PROJECT NOTIFICATION FORM

Motor Mart Garage

Submitted to:
Boston Planning and Development Agency
One City Hall Square
Boston, MA 02201

Submitted by:
201 Stuart Street Owner, LLC
c/o CIM Group, LLC
540 Madison Avenue, 8th Floor
New York, NY 10022

Prepared by:
Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, MA 01754

In Association with:
Boston Global Investors, LLC
CBT Architects
Goulston & Storrs
Howard Stein Hudson
Nitsch Engineering
The Green Engineer
R. G. Vanderweil Engineers, LLP
Haley & Aldrich, Inc.

September 10, 2018

Epsilon
ASSOCIATES INC.

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Chapter 1.0

Introduction/Project Description

1.0 INTRODUCTION/ PROJECT DESCRIPTION

1.1 Introduction

201 Stuart Street Owner, LLC (the Proponent), an affiliate of CIM Group LLC, together with its development partner Boston Global Investors, LLC, proposes to redevelop the existing eight-story, Motor Mart Garage into a vibrant, mixed-use building by adding basement level retail space, reducing parking, and constructing new residential apartments within the western portion of the existing building, and constructing new residential apartments and condominiums within a 20-story residential tower rising out of the existing building (the Project). The Project will create a mix of approximately 306 new apartment and condominium units, retain approximately 46,000 sf of retail and restaurant space, and retain 672 parking spaces.

The existing Motor Mart Garage (the Existing Building or Garage) is located in the Midtown Cultural District neighborhood of Downtown Boston and bounded by Stuart Street to the south, Park Plaice to the east, Columbus Avenue to the northwest, Eliot Street to the northeast and Church Street to the west (the Project Site). The Project will improve and activate the western façade along Statler Park by lightening the existing dark Garage windows to create more eyes on the park, and by locating the primary residential entrance directly across Church Street from the park. The Project will also enhance Church Street in order to create a more inviting connection between the Bay Village and Midtown Cultural District neighborhoods. Sidewalks surrounding the site will be improved in accordance with Boston Complete Streets guidelines, including new street lighting and new street trees where feasible. In addition to these public realm benefits, the Project will provide new housing, new affordable housing opportunities in accordance with the City Inclusionary Development Policy (IDP), new construction and permanent jobs, and improved tax revenues for the City.

This Expanded Project Notification Form (PNF) is being submitted to the Boston Redevelopment Authority (BRA), doing business as the Boston Planning and Development Agency (BPDA), to initiate review of the Project under Section 80B of the Zoning Code, Large Project Review. The PNF offers a description of the Project, its minimal impacts and proposed mitigation strategies, and its substantial benefits to the City of Boston.

1.2 Project Identification

Address/Location: 201 Stuart Street

Developer:	201 Stuart Street Owner, LLC c/o CIM Group LLC 540 Madison Avenue, 8th Floor New York, NY 10022 (646) 783-4600 Kate Perez
Development Partner:	Boston Global Investors, LLC 55 Seaport Boulevard, 4th Floor Boston, MA 02210 (617) 350-7577 John Hynes Dave Wamester
Architect:	CBT Architects 110 Canal Street Boston, MA 02114 (617) 262-4354 Phil Casey Henry Celli
Legal Counsel:	Goulston & Storrs 400 Atlantic Avenue Boston, MA 02110 Matthew Kiefer Michael Flannery
Permitting Consultants:	Epsilon Associates, Inc. 3 Clock Tower Place, Suite 250 Maynard, MA 01754 (978) 897-7100 Cindy Schlessinger Talya Moked
Transportation Consultant:	Howard Stein Hudson 11 Beacon Street, Suite 1010 Boston, MA 02108 (617) 482-7080 Elizabeth Peart

Civil Engineer	Nitsch Engineering 2 Center Plaza, Suite 430 Boston, MA 02108 (617) 338-0063 John Schmid Zuki Mahmuljin
Sustainability Consultant	The Green Engineer 23 Bradford Street, 1st Floor Concord, MA 01742 (978) 369-8978 Sarah Michelman Ryan Montoni
MEP Engineer	R. G. Vanderweil Engineers, LLP 274 Summer Street Boston, MA 02210 (617) 574-8132 Alex Vanderweil
Geotechnical Consultant:	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Boston, MA 02129 (617) 886-7400 Marya Gorczyca

1.3 Project Description

1.3.1 Project Site

The Project Site is a 1.2-acre parcel within the Midtown Cultural District bounded by Stuart Street to the south, Park Plaice to the east, Columbus Avenue to the northwest, Eliot Street to the northeast and Church Street to the west. The Project Site is located at the western edge of the Midtown Cultural District, with the Theatre District to the east and the Back Bay to the west. See Figure 1-1 for an aerial locus map.

The entirety of the Project site is occupied by the existing approximately 421,000 sf, eight-story Motor Mart parking garage containing 1,037 parking spaces. A large portion of the existing ground floor contains retail, with restaurants anchoring the corners and smaller retail uses (such as car rental agencies) in between. The Existing Building has three curb cuts: the garage entrances on Stuart Street and at the corner of Eliot Street and Columbus Avenue, and the loading area on Columbus Avenue. The basement level is used partly for a vehicle rental agency and accessory retail spaces. Figures 1-2 and 1-3 present existing conditions of the Garage.

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Data Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division

Motor Mart Garage Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 1-1

Aerial Locus Map

Motor Mart Garage **Boston, Massachusetts**

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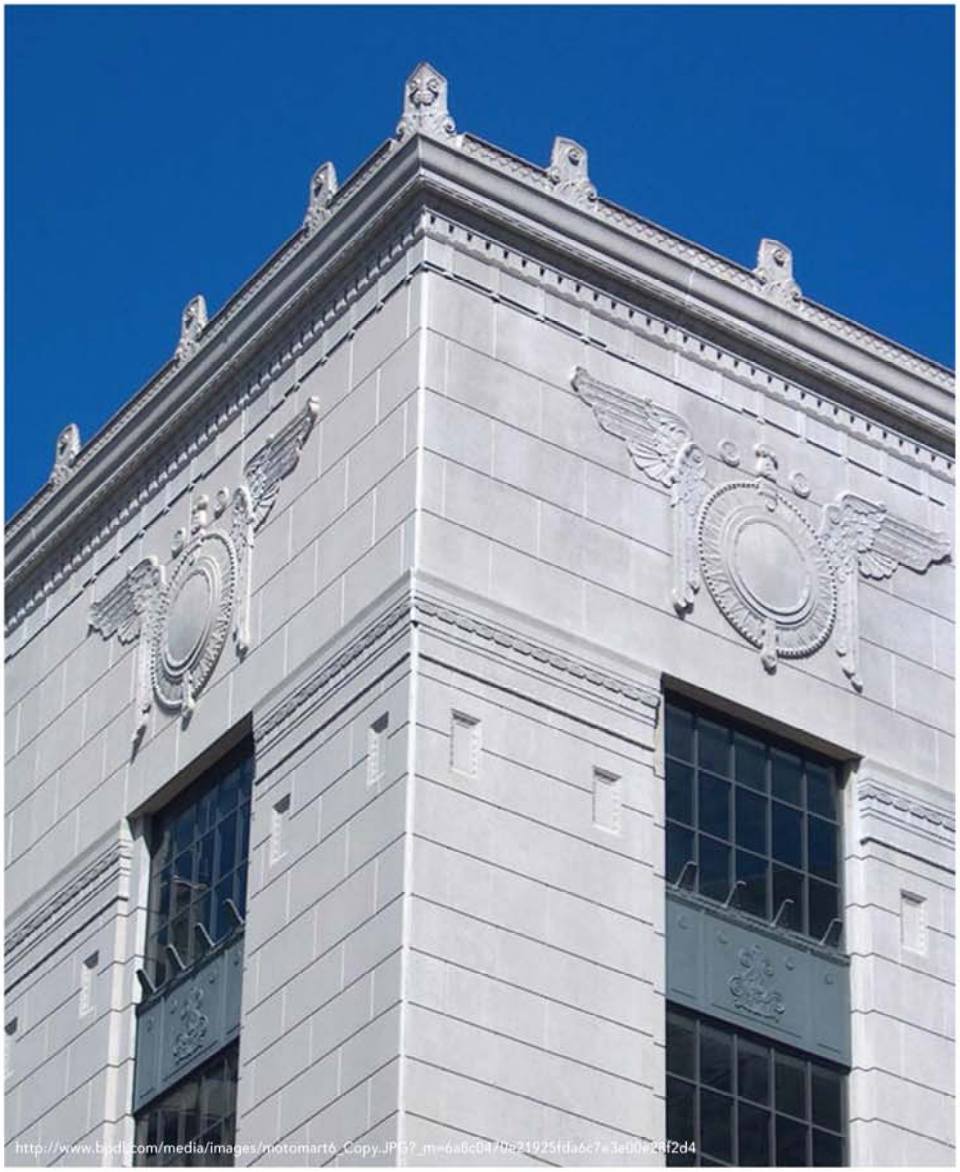
Figure 1-2
Existing Conditions



Motor Mart Garage **Boston, Massachusetts**

Figure 1-3
Existing Conditions

1.3.2 Area Context

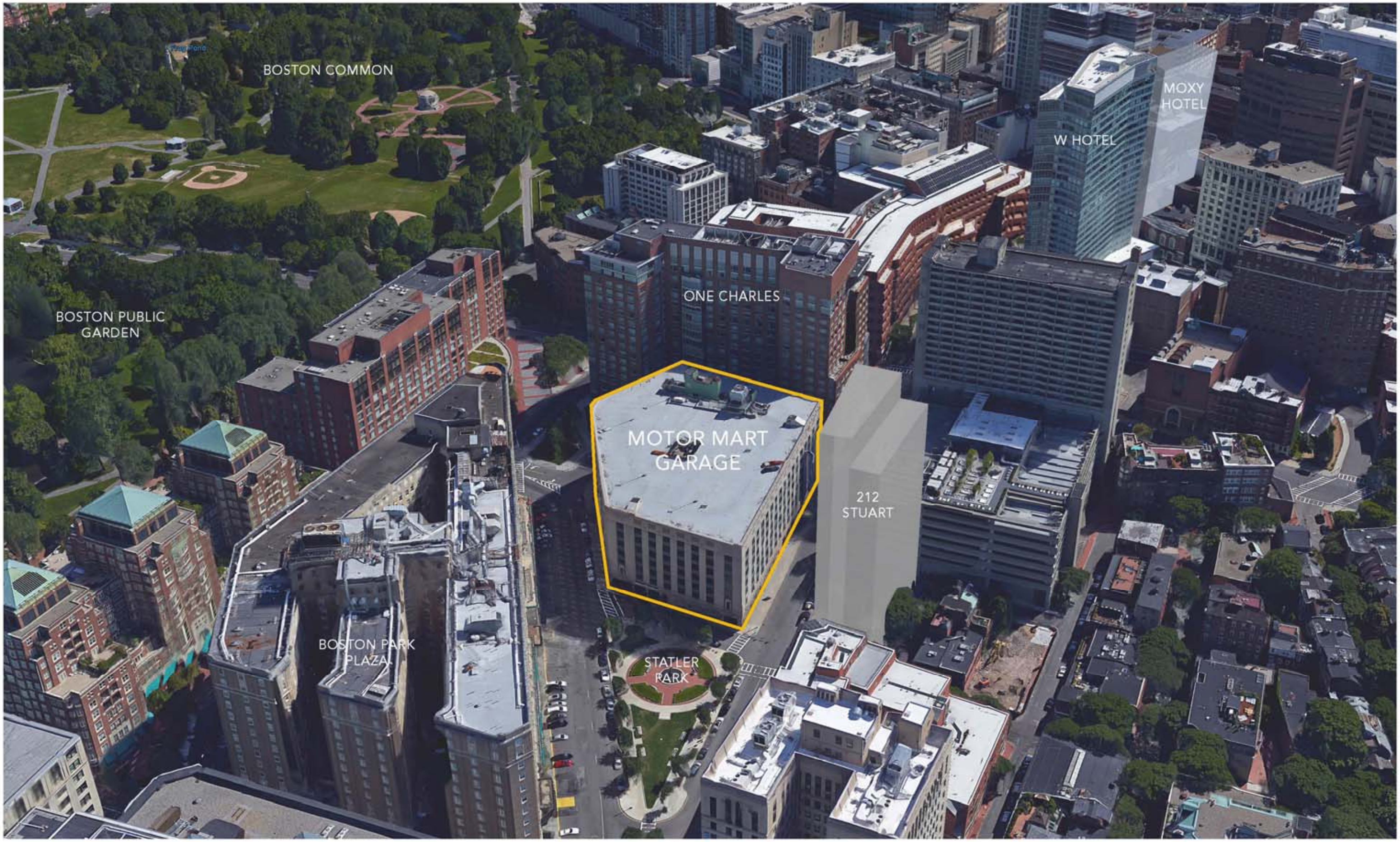
The Project Site is surrounded by large residential and hotel buildings on three sides, and opens towards Statler Park to the west. To the east is the existing One Charles Condominium building. To the north and south, the site is flanked by the Park Plaza Hotel and the Revere Hotel, respectively. Directly across Stuart Street and adjacent to the Revere Hotel is the site of a BPDA-approved approximately 200-foot-tall residential building known as 212 Stuart Street (see Figure 1-4).

The Project Site is well served by public transportation, making it an ideal site for transit-oriented development. Approximately a half-mile from the site are the Arlington Street and Boylston Street stations on the Green Line, and the Tufts Medical Center Station on the Orange Line, which collectively provide access to all branches of the MBTA. The area is also served by multiple bus routes, including the Route 39 bus which stops near the Project Site and serves points to the west. The Project Site also neighbors a number of cultural and recreational attractions including the Theatre District, Boston Common and Boston Public Garden. Tufts Medical Center is located less than a half mile from the Project Site, as are several educational institutions including Emmerson College.

1.3.3 Proposed Project

The Project consists of the redevelopment of the Existing Building and the construction of a 20-story residential tower rising out of the Existing Building. The western portion of the parking levels will be converted into approximately 84 new residential units. The new residential tower will rise out of the eighth floor of the Existing Building and contain apartment and condominium units. The Project will create approximately 306 new residential units ranging in size from studios to three-bedroom units. In addition, the Project will provide residential amenity spaces including a fitness center, a small exterior pool, and a vegetated roof on the ninth floor. As shown in the proposed site plan (see Figure 1-5), the Project has been designed to accommodate loading within the building.

Of the current 1,037 parking spaces in the garage, the Project will retain 672 parking spaces, designating approximately 144 spaces for residential use and the remaining approximately 528 spaces for primarily public use. The Project will also retain approximately 46,000 sf of commercial space on the ground and basement floors. Floor plans and sections are provided in Appendix A. Table 1-1 below presents the Project program.



Motor Mart Garage **Boston, Massachusetts**

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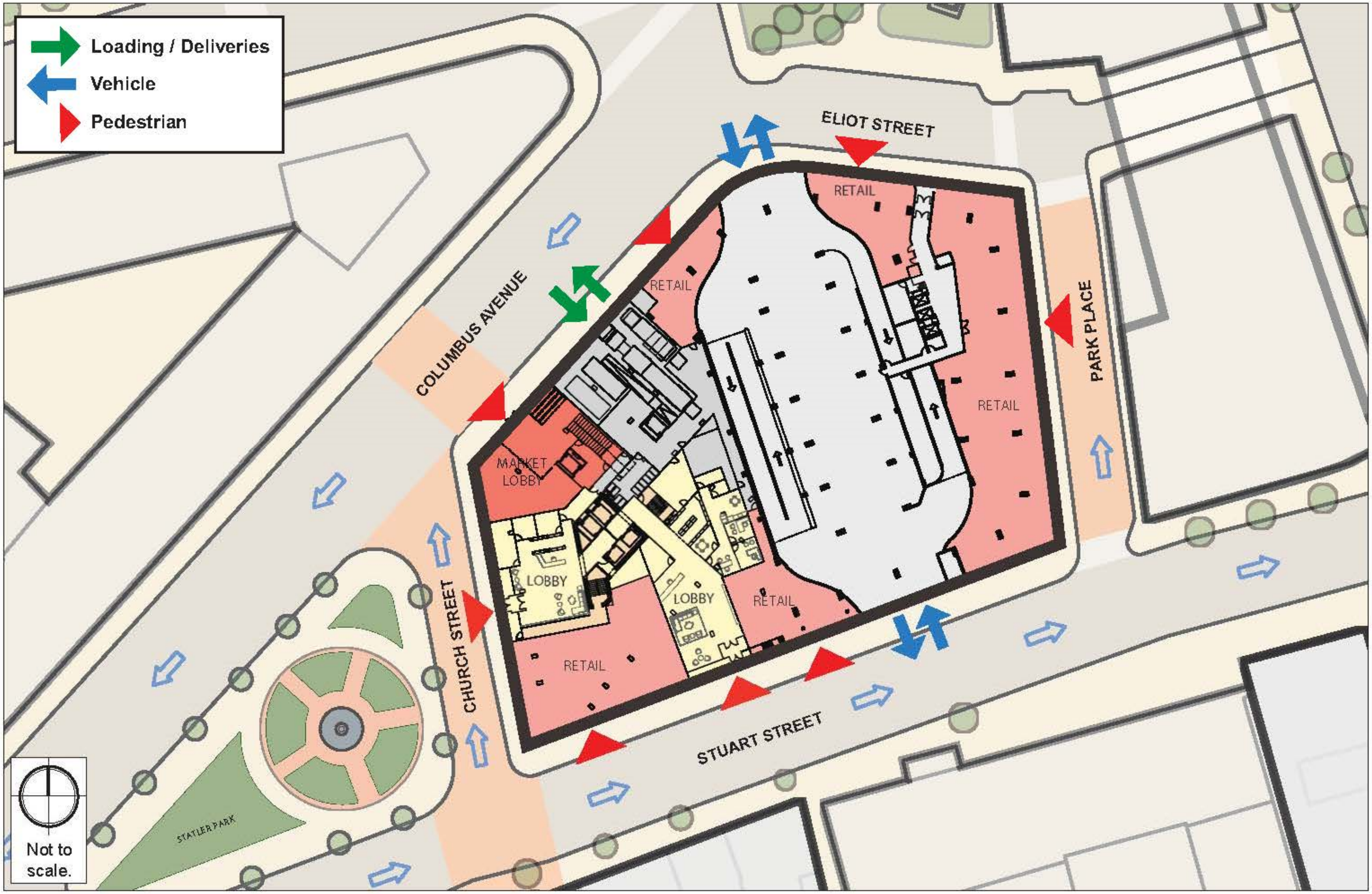
Figure 1-4
Area Context



Motor Mart Garage **Boston, Massachusetts**

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Figure 1-5
Site Plan

Table 1-1 Project Program

Project Element	Existing Dimension	Proposed Dimension
Residential	None	306 units
Commercial	50,712 sf	46,000 sf
Total Square Footage*	421,000 sf	685,000 sf
Parking	1,037 spaces	672 spaces
Zoning Height*	93 feet	310 feet
Parcel Area	52,323 sf	52,323 sf
FAR	8.0	13.1

* As defined in Article 2 of the Boston Zoning Code.

As part of the overall revitalization of the Existing Building, the ground floor will be rehabilitated. The four major corners of the building will continue to be anchored by retail with some smaller infill retail spaces along Stuart Street, Columbus Avenue, and Park Plaice. Part of the basement floor will also be improved to accommodate a shell space for future retail such as a market, with street presence to gain direct access to the basement. In addition, the Project will include two new residential building entries: a primary entry along Church Street, fronting Statler Park, and a second entry along Stuart Street opposite the residential entry to the 212 Stuart Street project. Loading for the Project will remain along Columbus Avenue. The existing garage entries on Columbus Avenue and at the corner of Elliot Street and Columbus Avenue will remain.

1.4 Public Benefits

The Project will provide many public benefits for the surrounding neighborhood and the City of Boston as a whole, both during construction and on an ongoing basis upon its completion. These benefits include housing creation, urban design and public realm improvements, job opportunities, and additional tax revenues. Specific public benefits include:

Urban Design and Public Realm Benefits

- Sidewalks surrounding the site will be improved in accordance with Boston Complete Streets guidelines, including new street lighting and new street trees where feasible.
- The Project will introduce residential uses to the Project Site, creating more activity in the area throughout the day.
- The Project will improve existing retail storefronts and signage in order to further activate the site.
- The Project will include enhanced car sharing opportunities within the garage for use by the neighborhood.

- The Project will enhance Church Street in order to visually extend through to Church Street Plaza and Statler Park.

Economic and Community Benefits

- In keeping with Mayor Walsh's goal of adding significant new housing in the city, the Project will create approximately 306 new residential units, including both ownership and rental housing, in close proximity to public transit.

- The Project will create new affordable housing units consistent with the BPDA's December 2015 Inclusionary Development Policy.

- The Project will create approximately 613 construction jobs and approximately ten to fifteen permanent jobs upon stabilization.

- The Project will result in increased tax revenues compared to the existing condition.

1.5 City of Boston Zoning

The Project site is located within the Midtown Cultural District ("MCD") governed by Article 38 of the Boston Zoning Code (the "Code"). The Project Site is also located within the Groundwater Conservation Overlay District ("GCOD") governed by Article 32 of the Code and the Restricted Parking Overlay District ("RPOD") governed by Article 3 of the Code.

The Project will require relief from certain zoning requirements as discussed in more detail below.

Large Project Review

Because the Project will add more than 50,000 square feet of gross floor area to the Project site and is located in a downtown zoning district, it is subject to Large Project Review by the BPDA pursuant to Article 80B of the Boston Zoning Code. The Large Project Review process was commenced by the filing of a Letter of Intent with the BPDA on March 1, 2018, and continues with the filing of this Expanded Project Notification Form.

Uses

The Project will include upper-floor multifamily dwelling use (with accessory parking), general retail use, and restaurant use, all of which are allowed as of right. The Project also proposes ground floor retail uses, commercial parking and parking accessory to retail and restaurant uses. These are conditional uses—either under MCD zoning or under RPOD requirements. All of these proposed uses currently exist at the Project site with the exception of multi-family dwelling use and its accessory parking.

Dimensional Requirements

For Projects subject to Large Project Review, Article 38 of the Code sets a maximum building height of 155 feet and a maximum floor area ratio ("FAR") of 10.0. Section 38-19 of the Code establishes specific design requirements relating to street wall continuity, street wall height, sky plan setbacks, display windows, and maximum floor plates above a building height of 125 feet.

The Project will exceed the maximum FAR and height allowed, and may require relief from the design requirements set forth in Section 38-19 of the Code.

Off-Street Parking and Loading

Within the RPOD, off-street parking for any non-residential uses is a conditional use. Loading requirements for projects within the MCD may be determined during Large Project Review.

Groundwater Conservation Overlay District

The Project is likely to require groundwater infiltration and a conditional use permit under Article 32 of the Code.

Inclusionary Housing

The City of Boston's Inclusionary Development Policy ("IDP") requires any residential project of 10 or more units requiring zoning relief (including a PDA Plan) to set aside at least 13 percent of its market rate units as affordable to households at specified levels of income. Alternatively, in the Zone A within which the Project site is located, a project may create the equivalent of 18 percent of the total number of units off-site, or contribute to a housing creation fund at a per-unit subsidy equal to 18 percent of the total number of project units.

Subject to BPDA approval and mindful of community input, the Proponent will work with the BPDA to determine a method for compliance with the IDP.

1.6 Legal Information

1.6.1 Legal Judgments Adverse to the Proposed Project

The Proponent is not aware of any legal judgments in effect or legal actions pending that are adverse to the Project.

1.6.2 History of Tax Arrears on Property

The Proponent does not have a history of tax arrears on any property owned within the City of Boston.

1.6.3 Site Control/ Public Easements

The Proponent is the fee owner of the Project site, and title research indicates that there are no public easements through or surrounding the Project Site. The Project Site is adjacent to public ways on all sides. See Appendix B for a site survey.

1.7 Anticipated Permits

Table 1-2 presents a preliminary list of permits and approvals from governmental agencies that are expected to be required for the Project, based on currently available information. It is possible that only some of these permits or actions will be required, or that additional permits or actions will be required.

Table 1-2 Anticipated Permits and Approvals

Agency	Permit, Review or Approval
City Agencies	
Boston Planning & Development Agency	Article 80B Large Project Review and Execution of Related Agreements Design Review Certification of Compliance Certification of Consistency
Board of Zoning Appeals/Boston Zoning Commission/Mayor	Zoning relief (as required)
Boston Civic Design Commission	Schematic Design Review
Boston Transportation Department	Transportation Access Plan Agreement Construction Management Plan
Boston Water and Sewer Commission	Site Plan Review Approval Water and Sewer Connection Permits Temporary Construction Dewatering Permit (issued jointly with MWRA) Groundwater Trust Certification
Public Improvement Commission/Public Works Department	Subsurface Discontinuances (as required) Specific Repair Plan/Curb Cut Permit Agreement for Temporary Earth Retention Systems, Tie-Back Systems and Temporary Support of Subsurface Construction (as required) Permits/Canopy Licenses for signs and awnings (as required)
Tree Warden (Boston Parks Department)	Approval of Cutting of Public Shade Trees (as required)
Public Safety Commission/Boston Committee on Licenses	Permit to Erect and Maintain Parking Structure / amendment to permit Inflammables License / amendment to license

Table 1-2 Anticipated Permits and Approvals (Continued)

Agency	Permit, Review or Approval
Boston Air Pollution Control Commission	Confirmation of exemptions / amendment to parking freeze permit
Boston Fire Department	Plan review approval Approval of fire safety equipment
Boston Inspectional Services Department	Building Permit Other construction-related permits Certificates of Occupancy
Parks and Recreation Commission	Approval of construction within 100′ of park or parkway
State Agencies	
Massachusetts Water Resources Authority	Temporary Construction Dewatering Permit (issued jointly with BWSC)
Federal	
Federal Aviation Administration	Determination of No Hazard to Air Navigation

1.8 Public Participation

As part of its planning efforts, the Proponent has met with elected officials, public agencies, nearby neighbors, residents, and representatives of neighborhood groups including the Bay Village Neighborhood Association, One Charles Condominium Association, Four Season Condominium Association, Four Seasons Hotel Management, Mid-Town Park Plaza Neighborhood Association, Emerson College, and Park Plaza Hotel Management and Ownership. The Proponent has also met with the BPDA and other City agencies on multiple occasions.

The Proponent continues to be committed to a comprehensive and effective community outreach and will continue to engage the community to ensure public input on the Project. The Proponent looks forward to working with the BPDA and city agencies, local officials, neighbors, and others as the design and review processes move forward.

1.9 Schedule

It is anticipated that construction will begin in the second quarter of 2019. Once begun, construction is expected to last approximately 30 months.

Chapter 2.0

Transportation

2.0 TRANSPORTATION

2.1 Overview

The Project is comprised primarily of new residential units and will not have a substantial impact on vehicular traffic. Residential developments generate far fewer trips per square foot than comparably sized office or retail developments and do not produce a large proportion of daily trips during commuter travel periods. The Project Site is located in a downtown, urban setting and in proximity to several alternate modes of transportation including MBTA rail and bus, car-sharing, and ride-sharing. The Proponent is committed to a robust Transportation Demand management program to further minimize and mitigate the Project's traffic impacts.

2.1.1 Purpose of the Transportation Component

In accordance with the City of Boston's Transportation Access Plan Guidelines, this Chapter describes roadway, pedestrian, and bicycle conditions; parking and loading; and transportation demand management (TDM) strategies for the Project.

2.1.2 Project Description

The Project Site is a 1.2-acre parcel within the Midtown Cultural District bounded by Stuart Street to the south, Park Plaice to the east, Columbus Avenue to the northwest, Eliot Street to the northeast and Church Street to the west. The Project Site is located at the western edge of the Midtown Cultural District, with the Theatre District to the east and the Back Bay to the west. The Project Site contains an eight-story parking garage with capacity for 1,037 vehicles. Today, this garage is primarily used for public parking, with some activity from monthly users and local restaurant/hotel valet agreements.

The existing site has three vehicle curb-cuts: the garage driveway on Stuart Street, the garage driveway on the corner of Eliot Street and Columbus Avenue, and the loading area on Columbus Avenue.

The Project will construct new residential apartments within the western portion of the Existing Building and create new residential apartments and condominiums within a new 20-story residential tower rising out of the Existing Building. The Project will contain approximately 306 residential units and retain approximately 46,000 sf of commercial space on the ground and basement floors.

A summary of the existing and proposed Project program is shown in Table 2-1

Table 2-1 Project Development Program

Land Use	Existing Site	Proposed Project
Commercial (square feet) *Including restaurant/retail*	50,712 sf	46,000 sf
Residential (units)	0	306
Parking (spaces)		
Commercial/Public	1,037	528
Residential	0	144
Total	1,037	672

2.1.3 Methodology

The Proponent engaged Howard Stein Hudson (HSH) to conduct an evaluation of the transportation impacts of the Project. This transportation study adheres to the Boston Transportation Department (BTD) Transportation Access Plan Guidelines and BPDA Article 80 Large Project Review process, as described below.

- The Existing (2018) Condition analysis includes an inventory of the existing transportation conditions such as traffic characteristics, parking, curb usage, transit, pedestrian circulation, bicycle facilities, loading, and site conditions. Existing counts for vehicles, bicycles, and pedestrians were collected at the study area intersections. A traffic data collection effort forms the basis for the transportation analysis conducted as part of this evaluation.
- The future transportation conditions analyses evaluate potential transportation impacts associated with the Project. The long-term transportation impacts are evaluated for Year 2025, based on a seven-year horizon.
- The No-Build (2025) Condition analysis includes general background traffic growth, traffic growth associated with specific developments (not including this Project), and transportation improvements that are planned in the vicinity of the Project Site.
- The Build (2025) Condition analysis includes a net increase in traffic volume due to the addition of Project-generated trips. The transportation study identifies expected roadway, parking, transit, pedestrian, and bicycle accommodations, as well as loading capabilities and deficiencies.
- The final sections of the transportation study identify travel demand management measures to reduce dependence on automobiles and present short-term construction impacts.

2.1.4 Transportation Evaluation Summary

None of the study intersections will experience a change in level of service from the No-Build Condition to Build Condition, indicating that the Project will have no significant impact to area traffic operations. Residential developments generate far fewer trips per square foot than comparably sized office or retail developments and do not produce a large proportion of daily trips during commuter travel periods, thereby minimizing the Project's impacts during peak hours. Additionally, the convenience of the nearby MBTA subway stations at Arlington Street, Boylston Street, and Tufts Medical Center will encourage transit travel to and from the Project Site by Project residents. Key transportation characteristics of the Project and analysis results include:

- ♦ During the a.m. peak hour, the Project will generate 11 new entering vehicle trips and 16 new exiting vehicle trips and during the p.m. peak hour, the Project will generate 15 new entering trips and 20 new exiting trips. Vehicle trips include automobiles, taxicabs, and transportation network company services such as Uber and Lyft.

- ♦ This is a gross calculation and does not account for any reduction in trips caused by the elimination of parking spaces within the Garage.Of the 672 parking spaces retained by the Project, approximately 144 will be designated for residents. The parking ratio for residents will be approximately 0.47 spaces/residential unit, assuming 100% residential utilization of the allocated parking spaces. It is expected that many residents will not own an automobile and will instead rely on car sharing services, taxicabs, or Uber/Lyft, for trips requiring a vehicle.

- ♦ The Proponent will construct new sidewalks in accordance with Boston Complete Streets guidelines and requirements of the Americans with Disabilities Act and Massachusetts Architectural Access Board (ADA/AAB) to the extent feasible.

- ♦ In accordance with the City of Boston Bicycle Guidelines, and to encourage bicycling as an alternative mode of transportation, the Proponent will provide secure bicycle storage capacity for residents and employees. Residential bicycle storage capacity will be provided at a ratio of one per residential unit.

- ♦ The Project will have three loading bays on Columbus Avenue, accessed from a single curb cut. Residential move-in/move-out activity will occur at these loading bays and be managed by an on-site transportation coordinator and subject to City regulation. Trash pick-up will occur along Columbus Avenue.

- ♦ The Proponent is committed to implementing Transportation Demand Management (TDM) measures to reduce residents' dependence on automobiles. TDM measures to be undertaken by the Proponent include: promoting transit services in marketing and orientation materials, providing adequate secure bicycle storage, joining the local Transportation Management Association, and designating an on-site transportation coordinator.

- A Transportation Access Plan Agreement (TAPA) will be entered into between the Proponent and BTD and will set forth the specific TDM measures and agreements between the Proponent and the City of Boston.

2.1.5 Study Area

The transportation study area is generally bounded by Charles Street to the east, Arlington Street to the west, Boylston Street to the north, and Stuart Street to the south. The study area includes the following seven intersections:

- Stuart Street/Arlington Street/Columbus Avenue (signalized);
- Stuart Street/Charles Street (signalized);
- Boylston Street/Charles Street (signalized);
- Boylston Street/Arlington Street (signalized);
- Arlington Street/Park Plaza/St. James Avenue (signalized);
- Park Plaza/Columbus Avenue (unsignalized); and
- Columbus Avenue/Eliot Street/Motor Mart Garage (unsignalized).

The study area is shown in Figure 2-1.

2.2 Existing Conditions

This section includes descriptions of existing study area roadway geometries, intersection geometry and traffic control, parking and curb usage, public transportation services, peak hour traffic counts of vehicles, bicycles, and pedestrians, and intersection traffic operations.

2.2.1 Existing Roadway Conditions

The study area includes the following major roadways, which are categorized according to the Massachusetts Department of Transportation (MassDOT) Office of Transportation Planning functional classifications:

Stuart Street is a two-way, four-lane roadway east of Charles Street, and a one-way eastbound, two-lane roadway west of Charles Street that runs in an east-west direction between Washington Street and Huntington Avenue. Stuart Street is adjacent to the south side of the Project Site and is classified as an urban principal arterial under BTD jurisdiction. On-street parking and sidewalks are provided on both sides of Stuart Street.

Motor Mart Garage Boston, Massachusetts

HOWARD STEIN HUDSON
Engineers + Planners

Figure 2-1
Study Area

Arlington Street is a one-way southbound, three-lane roadway located west of the Project Site that runs in a north-south direction between Beacon Street and Tremont Street. Arlington Street is classified as an urban principal arterial under BTD jurisdiction. On-street parking is provided on both sides of Arlington Street south of Stuart Street and is available on the west side north of Stuart Street. Sidewalks are provided on both sides of Arlington Street.

Columbus Avenue is a one-way southwest bound, two-lane roadway east of Arlington Street, and a two-way, four-lane roadway west of Arlington Street that runs in a northeast to southwest direction between Park Plaza and Tremont Street. Columbus Avenue is classified as an urban principal arterial under BTD jurisdiction. On-street parking and sidewalks are provided on both sides of Columbus Avenue.

Charles Street is a one-way northbound, three-lane roadway located to the east of the Project Site that runs in a north-south direction from Tremont Street to Beacon Street. Charles Street is classified as an urban principal arterial under BTD jurisdiction. On-street parking and sidewalks are provided on both sides of Charles Street in the vicinity of the Project Site.

Boylston Street is a one-way eastbound, three lane roadway located north of the Project Site that runs in an east-west direction between Washington Street and Dalton Street, and is a two-way, four-lane roadway between Park Drive and Dalton Street. Boylston Street is classified as an urban principal arterial under BTD jurisdiction. On-street parking and sidewalks are provided on both sides of Boylston Street in the vicinity of the Project Site.

Park Plaza is a one-way westbound, three lane roadway located north of the Project Site that runs in an east-west direction between Charles Street and Arlington Street. Park Plaza is one lane east of Columbus Avenue. Park Plaza is classified as an urban principal arterial under BTD jurisdiction. On-street parking and sidewalks are provided on both sides of Park Plaza.

Park Plaice is a one-way northbound, one-lane roadway that is adjacent to the east side of the Project Site that runs in a north-south direction between Eliot Street and Stuart Street. Park Plaice is classified as a local roadway under BTD jurisdiction. There is no on-street parking provided. Sidewalks are provided on both sides of Park Plaice.

Eliot Street is a one-way westbound, one-lane roadway located adjacent to north side of the Project Site that runs in an east-west direction between Park Plaice and Columbus Avenue. Eliot Street is classified as a local roadway under BTD jurisdiction. There is no on-street parking provided. Sidewalks are provided on both sides of Eliot Street.

2.2.2 Existing Intersection Conditions

The existing study area intersections are described below. Intersection characteristics such as traffic control, lane usage, pedestrian facilities, pavement markings, and adjacent land use are described.

Stuart Street/Arlington Street/Columbus Avenue is a six-leg, signalized intersection with four approaches. The Stuart Street eastbound approach has two lanes: an exclusive through lane and a shared through/right-turn/hard right-turn lane. The Arlington Street southbound approach has four lanes: an exclusive left-turn lane, two exclusive through lanes, and an exclusive right-turn lane. The Columbus Avenue northeast bound approach has two lanes: an exclusive through lane and a shared through/right-turn/hard right-turn lane. The Columbus Avenue southwest bound approach has three lanes: an exclusive through lane, a shared left-turn/through lane, and a channelized right-turn lane. On-street parking is provided on both sides of both Columbus Avenue approaches and the Stuart Street approach, and is provided on the east side of the Arlington Street approach. Sidewalks, crosswalks, wheelchair ramps, pedestrian signal heads, and push buttons are provided for all legs of the intersection.

Stuart Street/Charles Street is a four-leg, signalized intersection with three approaches. The Stuart Street eastbound approach has three lanes: an exclusive channelized left-turn lane and two exclusive through lanes. The Stuart Street westbound approach has two exclusive right-turn lanes. The Charles Street northbound approach has three lanes: two exclusive through lanes and a shared through/right-turn lane. On-street parking is provided on both sides of the Stuart Street westbound approach and the Charles Street northbound approach. Sidewalks, crosswalks, wheelchair ramps, pedestrian signal heads, and push buttons are provided across all legs of the intersection.

Boylston Street/Charles Street is a four-leg, signalized intersection with three approaches. The Boylston Street eastbound approach consists of two exclusive through lanes and two exclusive channelized left-turn lanes. The Boylston Street westbound approach consists of an exclusive channelized right-turn lane. The Charles Street northbound approach consists of two through lanes and a shared through/right-turn lane. On-street parking is restricted for approximately 50 feet on both sides of both legs of Charles Street, for approximately 30 feet on the north side of Boylston Street and approximately 100 feet on the south side of Boylston Street. Sidewalks, crosswalks, wheelchair ramps, pedestrian signal heads and push buttons are provided across all legs of the intersection.

Boylston Street/Arlington Street is a four-leg, signalized intersection, with two approaches. The Boylston Street eastbound approach consists of three exclusive through lanes and one shared through/right-turn lane. The Arlington Street southbound approach consists of an exclusive hard left-turn lane, a shared left-turn/through lane and two exclusive through lanes. On-street parking is restricted for approximately 100 ft on both sides of the Boylston Street legs and along the west side of the Arlington Street approach. There is an MBTA bus stop located at the Boylston Street eastbound approach. Sidewalks, crosswalks, wheelchair ramps, pedestrian signal heads and push buttons are provided across all legs of the intersection.

Arlington Street/Park Plaza/St. James Avenue is a four-leg, signalized intersection with three approaches. The St. James Avenue eastbound approach consists of one exclusive right-turn lane. The Park Plaza westbound approach consists of an exclusive through lane, a shared left-turn/through lane, and an exclusive left-turn lane. The Arlington Street southbound approach consists of a shared through/right-turn lane and two exclusive through lanes. On-street parking is provided on both sides of the Park Plaza approach and on both sides of the St. James Avenue leg. There are MBTA bus stops on the north side of St. James Avenue and on the west side of the Arlington Street approach. There are sidewalks, crosswalks, wheelchair ramps, pedestrian signal heads and push buttons provided across all legs of the intersection.

Park Plaza/Columbus Avenue is a three-leg, unsignalized intersection with two approaches. The Park Plaza westbound approach consists of one shared left-turn/through lane. The Columbus Avenue northbound approach consists of an exclusive left-turn lane. On-street parking is provided along the south side of the Park Plaza approach and is restricted for approximately 60 feet on both sides of the Columbus Avenue leg. There are sidewalks and crosswalks provided across both approaches of the intersection. Wheelchair ramps are provided on both sides of Park Plaza and on the east side of Columbus Avenue; the west side of Columbus Avenue is serviced by an asphalt ramp bridging the curb.

Columbus Avenue/Eliot Street/Motor Mart Garage Driveway is a four-leg, unsignalized intersection with two approaches. The Eliot Street westbound approach consists of a shared left-turn/bear left-turn/right-turn lane. The Motor Mart Garage approach consists of a shared hard left-turn/through/hard right-turn lane. There are sidewalks on both sides of all approaches. No crosswalks or wheelchair ramps are provided on any leg of the intersection.

2.2.3 Parking

An inventory of the existing on-street and off-street parking, as well as car sharing services in the vicinity of the Project, was collected. A description of each follows.

2.2.3.1 On-Street Parking and Curb Usage

On-street parking surrounding the Project Site consists of predominately commercial parking and no-parking or metered parking. The on-street parking regulations within the study area are shown in Figure 2-2.

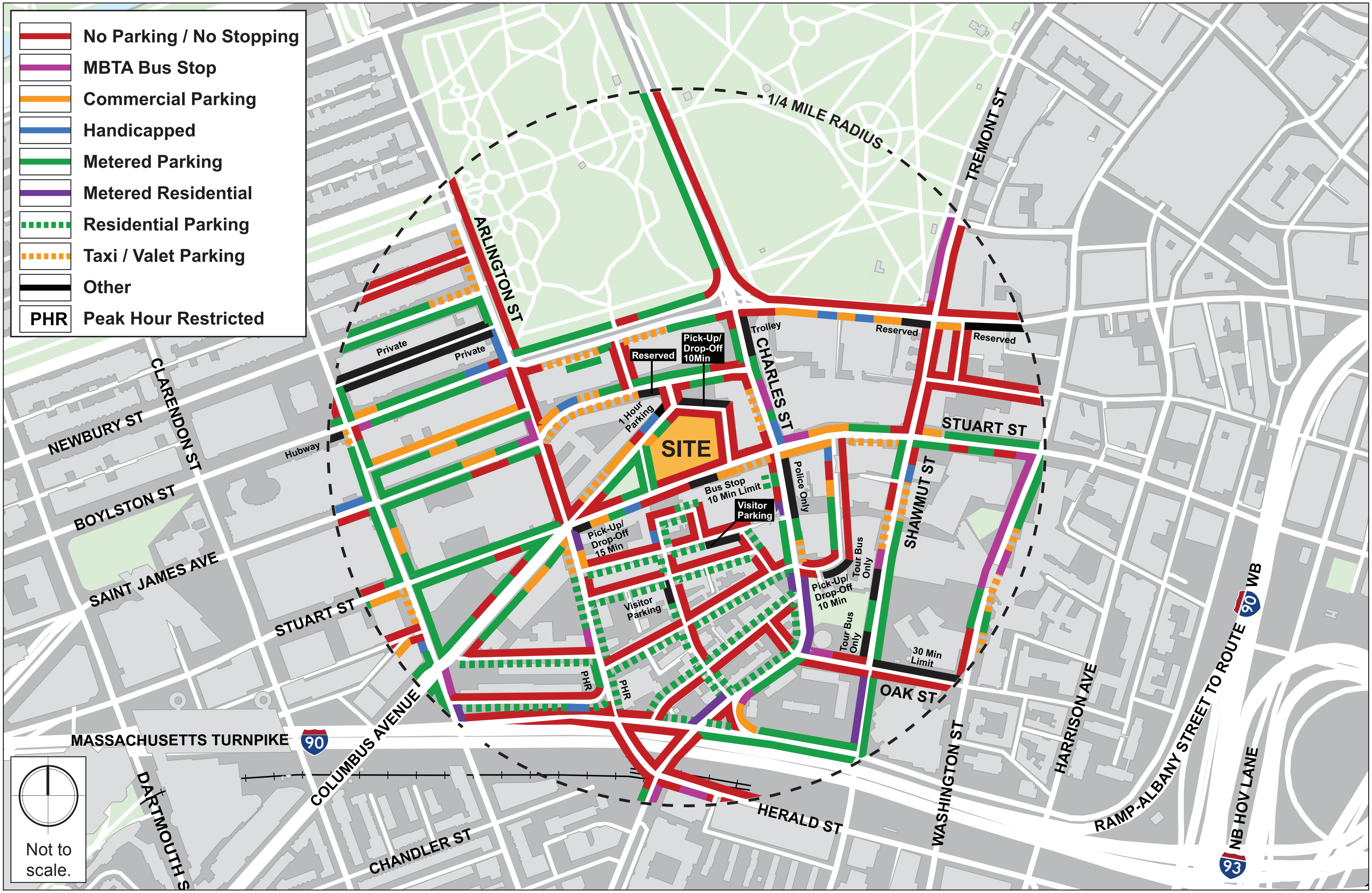

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Figure 2-2
On-Street Parking

2.2.3.2 Off-Street Parking

There are approximately 7,032 off-street public parking spaces, including those within the Motor Mart Garage, within about one-quarter mile, or a five-minute walk, from the Project Site. Of these, approximately 440 are found in surface parking lots and 6,592 are in parking garages. Public surface lots and garages within a quarter-mile of the Project Site are shown in Figure 2-3. A summary of all parking lots and garages are shown in Table 2-2.

Table 2-2 Off-Street Parking Lots and Garages within a Quarter-Mile of the Site

Map ID	Facility	Capacity	Map ID	Facility	Capacity
Parking Garages			**Parking Lots**		
A	200 Stuart Street Garage	888	K	The Arlington Street Lot	84
B	Motor Mart Garage (Project)	1037	L	132 Arlington Street Lot	54
C	City Place Garage	115	M	290 Tremont Street Lot	100
D	Boston Common Garage	1350	N	47 Lagrange Street Lot	50
E	St. James Avenue @ Arlington Street Garage	406	O	Theater District Parking Lot	35
F	The Clarendon Garage	316	P	Isabella Street @ Columbus Avenue Lot	52
G	Tufts Medical Center Garage	900	Q	210 Columbus Avenue Lot	45
H	45 Stuart Street Garage	89	R	222 Stuart Street Lot	20
I	The Back Bay Garage	960			
J	The W Hotel Garage	531			
Parking Garages Subtotal		**6,592**	**Parking Lots Subtotal**		**440**

2.2.3.3 Car Sharing Services

Car sharing services enable easy access to short-term vehicular transportation. Vehicles are rented on an hourly or daily basis, and all vehicle costs (gas, maintenance, insurance, and parking) are included in the rental fee. Vehicles are checked out for a specific time period and returned to their designated location. Pick-up/drop-off locations are typically in existing parking lots or other parking areas throughout neighborhoods as a convenience to users of the services. Nearby car sharing services provide an important transportation option and reduce the need for private vehicle ownership.

The major car sharing service with vehicle locations near the Project Site is Zipcar. There are currently three Zipcar locations within a quarter-mile and seven additional locations within a half-mile walk of the Project Site. The nearest Zipcar location to the Project Site is located within the Motor Mart Garage. The car sharing locations in proximity of the Project Site are shown in Figure 2-4.

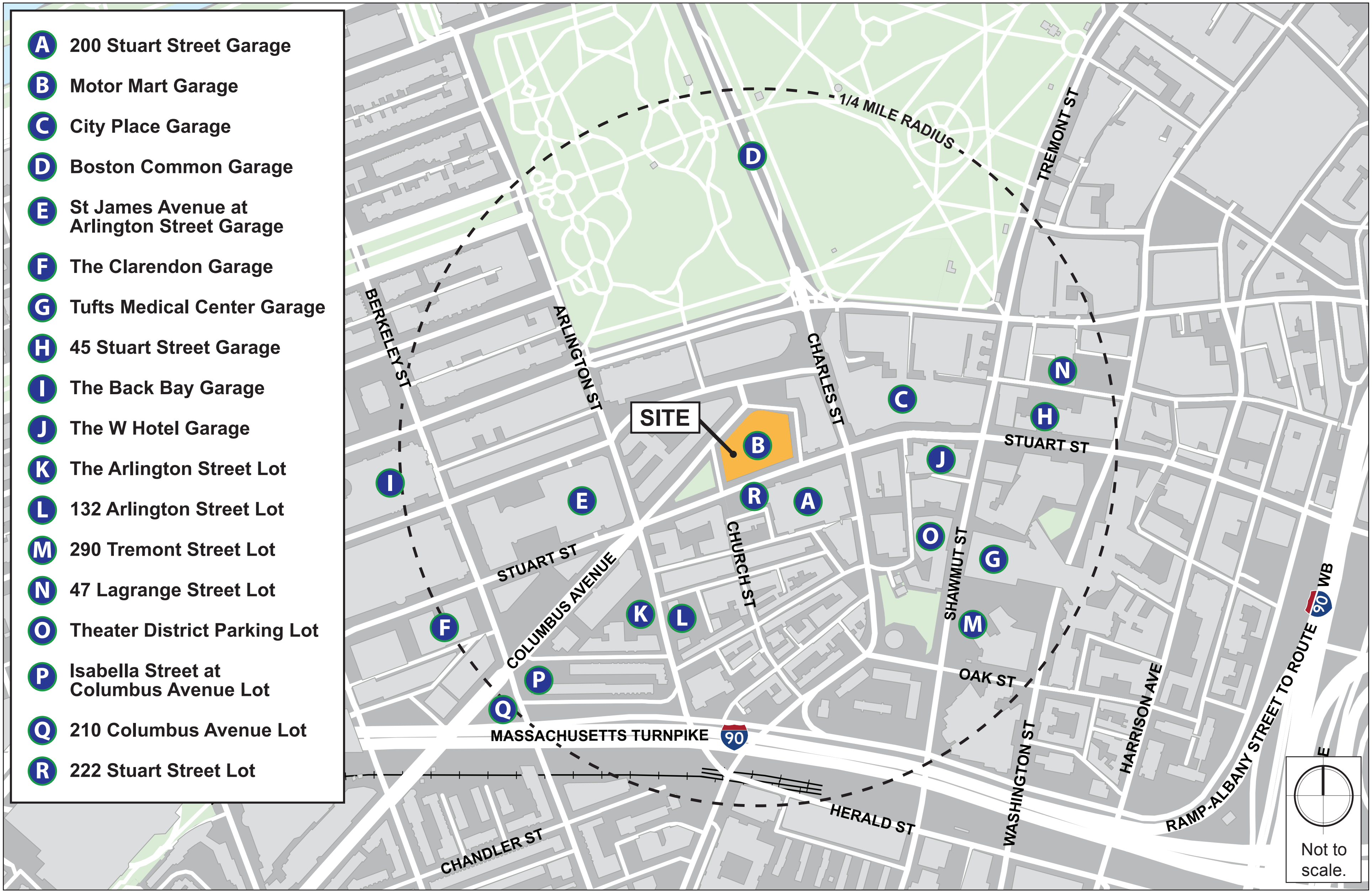

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Figure 2-3
Off-Street Parking

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Figure 2-4
Car Sharing Locations

2.2.4 Existing Public Transportation Services

The Project Site is in the Downtown neighborhood of Boston with many public transportation options. The site is within one-quarter mile of the MBTA Green Line Stations at Arlington Street and Boylston Street, and of the MBTA Orange Line Tufts Medical Center Station. There are four other MBTA subway stations within a half-mile walk of the Project Site. Additionally, five MBTA bus routes operate in proximity to the Project Site.

Nearby public transportation services are mapped in Figure 2-5 and listed in Table 2-3 below.

Table 2-3 Existing Public Transportation Services

Transit Service	Description	Peak-Hour Headway (minutes)[1]
Subway Lines		
Green Line	B Line – Government Center Station – Boston College Station C Line – North Station – Cleveland Circle Station D Line – Government Center Station – Riverside Station E Line – Lechmere Station – Heath Street Station	6
Orange Line	Oak Grove Station – Forest Hills Station	6
Bus Routes		
SL 4	Dudley Station – South Station at Essex Street via	12-14
SL 5	Dudley Station – Downtown Crossing at Temple Place via Washington Street	7-9
9	City Point – Copley Square via Broadway Station	4-6
10	City Point – Copley Square via Andrew Station	20-25
11	City Point – Downtown at Bedford Street & Chauncy Street	12-15
39	Forest Hills Station – Back Bay Station	6-11
43	Ruggles Station – Park Street & Tremont Street via Tremont Street	15-18
55	Jersey & Queensberry – Copley Square or Park Street & Tremont Street via Ipswich Street	15-30

1 Headway is the scheduled time between trains or buses. Headways are approximate.
Source: www.mbta.com, September 2017.

2.2.5 Existing Traffic Data

Turning Movement Counts (TMCs) and vehicle classification counts were conducted during the weekday a.m. and weekday p.m. peak periods (7:00 – 9:00 a.m. and 4:00 – 6:00 p.m., respectively). The traffic classification counts included car, heavy vehicle, pedestrian, and bicycle movements. The detailed traffic counts for the study area intersections are provided in Appendix C.

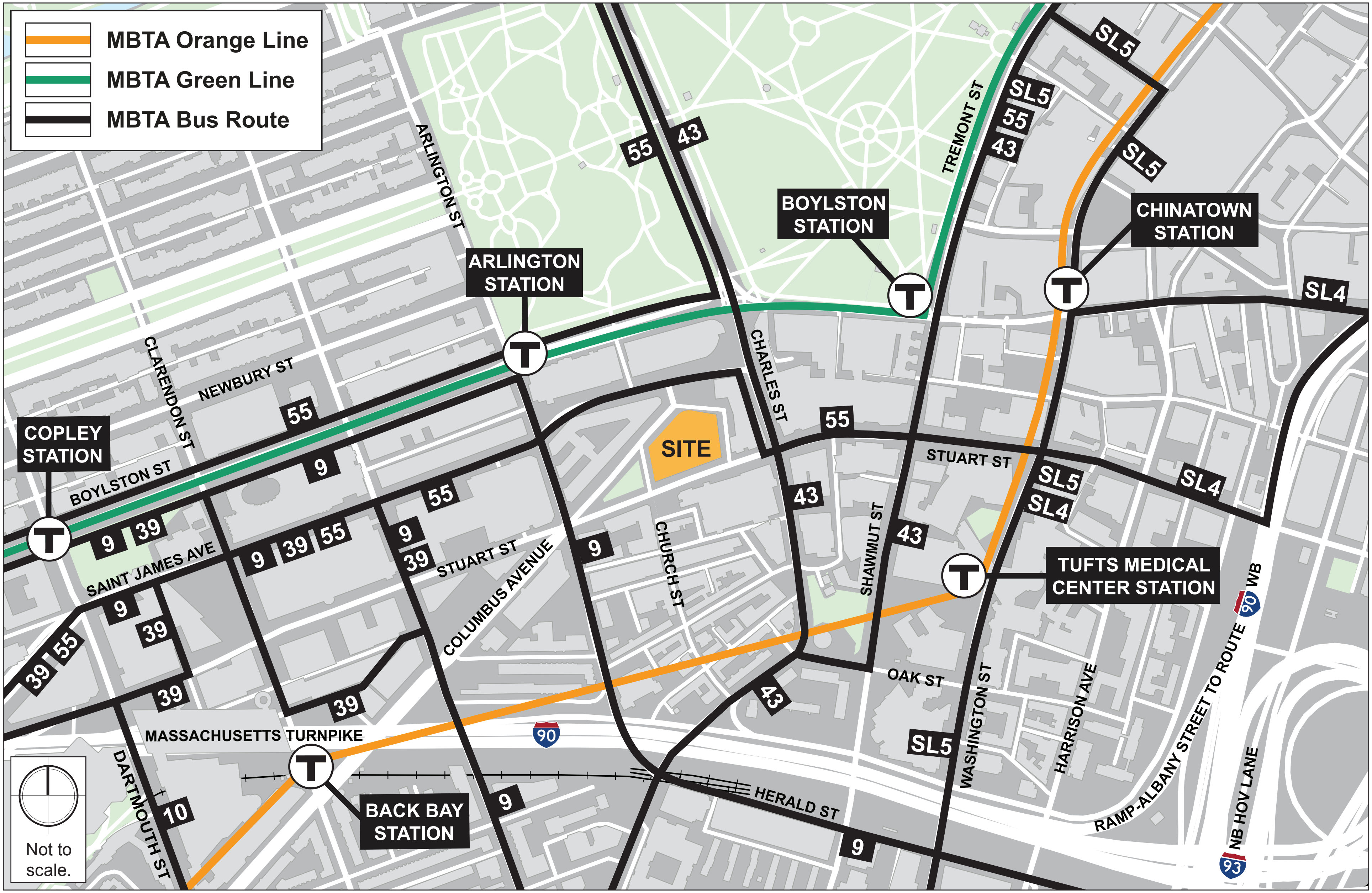

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Figure 2-5
Public Transportation

To account for seasonal variation in traffic volumes throughout the year, data provided by MassDOT was reviewed. The most recent (2011) MassDOT Weekday Seasonal Factors were used to determine the need for seasonal adjustments to the November 2017 TMCs. The seasonal adjustment factor for roadways similar to the study area (Group 6) in the month of November is 0.97. This indicates that average month traffic volumes are approximately three percent less than the traffic volumes that were collected. Therefore, the traffic counts were not adjusted downward to reflect average month conditions in order to provide a conservatively high analysis consistent with the peak season traffic volumes. The MassDOT 2011 Weekday Seasonal Factors table is provided in Appendix C.

2.2.6 Existing Vehicular Traffic Volumes

The traffic volumes collected in November 2017 were used to develop the Existing Condition traffic volumes. Because the counts were collected in late 2017 they have been adopted in this study as representative of Existing (2018) conditions. The volumes were balanced where necessary across the roadway network within the study area.

The resulting Existing (2018) weekday a.m. peak hour and weekday p.m. peak hour traffic volumes are shown in Figure 2-6 and Figure 2-7, respectively.

2.2.7 Existing Bicycle Volumes and Accommodations

In recent years, bicycle use has increased dramatically throughout the City of Boston. The Project Site is conveniently located in proximity to several bicycle facilities. The City of Boston's 2013 "Bike Routes of Boston" map designates Arlington Street and Stuart Street as advanced routes, suitable for experienced and traffic-confident cyclists. Neither street has bicycle markings on the roadway.

Columbus Avenue southwest of Stuart Street is designated as an intermediate route, suitable for riders with some on-road experience, and the roadway is marked with bicycle sharrows. There are no beginner bike routes within a quarter mile of the Project Site.

Bicycle counts were conducted concurrent with the vehicular TMCs and are presented in Figure 2-8.

The Project Site is also located in proximity to three bicycle sharing stations provided by Hubway/Blue Bikes. Hubway/Blue Bikes is the Boston area's largest bicycle sharing service, which was launched in 2011 and currently consists of more than 3,400 shared bicycles at more than 190 stations throughout Boston, Brookline, Cambridge, and Somerville. The nearest Hubway/Blue Bikes station to the Project Site is located on Stuart Street approximately 100 feet to the east of the intersection of Stuart Street/Charles Street. This station has 18 bicycle docks and is less than 500 feet to the east of the Project Site. The bicycle sharing locations within a quarter-mile of the Project Site are shown in Figure 2-9.

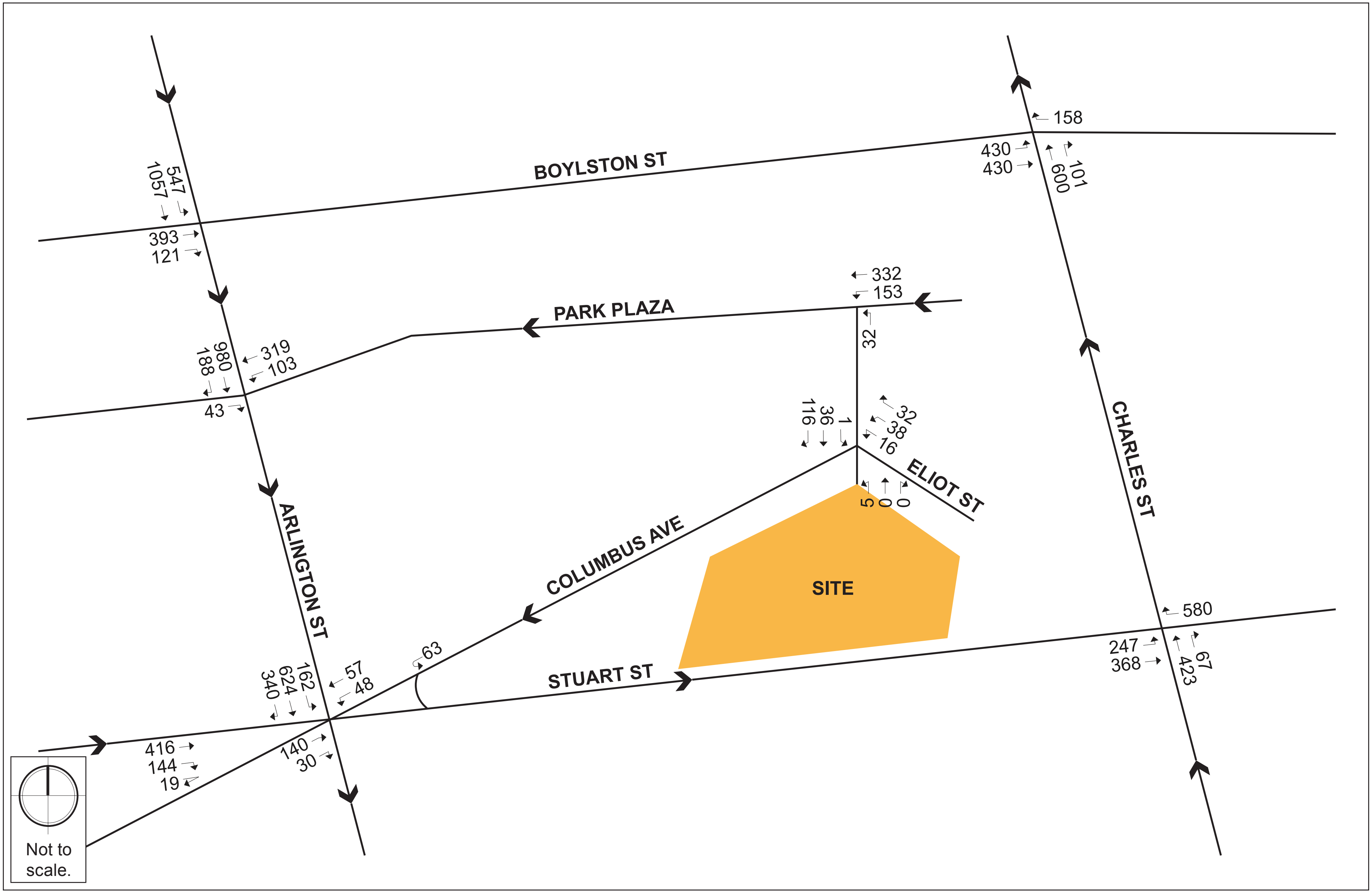

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Figure 2-6
Existing (2018) Condition Traffic Volumes, Weekday a.m. Peak Hour

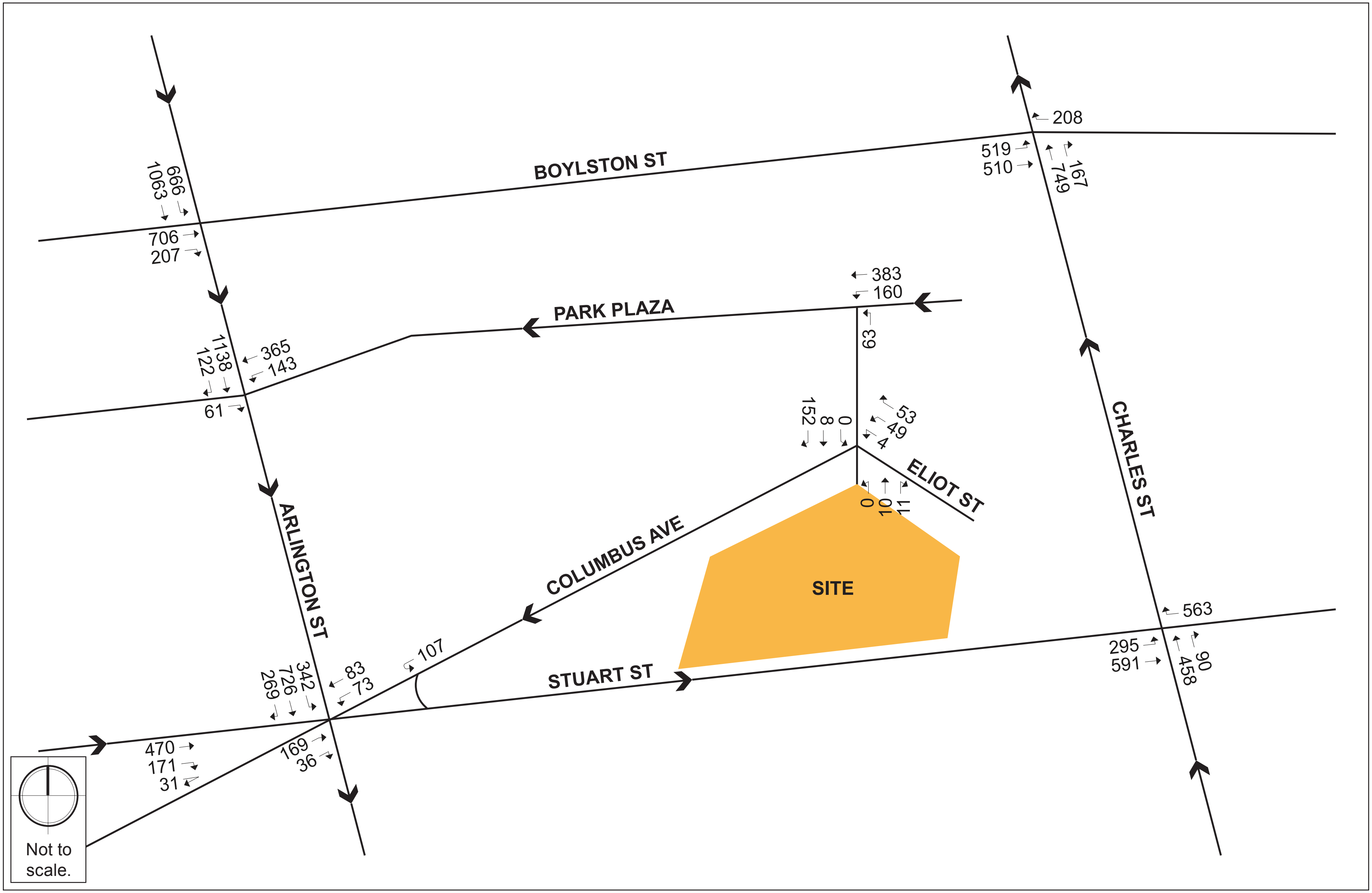

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Figure 2-7

Existing (2018) Condition Traffic Volumes, Weekday p.m. Peak Hour

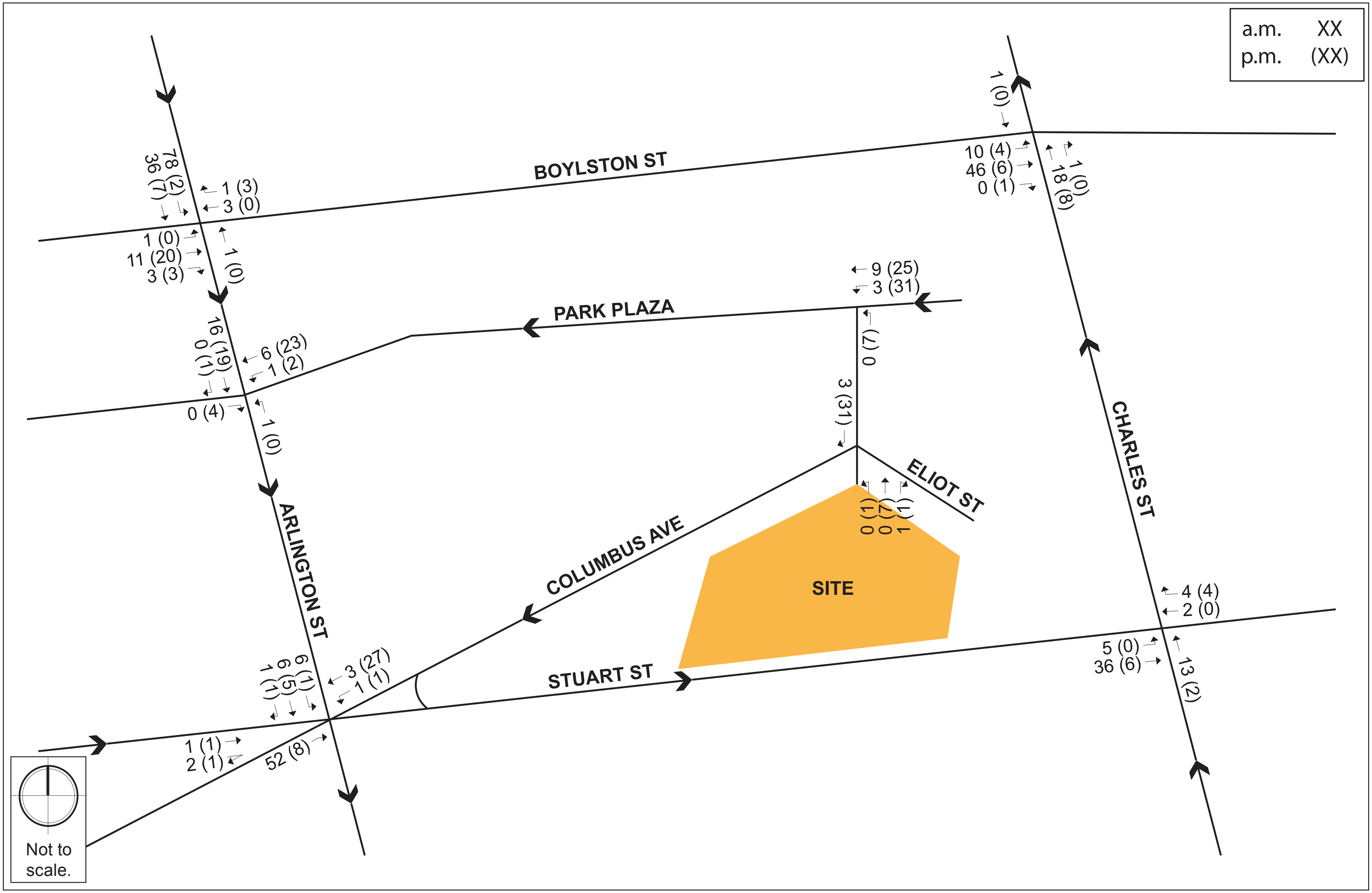

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Figure 2-8

Existing (2018) Condition Bicycle Volumes, Weekday a.m. and p.m. Peak Hour

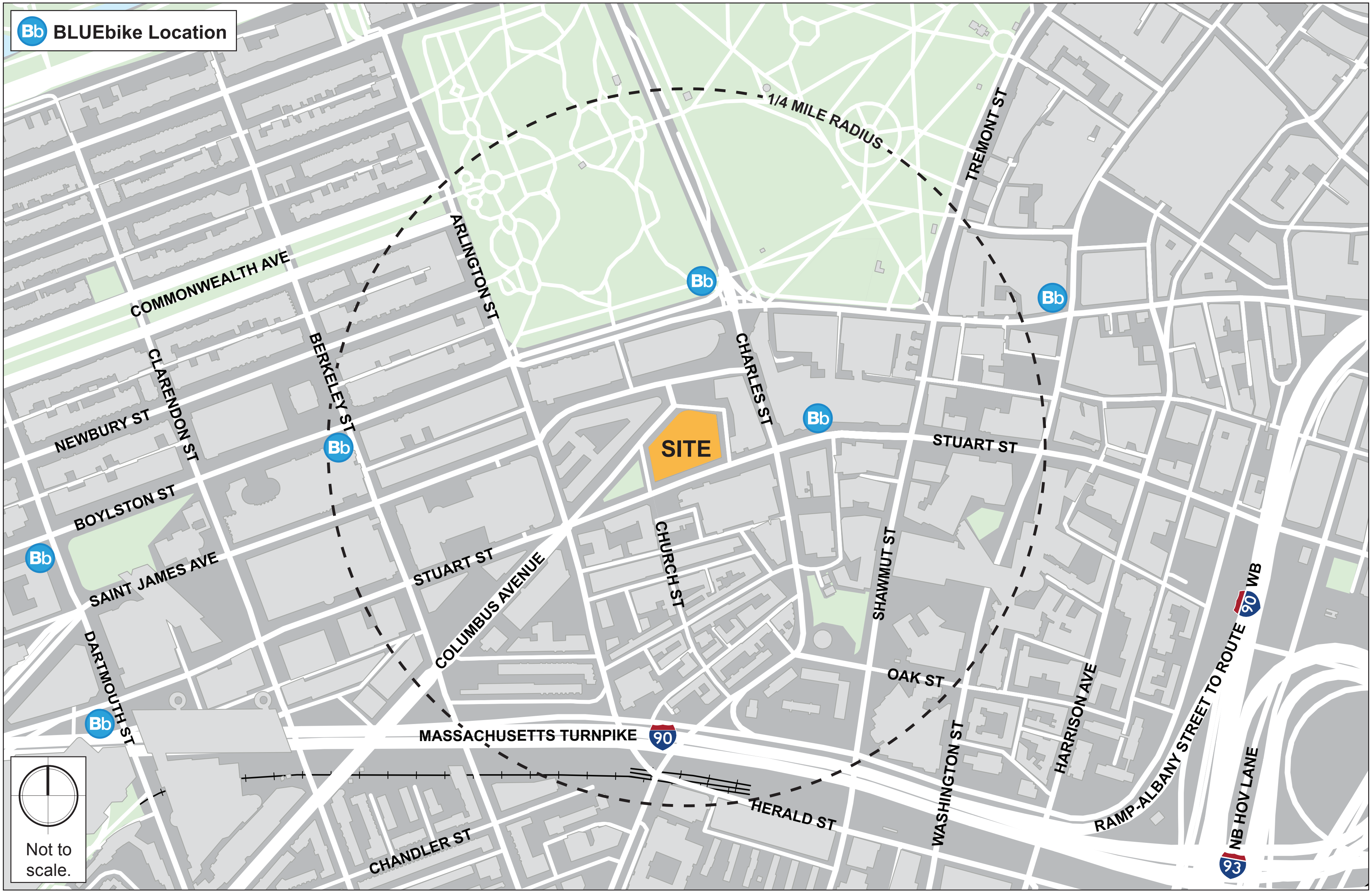

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Figure 2-9
Bicycle Sharing Locations

2.2.8 Existing Pedestrian Volumes and Accommodations

Sidewalks are provided along all roadways in the study area and are generally in good condition. Crosswalks and pedestrian signal equipment are provided at all five signalized study area intersections.

To determine the amount of pedestrian activity within the study area, pedestrian counts were conducted concurrent with the TMCs at the study area intersections and are presented in Figure 2-10.

2.3 No-Build (2025) Condition

2.3.1 Background Traffic Growth

The methodology to account for future traffic growth, independent of the Project, consists of two parts. The first part of the methodology accounts for general background traffic growth that may be affected by changes in demographics, automobile usage, and automobile ownership. Based upon a review of recent traffic studies conducted for nearby projects and to account for any additional unforeseen traffic growth, a 0.5% annual traffic growth rate was used to develop the future conditions traffic volumes.

The second part of the methodology identifies any specific planned developments that are expected to affect traffic patterns throughout the study area within the future analysis time horizon. Development projects were identified in the vicinity of the Project Site and are shown in Figure 2-11. Traffic volumes associated with the following projects were directly incorporated into the future conditions traffic volumes:

- **350 Boylston Street** – This project is located to the northwest of the Project Site and is proposed to consist of approximately 15,000 square feet of ground floor retail space, approximately 200,000 square feet of office space, and a 6,000 square foot fitness center/spa. A two-story below grade parking garage will provide 150 parking spaces. This project has been approved by the BPDA Board.

- **380 Stuart Street** – This project is located to the southwest of the Project Site and is proposed to consist of approximately 615,000 square feet of office space and 10,000 square feet of ground floor retail space. A multi-story below grade parking garage will provide 175 parking spaces. This project has been approved by the BPDA Board.

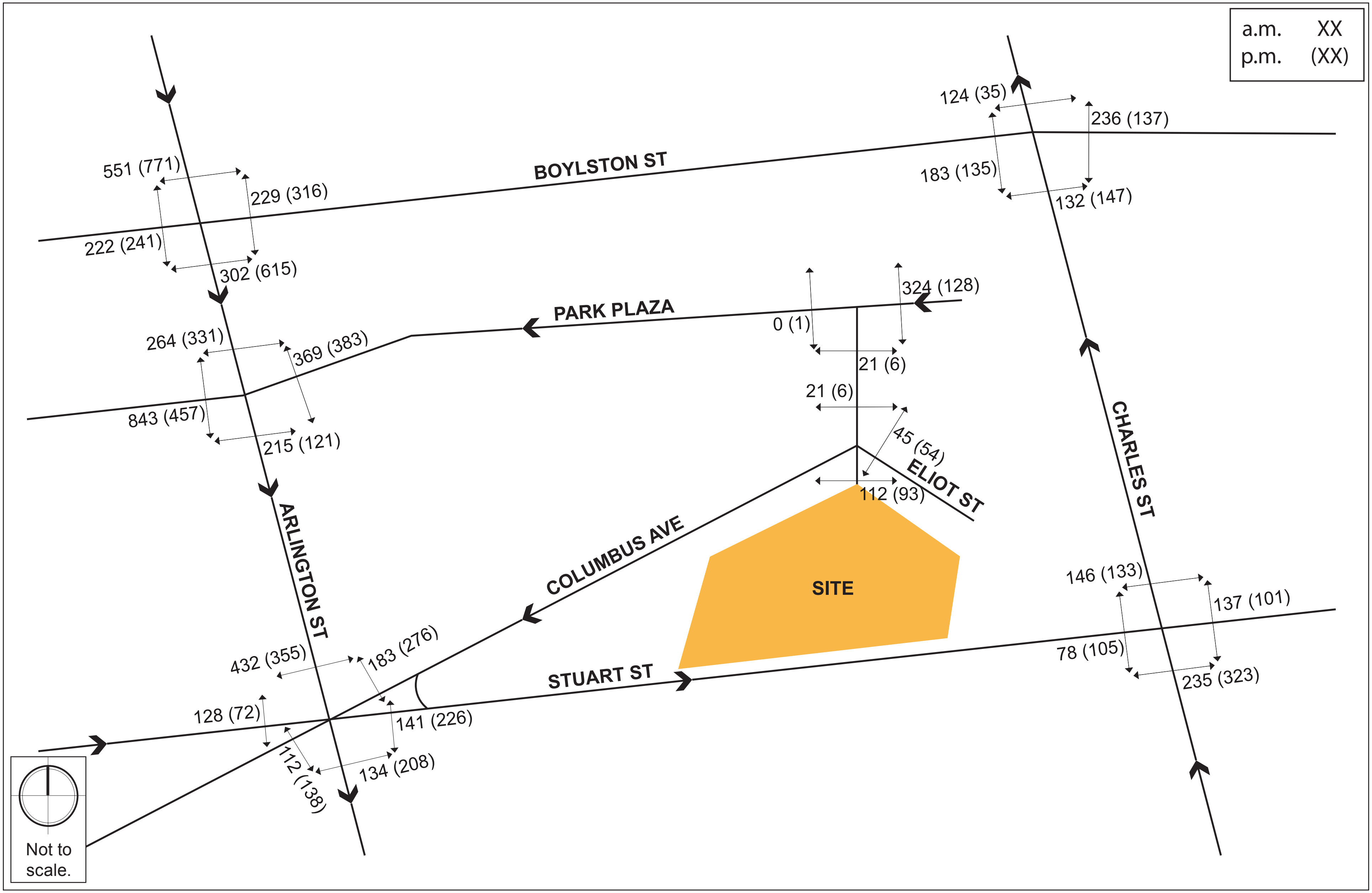

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Figure 2-10

Existing (2018) Condition Pedestrian Volumes, Weekday a.m. and p.m. Peak Hour

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Figure 2-11
Background Projects

- **40 Trinity Place** – This project is located to the southwest of the Project Site and is proposed to consist of approximately 142 residential units, a 220-unit hotel with accessory conference center space, ballroom space, and pool and fitness center space totaling approximately 163,010 square feet, as well as approximately 7,810 square feet of restaurant/lounge space. A two-story, above grade parking garage that will exist on levels four and five of the structure will provide 100 parking spaces. The parking will be accessed via vehicle elevators. This project has BPDA Board approval.

