EXPANDED PROJECT NOTIFICATION FORM

80 East Berkeley Street

Boston, Massachusetts

Submitted to:
Boston Redevelopment Authority
One City Hall Square
Boston, Massachusetts 02201

Submitted by:
The Druker Company, Ltd.
50 Federal Street, Suite 1000
Boston, Massachusetts 02110

Prepared by:
Epsilon Associates, Inc.
3 Clock Tower Place, Suite 250
Maynard, Massachusetts 01754

In Association with:
Elkus/Manfredi Architects
Goulston & Storrs, P.C.
Vanasse Hangen Brustlin, Inc.
Richard Burck Associates, Inc.
Haley & Aldrich, Inc.
Nitsch Engineering
McNamara/Salvia, Inc.
Cosentini Associates
The Green Engineer
John Moriarty & Associates

August 8, 2013

Epsilon
ASSOCIATES INC.

Expanded Project Notification Form

Submitted Pursuant to Article 80 of the Boston Zoning Code

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Section 1.0

General Information & Project Description

1.0 INTRODUCTION / PROJECT DESCRIPTION

1.1 Introduction

Located in Boston's South End, the 80 East Berkeley Street Project (the "Project") proposed by The Druker Company, Ltd. (the "Proponent") is one of the first new *office* buildings proposed in the City since the 2008 recession, a sign of the Proponent's confidence in the region's growing economy. The Project is a direct outgrowth of the Harrison Albany Corridor Strategic Plan (dated June 2012 and codified in recent amendments to Article 64 of the Code) and the more than two-and-a-half years of planning effort for the Corridor. The Project will complement the existing South End residential neighborhood and the approximately 1,500 units of housing either currently under construction or being proposed in nearby developments, such as Ink Block, 275 Albany Street, and 345 Harrison Avenue. An approximately 308,000 square foot, 11-story mixed-use building, the Project will include approximately 290,000 square feet (sf) of contemporary office space and approximately 18,000 square feet of ground-floor retail and/or restaurant space.

The Project will replace an existing surface parking lot and auto repair shop with a modern, architecturally distinctive 11-story mixed-use building and provide urban design, streetscape and pedestrian improvements, environmental and economic benefits. The existing surface parking will be replaced below grade, and the local street grid will be enhanced by a new landscaped accessway and view corridor running parallel to East Berkeley Street along the northern edge of the building and connecting Shawmut Avenue to Washington Street. The Project aims to create streets and accesways that become great public spaces and sustainable transportation networks. As a Transit-Oriented-Development (TOD), the Project will transform an underutilized parcel located near public transportation directly adjacent to the Silver Line, nearby Orange Line and Red Line, and several bus routes into a vibrant office and retail and/or restaurant development, will demonstrate environmental stewardship and the value that the Proponent places on sustainable design, and will provide important economic benefits to the City, including almost $2,000,000 in linkage payments, approximately $2,000,000 per year in increased tax revenues, and approximately 880 permanent jobs. In compliance with Article 37 of the Boston Zoning Code, the Project includes state-of-the-art sustainable design features. The Project will be certifiable under the U.S. Green Building Council ("USGBC") Leadership in Environmental and Energy Design (LEED) Green Building Rating System at the Silver level. The Proponent anticipates that the proposed mix of uses will further a creative economy and enliven the neighborhood, adding street level activity during the day and into the evening reinforcing the 18/7 nature of the area.

This Expanded Project Notification Form ("EPNF") is being submitted to the Boston Redevelopment Authority ("BRA") to initiate review of the Project under Article 80B, Large Project Review, of the Boston Zoning Code (the "Code").

1.2 Project Identification

Address/Location:	80 East Berkeley Street
Developer:	The Druker Company, Ltd. 50 Federal Street, Suite 1000 Boston, MA 02110 (617) 357-5700 Ronald M. Druker Harold Dennis Barbara Boylan
Architect:	Elkus/Manfredi Architects 300 "A" Street Boston, MA 02210 (617) 426-1300 David Manfredi Chris Milne
Legal Counsel:	Goulston & Storrs, P.C. 400 Atlantic Avenue Boston, MA 02110 (617) 482-1776 Matthew Kiefer Philip Tedesco
Permitting Consultants:	Epsilon Associates, Inc. 3 Clock Tower Place, Suite 250 Maynard, MA 01754 (978) 897-7100 Cindy Schlessinger Laura Rome
Transportation and Parking Consultant:	Vanasse Hangen Brustlin, Inc. 99 High Street Boston, MA 02110 (617) 728-7777 Sean Manning

Geotechnical Consultant:	Haley & Aldrich, Inc. 465 Medford St. Suite 2200 Boston, MA 02129 (617) 886-7400 Mark Haley Michael Atwood
Civil Engineer:	Nitsch Engineering 2 Center Plaza, Suite 430 Boston, MA 02108 (617) 338-0063 Josh Alston Deborah Danik
Landscape Architect	Richard Burck Associates, Inc. 7 Davis Square Somerville, MA 02144 Richard Burck Will Trimble
Structural Engineer:	McNamara/Salvia, Inc. 160 Federal Street, 5th Floor Boston, MA 02110 (617) 737-0040 Joe Salvia Adam McCarthy
MEP Engineer:	Cosentini Associates Building 200, 2nd Floor One Kendall Square, Suite B2204 Cambridge, MA 02139 (617) 494-9090 Bob Leber Bob Hamilton
Sustainable Design Consultant:	The Green Engineer 54 Junction Square Drive Concord, MA 01742 (978) 369-8978 Chris Schaffner Erik Ruoff

Construction Manager: John Moriarty & Associates
3 Church Street
Winchester, MA 01890
(781) 729-3900
John Moriarty
Rich Dalton

1.3 Project Description

1.3.1 Project Site

The Project will be located on an approximately 47,360 square foot (1.09 acre) site in the South End neighborhood of Boston, as shown on Figure 1-1, Aerial Locus Plan. The site, at 80 East Berkeley Street, is bounded by Shawmut Avenue on the west side, East Berkeley Street on the south, and Washington Street on the east; two buildings -- a seven-story residential building (Waterford Place) and a one-story Massachusetts Bay Transit Authority ("MBTA") substation building – are located just north of the northern edge of the site, as shown on Figure 1-1.

The eastern portion of the site fronting on Washington Street and East Berkeley Street contains an auto repair facility, and the western portion of the Project site fronting on Shawmut Avenue and East Berkeley Street is used as a surface public parking lot. The auto repair facility is paved and has a small, one story building with approximately 31 accessory parking spaces. The public parking lot contains 89 public parking spaces and an attendant's booth and is otherwise undeveloped. Figures 1-2 and 1-3 provide photographs of existing site conditions.

The plot plan and legal description are provided in Appendix A.

1.3.2 Proposed Development

1.3.2.1 Description and Program

The approximately 308,000 square foot mixed-use building will include approximately 18,000 square feet of ground floor retail and/or restaurant space, expanding upon the South End retail streetscape, ten floors containing a total of approximately 290,000 square feet of office space, and two levels of below-grade parking for approximately 200 vehicles, approximately 80 net new spaces. Figure 1-4 presents a perspective view of the Project. Along the northern edge of the site will be a landscaped, pedestrian-friendly accessway connecting Shawmut Avenue and Washington Street, as shown on Figure 1-5, Site Plan. The existing buildings on the site will be demolished. The new building is proposed to be 150 feet in height. Additional building plans and sections are provided in Appendix B.

G:\Projects2\MA\Boston\3645\aerial2.mxd

80 East Berkeley Street Boston, Massachusetts

Figure 1-1
Aerial Locus

Figure 1-2

Existing Conditions Photographs

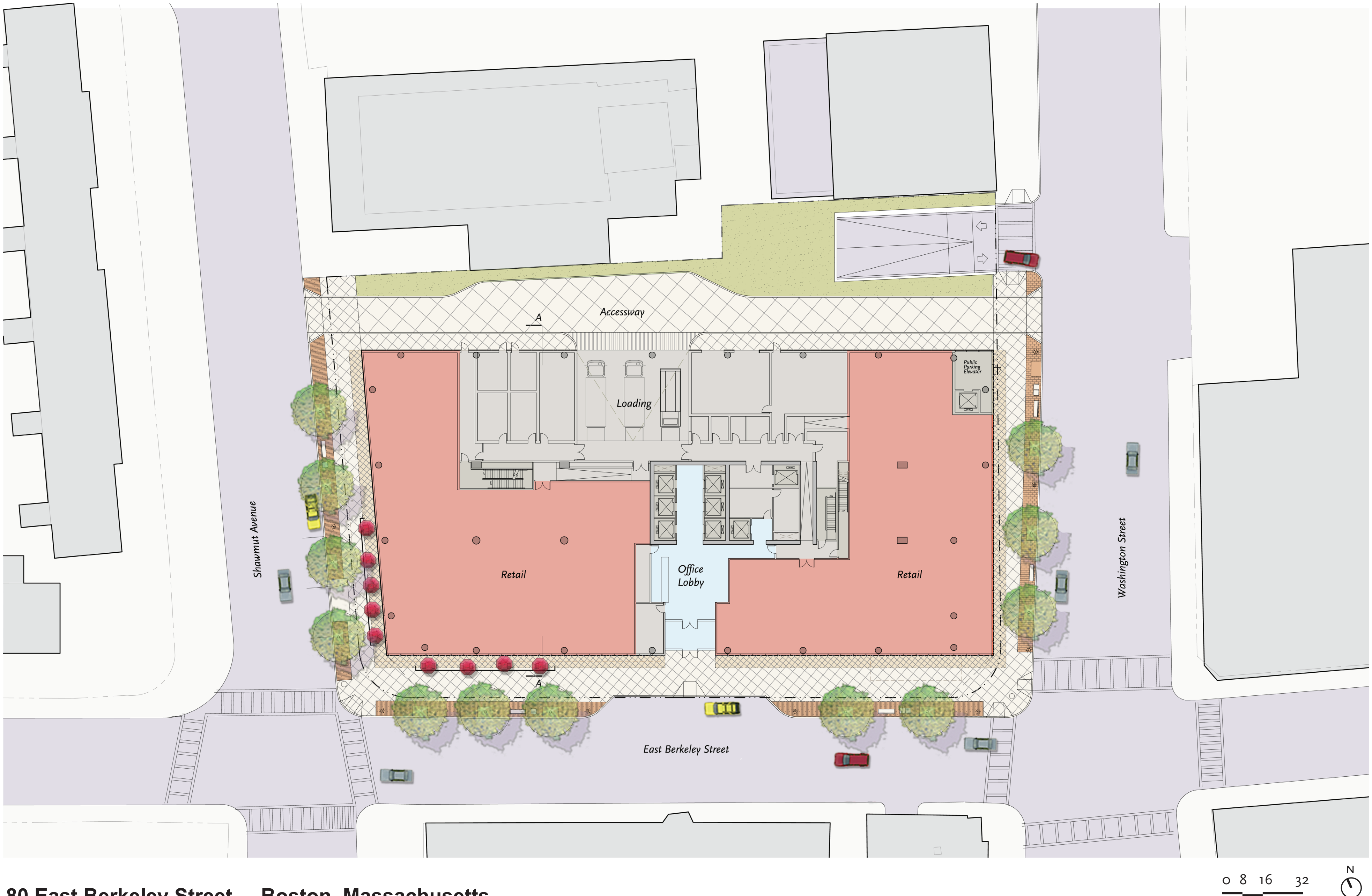
Figure 1-3
Existing Conditions Photographs

80 East Berkeley Street   Boston, Massachusetts

ELKUS | MANFREDI
ARCHITECTS

Figure 1-4

Exterior Perspective Looking West



80 East Berkeley Street Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Figure 1-5

Site Plan

A ramp leading to the below-grade parking will be located off Washington Street north of the new accessway near the northeast corner of the Project site, adjacent to where the accessway will meet Washington Street.

Loading will be serviced from the accessway. Loading will take place within the building footprint, and service vehicles will access the loading area from Washington Street. The design allows for three loading bays, including one for a dumpster within the internal loading dock.

Table 1-1 presents the approximate dimensions of the Project and the Project site.

Table 1-1 Approximate Dimensions

Use	Approximate Dimension
Office	290,000 square feet
Retail/restaurant	18,000 square feet
TOTAL	308,000 square feet
Height	11 stories, 150 feet
Parking	200 spaces, 80 net new
Site area	47,360 square feet
Floor area ratio	6.5

1.3.3.2 Consistency with the Harrison-Albany Corridor Strategic Plan

The Project site is located within the boundaries of the Harrison-Albany Corridor Strategic Plan, which was published by the BRA in June 2012. The Strategic Plan is made up of four distinct sub-areas, and the Project site is located in the New York Streets sub-area. The vision for the area is to:

> "emphasize its location as the vital physical and economic link between the City's downtown, Chinatown, and South End neighborhoods with convenient access to South Boston and the regional roadway system. Future development should provide exciting new 18-hour uses within a pedestrian-friendly public realm that includes a finer grain of city blocks that allow for enhanced transportation access and circulation. Non-residential uses should provide new jobs for Boston residents." (p. 20)

The Project is consistent with the goals stated in the Harrison-Albany Corridor Strategic Plan by achieving the following, all as described in more detail throughout this EPNF:

- Transforming an underutilized parcel into a vibrant mixed-use development, including "18 hour" office and retail and/or restaurant uses;
- Creating a landscaped, pedestrian-friendly accessway connecting Shawmut Avenue and Washington Street;

- Enhancing and promoting the growing South End streetscape with activated storefronts and office entrances;
- Introducing high-quality architecture and diverse architecture styles to provide a transformative effect for the neighborhood; and
- Promoting the use of alternative modes of transportation and minimizing parking on site, while providing bicycle racks and amenities.

1.3.3 Public Benefits

The Project will provide a number of public benefits to the City of Boston, such as improving retail vitality, enhancing the public realm, and providing contemporary office space in a highly visible and easily accessible location, with multiple transportation choices. The surrounding area will be enhanced by the urban design features and the architectural character provided by the Project -- a new signature building which is sensitive to its neighbors and replaces an auto repair building and a surface parking lot.

1.3.3.1 Urban Design/Planning Benefits

As described above, the Project fulfills the urban design and development objectives of the June 2012 Harrison Albany Corridor Strategic Plan and the more than two-and-a-half years of planning effort that recognizes the "proximity [of the Harrison Albany Corridor] to downtown, the successful redevelopment of the Washington Street Corridor, [and] adjacency to the regional highway network. . . ." (Page 6, Harrison Albany Corridor Strategic Plan) The Proponent participated in the BRA planning and community process and understands the overriding goals of the area's Harrison-Albany Corridor Strategic Plan as envisioned by the BRA and the Boston Transportation Department ("BTD").

The Project involves the construction of an architecturally striking building, which will add material enhancements and visual vibrancy to the neighborhood. The uses, massing, and height of the Project will reinforce the connections between the heart of the South End, Tremont Street, and the new developments south of Washington Street and will complement the eclectic South End architectural heritage and context with a contemporary building. Site access is being designed to help ensure compatibility with the vision of the Harrison-Albany Corridor set forth in the Strategic Plan, and to improve pedestrian connectivity and circulation of neighboring streets and areas.

The Project will improve the pedestrian connectivity and circulation of the neighboring streets and areas in accordance with the Harrison-Albany Corridor Strategic Plan by specifically:

- Creating a contemporary office building as a "gateway structure" in what was a non-key area (page 20, Harrison Albany Corridor Strategic Plan New York Streets sub-area vision diagram) and providing definition and retail vitality to the corners of East Berkeley Street / Washington Street and East Berkeley Street / Shawmut Avenue;

- Creating ground floor retail and/or restaurant uses, including outdoor dining, that reinforce the streetscape and reinforce the public realm plan of the Harrison Albany Corridor Strategic Plan, directly contributing to the lively, mixed use character of the Washington Street Corridor;

- Helping to restore the historic street grid and block pattern of this area of the South End by creating a new landscaped, pedestrian-friendly accessway occupying the approximate location of former Garland Street. This new connection will improve traffic flow and further enhance the pedestrian experience;

- Widening sidewalks along Washington Street, East Berkeley Street, and Shawmut Avenue at the Project site, in conformance with the Boston Complete Streets Guidelines improving pedestrian flow;

- The accessway, together with the widened sidewalks, will comprise more than 20 percent of the lot area;

- Locating parking underground, with the garage entry/exit located on Washington Street and loading activities located on the new accessway;

- Providing approximately 5,900 square feet of the Project's gross floor area on a subsidized basis for use by an existing or start-up business, as incubator space, or as affordable cultural space, which may take the form of "co-work" office space;

- Supporting Washington Street's function as a retail corridor;

- Enhancing the pedestrian connection along a "secondary green path" on Shawmut Avenue, as contemplated by the Strategic Plan; and

- Creating a continuous street wall along East Berkeley Street.

1.3.3.2 Environmental Benefits

In addition to the planning and urban design benefits described above, the Project incorporates numerous environmental benefits as described below.

Sustainable Design / Green Building

The Proponent is highly committed to environmental stewardship and values sustainable design strategies in the Project. The Project will include a number of sustainable building technologies, practices and materials in its design and construction, including energy efficiency, stormwater management, and water conservation measures. The Project will be LEED Certifiable at the Silver level and comply with Article 37 of the Code.

Water Quality

A combination of natural and structural best management practices will be used to reduce the suspended solids and phosphorus content of the site stormwater runoff. BMPs may include rain gardens, water quality inlets, and grit chambers. Site stormwater runoff will be captured and treated to the extent possible prior to release, and the Project's stormwater management system design will comply with Article 32 of the Code.

Encouraging Bicycle Use

Covered bicycle storage spaces within the parking garage and showers and changing facilities will be included within the new building for building tenants.

Bike racks will be provided at select, highly-visible locations within the site. The racks will be securely mounted and feature current designs to properly secure bikes of all kinds and will be located at centralized locations to serve the retail elements (both customers and employees).

Automobile Alternatives

A space for a car-sharing service will be provided, such as ZipCar®, within the new garage.

Space will be provided within the new garage for an Electric Vehicle ("EV") charging station.

Preferential parking for alternative-fueled and/or hybrid vehicles will be provided.

Smart Growth / Transit-Oriented Development

The Project advances smart-growth and transit-oriented development principles. The Project is transforming a currently underutilized parcel located near the Silver Line, Orange Line, Red Line, and several bus routes into an office and retail and /or restaurant development. These transportation networks provide convenient, non-automobile access to the Project site from other neighborhoods in the City of Boston, the surrounding suburbs and Logan International Airport.

Parking Supply

The Project's limited parking will encourage and precipitate proactive public transportation, bicycle and pedestrian activity on site.

Loading and Service

There will be dedicated off-street loading docks to ensure that loading and service operations are handled internal to the building site and will not impact adjacent streets. The dock will have three enclosed bays in the building for deliveries and trash removal. Access to the loading area will be provided via a new accessway along the northern edge of the site connecting Washington Street and Shawmut Avenue in a one-way westbound vehicular movement.

1.3.3.3 Economic Benefits

Linkage

The Project will result in significant financial benefits to the City of Boston and its residents, including a Housing Contribution Grant of approximately $1,636,960 and a Jobs Contribution Grant of approximately $326,560. These figures are based on approximately 308,000 square feet of Development Impact Uses (less the 100,000 square foot exemption). The Proponent anticipates entering into a Development Impact Project Agreement with the BRA concerning these linkage payments.

New Property Tax Revenue

The Project is anticipated to generate new property tax revenue for the City of approximately $2,000,000 per year upon completion.

Employment

The Project will create approximately 300 construction jobs and the opportunity for approximately 880 permanent jobs. The permanent jobs will result from the office and retail and/or restaurant components and building operations, maintenance, and security.

1.4 City of Boston Zoning

Large Project Review

Because the Project involves new construction in excess of 50,000 square feet of Gross Floor Area, the Project is subject to Large Project Review by the BRA. Under the Mayor's Executive Order dated October 10, 2000, as amended on April 3, 2001, regarding mitigation for development projects, the Mayor may appoint an Impact Advisory Group to advise the BRA on mitigation measures for the Project. In connection with the Project's Large Project Review, the Project will also be subject to review by the Boston Civic Design Commission and the green building requirements of Article 37 of the Code.

Zoning Districts

The Project is located within: (i) the EDA North Economic Development Area ("EDA North") of the South End Neighborhood District, governed by Article 64 of the Code, (ii) the Restricted Parking Overlay District, governed by Section 3-1A(c) of the Code, and (iii) the Groundwater Conservation Overlay District, governed by Article 32 of the Code.

PDA: The Project has been designed to be consistent with the applicable requirements for Planned Development Areas ("PDAs") under recent amendments to Article 64 of the Code. Under Section 64-29, approved PDA Development Plans must (1) provide 5% of the Gross Floor Area above what is allowed as-of-right for use by an existing or start-up business or as non-profit Affordable Cultural Space (or provide a combination of such dedicated space and a contribution to the Harrison/Albany Corridor Business and Cultural Loan Fund); and (2) limit the development footprint of projects to 80% of the project's lot and require that the remaining 20% be designed and built to ensure public access or to enhance the public realm. The Proponent intends to adhere to these requirements.

Uses: As described in Section 1.3, the Project will involve the construction of an approximately 11-story office building with ground-level retail and/or restaurant uses and an underground parking garage with accessory and public parking spaces. The Project may also include research and development uses. Pursuant to Section 64-15 and Table C of Article 64 of the Code, a variety of office, research, retail and restaurant uses are allowed as-of-right in the EDA North. Under Article 64 and because the Project lies within the Restricted Parking Overlay District. The Project will require zoning relief for its accessory and public parking. A portion of the Project site is currently used as an open-air surface parking lot pursuant to a variance from the Board of Appeal, and the Project involves no expansion of the existing number of public parking spaces.

Building Dimensions: Article 64 of the Code provides that projects located within Area 1 of the EDA North (as shown on Appendix C to Article 64), such as the Project, developed pursuant to an approved PDA Development Plan may have a maximum building height of up to 150 feet and a maximum Floor Area Ratio of up to 6.5. As noted above, the Project has been designed to be consistent with these PDA requirements.[1] No setback requirements are applicable to the Project. Required off-street parking and loading requirements, as well as screening and buffering requirements, will be established through Large Project Review.

[1] Under the Code, garage space in the basement of a building and mechanical space are excluded from the Gross Floor Area calculations. In addition, the Project's proposed building height of 150 feet is measured to the top of the structure of the highest occupiable floor.

Other Requirements: The Project will be subject to the requirements of Article 32 of the Code regarding the Groundwater Conservation Overlay District, to the requirements of Article 37 of the Code regarding Green Buildings, to the barrier-free access requirements of Article 30 of the Code and to the Code's signage requirements.

1.5 Legal Information

1.5.1 Legal Judgments Adverse to the Proposed Project

The Proponent is unaware of any legal judgments or pending legal actions that concern the Project.

1.5.2 History of Tax Arrears on Property

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

1.5.3 Site Control / Public Easements

Site Control:

The Project site is owned by Telephone Associates V.D Trust LLC (an affiliate of The Druker Company, Ltd.) and Robert J. Gottlieb, LLC, as tenants-in-common.

Public Easements:

The Project site is bounded on its eastern property line by Washington Street, along its southern property line by East Berkeley Street and on its western property line by Shawmut Avenue, all public ways in the control of the City of Boston. There are no public easements into, through or surrounding the Project site that would materially impair the Proponent's ability to carry out the Project.

1.6 Anticipated Permits

Table 1-2 below 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 Potentially Require Permits, Reviews and Approvals

Agency Name	Permit / Approval
BOSTON	
Boston Redevelopment Authority	• Article 80B Large Project Review • Cooperation Agreement • DIP Agreement • Minor Modification of Urban Renewal Plan (as required)
Boston Civic Design Commission	• Schematic Design Review
Boston Employment Commission	• Boston Residents Construction Employment Plan
Office of Jobs and Community Service	• Boston Permanent Employment Agreement
Boston Transportation Department	• Construction Management Plan • Transportation Access Plan Agreement
Boston Public Works Department	• Curb Cut Permit(s) • Street Opening Permit (as required) • Street/Sidewalk Occupancy Permit (as required)
Boston Air Pollution Control Commission	• Parking Freeze Permit and Exemption
Boston Water & Sewer Commission	• Site Plan Review • Water and Sewer Connection Permits • Temporary Construction Dewatering Permit
Boston Redevelopment Authority and Boston Zoning Commission	• Approval of PDA Development Plan
Boston Landmarks Commission	• Certificate of Appropriateness for work in Protection Area
Public Improvement Commission	• Specific Repair Plan (as required) • Permit/Agreement for Temporary Earth Retention Systems, Tie-Back Systems and Temporary Support of Subsurface Construction (as required) • Permit for sign, awning, hood, canopy or marquee, etc. (as required) • Street Layout (as required) • License, Maintenance and Indemnification Agreement (as required)
Public Safety Commission Committee on Licenses	• Permit to Erect and Maintain Garage • Flammable Storage License
Boston Inspectional Services Department	• Building Permits • Certificates of Occupancy

Table 1-2 Potentially Require Permits, Reviews and Approvals (Continued)

Agency Name	Permit / Approval
STATE	
Department of Environmental Protection	• Sewer connection self-certification • Notice of commencement of construction • Fossil Fuel Utilization self-certification • Storm Water Discharge Permit (as required)
Massachusetts Historical Commission	• Project Notification Form • "No Adverse Effect" Letter or Memorandum of Agreement (as required)
Massachusetts Water Resources Authority	• Temporary Construction Dewatering Permit (as required)
FEDERAL	
Environmental Protection Agency	• NPDES Construction General Permit • NPDES Remediation General Permit (as required)
Federal Aviation Administration	• Determination of No Hazard to Air Navigation (as required)

1.7 Public Participation

As part of its planning efforts, the Proponent has reached out to nearby residents and representatives of numerous neighborhood groups and businesses for initial meetings, including Old Dover Neighborhood Association, Berkeley Gardens, Chinese Consolidated Benevolent Association, Washington Gateway MS, Castle Square, Winn Development, Chinatown Neighborhood Council, and Project Place. The formal community outreach begins with the filing of this Expanded PNF, and the Proponent looks forward to a productive public review.

1.8 Project Schedule

Project construction is anticipated to begin in June 2014 and to last approximately 24 months.

Section 2.0

Transportation

2.0 TRANSPORTATION

2.1 Introduction

This section presents an evaluation and summary of existing and future transportation infrastructure and operations for the Project. The transportation study has been developed to understand and mitigate the transportation impacts of the Project and to develop appropriate transportation infrastructure improvements in Boston's South End. The study specifically addresses transportation comments that were raised as part of ongoing discussions between the Proponent and the BRA and BTD. The analyses indicate that the Project and its associated traffic will not result in any changes in overall Level of Service ("LOS") in the study area or transit operations.

This study analyzes the following:

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

In addition, this study quantifies and assesses the transportation impacts that are expected within the Project study area under future conditions.

The purposes of these analyses are to:

- Define and quantify existing transportation conditions in the Project study area as defined by the BTD;
- Estimate the transportation impacts that will be generated under future conditions based on the Project's anticipated program;
- Develop a set of mitigation strategies and improvement measures that will help to lessen the transportation effects of future growth and provide improvements to the transportation infrastructure in the South End; and
- Demonstrate that these transportation mitigation efforts will not only meet or exceed BRA and BTD requirements, and but also serve as exceptional public benefits.

The sections below provide an overview of the Project and a summary of findings of the transportation analysis, including anticipated impacts, proposed mitigation and improvements, a discussion of the study methodology, and a description of the study area. Subsequent sections provide detailed discussions of existing and future conditions expected both with and without the Project.

2.1.1 Project Overview

The Project includes the construction of an approximately 308,000 gross square foot building comprising approximately 290,000 square feet of office space on the upper ten stories and approximately 18,000 square feet of ground-level retail and/or restaurant space, which will replace an existing 89-space public surface parking lot and adjacent auto repair shop with accessory parking.

In addition, the Project will include a two-level, 200 car, below-grade parking garage, which will result in approximately 80 net-new spaces. Approximately 111 of the 200 parking spaces will be used to support the Project's office use (at a rate of 0.38 spaces per 1,000 sf of office space developed). The remaining 89 spaces will replace the existing 89 public parking spaces, subject to approval by the Air Pollution Control Commission ("APCC"); they will be available to the public as they have for over 40 years and as contemplated within the BRA's Harrison-Albany Corridor Strategic Plan.

A summary of the Project program is presented in Table 2-1.

Table 2-1 80 East Berkeley Street Project Program Summary

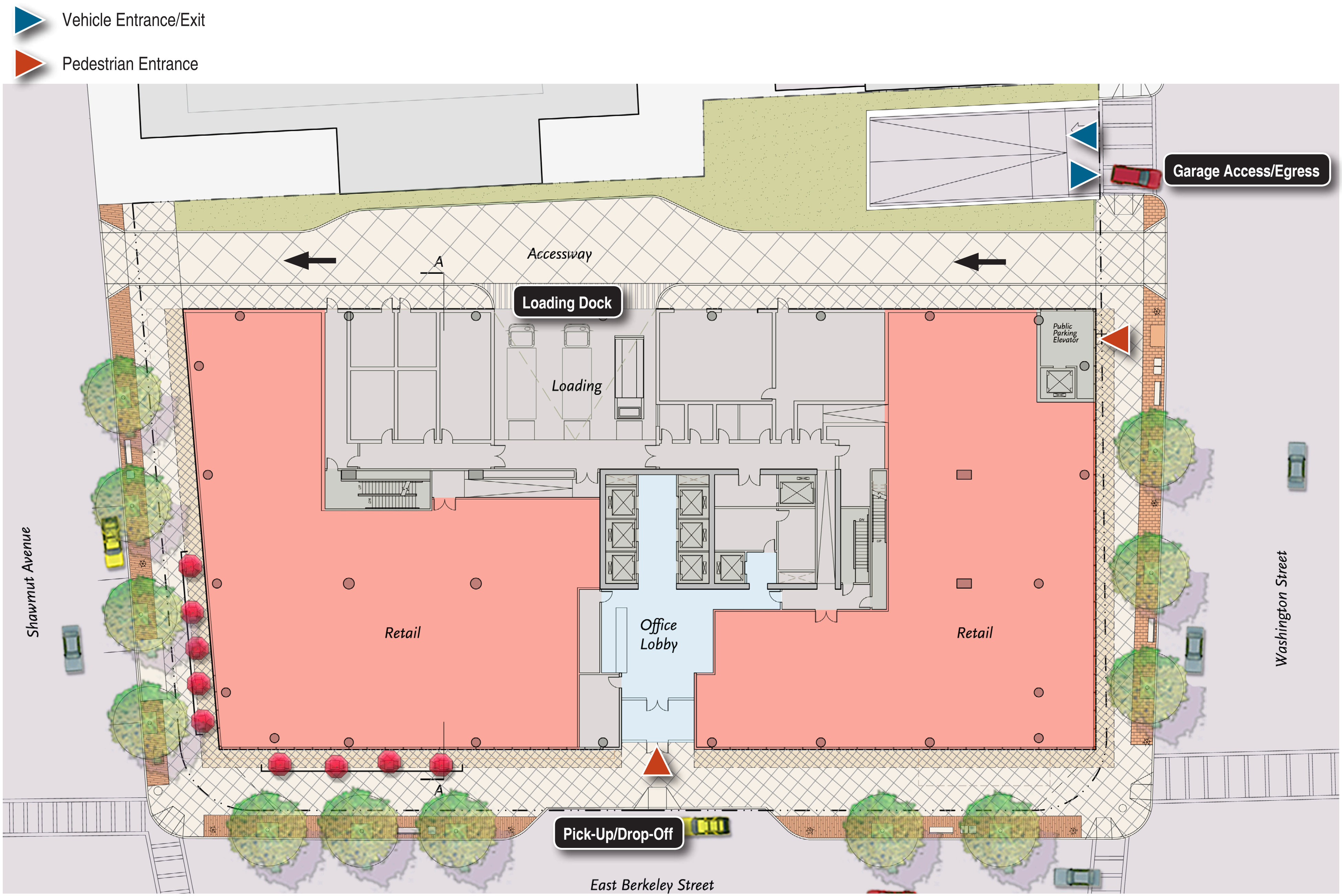
Project Program	Approximate Building Size* (Gross Floor Area)
Office Space	290,000
Ground Floor Retail/Restaurant**	18,000
Total New Construction	308,000
Project Parking	**Spaces**
Existing Public Parking	89
Existing Auto Center Parking	31
Proposed Below-Grade Parking	200
Net-New Parking	80

Source: The Druker Company Ltd and Elkus Manfredi Architects
* Zoning gross square footage.
**For analysis purposes, the Transportation Study has assumed a breakdown of 12,000 sf of Specialty Retail and 6,000 sf of Restaurant uses.

2.1.2 Summary of Findings and Transportation Mitigation

The additional traffic generated by the Project will produce limited impacts on the surrounding transportation infrastructure and is not expected to result in any change in the LOS in the study area or any measurable change to peak hour operating conditions at study area intersections. This is due, primarily, to the Project site's central location in the City, which will provide the opportunity for vehicles to make use of multiple access routes to access and exit the site. The Project is not expected to result in any measurable changes to peak hour operating conditions at study area intersections. However, to help offset net new trips generated by the Project, the Proponent will provide several transportation improvements and mitigation actions in connection with the future construction of the Project. These improvements and actions are intended to mitigate the Project's transportation impacts and to support other important transportation infrastructure initiatives that are currently being pursued by the BRA, the BTD and others. Figure 2-1 provides an illustrative site plan of the ground floor of the Project, indicating important transportation-oriented provisions of the Project. Key findings and actions include the following:

- The Project site is well served by transportation infrastructure, including access to Route I-93 and near public transit (the Silver Line, the Orange Line, the Red Line, and multiple bus routes).
- The Proponent participated in the more than two-and-a-half year BRA planning and community process and understands the overriding goals of the area's Harrison-Albany Corridor Strategic Plan as envisioned by the BRA and the BTD. Accordingly, site access is being designed to help ensure compatibility with the vision of the Harrison-Albany Corridor set forth in the Harrison Albany Corridor Strategic Plan, which includes modification of Washington Street to two-way vehicle access.
- The Project's limited accessory parking (anticipated to include approximately 111 accessory parking spaces, or 0.38 spaces per 1,000 square feet of office space) will encourage and precipitate proactive public transportation, bicycle and pedestrian activity on site.
- The 89 proposed public parking spaces, subject to approval by the APCC, will replace the existing 89 public, commercial spaces on the Project site on a one-for-one basis. These spaces will continue to be available to the public as they have for over 40 years and as contemplated within the BRA's Harrison-Albany Corridor Strategic Plan.
- There will be dedicated off-street loading docks to ensure that loading and service operations are handled internal to the building site and will not impact adjacent streets. The dock will have three enclosed bays in the building for deliveries and



80 East Berkeley Street **Boston, Massachusetts**

Vanasse Hangen Brustlin, Inc.

Figure 2-1

Proposed Site Access and Circulation

trash. Access to the loading area will be provided via a new accessway along the northern edge of the site connecting Washington Street and Shawmut Avenue in a one-way westbound vehicular movement.

- The accessway will provide a pedestrian-friendly connection between the two roadways following the vision in the Harrison-Albany Corridor Strategic Plan of creating pedestrian connections throughout the neighborhood.

- An entry/exit driveway to the below-grade parking garage will be provided north of the accessway off Washington Street. The revenue control system will be constructed at the base of the ramp providing ample queue space on site to minimize traffic impacts.

- The Project will substantially improve pedestrian sidewalks adjacent to the Project site through widening, planting street trees, and improving accessibility, all as further described in Section 2.1.2.3 below.

- The Proponent has worked proactively with the BRA and the BTD to develop a curbside plan for both East Berkeley Street and Washington Street. On East Berkeley Street, a dedicated drop-off area is proposed that would support the Project's ground floor retail and/or restaurant space. On Washington Street, no on-street curb activities are proposed, supporting the planned modification of Washington Street to two-way vehicular travel plus the inclusion of dedicated bus lanes as envisioned/set forth in the Harrison-Albany Corridor Strategic Plan. No Stopping/Parking is recommended for the Project's Washington Street frontage.

- The Proponent will provide covered bicycle storage capacity on site, as well as shower and changing facilities, in accordance with the City of Boston Bicycle Guidelines. The Project will also include public bike racks to support ground floor retail space and visitors.

- The Proponent will encourage future tenants to implement proactive transportation demand management measures to its employees to encourage the use of transit and other alternative forms of transportation.

2.1.2.1 Parking Summary

The Project includes the construction of a below-grade parking garage to provide necessary accessory parking for the Project and to maintain the existing public parking spaces that have supported the area for over 40 years.

The Project will replace the existing 89 surface public parking spaces and 31 auto repair shop accessory spaces with a new 200-space garage, resulting in 80 net-new parking spaces on site. Of the total underground parking space count, the Proponent anticipates that, subject to the approval of the APCC, 111 spaces will be allocated to supporting employees of and visitors to the office space in the Project (at a rate of 0.38 spaces per 1,000 sf), while the remaining 89 replacement public spaces will continue to be available to the public as they have for many years and as contemplated within the Harrison-Albany Corridor Strategic Plan. As shown in Figure 2-1, the parking garage will be accessed from Washington Street.

2.1.2.2 Traffic Impacts

A detailed traffic analysis, including intersection level of service, was conducted at eight intersections for 2013 Existing Conditions and 2018 No-Build Conditions and at ten intersections under 2018 Build Conditions during morning and evening peak commuter hours. The future conditions analyses assumes a five-year planning horizon and considers background growth, growth and improvements attributable to other proposed area projects, and traffic generation estimates associated with the Project. The results of the analysis indicate that there will be no measurable changes in overall intersection LOS in the study area that are attributable to the Project.

2.1.2.3 Pedestrian Access

The Project will substantially improve pedestrian sidewalks adjacent to the Project site. The building will be set back from the property lines to allow all of the existing sidewalks around the site to be widened. The Shawmut Avenue sidewalk will be widened from an average of 9 feet to an average of 20 feet. The East Berkeley Street sidewalk will be widened from an average of 7.5 feet to an average of 20 feet, and the Washington Street sidewalk will be widened from an average of six feet to an average of 17 feet. These increases in width will allow for a substantially improved area where pedestrians can wait to cross the Washington Street/East Berkeley Street intersection. This corner will be fitted with new ADA/AAB accessible ramps. Street trees will be provided along these newly widened sidewalks. Furthermore, the accessway at the rear of the site will provide a new pedestrian connection between Washington Street and Shawmut Avenue, following the vision in the Harrison-Albany Corridor Strategic Plan of creating additional pedestrian connections throughout the neighborhood.

2.1.2.4 Loading and Service

The Project will include a loading dock off the new accessway along the northern edge of the parcel connecting Washington Street to Shawmut Avenue. The dock will have three enclosed bays in the building for deliveries and trash removal. The dock will be accessed via Washington Street and is expected to be primarily used by delivery vans and single unit trucks. Larger vehicles will be able to pull into the accessway and off adjacent public streets. The Proponent is committed to monitoring loading operations at its loading dock to ensure timely operations and reduce impacts to surrounding streets.

2.1.2.5 Transportation Demand Management

Consistent with the City's goals to reduce auto-dependency, the Project will incorporate Transportation Demand Management ("TDM") measures to encourage alternative modes of transportation. TDM measures are most often directed at commuter travel; however, due to the mixed-use characteristics of the Project and nearby public transportation, there are many opportunities to implement TDM measures for the Project's proposed retail uses as well.

Section 2.3.2.4 below discusses the Project's TDM elements and land use types for which TDM measures will be implemented and describes how those elements will aid Project users – notably employees, visitors, and shoppers/restaurant patrons getting to and from the Project

TDM measures will be formalized in the Transportation Access Plan Agreement ("TAPA") to be executed with the BTD. Although fewer TDM opportunities internal to each of the retail and/or restaurant tenants may be available due to their smaller employment levels, all employees who work on site will be able to take advantage of the transportation guidance and programs coordinated by the Project's overall TDM program.

2.1.2.6 Public Transportation

Because there are so many public transportation options that provide service to and from the South End, no single service is anticipated to be unduly affected by anticipated increases in activity because of the Project under future conditions. Consequently, Project-related transit trips are expected to affect the transit system only minimally in the future Build Condition.

2.1.3 Methodology

The transportation analysis conforms to the BTD's "Transportation Access Plans Guidelines" and uses standard methodologies, including the Institute of Transportation Engineers' trip generation and local travel characteristics as defined in *Access Boston 2000-2010*.

The study was conducted in two distinct stages. The first stage (Existing Conditions) involved a survey and compilation of existing transportation conditions within the study area (defined below) including:

- An inventory of the transportation infrastructure within the defined Project study area;
- Geometric and operational characteristics of study area roadways and intersections;
- Existing traffic control at study area intersections (i.e., traffic signalization, stop signs, one-way streets, etc.);

- Area off-street and on-street parking supply;
- Pedestrian activity along study area roadways, and at study area intersections;
- Bicycle activity and accommodations;
- Public transportation options within the study area, including bus, trolley, commuter rail, and private shuttle bus options; and
- Existing parking operations currently on site.

In the second stage of the study (Evaluation of Long-Term Transportation Impacts), future transportation conditions were projected within the study area. The future No-Build Condition includes an assessment of future transportation including background growth on area roadways and intersections, planned transportation infrastructure improvements, and growth related to other proposed projects within the study area (without consideration of the Project). The future No-Build Condition takes into consideration many of the projects that are planned and/or under construction within the South End area including those listed in Section 2.3.1.1 below. Future Conditions also consider the outcomes of the recent Harrison-Albany Corridor Strategic Plan that has been undertaken by the BRA and the BTD for this area; including a vision for a future Harrison-Albany Streets corridor and plans to modify Washington Street to accommodate two-way vehicular travel. The future Build Condition assesses the No-Build Condition plus estimated traffic generated by the Project.

Roadway, pedestrian, and transit capacity for morning and evening peak commuter periods were studied and are summarized for the following conditions:

- 2013 Existing Condition
- 2018 No-Build Condition
- 2018 Build Condition

Specific travel demand forecasts for the Project were assessed along with future transportation demands due to background traffic growth and traffic growth from other planned or approved projects within the study area. The year 2018 was selected as the horizon year for the purposes of quantifying and assessing future transportation impacts generated by the Project based on a five-year horizon from the Existing Conditions.

This section also quantifies the proposed mitigation and improvement actions (presented previously) to address Project-related pedestrian, parking, traffic, and public transportation impacts that have been identified. The proposed improvement actions serve as the basis for the forthcoming preparation of a TAPA to be developed and executed with the BTD.

