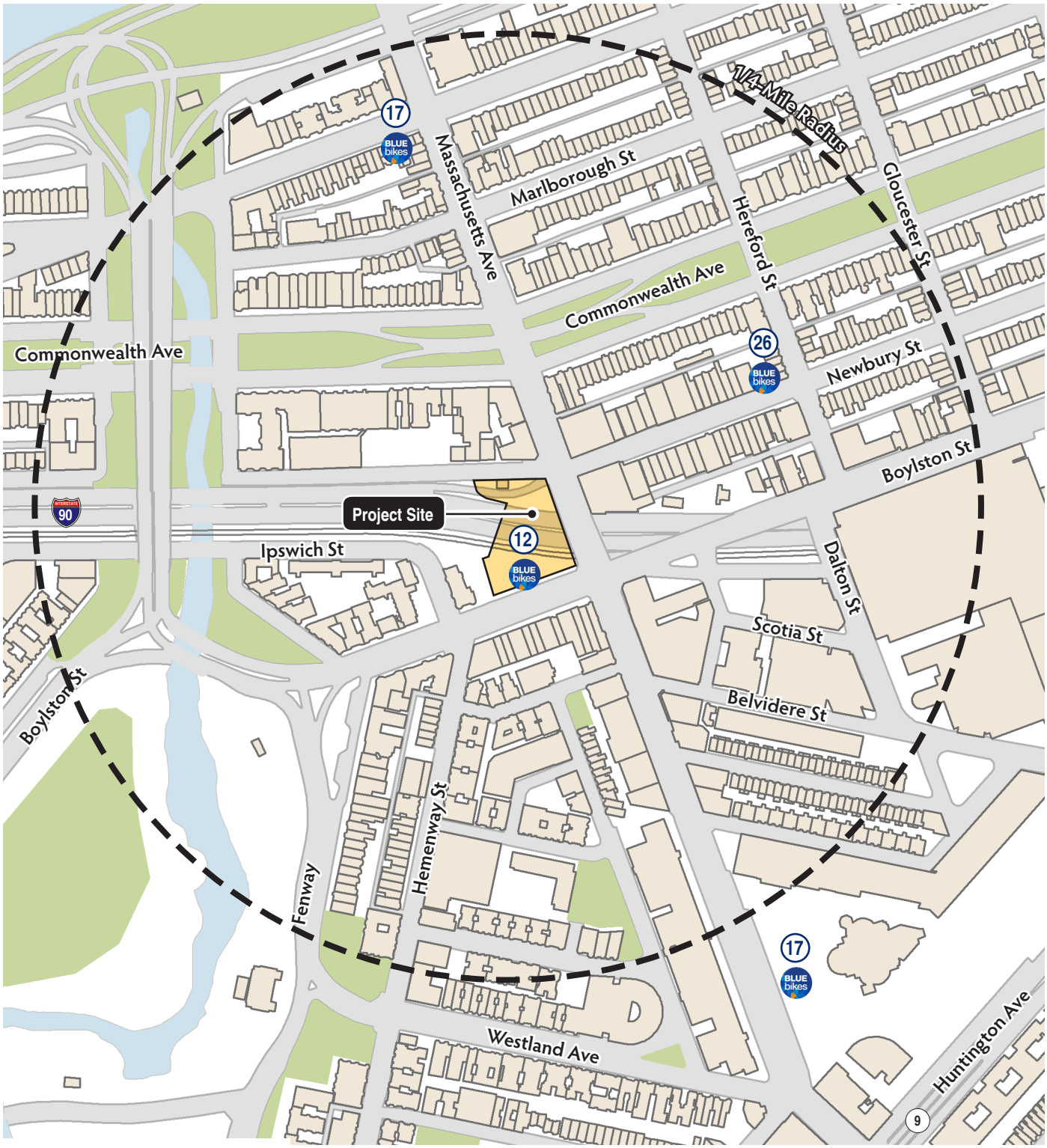
Bicycle Lanes

Shared Lanes

Bike Network

Figure 5.4c

Air Rights Parcel 12
Boston, Massachusetts



Source: BWSC Street Map

BLUE bikes Blue Bike Station

(#) Number of Docks

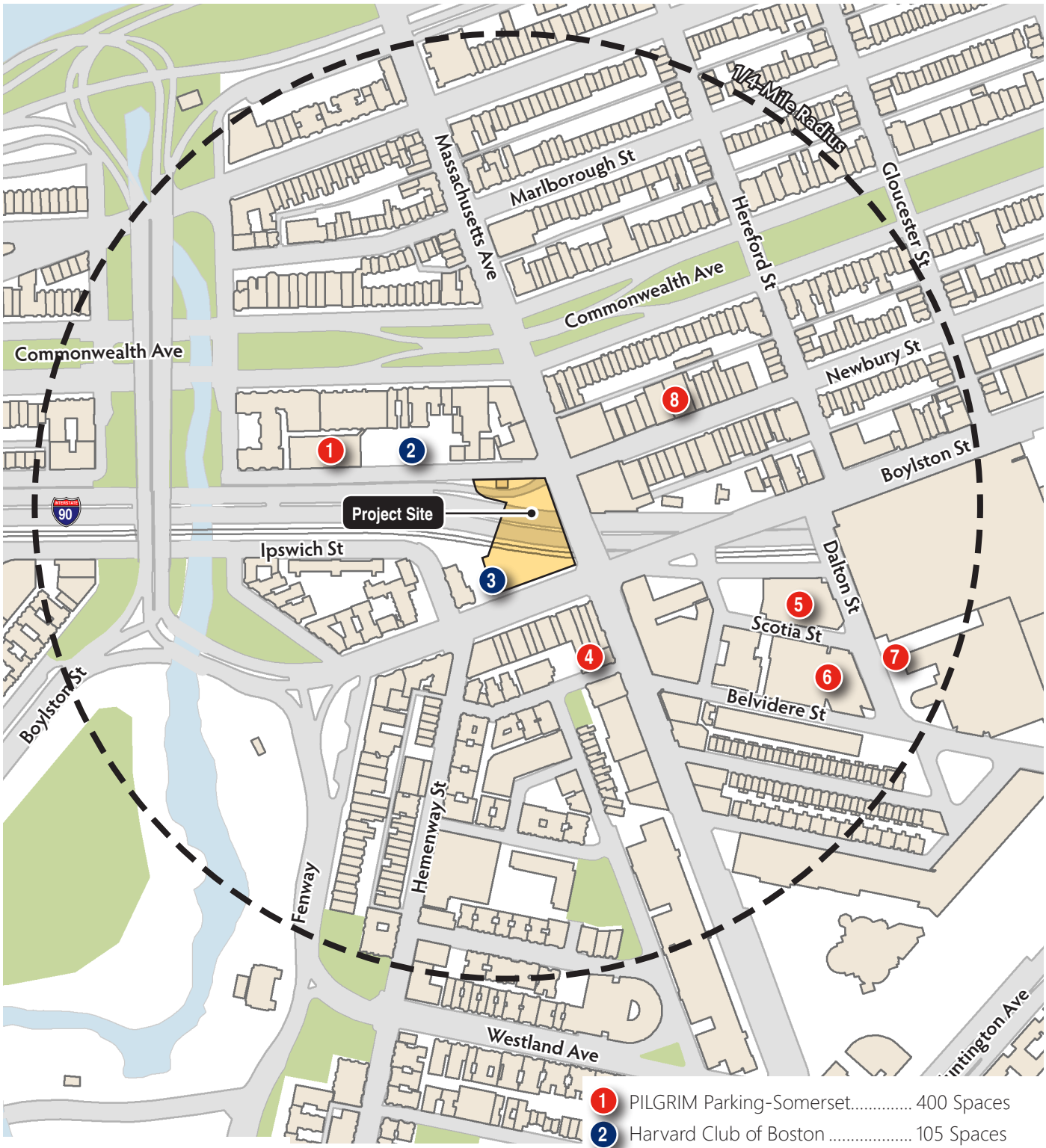
Blue Bike Facilties

Figure 5.4d

Air Rights Parcel 12
Boston, Massachusetts


Charles River
Hatch Shell
BACK BAY
Dr. Paul Dudley White Bike Path
Harvard Bridge
Back Bay–Logan Express
Hynes-Copley-Airport
800-23-LOGAN
www.massport.com
John Hancock Tower
Taj Boston
COPLEY
KENMORE
HYNES CONVENTION CENTER
Express bus to/from Waltham via Masspike and Rt. 128
Project Site
Prudential Tower
Prudential Center
Copley Place
Copley Plaza Hotel
BACK BAY SOUTH END
Berklee College
PRUDENTIAL
Colonnade Hotel
Christian Science Center
Fenway Park
Back Bay Fens
Muddy River
FENWAY
SYMPHONY
Symphony Hall
MASSACHUSETTS AVENUE
SOUTH END
UNION PARK
NORTHEASTERN
Northeastern University
Museum of Fine Arts
Orange Line
Providence/Stoughton, Needham and Franklin Commuter Rail
Pierre Lallement Bike Path (SW Corridor Park)
NEWTON ST
WORCESTER SQ
MUSEUM OF FINE ARTS
Simmons College
Gardner Museum
Mass. College of Art & Design
Wentworth Institute of Technology
"E" Branch
RUGGLES
LONGWOOD MEDICAL AREA
MASSACHUSETTS AVENUE
LENOX ST
MELNEA CASS BLVD
Boston Medical Center
SEE INSET
MISSION HILL

Source: MBTA



0 200 400 Feet

Source: BWSC Street Map

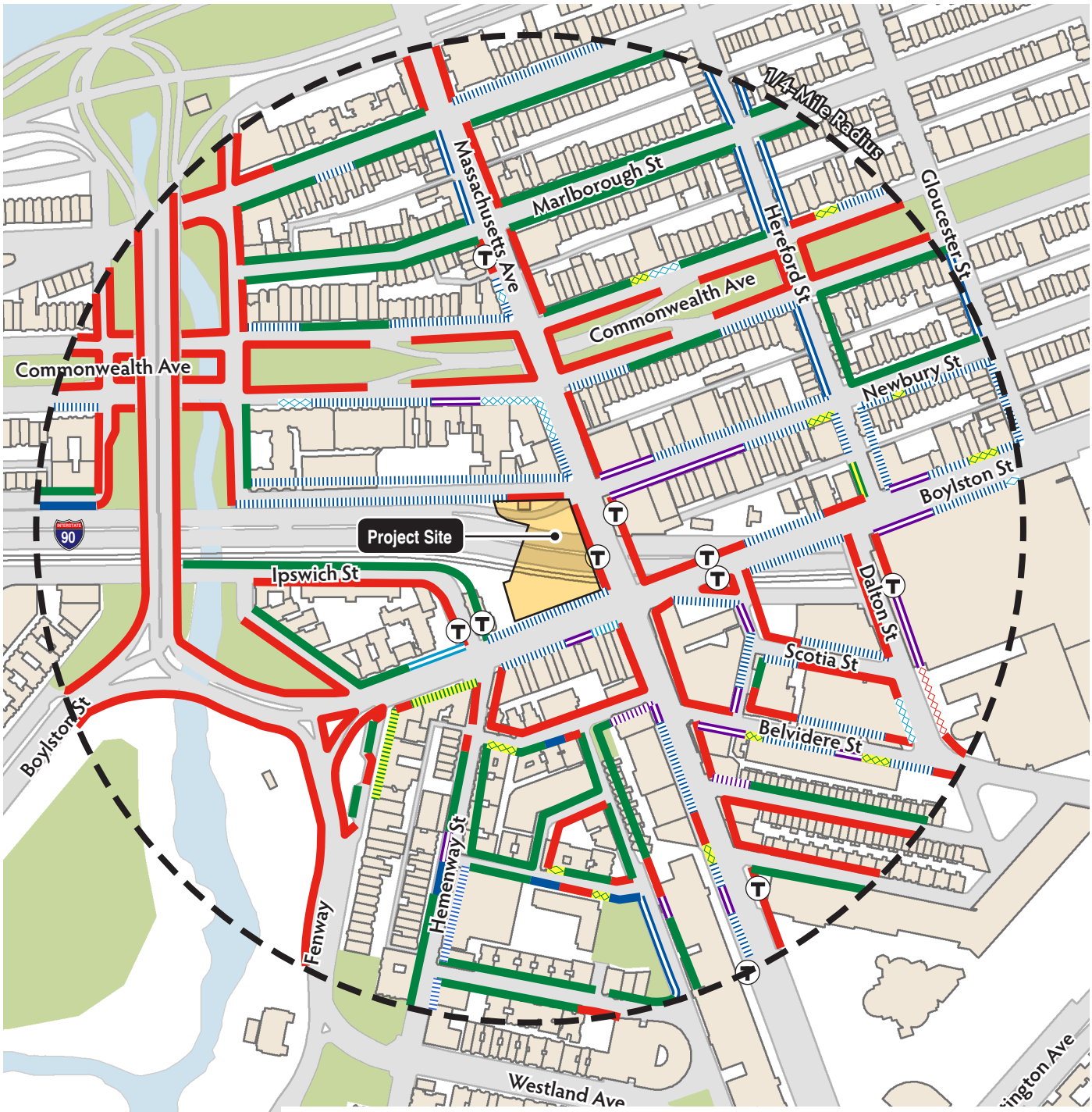
Garage Lot
Surface Lot

1 PILGRIM Parking-Somerset..... 400 Spaces
2 Harvard Club of Boston ..... 105 Spaces
3 SP PLUS Parking ..... 28 Spaces
4 PATRIOT Haviland Street Garage ... 100 Spaces
5 PILGRIM Auditorium Garage..... 500 Spaces
6 HILTON-Back Bay..... 100 Spaces
7 VPNE Prudential Center Garage.... 4,200+ Spaces
8 Danker & Donohue..... 500 Spaces

Off-Street Parking Facilities

Figure 5.6a

Air Rights Parcel 12
Boston, Massachusetts



0 200 400 Feet

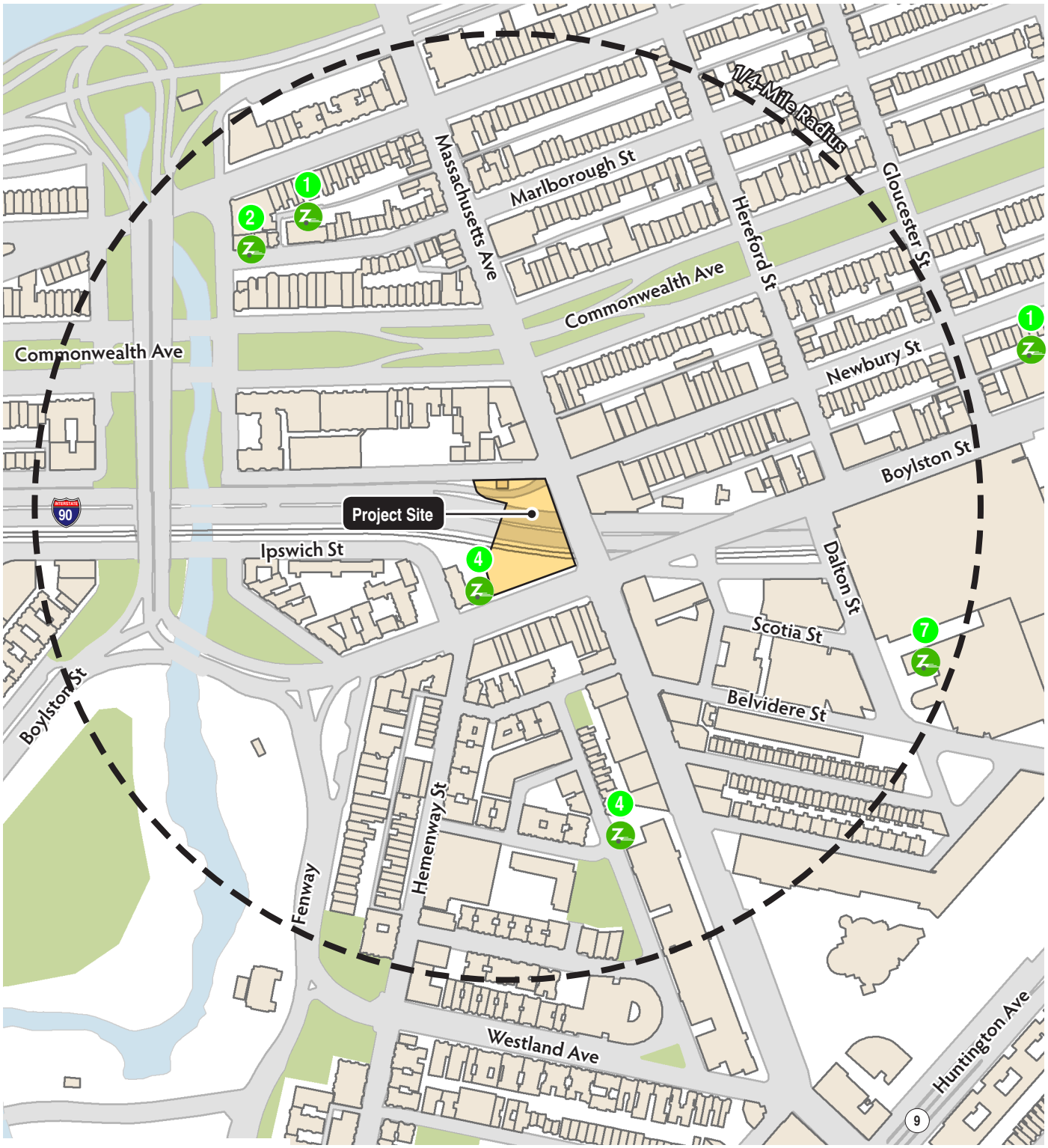
Source: BWSC Street Map

- Meters Mon-Sat 8AM-6PM or 8AM-8PM. 2-Hour Limit
- Meters Mon-Fri 8AM-6PM, Resident Only 6PM-8AM
- 2-Hour Parking Mon-Fri 8AM-6PM
- Commercial Parking 8AM-6PM, Resident Only 6PM-8AM
- Commercial Vehicles 7AM-7PM 30-Minute Limit, ex. Sun
- Commercial Parking 8AM-4PM, Meters 4PM-8PM
- Boston Conservatory, Historical Society, Berklee Parking Only
- Resident Parking Only
- Reserved for Fire Department
- Handicap Only
- Valet Parking, 15-Minute Limit
- Cab Stand
- Church Permit Parking Only
- No Parking
- Tour Bus Stop
- Construction
- MBTA Bus Stop