- **Back Bay/South End Gateway** – This project, which has BPDA Board approval, is located to the southwest of the Project Site and is proposed to provide up to 2,013 parking spaces within the parking garage on site as well as consist of four distinct but connected components, as described below:

  - The first parcel will consist of the partial demolition of the existing parking garage for the construction of a 26-story building containing a pedestrian connection to Back Bay Station, 582,000 square feet of office space, up to approximately 23,700 square feet of ground floor retail space and approximately 207,770 square feet of reconstructed parking garage.

  - The second parcel will consist of the demolition of the eastern most parking drum for the construction of a 28-story residential building with approximately 240 residential units.

  - The third parcel will consist of the demolition of an MBTA ventilation tower for the construction of a 35-story building containing 5,100 square feet of first and second floor retail and approximately 360 residential units.

  - The fourth parcel will include vertical expansion of the existing MBTA Back Bay Station to create approximately 30,000 square feet of retail space.

- **212-222 Stuart Street –** This project is located directly across Stuart Street from the Project Site and will include 131 residential units and 3,000 square feet of ground floor retail space. Approximately 50 parking spaces will be provided in the existing 200 Stuart Street Garage which is adjacent to the east side of the project site. This project has been approved by the BPDA Board.

- **240 Tremont Street (Parcel P-7a)** – This project is located to the east of the Project Site and is proposed to consist of a 23 story, 125,000 square foot micro-hotel with approximately 346 units. No parking will be provided on site. This Project has been approved by the BPDA and is currently under construction.

The trips generated by the projects listed below are accounted for in the background growth rate because they either are distant to the Project Site or will not generate significant volumes through the study area.

- **115 Winthrop Square** – The project is located to the northeast of the Project Site and is proposed to consist of the demolition of an existing parking garage and the construction of a 1.6 million sf residential/commercial tower, as well as structured parking. This project is currently under construction.

- **80 Boylston Street (Emerson College's "Little Building" residence hall)** – This project involves the restoration of the building's exterior façade, the renovation of floors two through 12, and the construction of a 13th floor. The project will add a total of 294 beds to the dormitory. This project is currently under construction.

2.3.2 Proposed Infrastructure Improvements

A review of planned improvements to roadway, transit, bicycle, and pedestrian facilities was conducted to determine if any are near the Project Site. Identified improvements include:

- Tremont Street between Court Street to the north and Boylston Street to the south will be reconstructed to improve sidewalks, wheelchair ramps, and traffic control signals.

- Tremont Street between Boylston Street to the north and Stuart Street to the south will be resurfaced and improvements will be made to pedestrian and bicycle accommodations.

These improvements have been incorporated into the future analysis, as appropriate.

2.3.3 No-Build Traffic Volumes

The 0.5% annual growth rate, compounded annually, was applied to the Existing (2018) Condition traffic volumes. Traffic volumes associated with the background development projects listed above were then added to develop the No-Build (2025) Condition traffic volumes. The No-Build (2025) weekday a.m. and p.m. peak hour traffic volumes are shown in Figure 2-12 and Figure 2-13, respectively.

2.4 Build Condition

The Project includes 306 residential units to be constructed within a portion of the Existing Building and within a new, 20-story tower that will rise out of the Existing Building. Parking capacity in the existing garage will be reduced from 1,037 spaces to 672 spaces. In the redeveloped garage, approximately 144 parking spaces will be for residential use and the remaining approximately 528 spaces will be available for commercial/public use.

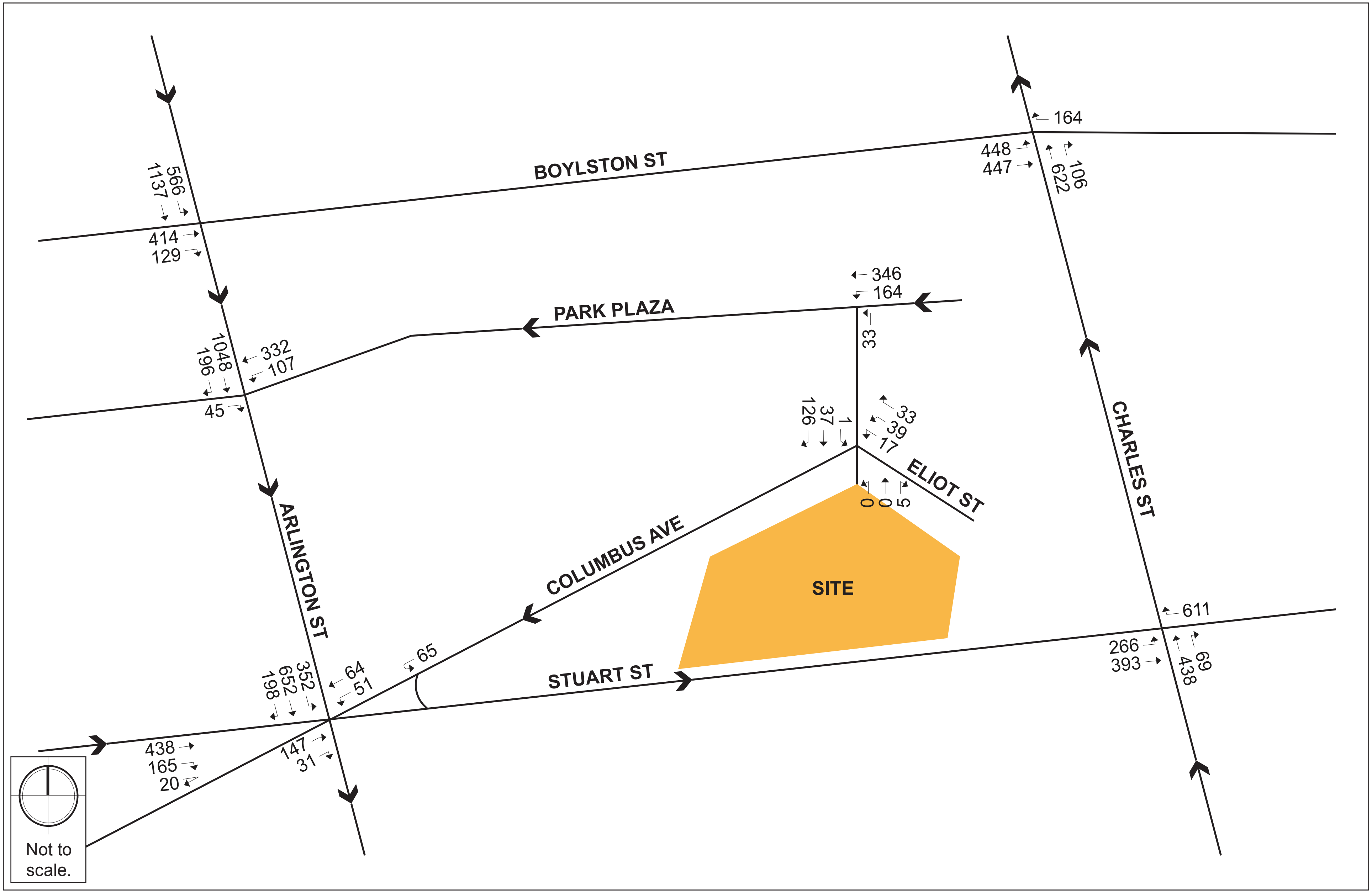

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Figure 2-12

No-build (2025) Condition Traffic Volumes, Weekday a.m. Peak Hour

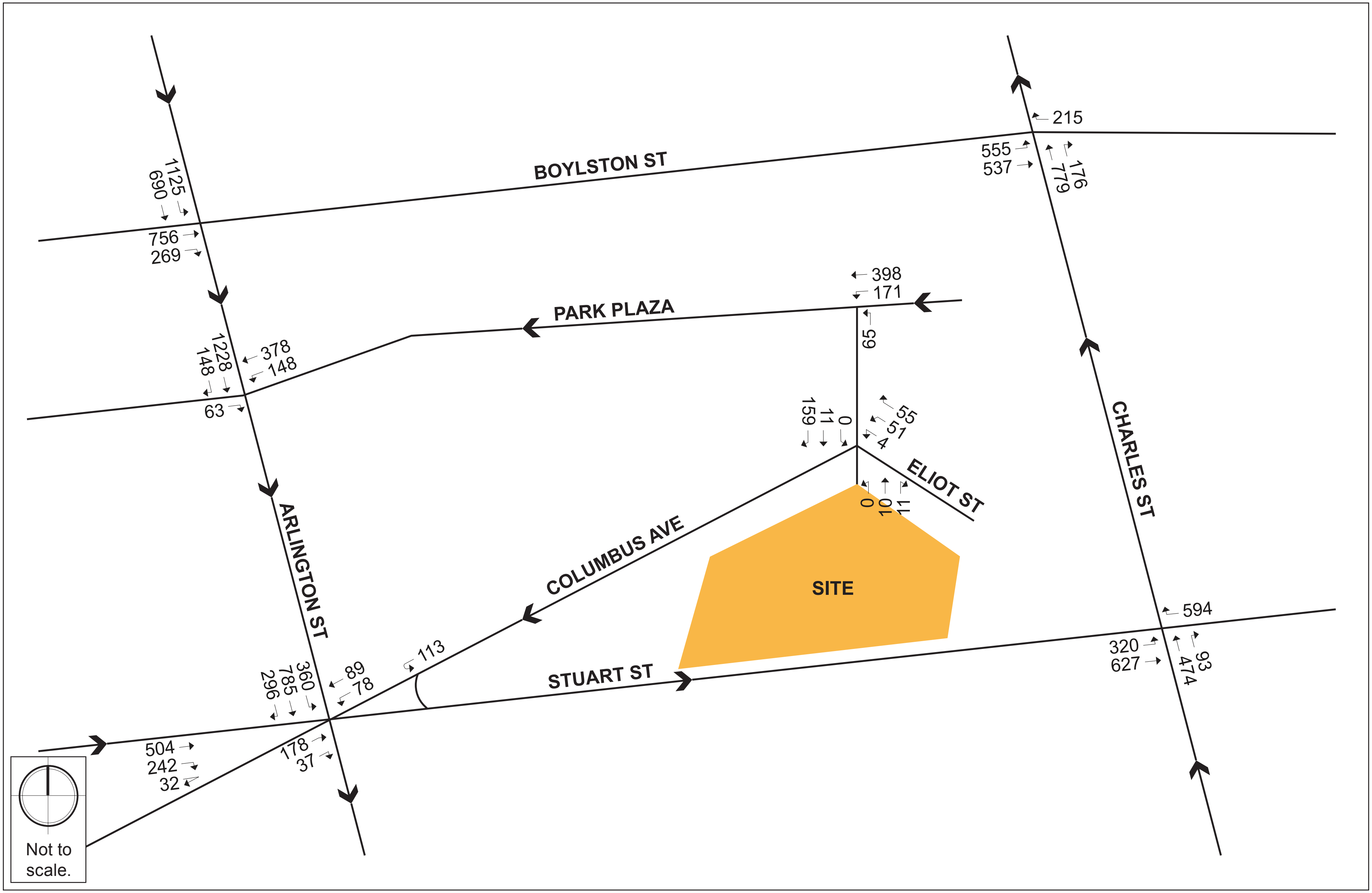

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Figure 2-13

No-build (2025) Condition Traffic Volumes, Weekday p.m. Peak Hour

Of the existing 50,712 sf of commercial (retail/restaurant) space on the ground and basement floors, approximately 46,000 sf will be retained and the rest will be replaced by new interior lobby spaces and internal circulation hallways.

2.4.1 Site Access and Vehicle Circulation

The site plan is shown in Figure 2-14.

The pedestrian entrances to the Project will be located on Church Street and Stuart Street and connect with new interior walkways to the residential lobbies. Condominium residents, who will live on the top six floors of the tower, will be able to enter/exit the Project's condominium lobby via Church Street, while apartment residents will be able to enter/exit the apartment lobby via Stuart Street. The ground floor retail uses will continue to have exterior doorways along the perimeter of the Project.

Vehicles will, as under current conditions, continue to access the garage driveways on either Stuart Street or at the corner of Eliot Street and Columbus Avenue. A drop-off/pick-up zone for two cars will be proposed along Church Street, in front of the doorway to the condominium lobby. Currently, these spaces are metered and this proposed change will be reviewed by the City as part of the Project's Transportation Access Plan Agreement (TAPA).

2.4.2 Loading and Service Accommodations

Two types of delivery activity are anticipated at the Project:

- ♦ Loading area/docks – Activity such as package delivery (USPS, UPS, Fed-Ex), furniture delivery, deliveries for on-site retail/restaurant businesses, and move-in/move-out will occur here. Typically, about 50% of loading dock deliveries occur via autos/vans and about 50% via Single Unit 30-foot (SU30) trucks.
- ♦ Residential Lobby – Activity related to laundry/dry cleaning pick-up/drop-off, single small package delivery, housecleaning services, dog walkers, water delivery, cable company service, and food delivery will occur here. Typically, about 90% of this activity occurs via autos/vans and about 10% via walking/bicycle.

The Project will have three truck bays in the single loading area located on Columbus Avenue. Delivery vehicles to the Project's loading dock will back in from the street into one of the bays. Vehicles will exit onto Columbus Avenue. Trash pick-up will occur from this loading area.

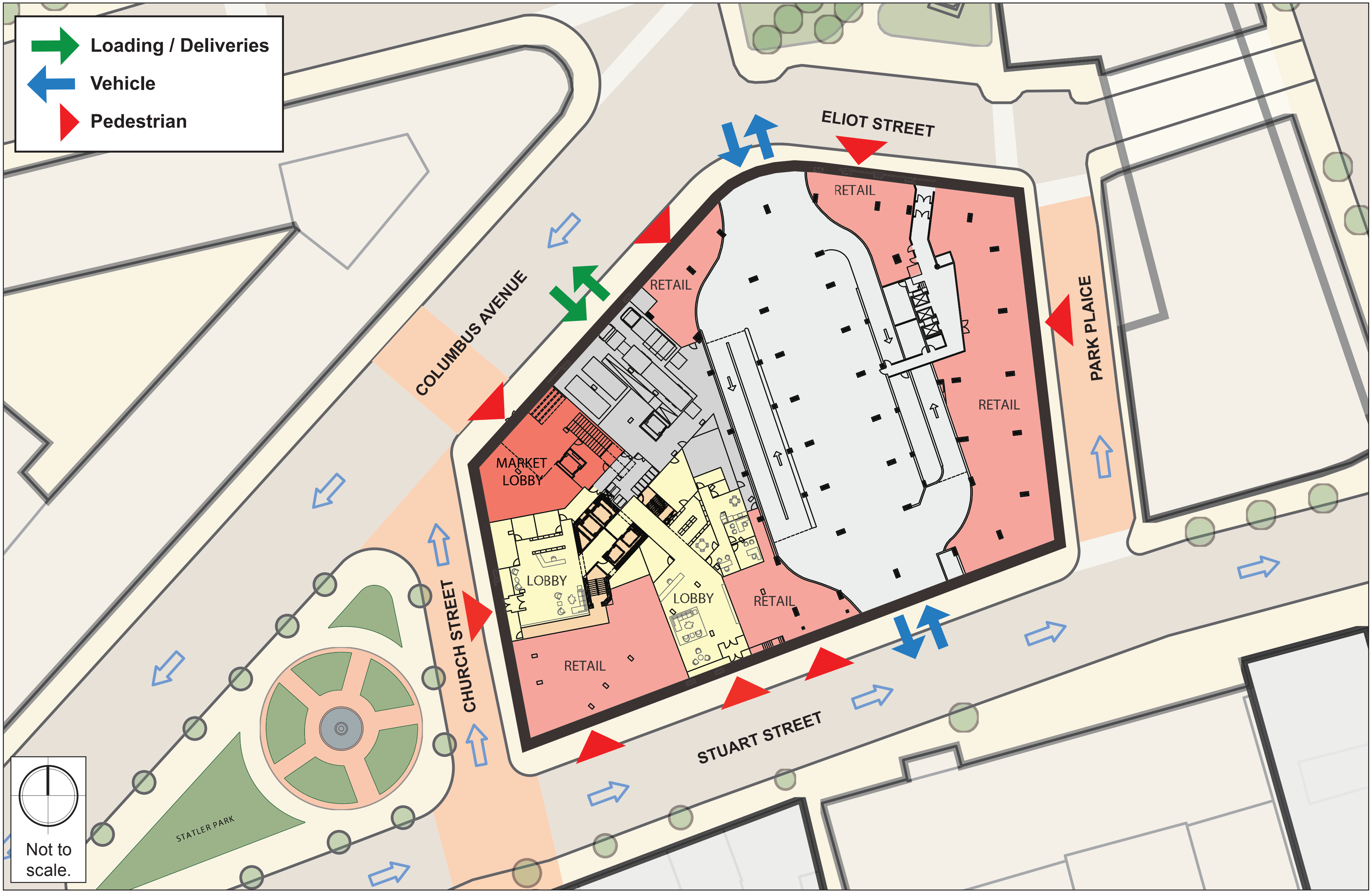

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Figure 2-14
Site Plan

Based on observations at other downtown residential buildings with ground floor retail space, it is expected that about ten deliveries per day will use the loading area. Typically, vehicles associated with such deliveries occupy a loading bay for about 15 minutes. Sufficient loading dock capacity is being provided at the Project.

In the lobby, it is expected that about 21 deliveries will occur throughout the day, lasting, on average, about four minutes each. The vehicles associated with these deliveries will use available on-street parking.

2.4.3 Project Parking

The Project will retain 672 parking spaces in the garage, designating 144 spaces for residential use and the remaining 528 spaces for primarily public use. A small number of these spaces may continue to be used by Zipcar, by rental car companies, or by monthly permit holders. The parking goals developed by the BTD for the Park Plaza/Bay Village neighborhood reflect a maximum of 0.5-1.0 residential parking spaces per unit. With approximately 306 residential units and 144 parking residential spaces, the Project anticipates having a parking ratio of approximately 0.47 spaces per unit, a rate consistent with City guidelines.

When Project residents arrive to park, they will stop inside the garage and leave their vehicles with an attendant, who will take and park the vehicle. Garage attendants will also retrieve vehicles for departing residents.

2.4.4 Trip Generation Methodology

Determining the future trip generation of the Project is a complex, multi-step process that produces an estimate of vehicle trips, transit trips, and walk/bicycle trips associated with a proposed development and a specific land use program. A project's location and proximity to different travel modes determines how people will travel to and from a site.

To estimate the number of trips expected to be generated by the new residential uses of the Project, data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual*[1] were used. ITE provides data to estimate the total number of unadjusted vehicular trips associated with the Project. In an urban setting well-served by transit, adjustments are necessary to account for other travel modes such as walking, bicycling, and transit. To estimate the unadjusted number of vehicular trips for the Project, the following ITE land use code (LUC) was used:

---

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

Land Use Code 222 – Multifamily Housing (High Rise). A High Rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have more than 10 levels (floors). They are likely to have one or more elevators. Calculations of the number of trips use ITE's average rate per dwelling units.

2.4.5 Travel Mode Share

BTD provides vehicle, transit, and walking mode share rates for different areas of Boston. The Project is in designated Area 3 – Park Plaza/Bay Village. The unadjusted vehicular trips were converted to person-trips by using vehicle occupancy rates published by the Federal Highway Administration (FHWA)[2]. The person-trips were then distributed to different modes according to the travel mode shares shown in Table 2-4.

Table 2-4 Travel Mode Shares

Land Use		Walk/Bicycle Share	Transit Share	Vehicle Share	Vehicle Occupancy Rate
Daily					
Multifamily Housing (High Rise)	In	48%	17%	34%	1.13
	Out	48%	17%	34%	1.13
Weekday a.m. Peak Hour					
Multifamily Housing (High Rise)	In	38%	17%	45%	1.13
	Out	65%	13%	22%	1.13
Weekday p.m. Peak Hour					
Multifamily Housing (High Rise)	In	65%	13%	22%	1.13
	Out	38%	17%	45%	1.13

2.4.6 Existing Trip Generation

When assessing a site with existing, active land uses, it is standard practice to estimate existing trips and subtract those trips from the projected new future trips. The result of this process yields "net new" trips that become the basis for traffic analysis.

Today, the Project Site generates vehicle trips associated with the garage and with retail/restaurant uses on the ground floor and basement floor. With the redevelopment, trip activity associated with the garage will decrease as parking spaces are reduced from 1,037 to 672. However, to assess the most conservative (higher impact) condition, no credit (reduction) for existing trips has been taken under the Build Condition.

2 Summary of Travel Trends: 2009 National Household Travel Survey; FHWA; Washington, D.C.; June 2011.

Trip activity associated with the retail/restaurant spaces will generally remain the same under the Build Condition since the square footage will be only slightly less than on the current site. No change in the trip making activity associated with the retail/restaurant was made for the Build Condition.

2.4.7 Project Trip Generation

For the new residential portion of the Project, the travel mode share percentages shown in Table 2-4 were applied to the number of person trips to develop walk/bicycle, transit, and vehicle trip generation estimates for the Project. It was assumed that 10% of vehicle trips will occur via taxicab/rideshare (such as Uber or Lyft). The trip generation for the Project by travel mode is shown in Table 2-5. The detailed trip generation information is provided in Appendix C.

Table 2-5 Project Trip Generation

Land Use		Walk/Bicycle Trips	Transit Trips	Vehicle Trips		
				Private Vehicle	Taxicab/ Rideshare	Total Vehicle Trips
Daily						
Multifamily Housing (High Rise)	In	377	131	209	22	231
	Out	377	131	209	22	231
	Total	**754**	**262**	**418**	**44**	**462**
a.m. Peak Hour						
Multifamily Housing (High Rise)	In	10	4	10	1	11
	Out	52	11	14	2	16
	Total	**62**	**15**	**24**	**3**	**27**
p.m. Peak Hour						
Multifamily Housing (High Rise)	In	49	10	13	2	15
	Out	19	8	18	2	20
	Total	**68**	**18**	**31**	**4**	**35**

As shown in Table 2-5, the Project is expected to generate approximately 27 new vehicle trips (11 in and 16 out) during the weekday a.m. peak hour and 35 new vehicle trips (15 in and 20 out) during the weekday p.m. peak hour.

2.4.8 Trip Distribution

The trip distribution identifies the various travel paths for vehicles associated with the Project. Trip distribution patterns for the Project were based on BTD's origin-destination data for Area 3 and trip distribution patterns presented in traffic studies for nearby projects. The trip distribution patterns for the Project are illustrated in Figure 2-15.

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Figure 2-15
Trip Distribution

2.4.9 Build Traffic Volumes

The new Project-generated vehicle trips were distributed throughout the study area according to the trip distribution patterns. The Project-generated trips at study area intersections are shown for the weekday a.m. peak hour and the weekday p.m. peak hour in Figure 2-16 and Figure 2-17, respectively. The trip assignments were added to the No-Build (2025) Condition vehicular traffic volumes to produce the Build (2025) Condition vehicular traffic volumes.

The Build (2025) Condition weekday a.m. and p.m. peak hour traffic volumes are shown in Figure 2-18 and Figure 2-19, respectively.

2.4.10 Bicycle Accommodations

In accordance with BTD guidelines, the Proponent will provide one secure/covered bicycle parking spaces for each residential unit and one for every 5,000 sf of retail, for retail employees.

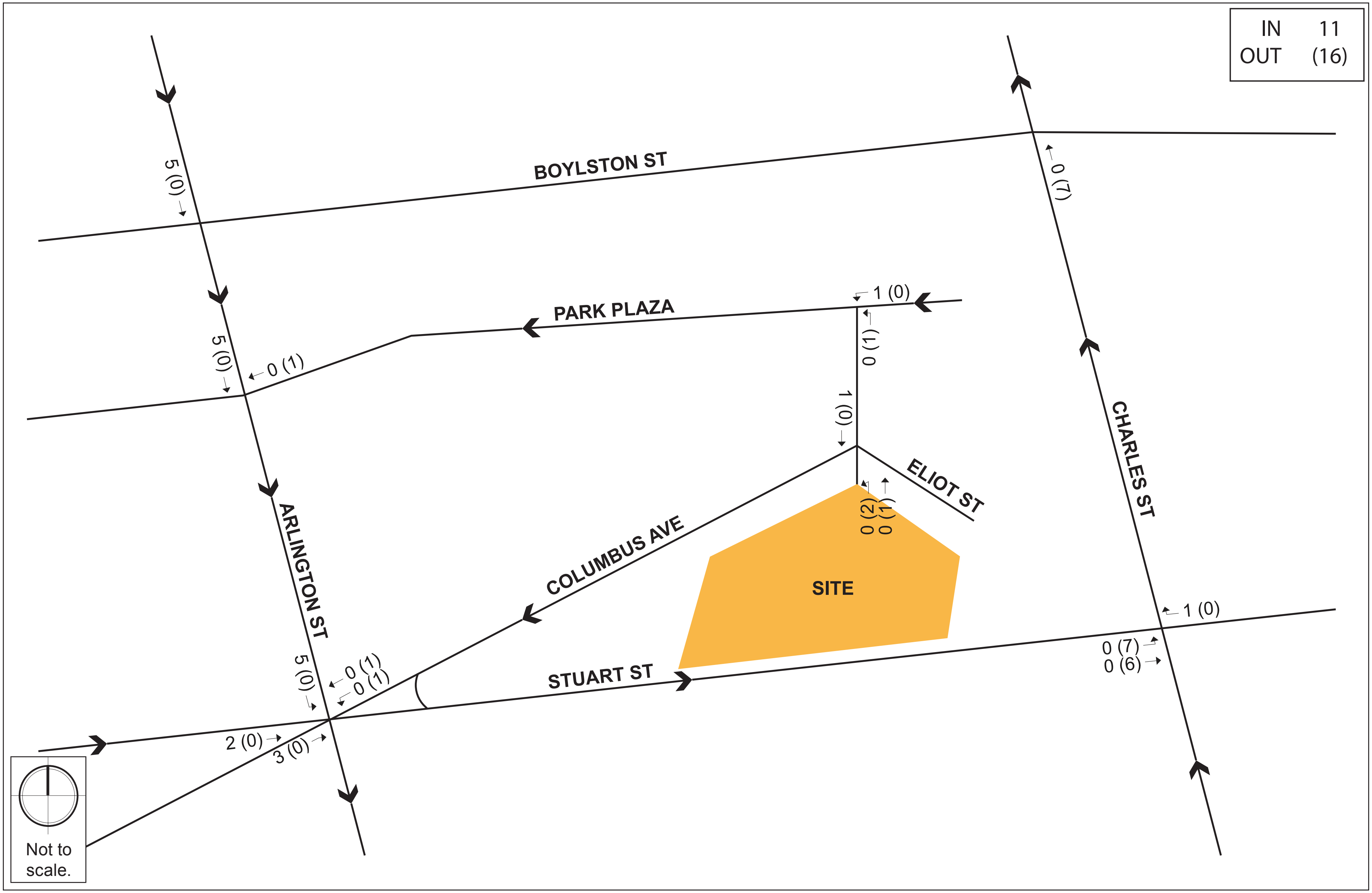
Bicycle storage will be provided in the garage and bicycle racks will be provided near primary entrances. Bicycle racks, signs, and parking areas will conform to BTD standards.

Because the closest Hubway/Blue Bikes bicycle-sharing station is about 500 feet from the Project Site (on Stuart Street, east of Charles Street), no new Hubway/Blue Bikes station is proposed at or adjacent to the Project.

2.5 Traffic Capacity Analysis

The criterion for evaluating traffic operations is level of service (LOS), which is determined by assessing average delay experienced by vehicles at intersections and along intersection approaches. Trafficware's Synchro (version 9) software package was used to calculate average delay and associated LOS at the study area intersections. This software is based on the traffic operational analysis methodology of the Transportation Research Board's 2000 Highway Capacity Manual (HCM).

LOS designations are based on average delay per vehicle for all vehicles entering an intersection. Table 2-6 displays the intersection LOS criteria. LOS A indicates the most favorable condition, with minimum traffic delay, while LOS F represents the worst condition, with significant traffic delay. LOS D or better is typically considered acceptable in an urban area. LOS D or better is typically considered acceptable in an urban area.



Motor Mart Garage **Boston, Massachusetts**

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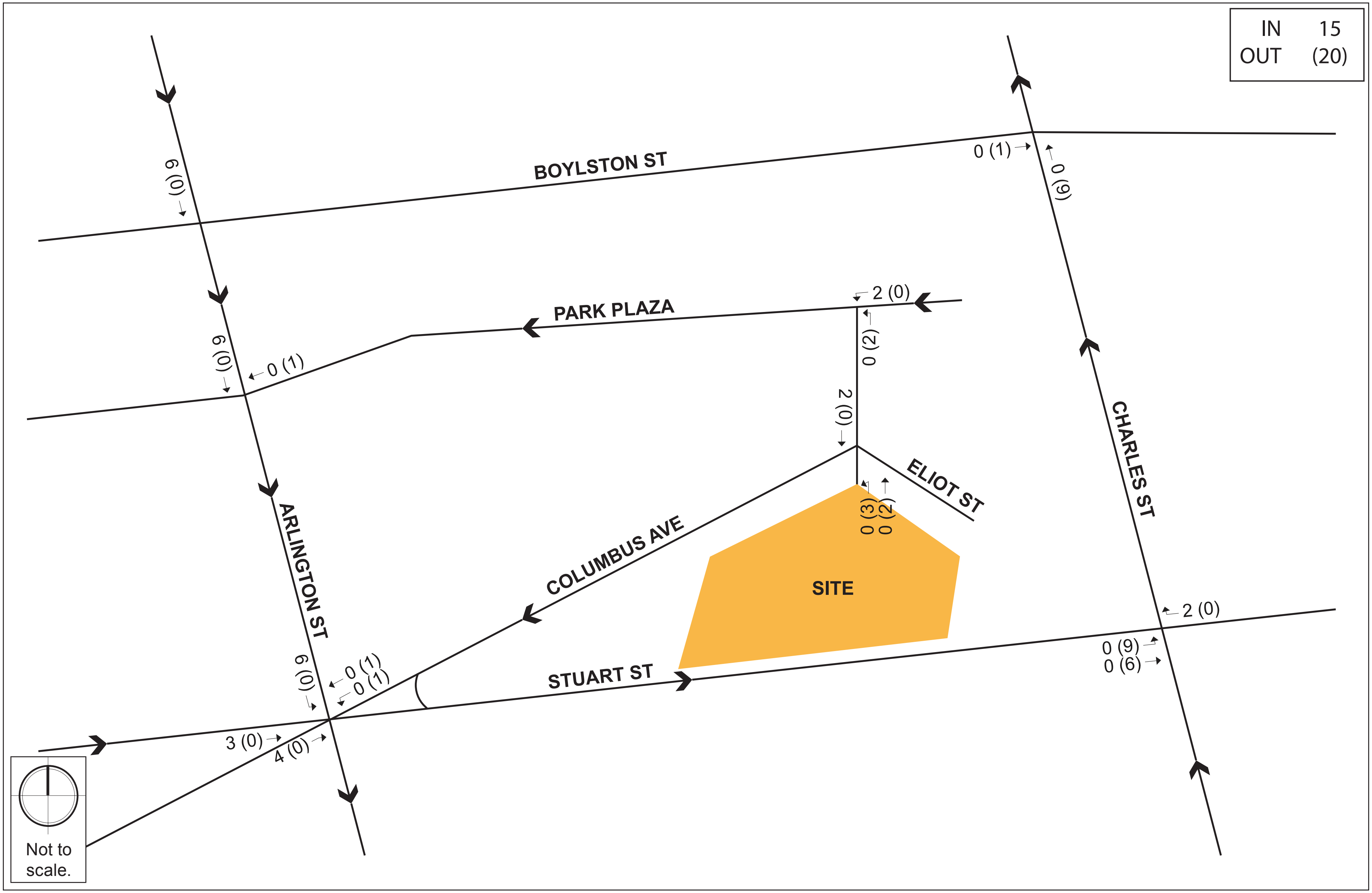
Figure 2-16
Project-generated Vehicle Trips, Weekday a.m. Peak Hour



Motor Mart Garage **Boston, Massachusetts**

Figure 2-17

Project-generated Vehicle Trips, Weekday p.m. Peak Hour

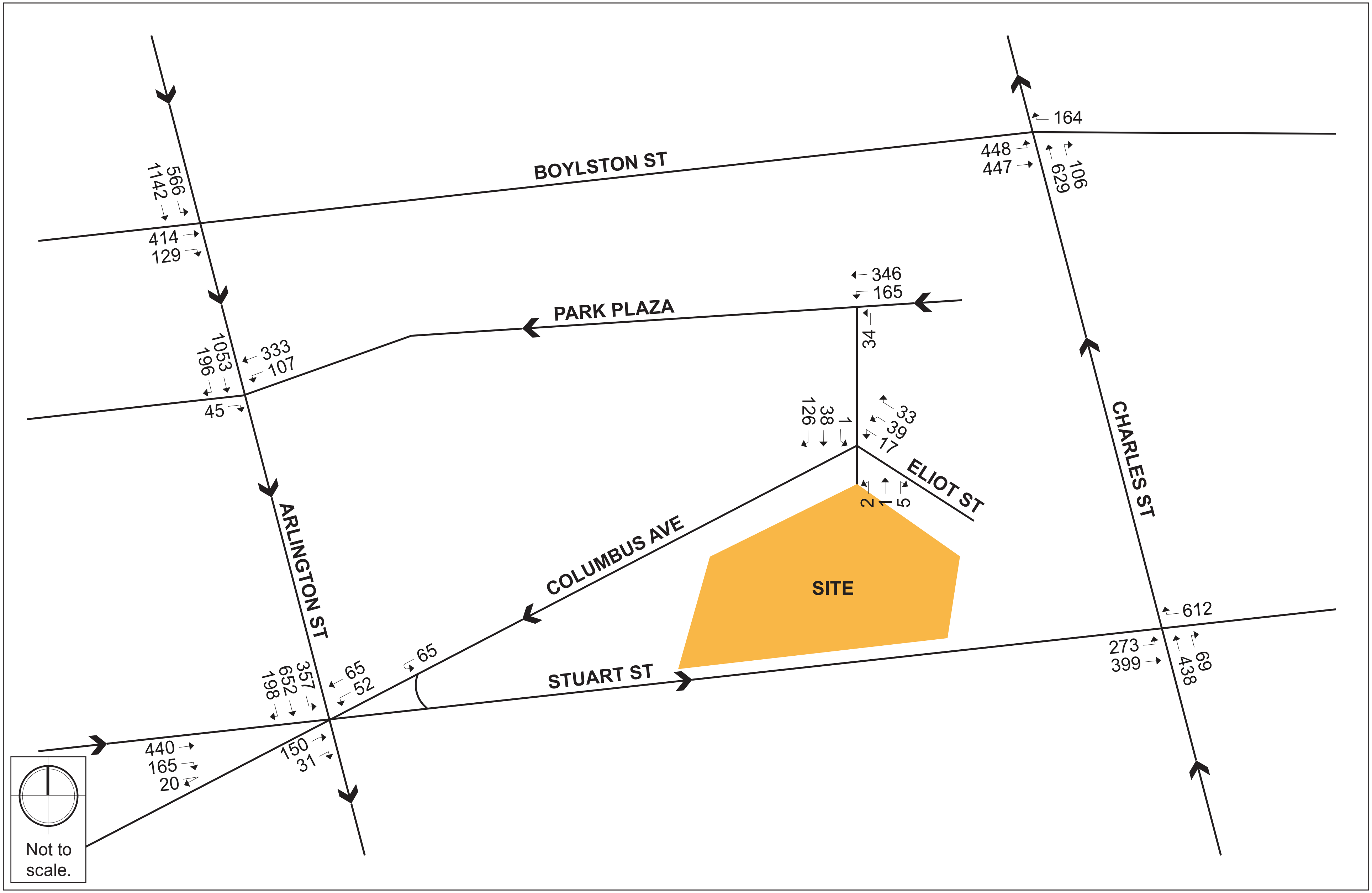


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Figure 2-18

Build (2025) Condition Traffic Volumes, Weekday a.m. Peak Hour

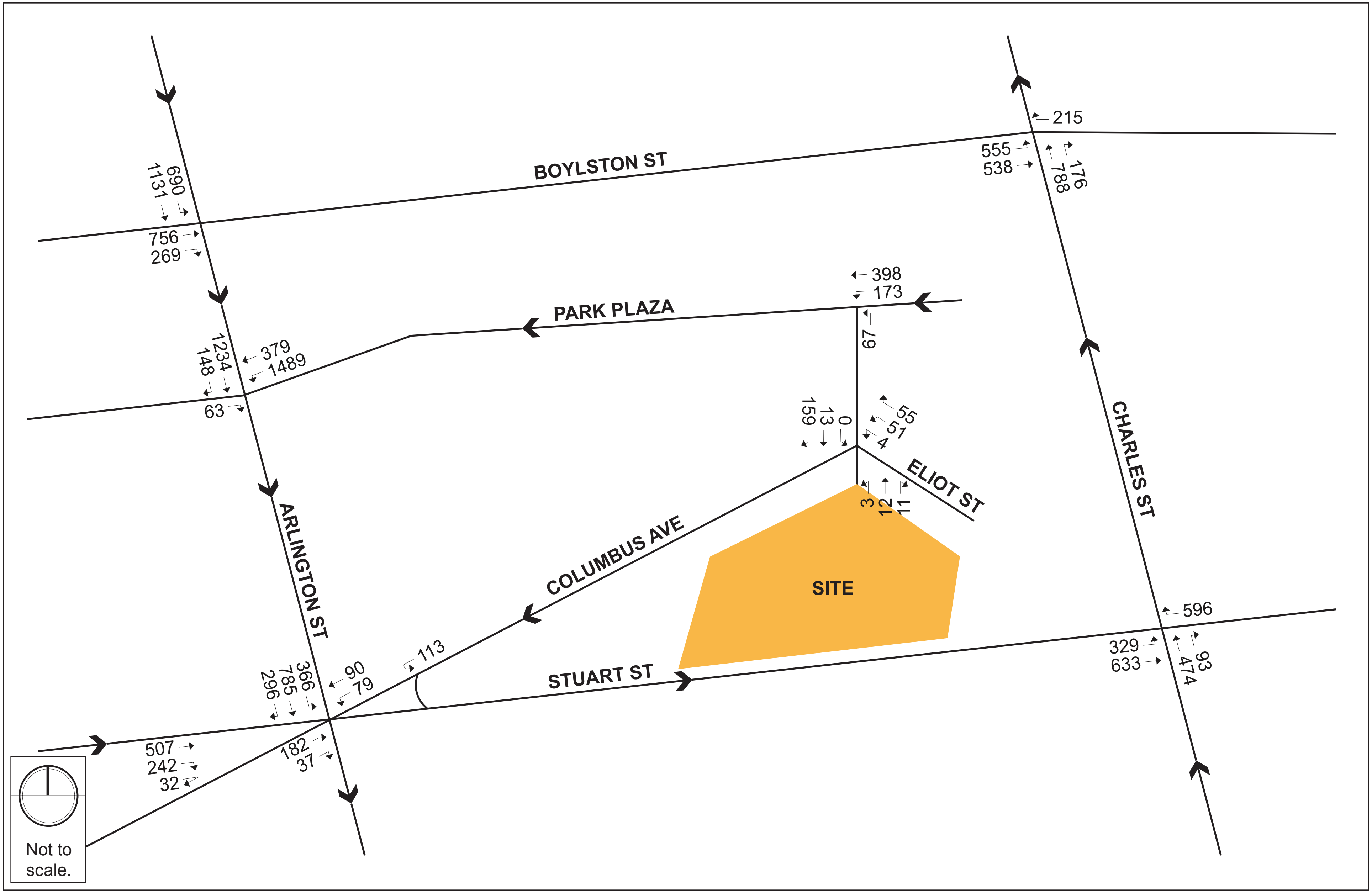

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Figure 2-19
Build (2025) Condition Traffic Volumes, Weekday p.m. Peak Hour

Table 2-6 Vehicle Level of Service Criteria

Level of Service	Average Stopped Delay (sec/veh)	
	Signalized Intersections	Unsignalized Intersections
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Source: 2000 Highway Capacity Manual, Transportation Research Board.

In addition to delay and LOS, the operational capacity and vehicular queues are calculated and used to further quantify traffic operations at intersections. The following describes these other calculated measures.

The volume-to-capacity ratio (v/c ratio) is a measure of congestion at an intersection approach. A v/c ratio below one indicates that the intersection approach has adequate capacity to process the arriving traffic volumes over the course of an hour. A v/c ratio of one or greater indicates that the traffic volume on the intersection approach exceeds capacity.

The 50th percentile queue length, measured in feet, represents the maximum queue length during a cycle of the traffic signal with typical (or median) entering traffic volumes.

The 95th percentile queue, measured in feet, denotes the farthest extent of the vehicle queue (to the last stopped vehicle) upstream from the stop line. This maximum queue occurs five percent, or less, of the time during the peak hour, and typically does not develop during off-peak hours. Since volumes fluctuate throughout the hour, the 95th percentile queue represents what can be considered a "worst case" condition. Queues at an intersection are generally below the 95th percentile length throughout most of the peak hour. It is also unlikely that 95th percentile queues for each approach to an intersection occur simultaneously.

Table 2-7 and Table 2-8 present, respectively, the weekday a.m. and p.m. peak hours capacity analysis for the study area intersections under each analysis condition: Existing (2018) Condition, No-Build (2025) Condition, and the Build (2025) Condition. The detailed analysis sheets are provided in Appendix C. The sections below present results for each condition.

2.5.1 Existing (2018) Condition Traffic Capacity Analysis

As shown under the Existing (2018) Condition of Table 2-7 and Table 2-8, a majority of the study area intersections and approaches operate at acceptable levels of service (LOS D or better) during the weekday a.m. and p.m. peak hours, with the exception of the following movements:

- The **Stuart Street/Arlington Street/Columbus Avenue** intersection operates at LOS E during both the a.m. and p.m. peak hours. The Stuart Street eastbound through movements operates at LOS E during the a.m. peak hour and LOS D during the p.m. peak hour. The Columbus Avenue northeast-bound approach operates at LOS E during both the a.m. and p.m. peak hours. The Arlington Street southbound left-turn and through movements both operate at LOS E during the a.m. and p.m. peak hours. The Arlington Street southbound right-turn movement operates at LOS E during the a.m. peak hour. The longest queues at the intersection occur at the Arlington Street southbound left-turn movement during both the a.m. and p.m. peak hours.

- While the **Stuart Street/Charles Street** intersection operates at LOS B during both the a.m. and p.m. peak hours, the Charles Street northbound approach operates at LOS E during the p.m. peak hour. The longest queues at the intersection occur at the Charles Street northbound approach during both the a.m. and the p.m. peak hours.

2.5.2 No-Build (2025) Condition Traffic Capacity Analysis

As shown under the No-Build (2025) Condition of Table 2-7 and Table 2-8, a majority of the study area intersections and approaches continue to operate at acceptable levels of service (LOS D or better) during the weekday a.m. and p.m. peak hours, with the exception of the following movements:

- The **Stuart Street/Arlington Street/Columbus Avenue** intersection continues to operate at LOS E during both the a.m. and p.m. peak hours. The Stuart Street eastbound through movements continue to operate at LOS E during the a.m. peak hour and LOS D during the p.m. peak hour. The Stuart Street eastbound right-turn movements decrease from a LOS D to LOS E during the p.m. peak hour. The Columbus Avenue northeast-bound approach continues to operate at LOS E during the a.m. peak hour and decreases from LOS E to LOS F during the p.m. peak hour. The Arlington Street southbound left-turn movement decreases form LOS E to LOS F during the a.m. peak hour and continues to operate at LOS E during the p.m. peak hour. The Arlington Street southbound through movements continue to operate at LOS E during both the a.m. and p.m. peak hours. The Arlington Street southbound right-turn movement continues to operate at LOS E during the a.m. peak hour and decreases from LOS D to LOS E during the p.m. peak hour. The longest queues at the intersection occur at the Arlington Street southbound left-turn movement during the a.m. peak hour and at the Arlington Street southbound through movement during the p.m. peak hour.

- The **Stuart Street/Charles Street** intersection continues to operate at LOS B during the a.m. peak hour and decreases from LOS B to LOS C during the p.m. peak hour. The Charles Street northbound approach continues to operate at LOS E during the p.m. peak hour. The longest queues at the intersection occur at the Charles Street northbound approach during both the a.m. and the p.m. peak hours.

2.5.3 Build (2025) Condition Traffic Capacity Analysis

As shown under the Build (2025) Condition of Table 2-7 and Table 2-8, all of the study area intersections and approaches continue to operate at the same overall LOS during the a.m. and p.m. peak hours as under the No-Build (2025) Condition.

While these results show that the Project will not have any impact to the adjacent roadway system, the Proponent is committed to implementing comprehensive travel demand management strategies to minimize dependence on automobile travel, as outlined in the next section.

Table 2-7 Capacity Analysis Summary, a.m. Peak

Intersection/Approach	Existing (2018) Condition					No-Build (2025) Condition					Build (2025) Condition				
	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)
Signalized Intersections															
Stuart Street / Arlington Street / Columbus Avenue	**E**	**62.8**	**-**	**-**	**-**	**E**	**65.8**	**-**	**-**	**-**	**E**	**66.4**	**-**	**-**	**-**
Stuart St EB thru | thru	E	64.9	.91	176	#243	E	70.2	0.95	188	#265	E	70.7	0.95	190	#266
Stuart St EB hard right/right	C	27.6	0.64	50	119	C	34.4	0.72	71	148	C	34.3	0.72	71	148
Columbus Ave NEB bear right | bear right/right	E	59.2	0.68	74	113	E	60.0	0.70	77	117	E	60.2	0.71	79	119
Columbus Ave SWB left/thru | thru	D	48.6	0.41	48	65	D	49.1	0.44	53	71	D	49.1	0.45	53	72
Arlington St SB left	E	76.6	0.73	277	#407	F	81.1	0.76	288	#428	F	83.5	0.78	292	#437
Arlington St SB thru | thru	E	67.6	0.68	266	332	E	69.6	0.72	279	345	E	70.0	0.73	280	346
Arlington St SB right	E	61.6	0.40	128	204	E	64.1	0.49	159	239	E	64.3	0.50	159	240
Stuart Street / Charles Street	**B**	**18.0**	**-**	**-**	**-**	**B**	**18.5**	**-**	**-**	**-**	**B**	**18.5**	**-**	**-**	**-**
Stuart St EB left	A	2.1	0.27	0	34	A	2.1	0.29	0	35	A	2.1	0.30	0	36
Stuart St EB thru | thru	B	11.7	0.23	65	92	B	11.8	0.25	70	97	B	11.8	0.25	71	99
Stuart St WB right | right	A	0.7	0.39	0	0	A	0.8	0.42	0	0	A	0.8	0.42	0	0
Charles Street NB thru | thru | thru/right	D	51.5	0.84	113	#174	D	53.9	0.86	120	#184	D	54.0	0.86	120	#184
Boylston Street / Charles Street	**B**	**17.5**	**-**	**-**	**-**	**B**	**17.7**	**-**	**-**	**-**	**B**	**17.8**	**-**	**-**	**-**
Boylston St EB left | left	A	3.2	0.34	0	32	A	3.2	0.35	0	33	A	3.2	0.35	0	33
Boylston St EB thru | thru	C	27.2	0.43	107	152	C	27.5	0.45	112	158	C	27.5	0.45	112	158
Boylston St WB right	A	0.7	0.23	0	0	A	0.7	0.24	0	0	A	0.7	0.24	0	0
Charles St NB thru | thru | thru/right	C	24.4	0.48	122	160	C	24.6	0.50	128	166	C	24.7	0.50	129	168
Boylston Street/Arlington Street	**C**	**21.8**	**-**	**-**	**-**	**C**	**22.4**	**-**	**-**	**-**	**C**	**22.5**	**-**	**-**	**-**
Boylston St EB thru | thru | thru | thru/right	C	27.7	0.33	77	104	C	28.1	0.35	83	110	C	28.1	0.35	83	110
Arlington St SB hard left	A	3.8	0.46	0	66	A	3.9	0.48	0	67	A	3.9	0.48	0	67
Arlington St SB hard left/thru | thru | thru	C	25.1	0.62	259	311	C	25.9	0.43	282	337	C	26.0	0.66	284	339

Table 2-7 Capacity Analysis Summary, a.m. Peak (Continued)

Intersection/Approach	Existing (2018) Condition					No-Build (2025) Condition					Build (2025) Condition				
	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)
Arlington Street / Park Plaza / St. James Avenue	**B**	**12.8**	**-**	**-**	**-**	**B**	**13.1**	**-**	**-**	**-**	**B**	**13.1**	**-**	**-**	**-**
St. James Ave EB right	A	0.3	0.10	0	0	A	0.3	0.10	0	0	A	0.3	0.10	0	0
Park Plaza WB left	A	6.8	0.20	0	40	A	6.7	0.21	0	41	A	6.7	0.21	0	41
Park Plaza WB left/thru | thru	C	27.7	0.38	98	139	C	28.0	0.40	104	144	C	28.1	0.40	104	145
Arlington St SB thru | thru | thru/right	A	9.4	0.61	45	52	A	9.7	0.65	48	54	A	9..8	0.66	48	55
Unsignalized Intersections															
Park Plaza / Columbus Avenue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Park Plaza WB left/thru	A	3.1	0.10	-	9	A	3.2	0.11	-	9	A	6.1	0.23	-	23
Columbus Ave NB left	C	17.8	0.21	-	20	C	19.0	0.24	-	23	D	30.2	0.36	-	40
Columbus Avenue / Eliot Street / Motor Mart Garage Driveway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eliot St WB left/bear left/right	A	9.0	0.01	-	0	B	10	0.13	-	0	B	10.0	0.13	-	0
Motor Mart Driveway NB hard left/thru/right	A	9.9	0.13	-	0	A	9.0	0.01	-	0	A	9.4	0.02	-	0
Columbus Ave SB left/thru/right	A	7.4	0.00	-	0	A	7.4	0.00	-	0	A	7.4	0.00	-	0

95th percentile queues do not clear after two cycles. Queue shown is the maximum after two cycles.
Grey shading indicates LOS E or F under the Existing Condition, or deterioration into LOS E or F from the previous condition.

Table 2-8 Capacity Analysis Summary, p.m. Peak

Intersection/Approach	Existing (2018) Condition					No-Build (2025) Condition					Build (2025) Condition				
	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)
Signalized Intersections															
Stuart Street / Arlington Street / Columbus Avenue	**E**	**55.1**	-	-	-	**E**	**67.1**	-	-	-	**E**	**68.1**	-	-	-
Stuart St EB thru | thru	D	53.7	0.82	176	234	D	50.3	0.79	188	253	D	50.5	0.79	190	254
Stuart St EB hard right/right	D	38.5	0.77	71	#181	E	73.4	0.97	136	#314	E	73.4	0.97	136	#314
Columbus Ave NEB bear right | bear right/right	E	72.8	0.84	95	#160	F	85.2	0.91	102	#171	F	87.0	0.92	104	#176
Columbus Ave SWB left/thru | thru	D	50.1	0.46	58	95	D	52.0	0.52	64	101	D	52.0	0.52	64	102
Arlington St SB left	E	57.9	0.64	264	365	E	67.7	0.71	279	378	E	70.6	0.72	283	386
Arlington St SB thru | thru	E	55.7	0.69	296	363	E	77.2	0.78	322	390	E	78.4	0.78	321	389
Arlington St SB right	D	52.7	0.57	207	296	E	57.0	0.66	228	322	E	57.1	0.66	228	322
Stuart Street / Charles Street	**B**	**19.7**	-	-	-	**C**	**20.3**	-	-	-	**C**	**20.3**	-	-	-
Stuart St EB left	A	2.0	0.30	0	36	A	2.1	0.32	0	37	A	2.1	0.33	0	37
Stuart St EB thru | thru	B	12.6	0.34	107	143	B	12.9	0.37	115	153	B	12.9	0.37	116	155
Stuart St WB right | right	A	0.7	0.40	0	0	A	0.8	0.42	0	0	A	0.8	0.42	0	0
Charles Street NB thru | thru | thru/right	E	58.2	0.90	127	#194	E	61.3	0.92	133	#205	E	61.3	0.92	133	#205
Boylston Street / Charles Street	**B**	**19.6**	-	-	-	**B**	**19.8**	-	-	-	**B**	**19.9**	-	-	-
Boylston St EB left | left	A	6.9	0.45	63	105	A	6.6	0.47	71	111	A	6.6	0.47	71	111
Boylston St EB thru | thru	D	35.2	0.65	207	271	C	35.0	0.67	219	286	C	35.0	0.67	220	286
Boylston St WB right	A	1.3	0.33	0	0	A	1.3	0.34	0	0	A	1.3	0.34	0	0
Charles St NB thru | thru | thru/right	C	22.1	0.48	183	224	C	22.9	0.51	199	236	C	23.0	0.51	201	238
Boylston Street/Arlington Street	**C**	**26.1**	-	-	-	**C**	**27.3**	-	-	-	C	27.4	-	-	-
Boylston St EB thru | thru | thru | thru/right	C	27.2	0.46	143	176	C	27.8	0.52	163	199	C	27.8	0.52	163	199
Arlington St SB hard left	A	5.4	0.52	9	91	A	6.6	0.55	25	120	A	6.6	0.55	25	120
Arlington St SB hard left/thru | thru | thru	C	31.9	0.74	308	369	C	33.5	0.78	331	393	C	33.5	0.78	332	396

Table 2-8 Capacity Analysis Summary, p.m. Peak (Continued)

Intersection/Approach	Existing (2018) Condition					No-Build (2025) Condition					Build (2025) Condition				
	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)	LOS	Delay (sec.)	V/C Ratio	50th Queue (ft)	95th Queue (ft)
Arlington Street / Park Plaza / St. James Avenue	**B**	**15.6**	**-**	**-**	**-**	**B**	**17.8**	**-**	**-**	**-**	B	17.6	-	-	-
St. James Ave EB right	A	0.3	0.11	0	0	A	0.4	0.11	0	0	A	0.4	0.11	0	0
Park Plaza WB left	A	6.6	0.27	0	46	A	6.8	0.28	0	47	A	6.8	0.28	0	47
Park Plaza WB left/thru | thru	C	31.0	0.46	123	165	C	32.3	0.48	129	171	C	32.2	0.48	130	171
Arlington St SB thru | thru | thru/right	B	12.4	0.64	67	76	B	15.4	0.70	83	104	B	15.4	0.71	84	106
Unsignalized Intersections															
Park Plaza / Columbus Avenue	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Park Plaza WB left/thru	A	3.1	0.12	-	10	A	3.2	0.13	-	11	A	3.2	0.13	-	11
Columbus Ave NB left	C	22.0	0.28	-	29	C	24.1	0.32	-	33	C	24.4	0.32	-	34
Columbus Avenue / Eliot Street / Motor Mart Garage Driveway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eliot St WB left/bear left/right	A	9.9	0.15	-	0	A	9.9	0.15	-	1	A	9.9	0.15	-	1
Motor Mart Driveway NB hard left/thru/right	A	9.3	0.03	-	1	A	9.3	0.03	-	0	A	9.4	0.04	-	0
Columbus Ave SB left/thru/right	A	0.0	0.00	-	0	A	0.0	0.00	-	0	A	0.0	0.00	-	0

95th percentile queues do not clear after two cycles. Queue shown is the maximum after two cycles.
Grey shading indicates LOS E or F under the Existing Condition, or deterioration into LOS E or F from the previous condition.

2.6 Transportation Demand Management

The Proponent is committed to implementing Transportation Demand Management (TDM) measures to reduce dependence on autos. TDM will be facilitated by the Project's proximity to available transit services, including the Green Line (at Arlington and Boylston stations) and Orange Line (Tufts Medical Center), and local MBTA bus routes.

Because the Project is primarily residential, its trip generation is already lower than that of an office or retail use project. TDM will be facilitated by the nature and location of the proposed Project. The Project Site's proximity to workplaces, shopping, and transit will help reduce auto use by residents and visitors alike. The Proponent is committed to implementing a TDM program that supports the City's efforts to reduce dependency on the automobile by encouraging travelers to use alternatives to driving alone, especially during peak time periods, through the following TDM commitments listed below:

- Limited Parking: The Project will have approximately 144 parking spaces for residents. With approximately 306 residential units, the resulting parking ratio is anticipated to be approximately 0.48 spaces per unit.
- Public Transportation:
  - Include language in new commercial tenant leases to encourage tenants to promote public transportation and consider subsidizing employee use of public transit.
  - Provide orientation packets to new residents containing information on the available transportation choices, including transit routes and schedules.
- Bicycle Spaces: Secure bicycle storage will be made available to tenants and visitors to encourage bicycling as an alternative mode of transportation. In accordance with BTD guidelines, the Proponent will provide one secure/covered bicycle parking spaces for each residential unit and one space for every 5,000 sf of retail, for retail employees. Bicycle racks, signs, and parking areas will conform to BTD standards and be sited in safe, secure locations.
- Transportation Management Association (TMA): The Proponent will join the local TMA, A Better City (ABC).
- Transportation Coordinator: The Proponent will designate a transportation coordinator to manage loading and service activities and provide alternative transportation materials to residents and Project residents.
- A Transportation Access Plan Agreement (TAPA) will be entered into between the Proponent and BTD. The TAPA will codify the specific measures and agreements between the Proponent and the City of Boston.

2.7 Evaluation of Short-term Construction Impacts

Most construction activities will be accommodated within the current Project Site boundaries. Details of the overall construction schedule, working hours, number of construction workers, worker transportation and parking, number of construction vehicles, and routes will be addressed in detail in the Construction Management Plan (CMP) to be filed with BTD in accordance with the City's transportation maintenance plan requirements.

To minimize transportation impacts during the construction period, the following measures will be considered for the CMP:

- Limited construction worker parking on-site;
- Encouragement of worker carpooling;
- Consideration of a subsidy for MBTA passes for full-time employees; and
- Providing secure spaces on-site for workers' supplies and tools so they do not have to be brought to the site each day.

The CMP to be executed with the City prior to commencement of construction will document all committed measures.

Chapter 3.0

Environmental Review Component

3.0 ENVIRONMENTAL REVIEW COMPONENT

3.1 Wind

3.1.1 Introduction

Rowan Williams Davies & Irwin Inc. (RWDI) was retained to conduct a Pedestrian Wind assessment for the proposed Project, which consists of the construction of a 20-story residential tower atop the existing Motor Mart Garage. The criteria recommended by the Boston Planning and Development Agency (BPDA) were used in this study.

The objective of the study is to assess the effect of the Project on local conditions in pedestrian areas around the Project area. The study involved wind simulations on a 1:300 scale model of the proposed Project and surroundings. These simulations were conducted in RWDI's boundary-layer wind tunnel in Guelph, Ontario, to quantify local wind speed conditions and compare to appropriate criteria for gauging wind comfort in pedestrian areas. The assessment focused on critical pedestrian areas including the main and secondary entrances, outdoor terraces/amenity spaces, adjacent residential properties, and sidewalks along adjacent and nearby streets.

The results of the wind analysis show that the effective gust criterion is met both seasonally and annually at all locations in both the No Build and Build configurations, and that wind comfort conditions are generally expected to be similar for both the No Build and Build configurations.

3.1.2 Background and Approach

3.1.2.1 Wind Tunnel Study Model

To assess the wind environment around the Project site, a 1:300 scale model of the site and surroundings was constructed for the wind tunnel tests. Information concerning the site and surroundings was derived from information on surrounding buildings and terrain and from site plans and elevations of the Project provided by the design team. The following configurations were simulated:

- No Build: Existing site with existing surroundings, including buildings that are under construction or BPDA approved (see Figure 3.1-1), and,
- Build: No Build Configuration with the proposed Project added (see Figure 3.1-2).

The wind tunnel model included all relevant surrounding buildings and topography within an approximately 1,200 foot radius of the Project site. The mean speed profile and turbulence of the natural wind approaching the modeled area were also simulated in RWDI's boundary layer wind tunnel. The scale model was equipped with 163 specially

Figure 3.1-1
Wind Tunnel Study Model – No Build

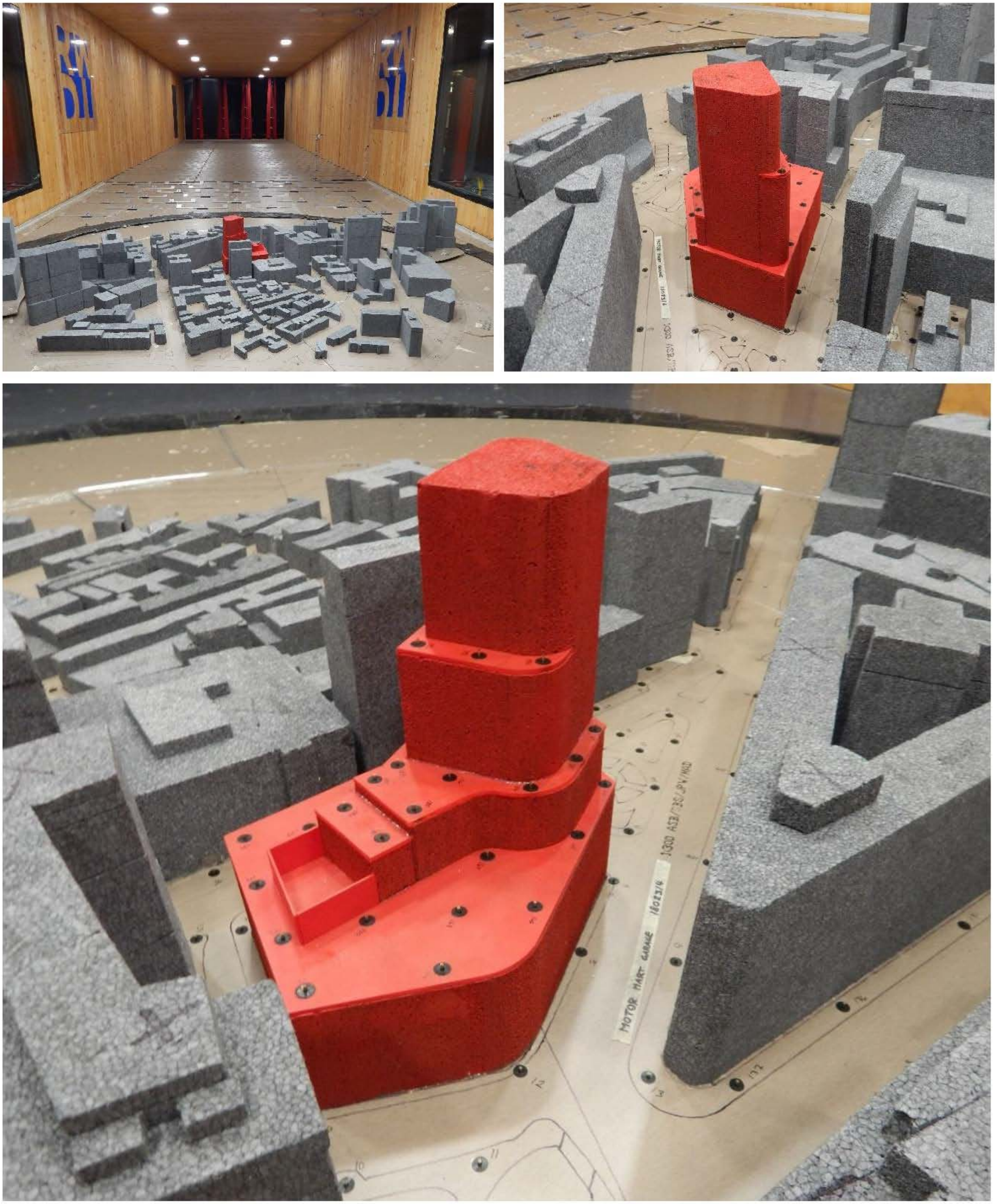

Figure 3.1-2
Wind Tunnel Study Model – Build

designed wind speed sensors that were connected to the wind tunnel's data acquisition system to record the mean and fluctuating components of wind speed at a full-scale height of 5 feet above local grade in pedestrian areas throughout the study site. Wind speeds were measured for 36 wind directions, in 10 degree increments, starting from true north. The measurements at each sensor location 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 placement of wind measurement locations was based on RWDI's experience and understanding of the pedestrian usage of the site, and was reviewed by CBT Architects and the BPDA.

3.1.2.2 Meteorological Data

The results were then combined with long-term meteorological data, recorded during the years 1987 through 2017 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. Figures 3.1-3 through 3.1-5 present "wind roses", summarizing the seasonal and annual wind climates in the Boston area respectively, based on the data from Logan Airport.

For example, the left wind rose in Figure 3.1-3, summarizes the spring (March, April, and May) wind data which in general, indicate prevailing winds occurring from the northwest to south-southwest and northeast to east-southeast and strong winds (red bands), primarily occurring from the west-northwest, northwest, south-southwest and west directions.

On an annual basis (Figure 3.1-5), the most common wind directions are those between north-northwest and south-southwest. Winds from the east-northeast to the east-southeast are also relatively common. In the case of strong winds, west-northwest, northwest and west are the dominant wind directions.

3.1.2.3 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 are expressed in terms of benchmarks for the one-hour mean wind speed exceeded 1% of the time (i.e., the 99-percentile mean wind speed). They are presented in Table 3.1-1.

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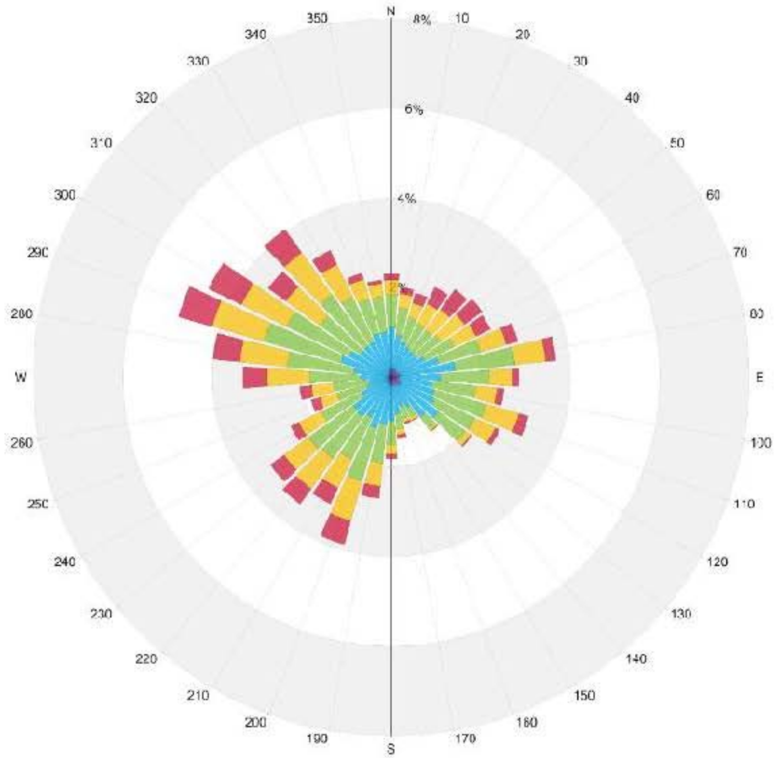
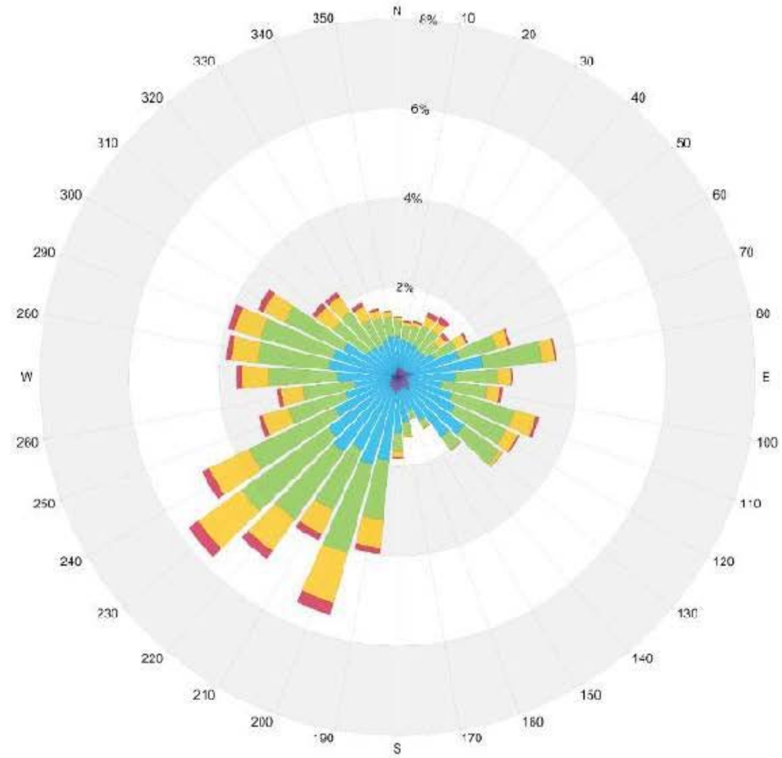
[1] Melbourne, W.H., 1978, "Criteria for Environmental Wind Conditions", Journal of Industrial Aerodynamics, 3 (1978) 241 - 249.



Spring (March – May)

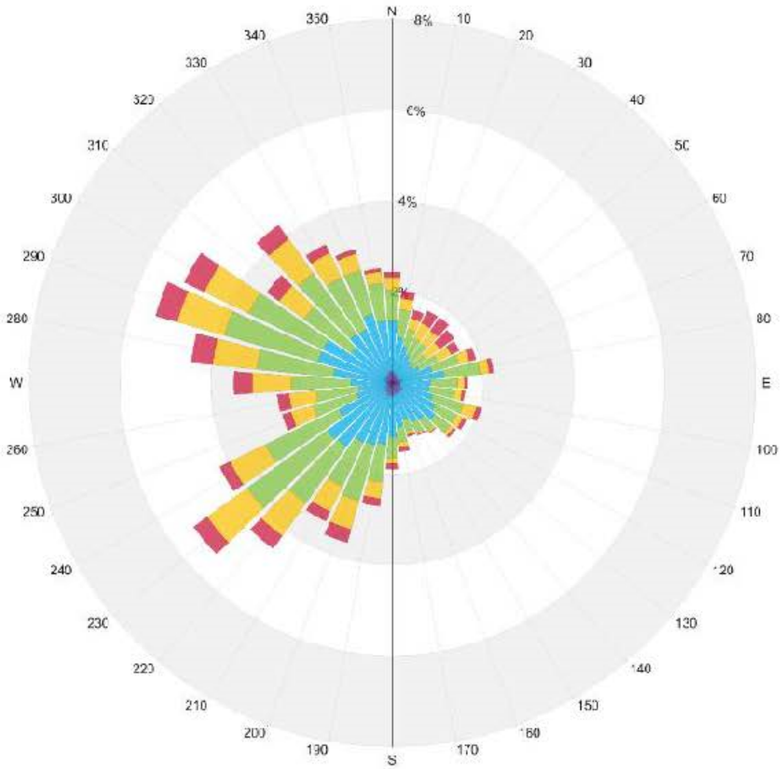


Summer (June – August)

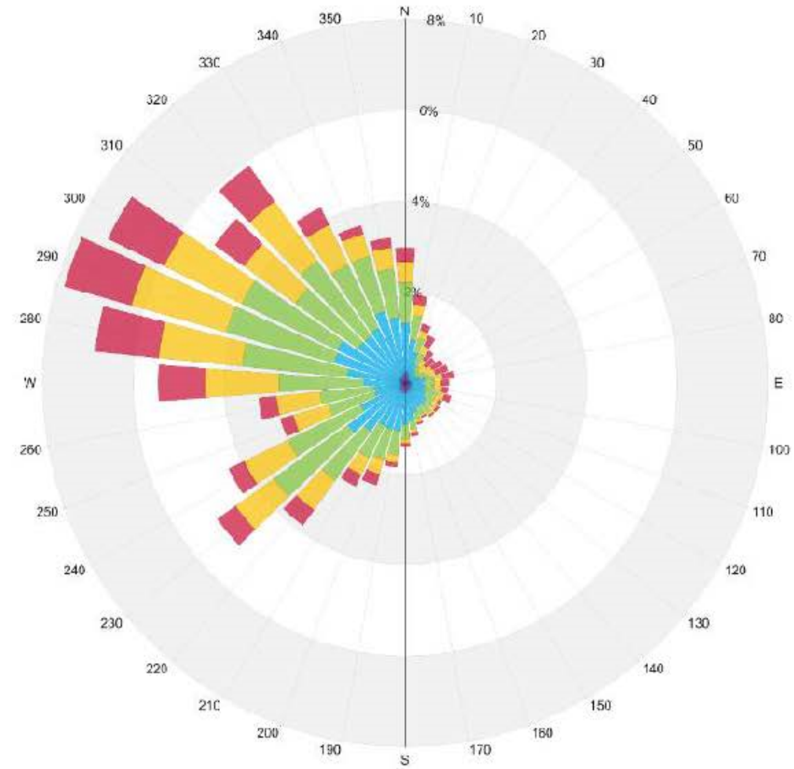
Wind Speed (mph)	Probability (%) Spring	Summer	Fall	Winter
Calm	2.2	2.3	2.6	2.1
1-5	5.7	7.8	7.2	5.5
6-10	27.9	37.2	33.1	26.4
11-15	32.9	35.7	33.0	31.3
16-20	20.5	14.0	16.4	21.1
>20	10.8	3.0	7.7	13.5

Figure 3.1-3

Directional Distribution (%) of Winds (Blowing From) Boston Logan International Airport (1987-2017)



Fall (September – November)

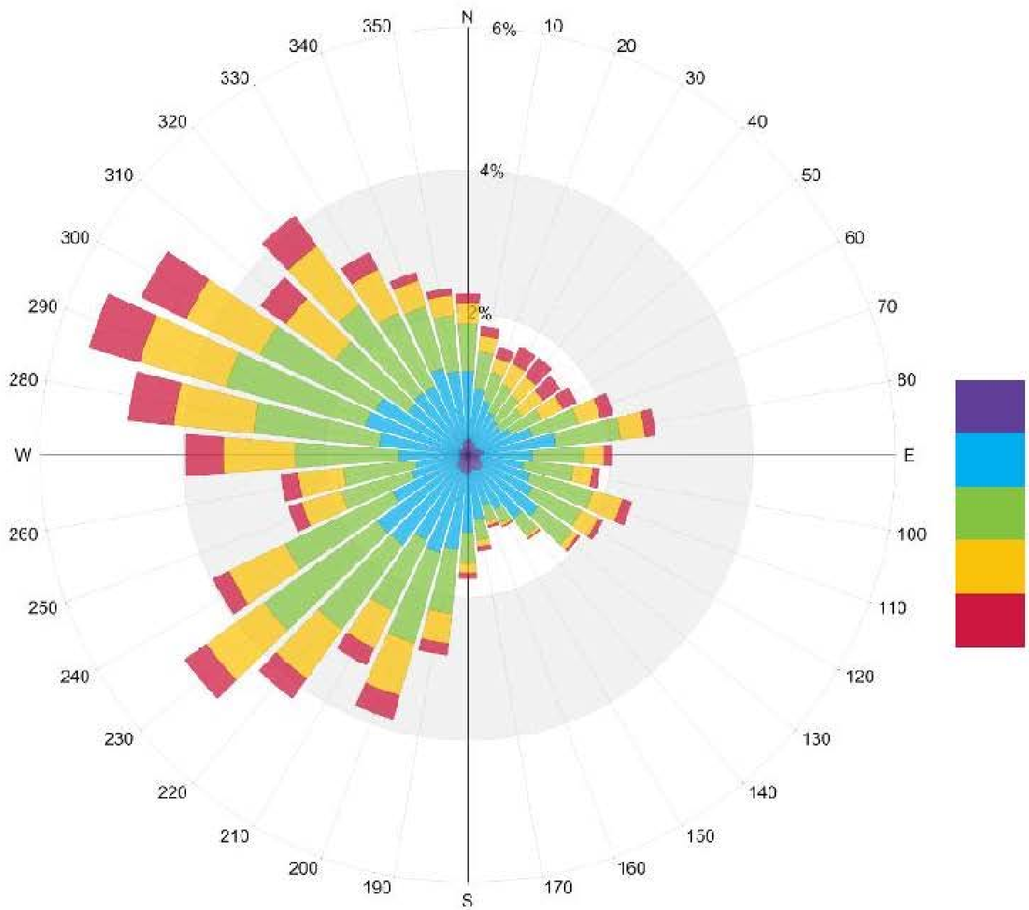


Winter (December – February)

Wind Speed (mph)	Probability (%) Spring	Summer	Fall	Winter
Calm	2.2	2.3	2.6	2.1
1-5	5.7	7.8	7.2	5.5
6-10	27.9	37.2	33.1	26.4
11-15	32.9	35.7	33.0	31.3
16-20	20.5	14.0	16.4	21.1
>20	10.8	3.0	7.7	13.5

Figure 3.1-4

Directional Distribution (%) of Winds (Blowing From) Boston Logan International Airport (1987-2017)



Wind Speed (mph)	Probability (%) Annual
Calm	2.3
1-5	6.6
6-10	31.2
11-15	33.2
16-20	18.0
>20	8.7

Figure 3.1-5

Directional Distribution (%) of Winds (Blowing From) Boston Logan International Airport (1987-2017)

Table 3.1-1 Boston Planning and Development Agency Mean Wind Criteria*

Level of Comfort	Wind Speed
Dangerous	> 27 mph
Uncomfortable for Walking	>19 and ≤27 mph
Comfortable for Walking	>15 and ≤19 mph
Comfortable for Standing	>12 and ≤15 mph
Comfortable for Sitting	<12 mph

* Applicable to the hourly mean wind speed exceeded one percent of the time.