2.1.4 Study Area

The Project site is located on a parcel bound by East Berkeley Street, Shawmut Avenue and Washington Street in Boston's South End neighborhood. The Project study area includes eight intersections, chosen in consultation with the BTD and the BRA, that have been studied under both Existing and future No-Build Conditions. These intersections, illustrated in Figure 2-2, are listed below:

- East Berkley Street/Shawmut Avenue
- East Berkley Street/Washington Street
- East Berkley Street/Harrison Avenue
- East Berkley Street/Albany Street
- Herald Street/Shawmut Avenue
- Herald Street/Washington Street
- Herald Street/Harrison Avenue
- Herald Street/Albany Street

In addition to these intersections, two new accessway connections at Shawmut Avenue and Washington Street were also evaluated under 2018 Build Conditions. These study area intersections were evaluated in detail using standard traffic engineering analysis techniques following BTD guidelines to identify incremental impacts of future traffic growth and site-generated traffic.

2.2 Existing Transportation Conditions

This section describes existing transportation conditions, including an overview of roadway conditions, transit operations, pedestrian and bicycle facilities, and general site conditions. A discussion of the existing on- and off-street public parking supply is also provided.

2.2.1 Roadways

Shawmut Avenue

Shawmut Avenue borders the Project site to the west. The roadway provides a single, one-way southbound travel lane that extends from north of Herald Street to East Berkeley Street. South of East Berkeley Street, Shawmut Avenue operates one-way northbound. Two-hour parking, except for South End residents, is provided on both the west and east sides of the street between Herald Street and East Berkeley Street. Sidewalks are provided along both sides of the street.

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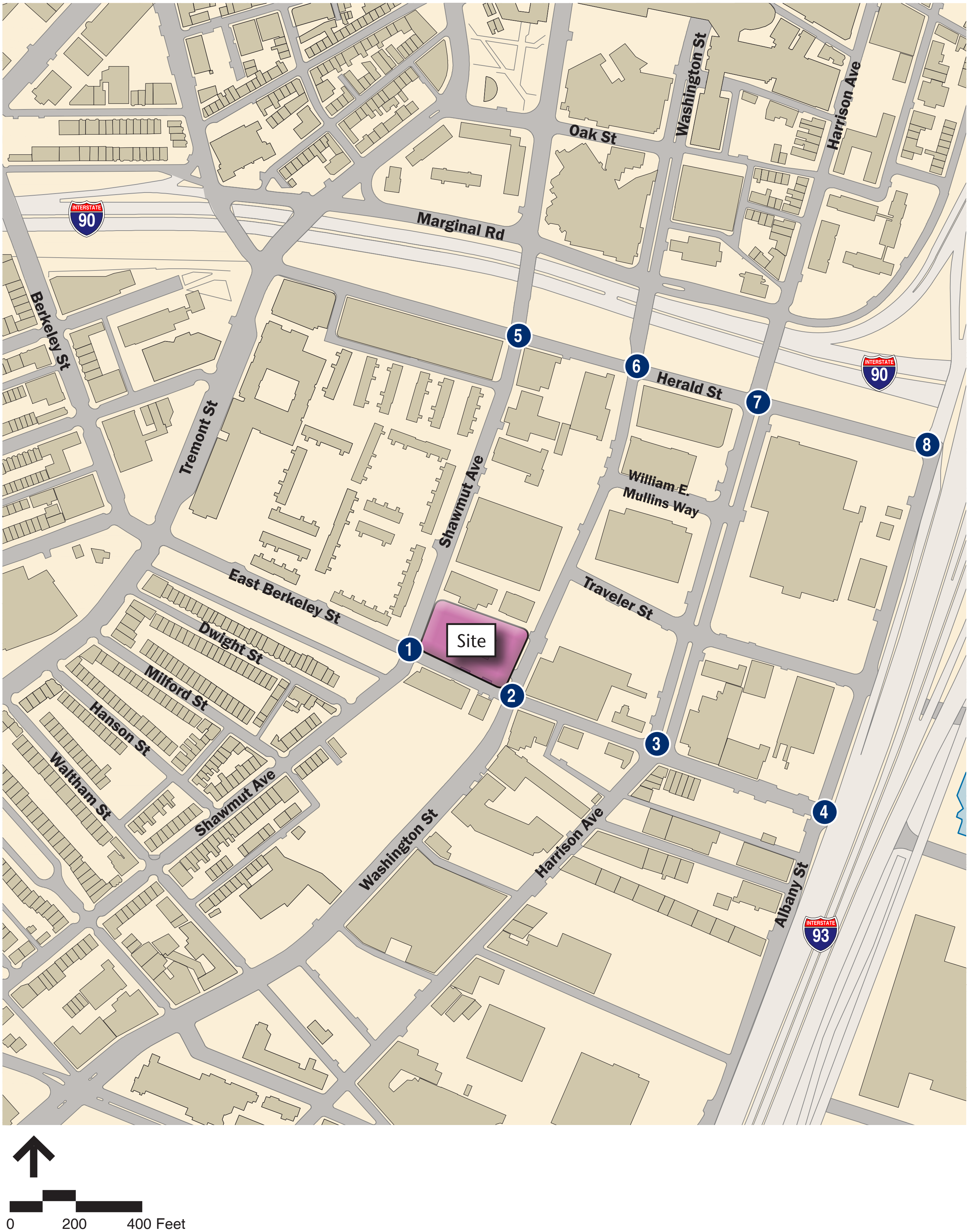

80 East Berkeley Street **Boston, Massachusetts**

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Figure 2-2

Study Area Intersections

East Berkeley Street

East Berkeley Street borders the Project site to the south and generally provides three lanes of one-way westbound travel. South End resident parking is provided on the south side of East Berkeley Street to the east of Harrison Avenue. Two-hour metered parking is available on the south side of the street adjacent to the site, and along both the north and south side between Harrison Avenue and Washington Street. The meters are restricted during the morning commuter peak hour to ensure three-lanes of travel for the higher vehicle volume time period. Sidewalks are provided along both sides of the streets with crosswalks at key intersections.

Washington Street

Washington Street, east of the site, runs parallel to Shawmut Avenue. The roadway provides one-way northbound travel for passenger vehicles and exclusive northbound and southbound lanes for MBTA Silver Line buses. Adjacent to the site, Washington Street splits from a single lane departing the intersection with East Berkeley Street into two general purpose lanes with the MBTA Bus lanes. Metered parking is provided on the east side of the roadway. Sidewalks are provided along both sides of the roadway with crosswalks at key intersections.

Herald Street

Herald Street is a three-lane through street that travels from Tremont Street to Albany Street. The roadway provides minimal turning movements onto and from the intersecting one-way perpendicular roadways. Parking is prohibited on both sides of the roadway. Sidewalks are provided along both the north and south side of the roadway with crosswalks provided at the signalized intersections along the corridor.

2.2.2 Study Area Intersections

Shawmut Avenue/Herald Street

Shawmut Avenue/Herald Street is a four-way signalized intersection. Shawmut Avenue is a one-way southbound roadway and provides a left-turn lane and a through lane. Herald Street is a one-way east-bound roadway that provides two exclusive through lanes and a shared through/right-turn lane. Parking is prohibited on Shawmut Avenue north of the intersection and permitted on both sides of the street south of the intersection. Parking is prohibited on both sides of Herald Street. Shawmut Avenue crosses over I-90 just north of the intersection. Pedestrians are accommodated within the intersection’s signalization via concurrent pedestrian phases. Crosswalks are provided across the Shawmut Avenue and Herald Street approaches to the intersection.

Shawmut Avenue/East Berkeley Street

Shawmut Avenue/East Berkeley Street is a four-way signalized intersection. East Berkeley Street is a one-way westbound roadway that provides three exclusive through lanes. Shawmut Avenue operates as a one-way southbound roadway north of the intersection and a one-way northbound roadway south of the intersection. The Shawmut Avenue approach can only turn westbound onto East Berkeley Street. Parking is permitted on both sides of Shawmut Avenue and prohibited on the north side of East Berkeley Street, with metered parking on the south side (except during the morning peak hour). Pedestrians are accommodated with an exclusive pedestrian phase. Crosswalks are provided across the Shawmut Avenue and East Berkeley Street approaches to the intersection.

Harrison Avenue/Herald Street

Harrison Avenue/Herald Street is a four-way signalized intersection. Harrison Avenue is a north-south running roadway that provides two-way operations to the south of Herald Street and one-way southbound travel to the north. The northbound approach consists of two right-turn only lanes while the southbound direction provides an exclusive left-turn lane and two through lanes. Harrison Avenue is median-divided to the south of the intersection. Herald Street runs in a one-way eastbound direction and provides two exclusive through lanes and a shared through/right-turn lane. Parking is prohibited on both sides of Herald Street and Harrison Avenue to the north of the intersection. On-street parking is permitted along the east side of Harrison Avenue to the south of the intersection. Nearest to the intersection, parking for approximately two commercial vehicles is permitted for a maximum of 30 minutes as well as two handicap spaces. Pedestrians are accommodated with an exclusive pedestrian phase. Crosswalks are provided across the northbound approach of Harrison Avenue and across both approaches of Herald Street.

Albany Street/Herald Street

Albany Street/Herald Street is a T-shaped signalized intersection in which Herald Street intersects Albany Street from the west. Herald Street operates as a one-way eastbound roadway consisting of three right-turn only lanes. Albany Street operates as a one-way southbound roadway consisting of three through lanes. Parking is prohibited on both sides of Albany Street and Herald Street. Pedestrians are accommodated in concurrent pedestrian phases. Crosswalks are provided across the Herald Street and Albany Street approaches to the intersection.

East Berkeley Street/Washington Street

East Berkeley Street/Washington Street is a four-way signalized intersection. East Berkeley Street runs in a one-way westbound direction. To the north of the intersection Washington Street operates as a one-way northbound roadway that provides an exclusive southbound lane for Silver Line bus service only. To the south of the intersection Washington Street provides two-way operations, while maintaining exclusive Silver Line bus lanes in each direction. The East Berkeley Street approach consists of a shared left-turn/through lane, a through lane, and a shared through/right-turn lane. The Washington Street northbound approach consists of an exclusive left-turn lane, a through lane, and a Silver Line exclusive bus lane. The Washington Street southbound approach consists solely of a Silver Line exclusive bus lane. Silver Line bus stops are located in the departure lanes on Washington Street to the north and south of the intersection. Additionally, a standard bus stop is located on the north side of the East Berkeley Street approach to the east of the intersection. Two-hour metered parking is available along the south side of East Berkeley Street to the east of the intersection though restrictions are enforced Monday through Friday during commuter peak periods. Two-hour unrestricted metered parking is provided to the south of the intersection on the east side of Washington Street. To the west of the intersection, a commercial zone is provided on the south side of East Berkeley Street. Pedestrians are accommodated with a concurrent pedestrian phase and crosswalks are provided across all approaches to the intersection.

East Berkeley Street/Harrison Avenue

East Berkeley Street/Harrison Avenue is a four-way signalized intersection. Harrison Avenue is a north-south running roadway that provides two-way operations while East Berkeley operates as a one-way westbound roadway. The northbound approach consists of one general purpose lane while the southbound direction provides an exclusive through lane and a shared through/right-turn lane. Harrison Avenue is median-divided to the north of the intersection. The East Berkeley Street approach consists of a shared left-turn/through lane, a through lane, and a shared right-turn/through lane. A bus stop is located on the north side of the East Berkeley Street approach. South End resident parking is provided on the west side of Harrison Avenue to the south of the intersection and the south side of East Berkeley Street to the east of the intersection. Two-hour metered parking is available along both sides of East Berkeley Street to the west of the intersection though restrictions are enforced Monday through Friday during commuter peak periods. Two-hour visitor parking is provided to the south of the intersection on the east side of Harrison Avenue. To the north of the intersection a ten-minute drop-off/pick-up zone is provided on the west side of Harrison Avenue. Pedestrians are accommodated with an exclusive pedestrian phase and crosswalks are provided across each leg of the intersection.

East Berkeley Street/Albany Street

East Berkeley Street/Albany Street is a four-way signalized intersection in which East Berkeley Street operates as a one-way westbound roadway and Albany Street operates as a one-way southbound roadway. The East Berkeley Street approach consists of a shared left-turn/through lane and an exclusive through lane. The Albany Street approach consists of two through lanes and a shared through/right-turn lane. South End resident parking is available along the south side of East Berkeley Street to the west of the intersection and is prohibited elsewhere. The signal operations at this location are interconnected with the adjacent East Berkeley Street/Frontage Road/West 4th Street signal to the east. Pedestrians are accommodated in concurrent pedestrian phases with crosswalks provided across the western and southern legs of the intersection.

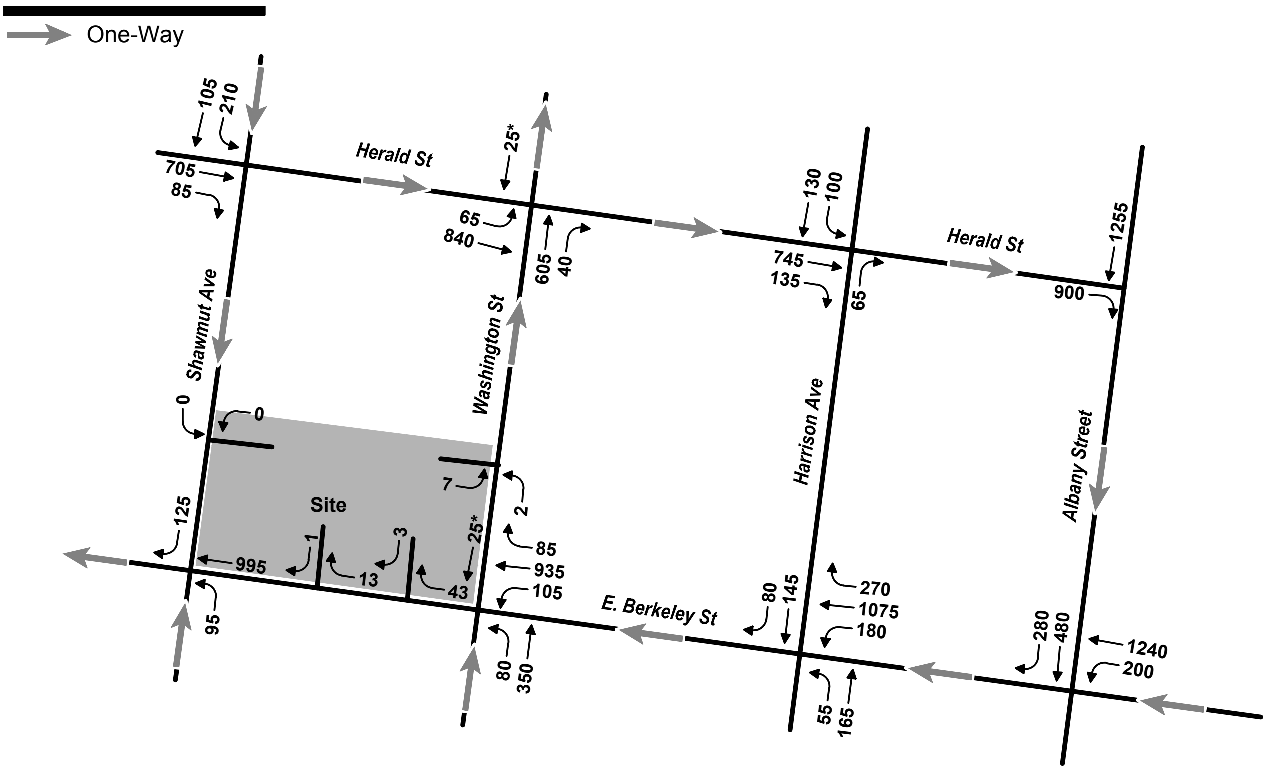
Washington Street/Herald Street

Washington Street/Herald Street is a four-way signalized intersection. Washington Street is a one-way northbound roadway that provides an exclusive southbound lane for Silver Line bus service only. The Washington Street northbound approach provides two through lanes and an exclusive right-turn lane. Herald Street runs in a one-way eastbound direction and provides a shared left-turn/through lane and two exclusive through lanes. Parking is prohibited on both sides of Washington Street and Herald Street. Bus stops are located on the west side of Washington Street directly to the south of the intersection and on the south side of Herald Street directly west of the intersection. Pedestrians are accommodated in concurrent pedestrian phases. Crosswalks are provided across the northbound approach of Washington Street and across both approaches of Herald Street.

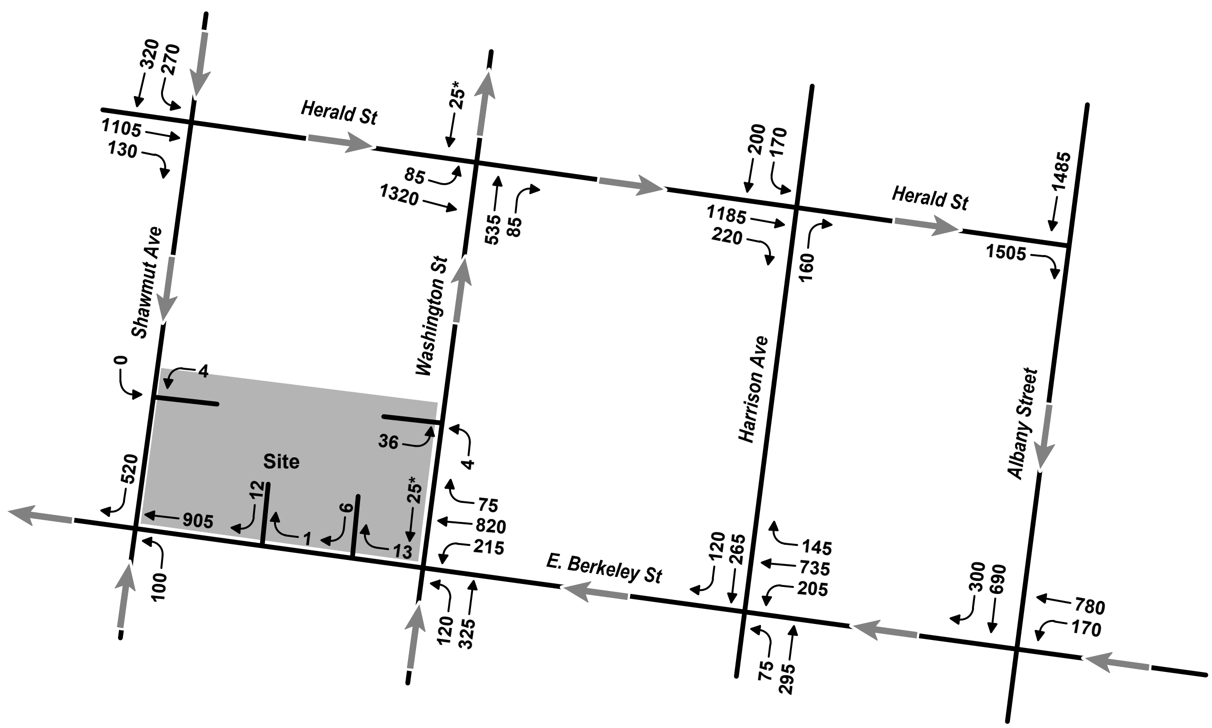
2.2.3 Traffic Data Collection

To estimate the existing traffic flow at the study area intersections, turning movement counts ("TMCs") were conducted in May 2013. The TMCs collected vehicle (passenger and heavy vehicles), bicycle, and pedestrian volumes at the study area intersections. The morning (8:00 - 9:00 AM) and evening (5:00 – 6:00 PM) peak hour vehicle volumes are presented in Figure 2-3.

In addition to the TMCs, two automatic traffic recorders ("ATRs") were placed on Washington Street (northbound) adjacent to the Project site to understand the daily vehicle volumes in the area. Washington Street is one-way northbound for all traffic except for an exclusive MBTA bus lane in the southbound direction. As shown in Table 2-2, Washington Street northbound carries approximately 5,327 vehicles on a typical weekday. This volume includes both the passenger vehicles in the commuter lane and the buses in the bus only lane. The peak weekday morning period occurs between 8:15 AM and 9:15 AM with an hourly volume of approximately 456 vehicles. The evening peak period on a typical weekday occurs between 4:30 PM and 5:30 PM carrying an hourly volume of approximately 419 vehicles.



Morning Peak Hour



Evening Peak Hour

* MBTA Silver Line Buses Only

Figure 2-3

2013 Existing Conditions
AM/PM Peak Hour Traffic Volumes

Table 2-2 Existing Traffic Volume Summary

	Daily	Peak Hour					
		Weekday Morning Average			Weekday Evening Average		
Location	Average Weekday (vpd) [1]	Vol. (vph) [2]	"K" Factor[3]	Directional Flow	Vol. (vph) [2]	"K" Factor	Directional Flow
Washington Street – North of East Berkeley Street	5,327	456	8.6	100% NB	419	7.9	100% NB
Washington Street Bus Lane SB – North of East Berkeley Street	428	25	5.8	100% SB	41	9.6	100% SB

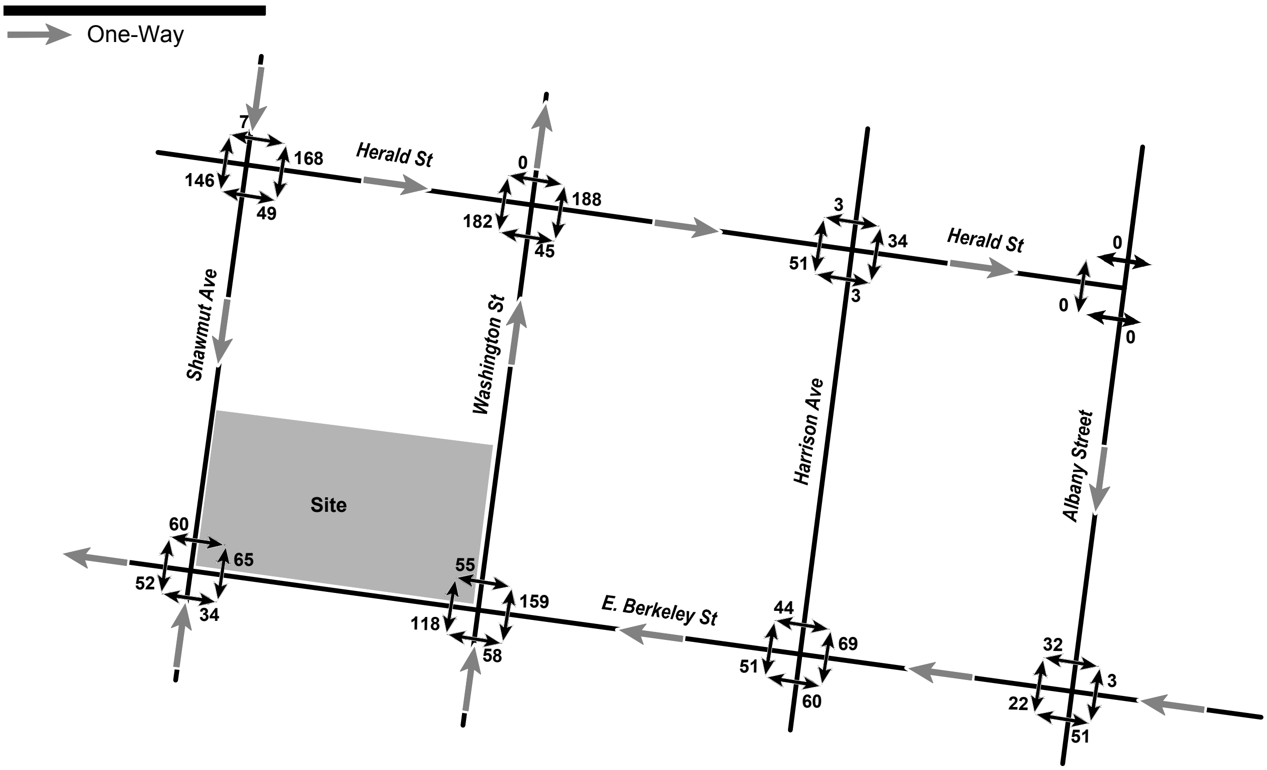
Source: Automatic Traffic Recorder counts conducted by VHB in March 2011.
Notes: EB = eastbound, WB = westbound, SB = southbound, NB = northbound. Peak hours do not necessarily coincide with the peak hours of the turning movement counts.
1 Daily traffic expressed in vehicles per day.
2 Peak hour volumes expressed in vehicles per hour.
3 Percent of daily traffic, which occurs during the peak hour.

Washington Street southbound is an exclusive bus lane. On a typical weekday the Washington Street southbound bus lane carries approximately 428 buses. Average weekday bus volumes steadily increase from the morning peak hour (approximately 25 buses) to the evening peak (approximately 41 buses).

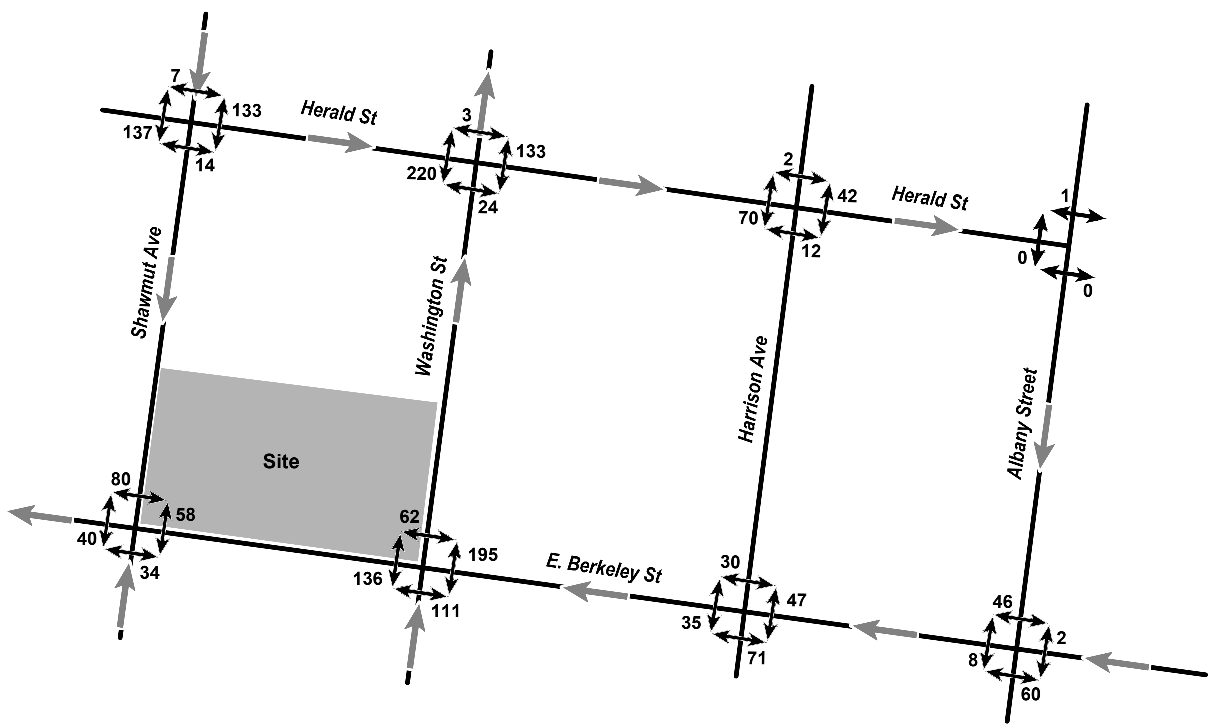
2.2.4 Pedestrians

Sidewalks along the roadway network near the Project site are in varying condition with striped crosswalks and pedestrian signals provided at the signalized intersections. Moderate levels of pedestrians were observed throughout the study area. Figure 2-4 shows the pedestrian volumes at the study area intersections for the morning and evening peak hours.

Adjacent to the Project site, pedestrian volumes along East Berkeley Street were approximately 60 during the morning peak hour and 80 during the evening peak hour. To the west of the site along Shawmut Avenue, pedestrian volumes average 65 and 58 during the morning and evening peak hours, respectively. Considerably higher pedestrian volumes are observed to the east of the site along Washington Street. During the morning peak hour approximately 118 pedestrians travel the west side of Washington Street, and approximately 136 pedestrians during the evening peak hour.



Morning Peak Hour



Evening Peak Hour

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Figure 2-4

2013 Existing Conditions

AM/PM Peak Hour Pedestrian Volumes

2.2.5 *Bicycles*

Bicycle volumes were collected throughout the study area during the morning and evening peak hours. Figure 2-5 highlights the morning bicycle volumes with roughly nine bicyclists traveling along East Berkeley Street adjacent to the Project site. Evening bicycle volumes can be found in Figure 2-6, showing an increase in bicycle traffic along East Berkeley Street with approximately 19 bicycles traveling westbound.

Within the Project study area only Washington Street has a shared bicycle/bus lane. From the figures it can be seen that most bicycle traffic travels along Washington Street and East Berkeley Street, adjacent to the Project site.

2.2.6 *Public Transportation*

The Project site is currently served by several MBTA public transportation services as shown in Figure 2-7. MBTA bus routes are the most accessible form of transit service in walking distance of the Project site. The Orange Line's Tuft's Medical Center Station is the closest subway stop to the site, located slightly over a quarter-mile to the north. The Red Line's Broadway Station is located to the east less than a half-mile from the site. Five local bus routes serve the study area, including the Silver Line SL4 and SL5 rapid bus routes. Two Silver Line bus stops are located on Washington Street adjacent to the site. The stop nearest the site is for inbound buses while the stop slightly north of the site is for outbound buses. Peak period frequencies/headways for MBTA services are summarized in Table 2-3.

Table 2-3 MBTA Service

Transit Line/Route	Origin/Destination	Rush-Hour Frequency (minutes)
Red Line – Broadway Station	Alewife – Braintree/Ashmont	10
Orange Line – Tufts Medical Center Station	Oak Grove – Forest Hills	5
Route 9	City Point – Copley Square	6-9
Route 11	City Point – Downtown Bayview	7-10
Route 43	Ruggles Station – Park & Tremont Streets	12
Route 47	Central Square, Cambridge - Broadway Station	8-20
Silver Line - SL 4	Dudley Station – South Station	5-15
Silver Line - SL 5	Dudley Station – Downtown Crossing	6

Source: MBTA June 2013

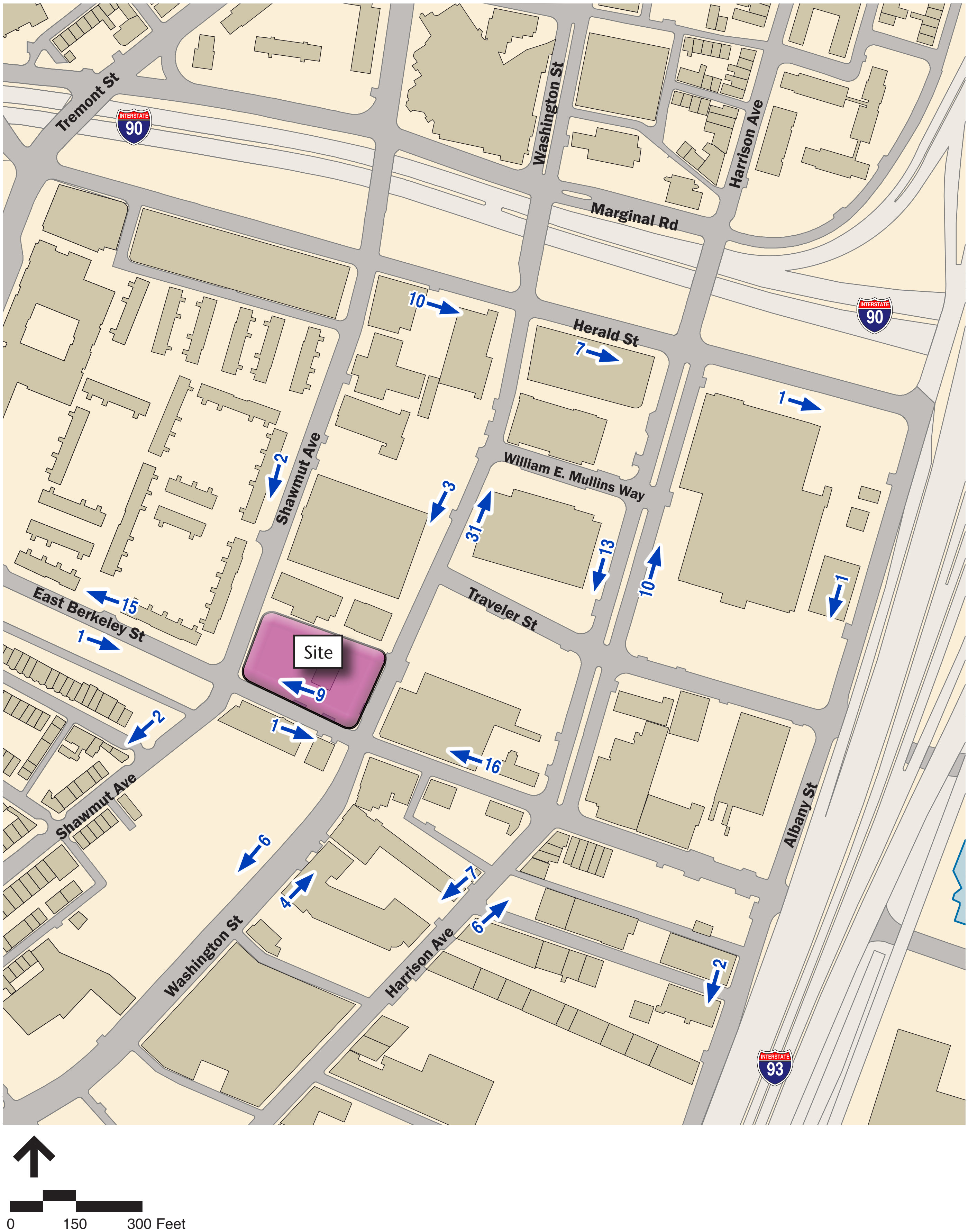

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Figure 2-5
2013 Existing Conditions
AM Peak Hour Bicycle Volumes

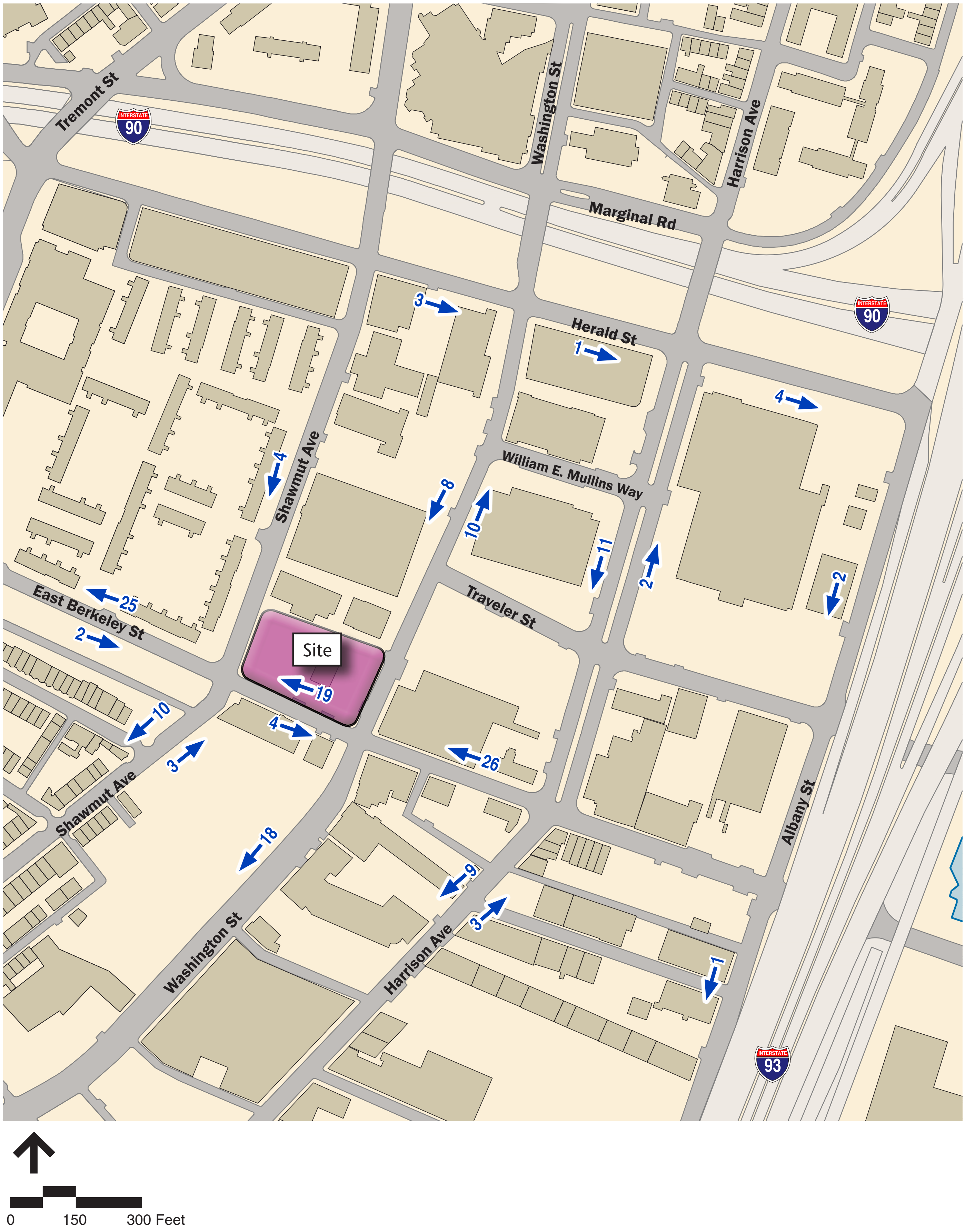

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Figure 2-6

2013 Existing Conditions
PM Peak Hour Bicycle Volumes

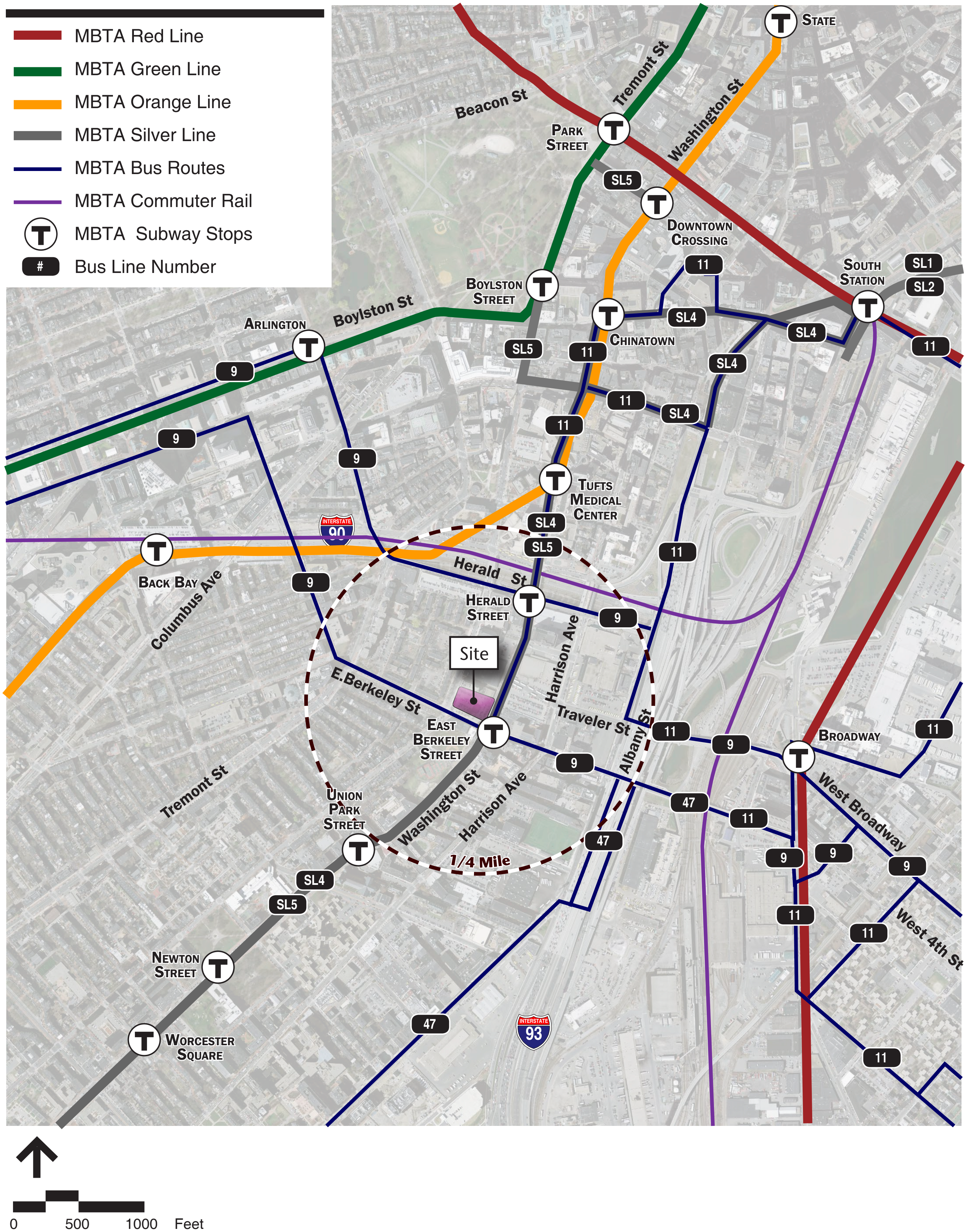

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Figure 2-7

Public Transportation

A description of each MBTA bus line that services the Project site is provided below:

Route 8 - Harbor Point/UMass - Kenmore Station via BU Medical Center & Dudley Station

While Route 8 currently does not travel past the Project site, the Harrison-Albany Corridor Strategic Plan recommended altering this route so that it would continue farther to the north beyond its current northerly limit at Msg. Reynolds Way. This route would continue north on Harrison Avenue and turn left onto East Berkeley Street. From that point the route would turn right onto Washington Street and then right onto Traveler Street where the bus would then turn right onto Harrison Avenue to return to the south. This alternative assumes the conversion of that portion of Traveler Street to two-way traffic as also proposed in the Strategic Plan. One of the goals of this potential measure is to better serve the overall Harrison Avenue corridor. The additional route time required for this extension, along with the desired interconnectivity within the southern section of Harrison Avenue, will need to be evaluated by the MBTA.

Route 9 - City Point - Copley Square via Broadway Station

On its eastbound path this route currently runs on Herald Street to Albany Street before turning left at Albany Street's intersection with Traveler Street to return over Broadway Bridge. In the future the eastbound path will turn down Harrison Avenue and turn left onto Traveler Street before returning over the Broadway Bridge. The closest bus stop is at the southwest corner of Herald Street and Washington Street.