On-Street Parking

Figure 5.6b

Air Rights Parcel 12
Boston, Massachusetts



Source: BWSC Street Map

Zipcar

Number of Vehicles

Car Share Locations

Figure 5.6c

Air Rights Parcel 12
Boston, Massachusetts

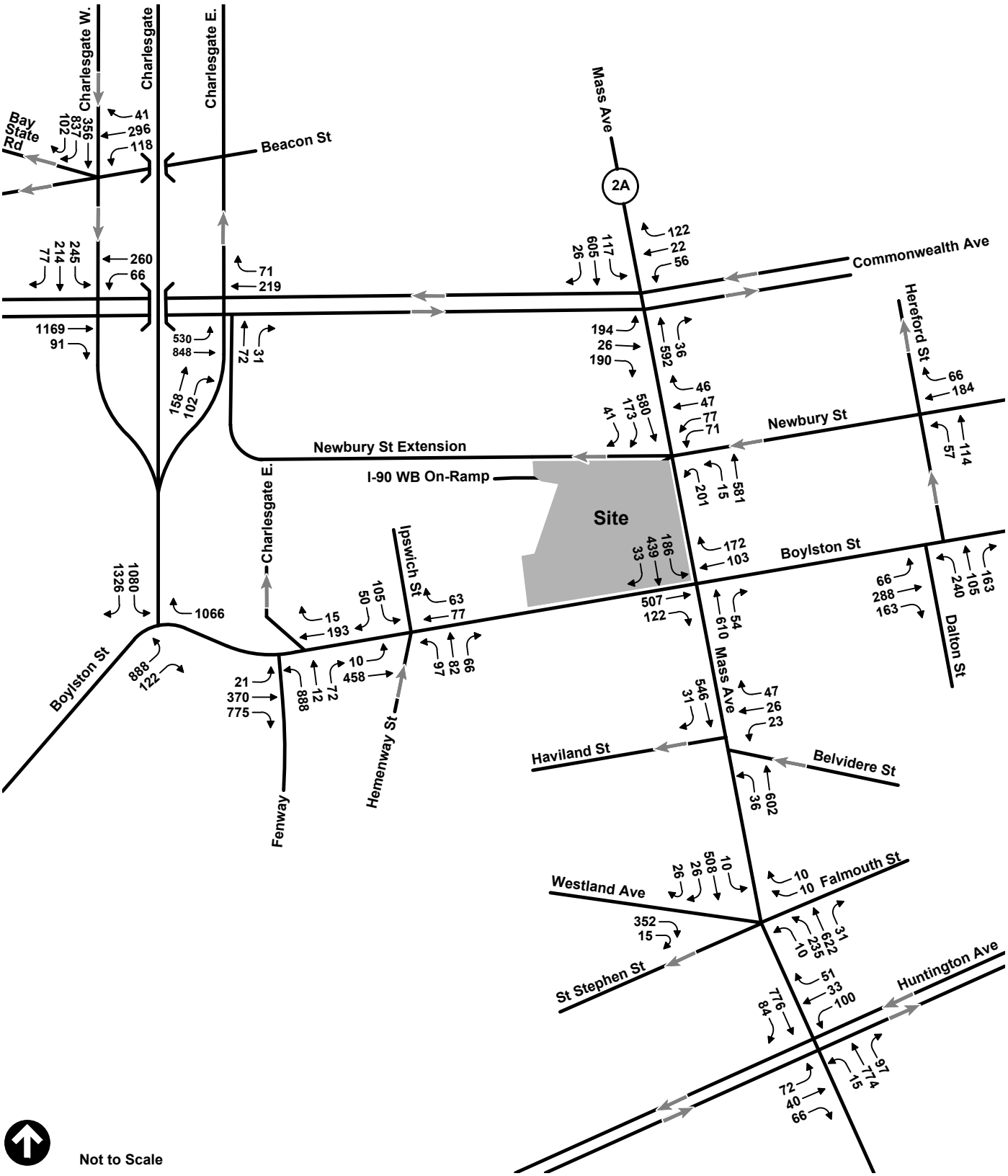


Figure 5.7a

2025 No-Build Condition Volumes
AM Peak Hour (8:00 AM - 9:00 AM)

Air Rights Parcel 12
Boston, Massachusetts

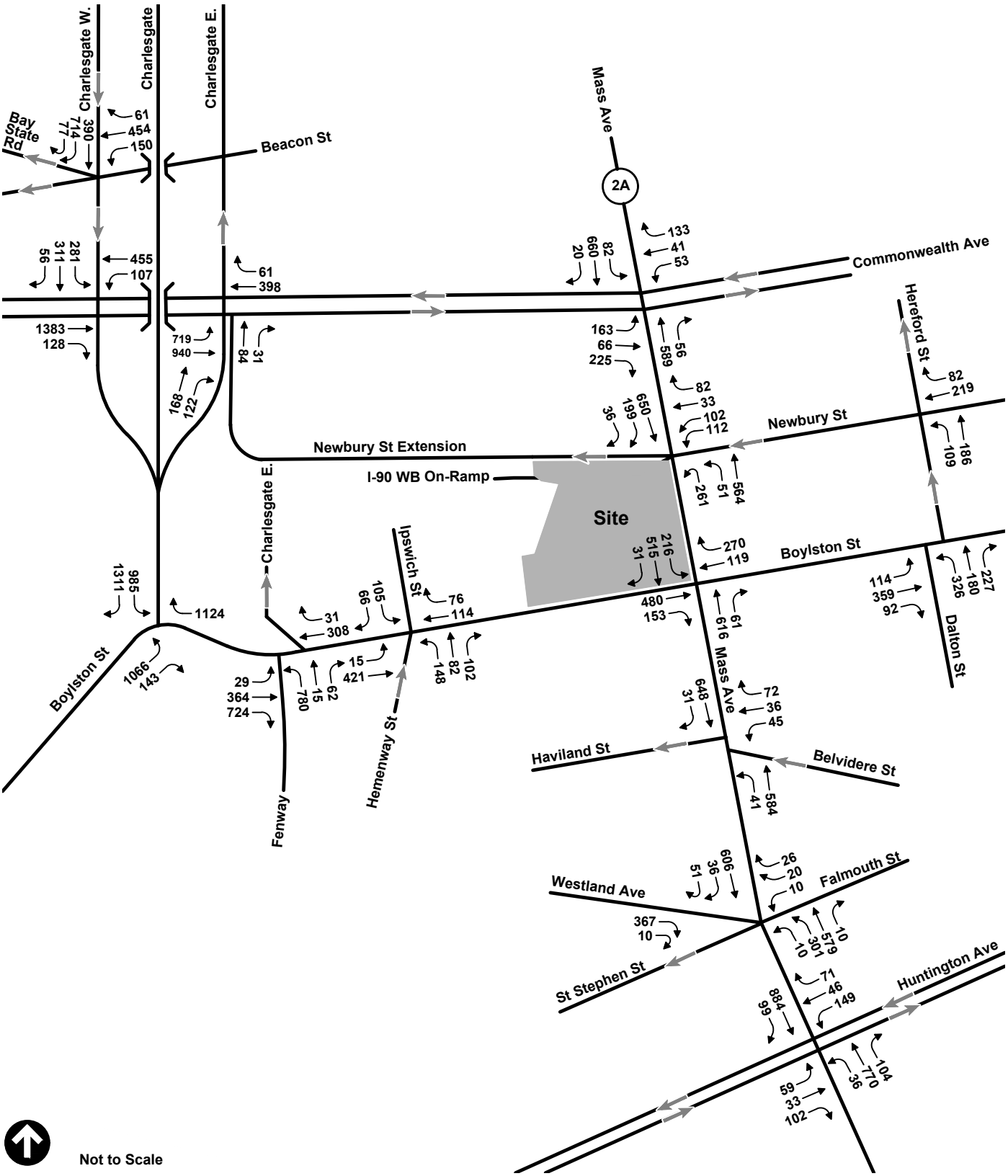
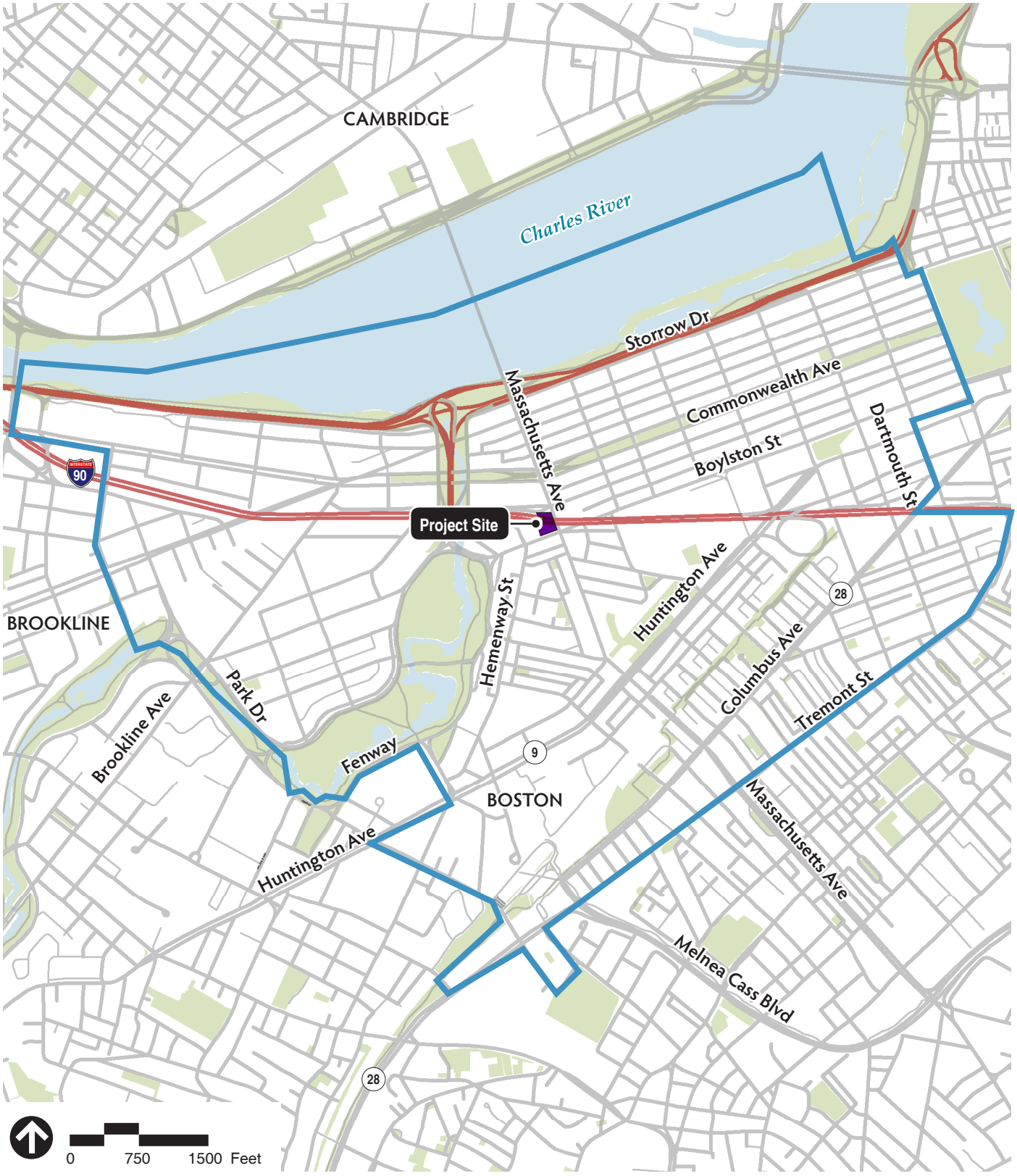


Figure 5.7b

2025 No-Build Condition Volumes
PM Peak Hour (4:45 PM - 5:45 PM)

Air Rights Parcel 12
Boston, Massachusetts



Source: BWSC Street Map

BTD Zone 4 Map

Figure 5.8

Air Rights Parcel 12
Boston, Massachusetts

Source: BWSC Street Map

% Outbound

% Inbound

Project Trip Distribution

Figure 5.9

Air Rights Parcel 12
Boston, Massachusetts

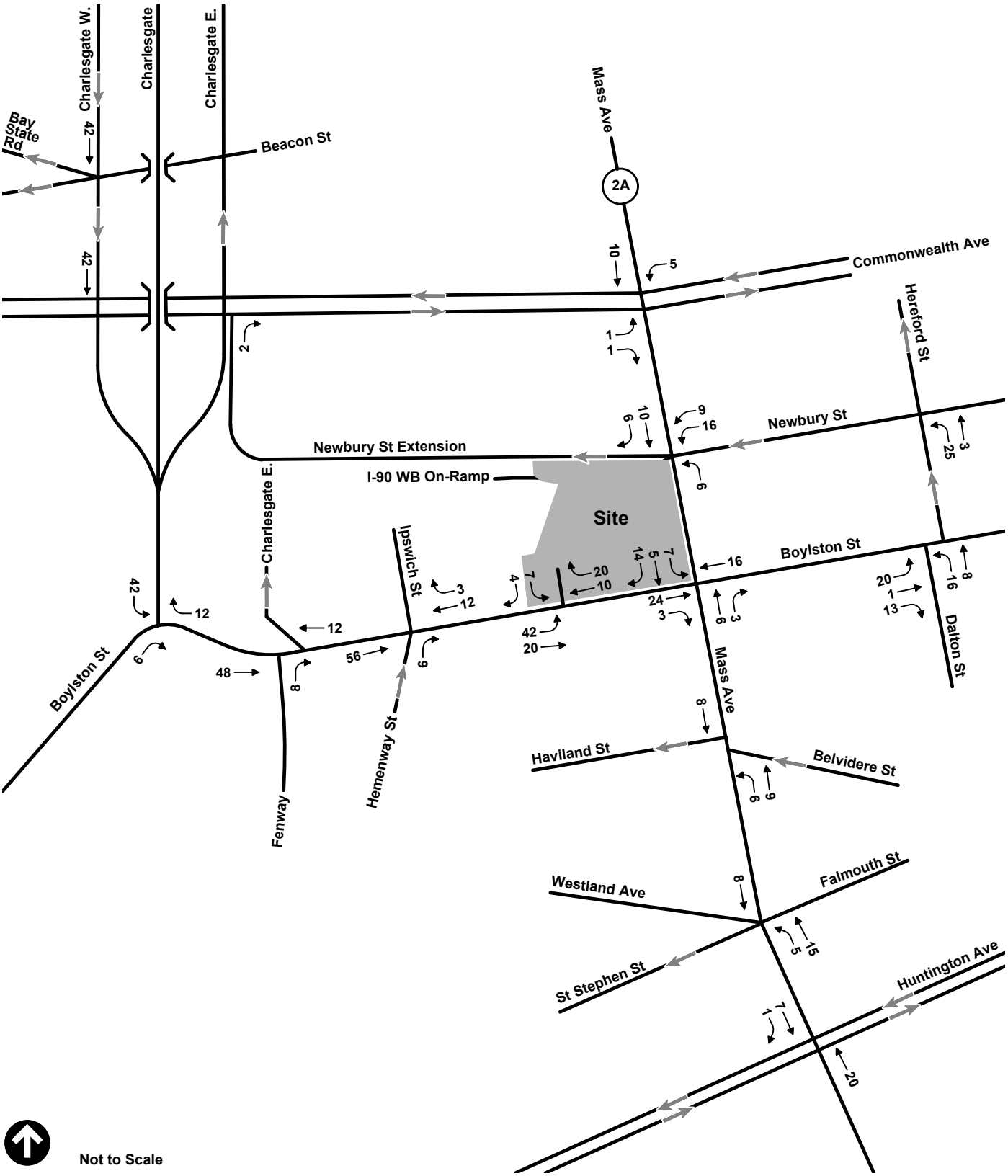


Figure 5.10a

Project-Generated Trips
AM Peak Hour (8:00 AM - 9:00 AM)

Air Rights Parcel 12
Boston, Massachusetts

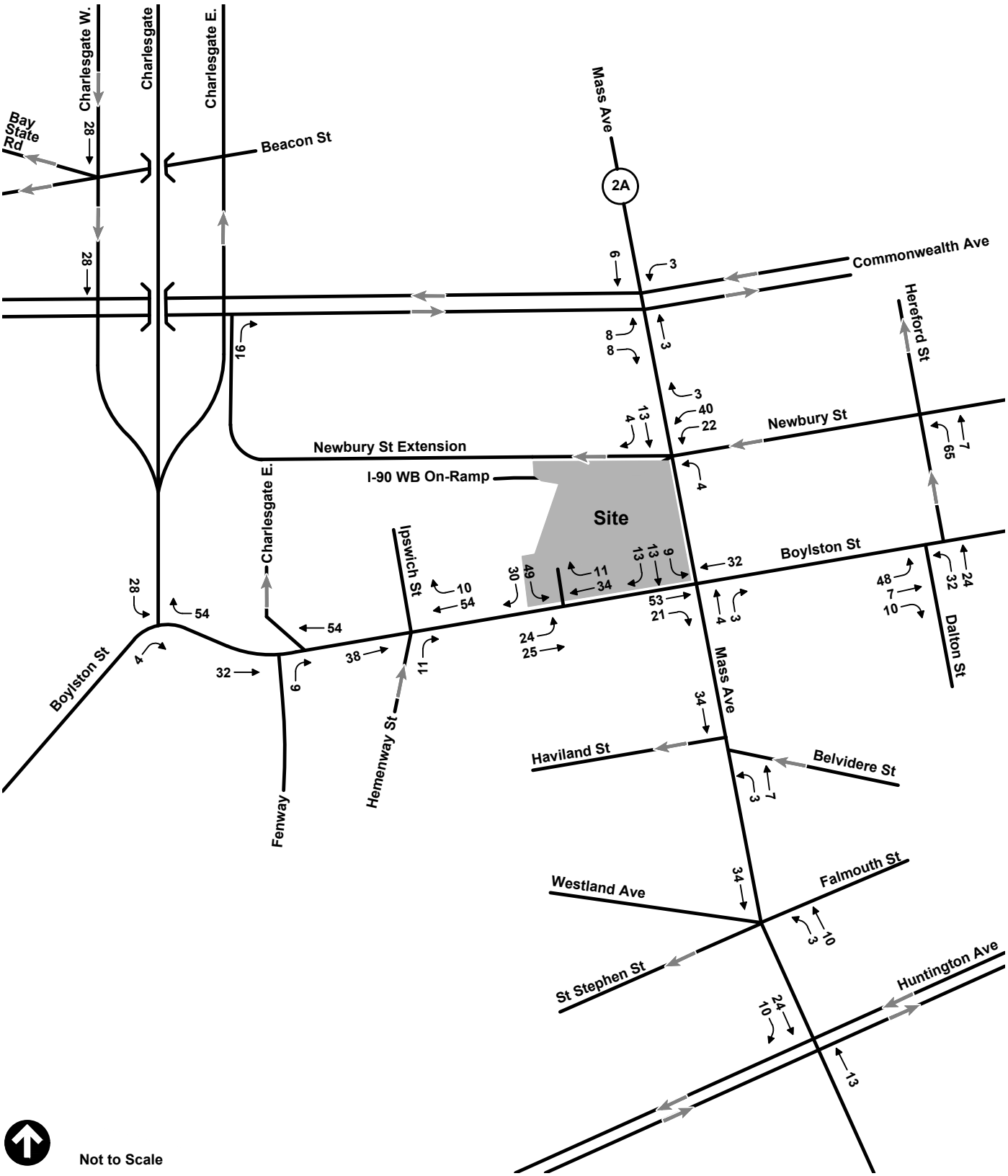


Figure 5.10b

Project-Generated Trips
PM Peak Hour (4:45 PM - 5:45 PM)

Air Rights Parcel 12
Boston, Massachusetts

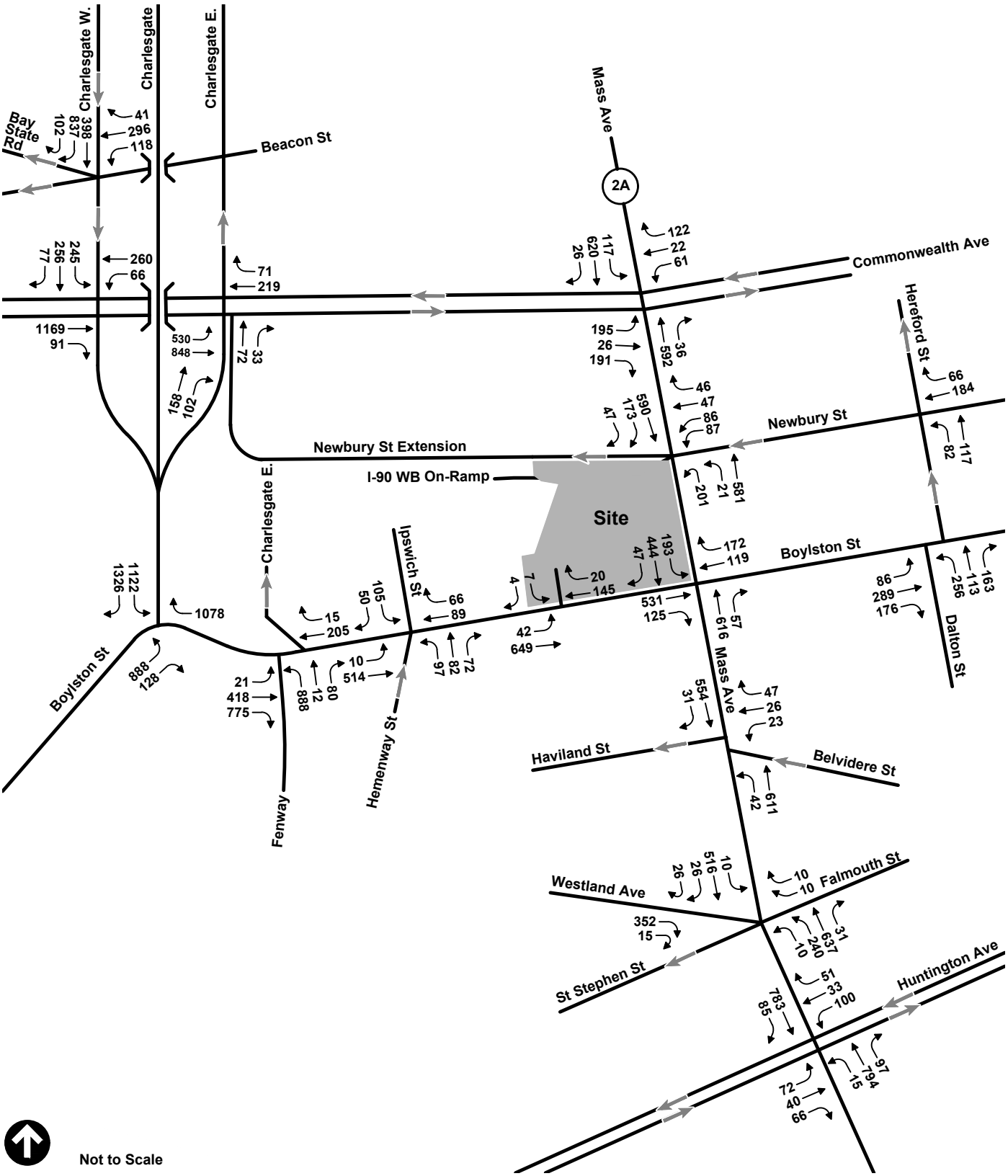


Figure 5.11a

2025 Build Condition Volumes
AM Peak Hour (8:00 AM - 9:00 AM)

Air Rights Parcel 12
Boston, Massachusetts

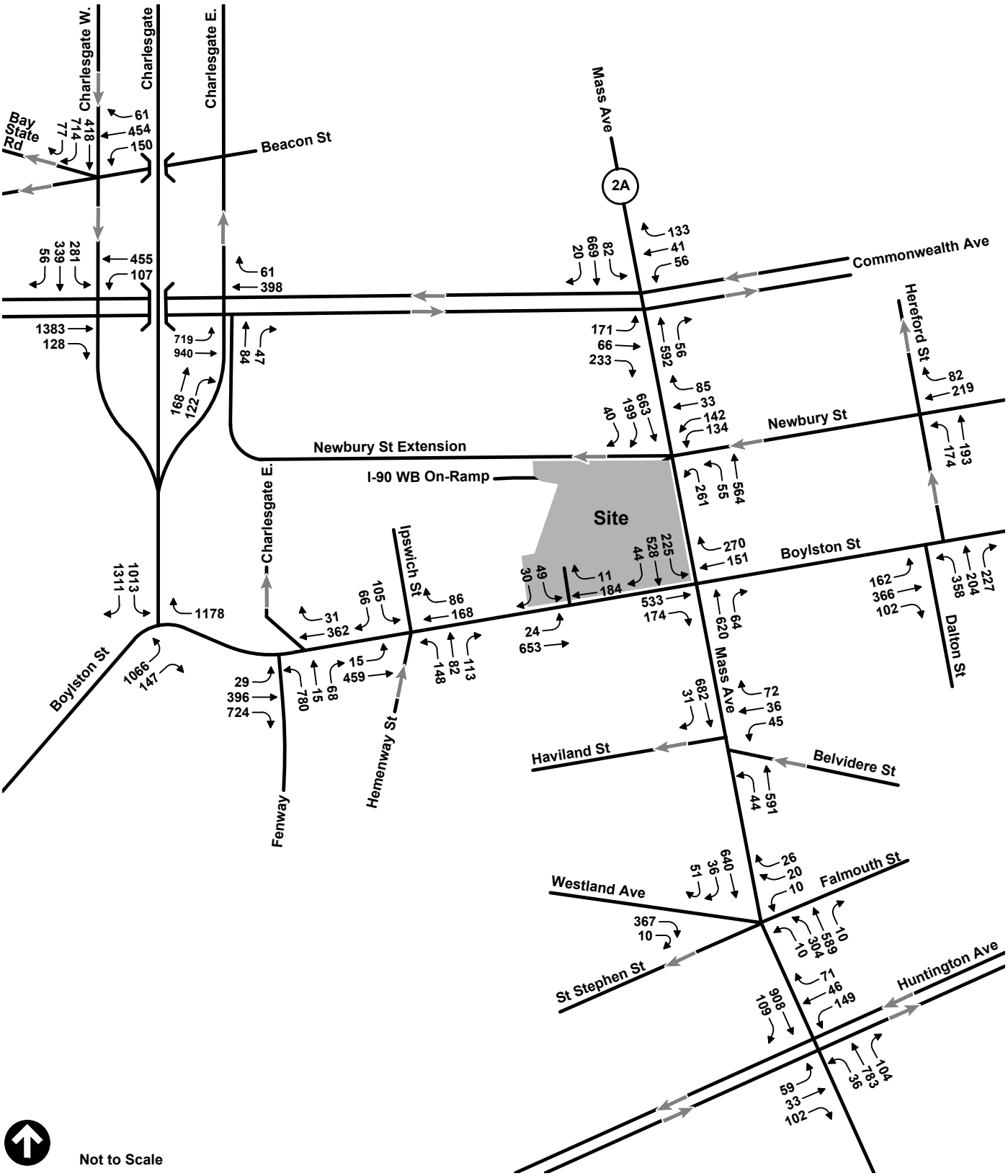


Figure 5.11b

2025 Build Condition Volumes
PM Peak Hour (4:45 PM - 5:45 PM)

Air Rights Parcel 12
Boston, Massachusetts

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6

Environmental Protection

This chapter presents information on the environmental conditions in the vicinity of the Project Site and the potential changes that may occur as a result of the Project. A key goal of the Project is to redevelop the Project Site for efficient and improved uses, while avoiding or minimizing potential adverse environmental impacts.

As discussed in more detail below, the Project-related impacts, which are to be expected in urban development of this scale, are counterbalanced by the significant benefits for the adjacent neighborhoods and the City, including the realization of many of the City's planning goals expressed in the Civic Vision for Turnpike Air Rights in Boston. The following sections identify Project impacts and discuss steps that have been or will be taken through design and management to avoid, minimize, and/or mitigate adverse effects. Temporary construction-period impacts will be managed to minimize disruption to the surrounding neighborhoods.

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

- Pedestrian Wind
- Shadow
- Daylight
- Solar Glare
- Air Quality
- Water Quality
- Noise
- Solid and Hazardous Waste
- Groundwater
- Geotechnical
- Construction

Where the current state of the design allows, this EENF/EPNF provides a full assessment of Project impacts. The Proponent looks forward to working through the Article 80 and MEPA processes with city and state agencies and the community to further refine the Project and its associated benefits.

6.1 Summary of Key Findings & Benefits

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

- Wind - The Project will not result in any new dangerous or unsafe wind conditions in or around the Project Site. Preliminary wind analysis results indicate that the majority of the surrounding area will remain comfortable at the pedestrian level for its intended use. The Project will continue to explore additional wind mitigation options, including landscape treatments and building elements to ensure pedestrian comfort at the Project Site and surrounding area by reducing wind speed and gusts.

- Shadow – The Project will result in relatively minor net new shadows as a result of the construction of a fifteen-story, and a twelve-story building on what is currently undeveloped land and air rights parcel; however, incremental net new shadows produced are consistent with the existing urban shadow patterns, and are not expected to have any material effect on pedestrian use patterns. Most of the net new shadow will land on existing buildings, creating minimal adverse effects on the pedestrian environment. The net new shadow will be offset by the substantial public realm improvements of the Project.
- Daylight – The Project will result in a reduction in the visible skydome when viewed from adjacent sidewalks compared to existing conditions. Such changes are consistent with the Project's urban context and location on a undeveloped site.
- Solar Glare – A conservative analysis of the anticipated solar glare impacts indicates that the Project will have potentially infrequent, brief glare impacts, which will be minimized through building design.
- Air Quality – The air quality analysis demonstrates that the Project will conform to the National Ambient Air Quality Standards and will not have an adverse impact on local air quality.
- Noise – The sound levels associated with the Project's mechanical equipment will be attenuated with mechanical enclosures and screening located on the roof, and therefore will have no adverse noise impacts at nearby sensitive receptor locations. Potential noise impacts associated with deliveries are expected to be negligible as loading will be enclosed and will be managed.
- Water Quality – The Project intends to meet all applicable stormwater management standards to the extent practicable by implementing a treatment train of Best Management Practices to improve water quality.
- Hazardous Materials – The Project Site does not contain any known reported releases of oil and hazardous materials and no related impacts are anticipated.
- Groundwater – The potential for groundwater impacts at the Project Site is limited by the small amount of terra firma affected and no impacts are anticipated due to the lack of substantive excavation in the Project.
- Geotechnical – The geotechnical engineer and contractor will work closely together throughout the excavation and foundation construction to avoid adverse impacts on adjacent structures and infrastructure during the installation of the foundation elements. Soil disturbance and vibration will be limited by low displacement foundation elements.
- Construction – The Project has been designed to avoid, minimize and mitigate potential construction-related impacts. The Project Team will work with the City to reduce potential construction period impacts.

6.2 Wind

The Project includes a building greater than 150 feet high and, therefore, requires a quantitative (wind tunnel) analysis comparing existing and proposed wind conditions pursuant to the Section B.1 of the BPDA Development Review Guidelines.

Wind Tunnel Conditions

A wind tunnel analysis was conducted for the following conditions:

- **No-Build Condition** – Based on guidance from the BPDA, this condition assumes future/planned developments, or background projects, surrounding the Project Site. These future projects were based on the currently proposed building height and massing, which are subject to change.
- **Build Condition** – The No-Build Condition with the Project, as described in Chapter 1, *Project Description and Alternatives*.

  (Note: This methodology is consistent with the other environmental impact studies being conducted including the traffic analysis and shadow studies.).

6.2.1 Methodology

A scale model was equipped with specially designed wind speed sensors at 139 grade level locations, chosen in consultation with the BPDA, which estimated the mean and fluctuating components of wind speed at a full-scale height of five feet above grade in pedestrian areas throughout the Project Site.

As shown in Figures 2a and 2b of the report provided in Appendix E, the wind tunnel model included the proposed development and all relevant surrounding buildings and topography within a 1,600-foot radius of the Project Site. The mean speed profile and turbulence of the natural wind approaching the modelled area were also simulated in the wind tunnel. Wind speeds were measured for 36 wind directions, in 10 degree increments, starting from true north. The measurements at each of the 90 sensor locations 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. The results were then combined with long-term meteorological data, recorded during the years 1990 to 2015 at Boston's Logan International Airport to predict full scale wind conditions. The analysis was performed separately for each of the four seasons and for the entire year.

As shown in Figures 3 and 4 of the report provided in Appendix B, the "wind roses" presented summarize the annual and seasonal wind climates in the Boston area, based on the data from Boston Logan International Airport. The wind rose for spring, for example, summarizes the wind data from March, April, and May. In general, as indicated by the red and yellow color bands on the wind rose, the prevailing winds at this time of year are from the west-northwest, northwest, west, south-southwest and southwest. In addition to these directions, winds are also prevalent from the east-southeast and east-northeast direction.