The consideration of wind in planning outdoor activity areas is important since high winds in an area tend to deter pedestrian use. For example, winds should be light or relatively light in areas where people would be sitting, such as outdoor cafes or playgrounds. For bus stops and other locations where people would be standing, somewhat higher winds can be tolerated. For frequently used sidewalks, where people are primarily walking, stronger winds are acceptable. For infrequently used areas, the wind comfort criteria can be relaxed even further.

The 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.

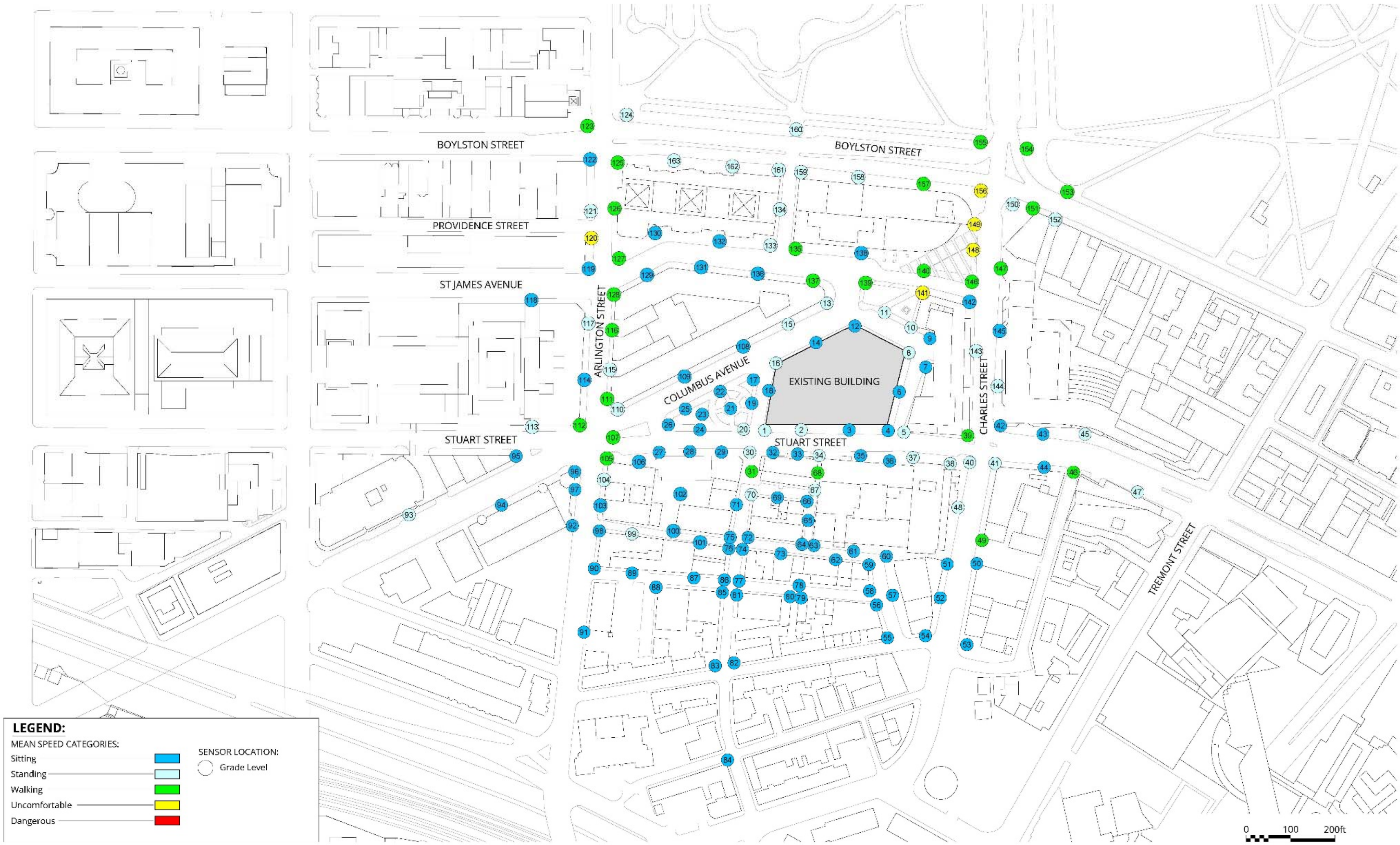
3.1.3 Results

The predicted wind comfort conditions pertaining to the two configurations assessed are graphically depicted on Figures 3.1-6 through 3.1-9. These conditions and the associated wind speeds are also presented in Appendix D. Typically, the summer and fall winds tend to be more comfortable than the annual winds while the winter and spring winds are less comfortable than the annual winds.

The following is a detailed discussion of the suitability of the predicted wind comfort conditions for the anticipated pedestrian use. The following summary of pedestrian wind comfort is based on the annual winds for each configuration tested, except where noted below in the text.

3.1.3.1 No Build Configuration

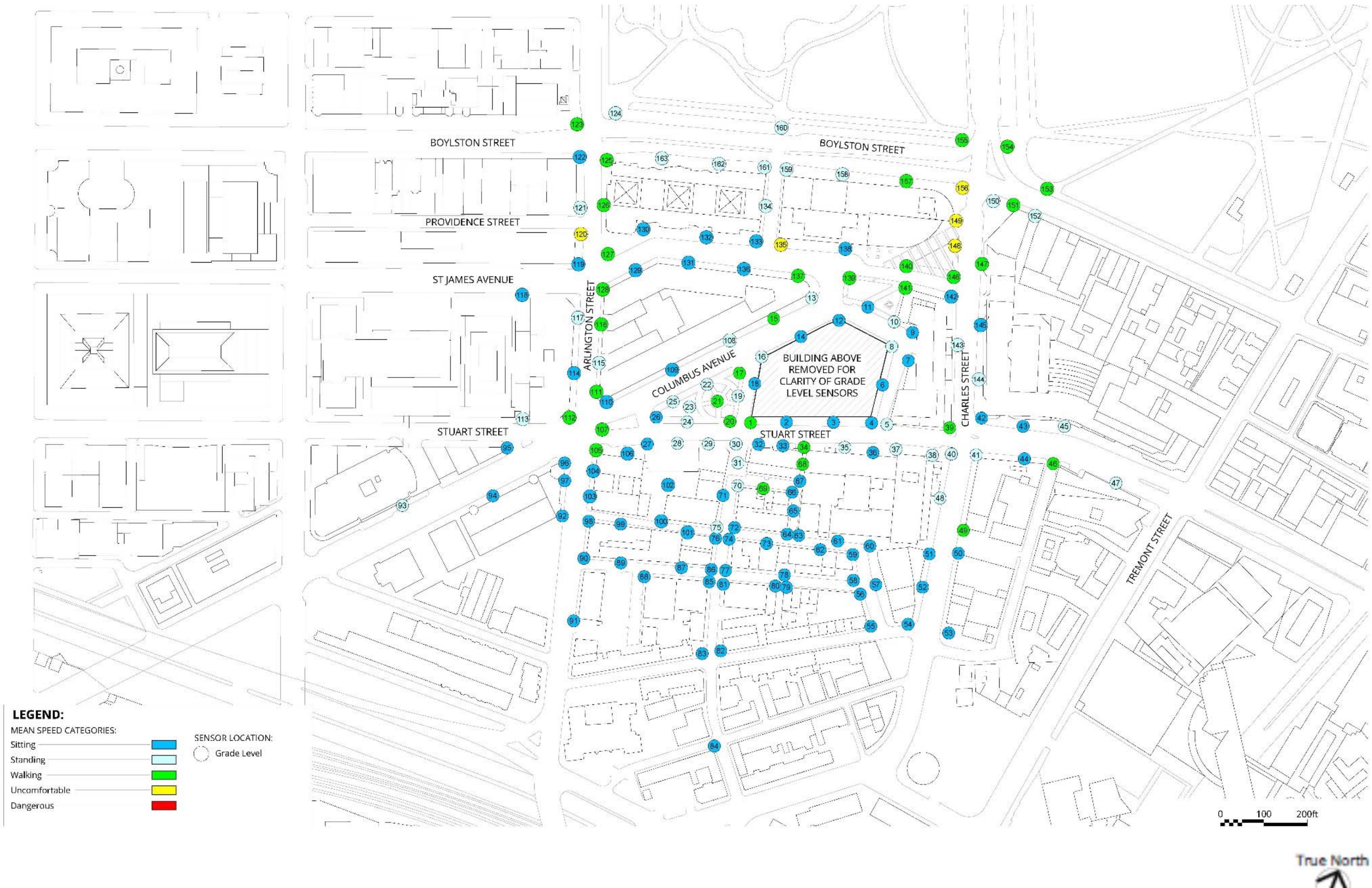
On an annual basis, the mean wind speeds for the No Build configuration are generally expected to be comfortable for walking or suitable for more passive activities except for isolated uncomfortable conditions along Charles Street, Arlington Street, and Park Plaza (Locations 120, 141, 148, 149 and 156 in Figure 3.1-6).



Motor Mart Garage Boston, Massachusetts

Figure 3.1-6

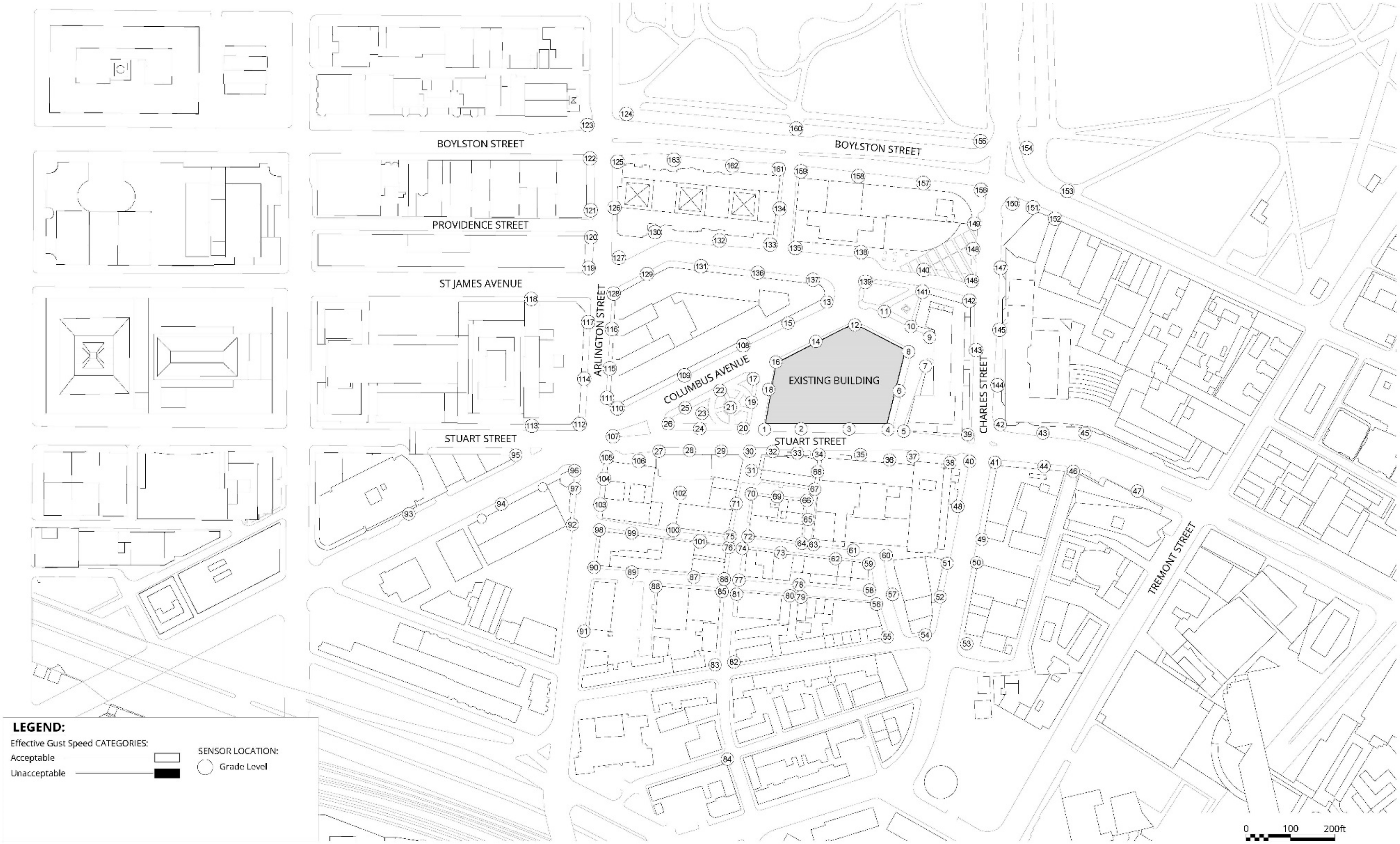
Pedestrian Wind Conditions – Mean Speed – No-Build



Motor Mart Garage Boston, Massachusetts

Figure 3.1-7

Pedestrian Wind Conditions – Mean Speed – Build

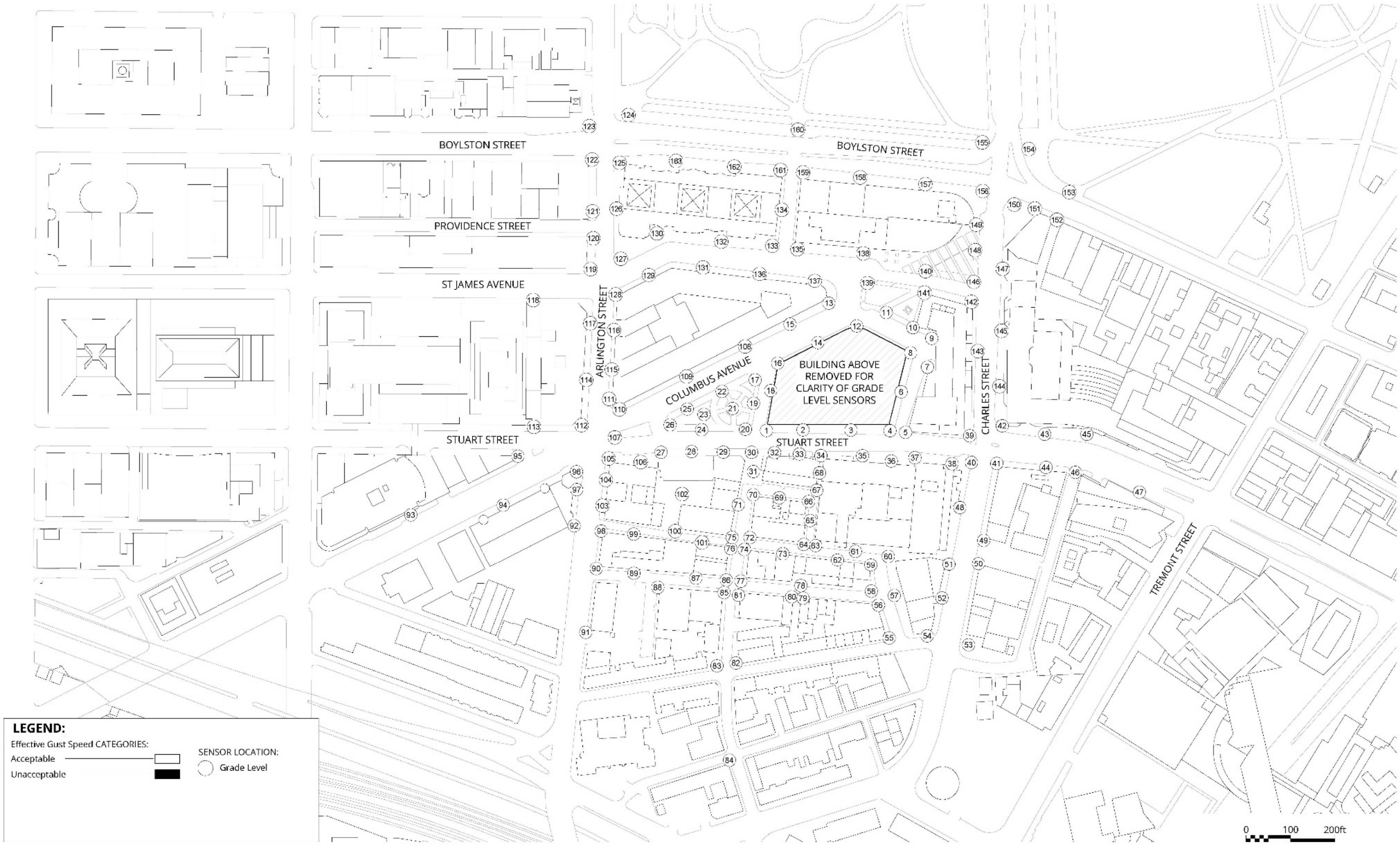


True North

Motor Mart Garage   Boston, Massachusetts

Figure 3.1-8

Pedestrian Wind Conditions – Effective Gust Speed – No-Build



True North

Motor Mart Garage   Boston, Massachusetts

Figure 3.1-9

Pedestrian Wind Conditions – Effective Gust Speed – Build

All locations are expected to meet the effective gust criterion used to assess pedestrian wind safety (see Figure 3.1-8).

3.1.3.2 Build Configuration

Similar to the No Build configuration, on an annual basis, the mean wind speeds for the Build configuration are generally expected to be comfortable for walking or suitable for more passive activities. One existing uncomfortable condition on Park Plaza will improve to comfortable for walking (Location 141). Other existing isolated uncomfortable conditions along Charles Street, Arlington Street, and Park Plaza will remain in both the No Build and Build (Locations 120, 148, 149 and 156 in 3.1-7). There will be one new uncomfortable condition on Park Plaza (location 135), however, the annual mean wind speed will increase by only one mile per hour.

In comparison to the No Build configuration, the wind comfort conditions are expected to remain similar with the development of the Project, except for minor wind comfort reductions occurring to the west of the development, south of Stuart Street and north of the development (Locations 1, 15, 17, 19 – 25, 28, 29, 34, 35, 75, 108 and 135 in 3.1-7).

With the addition of the Project, all locations are expected to continue to meet the effective gust criterion used to assess pedestrian wind safety (See Figure 3.1-9).

3.1.4 Conclusions

The results of the wind analysis show that the wind comfort conditions are generally expected to be similar for the No Build and Build configuration. The mean wind speeds for the Build configuration are generally expected to be comfortable for walking or suitable for more passive activities. The effective gust criterion is met both seasonally and annually at all locations in both the No Build and Build configurations.

3.2 Shadow

3.2.1 Introduction and Methodology

As typically required by the BPDA, a shadow impact analysis was conducted to investigate shadow impacts from the Project during three time periods (9:00 a.m., 12:00 noon, and 3:00 p.m.) during the vernal equinox (March 21), summer solstice (June 21), autumnal equinox (September 21), and winter solstice (December 21). In addition, shadow studies were conducted for the 6:00 p.m. time period during the summer solstice and autumnal equinox.

The shadow analysis presents the existing shadow and new shadow that would be created by the proposed Project, illustrating the incremental impact of the Project. The analysis focuses on nearby open spaces, sidewalks and bus stops adjacent to and in the vicinity of the Project Site. Figures showing the net new shadow from the Project are provided in Figures 3.2-1 to 3.2-14 at the end of this section.

The Project Site is located in a dense area of Boston where there is a significant amount of existing shadow, and the Existing Building occupies the entire footprint of the site. As a result, and because of the design and orientation of the tower, shadow impacts are anticipated to be minor and new shadow associated with the Project will generally be limited to nearby streets and sidewalks. Of the 14 time periods studied, new shadow will be cast on public open spaces during only two time periods. New shadow will be cast on the Boston Public Garden on December 21 at 9:00 a.m., and on the Boston Common on December 21 at 3:00 p.m. New shadow from the Project complies with Boston Common and Boston Public Garden shadow legislation, which is described in Section 3.2.6.

3.2.2 Vernal Equinox (March 21)

At 9:00 a.m. during the vernal equinox, new shadow from the Project will be cast to the northwest and will be limited to nearby rooftops. No new shadow will be cast onto nearby streets, sidewalks, bus stops, or public open spaces.

At 12:00 p.m., new shadow from the Project will be cast to the north onto a sliver of Park Plaza. No new shadow will be cast onto nearby sidewalks, bus stops, or public open spaces.

At 3:00 p.m., no new shadow will be cast as a result of the Project.

3.2.3 Summer Solstice (June 21)

At 9:00 a.m. during the summer solstice, new shadow from the Project will be cast to the west onto a small portion of Columbus Avenue and its northern sidewalk. No new shadow will be cast onto nearby bus stops or public open spaces.

At 12:00 p.m., new shadow from the Project will be cast to the north onto a small portion of Columbus Avenue. No new shadow will be cast onto nearby bus stops or public open spaces.

At 3:00 p.m., no new shadow will be cast as a result of the Project.

At 6:00 p.m., new shadow from the Project will be cast to the southeast and will be limited to nearby rooftops. No new shadow will be cast onto nearby streets, sidewalks, bus stops, or public open spaces.

3.2.4 Autumnal Equinox (September 21)

At 9:00 a.m. during the autumnal equinox, new shadow from the Project will be cast to the northwest and will be limited to nearby rooftops. No new shadow will be cast onto nearby streets, sidewalks, bus stops, or public open spaces.

At 12:00 p.m., new shadow from the Project will be cast to the north onto a sliver of Park Plaza. No new shadow will be cast onto nearby sidewalks, bus stops, or public open spaces.

At 3:00 p.m., no new shadow will be cast as a result of the Project.

At 6:00 p.m., much of the area is under existing shadow. New shadow from the Project will be limited to rooftops. No new shadow will be cast onto nearby streets, sidewalks, bus stops, or public open spaces.

3.2.5 Winter Solstice (December 21)

The winter solstice creates the least favorable conditions for sunlight in New England. The sun angle during the winter is lower than in any other season, causing the shadows in urban areas to elongate and be cast onto large portions of the surrounding area.

At 9:00 a.m. during the winter solstice, new shadow from the Project will be cast to the northwest onto a portion of the Boston Public Garden and nearby rooftops. No new shadow will be cast onto nearby streets, sidewalks, or other public open spaces.

At 12:00 p.m., new shadow from the Project will be cast to the north and will be limited to nearby rooftops. No new shadow will be cast onto nearby streets, sidewalks, bus stops, or public open spaces.

At 3:00 p.m., new shadow from the Project will be cast to the northeast onto a portion of the Boston Common, and onto Tremont Street and its sidewalks as well as nearby rooftops. No new shadow will be cast onto nearby bus stops or other public open spaces.

3.2.6 Compliance with Article 38, Boston Common and Boston Public Garden Shadow Legislation

Additional shadow analyses were conducted to ensure compliance with both Chapter 362 of the Acts of 1990, as amended (Boston Common Shadow Act), and Chapter 384 of the Acts of 1992, as amended (Public Garden Shadow Act). For projects within the Midtown Cultural District, the Boston Common Shadow Act prohibits structures that cast new shadow upon the Boston Common for more than two hours 8:00 a.m. through 2:30 p.m. on any day from March 21 through October 21, inclusive, in any calendar year.

For projects within the Midtown Cultural District, the Public Garden Shadow Act prohibits any structure which casts new shadow upon the Boston Public Garden after 10:00 a.m. on any day from March 21 to October 21, inclusive, in any calendar year.

In both the Boston Common Shadow Act and the Public Garden Shadow Act, new shadow is defined as shadow in addition to that cast by (i) structures in existence or for which a building permit has been issued, and (ii) shadow which would have been cast by an as-of-right building permitted as of May 1, 1990.

The results of the shadow impact analysis on the Boston Common and the Boston Public Garden are provided in Appendix E. As demonstrated, the new shadow from the Project complies with both the Boston Common and Boston Public Garden Shadow Acts. The Project does not cast new shadow on the Boston Common or the Boston Public Garden on any day from March 21 through October 21.

Midtown Cultural District Shadow Impact Area

Although it has not yet been determined whether a Planned Development Area overlay would be appropriate for the Project, the Project does comply with shadow requirements applicable to Planned Development Areas within the Midtown Cultural District. Section 38-16.1 of the Code requires that projects within a Planned Development Area not cast new shadow on any area within a delineated zone adjacent to the Project Site and inclusive of Statler Park, Lincoln Square, the Boston Common, and portions of Columbus Avenue and Boylston Street (defined in Article 38 of the Code as the "Shadow Impact Area") for more than two hours from 8:00 a.m. through 2:30 p.m. on any day from March 21 through October 21, inclusive, in any calendar year. In Sec. 38-16.1 of the Code, new shadow is defined as shadow in addition to shadow (i) cast by buildings in existence as of March 20, 1989, and (ii) that would be cast by buildings if constructed to their as-of-right heights pursuant to Article 38 of the Code.

The shadow study in Appendix E shows that the Project will comply with these shadow restrictions as set forth in Section 38-16.1 of the Code.

3.2.7 Conclusions

The shadow impact analysis investigated net new shadow created by the Project during fourteen time periods. Due to the presence of shadows created by the Existing Building and the design and orientation of the tower, shadow impacts from the Project are anticipated to be minor. During twelve of the fourteen time periods studied, the Project will not cast new shadow on public open spaces. New shadow will be cast on the Boston Public Garden on December 21 at 9:00 a.m., and on the Boston Common on December 21 at 3:00 p.m. The Project will comply with both the Boston Common Shadow Act and the Public Garden Shadow Act, as well as with the shadow restrictions set out in Sec. 38-16.1 of the Code.

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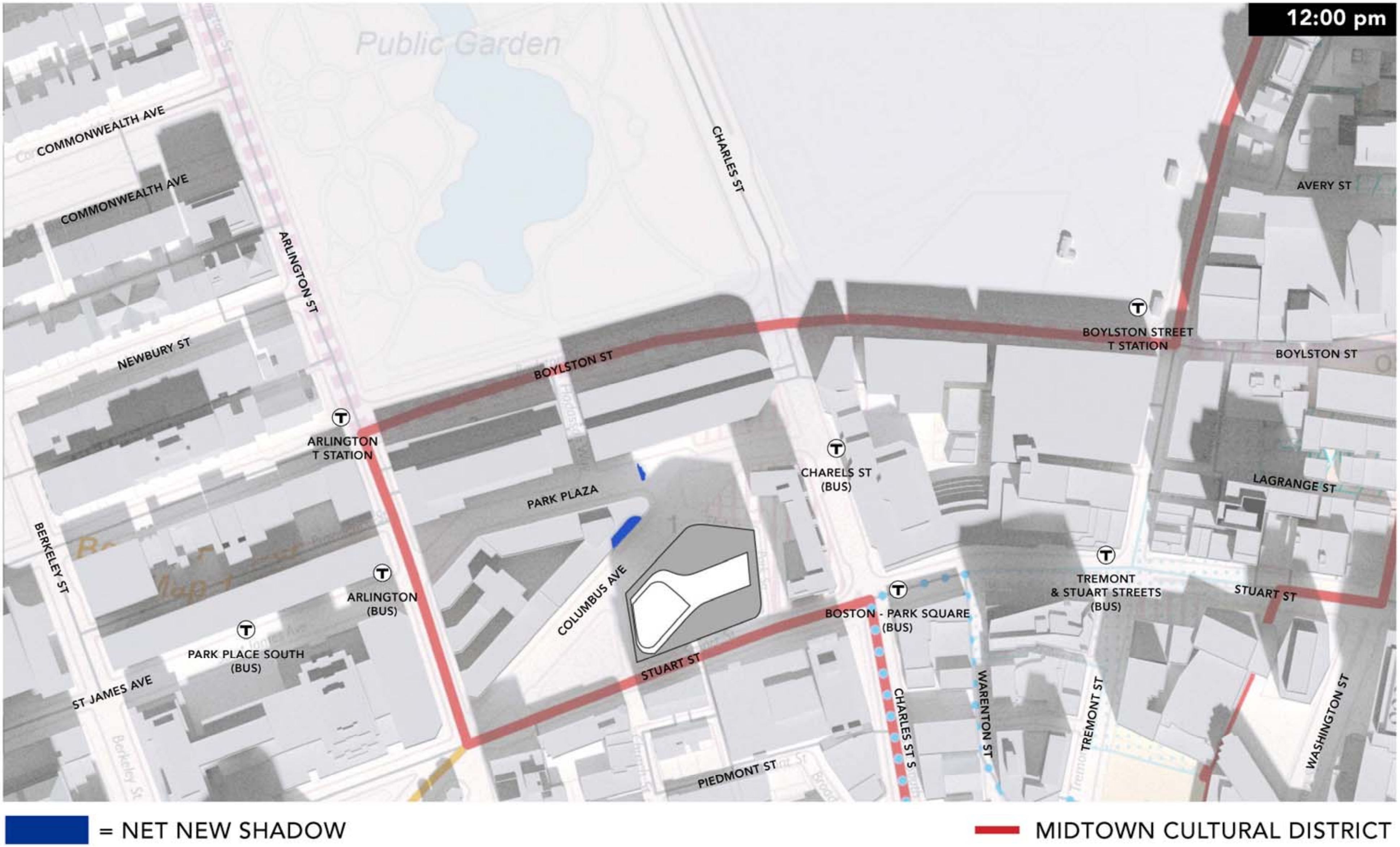
Figure 3.2-1

Shadow Study: March 21, 9:00 a.m.



Motor Mart Garage **Boston, Massachusetts**

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Figure 3.2-2

Shadow Study: March 21, 12:00 p.m.

= NET NEW SHADOW

MIDTOWN CULTURAL DISTRICT

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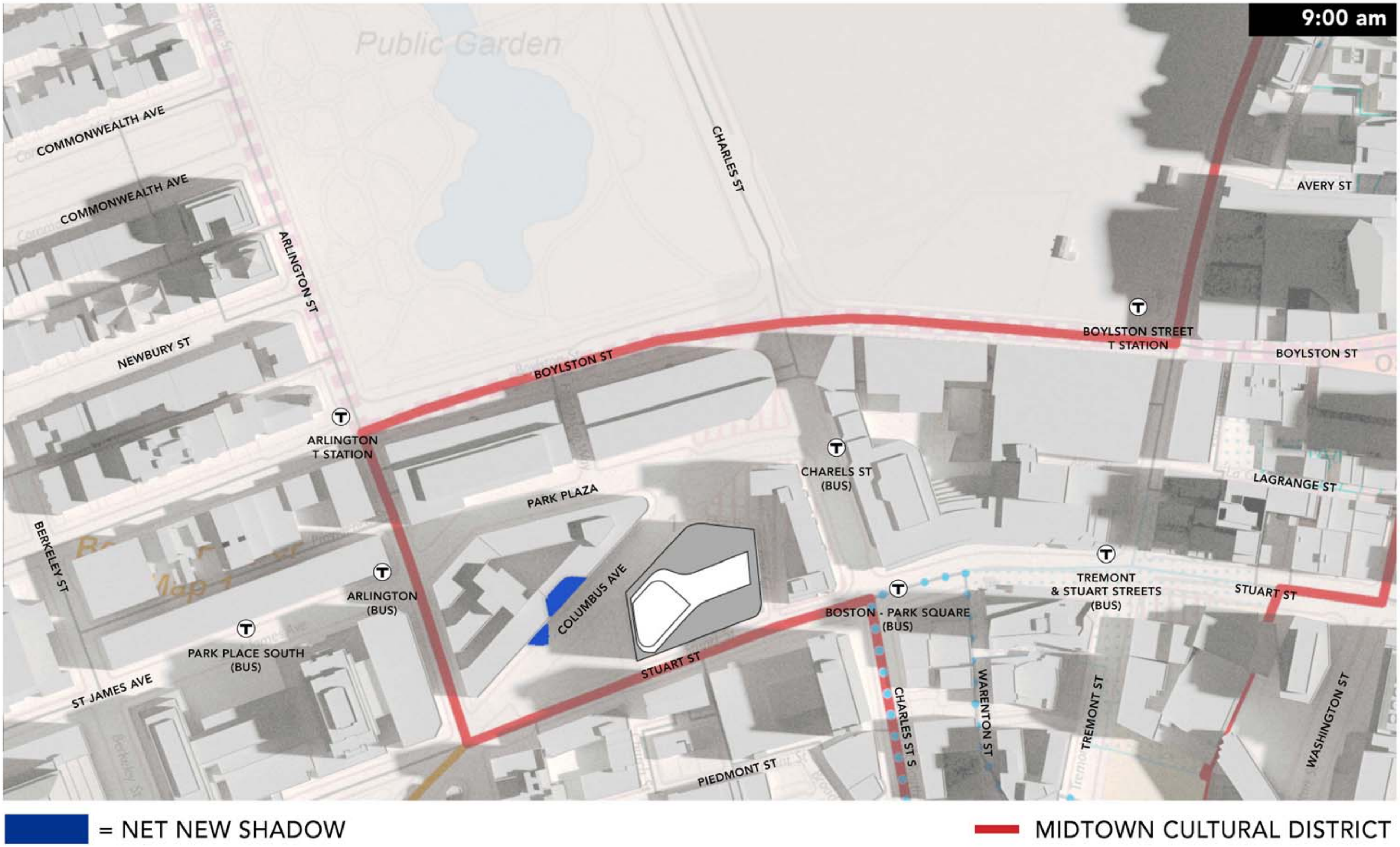
Figure 3.2-3

Shadow Study: March 21, 3:00 p.m.



Motor Mart Garage **Boston, Massachusetts**

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Figure 3.2-4

Shadow Study: June 21, 9:00 a.m.

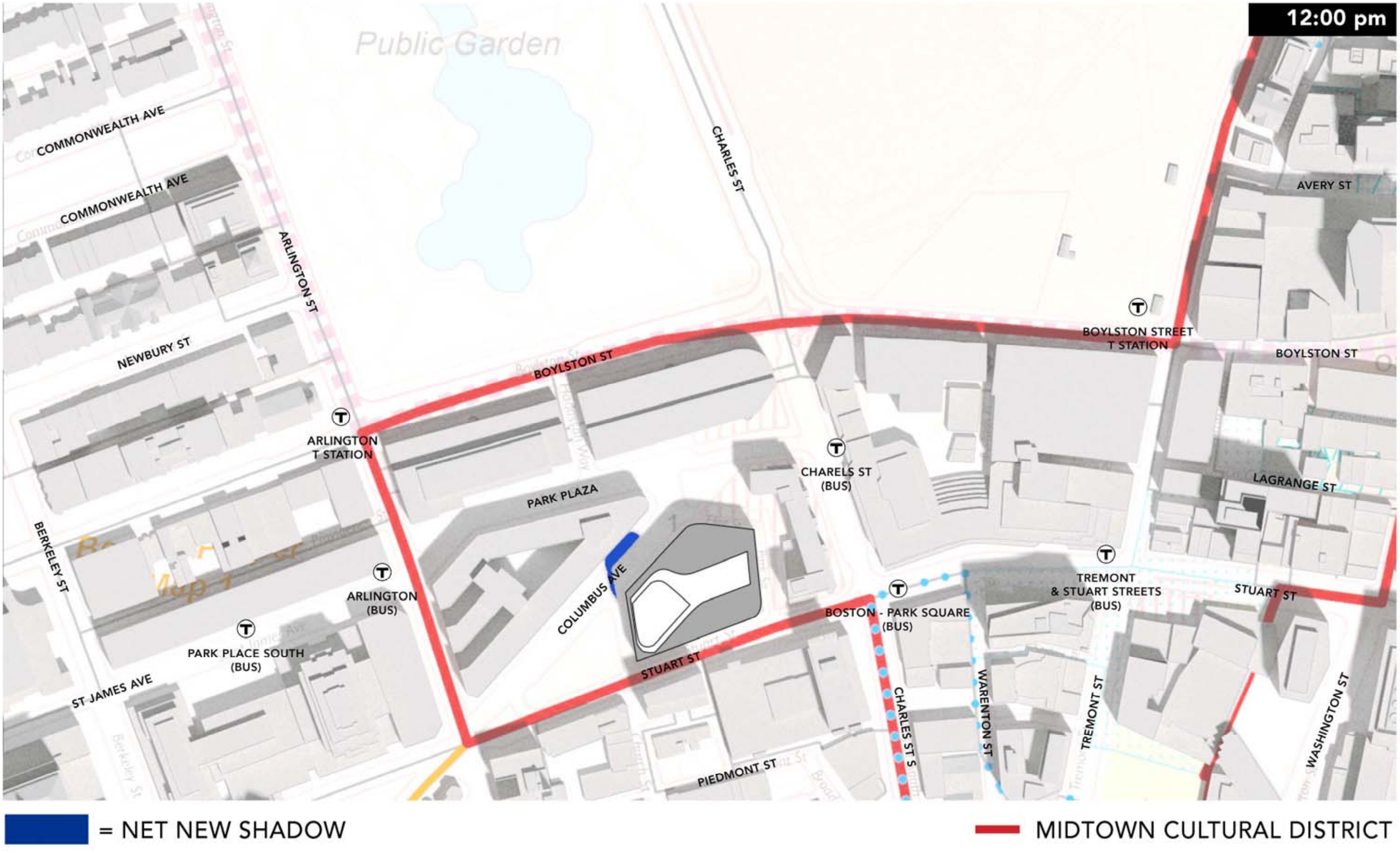

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Figure 3.2-5

Shadow Study: June 21, 12:00 p.m.

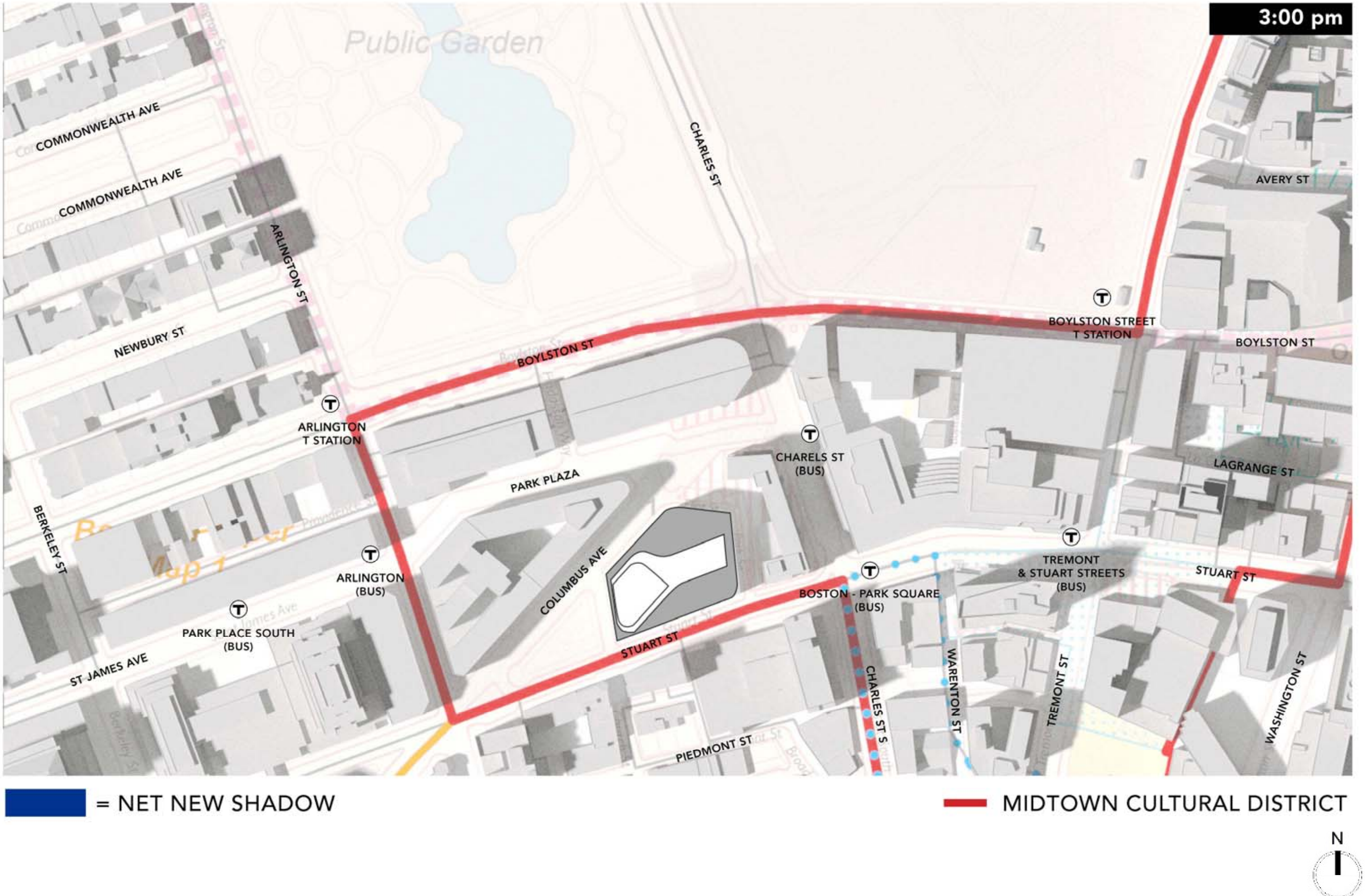
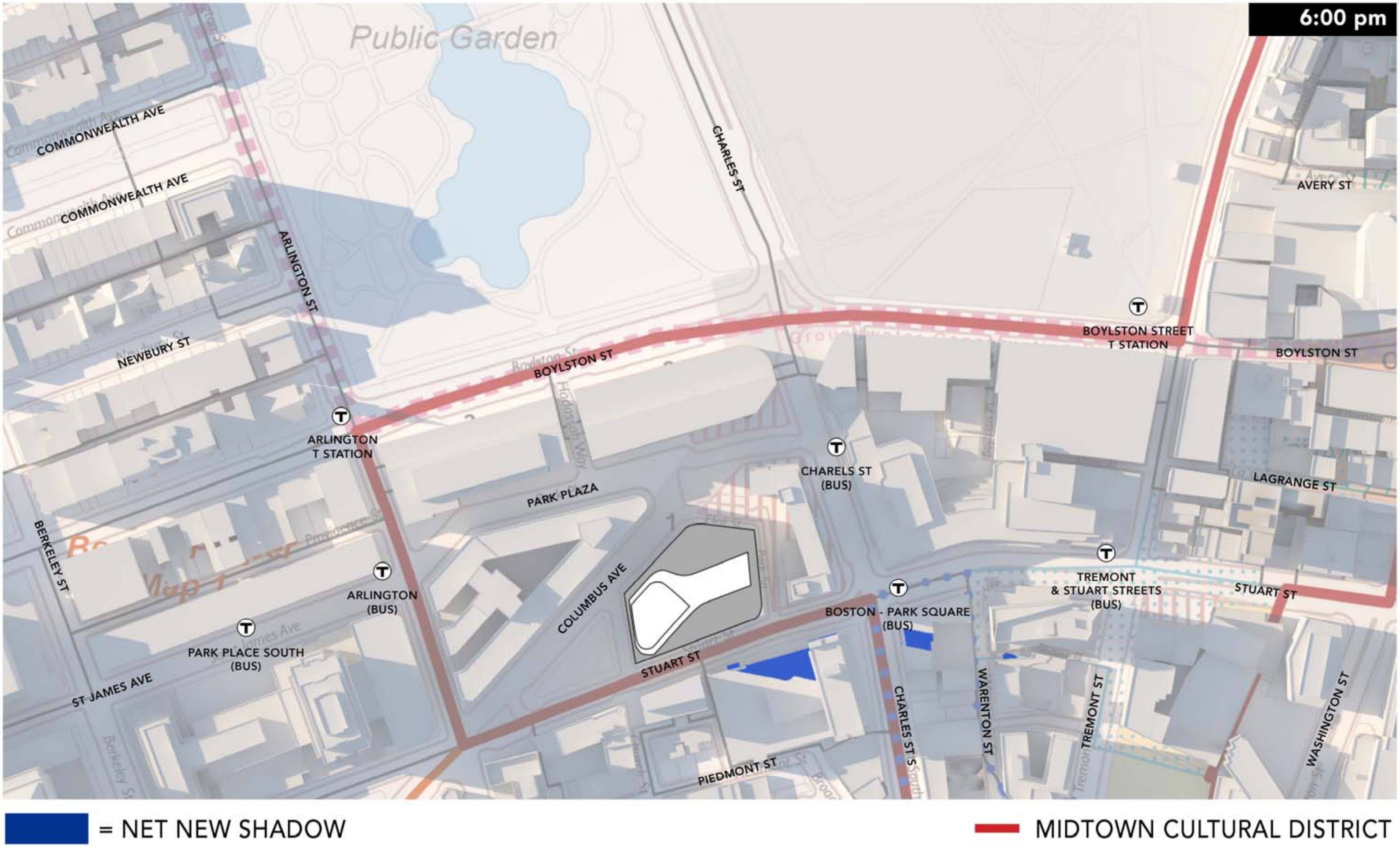


Figure 3.2-6

Shadow Study: June 21, 3:00 p.m.



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cbt

Figure 3.2-7

Shadow Study: June 21, 6:00 p.m.

= NET NEW SHADOW

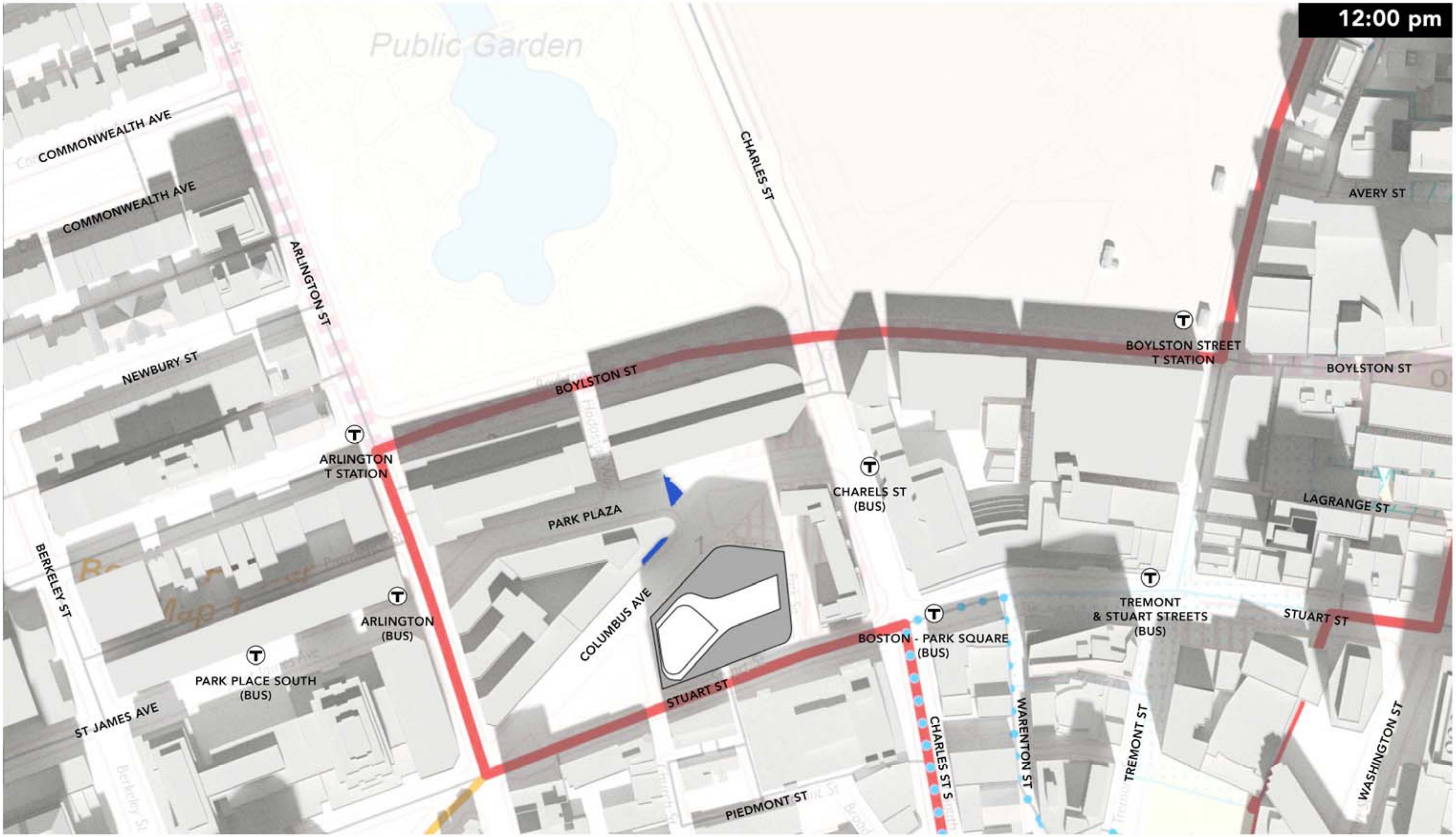
MIDTOWN CULTURAL DISTRICT

Motor Mart Garage Boston, Massachusetts

cbt

Figure 3.2-8

Shadow Study: September 21, 9:00 a.m.



= NET NEW SHADOW

MIDTOWN CULTURAL DISTRICT

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Figure 3.2-9

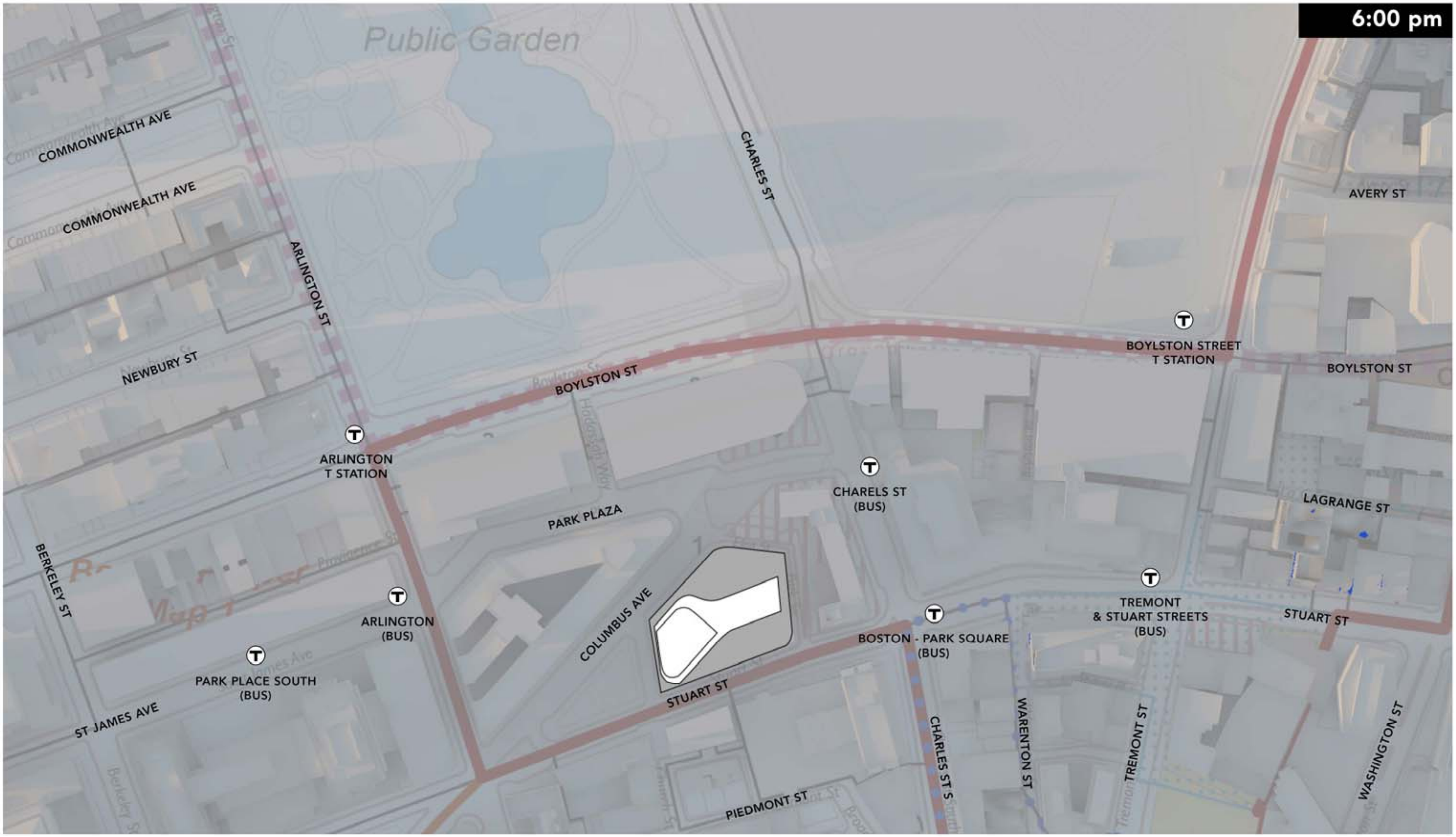
Shadow Study: September 21, 12:00 p.m.

Motor Mart Garage **Boston, Massachusetts**

cbt

Figure 3.2-10

Shadow Study: September 21, 3:00 p.m.



= NET NEW SHADOW

MIDTOWN CULTURAL DISTRICT

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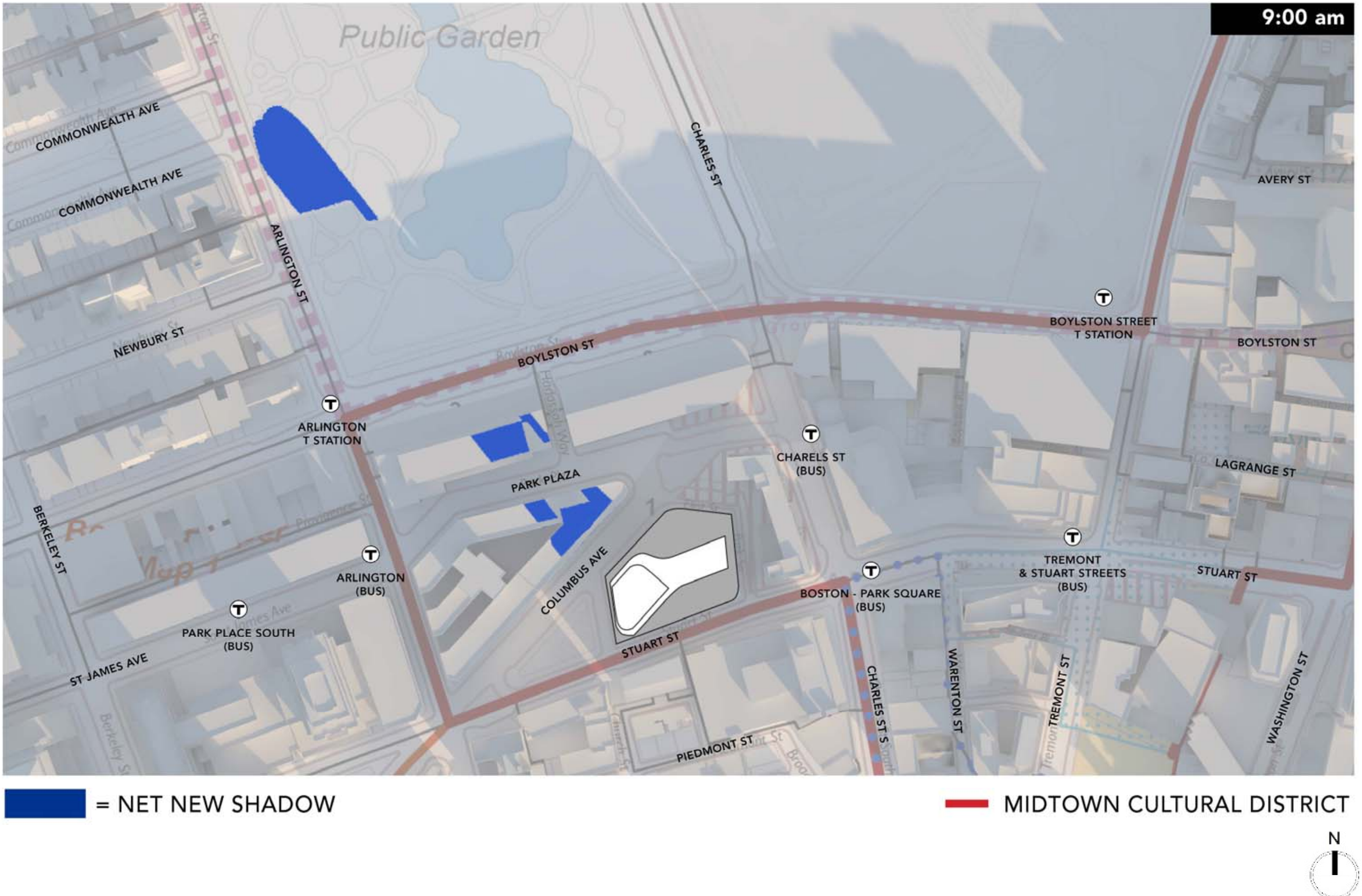
Motor Mart Garage **Boston, Massachusetts**

cbt

Figure 3.2-11

Shadow Study: September 21, 6:00 p.m.



Motor Mart Garage **Boston, Massachusetts**

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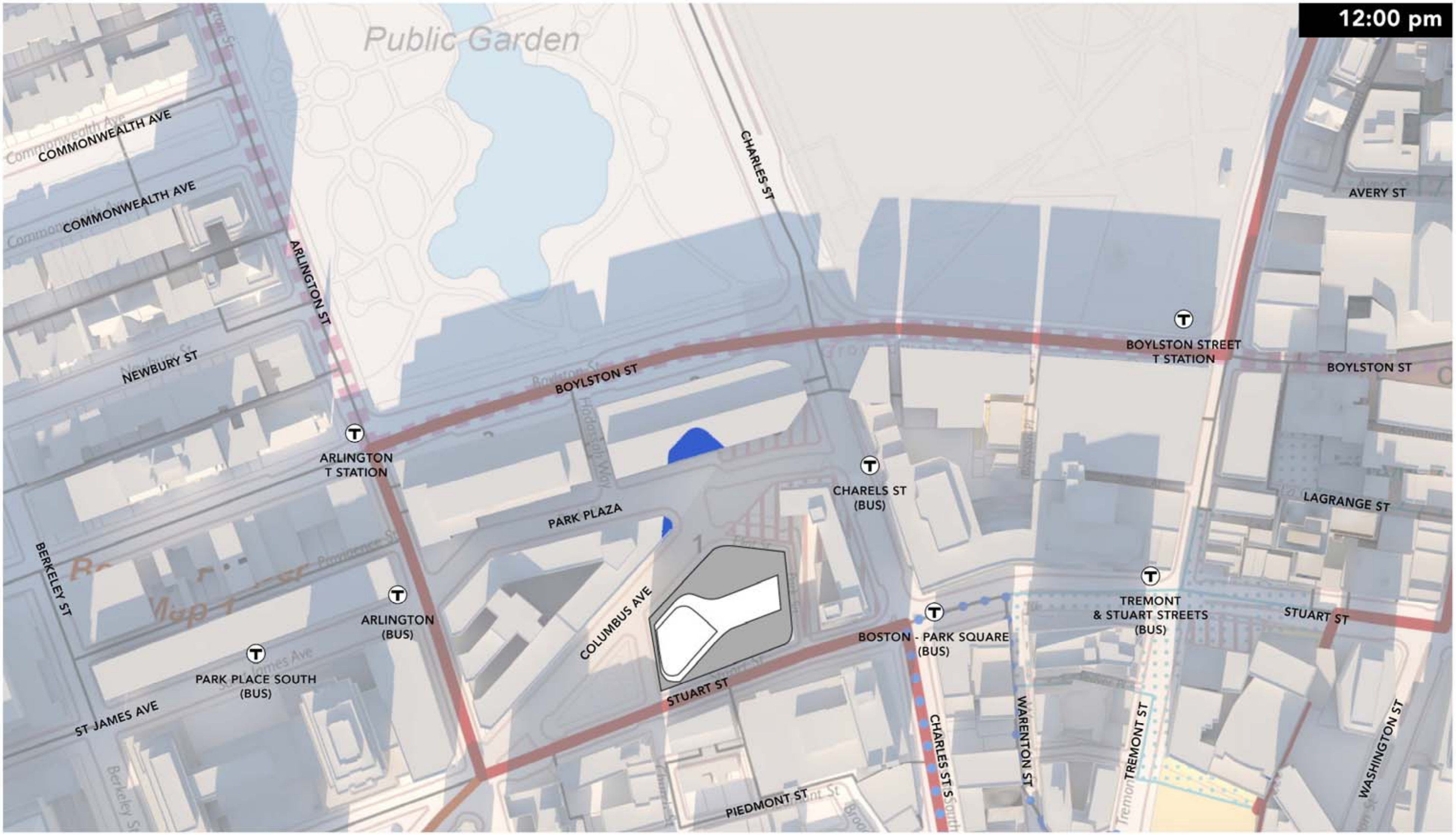
Figure 3.2-12

Shadow Study: December 21, 9:00 a.m.



= NET NEW SHADOW

MIDTOWN CULTURAL DISTRICT

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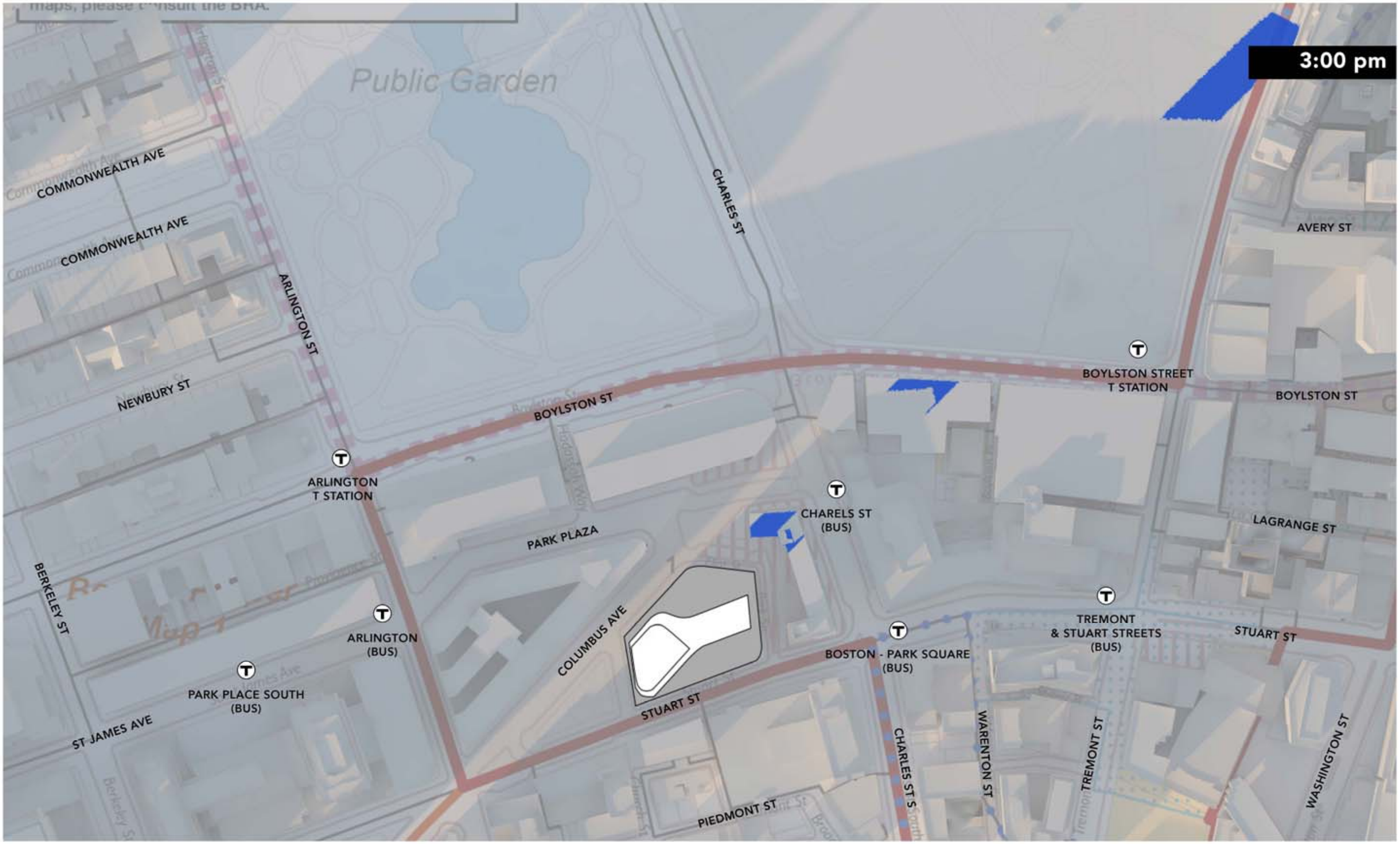
Motor Mart Garage **Boston, Massachusetts**

cbt

Figure 3.2-13

Shadow Study: December: 21, 12:00 p.m.



= NET NEW SHADOW

MIDTOWN CULTURAL DISTRICT

N

Figure 3.2-14

Shadow Study: December 21, 3:00 p.m.

3.3 Daylight Analysis

3.3.1 Introduction

The purpose of the daylight analysis is to estimate the extent to which a proposed project will affect the amount of daylight reaching the streets and the sidewalks in the immediate vicinity of a project site.

The Project includes a 20-story addition to the existing eight-story parking garage on the site, which will increase the daylight obstruction on the site. However, because the existing parking garage occupies the entire site, the increase in daylight obstruction will be minimal, and at some viewpoints the daylight obstruction value will not change.

3.3.2 Methodology

The daylight analysis was performed using the Boston Redevelopment Authority Daylight Analysis (BRADA) computer program[2]. This program measures the percentage of sky-dome that is obstructed by a project and is a useful tool in evaluating the net change in obstruction from existing to build conditions at a specific site.

Using BRADA, a silhouette view of the building is taken at ground level from the middle of the adjacent city streets or pedestrian ways centered on the proposed building. The façade of the building facing the viewpoint, including heights, setbacks, corners and other features, is plotted onto a base map using lateral and elevation angles. The two-dimensional base map generated by BRADA represents a figure of the building in the "sky dome" from the viewpoint chosen. The BRADA program calculates the percentage of daylight that will be obstructed on a scale of 0 to 100 percent based on the width of the view, the distance between the viewpoint and the building, and the massing and setbacks incorporated into the design of the building; the lower the number, the lower the percentage of obstruction of daylight from any given viewpoint.

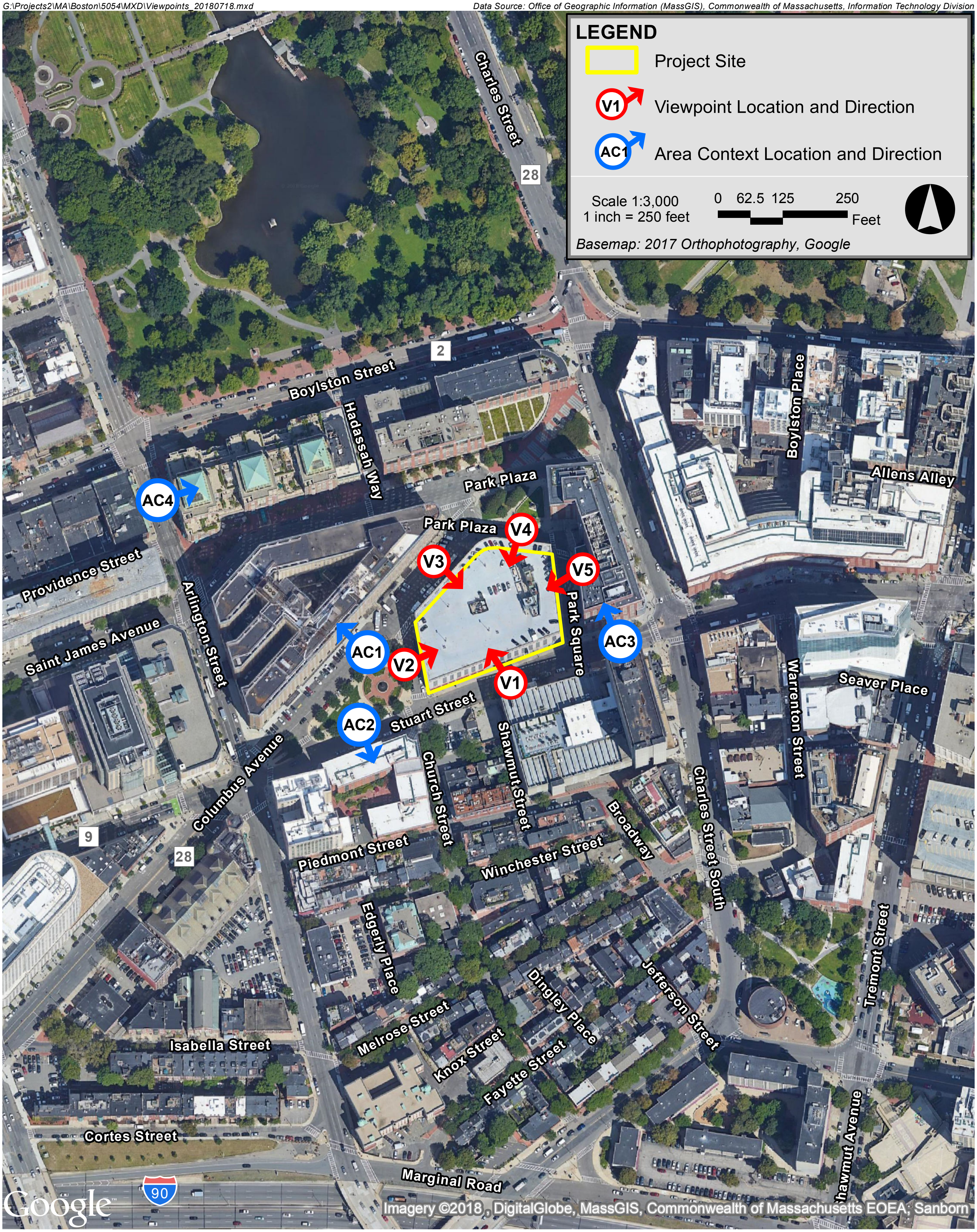
The analysis compares three conditions: Existing Conditions; Proposed Conditions; and the context of the area.

Five viewpoints were chosen to evaluate the daylight obstruction for the Existing and Proposed Conditions. Four area context points were considered to provide a basis of comparison to existing conditions in the surrounding area. The viewpoint and area context viewpoints were taken in the following locations and are shown on Figure 3.3-1.

[2] Method developed by Harvey Bryan and Susan Stuebing, computer program developed by Ronald Fergle, Massachusetts Institute of Technology, Cambridge, MA, September 1984.

G:\Projects2\MA\Boston\5054\MXD\Viewpoints_20180718.mxd

Data Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division



Motor Mart Garage   Boston, Massachusetts

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Figure 3.3-1

Viewpoint and Area Context Locations

- **Viewpoint 1:** View from the center of Stuart Street facing north toward the Project Site.
- **Viewpoint 2:** View from the center of Church Street facing east toward the Project Site.
- **Viewpoint 3:** View from the center of Columbus Avenue facing southeast toward the Project Site.
- **Viewpoint 4:** View from the center of Eliot Street facing southwest toward the Project Site.
- **Viewpoint 5:** View from the center of Park Plaice facing west toward the Project Site.
- **Area Context Viewpoint AC1:** View from Columbus Avenue facing northwest toward 20 Park Plaza.
- **Area Context Viewpoint AC2:** View from Stuart Street facing south toward 230-240 Stuart Street.
- **Area Context Viewpoint AC3:** View from Stuart Street facing north toward One Charles Street.
- **Area Context Viewpoint AC4:** View from Arlington Street facing east toward 28 Arlington Street.

3.3.3 Results

The results for each viewpoint are described in Table 3.3-1. Figures 3.3-2 through 3.3-7 illustrate the BRADA results for each analysis.

Table 3.3-1 Daylight Analysis Results

Viewpoint Locations		Existing Conditions	Proposed Conditions
Viewpoint 1	View from the center of Stuart Street facing north toward the Project Site	76.9%	78.1%
Viewpoint 2	View from the center of Church Street facing east toward the Project Site	85.5%	89.6%
Viewpoint 3	View from the center of Columbus Avenue facing southeast toward the Project Site	72.0%	72.2%
Viewpoint 4	View from the center of Eliot Street facing southwest toward the Project Site	78.9%	78.9%
Viewpoint 5	View from the center of Park Plaice facing west toward the Project Site	83.8%	83.8%

Table 3.3-1 Daylight Analysis Results (Continued)

Viewpoint Locations		Existing Conditions	Proposed Conditions
Area Context Points			
AC1	View from Columbus Avenue facing northwest toward 20 Park Plaza	83.8%	N/A
AC2	View from Stuart Street facing south toward 230-240 Stuart Street	68.7%	N/A
AC3	View from Stuart Street facing north toward One Charles Street	83.1%	N/A
AC4	View from Arlington Street facing east toward 28 Arlington Street	85.8%	N/A

Stuart Street – Viewpoint 1

Stuart Street runs along the southern edge of the Project Site. Viewpoint 1 was taken from the center of Stuart Street facing north toward the Project Site. The development of the Project will minimally increase the daylight obstruction values from 76.9% to 78.1% and is consistent with or lower than other daylight obstruction values for other buildings in the area, including the Area Context buildings.

Church Street – Viewpoint 2

Church Street runs along the western edge of the Project Site. Viewpoint 2 was taken from the center of Church Street facing east toward the Project Site. The development of the Project will increase the daylight obstruction from 85.5% to 89.6%. While this is a minor increase over existing conditions, the daylight obstruction value is only slightly higher than Area Context buildings.

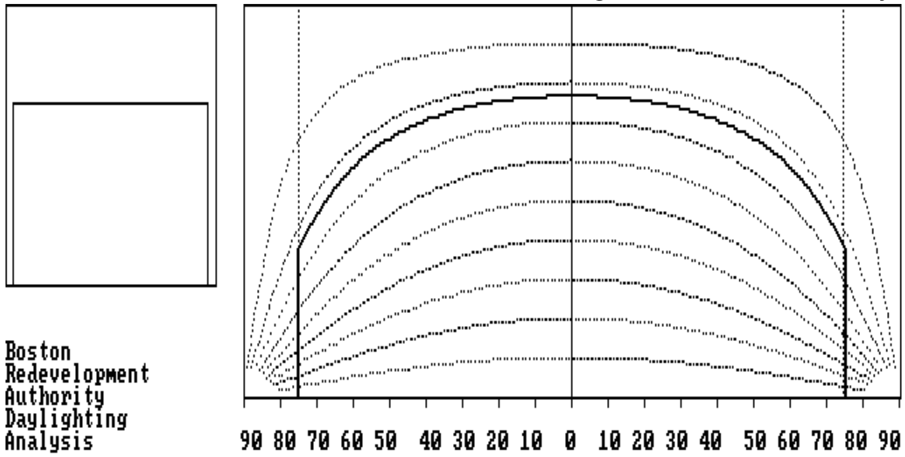
Columbus Avenue – Viewpoint 3

Columbus Avenue runs along the northwestern edge of the Project Site. Viewpoint 3 was taken from the center of Columbus Avenue facing southeast toward the Project Site. The development of the Project will result in a similar daylight obstruction value of 72.2% compared to the existing condition of 72.0%. In addition, the daylight obstruction value is consistent with other buildings in the area, including the Area Context buildings.

Eliot Street – Viewpoint 4

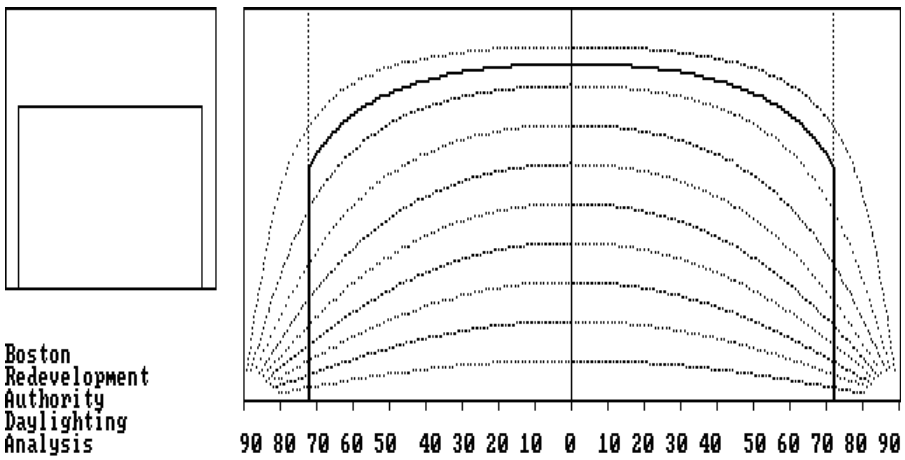
Eliot Street runs along the northeastern edge of the Project Site. Viewpoint 4 was taken from the center of Eliot Street facing southwest toward the Project Site. Because the existing garage occupies the entire site, and the addition is set back from the street, the daylight obstruction value at this viewpoint will not change.