The Route 9 westbound path currently travels along East Berkeley Street past the Project site and continues westbound out of the study area. The closest bus stop for this path is at the southeast corner of the Project site at the East Berkeley Street/Washington Street intersection.

Route 11 – City Point – Downtown BayView Route

The inbound path of this bus route runs along East Berkeley Street turning right onto Washington Street traveling past Herald Street into downtown Boston. The nearest bus stop to the Project site is located at the corner of East Berkeley Street at Washington Street.

Route 43 – Ruggles Station – Park & Tremont Streets via Tremont Street

This north-south route runs along Tremont Street to the west of the Project site within the Project study area. There is a bus stop along Tremont Street at the corner of East Berkeley Street.

Route 47 - Central Square, Cambridge - Broadway Station

At the northerly end of its route, Route 47 turns right from Frontage Road onto West Fourth Street to its terminus at Broadway Station. With the rerouting under consideration, this route would instead turn left from Frontage Road onto East Berkeley Street, then right onto Harrison Avenue and right onto Traveler Street. From there it would continue across Traveler Street to Broadway Station without any changes to the return route to the south. This potential change is also under consideration primarily due to development potential along Traveler Street.

2.2.7 Existing Parking

The Project site currently contains a surface public parking lot and an automotive repair shop. The public parking lot includes 89 public parking spaces. The parking spaces in the lot were observed to be highly utilized during weekdays. The automotive repair shop has approximately 31 parking spaces within its property.

Existing curb regulations in the vicinity of the Project site primarily include South End Resident parking with 8:00 AM-6:00 PM visitor parking allowed along Shawmut Avenue, morning commuter peak hour restricted meters along the south side of East Berkeley Street, and no parking along the north side of East Berkeley Street and west side of Washington Street. These and the surrounding on-street parking regulations within a one-quarter mile of the site are presented in Figure 2-8.

Off-street public parking garages are limited within the study area. The public parking options located within the study area are presented in Figure 2-9.

2.2.8 Crash Analysis

A detailed crash analysis was conducted to identify potential vehicle accident trends and/or roadway deficiencies in the traffic study area. The most current vehicle accident data for the traffic study area intersections were obtained from the Massachusetts Department of Transportation ("MassDOT") for the years 2008 to 2010. A summary of the study area intersections vehicle accident history is presented in Table 2-4.

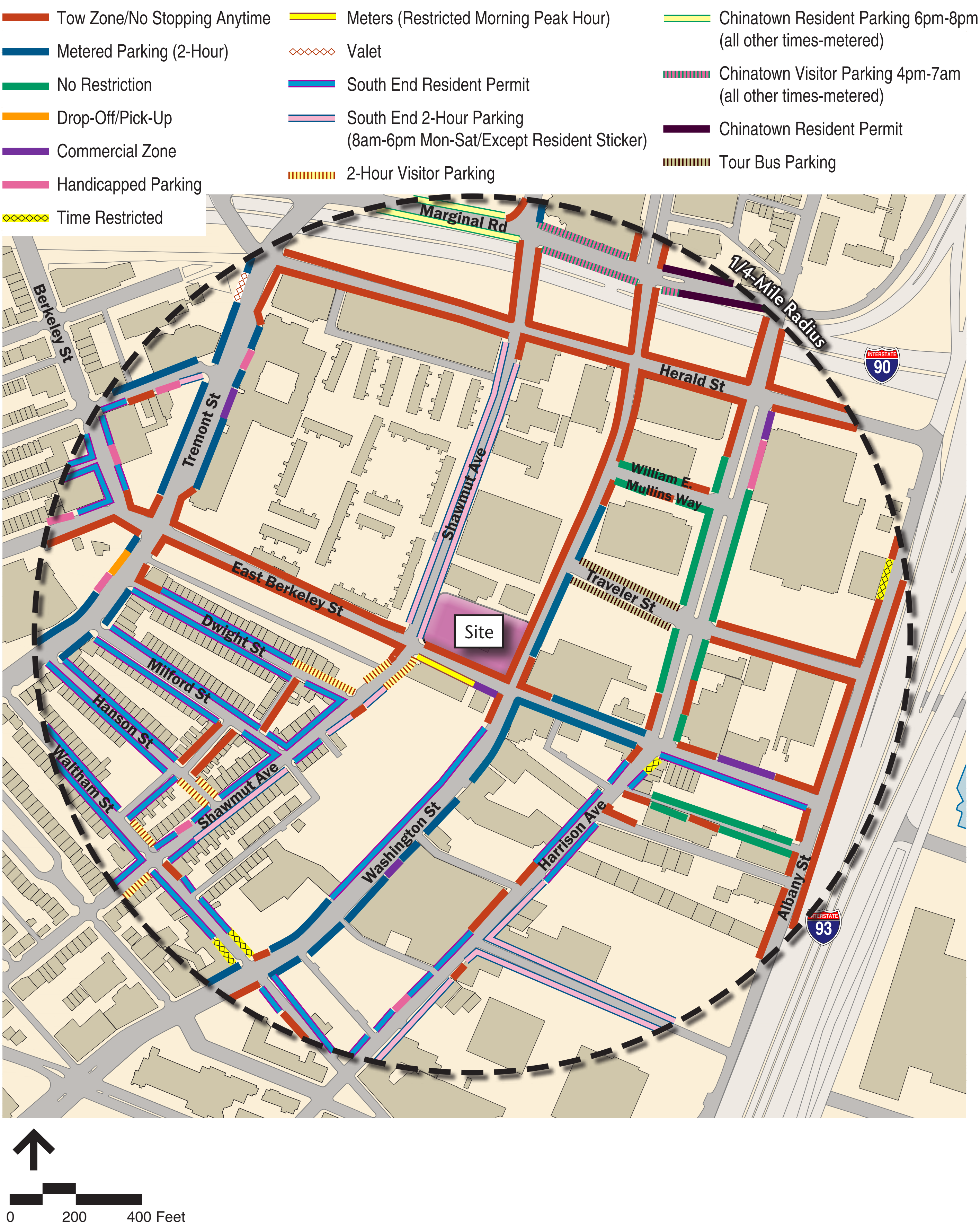

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Figure 2-8
Summary of Existing On-Street Parking

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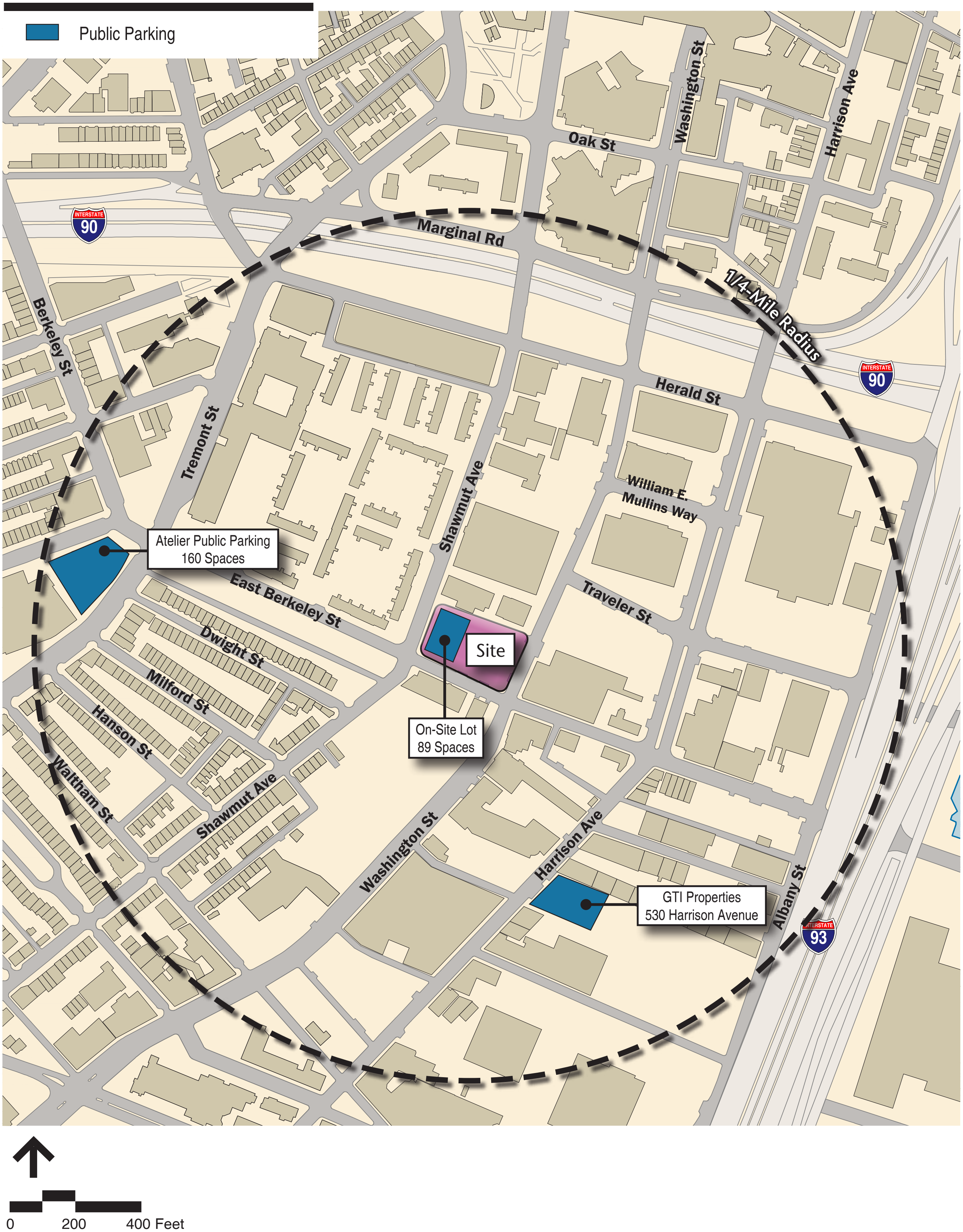


80 East Berkeley Street **Boston, Massachusetts**

Figure 2-9

Summary of Existing Off-Street Public Parking

Table 2-4 Vehicular Crash Summary

	East Berkeley Street at:				Herald Street at:			
	Shawmut Ave	Washington St	Harrison Ave	Albany St	Shawmut Ave	Washington St	Harrison Ave	Albany St
Currently Signalized?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MassHighway ACR	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
MassHighway CCR	0	0.72	0	0.34	0.15	0.17	0.40	0.30
Exceeds?	No	No	No	No	No	No	No	No
Year								
2008	0	6	0	6	3	2	3	3
2009	0	3	0	0	0	2	2	2
2010	0	1	0	1	0	0	5	5
Total	0	10	0	7	3	4	10	10
Collision Type								
Angle	0	1	0	1	0	1	4	1
Head-on	0	0	0	0	0	0	0	0
Rear-end	0	5	0	0	0	0	1	2
Rear-to-Rear	0	0	0	0	0	0	0	0
Sideswipe, opposite direction	0	0	0	0	0	0	0	0
Sideswipe, same direction	0	3	0	2	0	2	2	1
Single vehicle crash	0	1	0	0	1	0	0	1
Not reported/Unknown	0	0	0	4	2	1	3	5
Total	0	10	0	7	3	4	10	10
Crash Severity								
Fatal injury	0	0	0	0	0	0	0	0
Non-fatal injury	0	1	0	4	1	1	2	2
Property damage only (none injured)	0	6	0	3	1	3	3	5
Not reported/Unknown	0	3	0	0	1	0	5	3
Total	0	10	0	7	3	4	10	10
Time of Day								
Weekday, 7:00 AM - 9:00 AM	0	2	0	0	0	0	0	2
Weekday, 4:00 PM - 6:00 PM	0	0	0	0	0	0	0	0
Saturday, 11:00 AM - 2:00 PM	0	0	0	0	0	0	0	0

Table 2-4 Vehicular Crash Summary (Continued)

	East Berkeley Street at:				Herald Street at:			
	Shawmut Ave	Washington St	Harrison Ave	Albany St	Shawmut Ave	Washington St	Harrison Ave	Albany St
Weekday, other time	0	3	0	3	3	2	9	6
Weekend, other time	0	5	0	4	0	2	1	2
Total	0	10	0	7	3	4	10	10
Pavement Conditions								
Dry	0	6	0	5	2	3	5	5
Wet	0	3	0	1	0	1	2	1
Snow	0	0	0	0	0	0	0	0
Ice	0	1	0	0	0	0	0	0
Not reported/Unknown	0	0	0	1	1	0	3	4
Total	0	10	0	7	3	4	10	10
Non Motorist (Bike, Pedestrian)								
Total	0	0	0	0	1	0	0	0

Source: MassDOT Crash Data

Crash rates are calculated based on the number of accidents at an intersection and the average volume of traffic traveling through the intersection on a daily basis. These rates are compared to the MassDOT District averages to identify if certain intersections have safety issues that should be looked into further. The Project study area is located in District 6 which has a crash rate of 0.76 for signalized intersections. This means that on average 0.76 accidents occur per million vehicles entering a signalized intersection in District 6. From the crash analysis it was determined that none of the study intersections exceeds the MassDOT District 6 average.

Of the reported accidents nearly 60 percent occurred during a weekday outside the traditional peak morning and evening travel periods of 7:00 AM – 9:00 AM and 4:00 PM – 6:00 PM. The majority of accidents occurred during dry pavement conditions. The severity of accidents ranged from non-fatal injuries to property damage, with no fatalities recorded.

2.3 Future Transportation Conditions

Two future conditions scenarios were evaluated for a future five-year time horizon (2018) to assess the potential Project-related traffic impacts: the No-Build and Build Conditions. These future conditions are summarized in the sections below.

2.3.1 2018 No-Build Condition

The 2018 No-Build Condition was developed to evaluate future transportation conditions in the traffic study area without consideration of the Project. In accordance with BTD guidelines, this future analysis year represents a five-year horizon (2018) from Existing Conditions (2013). The No-Build Condition provides insight into future traffic conditions resulting from regional growth and traffic generated by specific planned projects that are expected to affect the local roadway network.

2.3.1.1 Background Growth

A background growth rate of half a percent per year was applied to the traffic volumes during the morning and evening peak hours. This growth rate accounts for regional growth outside of the South End neighborhood and is consistent with recent traffic studies for other developments within the area.

In addition to the background growth rate, traffic projections for several specific projects were incorporated in the No-Build Condition. These include the following development projects:

- 477-481 Harrison Avenue – Redevelopment of a 9,735 +/- square feet land area into 18 residential units.
- Castle Square – 25 unit residential building addition to an existing 500 unit residential development.
- 275 Albany Street – 198 room extended stay hotel and 210 room select-service hotel.
- Parcel 24 – 345 residential mixed-income units and 5,500 square feet of retail space.
- Ink Block – mixed-use redevelopment that includes 471 residential units, 30,000 square feet of retail/grocery space, and 55,000 square feet of retail space.
- Graybar – 557 residential units and 33,000 square feet of retail space (program provided by the BRA before the submittal of a Letter of Intent by the proponent of that project).

2.3.1.2 Harrison – Albany Corridor Strategic Plan

The BRA, along with other integral groups, have developed a Strategic Plan for the Harrison Avenue / Albany Street corridor in the South End which was published in June 2012. The Project study area falls into the EDA North subarea of the plan. The "New York Streets" subarea is defined as being north of East Berkeley Street, west of Route I-93, south of Herald Street, and east of Shawmut Avenue. The City is moving to support the redevelopment of the South End area through this plan. The vision that has developed over the past several years is multi-faceted, including improvements to the roadway and infrastructure system supporting the area.

The No-Build Condition includes the roadway and infrastructure changes that will be put into place with the Strategic Plan as presented in Figure 2-10. The future condition includes the planned two-way operation of Washington Street within the study area. Washington Street is planned to be a single general purpose lane in both the northbound and southbound directions with an exclusive bus-only lane in either direction. Harrison Avenue is modeled to include a single general purpose lane in both the northbound and southbound direction between East Berkeley Street and Herald Street. The southbound approach at Herald Street will remain one-way southbound with a single through lane and two left-turn lanes opposed to the two through lanes and single left-turn lane in Existing Conditions.

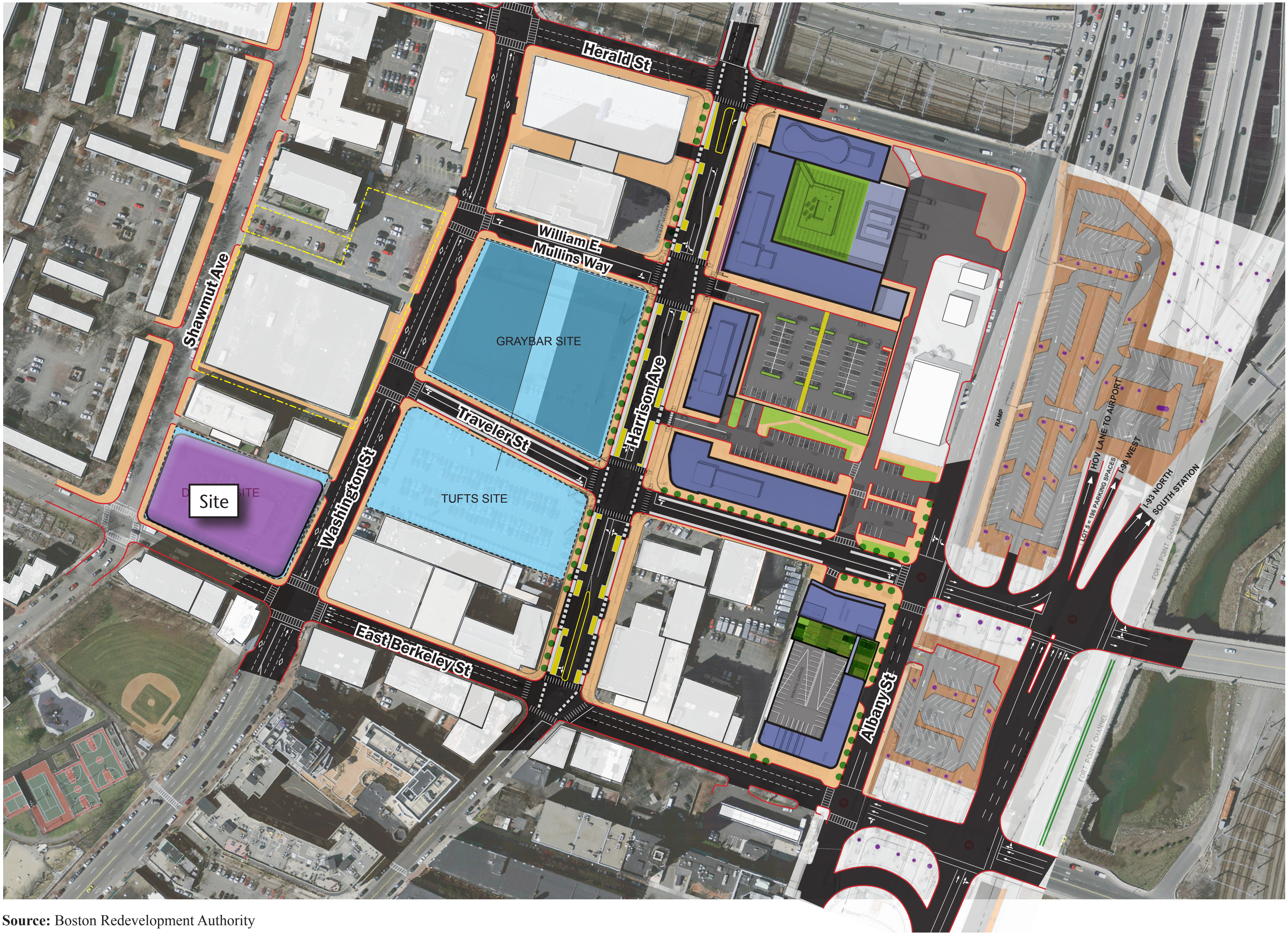
The No-Build Condition vehicle volumes are presented in Figure 2-11 for the morning and evening peak hours.

2.3.2 2018 Build Condition

The 2018 Build Condition assumes construction of the following:

- 290,000 square feet office;
- 18,000 square feet retail and/or restaurant; and,
- 200 below-grade parking spaces (80 net new spaces).

For the purposes of this analysis, the 18,000 square feet of ground floor space was analyzed as 12,000 square feet of retail space and 6,000 square feet of restaurant space. As part of the Project, existing site driveways will be eliminated and replaced to the north side of the site with access/egress to and from Washington Street connecting to the 200 space below-grade parking garage. An accessway just south of the garage entrance will run parallel to East Berkeley Street in the westbound direction and provide access to the off-street loading area.



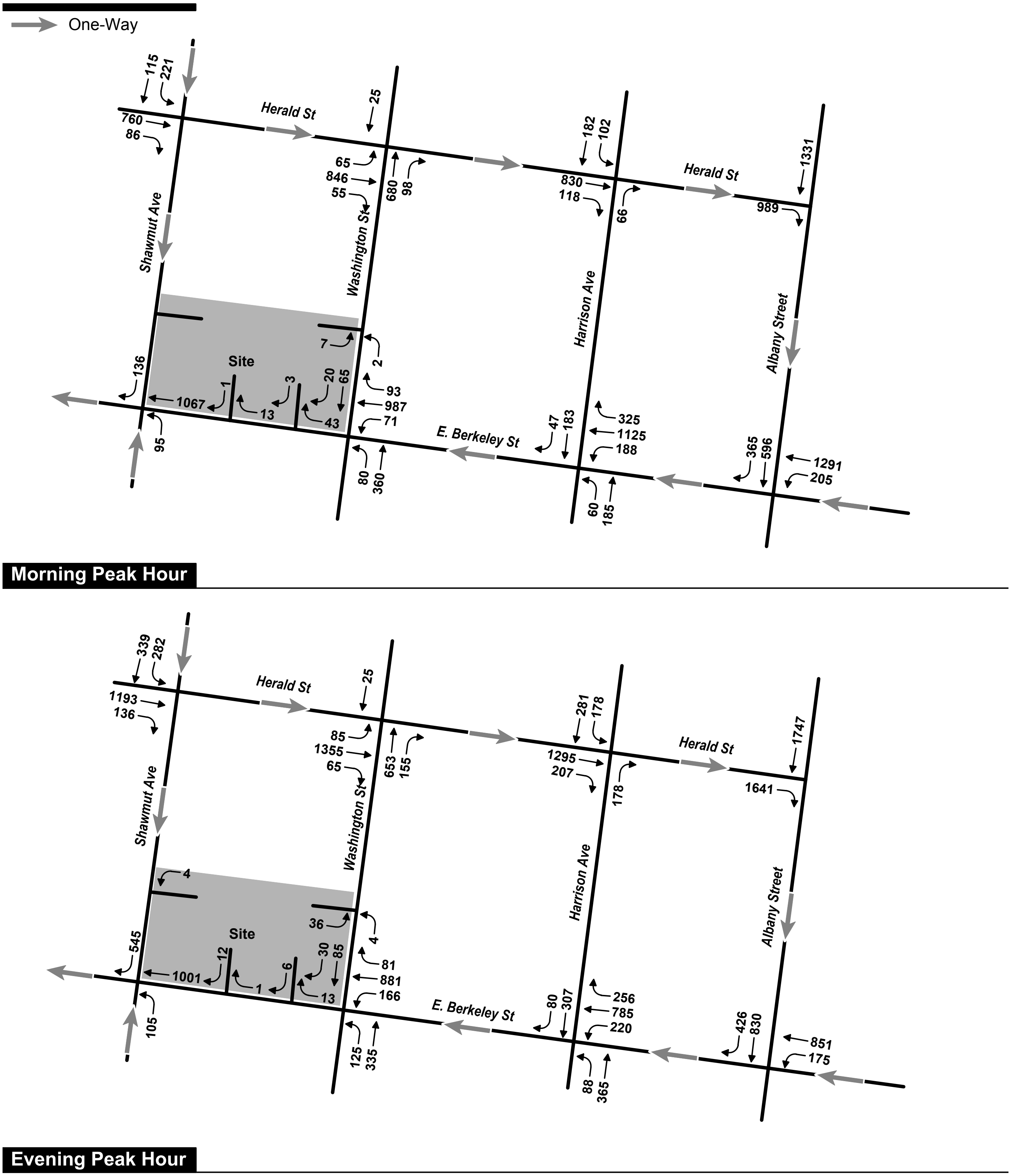
Source: Boston Redevelopment Authority

80 East Berkeley Street **Boston, Massachusetts**

Vanasse Hangen Brustlin, Inc.

Figure 2-10

Future Study Area Roadway and Infrastructure Improvements



80 East Berkeley Street **Boston, Massachusetts**

Figure 2-11
2018 No-Build Conditions
AM/PM Peak Hour Traffic Volumes

2.3.2.1 Site Access, Circulation, and Parking

The Project will include a two-level, 200 car, below-grade parking garage to replace the 120 surface parking spaces that will be eliminated due to the building's construction (89 existing public surface lot spaces and 31 auto repair shop accessory spaces) and add 80 net-new spaces. Most spaces will be used to support uses within the Project (111 spaces, or at a rate of 0.38 spaces per 1,000 square feet of office space developed). The remaining 89 spaces, subject to APCC approval, will continue to be operated as public spaces and made available to the public as they have for over 40 years and as contemplated within the BRA's Harrison-Albany Corridor Strategic Plan.

There will be dedicated off-street loading docks to ensure that loading and service operations are handled internal to the Project site and will not impact adjacent streets (Washington Street and Shawmut Avenue). The dock will have three enclosed bays in the building for deliveries and trash removal. Access to the loading area will be accommodated via a new accessway along the northern edge of the site connecting Washington Street to Shawmut Avenue. Service vehicles will travel from Washington Street to Shawmut Avenue in the westbound direction. The accessway will provide a landscaped, pedestrian-friendly connection between the two public roadways following the vision in the Harrison-Albany Corridor Strategic Plan of creating pedestrian connections throughout the neighborhood. The below-grade garage will be accessed from Washington Street just north of the new accessway. The entrance/exit ramp will be designed to provide queue space to limit traffic impacts on Washington Street.

The Project will substantially improve pedestrian sidewalks adjacent to the Project site. The building will be set back from the property lines to allow all of the existing sidewalks around the site to be widened. The Shawmut Avenue sidewalk will be widened from an average of 9 feet to an average of 20 feet. The East Berkeley Street sidewalk will be widened from an average of 7.5 feet to an average of 20 feet, and the Washington Street sidewalk will be widened from an average of 6 feet to an average of 17 feet. These increases in width will allow for a substantially improved area where pedestrians can wait to cross the Washington Street/East Berkeley Street intersection. This corner will be fitted with new ADA/AAB accessible ramps. Street trees will be provided along these newly widened sidewalks. Furthermore, the accessway at the rear of the site will provide a new pedestrian connection between Washington Street and Shawmut Avenue, following the vision in the Harrison-Albany Corridor Strategic Plan of creating additional pedestrian connections throughout the neighborhood.

The Proponent has also worked proactively with the BRA and the BTD to develop a curbside plan for both East Berkeley Street and Washington Street. On East Berkeley Street, a dedicated drop-off area is proposed that would support the Project's ground floor retail space. On Washington, no on-street curb activities are proposed, supporting future modification of Washington Street to two-way vehicular travel plus inclusion of dedicated bus lanes. No Stopping/Parking is recommended for the Project's Washington Street frontage.

The Proponent will also provide bicycle storage on site and public bicycle racks at-grade in accordance with the City of Boston Bicycle Guidelines. The Proponent will encourage future tenants to implement transportation demand management measures to its employees to encourage the use of transit and other alternative forms of transportation.

2.3.2.2 Project-Generated Trips

A daily trip generation estimate for the Project was calculated using the program described previously and developed based on data presented in the Institute of Transportation Engineers (ITE) publication *Trip Generation, 8th Edition.* These references establish daily unadjusted vehicle trip estimates based on independent variables, such as building size, for comparable facilities. A summary of unadjusted trip generation for the Project is presented below in Table 2-5.

Table 2-5 Unadjusted Daily Vehicle Trips

Land Use (LUC)	Size (Gross Zoning Square Feet)	Daily Vehicle Trips
Existing Auto Center	-3,000 SF	(-88)
Specialty Retail (LUC 814)	12,000 SF	532
Quality Restaurant (LUC 931)	6,000 SF	540
Office (LUC 710)	290,000 SF	3,193
80 East Berkeley Street Project	305,000 SF	4,177

Source: *Trip Generation, ITE 2008*

As quantified in Table 2-5, the Project is anticipated to generate 4,177 unadjusted daily vehicle trips based on ITE methodology. The City of Boston's guidelines for Article 80 submittals include the use of the BTD Mode Share for the particular Boston neighborhood to determine the vehicle, pedestrian, and transit trips to be generated by the Project during the morning and evening peak hours. The morning and evening peak hour trip generation, mode share, distribution, and subsequent analyses were completed following the City's guidelines. A summary of adjusted trip generation estimates following procedures set forth by the BTD follows in this section.

2.3.2.2.1 Mode Share and Vehicle Occupancy Rates

After the initial calculation of the base Project unadjusted trip generation using ITE data, further adjustments were made to account for local mode shares following guidelines by the BTD for individual City zones. This mode-share calculation is critical to the evaluation of overall Project-related traffic impacts as there will be a mixture of automobile travel, public transit, and walk/bike trips to the Project site. The Project site falls within Zone 3 of the BTD Guidelines which has a typical mode share as shown in Table 2-6.

Table 2-6 Mode Split by Land Use Category

Mode	Retail/Restaurant	Office
Automobile	33%	27%
Public Transit	40%	48%
Walk/Bike/Other	27%	25%

Source: BTD Guidelines Zone 3

Transit and bicycle/pedestrian activity was further evaluated by considering vehicle occupancy rates ("VOR") derived from the 2009 National Household Travel Survey. The survey presented a typical VOR for office use to be 1.13 persons per vehicle and for retail/restaurant to be 1.8 persons per vehicle.

Additionally, the site currently contains an 89-space surface parking lot and an automobile repair shop with accessory parking. These two uses produce vehicle trips throughout the day. To understand the impact these uses have on Existing Conditions, driveway counts were conducted during the morning and evening peak hour at each driveway. It was found that the public parking spaces generated approximately 13 trips into the site in the morning and 16 trips out of the Project site in the evening; while the automobile center supported 45 trips into the Project site in the morning and 42 trips out in the evening. As presented in Table 2-7, the existing trips traveling to and from the automobile center were deducted from the Project-generated vehicle trips as they are currently traveling within the study area roadway networks and this use will be eliminated with the future construction of the Project.

Table 2-7 Total Weekday Peak Hour Project Generated Trips

	Transit	Walk/Bike/ Other	Vehicle	Less Existing Trips*	Net-New Vehicle Trips
Morning Peak Hour					
IN	223	118	111	(-45)	66
OUT	33	18	16	(-10)	6
Total:	256	136	127	(-55)	72
Evening Peak Hour					
IN	72	43	36	(-17)	19
OUT	218	117	108	(-42)	66
Total:	290	160	144	(-59)	85

Source: Institute of Transportation Engineers Trip Generation 8th Edition

* Driveway Counts by VHB conducted June 27, 2013

As shown in Table 2-7, the Project-generated trips are estimated to be 72 net-new vehicle trips (66 entering and 6 exiting) in the morning peak hour and 85 net-new trips (19 entering and 66 exiting) in the evening peak hour.

2.3.2.2.2 Auto Trip Distribution

Trip distribution was based on BTD's guidelines for Zone 3. These guidelines, based on 2000 census data, provide information on where area residents work and where area employees live. Using this data, vehicle trips can be then assigned to the roadway network. A summary of the results is presented in Figure 2-12.

The net-new Project generated trips were then assigned to the garage entry/exit and accessway. The resulting net-new trips are illustrated in Figure 2-13. Net-new Project-generated trips were then added to the 2018 No-Build Condition traffic networks. The resulting 2018 Build Condition networks are shown in Figure 2-14 for both the morning and evening peak hours. A comprehensive operational and LOS analysis of all study area intersections is presented in Section 2.4.

2.3.2.3 Pedestrians/Bicycles

The number of pedestrians and bicyclists will range between 100 and 130 during morning and evening peak hours. In the future, through the implementation of the Harrison-Albany Corridor Strategic Plan, including future developments such as the Project, the pedestrian and bicyclist environments will be improved within the area. The Strategic Plan intends to create ample room on sidewalks with a single row of trees along Shawmut Avenue, East

80 East Berkeley Street Boston, Massachusetts

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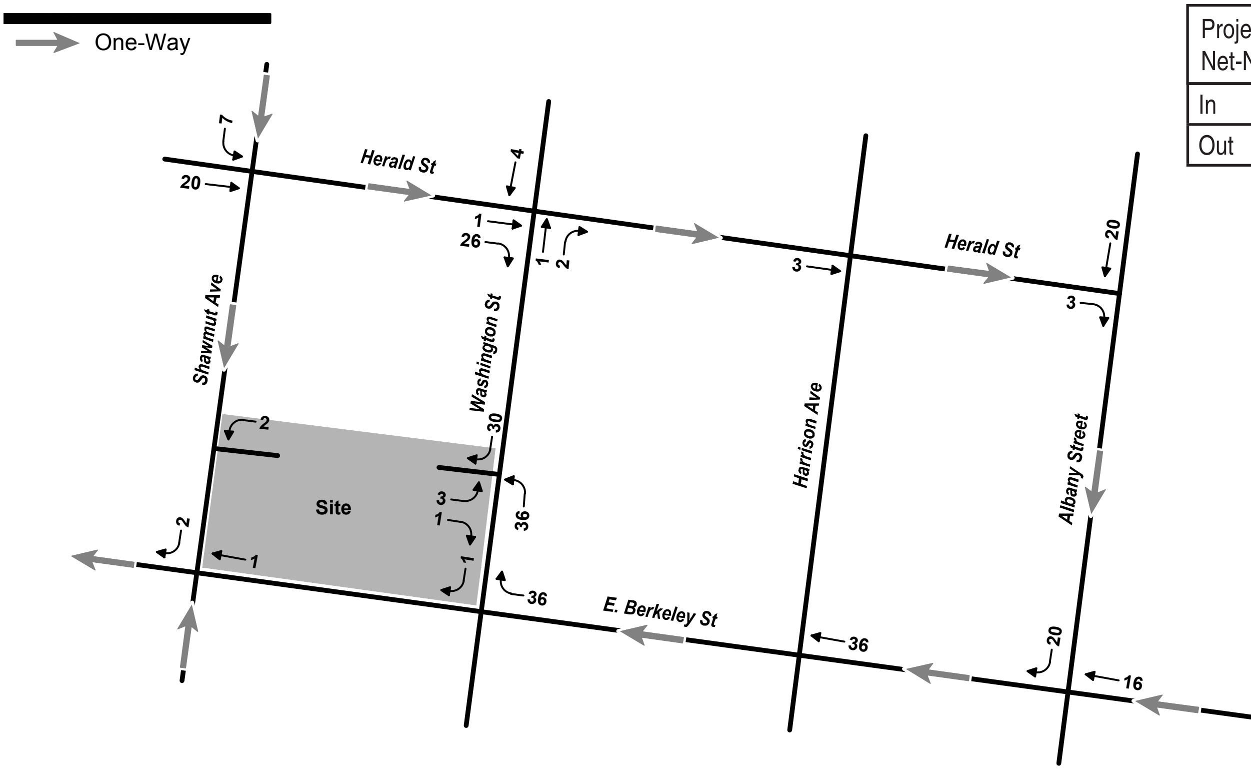
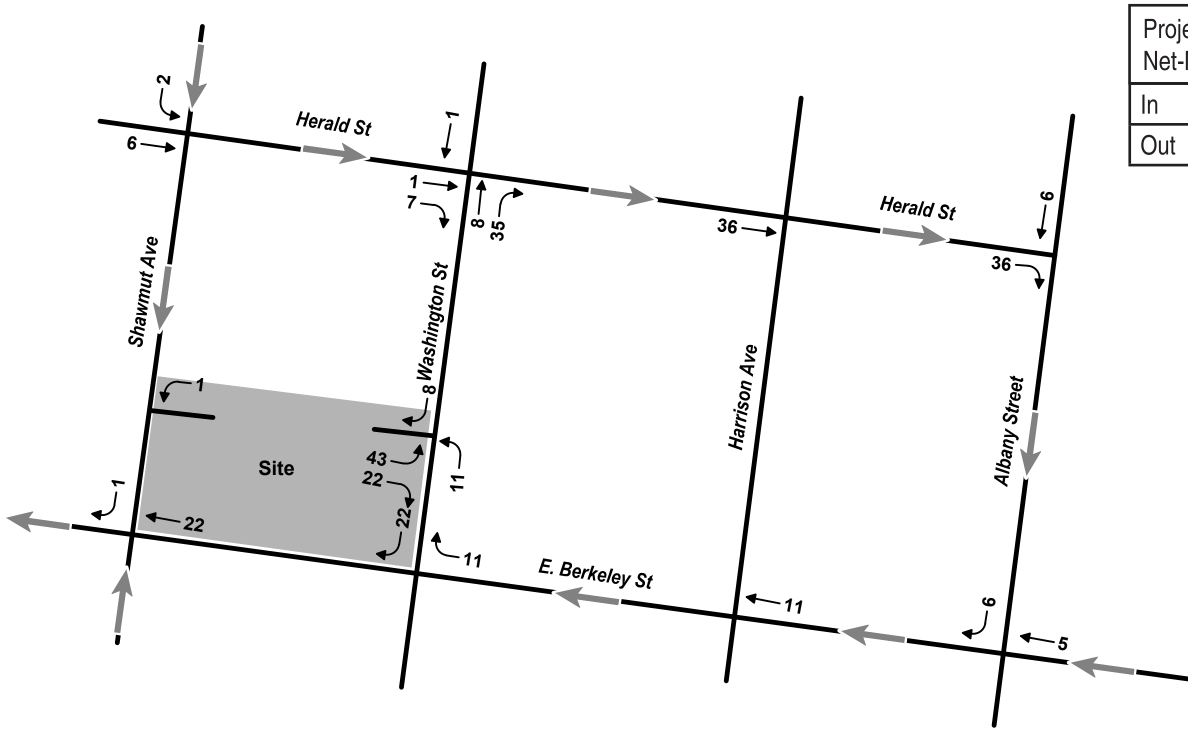
Figure 2-12

Trip Distribution



Project Generated Net-New Trips	
In	66
Out	6

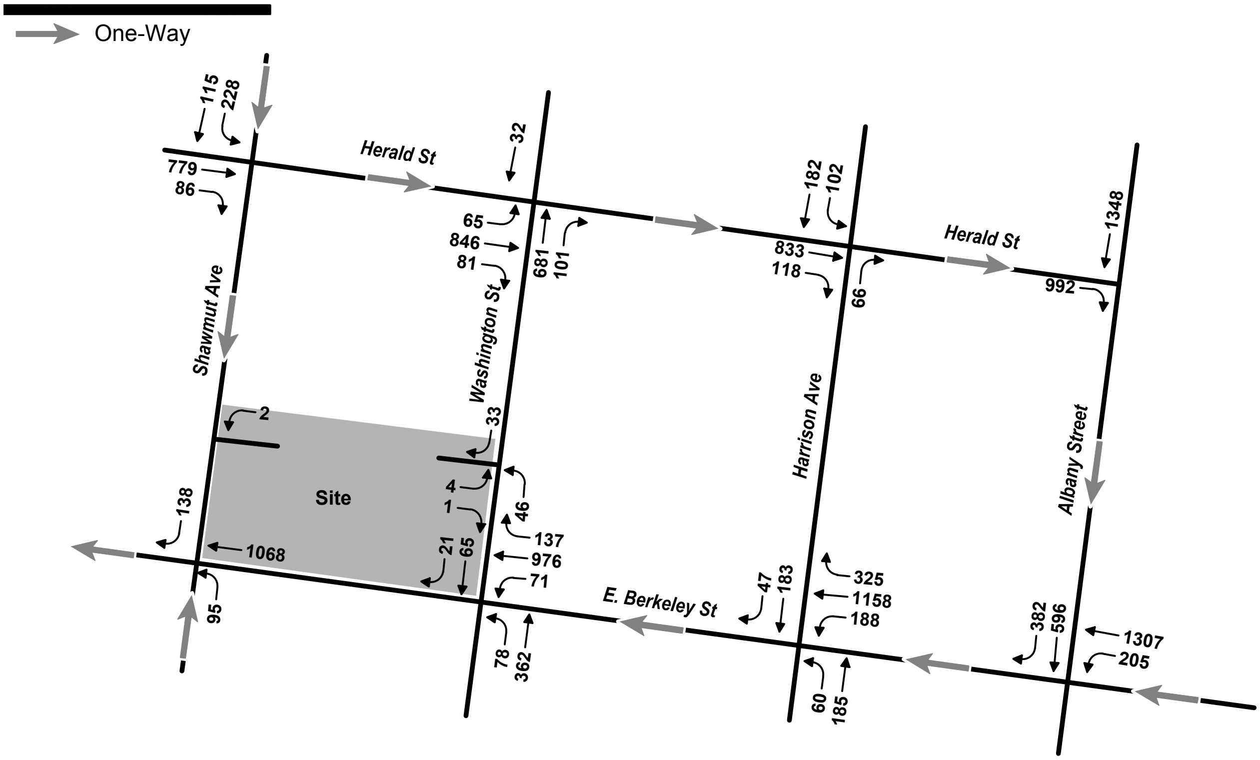
Morning Peak Hour



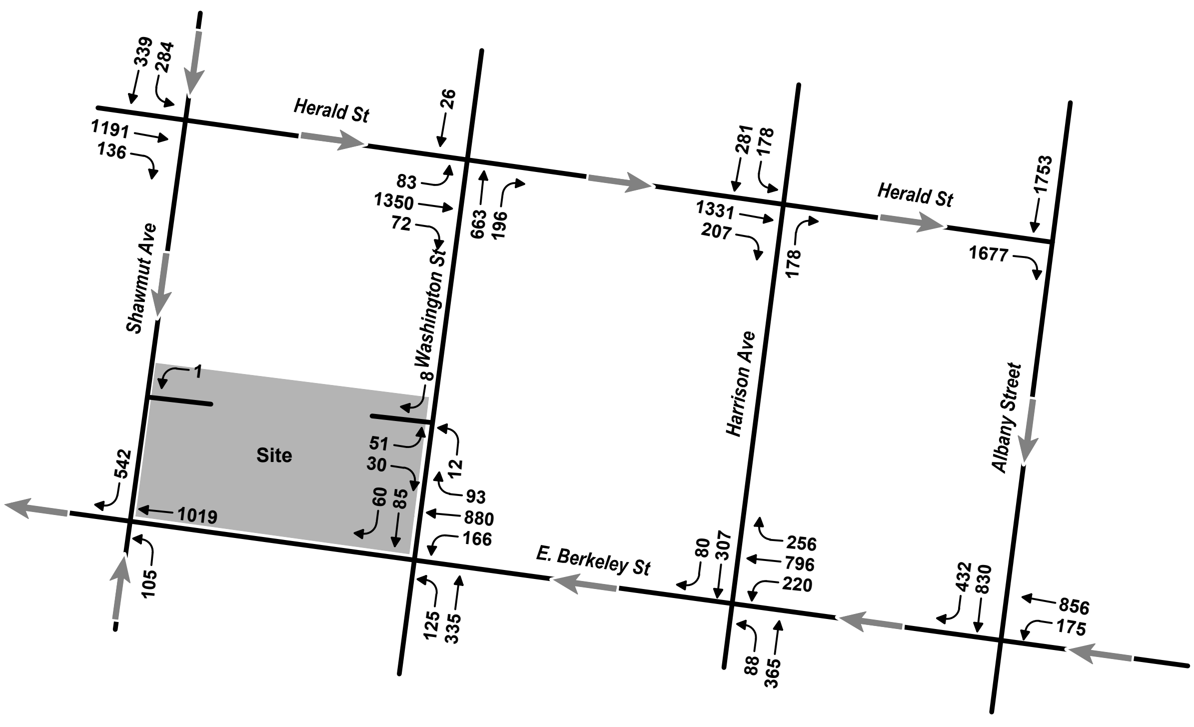
Project Generated Net-New Trips	
In	19
Out	66

Evening Peak Hour

Figure 2-13
Project Generated
AM/PM Peak Hour Traffic Volumes



Morning Peak Hour



Evening Peak Hour

Figure 2-14

2018 Build Conditions
AM/PM Peak Hour Traffic Volumes

Berkeley Street and Washington Street and envisions a pedestrian-friendly public realm in the EDA North that includes additional pathways throughout the existing larger blocks to enhance transportation access and circulation.