On an annual basis, the most common wind directions are those between south-southwest and north-northwest. Winds from the east-southeast are also relatively common. In the case of strong winds, west-northwest, northwest and west are the dominant wind directions.

Pedestrian Wind Criteria

The BPDA has adopted two standards for assessing the relative wind comfort of pedestrians. First, the BPDA wind design guidance criterion states that an effective gust velocity (hourly mean wind speed +1.5 times the root-mean-square wind speed) of 31 mph should not be exceeded more than 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[1]. 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, presented in Table 6-1 below, are expressed in terms of benchmarks for the 1-hour mean wind speed exceeded one (1) percent of the time (i.e., the 99-percentile mean wind speed).

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 one percent of the time.

The wind climate found in a typical downtown location in Boston is generally comfortable for the pedestrian use of sidewalks and thoroughfares and meets the BPDA effective gust velocity criterion of 31 mph. However, without any mitigation measures, this wind climate is likely to be frequently uncomfortable for more passive activities, such as sitting.

6.2.2 Pedestrian Wind Study Findings

Figures 6.1a-b graphically depict the predicted mean speed and estimated wind comfort conditions at each wind measurement location based on the modeled annual winds for the No-Build, and Build Conditions. Figures 6.2a-b depict annual wind safety conditions for the No-Build, and Build Conditions. Typically, summer and fall winds tend to be somewhat more comfortable than annual winds while winter and spring winds are somewhat less comfortable than annual winds. The following

[1] MELBOURNE, W.H., 1978, "CRITERIA FOR ENVIRONMENTAL WIND CONDITIONS", JOURNAL OF INDUSTRIAL AERODYNAMICS, 3 (1978) 241 - 249.

summary of pedestrian wind comfort is based on annual winds for each simulated condition.

No-Build Condition

The No-Build Condition wind conditions (mean speed and effective gust speed) are shown in Figure 6.1a. and 6.2a, respectively. These wind conditions represent the baseline to which the Project is measured against.

Under the No-Build Condition, mean wind speeds at most on-site locations are generally comfortable for sitting or standing on an annual basis. The presence of the Parcel 13, 1000 Boylston Street and the Berklee Crossroads project in the No-Build Condition are anticipated to slightly improve pedestrian wind comfort conditions as compared to existing conditions. Without the Parcel 13 Building specifically, which could be constructed after the Project, the Project is anticipated to result in an improvement to existing wind comfort conditions along the Project's Massachusetts Avenue and Boylston Street frontage, which are currently open and exposed under existing conditions.

At off-site locations surrounding the Project Site, mean wind speeds are generally comfortable for their intended used, which includes walking or better, with the exception of one location east of the Project Site along Newbury Street (Location 69), five locations along Boylston Street (Locations 29, 108, 110, 111 and 113), two locations along Scotia street (Locations 121 and 123), one location along Dalton Street (Location 106), and two locations along Massachusetts Avenue (Locations 69 and 136) that experience existing uncomfortable conditions. There are three locations further west of the Project Site along Ipswich Street, Newbury Street and Commonwealth Avenue (Locations 11, 80 and 84 respectively) that also experience uncomfortable existing conditions.

There are no locations on or off-site with pedestrian wind comfort conditions categorized as dangerous on an annual basis.

The effective gust criterion is met annually at all locations on and around the Project Site with the exception of one off-site locations along Massachusetts Avenue (Location 126). Refer to Figure 6.2a.

Build Condition

The Build Condition wind conditions (mean speed and effect gust speed) are show in Figures 6.1b and 6.2b, respectively.

Under the Build Condition, mean wind speeds at most on-site locations are generally comfortable for their intended use, which includes sitting or standing on an annual basis, with the exception of one new uncomfortable location along Newbury Street (Location 10). Acceleration of winds through the undercut corner of the residential/hotel building can be mitigated through the addition of landscaping or vertical wind screens, which will be explored as the Project design advances.

In general, wind patterns around the proposed development are anticipated to change as a result of the presence of the Project. At off-site locations immediately surrounding the Project Site, mean wind speeds remain generally comfortable for walking, standing, or sitting. To the west and south of the Project Site along Ipswich and Boylston Street, general wind speeds would be reduced, resulting in a slight improvement in pedestrian wind comfort at several locations (Locations 14, 15, 22, 39, and 40), with the exception of two new uncomfortable locations along Boylston Street and Belvidere Street (Locations 43 and 125 respectively). To the north of the Project Site along Newbury Street and Massachusetts Avenue, general wind speeds are anticipated to increase. Along Newbury Street, pedestrian wind comfort conditions generally remain comfortable for standing or better, with the exception of one new uncomfortable location (Location 91). Along Massachusetts Avenue to the north, pedestrian wind comfort conditions generally remain comfortable for walking or better, including several locations that experience a slight improvement in pedestrian wind comfort conditions (Locations 70, 72, and 74), and three new uncomfortable locations near Commonwealth Avenue (Locations 75, 78 and 79).

To the west and south of the Project Site pedestrian wind comfort conditions generally remain comfortable for their intended use, including walking or better. Six existing uncomfortable conditions along Boylston, Scotia Street and Dalton Street, (Locations 106, 108, 109, 110, 111 and 123) are improved with the Project.

There are no locations on or off-site with pedestrian wind comfort conditions categorized as dangerous on an annual basis.

Under the Build Condition, the number of exceedances compared to the No-Build Condition is improved, with all locations experiencing acceptable effective gust speeds as shown in Figure 6.2b.

6.3 Shadow

6.3.1 Regulatory Context

An analysis of the shading impact under the No-Build and Build Conditions is a requirement of the Article 80, Large Project Review (Section 80B-2(c) of the Code). The shading analysis was prepared in accordance with the requirements of Section B.2. of the BPDA Development Review Guidelines, with the additional requirements established by the recently enacted Stuart Street Zoning District. For a conservative projection of shadow impacts, the analysis utilizes the worst-case scenario, which is the Garage West Base Scheme. This scheme results in the largest shadow impact to adjacent public spaces.

6.3.2 Methodology

A shadow impact analysis was conducted at regular time intervals to investigate the effect that the Project will have throughout the year. In order to represent a variety of shadow conditions at various times of the day, and times of the year, three-time

intervals (9:00 AM, 12:00 PM, 3:00 PM) are represented for the Vernal Equinox (March 21st), Summer Solstice (June 21st), Autumnal Equinox (September 21st), and Winter Solstice (December 21st). 6:00PM was also run for June 21st.

The shadow study takes into consideration Daylight Savings Time and, therefore, times are presented in Eastern Standard Time ("EST") and Eastern Daylight Time ("EDT"), as identified in Table 6-2 below. The study shows both existing shadows in and around the Project Site, and the limited net new shadow impact of the Project. The shadow analysis focuses on dedicated public parkland, public open spaces, historic resources, major pedestrian areas, sidewalks, and plazas in the Project vicinity. Shadows were determined using the Boston altitude and azimuth data provided in Table 6-2 below.

Table 6-2 Azimuth and Altitude Data

		Solar Position	
Date	**Local Time**	***Altitude****	***Azimuth****
March 21	9:00 AM EDT	23.5	112.6
	12:00 PM EDT	46.6	161.2
	3:00 PM EDT	39.2	-136.6
June 21	9:00 AM EDT	39.9	93.5
	12:00 PM EDT	68.8	149.4
	3:00 PM EDT	56.5	-113.7
	6:00 PM EDT	23.9	-79.3
September 21	9:00 AM EDT	25.9	115.3
	12:00 PM EDT	47.4	166.0
	3:00 PM EDT	37.4	-132.9
December 21	9:00 AM EST	14.2	141.9
	12:00 PM EST	24.1	-175.6
	3:00 PM EST	10.0	-135.1

* Altitude is measured up from the horizon
** Azimuth is measured in degrees clockwise from the North
EST Eastern Standard Time
EDT Eastern Daylight Time

The incremental impact of net new shadow cast by the Project is shown in dark blue in Figures 6.3a through 6.3d, while existing shadows are shown in gray. Based on guidance from the BPDA, the existing shadow condition assumes future/planned developments, or background projects, surrounding the Project Site, including build-out of Air Rights Parcel 13, and the 1000 Boylston Street Project. These future projects were based on the currently proposed building height and massing, which are subject to change.

6.3.3 Article 80B Shadow Study Results

The shadow impact analysis looked at net new shadow created by the Project during 13-time periods (Table 6-2). The incremental net new shadows produced are consistent with the existing urban shadow patterns, and are not expected to have any material effect on pedestrian use patterns. Most of the net new shadow will land on existing buildings, creating minimal adverse effects on the pedestrian environment.

March 21st

The net new shadows associated with the Project for March 21 are illustrated in Figure 6.3a. March 21 is the vernal equinox, when the length of daytime and nighttime are equal. The sun rises on March 21 at 6:45 AM EDT in the southeastern sky and sets at 6:57 PM EDT. September 21st is the autumnal equinox and the daytime and nighttime hours are equal. The sun rises at 6:31 AM EDT in the southeastern sky and sets at 6:42 PM EDT. The shadows cast on this date are almost identical to those on March 21, the vernal equinox.

At 9:00 AM EDT on the vernal equinox, net new shadow from the Project will be will be cast to the northwest over the Turnpike and a onto a limited portion of Newbury Street.

At 12:00 noon EDT, the sun is in the south-southeasterly sky and shadows are cast nearly in line with the street grid. The majority of net new shadow cast by the Project will fall within the Project site, and on a limited portion of Newbury Street, including sidewalks.

At 3:00 PM EDT, the sun is in the southwestern sky and shadows are cast to the northeast. Net new shadow from the Project will shade a limited portion of Newbury Street and sidewalks to the northeast, and a portion of Massachusetts Avenue and sidewalks to the east.

Summer Solstice (June 21)

The net new shadows associated with the Project for June 21 are illustrated in Figure 6.3b. June 21 is the summer solstice and the longest day of the year. The sun rises at 5:07 AM EDT in the southeastern sky and sets at 8:24 PM EDT.

At 9:00 AM EDT on the summer solstice, net new shadow from the Project will extend westward over Ipswich Street, and on limited portions of the Turnpike and Newbury Street.

At 12:00 noon EDT, the sun is in the southwestern sky and shadows are cast to the north. The majority of net new shadow cast by the Project will fall within the Project site, and on a limited portion of Newbury Street, including sidewalks.

At 3:00 PM, the sun is in the western sky and shadows are cast east-northeast. The majority of net new shadow cast by the Project will fall within the Project site, and on a limited portion of Newbury Street and Massachusetts Avenue, including sidewalks .

At 6:00 PM EDT, the sun is in the west-northwestern sky and shadows are cast toward the east-southeast. Net new shadows from the Project will extend southeast over limited portions of Boylston Street and Massachusetts Avenue, including the sidewalks.

September 21st

The net new shadows associated with the Project for September 21 are illustrated in Figures 6.3c. September 21st is the autumnal equinox and the daytime and nighttime hours are equal. The sun rises at 6:31 AM EDT in the southeastern sky and sets at 6:42 PM EDT. The shadows cast on this date are almost identical to those on March 21, the vernal equinox, as described above.

The sun sets at 6:42 PM on the autumnal equinox and, therefore, the majority of the project area will be in existing shadow at 6:00 PM. At this time, the Project will result in minimal net new shadow that extends east over building rooftops.

Winter Solstice (December 21)

The net new shadows associated with the Project on December 21 are depicted on Figures 6.3d. December 21 is the winter solstice and the shortest day of the year. The sun is at its lowest inclination above the horizon at each hour of the day. Even low buildings cast long shadows in northerly latitudes, such as Boston. The sun rises at 7:10 AM EST and sets at 4:14 PM EST in December.

At 9:00 AM EST on the winter solstice, the Project casts a shadow to the northwest direction extending toward Newbury Street and Commonwealth Avenue, filling in gaps in the heavily shaded urban landscape. The net new shadow cast by the Project will cover a portion of the Turnpike and Newbury Street. Small sidewalk portions of Newbury Street will also be shaded, but the majority of new net shadows will land on existing buildings, creating minimal adverse effects on the pedestrian environment. The new incremental net shadow cast by the Project will reach a small portion of the northern sidewalk along westbound Commonwealth Avenue, but the Project will not add any net new shadows to the Commonwealth Mall.

At 12:00 EST noon, the sun is in the southern sky and the Project will cast limited net new shadows in a northeastern direction extending toward Newbury Street and Massachusetts Avenue, including limited sidewalks. The net new shadow from the Project will reach an incremental portion of the Commonwealth Mall along Massachusetts Avenue; however, the majority of net new shadows will fall within the Project Site or on existing buildings, creating minimal net new shadow on the pedestrian environment.

At 3:00 PM, net new shadow from the Project are long, and will extend northeast across Newbury Street and Massachusetts Avenue, filling in gaps in the heavily shaded urban landscape. Net new shadow will be cast on a limited portion of Newbury Street and Massachusetts Avenue, and an incremental portion of Commonwealth Avenue and the Commonwealth Mall, but the majority of net new

shadows will land on existing buildings, creating minimal adverse effects on the pedestrian environment.

In addition to the Large Project Review requirements set forth in Article 80B of the Code, a project in a PDA in the Huntington Avenue Prudential Center District (the "HAPC District"), must comply with additional shadow criteria set forth in Section 41-16(1) of the Code. Even through the Project Site is not located within the HAPC District, the Project has been designed to comply with the spirit and intent of the Section 41-16(1) shadow restrictions, and will not cast new shadows on any portion of dedicated public parkland for more than two hours between 8:00 AM and 2:30 PM on any day from March 21 through September 21.

6.4 Daylight

The BRADA program was developed in 1985 by the Massachusetts Institute of Technology to estimate the pedestrian's view of the skydome taking into account the 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 facades. 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 were taken from a combination of the BPDA City model, an existing conditions survey, and schematic design plans prepared by the Project's architects. As described above, the BRADA software considers the relative reflectivity of building facades 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 facades are considered non-reflective, resulting in a conservative estimate of daylight obstruction.

6.4.1 Viewpoints

The following viewpoints were used for this daylight analysis:

- **Boylston Street**– This viewpoint is located on the centerline of Boylston Street, centered on the southern side of the Project Site adjacent the proposed office building.
- **Massachusetts Ave.** – This viewpoint is located on the centerline of Massachusetts Ave. between Newbury Street and Boylston Street along the eastern side of the Project.
- **Newbury Street**– This viewpoint is located on the centerline of Newbury Street, centered on the northern side of the Project adjacent to the residential or hotel building.

These points represent existing and proposed building façades when viewed from the adjacent public way.

6.4.2 Results

Daylight Existing/No-Build Conditions

Under the Existing/No-Build Condition, the Site is undeveloped so the skydome is largely unobstructed. The existing skydome visible based on the viewpoint ranges from approximately zero percent at the Boylston Street and Massachusetts Avenue study points to 24.8 percent at the Newbury Street study point. The existing skyplane obstruction on Newbury Street is associated with the MassDOT ventilation tower.

Daylight Build Conditions

The Project-related daylight impacts for the viewpoints are presented in Figure 6.5a-c. Under the Proposed Conditions, the viewpoints along the three roadways are expected to experience an increase in skydome obstruction, as would be expected when increasing the height and massing on an urban site. The modest increase in skydome obstruction will be offset by substantial improvements to the public realm which are anticipated to improve the overall pedestrian experience as compared to existing conditions.

Skydome obstruction impacts are as follows:

- **Boylston Street** – The skydome obstructed from the Boylston Street study point will increase from zero percent to 81.1 percent. The increased skydome obstruction resulting from the Project shown in Figure 6.4a.
- **Massachusetts Avenue** – The skydome obstructed at the Massachusetts Avenue study point will increase from zero percent to 55.2 percent (Figure 6.4b).
- **Newbury Street Extension** – The skydome obstructed from the Newbury Street study point will increase from 24.8 percent to 89.5 percent at the study point (Figure 6.4c).

6.5 Solar Glare

The BPDA Development Review Guidelines require projects undergoing Large Project Review to analyze the potential impacts from solar glare on the following areas 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. In addition, the Project will be analyzed for the potential impact of solar glare on railroad operations.

A detailed review of the potential impacts from solar glare on the project area are presented below.

6.5.1 Methodology

A computer model of the Project and surrounding urban area was developed using proprietary software called Eclipse (refer to the full solar glare study provided in Appendix E for additional information). 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, including build-out of Air Rights Parcels 12 and 13 and the Berklee College of Music Crossroads project. These future projects were based on the currently proposed building height and massing, which are subject to change.

Several receptor locations with three types of receptors were utilized to understand the visual (glare) impacts on drivers, pedestrians and building façades. Refer to Table 3 of the solar glare study provided in Appendix E for the receptor locations and descriptions.

The solar glare analysis used "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 was performed to assess the frequency, intensity and duration of the glare events. Reflections from existing structures were not accounted for; although shadows from these structures were factored in.

Glazed surfaces on the podium level were modeled a visible and full spectrum reflectance of 11 and 39 percent, respectfully. Glazed surfaces on the office building and residential/hotel buildings were modeled a visible and full spectrum reflectance of 29 and 37 percent, respectfully.

Visual Glare Criteria

- **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.

Thermal Impact Criteria

- **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.

6.5.2 Solar Glare Study Findings

Analysis results are provided in Appendix E. Visual glare and thermal impacts are as follows;

Visual Glare

Drivers traveling east on the Turnpike are expected to experience potentially infrequent high impact glare between 4:00 PM and 6:00 PM EST in March, April, August and September, that is limited to within approximately 180 feet of the building, and occurs at most 129 days annually with a maximum duration of 45 minutes, representing less than two percent of daytime per year. Possible impacts occur during a time when eastbound traffic volumes tend to be lower. Additionally, any potential impacts will be momentary, and would be expected to last less than three seconds[2] given the high speed of vehicle travel and the short distance before the vehicle travels underneath the Project Site on the Turnpike. The impacts beyond approximately 180 feet from the Project are generally brief and infrequent.

Drivers traveling west on Newbury Street towards Massachusetts Avenue have the potential to experience potentially brief and infrequent high impact glare between 5:30 PM and 6:30 PM EST from mid-April through mid-August that occur at most up to 122 days per year with a maximum duration of up to 11 minutes per day, representing less than one percent of the daytime per year. However, this glare occurs at a time when the sun would already be generally in a westbound driver's field of view, so drivers would likely already be expecting a bright light source, and would have taken mitigation measures (i.e. lowering the sun visor, and/or putting on sunglasses). Additionally, once a driver has traveled west of Massachusetts Avenue, the limited potential for high impact glare from the Project is eliminated.

Southbound drivers on Massachusetts Avenue are not expected to experience any potential glare impact until they approach the Newbury Street intersection. At this location very brief and infrequent high impact glare events, are possible between

[2] Assumes a vehicle traveling 60 miles per hour across 180 feet.

approximately 5:30 AM and 5:45 AM EST, which is at a time of day where very low traffic volumes are likely. The potential infrequent impacts occur at most up to 50 days per year with a maximum duration of up to nine minutes per day, representing less than 0.2 percent of the daytime.

Northbound drivers on Massachusetts Avenue can potentially experience similarly brief and infrequent high impact glare events at Boylston Street from approximately 3:00 PM and 4:00 PM EST during mid-January to early-February, and again in early to mid-November. Potential infrequent glare can occur at most up to 36 days per year, with a maximum duration of up to 10 minutes per day, representing less than 0.1 percent of the daytime.

Westbound drivers on Boylston Street can potentially experience high impact glare can occur events from approximately 3:30 PM to 4:30 PM EST during January, February, October and November. These potential infrequent, high impact events can occur at most up between 88 and 99 days per year with a maximum duration of up to 15 minutes, representing less than 1.2 percent of the daytime. This potential, infrequent glare also occurs at a time when the sun would already be in a driver's field of view, and so they would likely have already taken mitigation measures such as those discussed above.

Eastbound drivers on Boylston Street have the potential to experience infrequent high impact glare during less than 30 days per year with an average duration of up to five minutes, representing less than 0.05 percent of the daytime.

Thermal Impact of Reflections

The study found that no significant thermal impacts are predicted at any of the study points (all points are rated as Low) as a result of the Project. The results of the visual glare study are illustrated in Figure 7 of the complete solar glare study provided in Appendix E.

6.6 Air Quality

This section presents an overview of the air quality assessment for the Project. The purpose of the air quality assessment is to demonstrate that the Project will not result in a violation of applicable local, state, and federal air quality standards. Boston, in Suffolk County, is in attainment for all National Ambient Air Quality Standards (NAAQS) criteria pollutants except for the 8-hour (1997 Revoked) and 1-hour (1979 Revoked) Ozone standards. The county is also in maintenance for carbon monoxide.

As demonstrated in Section 6.6.1, the Project does not require a mesoscale analysis per the screening criteria established by the BPDA. A discussion of the CO microscale assessment is presented, per BPDA Development Review Guidelines under Section 6.6.2. The air quality study considers the local effects of carbon monoxide (CO) emissions from the parking garage under Section 6.6.3. Finally, a discussion of potential stationary sources associated with the Project and possible permits is provided in Section 6.6.4.

6.6.1 Mesoscale Analysis

The purpose of the mesoscale analysis is to estimate the area-wide emissions of VOC and NOx during a typical day in the peak ozone season (summer) consistent with the requirements of the State Implementation Plan ("SIP"). A mesoscale analysis evaluates the change in VOC and NOx emissions from average daily traffic volumes and vehicle emission rates. To demonstrate compliance with the SIP criteria, the air quality study must show the Project's change in daily (24-hour period) VOC and NOx emissions.

The BPDA requires a mesoscale air quality analysis if a project produces 10,000 or more vehicle trips per day. The Project is not anticipated to generate over 10,000 or more vehicle trips per day, therefore this analysis is not required for the BPDA and no mesoscale air quality impacts are anticipated.

6.6.2 Microscale Analysis

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

The air quality assessment conducted for this Project includes a localized analysis of CO concentrations. The microscale analysis evaluated CO concentrations from vehicles traveling through congested intersections in the area around the Project Site under the future conditions. The results from this evaluation were compared to the NAAQS.

Background

The CAAA resulted in states being divided into attainment and nonattainment 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, nonattainment 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; nonattainment areas are those where concentrations exceed the NAAQS. A maintenance area is an area that used to be nonattainment, but has demonstrated that the air quality has improved to attainment. After 20 years of clean air quality, maintenance areas can be re-designated as attainment areas. Projects located in maintenance areas are required to evaluate their CO concentrations on the NAAQS.

The Project is located in the City of Boston, which under the EPA designation, is a CO maintenance area. As such, CO concentrations need to be evaluated for this Project.

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. Table 6-3 presents the NAAQS for carbon monoxide.

Table 6-3 National Ambient Air Quality Standards

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

Carbon monoxide is directly emitted by motor vehicles, and the predominant source of air pollution anticipated from typical developments is emissions from project-related motor vehicle traffic. A product of incomplete combustion, CO is a colorless and odorless gas that prevents the lungs from passing oxygen to the blood stream. According to the EPA, 60 percent of CO emissions result from motor vehicle exhaust, while other sources of CO emissions include industrial processes, non-transportation fuel combustion and natural sources (i.e., wildfires). In cities, as much as 95 percent of CO emissions may come from automobile exhaust.[3]

Background Concentrations

The total CO concentrations that receptor locations will experience include background concentrations from other existing surrounding emission sources. Background concentrations are ambient pollution levels from other stationary, mobile, and area sources. 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 2nd-highest annual values from the previous three years. Looking at the air quality monitor closest to and most representative of the Project Site (the Kenmore Square monitor for the years 2014-2015 and Harrison Avenue for 2016)[4], the CO background values are 2.4 ppm for the 1-hour averaging time and 1.2 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	1.2 ppm	8-hour	9 ppm	8-hour
	2.4 ppm	1-hour	35 ppm	1-hour

Monitoring Location: Kenmore Square, Boston, MA. Years 2014-2015 (Station discontinued in 2016). Harrison Avenue, Boston, MA. Year 2016.

[3] U.S. EPA. 2003. National air quality and emissions trends report – 2003 special studies edition. EPA/454/R-03/005. Research Triangle Park, NC.

[4] The Kenmore Square monitoring station ceased CO monitoring in 2016. Harrison Avenue is the next closest station.

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.

BPDA Development Review Guidelines

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

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

As presented in Chapter 5, *Transportation*, the traffic analysis indicates that the LOS at two of the study intersections will remain at or decline to D, E, or F under the build condition. As such, a microscale analysis was conducted pursuant to the BPDA Development Review Guidelines.

Microscale ("Hot Spot") Analysis Methodology

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

The microscale analysis calculates maximum 1-hour and 8-hour CO concentrations in the Project area during the peak CO season (winter). EPA's Office of Transportation and Air Quality ("OTAQ") has developed the Motor Vehicle Emission Simulator ("MOVES2014a"). Emission factors were developed using the MOVES2014a program, and were combined with the traffic data in EPA's computer model CAL3QHC Version 2.0[5] model to calculate the CO worst-case concentrations. EPA's CAL3QHC is an air quality dispersion model that applies emission factors obtained from MOVES2014a to projected traffic conditions in order to obtain localized pollutant concentrations at real-world locations.

The microscale analysis utilized the traffic (volumes and speeds) and emission factor data for the 2025 No Build and 2025 Build Conditions. These data were incorporated into air quality models and demonstrate that the Project will meet the CAAA criteria. The microscale analysis calculated CO concentrations at congested intersections near the Project Site under the No Build and Build conditions for comparison

[5] User's Guide to CAL3QHC Version 2.0: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections, US Environmental Protection Agency, Office of Air Quality Planning and Standards, Technical Support Division; Research Triangle Park, NC; EPA-454/R-92-005; November 1992

purposes. The worst-case CO concentrations were added to the background levels to determine if the Project's concentrations complied with the NAAQS.