Viewpoint 1: View from the center of Stuart Street facing north toward the Project site



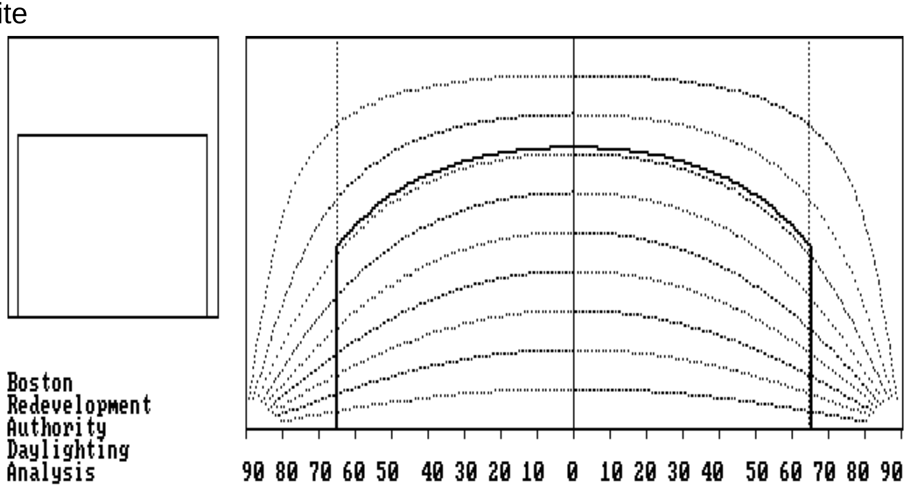
Obstruction of daylight by the building is 76.9 %

Viewpoint 2: View from the center of Church Street facing east toward the Project site



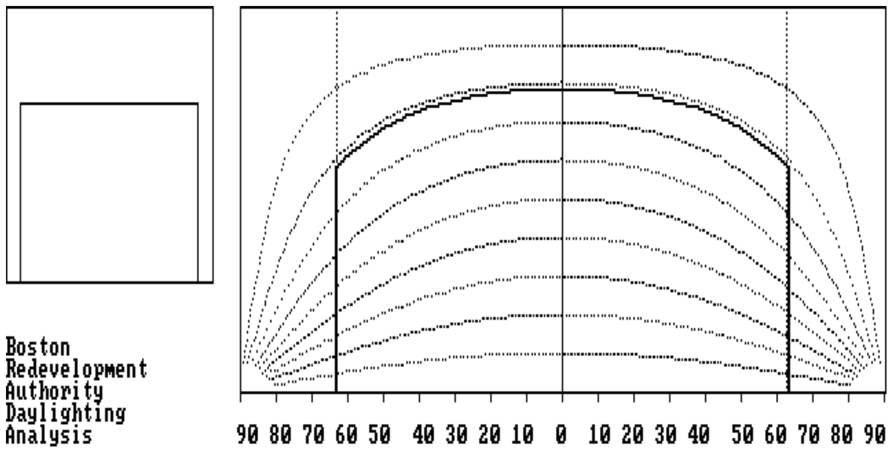
Obstruction of daylight by the building is 85.5 %

Viewpoint 3: View from the center of Columbus Avenue facing southeast toward the Project site



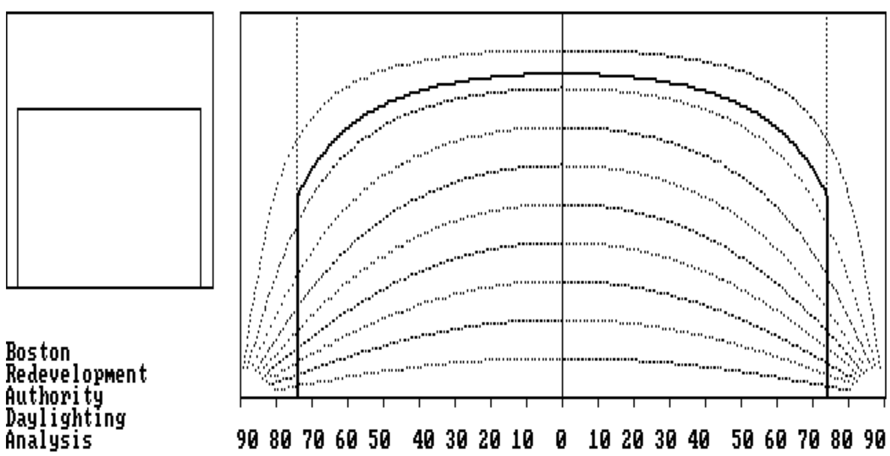
Obstruction of daylight by the building is 72.0 %

Viewpoint 4: View from the center of Eliot Street facing southwest toward the Project site



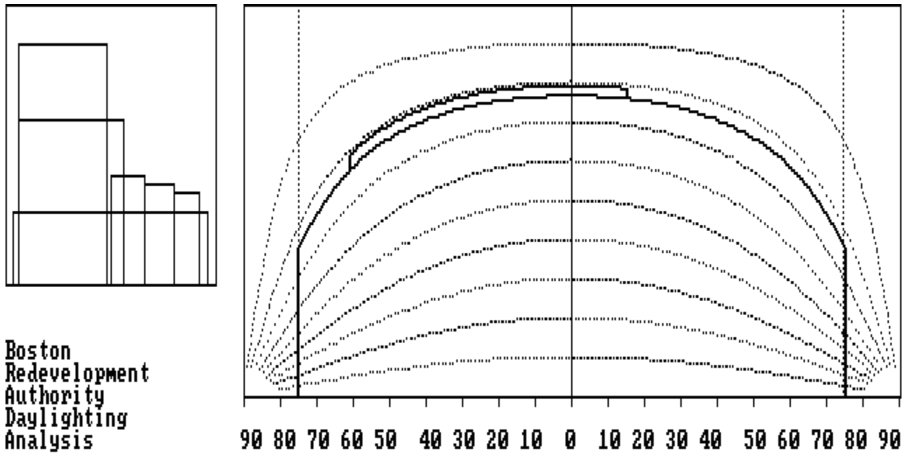
Obstruction of daylight by the building is 78.9 %

Viewpoint 5: View from the center of Park Plaice facing west toward the Project site



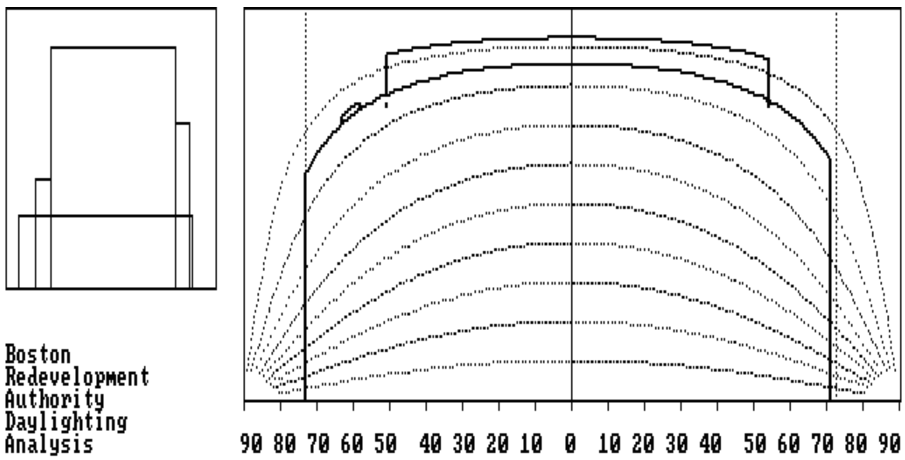
Obstruction of daylight by the building is 83.8 %

Viewpoint 1: View from the center of Stuart Street facing north toward the Project site



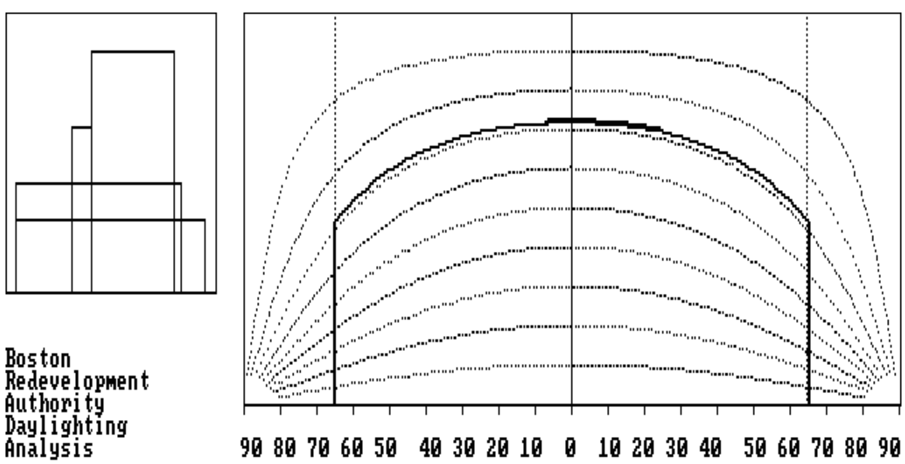
Obstruction of daylight by the building is 78.1 %

Viewpoint 2: View from the center of Church Street facing east toward the Project site



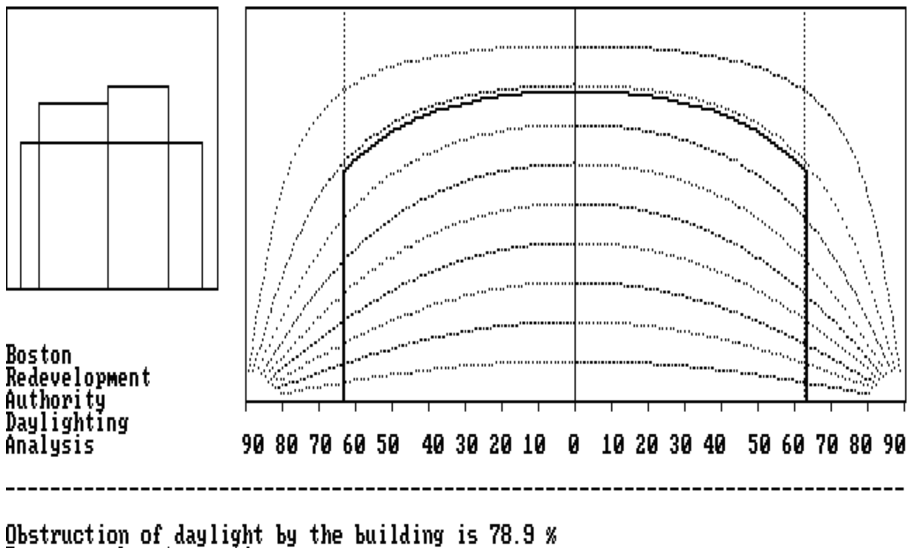
Obstruction of daylight by the building is 89.6 %

Viewpoint 3: View from the center of Columbus Avenue facing southeast toward the Project site

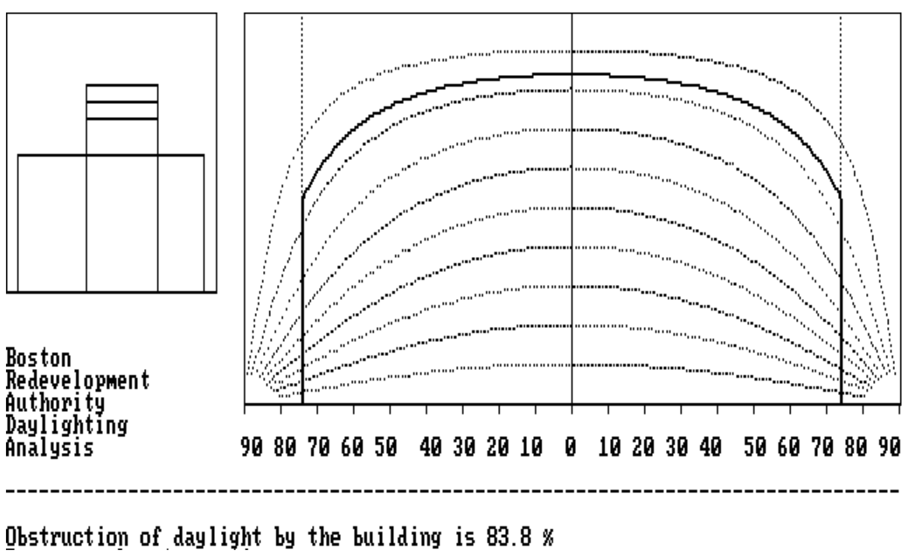


Obstruction of daylight by the building is 72.2 %

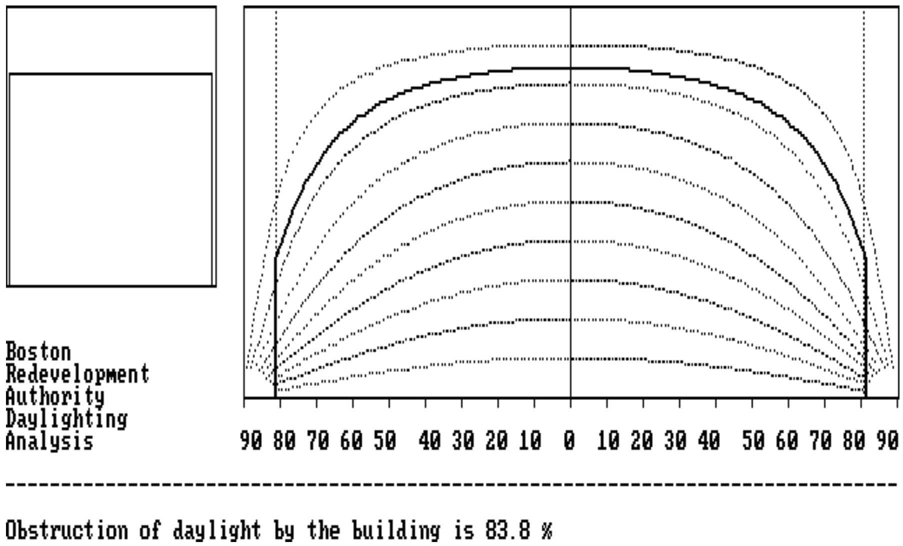
Viewpoint 4: View from the center of Eliot Street facing southwest toward the Project site



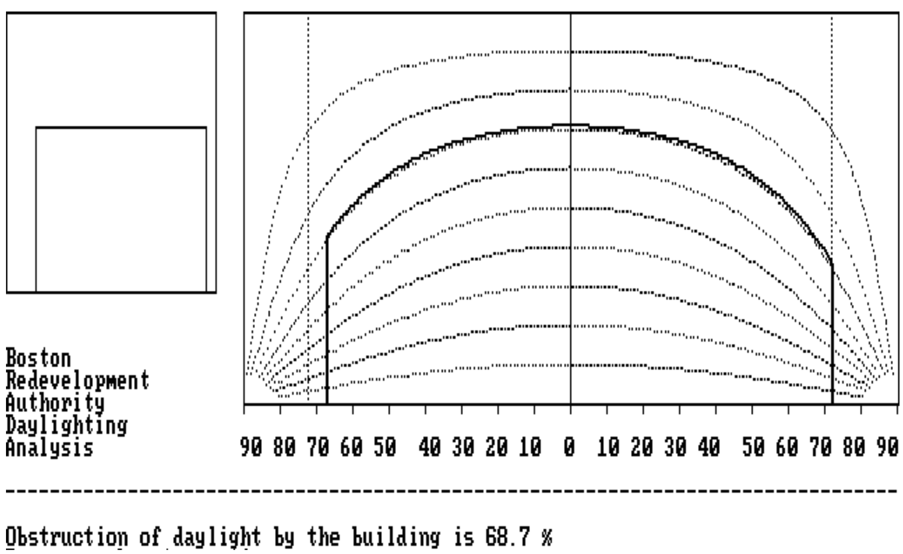
Viewpoint 5: View from the center of Park Plaice facing west toward the Project site



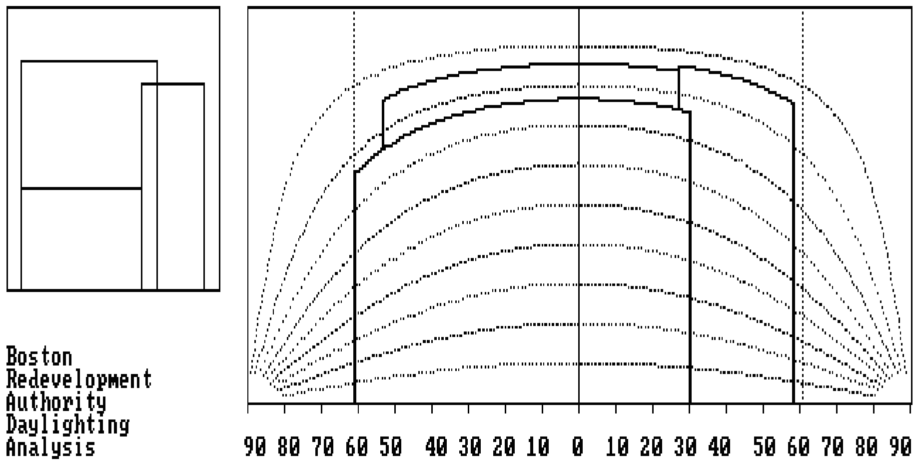
Area Context Viewpoint AC1: View from Columbus Avenue facing northwest toward 20 Park Plaza



Area Context Viewpoint AC2: View from Stuart Street facing south toward 230-240 Stuart Street

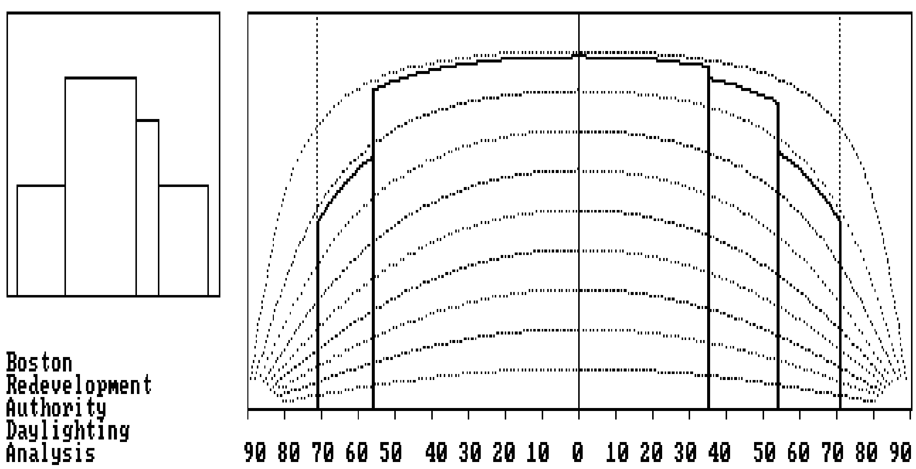


Area Context Viewpoint AC3: View from Stuart Street facing north toward One Charles Street



Obstruction of daylight by the building is 83.1 %

Area Context Viewpoint AC4: View from Arlington Street facing east toward 28 Arlington Street



Obstruction of daylight by the building is 85.8 %

Park Plaice – Viewpoint 5

Park Plaice runs along the eastern edge of the Project Site. Viewpoint 5 was taken from the center of Park Plaza facing west toward the Project Site. Because the existing garage occupies the entire site, and the addition is set back from the street, the daylight obstruction value at this viewpoint will not change.

Area Context Viewpoints

The Project area consists of mid- to high-rise residential and hotel buildings with ground floor commercial space, however, some of these buildings occupy large blocks with no setbacks from the street. To provide a larger context for comparison of daylight conditions, obstruction values were calculated for the three Area Context Viewpoints described above and shown on Figure 3.3-1. The daylight obstruction values ranged from 68.7% for AC2 to 85.8% for AC4. Daylight obstruction values for the Project are generally consistent with Area Context values.

3.3.4 Conclusions

The daylight analysis conducted for the Project describes existing and proposed daylight obstruction conditions at the Project Site and in the surrounding area. The results of the BRADA analysis indicate that the development of the Project will result in a slightly increased daylight obstruction over existing conditions, at three of the five viewpoints. At two of the viewpoints, the daylight obstruction value will remain the same as in existing conditions.

3.4 Solar Glare

The Project materials are still being studied and glazing of the windows will be determined as the design progresses. Due to the type of potential glass and glazing used, solar glare impacts are not currently anticipated.

3.5 Air Quality Analysis

3.5.1 Introduction

The BPDA requires that proposed projects evaluate the air quality in the local area, and assess any adverse air quality impacts attributable to a project.

The Project will not generate sufficient traffic to require a mesoscale vehicle emissions quantification analysis. However, the Project will create new trips through local intersections operating at LOS D or worse. Therefore, a microscale analysis of carbon monoxide has been completed to provide information on the Project's impact to air quality from mobile sources.

Any new stationary sources will be reviewed by the Massachusetts Department of Environmental Protection (MassDEP) during permitting under the Environmental Results Program, as required. It is expected that all stationary sources will be small, and any impacts from stationary sources would be minimal.

3.5.2 National Ambient Air Quality Standards and Background Concentrations

Background air quality concentrations and federal air quality standards were utilized to conduct the above air quality impact analyses. Federal National Ambient Air Quality Standards (NAAQS) were developed by the U.S. Environmental Protection Agency (EPA) to protect the human health against adverse health effects with a margin of safety. The modeling methodologies were developed in accordance with the latest MassDEP modeling policies and Federal modeling guidelines.[3] The following sections outline the NAAQS standards and detail the sources of background air quality data.

3.5.2.1 National Ambient Air Quality Standards

The 1970 Clean Air Act was enacted by the U.S. Congress to protect the health and welfare of the public from the adverse effects of air pollution. As required by the Clean Air Act, EPA promulgated NAAQS for the following criteria pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM) (PM-10 and PM-2.5), carbon monoxide (CO), ozone (O_3), and lead (Pb). The NAAQS are listed in Table 3.5-1. Massachusetts Ambient Air Quality Standards (MAAQS) are typically identical to NAAQS (differences are highlighted in **bold** in Table 3.5-1).

NAAQS specify concentration levels for various averaging times and include both "primary" and "secondary" standards. Primary standards are intended to protect human health, whereas secondary standards are intended to protect public welfare from any known or anticipated adverse effects associated with the presence of air pollutants, such as damage to vegetation. The more stringent of the primary or secondary standards were applied when comparing to the modeling results for this Project.

The NAAQS also reflect various durations of exposure. The non-probabilistic short-term periods (24 hours or less) refer to exposure levels not to be exceeded more than once a year. Long-term periods refer to limits that cannot be exceeded for exposure averaged over three months or longer.

[3] 40 CFR 51 Appendix W, Guideline on Air Quality Models, 70 FR 68228, Nov. 9, 2005

Table 3.5-1 National (NAAQS) and Massachusetts (MAAQS) Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)		MAAQS ($\mu g/m^3$)	
		Primary	Secondary	Primary	Secondary
NO_2	Annual (1)	100	Same	100	Same
	1-hour (2)	**188**	None	**None**	None
SO_2	Annual (1)(9)	80	None	80	None
	24-hour (3)(9)	365	None	365	None
	3-hour (3)	None	1300	None	1300
	1-hour (4)	**196**	None	**None**	None
PM-2.5	Annual (1)	**12**	**15**	**None**	**None**
	24-hour (5)	**35**	**Same**	**None**	**None**
PM-10	Annual (1)(6)	**None**	None	**50**	Same
	24-hour (3)(7)	150	Same	150	Same
CO	8-hour (3)	10,000	Same	10,000	Same
	1-hour (3)	40,000	Same	40,000	Same
Ozone	8-hour (8)	**147**	Same	**235**	Same
Pb	3-month (1)	1.5	Same	1.5	Same

(1) Not to be exceeded.
(2) 98th percentile of one-hour daily maximum concentrations, averaged over three years.
(3) Not to be exceeded more than once per year.
(4) 99th percentile of one-hour daily maximum concentrations, averaged over three years.
(5) 98th percentile, averaged over three years.
(6) EPA revoked the annual PM-10 NAAQS in 2006.
(7) Not to be exceeded more than once per year on average over three years.
(8) Annual fourth-highest daily maximum eight-hour concentration, averaged over three years.
(9) EPA revoked the annual and 24-hour SO_2 NAAQS in 2010. However, they remain in effect until one year after the area's initial attainment designation, unless designated as "nonattainment".

Source: http://www.epa.gov/ttn/naaqs/criteria.html and 310 CMR 6.04

3.5.2.2 Background Concentrations

To estimate background pollutant levels representative of the area, the most recent air quality monitor data reported by the MassDEP to EPA was obtained for 2014 to 2016. Data for the pollutant and averaging time combinations were obtained from the EPA's AirData website.

The Clean Air Act allows for one exceedance per year of the CO and SO_2 short-term NAAQS per year. The highest second-high accounts for the one exceedance. Annual NAAQS are never to be exceeded. The 24-hour PM-10 standard is not to be exceeded more than once per year on average over three years. To attain the 24-hour PM-2.5 standard, the three-year average of the 98th percentile of 24-hour concentrations must not exceed 35 $\mu g/m^3$. For annual PM-2.5 averages, the average of the highest yearly observations was used as the background concentration. To attain the one-hour NO_2 standard, the three-year average of the 98^{th} percentile of the maximum daily one-hour concentrations must not exceed 188 $\mu g/m^3$.

Background concentrations were determined from the closest available monitoring stations to the Project. All pollutants are not monitored at every station, so data from multiple locations are necessary. The closest monitor is at 174 North Street in Boston, roughly 1.1 miles north-northeast of the Project. This site samples for PM-2.5 only. The next closest site is at Kenmore Square, roughly 1.5 miles west-southwest of the Project location. However this site only samples for PM-10, NO_2 and SO_2. Finally, the remaining pollutants are measured at Harrison Avenue in Boston, roughly 1.7 miles south-southwest of the Project Site. A summary of the background air quality concentrations are presented in Table 3.5-2.

Table 3.5-2 Observed Ambient Air Quality Concentrations and Selected Background Levels

Pollutant	Averaging Time	2014	2015	2016	Background Concentration ($\mu g/m^3$)	NAAQS	Percent of NAAQS
SO_2 (1)(6)(7)	1-Hour (5)	25.4	14.4	10.7	16.9	196.0	9%
	3-Hour (6)	24.6	11.5	10.0	24.6	1300.0	2%
	24-Hour	13.1	7.6	5.2	13.1	365.0	4%
	Annual	2.5	1.3	1.1	2.5	80.0	3%
PM-10	24-Hour	53.0	30.0	30.0	53.0	150.0	35%
	Annual	14.9	14.2	14.1	14.9	50.0	30%
PM-2.5	24-Hour (5)	14.4	16.7	14.7	15.2	35.0	44%
	Annual (5)	6.9	7.3	7.7	7.3	12.0	61%
NO_2 (3)(7)	1-Hour (5)	92.1	105.3	88.4	95.3	188.0	51%
	Annual	32.3	32.5	28.3	32.5	100.0	33%
CO (2)(7)	1-Hour	1489.8	1604.4	2489.1	2489.1	40000.0	6%
	8-Hour	1031.4	1031.4	2062.8	2062.8	10000.0	21%
Ozone (4)	8-Hour	106.0	109.9	113.9	113.9	147.0	77%
Lead	Rolling 3-Month	0.014	0.016	0.017	0.017	0.15	12%

Notes:
From 2014-2016 EPA's AirData Website
(1) SO_2 reported ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 2.62 $\mu g/m^3$.
(2) CO reported in ppm. Converted to $\mu g/m^3$ using factor of 1 ppm = 1146 $\mu g/m^3$.
(3) NO_2 reported in ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 1.88 $\mu g/m^3$.
(4) O_3 reported in ppm. Converted to $\mu g/m^3$ using factor of 1 ppm = 1963 $\mu g/m^3$.
(5) Background level is the average concentration of the three years.
(6) The 24-hour and Annual standards were revoked by EPA on June 22, 2010, Federal Register 75-119, p. 35520.
(7) CO monitor at Kenmore Square was deactivated in January 2015. Harrison Avenue monitor used for 2015 and 2016.

Air quality in the vicinity of the Project Site is generally good, with all local background concentrations found to be well below the NAAQS.

3.5.2 Mobile Sources

Mobile sources of air pollution include emissions from gasoline, diesel, and natural gas fueled vehicle traffic. Emissions from mobile sources have continually decreased as engine technology and efficiency have been improved.

3.5.2.1 Methodology

The BPDA typically requests an analysis of the effect on air quality of the increase in traffic generated by projects subject to Large Project Review. This “microscale” analysis is typically required for any intersection where 1) Project traffic would impact intersections or roadway links currently operating at LOS D, E, or F or would cause LOS to decline to D, E, or F; 2) Project traffic would increase traffic volumes on nearby roadways by 10% or more (unless the increase in traffic volume is less than 100 vehicles per hour); or, 3) the Project will generate 3,000 or more new average daily trips on roadways providing access to a single location. The microscale analysis involves modeling of CO emissions from vehicles idling at and traveling through signaled intersections. Predicted ambient concentrations of CO for the Build and No-Build cases are compared with federal (and state) ambient air quality standards for CO.

The microscale analysis typically examines ground-level CO impacts due to traffic queues in the immediate vicinity of a project. CO is used in microscale studies to indicate roadway pollutant levels since it is the most abundant pollutant emitted by motor vehicles and can result in so-called "hot spot" (high concentration) locations around congested intersections. The NAAQS standards do not allow ambient CO concentrations to exceed 35 parts per million (ppm) for a one-hour averaging period, and 9 ppm for an eight-hour averaging period, more than once per year at any location. The widespread use of CO catalysts on current vehicles has reduced the occurrences of CO hotspots. Air quality modeling techniques (computer simulation programs) are typically used to predict CO levels for both existing and future conditions to evaluate compliance of the roadways with the standards. The microscale analysis has been conducted using the latest versions of EPA’s MOVES and CAL3QHC programs to estimate CO concentrations at sidewalk receptor locations. Baseline (2018) and future year (2025) emission factor data calculated from the MOVES model, along with traffic data, were input into the CAL3QHC program to determine CO concentrations due to traffic flowing through the selected intersections. The modeling methodology was developed in accordance with the latest MassDEP modeling policies and Federal modeling guidelines.[4]

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[4] 40 CFR 51 Appendix W, Guideline on Air Quality Models, 70 FR 68228, Nov. 9, 2005

Existing background values of CO at the nearest monitor location at Harrison Avenue were obtained from MassDEP. CAL3QHC results were then added to background CO values of 2.2 ppm (one-hour) and 1.8 ppm (eight-hour), as provided by MassDEP, to determine total air quality impacts due to the Project. These values were compared to the NAAQS for CO of 35 ppm (one-hour) and 9 ppm (eight-hour).

Modeling assumptions and backup data for results presented in this section are provided in Appendix F.

Intersection Selection

One signalized intersection included in the traffic study meets the above conditions described at the beginning of this section (see Chapter 2). The traffic volumes and LOS calculations provided in Chapter 2 form the basis of evaluating the traffic data versus the microscale thresholds. The sole intersection found to meet the criteria was the intersection of Columbus Avenue, Stuart Street, and Arlington Street.

Microscale modeling was performed for the intersection based on the aforementioned methodology. The 2018 Existing Condition and the 2025 No-Build and Build conditions were each evaluated for both morning (a.m.) and afternoon (p.m.) peak.

Emissions Calculations (MOVES)

The EPA MOVES computer program was used to estimate motor vehicle emission factors on the roadway network. Emission factors calculated by the MOVES model are based on motor vehicle operations typical of daily periods. The Commonwealth's statewide annual Inspection and Maintenance (I&M) program was included, as well as the county specific vehicle age registration distribution, fleet mix, meteorology, and other inputs. The inputs for MOVES for the existing (2018) and future year (2025) are provided by MassDEP.

All link types for the modeled intersections were input into MOVES. Idle emission factors are obtained from factors for a link average speed of 0 miles per hour (mph). Moving emissions are calculated based on speeds at which free-flowing vehicles travel through the intersection as stated in traffic modeling (Synchro) reports. A speed of 25 mph is used for all free-flow traffic, consistent with the City of Boston speed limit. Speeds of 10 and 15 mph were used for right (and U-turns, if necessary) and left turns, respectively. Roadway emissions factors were obtained from MOVES using EPA guidance.[5]

Winter CO emission factors are typically higher than summer. Therefore, January weekday emission factors were used to produce a conservative microscale analysis.

[5] U.S. EPA, 2010. Using MOVES in Project-Level Carbon Monoxide Analyses. EPA-420-B-10-041

Receptors & Meteorology Inputs

A set of 218 receptors were placed in the vicinity of the modeled intersection. Receptors extended approximately 300 feet on the sidewalks along the roadways approaching the intersections. The roadway links and receptor locations of the modeled intersections are presented in Figure 3.5-1.

For the CAL3QHC model, limited meteorological inputs are required. Following EPA guidance[6], a wind speed of one meter per second, stability class D (4), and a mixing height of 1,000 meters were used. To account for the intersection geometry, wind directions from 0° to 350°, every 10° were selected. A surface roughness length of 321 centimeters was selected.[7]

Impact Calculations (CAL3QHC)

The CAL3QHC model predicts one-hour concentrations using queue-links at signalized intersections, worst-case meteorological conditions, and traffic input data. The one-hour concentrations were scaled by a factor of 0.9 to estimate eight-hour concentrations.[8] The CAL3QHC methodology was based on EPA CO modeling guidance. Signal timings were provided directly from the traffic modeling outputs.

For use in the microscale analysis, background concentrations of CO in ppm were required. The corresponding maximum background concentrations in ppm were 2.2 ppm (2,489 $\mu g/m^3$) for one-hour and 1.8 ppm (2,062 $\mu g/m^3$) for eight-hour CO.

3.5.3.3 Air Quality Results

The results of the maximum one-hour predicted CO concentrations from CAL3QHC are provided in Tables 3.5-3 through 3.5-6 for the 2018 and 2025 scenarios. Eight-hour average concentrations are calculated by multiplying the maximum one-hour concentrations by a factor of 0.9.[9]

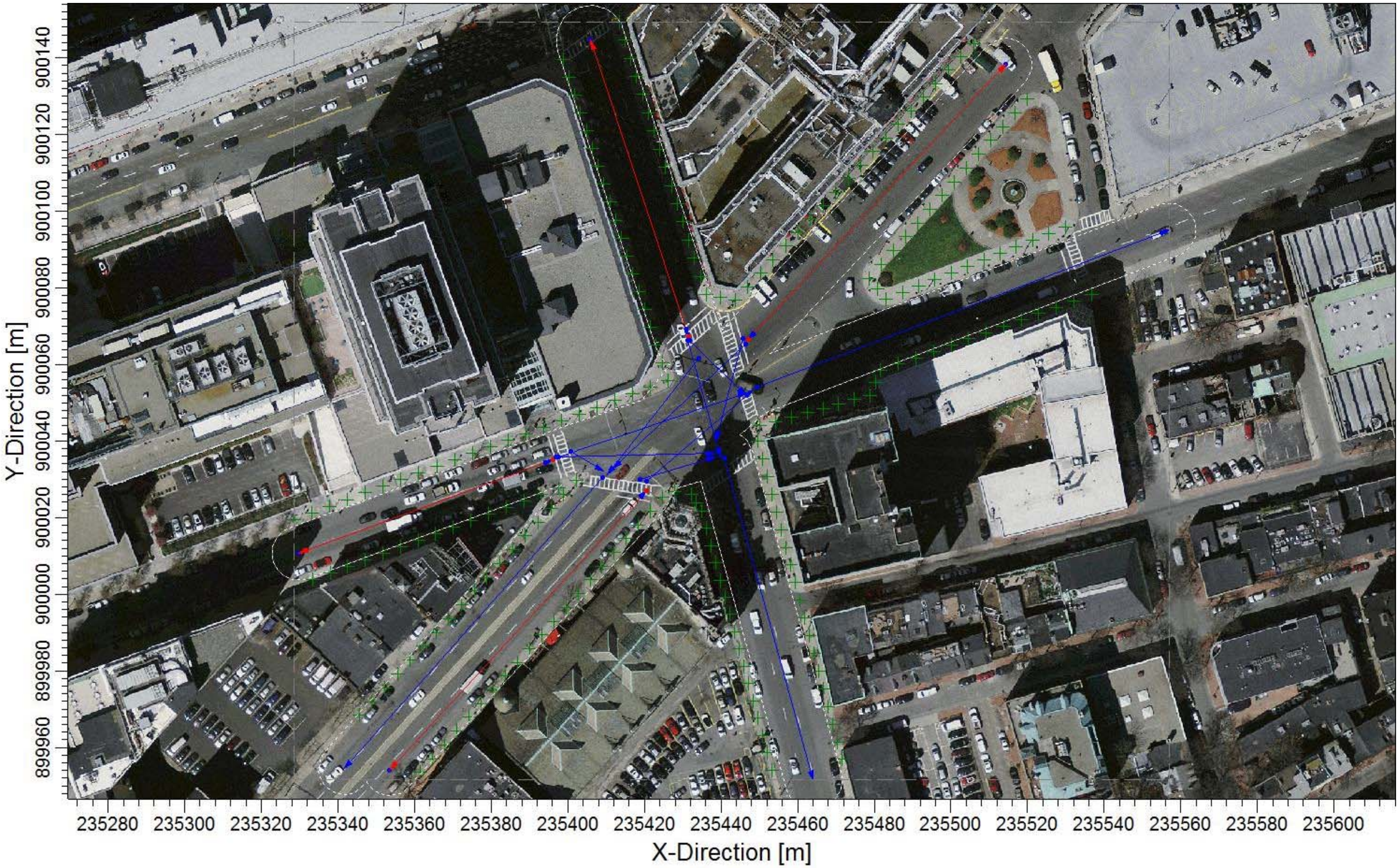
The results of the one-hour and eight-hour maximum modeled CO ground-level concentrations from CAL3QHC were added to EPA supplied background levels for comparison to the NAAQS. These values represent the highest potential concentrations at the intersection as they are predicted during the simultaneous occurrence of "defined"

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

[7] U.S. EPA, *User's Guide for CAL3QHC Version 2: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections*. EPA –454/R-92-006 (Revised), September 1995.

[8] U.S. EPA, AERSCREEN User's Guide; EPA-454/B-11-001, March 2011.

[9] U.S. EPA, AERSCREEN User's Guide; EPA-454/B-11-001, March 2011.



Motor Mart Garage **Boston, Massachusetts**

Figure 3.5-1

Intersection of Arlington Street, Stuart Street, and Columbus Avenue worst case meteorology. The highest one-hour traffic-related concentration predicted in the area of the Project for the modeled Build Case conditions (0.2 ppm) plus background (2.2 ppm) is 2.4 ppm. The highest eight-hour traffic-related concentration predicted in the area of the Project for the modeled conditions (0.2 ppm) plus background (1.8 ppm) is 2.0 ppm. All concentrations are well below the one-hour NAAQS of 35 ppm and the eight-hour NAAQS of 9 ppm.

Table 3.5-3 Summary of Microscale Modeling Analysis (Existing 2018)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Arlington Street, Columbus Avenue, and Stuart Street	AM	0.4	2.2	2.6	35
	PM	0.4	2.2	2.6	35
8-Hour					
Arlington Street, Columbus Avenue, and Stuart Street	AM	0.4	1.8	2.2	9
	PM	0.4	1.8	2.2	9

Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.9.

Table 3.5-4 Summary of Microscale Modeling Analysis (No-Build 2025)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Arlington Street, Columbus Avenue, and Stuart Street	AM	0.2	2.2	2.4	35
	PM	0.2	2.2	2.4	35
8-Hour					
Arlington Street, Columbus Avenue, and Stuart Street	AM	0.2	1.8	2.0	9
	PM	0.2	1.8	2.0	9

Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.9.

Table 3.5-5 Summary of Microscale Modeling Analysis (Build 2025)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Arlington Street, Columbus Avenue, and Stuart Street	AM	0.2	2.2	2.4	35
	PM	0.2	2.2	2.4	35
8-Hour					
Arlington Street, Columbus Avenue, and Stuart Street	AM	0.2	1.8	2.0	9
	PM	0.2	1.8	2.0	9

Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.9.

3.5.3.4 Conclusions

Results of the microscale analysis show that all predicted CO concentrations are well below one-hour and eight-hour NAAQS. Therefore, it can be concluded that there are no anticipated adverse air quality impacts resulting from increased traffic in the area.

3.6 Stormwater/Water Quality

Please see Section 7.4.

3.7 Flood Hazard Zones/ Wetlands

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the site located in the City of Boston - Community Panel Number 25025C0077J, effective March 16, 2016, indicates the FEMA Flood Zone Designations for the site area. The map shows that the Project is located in a Zone -X, "Areas of minimal flood hazard."

The site does not contain wetlands.

3.8 Geotechnical Impacts

3.8.1 Existing Site Conditions

The Project Site is occupied by the existing Motor Mart Garage building, which has nine floors of parking (including the roof), one basement level, and one partial subbasement for mechanical equipment. The property is generally bounded by: Stuart Street to the south, Church Street to the west, Columbus Avenue to the northwest, Eliot Street to the northeast, and Park Plaice to the east. Surrounding site grades vary from about El. 16 to El. 20 feet Boston City Base Datum (BCB).

3.8.2 Subsurface Soil and Bedrock Conditions

Site and subsurface conditions at the Project Site are based on available test boring data and geologic information for the area. The site is part of the Back Bay area of Boston and is located on the edge of the historic shoreline of the original Boston Peninsula. A comprehensive subsurface investigation including test borings and exploratory test pits will be performed at the site during project design and prior to construction.

Generalized subsurface conditions are summarized in Table 3.8-1 in order of increasing depth below ground surface.

Table 3.8-1 Subsurface Soil and Bedrock Conditions

Stratum/Subsurface Unit	Estimated Depth (ft) to Top of Stratum	Estimated Thickness (ft)
Miscellaneous Fill	0	5 to 20
Marine Deposits (Sand/Clay)	5 to 20	10 to 50
Glacial Deposits	10 to 75	40 to 100
Bedrock	130 to 160	-

3.8.3 Groundwater

Groundwater is anticipated at depths of approximately 10 to 15 feet below ground surface, corresponding to roughly El. 5 to 10 feet BCB. Variations in groundwater levels are possible as groundwater levels are influenced by precipitation, local construction activities, and leakage into and out of utilities and other below-grade structures.

The Project Site is located within the Groundwater Conservation Overlay District (GCOD) and accordingly, the Project will comply with requirements of Article 32 of the City of Boston Zoning Code. The Project will promote infiltration of stormwater into the ground by capturing within a suitably-designed system, a volume of rainfall equivalent to no less than 1-inch across the impervious portion of the site. The Project is not expected to have any negative impact on groundwater levels in the surrounding area.

Temporary dewatering in isolated excavations for foundation and substructure is anticipated. Given the relatively limited nature of dewatering, the Project is expected to have negligible long-term impacts on groundwater levels. Groundwater level monitoring will be undertaken during construction to document impact to area groundwater levels. The well will be installed prior to construction and monitored throughout foundation construction.

3.8.4 Project Impacts and Foundation Considerations

New foundations required for the Project are anticipated to be drilled-in, high capacity, deep foundations bearing in the dense glacial soils or bedrock underlying the site. No pile driving is planned. The drilled-in foundations result in negligible impacts to adjacent structures. Specific design and construction performance criteria will be established to be protective of adjacent structures.

3.8.5 Monitoring Program

Due to the Project location and proximity to surrounding buildings, a monitoring program will be developed and implemented prior to the start of construction. Prior to implementation of the monitoring program, performance criteria will be established to protect adjacent structures and included in the contract documents. Construction activities will be required to comply with the established criteria based on the data collected from the monitoring. The monitoring program is anticipated to include the following items, at a minimum, consistent with local practice and the proposed construction: 1) Preconstruction Condition Surveys of interior and exterior portions of adjacent structures; 2) Vibration Monitoring; 3) Groundwater Level monitoring; and 4) Movement Monitoring of the existing and adjacent buildings.

3.9 Solid and Hazardous Waste

3.9.1 Hazardous Waste

A Phase I Environmental Site Assessment was completed in 2016 by The Vertex Companies (Vertex). The report identified the presence of storage tanks on the roof and on and below the basement slab of the Existing Building. Historically, two RTNs have been assigned to the site, dating back to 1994, related to an underground storage tank associated with car rental operations onsite. Both RTNs were closed out with respect to the MCP with the filing of a Class A-2 RAO dated 1 November 2002, prepared by O&M, Inc.

Any excess soils generated as a result of the planned construction will be managed in accordance with applicable regulations, including the Massachusetts Contingency Plan (MCP). A soil management plan will be developed and included in the Contract Documents defining requirements for execution of the work.

3.9.2 Operation Solid and Hazardous Waste Generation

The Project will generate solid waste typical of residential and commercial uses. Solid waste is expected to include wastepaper, cardboard, glass bottles and food. Recyclable materials will be recycled through a program implemented by building management. The Project will generate approximately 525 tons of solid waste per year.

With the exception of household hazardous wastes typical of commercial and residential developments (e.g., cleaning fluids and paint), the Project will not involve the generation, use, transportation, storage, release, or disposal of potentially hazardous materials.

3.9.3 Recycling

A dedicated recyclables storage and collection program will facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills. The recycling program will be fully developed in accordance with LEED standards as described in Chapter 4.

3.10 Noise Impacts

3.10.1 Introduction

A sound level assessment was conducted that included a baseline sound monitoring program to measure existing sound levels in the vicinity of the Project Site, computer modeling to predict operational sound levels from proposed mechanical equipment, and a comparison of future Project sound levels to applicable City of Boston Zoning District Noise Standards.

This analysis, which is consistent with BPDA requirements for noise studies, indicates that with appropriate noise controls, predicted sound levels from the Project will comply with local noise regulations.

3.10.2 Noise Terminology

There are several ways in which sound (noise) levels are measured and quantified. All of them use the logarithmic decibel (dB) scale. The following information defines the sound level measurement terminology used in this analysis.

The decibel scale is logarithmic to accommodate the wide range of sound intensities found in the environment. A property of the decibel scale is that the sound pressure levels of two or more separate sounds are not directly additive. For example, if a sound of 50 dB is added to another sound of 50 dB, the total is only a three-dB increase (53 dB), which is equal to doubling in sound energy but not equal to a doubling in quantity (100 dB). Thus, every three-dB change in sound level represents a doubling or halving of sound energy. Relative to this characteristic, a change in sound levels of less than three dB is imperceptible to the human ear.

Another property of decibels is that if one source of noise is 10 dB (or more) louder than another source, then the total sound level is simply the sound level of the higher-level source. For example, a sound source at 60 dB plus another sound source at 47 dB is equal to 60 dB.

A sound level meter (SLM) that is used to measure noise is a standardized instrument.[10] It contains "weighting networks" to adjust the frequency response of the instrument to approximate that of the human ear under various circumstances. The most commonly used weighting network is the A-weighting (there are also C-, and Z-weighting networks) because it most closely approximates how the human ear responds to sound at various frequencies, described in Hertz (Hz). The A-weighting network is the accepted scale used for community sound level measurements, and sounds are frequently reported as detected with a sound level meter with this weighting. A-weighted sound levels emphasize middle frequency sounds (i.e., middle pitched – around 1,000 Hz), and de-emphasize low and high frequency sounds. A-weighted sound levels are reported in decibels designated as "dBA".

Because the sounds in the environment vary with time, many different sound metrics may be used to quantify them. There are two typical methods used for describing variable sounds. These are exceedance levels and equivalent levels, both of which are derived from a large number of moment-to-moment A-weighted sound pressure level measurements. Exceedance levels are values from the cumulative amplitude distribution of all of the sound levels observed during a measurement period. Exceedance levels are designated L_n, where "n" can have a value between 0 and 100 in terms of percentage. Equivalent levels are designated L_{eq} and quantify a hypothetical steady sound that would have the same energy as the actual fluctuating sound observed. The several sound level metrics that are commonly reported in community noise monitoring and are presented in this report are described below.

- L_{90} is the sound level in dBA exceeded 90 percent of the time during a measurement period. The L_{90} is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when there are no obvious nearby intermittent noise sources.

- L_{50} is the median sound level, the sound level in dBA exceeded 50 percent of the time during the measurement period.

- L_{10} is the sound level in dBA exceeded only 10 percent of the time. It is close to the maximum level observed during the measurement period. The L_{10} is sometimes called the intrusive sound level because it is caused by occasional louder noises like those from passing motor vehicles.

- L_{max} is the maximum instantaneous sound level observed over a given period.

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10 *American National Standard Specification for Sound Level Meters*, ANSI S1.4-1983, published by the Standards Secretariat of the Acoustical Society of America, Melville, NY.

- L_{eq} is a sound pressure level commonly A-weighted and presented in dBA. The equivalent level represents the time average of the fluctuating sound pressure, but because sound is represented on a logarithmic scale and the averaging is done with time-averaged mean square sound pressure values, the L_{eq} is primarily controlled by loud noises if there are fluctuating sound levels.

- In the design of noise controls, which do not function quite like the human ear, it is important to understand the frequency spectrum of the noise source of interest. The spectra of noises are usually stated in terms of octave-band sound pressure levels, in dB, with the frequency bands being those established by standard (American National Standards Institute [ANSI] S1.11, 1986). To facilitate the noise control design process, the estimates of noise levels in this analysis are also presented in terms of octave-band sound pressure levels. Octave-band measurements and modeling are used in assessing compliance with the City of Boston noise regulations.

3.10.3 Noise Regulations and Criteria

The City of Boston has both a noise ordinance and noise regulations. Chapter 16 §26 of the Boston Municipal Code sets the general standard for noise that is unreasonable or excessive: louder than 50 decibels between the hours of 11:00 p.m. and 7:00 a.m., or louder than 70 decibels at all other hours. The Boston Air Pollution Control Commission (BAPCC) has adopted regulations based on the city's ordinance - "Regulations for the Control of Noise in the City of Boston", which distinguish among residential, business, and industrial districts in the City. In particular, BAPCC Regulation 2 is applicable to the sounds from the Project and is considered in this noise study.

Table 3.10-1 below presents the "Zoning District Noise Standards" contained in Regulation 2.5 of the BAPCC "Regulations for the Control of Noise in the City of Boston," adopted December 17, 1976. These maximum allowable sound pressure levels apply at the property line of the receiving property. The "Residential Zoning District" limits apply to any lot located within a residential zoning district or to any residential use located in another zone except an Industrial Zoning District, according to Regulation 2.2. Similarly, per Regulation 2.3, business limits apply to any lot located within a business zoning district not in residential or institutional use.

Table 3.10-1 City Noise Standards, Maximum Allowable Sound Pressure Levels

Octave-band Center	Residential Zoning District		Residential Industrial Zoning District		Business Zoning District	Industrial Zoning District
Frequency (Hz)	Daytime (dB)	All Other Times (dB)	Daytime (dB)	All Other Times (dB)	Anytime (dB)	Anytime (dB)
32	76	68	79	72	79	83
63	75	67	78	71	78	82
125	69	61	73	65	73	77
250	62	52	68	57	68	73
500	56	46	62	51	62	67
1000	50	40	56	45	56	61
2000	45	33	51	39	51	57
4000	40	28	47	34	47	53
8000	38	26	44	32	44	50
A-Weighted (dBA)	**60**	**50**	**65**	**55**	**65**	**70**

Notes:

1. Noise standards from Regulation 2.5 "Zoning District Noise Standards", City of Boston Air Pollution Control Commission, "Regulations for the Control of Noise in the City of Boston", adopted December 17, 1976.
2. All standards apply at the property line of the receiving property.
3. dB and dBA based on a reference pressure of 20 micropascals.
4. Daytime refers to the period between 7:00 a.m. and 6:00 p.m. daily, except Sunday.

3.10.4 Existing Conditions

A background noise level survey was conducted to characterize the existing "baseline" acoustical environment in the vicinity of the Project Site. Existing noise sources around the site include: vehicular and truck traffic along local streets, pedestrian traffic, mechanical noise from surrounding buildings, overhead planes, construction activity and equipment operation, wind, rustling vegetation, birds, insects, a water fountain in a nearby park, and the general city soundscape.

3.10.5 Noise Monitoring Methodology

Since noise impacts from the Project on the community will be highest when background noise levels are the lowest, the study was designed to measure community noise levels under conditions typical of a "quiet period" for the area. Therefore, daytime measurements were scheduled to avoid peak traffic conditions. Sound level measurements were made on Friday, July 27, 2018 during the daytime (1:00 p.m. to 3:00 p.m.) and on Tuesday, July 31, 2018 during nighttime hours (1:00 a.m. to 3:00 a.m.). All measurements were 20 minutes in duration.

Sound levels were measured at publicly accessible locations at a height of five feet (1.5 meters) above ground level, under low wind conditions, and with dry roadway surfaces. Wind speed measurements were made with a Davis Instruments TurboMeter electronic wind speed indicator, and temperature and humidity measurements were made using a General Tools digital psychrometer. Unofficial observations about meteorology or land use in the community were made solely to characterize the existing sound levels in the area and to estimate the noise sensitivity at properties near the Project Site.

3.10.6 Noise Monitoring Locations

The selection of the noise monitoring locations was based upon a review of zoning and land use in the Project area. Four noise monitoring locations were selected as representative sites to obtain a sampling of the ambient baseline noise environment. These measurement locations are depicted on Figure 3.10-1 and described below.

- **Location 1** is located on the southern sidewalk of 230 Stuart Street., in front of the South Cove Plaza, southwest of the Project Site. This location is representative of the residential receptors southwest of the Project Site.

- **Location 2** is located on the northern sidewalk of Columbus Avenue, outside of 20 Park Plaza, and near the intersection of Columbus Avenue and Eliot Street. This location represents the closest residential receptors northwest of the Project Site.

- **Location 3** is located along the northern sidewalk of Park Plaza, outside of 222 Boylston Avenue. This is located due north of the Project Site. This location represents the closest residential receptors north of the Project Site.

- **Location 4** is located on the eastern sidewalk of Park Plaice, outside of 1 Charles Street South. This is located due east of the Project Site. This location represents the nearby residential receptors east of the Project Site.

3.10.7 Noise Monitoring Equipment

A Larson Davis Model 831 sound level meter equipped with a PCB PRM831 preamplifier, a PCB 377B20 half-inch microphone, and manufacturer-provided windscreen was used to collect background sound pressure level data. This instrumentation meets the "Type 1 - Precision" requirements set forth in ANSI S1.4 for acoustical measuring devices. The measurement equipment was calibrated in the field before and after the surveys with a Larson Davis CAL200 acoustical calibrator which meets the standards of IEC 942 Class 1L and ANSI S1.40-1984. Statistical descriptors (e.g., L_{eq}, L_{90}, etc.) were measured for each 20-minute sampling period, with octave-band sound levels corresponding to the same data set processed for the broadband levels.

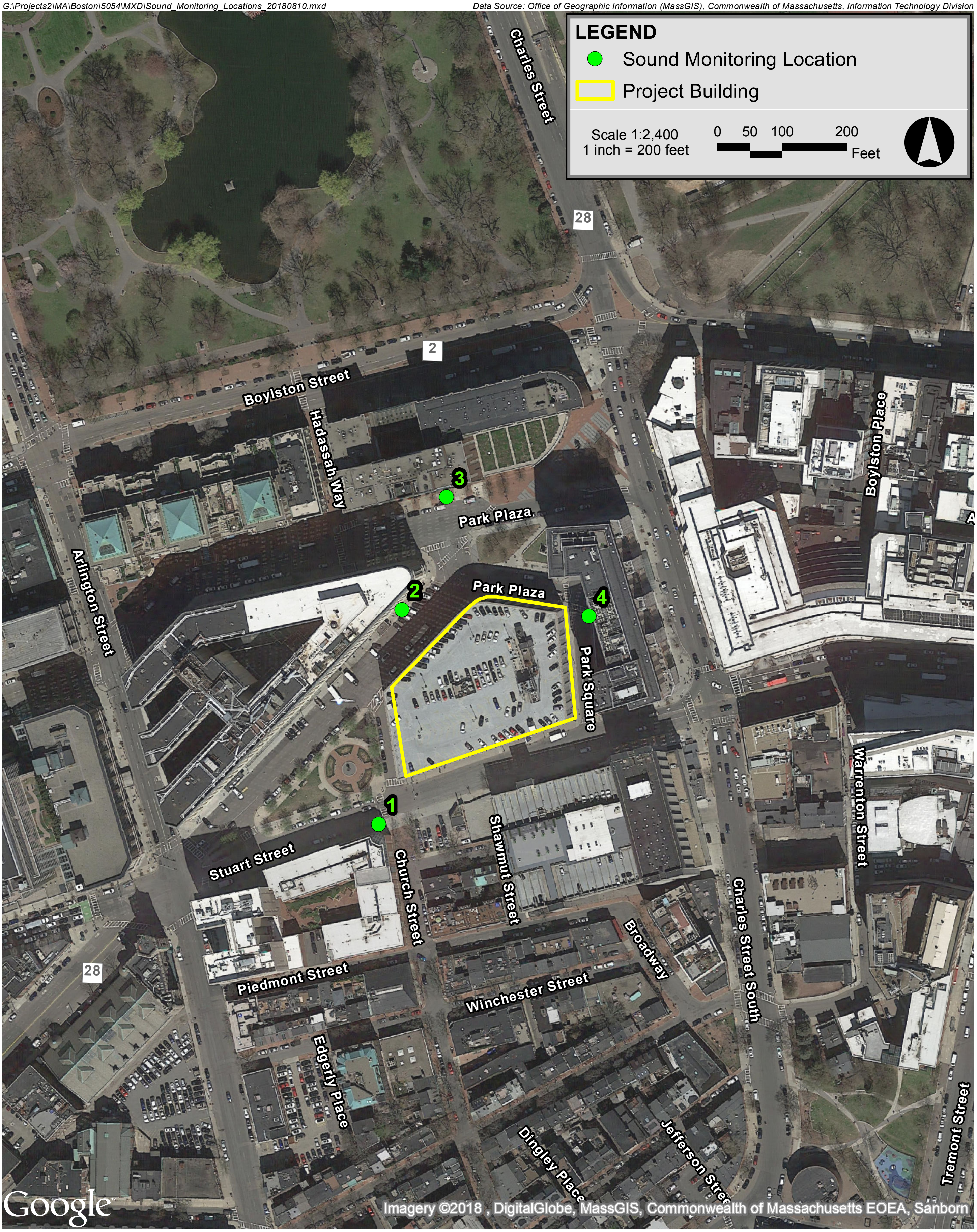

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Figure 3.10-1

Sound Monitoring Locations

3.10.8 Measured Background Sound Levels

Baseline noise monitoring results are presented in Table 3.10-2 and summarized below:

- The daytime residual background (L_{90}) measurements ranged from 61 to 65 dBA;
- The nighttime residual background (L_{90}) measurements ranged from 56 to 60 dBA;
- The daytime equivalent level (L_{eq}) measurements ranged from 65 to 67 dBA;
- The nighttime equivalent level (L_{eq}) measurements ranged from 60 to 64 dBA.

Table 3.10-2 Summary of Measured Background Noise Levels – July 27, 2018 (Daytime) & July 31, 2018 (Nighttime)

Location	Period	Start Time	LA_{eq}	LA_{max}	LA_{10}	LA_{50}	LA_{90}	L_{90} Sound Pressure Level by Octave-Band Center Frequency (Hz)									
								31.5	63	125	250	500	1000	2000	4000	8000	16000
			dBA	dBA	dBA	dBA	dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB
1	Day	1:22 PM	67	76	70	66	61	69	67	65	63	59	57	52	48	41	32
2	Day	1:43 PM	67	86	67	64	63	68	67	67	63	61	57	53	48	39	28
3	Day	2:04 PM	65	78	68	63	61	70	67	65	62	59	56	51	46	38	28
4	Day	2:25 PM	67	83	69	66	65	70	68	67	65	63	59	55	48	41	29
1	Night	1:01 AM	64	83	65	58	57	63	62	60	59	55	51	47	40	33	26
2	Night	1:22 AM	62	73	63	61	60	63	63	62	60	58	54	50	45	37	27
3	Night	1:43 AM	60	74	61	57	57	65	62	60	58	55	51	46	40	32	26
4	Night	2:04 AM	63	85	61	57	56	63	60	60	58	54	51	46	40	33	26

Note: Sound pressure levels are rounded to the nearest whole decibel.

Weather Conditions:

	Date	Temp	RH	Sky	Wind
Daytime	Friday, July 27, 2018	89 °F	59%	Partly Cloudy	S @ 0-4 mph
Nighttime	Tuesday, July 31, 2018	73 °F	73%	Few Clouds	Calm

Monitoring Equipment Used:

	Manufacturer	Model	S/N
Sound Level Meter	Larson Davis	LD831	3044
Microphone	Larson Davis	377C20	170889
Preamp	Larson Davis	PRM831	23824
Calibrator	Larson Davis	CAL200	7147

3.10.9 Future Conditions – Overview of Potential Project Noise Sources

The primary sources of continuous sound exterior to the Project are expected to consist of ventilation, heating, cooling, and emergency power noise sources. Multiple noise sources are anticipated to be located on the varying rooftops, exhaust fans are anticipated to be located on the first floor façades to the north and south, and an intake louver is anticipated to be located on the eastern façade at level 8.

Table 3.10-3 provides an anticipated list of the major sources of sound. Sound power levels used in the acoustical modeling of each piece of equipment are presented in Table 3.10-4. Sound power level data were provided by the respective manufacturer of each piece of equipment, or by calculations based on equipment size and capacity.

The Project includes select noise-control measures in order to achieve compliance with the applicable noise regulations. As the design progresses, specifications for mechanical equipment may change; however, appropriate measures will be taken to ensure compliance with the City Noise Standards. It is anticipated that the emergency generator sound levels will be controlled using a Level 1 canopy, an exhaust silencer, and an acoustical louver. To further limit impacts from the standby generator, required periodic, routine testing will be conducted during daytime hours, when background sound levels are highest. A summary of the noise mitigation proposed for the Project is presented in Table 3.10-5.

Table 3.10-3 Modeled Noise Sources

Noise Source	Quantity	Approximate Location & Elevation	Size/Capacity
Cooling Tower (Air cooled)	4	2-Roof (300' AFG) & 2-Roof (115' AFG)	389,200 CFM
Emergency Generator (Intake)	1	East façade of Level 8	600 kW
Emergency Generator (Exhaust)	1	Northeastern Roof (91' AFG)	600 kW
Energy Recovery Unit	1	South Roof (300' AFG)	20,000 CFM
Loading Dock Exhaust Fan	1	North façade of Level 1	5,000 CFM
Parking Garage Exhaust Fans	4	North & South façade of Level 1	15,000 CFM
Stair Pressurization Fans	3	2-Roof (300' AFG) & 1-Roof (115' AFG)	15,000 CFM

Table 3.10-4 Modeled Sound Power Levels per Noise Source

Noise Source	Broad-band (dBA)	Sound Level (dB) per Octave-Band Center Frequency (Hz)								
		31.5	63	125	250	500	1k	2k	4k	8k
Cooling Tower (Air cooled)	88	96[1]	96	89	85	83	83	81	75	71
Emergency Generator (Intake)[2]	96	107[1]	107	98	97	94	89	87	83	83
Emergency Generator (Exhaust)	130	128[1]	128	136	129	123	124	122	122	112
Energy Recovery Unit	97	95[1]	95	94	95	94	93	88	84	79
Loading Dock Exhaust Fan	83	84[1]	84	80	82	81	77	73	69	65
Parking Garage Exhaust Fans	90	84[1]	84	88	91	89	85	80	75	71
Stair Pressurization Fans	92	85[1]	85	88	92	90	87	82	77	72

Notes: Sound power levels do not include mitigation identified in Table 3.10-5.

1. No data provided by manufacturer. Octave-band sound level assumed to be equal to the 63 Hz band level.
2. Calculated interior sound level, assumes genset is in standard Level 1 Canopy enclosure

Table 3.10-5 Attenuation Values Applied to Mitigate Each Noise Source

Noise Source	Form of Mitigation	Sound Level (dB) per Octave-Band Center Frequency (Hz)								
		31.5	63	125	250	500	1k	2k	4k	8k
Generator Intake, Loading Dock Fan, Parking Garage Fans	Louver[1]	11[3]	11	13	17	22	26	24	21	22
Generator Exhausts	Silencer[2]	30	33	43	42	40	38	35	39	41

Notes:

1. Kinetics Noise Control KCAC-1 12 inch acoustical louver transmission loss.
2. GT Exhaust model A201-6100 Super Critical Grade Silencer
3. No data provided by manufacturer. Octave-band reduction level assumed to be equal to the 63 Hz band level.

3.10.10 Noise Modeling Methodology

The noise impacts associated with the Project were predicted at the nearest and most representative receptors using the CadnaA noise calculation software developed by DataKustik GmbH. This software uses the ISO 9613-2 international standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation). The benefits of this software are a refined set of computations due to the inclusion of topography, ground attenuation, multiple building reflections, drop-off with distance, and atmospheric absorption. The CadnaA software allows for octave-band calculation of noise from multiple noise sources, as well as computation of diffraction around building edges.

3.10.11 Future Sound Levels – Nighttime

The analysis of sound levels at night included all the mechanical equipment operating at maximum loads, except the emergency generator, to simulate worst-case nighttime operation conditions at nearby receptors. Five modeling locations were included in the analysis. All five modeling receptors represented nearby residentially zoned locations. Modeling location A represents monitoring location 1 on Stuart Street to the southwest of the Project Site. Modeling location B represents monitoring location 2 on Columbus Avenue to the northwest of the Project Site. Modeling location C represents monitoring location 3 on Park Plaza to the north of the Project Site. Modeling location D represents monitoring location 4 on Park Plaice to the east of the Project Site, and E represents the Revere Hotel across Stuart Street to the south of the Project Site. The modeling receptors, which correspond to residential uses in the community, are depicted in Figure 3.10-2. The predicted exterior Project-only sound levels range from 36 to 44 dBA at nearby receptors. The City of Boston Residential and Business limits have been applied to the appropriate locations. Predicted sound levels from Project-related equipment are within the broadband and octave-band nighttime limits under the City Noise Standards at the modeling locations. The evaluation is presented in Table 3.10-6.

Table 3.10-6 Comparison of Future Predicted Project-Only Nighttime Sound Levels to the City of Boston Limits

Modeling Location ID	Zoning / Land Use	Broadband (dBA)	Sound Level (dB) per Octave-Band Center Frequency (Hz)								
			31.5	63	125	250	500	1k	2k	4k	8k
A	Residential	36	47	45	40	39	33	28	23	17	4
B	Residential	42	51	51	47	45	39	35	31	25	17
C	Residential	42	51	51	46	43	39	37	33	26	13
D	Residential	41	51	51	44	41	37	36	33	24	12
E	Residential	44	52	51	49	48	42	36	32	28	19
City of Boston Limits	**Residential/Institutional**	**50**	**68**	**67**	**61**	**52**	**46**	**40**	**33**	**28**	**26**
	Business	**65**	**79**	**78**	**73**	**68**	**62**	**56**	**51**	**47**	**44**

3.10.12 Future Sound Levels – Daytime

As previously noted, the emergency generator will operate during the day only for brief, routine testing when the background sound levels are high, or during an interruption of power from the electrical grid. A second analysis combined noise from the Project's anticipated mechanical equipment and its emergency generator to reflect worst-case conditions during a period of equipment testing. The sound levels were calculated at the same receptors as in the nighttime analysis and then evaluated against daytime limits. The predicted exterior Project-only daytime sound levels range from 38 to 49 dBA at nearby receptors. Predicted sound levels from Project-related equipment are within the daytime broadband and octave-band limits under the City Noise Standards at each of the modeled locations. This evaluation is presented in Table 3.10-7.

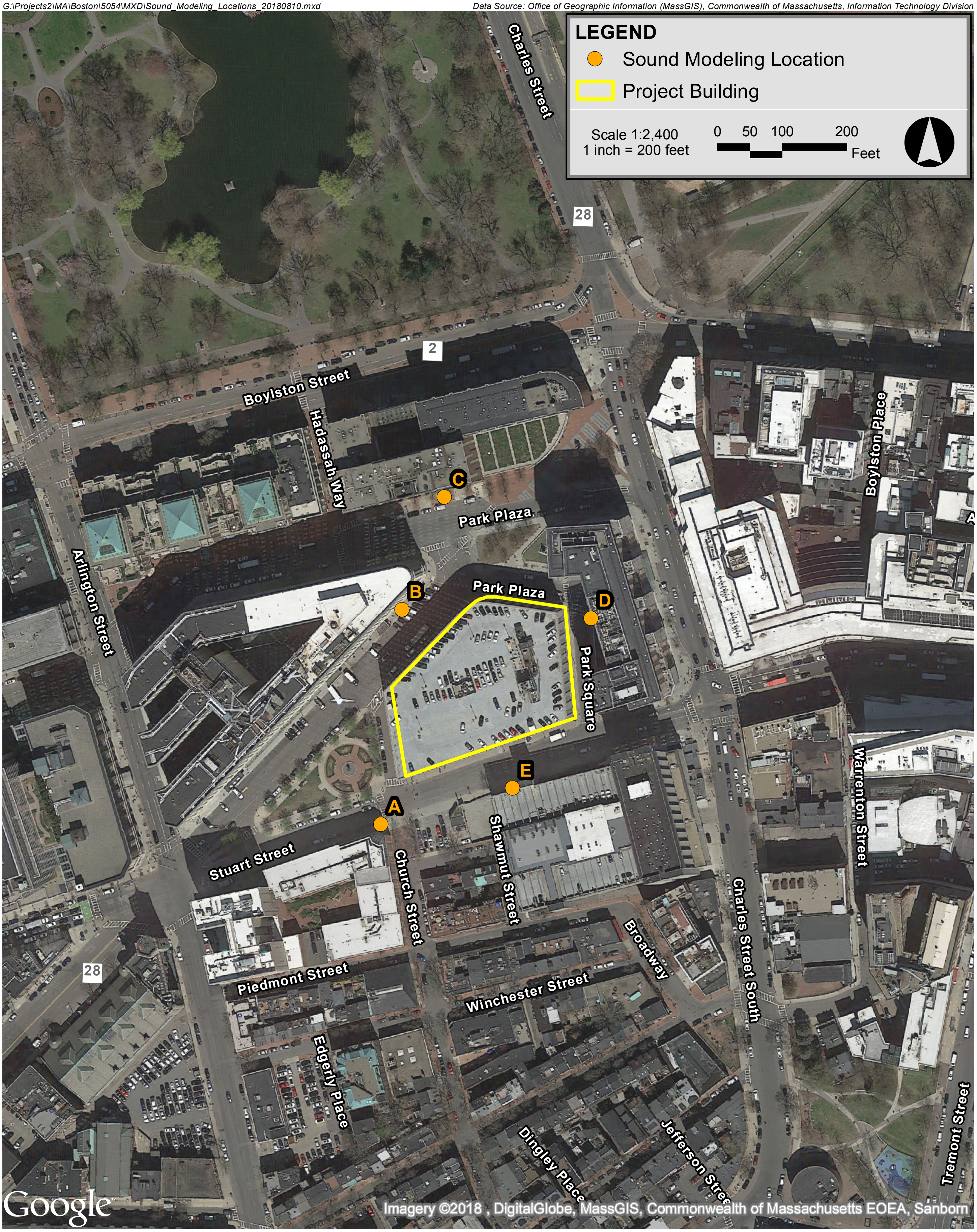

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Figure 3.10-2

Sound Modeling Locations

Table 3.10-7 Comparison of Future Predicted Project-Only Daytime Sound Levels to City Noise Standards

Modeling Location ID	Zoning / Land Use	Broadband (dBA)	Sound Level (dB) per Octave-Band Center Frequency (Hz)								
			31.5	63	125	250	500	1k	2k	4k	8k
A	Residential	38	49	47	42	40	34	31	29	20	4
B	Residential	42	54	52	48	45	39	35	32	26	17
C	Residential	49	57	55	52	47	42	44	44	38	20
D	Residential	48	67	66	56	51	44	39	37	33	28
E	Residential	45	54	54	50	49	42	36	33	28	19
City of Boston Limits	**Residential/Institutional**	**60**	**76**	**75**	**69**	**62**	**56**	**50**	**45**	**40**	**38**
	Business	**65**	**79**	**78**	**73**	**68**	**62**	**56**	**51**	**47**	**44**

3.10.13 Conclusions

Baseline noise levels were measured in the vicinity of the Project Site during the day and at night. At these and additional locations, future Project-only sound levels were calculated based on information provided on the expected mechanical equipment. Project-only sound levels were compared to applicable limits.

Predicted mechanical equipment noise levels from the Project at each receptor location, taking into account attenuation due to distance, structures, and noise-control measures, will be at or below the octave-band requirements of the City Noise Standards. The predicted sound levels from Project-related equipment, as modeled, are expected to remain well below 50 dBA at residences; therefore, within the nighttime residential zoning limits for the City of Boston at the nearest residential receptors. The results indicate that the Project can operate without substantial impact on the existing acoustical environment.

At this time, while the mechanical equipment and noise controls have been refined, they are still conceptual in nature. During the final design phase of the Project, mechanical equipment and noise controls will be specified and designed to meet the applicable broadband limit and the corresponding octave-band limits of the City Noise Standards.

3.11 Construction Impacts

3.11.1 Introduction

A Construction Management Plan (CMP) in compliance with the City's Construction Management Program will be submitted to the Boston Transportation Department (BTD) once final plans are developed and the construction schedule is fixed. The construction contractor will be required to comply with the details and conditions of the approved CMP.

Proper pre-planning with the City and neighborhood will be essential to the successful construction of the Project. Construction methodologies, which ensure public safety and protect nearby residences and businesses, will be employed. Techniques such as barricades, walkways and signage will be used. The CMP will include routing plans for trucking and deliveries, plans for the protection of existing utilities, and control of noise and dust.

During the construction phase of the Project, the Proponent will provide the name, telephone number and address of a contact person to communicate with on issues related to the construction.

The Proponent intends to follow the guidelines of the City of Boston and the MassDEP, which direct the evaluation and mitigation of construction impacts.

3.11.2 Construction Methodology/Public Safety

Construction methodologies that ensure public safety and protect nearby tenants will be employed. Techniques such as barricades 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 the control of noise and dust.

As the design of the Project progresses, the Proponent will meet with BTD to discuss the specific location of barricades, the need for lane closures, pedestrian walkways, and truck queuing areas. Secure fencing, signage, and covered walkways may be employed to ensure the safety and efficiency of all pedestrian and vehicular traffic flows. In addition, sidewalk areas and walkways near construction activities will be well marked and lighted to protect pedestrians and ensure their safety. Public safety for pedestrians on abutting sidewalks will also include covered pedestrian walkways when appropriate. If required by BTD and the Boston Police Department, police details will be provided to facilitate traffic flow. These measures will be incorporated into the CMP which will be submitted to BTD for approval prior to the commencement of construction work.

3.11.3 Construction Schedule

The Proponent anticipates that the Project will commence construction in the second quarter of 2019 and last for approximately 30 months.

Typical construction hours will be from 7:00 a.m. to 6:00 p.m., Monday through Friday, with most shifts ordinarily ending at 3:30 pm. No substantial sound-generating activity will occur before 7:00 am. If longer hours, additional shifts, or Saturday work is required, the construction manager will place a work permit request to the Boston Air Pollution Control Commission and BTD in advance. Notification should occur during normal business hours, Monday through Friday. It is noted that some activities such as finishing activities could run beyond 6:00 pm to ensure the structural integrity of the finished product; certain components must be completed in a single pour, and placement of concrete cannot be interrupted.

3.11.4 Construction Staging/Access

Access to the site and construction staging areas will be described in the CMP.

Although specific construction and staging details have not been finalized, the Proponent and its construction management consultant will work to ensure that staging areas will be located to minimize impacts to pedestrian and vehicular flow. Secure fencing and barricades will be used to isolate construction areas from pedestrian traffic adjacent to the site. Construction procedures will be designed to meet all Occupational Safety and Health Administration (OSHA) safety standards for specific site construction activities.

3.11.5 Construction Mitigation

The Proponent will follow City and MassDEP guidelines which will direct the evaluation and mitigation of construction impacts. As part of this process, the Proponent and construction team will evaluate the Commonwealth's Clean Air Construction Initiative.

A CMP will be submitted to BTD for review and approval prior to issuance of a Building Permit. The CMP will include detailed information on specific construction mitigation measures and construction methodologies to minimize impacts to abutters and the local community. The CMP will also define truck routes which will help in minimizing the impact of trucks on City and neighborhood streets.

"Don't Dump - Drains to Boston Harbor" plaques will be installed at storm drains that are replaced or installed as part of the Project.

3.11.6 Construction Employment and Worker Transportation

The number of workers required during the construction period will vary. It is anticipated that approximately 613 construction jobs will be created over the length of construction. The Proponent will make reasonable good-faith efforts to have at least 51% of the total employee work hours be for Boston residents, at least 40% of total employee work hours be for minorities and at least 12% of the total employee work hours be for women. The Proponent will enter into jobs agreements with the City of Boston.

To reduce vehicle trips to and from the construction site, minimal construction worker parking will be available at the site and all workers will be strongly encouraged to use public transportation and ridesharing options. The general contractors will work aggressively to ensure that construction workers are well informed of the public transportation options serving the area. Space on-site will be made available for workers' supplies and tools so they do not have to be brought to the site each day.

3.11.7 Construction Truck Routes and Deliveries

Truck traffic will vary throughout the construction period, depending on the activity. The construction team will manage deliveries to the site during morning and afternoon peak hours in a manner that minimizes disruption to traffic flow on adjacent streets. Construction truck routes to and from the site for contractor personnel, supplies, materials, and removal of excavations required for the development will be coordinated with BTD. Traffic logistics and routing will be planned to minimize community impacts. Truck access during construction will be determined by the BTD as part of the CMP. These routes will be mandated as a part of all subcontractors' contracts for the development. The construction team will provide subcontractors and vendors with Construction Vehicle & Delivery Truck Route Brochures in advance of construction activity.

"No Idling" signs will be included at the loading, delivery, pick-up and drop-off areas.

3.11.8 Construction Air Quality

Short-term air quality impacts from fugitive dust may be expected during demolition, excavation and the early phases of construction. Plans for controlling fugitive dust during demolition, excavation and construction include mechanical street sweeping, wetting portions of the site during periods of high wind, and careful removal of debris by covered trucks. The construction contract will provide for a number of strictly enforced measures to be used by contractors to reduce potential emissions and minimize impacts, pursuant to this Article 80 approval. These measures are expected to include:

- Using wetting agents on areas of exposed soil on a scheduled basis;
- Using covered trucks;
- Minimizing spoils on the construction site;
- Monitoring of actual construction practices to ensure that unnecessary transfers and mechanical disturbances of loose materials are minimized;
- Minimizing storage of debris on the site; and
- Periodic street and sidewalk cleaning with water to minimize dust accumulations.

3.11.9 Construction Noise

The Proponent is committed to mitigating noise impacts from the construction of the Project. Increased community sound levels, however, are an inherent consequence of construction activities. Construction work will comply with the requirements of the City of Boston Noise Ordinance. Every reasonable effort will be made to minimize the noise impact of construction activities.

Mitigation measures are expected to include:

- ♦ Instituting a proactive program to ensure compliance with the City of Boston noise limitation policy;
- ♦ Using appropriate mufflers on all equipment and ongoing maintenance of intake and exhaust mufflers;
- ♦ Muffling enclosures on continuously running equipment, such as air compressors and welding generators;
- ♦ Replacing specific construction operations and techniques by less noisy ones where feasible;
- ♦ Selecting the quietest of alternative items of equipment where feasible;
- ♦ Scheduling equipment operations to keep average noise levels low, to synchronize the noisiest operations with times of highest ambient levels, and to maintain relatively uniform noise levels;
- ♦ Turning off idling equipment; and
- ♦ Locating noisy equipment at locations that protect sensitive locations by shielding or distance.

3.11.10 Construction Vibration

All means and methods for performing work at the site will be evaluated for potential vibration impacts on adjoining property, utilities, and adjacent existing structures. Acceptable vibration criteria will be established prior to construction, and vibration will be monitored, if required, during construction to ensure compliance with the agreed-upon standard.

3.11.11 Construction Waste

The Proponent will take an active role with regard to the reprocessing and recycling of construction waste. The disposal contract will include specific requirements that will ensure that construction procedures allow for the necessary segregation, reprocessing, reuse and recycling of materials when possible. For those materials that cannot be recycled, solid waste will be transported in covered trucks to an approved solid waste facility, per MassDEP Regulations for Solid Waste Facilities, 310 CMR 16.00. This requirement will be specified in the disposal contract. Construction will be conducted so that materials that may be recycled are segregated from those materials not recyclable to enable disposal at an approved solid waste facility.

3.11.12 Protection of Utilities

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, Boston Public Works, Dig Safe, and the governing utility company requirements. All necessary permits will be obtained before the commencement of the specific utility installation. Specific methods for constructing proposed utilities where they are near to, or connect with, existing water, sewer and drain facilities will be reviewed by BWSC as part of its site plan review process.

3.11.13 Rodent Control

A rodent extermination certificate will be filed with each building permit application for the Project. Rodent inspection monitoring and treatment will be carried out before, during, and at the completion of all construction work for each phase of the Project, in compliance with the City's requirements.

3.11.14 Wildlife Habitat

The Project Site is in an established urban neighborhood. There are no wildlife habitats in or adjacent to the Project Site.

Chapter 4.0

Sustainable Design and Climate Change Resilience

4.0 SUSTAINABLE DESIGN AND CLIMATE CHANGE RESILIENCE

4.1 Sustainable Design

To measure the results of their sustainability initiatives and to comply with Article 37 of the Boston Zoning Code, the Proponent intends to use the framework of the Leadership in Energy and Environmental Design (LEED) rating system promulgated by the US Green Building Council (USGBC). The Project will use LEED for New Construction (LEED v4 for BD+C) as the rating system to demonstrate compliance with Article 37. The LEED rating system tracks the sustainable features of a project by achieving points in the following categories: Location and Transportation, Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation and Design Process, and Regional Priority Credits.