The Project's accessway provides one of these pathways by connecting Shawmut Avenue and Washington Street at the north side of the site. The accessway will provide both service vehicle access and a safe pedestrian and bicyclist way between the two corridors.

2.3.2.4 Transportation Demand Management

Consistent with the City's goals to reduce auto-dependency, the Project will proactively incorporate TDM measures to encourage alternative modes of transportation.

A description of the TDM elements is presented in this section along with information on how those elements aid Project users – notably employees, visitors, and shoppers/restaurant patrons getting to and from the Project. Measures being considered as part of the Project include:

- Secure bicycle storage, showers, and changing facilities will be provided for building tenants and their employees and visitors.
- Securely mounted bicycle racks featuring current designs to properly secure bikes of all kinds will be provided for the public at select, highly-visible locations within the site. .
- A space for a car-sharing service, such as ZipCar®, will be provided within the new garage, as will space for an EV charging station, and preferential parking for alternative-fueled and/or hybrid vehicles.
- Office and retail tenants will be encouraged to provide employer subsidies and direct deposit payment to employees who purchase monthly or multiple trip transit passes and a guaranteed ride home program, in conjunction with MassRIDES, to eliminate an often-cited deterrent to carpool and vanpool participation.
- An on-site Transportation Coordinator will be designated to oversee parking and loading operations as well as to promote alternative transportation measures. The person assigned to this role will coordinate with office and retail tenants to help promote a reduced reliance on single-occupant motor-vehicle travel to the Project site. To that end, the TDM measures identified in the following sections will be implemented under the direction and supervision of this person. The duties of the transportation coordinator may include, but not be limited to:
  - Acting as a liaison with office and retail employers and MassRIDES.
  - Assisting office and retail employees and residents with ride matching and transportation planning.
  - Disseminating information on alternate modes of transportation and developing transportation related marketing and education materials,

including a website. This includes posting relevant public transit information potentially at an outdoor kiosk included as part of the Project. This would include, but is not limited to, providing transit information such as maps and schedules to new residents and tenants in an orientation package.

- Developing and maintaining information pertaining to pedestrian and cycling access to and from the Project site.
- Encouraging tenants to provide on-site transit pass sales to employees.

As noted above, TDM measures will be formalized in the TAPA to be executed with BTD.

2.4 Traffic Operations Analysis

Consistent with BTD's guidelines, *Synchro 6* software was used to measure LOS operations at the study area intersections. LOS is a qualitative measure of control delay at an intersection providing an index to the operational qualities of a roadway or intersection.

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

Table 2-8 below presents the level of service threshold criteria as defined in the 2010 Highway Capacity Manual ("HCM").

Table 2-8 Level of Service Criteria

Level of Service	Un-signalized Intersection Control Delay (sec/veh)	Signalized Intersection Control Delay (sec/veh)
LOS A	0-10	≤ 10
LOS B	> 10-15	> 10-20
LOS C	> 15-25	> 20-35
LOS D	> 25-35	> 35-55
LOS E	> 35-50	> 55-80
LOS F	> 50	> 80

Source: 2010 HCM

Adjustments were made to the Synchro model to include characteristics of each intersection, such as geometry, signal timings, heavy vehicles, bus operations, parking activity, and pedestrian crossings. The LOS results of the analyses are summarized for each intersection in Table 2-9 for the Existing, No-Build, and Build conditions. Detailed results including delay by movement, queuing and volume-to-capacity ratio are presented below in Tables 2-10 through 2-15 and the detailed Synchro results are presented in Appendix C.

The traffic model includes a conservative approach to future traffic trends by forecasting an increase in background traffic and assigning specific known development projects to the study area as required by the BTD. The model also includes the infrastructure and roadway improvements as planned in the Harrison-Albany Corridor Strategic Plan as discussed previously. Incorporating these changes to the roadways generates differences in level of service results from the Existing Condition to the No-Build Condition that would not be seen due to vehicle volume increases alone.

The Build Condition includes removal of the existing site access driveways and construction of a garage entrance at the northeast corner of the site with access to and from Washington Street. Additionally, off street loading and service access will be from Washington Street.

Level of service analyses for the 2018 Build Condition, as shown in Table 2-9, indicate that the redevelopment of the Project site and its associated traffic cause no changes in overall LOS at the signalized intersections analyzed. As can be expected in an urban area, several of the study area intersections operate with long delays either on some of their individual approaches or for the entire intersection, with or without the Project.

The accessway entrance in conjunction with the garage entry/exit at Washington Street and the accessway egress at Shawmut Avenue are presented in the Build Condition. The two unsignalized intersections operate at acceptable levels of service during both peak hours. The accessway egress at Shawmut Avenue operates at LOS A and LOS B during the morning and evening peak hours, respectively. The accessway and garage entry/exit at Washington Street operates at LOS C during both peak hours. Any queue that forms due to the delay on the main corridor will be processed within the site.

Table 2-9 Intersection Level of Service Summary

	AM Peak Hour Operations			PM Peak Hour Operations		
Intersection	Existing	No-Build	Build	Existing	No-Build	Build
Herald Street / Shawmut Avenue	B	B	B	B	B	B
Herald Street / Washington Street	C	C	C	C	B	B
Herald Street / Harrison Avenue	B	B	B	B	B	B
Herald Street / Albany Street	B	B	B	E	F	F
East Berkeley Street / Shawmut Avenue	B	B	B	D	D	D
East Berkeley Street / Washington Street	B	C	C	C	C	C
East Berkeley Street / Harrison Avenue	C	C	C	D	D	D
East Berkeley Street / Albany Street	C	C	C	C	C	C
Shawmut Avenue / Accessway	-	-	A	-	-	B
Washington Street / Accessway and Garage Entry/Exit	-	-	C	-	-	C

Table 2-10 Existing Condition (2013) Intersection LOS Summary – AM Peak Hour

Intersection	LOS	Delay (sec.)	V/C Ratio	95th % Queue (feet)
Signalized Intersections				
Herald Street at Shawmut Avenue	**B**	**15.2**	**0.31**	
EB Herald Thru/Right	A	4.0	0.29	122
SB Shawmut Left	D	41.8	0.09	54
SB Shawmut Thru/Left	D	44.5	0.48	76
Herald Street at Washington Street	**C**	**22.5**	**0.49**	
EB Herald Thru/Left	C	24.9	0.50	250
NB Washington Thru	C	20.1	0.49	202
NB Washington Right	B	15.0	0.04	19
SB Washington Thru	B	15.9	0.11	23
Herald Street at Harrison Avenue	**B**	**11.5**	**0.38**	
EB Herald Thru/Right	A	0.9	0.34	4
NB Harrison Right	D	42.5	0.03	0
SB Harrison Left	D	38.7	0.50	107
SB Harrison Thru	C	33.1	0.31	64

Table 2-10 Existing Condition (2013) Intersection LOS Summary – AM Peak Hour (Continued)

Intersection	LOS	Delay (sec.)	V/C Ratio	95th % Queue (feet)
Signalized Intersections				
Herald Street at Albany Street	**B**	**19.1**	**0.69**	
EB Herald Right	C	22.9	0.85	349
SB Albany Thru	B	16.2	0.57	290
E. Berkeley Street at Shawmut Avenue	**B**	**10.4**	**0.30**	
WB E. Berkeley Thru	A	1.0	0.31	24
NB Shawmut Left	D	43.9	0.05	0
SB Shawmut Right	D	45.0	0.16	27
E. Berkeley Street at Washington Street	**B**	**16.8**	**0.68**	
WB E. Berkeley Left/Thru/Right	B	13.8	0.78	m96
NB Washington Left	B	19.6	0.19	76
NB Washington Thru	C	25.4	0.55	300
SB Washington Thru	B	18.2	0.08	31
E. Berkeley Street at Harrison Avenue	**C**	**26.6**	**0.77**	
WB E. Berkeley Left/Thru/Right	B	19.5	0.71	#424
NB Harrison Thru/Left	E	63.8	0.90	218
SB Harrison Thru/Right	C	30.5	0.29	67
E. Berkeley Street at Albany Street	**C**	**26.0**	**0.63**	
WB E. Berkeley Thru/Left	C	28.7	0.75	381
SB Albany Thru/Right	C	21.3	0.51	150

Table 2-11 Existing Condition (2013) Intersection LOS Summary – PM Peak Hour

Intersection	LOS	Delay (sec.)	V/C Ratio	95th % Queue (feet)
Signalized Intersections				
Herald Street at Shawmut Avenue	**B**	**19.3**	**0.51**	
EB Herald Thru/Right	A	8.6	0.45	268
SB Shawmut Left	D	35.1	0.21	51
SB Shawmut Thru/Left	D	42.4	0.71	156

Table 2-11 Existing Condition (2013) Intersection LOS Summary – PM Peak Hour (Continued)

Intersection	LOS	Delay (sec.)	V/C Ratio	95th % Queue (feet)
Signalized Intersections				
Herald Street at Washington Street	**C**	**33.3**	**0.60**	
EB Herald Thru/Left	D	41.8	0.96	#452
NB Washington Thru	B	13.6	0.35	141
NB Washington Right	B	11.8	0.13	53
SB Washington Thru	B	11.2	0.06	21
Herald Street at Harrison Avenue	**B**	**14.1**	**0.59**	
EB Herald Thru/Right	A	2.7	0.56	m29
NB Harrison Right	D	43.7	0.12	0
SB Harrison Left	D	45.1	0.68	#197
SB Harrison Thru	C	34.0	0.37	96
Herald Street at Albany Street	**E**	**56.3**	**0.95**	
EB Herald Right	F	>80	>1.0	#674
SB Albany Thru	C	24.8	0.75	354
E. Berkeley Street at Shawmut Avenue	**D**	**41.0**	**0.69**	
WB E. Berkeley Thru	A	8.9	0.54	m106
NB Shawmut Left	C	32.6	0.04	0
SB Shawmut Right	F	>80	>1.0	#531
E. Berkeley Street at Washington Street	**C**	**22.2**	**0.67**	
WB E. Berkeley Left/Thru/Right	C	21.7	0.87	m152
NB Washington Left	C	22.5	0.32	121
NB Washington Thru	C	24.0	0.46	286
SB Washington Thru	B	18.3	0.07	32
E. Berkeley Street at Harrison Avenue	**D**	**37.8**	**0.78**	
WB E. Berkeley Left/Thru/Right	C	26.3	0.60	349
NB Harrison Thru/Left	E	79.1	1.0	#418
SB Harrison Thru/Right	C	27.2	0.34	132
E. Berkeley Street at Albany Street	**C**	**25.3**	**0.51**	
WB E. Berkeley Thru/Left	C	30.7	0.62	245
SB Albany Thru/Right	B	19.7	0.44	314

Table 2-12 No Build Condition (2018) Intersection LOS Summary – AM Peak Hour

Intersection	LOS	Delay (sec.)	V/C Ratio	95th % Queue (feet)
Signalized Intersections				
Herald Street at Shawmut Avenue	**B**	**15.3**	**0.33**	
EB Herald Thru/Right	A	4.2	0.31	135
SB Shawmut Left	D	41.6	0.09	56
SB Shawmut Thru/Left	D	44.5	0.51	81
Herald Street at Washington Street	**C**	**31.5**	**0.79**	
EB Herald Thru/Left	D	41.4	0.77	304
NB Washington Thru	C	22.7	0.80	523
NB Washington Right	A	9.2	0.14	48
SB Washington Left/Thru	A	8.3	0.04	16
Herald Street at Harrison Avenue	**B**	**18.0**	**0.48**	
EB Herald Thru/Right	B	10.8	0.42	117
NB Harrison Right	D	42.1	0.06	0
SB Harrison Left	C	30.1	0.19	44
SB Harrison Thru	C	32.8	0.61	161
Herald Street at Albany Street	**B**	**19.0**	**0.74**	
EB Herald Right	B	13.1	0.78	385
SB Albany Thru	C	23.7	0.71	316
E. Berkeley Street at Shawmut Avenue	**B**	**10.1**	**0.32**	
WB E. Berkeley Thru	A	0.9	0.34	m26
NB Shawmut Left	D	43.3	0.05	0
SB Shawmut Right	D	44.4	0.17	36
E. Berkeley Street at Washington Street	**C**	**21.9**	**0.69**	
WB E. Berkeley Left/Thru/Right	C	22.9	0.88	m146
NB Washington Left	B	16.6	0.18	69
NB Washington Thru	C	21.3	0.51	278
SB Washington Thru/Right	B	15.7	0.12	60
E. Berkeley Street at Harrison Avenue	**C**	**29.8**	**0.84**	
WB E. Berkeley Left/Thru/Right	C	23.4	0.80	#500
NB Harrison Thru/Left	E	66.3	0.93	#264
SB Harrison Thru/ Right	C	29.4	0.33	87

Table 2-12 No Build Condition (2018) Intersection LOS Summary – AM Peak Hour (Continued)

Intersection	LOS	Delay (sec.)	V/C Ratio	95th % Queue (feet)
Signalized Intersections				
E. Berkeley Street at Albany Street	**C**	**27.5**	**0.71**	
WB E. Berkeley Thru/Left	C	28.8	0.77	389
SB Albany Thru/Right	C	25.6	0.65	279

Table 2-13 No-Build Condition (2018) Intersection LOS Summary – PM Peak Hour

Intersection	LOS	Delay (sec.)	V/C Ratio	95th % Queue (feet)
Signalized Intersections				
Herald Street at Shawmut Avenue	**B**	**19.4**	**0.54**	
EB Herald Thru/Right	A	9.4	0.49	300
SB Shawmut Left	C	34.5	0.23	52
SB Shawmut Thru/Left	D	41.5	0.70	161
Herald Street at Washington Street	**B**	**19.1**	**0.68**	
EB Herald Thru/Left	B	14.2	0.70	76
NB Washington Thru	C	29.4	0.64	258
NB Washington Right	C	25.7	0.35	125
SB Washington Thru	C	21.0	0.05	29
Herald Street at Harrison Avenue	**B**	**18.8**	**0.70**	
EB Herald Thru/Right	A	5.6	0.63	439
NB Harrison Right	D	42.1	0.23	0
SB Harrison Left	D	35.0	0.32	81
SB Harrison Thru	E	56.5	0.88	#308
Herald Street at Albany Street	**F**	**>80.0**	**>1.0**	
EB Herald Right	F	>80.0	>1.0	#767
SB Albany Thru	C	30.4	0.88	456
E. Berkeley Street at Shawmut Avenue	**D**	**49.7**	**0.76**	
WB E. Berkeley Thru	A	8.2	0.60	m81
NB Shawmut Left	C	32.6	0.04	0
SB Shawmut Right	F	>80.0	>1.0	#591

Table 2-13 No-Build Condition (2018) Intersection LOS Summary – PM Peak Hour (Continued)

Intersection	LOS	Delay (sec.)	V/C Ratio	95th % Queue (feet)
Signalized Intersections				
E. Berkeley Street at Washington Street	**C**	**24.2**	**0.68**	
WB E. Berkeley Left/Thru/Right	C	26.1	0.94	m151
NB Washington Left	C	20.5	0.33	120
NB Washington Thru	C	21.5	0.44	277
SB Washington Thru/Right	B	17.3	0.16	86
E. Berkeley Street at Harrison Avenue	**D**	**42.5**	**0.92**	
WB E. Berkeley Left/Thru/Right	D	40.1	0.84	#516
NB Harrison Thru/Left	E	65.5	0.98	#543
SB Harrison Thru/Right	C	21.2	0.30	130
E. Berkeley Street at Albany Street	**C**	**26.0**	**0.61**	
WB E. Berkeley Thru/Left	C	30.7	0.65	271
SB Albany Thru/Right	C	21.8	0.58	371

Table 2-14 Build Condition (2018) Intersection LOS Summary – AM Peak Hour

Intersection	LOS	Delay (sec.)	V/C Ratio	95th % Queue (feet)
Signalized Intersections				
Herald Street at Shawmut Avenue	**B**	**15.3**	**0.34**	
EB Herald Thru/Right	A	4.3	0.31	138
SB Shawmut Left	D	41.6	0.09	57
SB Shawmut Thru/Left	D	44.6	0.51	81
Herald Street at Washington Street	**C**	**32.0**	**0.80**	
EB Herald Thru/Left	D	42.4	0.80	311
NB Washington Thru	C	22.7	0.81	525
NB Washington Right	A	9.2	0.15	50
SB Washington Left/Thru	A	8.4	0.06	19
Herald Street at Harrison Avenue	**B**	**18.5**	**0.49**	
EB Herald Thru/Right	B	11.6	0.42	123
NB Harrison Right	D	42.1	0.06	0
SB Harrison Left	C	30.1	0.19	44
SB Harrison Thru	C	32.8	0.61	161

Table 2-14 Build Condition (2018) Intersection LOS Summary – AM Peak Hour (Continued)

Intersection	LOS	Delay (sec.)	V/C Ratio	95th % Queue (feet)
Signalized Intersections				
Herald Street at Albany Street	**B**	**19.3**	**0.75**	
EB Herald Right	B	13.4	0.78	387
SB Albany Thru	C	23.9	0.72	321
E. Berkeley Street at Shawmut Avenue	**B**	**10.2**	**0.32**	
WB E. Berkeley Thru	A	0.9	0.34	m26
NB Shawmut Left	D	43.7	0.05	0
SB Shawmut Right	D	45.0	0.17	23
E. Berkeley Street at Washington Street	**C**	**22.8**	**0.71**	
WB E. Berkeley Left/Thru/Right	C	23.9	0.90	m156
NB Washington Left	B	17.1	0.18	67
NB Washington Thru	C	22.1	0.52	280
SB Washington Thru/Right	B	16.2	0.12	61
E. Berkeley Street at Harrison Avenue	**C**	**30.2**	**0.86**	
WB E. Berkeley Left/Thru/Right	C	24.0	0.82	#518
NB Harrison Thru/Left	E	66.3	0.93	#264
SB Harrison Thru/ Right	C	29.4	0.33	87
E. Berkeley Street at Albany Street	**C**	**27.7**	**0.72**	
WB E. Berkeley Thru/Left	C	28.6	0.77	389
SB Albany Thru/Right	C	26.5	0.67	300
Shawmut Avenue at Accessway	(unsignalized)			
WB Accessway Left	A	10.0	0.0	0
Washington Street at Accessway and Garage Entry/Exit	(unsignalized)			
EB Garage Entry/Exit Left/Right	C	21.6	0.03	2

Table 2-15 Build Condition (2018) Intersection LOS Summary – PM Peak Hour

Intersection	LOS	Delay (sec.)	V/C Ratio	95th % Queue (feet)
Signalized Intersections				
Herald Street at Shawmut Avenue	**B**	**19.5**	**0.54**	
EB Herald Thru/Right	A	9.4	0.49	299
SB Shawmut Left	C	34.5	0.23	52
SB Shawmut Thru/Left	D	41.5	0.70	161
Herald Street at Washington Street	**B**	**19.5**	**0.68**	
EB Herald Thru/Left	B	14.2	0.70	76
NB Washington Thru	C	29.6	0.65	263
NB Washington Right	C	28.0	0.46	163
SB Washington Left/Thru	C	21.0	0.05	31
Herald Street at Harrison Avenue	**B**	**19.0**	**0.71**	
EB Herald Thru/Right	A	6.2	0.64	455
NB Harrison Right	D	42.1	0.23	0
SB Harrison Left	D	35.0	0.32	81
SB Harrison Thru	E	56.5	0.88	#308
Herald Street at Albany Street	**F**	**>80.0**	**>1.0**	
EB Herald Right	F	>80.0	>1.0	#792
SB Albany Thru	C	30.6	0.89	458
E. Berkeley Street at Shawmut Avenue	**D**	**48.6**	**0.76**	
WB E. Berkeley Thru	A	8.7	0.61	m97
NB Shawmut Left	C	32.6	0.04	0
SB Shawmut Right	F	>80.0	>1.0	#587
E. Berkeley Street at Washington Street	**C**	**24.6**	**0.68**	
WB E. Berkeley Left/Thru/Right	C	26.6	0.94	m160
NB Washington Left	C	21.1	0.34	121
NB Washington Thru	C	21.8	0.44	277
SB Washington Thru	B	18.2	0.21	100
E. Berkeley Street at Harrison Avenue	**D**	**42.7**	**0.92**	
WB E. Berkeley Left/Thru/Right	D	40.6	0.85	#523
NB Harrison Thru/Left	E	65.5	0.98	#543
SB Harrison Thru/ Right	C	21.2	0.30	130

Table 2-15 Build Condition (2018) Intersection LOS Summary – PM Peak Hour (Continued)

Intersection	LOS	Delay (sec.)	V/C Ratio	95th % Queue (feet)
Signalized Intersections				
E. Berkeley Street at Albany Street	**C**	**26.0**	**0.61**	
WB E. Berkeley Thru/Left	C	30.8	0.65	272
SB Albany Thru/Right	C	21.9	0.58	372
Shawmut Avenue at Accessway	(unsignalized)			
WB Accessway Left/Right	B	11.0	0.00	0
Washington Street at Accessway and Garage Entry/Exit	(unsignalized)			
EB Garage Exit/Entry Left/Right	C	23.8	0.32	33

Section 3.0

Environmental Protection Component

3.0 ENVIRONMENTAL REVIEW COMPONENT

3.1 Wind

A pedestrian wind study was conducted for the Project by Rowan Williams Davies & Irwin Inc. (RWDI). The objective of the study was to assess the effect of the Project on local wind conditions in pedestrian areas around the site. The No Build (present condition including approved, but not yet built projects in the area) and Build including the Project in the presence of all existing and approved surroundings). construction conditions were tested by placing specially designed wind sensors at 71 locations, chosen in consultation with the BRA, surrounding the Project site on a scaled model of the Project area as described more fully in Section 3.1.3. The wind analysis shows that the overall wind conditions expected in the surrounding area are largely similar in the No Build and Build Conditions. A canopy and other mitigation measures are being considered and will be assessed as design continues to minimize any Project impacts.

3.1.1 Overview

Major buildings, especially those that protrude above their surroundings, often cause increased local wind speeds at the pedestrian level. Typically, wind speeds increase with elevation above the ground surface, and taller buildings intercept these faster winds and deflect them down to the pedestrian level. The funneling of wind through gaps between buildings and the acceleration of wind around corners of buildings may also cause increases in wind speed. Conversely, if a building is surrounded by others of equivalent height, it may be protected from the prevailing upper level winds, resulting in no significant changes to the local pedestrian level wind environment. The most effective way to assess potential pedestrian level wind impacts around a proposed new building is to conduct scale model tests in a wind tunnel.

The consideration of wind in planning outdoor activity areas is important since high winds in an area tend to deter pedestrian use. For example, winds should be light or relatively light in areas where people would be sitting, such as outdoor cafes or playgrounds. For bus stops and other locations where people would be standing, somewhat higher winds can be tolerated. For frequently used sidewalks, where people are primarily walking, stronger winds are acceptable. For infrequently used areas, the wind comfort criteria can be relaxed even further. The actual effects of wind can range from pedestrian inconvenience, due to the blowing of dust and other loose material in a moderate breeze, to severe difficulty with walking due to the wind forces on the pedestrian.

3.1.2 Methodology

The study involved wind simulations on a 1:400 scale model of the Project and surroundings. These simulations were conducted in RWDI's boundary-layer wind tunnel at Guelph, Ontario, for the purpose of quantifying local wind speed conditions and comparing to appropriate criteria for gauging wind comfort in pedestrian areas. The model was constructed based on information provided by the Proponent and its architect Elkus Manfredi. The criteria recommended by the BRA were used in this study. The following section includes a discussion of the methods and the results of the wind tunnel simulations. Information concerning the site and surroundings was derived from information provided by the Proponent, Elkus Mandfredi, and the BRA . The following Conditions were simulated:

- No Build Condition: existing on-site buildings, in the presence of existing and approved surroundings; and
- Build Condition: the proposed Project, in the presence of existing and approved surroundings.

As shown in Figures 3.1-1 and 3.1-2, the wind tunnel model included the Project and relevant surrounding buildings and topography within a 1,600 foot radius of the study 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 71 specially 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 five feet above grade in pedestrian areas throughout the study site. The locations of the 71 wind speed sensors were determined in consultation with the BRA. 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 results were then combined with long term meteorological data, recorded during the years 1981 to 2011 at Logan International Airport, in order 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 to 3.1-5 present "wind roses," summarizing the annual and seasonal wind climates in the Boston area, based on the data from Logan International Airport. The wind roses, in Figures 3.1-3 and 3.1-4, are based on all observed wind readings for the given season. The left-hand side wind rose in Figure 3.1-3, for example, summarizes the spring (March, April, and May) wind data. In general, the prevailing winds are from the west northwest, northwest, west and southwest. In the case of strong winds, however, the most common wind direction is northwest and west. On an annual basis (Figure 3.1-5) the most common wind directions are those between southwest and northwest. These are also the dominant directions for strong winds.

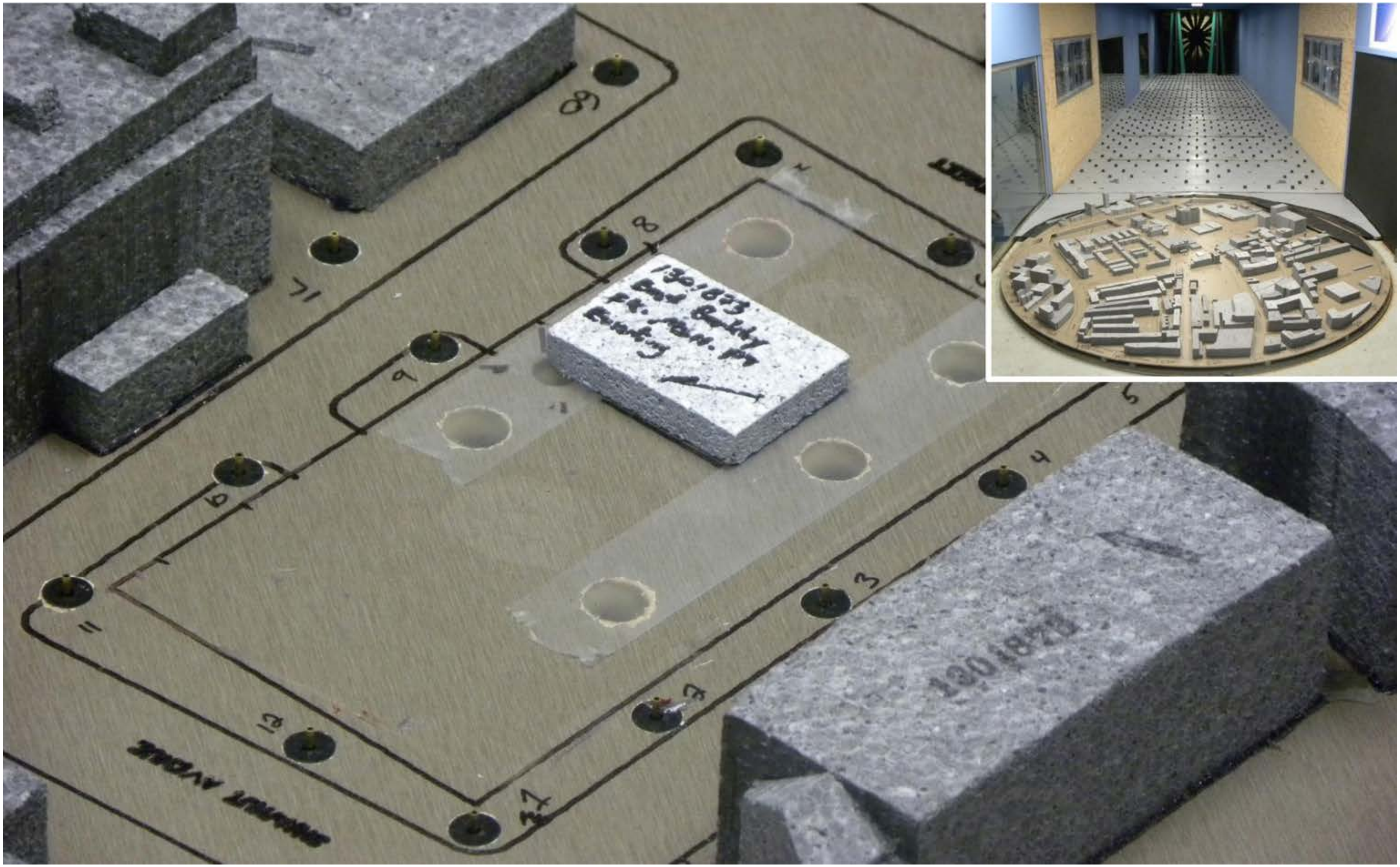


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Figure 3.1-1

Wind Tunnel Study Model: No Build

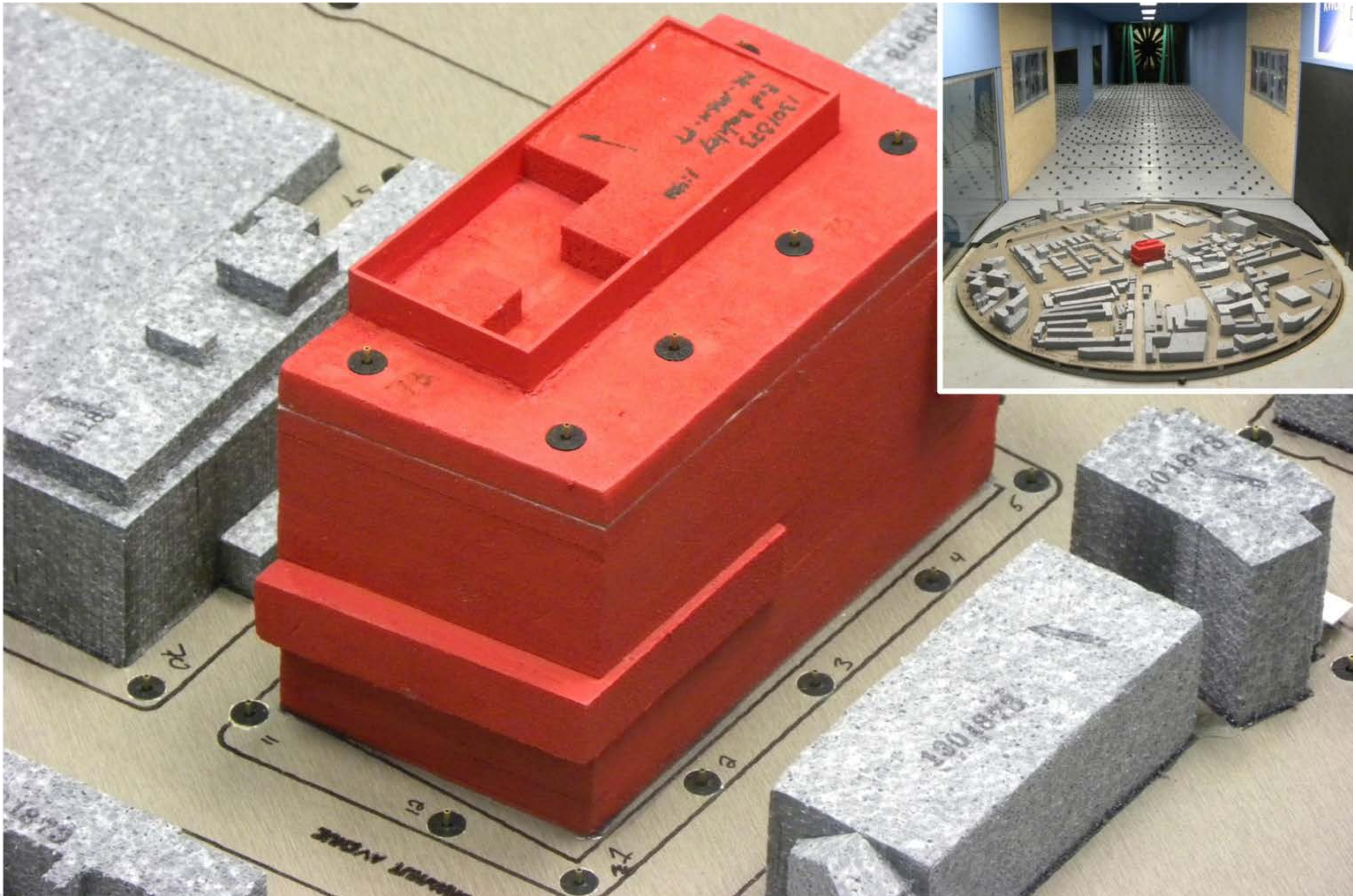
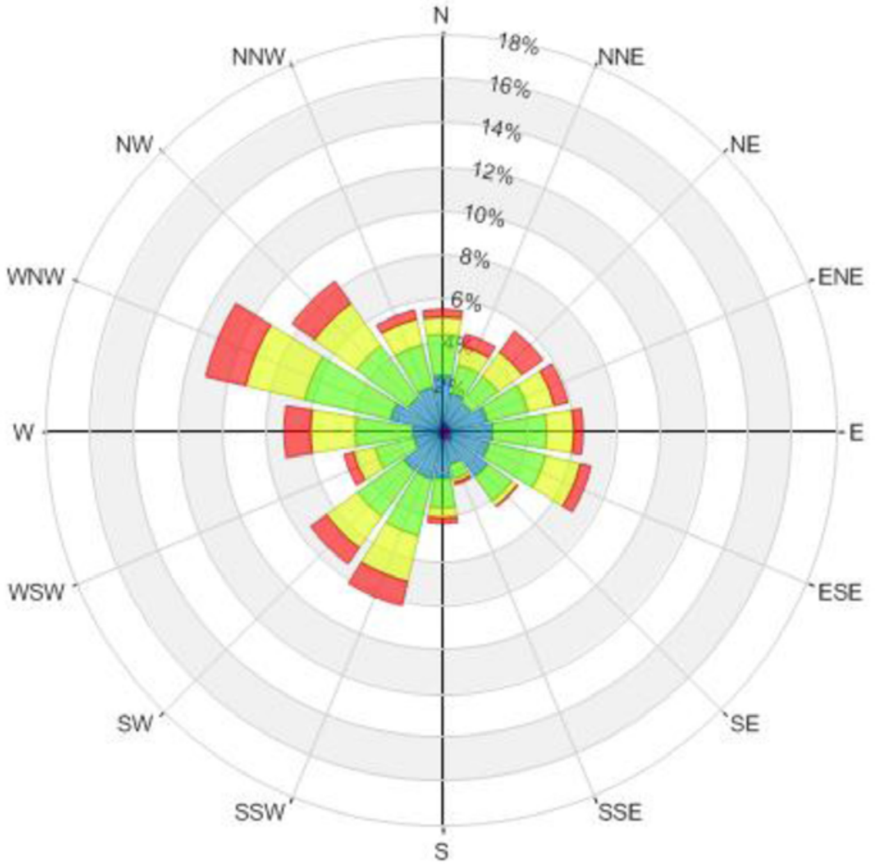
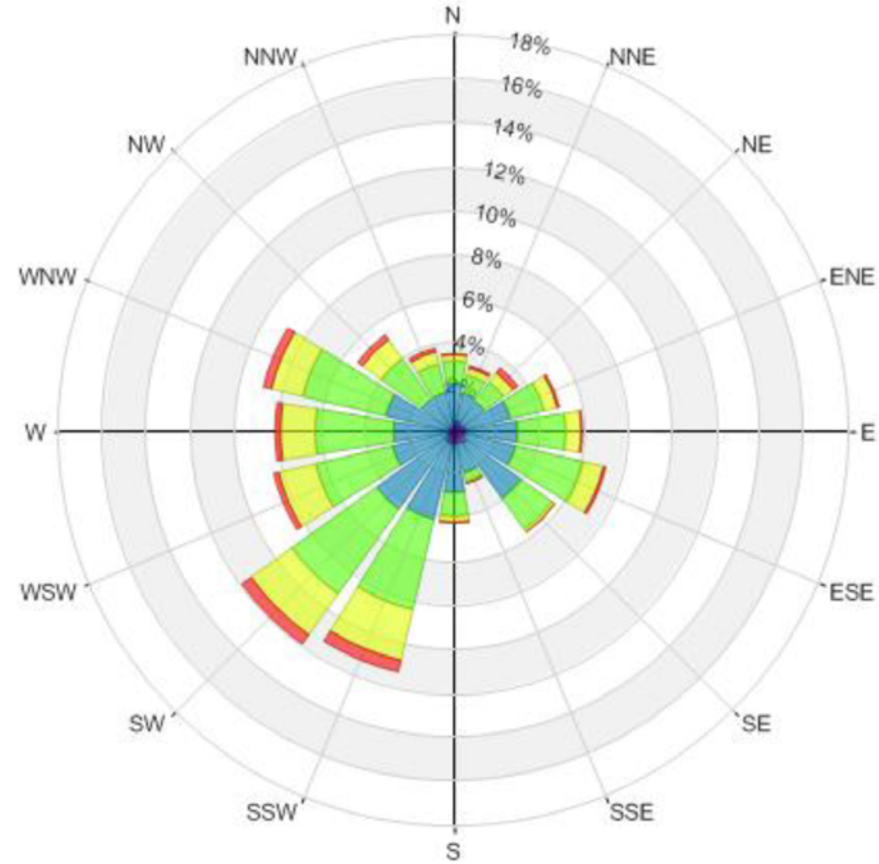


Figure 3.1-2

Wind Tunnel Study Model: Build



Spring
(March - May)



Summer
(June - August)

Wind Speed (mph)	Probability (%) Spring	Summer
Calm	1.7	1.8
1-5	5.2	7.1
6-10	27.0	36.4
11-15	33.7	36.7
16-20	21.2	15.0
>20	11.2	3.0

Figure 3.1-3

Directional Distribution (%) of Winds (Blowing From) Boston Logan International Airport (1981 – 2011)

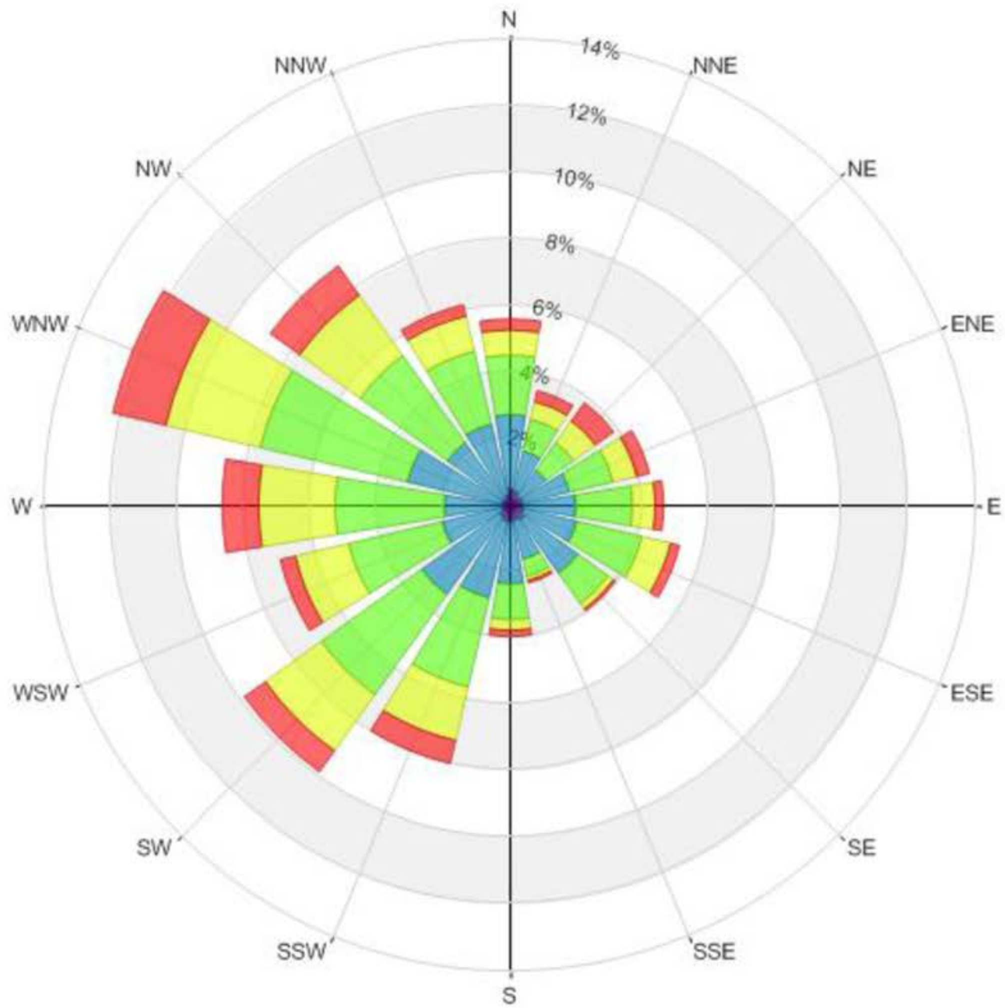
Fall
(September - November)

Winter
(December - February)

Wind Speed (mph)	Probability (%) Fall	Probability (%) Winter
Calm	1.9	1.5
1-5	6.7	5.1
6-10	32.2	25.8
11-15	34.4	32.0
16-20	17.4	22.2
>20	7.3	13.4

Figure 3.1-4

Directional Distribution (%) of Winds (Blowing From) Boston Logan International Airport (1981 – 2011)



Annual Winds

Wind Speed (mph)	Probability (%)
Calm	1.7
1-5	6.0
6-10	30.3
11-15	34.2
16-20	18.9
>20	8.7

Figure 3.1-5

Directional Distribution (%) of Winds (Blowing From) Boston Logan International Airport (1981 – 2011)

This study involved state of the art measurement and analysis techniques to predict wind conditions at the study site. Wind speeds and directions collected at Logan International Airport were adjusted for the Project site, based on a well-established analytical procedure that considered the topographic and building features of surrounding areas around both the airport and the Back Bay. Nevertheless, some uncertainty remains in predicting wind comfort, and this must be kept in mind. For example, the sensation of comfort among individuals can be quite variable. Variations in age, individual health, clothing, and other human factors can change a particular response of an individual. The comfort limits used in this section represent an average for the total population. Also, unforeseen changes in the Project area, such as the construction or removal of buildings, can affect the conditions experienced at the site. Finally, the prediction of wind speeds is necessarily a statistical procedure. The wind speeds reported are for the frequency of occurrence stated (one percent of the time). Higher wind speeds will occur, but on a less frequent basis and the other 99% of the time, the winds will be lower than the speeds stated.