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

Emission Rates

All the vehicle emission factors used in the microscale analysis were obtained using the EPA's MOVES2014a emissions model. MOVES2014a calculates CO emission factors from motor vehicles for free-flow conditions in grams per vehicle mile and for idling conditions in grams per vehicle hour. The emission rates used in this study were developed with the data provided by DEP. The emission factors for the microscale analysis were based upon a morning peak hour on a typical weekday in the winter for Suffolk County and were calculated for idle and free-flow conditions based upon roadway travel speeds and grades.

Traffic Data

The air quality study evaluates the air quality impacts of the vehicular traffic associated with the Project on the environment. The vehicle traffic represents the worst-case conditions, which includes the increase in traffic volumes due to specific developments proposed for the study area, projected traffic growth over time, and future traffic associated with the Project. The air quality study utilizes traffic and emissions data for the future No-Build and future Build Conditions. These data are incorporated into the EPA air quality models to generate air pollutant concentrations that demonstrate whether or not the Project would have air quality impacts. The scenarios modeled include:

- **No-Build Condition (2025):** reflects background growth associated with other planned projects and general background regional growth.
- **Build Condition (2025):** assuming the 2025 No Build Condition background growth with the Project fully constructed and in operation.

Traffic data (volumes, delays, and speeds) was developed for each analysis condition. The traffic volumes and level of-service for the study area were evaluated, and based on the BPDA Development Review Guidelines, four intersections were selected for analysis:

- Boylston Street at Charlesgate
- Boylston Street at Massachusetts Avenue
- Boylston Street at Dalton Street
- Boylston Street at Project Driveway (Build Only)

The analysis considered the evening peak hour traffic conditions as intersection volumes and delays are generally larger.

Microscale Air Quality Study Results

The CO concentrations for each intersection under the No-Build and Build Conditions are presented in Table 6-5. The results show that there are minimal to no increases for 1-hour and 8-hour CO concentrations between the No Build and Build conditions due to the minor traffic volume increase and minimal intersection delays experienced at the study intersections. The 1-hour CO concentrations ranged from 2.5 to 2.8 ppm, and the 8-hour CO concentrations ranged from 1.3 to 1.5 ppm for the No-Build and Build conditions. The results of the microscale analysis demonstrate that the No Build and Build CO concentrations (both 1-hour and 8-hour values) for the Project are well below the NAAQS.

Table 6-5 Predicted Maximum 1-Hour and 8-Hour CO Concentrations

	1-Hour CO Concentrations (ppm)[1,2]		8-Hour CO Concentrations (ppm)[3,4]	
Intersection	No Build	Build	No Build	Build
Boylston/Charlesgate	2.8	2.8	1.5	1.5
Boylston/Massachusetts	2.6	2.6	1.3	1.3
Boylston/Dalton	2.5	2.6	1.3	1.3
Boylston/Driveway	-	2.6	-	1.3

Source: VHB, Inc.

- This intersection does not exist in the No Build scenario.

1 The concentrations are expressed in parts per million (ppm) and include a 1-hour background concentration of 2.4 ppm. The 1-hour NAAQS for CO is 35 ppm.

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

2 The concentrations are expressed in parts per million (ppm) and include an 8-hour background concentration of 1.2 ppm and a persistence factor of 0.7. The 8-hour NAAQS for CO is 9 ppm.

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

Conclusion of Microscale Analysis

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

- All the one-hour CO concentrations ranged from 2.5 to 2.8 ppm and are well below the CO NAAQS of 35 ppm.
- All the eight-hour CO concentrations ranged from 1.3 to 1.5 ppm and are below the CO NAAQS of 9 ppm.

The microscale study demonstrates that the Project conforms to the CAAA and the SIP because:

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

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

6.6.3 Parking Garage Emissions

The Project will include ventilation fans associated with the two levels of below-grade enclosed parking garage on the *terra firma* portion of the Project Site. The garage will have 150 total spaces across the two levels serviced by car lifts to transfer vehicles from the Boylston Street entrance to the below-grade levels. The parking garage will only be used by light-duty vehicles. Carbon monoxide can be a pollutant of concern for mechanically ventilated parking garages.

The garage is expected to experience the most usage during the evening peak hour when 79 vehicles will exit the garage and 35 vehicles will enter. CO emissions from a parking garage are composed multiple vehicle activities including: vehicle starts, idling at the parking spot, traveling to and from the entrance and idling on the car lift. As vehicle starts are only associated with vehicles exiting the garage, garage "outs" produce more CO emissions than vehicles entering the garage.

Preliminary design of the garage ventilation system has determined that CO emissions from the garage will be exhausted through vents underneath the Project facing the MBTA right of way and the Turnpike. As these are not areas to which the public has access, they are not considered receptor locations by EPA Guidelines in a microscale analysis.[6,7] Emissions emanating from the garage in the tunnel under the Project will be appropriately ventilated and dispersed by tunnel fans so as not to cause poor air quality or exceedances of the NAAQS criteria. As such, no significant adverse air quality impacts are anticipated from the parking garage.

[6] Guideline for Modeling Carbon Monoxide from Roadway Intersections. U.S. Environmental Protection Agency. EPA-454/R-92-005. November 1992.

[7] Using MOVES2014 in Project-Level Carbon Monoxide Analyses. U.S. Environmental Protection Agency. EPA-420-B-15-028. March 2015.

6.6.4 Stationary Source Emissions and Permitting

Sizable combustion equipment (emergency generators, boilers, etc.) with the potential to emit air pollutants at the Proposed Project may be subject to air permitting under 310 CMR 7.00. MassDEP has established the "Environmental Results Program" (ERP) to streamline the certification process of smaller combustion equipment subject to permitting regulations.

The exact sizes, makes, models of equipment to be used by the Project is currently unknown and will be determined throughout the design process. However, equipment that is likely to be used at the Project, such as boilers or emergency generators, may be subject to permitting regulations. If a boiler with a rated capacity between 10 to 40 MMBtu per hour is used on the site, the Proponent will submit the appropriate self-certification forms under the ERP process before the installation of the boiler. Additionally, if an emergency generator with a rated capacity equal to or greater than 37 kW is used on the site, the Proponent will submit the appropriate self-certification forms under the ERP process within 60 days of generator startup. During the ERP process, the stationary sources will be required to show compliance with all applicable air quality regulations in order to ensure public health and safety.

6.7 Water Quality

The Project is expected to comply with the MassDEP Stormwater Management Standards and improve the quality of stormwater runoff from the Project Site and reduce its quantity compared to the existing condition. The Project intends to comply with both the 2008 DEP Stormwater Management Policy and Standards and local requirements set forth by the Boston Water and Sewer Commission (BWSC) to the maximum extent practicable. One such requirement includes the infiltration of the first inch and a quarter of stormwater over the site impervious area to supplement groundwater elevations in the Groundwater Conservation Overlay District (GCOD). As a Project located in the GCOD, as defined in Article 32 of the Zoning Code, and, therefore, site infiltration systems must be sized to promote the infiltration of the 1.25-inch volume over the proposed impervious area. In addition to promoting groundwater levels, the implementation of stormwater management practices will improve water quality and runoff in comparison to existing conditions. The Project intends to improve water quality by collecting and treating stormwater runoff through a series of infiltration or recharge systems, which will be determined as the Project progresses in design. Best Management Practices (BMPs) designed to remove oil, floatables, and Total Suspended Solids (TSS). Prior to discharge into the city's existing utility infrastructure, runoff from the Project Site will generally be directed to recharge systems designed to infiltrate stormwater runoff in order to replenish groundwater and promote phosphorous removal. Chapter 8, *Infrastructure*, provides a complete description of the existing and proposed stormwater management systems, to the extent these systems are designed, and provides a summary of the Project's compliance with the MassDEP Stormwater Management Standards.

6.8 Flood Hazard

According to the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) (panel 25025C0077J, dated 03/16/2016) information, the Project Site is not located within a special flood hazard area. While the potential results of climate change, including rising sea levels and more frequent extreme storms, increase the probability of flooding, according to the Coastal Flood Exceedance maps included in the *MassDOT-FHWA Pilot Project Report: Climate Change and Extreme Weather, Vulnerability Assessments and Adaptation Options for the Central Artery*, the Project Site is not at high risk of inundation from sea level rise and flooding during its design life. This is primarily due to the Project's location above the Turnpike and the MBTA commuter rail tracks. A further study will be conducted to determine the risk of inundation of the vent building from sea level rise and/or flooding during the longer design life (75-100 years) of the MBTA vent building. Chapter 3, *Sustainability/Green Building Design and Climate Change Preparedness*, provides a more in-depth discussion of sea level rise and extreme flooding.

6.9 Noise

The noise assessment evaluated the potential noise impacts associated with the Project's activities, including mechanical equipment and loading activities. This section discusses the fundamentals of noise, the City's noise standards, noise analysis methodology, existing ambient sound levels, and potential future sound levels associated with the Project's operations.

The assessment demonstrates that the proposed Project will comply with City's noise regulations. Based on preliminary design, the Project's operations will have no adverse noise impacts at nearby sensitive receptor locations.

6.9.1 Fundamentals of Noise

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

Table 6-6: Common Outdoor and Indoor Sound Levels

Outdoor Sound Levels	Sound Pressure (μPa)*		Sound Level dB(A)**	Indoor Sound Levels
	6,324,555	-	110	Rock Band at 5 m
Jet Over Flight at 300 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

Source: Highway Noise Fundamentals. Federal Highway Administration, September 1980.

* 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. 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. The Leq sound level accounts for varying fluctuations of sound energy during an interval and provides a uniform method for comparing sound levels that vary over time.

6.9.2 Methodology

The noise study evaluated the potential noise impacts associated with the proposed Project's operations, which include mechanical equipment and loading/service activities. The assessment included measurements of existing ambient background sound levels and a qualitative evaluation of potential noise impacts associated with the proposed mechanical equipment (such as HVAC systems) and loading/service activities. The study area was evaluated and sensitive receptor locations near the proposed Project site were identified and examined. The site layout and building design, as they relate to the loading areas and management of deliveries at the Project site were also considered. The analysis considered sound level reductions due to distance, proposed building design, and obstructions from surrounding structures.

Receptor Locations

The noise study included an evaluation of the study area to identify nearby sensitive receptor locations, which typically include areas of sleep and areas of outdoor activities. This assessment identified six residential areas near the Project site that would have the most potential for exposure to the proposed Project's activities. As shown on Figure 6.6, the receptor locations include the following:

- R1 – Newbury Street West;
- R2 – Newbury Street East;
- R3 – Massachusetts Avenue/Newbury Street;
- R4 – Massachusetts Avenue/Boylston Street;
- R5 – Boylston Street; and
- R6 – Ipswich Street.

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

6.9.3 City of Boston Noise Impact Criteria

The City 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 Project 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 Code, the Air Pollution Control Commission of the City of Boston has adopted Regulations for the Control of Noise in the City. These regulations establish maximum allowable sound levels based upon the land use affected by the proposed development. Table 6-7 summarizes the allowable sound levels that should not be exceeded.

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).

Table 6-7: 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.

6.9.4 Existing Noise Conditions

Noise measurements were conducted along the property line of the Project Site to establish existing ambient sound levels representative of the nearby sensitive receptor locations. The existing sound levels were measured using Type 1 sound analyzers (Larson Davis SoundExpert LxT). Measurements were conducted at six locations, shown in Figure 6.5, 20 minutes during each period to capture sound levels representative of typical weekday daytime and nighttime periods. The daytime measurements were conducted between 10:00 AM and 2:00 PM on June 7, 2018. The nighttime measurements occurred from approximately 3:00 AM to approximately 5:00 AM on June 8, 2018. The existing measured sound level data are summarized in Table 6-8.

Table 6-8: Existing Ambient Sound Levels, dB(A)

	City of Boston Residential District Noise Standard		Measured L90 Sound Levels	
Monitoring Location	**Daytime**	**Nighttime**	**Daytime**	**Nighttime**
M1 – Newbury Street West	60	50	70.4	56.3
M2 – Newbury Street East	60	50	65.9	57.2
M3 – Massachusetts Ave North	60	50	69.9	59.9
M4 – Massachusetts Ave South	60	50	62.9	63.9
M5 – Boylston Street	60	50	64.4	57.9
M6 – Ipswich Street	60	50	67.4	53.5

Source: VHB

Note: Refer to Figure 6.5 for noise monitoring locations.
Measured sound levels represent hourly L90 levels.

The measured L90 sound levels range from approximately 63 dB(A) to approximately 70 dB(A) during the daytime period in the surrounding neighborhoods. During the nighttime period, the neighborhoods experience sound levels ranging from approximately 54 dB(A) to approximately 64 dB(A). The result of the noise monitoring program indicates that the sound levels in the surrounding neighborhoods adjacent to the Project Site are currently exceeding the City's daytime and nighttime standards for a Residential District. During the daytime period, the measured sound levels data were predominantly vehicles traveling on the surrounding roadways, such as I-90, Massachusetts Avenue, Boylston Street, and Ipswich Street. Along Newbury Street, noise associated with building ventilation systems were also audible during the measurement periods. The measured sound levels during the nighttime also exceeds the City's nighttime standards. The nighttime period sound levels were generally associated with similar sources. The noise associated with the building ventilation equipment along Newbury Street seem to be more audible during the nighttime period as there were less traffic to mask the ventilation noise.

6.9.5 Future Noise Conditions

The noise analysis assessed the potential noise impacts associated with the Project's mechanical equipment and loading activities. The analysis evaluated the potential sound level impacts at the nearby areas.

Mechanical Equipment

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:

- Energy recovery air handling units,
- Heating, ventilation and air conditioning (HVAC) units,

- Exhaust fans,
- Cooling towers,
- Boilers, and
- Emergency generators.

The Project will incorporate noise attenuation measures as necessary to comply with City's noise criteria at the sensitive receptor locations. During the design and selection process, the mechanical equipment will be strategically located to minimize potential noise impacts, such as setting on the building's rooftop. The appropriate low-noise mechanical equipment will be selected, including potential noise mitigation measures, such as acoustical enclosures and/or acoustical silencers.

The rooftop mechanical equipment would be strategically located on the rooftop enclosed within a mechanical penthouse to minimize the impacts to the surrounding sensitive receptor locations. Additionally, noise attenuation can also be achieved by utilizing the building structure. The proposed building heights range from approximately 150 feet to 237 feet tall. The proposed height would be equal to or greater than the heights of the surrounding sensitive receptors. The proposed building rooftops could serve as a barrier by breaking the direct line of exposure between the potential rooftop noise sources and nearby receptor locations. As such, the sound levels associated with the Project's mechanical equipment are expected to be insignificant at the surrounding sensitive receptor locations.

Emergency generators are generally considered for life safety purposes, such as emergency exit lighting. The proposed Project will be required to adhere to Massachusetts Department of Environmental Protection's (MassDEP's) regulations that require such equipment to be certified and registered when installed. As part of the air permitting process, proposed generators will be required to comply with additional noise requirements described in MassDEP regulations under the Codes of Massachusetts Regulations (310 CMR 7.00). At the proper time during the construction phase, the Proponent will submit the appropriate permit application or certification to MassDEP, which would include noise mitigation measures, such as acoustic enclosures and exhaust silencers as necessary to meet MassDEP's noise criteria.

Service and Loading Activities

Loading activities are expected to occur in designated loading areas at the ground/lower level of the Project. The loading area is expected to be located internally, below the proposed building structure. The loading activities will be managed so that service and loading operations do not impact traffic on the adjacent roadways. Since loading activities will be enclosed and will be managed, potential noise impacts to nearby sensitive receptor locations are expected to be negligible.

6.9.6 Decking Impact Assessment

The Project consists of creating a deck over I-90, which essentially extends the existing tunnel traveling under the Prudential Center. By decking over the Turnpike , the Project extends the tunnel system approximately 125 feet to 180 feet on the western termini of the tunnel. This extension will reduce noise attributed to traffic traveling on I-90 as it will serve as a barrier as it encloses this portion of the roadway and provide shielding to the sensitive receptors abutting this portion of I-90.

6.9.7 Conclusion of Noise Impact Assessment

The noise analysis determined that the sensitive receptor locations near the Project Site currently experience sound levels above the City's noise standards during both the daytime and nighttime periods. Based on preliminary design, the proposed Project's operations will have no adverse noise impacts at nearby sensitive receptor locations. During the design of the proposed buildings, the mechanical equipment will be located within a mechanical penthouse on the roof of the proposed buildings and election of low noise equipment will be considered to minimize sound levels at nearby sensitive receptor locations.

6.10 Solid and Hazardous Wastes

The Project Site is not currently a Listed Disposal Site under the Massachusetts Contingency Plan (MCP) at 310 CMR 40.000. However, test borings identified the presence of miscellaneous urban fill that may require special handling and management during construction if it is to be transported off-site.

No hazards to public health or nearby residents will be created during construction of the Project. No hazardous waste will be generated by the construction of the Project. Soil in the planned excavation area will be sampled and tested prior to excavation, and if necessary, managed in accordance with the Massachusetts Contingency Plan (MCP) and applicable DEP policies.

A soil pre-characterization program to define environmental quality of soil and groundwater relative to presence of any oil or hazardous materials (O&HM) will be undertaken during design to define environmental quality of materials to be excavated during construction. The program will include soil and groundwater sampling and chemical analysis for the full suite of chemical constituents required by receiving facilities. Excavated soil will be characterized in groups based on the chemical test results and a soil management plan. Any reporting obligations or response actions required under the MCP will be identified early based on the pre-characterization program and timing of regulatory filings identified. Management of all material excavated from the site will be in accordance with applicable laws and regulations.

6.11 Groundwater

General Observations

In 2014, groundwater observation wells were installed in completed test borings located on the south and north sides of the Project Site. Groundwater levels were observed shortly after installation of the wells to be between 20.6 ft and 23.4 ft below ground surface, or corresponding to approximately El. 5.9 and El. 5.6.

GCOD

The Project Site is located within the limits of the GCOD as established by Article 32 of the Code. The new construction will be designed and constructed in a manner to avoid adverse impacts on groundwater levels and include a suitably designed storm water collection and infiltration system to recharge groundwater.

The lowest parking level below the office building will be approximately at or slightly below area groundwater levels. Temporary construction dewatering will be required within the limits of watertight temporary excavation support system to conduct excavation and construction in the dry. Stormwater and groundwater within the excavation will be collected and discharged under appropriate permits.

6.12 Geotechnical

6.12.1 Site Conditions

The Project Site consists of filled land located on the original "Gravelly Point" peninsula of Boston, which was surrounded by former tidal marsh and later converted into the "full" and "receiving" basins used for tidal power in the early 1800s. Since then, site development has consisted of railroad and, later, highway development, and residential and commercial structures,

Five test borings were drilled on the Project Site as recently as 2014, generally located north and south of the Turnpike and the MBTA railroad alignment, as part of a due diligence phase subsurface investigation program for the Project. These test borings were drilled up to 200 ft below ground surface. Two of the test borings were advanced into bedrock.

The following subsurface conditions, listed below in order of increasing depth below ground surface, were observed at the Project Site during the aforementioned exploration program. Note that ground surface grades vary by up to approximately 20 ft between the MBTA railroad alignment and the north portion of the Project Site. Additional explorations will be undertaken during future design phases at adjacent locations for air rights projects. Subsurface conditions in the MBTA railroad alignment and Turnpike roadway surface will vary from the conditions described below.

6.12.2 Subsurface Soil and Bedrock Conditions

Miscellaneous Fill – The miscellaneous fill is highly variable and consists of loose to very dense sand and gravel intermixed with silt, bricks, concrete, cinders, steel, slag, old foundation structures, and other miscellaneous materials. The observed thickness of the fill ranged from about 21 to 28 ft at test borings locations. Remains of former structures, abandoned below-grade, were encountered in the miscellaneous fill at the test borings locations.

Organic Deposits – The organic deposits typically consist of soft to stiff organic soil and peat. The thickness of the organic deposits observed in the test borings ranged from approximately 4 to 8 ft.

Glaciofluvial Deposits – The glaciofluvial deposits typically consist of dense to very dense sand with gravel. Where penetrated, the thickness of the glaciofluvial deposits observed in the test borings ranged from approximately 15 to 18 ft.

Marine Deposits – The marine deposits typically consist of very soft to stiff lean clay, with an approximate thickness ranging from about 80 to 108 ft.

Glaciomarine and Glacial Till – Glaciomarine and glacial till deposits were observed in the test borings above bedrock. Glaciomarine deposits were described as hard lean clay, while glacial till was observed to consist of very dense silt and clay with gravel and cobbles. The thickness of the glaciomarine and glacial till deposits ranged from about 5 to 13 ft.

Bedrock – The bedrock below the Site is locally known as Cambridge Argillite. The bedrock is typically fractured at the top and increasing in quality with depth. Bedrock was encountered at depths of 130 and 180 ft below ground surface at two boring locations.

6.12.3 Proposed Construction and Mitigation Measures

The north portion of the Project Site is located adjacent to Newbury Street, MBTA Vent Building G-15B, On-Ramp "A" to the Massachusetts Turnpike (which will be demolished to accommodate the Project), Bridge Structure 54 (Massachusetts Avenue) over the Turnpike, roadway, and east and westbound lanes. The south portion of the Project Site is located adjacent to Boylston Street, an existing 7-story building, the MBTA rail alignment, and Bridge Structure 54 (Massachusetts Avenue) crossing the Turnpike. The construction will be completed using methodology which will not adversely impact adjacent structures. Performance criteria will be established and specified in the contract documents to minimize off site impacts.

Numerous utilities are present below-grade under Newbury and Boylston Streets. Bridge Structure 54 is anticipated to be supported on wood piles bearing in the sands below the site. The foundations supporting the adjacent building on Boylston Street are unknown at this time, however, we anticipate the building is supported in piles bearing below the unsuitable soils. The excavation on the south side of the

Project Site will be performed within a stiff excavation support system which will mitigate ground movement and maintain groundwater levels outside the excavation.

The Proponent recognizes the importance for maintaining and monitoring adjacent streets, utilities, structures, groundwater levels, as well as performance of the construction. A geotechnical instrumentation and monitoring program will be implemented to mitigate impacts. The program will include preconstruction condition surveys, groundwater level, movement and vibration monitoring. Performance criteria developed will be specified in the contract documents

6.13 Temporary Construction Impacts

There are many challenges associated with the construction on air-rights parcels, which will be worked through as a team prior to the start of construction. Some of these challenges include working over an active railroad and interstate highway, building a foundation that is intertwined with an active highway requiring the need to coordinate lane shutdowns, removing existing abutments/structures on both sides of the railroad, coordinating the construction of the overbuild and coordination with property owners/abutters, such as MassDOT, Amtrak/MBTA, and the BTD. These challenges greatly constrain building massing and design, specifically the structural considerations due to the limitations for where the building core and support footings can be located.

Impacts associated with the 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 and MassDOT prior to construction. The CMP will include detailed information on construction activities, specific construction mitigation measures, and construction materials access and staging area plans to minimize impact on the surrounding neighborhood and the Turnpike.

Construction methodologies that ensure public safety and protect nearby residents will be employed. Techniques, such as barricades, walkways, and signage will be used. Construction management and scheduling will minimize impacts on the surrounding environment and will include plans for construction worker commuting and parking, routing plans for trucking and deliveries, and control of noise and dust. The following section generally describes the potential construction-period impacts and proposed CMP elements, which are subject to refinement and modification as the design of the Project progresses.

6.13.1 Overview of Construction Approach

Construction on air-rights parcels require extensive coordination with multiple authorities having jurisdiction (AHJs) so work can be planned in concert with other projects in and around the areas. Regarding the structural considerations, the Construction Manager (CM) will coordinate foundation activities closely with MassDOT on lane closures and work restrictions. Because there are limited places to

install new foundations, those locations ultimately drive the building massing and design.

The CM will actively and regularly communicate construction activities, including closures and temporary routes of travel through the creation of a website. This aims to keep the community updated during construction.

Deck Construction

All work activities will be closely coordinated with the affected AHJs. Specifically, the foundations and structural overbuild will require alternate traffic patterns at certain days and times; however, it is imperative that the Project work is coordinated with other projects (e.g. 100 Boylston Street) to fully understand the total impacts to vehicular/transit operations and best mitigate them.

6.13.2 Construction Sequencing

As described in Chapter 1, *Project Description*, the Project includes construction of up to approximately 545,000 square feet of development consisting of up to approximately 325,000 square feet of commercial office uses, up to approximately 150,000 square feet of residential or hotel uses, up to 70,000 square feet of retail uses on the first and second floors, in addition to project-related parking, loading and service uses. The Project is currently anticipated to be constructed in a single phase, although it is possible that as a result of market conditions one building could be deferred to a Phase 2. The Proponent anticipates commencing site preparation work in 2019. The deep foundation work for the Podium, hotel/residential, and office buildings will follow the completion of the site preparation and utility work. Work on the Podium and office and residential/hotel building is expected to be complete in 2021.

The work zone will be confined by fencing and jersey barriers as well as covered pedestrian walkways along Boylston Street and Massachusetts Ave.

Typical hours of construction are from 7:00 AM to 6:00 PM, Monday through Friday. There may be occasions where work on selected Saturdays is necessary. Any specific instances requiring work outside of typical hours of construction will be identified and necessary permits will be obtained from the City of Boston. In addition, the Proponent will coordinate with MassDOT with respect to the timing of deck construction and other work above the Turnpike. It is anticipated that Project construction will require lane closures of the Turnpike, that will require review and approval of MDOT. The Proponent will work with MassDOT, MBTA, and Amtrak to determine what restrictions may need to be in place before a CMP is finalized and the impacts (work hours, lane closures, etc.) are identified.