A LEED checklist for the Project is included at the end of this section, and the narrative below outlines how the Project intends to achieve the prerequisites and credits for each credit category. The checklist will be updated regularly as the design develops and engineering assumptions are substantiated. At present, 46 points have been targeted. Additional credits, identified as "Maybe" on the checklist, will be evaluated as the design progresses.

Integrative Process

The Project team has met and will continue to meet regularly to ensure that the team members from the various disciplines involved are all known to each other and collectively communicating. A sustainable design focused workshop will be held during schematic design and the team will establish shared sustainable design and energy efficiency goals for the Project. As the Project progresses, there will be regular design meetings to ensure the entire team is engaged throughout the design and construction process. Additionally, the Project team will meet with Eversource and National Grid to discuss the available incentive programs and potential Energy Conservation Measures for the proposed Project.

<u>Integrative Process:</u> The Project team will implement an integrative design process throughout design and construction.

Location and Transportation

The Project is located on a currently developed site in the City of Boston. It is located in close proximity to several public services and has access to multiple subway and bus routes as well as vehicular access to major highway routes. Residents will have access to vehicle and bicycle parking within the parking garage.

Sensitive Land Protection: The Project is located on a parcel used for the existing Motor Mart Garage which will be preserved and partially redeveloped, with a new residential tower constructed atop the existing garage.

Surrounding Density and Diverse Uses: The Project Site is located in a dense urban neighborhood and is within a ½-mile walking distance to at least eight services including retail establishments, restaurants and the Theater District. Additionally, the neighborhood in which the Project is located has a density of greater than 35,000 sf per acre of buildable land.

Access to Quality Transit: There are several modes of public transit located within ¼ mile of the Project Site, including the Chinatown MBTA Orange line subway stop and the Arlington Green line subway stop, which are located 0.4 mile walking distance from the closest functional entry of the Project building. Additionally, an MBTA No. 9 bus stop is located 0.2 miles away from the Project Site.

Bicycle Facilities: The Project Site is located within a 200-yard walking distance from a bicycle network that connects to at least ten diverse uses and a transit hub. Additionally, short-term bicycle storage for at least 2.5% of all peak visitors and one long-term (covered) bicycle storage space for each residential unit, exceeding the requirement of providing long-term bicycle storage for at least 5% of all regular building occupants.

Green Vehicles: The Project will designate 5% of all parking spaces used by the Project as preferred parking for green vehicles. Additionally, electrical vehicle supply equipment (EVSE) will be installed in 2% of all parking spaces used by the Project.

Sustainable Sites

The Project Site is a currently developed urban parcel located in Boston. A site assessment will be conducted in order to determine if there are contaminated soils that require regulated removal. If deemed necessary, a compliant remediation plan will be drafted, submitted and implemented to ensure the contaminated soils removed from the site are categorized and disposed of in accordance with applicable requirements.

To the extent possible, light colored pedestrian-oriented hardscape and open spaces will be provided to increase site walkability. Additionally, a rainwater management plan will be developed to address the rate, run-off and quality of the site rainwater.

The Project is planning to meet Boston Water and Sewer Commission requirements by significantly reducing the rainwater runoff by directing it into a below grade re-charge/collection system sized to treat 1-inch of rain over all impervious areas of the site. Rainwater directed to the municipal system will be treated to remove suspended solids prior to being released into the City system.

Construction Activity Pollution Prevention (prerequisite): The Project is required to comply with a Storm Water Pollution Prevention Plan (SWPPP) per the City of Boston requirements. Within the SWPPP, an Erosion and Sedimentation Control (ESC) Plan is required to be developed and implemented on the Project, for the duration of construction. The ESC plan has been developed and included within the Project Construction Documents, and will be required during Construction Administration.

Heat Island Reduction: To minimize effects on microclimates and human and wildlife habitats, heat island effect will be reduced by specifying light colored roof and hardscape materials. Additionally, portions of the roof will be vegetated.

Water Efficiency

The Project documents will include specifications for low flow and high efficiency plumbing fixtures within the Project to reduce the amount of potable water used throughout the building. The site will utilize native, adaptive, and/or drought tolerant plant species that require limited irrigation.

Outdoor Water Use Reduction (prerequisite): The Project will reduce landscape water demand by at least 30% from the calculated baseline for the site's peak watering month. Reductions will be achieved through plant species selection and irrigation system efficiency, as calculated by the Environmental Protection Agency (EPA) WaterSense Water Budget Tool.

Indoor Water Use Reduction (prerequisite): Flush and flow fixtures specified for the Project will enable the building to exceed the aggregate water consumption reduction requirement of 20% and will be WaterSense labeled, as applicable. Additionally, appliance and process water use will meet applicable requirements

Building-level Water Metering (prerequisite): Permanent whole building water use meters will be installed on the Project to measure potable water use within the building and from site irrigation. Monthly and annual summaries will be uploaded to Energy Star Portfolio Manager.

Outdoor Water Use Reduction: The Project will not require a permanent irrigation system beyond the maximum two-year establishment period.

Indoor Water Use Reduction: The Project will specify high-efficiency flush and flow water fixtures with a target to reduce overall annual potable water demand by 30% or more.

Water Metering: The Project will install permanent water meters for two or more water subsystems such as irrigation, domestic hot water or indoor plumbing fixtures.

Energy and Atmosphere

The Project will be designed with high-efficiency building systems and a high-performance building envelope. The proposed HVAC systems design for the building includes a heat pump system with chiller, cooling tower and condensing boilers. The proposed lighting will target a lighting power density below code maximums through the use of daylight dimming, carefully considered controls systems and LED fixtures. The preliminary energy use assessment has been conducted using whole building energy modeling. The proposed design must meet both the State Stretch Energy Code and LEED v4 criteria.

Refrigerants with low global warming and ozone depleting potential will be specified for use in the building systems equipment.

Additionally, the Owner will engage a Commissioning Agent (CxA) to perform fundamental, enhanced and envelope commissioning services including providing reviews of design documents. The CxAs role will continue on through construction and ultimately confirm the building systems are installed and function as intended and desired.

Fundamental Commissioning and Verification (prerequisite): A third-party Commissioning Agent, (CxA) will be engaged by the owner for purposes of providing fundamental commissioning services for the building energy related systems including HVAC & R, lighting and domestic hot water systems. The CxA will verify the building systems are installed, calibrated and perform to the building owners project requirements through verification and performance reviews of the systems to be commissioned. The commissioning agent will provide a summary report.

Minimum Energy Performance (prerequisite): The Project will include a high performing envelope, efficient mechanical equipment, and efficient lighting fixtures. A whole building energy simulation will be used to assess the proposed design against the applicable reference standards. The Project will meet the Stretch Code requirement to be 10% better than current MA code in annual site energy use (using an ASHRAE Standard 90.1-2013 baseline, the Project is demonstrating 20% site energy use savings). This LEED prerequisite requires that projects achieve a minimum energy cost savings of 5% over an ASHRAE Standard 90.1-2010 baseline. The Project currently achieves 14% annual energy cost savings when compared to the ASHRAE 90.1-2010 baseline. The energy model will continue to be updated as the design progresses. New information regarding lighting power density, equipment, schedules, and site lighting will be incorporated into the model when applicable. Please refer to the Energy Model Summary provided in Appendix G.

Enhanced Commissioning: In addition to those required under EA Prerequisite Fundamental Commissioning and Verification, a Commissioning Agent will be engaged to provide enhanced and envelope commissioning services which include activities such as reviewing submittals, verification of equipment installation, and seasonal testing review.

Optimize Energy Performance: The preliminary energy model indicates that the Project achieves a total of five points by demonstrating a 14% estimated annual energy cost savings over ASHRAE Standard 90.1-2010 baseline. The energy model will continue to be updated as the design progresses. New information regarding lighting power density, equipment, schedules, and site lighting will be incorporated into the model when applicable. The final iteration of the energy model submitted for LEED certification will be based on the Construction Documents. Please refer to the Energy Model Summary provided in Appendix G.

Materials and Resources

The Project will specify materials and products that are environmentally responsible and are transparent regarding the harvest and extraction of raw materials and the manufacturing processes. The design team will specify materials and products with environmental and health product declarations to help support a reduced impact of the development on the environment. Waste management will be addressed during demolition, construction and post occupancy.

Storage and Collection of Recyclables (prerequisite): Recyclables collected post occupancy will be accommodated in a centrally located room dedicated to the storage and collection of recyclables. Residents will be responsible for relocating recyclables from their units to a collection room located on each respective floor. Building maintenance staff will be responsible for relocating recyclables from the residential collection rooms located on each floor and from the retail tenants to the central recycling storage room located on the ground level.

Construction and Demolition Waste Management Planning (prerequisite): The Construction Manager will be required to develop a compliant construction and demolition waste management plan that establishes waste diversion goals, specifies commingled versus site separated strategies, and enables the Project to divert least 50% of the onsite generated construction and demolition waste from area landfills.

Building Product Disclosure & Optimization: Environmental Product Declarations: The Project will specify and install at least 20 different permanently installed products with compliant Environmental Product Declarations sourced from at least five different manufacturers. Requirements for the CM to procure compliant materials will be included in the project manual.

Building Product Disclosure & Optimization: Materials Ingredients: The Project will specify and install at least 20 different permanently installed products from at least five different manufacturers with compliant Health Product Declarations or similar disclosure documentation. Requirements for the CM to procure compliant materials will be included in the project manual.

Construction and Demolition Waste Management: MR Construction and Demolition Waste Management: The Project will reduce construction waste through at least 50% diversion of three material streams.

Indoor Environmental Quality:

The building will have a healthy interior environment generated through the use of low-VOC containing interior construction and finish materials and maintained through an efficient ventilation system in compliance with ASHRAE 62.1-2010. In compliance with local regulations, the building will be non-smoking, and no smoking will be allowed within 25 feet of the building.

During construction the Construction Manager will develop and implement a compliant Indoor Air Quality Management Plan for the construction and pre-occupancy phases of the Project.

The building envelope design includes large areas of vision glazing with ample access to daylight and views for the anticipated regularly occupied spaces. The buildings thermal comfort systems and controls will be designed to meet the requirements of ASHRAE 55-2010 for all applicable mechanically ventilated regularly occupied spaces.

Minimum Indoor Air Quality Performance (prerequisite): Mechanical ventilation into the building is provided by rooftop mounted AHU's ducted to residential units. The ventilation meets minimum rates in the breathing zone and is met through the performance path as required by ASHRAE 62.1 2010, Ventilation for Acceptable Indoor Air Quality.

Environmental Tobacco Smoke Control (prerequisite): No smoking will be permitted in the building or within 25 feet of the building. This policy will be made clear to all residents, guests, employees and retail transients.

Enhanced IAQ Strategies: The Project will include the following:

- 10' long entryway systems to capture dirt and particulates entering the building at regularly used exterior entrances;
- Sufficient exhausting of each space where hazardous gases or chemicals may be present or used (e.g., housekeeping, welding rooms, copying and printing rooms); and
- MERV 13 filtration (or better) on each ventilation system that supplies outdoor air to occupied spaces

Low Emitting Materials: The Project will meet the threshold level of compliance with emissions and content standards for a minimum of three product categories through specification of materials and products with compliant VOC content and emissions for paints and coatings, flooring systems and composite wood. The technical specifications will include requirements for products with compliant VOC content and general emissions limits where applicable.

Construction Indoor Air Quality Management Plan: The Construction Manager will develop and implement a compliant Indoor Air Quality Management Plan for the construction phase of the Project to meet or exceed the recommended Control Measures of the SMACNA IAQ Guidelines for Occupied buildings Under Construction 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3). The permanently installed air handlers will not be operated during construction, and tobacco products will be prohibited within the building as well as within 25 feet of the building entrance.

Thermal Comfort: The heating, ventilating, and air-conditioning (HVAC) systems and the building envelope will be designed to meet the requirements of ASHRAE Standard 55–2010, Thermal Comfort Conditions for Human Occupancy, with errata.

Thermal comfort in each residential unit will be controlled via a thermostat. Individual thermal comfort controls will be provided for at least 50% of individual occupant spaces. Additionally, group thermal comfort controls are provided for all shared multi-occupant spaces. Thermal comfort controls allow occupants, whether in individual spaces or shared multi-occupant spaces, to adjust at least one of the following in their local environment: air temperature, radiant temperature, air speed, and humidity.

Interior Lighting: A ceiling mounted lighting fixture will be provided in all bedrooms and controlled by a local on/off switch. Additionally, a switched receptacle will be provided in each bedroom to accommodate an additional fixture. Common area lighting will be controlled by local on/off switching. For at least 90% of individual occupant spaces, individual lighting controls will be provided that enable occupants to adjust the lighting to suit their individual tasks and preferences, with at least three lighting levels or scenes (on, off, midlevel).

All shared multioccupant spaces will have lighting controls that enable occupants to adjust the lighting to meet group needs and preferences, with at least three lighting levels or scenes (on, off, midlevel).

Quality Views: The Project design will include large windows within the regularly occupied spaces within the residential units providing ample access to views.

Innovation in Design

The Project team will explore innovative approaches to design and maintenance including green housekeeping and pest management programs and purchasing lighting with low-mercury content. Additionally, the Project is eligible to achieve one credit point due to several team members being certified LEED AP with the BD+C specialty.

LEED v4 BD+C: New Construction

Project Checklist

Project Name: **Motormart Residential**
Address: 201 Stuart St, Boston, MA 02116
Date: 28-Aug-2018

Y	?+	?-	N		Integrative Process	1
1	0	0	0	Credit 1	Integrative Process	1

13	1	2	0		Location and Transportation	16
			x	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

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

5	2	1	3		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
2				Credit 1	Outdoor Water Use Reduction	2
2	1		3	Credit 2	Indoor Water Use Reduction	6
	1	1		Credit 3	Cooling Tower Water Use	2
1				Credit 4	Water Metering	1

10	4	10	9		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
5		1		Credit 1	Enhanced Commissioning	6
5	3	3	7	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

3	0	1	9		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 - EPD	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
1		1		Credit 5	Construction and Demolition Waste Management	2

7	1	6	2		Indoor Environmental Quality	16
Y				Prereq 1	Minimum Indoor Air Quality Performance	Required
Y				Prereq 2	Environmental Tobacco Smoke Control	Required
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
	1	1		Credit 4	IAQ Assessment	2
1				Credit 5	Thermal Comfort	1
1		1		Credit 5	Interior Lighting	2
		3		Credit 5	Daylight	3
1				Credit 5	Quality Views	1
		1		Credit 5	Acoustic Performance	1

5	0	1	0		Innovation	6
		1		Credit 1	Exemplary Performance: TBD	1
1				Credit 2	Innovation in Design: Green Cleaning Policy/Porgram	1
1				Credit 3	Innovation in Design: Innovative Purchasing of Lamps	1
1				Credit 4	Pilot Credit: Integrative Analysis of Building Materials	1
1				Credit 5	Innovation in Design: Exterior Hardscape Management Plan	1
1				Credit 6	LEED Accredited Professional	1

0	2	2	0		Regional Priority (earn up to 4 points)	4
	1			Credit 1	EAc2 Optimize Energy Performance (8pts)	1
		1		Credit 2	MRc1 Building Life-Cycle Impact Reduction (2pts)	1
	1			Credit 3	LTc3 High Priority Site (2 points), Renewable Energy Production (1pt)	1
		1		Credit 4	SSc4 Rainwater Management (2 pts), WEc2 Indoor Water Use Reduction (4pts)	1

46	12	25	27	TOTALS	Possible Points:	110

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

4.2 Climate Change Resilience

4.2.1 Introduction

Climate change conditions considered by the Project team include sea level rise, higher maximum and mean temperatures, more frequent and longer extreme heat events, more frequent and longer droughts, more severe freezing rain and heavy rainfall events, and increased wind gusts.

A copy of the completed Climate Resiliency Checklist is included in Appendix H. Given the preliminary level of design, the responses are also preliminary and may be updated as the Project design progresses.

4.2.2 Extreme Heat Events

The *Climate Ready Boston* report predicts that in Boston, there may be between 25 to 90 days with temperatures over 90 degrees by 2070, compared to an average of 11 days per year over 90 degrees between 1971 to 2000. In order to adapt the building to efficiently manage future heat waves, the building heating and cooling systems will be modular vis a vis their major equipment (boilers, pumps, cooling towers). This will allow the systems to be expanded in the future to accommodate higher extreme temperatures. The building heating and cooling systems will be capable of modulation, allowing them to efficiently maintain comfort conditions in the building during higher average temperatures and during longer heat waves. New street trees and landscaping as well as a vegetated roof on the ninth floor will mitigate the urban heat island effect.

4.2.3 Drought Conditions

Although more intense rain storms are predicted, extended periods of drought are also predicted due to climate change. Under the high emissions scenario, the occurrence of droughts lasting one to three months could increase by as much as 75% over existing conditions by the end of the century. To minimize the Project’s susceptibility to drought conditions, the landscape design is anticipated to incorporate native and adaptive plant materials and high efficiency irrigation systems will be installed. Aeration fixtures and appliances will be chosen for water conservation qualities, conserving potable water supplies.

4.2.4 Sea Level Rise and Future Storms

According to Climate Ready Boston, by 2030 sea level may be as much as eight inches higher than it was in 2000, and could be as high as seven feet higher by 2100. As described in “Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Options for the Central Artery” by MassDOT (MassDOT Report), “one of the challenges presented by the wide range of SLR projections is the inability to assign likelihood to any particular [SLR] scenario."[1] To be conservative, in the year 2070, SLR could be as high as approximately four feet.

Combined with storm surge at an inopportune tide, flooding in this future scenario would be possible at the Project Site.[2] The storms in the Boston area that could create these flood conditions would be Nor'easters and tropical storms. In 2017, hurricanes occur less frequently than Nor'easters; however, in the future according to the MassDOT Report, it is anticipated that there will be roughly the same number of tropical storms and Nor'easters impacting the Boston area. In addition, the intensity of storms is anticipated to increase. The risks of each type of storm differ: hurricanes are typically shorter in duration, but are more intense and create a larger storm surge; Nor'easters are longer in duration, but create a smaller storm surge. For this reason, a hurricane would need to impact Boston within a short window to create flooding as shown in the MassDOT Report, while Nor'easters are more likely to create flooding given that they have a higher probability of impacting the area during the rising tide and high tide.

According to the BPDA Sea Level Rise Flood Hazard Area Map, the Sea Level Rise – Base Flood Elevation for the site is 17.7 feet Boston City Base (BCB). This is calculation based on a 1% annual chance of flooding with 40 inches on sea level rise. The first-floor elevation of the existing parking garage ranges from 17.9 to 18.5 ft BCB, making the site vulnerable to storm surge, and stormwater flooding. Because the Project consists of construction an addition on the Existing Building, raising the first-floor elevation or designing higher ceiling heights is not feasible. However, the Project will take measures to minimize the impact of potential flooding at the site, including the following:

- Critical infrastructure will be located above the 500-year flood plain, including boilers, cooling towers, generators and building switchgear, as will major air intakes and discharge points.
- Knee wall barriers are proposed for the surrounding ground floor storefronts. Temporary flood barriers will be deployed in areas without knee walls.

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1 Massachusetts Department of Transportation, et al. "MassDOT-FHWA Pilot Project Report: Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Options for the Central Artery." November 2015.

2 The MassDOT Report, funded by the Federal Highway Administration, studied the impact of sea level rise and future storm impacts related to climate change on the Central Artery in Boston. As part of this project, a hydrodynamic model was developed for Boston Harbor, including inland areas that cover portions of Boston, including the Project Site. The report states that the model is able to provide site-specific information about the risk of potential future flooding in the years 2030, 2070 and 2100 related to storm events, in particular Nor'easters and tropical cyclones (i.e., hurricanes).

- A modular approach will be taken for the mechanical infrastructure; this will allow the equipment to be more standard commercial "off the shelf" type. This will help reduce the lead times for replacement equipment, allowing more rapid recovery.

- The Project will incorporate water tight utility conduits, waste water back flow prevention, and storm water back flow prevention.

Chapter 5.0

Urban Design

5.0 URBAN DESIGN

5.1 Project Site

The Motor Mart Garage occupies the entirety of the Project Site. A large portion of the existing ground floor is retail, with restaurants anchoring the corners and smaller retail uses (car rental agencies) in between. The garage building is clad in a rhythmic vertical pattern of windows with metal frames and spandrels as well as detailed precast panels. The ground floor is mostly defined by retail storefronts of varying materials and sizes, at times incongruous with the strong precast and window rhythm above.

5.2 Area Context

The area surrounding the Project Site is defined by large residential and hotel buildings on three sides, which forms part of the High Spine of Boston leading towards the financial district. The Project Site opens towards the west to the small triangular Statler Park, a city park that forms a node among its taller neighbors. Statler Park affords dramatic framed views of the Project Site as well as long views from the Project Site towards the west. To the east is the existing One Charles Condominium building, which is a 200 foot tall residential building fronting Charles Street. To the north and south, the site is flanked by the approximately 154 foot tall Park Plaza Hotel and the 225 foot tall Revere Hotel, respectively. There is also a planned, BPDA Board approved, 200 foot tall residential building project adjacent to the Revere and known as 212 Stuart Street, which would occupy an unsightly open parcel between Bay Village and the Midtown Cultural District (see Figure 5-1). In addition, the Project's height relates well to, but does not exceed, typical heights for this segment of the High Spine. From east to west, the Project's height is equal to or exceeded by those of 45 Stuart Street (332 feet); the W Hotel (310 feet); Liberty Mutual (325 feet); the old John Hancock building (430 feet); the 380 Stuart and the Clarendon (both, 370 feet); and the planned 40 Trinity Place (393 feet).

5.3 Public Realm Improvements

The Project will include significant improvements to the public realm and consider its position within the context as a hinge that connects several neighborhoods. The incorporation of vibrant residential use to the Project Site will help bridge the various neighborhoods.

In an effort to make a more inviting connection between the Midtown Cultural District and Bay Village neighborhoods, the Project will table Church Street to be flush with the adjacent sidewalks and extend the paving pattern through to the north end of Church Street (see Figure 5-2). This will also extend the ground plane of Statler Park through Church Street, visually expanding the intersection and improving the pedestrian link. The intent is to make Statler Park appear less of an isolated island and more part of a pedestrian gateway. The Project will also widen sidewalks along Church Street by removing street parking in order to create a larger visual plaza which then leads to Columbus Avenue and forms a larger path to Boston Common. A drop off area for the residential entrance will also be accommodated within Church Street (see Figure 5-3). These proposed streetscape improvements are anticipated to complement anticipated improvements to the intersection of Stuart Street and Church Street by the proponent of a nearby BPDA-approved project.

To further extend and link the neighborhoods, the sidewalks surrounding the Project Site will be improved in accordance with Boston Complete Streets guidelines, including new street lighting and new street trees where practicable.

Retail storefront and Project entrances, including the residential entrances, have been carefully considered and positioned. The residential entrances diverge, providing an entrance along Church Street as well as Stuart Street to encourage more residential activity. The greater presence of residential activity throughout the day will activate the site and provide a safer neighborhood. In addition, the retail storefronts, with a strong corner presence, will further enhance the urban thoroughfare and help create a stronger sense of place in conjunction with the retail spaces directly across Stuart Street and Columbus Avenue (see Figures 5-4 and 5-5).

5.4 Evolution of Design

The Project's height was considered as a continuation of the high spine of Boston, linking the Back Bay on the west and the Midtown Cultural District to the east (see Figure 5-6). The new tower is situated on the west edge of the Project Site to maximize the light and air between surrounding buildings while also providing a formal background for Statler Park within the long east view of Columbus Avenue. Along Stuart Street and Columbus Avenue, the mass of the tower has been pulled back from the Existing Building façade to: 1) minimize the valley effect of tall buildings flanking the street, and 2) allow the existing regal and sturdy building to continue its definitive stance. The lower four-story portion of the tower has been positioned to eliminate its visual impact from the street but also to help define different roof terraces of varying character. The tower has been articulated in three stacks, each stepping away from the street edge and referencing the heights of immediate buildings. To further reduce the visual impact of the new tower, the corners were eased and rounded, referencing nearby buildings with similar articulation (see Figure 5-7).

With the rhythmic and ornamental façade of the Existing Building, the design approach is to make a strong and immediate connection between the existing façade and the new tower. The rhythm of the robust precast pillars evenly marching along each existing façade was drawn upwards and integrated into the new tower (see Figures 5-8 and 5-9). The new pillars are further punctuated by a highly articulated curtain wall that slips down and between the new panels. This rhythm harkens to the existing garage façade. The new façade marches similarly along each façade, even cloaking a mechanical area towards the east of the site, concealing it from the public realm. As the tower draws up, the solid panels appear to dissolve into the sky, revealing a curtain wall which reflects the natural condition of the sky.

To further make the connection between the existing garage building and the tower, unique residential units are proposed within the perimeter of the garage floors, further activating the existing façade with human activity within (as opposed to dark garage windows).

The existing garage façade has a rich and varied ornamentation that will be enhanced by the addition of residential type windows which by their nature have greater depth than the current single panel windows. The gridded pattern of the windows will help reduce the scale of the large existing windows. This strategy is also implemented into the design of the curtain wall, making sure the scale is appropriate to a residential building. In a similar fashion the precast panels of the existing garage have also been visually reduced by employing a scalloped motif which also allows the sun to interact with the panel in different ways depending on its position. This similar scallop extends upwards into the panels of the tower.

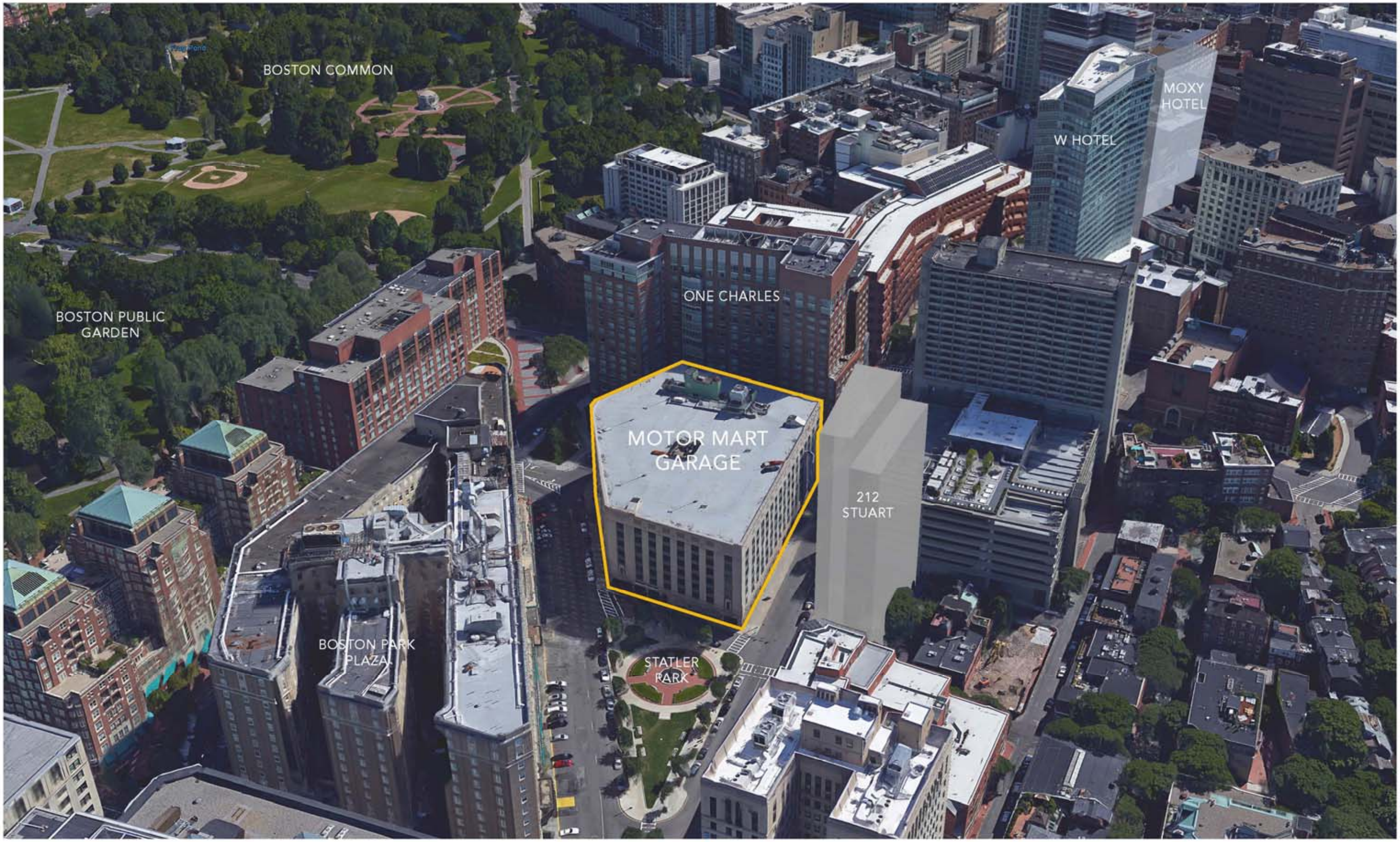

Figure 5-1
Area Context

Motor Mart Garage **Boston, Massachusetts**

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Figure 5-2
View from the Corner of Church and Stuart Streets

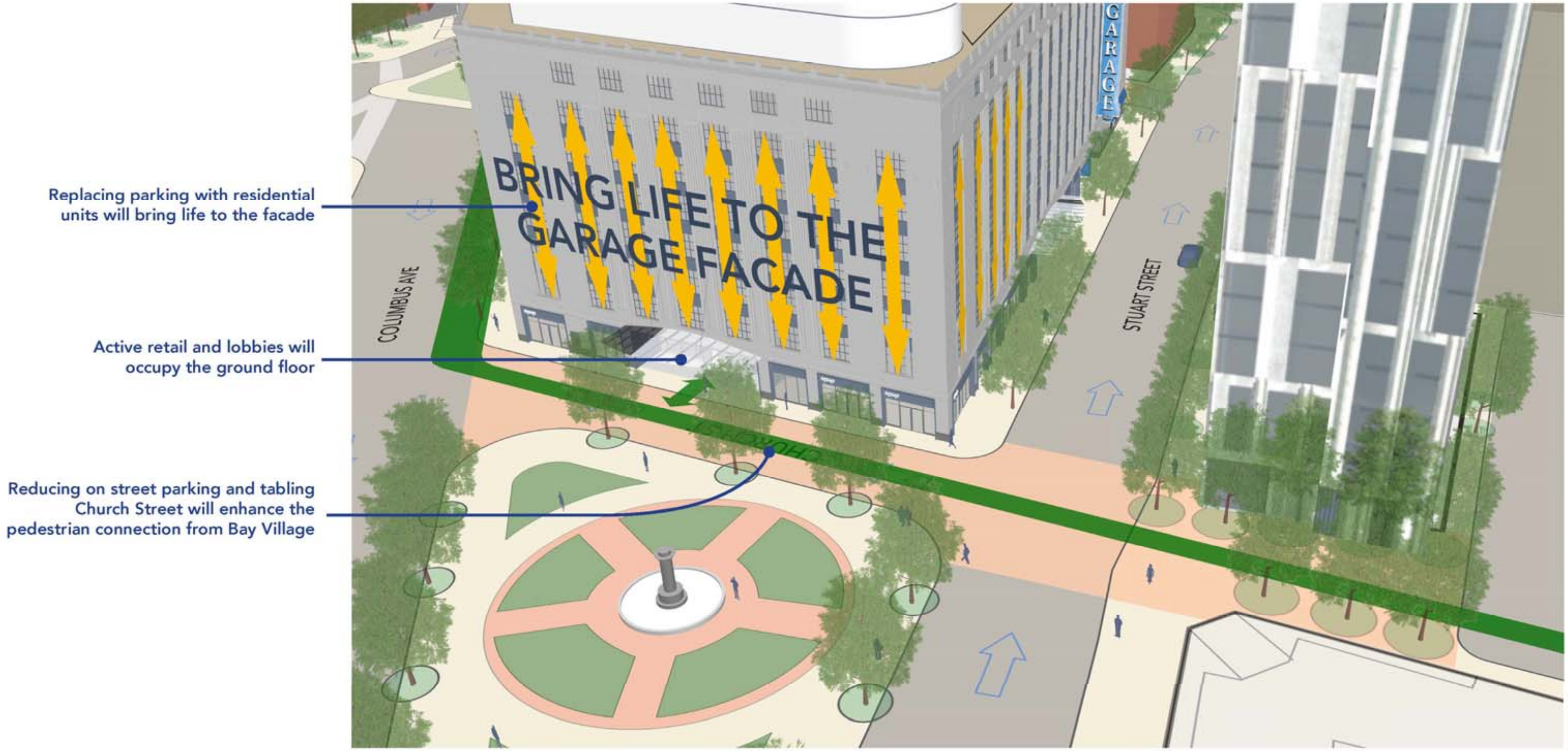
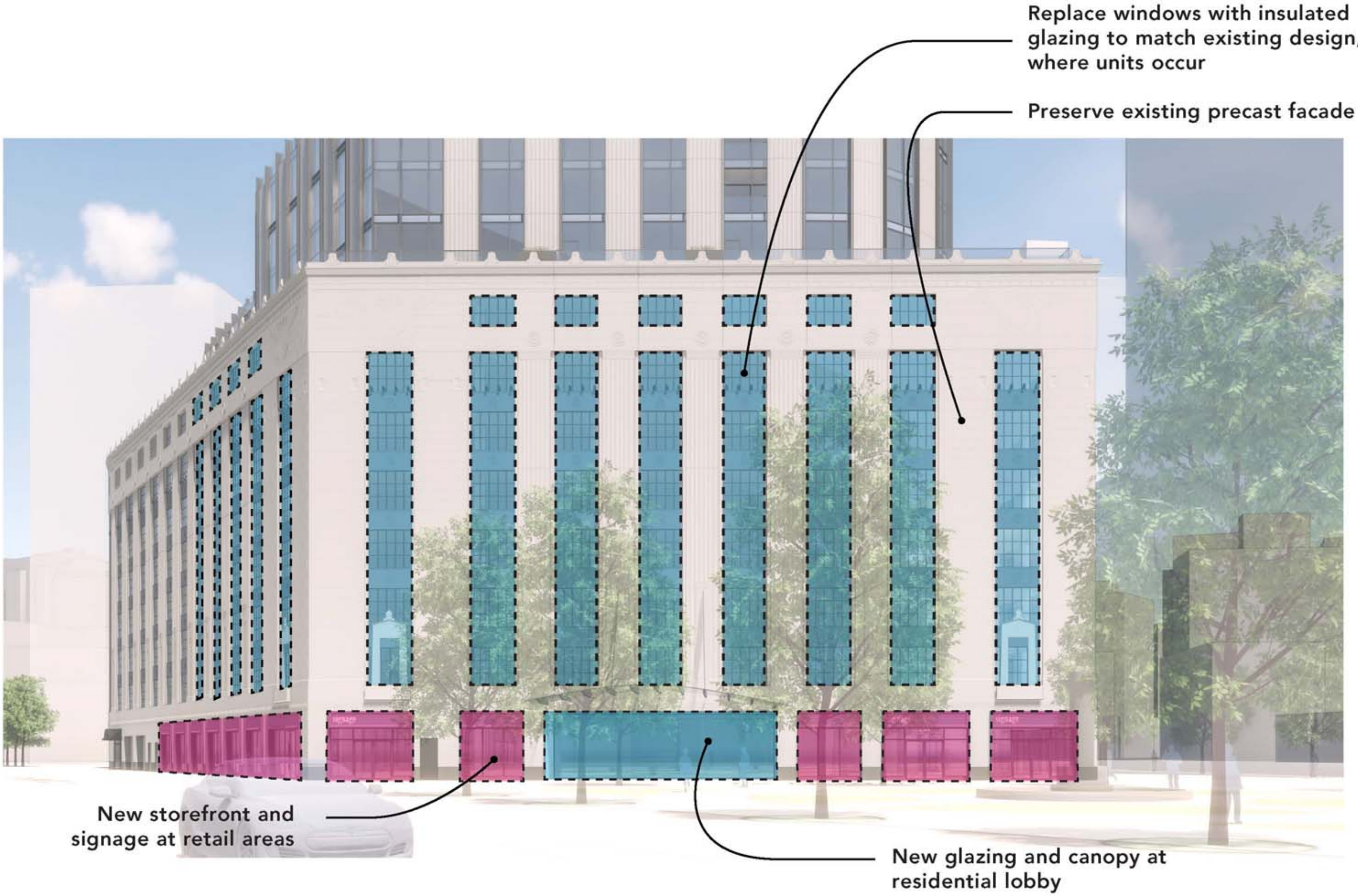


Figure 5-3
Public Realm Improvements

Motor Mart Garage   Boston, Massachusetts

cbt

Figure 5-4
View from Columbus Avenue and Church Street



Motor Mart Garage **Boston, Massachusetts**

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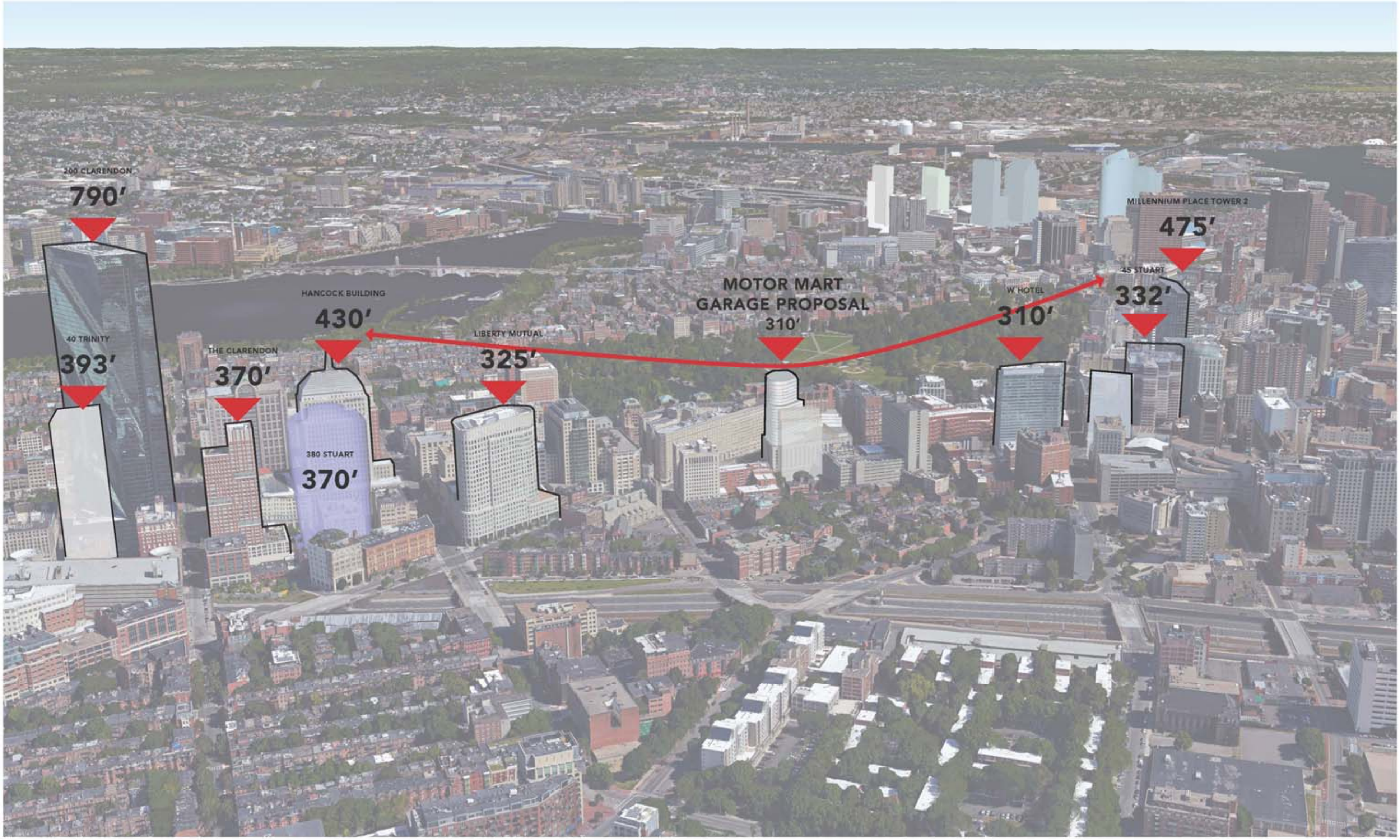
Figure 5-5
Ground Floor Improvements



Motor Mart Garage **Boston, Massachusetts**

cbt

Figure 5-6
High Spine Diagram

Motor Mart Garage **Boston, Massachusetts**

cbt

Figure 5-7
View from Stuart Street

Motor Mart Garage   Boston, Massachusetts

cbt

Figure 5-8
View of Masonry Pier Integration

Motor Mart Garage **Boston, Massachusetts**

cbt

Figure 5-9
View from Park Plaza facing Southwest

Chapter 6.0

Historic and Archaeological Resources

6.0 HISTORIC AND ARCHAEOLOGICAL RESOURCES

This section identifies the historic and archaeological resources within and in the vicinity of the Project Site and describes potential Project-related impacts to the resources. The Project has been sensitively designed to be responsive to and harmonious with its context. The Project will have minimal impacts to the Existing Building and surrounding area, imparting a measure of visual interest to the local skyline while remaining aesthetically deferential to the historic Motor Mart Garage.

6.1 Existing Conditions

Occupying a pentagonal parcel bounded by Columbus Avenue to the north, Stuart Street to the south, Church Street to the west and Eliot Street to the north and east, the Project Site is located in Park Square, which in turn lies south of the Boston Public Garden, southwest of Boston Common, north of Bay Village and southeast of the Back Bay.

Freed from the railroad yards that had characterized the area throughout much of the nineteenth century, Park Square was poised for change following the completion of South Station at Atlantic Avenue and Summer Street in 1897. Whereas previously each southbound railroad had maintained its own facility in Park Square, the South Station headhouse served the Boston and Albany, Boston and Providence, Old Colony and New York, and New Haven and Hartford lines. As a result, the former locations of the separate stations, tracks and freight yards afforded sizable building sites for redevelopment.

Although large-scale construction activity was delayed initially by the financial panic of 1907 and again by the First World War, a building boom transformed this section of the city beginning in the 1920s. During that prosperous decade, Park Square gained the massive steel-framed Park Plaza Hotel and office buildings that continue to dominate its streetscapes to the present day. Ten to fifteen stories in height with footprints conforming to the lot lines to maximize profitability, each of these buildings represents a variant of the Italian Renaissance style and is executed in pale masonry materials of limestone, buff brick, terra cotta or concrete. These properties include the Statler (now Park Plaza) Hotel and office building, the former Boston Gas Company and the original John Hancock and Liberty Mutual Insurance Company buildings. Another notable example from this period is the Park Square Building, which fills a 15-acre site spanning an entire block along Stuart Street and St. James Avenue between Arlington and Berkeley streets.

6.1.1 Historic Resources within the Project Site

It was in this already bustling and visually well-defined context that construction of 201 Stuart Street, the Motor Mart Garage, began in 1926. When completed three years later, in May 1929, the eight-story structure was the largest parking garage in the world. Many of these automobiles belonged to the guests of the Statler Hotel, opposite, whose site had been chosen in anticipation of the garage's proximity. Promoted as "more than a place to park your car," the Motor Mart not only included a Texaco filling station and car wash but also offered a variety of other automotive services to the public. Among these were lubrication, tire, brake and battery work in addition to headlight adjustment and general repairs. Nor was the Motor Mart solely the province of the private vehicle: mass transit was represented by several bus lines operating out of the building's Park Square Motor Coach Terminal. These included the B & M Transportation Company, Colonial Greyhound Lines, Frontier Coach Lines, New England Transportation Company, and the Newport Short Line. Another early tenant was the Lewis Auto Rental Service. Meanwhile, several of the building's ground-floor storefronts were occupied by non-automotive businesses catering to the patronage of garage customers; these included a coffee shop, newsstand, florist and fruit stand.

An eight -story, steel-framed concrete building occupying the entirety of its pentagonal site, the Motor Mart's five exterior elevations vary in width from ten to 20 bays but are consistent in their ornamental program. Above a base of ground-floor storefronts interrupted only by garage entry and egress bays, each elevation's six-story shaft is bracketed by unadorned corner piers. The masonry openings of the vertical bays are divided by wide pilasters; unusually, these display shallow flutes and are surmounted by stylized Greek key motifs in lieu of capitals.

Demarcating each successive floor level, the bays' individual window openings are equipped with metal-framed hoppers set vertically between pressed-metal spandrel panels. At the second floor, each corner bay is emphasized by an aediculated surround with shallow balconette, above which a large winged medallion appears in low relief. Suggesting both the wheel of an automobile and an Egyptoid sun disk, this circular motif conveys in microcosm the equivocal nature of the Motor Mart's decorative expression, at once traditional and modern.

At the attic level, aligned with each vertical bay below, horizontally proportioned concrete ventilation grilles are divided by piers on which are centered small applied concave roundels. Supported by dentils, the minimally projecting cornice encircles the roof line; this is punctuated by small palmettes whose rhythmic placement (corresponding to the bays below) adds a degree of animation as the building meets the sky.

In stylistic terms, the Motor Mart is a relatively early expression of so-called Stripped Classicism, which would become nationally prevalent in the next decade. Characteristically, buildings in this idiom feature ornament derived from antiquity but applied with an unusually light hand. The resulting sparseness of detail yields a sleek effect that demonstrates the influence of the Art Déco and other modernist styles then in vogue. The Stripped Classical style (sometimes called "Starved Classical" by its detractors) gained widespread popularity for civic and commercial buildings during the Great Depression of the 1930s. Its blend of precedent and restraint seemed to answer a cultural need to reconcile the desire for tradition with the demands of economy.

The Motor Mart was designed by Ralph Harrington Doane (1886-1941), a Nova Scotia-born minister's son who received his architectural education at MIT, from which he was graduated in 1912. In 1916 Doane accepted an appointment from the Philippine government to design numerous civic buildings in Manila; most notable among these is the Classical Revival-style public library (now the National Museum of Anthropology) whose parapet detail anticipates that of the Motor Mart.

Upon his return to the United States two years later, Doane opened his own firm in Boston where he remained in architectural practice for the remainder of his life. Proficient in both revival and modernistic styles, Doane designed the Hutchinson Building at Bromfield and Province streets in Boston's central business district, a sophisticated limestone composition of 1924 that suggests the architect's affinity for the English Regency. His other classically inspired works in Massachusetts favor red brick; these include the distinguished cluster of four Federal Revival courtyard apartment buildings at 360-388 Beacon Street in the Back Bay (1926); the Cunningham Junior High School in East Milton (1935), and the Norwell High School and Town Hall buildings (1936). In the modernist vein, Doane's best-known work after the Motor Mart may be the Rindge Technical High School in Cambridge (1932). While the latter is considerably smaller in height and footprint, it repeats the garage's pale masonry veneer, shallow pilaster fluting and elongated window openings.

Recognizing the merit of his Motor Mart Garage, the Boston Society of Architects awarded Ralph Harrington Doane its prestigious Harleston Parker Medal for having created the city's most beautiful new building of 1927. After an early heyday which continued into the 1940s, the Motor Mart suffered from several decades of neglect during the post-World War II era. While the garage remained in active use during these years, routine maintenance was deferred and original storefront conditions were compromised by haphazard tenant alterations. As a consequence, the building acquired a forlorn air which detracted not only from its own appearance but also from that of Park Square as a whole.

The Motor Mart received a comprehensive restoration in the late 1990s; this ambitious effort involved not only the complete removal and replacement of the building's concrete veneer but also the reintroduction of its original storefront detail. Even the building's long-vanished upright illuminated sign was re-created (albeit relocated from its historic position). Following the restoration, building maintenance has since been conducted to a high standard.

Though included in the *Inventory of Historic and Archaeological Assets of the Commonwealth* ("the Inventory"), the Motor Mart is not included in either the State or National Registers of Historic Places. It is, however, located within the Park Square-Stuart Street Historic District, which has been determined eligible for listing in the National Register. The National Register nomination prepared for the district in 2006 identifies the Motor Mart as "contributing" to the historic and architectural significance of the district. While the district was not formally listed in the National Register due to objections from a majority of the property owners, the district is nonetheless considered historically significant for its associations with the development of the Back Bay in the late nineteenth and early twentieth centuries, and architecturally significant for its diverse and intact collection of commercial buildings reflecting the architectural styles of the period.

6.1.2 Historic Resources in the Vicinity of the Project Site

The Project Site is located in close proximity to a dense cluster of National Register and locally designated historic districts as well as properties individually listed in the State and National Registers of Historic Places. Among these are the Bay Village Historic District, the South End Historic District and locally designated South End Landmark District, the Boston Common, the Boston Public Garden, the Piano Row Historic District, and the locally designated Back Bay Architectural District and Back Bay Historic District. These and other resources in the Project vicinity, which are included in the State and National Registers of Historic Places, are described below.

Established in 1634 as a public pasture for the grazing of settlers' livestock, the **Boston Common** is the oldest municipal park in the United States. It is also the oldest link in the so-called Emerald Necklace of contiguous Boston parklands. Bounded by Tremont, Park, Beacon, Charles and Boylston streets, its footprint encompasses some 50 acres. Used as an encampment by occupying British forces during the Revolutionary War, the Common was also the scene of public executions until the early nineteenth century. Thereafter it came to function more as a modern city park, enhanced by ornamental plantings and pedestrian promenades (or "malls"), as well as decorative fencing, water features and commemorative statuary. Perhaps its most admired work of public art is the memorial to Captain Robert Gould Shaw and the 54th Massachusetts Regiment, which faces Beacon Street opposite the State House. Unveiled in 1897, this bronze relief by Augustus St. Gaudens depicts the Boston native Shaw on horseback leading his volunteer infantry of African-American freedmen and escaped slaves prior to battle in the Civil War. Consistent with its historic origins as a locus of community engagement, the Common continues to attract civic gatherings, political protests, musical performances and other cultural events. It also affords active and passive recreational opportunities for Bostonians and visitors throughout the year. Following its National Register listing in 1972 and local landmark designation in 1977, the Boston Common attained recognition as a National Historic Landmark in 1987.

Located just west of the Common on a former tidal marsh, the **Boston Public Garden** was initially conceived in 1837 as a formal botanical garden of a type previously known only in Europe. As the first of its kind in the United States, the Public Garden was designed to include specimen trees and a seasonally rotating display of flowering plant materials. Its rectangular footprint of 24 acres is bounded by Charles, Boylston, Arlington and Beacon streets and contained by ornamental cast-iron fencing. The centerpiece of the landscape is an artificial pond, some four acres in area, which is spanned by a small suspension bridge supported by granite piers. As with the Boston Common, commemorative sculpture abounds within the Garden. Notable works include a prominent equestrian statue of General Washington by Thomas Ball, installed at the Arlington Street entrance in 1869, and the "Angel of the Waters" by Daniel Chester French; a memorial to the philanthropist George Robert White, the latter was dedicated in 1924 at the Garden's northwest corner. In 1987 a highly popular set of bronzes was introduced near the northeast entrance; based on the avian characters of Robert McCloskey's 1942 children's classic *Make Way for Ducklings*, these are the work of sculptor Nancy Schon. Similar to the Boston Common, the Public Garden was listed in the National Register in 1972, designated a Boston Landmark in 1977 and recognized as a National Historic Landmark in 1987.

The Project Site lies to the southeast of the **Back Bay Historic District** and **Architectural District,** which is bounded by Arlington Street to the east and Massachusetts Avenue and Charlesgate East to the west, Boylston Street to the south and the Charles River Esplanade to the north. Beginning in 1857 at Arlington Street, the area of land known as the Back Bay was created by filling in vast spans of tidal flats. Heavily influenced by the contemporary redevelopment of Paris under Napoleon III, the landfill operation was conceived on a rational gridded plan. This incorporated regular setbacks, minimum building heights and a public alley system to ensure a harmonious appearance. By the late 1880s, the marshy flats that once separated Boston and the neighboring town of Brookline had been completely filled in. The result was the creation of approximately 400 acres of dry, developable—and highly desirable–land. Attracting the interest of prosperous private individuals, churches and cultural institutions, the new area's appeal soon eclipsed that of the neighboring South End. Notable among its buildings are major residential, ecclesiastic and civic and institutional works by nationally significant architects, including H. H. Richardson, McKim, Mead & White, and Peabody & Stearns. Other architects of local and regional importance are also well represented. Aesthetically, these designs epitomize the Second Empire, Romanesque Revival, Queen Anne, Colonial Revival, and Classical Revival styles. The Back Bay Historic District was listed in the National Register in 1973. Enacted in 1966, the locally designated Back Bay Architectural District has similar boundaries to the National Register district but does not include Copley Square or the largely commercial properties on the south side of Boylston Street.

A linear park extending more than a mile westward from the Public Garden to Charlesgate, just east of Kenmore Square, the **Commonwealth Avenue Mall** is both the central axis of the Back Bay and a major component of Boston's so-called Emerald Necklace of contiguous public parklands. An integral feature of architect Arthur Gilman's original 1857 plan for the neighborhood, the mall was modeled on the landscaped boulevards of Second Empire Paris. Four rows of American elms (now partially replaced with more disease-resistant specimens) form a double allée lining a broad central promenade; this is punctuated in each block by statuary depicting such well-known historical figures as Leif Eriksson, Alexander Hamilton, and William Lloyd Garrison, among others. The most recent addition, from 2003, is the Boston Women's Memorial, which honors the enslaved African-American poet Phillis Wheatley, presidential wife and mother Abigail Adams and feminist Lucy Stone. Included in the National Register in 1973, the Commonwealth Avenue Mall was designated a local landmark in 1978.

The **block of Tremont Street between Avery and Boylston streets** has lost several contributing buildings to demolition since its 1980 inclusion in the National Register. Nevertheless, it retains three distinguished steel-framed structures from the late nineteenth and early twentieth centuries. These include the ten-story Renaissance Revival-style Oliver Ditson Building at 178-179 Tremont Street, designed by C. Howard Walker in 1916; the soaring 15-story Moderne skyscraper by Bigelow, Wadsworth, Hubbard & Smith at 180-182 Tremont Street, completed in 1931 as the second Edison Electric Illuminating Company building; and, at 183-186 Tremont Street, the Renaissance Revival-style Grand Lodge of Masons built in 1897 to the designs of Loring & Phipps.

The Project Site is located north of the **South End District** and **Landmark District**. The South End of Boston was developed predominately between 1848 and 1930. The neighborhood's oldest thoroughfare, Washington Street, was laid out on the "neck" connecting Boston's originally peninsular landmass with the Roxbury mainland. The City of Boston eventually filled the tidal marshes lining Washington, and in 1848 began to auction off parcels to speculative developers. As a result of this initiative, the South End became one of the most fashionable residential neighborhoods of mid-nineteenth century Boston.

Although its earliest buildings are conservative flat-fronted, gable-roofed Greek Revival rowhouses, the South End is better known for its harmonious blocks of speculator-built houses whose bow-fronted façades and mansard roofs reflect the later and more florid Italianate and Second Empire styles. Many of these line ornamental squares of varying proportions, featuring cast-iron fences and fountains. Despite changes in use and alterations to many of its buildings, the South End is today the largest remaining urban Victorian residential neighborhood in the U.S. East of its residential streets and adjacent to major rail lines, an industrial area dominated by warehouses and factory buildings was developed in the later nineteenth and early twentieth centuries; this is now a designated sub-district known as the South End Protection Area. Included in the National Register of Historic Places in 1973, the 600-acre South End attained local historic district status in 1983.

The **Piano Row Historic District** comprises two blocks of distinguished late nineteenth-century commercial buildings along Tremont and Boylston streets overlooking the southwest corner of the Boston Common. Its name reflects a historic concentration of music-related business enterprises, including several piano showrooms. Most notable among these is the establishment of M. Steinert & Sons, which has retailed Steinways since 1896. Piano Row was included in the National Register of Historic Places in 1980.

The **Bay Village Historic District** was designated a local historic district in 1983. Located southwest of Downtown Boston, Bay Village was first constructed on landfill in the 1820s. Before acquiring its present name during the so-called urban pioneer movement of the 1960s, the area had been known as the Church Street District. Dating from the second quarter of the nineteenth century, the early dwellings of Bay Village exemplify the late Federal and Greek Revival styles, resembling smaller, more modestly ornamented versions of houses found on Beacon Hill. This phenomenon is explained by the fact that housewrights active in the development of Beacon Hill built their own homes here in the prevailing architectural fashions of the day, though smaller in scale and simpler in detail.

As the nearby South End and Back Bay neighborhoods were developed in the years immediately before and after the Civil War, substantial brick houses and residential hotels went up along Cortes and Isabella Streets, in the area west of Arlington Street (which was known as Ferdinand Street until the turn of the twentieth century). Variously Second Empire, Ruskin Gothic or Queen Anne in style, these buildings mirror the visual character of those adjacent residential areas.

In the early 20th century, Bay Village benefited from its proximity to the downtown theater district, becoming a hub for film distribution throughout New England. Though since converted to residential use, a number of former movie warehouses and newsreel studios survive from this era, particularly on Piedmont, Winchester and Church streets. Modest in size and economical in detail, these vernacular buildings echo the fanciful Art Déco and streamlined Art Moderne idioms associated with the cinemas of the period. The **Boston Edison Electric Illuminating Company** building at 25-39 Boylston Street is an 11-story Beaux-Arts skyscraper initially built in 1906 to the designs of Winslow & Bigelow. Typical of the genre, its limestone façade corresponds to the capital expression of a classical column's base, shaft and capital, in which an elongated storefront base and rusticated *piano nobile* supports the smooth ashlar of the upper floors, crowned in turn by a more heavily ornamented attic story. An addition completed in 1922 by Bigelow and Wadsworth, the original architects' successor firm, is similar but disregards the symmetry of the composition. The building was listed in the National Register in 1979.

The **Young Men's Christian Union**, located at 48 Boylston Street near the southeast corner of the Boston Common, is a building in the High Victorian (or Ruskin) Gothic style. Completed in 1875 to the designs of Boston architect Nathaniel Bradlee, it is noteworthy for its ornate sandstone façade and was designated a Boston Landmark in 1977.

The **Boylston Building** at 2-22 Boylston Street is the work of the German-born architect Carl Fehmer. Completed in 1887, it is an early and rather tentative example of skeletal framing, which relies on load-bearing masonry for its minor elevations. Seven bays wide by three bays deep, its Renaissance Revival façade of Nova Scotia sandstone is underpinned by the cast-iron piers of the elongated storefront base. On the office floors above, a variety of round-arched and square-headed window openings appear in groupings of two and three; at the top floor, these are surmounted by narrower arched windows arranged in clusters of four and five. The Boylston Building attained local landmark status in 1977 and was included in the National Register in 1980.

Built in 1875 at the corner of Lagrange Street, the **Hayden Building** at 681-683 Washington Street is Boston's last surviving commercial building designed by H. H. Richardson. Despite its small footprint of 22 by 62 feet and modest five-story height, the building's simple silhouette, arched fenestration and quarry-faced sandstone elevations identify the architect's work. These features also seem to anticipate by nearly a decade Richardson's magnum opus, Chicago's Marshall Field Warehouse, completed in 1886. Designated a Boston Landmark in 1977 and listed in the National Register in 1980, the Hayden Building is also subject to a preservation restriction instituted in 1995.

A pair of 3½-story bow-fronted rowhouses dating from 1844, the **Jacob Wirth Building** at 31-39 Stuart Street is unified by a cast-iron storefront added as part of its conversion to a restaurant in 1868. Still in operation today, Jacob Wirth & Co. is the second-oldest continuously operating restaurant in Boston (after the Union Oyster House). Its exterior is distinctive for its painted-brick façade and pedimented dormers, while its interior retains much of its original Victorian-era woodwork and other historic fabric. It was designated a Boston Landmark in 1977 and added to the National Register in 1980.

The **Dill Building** at 11-25 Stuart Street is a six-story red-brick commercial building completed to the designs of A. S. Drisko between 1886 and 1888. Listed on the National Register of Historic Places in 1980, the Dill Building is now operated as a hostel.

Designed by the well-known architect Clarence Blackall, the **Wilbur Theater** at 244-250 Tremont Street was completed in 1913. Trimmed with white marble, its symmetrical red-brick façade evokes a transitional Federal-to-Greek Revival idiom often seen on Beacon Hill. Accommodating 1,200 patrons, the theatre was designated a Boston Landmark in 1987.

Another Blackall design, the **Metropolitan Theater** at 270 Tremont Street was completed in 1925. Its restrained Classical façade of monochromatic limestone belies the colorful opulence of its vast interior, which has a seating capacity of 3,600. Now operated as the Citi Performing Arts Center, the Metropolitan was designated a Boston Landmark in 1990.

Opposite the Wilbur, at 263-265 Tremont Street, stands the **Shubert Theater**. Opened as the Lyric Theatre in 1910, the building was designed by architect Thomas James of the firm Hill, James & Whitaker. Spanned by an arched marquee of iron and glass, its limestone façade is expressed as a triumphal arch centering a Palladian window. The theater was listed in the National Register in 1980.

The **Charles Playhouse** at 76-78 Warrenton Street has enjoyed a vivid history. Its pedimented red-brick façade dominated by a monumental pair of Ionic columns in antis suggests its origin as a house of worship. Erected in 1839 as a Universalist church designed by Asher Benjamin, the building was later used as a synagogue and a speakeasy before its conversion to a theater in 1958. It was included in the National Register in 1980.

The **Paine Furniture Building** at 75 Arlington Street is a ten-story, steel-framed Classical Revival design. Its three street-facing elevations are veneered in limestone and buff brick with ornaments of terra cotta; the main entrance is sheltered by a robustly curved cast-iron marquee. The work of architects Densmore & LeClear, it was completed in 1913 and remained in use by the Paine company for more than eight decades. As the first new construction to occupy former railroad yards in Park Square, it established the style, scale and materials palette for subsequent buildings erected there over the next twenty years. It was listed in the National Register in 2002.

Built in 1861, **Emmanuel Church** at 15 Newbury Street is both the only Back Bay church to occupy a mid-block site and the only one to lack a steeple. Nevertheless, the building enjoys a major presence on the streetscape, occupying approximately one-third of the block between Arlington and Berkeley streets. Designed by Alexander Estey in a restrained English rural Gothic style, its principal elevations are of randomly coursed Roxbury puddingstone trimmed with low-contrast sandstone below a steeply pitched roof of gray slate. Its Lindsey Chapel was added in 1924 as a memorial to a parishioner who perished in the sinking of the *Lusitania* during the First World War. The chapel's interior is the work of a noted Scottish architect, the Gothic Revivalist Ninian Comper. Included in the locally designated Back Bay Architectural District enacted in 1966 and the Back Bay National Register District designated in 1973, Emmanuel Church is also the subject of a preservation restriction instituted in 2014.

The fortress of rock-faced granite at 97-105 Arlington Street was built as the **Armory of the First Corps of Cadets**, an élite militia unit, in 1895. Designed by William Gibbons Preston in a robust Romanesque Revival style, its round-arched window openings and six-story corbeled tower demonstrate the continuing influence of H. H. Richardson. Listed in the National Register in 1973, the building was designated a Boston Landmark in 1977.

Named for the children's weekly founded in 1827 and published there until 1929, the **Youth's Companion Building** at 195-215 Columbus Avenue was completed in 1887. Designed by the firm Henry Walker Hartwell & William Cummings Richardson, the five-story composition dominates the corner of Berkeley Street. Suggesting a flat-roofed transcription of H. H. Richardson's Sever Hall at Harvard, this affinity is evident from the building's ample footprint, the low-contrast materials of red Longmeadow stone and Roman brick, and the broad "Syrian" arch of its main entry. Although a reticulated parapet of stone and brick was removed in 1953, the building's exterior elevations are otherwise intact, as is the double-height, granite-floored interior lobby. The Youth's Companion Building was included in the National Register in 1974.

The tiny brick house at **1 Bay Street** in the Bay Village Historic District occupies a footprint of only 650 square feet. Twenty feet wide and 2½ stories tall, its elliptical-arched entry recess identifies its late Federal style. Built ca. 1830, it was included in the National Register in 1994.

Table 6-1 lists the State and National Register-listed properties and historic districts located within a quarter-mile radius of the Project Site. The individually listed properties are assigned numbers, which correspond to Figure 6-1. Figure 6-1 also identifies the locations of the State and National Register-listed historic districts within a quarter mile of the Project Site; these are indicated by letters.

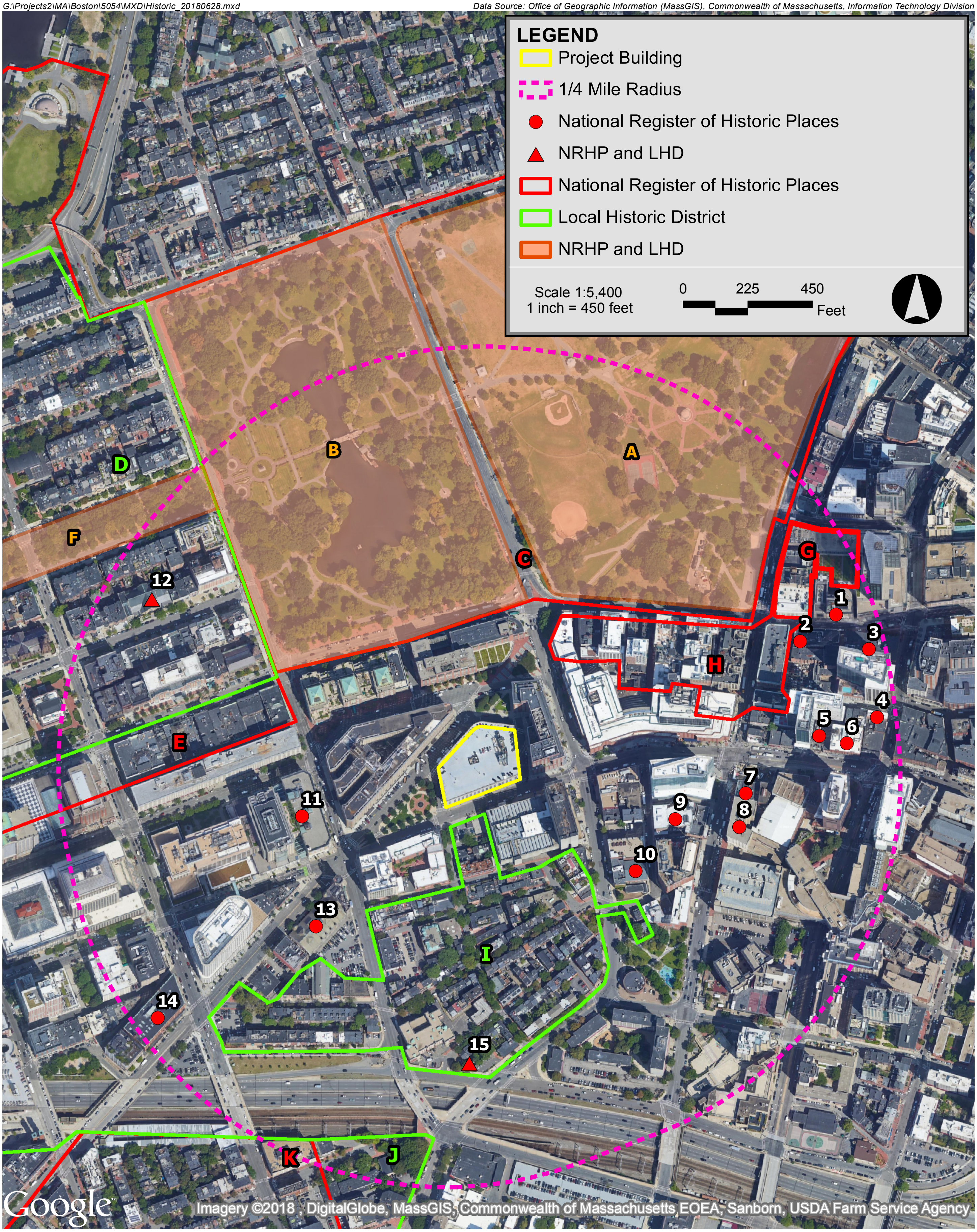
Table 6-1 State and National Register Resources in the Vicinity of the Project Area

No.	Historic Resource	Address	Designation
1	Boston Edison Electric Illuminating Company	25-39 Boylston St.	NRDOE, NR, NRMRA
2	Young Men's Christian Union	48 Boylston St.	LL, NR, NRMRA
3	Boylston Building	2-22 Boylston St.	LL, NR, NRMRA
4	Hayden Building	681-683 Washington St.	LL, NR, NRMRA,PR
5	Jacob Wirth Building	31-39 Stuart St.	LL, NR, NRMRA
6	Dill Building	11-25 Stuart St.	NR, NRMRA
7	Wilbur Theatre	244-248 Tremont St.	LL, NR, NRMRA
8	Metropolitan Theatre	252-272 Tremont St.	LL, NR, NRMRA
9	Shubert Theatre	263-265 Tremont St.	NR, NRMRA
10	Charles Playhouse	76-78 Warrenton St.	NR, NRMRA
11	Paine Furniture Building	75-81 Arlington St.	NR
12	Emmanuel Church	15 Newbury Street	LHD, NR, PR
13	Armory of the First Corps of Cadets	97-105 Arlington St.	LL, NR
14	Youth's Companion Building	195-215 Columbus Ave.	NR
15	1 Bay Street	1 Bay Street	LHD, NR
A	Boston Common		LL, NHL, NRDIS
B	Boston Public Garden		LL, NHL, NRDIS
C	Boston Common & Public Garden		NRDIS
D	Back Bay Architectural District		LHD
E	Back Bay Historic District		NRDIS
F	Commonwealth Avenue Mall		LL, NRDIS
G	Tremont St. block between Avery and Boylston		NRDIS, NRDOE, NRMRA
H	Piano Row Historic District		NRDIS, NRMRA
I	Bay Village Historic District		LHD
J	South End Landmark District		LHD
K	South End Historic District		NRDIS

Designation Legend:

NR	Individually listed on the National Register of Historic Places
NRDIS	National Register of Historic Places historic district
NRDOE	Determined eligible for inclusion in the National Register of Historic Places
NRMRA	National Register Multiple Resources Area
NHL	National Historic Landmark
LHD	Local Historic District
LL	Local Landmark
PR	Preservation Restriction

Data Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division



Motor Mart Garage **Boston, Massachusetts**

Epsilon
ASSOCIATES INC.

Figure 6-1
Historic Resources

6.1.3 Archaeological Resources on the Project Site

The Project Site is a currently developed urban parcel. As confirmed on July 24, 2018, there are no known archaeological resources listed in the State and National Registers of Historic Places or included in the Inventory within the Project Site.

6.2 Impacts to Historic Resources

Potential urban design and shadow impacts of the new construction on nearby historic resources were considered and are summarized below.

6.2.1 Demolition of Historic Resources

No demolition of historic resources will be required to execute the Project, which is essentially additive in nature.

6.2.2 Urban Design

The proposed Project will bring a new but discreet presence to the local skyline. While participating in the large-scale buildings of Stuart Street and Park Square, which span nearly a century in origin, the Project's design pursues a distinctive aesthetic which is intended to complement, but not compete with, the original Motor Mart and the historic resources in the vicinity. This balance has been achieved by managing the setback, footprint and massing, all of which are clearly distinct from the Existing Building. These adjustments allow the addition to float somewhat equivocally above the present roof line. More significantly, a curvilinear expression ensures the continued visual primacy of the architecturally angular, polygonal historic garage.

Accordingly, the design of the Project responds to the monumental scale, irregular footprint and monochromatic masonry palette, here leavened with glass, of its Stuart Street neighbors. Moreover, it achieves this visual result in a re-interpretive, rather than imitative, fashion. Similarly, its height of approximately 310 feet acknowledges and relates well to, but does not exceed, that which is typical for this segment of the so-called High Spine. From east to west, the Project's height is equal to or exceeded by 45 Stuart Street (332 feet); the W Hotel (310 feet); Liberty Mutual (325 feet); the old John Hancock building (430 feet); 380 Stuart and the Clarendon (both, 370 feet); and the planned 40 Trinity Place (393 feet).

There are no anticipated urban design impacts to any other historic resources within the vicinity of the Project Site.

6.3 Shadow Impacts to Historic Resources

A shadow impact analysis was conducted to demonstrate the anticipated impacts from the Project. These consisted of standard shadow studies done for March 21, June 21, September 21, and December 21 at 9:00 a.m., 12:00 p.m. and 3:00 p.m., as well as 6:00 p.m. for June 21 and September 21.

The shadow analysis for the Project demonstrates that net new shadow is limited in extent and duration, and is typically cast across Columbus Avenue, Stuart Street, and Charles Street South. With the exceptions of 9:00 a.m. and 3:00 p.m. on December 21, when existing shadow on the Boston Public Garden and Boston Common is extended, the chief shadow impact appears to be on the Statler Office Building; this building is partially shadowed on March 21 at 9:00 a.m. and 12:00 p.m., on June 21, at 9:00 a.m. on September 21 at 9:00 a.m., and on December 21 at 9:00 a.m. and 12:00 p.m. There is no new shadow cast on the Statler building during the other times studied.

The results of these shadow studies are included in Section 3.2 and shown in Figures 3.2-1 to 3.2-14.

6.4 Wind Impacts to Historic Resources

The results of the wind analysis demonstrate minimal anticipated impacts on historic resources within and adjacent to the Project Site, in that mean wind speeds are expected to be comfortable for walking or suitable for more passive activities. Moreover, the effective gust criterion is met both seasonally and annually.

6.5 Conclusion

The Project has been sensitively designed to be responsive to and harmonious with its context. The Project will have minimal impacts to the Existing Building and surrounding area, imparting a measure of visual interest to the local skyline while remaining aesthetically deferential to the historic Motor Mart Garage.

Chapter 7.0

Infrastructure

7.0 INFRASTRUCTURE

This Chapter outlines the existing utilities surrounding the Project Site, the connections required to provide service to the Project, and any impacts on the existing utility systems that may result from the construction of the Project. The following utility systems are discussed herein:

- Sewer
- Domestic water
- Fire protection
- Drainage
- Natural gas
- Electricity
- Telecommunications

The Project includes the construction of an additional 20 floors of apartment and condominium units atop the existing eight story parking garage located at 201 Stuart Street. The Project Site is located on Stuart Street in Boston and is bounded by Stuart Street to the south, Church Street to the west, Columbus Avenue to the northwest, Eliot Street to the northeast, and Broadway Street (Park Plaice) to the east.

The Project is anticipated to have minimal impacts on existing infrastructure, and no significant infrastructure improvements should be necessary to accommodate the Project.

7.1 Wastewater

7.1.1 Existing Sewer System

Existing Boston Water and Sewer Commission (BWSC) dedicated sewer and combined sewer mains are located in Stuart Street, Church Street, Columbus Avenue, Eliot Street, and Park Plaice.

Stuart Street

There is a 12-inch BWSC combined sewer main which flows in a westerly direction before joining a 54-inch by 48-inch combined sewer main in Church Street.

Church Street

There is a 54-inch by 48-inch combined sewer main which flows in a northerly direction before joining a 60-inch by 60-inch combined sewer main in Columbus Avenue.

Columbus Avenue

There is a 60-inch by 60-inch combined sewer main which flows in a northeast direction before joining a 69-inch by 69-inch BWSC combined sewer main that ultimately flows northerly across Boylston Street and joins a 52-inch by 48-inch BWSC combined sewer main. The flow eventually joins a 76-inch by 92-inch MWRA interceptor main along Storrow Drive which ultimately flows to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

Broadway Street (Park Plaice)

There is an existing 12-inch dedicated sewer main which flows in a northerly direction before joining a 20-inch dedicated sewer and then a 24-inch dedicated sewer main which flows westerly along Park Plaza and then joins a 36-inch dedicated sewer main which flows westerly along Saint James Avenue. The flow joins another 36-inch main in Dartmouth Street which flows northerly before joining the 57-inch by 66-inch West Side Interceptor which ultimately flows to the MWRA Deer Island Water Treatment Plans for treatment and disposal.

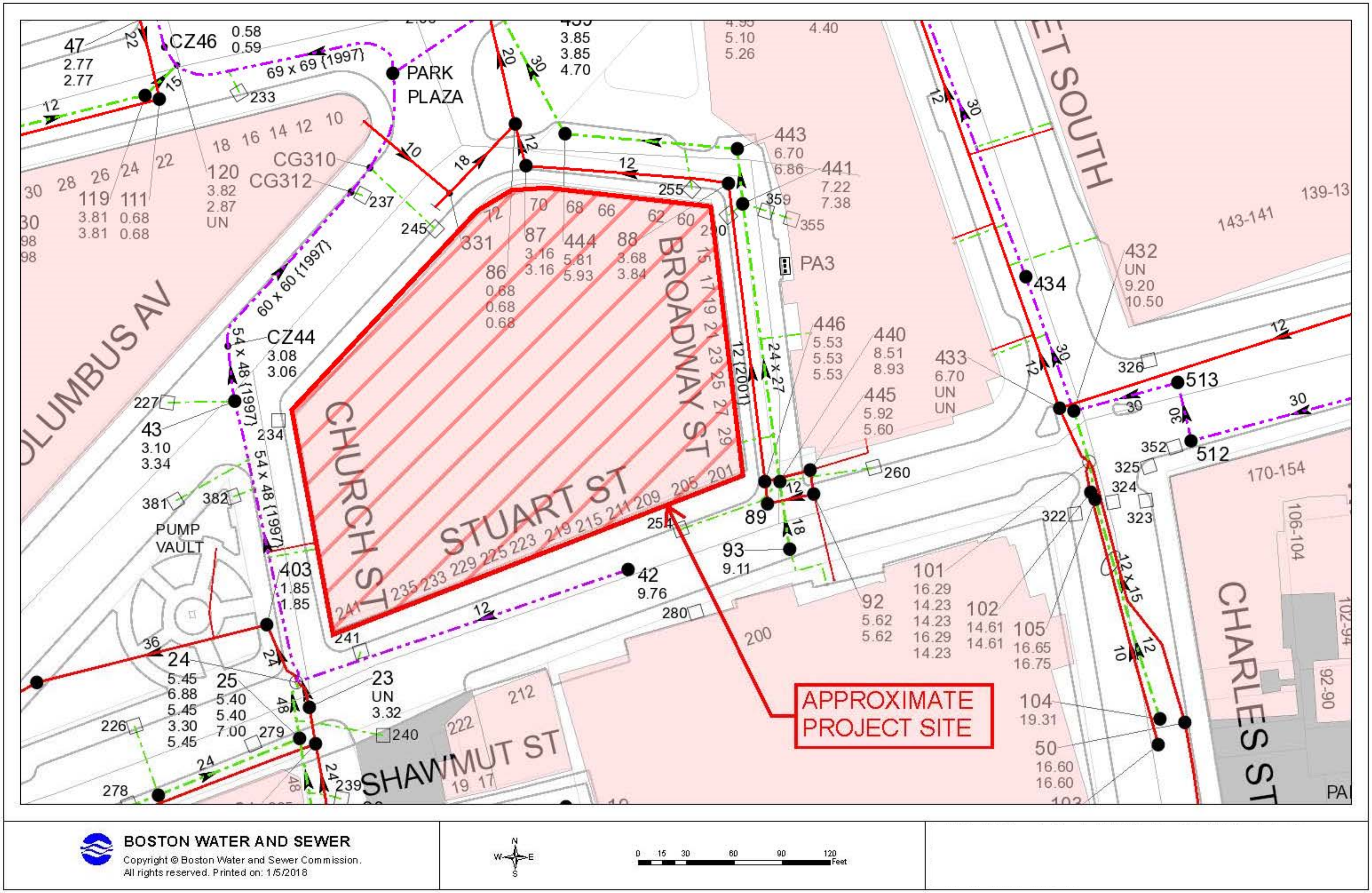
The existing sewer system is illustrated in Figure 7-1.