3.1.3 Pedestrian Wind Comfort Criteria

The BRA has adopted two standards for assessing the relative wind comfort of pedestrians. First, the BRA 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 miles per hour (mph) should not be exceeded more than one percent of the time. The second set of criteria used by the BRA 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 one percent of the time (i.e., the 99-percentile mean wind speed). They are shown in Table 3.1-1 below.

Table 3.1-1 Boston Redevelopment Authority 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.

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

3.1.4 Test Results

Appendix D presents the mean and effective gust speeds for each season as well as annually. Figures 3.1-6 through 3.1-9, graphically depict the gust wind and mean wind conditions at each wind measurement location based on the annual winds for each of the Conditions tested. Figure 3.1-10, shows the change in comfort categories between the No Build and Build Conditions.

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 summary of pedestrian wind comfort is based on the annual winds for each configuration tested, except where noted below in the text.

In general, wind conditions suitable for walking are appropriate for sidewalks, and lower wind speeds conducive to standing are preferred at building entrances.

3.1.4.1 No Build Configuration

As shown in Figure 3.1-8, under the No-Build Configuration, both annually and seasonally, mean wind speeds are predicted to be comfortable for walking or better at all locations.

In addition, the effective gust velocity criterion was met seasonally and annually at all locations.

3.1.4.2 Build Configuration

On-Site Building Entrances and Sidewalks

Under the Build Configuration, most on-site locations are predicted to have conditions suitable for walking or better on an annual basis, with uncomfortable conditions limited to only two of the 71 locations studied (Locations 5 and 11). In particular, the main entrance to the building (Location 3) is expected to be comfortable for walking or standing. The service entrances will also be comfortable for walking or standing (Locations 8 through 10).

The only two uncomfortable conditions can be attributed to localized acceleration of downwashed westerly and easterly winds around the corners of the proposed building façade. The Build configuration was not tested with any canopies or mitigation measures around these areas. A canopy was subsequently incorporated into the design of the building. This canopy and additional mitigation measures under consideration are expected to create improvements to wind conditions predicted at Locations 5 and 11. The exact size and location of the canopy as well as other mitigation measures will be assessed as design continues.

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Figure 3.1-6

Pedestrian Wind Conditions - Mean Speed - No Build (Annual)

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Figure 3.1-7

Pedestrian Wind Conditions - Mean Speed - Build (Annual)

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Figure 3.1-8

Pedestrian Wind Conditions - Effective Gust - No Build (Annual)

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Figure 3.1-9

Pedestrian Wind Conditions - Effective Gust - Build (Annual)

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Figure 3.1-10

Pedestrian Wind Conditions - Category Change - Build (Annual)

The effective gust criteria are expected to be met seasonally and annually at most locations. The exception is the north corner (Location 11) which is not predicted to meet this criterion during the spring and winter, as well as on an annual basis. The overhead canopy proposed to improve wind comfort for this area is expected to be beneficial in improving these safety conditions, too.

Off-Site Walkways

Under the Build Configuration, most off-site walkway locations studied are predicted to be comfortable for walking or better, with the exception of Location 57 on Washington Street, where uncomfortable conditions are anticipated. However, it should be noted that only a marginal increase (approximately two miles per hour) is expected with the addition of the Project. Wind comfort conditions are expected to generally remain appropriate for the intended pedestrian usages in all other locations.

The effective gust criterion will be met for all off-site locations annually under the Build Configuration.

3.1.4.3 Conclusion

The wind analysis shows that the overall wind conditions expected in the surrounding area are largely similar in the No Build and Build Conditions. A canopy and other mitigation measures are being considered and will be assessed as design continues to minimize any Project impacts.

3.2 Shadow

3.2.1 Introduction and Methodology

As is typically required by the BRA, a shadow impact analysis was conducted to assess shadow impacts from the Project during the following times of the year:

- Spring Equinox (March 21) at 9:00 a.m., 12:00 noon, and 3:00 p.m.
- Summer Solstice (June 21) at 9:00 a.m., 12:00 noon, 3:00 p.m. and 6:00 p.m.
- Autumnal Equinox (September 21) at 9:00 a.m., 12:00 noon, 3:00 p.m. and 6:00 p.m.
- Winter Solstice at 9:00 a.m., 12:00 noon, and 3:00 p.m.

The shadow analysis as set forth below presents the existing shadow and new shadow that would be created by the Project, illustrating the incremental impact of the Project on nearby open spaces, sidewalks, and T stops adjacent to and in the vicinity of the Project site. Section 5.3 describes the Project's shadows in relation to historic resources in the Project area. Shadows have been determined using the applicable altitude and azimuth data for Boston. Figures showing the new shadow from the Project are provided in Figures 3.2-1 to 3.2-14 at the end of Section 3.2.

New shadow will generally be limited to the immediately surrounding streets, sidewalks and buildings. The Project will not cast new shadow on formally designated open spaces ("open spaces") in the area during the time periods studied.

3.2.2 Spring Equinox (March 21)

The Project is not anticipated to cast new shadow on open spaces during the spring equinox time periods studied.

At 9:00 a.m. during the vernal equinox, the Project is not anticipated to cast new shadow on any nearby T bus stops. Project shadow will fall on the Project site, across Shawmut Avenue onto the closest Castle Square building on the opposite side of Shawmut Avenue, the northern side of the small green space on the northwest corner of East Berkeley Street and Shawmut Avenue, and the roof of the entrance to the Waterford Place parking garage.

At 12:00 p.m., the Project is not anticipated to cast new shadow on any nearby T bus stops. New shadow will fall on the Project site, Waterford Place and the MBTA substation building. New shadow will also fall on the Shawmut Avenue sidewalk adjacent to the Project site and Waterford Place.

At 3:00 p.m., the Project will not cast new shadow on any nearby T bus stops. New shadow will fall on the Project site extending to Waterford Place and the MBTA substation building and will fall across Washington Street onto a parking lot located north of and adjacent to the building at 1130 Washington Street.

3.2.3 Summer Solstice (June 21)

During the summer solstice time periods studied, the Project is not anticipated to cast new shadow on open spaces.

At 9:00 a.m. during the summer solstice, the Project is not anticipated to cast new shadow on any T stops. New shadow is limited to the width of the proposed Project and will fall across Shawmut Avenue and the sidewalks on both sides of Shawmut Avenue.

At 12:00 p.m., the Project is not anticipated to cast new shadow on any T stops. New shadow is limited to the accessway and a portion of the roof of the entrance to the Waterford Place parking garage.

At 3:00 p.m., the accessway and a corner of the roof of the entrance to the Waterford Place parking garage will be in shadow. New shadow will also fall across Washington Street onto the T bus stop located at the northeast corner of East Berkeley Street and Washington Street and onto a small portion of the one-story building at 1130 Washington Street.

At 6:00 p.m., shadows are longer, and new shadow will fall across Washington Street, onto the T stop located at the northeast corner of East Berkeley Street and Washington Street and the one-story building located at 1130 Washington Street.

3.2.4 Autumnal Equinox (September 21)

During the autumnal equinox time periods studied, the Project is not anticipated to cast new shadow on open spaces.

At 9:00 a.m. during the autumnal equinox, the Project is not anticipated to cast new shadow on any T stops. New shadow will fall on the accessway and the roof of the entrance to the Waterford Place parking garage. New shadow will also fall across Shawmut Avenue onto the closest Castle Square building bordering Shawmut Avenue and onto the northern edge of the small, shaded green space located at the corner of East Berkeley Street and Shawmut Avenue.

At 12:00 p.m., the Project is not anticipated to cast new shadow on any T stops. New shadow will be limited to the accessway, Waterford Place, and the MBTA substation building.

At 3:00 p.m., there will be new shadow on the accessway, the easternmost portion of Waterford Place, and the MBTA substation building. New shadow will also extend across Washington Street to the building located at 1130 Washington Street and the adjacent T bus stop located at the northeast corner of East Berkeley Street and Washington Street and the parking lot located north of and adjacent to the building at 1130 Washington Street.

At 6:00 p.m., much of the area will be in shadow. New shadow will fall on the eastern end of the accessway, a corner of the roof of the entrance to the Waterford Place parking garage, the MBTA substation building, and across Washington Street, the T bus stop, 1130 Washington Street and the adjacent parking lot, across Harrison Avenue, and onto the buildings and parking lot on the far side of Harrison Avenue.

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.

During the winter solstice time periods studied, the Project is not anticipated to cast new shadow on open spaces.

At 9:00 a.m., the Project is not anticipated to cast new shadow on any T stops. New shadow will fall on the accessway, Waterford Place, across Shawmut Avenue, and onto a portion of the Castle Square buildings and a parking lot on the opposite side of Shawmut Avenue.

At 12:00 p.m., the Project is not anticipated to cast new shadow on any T stops. The Project will cast new shadow onto the accessway, Waterford Place, the MBTA substation building, the sidewalk on the west side of Waterford Place, a small portion of the eastern sidewalk on Shawmut Avenue, and the roof 170 Shawmut Avenue.

At 3:00 p.m., there will be new shadow on the accessway, Waterford Place, the MBTA substation building, a corner of 170 Shawmut Avenue, Washington Street, the parking lot across Washington Street north of the building at 1130 Washington Street, Traveler Street, the building north of Traveler Street, William E. Mullins Way, and the sidewalk on the north side of William E. Mullins Way.

3.2.6 Conclusions

The shadow impact analysis looked at new shadow created by the Project during fourteen time periods at various times of day throughout the entire year. New shadow will generally be limited to the immediately surrounding streets, sidewalks and buildings. The Project will not cast any material new shadow on open spaces in the area, and will not cast any new shadow on the Community Gardens, Peters Park, or Watson Park during the time periods studied.

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Figure 3.2-1

Shadow Study: March 21, 9 am

80 East Berkeley Street Boston, Massachusetts

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Figure 3.2-2

Shadow Study: March 21, 12 pm

80 East Berkeley Street Boston, Massachusetts

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Figure 3.2-3

Shadow Study: March 21, 3 pm

80 East Berkeley Street **Boston, Massachusetts**

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Figure 3.2-4

Shadow Study: June 21, 9 am

80 East Berkeley Street Boston, Massachusetts

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Figure 3.2-5

Shadow Study: June 21, 12 pm

80 East Berkeley Street   Boston, Massachusetts

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Figure 3.2-6

Shadow Study: June 21, 3 pm

80 East Berkeley Street **Boston, Massachusetts**

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Figure 3.2-7

Shadow Study: June 21, 6 pm

80 East Berkeley Street Boston, Massachusetts

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Figure 3.2-8

Shadow Study: September 21, 9 am

80 East Berkeley Street Boston, Massachusetts

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Figure 3.2-9

Shadow Study: September 21, 12 pm

80 East Berkeley Street   **Boston, Massachusetts**

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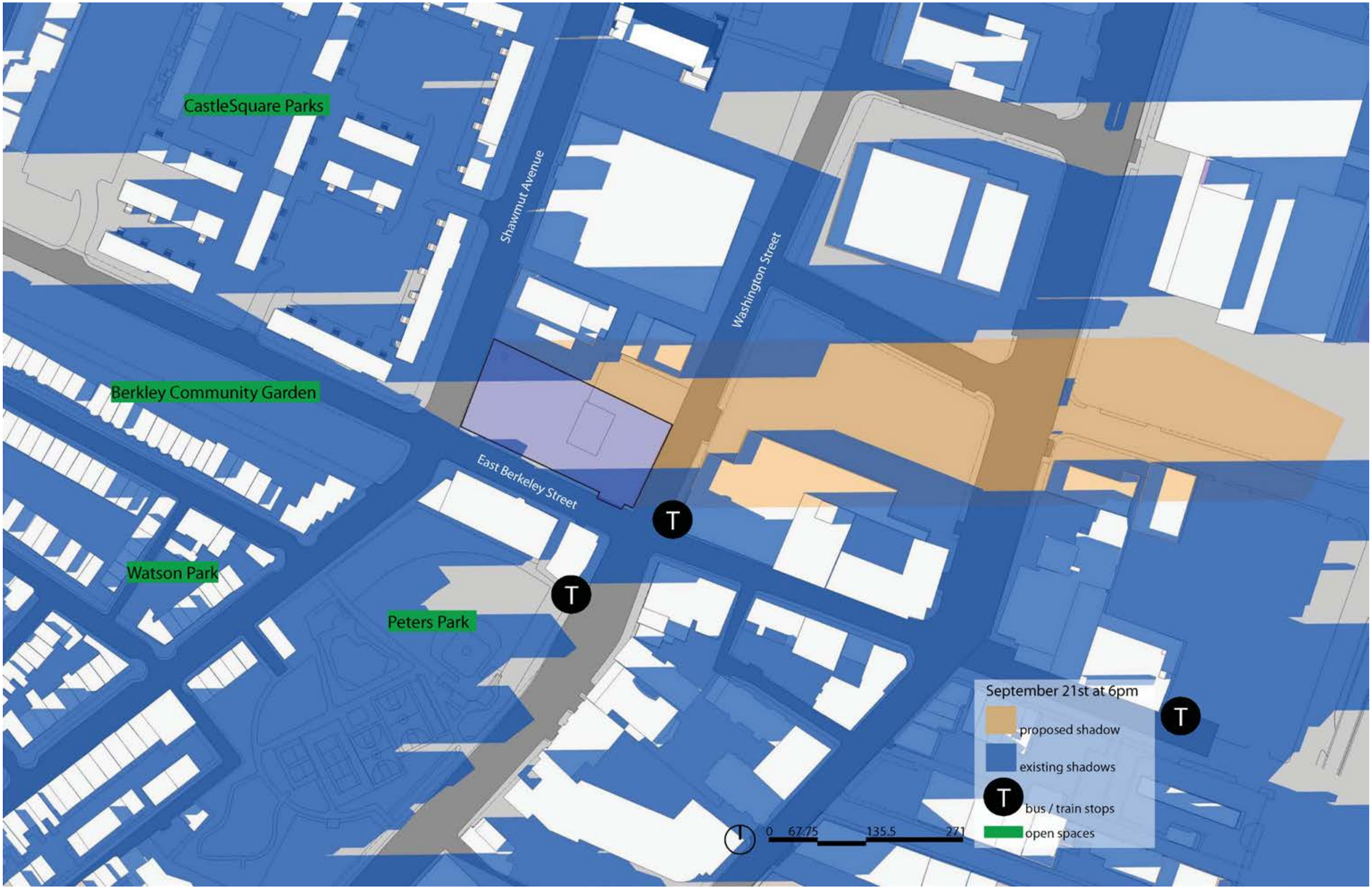
Figure 3.2-10

Shadow Study: September 21, 3 pm

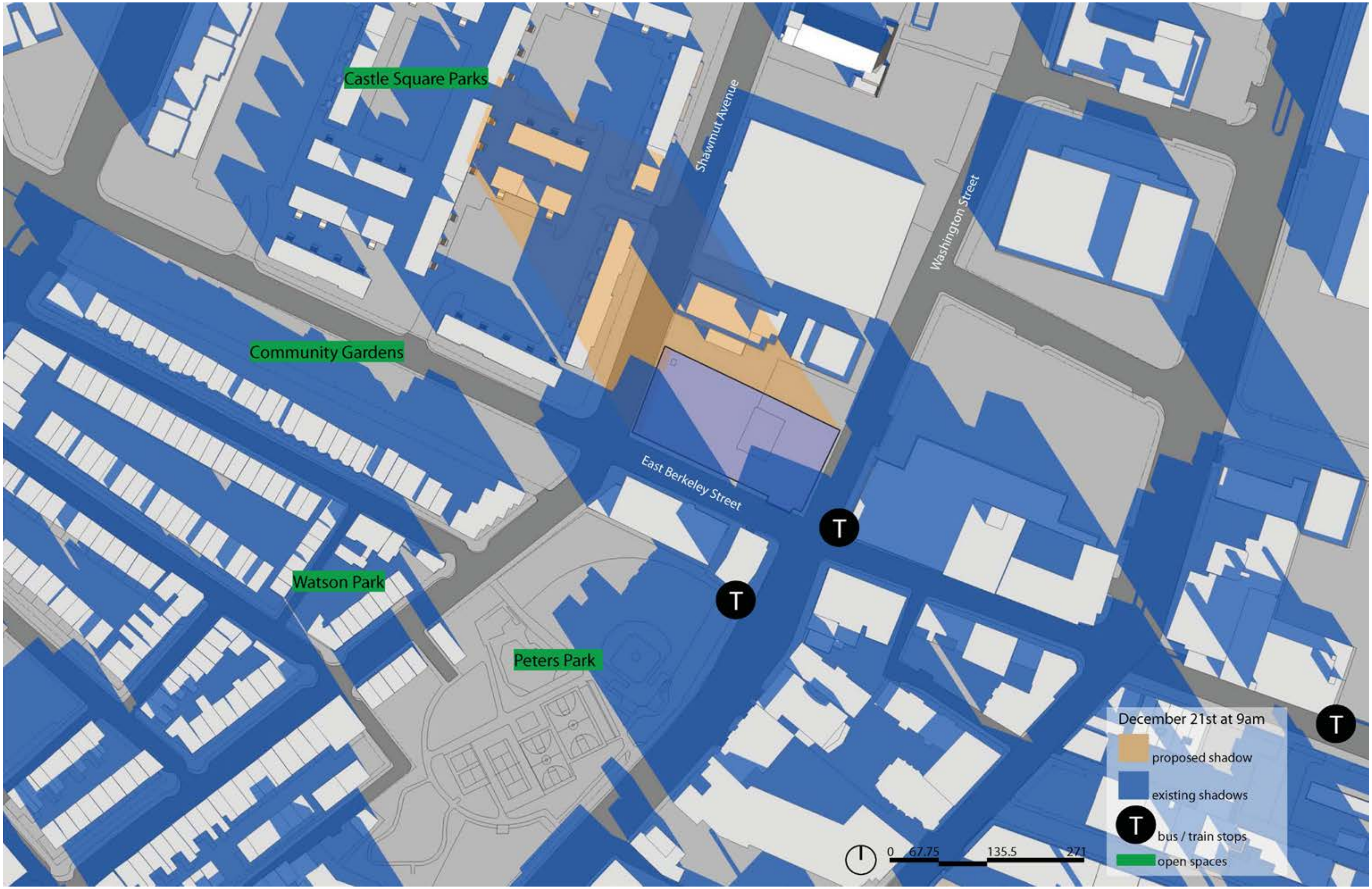


80 East Berkeley Street   Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Figure 3.2-11

Shadow Study: September 21, 6 pm



80 East Berkeley Street   Boston, Massachusetts

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ARCHITECTS

Figure 3.2-12

Shadow Study: December 21, 9 am

80 East Berkeley Street Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Figure 3.2-13

Shadow Study: December 21, 12 pm

80 East Berkeley Street Boston, Massachusetts

Figure 3.2-14

Shadow Study: December 21, 3 pm

3.3 Daylight

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 pedestrian areas adjacent to the Project site. As is typically required by the BRA, the daylight analysis for the Project considers existing and proposed daylight conditions as well as those of the surrounding area. The Project site is currently occupied by a surface parking lot, a one-story auto repair garage, and parking attendant's booth, and thus has a low daylight obstruction value on all sides. Although the Project will result in daylight obstruction, the resulting condition will be similar to nearby areas and typical of urban areas.

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 Project. 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. Due to the constraints of the BRADA program, the setbacks of the building may be simplified or the building may be divided into sections in some cases. The BRADA program calculates the percentage of daylight that will be obstructed on a scale of zero percent 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.

This daylight analysis compares three conditions:

- Existing Conditions;
- Proposed Conditions; and
- The context of the area.

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

Viewpoints were chosen from the three public ways surrounding the Project site: East Berkeley Street (Viewpoint 1), Washington Street (Viewpoint 2), Shawmut Avenue (Viewpoint 3), and the northern edge of the Project site (Viewpoint 4). The area evaluated as Viewpoint 4 is a part of the Project site, which, although it currently allows for public access, is proposed as a new accessway open to vehicles and pedestrians. Additionally, this study considered area context points to provide a basis of comparison to Existing Conditions in the surrounding area. These viewpoints were taken along East Berkeley Street (AC1 and AC2), Washington Street (AC3), and Waterford Street (AC4). These viewpoints and area context points are illustrated on Figure 3.3-1.

3.3.3 Daylight Analysis Results

The results for each viewpoint under each condition are described in Table 3.3-1. Figures 3.3-2 through 3.3-6 illustrate the BRADA results for each viewpoint and are located at the end of this section. Because the existing site is almost entirely vacant, the existing daylight obstruction values are negligible and range from 0.6 % to 2.3%.

Table 3.3-1 Daylight Obstruction Values

Viewpoint Locations		Proposed
Viewpoint 1	East Berkeley Street looking north at the Project site	76.8%
Viewpoint 2	Washington Street looking west at the Project site	76.0%
Viewpoint 3	Shawmut Avenue looking east at the Project site	73.9%
Viewpoint 4	Proposed accessway looking south at the Project site	91.0%
Area Context Points		
AC1	East Berkeley Street looking at 160 East Berkeley Street	75.1%
AC2	East Berkeley Street looking at 105 East Berkeley Street	71.3%
AC3	Washington Street looking at 1145 Washington Street	59.5%
AC4	Waterford Street looking at 180 Shawmut Avenue	87.7%

3.3.3.1 Viewpoint 1

East Berkeley Street runs along the southern edge of the Project site. Viewpoint 1 was taken from the center of East Berkeley Street, looking north toward the Project site. The daylight analysis demonstrates that the Project will result in daylight obstruction value of 76.8 percent.

3.3.3.2 Viewpoint 2

Washington Street runs along the eastern edge of the Project site. Viewpoint 2 was taken from the center of Washington Street, looking west toward the Project site. Under Proposed Conditions, Viewpoint 2 faces the proposed building and the new accessway proposed on the Project site, yielding a daylight obstruction value of 76.0 percent.

3.3.3.3 Viewpoint 3

Shawmut Avenue runs along the western edge of the Project site. Viewpoint 3 was taken from the center of Shawmut Avenue Street, looking east toward the Project site. Under Proposed Conditions, Viewpoint 3 faces the Project and the new accessway proposed on the Project site, yielding a daylight obstruction value of 73.9 percent.

3.3.3.4 Viewpoint 4

Viewpoint 4 was taken from the center of the northern edge of the Project site, which currently lies between the parking lot on the Project site and existing buildings that face Washington Street, Shawmut Avenue, and Waterford Street. This portion of the Project site includes a landscaped accessway for vehicles and pedestrians. Under Proposed Conditions, the view from the new accessway would have a daylight obstruction value of 91.0 percent.

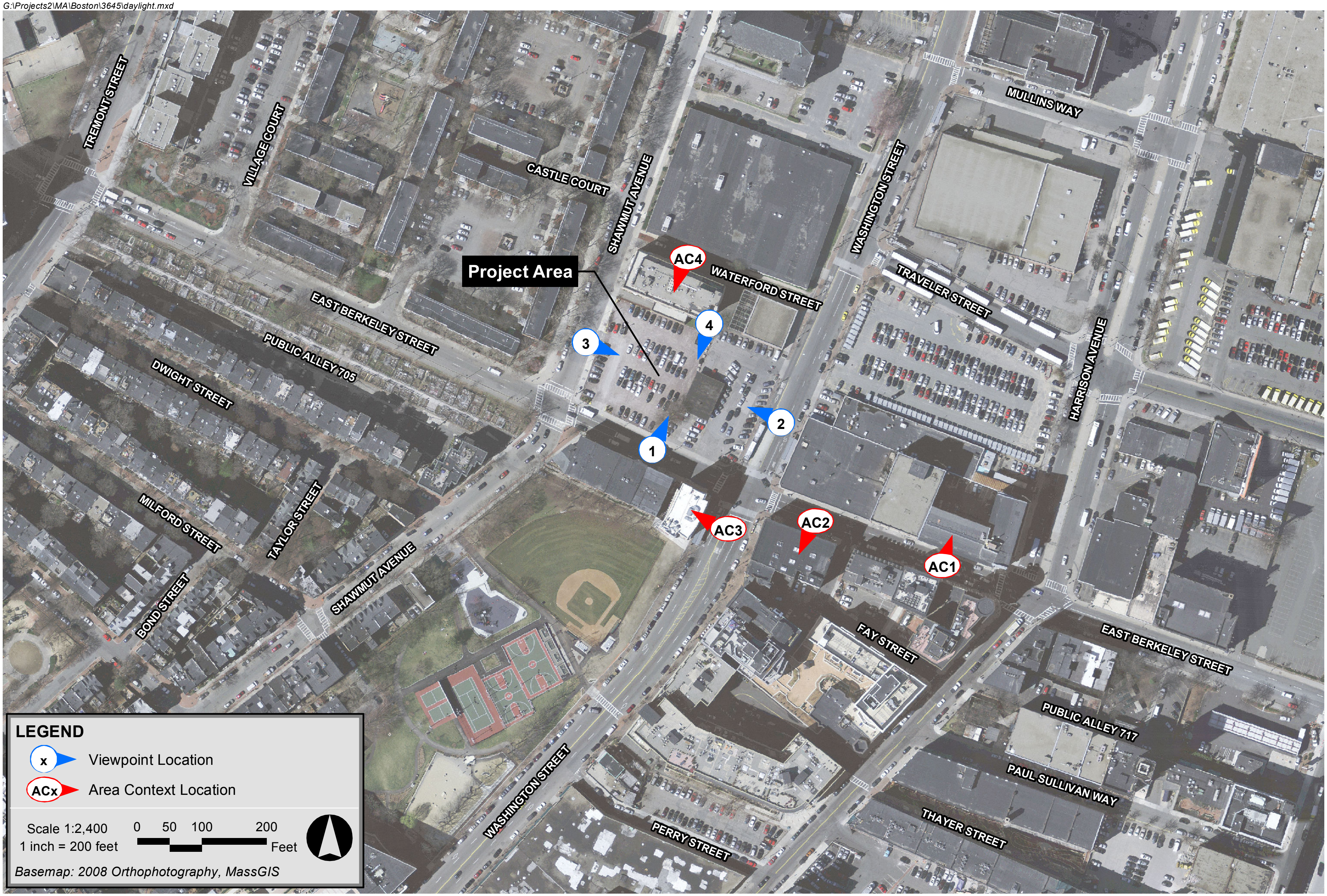
3.3.3.5 Area Context Viewpoints

The Project area includes a mix of commercial and residential buildings of a variety of heights and ages. To evaluate general daylight conditions in the area, the analysis included four area context viewpoints. The daylight obstruction values from the area context points are similar to the Project. From East Berkeley Street, 160 East Berkeley Street, one block to the east of the Project site, has a daylight obstruction value of 75.1 percent. Across the street to the southeast of the Project site, 105 East Berkeley Street has a daylight obstruction value of 71.3 percent. The building at 1145 Washington Street, to the south of the Project site, has a daylight obstruction value of 59.5 percent from the center of Washington Street. From Waterford Street, the building at 180 Shawmut Avenue has a daylight obstruction value of 87.7 percent.

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 daylight obstruction will increase due to the Project because the existing site includes only a paved surface parking lot, a single-story building, and a parking attendant's booth. To mitigate impacts on daylight as seen from Castle Square and Waterford Place, the Project includes setbacks on the west and north sides of the site. High pedestrian activity is anticipated on East Berkeley Street, Washington Street, and Shawmut Avenue, and daylight obstruction values from these viewpoints are similar to other locations in the surrounding area. The new landscaped accessway on the northern portion of the Project site will be designed similarly to other local accessways in the area and have comparable daylight obstruction. Overall, the daylight obstruction values related to the Project will be typical of urban areas and consistent with the level of density contemplated in the Harrison-Albany Corridor Strategic Plan.

G:\Projects2\MA\Boston\3645\daylight.mxd



80 East Berkeley Street **Boston, Massachusetts**

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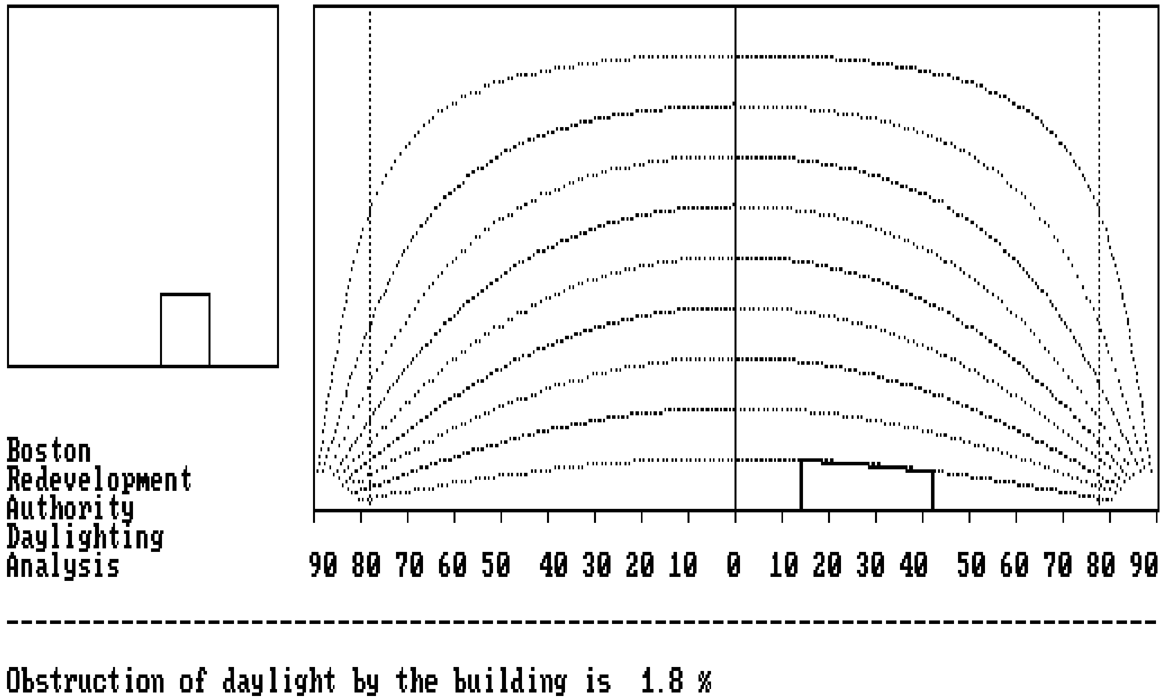
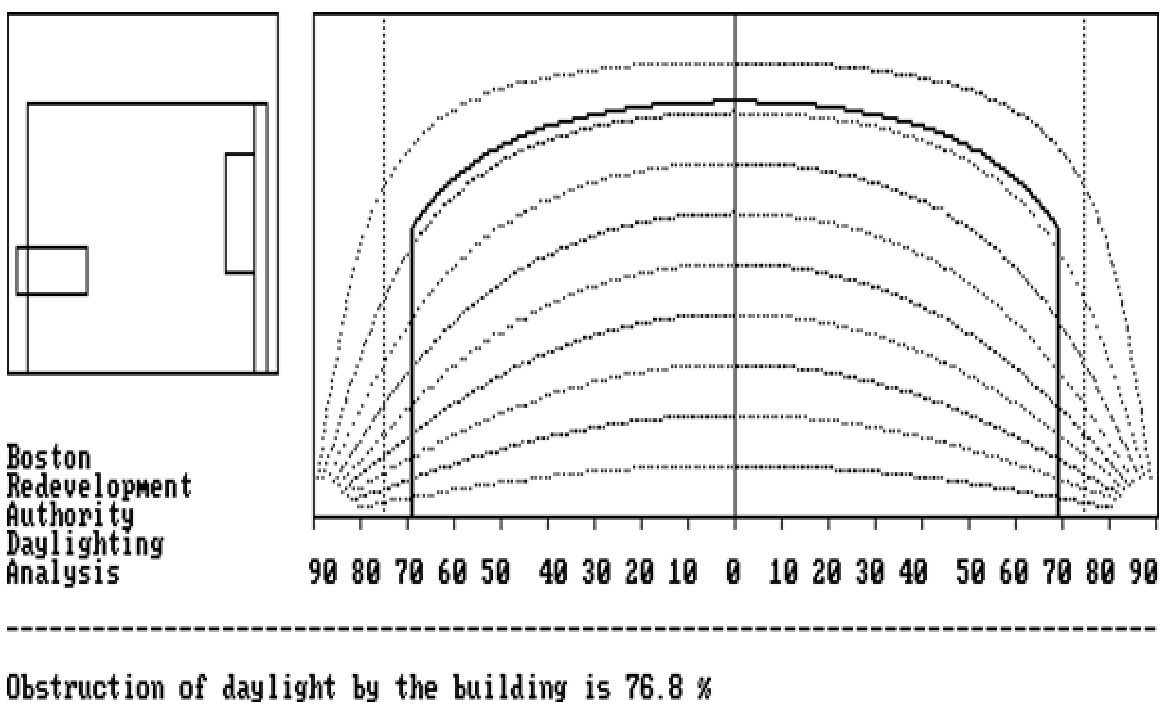
Figure 3.3-1

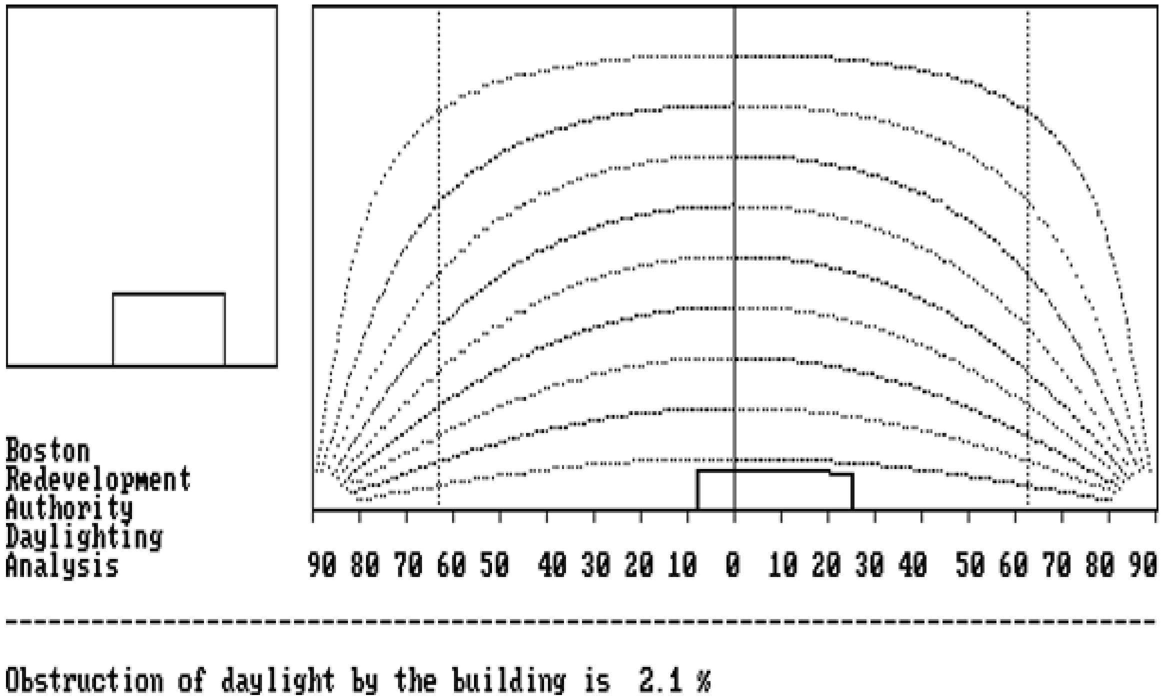
Daylight Analysis - Viewpoint Locations



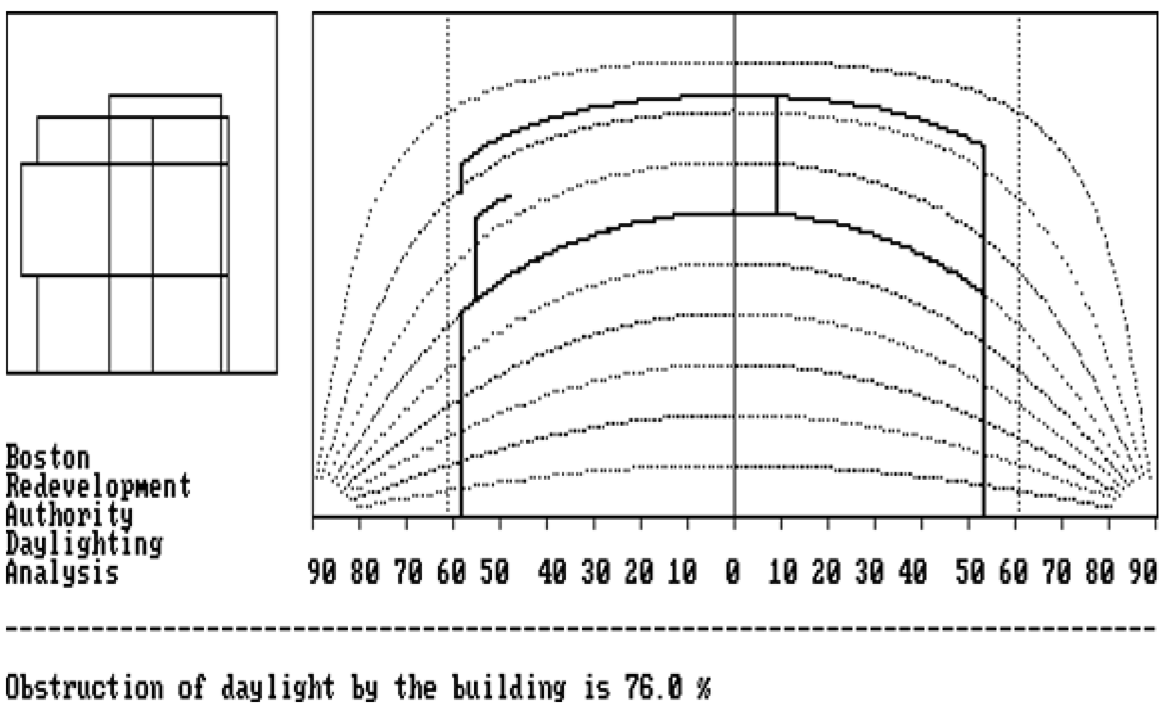
Viewpoint 1 – Existing Conditions: East Berkeley Street Looking North at the Project Site



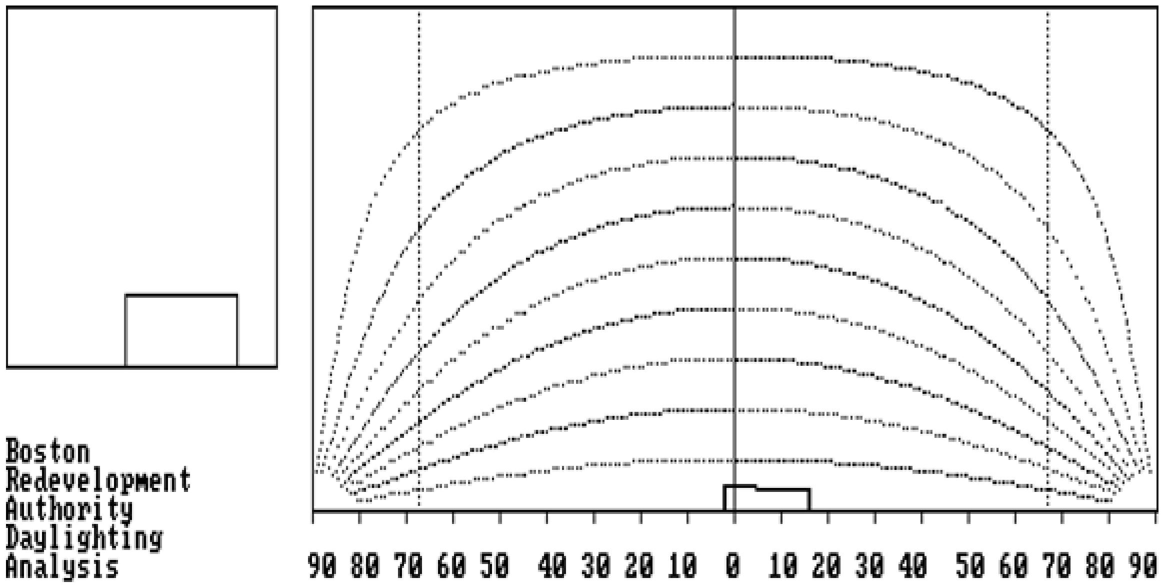
Viewpoint 1 – Proposed Conditions: East Berkeley Street Looking North at the Project Site



Viewpoint 2 – Existing Conditions: Washington Street Looking West at the Project Site