6.13.3 Site Preparation and Staging

Construction site access will be from Boylston Street, to be determined as part of the final CMP. The construction area work zone will be confined by fencing and jersey

barriers as well as covered pedestrian walkways along Boylston Street, Massachusetts Avenue and Newbury Street.

Prior to the start of construction, existing utilities will be surveyed and mapped. No excavations will be performed until Dig Safe has been notified, and utilities marked. Existing public and private infrastructure located within the public right-of-way will be protected during construction. The installation of proposed utilities within the public way will be in accordance with the MWRA, BWSC, BPW, Dig Safe, and the governing utility company requirements, as applicable. All necessary permits will be obtained before the commencement of the specific utility installation. Specific methods for constructing proposed utilities will be reviewed by BWSC as part of its Site Plan Review process.

6.13.4 Stormwater Runoff/Erosion Control

A federal NPDES Permit is required because construction of the Project is anticipated to disturb over one acre of land. An overall site-specific Stormwater Pollution Prevention Plan (SWPP) will be developed in accordance with BWSC.

During Project construction, Erosion and Sediment Control (ESC) measures will be implemented to minimize the transport of Project Site soils to off-site areas and BWSC storm drain systems. The existing catch basins will be protected with filter fabric or silt sacks to provide for sediment removal from runoff. These ESC controls will be inspected and maintained throughout the construction phase until all areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover.

Other sediment controls, which will be implemented as needed during construction, will include the following:

- Staked hay bales and/or silt fence barriers will be installed at the base of stockpiled soils and at erosion-prone areas throughout the construction phase of the Project. The erosion controls will be maintained and replaced as necessary to assure their effectiveness;
- Where necessary, temporary sedimentation basins will be constructed to prevent the transport of sediment off-site;
- Measures to control dust will be implemented during construction. All debris will be properly contained on the Project Site; and
- Erosion controls will be maintained and replaced as necessary until the installation of pavement and the establishment of stabilized vegetation at the Project Site.

6.13.5 Pedestrian Safety and Access

Public safety is the primary consideration in all of Proponent's construction planning and building processes. Specific pedestrian crosswalks and re-routing measures will be taken to allow for adequate egress around the active construction zones.

The construction area work zone will be confined by fencing and jersey barriers as well as covered pedestrian walkways along Boylston Street, Massachusetts Avenue and Newbury Street.

A fenced lay down and work area will be established to separate construction activity from day-to-day pedestrian and vehicular traffic on the Project Site. Police detail will be provided, as required by the approved CMP.

6.13.6 Construction Traffic and Parking

Construction truck routes are expected to be Boylston Street, or Massachusetts Ave., subject to the approved CMP. Best efforts will be made to schedule major deliveries on non-peak traffic hours. Signage will be prevalent throughout the Project Site and surrounding streets informing vehicular and construction truck traffic alike of detours, as needed. Also, a security detail will be utilized to safely direct and manage construction-related traffic as well as routine traffic. The intent of the construction truck route will be to minimize the impact of construction truck traffic in the Project area and on other nearby roadways.

Construction Worker Parking

Because the workforce will arrive and depart prior to peak commuter traffic periods, the workforce trips are not expected to have a large impact on the area's transportation system. Construction workers will be strongly encouraged to arrive at the Project Site via public transportation. There will be no construction parking available at the Project Site for the workforce.

6.13.7 Air Quality and Dust

The construction contract for the Project will require the contractor to reduce potential emissions and minimize air quality impacts. Mitigation measures are expected to include the use of wetting agents where needed on a scheduled basis, covered trucks, minimizing exposed construction debris stored on-site, monitoring construction practices to ensure that unnecessary transfers and mechanical disturbances of loose materials are minimized, locating aggregate storage piles away from areas having the greatest pedestrian activity where and when possible, and periodic cleaning of streets and sidewalks to reduce dust accumulations.

The State's anti-idling law will be enforced during construction of the Project with the installation of on-site anti-idling signage at loading and drop-off/pick-up/waiting areas. In addition, the Proponent is committed to meeting the requirements of the DEP State Revolving Fund (SRF) for diesel construction equipment. These require that all non-road diesel equipment rated 50 horsepower or greater that will be used on a construction site meet EPA's Tier 4 emission limits or be retrofitted with appropriate emission reduction equipment. Emission reduction equipment includes EPA-verified, CARB-verified or DEP-approved diesel oxidation catalysts or diesel particulate filters.

6.13.8 Construction Noise

Intermittent increases in noise levels will occur in the short-term during construction of the Project. Efforts will be made to minimize the noise impact of construction activities, including appropriate mufflers on all equipment such as air compressors and welding generators, maintenance of intake and exhaust mufflers, turning off idling equipment, replacing specific operations and techniques with less-noisy ones, and scheduling equipment operations to synchronize the noisiest operations with times of highest ambient noise levels.

6.13.9 Construction Waste Management

The CM will take an active role regarding the processing and recycling of construction waste and will implement a Construction Waste Management Plan ("CWMP") for the Project. The CWMP will require the CM to contract with a licensed waste hauler that has off-site sorting capabilities. All construction debris will be taken off-site by the waste hauler, sorted as either recycled debris or waste debris and sent to the proper recycling center or waste facility. Construction debris will be wetted and covered to minimize air born dust particles. Prior to construction, construction and demolition debris will be diverted away from landfills and incineration facilities, and will be sought to reuse materials. A minimum 75 percent recycling/diversion rate will be targeted based on recent construction projects.

The Proponent does not anticipate any asbestos-containing material or other contaminated material on site.

6.13.10 Odor and Rodent Control

A significant effort will be made to minimize the potential for odor impact, if encountered, during the Project's construction activities. Mitigation measures that may be undertaken include:

- Vapor suppression sprays or foams;
- Remote air fresheners/filters placed around the Project Site; and
- Limiting the amount of open excavation at any one time.

The contractor will file a rodent extermination certificate as required with any building permit applications to the City. Rodent inspection, monitoring, and treatment will be carried out before, during, and at the completion of all construction work for the Project, in compliance with the City's requirements. Rodent extermination prior to work start-up will consist of treatment of areas throughout the Project Site. During the construction process, regular service visits will be made to maintain effective rodent control levels.

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COMMONWEALTH AVENUE

NEWBURY STREET

IPSWICH STREET

BOYLSTON STREET

MASSACHUSETTS AVENUE

HEREFORD STREET

GLOUCESTOR STREET

DALTON STREET

HEMENWAY STREET

MUDDY RIVER

LEGEND:

MEAN SPEED CATEGORIES:
- Sitting
- Standing
- Walking
- Uncomfortable
- Dangerous

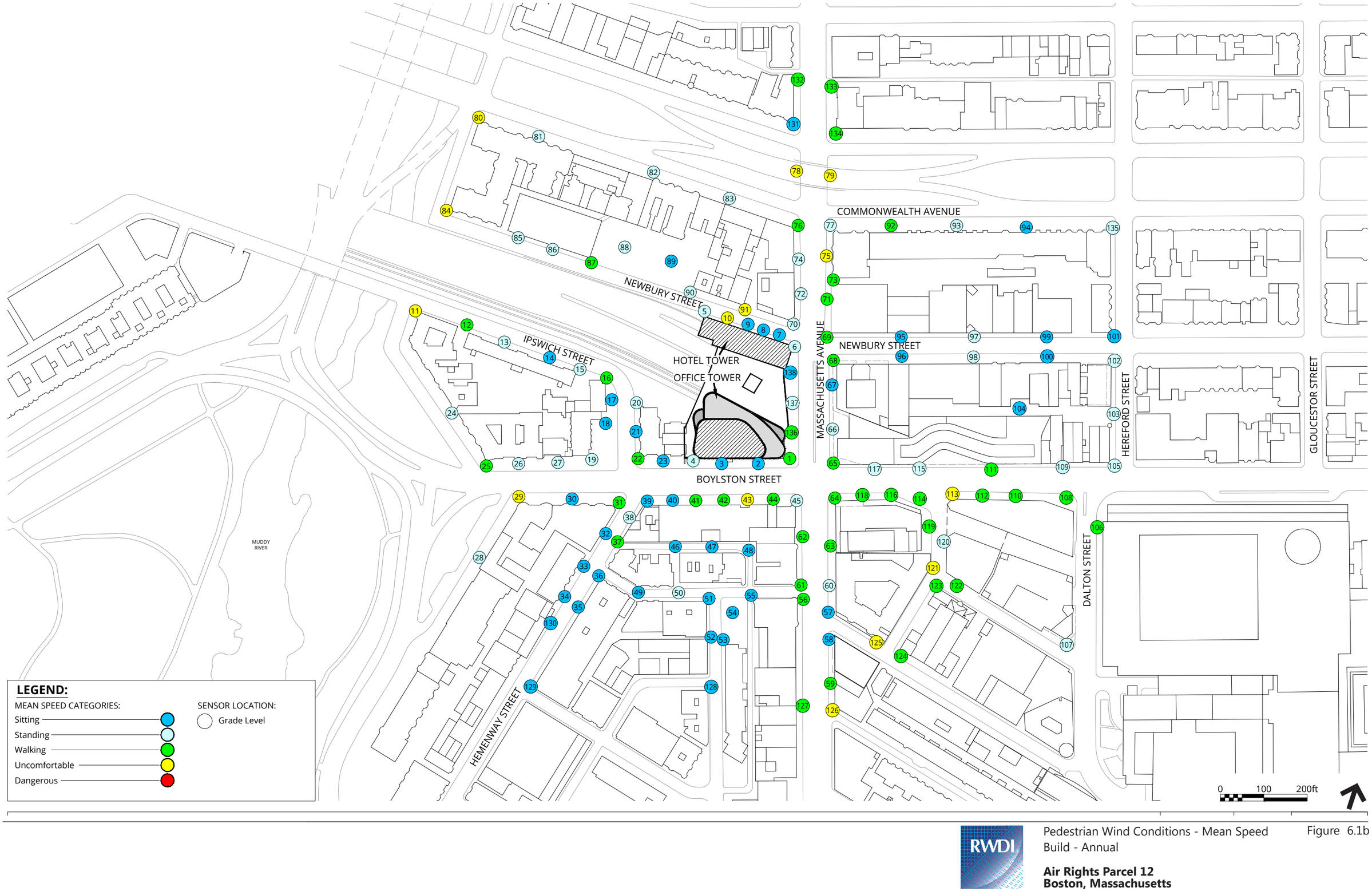
SENSOR LOCATION:
- Grade Level

0 100 200ft

Pedestrian Wind Conditions - Mean Speed
No Build - Annual

Figure 6.1a

Air Rights Parcel 12
Boston, Massachusetts



Pedestrian Wind Conditions - Mean Speed
Build - Annual

Figure 6.1b

Air Rights Parcel 12
Boston, Massachusetts

COMMONWEALTH AVENUE

NEWBURY STREET

IPSWICH STREET

BOYLSTON STREET

MASSACHUSETTS AVENUE

HEREFORD STREET

GLOUCESTOR STREET

DALTON STREET

HEMENWAY STREET

MUDDY RIVER

LEGEND:

EFFECTIVE GUST SPEED CATEGORIES:

Acceptable

Unacceptable

SENSOR LOCATION:

Grade Level

0 100 200ft

Pedestrian Wind Conditions - Effective Gust Speed Figure 6.2a
No Build - Annual

Air Rights Parcel 12
Boston, Massachusetts

COMMONWEALTH AVENUE

NEWBURY STREET

IPSWICH STREET

HOTEL TOWER

OFFICE TOWER

BOYLSTON STREET

MASSACHUSETTS AVENUE

HEREFORD STREET

GLOUCESTOR STREET

DALTON STREET

HEMENWAY STREET

MUDDY RIVER

LEGEND:

EFFECTIVE GUST SPEED CATEGORIES:

Acceptable

Unacceptable

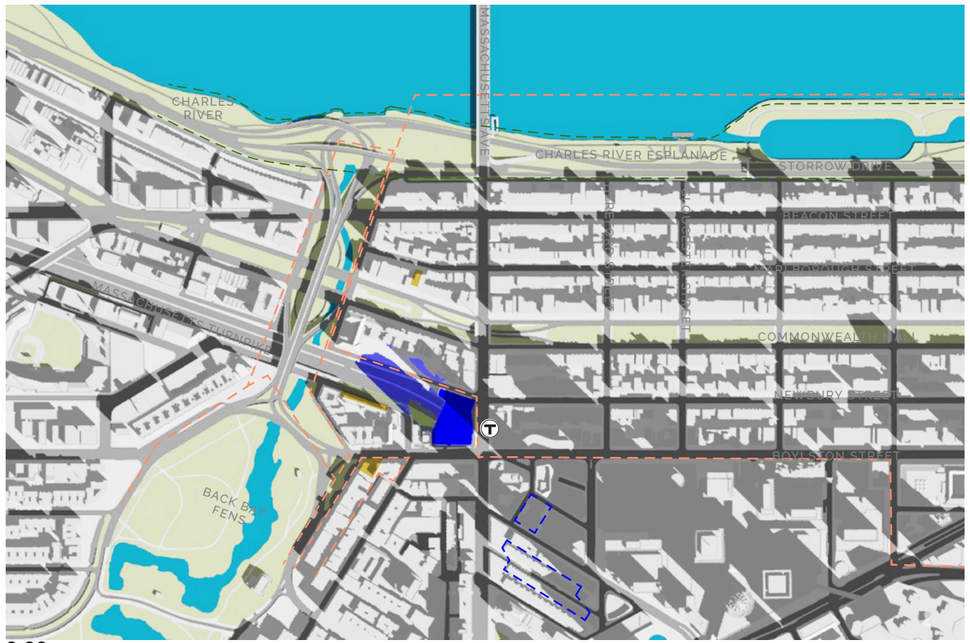
SENSOR LOCATION:

Grade Level

0 100 200ft

Pedestrian Wind Conditions - Effective Gust Speed Figure 6.2b
Build - Annual

Air Rights Parcel 12
Boston, Massachusetts



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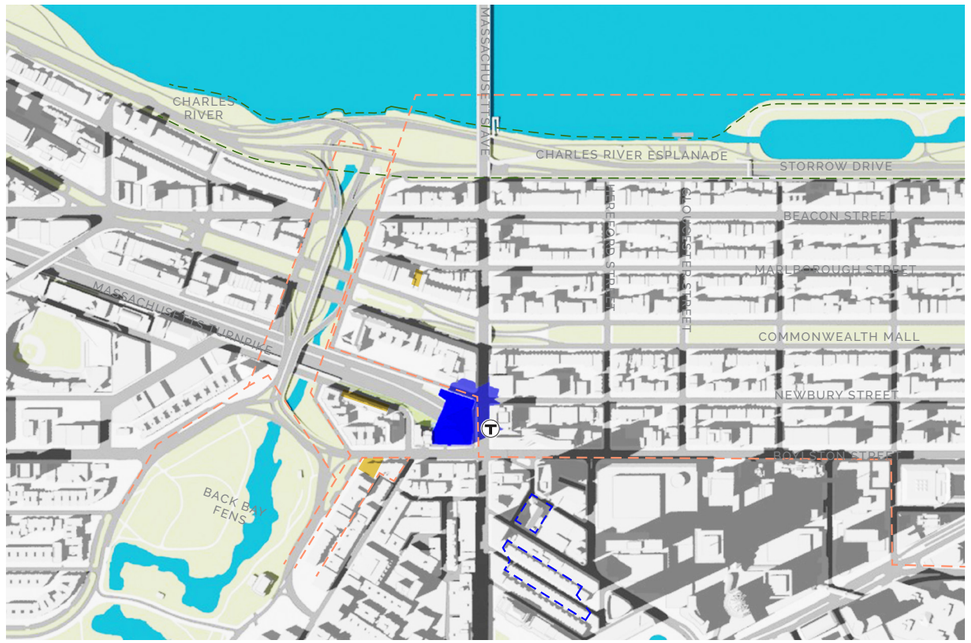

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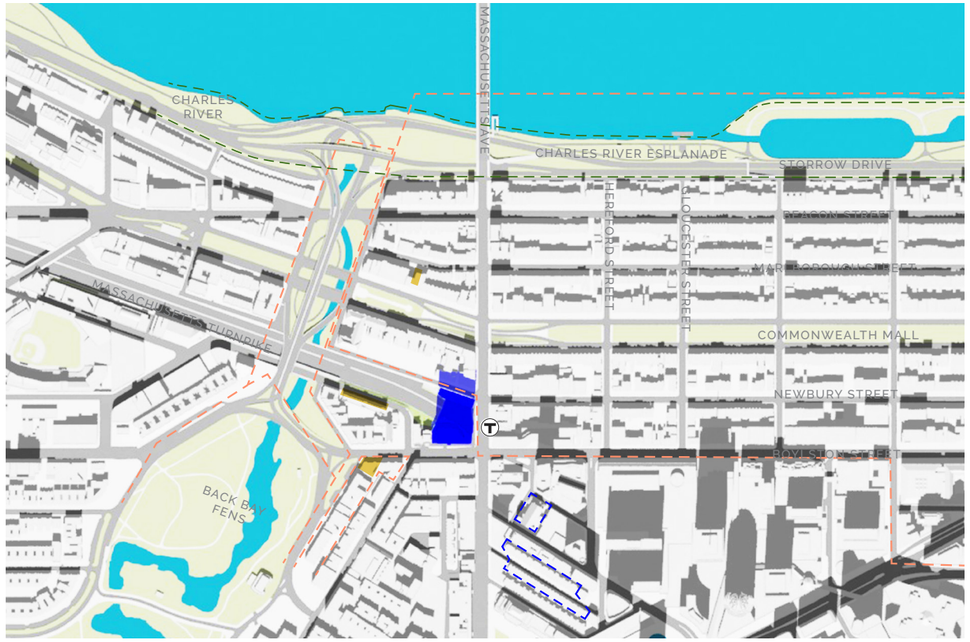

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PROJECT

NET NEW SHADOWS OF PROPOSED PROJECT (484')

EXISTING SHADOWS

NATIONAL HISTORIC LANDMARK

NATIONAL REGISTER OF HISTORIC PLACES DISTRICT

INVENTORIED AREA

CHARLES RIVER BASIN HISTORIC DISTRICT

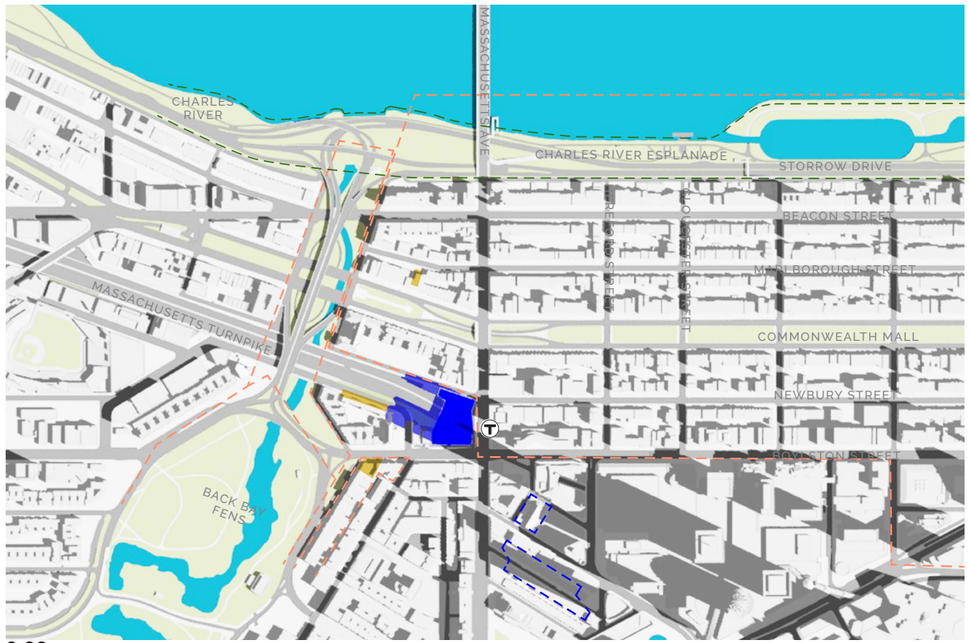
PUBLIC OPEN SPACE

0 300 600 Feet

ELKUS | MANFREDI ARCHITECTS

Shadow Study - March 21
Air Rights Parcel 12
Boston, Massachusetts

Figure 6.3a



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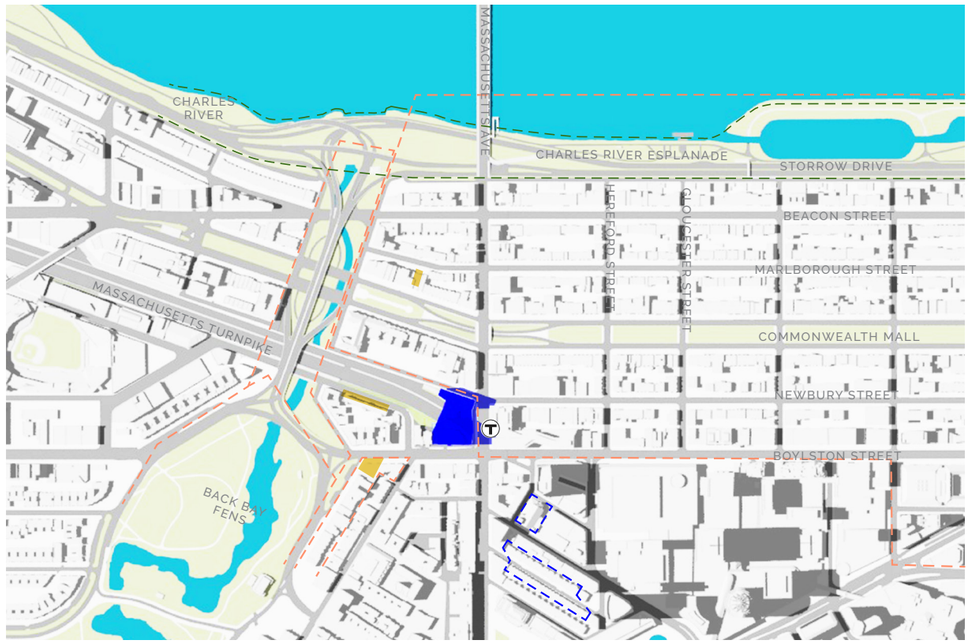

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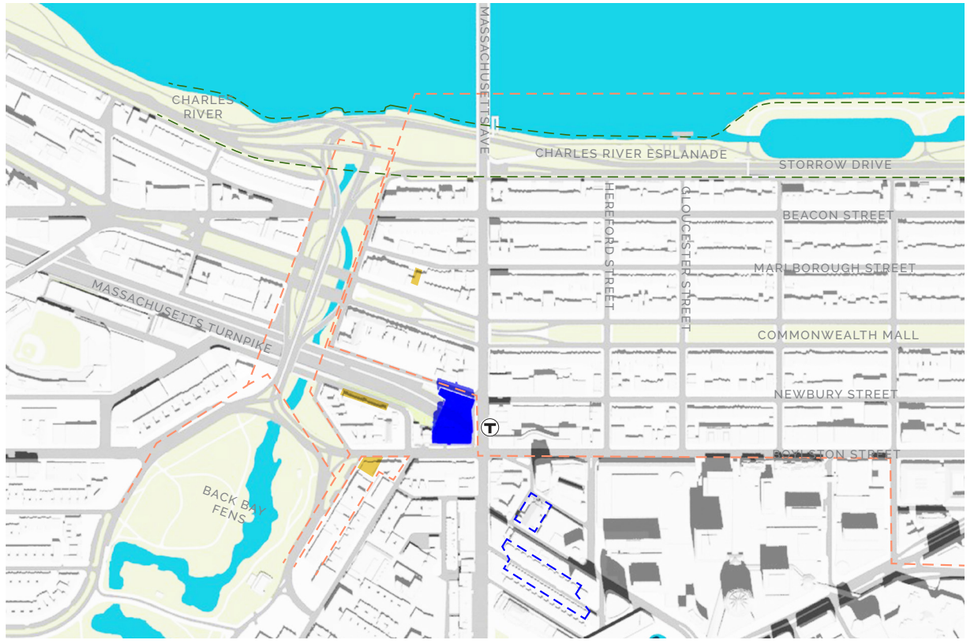


12:00 pm

6:00 pm

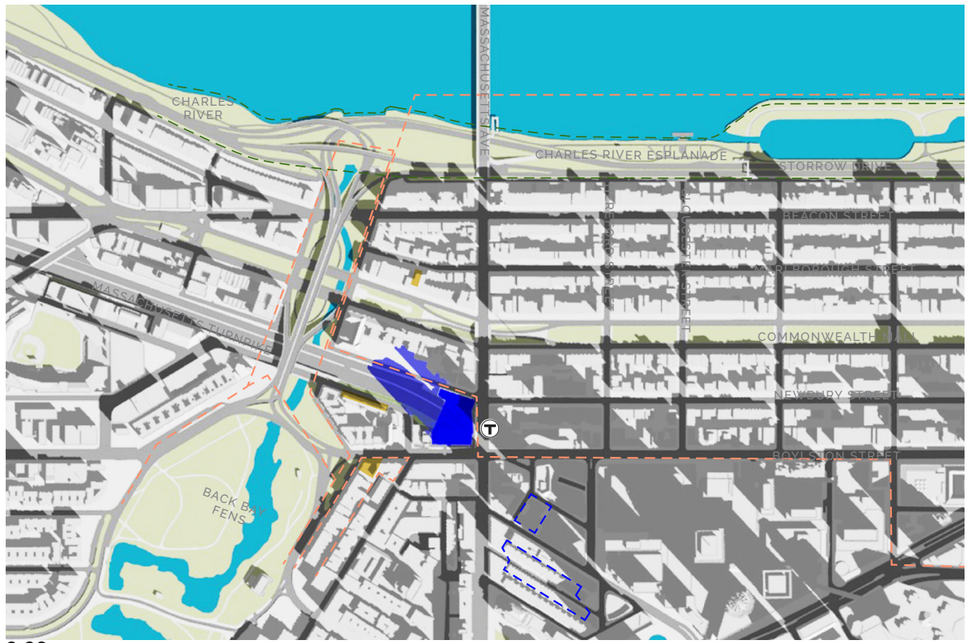
- PROJECT
- NET NEW SHADOWS OF PROPOSED PROJECT (484')
- EXISTING SHADOWS
- NATIONAL HISTORIC LANDMARK
- NATIONAL REGISTER OF HISTORIC PLACES DISTRICT
- INVENTORIED AREA
- CHARLES RIVER BASIN HISTORIC DISTRICT
- PUBLIC OPEN SPACE