7.1.2 Wastewater Generation

The Project's sewage generation rates were estimated using record BWSC water meter billing data for the Existing Building and Massachusetts Department of Environmental Protection 310 CMR 15.00 values for the proposed building program. 310 CMR 15.00 lists typical sewage generation values for the proposed building use, as shown in Table 7-1. Typical generation values are conservative values for estimating the sewage flows from new construction.

The Project Site is currently comprised of an eight-story building, with retail and restaurant spaces on the ground floor and seven stories of garage parking above.

The Project will retain approximately 46,000 sf of existing ground floor retail spaces and much of the garage parking within the seven floors above. Within this retail area the Project anticipates retaining one of the existing restaurants and adding one smaller restaurant. The western portion of the Existing Building will be redeveloped into residential units, and a 20-story residential tower comprised of apartment and condominium units will rise out of the Existing Building.



Motor Mart Garage Boston, Massachusetts

Figure 7-1

Existing Sewer and Stormwater System

Nitsch Engineering

Table 7-1 Proposed Project Wastewater Generation

Use	Size/Unit	310 CMR Value (gpd/unit)	Total Flow (gpd)
Existing Building Program (from average existing water billing data for 2017)			
201 Stuart St	-	-	27,027
		Total Existing Sewer Flows	**27,027**
Proposed Residential Building (using average 310 CMR values)			
Lobby Space	8,017 square feet	75/1,000 SF	601
Retail Space	20,000 square feet	50/1,000 SF	1,000
Restaurant 1	420 seats	35/seat	14,700
Restaurant 2	210 seats	35/seat	7,350
Garage Parking	52,164 square feet	50/1,000 SF	2,608
Total Bedrooms	418 Bedrooms	110/bedroom	45,980
		Total Proposed Sewer Flows	**72,239**

Increase in Sewer Flows (gpd):	**45,212**

7.1.3 Sewage Capacity and Impacts

The Project's impact on the existing BWSC systems in Stuart Street, Church Street, and Broadway Street (Park Plaice) were analyzed. The existing sewer system capacity calculations are presented in Table 7-2.

Table 7-2 Sewer Hydraulic Capacity Analysis

Manhole (BWSC Number)	Distance (feet)	Invert Elevation (up)	Invert Elevation (down)	Slope (%)	Dia. (in)	Manning's Number	Flow Capacity (cfs)	Flow Capacity (MGD)
Stuart Street (Combined Sewer)								
42 to 48	217	9.76	3.32	3.0%	12	0.013	6.14	3.97
						Minimum Flow Analyzed:	6.14	3.97
Church Street (Combined Sewer)								
48 to 43	180	3.32	3.10	0.1%	48	0.013	54.88	35.47
						Minimum Flow Analyzed:	7.19	4.65
Broadway Street (Park Plaice)								
446 to 88	187	5.53	3.84	0.9%	12	0.013	1.47	0.95
88 to 87	128	3.68	3.16	0.4%	12	0.013	0.98	0.64
						Minimum Flow Analyzed:	0.98	0.64

Note: 1. Manhole numbers taken from BWSC Sewer system GIS Map received on February 13, 2018.
2. Flow Calculations based on Manning Equation

Table 7-2 indicates the hydraulic capacity of the existing 12-inch sewer main in Stuart Street, the 48-inch combined sewer main in Church Street, and the 12-inch sewer main in Broadway Street (Park Plaice). The minimum hydraulic capacity is 6.14 million gallons per day (MGD) or 3.97 cubic feet per second (CFS) for the 12-inch main in Stuart Street, 54.88 million gallons per day (MGD) or 35.47 cubic feet per second (CFS) for the 48-inch combined sewer main in Church Street, and 0.98 million gallons per day (MGD) or 0.64 cubic feet per second (CFS) for the 12-inch main in Broadway Street (Park Plaice).

Based on an average daily flow estimate for the Project of 72,239 GPD or .0722 MGD, an increase of 45,212 GPD or .0452 MGD from the Existing Building; and with a factor of safety estimate of 10 (total estimate = 0.0452 MGD x 10 = 0.452 MGD), no capacity problems are expected within the BWSC sewer systems in any of the adjacent roadways.

7.1.4 Proposed Conditions

The Proponent will coordinate with the BWSC on the design and capacity of the proposed connections to the sewer system. The Project is expected to generate an increase in wastewater flows of approximately 45,212 gpd. Approval for the increase in sanitary flow will come from BWSC.

Sewer services for the Existing Building will be evaluated for capacity and condition and will be replaced as necessary. New sewer services resulting from the Project will connect to the existing sanitary sewer mains in Stuart Street, Church Street, and/or Broadway Street (Park Plaice).

Improvements and connections to BWSC infrastructure will be reviewed as part of the BWSC's Site Plan Review process for the Project. This process will include a comprehensive design review of the existing and proposed service connections, an assessment of Project demands and system capacity, and the establishment of service accounts.

7.2 Water System

7.2.1 Existing Water Infrastructure

Water for the Project Site will be provided by the BWSC. There are five water systems within the City, and these provide service to portions of the City based on ground surface elevation. The five systems are southern low (commonly known as low service), southern high (commonly known as high service), southern extra high, northern low, and northern high. There are existing BWSC water mains in Church Street, Columbus Avenue, Eliot Street, and Broadway Street (Park Plaice).

There is a 16-inch southern low in Church Street, two separate 12-inch southern low mains in Columbus Avenue, a 12-inch southern high in Eliot Street, and a 12-inch southern high and 16-inch southern high in Broadway Street (Park Plaice).

The existing water system is illustrated in Figure 7-2.

7.2.2 Anticipated Water Consumption

The Project's water demand estimate for domestic services is based on the Project's estimated sewage generation, described above. A conservative factor of 1.1 (10%) is applied to the estimated average daily wastewater flows calculated with 314 CMR 15.00 values to account for consumption, system losses and other usages to estimate an average daily water demand. The Project's estimated domestic water demand is 79,463 gpd. The water for the Project will be supplied by the BWSC systems in Church Street, Columbus Avenue, Eliot Street and/or Broadway Street (Park Plaice).

The Existing Building at the Project Site has one existing BWSC water account. The historical water use for the service to the Existing Building is estimated to be between 22,247 gpd and 29,084 gpd. This estimate is based on the water meter billing history provided by BWSC for the existing account located at 201 Stuart Street from January 2017 to December 2017. The billing history for the Existing Building water meter account (Account #168475000), is summarized in Table 7-3.

Table 7-3 Existing Building Water Use

	Time Period	Water Use (cubic feet - cf)	Total Days Metered	Water Use (cf/day)	Water Use (gpd)
Minimum Water Use Recorded	1/20/17-2/20/17	92,190	31	2,974	22,247
Maximum Water Use Recorded	6/18/15-7/19/15	124,400	32	3,888	29,084
Average Water Use for 2017	1/20/17-12/21/17	1,212,240	336	3,608	26,987

Note: Billing History for Account #112895000 provided by BWSC record invoices

7.2.3 Existing Water Capacity and Impacts

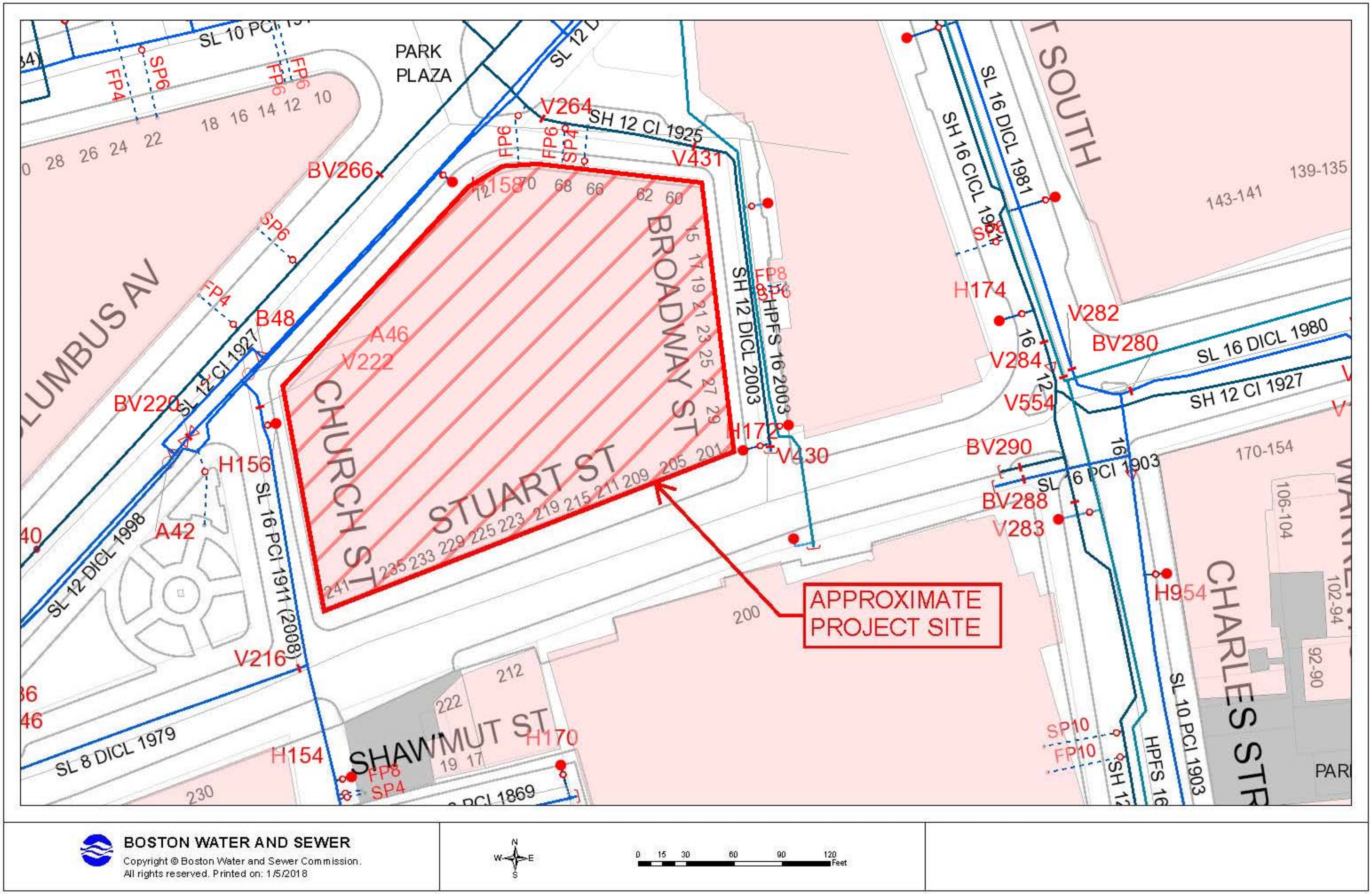
BWSC record flow test data containing actual flow and pressure for hydrants within the vicinity of the Project Site was requested by the Proponent. Hydrant flow data was available for one hydrant near the Project Site. The existing hydrant flow data is shown in Table 7-4.

Table 7-4 Existing Hydrant Flow Data

Flow Hydrant Number	Date of Test	Static Pressure (psi)	Residual Pressure (psi)	Total Flow (gpm)
H108 (Stuart St)	9/20/2016	70	66	1,876

Note: Data provided by BWSC on January 16, 2018.

Water capacity problems are not anticipated within this system as a result of the Project's construction.



Motor Mart Garage **Boston, Massachusetts**

Figure 7-2

Existing Water System

Nitsch Engineering

7.2.4 Proposed Project

The domestic and fire protection water services for the Project will connect to the existing BWSC water mains in Church Street, Columbus Avenue, Eliot Street, and/or Broadway Street (Park Plaice).

The proposed Project's impacts to the existing water system will be reviewed as part of the BWSC's Site Plan Review process.

The domestic and fire protection water service connections required for the Project will meet the applicable City and State codes and standards, including cross-connection backflow prevention. Compliance with the standards for the domestic water system service connection will be reviewed as part of BWSC's Site Plan Review Process. This review will include sizing of domestic water and fire protection services, calculation of meter sizing, backflow prevention design, and location of hydrants and siamese connections that conform to BWSC and Boston Fire Department requirements.

Efforts to reduce water consumption will be made. Aeration fixtures and appliances will be chosen for water conservation qualities. In public areas, sensor operated faucets and toilets will be installed.

New water services will be installed in accordance with the latest local, state, and federal codes and standards. Backflow preventers will be installed at both domestic and fire protection service connections. New meters will be installed with Meter Transmitter Units (MTU's) as part of the BWSC's Automatic Meter Reading (AMR) system.

7.3 Storm Drainage System

7.3.1 Existing Storm Drainage System

There are existing BWSC storm drain mains and BWSC combined sewer mains in Stuart Street, Church Street, Columbus Avenue, Eliot Street, and Broadway Street (Park Plaice) adjacent to the Project Site (combined sewer mains as previously described in Section 7.2.1). The existing combined sewer mains follow the same path as the sanitary sewer through combined sewer mains in Church Street and Columbus Avenue before ultimately flowing to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal. This section will be limited to describing the existing dedicated BWSC storm drain mains in Eliot Street and Broadway Street (Park Plaice).

Broadway Street (Park Plaice)

There is a 24-inch by 27-inch BWSC storm drain which flows in a northerly direction along Broadway Street (Park Plaice) before continuing onto Eliot Street.

Eliot Street

The 24-inch by 27-inch BWSC storm drain from Broadway Street (Park Plaice) flows into a 30-inch storm drain main in Eliot Street and continues flowing in a northerly direction. It continues and joins a 30-inch BWSC combined sewer main, which flows west and eventually joins the previously mentioned 76-inch by 92-inch MWRA interceptor main along Storrow Drive which ultimately flows to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

The existing BWSC storm drain system is illustrated in Figure 7-1.

Stormwater at the site is currently captured by existing closed drainage systems incorporated into the Existing Building. Stormwater in the roadways is captured by existing catch basins, which flow to the existing BWSC combined sewer mains in Church Street, Columbus Avenue, Eliot Street, and Broadway Street (Park Plaice).

7.3.2 Proposed Project

The Project Site is comprised of one Existing Building and is nearly entirely impervious. The Project will meet or reduce the existing peak rates of stormwater discharge and volumes of stormwater runoff from the site and promote runoff recharge to the greatest extent possible.

The Project will strive to infiltrate one-inch of stormwater runoff from impervious areas into the ground to the greatest extent possible. Different approaches to stormwater recharge will be assessed. It is anticipated that the stormwater recharge systems will work to passively infiltrate runoff into the ground with a gravity recharge system or a combination of storage tanks in the building and pumps. The underground recharge system, and any required site closed drainage systems, will be designed so that there will be no increase in the peak rate of stormwater discharge from the Project Site in the developed condition compared to the existing condition.

Improvements and connections to BWSC infrastructure will be reviewed as part of the BWSC's Site Plan Review process. The process will include a comprehensive design review of the proposed service connections, and assessment of Project demands and system capacity.

7.3.3 Water Quality

The Project will not affect the water quality of nearby water bodies. Erosion and sediment control measures will be implemented during construction to minimize the transport of site soils to off-site areas and BWSC storm drain systems. During construction, existing catch basins will be protected with filter fabric, straw bales and/or crushed stone, to provide for sediment removal from runoff. These controls will be inspected and maintained throughout the construction phase until the areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover.

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

7.3.4 Groundwater Conservation Overlay District

The BPDA oversees proposed projects within the Groundwater Conservation Overlay District under Article 32. The Project parcel is located within the City of Boston's Groundwater Conservation Overlay District. The purpose of the article is to prevent deterioration of and, where necessary, promote the restoration of, groundwater levels in the city of Boston, to protect and enhance the city's historic neighborhoods and structures, reduce surface water runoff and water pollution and maintain public safety. Article 32 requires that the Project captures and infiltrates no less than 1.0 inches across the portion of impervious surface area of the lot to be occupied by the Project.

Furthermore, the BPDA also oversees the Smart Utilities Policy for Article 80 Development Review. Since the Project is above the threshold criteria of having at or above 100,000 square feet of floor area, the Project is required through the use of Green Infrastructure to retain, on site, a volume of runoff equal to 1.25 inches of rainfall across the portion of impervious area on site.

The Project will comply with both Article 32 and Article 80 by capturing within a suitably-designed system a volume of rainfall on the lot equivalent to no less than 1.25 inches across that portion of the surface area of the lot to be occupied by the Project. The Project will result in no negative impact on groundwater levels within the lot in question or adjacent lots, subject to the terms of any (i) dewatering permit or (ii) cooperation agreement entered into by the Proponent and the BPDA, to the extent that such agreement provides standards for groundwater protection during construction.

7.3.5 MassDEP Stormwater Management Policy Standards

In March 1997, MassDEP adopted a 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 Policy prescribes specific stormwater management standards for development projects, including urban pollutant removal criteria for projects that may impact environmental resource areas. Compliance is achieved through the implementation of Best Management Practices (BMPs) in the stormwater management design. The Policy is administered locally pursuant to MGL Ch. 131, s. 40.

A brief explanation of each Policy Standard and the system compliance is provided below:

Standard #1: No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Compliance: The Project will comply with this Standard. The design will incorporate the appropriate stormwater treatment and no new untreated stormwater will be directly discharged to, nor will erosion be caused to wetlands or waters of the Commonwealth as a result of stormwater discharges related to the Project.

Standard #2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR.

Compliance: The Project will comply with this Standard. The existing discharge rate will be met or decreased as a result of the improvements associated with the Project.

Standard #3: Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmental sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Compliance: The Project will comply with this Standard to the maximum extent practicable.

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 Project will comply with this standard. Within the Project's limit of work, there will be mostly building roof, paved sidewalk, and roadway areas. Runoff from paved areas that would contribute unwanted sediments or pollutants to the existing storm drain system will be collected by deep sump, hooded catch basins and conveyed through water quality units before discharging into the BWSC system.

Standard #5: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the 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 thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Compliance: The Project will comply with this standard. The Project is not associated with Higher Potential Pollutant Loads (per the Policy, Volume I, page 1-6).

Standard #6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater 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 Project will comply with this Standard. The Project will not discharge untreated stormwater to a sensitive area or any other area.

Standard #7: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

Compliance: The proposed design will comply with this Standard. The Project will comply with the Stormwater Management Standards as applicable to the redevelopment and improve existing conditions.

Standard #8: A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

Compliance: The Project will comply with this Standard. Sedimentation and erosion controls will be incorporated as part of the design of these projects and employed during construction.

Standard 9: A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

Compliance: The Project will comply with this Standard. An O&M Plan including long-term BMP operation requirements will be prepared for the Project and will assure proper maintenance and functioning of the stormwater management system.

Standard 10: All illicit discharges to the stormwater management system are prohibited.

Compliance: The Project will comply with this Standard. There will be no illicit connections associated with the Project.

7.4 Electrical Service

Eversource owns the electrical system in the vicinity of the Project Site. It is expected that adequate service is available in the existing electrical systems in the surrounding streets to serve the Project. The Proponent will work with Eversource to confirm adequate system capacity as the design is finalized.

7.5 Telecommunication Systems

The Proponent will select private telecommunications companies to provide telephone, cable, and data services. There are several potential candidates with substantial downtown Boston networks capable of providing service. Upon selection of a provider or providers, the Proponent will coordinate service connection locations and obtain appropriate approvals.

7.6 Gas Systems

National Grid has gas services in the vicinity of the Project Site. The Proponent will work with National Grid to confirm adequate system capacity as design is finalized.

7.7 Utility Protection During Construction

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

The Proponent will continue to work and coordinate with the BWSC and the utility companies to ensure safe and coordinated utility operations in connection with the Project.

7.8 Conservation of Resources

The State Building Code requires the use of water-conserving fixtures. Water conservation measures such as low-flow toilets and restricted flow faucets will help reduce the domestic water demand on the existing distribution system. The installation of sensor-operated sinks with water conserving aerators and sensor-operated toilets in all non-residential restrooms will be incorporated into the design plans for the Project.

Chapter 8.0

Coordination with other Governmental Agencies

8.0 COORDINATION WITH OTHER GOVERNMENTAL AGENCIES

8.1 Architectural Access Board Requirements

The Project will comply with the requirements of the Massachusetts Architectural Access Board and will be designated to comply with the standards of the Americans with Disabilities Act. The Accessibility Checklist is provided in Appendix I.

8.2 Massachusetts Environmental Policy Act (MEPA)

The Proponent does not expect that the Project will require review by the Massachusetts Environmental Policy Act (MEPA) Office of the Massachusetts Executive Office of Energy and Environmental Affairs. Current plans do not call for the Project to receive any state permits establishing MEPA jurisdiction, state funding, or to involve any state land transfers.

8.3 Massachusetts Historical Commission

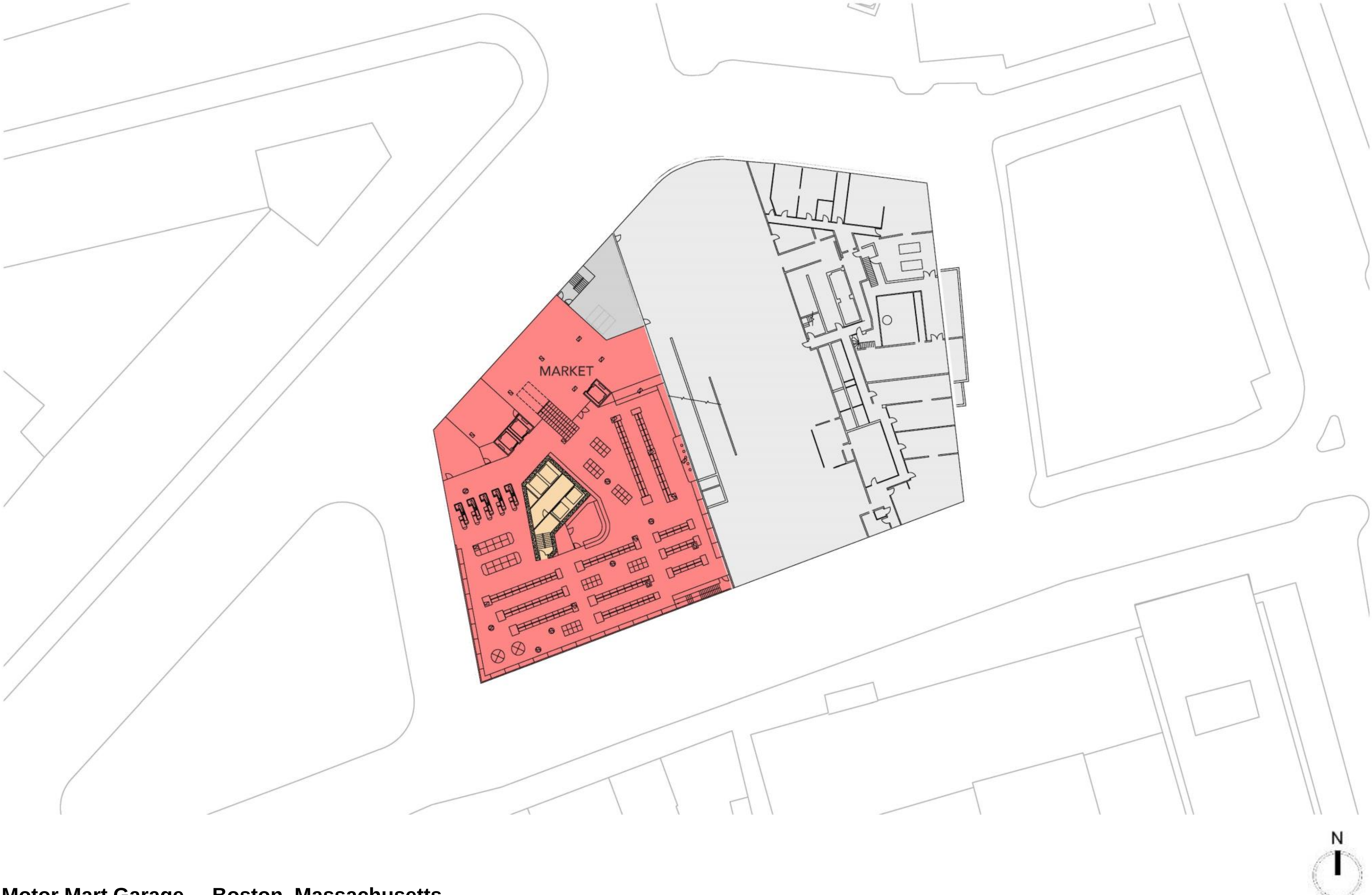
The Proponent does not anticipate that the Project will require any state or federal licenses, permits or approvals, and does not anticipate utilizing any state or federal funds. Therefore, review by the Massachusetts Historical Commission (MHC) is not anticipated at this time. In the event that state or federal licenses, permits, approvals or funding is involved, the Proponent will file an MHC Project Notification Form to initiate review of the Project.

8.4 Boston Civic Design Commission

The Project will comply with the provisions of Article 28 of the Boston Zoning Code. This PNF will be submitted to the Boston Civic Design Commission by the BPDA as part of the Article 80 process.

Appendix A

Floor Plans, Sections and Elevations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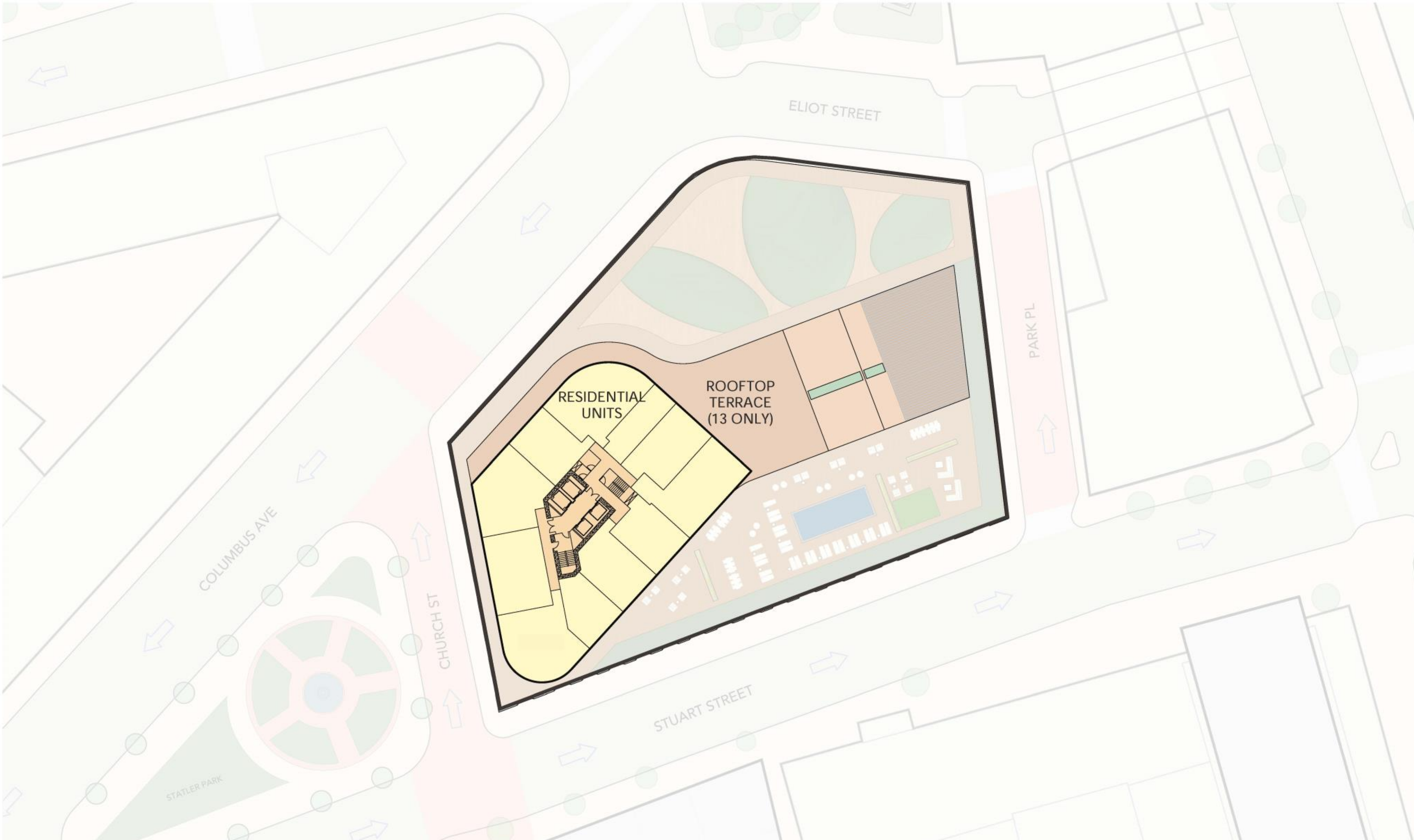
Ground Floor Plan

Motor Mart Garage Boston, Massachusetts

Motor Mart Garage **Boston, Massachusetts**



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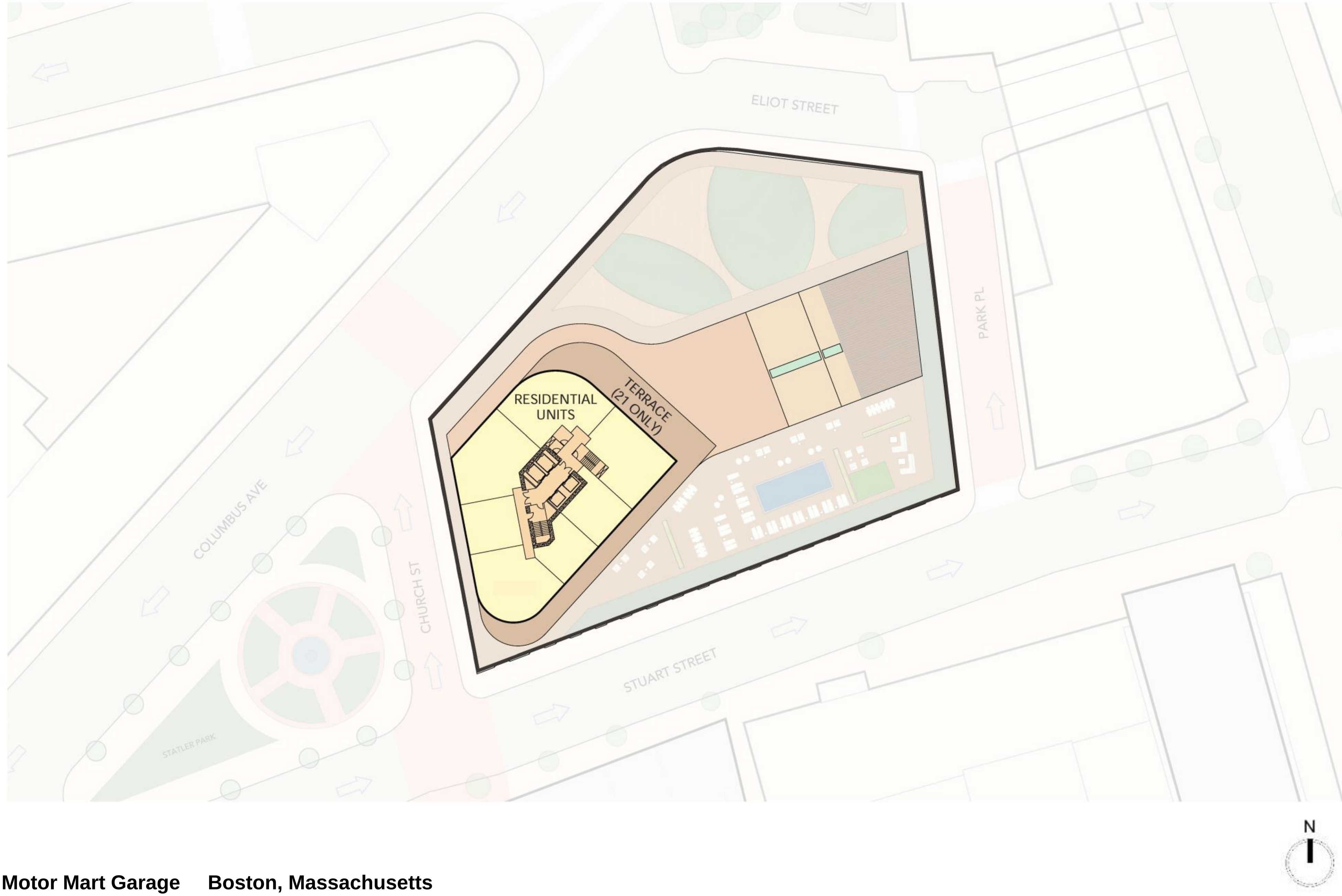
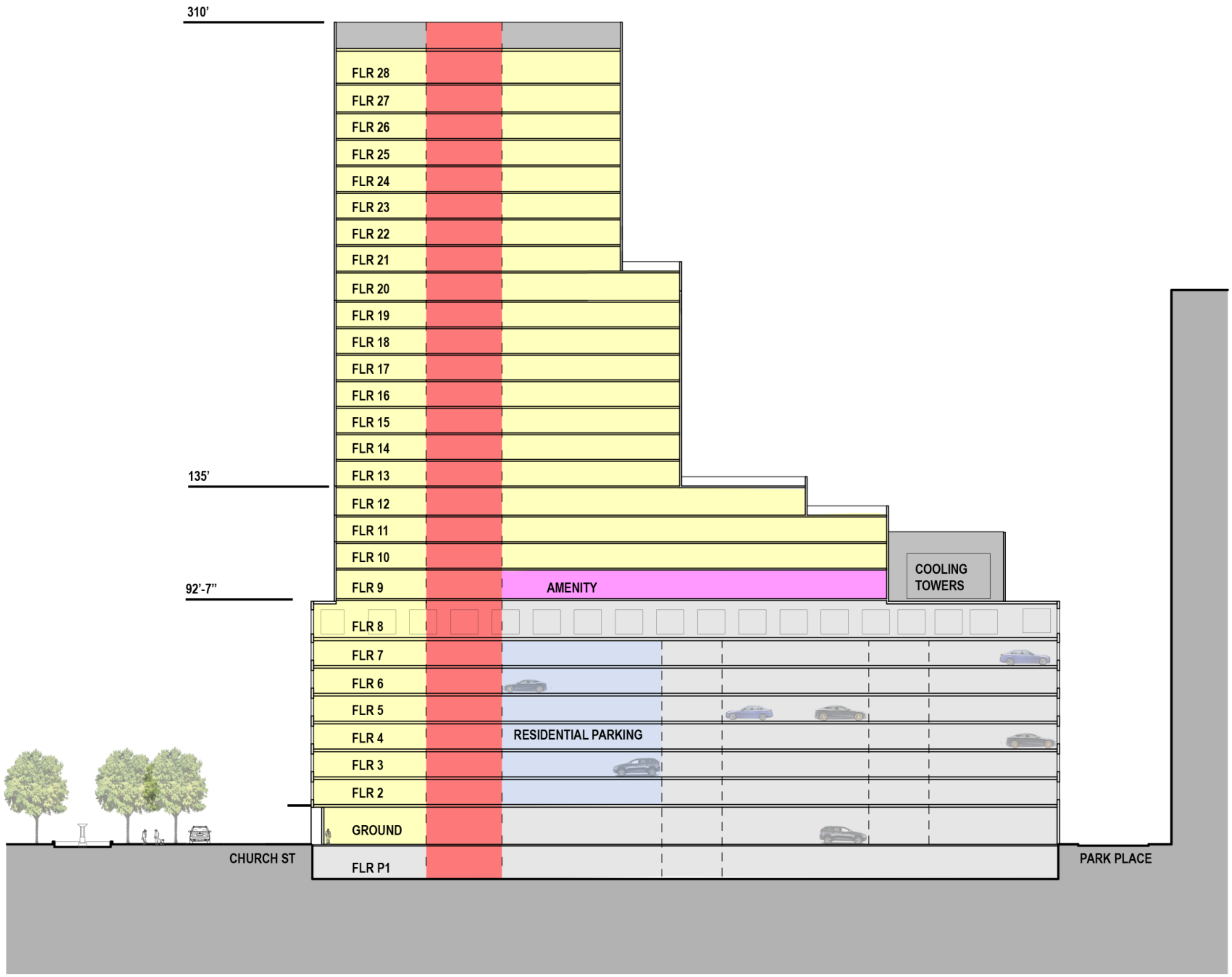


Motor Mart Garage **Boston, Massachusetts**

Floors 21-28 Plan



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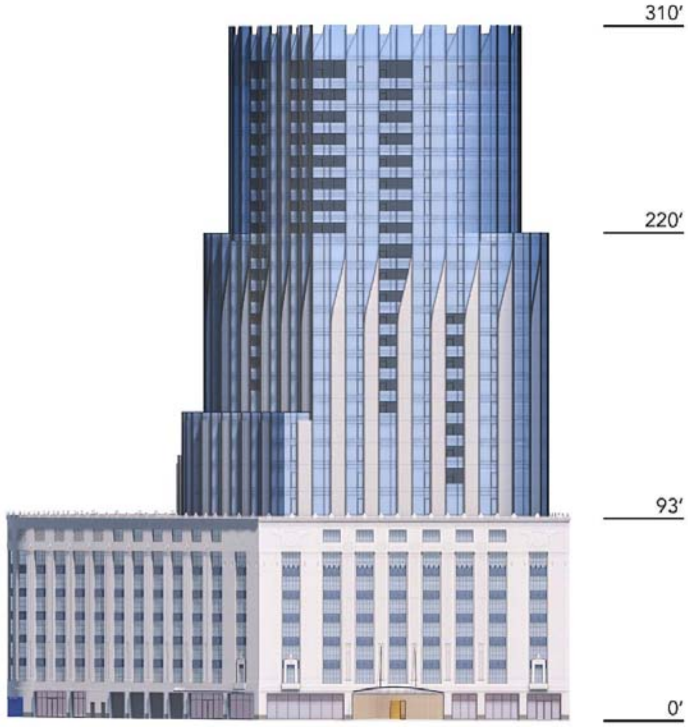
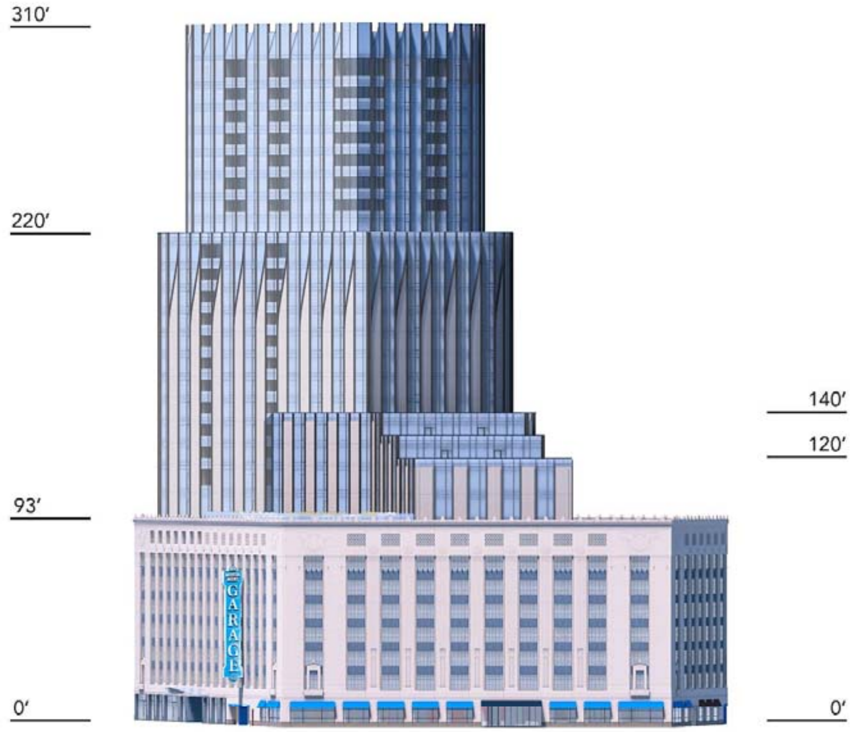
Section



WEST ELEVATION

SOUTH ELEVATION

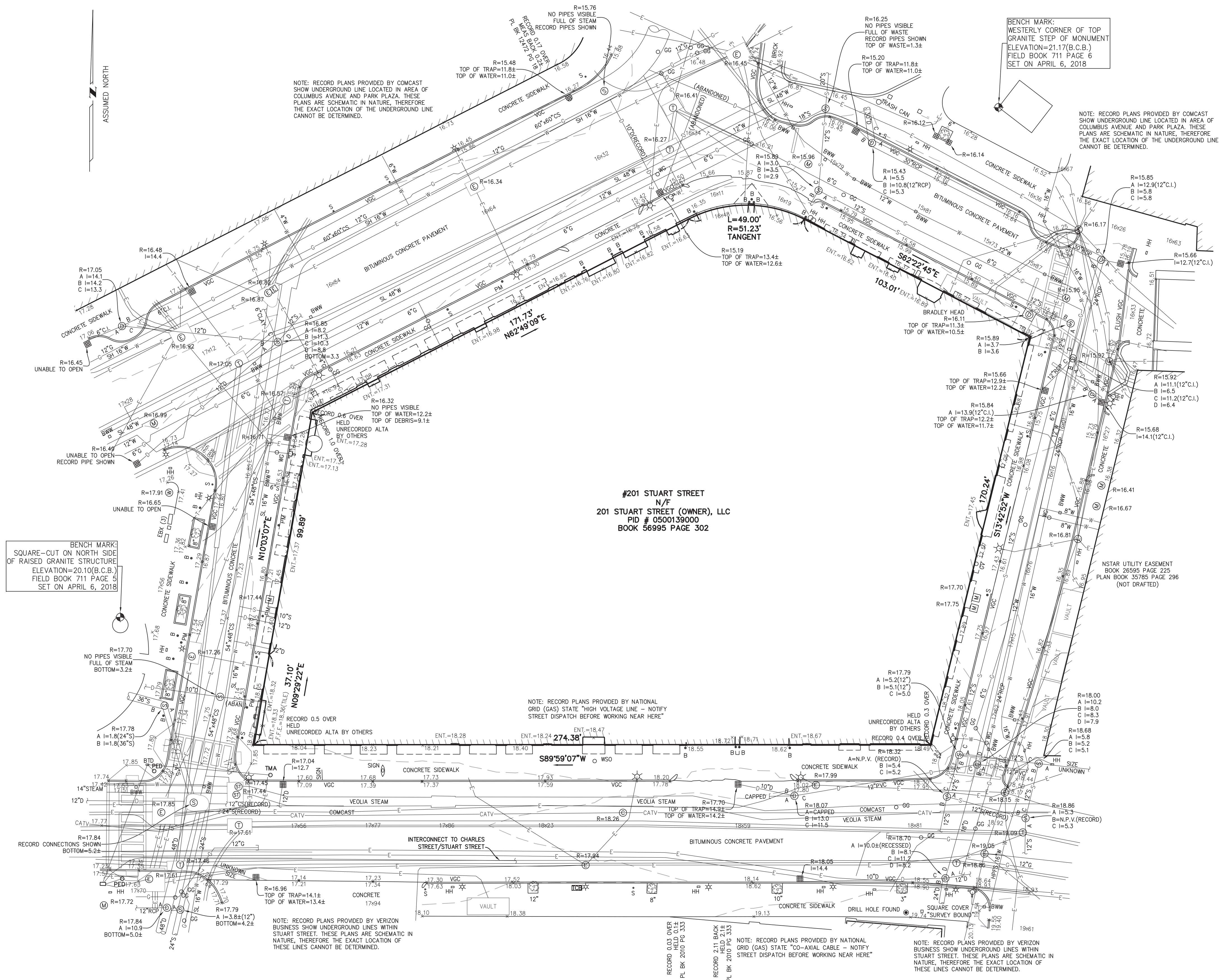


EAST ELEVATION

NORTH ELEVATION

Appendix B

Site Survey



UTILITY INFORMATION STATEMENT

1. THE SUB-SURFACE UTILITY INFORMATION SHOWN HEREON IS COMPILED BASED ON FIELD SURVEY INFORMATION, RECORD INFORMATION AS SUPPLIED BY THE APPROPRIATE UTILITY COMPANIES, AND PLAN INFORMATION SUPPLIED BY THE CLIENT, IF ANY; THEREFORE WE CANNOT GUARANTEE THE ACCURACY OF SAID COMPILED SUB-SURFACE INFORMATION TO ANY CERTAIN DEGREE OF STATED TOLERANCE. ONLY PHYSICALLY LOCATED SUB-SURFACE UTILITY FEATURES FALL WITHIN NORMAL STANDARD OF CARE ACCURACIES.

2. THE LOCATIONS OF UNDERGROUND PIPES, CONDUITS, AND STRUCTURES HAVE BEEN DETERMINED FROM SAID INFORMATION, AND ARE APPROXIMATE ONLY. COMPILED LOCATIONS OF ANY UNDERGROUND STRUCTURES, NOT VISIBLY OBSERVED AND LOCATED, CAN VARY FROM THEIR ACTUAL LOCATIONS.

3. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED.

4. THE STATUS OF UTILITIES, WHETHER ACTIVE, ABANDONED, OR REMOVED, IS AN UNKNOWN CONDITION AS FAR AS OUR COMPILATION OF THIS INFORMATION.

5. IT IS INCUMBENT UPON INDIVIDUALS USING THIS INFORMATION TO UNDERSTAND THAT COMPILING UTILITY INFORMATION IS NOT EXACT, AND IS SUBJECT TO CHANGE BASED UPON VARYING PLAN INFORMATION RECEIVED AND ACTUAL LOCATIONS.

6. THE ACCURACY OF MEASURED UTILITY INVERTS AND PIPE SIZES IS SUBJECT TO FIELD CONDITIONS, THE ABILITY TO MAKE VISUAL OBSERVATIONS, DIRECT ACCESS TO THE VARIOUS ELEMENTS AND OTHER MATTERS.

7. THE PROPER UTILITY ENGINEERING/COMPANY SHOULD BE CONSULTED AND THE ACTUAL LOCATIONS OF SUBSURFACE STRUCTURES SHOULD BE VERIFIED IN THE FIELD (V.I.F.) BEFORE PLANNING FUTURE CONNECTIONS. CONTACT THE DIG SAFE CALL CENTER AT 1-888-344-7233, SEVENTY-TWO HOURS PRIOR TO EXCAVATION, BLASTING, GRADING, AND/OR PAVING.

8. AS OF THE DATE OF THIS PLAN RECORD INFORMATION HAS NOT BEEN RECEIVED BY NITSCH ENGINEERING FOR THE FOLLOWING UTILITIES:

NOTES

1. THIS DOCUMENT IS AN INSTRUMENT OF SERVICE OF NITSCH ENGINEERING. IT IS ISSUED TO BOSTON GLOBAL INVESTORS, LLC FOR PURPOSES RELATED DIRECTLY AND SOLELY TO NITSCH ENGINEERING'S SCOPE OF SERVICES UNDER CONTRACT WITH BOSTON GLOBAL INVESTORS, LLC FOR SURVEY OF THE MOTO MART GARAGE SITE IN BOSTON, MASSACHUSETTS. ANY USE OR REUSE OF THIS DOCUMENT FOR ANY REASON BY ANY PARTY FOR PURPOSES UNRELATED DIRECTLY AND SOLELY TO SAID CONTRACT AND PROJECT SHALL BE AT THE USER'S SOLE AND EXCLUSIVE RISK AND LIABILITY, INCLUDING LIABILITY FOR VIOLATION OF COPYRIGHT LAWS, UNLESS WRITTEN AUTHORIZATION IS GIVEN THEREFOR BY NITSCH ENGINEERING.

2. THE PURPOSE OF THIS PLAN IS TO SHOW TOPOGRAPHY AND PROPERTY AS THE RESULT OF AN ON-THE-GROUND INSTRUMENT SURVEY WHICH OCCURRED IN APRIL OF 2018.

3. HORIZONTAL COORDINATES REFER TO AN ASSUMED SYSTEM.

4. ELEVATION REFERS TO BOSTON CITY BASE VERTICAL BASED ON RTK GPS OBSERVATIONS.

5. THE INFORMATION CONTAINED ON THE DISK OR ELECTRONIC DRAWING FILE ACCOMPANYING THIS PLAN MUST BE COMPARED TO THE SEALED AND SIGNED HARD COPY OF THE PLAN TO ENSURE THE ACCURACY OF ALL INFORMATION AND TO ENSURE NO CHANGES, ALTERATIONS, OR MODIFICATIONS HAVE BEEN MADE. RELIANCE SHALL NOT BE MADE ON A DOCUMENT TRANSMITTED BY COMPUTER OR OTHER ELECTRONIC MEANS UNLESS FIRST COMPARED TO THE ORIGINAL SEALED DOCUMENT ISSUED AT THE TIME OF THE SURVEY. DUE TO THE CRITICAL NATURE OF SURVEYING, DATA ACQUISITION, AND AUTOCAD PLAN DEVELOPMENT, IF CRITICAL DIMENSIONAL INFORMATION IS NEEDED AND IS NOT SPECIFICALLY SHOWN ON THE ELECTRONIC DRAWING FILE, PLEASE CONTACT NITSCH ENGINEERING.

LEGEND

	CATCH BASIN
Ⓒ	CABLE TELEVISION MANHOLE
Ⓓ	DRAIN MANHOLE
Ⓔ	ELECTRIC MANHOLE
Ⓜ	MISCELLANEOUS MANHOLE
Ⓢ	SEWER MANHOLE
Ⓣ	TELEPHONE MANHOLE
Ⓦ	WATER MANHOLE
GG	GAS GATE
WG	WATER GATE
BWW	BOSTON WATER WORKS
	FIRE HYDRANT
	LIGHT POLE
HH	HAND HOLE
PM	PARKING METER
S	SIGN POST
TMA	TRAFFIC MAST ARM
PED	PEDESTRIAN SIGNAL
16x38	SPOT ELEVATION
VGC	VERTICAL GRANITE CURB
WCR	WHEELCHAIR RAMP
R=	RIM ELEVATION EQUALS
I=	INVERT ELEVATION EQUALS
N.P.V.	NO PIPES VISIBLE
TCB	TRAFFIC CONTROL BOX
DWP	DETECTABLE WARNING PANEL
CATV	UNDERGROUND CABLE TELEVISION LINE
D	UNDERGROUND DRAIN LINE
E	UNDERGROUND ELECTRIC LINE
G	UNDERGROUND GAS LINE
S	UNDERGROUND SEWER LINE
T	UNDERGROUND TELEPHONE LINE
W	UNDERGROUND WATER LINE
	BENCH MARK

COMMONWEALTH OF MASSACHUSETTS
ROBERT G. MILES
NO. 51608
REGISTERED PROFESSIONAL LAND SURVEYOR

JUNE 29, 2018

GRAPHIC SCALE

20 10 0 20 40 60

SCALE: 1"=20'

Nitsch Engineering
www.nitscheng.com
2 Center Plaza, Suite 430
Boston, MA 02108
T: (617) 338-0063
F: (617) 338-6472

- Civil Engineering
- Land Surveying
- Transportation Engineering
- Structural Engineering
- Green Infrastructure
- Planning
- GIS

PROJECT #	12536
FILE:	12536.2_TOPO1.dwg
SCALE:	1"=20'
DATE:	JUNE 2018
PROJECT MANAGER:	RGM
FIELD BOOK:	708 & 711
DRAFTED BY:	TAL
CHECKED BY:	

REV.	COMMENTS	DATE
	REVISIONS	

TOPOGRAPHIC PLAN OF LAND

MOTO MART GARAGE
BOSTON, MASSACHUSETTS

PREPARED FOR:

BOSTON GLOBAL INVESTORS, LLC
55 SEAPORT BOULEVARD, BOSTON, MASSACHUSETTS 02210

SHEET:

EX-1

OF I REV.

Appendix C

Transportation

Transportation Appendix is Available Upon Request

Appendix D

Wind

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
1	No Build	Annual	14		Standing	20		Acceptable
	Build	Annual	18	29%	Walking	27	35%	Acceptable
2	No Build	Annual	13		Standing	19		Acceptable
	Build	Annual	10	-23%	Sitting	15	-21%	Acceptable
3	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	11		Sitting	18		Acceptable
4	No Build	Annual	12		Sitting	19		Acceptable
	Build	Annual	12		Sitting	20		Acceptable
5	No Build	Annual	14		Standing	20		Acceptable
	Build	Annual	15		Standing	21		Acceptable
6	No Build	Annual	10		Sitting	15		Acceptable
	Build	Annual	9		Sitting	15		Acceptable
7	No Build	Annual	10		Sitting	17		Acceptable
	Build	Annual	8	-20%	Sitting	14	-18%	Acceptable
8	No Build	Annual	13		Standing	20		Acceptable
	Build	Annual	13		Standing	19		Acceptable
9	No Build	Annual	6		Sitting	10		Acceptable
	Build	Annual	5	-17%	Sitting	9		Acceptable
10	No Build	Annual	13		Standing	20		Acceptable
	Build	Annual	13		Standing	19		Acceptable
11	No Build	Annual	13		Standing	22		Acceptable
	Build	Annual	12		Sitting	20		Acceptable
12	No Build	Annual	12		Sitting	19		Acceptable
	Build	Annual	10	-17%	Sitting	16	-16%	Acceptable
13	No Build	Annual	14		Standing	21		Acceptable
	Build	Annual	14		Standing	20		Acceptable
14	No Build	Annual	12		Sitting	18		Acceptable
	Build	Annual	11		Sitting	17		Acceptable
15	No Build	Annual	15		Standing	21		Acceptable
	Build	Annual	16		Walking	22		Acceptable
16	No Build	Annual	13		Standing	18		Acceptable
	Build	Annual	15	15%	Standing	21	17%	Acceptable
17	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	16	45%	Walking	23	35%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
18	No Build	Annual	7		Sitting	11		Acceptable
	Build	Annual	8	14%	Sitting	14	27%	Acceptable
19	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	13	86%	Standing	21	75%	Acceptable
20	No Build	Annual	13		Standing	20		Acceptable
	Build	Annual	16	23%	Walking	24	20%	Acceptable
21	No Build	Annual	12		Sitting	18		Acceptable
	Build	Annual	17	42%	Walking	24	33%	Acceptable
22	No Build	Annual	12		Sitting	18		Acceptable
	Build	Annual	15	25%	Standing	23	28%	Acceptable
23	No Build	Annual	11		Sitting	18		Acceptable
	Build	Annual	14	27%	Standing	21	17%	Acceptable
24	No Build	Annual	11		Sitting	18		Acceptable
	Build	Annual	15	36%	Standing	21	17%	Acceptable
25	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	13	18%	Standing	20	18%	Acceptable
26	No Build	Annual	12		Sitting	19		Acceptable
	Build	Annual	12		Sitting	19		Acceptable
27	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	11		Sitting	18		Acceptable
28	No Build	Annual	8		Sitting	13		Acceptable
	Build	Annual	14	75%	Standing	19	46%	Acceptable
29	No Build	Annual	9		Sitting	15		Acceptable
	Build	Annual	15	67%	Standing	21	40%	Acceptable
30	No Build	Annual	15		Standing	21		Acceptable
	Build	Annual	15		Standing	23		Acceptable
31	No Build	Annual	17		Walking	23		Acceptable
	Build	Annual	14	-18%	Standing	22		Acceptable
32	No Build	Annual	9		Sitting	15		Acceptable
	Build	Annual	10	11%	Sitting	18	20%	Acceptable
33	No Build	Annual	10		Sitting	15		Acceptable
	Build	Annual	12	20%	Sitting	19	27%	Acceptable
34	No Build	Annual	14		Standing	21		Acceptable
	Build	Annual	16	14%	Walking	25	19%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
35	No Build	Annual	8		Sitting	14		Acceptable
	Build	Annual	14	75%	Standing	22	57%	Acceptable
36	No Build	Annual	9		Sitting	13		Acceptable
	Build	Annual	10	11%	Sitting	16	23%	Acceptable
37	No Build	Annual	13		Standing	19		Acceptable
	Build	Annual	14		Standing	21	11%	Acceptable
38	No Build	Annual	14		Standing	20		Acceptable
	Build	Annual	14		Standing	20		Acceptable
39	No Build	Annual	16		Walking	22		Acceptable
	Build	Annual	16		Walking	23		Acceptable
40	No Build	Annual	15		Standing	21		Acceptable
	Build	Annual	15		Standing	21		Acceptable
41	No Build	Annual	15		Standing	19		Acceptable
	Build	Annual	15		Standing	20		Acceptable
42	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	11		Sitting	16		Acceptable
43	No Build	Annual	11		Sitting	15		Acceptable
	Build	Annual	11		Sitting	16		Acceptable
44	No Build	Annual	10		Sitting	16		Acceptable
	Build	Annual	11		Sitting	17		Acceptable
45	No Build	Annual	15		Standing	21		Acceptable
	Build	Annual	15		Standing	21		Acceptable
46	No Build	Annual	19		Walking	25		Acceptable
	Build	Annual	19		Walking	25		Acceptable
47	No Build	Annual	13		Standing	20		Acceptable
	Build	Annual	13		Standing	20		Acceptable
48	No Build	Annual	14		Standing	19		Acceptable
	Build	Annual	14		Standing	19		Acceptable
49	No Build	Annual	17		Walking	23		Acceptable
	Build	Annual	17		Walking	23		Acceptable
50	No Build	Annual	11		Sitting	18		Acceptable
	Build	Annual	11		Sitting	17		Acceptable
51	No Build	Annual	12		Sitting	17		Acceptable
	Build	Annual	12		Sitting	17		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
52	No Build	Annual	10		Sitting	15		Acceptable
	Build	Annual	10		Sitting	15		Acceptable
53	No Build	Annual	5		Sitting	8		Acceptable
	Build	Annual	5		Sitting	8		Acceptable
54	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	7		Sitting	12		Acceptable
55	No Build	Annual	8		Sitting	13		Acceptable
	Build	Annual	8		Sitting	13		Acceptable
56	No Build	Annual	8		Sitting	14		Acceptable
	Build	Annual	8		Sitting	13		Acceptable
57	No Build	Annual	9		Sitting	14		Acceptable
	Build	Annual	9		Sitting	14		Acceptable
58	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	7		Sitting	13		Acceptable
59	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	7		Sitting	12		Acceptable
60	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	7		Sitting	12		Acceptable
61	No Build	Annual	6		Sitting	10		Acceptable
	Build	Annual	6		Sitting	11		Acceptable
62	No Build	Annual	9		Sitting	14		Acceptable
	Build	Annual	9		Sitting	14		Acceptable
63	No Build	Annual	8		Sitting	14		Acceptable
	Build	Annual	8		Sitting	14		Acceptable
64	No Build	Annual	10		Sitting	16		Acceptable
	Build	Annual	10		Sitting	16		Acceptable
65	No Build	Annual	9		Sitting	15		Acceptable
	Build	Annual	9		Sitting	15		Acceptable
66	No Build	Annual	10		Sitting	15		Acceptable
	Build	Annual	9		Sitting	15		Acceptable
67	No Build	Annual	13		Standing	19		Acceptable
	Build	Annual	11	-15%	Sitting	16	-16%	Acceptable
68	No Build	Annual	17		Walking	22		Acceptable
	Build	Annual	16		Walking	20		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
69	No Build Build	Annual Annual	12 16	 33%	Sitting Walking	18 25	 39%	Acceptable Acceptable
70	No Build Build	Annual Annual	13 13		Standing Standing	20 20		Acceptable Acceptable
71	No Build Build	Annual Annual	11 12		Sitting Sitting	18 18		Acceptable Acceptable
72	No Build Build	Annual Annual	9 12	 33%	Sitting Sitting	15 18	 20%	Acceptable Acceptable
73	No Build Build	Annual Annual	8 7	 -12%	Sitting Sitting	13 13		Acceptable Acceptable
74	No Build Build	Annual Annual	7 7		Sitting Sitting	11 12		Acceptable Acceptable
75	No Build Build	Annual Annual	10 13	 30%	Sitting Standing	16 19	 19%	Acceptable Acceptable
76	No Build Build	Annual Annual	8 9	 12%	Sitting Sitting	13 14		Acceptable Acceptable
77	No Build Build	Annual Annual	6 7	 17%	Sitting Sitting	11 12		Acceptable Acceptable
78	No Build Build	Annual Annual	7 8	 14%	Sitting Sitting	12 14	 17%	Acceptable Acceptable
79	No Build Build	Annual Annual	7 7		Sitting Sitting	11 12		Acceptable Acceptable
80	No Build Build	Annual Annual	7 7		Sitting Sitting	12 12		Acceptable Acceptable
81	No Build Build	Annual Annual	7 7		Sitting Sitting	12 13		Acceptable Acceptable
82	No Build Build	Annual Annual	7 7		Sitting Sitting	11 11		Acceptable Acceptable
83	No Build Build	Annual Annual	8 8		Sitting Sitting	13 12		Acceptable Acceptable
84	No Build Build	Annual Annual	8 9	 12%	Sitting Sitting	14 14		Acceptable Acceptable
85	No Build Build	Annual Annual	7 8	 14%	Sitting Sitting	12 13		Acceptable Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
86	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	9	29%	Sitting	15	25%	Acceptable
87	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	7		Sitting	12		Acceptable
88	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	7		Sitting	11		Acceptable
89	No Build	Annual	10		Sitting	17		Acceptable
	Build	Annual	10		Sitting	16		Acceptable
90	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	11		Sitting	17		Acceptable
91	No Build	Annual	10		Sitting	16		Acceptable
	Build	Annual	10		Sitting	16		Acceptable
92	No Build	Annual	10		Sitting	16		Acceptable
	Build	Annual	10		Sitting	15		Acceptable
93	No Build	Annual	14		Standing	20		Acceptable
	Build	Annual	14		Standing	20		Acceptable
94	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	11		Sitting	18		Acceptable
95	No Build	Annual	10		Sitting	16		Acceptable
	Build	Annual	10		Sitting	16		Acceptable
96	No Build	Annual	11		Sitting	18		Acceptable
	Build	Annual	12		Sitting	19		Acceptable
97	No Build	Annual	11		Sitting	18		Acceptable
	Build	Annual	12		Sitting	19		Acceptable
98	No Build	Annual	12		Sitting	19		Acceptable
	Build	Annual	11		Sitting	18		Acceptable
99	No Build	Annual	13		Standing	19		Acceptable
	Build	Annual	10	-23%	Sitting	15	-21%	Acceptable
100	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	11		Sitting	16		Acceptable
101	No Build	Annual	10		Sitting	17		Acceptable
	Build	Annual	10		Sitting	16		Acceptable
102	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	10		Sitting	17		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
103	No Build	Annual	11		Sitting	18		Acceptable
	Build	Annual	11		Sitting	18		Acceptable
104	No Build	Annual	13		Standing	19		Acceptable
	Build	Annual	12		Sitting	18		Acceptable
105	No Build	Annual	19		Walking	24		Acceptable
	Build	Annual	18		Walking	24		Acceptable
106	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	8	14%	Sitting	12		Acceptable
107	No Build	Annual	19		Walking	25		Acceptable
	Build	Annual	18		Walking	24		Acceptable
108	No Build	Annual	11		Sitting	18		Acceptable
	Build	Annual	14	27%	Standing	20	11%	Acceptable
109	No Build	Annual	10		Sitting	17		Acceptable
	Build	Annual	10		Sitting	16		Acceptable
110	No Build	Annual	13		Standing	18		Acceptable
	Build	Annual	12		Sitting	18		Acceptable
111	No Build	Annual	18		Walking	24		Acceptable
	Build	Annual	18		Walking	23		Acceptable
112	No Build	Annual	19		Walking	24		Acceptable
	Build	Annual	19		Walking	24		Acceptable
113	No Build	Annual	13		Standing	19		Acceptable
	Build	Annual	13		Standing	19		Acceptable
114	No Build	Annual	10		Sitting	16		Acceptable
	Build	Annual	11		Sitting	16		Acceptable
115	No Build	Annual	13		Standing	18		Acceptable
	Build	Annual	13		Standing	19		Acceptable
116	No Build	Annual	16		Walking	22		Acceptable
	Build	Annual	16		Walking	22		Acceptable
117	No Build	Annual	13		Standing	19		Acceptable
	Build	Annual	14		Standing	21	11%	Acceptable
118	No Build	Annual	10		Sitting	15		Acceptable
	Build	Annual	10		Sitting	15		Acceptable
119	No Build	Annual	12		Sitting	20		Acceptable
	Build	Annual	12		Sitting	20		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
120	No Build	Annual	21		Uncomfortable	27		Acceptable
	Build	Annual	21		Uncomfortable	27		Acceptable
121	No Build	Annual	13		Standing	20		Acceptable
	Build	Annual	14		Standing	20		Acceptable
122	No Build	Annual	12		Sitting	18		Acceptable
	Build	Annual	12		Sitting	19		Acceptable
123	No Build	Annual	16		Walking	23		Acceptable
	Build	Annual	16		Walking	23		Acceptable
124	No Build	Annual	13		Standing	20		Acceptable
	Build	Annual	13		Standing	20		Acceptable
125	No Build	Annual	16		Walking	23		Acceptable
	Build	Annual	17		Walking	23		Acceptable
126	No Build	Annual	19		Walking	26		Acceptable
	Build	Annual	18		Walking	25		Acceptable
127	No Build	Annual	18		Walking	25		Acceptable
	Build	Annual	17		Walking	25		Acceptable
128	No Build	Annual	18		Walking	25		Acceptable
	Build	Annual	17		Walking	24		Acceptable
129	No Build	Annual	9		Sitting	16		Acceptable
	Build	Annual	10	11%	Sitting	16		Acceptable
130	No Build	Annual	7		Sitting	11		Acceptable
	Build	Annual	7		Sitting	11		Acceptable
131	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	11		Sitting	18		Acceptable
132	No Build	Annual	7		Sitting	11		Acceptable
	Build	Annual	7		Sitting	11		Acceptable
133	No Build	Annual	13		Standing	21		Acceptable
	Build	Annual	11	-15%	Sitting	19		Acceptable
134	No Build	Annual	14		Standing	21		Acceptable
	Build	Annual	13		Standing	21		Acceptable
135	No Build	Annual	19		Walking	25		Acceptable
	Build	Annual	20		Uncomfortable	26		Acceptable
136	No Build	Annual	11		Sitting	18		Acceptable
	Build	Annual	11		Sitting	18		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
137	No Build	Annual	18		Walking	25		Acceptable
	Build	Annual	17		Walking	24		Acceptable
138	No Build	Annual	9		Sitting	16		Acceptable
	Build	Annual	10	11%	Sitting	16		Acceptable
139	No Build	Annual	17		Walking	25		Acceptable
	Build	Annual	16		Walking	24		Acceptable
140	No Build	Annual	18		Walking	25		Acceptable
	Build	Annual	17		Walking	24		Acceptable
141	No Build	Annual	20		Uncomfortable	27		Acceptable
	Build	Annual	19		Walking	26		Acceptable
142	No Build	Annual	12		Sitting	15		Acceptable
	Build	Annual	12		Sitting	15		Acceptable
143	No Build	Annual	14		Standing	20		Acceptable
	Build	Annual	14		Standing	19		Acceptable
144	No Build	Annual	13		Standing	19		Acceptable
	Build	Annual	13		Standing	19		Acceptable
145	No Build	Annual	8		Sitting	12		Acceptable
	Build	Annual	8		Sitting	12		Acceptable
146	No Build	Annual	17		Walking	25		Acceptable
	Build	Annual	17		Walking	25		Acceptable
147	No Build	Annual	16		Walking	24		Acceptable
	Build	Annual	17		Walking	24		Acceptable
148	No Build	Annual	21		Uncomfortable	29		Acceptable
	Build	Annual	21		Uncomfortable	28		Acceptable
149	No Build	Annual	21		Uncomfortable	29		Acceptable
	Build	Annual	21		Uncomfortable	28		Acceptable
150	No Build	Annual	14		Standing	20		Acceptable
	Build	Annual	14		Standing	21		Acceptable
151	No Build	Annual	18		Walking	26		Acceptable
	Build	Annual	18		Walking	27		Acceptable
152	No Build	Annual	14		Standing	22		Acceptable
	Build	Annual	15		Standing	22		Acceptable
153	No Build	Annual	17		Walking	23		Acceptable
	Build	Annual	17		Walking	23		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
154	No Build	Annual	17		Walking	23		Acceptable
	Build	Annual	17		Walking	23		Acceptable
155	No Build	Annual	18		Walking	23		Acceptable
	Build	Annual	18		Walking	23		Acceptable
156	No Build	Annual	20		Uncomfortable	27		Acceptable
	Build	Annual	20		Uncomfortable	27		Acceptable
157	No Build	Annual	18		Walking	25		Acceptable
	Build	Annual	18		Walking	25		Acceptable
158	No Build	Annual	15		Standing	22		Acceptable
	Build	Annual	15		Standing	22		Acceptable
159	No Build	Annual	15		Standing	22		Acceptable
	Build	Annual	15		Standing	22		Acceptable
160	No Build	Annual	15		Standing	21		Acceptable
	Build	Annual	15		Standing	21		Acceptable
161	No Build	Annual	13		Standing	20		Acceptable
	Build	Annual	14		Standing	20		Acceptable
162	No Build	Annual	13		Standing	20		Acceptable
	Build	Annual	14		Standing	21		Acceptable
163	No Build	Annual	13		Standing	19		Acceptable
	Build	Annual	13		Standing	20		Acceptable

Configurations	Mean Wind Criteria Speed (mph)		Effective Gust Criteria (mph)	
No Build	≤ 12	Comfortable for Sitting	≤ 31	Acceptable
Without the proposed Motor Mart development	13 - 15	Comfortable for Standing	> 31	Unacceptable
Build	16 - 19	Comfortable for Walking		
With the proposed Motor Mart development	20 - 27	Uncomfortable for Walking		
	> 27	Dangerous Conditions		

Notes

1) Wind Speeds are for a 1% probability of exceedance

2) % Change is based on comparison with Configuration A

3) % changes less than 10% are excluded

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
1	No Build Build	14 18	11 14	14 17	15 20	20 27	16 21	20 25	22 30
2	No Build Build	14 10	12 8	13 10	12 11	21 16	18 13	19 15	19 17
3	No Build Build	11 11	10 9	10 11	11 13	18 18	15 14	17 17	18 20
4	No Build Build	12 12	10 10	12 12	12 13	19 20	15 15	18 19	20 22
5	No Build Build	15 15	13 13	14 14	14 16	21 21	18 18	20 20	21 22
6	No Build Build	10 10	8 8	10 9	10 10	16 15	12 13	16 15	16 15
7	No Build Build	11 8	9 7	10 8	10 9	18 14	16 11	17 14	18 15
8	No Build Build	13 13	12 12	13 13	14 14	20 20	17 17	20 19	21 20
9	No Build Build	6 5	5 4	6 5	6 6	10 9	8 8	10 9	11 10
10	No Build Build	13 14	12 12	13 13	14 14	20 20	17 17	19 19	21 20
11	No Build Build	14 13	12 10	13 12	14 13	22 21	18 17	22 20	23 21
12	No Build Build	13 10	11 8	12 9	13 11	20 16	16 13	19 15	21 17
13	No Build Build	15 15	13 13	14 14	15 15	21 22	18 18	21 20	22 21
14	No Build Build	12 12	9 9	12 11	13 13	18 18	14 13	18 17	20 19
15	No Build Build	15 17	12 14	15 16	16 17	21 23	17 19	21 22	22 23
16	No Build Build	14 16	11 13	13 16	13 16	19 22	16 17	19 21	19 22
17	No Build Build	11 16	9 12	11 16	11 17	17 24	14 18	17 23	18 25

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
18	No Build	7	6	7	7	11	10	11	12
	Build	8	6	8	9	14	11	14	15
19	No Build	8	6	7	8	13	10	12	13
	Build	13	10	13	15	21	16	20	23
20	No Build	14	10	13	15	20	16	20	22
	Build	16	12	15	18	24	19	23	26
21	No Build	12	10	11	12	18	15	18	19
	Build	16	13	16	19	24	19	23	27
22	No Build	12	10	12	12	19	16	18	19
	Build	15	12	15	17	23	18	23	25
23	No Build	12	10	11	12	18	15	18	18
	Build	14	11	14	16	21	16	21	23
24	No Build	12	9	12	12	19	15	18	19
	Build	15	11	14	16	21	17	21	24
25	No Build	11	9	11	11	18	15	17	18
	Build	13	10	13	14	20	16	20	21
26	No Build	12	9	12	12	20	15	19	20
	Build	12	10	12	13	19	15	18	20
27	No Build	11	8	11	11	17	13	17	18
	Build	11	9	11	12	18	14	18	19
28	No Build	9	6	8	9	14	10	13	15
	Build	14	10	13	15	19	15	18	22
29	No Build	9	7	9	10	15	11	14	16
	Build	15	11	14	16	21	16	20	23
30	No Build	16	13	15	15	22	18	21	22
	Build	15	13	15	16	23	18	22	25
31	No Build	18	13	17	18	25	19	24	26
	Build	15	12	14	15	22	18	21	24
32	No Build	10	8	9	10	16	13	15	16
	Build	11	8	10	11	18	14	17	19
33	No Build	10	9	10	10	16	14	15	15
	Build	12	9	12	13	19	15	18	21
34	No Build	15	13	14	15	22	20	21	22
	Build	17	14	16	18	25	20	24	27

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
35	No Build	9	8	8	9	14	12	14	15
	Build	14	10	13	15	22	17	21	25
36	No Build	9	8	8	9	14	12	13	14
	Build	10	8	9	11	16	13	15	18
37	No Build	14	12	14	14	20	16	19	21
	Build	14	12	14	15	21	17	20	22
38	No Build	15	13	14	14	21	18	20	21
	Build	14	12	13	15	21	18	19	21
39	No Build	16	13	16	17	23	19	22	24
	Build	17	14	16	17	23	20	22	24
40	No Build	15	13	15	16	21	19	21	23
	Build	16	13	15	17	22	19	21	23
41	No Build	15	13	14	16	20	17	19	21
	Build	15	13	14	16	20	17	19	21
42	No Build	12	10	11	11	18	15	17	17
	Build	11	10	11	11	17	15	16	17
43	No Build	12	10	11	12	16	14	15	16
	Build	12	10	11	11	17	14	15	16
44	No Build	10	8	10	12	16	13	16	18
	Build	11	9	11	12	17	13	16	18
45	No Build	15	12	15	16	22	17	21	23
	Build	15	12	14	16	21	17	21	23
46	No Build	19	17	19	20	25	23	25	26
	Build	19	18	19	20	25	22	25	26
47	No Build	13	11	13	14	21	17	20	21
	Build	14	11	13	14	21	18	20	21
48	No Build	15	13	14	15	20	17	19	21
	Build	15	13	14	15	20	17	19	21
49	No Build	18	16	17	18	24	21	23	24
	Build	18	16	17	18	24	21	23	24
50	No Build	12	10	11	12	18	15	17	19
	Build	11	9	11	12	18	15	17	19
51	No Build	12	10	12	13	18	15	17	19
	Build	13	10	12	13	18	15	17	19

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
52	No Build Build	11 11	8 8	10 10	11 11	16 16	12 12	15 15	16 16
53	No Build Build	5 5	4 4	5 5	5 5	8 9	7 7	8 8	8 8
54	No Build Build	7 8	6 6	7 7	8 8	12 13	10 10	12 12	13 13
55	No Build Build	8 8	6 6	8 8	9 8	13 13	10 10	13 13	14 14
56	No Build Build	9 9	7 7	8 8	9 8	15 14	12 11	13 13	15 14
57	No Build Build	9 9	8 8	8 9	9 9	15 15	13 13	14 14	15 15
58	No Build Build	7 8	6 6	7 7	7 8	12 13	10 11	12 12	13 14
59	No Build Build	8 8	6 7	7 7	7 8	13 13	11 11	12 12	13 13
60	No Build Build	7 8	6 6	7 7	7 7	12 13	11 11	12 12	12 12
61	No Build Build	6 7	6 6	6 6	6 7	11 11	9 10	10 11	11 11
62	No Build Build	9 10	8 8	9 9	9 9	15 15	13 13	14 14	16 15
63	No Build Build	8 8	7 7	8 8	8 9	14 15	12 13	13 14	14 15
64	No Build Build	10 10	9 9	10 10	10 10	16 16	14 14	16 16	17 16
65	No Build Build	9 9	8 8	9 9	10 10	15 15	12 13	15 15	16 16
66	No Build Build	10 10	8 8	10 9	10 10	16 16	13 13	15 15	16 16
67	No Build Build	14 12	11 10	13 11	14 11	20 17	16 15	19 16	21 17
68	No Build Build	18 16	15 14	16 15	17 16	23 21	20 19	21 20	22 21

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
69	No Build Build	13 16	9 12	12 15	13 18	19 25	14 19	19 23	19 28
70	No Build Build	14 13	12 11	13 13	14 14	20 20	17 17	19 20	21 21
71	No Build Build	12 12	9 9	12 12	13 14	19 18	14 14	18 17	20 20
72	No Build Build	10 12	7 9	9 11	10 13	16 19	12 14	15 17	16 21
73	No Build Build	8 8	7 6	8 7	8 8	13 14	12 11	13 13	14 14
74	No Build Build	7 7	5 6	7 7	7 8	11 12	9 10	11 12	12 13
75	No Build Build	10 13	9 10	9 12	10 14	17 20	14 15	16 18	17 21
76	No Build Build	8 9	6 7	8 8	8 10	13 15	10 11	13 14	14 16
77	No Build Build	7 7	5 6	6 7	7 7	12 12	9 10	11 12	12 13
78	No Build Build	7 8	6 6	7 8	7 9	12 14	10 11	12 13	12 15
79	No Build Build	7 7	6 6	6 7	7 7	12 12	9 10	11 11	12 13
80	No Build Build	7 7	6 6	6 7	7 7	12 12	10 10	12 12	13 13
81	No Build Build	7 8	6 6	7 7	7 8	12 13	10 11	12 12	12 14
82	No Build Build	7 7	6 6	7 6	7 7	12 11	9 9	11 11	12 11
83	No Build Build	9 8	7 7	8 8	8 8	13 13	11 11	13 12	13 13
84	No Build Build	9 9	7 7	8 8	9 9	14 14	12 12	14 14	15 14
85	No Build Build	7 8	6 7	7 7	8 8	13 13	11 11	12 13	13 14