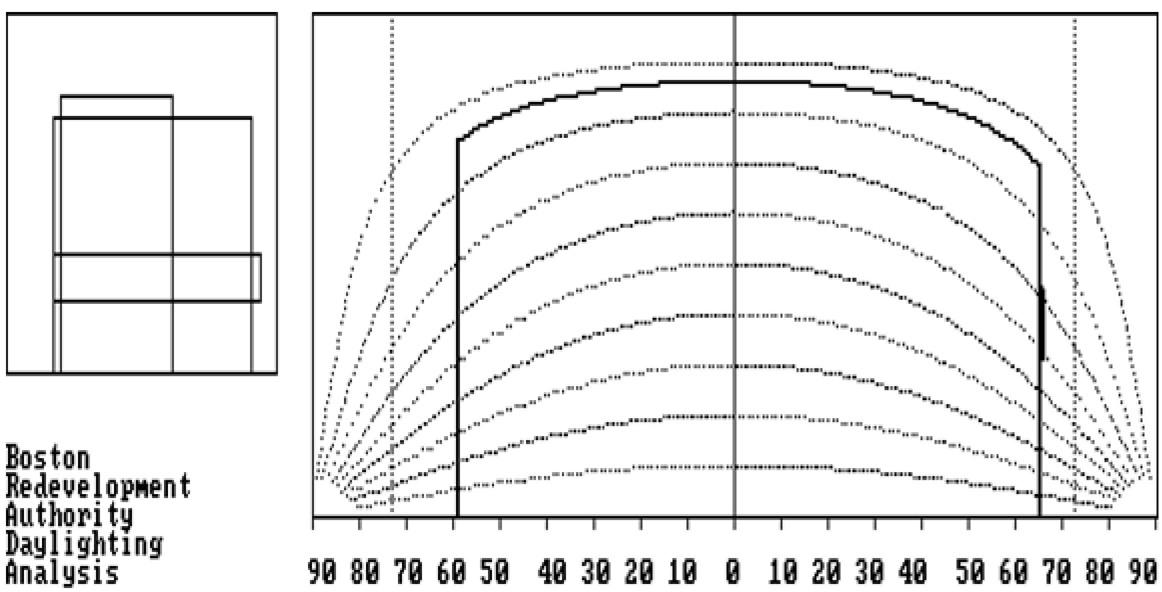


Viewpoint 2 – Proposed Conditions: Washington Street Looking West at the Project Site



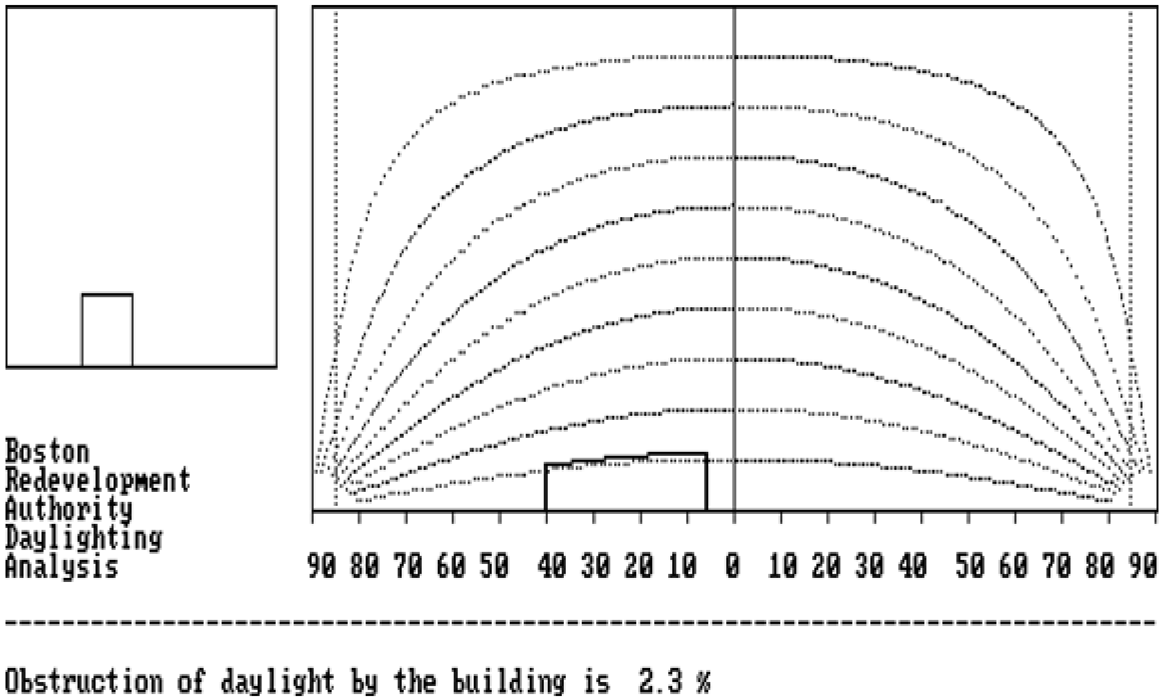
Obstruction of daylight by the building is 0.6 %

Viewpoint 3 – Existing Conditions: Shawmut Avenue Looking East at the Project Site

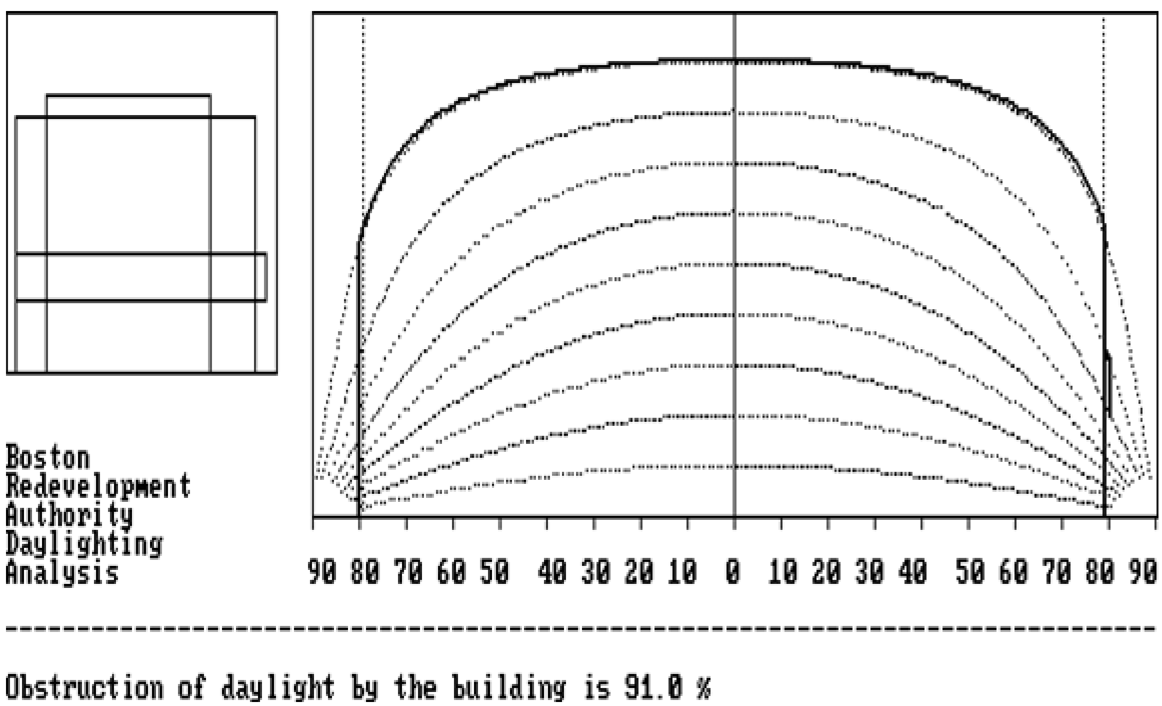


Obstruction of daylight by the building is 73.9 %

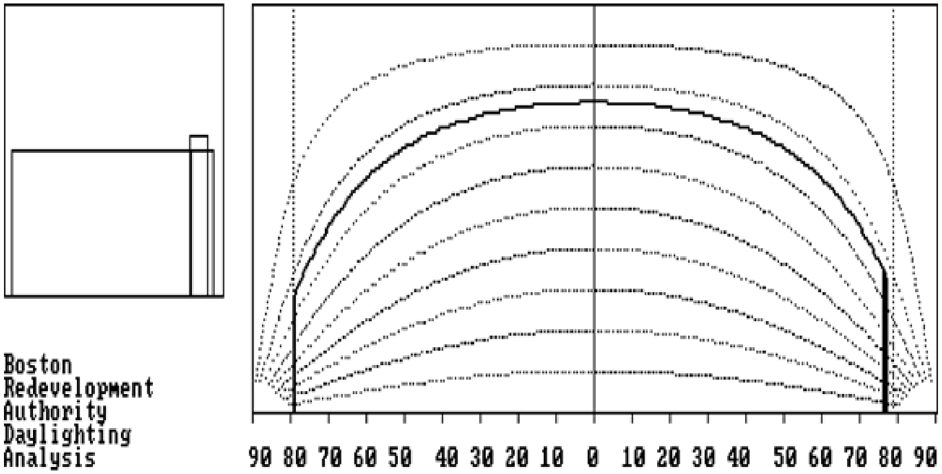
Viewpoint 3 – Proposed Conditions: Shawmut Avenue Looking East at the Project Site



Viewpoint 4 – Existing Conditions: Proposed Through-Way Location Looking South at the Project Site

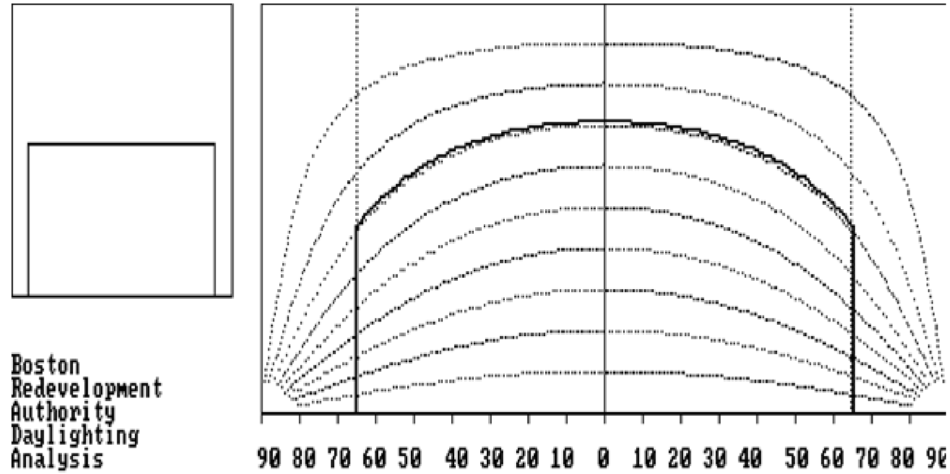


Viewpoint 4 – Proposed Conditions: Proposed Through-Way Location Looking South at the Project Site



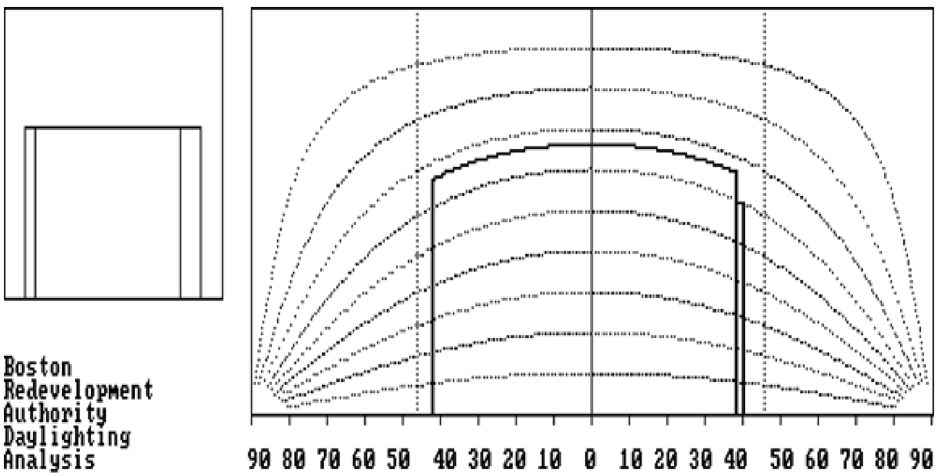
Obstruction of daylight by the building is 75.1 %

Area Context 1 – East Berkeley Street Looking at 160 East Berkeley Street



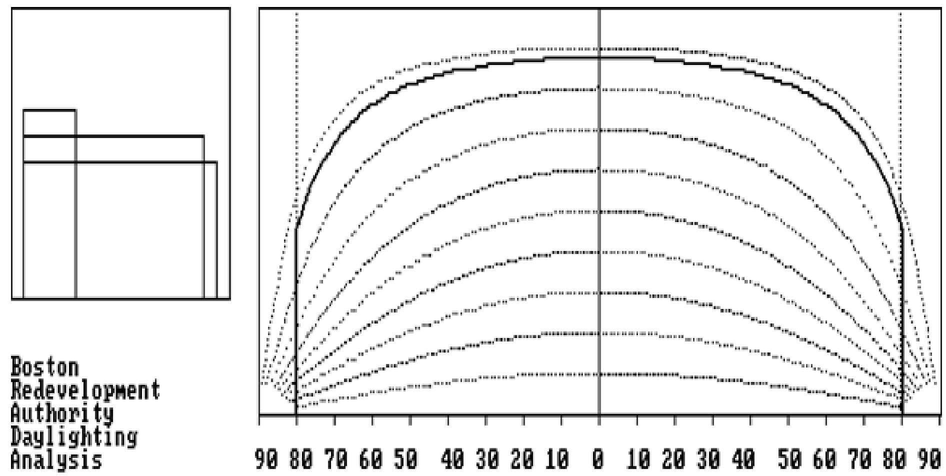
Obstruction of daylight by the building is 71.3 %

Area Context 2 – East Berkeley Street Looking at 105 East Berkeley Street



Obstruction of daylight by the building is 59.5 %

Area Context 3 – Washington Street Looking at 1145 Washington Street



Obstruction of daylight by the building is 87.7 %

Area Context 4 – Waterford Street Looking at 180 Shawmut Avenue

3.4 Solar Glare

The Project is not anticipated to include the use of reflective glass or other reflective materials on the building's facades that would result in adverse impacts from reflected solar glare.

3.5 Air Quality

3.5.1 Introduction

An air quality analysis was conducted to determine the impact of pollutant emissions from mobile sources generated by the Project. A microscale analysis was performed to evaluate the potential air quality impacts of carbon monoxide (CO) due to traffic flow around the Project areas. Results of the microscale analysis show that all predicted CO concentrations are well below 1-hour and 8-hour National Ambient Air Quality Standards (NAAQS). Therefore, it can be concluded that there are no adverse air quality impacts resulting from increased traffic in the area.

3.5.1.1 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 these criteria pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM) (PM10 and PM2.5), 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.

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 are applied when comparing to the modeling results for a Project.

The NAAQS also reflect various durations of exposure. The 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.

The standards were developed by Environmental Protection Agency ("EPA") to protect the human health against adverse health effects with a margin of safety.

Table 3.5-1 National Ambient Air Quality Standards

Pollutant	*Averaging Period*	*National Ambient Air Quality Standards and Massachusetts Ambient Air Quality Standards (micrograms per cubic meter)*	
		Primary	*Secondary*
NO_2	Annual [1]	100	Same
	1-hour [7]	188	None
SO_2	Annual [1,8]	80	None
	24-hour [2,8]	365	None
	3-hour [2]	None	1,300
	1-hour [7]	195	None
PM10 [6]	Annual	50	Same
	24-hour [3]	150	Same
PM2.5	Annual [4]	12	15
	24-hour [5]	35	Same
CO	8-hour [2]	10,000	Same
	1-hour [2]	40,000	Same
Ozone	8-hour [3]	235	Same
Pb	3-month [1]	1.5	Same
Notes:			

[1] Not to be exceeded

[2] Not to be exceeded more than once per year.

[3] Not to be exceeded more than an average of one day per year over three years.

[4] Not to be exceeded by the arithmetic average of the annual arithmetic averages from three successive years.

[5] Not to be exceeded based on the 98th percentile of data collection.

[6] Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, EPA revoked the annual PM10 standard in 2006 (effective December 17, 2006). However, the annual standard remains codified in 310 CMR 6.00

[7] Not to be exceeded. Based on the 3-yr average of the 98th (NO2) or 99th (SO2) percentile of the daily maximum 1-hour concentrations.

[8]The Annual and 24-hour SO2 standards were revoked on June 2, 2010. However, these standards remain in effect until one year after an area is designated for the 1-hour standard, unless currently in nonattainment.

Source: 40 CFR 50 and 310 CMR 6.00

3.5.1.2 Background Concentrations

To estimate background pollutant levels representative of the area, the most recent air quality monitor data reported by the Massachusetts Department of Environmental Protection (MassDEP) in their Annual Air Quality Reports was obtained for 2007 to 2011. MassDEP guidance specifies the use of the latest three years of available monitoring data from within 10 km of the Project site.

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. A new 1-hr NO_2 standard was recently promulgated. To attain this standard, the 3-year average of the 98th percentile of the maximum daily 1-hour concentrations must not exceed 188 $\mu g/m^3$.

Background concentrations were determined from the closest available monitoring stations to the Project. The closest monitor is located at Kenmore Square, in Boston. 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	2010	2011	2012	Background Concentration ($\mu g/m^3$)	Location
SO_2 (1)(7)(8)	1-Hour	63.2	93.3	55.4	93.3	Harrison Ave., Boston
	3-Hour	62.4	54.6	72.8	72.8	Harrison Ave., Boston
	24-Hour	22.9	33.5	20.5	33.5	Harrison Ave., Boston
	Annual	4.2	3.3	2.9	4.2	Harrison Ave., Boston
PM-10	24-Hour	50.0	42.0	72.0	72.0	Harrison Ave., Boston
	Annual	14.1	14.8	14.1	14.8	Harrison Ave., Boston
PM-2.5	24-Hour (4)	22.5	20.9	20.6	21.3	Harrison Ave., Boston
	Annual (5)	8.3	8.5	8.3	8.3	Harrison Ave., Boston
NO_2 (3)	1-Hour (6)	116.6	139.1	126.0	139.1	Harrison Ave., Boston
	Annual	32.1	34.8	29.7	34.8	Harrison Ave., Boston
CO (2)	1-Hour	3306	2816	2622	3306	Harrison Ave., Boston
	8-Hour	2394	2166	2166	2394	Harrison Ave., Boston

Notes: From 2007-2012 MA DEP Annual Data Summaries

1 SO_2 reported in ppm or ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 2600 $\mu g/m^3$.

2 CO reported in ppm or ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 1140 $\mu g/m^3$.

3 NO_2 reported in ppm or ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 1880 $\mu g/m^3$.

4 Background level for 24-hour PM-2.5 is the average concentration of the 98th percentile for three years.

5 Background level for annual PM-2.5 is the average for three years.

6 Maximum annual 1-hr concentrations.

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

8 The 2010 - 2012 SO_2 3-hr value is not reported. Years 2007-2009 used instead.

Air quality is generally good in the area, with all of the ambient concentrations well below their respective NAAQS. For use in the microscale analysis, background concentrations of

CO in ppm were required. The corresponding maximum background concentrations in ppm were 2.9 ppm (3306 $\mu g/m^3$) for 1-hour and 2.1 ppm (2394 $\mu g/m^3$) for 8-hour CO.

3.5.2 Methodology

3.5.2.1 Microscale Analysis

The BRA requires an analysis of the effect on air quality of the increase in traffic generated by the Project. This "microscale" analysis is required for any intersection (including garage entrances/exits where the Level of Service (LOS) is expected to deteriorate to D and the proposed Project causes a 10 percent increase in traffic or where the LOS is E or F and the proposed Project contributes to a reduction in LOS. The microscale analysis involves modeling of carbon monoxide (CO) emissions from vehicles idling at and traveling through both signaled and unsignalized 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 analyses for the Project followed the procedure outlined in U.S. EPA's intersection modeling guidance.[3]

The microscale analysis has been conducted using the latest versions of EPA's MOBILE6.2 and CAL3QHC programs to estimate CO concentrations at sidewalk receptor locations.

Baseline (2013) and future year (2018) emission factor data calculated from the MOBILE6.2 model, along with traffic data, were input into the CAL3QHC program to determine CO concentrations due to traffic flowing through the selected intersections.

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

Existing background values of CO at the nearest monitor location at Kenmore Square were obtained from the MassDEP. CAL3QHC results were then added to background CO values of 2.9 ppm (one-hour) and 2.1 ppm (eight-hour), as provided by the 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).

The modeling methodology was developed in accordance with the latest MassDEP modeling policies and Federal modeling guidelines.[4]

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

Intersection Selection

As stated previously, a "microscale" analysis is required for the Project at intersections where 1) Project traffic would impact intersections or roadway links currently operating at Level of Service ("LOS") D, E, or F or would cause LOS to decline to D, E, or F; 2) Project traffic would increase traffic volumes on nearby roadways by 10% or more (unless the increase in traffic volume is less than 100 vehicles per hour); or, 3) the Project will generate 3,000 or more new average daily trips on roadways providing access to a single location.

Only three signalized intersections included in the traffic study meet the above conditions (See Section 2.0, Transportation). The traffic volumes and LOS calculations provided in Section 2.0 form the basis of evaluating the traffic data versus the microscale thresholds. All three intersections were found to meet the criteria for inclusion in the microscale analysis:

- The intersection of Herald Street and Albany Street;
- The intersection of East Berkeley Street and Shawmut Avenue; and,
- The intersection of East Berkeley Street and Harrison Avenue.

Microscale modeling was performed for the intersections based on the aforementioned methodology. The 2013 Existing Conditions, and the 2018 No Build and Build Conditions were each evaluated for both morning (AM) and afternoon (PM) peak.

Emissions Calculations (MOBILE6.2)

The EPA MOBILE6.2 computer program was used to estimate motor vehicle emission factors on the roadway network. Emission factors calculated by the MOBILE6.2 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

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

state specific vehicle age registration distribution. The input files for MOBILE6.2 for the existing (2013) and build year (2018) are provided by MassDEP. As is typical, minor edits to the files were necessary to allow the program to output emission factors for the various speeds used in the analyses.

Idle emission factors are obtained from factors for a vehicle speed of 2.5 mph. The resulting emission rate given in (grams/mile) is then multiplied by 2.5 mph to estimate idle emissions (in grams/hour). Moving emissions are calculated based on actual speeds at which free-flowing vehicles travel through the intersections. A speed of 30 mph is used for all free-flow traffic. Speeds of 10 and 15 mph were used for right (and U-turns, if necessary) and left turns, respectively.

Winter CO emission factors are typically higher than summer for CO. Therefore winter vehicular emission factors were conservatively used in the microscale analyses.

Receptors & Meteorology Inputs

Sets of up to 240 receptors were placed in the vicinity of each of the modeled intersections. Receptors extended approximately 300 feet on the sidewalks along the roadways approaching the intersection. The roadway links and receptor locations of the modeled intersections are presented in Figures 3.5-1 through 3.5-3.

For the CAL3QHC model, limited meteorological inputs are required. Following EPA guidance[5], a wind speed of 1 m/s, stability class D (4), and a mixing height of 1000 meters was used. To account for the intersection geometry, wind directions from 0° to 350°, every 10° were selected. A surface roughness length of 321 cm was selected for all three intersections.[6]

Impact Calculations (CAL3QHC)

The CAL3QHC model predicts one-hour concentrations using queue-links at intersections, worst-case meteorological conditions, and traffic input data. The one-hour concentrations were scaled by a factor of 0.7 to estimate 8-hour concentrations.[7] The CAL3QHC

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

6 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

7 U.S. EPA, Screening Procedures for Estimating the Air Quality Impact of Stationary Sources; EPA-454/R-92-019, October 1992

80 East Berkeley Street **Boston, Massachusetts**

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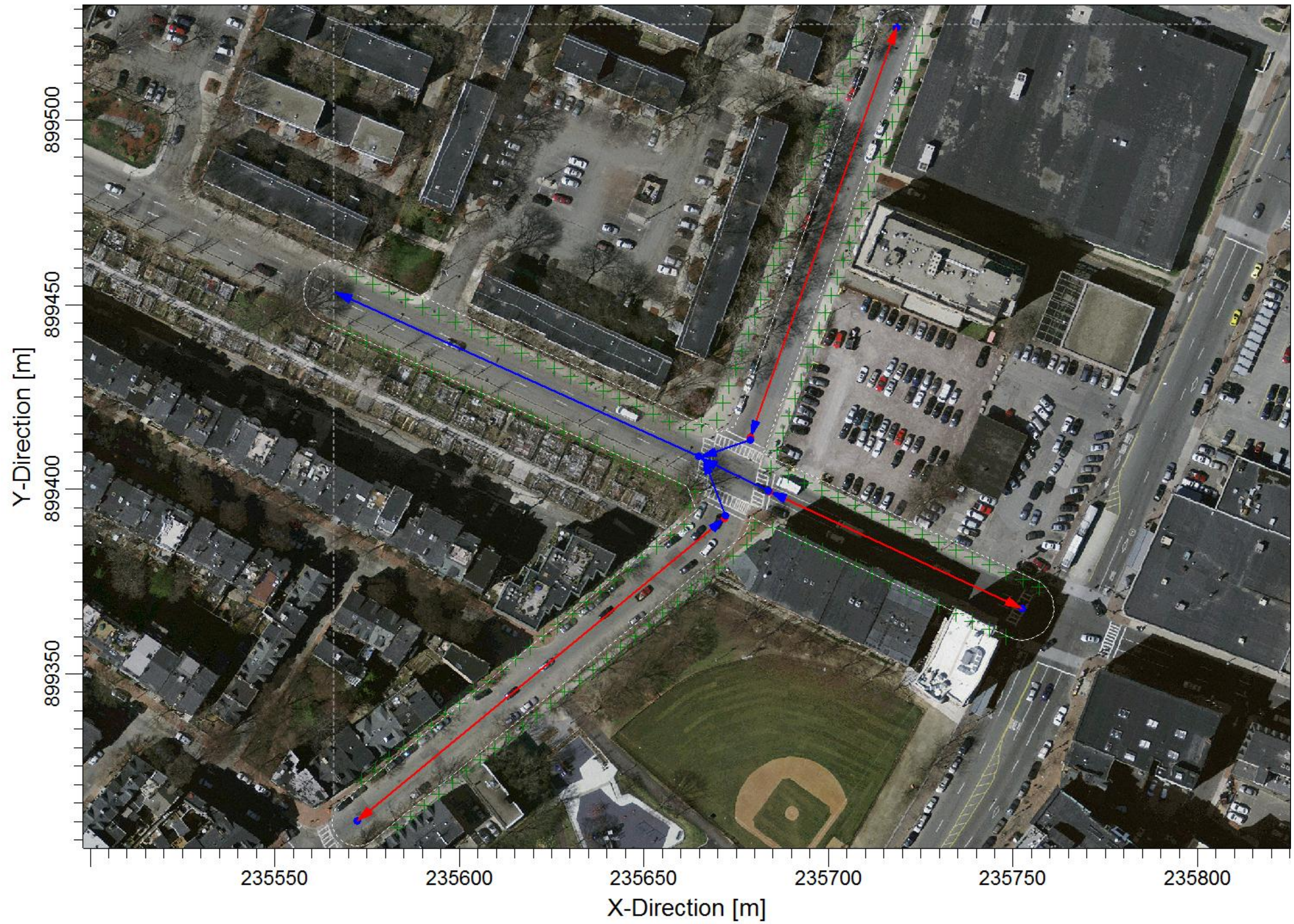
Figure 3.5-1

Link and Receptor Locations for CAL3QHC modeling of Intersection of Herald St. & Albany St.



80 East Berkeley Street   Boston, Massachusetts

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ASSOCIATES INC.

Figure 3.5-2

Link and Receptor Locations for CAL3QHC modeling of Intersection of E. Berkeley St. & Shawmut Ave.

80 East Berkeley Street **Boston, Massachusetts**

Epsilon ASSOCIATES INC.

Figure 3.5-3

Link and Receptor Locations for CAL3QHC modeling of Intersection of E. Berkeley St. & Harrison Ave.

methodology was based on EPA CO modeling guidance. Signal timings were provided directly from the traffic modeling outputs. The CAL3QHC input parameters are also described in Appendix E.

3.5.3 Air Quality Results

3.5.3.1 Microscale Analysis

The results of the maximum one-hour predicted CO concentrations from CAL3QHC are provided in Tables 3.5-3 through 3.5-5 for the 2013 and 2018 scenarios. Eight-hour average concentrations are calculated by multiplying the maximum one-hour concentrations by a factor of 0.7.[8]

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" worst case meteorology. The highest one-hour traffic-related concentration predicted in the area of the Project, for the modeled conditions (2.4 ppm) plus background (2.9 ppm) is 5.3 ppm for all afternoon peak hour cases at the intersection of Herald Street and Albany Street. The highest eight-hour traffic-related concentration predicted in the area of the Project for the modeled conditions (1.7 ppm) plus background (2.1 ppm) is 3.8 ppm for at the same location and scenarios. All concentrations are well below the one-hour NAAQS of 35 ppm and the eight-hour NAAQS of 9 ppm.

It would be expected that any future mitigation measures implemented to improve traffic flow at any of the modeled intersections would result in further improved air quality impacts.

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8 U.S. EPA, Screening Procedures for Estimating the Air Quality Impact of Stationary Sources; EPA-454/R-92-019, October 1992

Table 3.5-3 Summary of Microscale Modeling Analysis (Existing 2013)

Intersection	*Peak*	*CAL3QHC Modeled CO Impacts (ppm)*	*Monitored Background Concentration (ppm)*	*Total CO Impacts (ppm)*	*NAAQS (ppm)*
1-Hour					
Herald Street & Albany Street	AM	1.7	2.9	4.6	35
	PM	2.4	2.9	5.3	35
East Berkeley Street and Shawmut Avenue	AM	1.2	2.9	4.1	35
	PM	1.2	2.9	4.1	35
East Berkeley Street and Harrison Avenue	AM	1.7	2.9	4.6	35
	PM	1.6	2.9	4.5	35
8-Hour					
Herald Street & Albany Street	AM	1.2	2.1	3.3	9
	PM	1.7	2.1	3.8	9
East Berkeley Street and Shawmut Avenue	AM	0.8	2.1	2.9	9
	PM	0.8	2.1	2.9	9
East Berkeley Street and Harrison Avenue	AM	1.2	2.1	3.3	9
	PM	1.1	2.1	3.2	9

Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.7.

Table 3.5-4 Summary of Microscale Modeling Analysis (No-Build 2018)

Intersection	*Peak*	*CAL3QHC Modeled CO Impacts (ppm)*	*Monitored Background Concentration (ppm)*	*Total CO Impacts (ppm)*	*NAAQS (ppm)*
1-Hour					
Herald Street & Albany Street	AM	1.7	2.9	4.6	35
	PM	2.4	2.9	5.3	35
East Berkeley Street and Shawmut Avenue	AM	1.0	2.9	3.9	35
	PM	1.2	2.9	4.1	35
East Berkeley Street and Harrison Avenue	AM	1.6	2.9	4.5	35
	PM	1.7	2.9	4.6	35
8-Hour					
Herald Street & Albany Street	AM	1.2	2.1	3.3	9
	PM	1.7	2.1	3.8	9
East Berkeley Street and Shawmut Avenue	AM	0.7	2.1	2.8	9
	PM	0.8	2.1	2.9	9
East Berkeley Street and Harrison Avenue	AM	1.1	2.1	3.2	9
	PM	1.2	2.1	3.3	9

Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.7.

Table 3.5-5 Summary of Microscale Modeling Analysis (Build 2018)

Intersection	*Peak*	*CAL3QHC Modeled CO Impacts (ppm)*	*Monitored Background Concentration (ppm)*	*Total CO Impacts (ppm)*	*NAAQS (ppm)*
1-Hour					
Herald Street & Albany Street	AM	1.7	2.9	4.6	35
	PM	2.4	2.9	5.3	35
East Berkeley Street and Shawmut Avenue	AM	1.0	2.9	3.9	35
	PM	1.1	2.9	4.0	35
East Berkeley Street and Harrison Avenue	AM	1.7	2.9	4.6	35
	PM	1.7	2.9	4.6	35
8-Hour					
Herald Street & Albany Street	AM	1.2	2.1	3.3	9
	PM	1.7	2.1	3.8	9
East Berkeley Street and Shawmut Avenue	AM	0.7	2.1	2.8	9
	PM	0.8	2.1	2.9	9
East Berkeley Street and Harrison Avenue	AM	1.2	2.1	3.3	9
	PM	1.2	2.1	3.3	9
Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.7.					

3.5.4 Stationary Sources

Stationary sources of air pollution are typically units that combust fuel. In this case, these sources consist of heating units and emergency electrical generators. Cooling towers, although not a combustion source, are a source of particulate emissions.

3.5.4.1 Boilers

The current plans include a number of small condensing boilers for heat. The units will be natural gas-fired and located in a penthouse mechanical area on the roof of the buildings. The units are expected to be exhausted through individual stacks.

3.5.4.2 Emergency Generators

Design plans include an emergency generator to be installed on the building to be constructed. The units will provide life safety and standby emergency power to the building. Typically, generators operate for approximately one hour each month for testing and general maintenance and as needed for emergency power. The units will be diesel-fired and located in a mechanical area on the roof of the building or in the basement. The generators are to be designed such that its exhaust stack extends at least 10 feet above the generator enclosure.

3.5.4.3 Cooling Towers

Design plans call for cooling towers to be installed on the building to be constructed. These units will remove the excess heat generated by the building's mechanical equipment. The units will be located on the roof of the building.

3.5.4.4 Parking Garage Exhausts

The below-grade parking areas will be mechanically ventilated using carbon monoxide sensors, as required under state and local regulations.

3.5.4.5 Certification

It is expected that the majority of stationary sources (e.g., boilers, engines) will require self-certification through MassDEP's Environmental Results Program (ERP).

The boilers are expected to be within the requirements of the ERP since individual estimated heat inputs are within or below the 10 to 40 MMBtu/hour ERP range.

The ERP regulation applies to new emergency generators greater than 37 kW. The regulation is similar to the boiler ERP in that new engines are subject to emission standards, recordkeeping, certification, and compliance with the MassDEP noise policy. Since the generator maximum rating capacity will be greater than the ERP limit of 37 kW, it will be subject to the ERP program. Per ERP, the generator owner will limit operation of the generator to less than 300 hours per year and submit a certification form to MassDEP within 60 days of installation.

3.5.5 Conclusions

Results of the microscale analysis show that all predicted CO concentrations are well below 1-hour and 8-hour NAAQS. Therefore, it can be concluded that there will be no adverse air quality impacts resulting from increased traffic in the area.

3.6 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 25025C0077G, indicates the FEMA Flood Zone Designations for the site area and shows that the Project site is located in a Zone X, Area of Minimal Flooding.

The site does not contain wetlands.

3.7 Geotechnical/Groundwater

3.7.1 Introduction

This section includes a description of existing site conditions, subsurface soil and groundwater conditions, planned below-grade construction activities for the Project, procedures for monitoring and protecting adjacent structures and maintaining groundwater levels in the Project area during excavation and foundation construction, and following construction completion.

3.7.2 Existing Site Conditions

The Project site consists of three parcels totaling approximately 47,360 square feet of land area. The eastern portion of the site fronting on Washington Street and East Berkeley Street is currently used as an auto repair facility, and the western portion of the Project site fronting on Shawmut Avenue and East Berkeley Street is used as a surface public parking lot. The auto repair facility is paved and has a small, one story building with approximately 31 accessory parking spaces. The public parking lot contains 89 public parking spaces and an attendant's booth and is otherwise undeveloped. Figures 1-2 and 1-3 provide photographs of existing site conditions. Ground surface along the East Berkeley Street side of the Project is about El. 14 to El. 15.5 Boston City Base (BCB), sloping upward gradually to about El. 17 to El. 18 BCB along the north side of the Project.

The existing one-story building and the parking attendant's booth will be demolished and removed to accommodate the Project.

3.7.3 Subsurface Soil and Bedrock Conditions

Based on subsurface data obtained at the site during a test boring exploration program undertaken for the Proponent and available subsurface data collected by others in the general Project area, the general subsurface profile is listed in Table 3.7.-1 in order of increased depth below the ground surface:

Table 3.7-1	Subsurface Soil and Bedrock Conditions in Project Area

Generalized Subsurface Strata	Approximate Depth Below Ground Surface to Top of Stratum (feet)	Approximate Thickness (feet)
Miscellaneous (Urban) Fill	Not Applicable	10 to 14
Marine (Clay) Deposits	10 to 14	81 to 98
Glacial Deposits	95 to 108	8 to 11
Bedrock	106 to 116	Not Applicable

Generalized descriptions of the strata are described below:

- *Miscellaneous (Urban) Fill* – The Project site consists of filled land reclaimed from the former Back Bay tidal flats during the late 1800s. The composition of this material varies, but typically consists of loose to medium dense, brown to gray, poorly graded sand with silt and gravel, and/ or medium dense brown silty sand with gravel, and/or medium dense gray to black sandy silt with gravel, and having varying amounts of concrete, cinders, metal, brick, and other miscellaneous materials. Buried building demolition debris, rubble from pre-existing buildings, and remnant foundation walls, slabs and utilities may also be encountered within and beneath the footprint of former rowhouse buildings that occupied the site until about the early 1960s.

- *Marine (Clay) Deposits* – The clay, known locally as Boston Blue Clay, is very stiff to stiff at the top of the stratum ("crust"), becoming softer with depth, and is generally described as olive gray to gray lean clay with occasional seams of sandy silt/silty sand.

- *Glacial Deposits* – A dense to medium dense gray poorly graded sand and/or clayey sand (glaciomarine deposits) was encountered below the marine deposits.

- *Bedrock* - Bedrock is anticipated to be encountered below the glacial deposits at depths of about 106 to 116 feet.

3.7.4 Existing Groundwater Conditions

The Project site is located in the South End neighborhood, which is part of Boston's Groundwater Conservation Overlay District (GCOD), which includes those areas in Boston having wood pile supported buildings that are potentially susceptible to the possible effects of depressed groundwater levels. Groundwater levels need to be above the tops of the wood piles to keep the piles submerged and lessen the potential for the wood to decay. Groundwater levels in the vicinity of the Project site are monitored by the Boston Groundwater Trust, an entity that tracks and reports groundwater levels in the GCOD. The Proponent has contacted the Boston Groundwater Trust to discuss the Project and measures to protect groundwater during construction as the design progresses.

Recent groundwater level measurements in observation wells in proximity to the Project site have ranged from El. 3.6 to El. 8.4 (BCB). Groundwater levels at and near the site could be influenced by leakage into and out of sewers, storm drains, water utilities, and other below-grade structures, and environmental factors such as precipitation, season, and temperature.

3.7.5 Proposed Foundation and Below Ground Construction

The Project will include construction of an 11-story above-grade building with two underground levels. Construction of the underground structure and building foundations will require an excavation from current ground surface (El. 14 to El. 18 BCB) to about El. -14.5 BCB, which corresponds to a depth of about 28.5 feet to 32.5 feet below current ground surface. The bottom of the excavation is anticipated to terminate within the Marine (Clay) Deposits, the design bearing strata for the new building's foundation system. The foundation system selected for the new building is anticipated to be composed of a reinforced concrete mat slab foundation.

In advance of the excavation and foundation construction, an excavation support system will be installed around the perimeter of the entire site to control the limits of the excavation, mitigate adverse impacts to adjacent properties, control groundwater seepage, and maintain current groundwater levels outside the excavation. Although the wall system has not yet been selected, it is anticipated to consist of a continuous interlocking steel sheetpile wall installed from ground surface and sealed into the relatively impervious Marine Deposits anticipated below the bottom of excavation.

Because of the nature of the near surface fill soils, pre-excavation will be performed in advance of installing the excavation support wall. The intent of the pre-excavation is to remove foundations and other buried obstructions from former site buildings that could interfere with installation of the excavation support walls. The Proponent will seek a license from the City to install the excavation support walls in the public right-of-way along the two sides bordered by East Berkeley Street and Washington Street.

Due to the depth of excavation, which will be made using conventional methods, lateral bracing of the walls will be required as the excavation is advanced down to foundation subgrade level. Lateral bracing of the excavation support wall will be by internal systems, likely comprised of up to two levels of steel beam struts spanning opposing walls and across corners; external bracing (tiebacks) will not be allowed.

Temporary dewatering will be required inside the excavation to remove groundwater and precipitation during excavation and foundation construction. The relatively watertight excavation support wall will prevent any significant withdrawal of groundwater from beyond the excavation limits. Applicable temporary construction dewatering permits will be obtained from governing agencies, as required, prior to discharge of dewatering effluent from the site. Chemical testing of the effluent will be conducted in accordance with permit criteria prior during discharge to municipal systems.

The proposed below-grade construction, which will extend approximately 18 to 23 feet below groundwater levels, will be fully waterproofed and designed to resist hydrostatic pressures. In this manner, the below grade construction will be designed to not adversely affect (lower) long-term groundwater levels. The Proponent will contact the Boston Groundwater Trust to discuss the Project and measures to protect groundwater as the design progresses. See Section 6.4.1 for additional information regarding compliance with Article 32 of the Code.

3.7.6 Potential Impacts During Excavation and Foundation Construction

Potential impacts during excavation and foundation construction include impacts to area groundwater levels and ground and building movements due to excavation. Additionally, construction activities will generate ground vibrations, dust, and noise. The excavation support wall and foundation design and construction will be conducted to limit potential adverse impacts, especially to adjacent structures and to groundwater levels.

3.7.7 Mitigation Measures

Provisions will be incorporated into the design and construction contract documents and procedures to limit potential adverse impacts, including the following: The design team will conduct studies, prepare designs and specifications, and review contractor's submittals for conformance to the Project contract documents, with specific attention to protection of nearby structures and facilities and to maintaining existing groundwater levels. In particular, selection of building foundation systems and excavation support systems and their details will be made taking into consideration mitigation of adverse temporary and long-term effects outside the site.

- ♦ Performance criteria will be established in the Project specifications for the excavation support systems with respect to movements, water-tightness and the construction sequence of the below-grade portion of the work. The contractor will be required to employ, and modify as necessary, construction methods and take necessary steps during the work to protect nearby buildings and other facilities.

- Performance criteria will be established for protection of groundwater levels in the vicinity of the Project. The contractor will be required to modify construction methods and take necessary steps during the work to not lower groundwater levels outside the limits of the site.

- Geotechnical instrumentation will be installed and monitored during the below-grade portion of the work to observe the performance of the excavation, adjacent buildings and structures, and area groundwater levels. Groundwater observation wells will be monitored prior to and during construction activities. When construction begins, groundwater observation wells will be monitored regularly for the duration of the below-grade construction period.

3.8 Solid and Hazardous Waste

3.8.1 Classification and Removal of Hazardous Materials

Prior to commencement of the work, investigations will be performed at the site and in the area of the existing building to evaluate the presence of contaminated soils, groundwater, asbestos, lead paint, and other hazardous materials that may exist. If such materials are present, they will be characterized based on the type, composition, and level of the contaminants. Work plans will be prepared by appropriately licensed professionals to identify the means and methods for safe removal and legal disposal or recycling of these materials.