0 300 600 Feet

ELKUS | MANFREDI ARCHITECTS

Shadow Study - June 21
Air Rights Parcel 12
Boston, Massachusetts

Figure 6.3b



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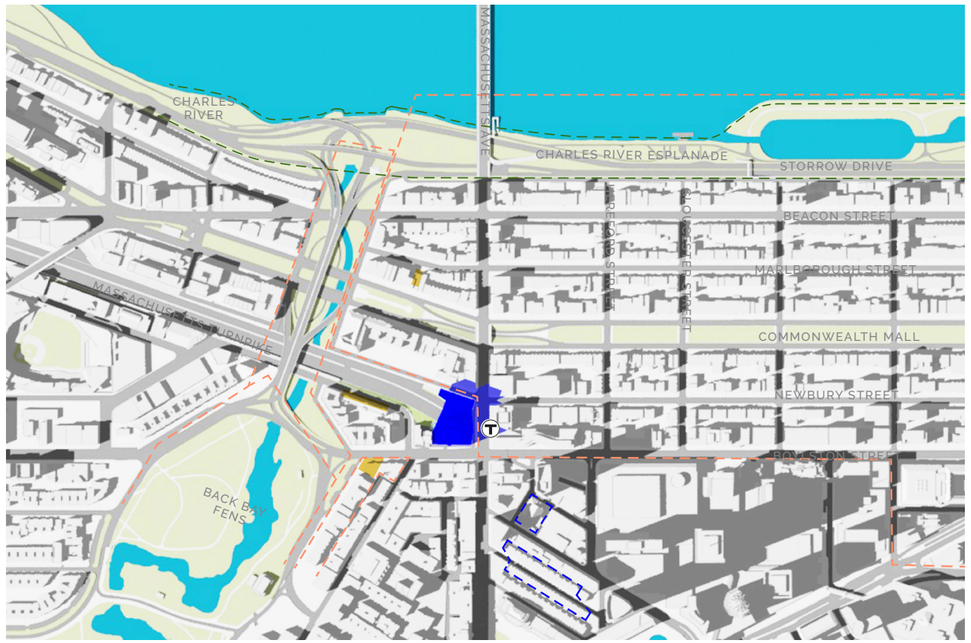

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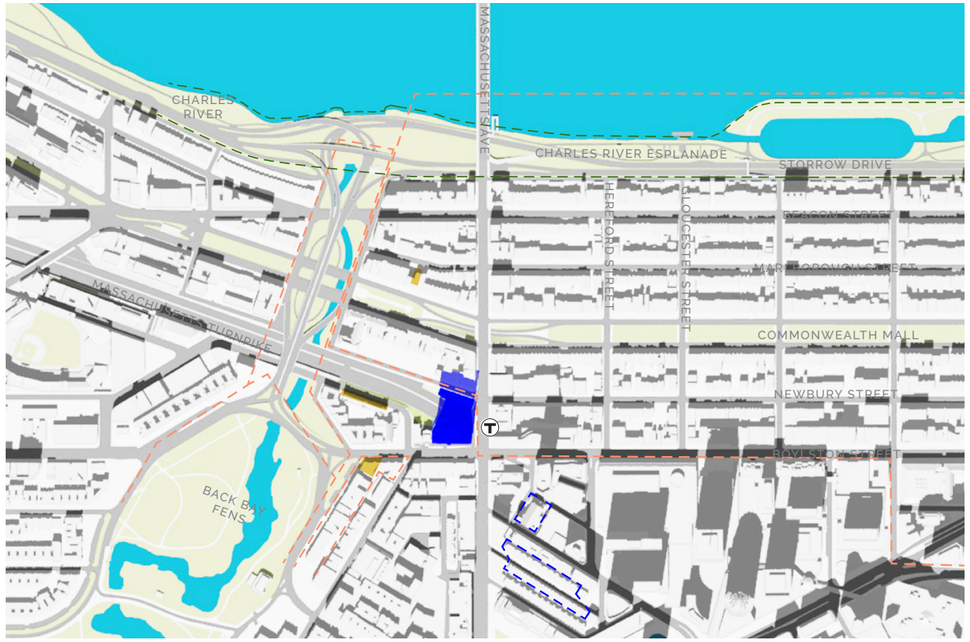

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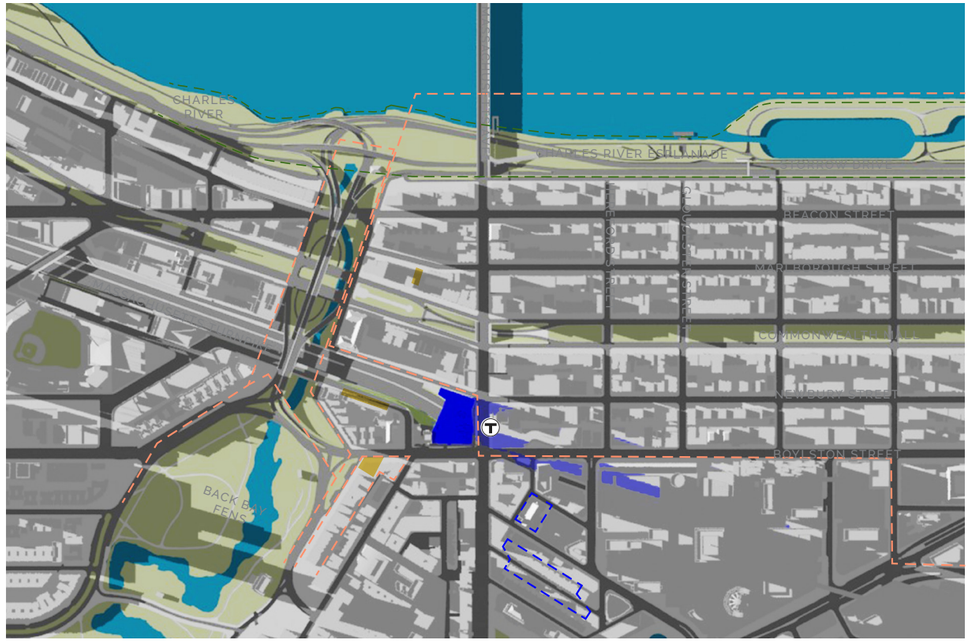


6:00 pm

PROJECT

NET NEW SHADOWS OF PROPOSED PROJECT (484')

EXISTING SHADOWS

NATIONAL HISTORIC LANDMARK

NATIONAL REGISTER OF HISTORIC PLACES DISTRICT

INVENTORIED AREA

CHARLES RIVER BASIN HISTORIC DISTRICT

PUBLIC OPEN SPACE

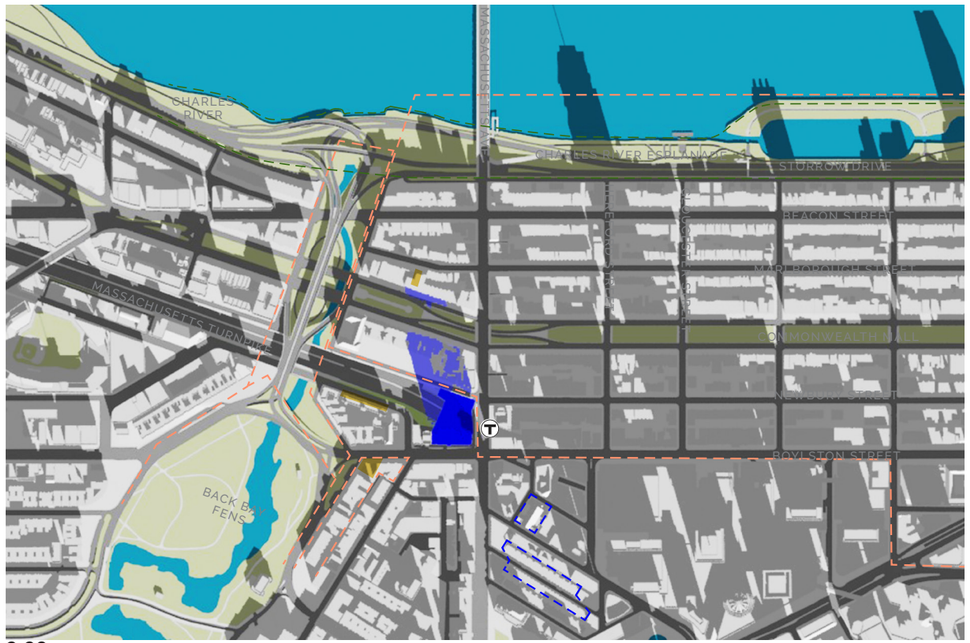
0 300 600 Feet

ELKUS | MANFREDI ARCHITECTS

Shadow Study - September 21

Air Rights Parcel 12
Boston, Massachusetts

Figure 6.3c



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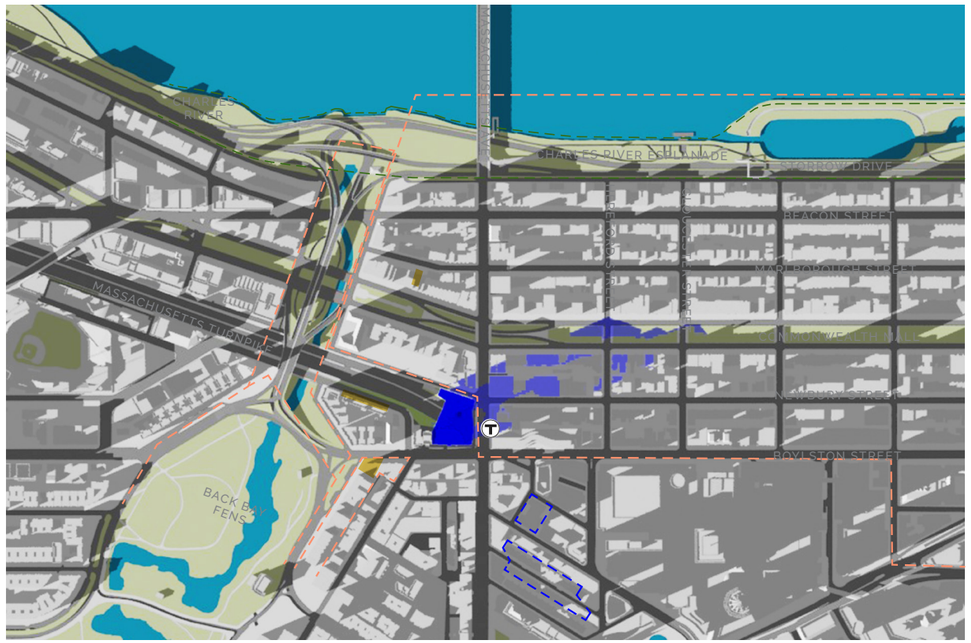

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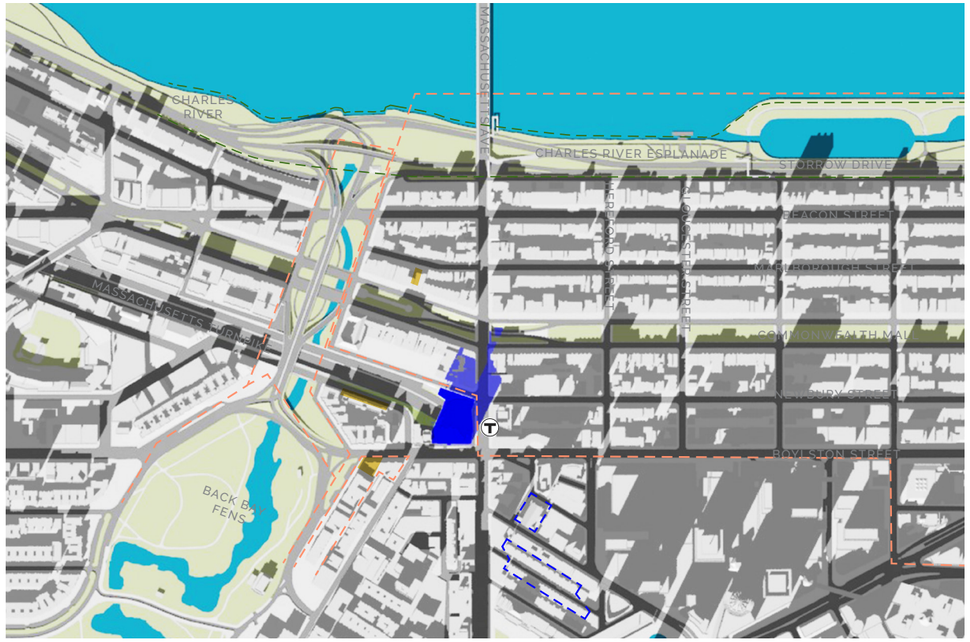

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PROJECT

NET NEW SHADOWS OF PROPOSED PROJECT (484')

EXISTING SHADOWS

NATIONAL HISTORIC LANDMARK

NATIONAL REGISTER OF HISTORIC PLACES DISTRICT

INVENTORIED AREA

CHARLES RIVER BASIN HISTORIC DISTRICT

PUBLIC OPEN SPACE

0 300 600 Feet

ELKUS | MANFREDI ARCHITECTS

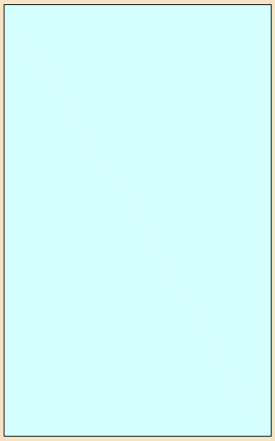
Shadow Study - December 21

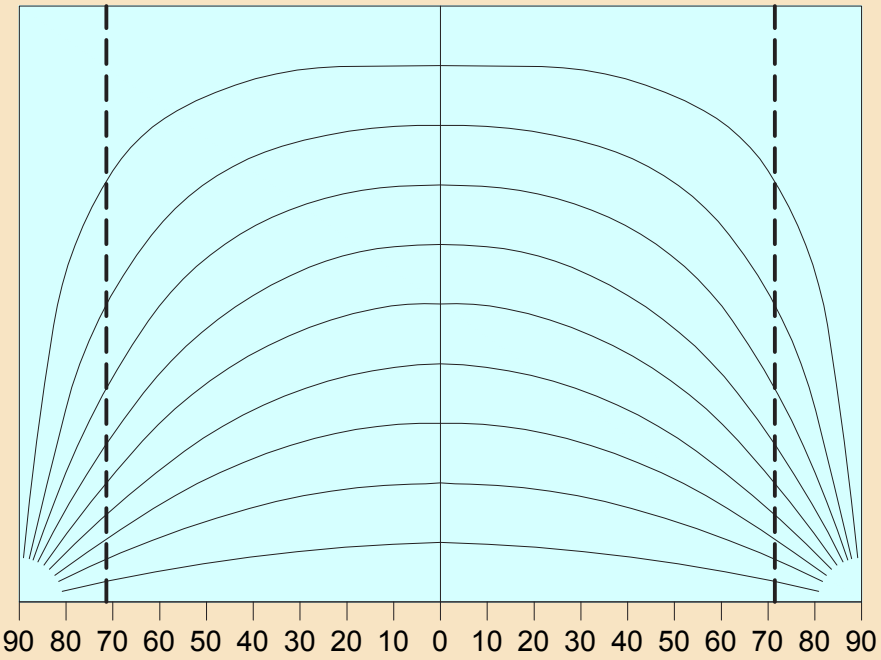
Air Rights Parcel 12
Boston, Massachusetts

Figure 6.3d

Existing

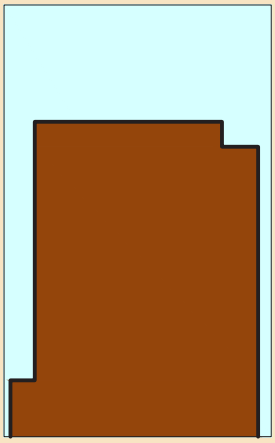
Obstruction of
Skyplane = 0.0%

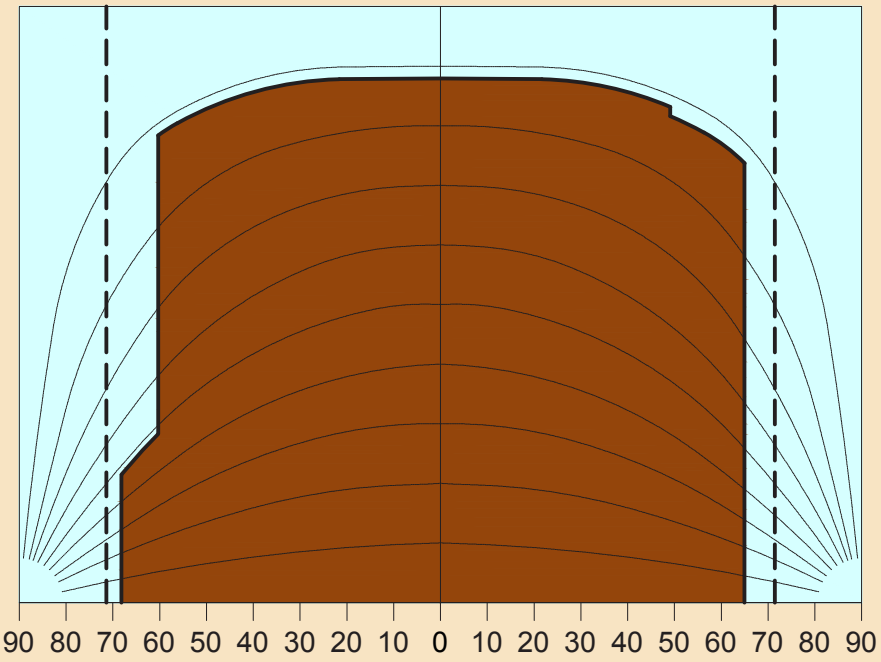




Proposed

Obstruction of
Skyplane = 81.1%



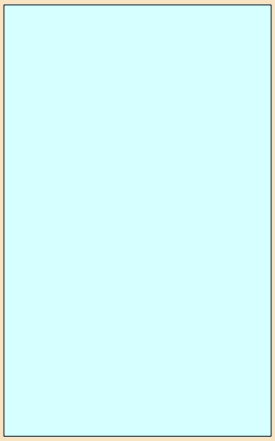


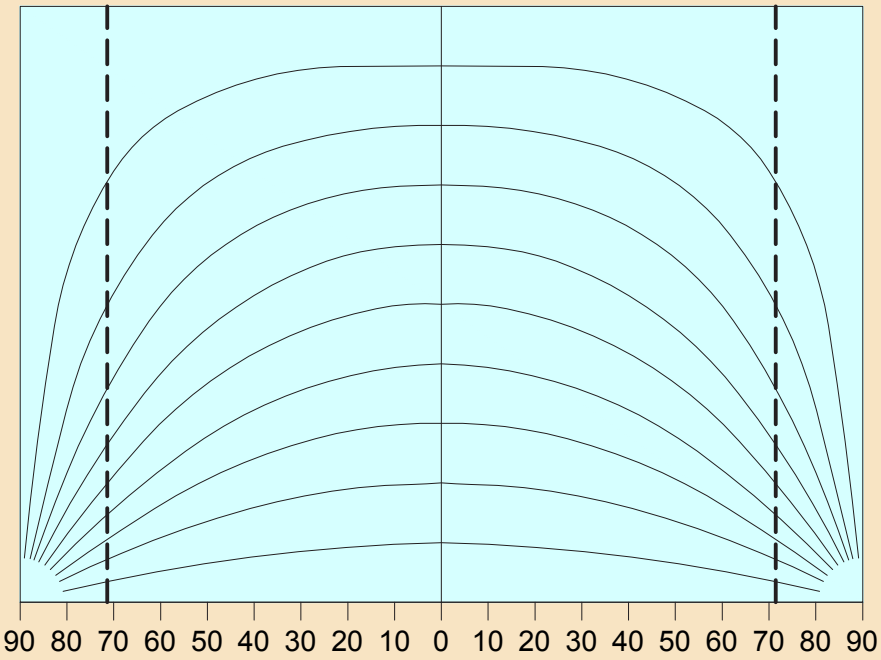
Daylight Analysis
Center of Boylston Street
Air Rights Parcel 12
Boston, Massachusetts

Figure 6.4a

Existing

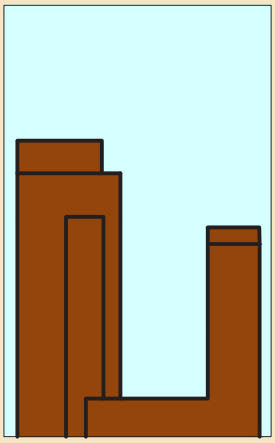
Obstruction of
Skyplane = 0.0%

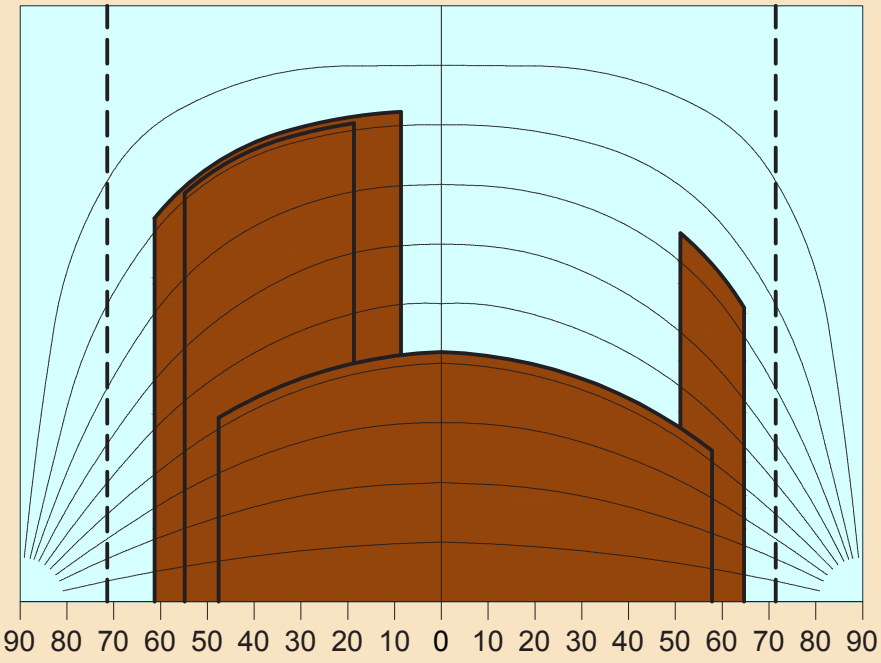




Proposed

Obstruction of
Skyplane = 55.2%



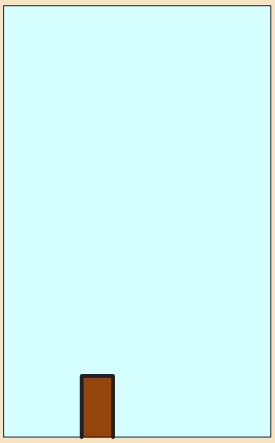


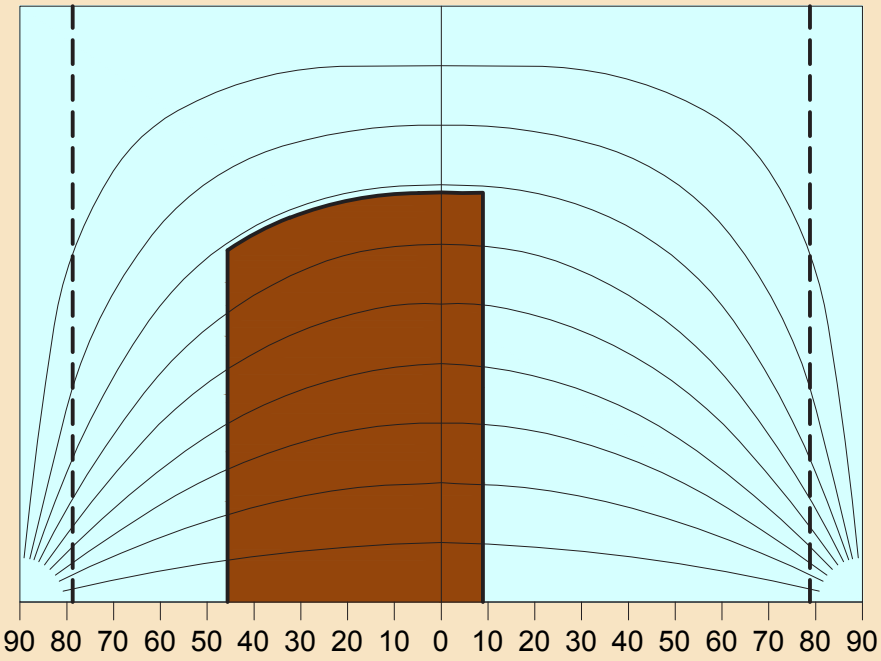
Daylight Analysis
Center of Massachusetts Avenue
Air Rights Parcel 12
Boston, Massachusetts

Figure 6.4b

Existing

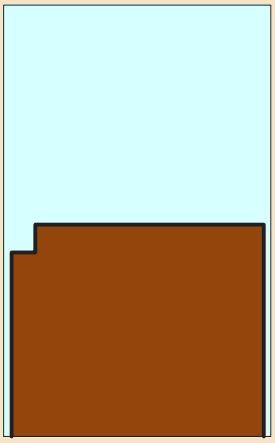
Obstruction of
Skyplane = 24.8%

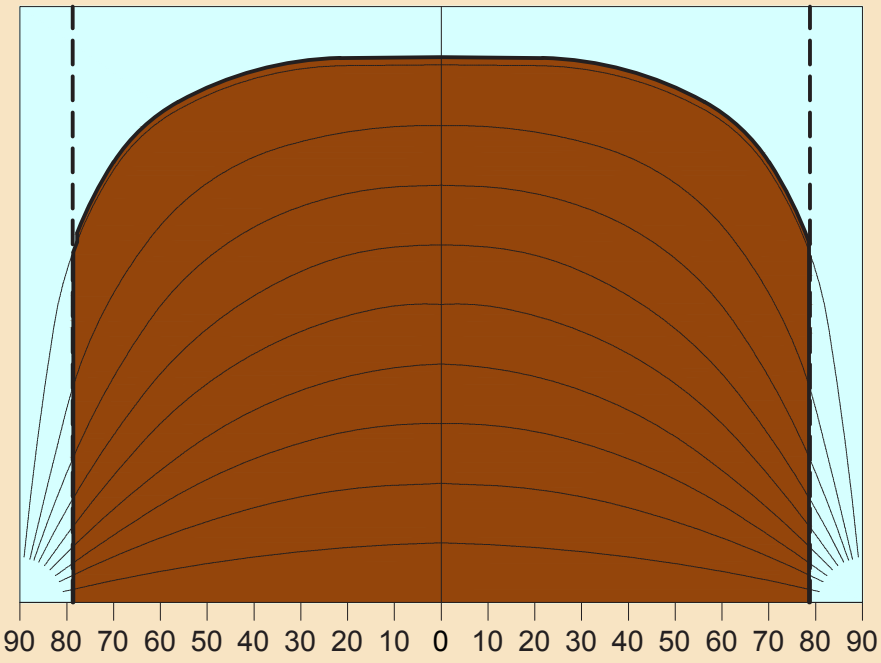




Proposed

Obstruction of
Skyplane = 89.5%





Daylight Analysis
Center of Newbury Street
Air Rights Parcel 12
Boston, Massachusetts

Figure 6.4c

0 40 80 160 Feet

Monitor and Receptor Locations

Parcel 12 Area

Noise Monitor and Receptor Locations

Air Rights Parcel 12
Boston, Massachusetts

Figure 6.5

7

Historic Resources

This chapter identifies properties that are either in the Inventory of Historic and Archaeological Assets of the Commonwealth ("Inventory") or listed in the National or State Registers of Historic Places that are located on, or are within proximity to, the Project Site. This chapter also describes effects the Project may have on these properties.