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
86	No Build	7	6	7	7	12	10	12	12
	Build	10	7	9	11	16	12	15	17
87	No Build	7	7	7	8	13	11	12	13
	Build	7	6	7	7	13	11	12	13
88	No Build	7	6	7	7	12	10	12	13
	Build	7	6	7	7	12	10	11	12
89	No Build	10	10	10	11	17	16	17	18
	Build	10	9	10	10	17	15	16	17
90	No Build	11	10	11	11	18	16	17	19
	Build	11	10	10	11	18	16	17	18
91	No Build	10	9	10	10	17	14	16	17
	Build	10	9	10	10	17	14	16	17
92	No Build	11	9	10	10	17	14	16	17
	Build	10	8	10	10	16	13	15	16
93	No Build	15	13	14	14	21	17	20	21
	Build	15	13	14	14	21	17	20	21
94	No Build	11	9	11	12	17	14	17	19
	Build	11	9	11	12	18	14	17	19
95	No Build	10	8	10	11	16	13	16	18
	Build	11	8	11	11	17	13	16	18
96	No Build	12	9	11	12	18	14	18	19
	Build	13	9	12	12	19	15	19	20
97	No Build	12	9	12	12	20	14	19	18
	Build	13	9	12	12	20	14	19	20
98	No Build	13	10	12	12	20	17	19	20
	Build	11	10	11	11	18	16	18	19
99	No Build	15	10	14	13	21	15	20	19
	Build	11	8	10	10	17	12	16	16
100	No Build	12	10	11	11	19	15	18	18
	Build	11	10	10	11	17	15	16	17
101	No Build	11	9	10	10	18	16	17	17
	Build	11	9	10	10	18	15	16	16
102	No Build	11	10	11	11	18	16	17	18
	Build	11	10	10	11	18	16	17	18

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
103	No Build	11	9	11	12	18	15	18	19
	Build	11	9	11	12	18	16	18	20
104	No Build	14	12	13	13	20	17	18	20
	Build	13	11	12	13	19	16	18	19
105	No Build	20	18	19	19	26	23	24	25
	Build	20	17	18	19	26	22	24	25
106	No Build	7	6	7	7	12	10	12	13
	Build	8	6	7	8	13	10	12	14
107	No Build	20	17	19	19	26	22	25	25
	Build	19	16	18	18	25	21	23	25
108	No Build	12	9	12	12	19	15	18	18
	Build	15	11	15	15	21	16	21	22
109	No Build	11	9	10	10	18	15	17	17
	Build	10	8	10	11	17	14	16	17
110	No Build	14	12	13	13	19	16	18	19
	Build	13	11	12	13	19	16	18	19
111	No Build	19	17	18	17	26	22	24	24
	Build	19	17	18	17	25	22	23	23
112	No Build	20	17	19	19	25	21	24	24
	Build	20	17	19	19	25	21	24	24
113	No Build	14	11	13	15	20	15	19	21
	Build	14	11	13	15	20	16	19	21
114	No Build	11	9	10	10	17	14	16	16
	Build	12	10	11	10	17	15	16	16
115	No Build	14	11	13	14	19	16	18	19
	Build	14	12	13	14	19	16	18	19
116	No Build	16	13	15	17	22	18	21	24
	Build	16	13	15	17	22	18	21	23
117	No Build	13	11	12	14	20	16	19	21
	Build	14	12	13	14	21	17	20	22
118	No Build	10	8	9	11	15	12	14	16
	Build	10	8	9	10	15	12	14	16
119	No Build	12	10	11	13	20	16	19	22
	Build	13	10	12	14	20	16	19	22

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
120	No Build Build	21 21	17 17	20 20	23 23	27 28	22 22	26 26	30 30
121	No Build Build	14 15	11 10	14 14	14 14	21 22	16 16	21 21	21 22
122	No Build Build	12 13	9 10	12 12	13 14	19 19	14 14	18 18	20 21
123	No Build Build	16 16	12 12	16 16	18 18	23 23	17 18	22 22	25 25
124	No Build Build	14 14	10 10	13 13	15 15	20 20	16 16	19 20	22 22
125	No Build Build	17 17	13 13	16 17	18 18	23 24	18 18	23 23	25 25
126	No Build Build	19 18	15 14	18 17	21 20	26 25	20 20	24 24	29 28
127	No Build Build	18 18	14 14	17 16	19 19	26 26	20 20	24 24	28 28
128	No Build Build	18 17	14 14	17 17	19 19	25 25	20 20	24 23	27 26
129	No Build Build	9 10	8 8	9 9	10 10	16 16	13 14	15 16	17 17
130	No Build Build	7 7	5 5	6 6	7 7	11 11	8 9	11 11	12 12
131	No Build Build	11 12	9 9	11 11	12 12	18 18	14 14	17 17	19 19
132	No Build Build	7 8	6 6	7 7	8 8	12 12	9 9	11 11	12 12
133	No Build Build	13 11	10 9	13 11	14 13	21 19	16 15	21 18	23 21
134	No Build Build	15 14	11 11	14 14	15 14	23 22	17 17	22 21	23 23
135	No Build Build	19 20	15 16	18 19	21 22	25 26	19 20	24 25	27 28
136	No Build Build	11 11	8 8	10 10	12 11	18 18	14 14	17 17	19 19

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
137	No Build	19	14	18	20	26	20	25	28
	Build	18	14	17	19	25	19	24	26
138	No Build	10	8	9	10	16	13	15	17
	Build	10	8	10	10	16	13	16	17
139	No Build	17	13	17	19	25	20	24	27
	Build	17	13	16	18	24	19	24	26
140	No Build	18	14	17	19	26	20	25	27
	Build	18	13	17	19	25	19	24	26
141	No Build	21	16	20	22	28	22	27	30
	Build	20	15	19	21	27	20	25	28
142	No Build	12	10	11	13	15	12	15	16
	Build	12	9	11	12	15	12	14	16
143	No Build	14	11	14	16	20	16	19	21
	Build	14	11	13	15	19	15	18	21
144	No Build	13	11	13	14	19	16	18	20
	Build	14	12	13	14	20	17	19	20
145	No Build	8	7	8	9	12	10	12	13
	Build	8	7	8	9	12	10	12	13
146	No Build	17	13	16	19	25	20	24	28
	Build	17	13	16	19	25	19	24	27
147	No Build	16	13	15	18	24	19	23	27
	Build	17	13	16	19	24	19	23	27
148	No Build	22	17	21	24	30	23	28	32
	Build	22	17	21	23	29	23	28	31
149	No Build	22	17	21	23	29	23	28	31
	Build	21	16	20	23	28	22	27	30
150	No Build	15	11	14	15	21	16	21	22
	Build	16	11	15	15	22	16	21	22
151	No Build	19	14	18	19	27	20	26	29
	Build	19	14	18	20	28	21	26	29
152	No Build	14	11	14	15	22	16	21	23
	Build	15	11	14	16	23	17	22	24
153	No Build	17	13	16	18	23	18	22	25
	Build	17	13	16	19	24	18	22	25

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Speed (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
154	No Build	17	13	16	18	23	18	22	25
	Build	17	13	17	19	23	18	22	25
155	No Build	18	14	17	20	24	19	23	26
	Build	18	14	17	20	24	18	23	26
156	No Build	20	16	19	22	27	22	26	30
	Build	20	15	19	22	27	21	26	30
157	No Build	18	13	17	19	25	19	24	28
	Build	18	14	17	20	26	20	24	28
158	No Build	15	11	14	16	22	17	21	24
	Build	15	11	14	16	22	17	21	24
159	No Build	15	11	15	16	22	17	22	23
	Build	16	12	15	16	23	17	22	23
160	No Build	15	12	15	17	22	17	21	23
	Build	16	12	15	17	22	17	21	23
161	No Build	13	10	13	14	20	16	19	22
	Build	14	11	13	15	21	16	20	22
162	No Build	14	10	13	14	21	15	20	21
	Build	14	11	13	14	22	16	20	22
163	No Build	13	10	12	14	20	15	19	21
	Build	14	10	13	14	21	16	20	22

Seasons	Months	Mean Wind Criteria Speed (mph)		Effective Gust Criteria (mph)
Spring	March - May	≤ 12	Comfortable for Sitting	≤ 31 Acceptable
Summer	June - August	13 - 15	Comfortable for Standing	> 31 Unacceptable
Fall	September - November	16 - 19	Comfortable for Walking	
Winter	December - February	20 - 27	Uncomfortable for Walking	
Annual	January - December	> 27	Dangerous Conditions	

Configurations

No Build Without the proposed Motor Mart development

Build With the proposed Motor Mart development

Notes

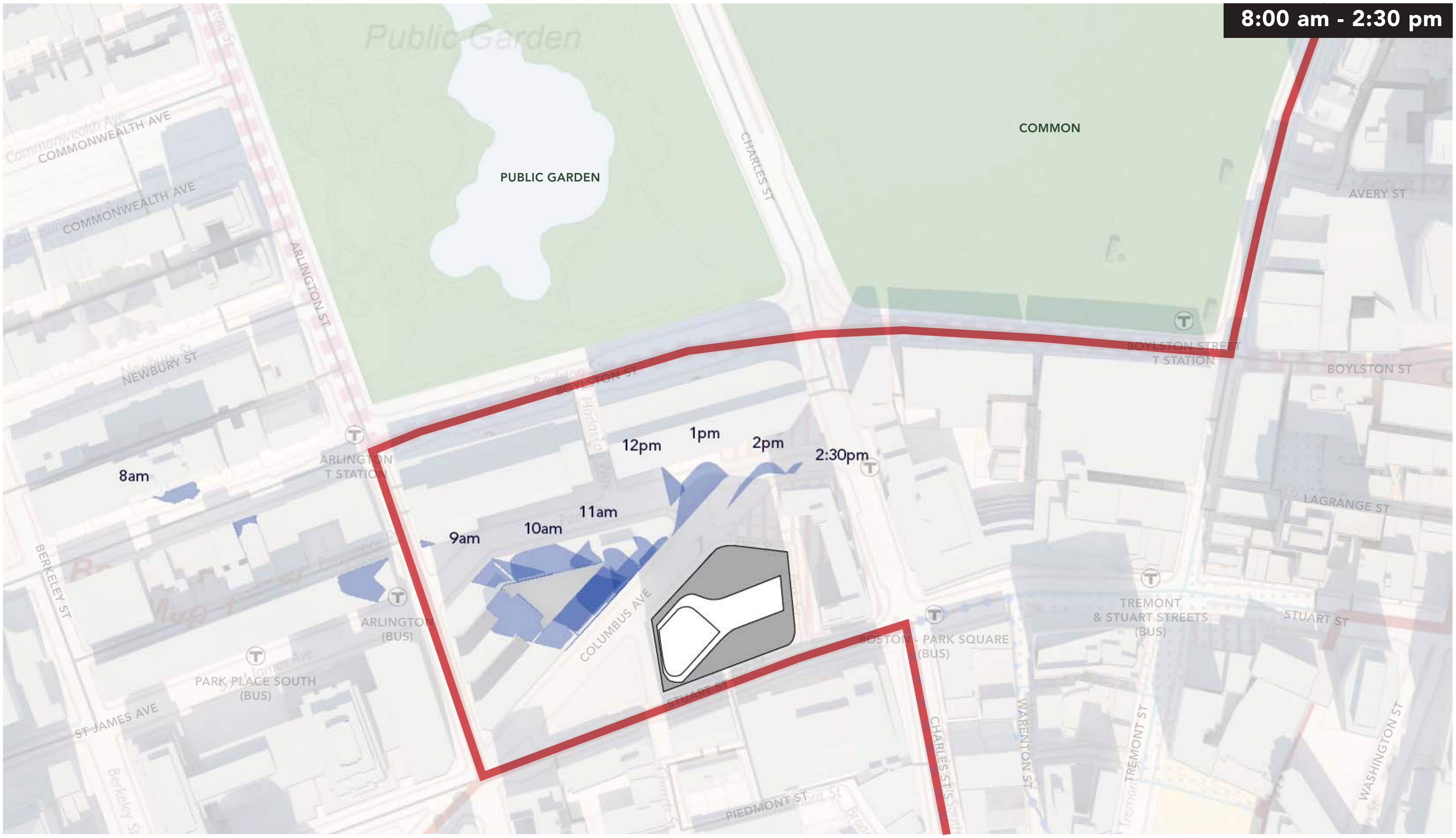
1) Wind Speeds are for a 1% probability of exceedance

Appendix E

Shadow Studies

Boston Common Shadow Analysis

MARCH 21
SHADOW TIME-LAPSE



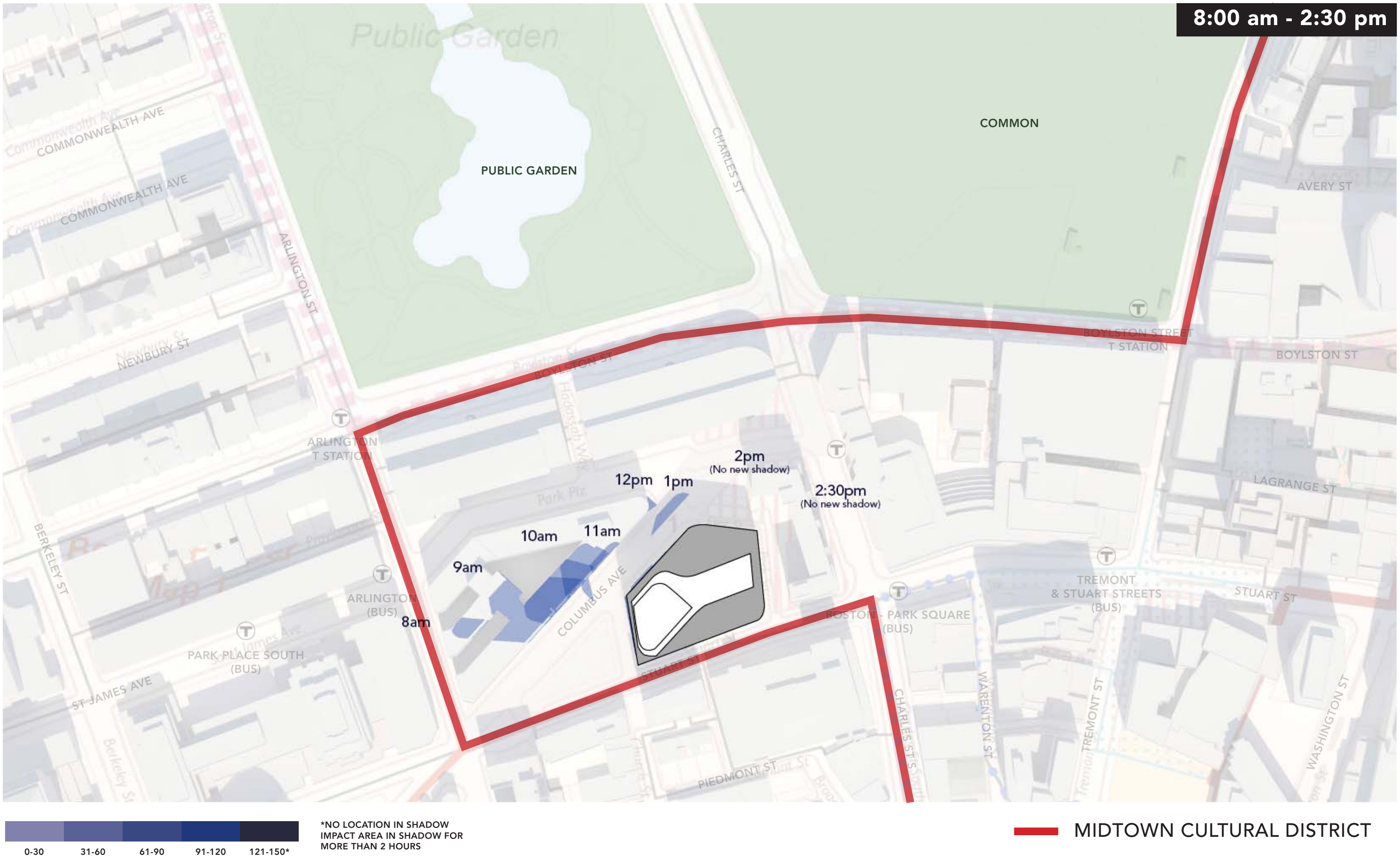
MINUTES IN SHADOW

0-30	31-60	61-90	91-120	121-150*

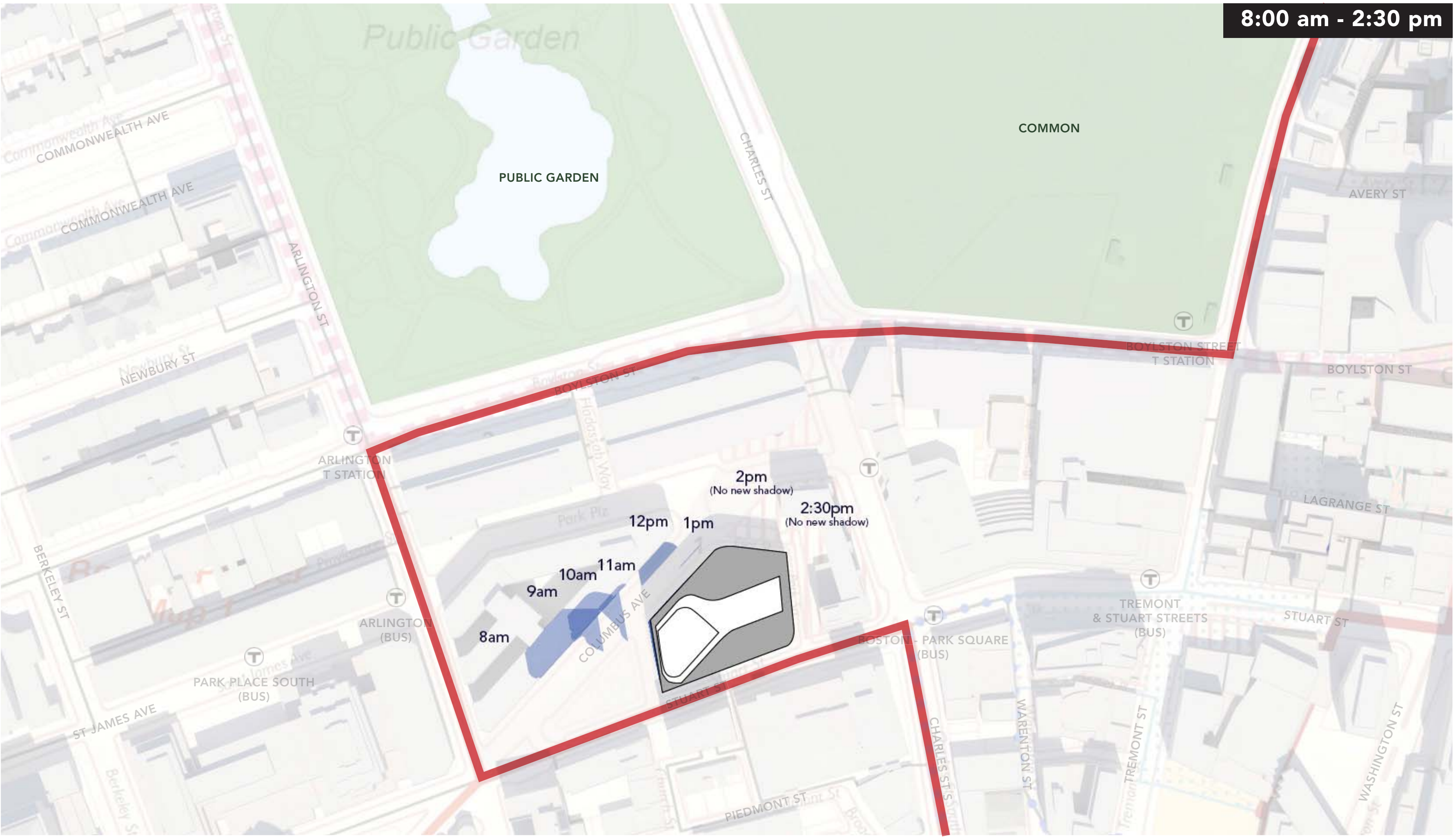
*NO LOCATION IN SHADOW IMPACT AREA IN SHADOW FOR MORE THAN 2 HOURS

MIDTOWN CULTURAL DISTRICT

APRIL 21
SHADOW TIME-LAPSE



MAY 21
SHADOW TIME-LAPSE



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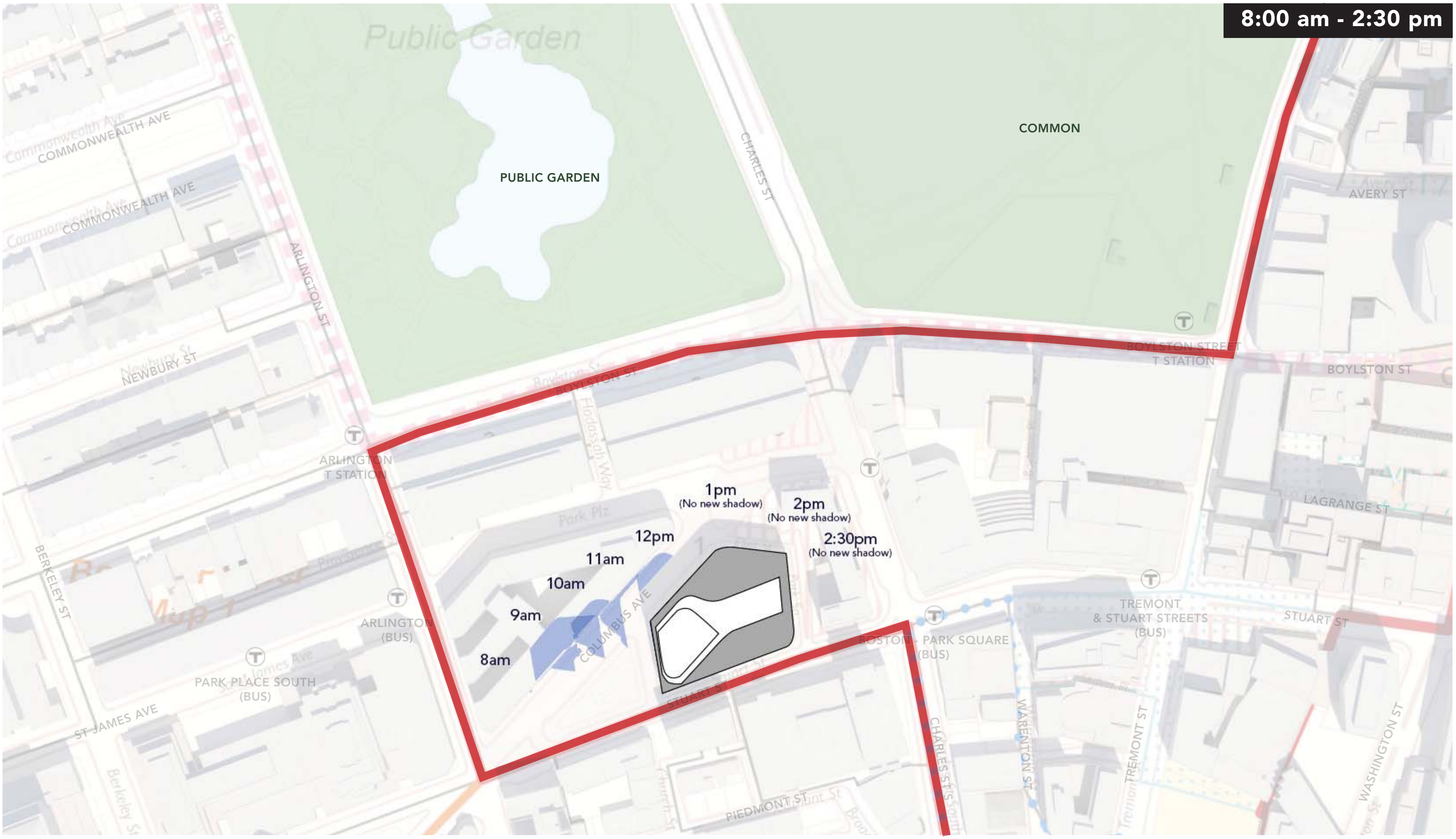
MIDTOWN CULTURAL DISTRICT

JUNE 21
SHADOW TIME-LAPSE



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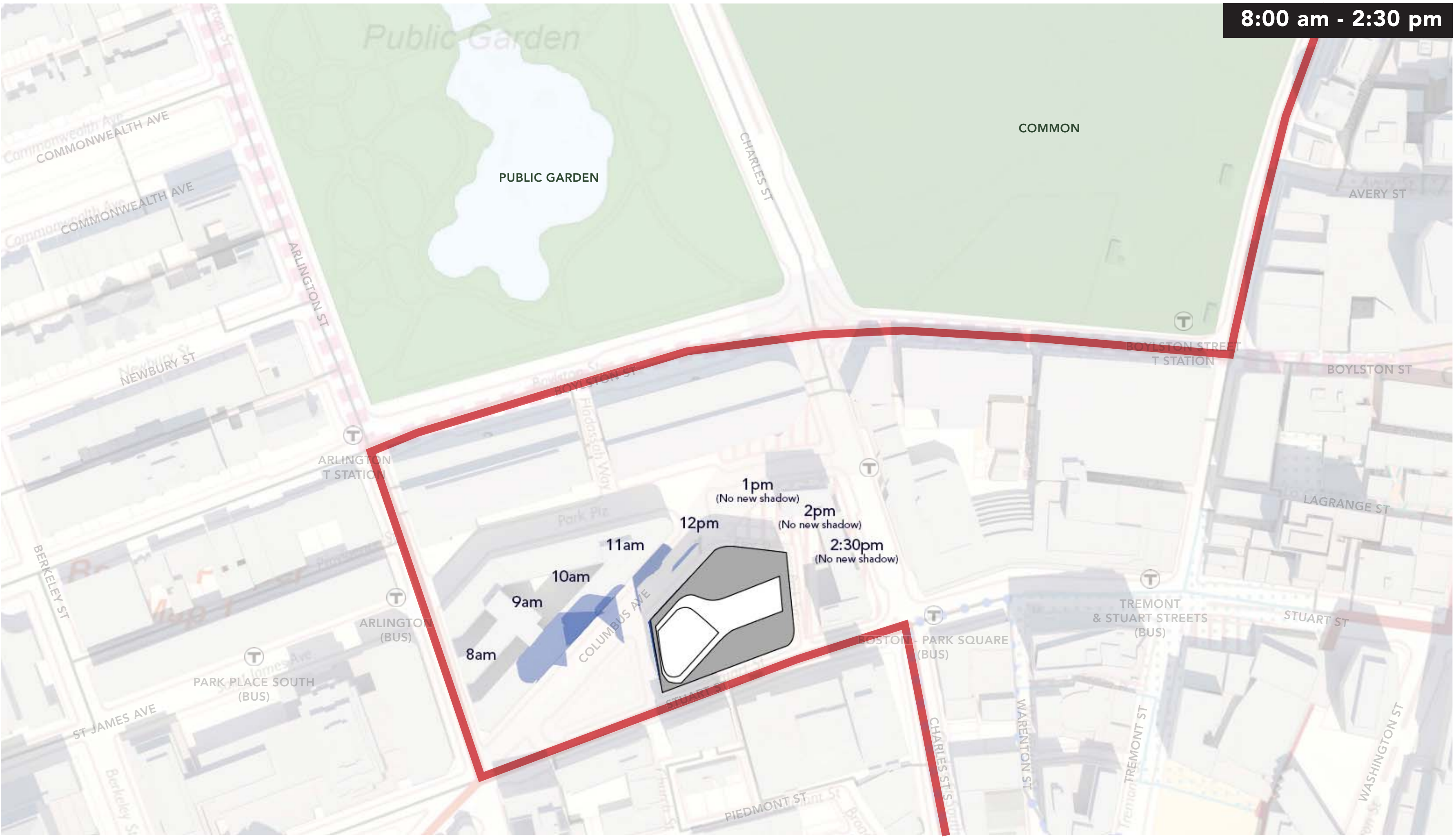
MIDTOWN CULTURAL DISTRICT

JULY 21
SHADOW TIME-LAPSE



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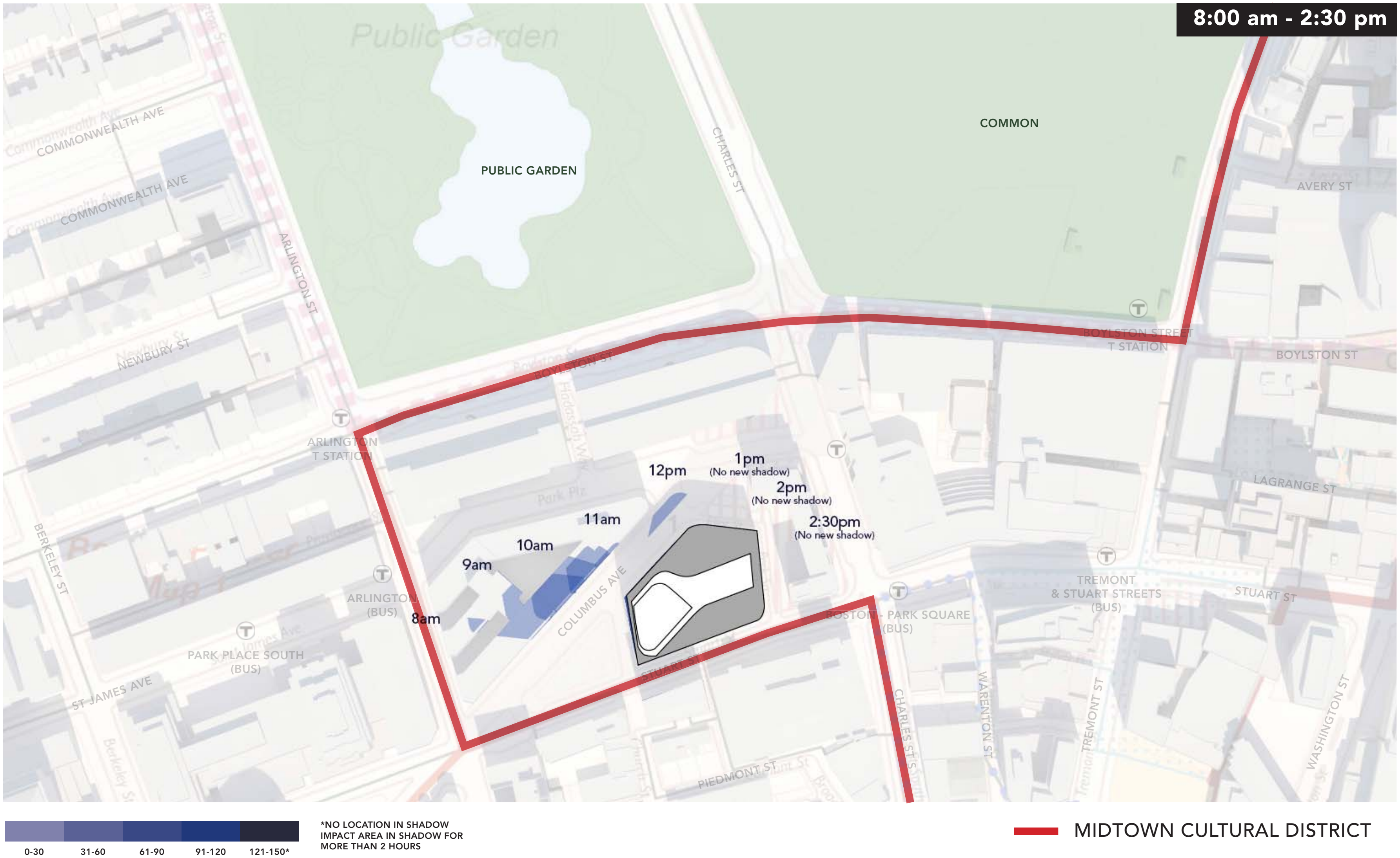
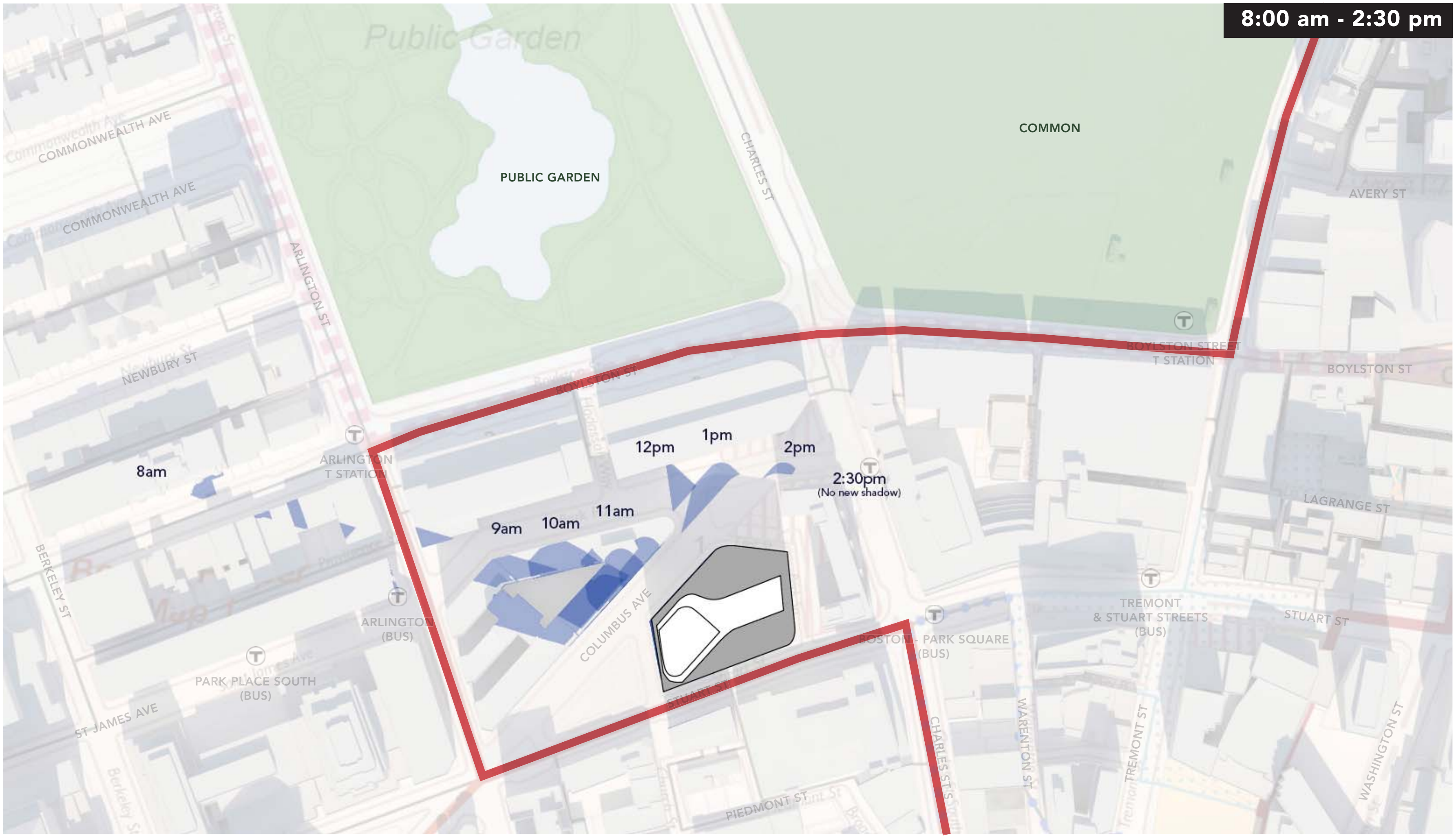
MIDTOWN CULTURAL DISTRICT

AUGUST 21
SHADOW TIME-LAPSE



SEPTEMBER 21
SHADOW TIME-LAPSE



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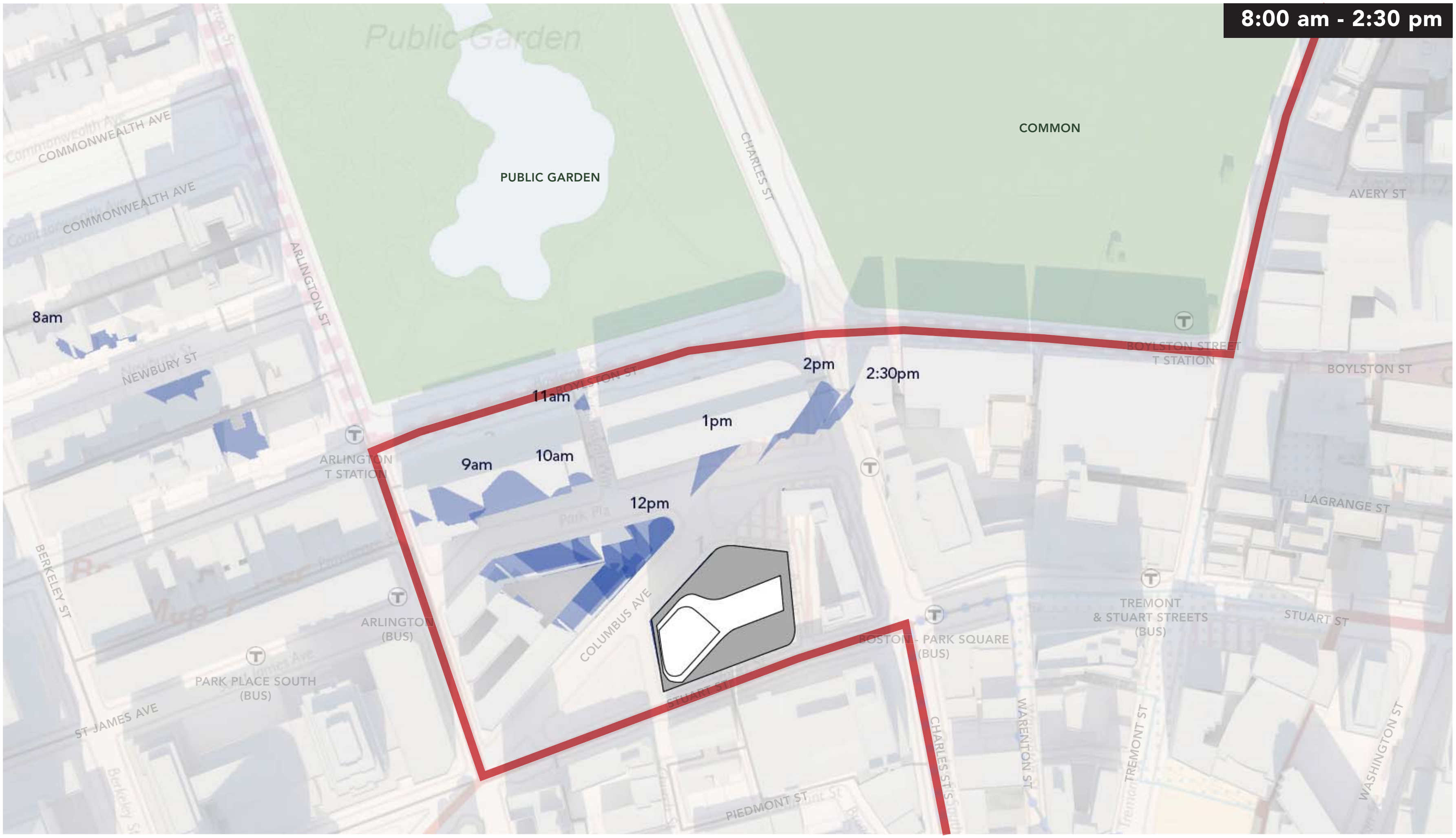
MIDTOWN CULTURAL DISTRICT

OCTOBER 21
SHADOW TIME-LAPSE

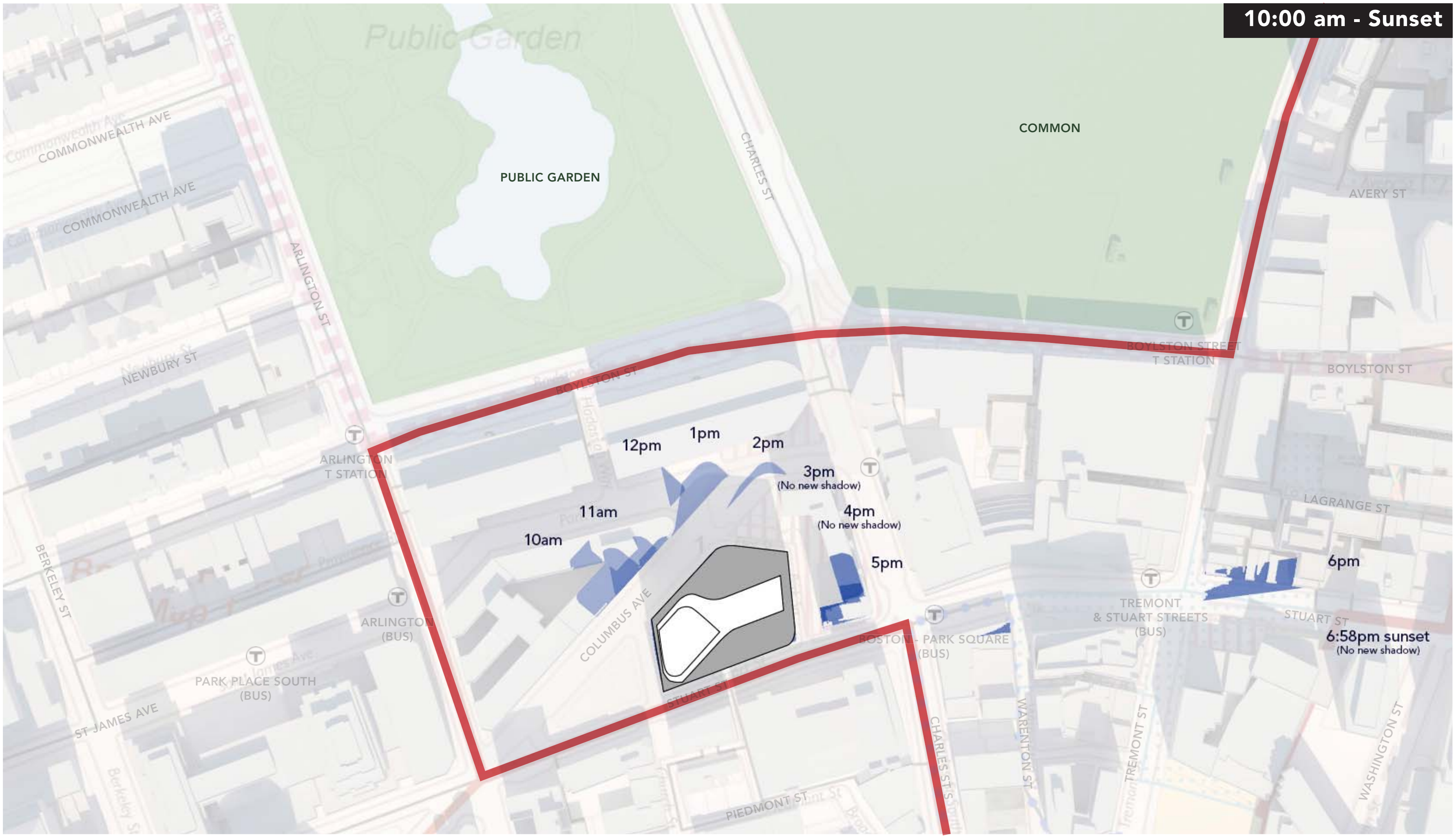


*NO LOCATION IN SHADOW IMPACT AREA IN SHADOW FOR MORE THAN 2 HOURS

MIDTOWN CULTURAL DISTRICT

Public Garden Shadow Analysis

MARCH 21
SHADOW TIME-LAPSE



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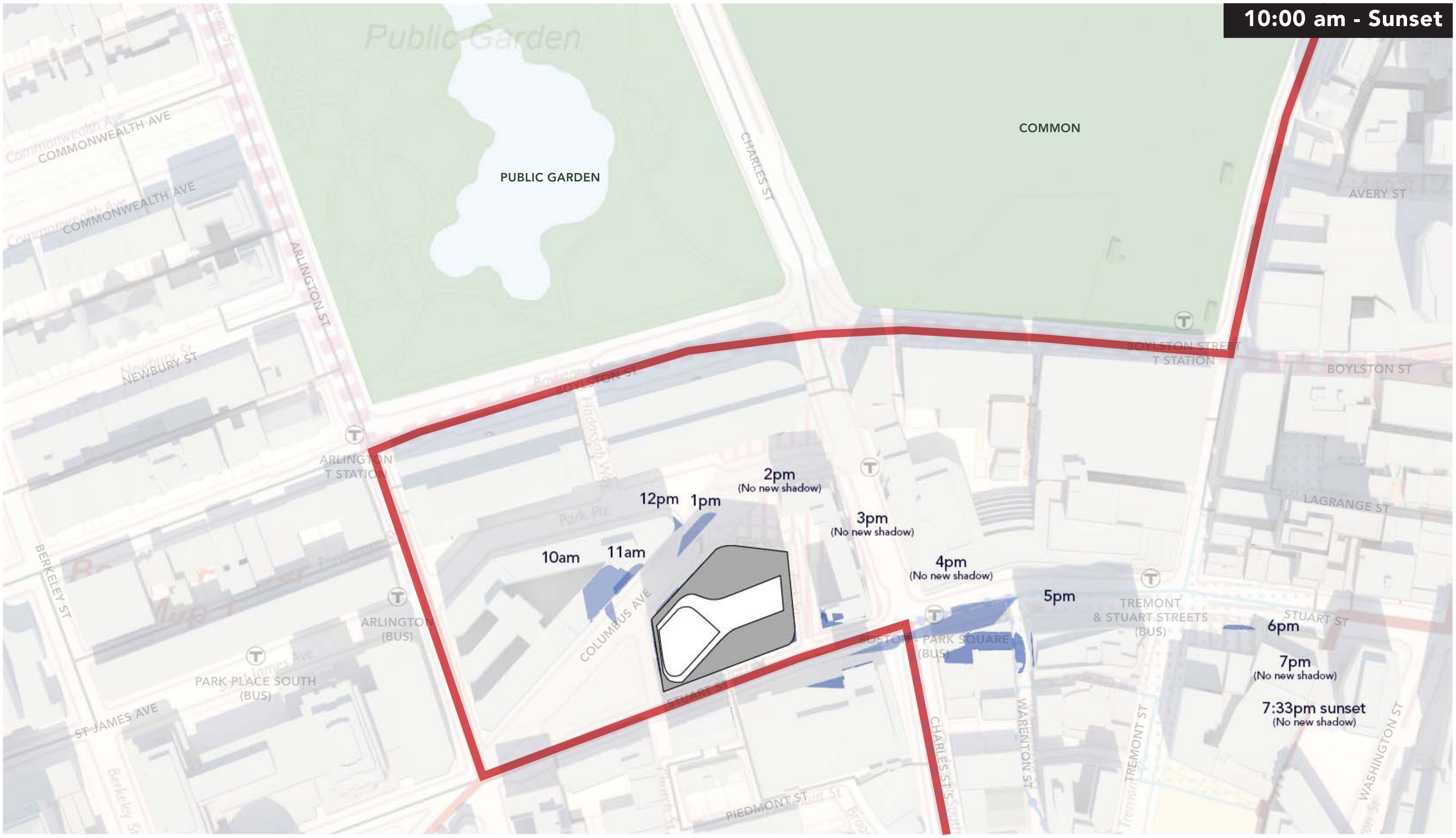
MIDTOWN CULTURAL DISTRICT

APRIL 21
SHADOW TIME-LAPSE



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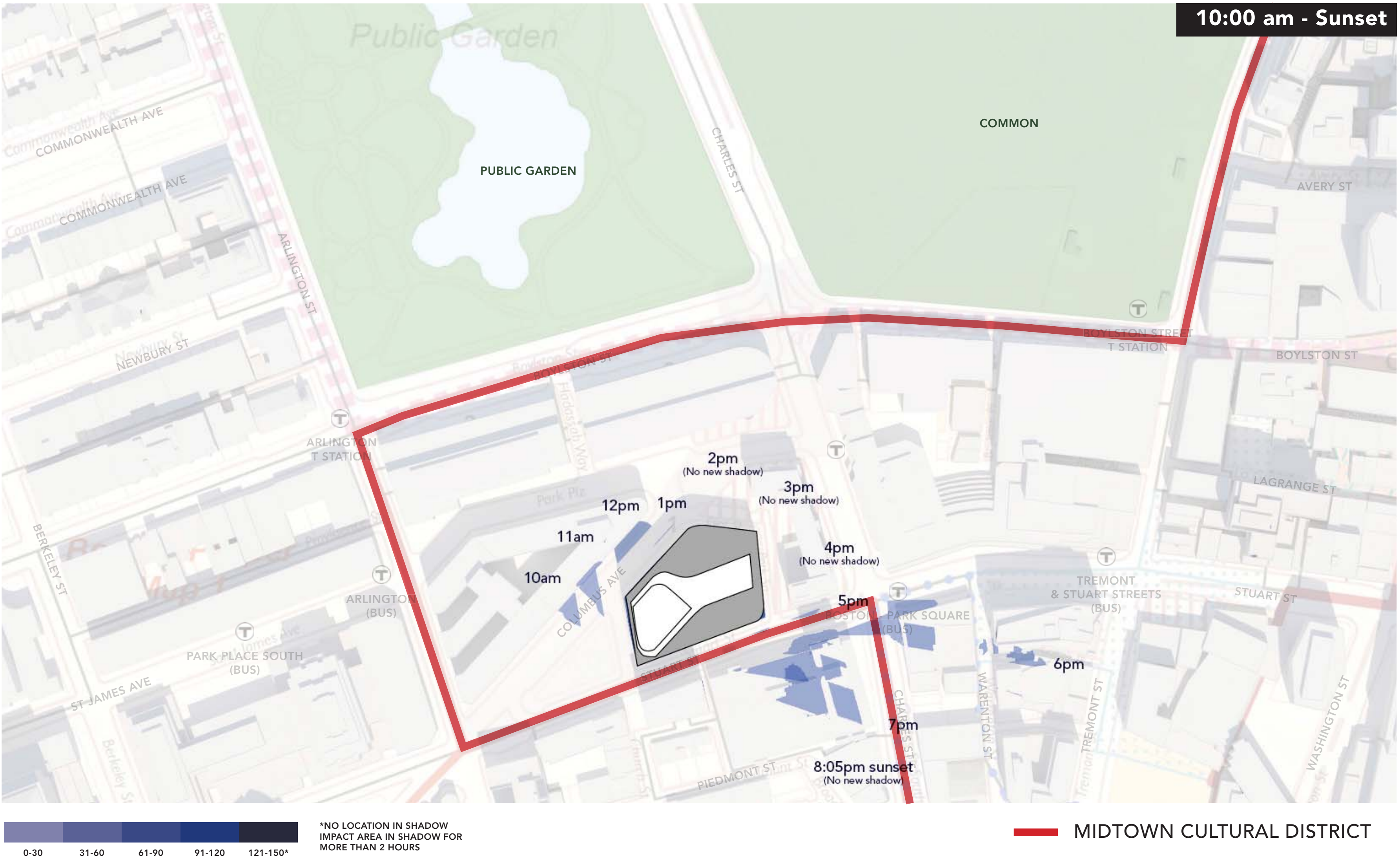
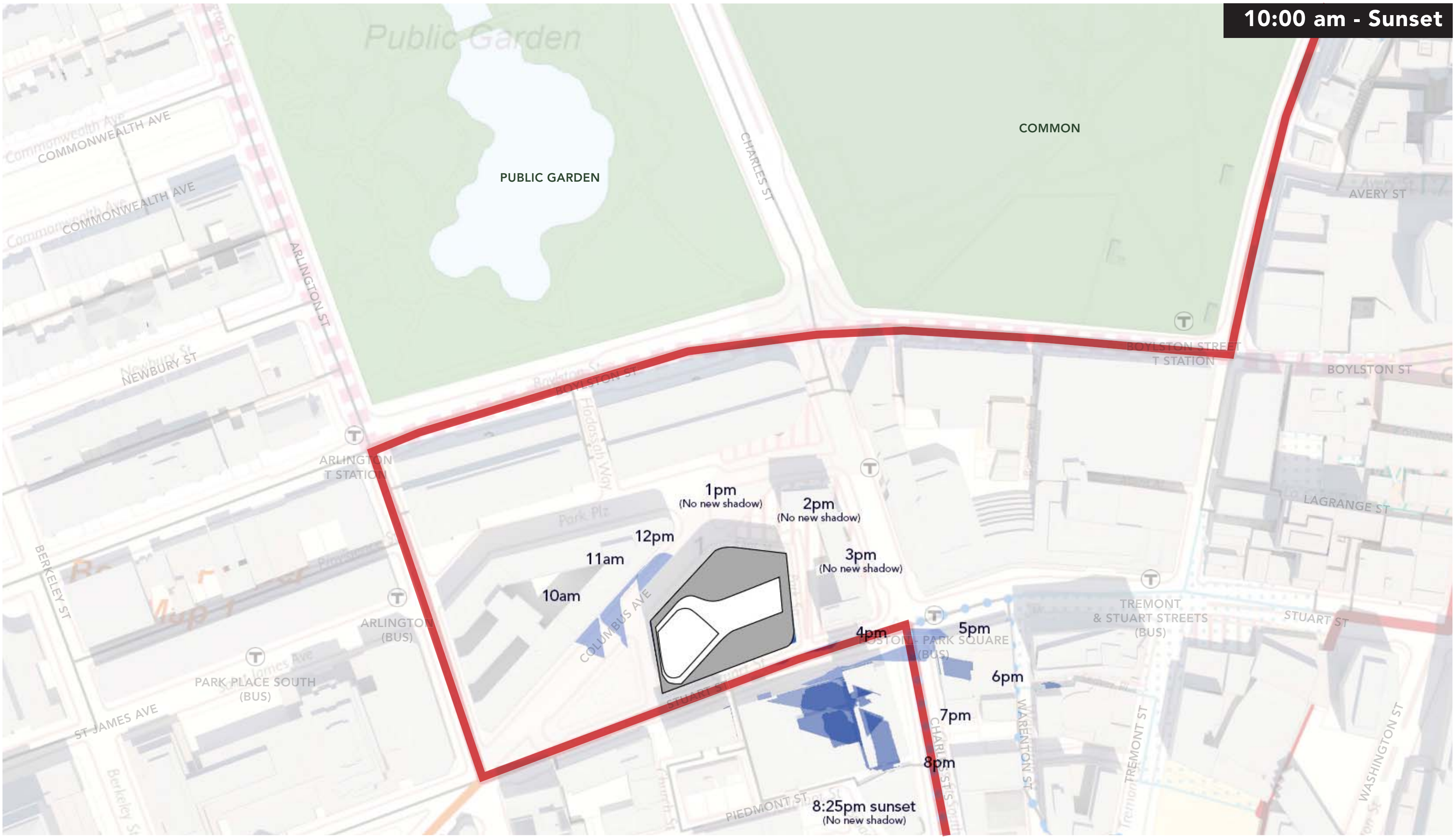
MIDTOWN CULTURAL DISTRICT

MAY 21
SHADOW TIME-LAPSE



JUNE 21
SHADOW TIME-LAPSE



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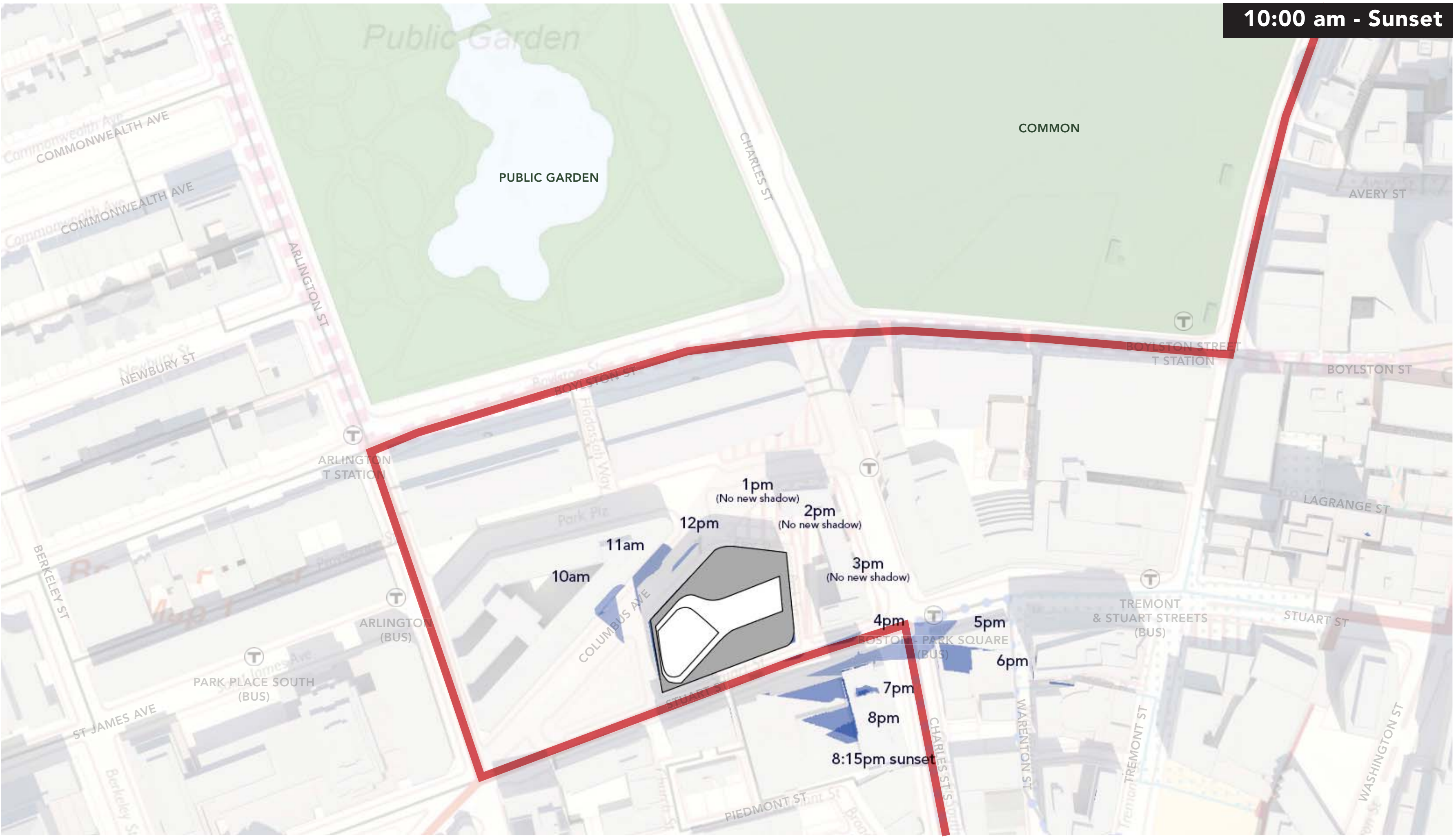
MIDTOWN CULTURAL DISTRICT

JULY 21
SHADOW TIME-LAPSE



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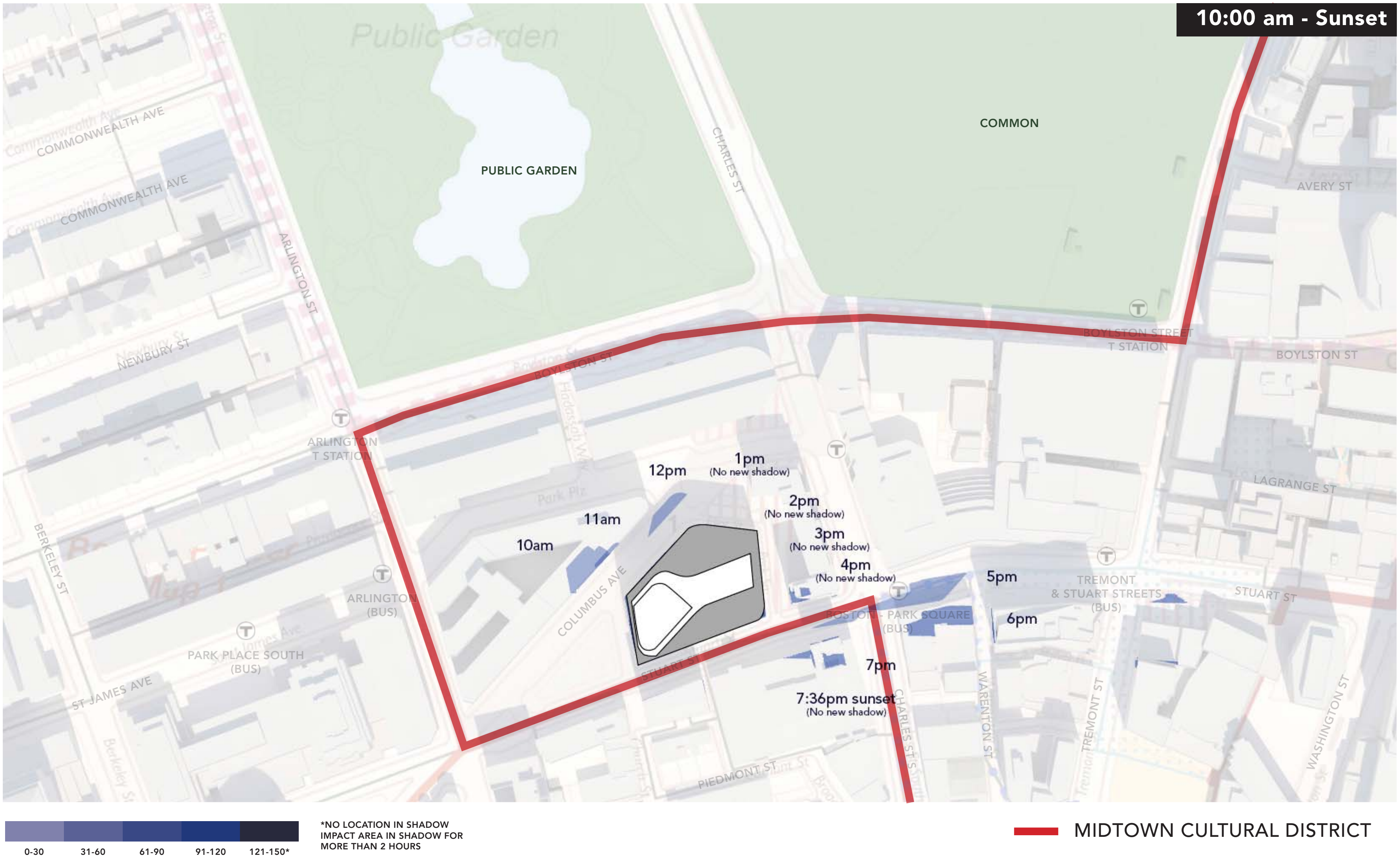
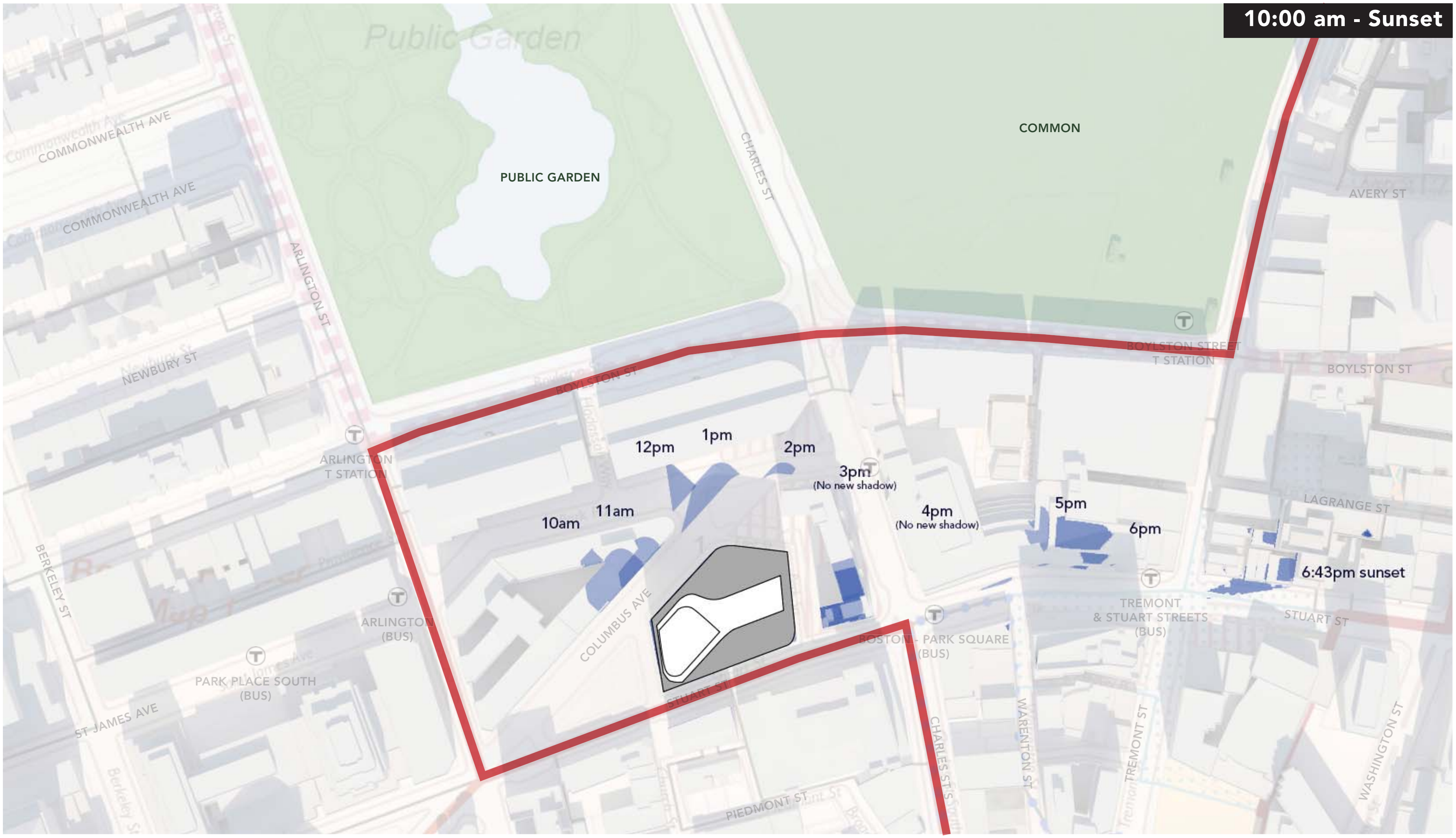
MIDTOWN CULTURAL DISTRICT

AUGUST 21
SHADOW TIME-LAPSE



SEPTEMBER 21
SHADOW TIME-LAPSE



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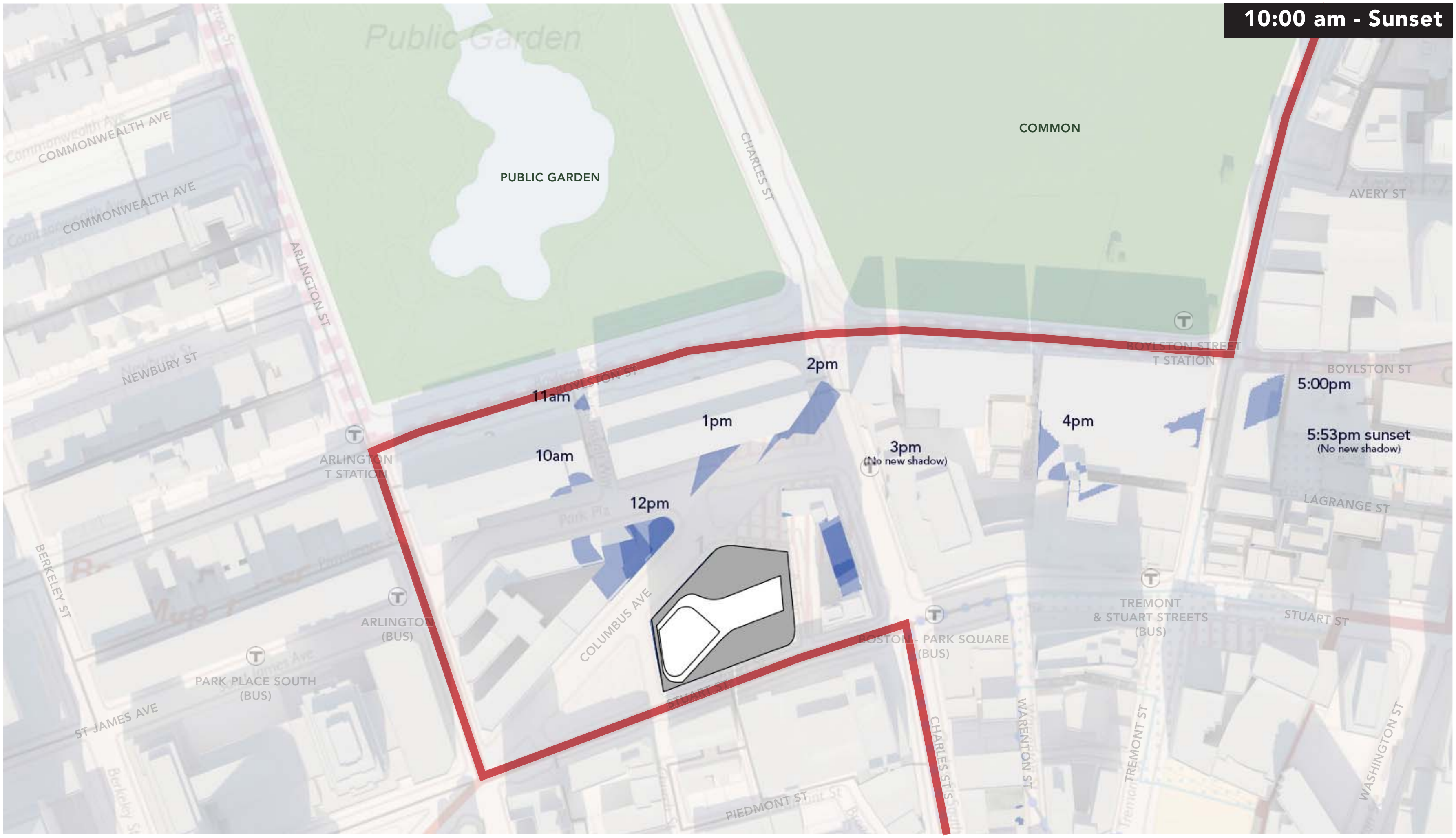
MIDTOWN CULTURAL DISTRICT

OCTOBER 21
SHADOW TIME-LAPSE



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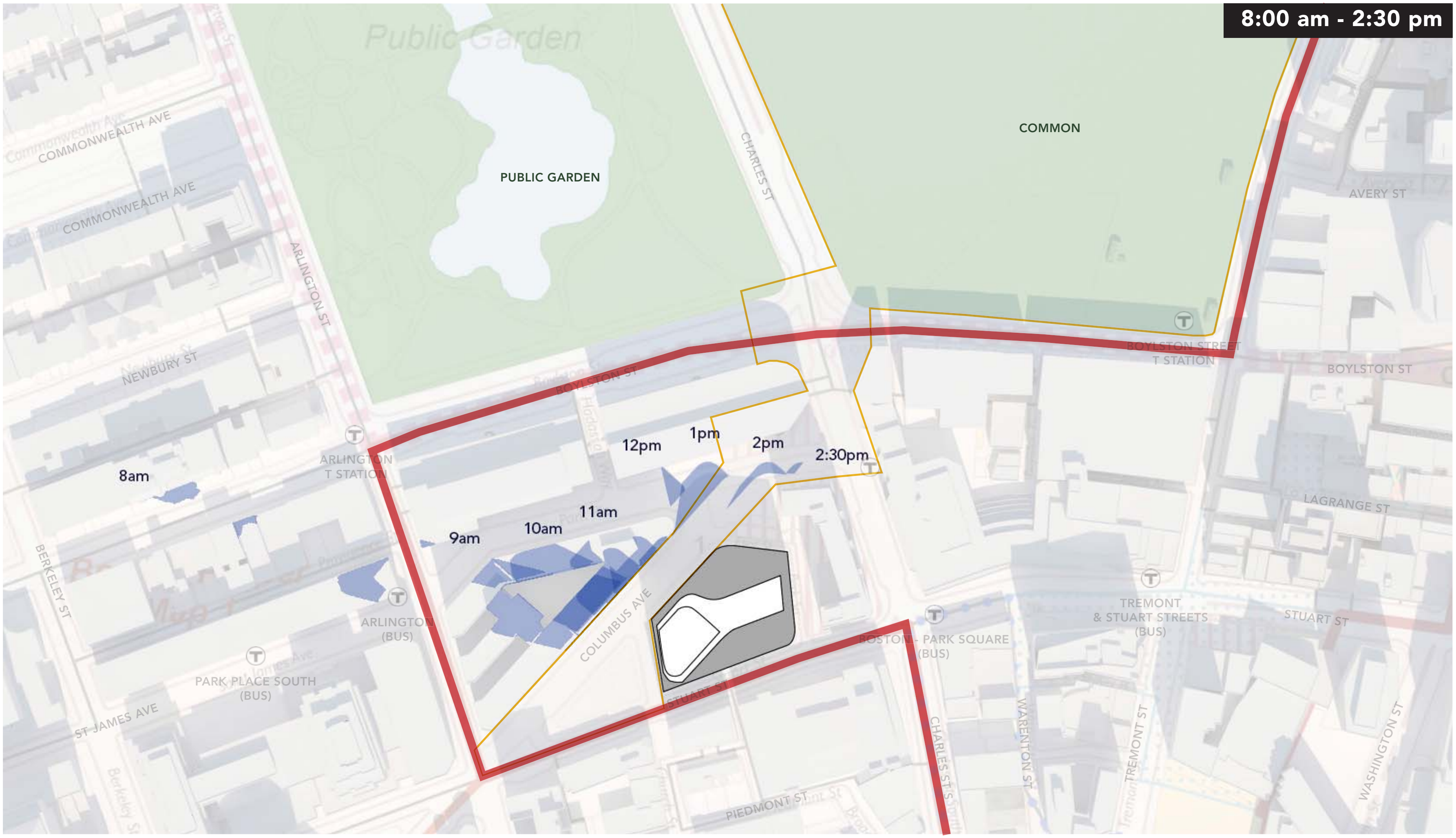
MIDTOWN CULTURAL DISTRICT

Shadow Impact Area Analysis

MARCH 21
SHADOW TIME-LAPSE



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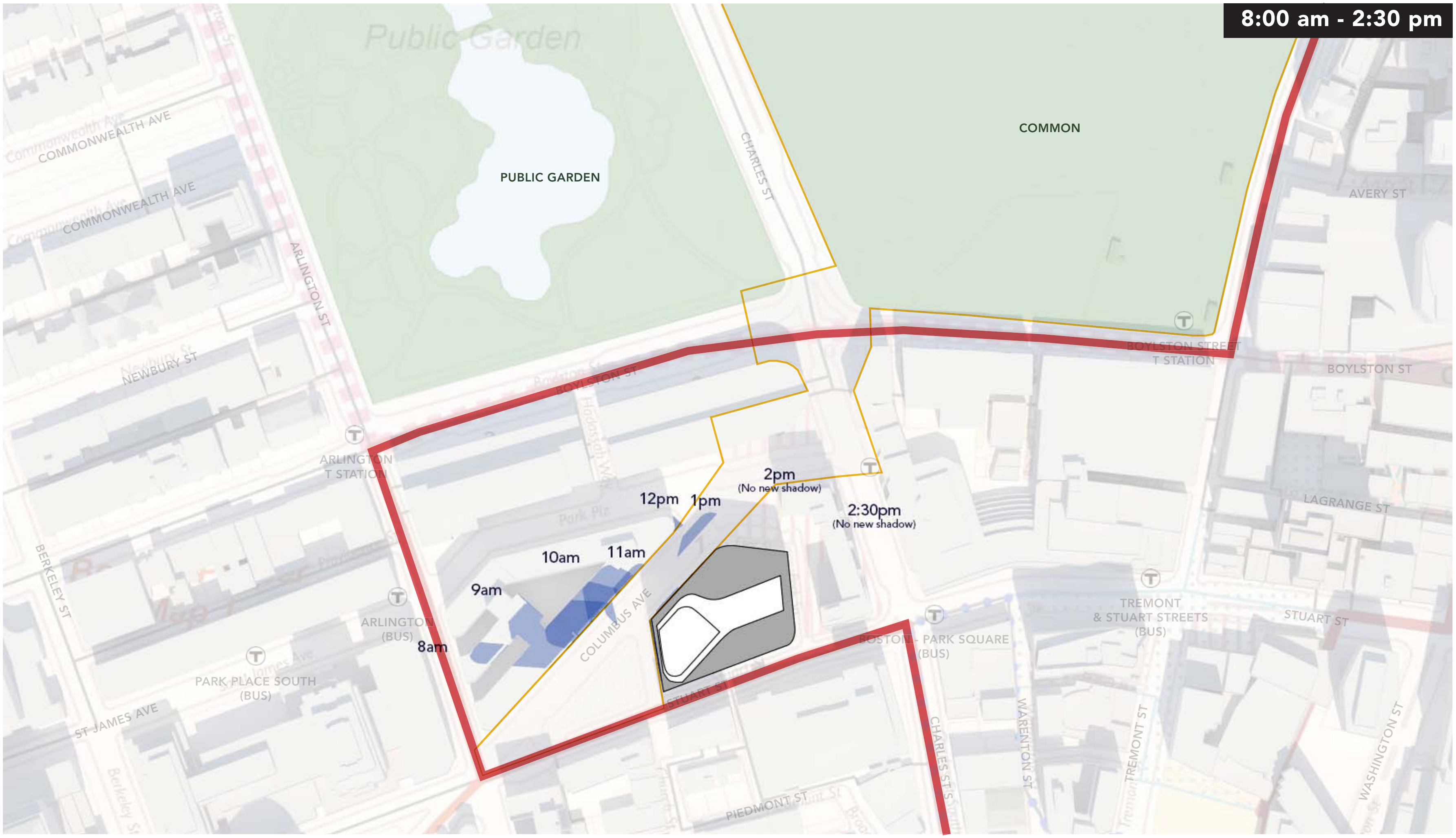
MIDTOWN CULTURAL DISTRICT
SHADOW IMPACT AREA