Abatement and disposal of hazardous materials (or hazardous waste) discovered in the existing building will be performed prior to demolition of the buildings by specialty contractors experienced and licensed in removing and handling these materials.

Excess soils generated from excavations on site and not reused on site will be legally transported off site and disposed of in accordance with the Massachusetts Contingency Plan and other applicable regulatory requirements. Disposal of excess excavated soil materials will be tracked via Bills of Lading or other methods, as required to ensure their proper and legal transport and disposal in accordance with MassDEP regulations.

3.8.2 Solid Waste

The Project will generate solid waste typical of office and retail and/or restaurant uses. Solid waste is expected to include wastepaper, cardboard, and glass bottles, and food. Recyclable materials will be recycled through a program implemented by building management. It is anticipated that the Project will generate approximately 467.6 tons of solid waste per year.

With the exception of household hazardous wastes typical of office developments, the Project will not involve the generation, use, transportation, storage, release, or disposal of potentially hazardous materials. Typical waste generated by the office and retail and/or restaurant uses will be handled in compliance with all local, state and federal regulations.

Dedicated recycling areas will be included in the design. Building occupant waste recycling will be encouraged through the use of a building recycling program and facility.

3.9 Noise

3.9.1 Introduction

The Project's sound level assessment 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 mechanical equipment associated with the Project, and a comparison of future Project sound levels to applicable noise regulations, including the City of Boston Zoning District Noise Standards and the MassDEP Noise Policy.

The analysis, which is consistent with BRA requirements for noise studies, indicates that predicted noise levels from the Project with appropriate noise controls will comply with both state and local regulations.

3.9.2 Noise Terminology

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

The decibel scale is logarithmic to accommodate the wide range of sound intensities observed in the environment. A property of the decibel scale is that the sound pressure levels of two distinct sounds are not purely additive. For example, if a sound of 50 dB is added to another sound of 50 dB, the total is only a three-decibel increase (53 dB), not a doubling (100 dB). Thus, every three-decibel change in sound level represents a doubling or halving of sound energy. Related to this is the fact that a change in sound level of less than three dB is generally imperceptible to the human ear.

Another property of the decibel scale is that if one source of noise is 10 dB (or more) louder than another source, then the total combined sound level is simply that of the louder source (i.e., the quieter source contributes negligibly to the overall sound level). For example, a source of sound at 60 dB plus another source at 47 dB is 60 dB.

The sound level meter used to measure noise is a standardized instrument.[9] It contains "weighting networks" to adjust the frequency response of the instrument to approximate that of the human ear under various conditions. One network is the A-weighting network (there are also B- and C-weighting networks), which most closely approximates how the human ear responds to sound as a function of frequency, and is the accepted scale used for community sound level measurements. Sounds are frequently reported as detected with the A-weighting network of the sound level meter, in dBA. A-weighted sound levels emphasize the middle frequencies (*i.e.,* middle pitched – around 1,000 Hertz sounds), and de-emphasize lower- and higher-frequencies.

Because the sounds in the environment vary with time, they cannot simply be represented with a single number. In fact, there are several methods used for quantifying variable sounds which are commonly reported in community noise assessments, as defined below.

- L_{eq}, the equivalent level, in dBA, is the level of a hypothetical steady sound that would have the same energy (*i.e.,* the same time-averaged mean square sound pressure) as the actual fluctuating sound observed.

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

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

- L_{10} is the sound level, in dBA, exceeded only 10 percent of the time in a given measurement period. The L_{10}, or intrusive sound level, is close to the maximum sound level observed due to occasional louder intermittent noises, like those from passing motor vehicles.

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

By employing various noise metrics it is possible to separate prevailing, steady sounds (the L_{90}) from occasional louder sounds (L_{10}) in the noise environment. The analysis treats all noise sources from the Project as though the emissions will be steady and continuous, described most accurately by the L_{90} exceedance level.

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

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9 *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.

octave frequency bands being those established by standard. To facilitate the noise-control design process, the estimates of noise levels in the analysis are also presented in terms of octave-band sound pressure levels.

3.9.3 Noise Regulations and Criteria

The primary set of regulations relating to the potential increase in noise levels is the City of Boston Zoning District Noise Standards (City of Boston Code – Ordinances: Section 16–26 Unreasonable Noise and City of Boston Air Pollution Control Commission Regulations for the Control of Noise in the City of Boston). Results of the baseline ambient sound level survey and the modeled Project sound levels were compared to the City of Boston Zoning District Noise Standards. Separate regulations within the Standards provide criteria to control different types of noise. Regulation 2 is applicable to the effects of the Project, as completed, and is considered in this noise study. Table 3.9-1 includes the Zoning District Standards.

Table 3.9-1 City of Boston Zoning District Noise Standards, Maximum Allowable Sound Pressure Levels

Octave-band Center Frequency (Hz)	Residential Zoning District		Residential-Industrial Zoning District		Business Zoning District	Industrial Zoning District
	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:

- Noise standards are extracted from Regulation 2.5, City of Boston Air Pollution Control Commission, "Regulations for the Control of Noise in the City of Boston", adopted December 17, 1976.
- All standards apply at the property line of the receiving property.
- dB and dBA based on a reference sound pressure of 20 micropascals.
- 'Daytime' refers to the period between 7:00 a.m. and 6:00 p.m. daily, excluding Sunday.

Additionally, MassDEP has the authority to regulate noise under 310 CMR 7.10, which is part of the Commonwealth's air pollution control regulations. According to MassDEP, "unnecessary" noise is considered an air contaminant and thus prohibited by 310 CMR 7.10. MassDEP administers this regulation through Noise Policy DAQC 90-001 which limits a source to a 10-dBA increase above the L_{90} ambient sound level measured at the Project property line and at the nearest residences. The MassDEP policy further prohibits "pure tone" conditions where the sound pressure level in one octave-band is 3 dB or more greater than the sound levels in each of two adjacent bands.

3.9.4 Existing Conditions

A background noise level survey was conducted to characterize the existing "baseline" acoustical environment in the vicinity of the Project, located within the South End neighborhood of Boston, Massachusetts. Existing noise sources in the vicinity of the Project site currently include: vehicular traffic along local roadways; birds; wind noise; light leaf rustle; aircraft flyovers; pedestrian conversation and foot traffic; mechanical equipment located on the surrounding buildings; industrial loading/unloading activities; and the general noises of the City.

3.9.4.1 Noise Monitoring Methodology

Sound level measurements were made on Monday, July 8, 2013 during the daytime (12:00 p.m. to 4:00 p.m.) and on Tuesday, July 16, 2013 during nighttime hours (12:00 a.m. to 4:00 a.m.). 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. Daytime measurements were scheduled to avoid peak traffic conditions. 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.

3.9.4.2 Noise Monitoring Locations

The selection of the noise monitoring locations was based upon a review of zoning and land use in the Project area. Seven 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 3.9-1 and described below.

- **Location ST-1** was located at the southwest corner of the South Cove Manor Apartment garage along Shawmut Avenue. This location was selected to represent sound levels at residential receptors along Shawmut Avenue north of the Project.

- **Location ST-2** was located on the sidewalk of the Waterford Place Apartments along Shawmut Avenue. This location was selected to represent sound levels at residential receptors along Shawmut Street immediately north and west of the Project.

- **Location ST-3** was located east of Shawmut Avenue along East Berkeley Street. This location was selected to represent sound levels at residential receptors along East Berkeley Street south and southwest of the Project.

- **Location ST-4** was located at the southwest corner of the intersection of East Berkeley Street and Harrison Avenue. This location was selected to represent sound levels at residential receptors along East Berkeley Street southeast of the Project.

- **Location ST-5** was located on the western sidewalk of Harrison Avenue just north of East Berkeley Street. This location was selected to represent sound levels at residential receptors along Harrison Avenue east of the Project.

- **Location ST-6** was located along the eastern sidewalk of Harrison Avenue just south of Traveler Street. This location was selected to represent sound levels at industrial receptors along Harrison Avenue east of the Project.

- **Location ST-7** was located at the northeast corner of Washington Street and Mullins Way. This location was selected to represent sound levels at commercial receptors along Washington Street east and northeast of the Project.

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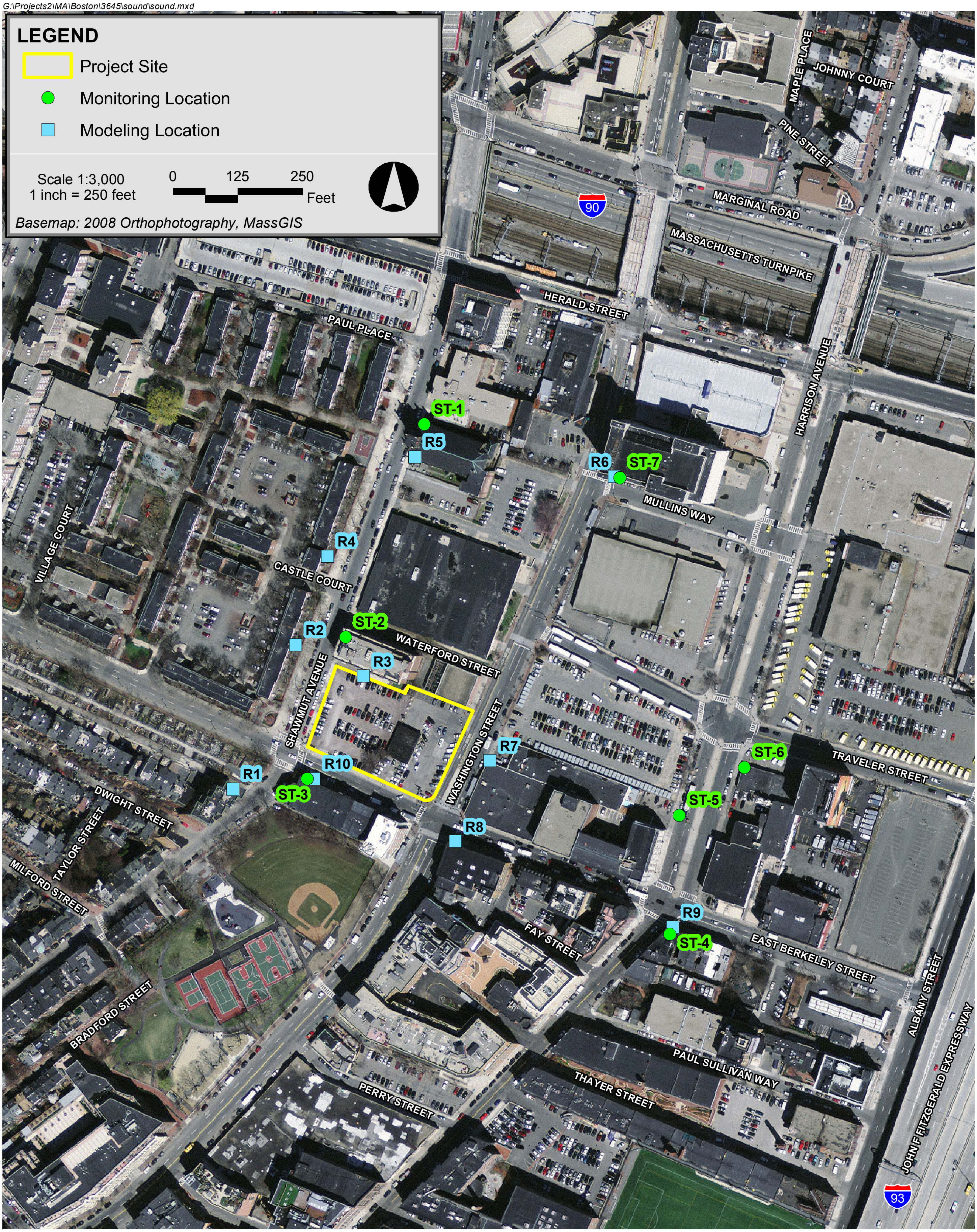


80 East Berkeley Street   Boston, Massachusetts

Figure 3.9-1

Noise Monitoring and Modeling Locations

3.9.4.3 Noise Monitoring Equipment

A Larson Davis Model 831 sound level meter equipped with a PRM831 Type I Preamplifier, a 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 American National Standards Institute (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 (L_{eq}, L_{90}, etc.) were calculated for each 20-minute sampling period, with octave-band sound levels corresponding to the same data set processed for the broadband levels.

3.9.4.4 Measured Background Noise Levels

Baseline noise monitoring results are presented in Table 3.9-2, and summarized below:

- The daytime residual background (L_{90} dBA) measurements ranged from 58 to 63 dBA;
- The nighttime residual background (L_{90} dBA) measurements ranged from 52 to 58 dBA;
- The daytime equivalent level (L_{eq} dBA) measurements ranged from 63 to 74 dBA;
- The nighttime equivalent level (L_{eq} dBA) measurements ranged from 55 to 62 dBA;

Table 3.9-2 Summary of Measured Background Noise Levels

Location	Period	Start Time	L_{eq}	L_{max}	L_{10}	L_{50}	L_{90}	L_{90} Sound Pressure Level by Octave-Band								
								32 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
			dBA	dBA	dBA	dBA	dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB
ST-1	Day	1:34 PM	64	75	66	63	60	64	65	62	60	57	55	50	46	37
ST-2	Day	1:11 PM	63	86	65	59	58	66	65	62	56	54	54	49	43	34
ST-3	Day	12:47 PM	70	91	72	63	59	64	65	62	57	55	55	50	45	34
ST-4	Day	4:23 PM	74	101	72	66	63	70	70	65	61	59	58	54	48	39
ST-5	Day	3:42 PM	65	84	66	63	61	69	69	64	58	56	54	52	54	44
ST-6	Day	3:16 PM	67	92	68	63	61	69	72	68	60	57	56	51	42	31
ST-7	Day	2:49 PM	71	98	70	64	60	68	68	65	60	56	56	51	44	35
ST-1	Night	12:10 AM	58	77	59	57	56	58	62	60	59	53	50	46	40	34
ST-2	Night	12:33 AM	55	72	56	53	52	58	60	58	52	49	46	41	34	26
ST-3	Night	12:56 AM	59	79	60	55	54	57	62	61	55	51	47	41	35	29
ST-4	Night	2:42 AM	60	77	61	59	58	63	64	62	57	55	53	48	40	31
ST-5	Night	2:20 AM	59	76	60	58	57	63	64	62	57	54	51	47	40	32
ST-6	Night	1:57 AM	60	73	63	57	55	62	64	62	57	52	49	44	36	26
ST-7	Night	1:31 AM	62	89	58	54	53	59	61	61	54	50	47	41	33	25

Weather Conditions:

	Date	Temp	RH	Sky	Wind
Daytime	Monday, July 08, 2013	81.1 °F	64%	Partly Cloudy	0-5 mph
Nighttime	Tuesday, July 16, 2013	81.8 °F	68%	Clear	0-6 mph

Monitoring Equipment Used:

	Manufacturer	Model	S/N
Sound Level Meter	Larson Davis	LD831	3047
Microphone	Larson Davis	377B20	LW130579
Preamp	Larson Davis	PRM831	23825
Calibrator	Larson Davis	CAL200	7147

3.9.5 Future Conditions

3.9.5.1 Overview of Potential Project Noise Sources

The primary sources of continuous sound exterior to the Project will include ventilation, cooling, and emergency power noise sources, the majority of which will be rooftop in nature with the exception of several exhaust fans related to parking garage ventilation.

Two cooling towers, one office ventilation air unit, and three restaurant kitchen exhaust fans will be located within a well on the roof of the proposed building, while eight garage ventilation fans will be exhausted horizontally at-grade through two intake and two exhaust duct breakthroughs. Other secondary noise sources, such as domestic hot water heaters, boilers, and pumps will be enclosed within a solid rooftop mechanical penthouse and were not considered in this analysis to contribute significantly to the overall sound level. Ventilation fans proposed for the rooftop mechanical penthouse will be much smaller in size and were not anticipated to be a significant source of noise. Stair pressurization fans were assumed to be for emergency use only and are therefore were not considered a steady source of mechanical noise.

One emergency diesel generator will be located at roof level in a dedicated weather-proof, sound-attenuating enclosure, exhausted vertically. It is assumed that this generator will only operate during the day for brief, routine testing when background sound levels will be higher or during an emergency interruption of the electrical grid when other rooftop mechanical equipment will not be operating.

Mitigation will be applied to sources as needed, to ensure compliance with the applicable noise regulations. The noise control features assumed in this analysis, as described in Table 3.9-4, were a solid 15-foot screening penthouse wall along the roofline surrounding the mechanical well, acoustical louvers on the garage supply/exhaust duct breakthroughs, a generator enclosure, and a critical-grade generator exhaust silencer.

A tabular summary of the modeled mechanical equipment proposed for the Project is presented below in Table 3.9-3a. Sound power level data for each unit, as provided by the manufacturer or calculated from provided sound pressure level data, is presented in Table 3.9-3b. Sound power levels of those units for which data was not provided were assumed based on data for similar or representative equipment. The approximate locations of the mechanical equipment were provided by the Project Team in a preliminary roof plan.

Table 3.9-3a Modeled Noise Sources

Noise Source	Quantity	Location	Size/Capacity per Unit
Office Ventilation Air Unit	1	Roof at 152′ AGL	45,000 CFM
Cooling Tower	2	Roof at 152′ AGL	450 Ton
Kitchen Exhaust Fan	3	Roof at 152′ AGL	15,000 CFM
Garage Ventilation Fan	8	At-Grade at 0' AGL	12,000 CFM

Table 3.9-3b Modeled Sound Power Levels per Unit

Noise Source	Broadband	32 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
	dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB
Office Ventilation Air Unit[1] (Unenclosed)	112	102	102	104	114	107	106	101	103	98
Cooling Tower[2]	93	101	101	98	90	89	88	84	82	81
Garage Ventilation Intake Fan[3]	90	77	77	86	91	88	84	81	78	69
Garage Ventilation Exhaust Fan[4]	92	84	84	84	87	89	88	84	80	69
Kitchen Exhaust Fan[5]	96	102	102	100	99	92	90	86	79	73
Emergency Generator – Mechanical[6] (Enclosed)	102	117	117	111	107	98	91	89	86	80
Emergency Generator – Exhaust[7] (Open)	125	116	116	116	119	118	120	117	117	105

Notes:

1. RK+-500-HW-C-H-ACCUi, 2" insulation, DW, Unenclosed
2. Evapco AT/UT/USS Cooling Tower, 450 Ton, Single-cell with super low sound fan
3. Greenheck QEI-22-I Mix Flow Fan, 12,000 CFM, Inlet
4. Greenheck QEI-22-I Mix Flow Fan, 12,000 CFM, Outlet
5. Assumed Greenheck 30-BISW-21 Fan, 15,500 CFM, Outlet
6. Caterpillar C18DE97 600 kW Diesel Generator Set, SA Canopy
7. Caterpillar C18DE97 600 kW Diesel Generator Set, Open Exhaust

Table 3.9-4 Attenuation Values Used for Noise Modeling (dB)

Noise Control	Noise Source	Noise Reduction (dB) per Octave-band Center Frequency (Hz)								
		32	63	125	250	500	1000	2000	4000	8000
Exhaust Silencer[1]	Emergency Generator Exhaust	-	20	35	35	27	20	20	22	22
Office Ventilation Air Unit Enclosure[2]	Office Ventilation Air Unit	-	10	19	27	34	37	40	40	40
Acoustical Louvers[3]	Garage Exhaust Fans	-	15	14	15	19	30	31	29	29

Notes:

1. JB Series Critical Grade Silencer (JB-18)
2. RK+-500-HW-C-H-ACCUi, 2" insulation, DW
3. Safe Air Dowco Model UFD-12 Acoustical Louver

3.9.5.2 Noise Modeling Methodology

Noise impacts from mechanical equipment associated with the Project were predicted using Cadna/A noise calculation software (DataKustik Corporation, 2005). This software, which uses the ISO 9613-2 international standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation), offers a refined set of computations accounting for local topography, ground attenuation, drop-off with distance, barrier shielding, diffraction around building edges, reflection off building facades, and atmospheric absorption of sound from multiple noise sources.

An initial analysis considered all of the mechanical equipment without the emergency generator running, to simulate typical nighttime operating conditions at nearby receptors. A second analysis combined the mechanical equipment and the emergency generator, to reflect worse-case daytime conditions during brief, routine, testing of the generator.

3.9.5.3 Noise Modeling Results

In the first modeling scenario, the analysis of sound levels at night considered all of the mechanical equipment without the emergency generator running, to simulate typical nighttime operating conditions at nearby receptors. In the second modeling scenario, the analysis combined sound emissions from the mechanical equipment and the emergency generator, to reflect worse-case conditions during brief, routine, daytime testing of the generator when ambient levels are higher. Ten modeling locations with a height of 1.5 meters above-grade were included in both analyses, consisting of nearby residential, and commercial locations, and were evaluated against the applicable daytime or nighttime background sound levels and noise limits. Figure 3.9-1 shows the locations of each modeled receptor as well as the monitoring locations selected for background measurements.

In both scenarios, the predicted future sound levels (Project + Background) are well below the MassDEP criteria of 10dBA over the measured background L_{90} sound levels at all sensitive receptor locations. This evaluation, with and without the emergency generator, is presented in Tables 3.9-5a and b, respectively. The Project's mechanical equipment is not expected to create or exacerbate any "pure-tone" conditions as defined by MassDEP when combined with existing background sound levels at these locations. Predicted sound levels combining Project and background sources are shown with and without the emergency generator in Tables 3.9-6a and b, respectively. Additionally, modeled sound levels from Project equipment are within the most stringent broadband and octave-band residential zoning limits for the City of Boston at the closest residential receptors and also meet the business and industrial limits where applicable. This evaluation is presented with and without the emergency generator in Tables 3.9-7a and b, respectively.

Table 3.9-5a MassDEP Compliance Evaluation (*With* Emergency Generator)

Receptor Description	Receptor ID	Land Use	Representative Background ID	Evaluation Period	Measured Background Noise Level	Modeled Project-Only Noise Level	Combined Project + Background Noise Level	Project Impact[1]	Meets MassDEP Noise Policy?
					dBA	dBA	dBA	dBA	
R1	R1	Residential	ST-3	Day	59	38	59	0	YES
R2	R2	Residential	ST-2	Day	58	42	58	0	YES
R3	R3	Residential	ST-2	Day	58	48	58	0	YES
R4	R4	Residential	ST-2	Day	58	41	58	0	YES
R5	R5	Residential	ST-1	Day	60	39	60	0	YES
R6	R6	Commercial	ST-7	Day	60	39	60	0	YES
R7	R7	Commercial	ST-6	Day	61	37	61	0	YES
R8	R8	Residential	ST-6	Day	61	39	61	0	YES
R9	R9	Residential	ST-4	Day	63	33	63	0	YES
R10	R10	Residential	ST-3	Day	59	42	59	0	YES

1. Calculation of increase over background performed using data rounded to nearest whole decibel

Table 3.9-5b MassDEP Compliance Evaluation (*Without* Emergency Generator)

Receptor Description	Receptor ID	Land Use	Representative Background ID	Evaluation Period	Measured Background Noise Level	Modeled Project-Only Noise Level	Combined Project + Background Noise Level	Project Impact[1]	Meets MassDEP Noise Policy?
					dBA	dBA	dBA	dBA	
R1	R1	Residential	ST-3	Night	54	34	54	0	YES
R2	R2	Residential	ST-2	Night	52	37	52	0	YES
R3	R3	Residential	ST-2	Night	52	44	52	0	YES
R4	R4	Residential	ST-2	Night	52	36	52	0	YES
R5	R5	Residential	ST-1	Day	60	34	60	0	YES
R6	R6	Commercial	ST-7	Day	60	33	60	0	YES
R7	R7	Commercial	ST-6	Day	61	33	61	0	YES
R8	R8	Residential	ST-6	Night	55	36	55	0	YES
R9	R9	Residential	ST-4	Night	58	29	58	0	YES
R10	R10	Residential	ST-3	Night	54	40	54	0	YES

[1] Calculation of increase over background performed using data rounded to nearest whole decibel

Table 3.9-6a MassDEP "Pure Tone" Evaluation: Combined Project + Background Levels (*With* Emergency Generator)

Receptor ID	Land Use	Period	dBA	32 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
				dB	dB	dB	dB	dB	dB	dB	dB	dB
R1	Residential	Day	59	66	66	62	58	55	55	50	45	34
R2	Residential	Day	58	68	66	62	56	54	54	49	43	34
R3	Residential	Day	58	69	66	63	57	55	54	49	44	35
R4	Residential	Day	58	67	66	62	56	54	54	49	43	34
R5	Residential	Day	60	65	65	62	60	57	55	50	46	37
R6	Commercial	Day	60	68	69	65	60	56	56	51	44	35
R7	Commercial	Day	61	70	72	68	60	57	56	51	42	31
R8	Residential	Day	61	70	72	68	60	57	56	51	42	31
R9	Residential	Day	63	70	70	65	61	59	58	54	48	39
R10	Residential	Day	59	66	66	62	58	55	55	50	45	34

Table 3.9-6b MassDEP "Pure Tone" Evaluation: Combined Project + Background Levels (*Without* Emergency Generator)

Receptor ID	Land Use	Period	dBA	32 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
				dB	dB	dB	dB	dB	dB	dB	dB	dB
R1	Residential	Night	54	58	62	61	55	51	47	41	35	29
R2	Residential	Night	52	59	61	58	53	49	46	41	34	26
R3	Residential	Night	52	60	61	58	54	50	46	42	35	26
R4	Residential	Night	52	59	61	58	53	49	46	41	34	26
R5	Residential	Day	60	64	65	62	60	57	55	50	46	37
R6	Commercial	Day	60	68	68	65	60	56	56	51	44	35
R7	Commercial	Day	61	69	72	68	60	57	56	51	42	31
R8	Residential	Night	55	62	64	62	57	52	49	44	36	26
R9	Residential	Night	58	63	64	62	57	55	53	48	40	31
R10	Residential	Night	54	58	62	61	55	51	47	41	35	29

Table 3.9-7a City of Boston Compliance Evaluation: Project-Only Modeling Results (*With* Emergency Generator)

Receptor ID		Land Use	Period	dBA	32 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
					dB	dB	dB	dB	dB	dB	dB	dB	dB
R1		Residential	Day	38	62	56	47	41	32	30	26	20	2
R2		Residential	Day	42	64	58	50	44	38	35	31	25	8
R3		Residential	Day	48	65	60	53	50	45	42	38	33	19
R4		Residential	Day	41	62	57	49	44	35	33	29	23	5
R5		Residential	Day	39	61	56	49	43	33	32	26	19	0
R6		Commercial	Day	39	60	56	48	43	33	32	25	16	0
R7		Commercial	Day	37	59	53	44	39	32	30	26	20	3
R8		Residential	Day	39	60	54	45	42	35	31	27	21	4
R9		Residential	Day	33	56	51	43	37	27	24	18	10	0
R10		Residential	Day	42	63	57	48	46	39	34	30	25	11
City of Boston Noise Limits	Residential		Day	60	76	75	69	62	56	50	45	40	38
			Night	50	68	67	61	52	46	40	33	28	26
	Residential/Industrial		Day	65	79	78	73	68	62	56	51	47	44
			Night	55	72	71	65	57	51	45	39	34	32
	Business		Day	65	79	78	73	68	62	56	51	47	44
			Night	65	79	78	73	68	62	56	51	47	44
	Industrial		Day	70	83	82	77	73	67	61	57	53	50
			Night	70	83	82	77	73	67	61	57	53	50

Table 3.9-7b City of Boston Compliance Evaluation: Project-Only Modeling Results (*Without* Emergency Generator)

Receptor ID	Land Use	Period	dBA	32 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
				dB	dB	dB	dB	dB	dB	dB	dB	dB
R1	Residential	Night	34	51	48	42	39	31	24	19	12	0
R2	Residential	Night	37	53	48	43	40	36	28	23	17	5
R3	Residential	Night	44	56	51	48	48	44	36	31	26	15
R4	Residential	Night	36	51	49	45	40	32	28	23	15	1
R5	Residential	Day	34	50	47	43	38	30	26	20	10	0
R6	Commercial	Day	33	48	46	42	37	29	24	16	5	0
R7	Commercial	Day	33	50	45	40	36	30	25	20	12	0
R8	Residential	Night	36	50	46	41	41	34	25	20	15	2
R9	Residential	Night	29	46	44	38	33	25	19	12	2	0
R10	Residential	Night	40	52	48	44	45	38	28	24	19	9
City of Boston Noise Limits	Residential	Day	60	76	75	69	62	56	50	45	40	38
		Night	50	68	67	61	52	46	40	33	28	26
	Residential/Industrial	Day	65	79	78	73	68	62	56	51	47	44
		Night	55	72	71	65	57	51	45	39	34	32
	Business	Day	65	79	78	73	68	62	56	51	47	44
		Night	65	79	78	73	68	62	56	51	47	44
	Industrial	Day	70	83	82	77	73	67	61	57	53	50
		Night	70	83	82	77	73	67	61	57	53	50

3.9.6 Conclusions

Baseline noise levels were measured in the vicinity of the Project site and were compared to predicted noise levels based on information provided by the manufacturers of representative mechanical equipment or estimated from the equipment's capacity. With appropriate mitigation (as included in the analysis and listed below), the Project is not expected to introduce significant outdoor mechanical equipment noise into the surrounding community.

The recommended mitigation measures are as follows:

- The emergency generator should be fitted with a critical-grade exhaust silencer and sound-attenuating enclosure, similar to that specified in Tables 3.9-3b and 3.9-4. Routine testing of the generator should be scheduled during daytime hours only when background sound levels are higher.

- Each garage ventilation duct breakthrough should be fitted with acoustical louvers to minimize at-grade mechanical noise from the Project.

Results of the analysis indicate that noise levels from the Project at the nearest receptors will be equal to or below the City of Boston Noise Zoning requirements based on land use, and will comply with MassDEP A-weighted and tonal noise limits. The results presented in Section 3.9.5.3 indicate that the Project can operate without significant impact on the existing acoustical environment.

At this time, the mechanical equipment and noise controls are conceptual in nature and, during the final design phase of the Project, will be specified to meet the applicable City of Boston and MassDEP noise limits. Additional mitigation may include the selection of quieter units, acoustical louvers, screening walls, mufflers, or equipment enclosures, as needed.

3.10 Construction

In accordance with Article 80 of the Code, a Construction Management Plan ("CMP") in compliance with the City's CMP will be submitted to BTD once final plans are developed and the construction schedule is determined for the Project. The CMP will include detailed information on construction activities, specific construction mitigation measures, and construction materials, access and staging area plans to minimize impacts to abutters and the local community. The construction contractor will be required to comply with the details and conditions of the approved CMP.

3.10.1 Construction schedule

Construction of the Project is estimated to last approximately twenty-four months, with initial site work expected to begin in the second quarter of 2014. There will be a one-month site mobilization period.

The City of Boston allows construction work from 7:00 a.m. to 6:00 p.m. Monday through Friday. Construction outside of those hours requires a permit. Typical construction hours for the Project will be in compliance with the City's regulations with no work anticipated on the weekends. In the event that weekend work is necessary, the Proponent will obtain required City approvals.

The construction contractor will be responsible for coordinating construction activities during all phases of construction with City of Boston agencies to minimize potential scheduling and construction conflicts with other construction projects in the area.

3.10.2 Demolition

Existing buildings at the Project site -- 1115 Washington Street, a one-story, brick building containing an automotive repair garage, and a parking attendant's booth located on 68 East Berkeley Street -- will be demolished as part of the Project. Demolition debris will be disposed of at a properly licensed solid waste disposal facility.

During demolition, provisions will be made for the use of water spray to control the generation of dust. If asbestos-containing materials are identified, they will be treated as a special waste in accordance with MassDEP guidelines, and addressed and disposed of accordingly.

The contractor will contact the Building Materials Resource Center (BMRC) prior to demolition to discuss the potential for reusing building materials through the BMRC's program.

3.10.3 Construction Staging / Public Safety / Access

Construction truck access to the Project site will be outlined in the CMP described above.

The Proponent will ensure that staging areas are located to minimize impacts to pedestrian and vehicular flow. It may be necessary from time to time to temporarily occupy pedestrian walkways and parking lanes on Shawmut Avenue, East Berkeley Street, and Washington Street. Secure fencing, signage, and covered walkways may be employed to ensure the safety and efficiency of pedestrian and vehicular traffic flows. Sidewalk areas and walkways near construction activities will be well marked and lighted to protect pedestrians and ensure their safety. Pedestrian protection will be in place early in the construction process and will remain until construction completion. When necessary, police details will be provided to facilitate traffic flow. Construction procedures will be designed to meet OSHA safety standards for specific site construction activities.

3.10.4 Construction Air Quality

During the construction period, temporary effects on ambient air quality adjacent to the construction site may occur. Some construction activities will generate fugitive dust which may result in localized increases in particulate levels. The Project does not involve extensive or deep excavations, therefore air quality impacts associated with fugitive dust are anticipated to be minimal. The Proponent will explore participation in the MassDEP Diesel Retrofit Program.

The construction contract will provide for a number of strictly enforced measures to be used by contractors to reduce potential emissions and minimize impacts. These measures are expected to include the following:

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

3.10.5 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 the following:

- Instituting a proactive program to ensure compliance with the City of Boston noise limitation policy;

- Using appropriate mufflers on 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 with 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.

3.10.6 Construction Period Transportation Issues

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 CMP to be filed with BTD in accordance with the City's transportation maintenance plan requirements.

The Project will create approximately 300 construction jobs, although the number of workers required during the construction period will vary, depending upon the phase of construction. Because the construction workers will arrive and depart prior to peak traffic periods, the construction trips are not expected to impact local traffic conditions.

To reduce vehicle trips to and from the construction site, workers will be strongly encouraged to use public transportation. 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.

Specific delivery truck access routes will be established in consultation with BTD through its approval of the CMP required for the Project. Construction contracts will include clauses restricting truck travel to primary roads. Enforcement of truck routes will be accomplished through clauses in the subcontractors' agreements.

3.10.7 Protection of Utilities

Protection of Boston Water and Sewer Commission (BWSC) water, sewer, and drain lines will begin before commencement of site work. The Proponent will request that the locations of existing water, sewer, and drainage lines be marked by BWSC. Excavation in the area of existing water, sewer and drain lines will proceed with caution. Hand excavation will take place when excavation in the immediate area of pipe walls is required. BWSC will require additional protection measures if new pipes are to cross existing pipes.

Existing public and private infrastructure located within nearby public rights-of-way will be protected during construction of each component of the Project. The installation of proposed utility connections within public ways will be undertaken in accordance with BWSC, Boston Public Works Department, Dig-Safe Program, and applicable utility company requirements. Specific methods for constructing proposed utilities where they are near, 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 BWSC will require the Proponent to submit a General Service Application and a site plan for review prior to construction. The site plan must include existing water mains, sanitary sewers, storm drains, and proposed service connections.

3.10.8 Vibration Control

All means and methods for performing work at the Project site will be evaluated for potential vibration impacts on the buildings slated for rehabilitation and nearby buildings and utilities.

3.10.9 Generation and Disposal of Construction Debris

The Proponent will advise its contractor to take an active role with regard to the reprocessing and recycling of construction waste. The disposal contract should include requirements to allow for sufficient space for segregation, reprocessing, reuse and recycling of materials. For materials that cannot be recycled, solid waste will be transported in covered trucks to an approved solid waste facility, per MassDEP's Regulations for Solid Waste Facilities, 310 CMR 16.00. 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.

As discussed above, removal of any hazardous materials, lead, or asbestos will be undertaken in accordance with applicable regulations. Moreover, the contractor will contact the BMRC prior to the start of construction to discuss the potential for reusing building materials through the BMRC's program or donating materials to the BMRC.

3.10.10 Rodent Control During Construction

A rodent examination certificate will be filed with the building permit application to the City. Rodent inspection and monitoring and treatment will be carried out during and at the completion of construction work for the Project, in compliance with the City's requirements. Rodent extermination prior to work start-up consists of establishing treatment areas throughout the Project site. During the construction process, regular service visits will be made.

3.10.11 National Pollutant Discharge Elimination System

The Project will disturb one or more acres of land. As required under the National Pollutant Discharge Elimination System, the Proponent will obtain coverage under an Environmental Protection Agency Construction General Permit.

3.11 Sustainable Design

3.11.1 Green Building

The Proponent is highly committed to environmental stewardship and sustainable, energy efficient design strategies in the Project, including interior environments that are healthy for employees and visitors. The Project will include a number of sustainable building technologies, practices and materials in its design and construction.

As required under Article 37 of the Code, projects that are subject to Article 80B, Large Project Review, will be LEED Certifiable. The Project will meet or exceed the requirements of Article 37 of the Code. The Project Team will use the U.S. Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Rating System as a model for incorporating sustainable design strategies into the Project. It is anticipated that the Project will be certifiable at the LEED Silver level. The Proponent will continue to research additional sustainable and energy efficient measures as the building design progresses.

There are seven categories in the LEED certification guidelines: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation in Design Process and the additional Regional Priority Credits. The Project is targeting several credits which span the seven categories and enable the Project to meet Article 37 requirements as described below. The preliminary LEED-CS v2009 checklist is included as Figure 3.11-1

The Project is anticipating reaching the Silver level by targeting 50 credit points. There are a few additional credit points, listed in italics below, which are still under consideration as to whether or not the Proponent will attempt them; it may be determined that some of the credits under consideration may not be attainable. The LEED-CS v2009 checklist provides further information.

LEED v3 for Core and Shell Development 2009
Project Scorecard

Figure 3.11-1

Project Name: E Berkeley St
Project Address: Boston, MA

TOTALS

Yes	?	No
50	28	32

Yes	?	No			
25	2	1		**Sustainable Sites**	**28**
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
5			Credit 2	**Development Density & Community Connectivity**	5
1			Credit 3	**Brownfield Redevelopment**	1
6			Credit 4.1	**Alternative Transportation,** Public Transportation Access	6
2			Credit 4.2	**Alternative Transportation,** Bicycle Storage & Changing Rooms	2
3			Credit 4.3	**Alternative Transportation,** Low-Emitting & Fuel-Efficient Vehicles	3
2			Credit 4.4	**Alternative Transportation,** Parking Capacity	2
		1	Credit 5.1	**Site Development,** Protect or Restore Habitat	1
	1		Credit 5.2	**Site Development,** Maximize Open Space	1
1			Credit 6.1	**Stormwater Design,** Quantity Control	1
1			Credit 6.2	**Stormwater Design,** Quality Control	1
1			Credit 7.1	**Heat Island Effect,** Non-Roof	1
1			Credit 7.2	**Heat Island Effect,** Roof	1
	1		Credit 8	**Light Pollution Reduction**	1
1			Credit 9	**Tenant Design and Construction Guidelines**	1

Yes	?	No			
0	8	2		**Water Efficiency**	**10**
Y			Prereq 1	**Water Use Reduction, 20%** Reduction	Required
	4		Credit 1	**Water Efficient Landscaping**	2 to 4
				M Reduce Water Use by 50%	2
				M No Potable Water use for Irrigation	4
		2	Credit 2	**Innovative Wastewater Technologies** *** RP	2
	4		Credit 3	**Water Use Reduction**	2 to 4
				M 30% Reduction	2
				M 35% Reduction	3
				M 40% Reduction	4

Yes	?	No			
8	9	20		**Energy & Atmosphere**	**37**
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
7	3	11	Credit 1	**Optimize Energy Performance**	3 to 21
				Y 12% New Buildings or 8% Existing Building Renovations	3
				Y 14% New Buildings or 10% Existing Building Renovations	4
				Y 16% New Buildings or 12% Existing Building Renovations	5
				Y 18% New Buildings or 14% Existing Building Renovations	6
				Y 20% New Buildings or 16% Existing Building Renovations	7
				M 22% New Buildings or 18% Existing Building Renovations	8
				M 24% New Buildings or 20% Existing Building Renovations	9
				M 26% New Buildings or 22% Existing Building Renovations	10
				N 28% New Buildings or 24% Existing Building Renovations	11
				N 30% New Buildings or 26% Existing Building Renovations	12
				N 32% New Buildings or 28% Existing Building Renovations	13
				N 34% New Buildings or 30% Existing Building Renovations	14
				N 36% New Buildings or 32% Existing Building Renovations	15
				N 38% New Buildings or 34% Existing Building Renovations	16
				N 40% New Buildings or 36% Existing Building Renovations	17
				N 40% New Buildings or 36% Existing Building Renovations	16
				N 40% New Buildings or 36% Existing Building Renovations	17
				N 40% New Buildings or 36% Existing Building Renovations	18
				N 42% New Buildings or 38% Existing Building Renovations	18
				N 44% New Buildings or 40% Existing Building Renovations	19
				N 46% New Buildings or 42% Existing Building Renovations	20
				N 48% New Buildings or 44% Existing Building Renovations	21
		4	Credit 2	**On-Site Renewable Energy** 1% Renewable Energy use	4
	2		Credit 3	**Enhanced Commissioning**	2
	2		Credit 4	**Enhanced Refrigerant Management**	2
1		2	Credit 5.1	**Measurement & Verification:** Base Building	3
		3	Credit 5.2	**Measurement & Verification:** Tenant Submetering	3
	2		Credit 6	**Green Power**	2

Yes	?	No			
3	4	6		**Materials & Resources**	13
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
		5	Credit 1	**Building Reuse**	1 to 5
				N Reuse 25% of Existing Walls, Floors & Roof	1
				N Reuse 33% of Existing Walls, Floors & Roof	2
				N Reuse 42% of Existing Walls, Floors & Roof	3
				N Reuse 50% of Existing Walls, Floors & Roof	4
				N Reuse 75% of Existing Walls, Floors & Roof	5
2			Credit 2	**Construction Waste Management**	1 to 2
				Y Divert 50% from Disposal	1
				Y Divert 75% from Disposal	2
		1	Credit 3	**Materials Reuse,** (5%)	1
1	1		Credit 4	**Recycled Content**	1 to 2
				Y 10% (post-consumer + ½ pre-consumer)	1
				M 20% (post-consumer + ½ pre-consumer)	2
	2		Credit 5	**Regional Materials, 10%** Extracted, Processed & Manufactured Regionally	1 to 2
				M 10% Extracted, Processed & Manufactured Regionally	1
				M 20% Extracted, Processed & Manufactured Regionally	2
	1		Credit 6	**Certified Wood**	1

Yes	?	No			
7	2	3		**Indoor Environmental Quality**	12
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	Required
1			Credit 1	**Outdoor Air Delivery Monitoring**	1
		1	Credit 2	**Increased Ventilation**	1
1			Credit 3	**Construction IAQ Management Plan,** During Construction	1
1			Credit 4.1	**Low-Emitting Materials,** Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials,** Paints & Coatings	1
1			Credit 4.3	**Low-Emitting Materials,** Flooring Systems	1
	1		Credit 4.4	**Low-Emitting Materials,** Composite Wood & Agrifiber Products	1
	1		Credit 5	**Indoor Chemical & Pollutant Source Control**	1
		1	Credit 6	**Controllability of Systems,** Thermal Comfort	1
1			Credit 7	**Thermal Comfort,** Design	1
		1	Credit 8.1	**Daylight & Views,** Daylight 75% of Spaces	1
1			Credit 8.2	**Daylight & Views,** Views for 90% of Spaces	1

Yes	?	No			
3	3	0		**Innovation & Design Process**	6
1			Credit 1.1	**ID - Exemplary Performance in SSc4.1**	1
1			Credit 1.2	**ID - Exemplary Performance in SSc7.1**	1
	1		Credit 1.3	**ID - Pending Strategy**	1
	1		Credit 1.4	**ID - Pending Strategy**	1
	1		Credit 1.5	**ID - Pending Strategy**	1
1			Credit 2	**LEED® Accredited Professional**	1

Yes	?	No			
4	0	0		**Regional Priority Credits**	4
1			Credit 1.1	**Regional Priority for 02118:** SSc3, SSc6.1, SSc7.1, SSc7.2, EAc2 (1%), MRc1.1	1
1			Credit 1.2	**Regional Priority for 02118:** SSc3, SSc6.1, SSc7.1, SSc7.2, EAc2 (1%), MRc1.1	1
1			Credit 1.3	**Regional Priority for 02118:** SSc3, SSc6.1, SSc7.1, SSc7.2, EAc2 (1%), MRc1.1	1
1			Credit 1.4	**Regional Priority for 02118:** SSc3, SSc6.1, SSc7.1, SSc7.2, EAc2 (1%), MRc1.1	1

Yes	?	No		
50	28	32	**Project Totals (Certification Estimates)**	110

Certified: 40-49 points, **Silver:** 50-59 points, **Gold:** 60-79 points, **Platinum:** 80+ points

The following is a detailed credit-by-credit analysis of the Project Team's approach for achieving a LEED-CS v2009 "Certifiable" building for the Project.