A search of the Massachusetts Historical Commission (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 7.1 depicts the location and the proximity of these resources.

7.1 Summary of Key Findings & Benefits

The key findings and benefits related to historic and cultural resources include:

- There are no designated or inventoried properties located on the Project Site;
- There are 38 recorded above-ground historic resources, including individual properties and areas/districts, located within a one-quarter mile radius of the Project Site;
- Twelve (12) properties within a one-quarter mile radius are listed in the National and/or State Registers, including eight (8) historic districts or areas and four (4) individually-designated buildings;
- Three (3) of the National Register-listed individual buildings are also National Historic Landmarks;
- An additional 24 individual buildings and two (2) areas within the one-quarter mile radius are included in the Inventory;
- The Project site is located outside of, but directly adjacent on the north and east to, the Back Bay Historic District (National Register)/Back Bay Architectural District (Local Historic District) boundary; and
- The Project will span and cover undeveloped areas of the Turnpike, contributing to knitting together Boston's Back Bay and Fenway neighborhoods.

7.2 Regulatory Context

7.2.1 Boston Landmarks Commission Article 80 Review

Under the Article 80 review process, this EPNF will be circulated for comment to all City agencies, including the Boston Landmarks Commission.

7.3 Historic Resources

On-site historic resources, historic resources within a one-quarter mile radius of the Project Site, and archaeological resources are detailed below.

7.3.1 On-Site Resources

There are no designated or inventoried properties located on the Project Site, which is undeveloped. The Project Site is comprised of both land and air rights parcels above and adjacent to the Turnpike, which is below street level.

7.3.2 Historic Resources in Project Site Vicinity

The area surrounding the Project Site has been heavily documented, resulting in numerous listed and inventoried historic resources as listed in Table 7-1 and identified in Figure 7.1. Within a one-quarter mile radius are eight (8) National Register and/or State Register-listed districts or areas, which are wholly or partially contained within the radius, as well as four (4) individually-designated buildings.

Table 7-1 Historic Resources in the Vicinity of the Project Site

Map No.	Resource Name	Location	MHC Inventory No.	Designation
BOS.BT	Back Bay Historic District		BOS.BT	NRDIS 8/14/1973
BOS.BW	Back Bay Architectural District		BOS.BW	LHD 9/3/1966
BOS.BX	Commonwealth Ave. Mall		BOS.BX	NRDIS 08/14/1973
BOS.JC	Bay State Road – Back Bay West Architectural		BOS.JC	LHD 11/8/1979
BOS.JD	Back Bay Fens, Section of		BOS.JD	LL 11/1/1983
BOS.IO	Olmstead Park System		BOS.IO	NRDIS 12/8/1971
BOS.JF	Fenway-Boylston St. Historic District		BOS.JF	NRDIS 9/4/1984
BOS.VI	St. Cecilia Roman Catholic Church Complex		BOS.VI	N/A
BOS.ZR	Christian Science Center Complex		BOS.ZR	LL 7/14/2011
BOS.ABB	St. Germain St, 8-65		BOS.ABB	N/A
1	Ayer, Frederick Mansion	395 Commonwealth Ave	BOS.3663	NHL 4/5/2005; NRIND 8/14/1973
2	Fenway Studios Building	30 Ipswich St	BOS.7500	NHL 8/5/1998; NRIND 9/13/1978

3	Fenmore Apartments	1109 Boylston St	BOS.7354	N/A
4	Fenmore Apartments	1111 Boylston St	BOS.7355	N/A
5	Fenmore Apartments	64 Charlesgate East	BOS.7356	N/A
6	Church of the Redemption (Universalist)	1103 Boylston St	BOS.7353	N/A
7	State Street Trust Company Building	1046-1050 Boylston St	BOS.2629	N/A
8	State Street Trust Company Building	130-132 Mass. Ave	BOS.7518	N/A
9	Fenway Theater	136 Mass. Ave	BOS.7519	N/A
10	Massachusetts Historical Society Building	1154 Boylston St	BOS.7352	NHL 10/15/1966; NRIND 10/15/1966;
11	Webber, John P. Row House	12 Edgerly Rd	BOS.7371	N/A
12	Webber, John P. Row House	14 Edgerly Rd	BOS.7372	N/A
13	Webber, John P. Row House	16 Edgerly Rd	BOS.7373	N/A
14	Webber, John P. Row House	18 Edgerly Rd	BOS.7374	N/A
15	Webber, John P. Row House	20 Edgerly Rd	BOS.7375	N/A
16	Webber, John P. Row House	22 Edgerly Rd	BOS.7376	N/A
17	Webber, John P. Row House	24 Edgerly Rd	BOS.7377	N/A
18	Webber, John P. Row House	26 Edgerly Rd	BOS.7378	N/A
19	Webber, John P. Row House	28 Edgerly Rd	BOS.7379	N/A
20	Webber, John P. Row House	30 Edgerly Rd	BOS.7380	N/A
21	Smith, William H. Row House	179 Mass. Ave	BOS.7522	N/A
22	Smith, William H. Row House	181 Mass. Ave	BOS.7523	N/A
23	Thomas, David W. Row House	57 Hemenway St	BOS.7477	N/A
24	Thomas, David W. Row House	59 Hemenway St	BOS.7478	N/A

25	Thomas, David W. Row House	61 Hemenway St	BOS.7479	N/A
26	The New Riding Club	52 Hemenway St	BOS.7466	NRIND 8/20/1987
27	Bawford, A.J. Store	58 Burbank St	BOS.15525	N/A
28	Hemenway Chambers – Hotel Hemenway	91 Westland Ave	BOS.7708	N/A

Notes:
NRIND National Register of Historic Places, Individual Listing
NRDIS National Register of Historic Places, District
NHL National Historic Landmark
LHD Local Historic District (State Register of Historic Places)
LL Boston Local Landmark (State Register of Historic Places)

Back Bay Historic District (BOS.BT)/Back Bay Architectural District (BOS.BW)

The Back Bay Historic District is located directly north and east of the Project Site. The district is a largely residential area constructed during the late 19th century on newly-filled tidal flats on the southern bank of the Charles River. While recognized for its dense concentration of complementary high-style brownstones arranged in a strict grid pattern, the district also boasts a number of institutional buildings, hotels, apartment buildings, and commercial buildings, as well as public spaces such as the Commonwealth Avenue Mall and Copley Square. The predominantly residential portion of the district has also been designated as a local historic district, the Back Bay Architectural District.

Within the Back Bay Historic District is the National Register-listed Commonwealth Avenue Mall (BOS.BX). This is the centerpiece of the Commonwealth Avenue boulevard and an integral part of the Back Bay plan of 1858. The mall is 100 feet wide with ornamental trees and statuary, and forms a vital link in the public park system. Also located within the district is the Frederick Ayers Mansion (BOS.3663) at 395 Commonwealth Avenue. A National Historic Landmark, it was constructed between 1899 and 1902 and is the only one of three surviving residences designed by American artist and designer, Louis Comfort Tiffany.

Bay State Road/ Back Bay West Architectural Conservation District (BOS.JC)

The Bay State Road/Back Bay West Architectural Conservation District (BOS. JC), located northwest of the Project Site, is an architectural conservation district that includes approximately 200 buildings. The district is roughly bordered by Kenmore Square, the Massachusetts Turnpike, Charlesgate West, Storrow Drive, and Granby Street. The area was developed during the late 19th century as part of the large-scale land reclamation project that created the Back Bay. The buildings in the district were largely designed in the revival styles that were popular during the late 19th century, such as the Tudor, Classical, and Renaissance Revival styles. The neighborhood is associated with many significant individuals and institutions, including prominent medical clinics.

Olmsted Park System (BOS.IO)/Sections of Back Bay Fens (BOS.JD)

The National Register-listed Olmsted Park System (BOS.IO), located to the west of the Project Site, is one of the first park systems created in the United States and which served as a model for other metropolitan areas. This park system created municipal open space throughout the City, rather than in just one large area, which enabled the City to be connected to the suburbs, and includes recreation space, as well as other amenities. A large portion of the district has been designated as a Boston Landmark as well, the Sections of Back Bay Fens (BOS.JD) district.

Fenway-Boylston Street Historic District (BOS.JF)

The Fenway-Boylston Street Historic District, located southwest of the Project Site, consists of approximately 20 buildings located between Hemenway Street and the Back Bay Fens. While most of the contributing resources to this National Register-listed district are rowhouses dating to the turn of the 20th century, the district also includes the Boston Medical Library, an early 20th-century apartment house, and the 1899 Massachusetts Historical Society Building (BOS.7352), a National Historic Landmark.

Christian Science Center Complex (BOS.ZR)

The Christian Science Center Complex (BOS.ZR) is located southeast of the Project Site. The Boston Landmark-designated complex is historically and architecturally significant as an extraordinary example of the evolution of a religious complex, for its association with Mary Baker Eddy, the founder of the First Church of Christ, Scientist, and for its association with several distinguished architects and landscape architects over the span of nearly a century of development including Charles Brigham, Solon S. Beman, I. M. Pei, Araldo Cossutta, Hideo Sasaki, and Stuart Dawson.

Fenway Studios Building (BOS.7500)

The Fenway Studios Building (BOS.7500), a National Historic Landmark located west of the Project Site near the Back Bay Fens, features an Arts and Crafts style façade. The building was constructed in 1906 and is the only studio in the United States designed by artists and still used by artists.

The New Riding Club (BOS.7466)

Located south of the Project Site is the National Register-listed New Riding Club (BOS.7466). Located on Hemenway Street, it is a large-scale Tudor Revival style building designed c. 1890 by the Boston architectural firm of Cummings and Sears. The club was built as a horse stable with clubhouse facilities, riding ring, and services for horses. Located next to the fashionable Fens neighborhood, The New Riding Club attracted an elite membership of Boston's socially prominent families.

Inventoried Properties

Southeast of the Project Site are two inventoried areas: the Saint Cecilia Roman Catholic Church Complex (BOS.VI); and the Saint Germain Street Area (#s 8-65) (BOS.ABB). Saint Cecilia Roman Catholic Church was built in the 1890s by a community of workers associated with the railroad, or in service to wealthy families of Commonwealth Avenue. Saint Germain Street is a well-preserved block of three-story brick row houses, a niche of 1890s residential development located between the modern commercial and institutional uses along Massachusetts Avenue.

Southeast of the Project Site are also three individually inventoried properties. The State Street Trust Company Building (BOS.2629/BOS.7518), currently the Berklee College of Music, is a low-rise Classical Revival bank building with façades on Boylston Street and Massachusetts Avenue. It was designed by Allen and Collens, a firm known for its modern Gothic Revival work. The building was originally planned as the first stage in the construction of a six-story office building that was never executed. The Classical Revival Fenway Theater (BOS.7519), uptown Boston's first movie house, was constructed in 1914 to open at the same time as the nearby streetcar station (now Hynes Convention Center Station). It currently serves as Berklee's Performance Center.

To the southwest of the Project Site, on Boylston Street adjacent to the Back Bay Fens, are the Fenmore Apartments (BOS.7354-7356). This brick complex, consisting of connected contiguous buildings, was constructed in 1914 in the Classical Revival style with elaborate limestone Beaux Arts-style center entrances. Next to the apartment complex is the Church of the Redemption (Universalist) (BOS.7353), a 1923 Neo-Gothic Revival style granite church that later served a Roman Catholic congregation.

To the south of the Project Site, there are several individual inventoried properties. Closest to the Project Site is a contiguous block referred to as the John P. Webber Row Houses (BOS.7371-7380), which consists of a group of then Queen Anne/Classical Revival brick rowhouses constructed on Edgerly Street ca. 1890. The William H. Smith Row Houses on Massachusetts Avenue (BOS.7522, BOS.7523) were remodeled into commercial buildings. Also located in this area are the 1895 Georgian Revival David W. Thomas Row Houses on Hemenway Street (BOS.7477-7479). Located at the south edge of the one-quarter mile radius are the Hotel Chambers-Hotel Hemenway (BOS.7708), a 1900 Classical Revival brick apartment house with limestone detailing, and the A.J. Bawford Store (BOS.15525), constructed in 1915 and updated with a new storefront c. 1960.

7.3.3 Archaeological Resources

There are no known archaeological resources within the Project Site that are listed in the State or National Registers or included in the Inventory. The entire Project Site was redeveloped in the 1960s and much of it is currently located over the Turnpike; therefore, it is unlikely that the Project will affect previously unidentified archaeological resources.

7.4 Evaluation of Potential Impacts

7.4.1 Visual and Public Realm

As described in Chapter 3, *Urban Design*, the Project has been designed to be respectful of the history and spirit of the Back Bay and has been designed to enhance the pedestrian experience in this historic neighborhood. The buildings have been designed to minimize wind and shadow impacts on the surrounding neighborhood and civic and historic resources.

The Project will span and cover a portion of the existing undeveloped highway overpass, knitting together the historic Back Bay and Fenway neighborhoods and eliminating an undeveloped, vacant highway overpass amidst one of Boston's most lively and walkable districts.

The Project will significantly improve the pedestrian realm, address vehicular and pedestrian circulation and safety, increase sidewalk capacity, construct a dedicated bus lane, a new cycle track, reopen and renovate the currently closed Station pedestrian tunnel under Massachusetts Avenue, and create a new headhouse within the podium to reduce unsafe pedestrian street crossings. The Project will also provide a significantly upgraded streetscape, including new sidewalks, street lighting, landscaping where feasible and other public amenities along Massachusetts Avenue, Boylston Street and Newbury Street, consistent with the BTD's Boston Complete Streets guidelines. Please refer to Section 3.1 and 3.5 for a detailed description of proposed pedestrian realm improvements.

7.4.2 Shadow

A shadow impact analysis was conducted for the Project, which is the Preferred Alternative, consistent with Section 80B-2(c) of the Boston Zoning Code. The results of the shadow analysis are provided in Chapter 6, *Environmental Protection,* Section 6.4 Shadow. The Project will result in new shadows as a result of the construction of a sixteen-story and thirteen-story buildings on what is largely an undeveloped air rights parcel; however, incremental net new shadows produced are consistent with the existing urban shadow patterns. The Project has been designed to minimize to the maximum extent practicable any noticeable effect on pedestrian use patterns and historic resources. The majority of shadow anticipated to be cast on historic resources are limited to the winter solstice on December 21st, which is the shortest day of the year and when cast shadows are at their longest and are least noticeable due to the low sun angle.

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 general pattern of new shadows primarily occurring north of the

Project Site remains consistent; differences between the shadow impacts of the previous design and the current Project design are highlighted below.

On March 21 and September 21 (Figures 6.3a-6.3c and 6.3h-l), sweeping shadows move across the rear elevations of buildings facing north on Commonwealth Avenue between Charlesgate East and Massachusetts Avenue, as well as the side elevation of 375 Newbury Street, all located within the Back Bay Historic District.

On June 21 (Figures 6.3d-6.3g), net new shadows are confined to the Project Site and adjacent roadways for the majority of the day. At 6:00 PM, new shadow is cast across the Massachusetts Avenue and Boylston Street intersection, outside of the Back Bay Historic District.

On December 21 (Figures 6.3l-6.3n), at 9:00 AM on the winter solstice, the Project casts shadows to the northwest. The area is heavily shaded under the existing conditions. Net new shadows move across the rear elevations of buildings facing north on Commonwealth Avenue between Charlesgate East and Massachusetts Avenue, the front elevations of buildings facing south on Commonwealth Avenue, and the side elevation of 375 Newbury Street, all located within the Back Bay Historic District.

At 12:00 noon on December 21, the Project casts shadows to the northeast. Incremental net new shadows will be cast on the side elevation of 375 Newbury Street, front elevation of buildings facing west on Massachusetts Avenue between Commonwealth Avenue and Newbury Street, and a very small sliver of the Commonwealth Mall, which are heavily shaded under the existing conditions.

At 3:00 PM on the winter solstice, the Project casts shadow to the northeast. Incremental net new shadow will be cast on front elevation of buildings facing west on Massachusetts Avenue between Commonwealth Avenue and Newbury Street, the roofs of buildings in the block bounded by Commonwealth Avenue, Newbury Street, Massachusetts Avenue, and Hereford Street, and a small sliver of the Commonwealth Mall, all of which are heavily shaded under the existing conditions.

7.4.3 Wind

A wind tunnel analysis was conducted which compared existing and proposed conditions, pursuant to the Section B.1 of the BPDA Development Review guidelines. As described in Section 6.2, the Project will not result in any new unacceptable or unsafe wind conditions within the Project Site or in the surrounding historic Back Bay neighborhood.

7.4.4 Geotechnical

As discussed in Section 6.12, the foundation design and construction methodology for the Project have taken into consideration the dense 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. Throughout construction, ongoing instrumentation monitoring will evaluate movement, vibration and groundwater levels, and will ensure that performance criteria are being met. This will allow for early detection of potential impacts, modification to procedures and, where applicable, implementation of additional mitigation measures.

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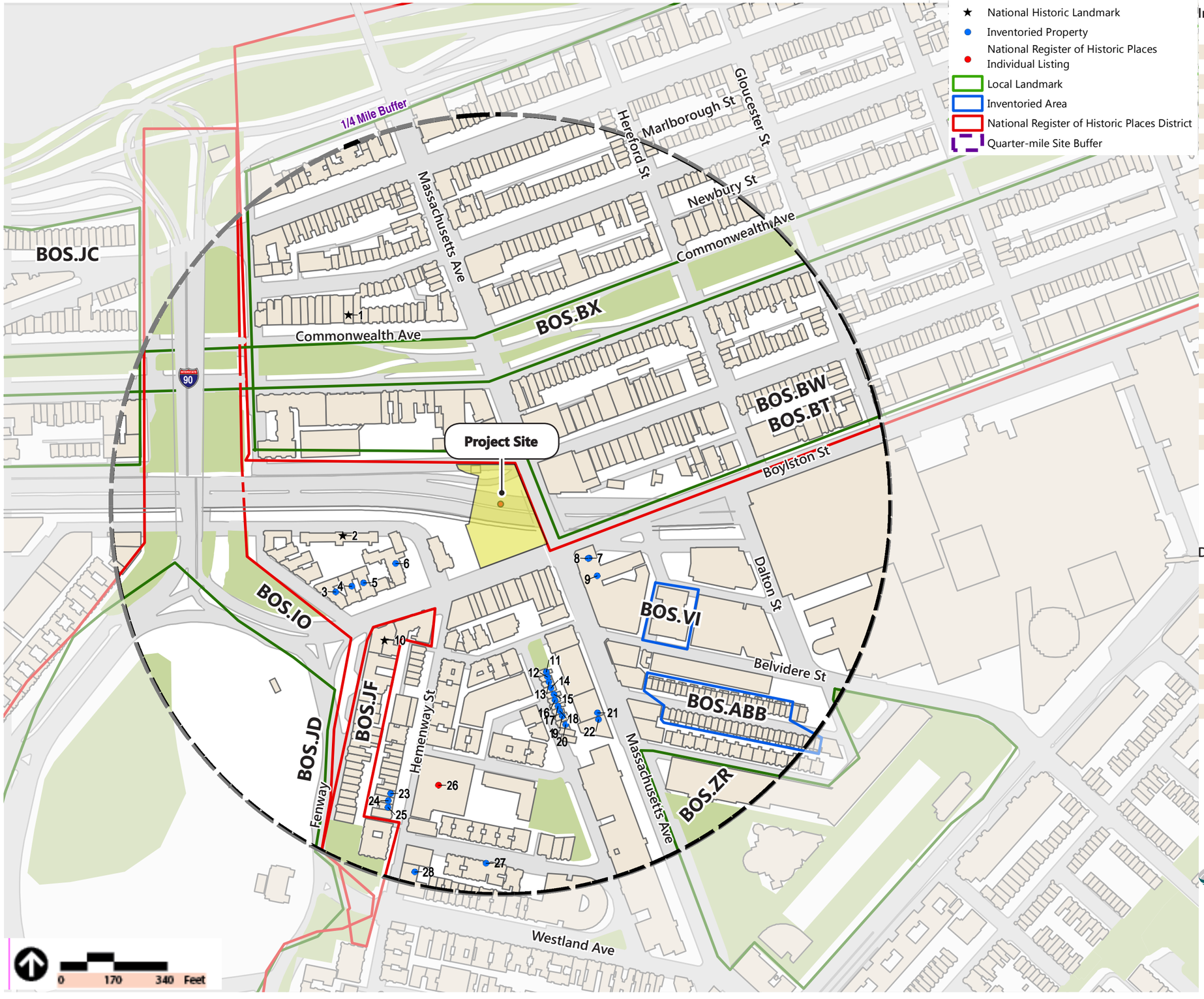


- ★ National Historic Landmark
- Inventoried Property
- National Register of Historic Places Individual Listing
- Local Landmark
- Inventoried Area
- National Register of Historic Places District
- Quarter-mile Site Buffer

Individual Properties Within 1/4 Mile Of Site

ID	Name
1	Ayer, Frederick Mansion
2	Fenway Studios Building
3	Fenmore Apartments
4	Fenmore Apartments
5	Fenmore Apartments
6	Church of the Redemption (Universalist)
7	State Street Trust Company Building
8	State Street Trust Company Building
9	Fenway Theatre
10	Massachusetts Historical Society Building
11	Webber, John P. Row House
12	Webber, John P. Row House
13	Webber, John P. Row House
14	Webber, John P. Row House
15	Webber, John P. Row House
16	Webber, John P. Row House
17	Webber, John P. Row House
18	Webber, John P. Row House
19	Webber, John P. Row House
20	Webber, John P. Row House
21	Smith, William H. Row House
22	Smith, William H. Row House
23	Thomas, David W. Row House
24	Thomas, David W. Row House
25	Thomas, David W. Row House
26	New Riding Club, The
27	Bawford, A. J. Store
28	Hemenway Chambers - Hotel Hemenway

Districts/Areas Within 1/4 Mile Of Site

ID	Name
BOS.BW	Back Bay Architectural District
BOS.JD	Back Bay Fens, Sections of
BOS.BT	Back Bay Historic District
BOS.JC	Bay State Road - Back Bay West Architectural
BOS.ZR	Christian Science Center Complex
BOS.BX	Commonwealth Avenue Mall
BOS.JF	Fenway - Boylston Street Historic District
BOS.IO	Olmsted Park System
BOS.VI	Saint Cecilia Roman Catholic Church Complex
BOS.ABB	Saint Germain Street, 8-65

Figure 7.1
Historic Resources

Air Rights Parcel 12
Boston, Massachusetts

8

Infrastructure

This chapter describes the existing infrastructure systems surrounding the Project Site, and discusses utility aspects of the Project and potential utility impacts. The following utilities are discussed: storm drainage; sanitary sewage; domestic water and fire protection; natural gas; electrical; and telecommunications. Chapter 4, *Sustainability/Green Building and Climate Change Resiliency*, discusses energy conservation measures being considered as part of the Project.