APRIL 21
SHADOW TIME-LAPSE



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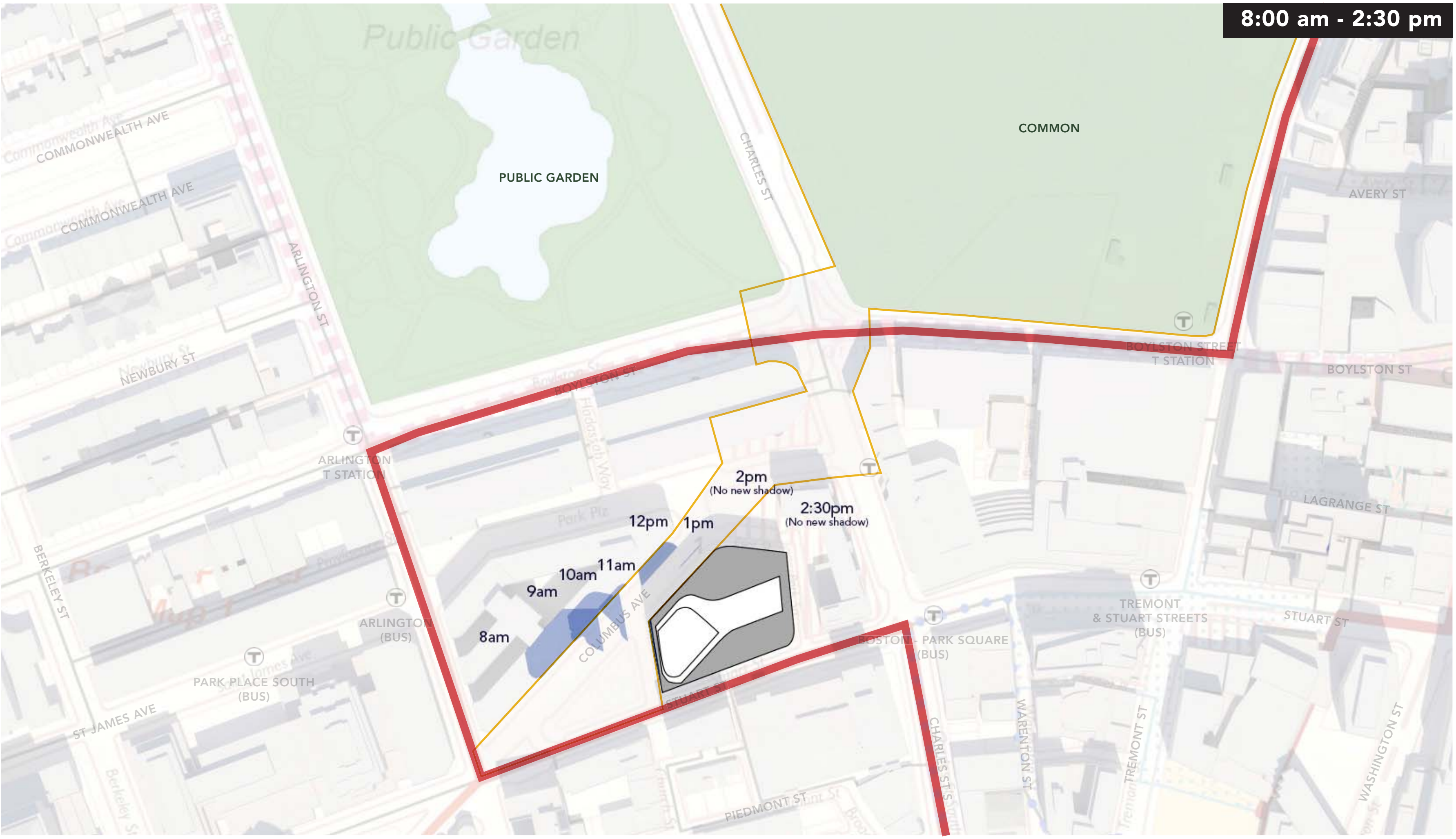
MIDTOWN CULTURAL DISTRICT
SHADOW IMPACT AREA

MAY 21
SHADOW TIME-LAPSE



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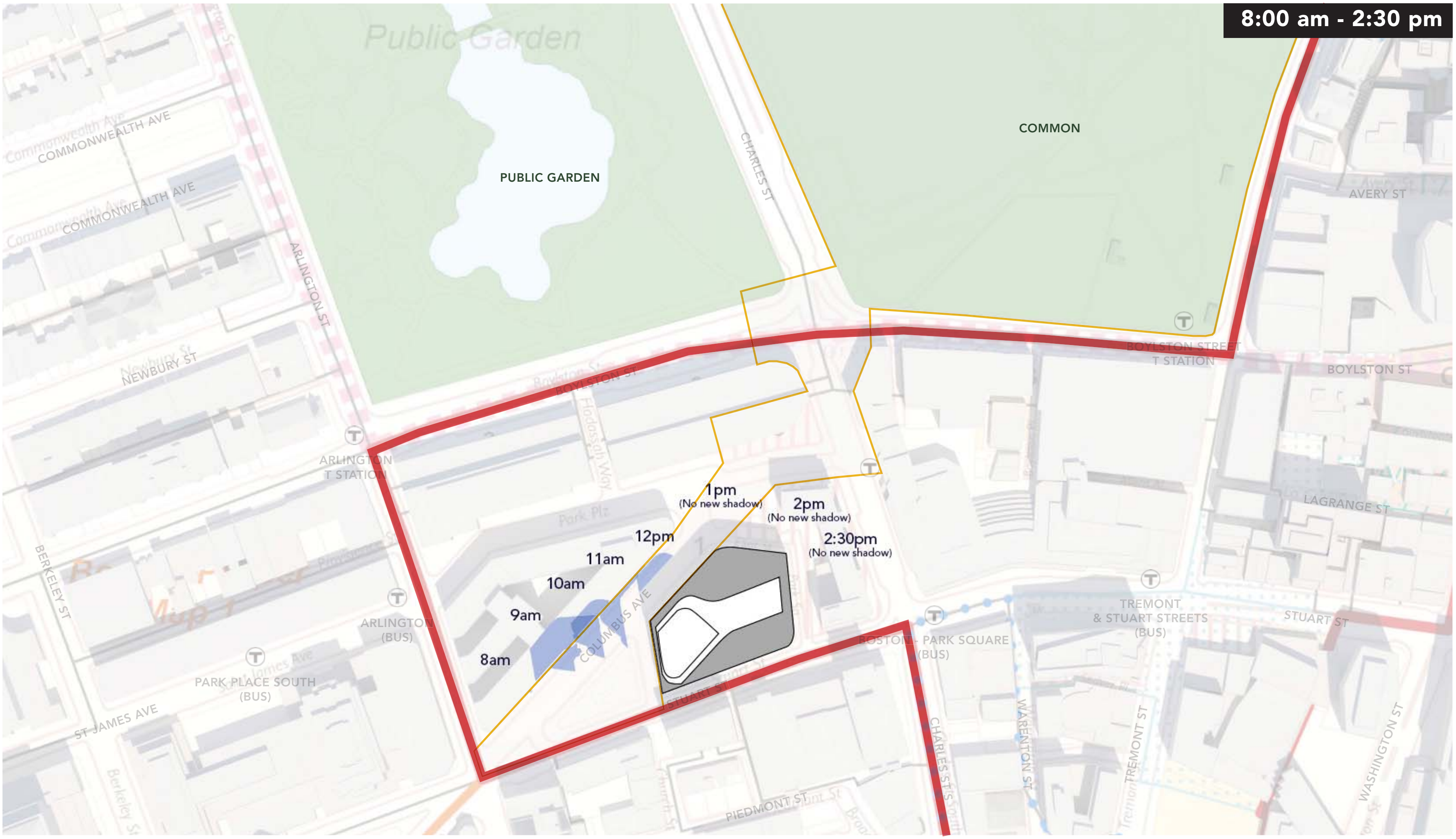
MIDTOWN CULTURAL DISTRICT
SHADOW IMPACT AREA

JUNE 21
SHADOW TIME-LAPSE



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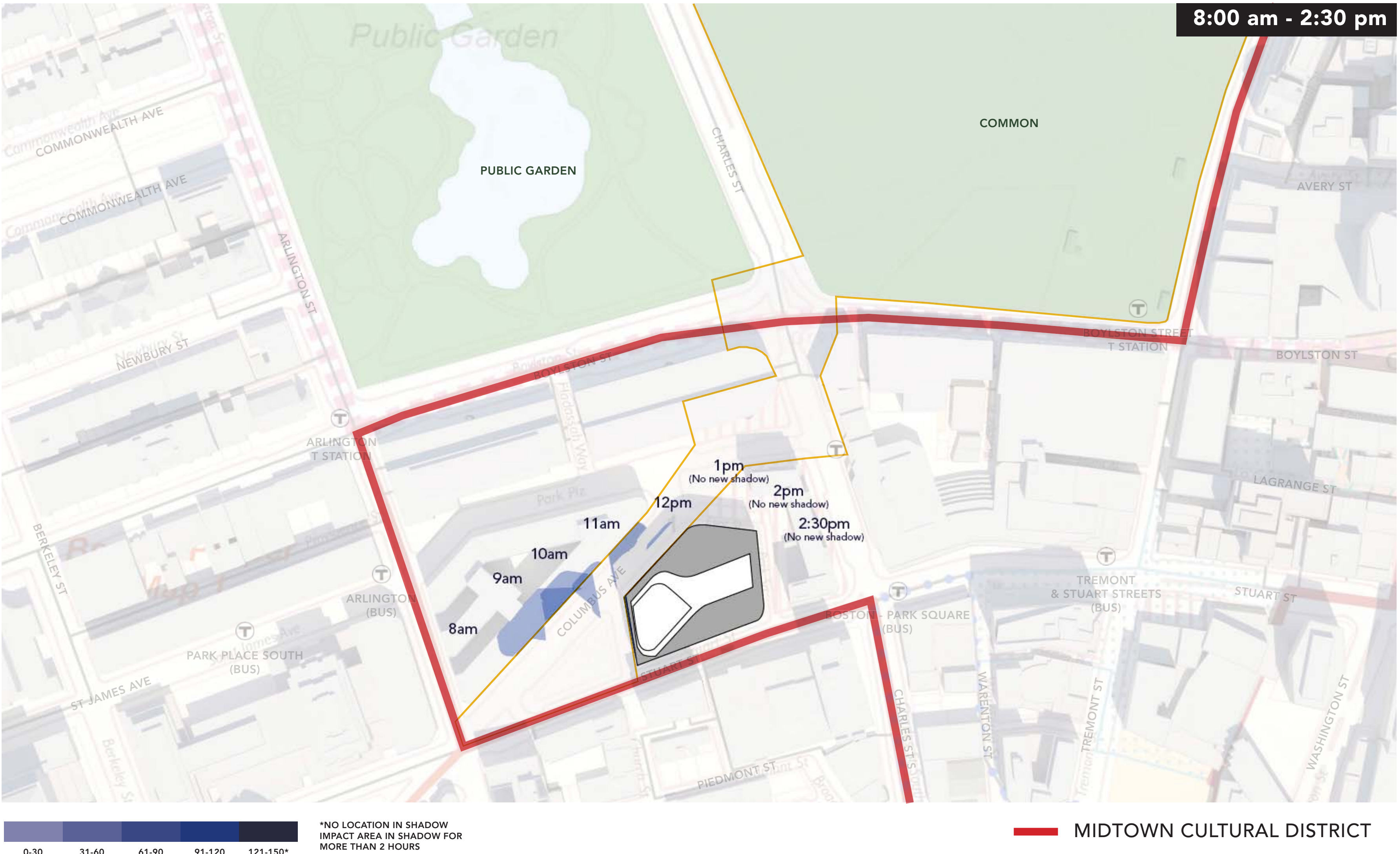
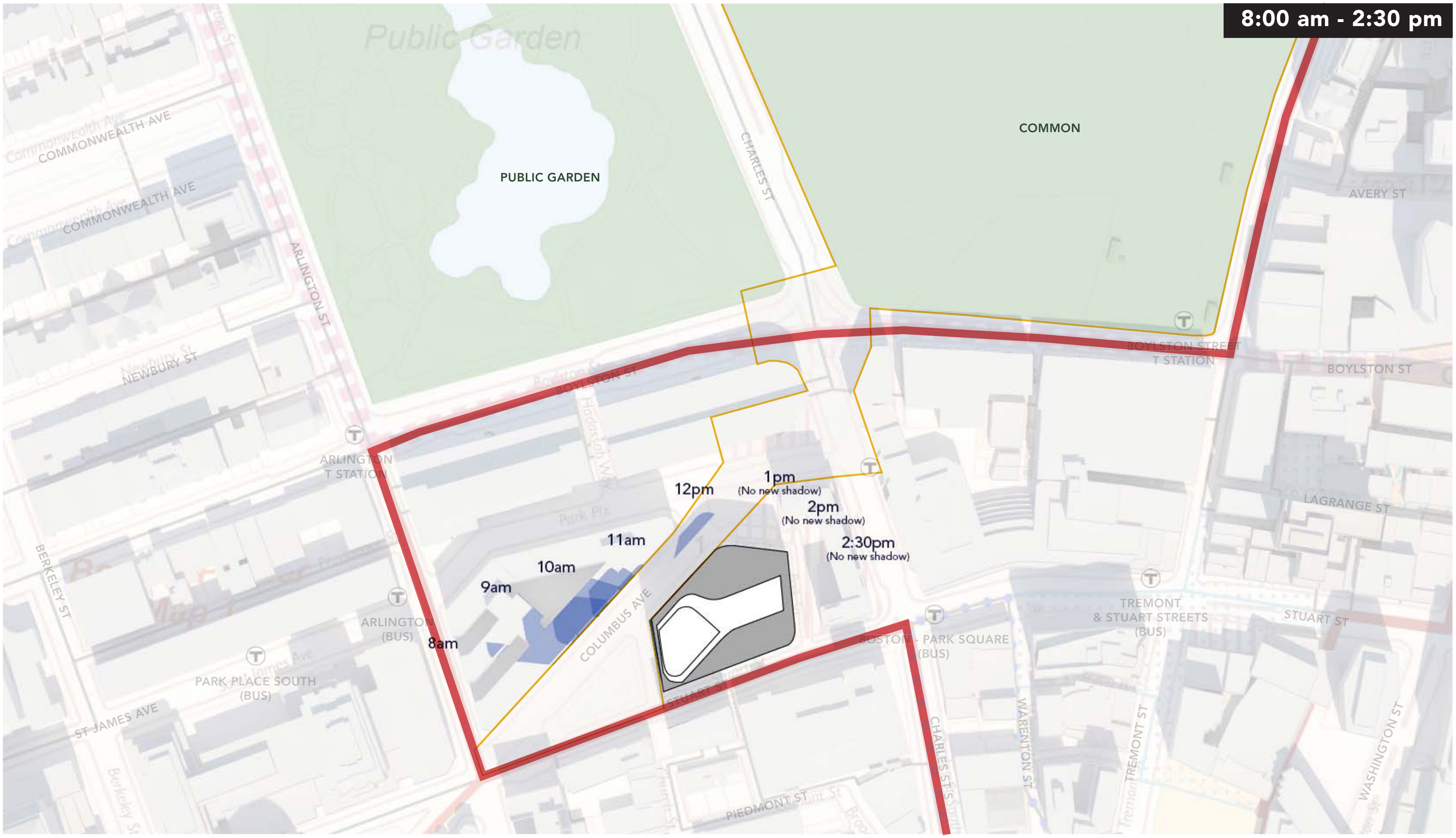
MIDTOWN CULTURAL DISTRICT
SHADOW IMPACT AREA

JULY 21
SHADOW TIME-LAPSE



AUGUST 21
SHADOW TIME-LAPSE



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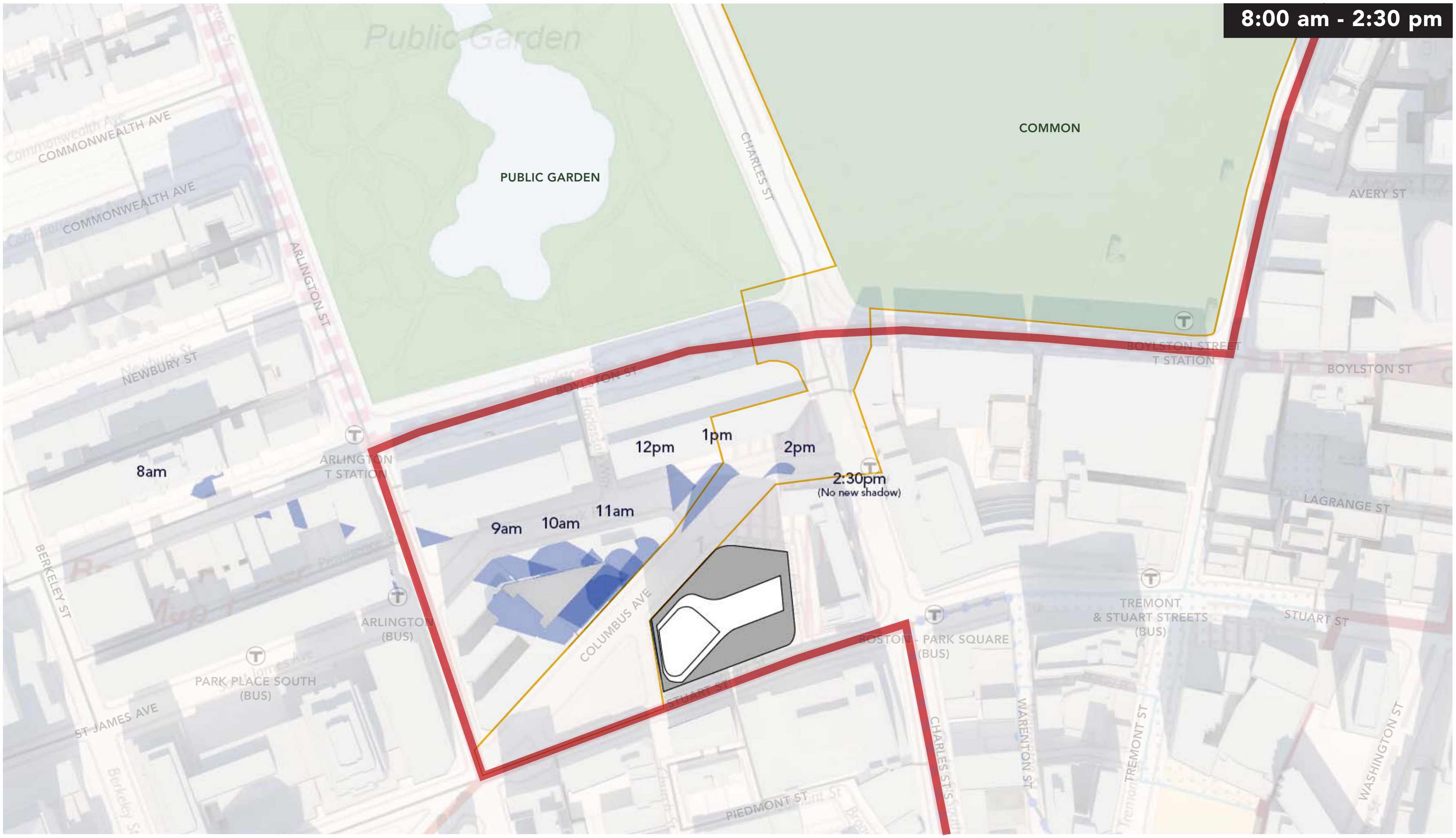
MIDTOWN CULTURAL DISTRICT
SHADOW IMPACT AREA

SEPTEMBER 21
SHADOW TIME-LAPSE



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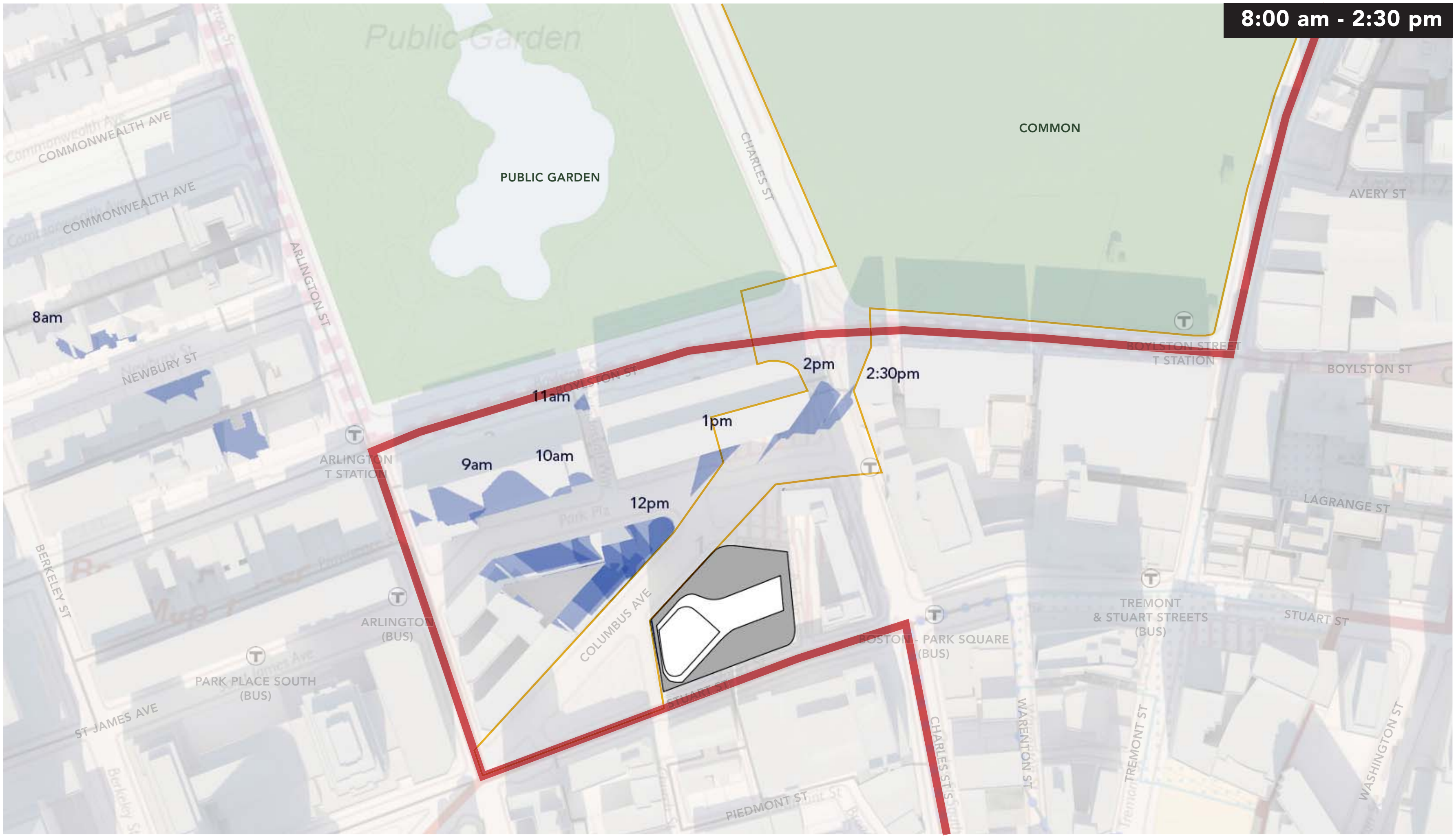
MIDTOWN CULTURAL DISTRICT
SHADOW IMPACT AREA

OCTOBER 21
SHADOW TIME-LAPSE



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MIDTOWN CULTURAL DISTRICT
SHADOW IMPACT AREA

Appendix F

Air Quality

AIR QUALITY APPENDIX

Introduction

This Air Quality Appendix provides modeling assumptions and backup for results presented in Section 3.5 of the report. Included within this documentation is a brief description of the methodology employed along with pertinent calculations and data used in the emissions and dispersion calculations supporting the microscale air quality analysis.

Motor Vehicle Emissions

The EPA MOVES computer program generated motor vehicle emissions used in the garage stationary source analysis along with the mobile source CAL3QHC modeling and mesoscale analysis. The model input parameters were provided by MassDEP. Emission rates were derived for 2018 and 2025 for speed limits of idle, 10, 15, and 25 mph for use in the microscale analyses.

MOVES CO Emission Factor Summary

Carbon Monoxide Only

		2018	2025
Free Flow	25 mph	2.448	1.658
Right Turns	10 mph	3.788	2.541
Left Turns	15 mph	3.288	2.237
Queues	Idle	6.673	3.039

Notes: Winter CO emission factors are higher than Summer and are conservatively used
Urban Unrestricted Roadway type used

CAL3QHC

For the intersection studied, the CAL3QHC model was applied to calculate CO concentrations at sensitive receptor locations using emission rates derived in MOVES. The intersection's queue links and free flow links were input to the model along with sensitive receptors at all locations nearby each intersection. The meteorological assumptions input into the model were a 1.0 meter per second wind speed, Pasquill-Gifford Class D stability combined with a mixing height of 1000 meters. For each direction, the full range of wind directions at 10 degree intervals was examined. In addition, a surface roughness (z_0) of 321 cm was used for the intersection. Idle emission rates for queue links were based on 0 mph emission rates derived in MOVES. Emission rates for speeds of 10, 15, and 25 mph were used for right turn, left turn, and free flow links, respectively.

Background Concentrations

POLLUTANT	AVERAGING TIME	Form	2014	2015	2016	Units	ppm/ppb to µg/m³ Conversion Factor	2014-2016 Background Concentration (µg/m³)	Location
SO_2 (1)(6)(7)	1-Hour (5)	99th %	9.7	5.5	4.1	ppb	2.62	16.9	Kenmore Sq., Boston
	3-Hour (6)	H2H	9.4	4.4	3.8	ppb	2.62	24.6	Kenmore Sq., Boston
	24-Hour	H2H	5	2.9	2	ppb	2.62	13.1	Kenmore Sq., Boston
	Annual	H	0.94	0.5	0.4	ppb	2.62	2.5	Kenmore Sq., Boston
PM-10	24-Hour	H2H	53	30	30	µg/m³	1	53	Kenmore Sq., Boston
	Annual	H	14.9	14.2	14.1	µg/m³	1	14.9	Kenmore Sq., Boston
PM-2.5	24-Hour (5)	98th %	14.35	16.65	14.7	µg/m³	1	15.2	174 North St., Boston
	Annual (5)	H	6.935	7.3	7.7	µg/m³	1	7.3	174 North St., Boston
NO_2 (3)(7)	1-Hour (5)	98th %	49	56	47	ppb	1.88	95.3	Kenmore Sq., Boston
	Annual	H	17.17	17.3	15.0	ppb	1.88	32.5	Kenmore Sq., Boston
CO (2)(7)	1-Hour	H2H	1.3	1.4	2.2	ppm	1146	2489.1	Harrison Ave., Boston
	8-Hour	H2H	0.9	0.9	1.8	ppm	1146	2062.8	Harrison Ave., Boston
Ozone (4)	8-Hour	H4H	0.054	0.056	0.058	ppm	1963	113.9	Harrison Ave., Boston
Lead	Rolling 3-Month	H	0.014	0.016	0.017	µg/m³	1	0.017	Harrison Ave., Boston

Notes:

From 2014-2016 EPA's AirData Website

[1] SO_2 reported ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 2.62 $\mu g/m^3$.

[2] CO reported in ppm. Converted to $\mu g/m^3$ using factor of 1 ppm = 1146 $\mu g/m^3$.

[3] NO_2 reported in ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 1.88 $\mu g/m^3$.

(4) O_3 reported in ppm. Converted to $\mu g/m^3$ using factor of 1 ppm = 1963 $\mu g/m^3$.

[5] Background level is the average concentration of the three years.

[6] The 24-hour and Annual standards were revoked by EPA on June 22, 2010, Federal Register 75-119, p. 35520.

[7] CO monitor at Kenmore Square was deactivated in January 2015. Harrison Avenue monitor used for 2015 and 2016.

Due to excessive size CAL3QHC, and MOVES input and output files are available on digital media upon request.

Appendix G

Preliminary Energy Model Results

ENERGY MODEL REPORT

Motor Mart | Boston, MA

An Energy Evaluation by R. G. Vanderweil Engineers LLP's Building Performance Group
July, 2018

VANDERWEIL

DESIGN PHASE	Conceptual Development
BUILDING TYPE	Residential and Retail
PROJECT SQUARE FOOTAGE	685,000 ft^2

LEED RATING SYSTEM	LEED Version 4
LEED BASELINE	ASHRAE 90.1 2010

{
30% Energy Savings
14% Energy Cost Savings
22% GHG Savings
5 LEED EAc1 Points
}

MODELING PROCESS

Vanderweil performed conceptual level energy modeling for the Motor Mart project to help comply with the Green Building Review Procedures and the initial project filing. The modeling software eQuest 3.64 was used for the analysis. The model is based on the July, 2018 concept programming information received from CBT.

Article 37 requires that the project earn enough credits to achieve LEED Version 4 certification. The minimum Energy Performance prerequisite (EAp2) is a mandatory credit that must be achieved in order to be LEED certifiable.

The modeling estimates an annual site energy use for the proposed design that is approximately 14% below the standard reference design as per ASHRAE 90.1- 2010. The total Green House Gas (GHG) reductions are 22% when the design is compared to the LEED Baseline.

PROJECT OVERVIEW

The Motor Mart facility will be a twenty-eight story building (approximately 685,000 sf) in Boston MA. The building will have two floors of retail and the remaining space will be divided between condominiums, apartments, parking and associated spaces. The facility's HVAC system will consist of water-source heat pumps equipped with ECM motors connected to the building condenser loop with condensing boilers and cooling towers. Ventilation will be provided by a dedicated outside air unit (DOAS) equipped with heat recovery.

The United States Green Building Council (USGBC) requires all buildings pursuing LEED® Certification be 5% more energy cost efficient than an equivalent ASHRAE 90.1-2010 Appendix G building. Evaluating a building's performance based on energy cost can result in savings that are significantly different than the actual energy savings in kBTU, depending on local utility rates. The annual energy cost estimates herein are based on EIA utility rates for Massachusetts 2018 of $ .16/ kWh for electricity and $ 1.058/therm for natural gas.

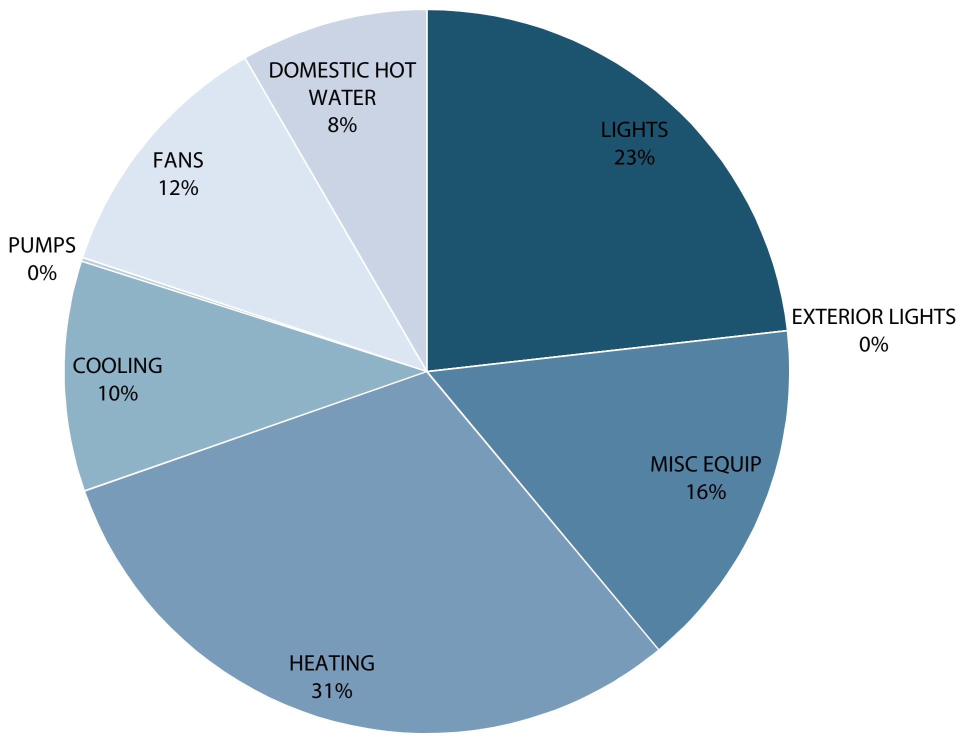
BASELINE MODEL

In order to evaluate the energy performance of the facility design, a Baseline energy model was developed to serve as a basis of comparison. The ASHRAE 90.1-2010 Appendix G Performance Rating Method was followed as this is the basis of comparison for LEED.

ASHRAE 90.1 BUILDING TYPE	Residential
ASHRAE 90.1 HVAC SYSTEM TYPE	Packaged terminal air conditioner
ASHRAE 90.1 COOLING TYPE	Direct expansion (DX)
ASHRAE 90.1 HEATING TYPE	Hot water fossil fuel boiler

To understand how design decisions impact the energy performance of the building, it is useful to view the Baseline model's annual energy consumption (kBTU) broken down by major end-use components.

Baseline Model:
Energy End-Use Breakdown



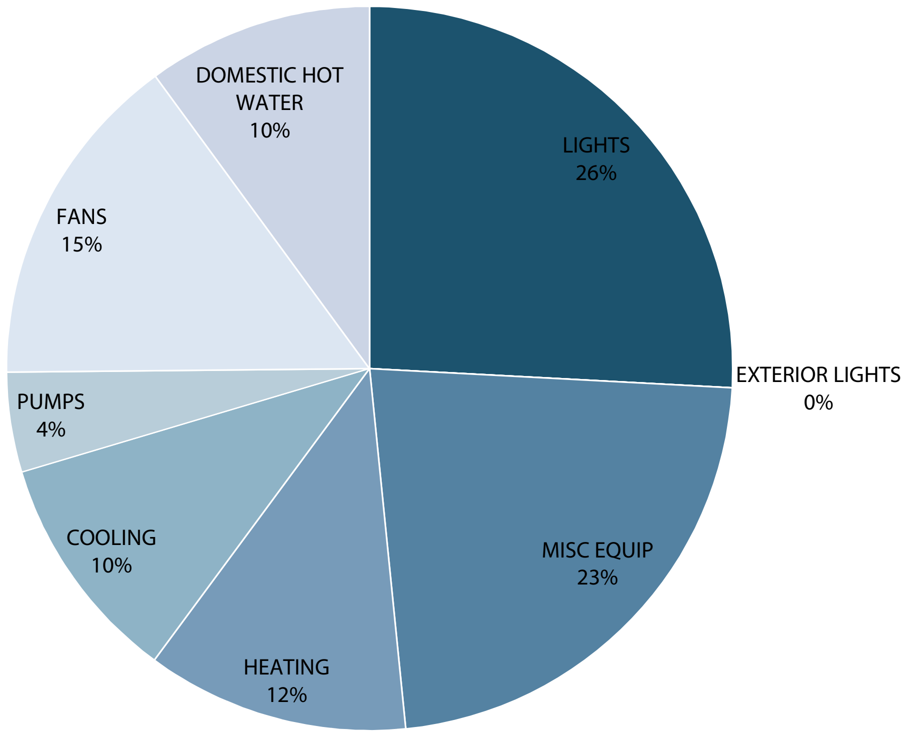
DESIGN MODEL

The Design model has Water Source Heat Pumps (WSHP) serving all residential and retail spaces. Heating and cooling are provided by these units, which draw heat from or reject heat to a common building condenser water system, as the units call for heating or cooling. This common condenser water system enables heat recovery when simultaneous heating and cooling are present in the building. Heating for the condenser water system is provided by condensing boilers and heat rejection is provided by cooling towers.

Ventilation for the design model is provided by Energy Recovery Units (ERU) equipped with enthalpy wheels for energy recovery. Heating is provided by hot water coils in the ERU. Cooling is provided by water cooled condensers which reject heat to the condenser water loop. Common spaces have an overall lighting power density ("LPD") reduction from Appendix G values. All spaces have the same LPD as the ASHRAE 90.1-2013 Appendix G with the Massachusetts Stretch Code upgrade of ten percent (10%).

The Design model's annual energy consumption (kBTU) broken down by major end-use components is:

Design Model: Energy End-Use Breakdown



Key energy conservation measures (ECMs) currently include:

1. Energy Efficient Lighting Upgrades (ASHRAE 90.1 2010 to MA Stretch Code)
    - Retail: 1.4 W/ft^2 upgraded to 1.13 W/ft^2
    - Residence: .6 W/ft^2 upgraded to .46 W/ft^2
    - Parking: .25 W/ft upgraded to .19 W/ft^2
2. Condensing Hot water Boilers with a thermal efficiency of 93% to 95% for heating and domestic hot water.
3. High Efficiency Water Source Heat Pumps with a weighted average cooling efficiency of 14.2 EER and 4.2 COP heating efficiency.
4. Water Source Heat Pumps with ECM motors
5. Enthalpy Wheel heat recovery with performance effectiveness of seventy percent (70%) and variable speed drives.

MODEL OUTPUT SUMMARY

Project Name: Motor Mart
Project Number:
Date: 7/23/2018

End Use	Proposed (Design HVAC system description) Electricity (kWh)	NAT GAS (therms)	Total Energy (kBTU)	% of Total	Baseline (Baseline HVAC system description) Electricity (kWh)	NAT GAS (therms)	Total Energy (kBTU)	% of Total	Energy Savings (%)
Lights	1,301,562		4,440,930	26%	1,673,015		5,708,327	23%	22%
Exterior Lights	-		-	0%	-		-	0%	
Misc. Equipment	1,136,300		3,877,056	23%	1,136,300		3,877,056	16%	0%
Space Heating	194,517	13,447	2,008,392	12%		75,498	7,549,800	31%	73%
Space Cooling	516,623		1,762,718	10%	741,154		2,528,817	10%	30%
Heat Rejection	802		2,736	0%			-	0%	
Pumps & Aux	224,528		766,090	4%	12,042		41,087	0%	-1765%
Ventilation & Fans	761,051		2,596,706	15%	833,040		2,842,332	12%	9%
Heat Pump Supplement			-	0%			-	0%	
Domestic Hot Water		17,257	1,725,700	10%		20,544	2,054,400	8%	16%
Total Energy by Type	4,135,383	30,704	17,180,327	100%	4,395,551	96,042	24,601,820	100%	
Total Cost by Type	$ 660,834	$ 32,485			$ 702,409	$ 101,612			**Total Cost Savings**
Total Energy Cost	**$ 693,319**				**$ 804,021**				**14%**
									Site Energy Savings
Site Energy (kBTU)	14,109,927	3,070,400	17,180,327		14,997,620	9,604,200	24,601,820		**30%**
Site EUI (kBTU/SF)									

Rating Method	LEED Version 4

Energy Type	Utility Rate	
Electricity (EIA)	$ 0.160	/kWh
Natural Gas (EIA)	$ 1.058	/therm
Steam (*source*)		/MBTU
Chilled Water (*source*)		/MBTU

	GHG Emissions CO_2 Ton/yr
Baseline (LEED v	2,122
Design	1,648
GHG Savings	22%

Electricity: 2016 ISO-NE Electric Generator Air Emissions Report
Natural Gas: EIA Fuel Emissions Service National Average 117 lbs

MODEL INPUT SUMMARY

INPUT PARAMETER	BASELINE	PROPOSED DESIGN	INPUT SOURCE(S) Baseline/Design
GENERAL INFORMATION			
	Gross Area: 685,000 sf Residence: 345,000 sf		
CLIMATE ZONE	5		ASHRAE 90.1 2010 Appendix G
WEATHER STATION	Boston, MA		DOE 2.2
BUILDING ORIENTATION	0		
OUTDOOR DESIGN CONDITIONS	7 °F HDD 91°F CDD Dry-Bulb 73°F CDD Wet-Bulb Range 15		
INDOOR DESIGN CONDITIONS	Summer 75F , Winter 70F		Assumed
PEAK OCCUPANT DENSITY	Retail: 300 ft^2/person Residence: 250 ft^2/person		Assumed
UTILITY RATES			
ELECTRICITY UTILITY RATE	16¢/kWh		EIA 2018 commercial average for MA
NATURAL GAS UTILITY RATE	$1.058/therm		EIA 2018 commercial average for MA
SUMMARY OF CONSTRUCTION MATERIALS			
ROOF CONSTRUCTION	Insulation Entirely Above Deck U-0.048	Insulation Entirely Above Deck U-0.032	Baseline: ASHRAE 90.1 2010 Table 5.5-5
WALL CONSTRUCTION	Steel-Framed U-0.064	Steel-Framed U-0.064	Baseline: ASHRAE 90.1 2010 Table 5.5-5
SLAB CONSTRUCTION	Uninsulated Slab F-0.730	Same as Baseline	ASHRAE 90.1 2010 Table 5.5-5

INPUT PARAMETER	BASELINE	PROPOSED DESIGN	INPUT SOURCE(S) Baseline/Design
INFILTRATION	Perimeter: 0.095 cfm/ft^2 Core: 0.048 cfm/ft^2	Same as Baseline	DOE infiltration modeling guidelines, 09/2009
GLAZING DESCRIPTION (ASSEMBLY)	Metal framing (curtainwall/storefront) U-0.45 SHGC-0.40	Same as Baseline	ASHRAE 90.1 2010 Table 5.5-5
WINDOW-TO-WALL RATIO	40% Combination of Curtain Wall and Punched Windows.	40% to 65% Combination of Curtain Wall and Punched Windows.	ASHRAE 90.1 2010
PLUG LOADS & LIGHTING			
EQUIPMENT POWER DENSITY	Retail: .25 W/ft^2 Residence: .5 W/ft^2	Same as Baseline	
LIGHTING POWER DENSITY	Retail: 1.4 W/ft^2 Residence: .6 W/ft^2 Parking: .25 W/ft^2	Retail: 1.13 W/ft^2 Residence: .46 W/ft^2 Parking: .19 W/ft^2	Baseline ASHRAE 90.1 2010 Table 9.5.1 Design ASHRAE 90.1 2013 Table 9.5.1 With Stretch Code 10% upgrade
LIGHTING CONTROLS	Time of day schedule Occupancy sensors in appropriate rooms	Same as Baseline	ASHRAE 90.1 2010 App. G
HVAC AIR SIDE SYSTEM SUMMARY			
HVAC SYSTEM - PRIMARY	Residences System 1 – PTAC Retail System 5 – VAV with Reheat	Water-source heat pumps w/ ECM motors connected to the building condenser loop with condensing boiler and cooling tower Ventilation via DOAS with DX coil Parking: Ventilated only	ASHRAE 90.1 2010 App. G

INPUT PARAMETER	BASELINE	PROPOSED DESIGN	INPUT SOURCE(S) Baseline/Design
COOLING PERFORMANCE	PTACs: 0.3050 EIR PVAVs: 0.2332 EIR	ERU: 0.2332 EIR WLHP: 14.2 EER	ASHRAE 90.1 2010 App. G
HEATING PERFORMANCE	Hot Water Boiler	WLHP: 4.2 COP	ASHRAE 90.1 2010 App. G
FAN CONTROL	Operate continuously for residential spaces, operate according to schedule for retail spaces	DOAS: Variable speed WSHPs: ECM motors	
MINIMUM FLOW	VAV: 30%	n/a	ASHRAE 90.1 2010 App. G
VENTILATION	33,160 CFM	33,160 CFM	
AIR-SIDE ECONOMIZER	OA Temp High-limit shutoff of 70°F	n/a	ASHRAE 90.1 2010 App. G
FAN POWER	Residence Supply .0003 kW/cfm Retail Supply .000966kW/cfm Return .000322 kW/cfm	WLHP Supply .0002 kW/cfm Return .000343 ERU Supply 4.5 in SP Return 2 in SP	ASHRAE 90.1 2010 App. G
ENERGY RECOVERY (TYPE AND EFFECTIVENESS)	None	DOAS: Enthalpy Wheel Summer: 72%/70% (Sensible/Latent) Winter: 72%/70% (Sensible/Latent)	ASHRAE 90.1 2010
HVAC WATER SIDE SYSTEM SUMMARY			
CONDENSER WATER (CW) PLANT TYPE	N/A	Open circuit cooling towers with VFDs	ASHRAE 90.1 2010 App. G
CW SUPPLY TEMP	N/A	85°F	Assumed
CW RETURN TEMP	N/A	70°F	ASHRAE 90.1 2010 App. G
CW PUMP CONTROLS	N/A	VFD	ASHRAE 90.1 2010 App. G

INPUT PARAMETER	BASELINE	PROPOSED DESIGN	INPUT SOURCE(S) Baseline/Design
HEATING PLANT TYPE	Gas-fired Boilers: 80% efficient	Condensing Boilers 93.4% efficient	
HEATING HOT WATER (HHW) SUPPLY TEMP (°F)	180°F	180°F	Assumed
HHW LOOP DELTA T	50°F	50°F	Assumed
HHW SETPOINT CONTROL	180°F at 20°F and below, 150°F at 50°F and above, ramped linearly between 180°F and 150°F at temperatures between 20°F and 50°F.	180°F at 20°F and below, 150°F at 50°F and above, ramped linearly between 180°F and 150°F at temperatures between 20°F and 50°F.	ASHRAE 90.1 2010 App. G
PRIMARY HHW PUMP SPEED CONTROL	Variable-speed drives	Variable-speed drives	ASHRAE 90.1 2010 App. G
DOMESTIC HOT WATER	NG DHW heater, 15. GPM	NG DHW heater, 15. GPM	ASHRAE 90.1 2010 App. G

METHODOLOGY

Vanderweil models energy performance using eQUEST 3.64, a software program that utilizes DOE-2.2 to simulate the hourly energy consumption and demand load shapes for a given building. To develop a model, a graphic representation of the building is created using floor plans, floor heights, and window configurations. Mechanical systems and building envelope are defined, and operating parameters such as lighting power density, airflow rates, and occupancy schedules are included. The simulation uses 30-year average hourly weather data to estimate the energy consumption of the building for each hour of the year.

LIMITATIONS

In order to estimate energy consumption profiles, Vanderweil utilizes traditional computer based simulation programs such as Trane Trace®, DOE-2, and/or our own in-house calculations and/or programs based on industry standard methods. Vanderweil neither has control of nor assumes control of the actual building and equipment operation and climatic conditions. Accordingly, Vanderweil does not expressly or implicitly warrant or represent that Vanderweil's energy and associated cost estimates of the building or equipment operation will be the actual operation energy and cost.

CODES & INDUSTRY STANDARDS

U.S. Green Building Council LEED for New Construction (LEED-NC) v4
ASHRAE Standard 90.1-2010 Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE Standard 62.1-2007 Ventilation for Acceptable Indoor Air Quality
2013 ASHRAE Handbook-Fundamentals

Appendix H

Climate Resiliency Checklist

Boston Planning & Development Agency
Climate Resiliency Report Summary

Submitted: 09/07/2018 11:40:26

A.1 - Project Information

Project Name:	Motor Mart Garage			
Project Address:	201 Stuart Street			
Filing Type:	Initial (PNF, EPNF, NPC or other substantial filing)			
Filing Contact:	Talya Moked	Epsilon Associates	tmoked@epsilonassociates.com	9784616223
Is MEPA approval required?	No	MEPA date:		

A.2 - Project Team

Owner / Developer:	201 Stuart Street Owner, LLC
Architect:	CBT Architects
Engineer:	R. G. Vanderweil Engineers, LLP
Sustainability / LEED:	The Green Engineer
Permitting:	Epsilon Associates, Inc.
Construction Management:	

A.3 - Project Description and Design Conditions

List the principal Building Uses:	Parking, residential, retail
List the First Floor Uses:	Retail, residential lobby, parking
List any Critical Site Infrastructure and or Building Uses:	

Site and Building:

Site Area (SF):	52323	Building Area (SF):	685000
Building Height (Ft):	310	Building Height (Stories):	28
Existing Site Elevation – Low (Ft BCB):	15.3	Existing Site Elevation – High (Ft BCB):	18.7
Proposed Site Elevation – Low (Ft BCB):	15.3	Proposed Site Elevation – High (Ft BCB):	18.7
Proposed First Floor Elevation (Ft BCB):	18.5	Below grade spaces/levels (#):	1

Article 37 Green Building:

LEED Version - Rating System:	LEED BD+C	LEED Certification:	
Proposed LEED rating:	Certified	Proposed LEED point score (Pts.):	46

Building Envelope:

When reporting R values, differentiate between R discontinuous and R continuous. For example, use "R13" to show R13 discontinuous and use R10c.i. to show R10 continuous. When reporting U value, report total assembly U value including supports and structural elements.

Roof:	30	Exposed Floor :	
Foundation Wall:		Slab Edge (at or below grade):	10

Vertical Above-grade Assemblies (%'s are of total vertical area and together should total 100%):

Area of Opaque Curtain Wall & Spandrel Assembly:	19	Wall & Spandrel Assembly Value:	25
Area of Framed & Insulated / Standard Wall:	40	Wall Value:	17
Area of Vision Window:	40	Window Glazing Assembly Value:	34
		Window Glazing SHGC:	28
Area of Doors:	1	Door Assembly Value :	34

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined	Peak heating, cooling and electric loads were calculated based on anticipated building program. Annual energy consumption and greenhouse gas emissions were estimated via energy modeling software (DOE).		
Annual Electric (kWh):	3472000	Peak Electric (kW):	5000
Annual Heating (MMbtu/hr):	3070	Peak Heating (MMbtu):	13.6
Annual Cooling (Tons/hr):	770000	Peak Cooling (Tons):	1310
Energy Use - Below ASHRAE 90.1 - 2013 (%):	21.6	Have the local utilities reviewed the building energy performance?:	No
Energy Use - Below Mass. Code (%):	21.6	Energy Use Intensity (kBtu/SF):	41.4

Back-up / Emergency Power System

Electrical Generation Output (kW):	600	Number of Power Units:	1
System Type (kW):	Standby	Fuel Source:	Diesel

Emergency and Critical System Loads (in the event of a service interruption)

Electric (kW):	490	Heating (MMbtu/hr):	7.5
		Cooling (Tons/hr):	0

B – Greenhouse Gas Reduction and Net Zero / Net Positive Carbon Building Performance

Reducing greenhouse gas emissions is critical to avoiding more extreme climate change conditions. To achieve the City's goal of carbon-neutrality by 2050 the performance of new buildings will need to progressively improve to carbon net zero and net positive.

B.1 – GHG Emissions - Design Conditions

For this filing - Annual Building GHG Emissions (Tons): 1650

For this filing - describe how building energy performance has been integrated into project planning, design, and engineering and any supporting analysis or modeling:

The Project team has performed a preliminary energy model in order to determine appropriate energy efficiency measures for the Project.

Describe building specific passive energy efficiency measures including orientation, massing, building envelop, and systems:

The Project proposes to orient the building so as to benefit from solar gain. In order to control the amount of gain, the window to wall ratio, currently proposed at 40% will continue to be studied for optimization. The Project will also endeavor to study details at the envelope in order to maximize insulation, including over insulating window frames.

Describe building specific active energy efficiency measures including high performance equipment, controls, fixtures, and systems:

Engineering system energy efficiency measures will include: heat recovery systems for ventilation, high efficiency water source heat pumps, condensing heating boilers, condensing domestic hot water heaters, low flow plumbing fixtures, high performance lighting and lighting controls, energy metering, and an automated control system capable of monitoring equipment.

Describe building specific load reduction strategies including on-site renewable energy, clean energy, and storage systems:

Describe any area or district scale emission reduction strategies including renewable energy, central energy plants, distributed energy systems, and smart grid infrastructure:

Describe any energy efficiency assistance or support provided or to be provided to the project:

The Project team will reach out to the utility companies as design progresses.

B.2 - GHG Reduction - Adaptation Strategies

Describe how the building and its systems will evolve to further reduce GHG emissions and achieve annual carbon net zero and net positive performance (e.g. added efficiency measures, renewable energy, energy storage, etc.) and the timeline for meeting that goal (by 2050):

> The building will be capable of conversion to an all-electric building, using grid-generated electricity as its primary fuel source; as the electrical grid evolves to be carbon neutral the building will as well. The building electrical and heating systems will be configured to accept future renewable energy sources (photovoltaic and/or solar thermal hot water). Space will be allocated to allow energy storage device to be installed in the future.

C - Extreme Heat Events

Annual average temperature in Boston increased by about 2˚F in the past hundred years and will continue to rise due to climate change. By the end of the century, the average annual temperature could be 56° (compared to 46° now) and the number of days above 90° (currently about 10 a year) could rise to 90.

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low (Deg.):	8	Temperature Range - High (Deg.):	91
Annual Heating Degree Days:		Annual Cooling Degree Days	

What Extreme Heat Event characteristics will be / have been used for project planning

Days - Above 90° (#):	60	Days - Above 100° (#):	30
Number of Heatwaves / Year (#):	6	Average Duration of Heatwave (Days):	5

Describe all building and site measures to reduce heat-island effect at the site and in the surrounding area:

> The Project will install high-reflective paving materials and roof materials, and the ninth floor roof will feature a vegetated roof to reduce building-related heat island effects.

C.2 - Extreme Heat – Adaptation Strategies

Describe how the building and its systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heatwaves, and longer heatwaves:

> The building heating and cooling systems will be modular vis a vis their major equipment (boilers, pumps, cooling towers). This will allow the systems to be expanded in the future to accommodate higher extreme temperatures. The building heating and cooling systems will be capable of modulation, allowing them to efficiently maintain comfort conditions in the building during higher average temperatures and during longer heat waves.

Describe all mechanical and non-mechanical strategies that will support building functionality and use during extended interruptions of utility services and infrastructure including proposed and future adaptations:

> Mechanical strategies to support the building during a service interruption include generator power for life-safety systems and other critical systems (stair pressurization, fire alarm, security), and generator power for freeze protection to

reduce the risk of freeze damage, generator power for domestic cold and hot water systems so occupants can bathe and have drinking water during an outage. The building will have a hook-up connection point for a roll-up generator, to allow additional systems to be powered during an outage. Non-mechanical strategies include providing operable windows for residential units, so residents can get some ventilation in their units during an outage.

D - Extreme Precipitation Events

From 1958 to 2010, there was a 70 percent increase in the amount of precipitation that fell on the days with the heaviest precipitation. Currently, the 10-Year, 24-Hour Design Storm precipitation level is 5.25". There is a significant probability that this will increase to at least 6" by the end of the century. Additionally, fewer, larger storms are likely to be accompanied by more frequent droughts.

D.1 – Extreme Precipitation - Design Conditions

What is the project design precipitation level? (In. / 24 Hours)	6

Describe all building and site measures for reducing storm water run-off:

The Project will comply with both Article 32 of the Groundwater Conservation Overlay District and the Smart Utilities Policy for Article 80 Development Review, both respectively overseen by the BPDA, by capturing within a suitably-designed system a volume of rainfall on the lot equivalent to no less than 1.25 inches across that portion of the surface area of the lot to be occupied by the Project. In doing so, the Project will reduce storm water run-off and will also result in no negative impact on groundwater levels within the lot in question or adjacent lots, subject to the terms of any (i) dewatering permit or (ii) cooperation agreement entered into by the Proponent and the BPDA, to the extent that such agreement provides standards for groundwater protection during construction.

D.2 - Extreme Precipitation - Adaptation Strategies

Describe how site and building systems will be adapted to efficiently accommodate future more significant rain events (e.g. rainwater harvesting, on-site storm water retention, bio swales, green roofs):

The site is nearly entirely occupied by the existing building footprint which is to remain in the proposed condition. By complying with the Article 32 and 80 regulations, the Project will strive to mitigate future rain events through infiltration on site to the greatest extent feasible.

E – Sea Level Rise and Storms

Boston Planning & Development Agency

Climate Resiliency Report Summary

Under any plausible greenhouse gas emissions scenario, the sea level in Boston will continue to rise throughout the century. This will increase the number of buildings in Boston susceptible to coastal flooding and the likely frequency of flooding for those already in the floodplain.

Is any portion of the site in a FEMA Special Flood Hazard Area?	No	What Zone:	
		What is the current FEMA SFHA Zone Base Flood Elevation for the site (Ft BCB)?	
Is any portion of the site in the BPDA Sea Level Rise Flood Hazard Area (see SLR-FHA online map)?	Yes		

If you answered YES to either of the above questions, please complete the following questions.
Otherwise you have completed the questionnaire; thank you!

E.1 – Sea Level Rise and Storms – Design Conditions

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented by the Sea Level Rise Flood Hazard Area (SLR-FHA), which includes 3.2' of sea level rise above 2013 tide levels, an additional 2.5" to account for subsidence, and the 1% Annual Chance Flood. After using the SLR-FHA to identify a project's Sea Level Rise Base Flood Elevation, proponents should calculate the Sea Level Rise Design Flood Elevation by adding 12" of freeboard for buildings, and 24" of freeboard for critical facilities and infrastructure and any ground floor residential units.

What is the Sea Level Rise - Base Flood Elevation for the site (Ft BCB)?	17.7		
What is the Sea Level Rise - Design Flood Elevation for the site (Ft BCB)?		First Floor Elevation (Ft BCB):	17.9
What are the Site Elevations at Building (Ft BCB)?	16.35-18.7	What is the Accessible Route Elevation (Ft BCB)?	17.9-18.5

Describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Per the most recent available online FEMA flood map number 25025C0077J effective on March 16, 2016, the Project is located within Zone X, Area of Minimal Flood Hazard. The site is approximately 3,000 feet from the next closest Area of Flood Hazard, defined by FEMA as a subsection of Zone X, 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile. Ground floor areas are proposed to be set higher than flood elevation. Knee wall barriers are proposed for the surrounding ground floor storefronts. Temporary flood barriers will be deployed in areas without knee walls. Critical building systems are proposed to be situated above the flood elevation.

Describe how the proposed Building Design Flood Elevation will be achieved including dry / wet flood proofing, critical systems protection, utility service protection, temporary flood barriers, waste and drain water back flow prevention, etc.:

The Project will incorporate water tight utility conduits, waste water back flow prevention, storm water back flow prevention, and any other requirements as part of the Boston Water and Sewer Site Plan review process. Temporary flood barriers and garage doors (for garage entrances/exits) will be deployed in areas without knee wall protection.

Describe how occupants might shelter in place during a flooding event including any emergency power, water, and waste water provisions and the expected availability of any such measures:

Critical infrastructure will be located above the 500-year flood plain, including boilers, cooling towers, generators and building switchgear, as will major air intakes and discharge points. Major building services should therefore generally be available during a flooding event. In the event of a flooding-related disruption to building energy sources (natural gas, electricity), some critical services will be on generator power, and passive ventilation will be designed. Refer to question #13 for more information.

Describe any strategies that would support rapid recovery after a weather event:

Critical infrastructure will generally be located above the 500-year flood plain to reduce the flood risk. A modular approach will be taken for the mechanical infrastructure; this will allow the equipment to be more standard commercial “off the shelf” type. This will help reduce the lead times for replacement equipment, allowing more rapid recovery.

E.2 – Sea Level Rise and Storms – Adaptation Strategies

Describe future site design and or infrastructure adaptation strategies for responding to sea level rise including future elevating of site areas and access routes, barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Ground floor areas are proposed to be set higher than flood elevation. Knee wall barriers are proposed for the surrounding ground floor storefronts. Temporary flood barriers will be deployed in areas without knee walls. Critical building systems are proposed to be situated above the flood elevation.

Describe future building adaptation strategies for raising the Sea Level Rise Design Flood Elevation and further protecting critical systems, including permanent and temporary measures:

Thank you for completing the Boston Climate Change Checklist!

For questions or comments about this checklist or Climate Change best practices, please contact:
John.Dalzell@boston.gov

Appendix I

Accessibility Checklist

Article 80 – Accessibility Checklist

A requirement of the Boston Planning & Development Agency (BPDA) Article 80 Development Review Process

The Mayor's Commission for Persons with Disabilities strives to reduce architectural, procedural, attitudinal, and communication barriers that affect persons with disabilities in the City of Boston. In 2009, a Disability Advisory Board was appointed by the Mayor to work alongside the Commission in creating universal access throughout the city's built environment. The Disability Advisory Board is made up of 13 volunteer Boston residents with disabilities who have been tasked with representing the accessibility needs of their neighborhoods and increasing inclusion of people with disabilities.

In conformance with this directive, the BDPA has instituted this Accessibility Checklist as a tool to encourage developers to begin thinking about access and inclusion at the beginning of development projects, and strive to go beyond meeting only minimum MAAB / ADAAG compliance requirements. Instead, our goal is for developers to create ideal design for accessibility which will ensure that the built environment provides equitable experiences for all people, regardless of their abilities. As such, any project subject to Boston Zoning Article 80 Small or Large Project Review, including Institutional Master Plan modifications and updates, must complete this Accessibility Checklist thoroughly to provide specific detail about accessibility and inclusion, including descriptions, diagrams, and data.

For more information on compliance requirements, advancing best practices, and learning about progressive approaches to expand accessibility throughout Boston's built environment. Proponents are highly encouraged to meet with Commission staff, prior to filing.

Accessibility Analysis Information Sources:

1. Americans with Disabilities Act – 2010 ADA Standards for Accessible Design
   http://www.ada.gov/2010ADAstandards_index.htm
2. Massachusetts Architectural Access Board 521 CMR
   http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/aab/aab-rules-and-regulations-pdf.html
3. Massachusetts State Building Code 780 CMR
   http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/csl/building-codebbrs.html
4. Massachusetts Office of Disability – Disabled Parking Regulations
   http://www.mass.gov/anf/docs/mod/hp-parking-regulations-summary-mod.pdf
5. MBTA Fixed Route Accessible Transit Stations
   http://www.mbta.com/riding_the_t/accessible_services/
6. City of Boston – Complete Street Guidelines
   http://bostoncompletestreets.org/
7. City of Boston – Mayor's Commission for Persons with Disabilities Advisory Board
   www.boston.gov/disability
8. City of Boston – Public Works Sidewalk Reconstruction Policy
   http://www.cityofboston.gov/images_documents/sidewalk%20policy%200114_tcm3-41668.pdf
9. City of Boston – Public Improvement Commission Sidewalk Café Policy
   http://www.cityofboston.gov/images_documents/Sidewalk_cafes_tcm3-1845.pdf

Glossary of Terms:

1. *Accessible Route* – A continuous and unobstructed path of travel that meets or exceeds the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 20
2. *Accessible Group 2 Units* – Residential units with additional floor space that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 9.4
3. *Accessible Guestrooms* – Guestrooms with additional floor space, that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 8.4
4. *Inclusionary Development Policy (IDP)* – Program run by the BPDA that preserves access to affordable housing opportunities, in the City. For more information visit: http://www.bostonplans.org/housing/overview
5. *Public Improvement Commission (PIC)* – The regulatory body in charge of managing the public right of way. For more information visit: https://www.boston.gov/pic
6. *Visitability* – A place's ability to be accessed and visited by persons with disabilities that cause functional limitations; where architectural barriers do not inhibit access to entrances/doors and bathrooms.

1. Project Information:

If this is a multi-phased or multi-building project, fill out a separate Checklist for each phase/building.

Project Name:	Motor Mart Garage
Primary Project Address:	201 Stuart Street, Boston MA 02116
Total Number of Phases/Buildings:	1 Building
Primary Contact (Name / Title / Company / Email / Phone):	David Wamester/Boston Global Investors, LLC
Owner / Developer:	201 Stuart Street Owner, LLC
Architect:	CBT Architects
Civil Engineer:	Nitsch Engineering
Landscape Architect:	
Permitting:	Epsilon Associates, Inc.
Construction Management:	

At what stage is the project at time of this questionnaire? Select below:

☑PNF / Expanded PNF Submitted	Draft / Final Project Impact Report Submitted	BPDA Board Approved
BPDA Design Approved	Under Construction	Construction Completed:

Do you anticipate filing for any variances with the Massachusetts Architectural Access Board (MAAB)? *If yes,* identify and explain.	Not at this time.

2. Building Classification and Description:

This section identifies preliminary construction information about the project including size and uses.

What are the dimensions of the project?

Site Area:	*52,323 SF*	Building Area:	*685,000 GSF*
Building Height:	*310 FT.*	Number of Stories:	*28 Flrs.*

First Floor Elevation:	18.5'	Is there below grade space:		*Yes*
What is the Construction Type? (Select most appropriate type)				
	Wood Frame	Masonry	☑Steel Frame	☑Concrete
What are the principal building uses? (IBC definitions are below – select all appropriate that apply)				
	Residential – One - Three Unit	☑Residential - Multi-unit, Four +	Institutional	Educational
	☑Business	☑Mercantile	Factory	Hospitality
	Laboratory / Medical	Storage, Utility and Other		
List street-level uses of the building:	*Residential Lobby, Retail, Public Garage Entry*			

3. Assessment of Existing Infrastructure for Accessibility: *This section explores the proximity to accessible transit lines and institutions, such as (but not limited to) hospitals, elderly & disabled housing, and general neighborhood resources. Identify how the area surrounding the development is accessible for people with mobility impairments and analyze the existing condition of the accessible routes through sidewalk and pedestrian ramp reports*.	
Provide a description of the neighborhood where this development is located and its identifying topographical characteristics:	The Project includes the construction of new building on top of existing parking garage. The site is within the Midtown Cultural District zone of Boston. The Project site is bordered by the Back Bay District to the north and Bay Village to the South. The site is bounded by Stuart Street to the south, Park Place to the east, Columbus Avenue to the northwest, Eliot Street to the northeast and Church Street to the west. The general topography of the area is mostly flat with slight grading. The site is bordered on the North by Lincoln Park and on the West by Statler Park.
List the surrounding accessible MBTA transit lines and their proximity to development site: commuter rail / subway stations, bus stops:	The MBTA Green Line Arlington stop is within 1,000 feet. The MBTA Orange Line Tufts Medical Center stop is also within 1,600 feet. The MBTA bus line routes 39, 55, 57, 504 and 503 at Charles and Stuart Street is within 500 feet.
List the surrounding institutions: hospitals, public housing, elderly and disabled housing developments, educational facilities, others:	Emerson College, Suffolk University, New England School of Law, Tufts Medical Center, American Red Cross, South Cove Plaza Elderly and Disabled Housing
List the surrounding government buildings: libraries, community centers, recreational facilities, and other related facilities:	Massachusetts Bay Transportation Authority, MassDOT, YMCA.
4. Surrounding Site Conditions – Existing:	

This section identifies current condition of the sidewalks and pedestrian ramps at the development site.	
Is the development site within a historic district? ***If yes,*** identify which district:	No.
Are there sidewalks and pedestrian ramps existing at the development site? ***If yes***, list the existing sidewalk and pedestrian ramp dimensions, slopes, materials, and physical condition at the development site:	Yes, sidewalk widths range from 6'-0" to 10'-0"+. The concrete sidewalks are generally in good condition.
Are the sidewalks and pedestrian ramps existing-to-remain? ***If yes,*** have they been verified as ADA / MAAB compliant (with yellow composite detectable warning surfaces, cast in concrete)? ***If yes,*** provide description and photos:	TBD
5. Surrounding Site Conditions – Proposed *This section identifies the proposed condition of the walkways and pedestrian ramps around the development site. Sidewalk width contributes to the degree of comfort walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Wider sidewalks allow people to walk side by side and pass each other comfortably walking alone, walking in pairs, or using a wheelchair.*	
Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? ***If yes***, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, or Boulevard.	TBD
What are the total dimensions and slopes of the proposed sidewalks? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone:	TBD
List the proposed materials for each Zone. Will the proposed materials be on private property or will the proposed materials be on the City of Boston pedestrian right-of-way?	TBD

Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way? ***If yes,*** what are the proposed dimensions of the sidewalk café or furnishings and what will the remaining right-of-way clearance be?	Undetermined at this time
If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the Public Improvement Commission (PIC)?	Undetermined at this time
Will any portion of the Project be going through the PIC? ***If yes,*** identify PIC actions and provide details.	Undetermined at this time
6. Accessible Parking: *See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirement counts and the Massachusetts Office of Disability – Disabled Parking Regulations*.	
What is the total number of parking spaces provided at the development site? Will these be in a parking lot or garage?	672 in a parking garage
What is the total number of accessible spaces provided at the development site? How many of these are "Van Accessible" spaces with an 8 foot access aisle?	14 with 2 van accessible spaces.
Will any on-street accessible parking spaces be required? ***If yes,*** has the proponent contacted the Commission for Persons with Disabilities regarding this need?	Undetermined at this time
Where is the accessible visitor parking located?	Undetermined at this time
Has a drop-off area been identified? ***If yes,*** will it be accessible?	Undetermined at this time
7. Circulation and Accessible Routes:	

The primary objective in designing smooth and continuous paths of travel is to create universal access to entryways and common spaces, which accommodates persons of all abilities and allows for visitability with neighbors.	
Describe accessibility at each entryway: Example: Flush Condition, Stairs, Ramp, Lift or Elevator:	Main entries will have a flush condition at the adjacent sidewalk.
Are the accessible entrances and standard entrance integrated? ***If yes,*** *describe.* ***If no,*** what is the reason?	Yes, entrances will have handicap operated hardware.
If project is subject to Large Project Review/Institutional Master Plan, describe the accessible routes way-finding / signage package.	Undetermined at this time
8. Accessible Units (Group 2) and Guestrooms: (If applicable) *In order to facilitate access to housing and hospitality, this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing and hotel rooms.*	
What is the total number of proposed housing units or hotel rooms for the development?	Approximately 306 units
If a residential development, how many units are for sale? How many are for rent? What is the breakdown of market value units vs. IDP (Inclusionary Development Policy) units?	Undetermined at this time
If a residential development, how many accessible Group 2 units are being proposed?	Undetermined at this time, minimum 5% of for lease units.
If a residential development, how many accessible Group 2 units will also be IDP units? ***If none***, describe reason.	Undetermined at this time
If a hospitality development, how many accessible units will feature a	N/A

wheel-in shower? Will accessible equipment be provided as well? ***If yes,*** provide amount and location of equipment.	
Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs / thresholds at entry, step to balcony, others. ***If yes,*** provide reason.	Undetermined at this time
Are there interior elevators, ramps or lifts located in the development for access around architectural barriers and/or to separate floors? ***If yes,*** describe:	Yes, all (mechanical floors are not included) will be served by an elevator.
9. Community Impact: *Accessibility and inclusion extend past required compliance with building codes. Providing an overall scheme that allows full and equal participation of persons with disabilities makes the development an asset to the surrounding community*.	
Is this project providing any funding or improvements to the surrounding neighborhood? Examples: adding extra street trees, building or refurbishing a local park, or supporting other community-based initiatives?	Portions of the sidewalks will be improved implementing some Boston Complete Streets strategies where the sidewalk depth allows. Vegetated strips or trees are being contemplated.
What inclusion elements does this development provide for persons with disabilities in common social and open spaces? Example: Indoor seating and TVs in common rooms; outdoor seating and barbeque grills in yard. Will all of these spaces and features provide accessibility?	Indoor and outdoor seating in amenity spaces including accessible grilles, warming kitchens.
Are any restrooms planned in common public spaces? ***If yes,*** will any be single-stall, ADA compliant and designated as "Family"/	Undetermined at this time

"Companion" restrooms? *If no*, explain why not.	
Has the proponent reviewed the proposed plan with the City of Boston Disability Commissioner or with their Architectural Access staff? *If yes,* did they approve? *If no,* what were their comments?	Not yet.
Has the proponent presented the proposed plan to the Disability Advisory Board at one of their monthly meetings? Did the Advisory Board vote to support this project? *If no,* what recommendations did the Advisory Board give to make this project more accessible?	Not yet.

10. Attachments

Include a list of all documents you are submitting with this Checklist. This may include drawings, diagrams, photos, or any other material that describes the accessible and inclusive elements of this project.

Provide a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations, including route distances. See attached Ground Floor Accessible Route diagram
Provide a diagram of the accessible route connections through the site, including distances.
Provide a diagram the accessible route to any roof decks or outdoor courtyard space? (if applicable) See attached Floor 09 Amenity Accessible Route diagram
Provide a plan and diagram of the accessible Group 2 units, including locations and route from accessible entry. **Undetermined at this time.**
Provide any additional drawings, diagrams, photos, or any other material that describes the inclusive and accessible elements of this project. • • • •

Article 80 | ACCESSIBILTY CHECKLIST

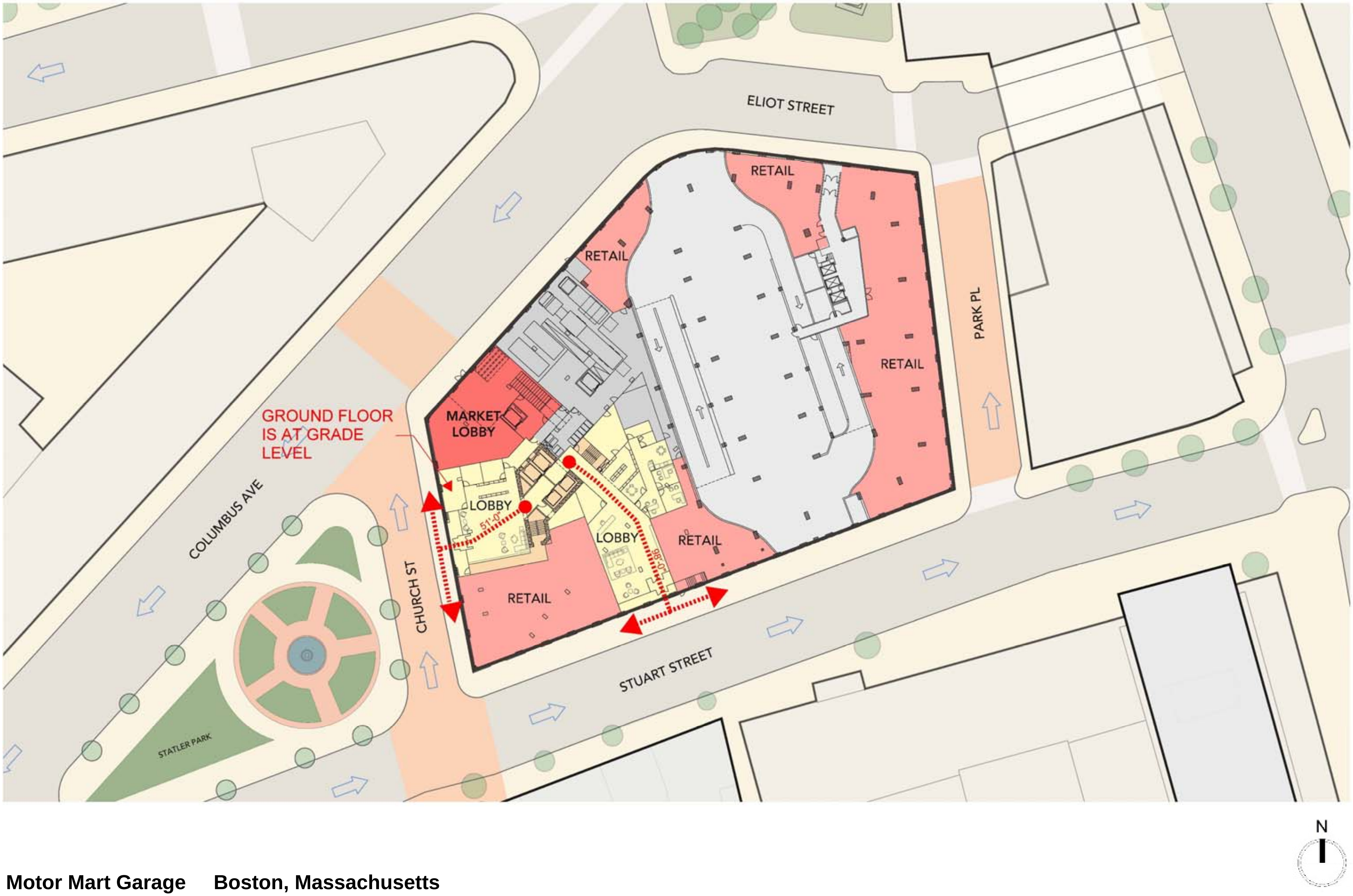
This completes the Article 80 Accessibility Checklist required for your project. Prior to and during the review process, Commission staff are able to provide technical assistance and design review, in order to help achieve ideal accessibility and to ensure that all buildings, sidewalks, parks, and open spaces are usable and welcoming to Boston's diverse residents and visitors, including those with physical, sensory, and other disabilities.

For questions or comments about this checklist, or for more information on best practices for improving accessibility and inclusion, visit www.boston.gov/disability, or our office:

The Mayor's Commission for Persons with Disabilities
1 City Hall Square, Room 967,
Boston MA 02201.

Architectural Access staff can be reached at:

accessibility@boston.gov | patricia.mendez@boston.gov | sarah.leung@boston.gov | 617-635-3682



Motor Mart Garage **Boston, Massachusetts**

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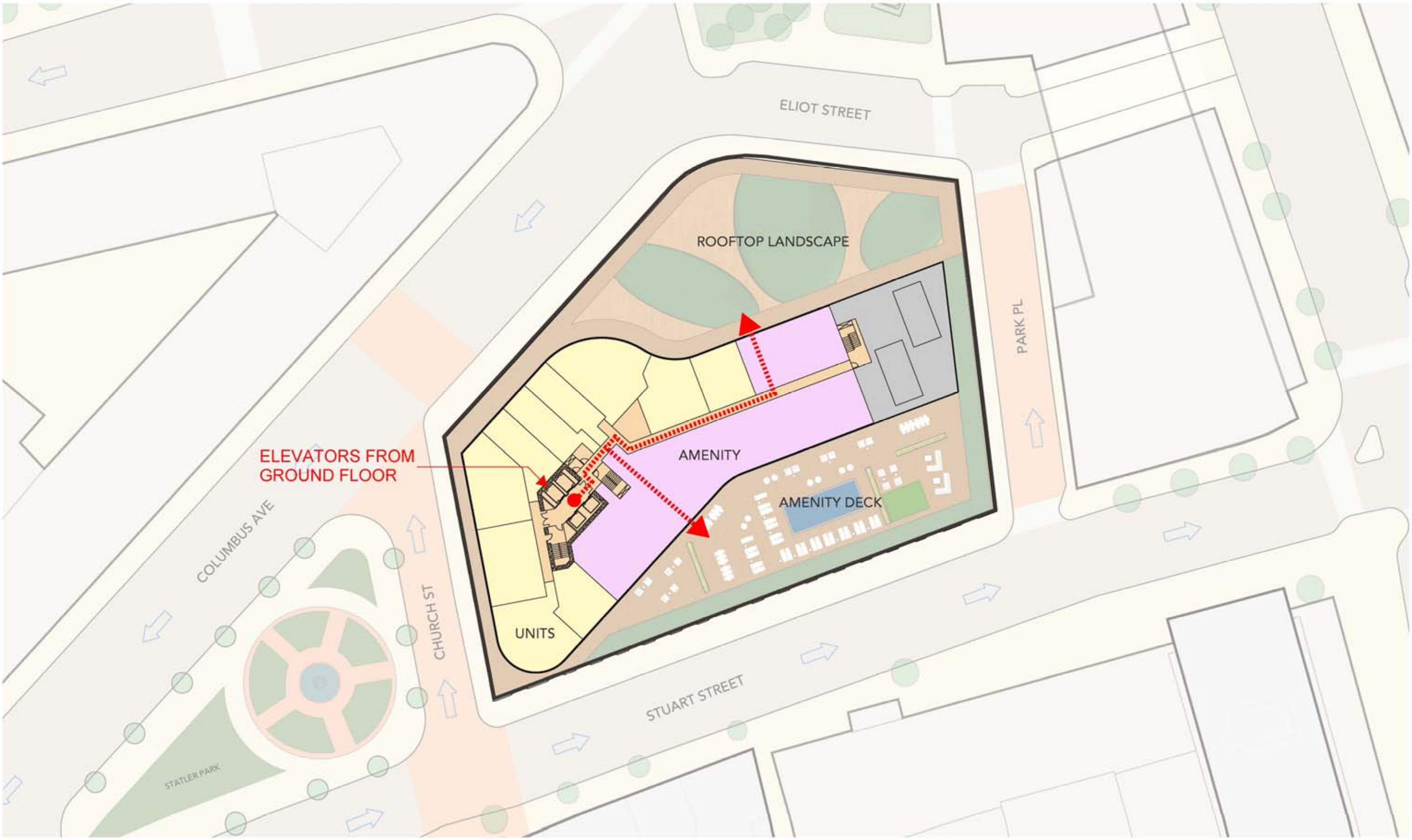
Ground Floor Accessibility Diagram



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Ninth Floor Accessibility Diagram