The Project is expected to connect to existing utility systems available in public streets adjacent to the Project Site. These utility systems include those owned or managed by the BWSC, MassDOT, and private utility providers. As design of the Project progresses, the availability and capacity of the existing utility systems will be assessed and coordinated with the applicable utility authorities and providers.

The Proponent will coordinate the design of the proposed utility connections with the BWSC, MassDOT, and applicable private utility providers. All utility connections will be designed to minimize adverse effects to the existing systems and surrounding areas. See Figures 8.1 and 8.2 that show the existing infrastructure at and adjacent to the Project Site.

8.1 Summary of Key Findings & Benefits

The key impact assessment findings related to infrastructure systems include:

- The existing city, state, and private utility infrastructure systems are expected to be adequately sized to accept the demand associated with the development and operation of the Project.
- The Project will comply with the *2008 MassDEP Stormwater Management Policy and Standards* to the maximum extent practicable, and will improve both the quality and quantity of stormwater runoff from the Project Site compared to existing conditions;
- Groundwater will be recharged in accordance with the GCOD requirements, to the maximum extent practicable;
- Based on the current development program, the Project is estimated to generate approximately **125,380** gallons per day of sanitary sewage and will require approximately **137,918** gallons of water per day.
- Construction of the Project plans to incorporate on-site stormwater management and treatment systems that are expected to improve water quality, reduce runoff volumes, and control peak rates of runoff in comparison to existing conditions.

› The Project is not expected to result in the introduction of any increased peak flows, pollutants, or sediments that would potentially impact the local storm drainage systems.

8.2 Complexities Associated with Air Rights Construction

The Project Site is located on Air Rights Parcels founded over major transportation facilities, including the Turnpike and MBTA Commuter Rail tracks. In addition, the Project fronts along the western side of the Massachusetts Avenue bridge.

The existing transportation facilities listed above create intricate and costly design, engineering, and construction challenges for the Project. The key challenges include:

› Maintaining the functionality and operations of the existing transportation infrastructure while minimizing disturbances during construction of the Project;

› Air rights construction and limited terra firma requiring unique and extensive foundation systems;

› Complexity for establishing utility corridors and connections; and

› Extensive construction period monitoring.

8.3 Regulatory Context

The following section discusses the regulatory framework for utility connection reviews and standards. A complete list of the anticipated state and local permits associated with Project-related infrastructure is included in Chapter 1, *Project Description*. For the Project:

› BWSC approval will be required for all storm drain, sanitary sewer, and water service connections to BWSC infrastructure.

› MassDOT approval for all storm drain connections to the MassDOT system.

› The Boston Fire Department ("BFD") will review the Project with respect to fire protection measures such as siamese connections, hydrants, and standpipes.

› Design of the Project Site access, hydrant locations, and energy systems (gas and electric) will also be coordinated with the respective system owners.

› Where new utility connections are needed and existing connections are to be capped, the excavation will be authorized by the Boston Public Works Department ("BPWD") through the street opening permit process, as required.

› Additional information on the regulatory framework for each utility system is included in subsequent sections of this chapter.

8.3.1 EPA National Pollutant Discharge Elimination System

The 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 and the Order of Conditions.

Compliance with the CGP and its Standard Permit Conditions is the responsibility of the site contractor and/or site operator.

8.3.2 MassDEP Stormwater 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 was revised in February 2008. The Stormwater Management Standards are regulated under the Wetlands Protection Act Regulations 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 resources areas.

8.3.3 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.

8.3.4 BPDA Smart Utilities Policy

Adopted in June 2018, the BPDA's Smart Utilities Policy seeks to develop a more equitable, sustainable, affordable, resilient, and integrated planning approach amoung energy, transportation, water and communication utilities in the City of Boston. The Project will be expected to integrate the applicable Smart Utility Technologies into the design and planning of the associated utility infrastructure, based on policy outlines which include project size and scope of work.

In collaboration with BWSC, the BPDA will review the Project utility connections and recommend improvements in compliance with the Smart Utility Standards, set forth by the BPDA and City of Boston.

8.4 Storm Drainage/Stormwater Management

The following section describes the storm drain infrastructure around the Project Site in the existing conditions and describes how this infrastructure will service the Project in the future.

8.4.1 Existing Drainage Conditions

Due to the varying grades and the nature of the Air Rights Parcels, on-site stormwater runoff currently flows to multiple storm drainage systems owned and maintained by BWSC and MassDOT. BWSC infrastructure is separated into two systems, north of the Project Site within Newbury Street and south of the Project Site within Boylston Street. Both BWSC systems discharge to combined sewer systems located to the west of the Project Site adjacent to the Muddy River. Additionally, there is MassDOT drainage infrastructure along the Turnpike and MBTA commuter rail tracks. The MassDOT system discharges to the Muddy River via a pump station. See Figures 8.1 and 8.2.

Under existing conditions, the Project Site is primarily occupied by the Turnpike and MBTA commuter rail tracks which are located at a lower level than the adjacent public streets. The majority of stormwater runoff from the Project Site discharges to the MassDOT system. Only small portions of the Project Site along Massachusetts Avenue, Boylston Street, and Newbury Street discharge to BWSC systems. There is no evidence of existing stormwater treatment or infiltration systems within the Project Site.

8.4.2 Proposed Drainage Conditions

In order to address the City's stormwater management requirements, MassDOT's requirements, and MassDEP's stormwater guidelines, the Project plans to incorporate on-site stormwater management and treatment systems which collectively are expected to improve water quality, reduce runoff volume, and control peak rates of runoff in comparison to existing conditions. Additionally, the Project is expected to reduce peak runoff rates and volumes for various design storm events for the post-development condition as compared to the pre-development condition, including the 2-, 10-, and 25-year design storms. Stormwater runoff from proposed and modified impervious surface areas is expected to be treated using new infrastructure such as deep-sump, hooded catch basins and proprietary treatment devices to reduce the Total Suspended Solids ("TSS") concentrations by at least 80 percent.

The Project will require BWSC Site Plan Review and approval and approval from MassDOT. The Proponent will coordinate with BWSC and MassDOT on the design of any proposed connections and to ensure there is adequate capacity in the existing storm drain systems. A capacity analysis of the existing public infrastructure will be conducted as part of the BWSC Site Plan Review. Mitigation measures to be provided by the Proponent will also be agreed upon with BWSC once the proposed design for the Project reaches an appropriate level of detail. The Project will also evaluate the use of Best Management Practices ("BMP's") during the BWSC Site Plan Review process.

8.4.3 Compliance with the Groundwater Conservation Overlay District

The Project Site is located within the GCOD, as established by Article 32 of the Code. Therefore, the Project will include facilities to capture stormwater runoff and direct it to infiltration systems consistent with the requirement of Article 32, to the maximum extent practicable, with the goal of replenishing the groundwater table.

However, given that the Project Site is located on Air Rights Parcels founded over major transportation facilities and infrastructure and the limited terra firma available, it may not be possible to infiltrate the first inch of runoff over the entire post-development impervious area. To provide groundwater recharge, to the maximum extent practicable, the proposed stormwater management system will include recharge chambers or wells designed to infiltrate runoff over a 72-hour period.

Prior to the issuance of a building permit, the Proponent will provide the BPDA, BWSC, and Boston Groundwater Trust a letter stamped by a professional engineer registered in Massachusetts that details how the Project will meet the GCOD requirement for no reduction in groundwater levels on site or on adjoining lots.

8.4.4 Compliance with MassDEP Stormwater Standards

The Project will comply with the Stormwater Management Standards as established in the Massachusetts Stormwater Handbook issued by MassDEP in 1997 and revised in 2008. A brief explanation of each standard and the Project 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 fully comply with Standard 1. All proposed stormwater conveyances for the Project will not discharge untreated stormwater directly to or cause erosion or scour to wetlands or receiving waters.

Standard 2: *Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.*

- Compliance: The proposed design will fully comply with Standard 2. As a result of the improvements associated with the Project, the post-development peak discharge rates will not exceed the pre-development peak discharge rates.

Standard 3: *Loss of annual recharge to groundwater should be minimized through the use of infiltration measures including 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.*

- Compliance: The proposed design will comply with Standard 3 to the maximum extent practicable. The Project is currently planning to incorporate the required

subsurface infiltration systems to promote groundwater recharge to the maximum extent practicable. Further geotechnical explorations are planned to be conducted.

Standard 4: *Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids ("TSS"). This Standard is met when: a) Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained; b) Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and c) Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

› Compliance: The proposed design will fully comply with Standard 4. Stormwater runoff will be captured in a series of deep-sump hooded catch basins and/or directed to proprietary particle separators to provide 80% TSS removal prior to discharging to the existing drainage systems.

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 Department 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 there under at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.*

› Compliance: The proposed design will fully comply with Standard 5. The Project's vehicular parking and loading areas will be located within the proposed building and protected from rainfall. The remainder of the Project Site will be treated through structural BMPs and subsurface infiltration, where feasible.

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 best management practices determined by the Department 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 "storm water 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 fully comply with Standard 6. The Project is not located within and will not discharge untreated stormwater to a critical area, as defined by Standard 6.

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 is considered a redevelopment and therefore will be designed to comply only to the maximum extent practicable for the requirements of Standard 3. The Project will be designed to fully comply with all other Standards.

Standard 8: *Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.*

› Compliance: The proposed design will fully comply with Standard 8. Sedimentation and erosion controls are expected to be incorporated as part of the design of the Project and be employed during construction. Erosion and sedimentation control plans would be submitted to the BWSC on a component by component basis and the contractor would be required to implement the measures as part of the BWSC general service application process.

Standard 9: *A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

› Compliance: The proposed design will full comply with Standard 9. An operations and maintenance plan (O&M Plan), including long-term BMP operation requirements, will be prepared for the Project to ensure proper maintenance and functioning of the proposed stormwater management system.

Standard 10: All illicit discharges to the stormwater management system are prohibited.

› Compliance: The proposed design will fully comply with Standard 10. There will be no illicit connections associated with the proposed Project.

8.4.5 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 storm drain, sanitary sewer, and water systems.

8.5 Sanitary Sewer

The following sections describe the sanitary sewer infrastructure around the Project Site and describe how this infrastructure will service the Project.

8.5.1 Existing Sewer System

The BWSC owns and maintains sanitary sewer lines in the vicinity of the Project Site. The infrastructure along Boylston Street and Newbury Street abut the Project Site, as shown in Figure 8.1 The infrastructure includes:

- Two existing 10" sanitary sewer lines that run in a westerly direction in Newbury Street. The sanitary flow from these lines combine into a single 12" sanitary sewer line which then ties into the 30"x24" combined sewer line that runs parallel to the Muddy River.
- An existing 12" sanitary sewer line within Boylston Street near the southwestern corner of the Project Site. This line begins at a manhole to the east of the intersection of Boylston Street and Ipswich Street and then ties into an 18" combined sewer line that runs north and west through Ipswich Street. The sanitary flow from this line reaches the 30"x24" combined sewer that runs parallel to the Muddy River.

8.5.2 Proposed Sewage Flow and Connection

Based on the current development program, the Project is estimated to generate approximately **125,380** gallons per day of sanitary sewage based on Massachusetts State Environmental Code (Title 5) generation rates. Table 8-1 below summarizes the proposed sewer generation rates based on Massachusetts State Environmental Code (Title 5) generation rates.

Changes to the proposed building program will vary sanitary sewer flow. Final flow estimates will be determined as the Project design moves forward.

Table 8-1 Future Sewer Generation

Program Type	Units	Generation Rate[1]	Sewer Generation (GPD)
Office	325,000 SF	75 GPD/KSF	24,375
Hotel[2]	TBD	110 GPD/Unit	45,000[3]
Retail	47,000 SF	50 GPD/KSF	2,350
Restaurant	1,533 Seats	35 GPD/Seat	53,655
TOTAL			**Approx. 125,380 GPD**

1 Generation rates based on 310 CMR 15.203 guidelines

2 As documented in Table 1-1, depending on economic conditions and market opportunities, the second building could include residential or hotel uses. To preserve flexibility for the

Proponent, the environmental analyses herein use the larger residential building massing, and the more impactful hotel use.

3 The final unit count for the hotel will be determined by the hotel operator. For the purposes of the environmental analyses herein a conservative sewer generation rate is used.

8.5.3 Inflow and Infiltration (I/I) Mitigation

Since the Project is expected to generate an increase of net new sanitary flows of approximately 125,380 gallons per day, certain required regulatory thresholds are triggered. BWSC requires than new developments generating greater than 15,000 gallons per day of net new wastewater flows mitigate the impacts of the development by removing inflow and infiltration ("I/I") present in the existing sanitary sewer system. I/I is the component of flows in sanitary sewer systems that does not come from wastewater generated by building uses. I/I includes groundwater infiltration from leaking/broken sewer infrastructure as well as illicit stormwater connections from roof leaders and drainage infrastructure. Following DEP and BWSC policy, projects that generate flows greater than the 15,000-gallon threshold are responsible for mitigating I/I at a ratio of 4:1 relative to the net-new wastewater generated. The Proponent is committed to working with BWSC to define the appropriate I/I mitigation.

8.6 Domestic Water and Fire Protection

The following sections describe the water infrastructure around the Project Site and how this infrastructure will service the Project.

8.6.1 Existing Water Supply System

The BWSC owns and maintains the water mains in the vicinity of the Project Site. BWSC record drawings show that streets surrounding the Project Site are serviced by mostly southern low-service pipes. These vary in size and include: a 12" main in Massachusetts Avenue that is capped at the Massachusetts Avenue bridge, north of the Turnpike; a 24" main in Massachusetts Avenue that is reduced to a 20" main while crossing the Massachusetts Avenue bridge, north of the Turnpike; a 12" main in Boylston Street; a 12" main in Ipswich Street; and a 12" main in Newbury Street. These pipes vary in both material and installation date. Most of the mains were installed in the late 1800's and early 1900's, but have been relined in the 1980's and 1990's. They also all are either ductile iron in the newer mains or pit cast iron in the older mains. Additionally, five fire hydrants are in close proximity to the Project Site.

8.6.2 Proposed Water Demand and Connection

Domestic water demand is based on estimated sewage generation with an added factor of 10 percent for consumption, system losses, and other use. Based upon standard sewage generation rates outlined in the MassDEP System Sewage Flow Design Criteria, 310 CMR 15.203, the Project will require approximately **137,918**

gallons of water per day. The Proponent will continue to consider and evaluate methods to conserve water as building design evolves.

New water connections to BWSC infrastructure will be designed in accordance with BWSC design standards and requirements. Water services to the new buildings will be metered in accordance with BWSC's Site Plan Requirements and Site Review Process. The review includes, but is not limited to, sizing of domestic water and fire protection services, calculation of meter sizing, backflow prevention design, and location of hydrants and siamese connections to ensure conformity with BWSC and BFD requirements. The Proponent will provide for the connection of the meter to BWSC's automatic meter reading system. Fire protection connections on the Project Site will also need approval of the BFD.

8.7 Other Utilities

The following sections describe other utility infrastructure (natural gas, electrical, and telecommunications) around the Project Site and describe how this infrastructure will service the Project.

8.7.1 Natural Gas Service & Estimated Load

Natural gas service is provided by National Grid in the vicinity of the Project Site. The existing natural gas service includes: a 20" main in Massachusetts Avenue north of the Turnpike; a 12" main in Massachusetts Avenue north of the Turnpike; a 24" main in Massachusetts Avenue that is reduced to a 12" main after crossing the Massachusetts Avenue bridge, north of the Turnpike; an 8" main on the north side of Boylston Street; a 6" main on the south side of Boylston Street; and a 6" main in Newbury Street.

The total estimated natural gas demand for the Project is unknown at this time. As the energy system designs for the proposed buildings are developed, the Proponent will coordinate service connection locations and system requirements with National Grid to ensure adequate capacity for natural gas service is available for the Project. Final design and installation of natural gas services will similarly be coordinated with National Grid.

8.7.2 Electrical Service & Estimated Load

Electric service is provided by Eversource Energy in the vicinity of the Project Site and available in Massachusetts Avenue, Boylston Street and Newbury Street.

The estimated electricity demand for the entire Project based on the current building program is approximately **4,456,522 kWh**.

It is anticipated that the existing electrical service and connections will be expanded, modified and/or relocated as determined to be necessary in accordance with Eversource's standards.

As the electric system designs for the proposed buildings are further developed, the Proponent will coordinate service connection locations and system requirements with Eversource. On-site transformer facilities are required and will be subject to design and construction approval from Eversource. Final design and installation of electric services and components will similarly be coordinated with Eversource.

8.7.3 Telecommunications

Telecommunication service is provided in the vicinity of the Project Site and available in Massachusetts Avenue, Boylston Street and Newbury Street.

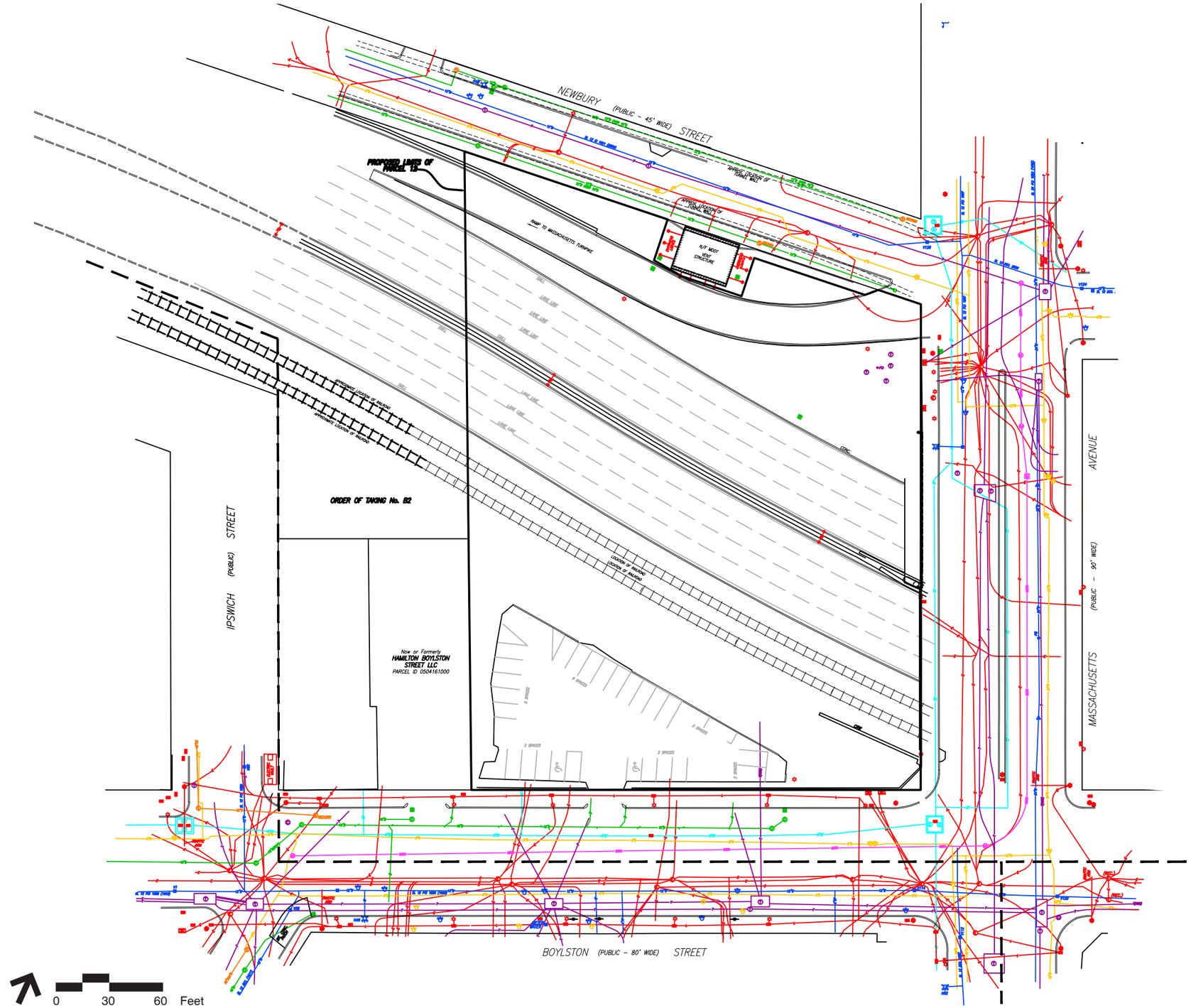
Comcast has confirmed service is available on both the north and south sides of the Project Site in Newbury Street and Boylston Street, respectively.

The Proponent will select private telecommunications companies to provide telephone, cable TV and data services. Upon selection of a provider or providers, the Proponent will coordinate service connection locations and system requirements and obtain appropriate approvals.

8.7.4 Protection of Utilities During Construction

Existing public and private infrastructure located within the public right-of-ways in the vicinity of the Project Site will be protected during construction of the Project. The installation of proposed utility service lines and connections within the public ways will be constructed in accordance with BWSC, MassDOT, BPWD, the Dig-Safe Program, and applicable private utility company requirements. Specific methods for constructing proposed utilities where they are near, or connect with existing BWSC storm drain, sanitary sewer, or water facilities are subject to review by the BWSC as part of its Site Plan Review process.

The Proponent will continue to coordinate with BWSC, MassDOT, and applicable private utility companies to ensure safe and coordinated utility operations in connection with the Project. All necessary permits will be obtained before the commencement of any work.



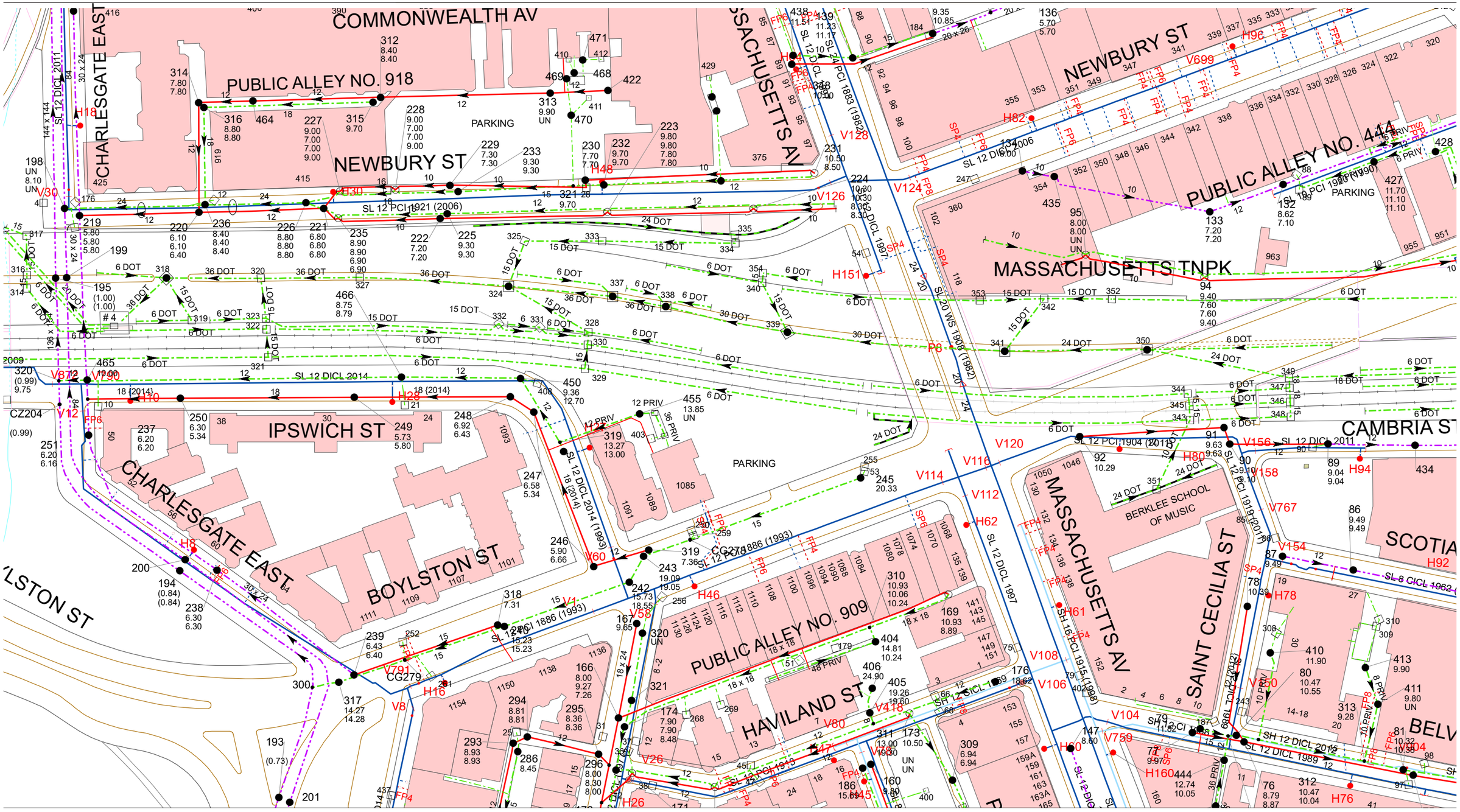
- Existing Drain Service
- Existing Electric Service
- Existing Gas Service
- Existing MBTA Service
- Existing Sewer Service
- Existing Steam Service
- Existing Telephone/Cable TV Service
- Existing Water Service

Source: Feldman Land Surveyors

Existing Utility Infrastructure

Figure 8.1

Air Rights Parcel 12
Boston, Massachusetts



Source: Boston Water and Sewer Commission

Existing BWSC Map

Figure 8.2

Air Rights Parcel 12
Boston, Massachusetts