<u>Sustainable Sites:</u>

The Project site is in Boston's South End, an urban neighborhood close to public transportation, including multiple MBTA bus routes, the Silver Line, Tufts Medical Center Orange Line T station, and the Broadway Red Line T station. The site plan will incorporate low-impact site features that will properly capture and infiltrate stormwater to improve groundwater levels and help to mitigate the negative impacts on historic wood pile foundations found in the area. Hardscape and roofing materials will be selected to minimize contribution to urban heat island effect. Alternative transportation strategies will be employed to reduce pollution impacts from automobile use.

The Project will earn points for Site Selection, Development Density, Brownfield Redevelopment, Alternative Transportation options, Site Development, Stormwater Design, Heat Island Effect, as well as Tenant Design and Construction Guidelines. The Proponent supports public transportation and a number of parking spaces will be designated to alternative transportation options, which may include providing charging stations for electric vehicles, space for a car-sharing service, and preferential parking for hybrid and alternative-fuel automobiles. Parking will be located below grade and there will be preferred parking for low emitting and fuel efficient vehicles. Bicycle storage and changing rooms will also be provided.

A light colored roof will be employed to reduce solar heat gain and the heat island effect. Stormwater from the roof and open spaces will be collected and managed.

Open space will be used to add separation between the adjacent residential building and the Project structure.

Comprehensive tenant design and construction guidelines will encourage future tenants to implement sustainable practices.

<u>Prerequisite 1: Construction Activity Pollution Prevention</u>

The Construction Manager will submit and implement an Erosion and Sedimentation Control (ESC) Plan for construction activities related to the demolition of existing buildings and the construction of the Project. The ESC Plan will conform to the erosion and sedimentation requirements of the 2012 EPA Construction General Permit and specific municipal requirements for the City of Boston.

Credit 1: Site Selection

The Project site is located on a previously developed parcel in Boston's South End neighborhood, situated near South Boston and south of the Chinatown District of Boston.

Credit 2: Development Density and Community Connectivity

The Project site is located in an urban area, with a surrounding community that includes housing, restaurants, shops, grocery stores, educational and religious institutions, and other amenities within walking distance.

Credit 3: Brownfield Redevelopment

The Project site is being tested to determine if the existing soils or building contain contaminants. If they do, a remediation plan will be implemented. Contaminated materials will be removed and disposed of following all federal, state, and local guidelines and regulations.

Credit 4.1: Alternative Transportation, Public Transportation Access

There are several MBTA bus routes that stop within a one-quarter mile walking distance of the Project site and travel in high frequency. The Project will meet the exemplary performance requirements to earn an Innovation Credit.

Credit 4.2: Alternative Transportation, Bicycle Storage

Exterior bike storage locations for visitors and employees will be incorporated into the site design, as will bike storage within the underground parking garage. The Proponent will include showering facilities for employee occupants.

Credit 4.3: Alternative Transportation, Low-Emitting & Fuel-Efficient Vehicles

Parking will be accommodated within the below-grade parking structure and will include designated parking spaces for low emitting fuel-efficient vehicles. Additionally, the Project will include charging station space with access to electrical outlets for electric vehicles.

Credit 4.4: Alternative Transportation Parking Capacity

The number of available parking spaces in the new parking garage will not exceed the number permitted under Large Project Review and will be consistent with BTD guidelines for office use.

Credit 5.2: Site Development, Maximize Open Space

The Project will provide landscaped open areas and pedestrian oriented hardscape that will contribute to improving the urban open space. The zoning requirements will be met or exceeded with respect to the percentage of the Project site occupied by vegetation and pedestrian-oriented hardscape areas.

Credit 6.1: Stormwater Design, Quantity Control

Under Article 32 of the Code, the City of Boston has requirements for collection and management of storm water. Absorptive landscaped areas will help mitigate stormwater runoff from the Project site. The Project team is aiming to reduce the total stormwater runoff for a one and two-year storm.

Credit 6.2: Stormwater Design, Quality Control

A combination of natural and structural best management practices will be used to reduce the suspended solids and phosphorus content of the site stormwater runoff. BMPs may include rain gardens, water quality inlets, and grit chambers. Site stormwater run-off will be captured and treated to the extent possible prior to release, and the Project's stormwater management system design will comply with Article 32 of the Code

Credit 7.1: Heat Island Effect, Non-Roof

More than 75% of the on-site parking will be located undercover within the footprint of the proposed building. The Proponent is also aiming to meet the exemplary performance requirement with 100% of the total parking provided underground.

Credit 7.2: Heat Island Effect, Roof

The roof will be a high albedo membrane roof product with a minimum SRI value of 78, which will cover a minimum of 75% of the Project's total roof area.

Credit 8: Light Pollution Reduction

The Project Team is evaluating designs for a reduction of the exterior site lighting encroachment across the Project site boundary and the automation of interior lighting to optimize daily use of the lighting fixtures within interior spaces.

Credit 9: Tenant Design and Construction Guidelines

A set of Design and Construction Guidelines will be developed and available for the tenants, highlighting the Project's sustainable features and providing guidance on how to make sustainable choices in tenant improvement projects.

Water Efficiency

The Proponent will specify low-flow and high-efficiency plumbing fixtures to reduce the amount of potable water used throughout the building. The landscape design will use regionally appropriate, drought tolerant, indigenous plants

Prerequisite 1: Water Use Reduction, 20% Reduction and Credit 3: Water Use Reduction

Through the specification of low-flow and high-efficiency plumbing fixtures, the Proponent will implement water use reduction strategies that use at least 20% less potable water than the water use baseline calculated for the building (not including irrigation) after meeting Energy Policy Act of 1992 fixture performance requirements.

Credit 1: Water Efficient Landscaping

No permanent irrigation system will be included in the Project. The landscaped areas will be composed of regionally appropriate, drought tolerant native landscaping species. Credit eligibility will depend on the actual square footage of vegetated area.

Credit 3: Water Use Reduction – 30%

The Proponent will evaluate high-efficiency plumbing fixtures with the goal of reducing overall potable water use.

Energy and Atmosphere

The building systems will be designed to optimize energy performance and reduce energy consumption. The design will include high efficiency building systems. The Proponent will engage a building commissioning agent to ensure the proper installation and operation of systems. No chlorofluorocarbon (CFC) based refrigerants will be used in order to avoid ozone depletion in the atmosphere. The Proponent will explore the feasibility of on-site renewable technologies. At a minimum, the building will be designed to be "solar ready" to ease future photo-voltaic installations.

Attention will be paid to the interior lighting control systems in base building occupied areas, and tenant guidelines will encourage tenants to use interior lighting control systems, which can include occupancy sensors and using less power per square foot than a customary office environment. The Proponent will also consider participating in the "Lights

Out Boston" program, which involves turning off all occupied space lighting during night-time hours when the Project will not be occupied.

The Proponent will engage a Commissioning Agent during the design phase to review the proposed design and ultimately confirm the building systems are installed and function as intended and desired.

Prerequisite 1: Fundamental Commissioning of the Building Energy Systems

A Commissioning Agent, (CxA) will be engaged by the Proponent for purposes of providing basic commissioning services for the building energy related systems, including heating, venting, air conditioning, refrigeration (HVAC&R), lighting, and domestic hot water systems. The CxA will verify that the building systems are installed, calibrated, and performing as designed.

Prerequisite 2: Minimum Energy Performance and Credit 1: Optimize Energy Performance

The building performance rating will demonstrate a minimum of a 20% improvement in energy use when compared to a baseline building performance, as calculated using the rating method in Appendix G of ANSI/ASHREA/IESNA Standard 90.1-2007. This requirement will be met by selecting efficient mechanical equipment. Additionally, an improved building envelope design and efficient lighting will be required to achieve this minimum. The Project Team will develop a whole building energy model to demonstrate the expected performance rating of the designed building systems.

Prerequisite 3: Fundamental Refrigerant Management

The specifications for refrigerants used in the building HVAC&R systems will not permit the use of CFC based refrigerants.

Credit 1: Optimize Energy Performance

The building performance rating will demonstrate a minimum of 20% improvement in energy use when compared to baseline building performance, as calculated using the rating method in Appendix G of ANSI/ASHREA/IESNA Standard 90.1-2007. This requirement will be met by selecting efficient mechanical equipment. Additionally, an improved building envelope design and efficient lighting will be required to achieve this minimum. The Project Team will develop a whole building energy model to demonstrate the expected performance rating of the designed building systems

Credit 3: Enhanced Commissioning

The Project Team is evaluating the option to engage a third party Commissioning Agent during the Design Development phase. The CxA's role will include reviewing the Project requirements, creating, distributing, and implementing a commissioning plan, and performing a design review of the Project documents.

Credit 4: Enhanced Refrigerant Management

Long-life, high-efficiency mechanical equipment will be specified for the HVAC systems, and the refrigerants specified for the systems will have low ozone-depletion and global warming potentials. Credit achievement is based on the final equipment selection and the calculated amount of refrigerant in the systems.

Credit 5.1: Measurement and Verification, Base Building

The Proponent will establish an ENERGY STAR Portfolio Manager account to enable the USGBC to review whole building energy and water use for five years after occupancy to be eligible for one point is this credit. The development of a full Measurement & Verification Plan is not anticipated.

Credit 6: Green Power

The Proponent is evaluating purchase of "green power" for a two-year renewable energy contract to provide a minimum of 35% of the building's electricity from renewable sources.

Materials and Resources

A demolition and construction waste management plan will be implemented during construction of the Project to divert at least 75 percent of waste material from landfills. Building materials will be selected that contain recycled and regional content to reduce use of virgin materials and energy use associated with transportation while supporting local economies. Building-occupant waste recycling will be encouraged through the use of a building recycling program and facility.

Prerequisite 1: Storage and Collection of Recyclables

Storage of collected recyclables will be accommodated within the design of the core spaces. Occupants will bring their recyclables to a centrally located trash and recycling storage room. Recyclables will be collected by a contracted waste management company on a regular basis.

Credits 2.1 and 2.2: Construction Waste Management

Prior to the start of construction the Construction Management team will prepare a Construction Waste Management plan which will be implemented on site. The Construction Manager will divert as much demolition debris and construction waste from area landfills as possible with a goal to achieve 75% diversion.

Credits 4.1: Recycled Content 10% (post-consumer & ½ pre-consumer)

Project specifications will require certain materials to include pre- or post-consumer recycled content, or both. During construction, materials and products submittals will include documentation of the percentage of pre- or post-consumer recycled content. The Construction Manager will track the recycled content with a goal to achieve 10% recycled-content materials based on overall Project materials costs.

Credits 4.2: Recycled Content 20% (½ post-consumer & ½ pre-consumer)

The Construction Manager will track the recycled content for each material with a target to achieve 20% recycled-content materials based on overall Project materials costs.

Credit 5.1: Regional Materials, 10% Extracted, Processed and Manufactured Regionally

Project specifications will indicate materials to be extracted, harvested, recovered and manufactured within a 500 mile radius of the job site. The Construction Manager will track the submitted and installed materials and products with a goal to achieve the 10% threshold based on overall project materials costs.

Credits 5.2: Regional Materials 20% Extracted, Processed and Manufactured Regionally

The Construction Manager will track the regional materials with a target to achieve 20% regional materials based on overall Project materials costs.

Credits 6: Certified Wood

The Project Team is evaluating the cost and availability of Forest Stewardship Council (FSC) certified wood. The Construction Manager will track wood materials installed in the Project, as well as invoicing documentation for all FSC certified products installed in the Project.

Indoor Environmental Quality

The comfort and well-being of the building occupants will be paramount in regard to air quality, access to daylight and outside views. An indoor air quality management plan will be implemented during construction to enhance the well-being of construction workers and to promote a better indoor environment for building occupants. Low-emitting materials, finishes, adhesives, and sealants will be employed throughout the building to reduce the quantity of indoor air contaminants and promote the comfort and well-being of installers and building occupants.

Prerequisite 1: Minimum IAQ Performance

The building mechanical systems will be designed to meet or exceed the requirements of ASHRAE Standard 62.1-2007 sections 4 through 7 and applicable building codes. Naturally ventilated spaces will comply with the applicable portions of ASHRAE 62.1.

Prerequisite 2: Environmental Tobacco Smoke (ETS) Control

The public spaces and common areas within the building will be non-smoking. Additionally, smoking will be prohibited within 25 feet of building openings and air intakes.

Credit 1: Outdoor Air Delivery Monitoring

The HVAC design will include permanent monitoring systems to ensure that ventilation systems maintain design minimum requirements through the use of airflow monitoring stations and carbon dioxide sensors.

Credit 3: Construction IAQ Management Plan, During Construction

The specifications will require the Construction Manager to develop an Indoor Air Quality Management Plan for the construction and pre-occupancy phases 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).

Credits 4.1: Low-Emitting Materials, Adhesives & Sealants

The specifications will include requirements for adhesives and sealants to meet low VOC criteria for adhesives and sealants. The Construction Manager will be required to track products used to ensure compliance.

Credits 4.2: Low-Emitting Materials, Paints and Coatings

The specifications will include requirements for paints and coatings to meet low VOC criteria for paints and coatings. The Construction Manager will be required to track products used to ensure compliance.

Credits 4.3: Low-Emitting Materials, Flooring Systems

The specifications will include requirements for hard surface flooring materials to be Floor Score certified, and the Proponent will endeavor to have carpet systems comply with the Carpet Institute Green Label program. The Construction Manager will be required to track products used to ensure compliance.

Credit 4.4: Low Emitting Materials, Composite Wood and Agrifiber Products

The Proponent is evaluating the cost and availability of composite wood and agrifiber products that do not contain added urea-formaldehyde.

Credit 5: Indoor Chemical and Pollutant Source Control

The Project Team is evaluating the design to minimize and control the entry of pollutants into the building and to contain chemical use areas.

Credit 7: Thermal Comfort, Design

The Project HVAC system design will comply with ASHRAE 55 for tenant spaces and provide the flexibility for tenant fit-out extensions of the mechanical systems to meet the ASHRAE 55 requirements for thermal comfort.

Credit 8.2: Daylight and Views, Views for 90% of the spaces

It is the intent of the design to provide ample glazing along the perimeter allowing for views from at least 90% of the tenant spaces.

Innovation & Design Processes

The Project Team has identified several possible Innovation and Design (ID) credits listed below, (limited to 5 ID credits total):

Exemplary Performance for SSc4.1

The Project site is located on several bus routes with a frequency of service that may include over 200 transit rides per day.

Exemplary Performance for SSc7.1

The Project design locates 100% of parking underground with a compliant surface.

Building as an Educational Tool

The Proponent will evaluate implementation of two public outreach programs to inform the public about the sustainable design features incorporated into the Project.

Green Housekeeping/Operations

The owner will use green cleaning products and equipment in the common areas and provide a package for tenants explaining the "green living" components of the Project.

Credit 2 LEED Accredited Professional (required ID credit for LEED certification)

A LEED Accredited Professional will provide administrative services to oversee the LEED credit documentation process.

Regional Priority Credits

Regional Priority Credits, (RPC) are established LEED credits designated by the USGBC to have priority for a particular area of the country. When a project team achieves one of the designated RPCs, an additional credit is awarded to the project. RPCs applicable to the 02118 zip code include: SSc3, SSc6.1, SSc7.1 EAc2(1%) and MRc1.1(75%). The Proponent anticipates four RPCs, one each for SSc3-Brownfield Redevelopment, SSc6.1-Stormwater Design, Quantity Control, SSc7.1-Heat Island Effect, Non-Roof and SSc7.2 Heat Island Effect, Roof

Boston Green Building Credits

The Boston Green Building Credits were established in Appendix A to Article 37 of the Code as Boston-specific credits that can contribute points toward a project's LEED "Certifiable" point total. One point may be awarded for each of the following four categories: Modern Grid; Historic Preservation; Groundwater Recharge; and Modern Mobility.

Modern Grid

The Proponent does not anticipate the Project's qualifying for this credit.

Historic Preservation

The Project is not eligible for this credit since it is a new construction project.

Groundwater Recharge

The Project Team will explore whether or not the Project can provide 50% greater recharge than required under Section 32-6 of the Code.

Modern Mobility

The Project Team will evaluate Transportation Demand Management options appropriate for the Project.

3.11.2 Climate Change Preparedness

The Proponent understands that the City of Boston is especially interested in the adaptability of the city to long-term climate change. This interest has been manifested already by the Mayor's Executive Order Relative to Climate Change in Boston and the recent convening of the Mayor's Climate Action Leadership Committee. The Climate Change Preparedness Questionnaire is included as Appendix F.

In general, the Project team examined three areas of concern related to climate change: sea level rise, changing weather conditions, and increased number of high-heat days and higher cost of energy.

Sea Level Rise

According to the Intergovernmental Panel on Climate Change (IPCC), if sea level continues to rise at the current rate, the sea level in Massachusetts as a whole will rise by one foot by the year 2100[10]. However, using a high emissions scenario, sea level rise could reach six feet. According to The Boston Harbor Association's Sea-level Rise Maps, the Project site would not be impacted by a rise in sea level of up to five feet due to the site's elevation and distance from the nearest water body. The Proponent has not taken any special precautions to protect against sea level rise.

Weather Conditions

As a result of Climate Change, the Northeast is expected to experience more frequent and intense storms. To mitigate this, the Project will decrease stormwater runoff by 25% from the two-year 24-hour design storm. Critical mechanical and electrical equipment will be located at the highest elevation possible to prevent exposure to flood waters. The emergency generator will be located on the roof penthouse while the electrical substation will be located within the building at the highest elevation on the multi-level ground floor.

High Heat Days and Cost of Energy

The IPCC has also predicted that in Massachusetts the number of days with temperatures greater than 90°F will increase from the current 5 to 20 days annually to thirty to sixty days annually. To prepare for this, the Project will minimize the heat island effect by placing all parking spaces underground, which will reduce the amount of impervious pavement on the Project site, and will use light-colored paving materials on the pedestrian-oriented hardscape to absorb less heat. Light colored roof materials will be employed to reduce

10 IPCC (Intergovernmental Panel on Climate Change), 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Avery, M. Tignor, and H. L. Miller (eds.)]. Cambridge University Press, Cambridge, UK, and New York, 996 pp.

solar heat gain and the heat island effect. The state energy code (IECC 2009) allows a maximum Solar Heat Gain Coefficient (SHGC) of 0.45. Glazing used in the Project will have a SHGC of 0.40 or less, representing an 11% reduction in solar heat gain.

The Project has taken the predicted increase of high heat days into account to minimize increases in energy demand. As part of the energy modeling process, climate files that reflect the predicted increase in temperature will be used to better understand how the buildings and their systems perform under different climate conditions. This understanding will be taken into account when designing plant and HVAC systems. In addition, the office façades will be designed to include improved natural ventilation to reduce the reliance on mechanical ventilation systems.

To minimize the Project's impact on climate change, the Project's energy performance is anticipated to be at least 20% above the ASHRAE 90.1-2007 baseline standard. The Proponent is evaluating purchase of "green power" for a two-year renewable energy contract to provide a minimum of 35% of the building's electricity from renewable sources.

Section 4.0

Urban Design

4.0 URBAN DESIGN

4.1 Introduction

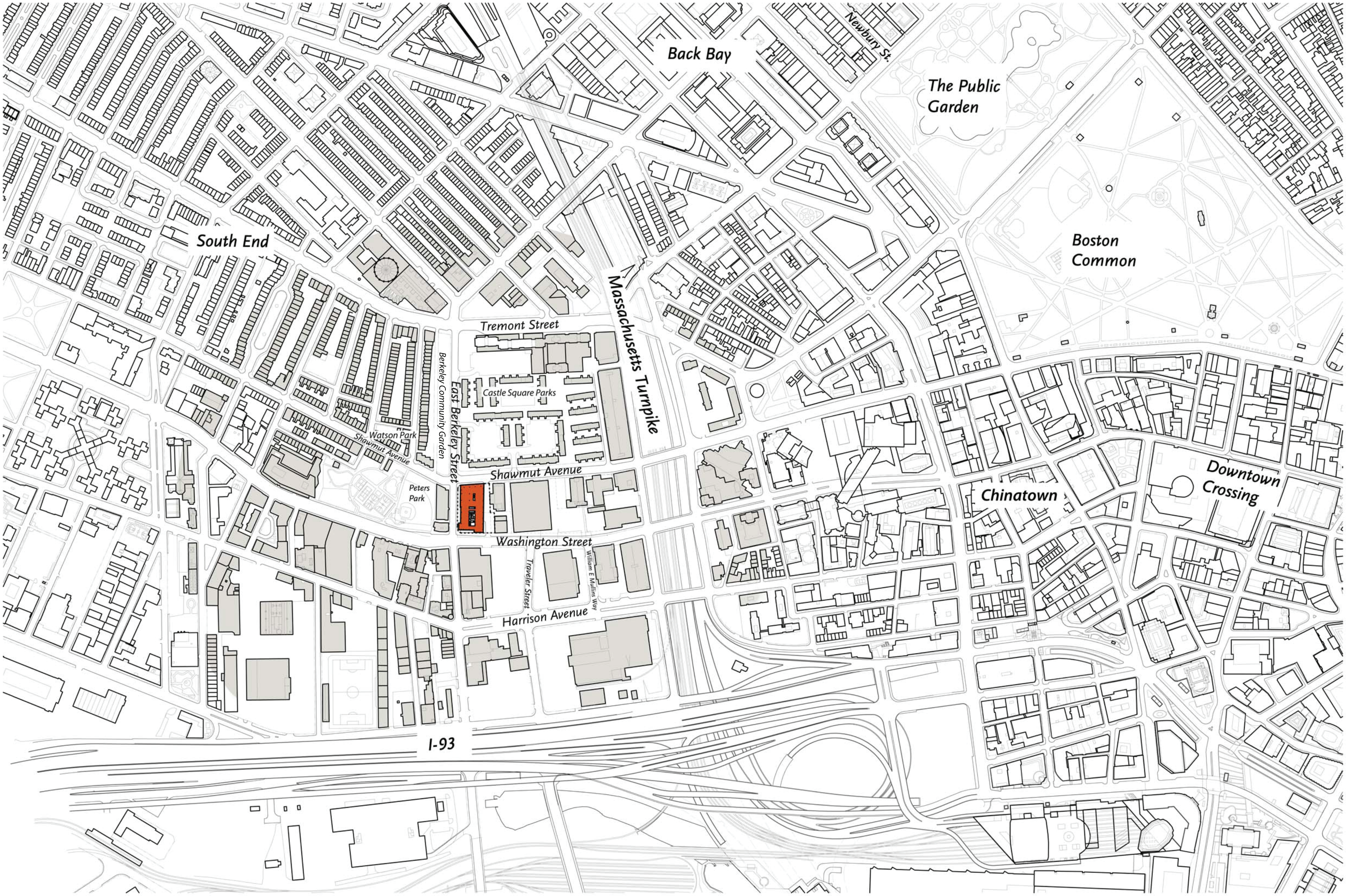
This section describes the existing urban context of the Project site, the consistency of the Project with the City's Harrison Albany Corridor Strategic Plan and the key benefits, planning principles, and design goals for the Project. The design will continue to evolve through BRA and BCDC design review. Supporting graphics in this section include a Location Plan, a perspective rendering, and building elevations. See Figures 4-1 through 4-6.

Key Benefits/Planning Principle:

The key planning principle is to create an active 18 hour/7 day-a week ("18/7") neighborhood through a diversity of mixed uses, and significant pedestrian-friendly public realm improvements. The 80 East Berkeley Street Project, incorporating its mix of office and retail and/or restaurant uses, will complement the existing South End residential neighborhood and the approximately 1,500 units of housing either currently under construction or proposed in nearby developments, such as Ink Block, 275 Albany Street and 345 Harrison Avenue, and will link this vital area of the South End neighborhood with the City's Downtown, Chinatown, and Back Bay neighborhoods.

Key Design Goals:

- ♦ Increase density by building to the densities proposed by the Strategic Plan, and codified in recent amendments to Article 64 of the Code, with a height of 150 feet, and a FAR of 6.5;
- ♦ Introduce new activity with "18/7" office/retail and/or restaurant uses;
- ♦ Define and develop a new "Gateway" to the South End which connects this prominent East Berkeley Street/Shawmut Avenue South End neighborhood quadrant to Back Bay, Chinatown and Downtown;
- ♦ Complement the eclectic architectural heritage and context of this part of the South End with a significant contemporary and iconic building;
- ♦ Advance smart-growth and transit oriented development principles;
- ♦ Restore the historic street grid and block pattern of this area in the South End, with active street edges;
- ♦ Enhance the Washington Street retail corridor;
- ♦ Integrate service, parking and loading into the Project site;



80 East Berkeley Street **Boston, Massachusetts**

ELKUS | MANFREDI ARCHITECTS

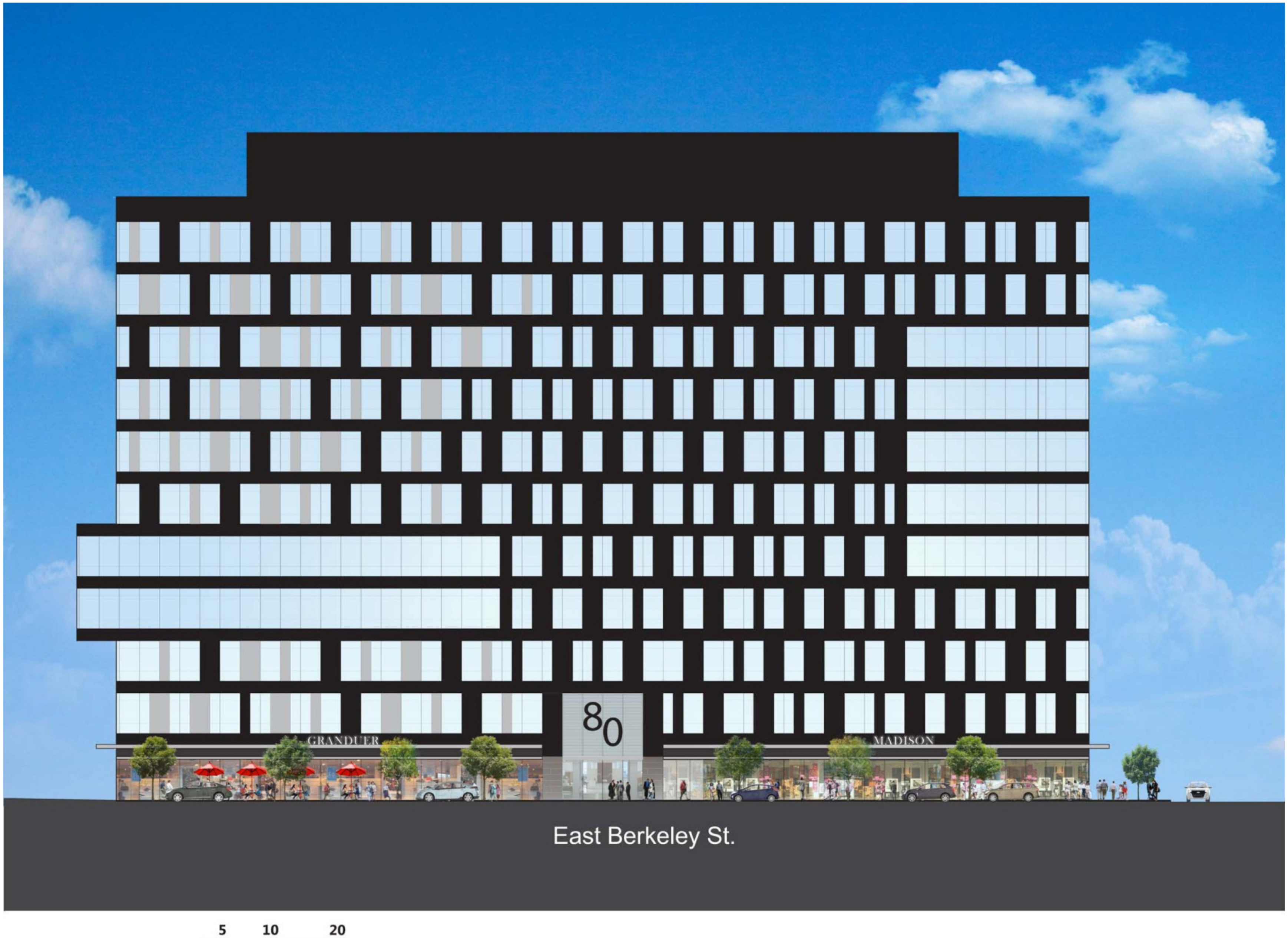
Figure 4-1
Location Plan

80 East Berkeley Street   Boston, Massachusetts

ELKUS | MANFREDI
ARCHITECTS

Figure 4-2

Exterior Perspective Looking West



80 East Berkeley Street **Boston, Massachusetts**

ELKUS | MANFREDI
ARCHITECTS

Figure 4-3

South Elevation

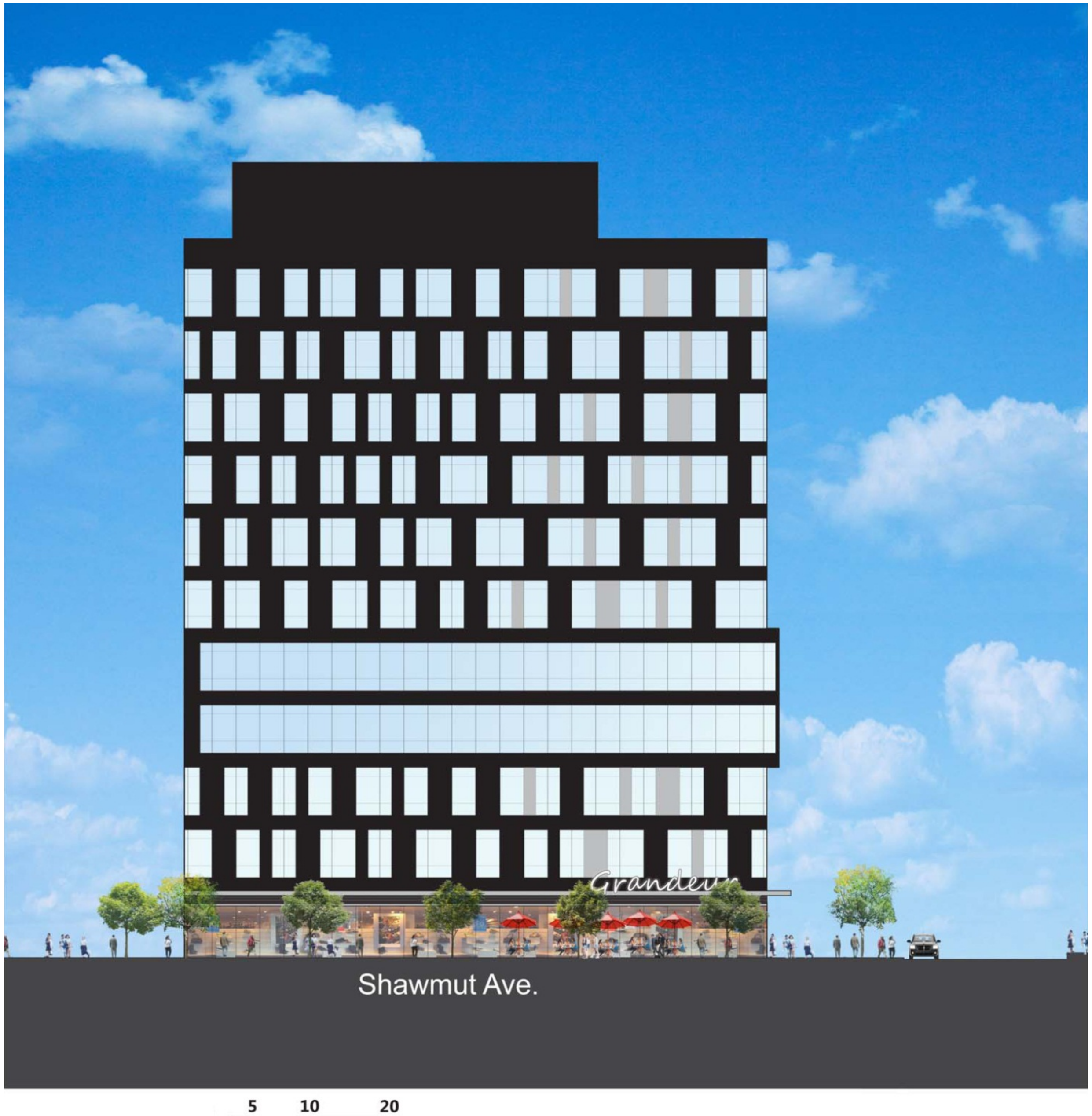
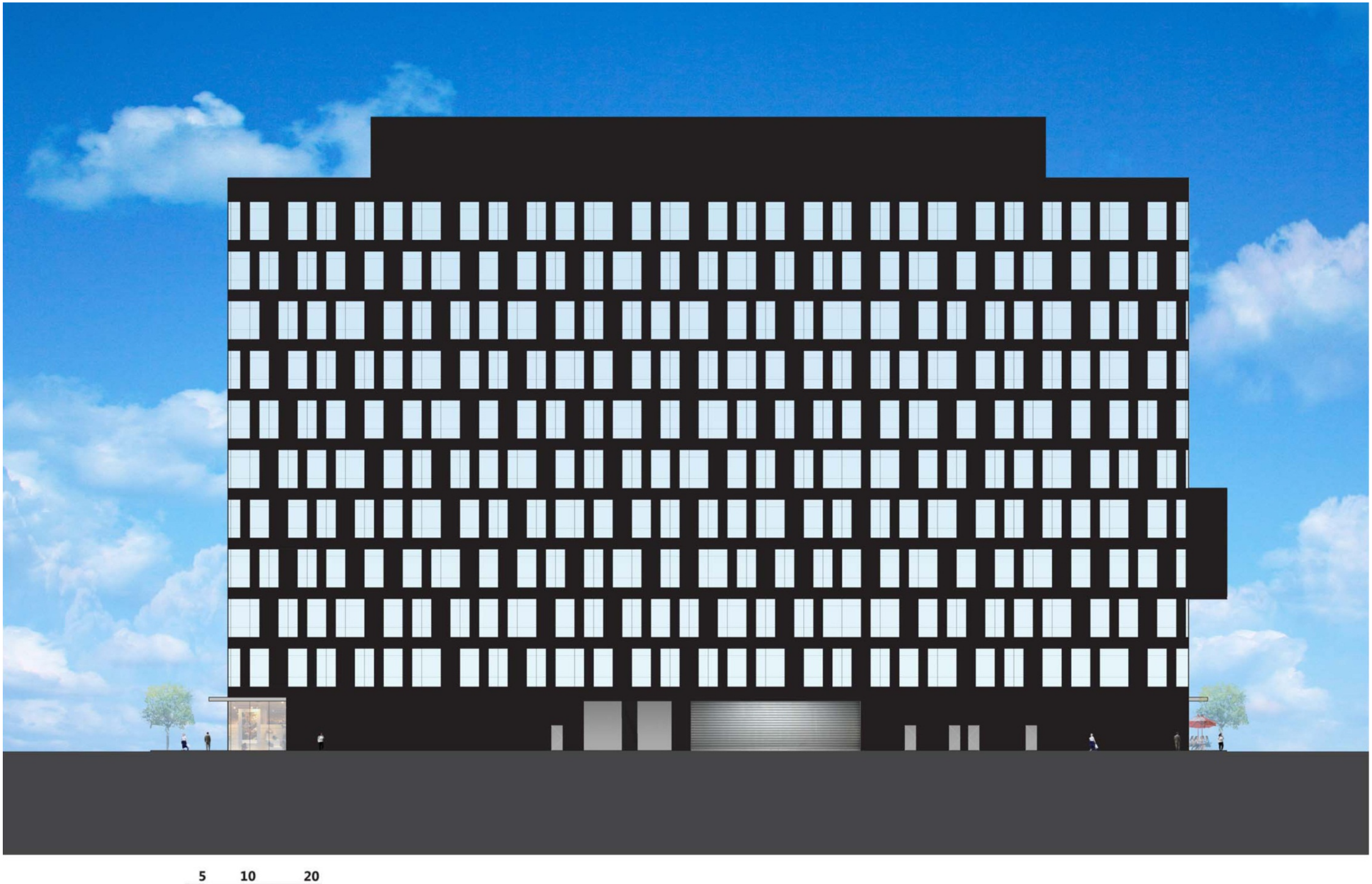


Figure 4-4

West Elevation



80 East Berkeley Street **Boston, Massachusetts**

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Figure 4-5

North Elevation

Figure 4-6

East Elevation

- Promote a secondary tree-lined green connection along Shawmut Avenue, in furtherance of the Strategic Plan's vision for Shawmut Avenue;
- Enhance pedestrian-friendly circulation with a new through block connection; and
- Improve the public realm with wider, landscaped, pedestrian-friendly, and café-activated sidewalks.

4.2 Neighborhood Context

The Project site is located in the EDA North of the South End Neighborhood District and is bordered by Washington Street on the east, East Berkeley Street on the south and Shawmut Avenue on the west. The Chinatown and Downtown neighborhoods are located north of the Project site across I-90, the Fort Point Channel and South Boston neighborhoods are located east of the Project site across I-93, and the South End and Back Bay neighborhoods are located immediately adjacent southwest and west respectively. (See Location Plan Figure 4-1). The Project site is directly bounded on the north by Waterford Place, and by the MBTA substation facility. As described further in Section 2.0, Transportation, the Project site is well served by multiple MBTA bus lines, an East Berkeley Street Silver Line transit stop and two MBTA subway stations (one Red Line and one Orange Line station). Refer to Figure 2-7 for public transportation accessible to the Project site.

The surrounding mixed use buildings are today generally residential and industrial in nature and consist of some light manufacturing and warehousing uses. Located across the street on Washington Street is a two story brick building with a vacant warehouse formerly used by Graybar Electric Company (345 Harrison Avenue). On the north is a seven-story building, Waterford Place, which is owned by the Chinese Consolidated Benevolent Association and provides affordable housing, and a one story MBTA substation facility. North of Waterford Place and the MBTA substation facility is a one story industrial building formerly used by Verizon. The block to the south of the Project site, fronting on East Berkeley Street, consists of four-story residential condominiums at 69-77 East Berkeley Street. At the southwest corner of East Berkeley Street and Washington Street is a modern six-story building, Project Place, with Myers and Chang restaurant on the ground floor. To the west is the four-story Castle Square residential development. Small retail shops are located along East Berkeley Street, Washington Street, and Shawmut Avenue. Also Ming's and Cmart supermarkets, as well as a number of restaurants, currently exist on Washington Street within the vicinity of the Project site. The area also includes open spaces such Peters Park, the Community Gardens, and Watson Park.

The area between I-90/Herald Street and the Project site includes buildings of varied programs, heights, architectural styles, and materials, which create varied blocks, and less pedestrian-friendly streets and connections. See Figure 2-10.

4.3 Urban Design Principles/ Harrison Albany Corridor Strategic Plan

Consistent with the City of Boston's Harrison Albany Corridor Strategic Plan, the Project is the embodiment of the South End's overall revitalization vision. The Project is ideally suited for this site and represents the opportunity to serve as a "gateway" to the neighborhood, enhancing the public realm, adding mixed uses which will attract and maintain jobs while preserving the South End's funky and eclectic vibe, and serving as a good neighbor to the popular and successful South End. The revitalization and development of the 1.09 acre site from public parking lot and one story auto repair facility represents a vital infusion of programmatic uses that will attract people to work and shop in the South End.

The Project will also create a sense of place along the Washington Street retail corridor, and enhance the public realm by reinforcing the historic street grid and block pattern of the area with active urban edges. The new pedestrian-friendly accessway restores a portion of the historic grid (formerly Garland Street) while setting back and providing a buffer for Waterford Place.

The Project complements the South End's built heritage, while fostering sustainable, environmentally responsible growth. This significant contemporary architecture and enhanced public realm will create a vibrant 18-hour/7-day-a-week urban loft office building with ground floor retail and/or restaurant space that will infuse the neighborhood with a renewed vibrancy and extend and reinforce the mixed use character of this quadrant of the South End. Well- designed spaces and streetscape, and a significant building such as this invite people to connect with each other in meaningful ways. The Project is carefully planned to engage people day and night by providing a new place to work, shop, and "innovate." The office will include, as required under Article 64 in a Planned Development Area (PDA), 5% affordable "incubator"/co-work office space for a start-up or affordable cultural space of approximately 5,900 sf, additions to the neighborhood which, in time, could spawn ideas resulting in new jobs.

The Proponent was an active participant in the over two-and-a-half year planning process of the Harrison Albany Corridor Strategic Plan and understands its vision for the density, the types of uses, the public realm, and the scale of the development appropriate for this neighborhood. The Proponent has demonstrated how it can activate the South End's vitality and character, having developed Atelier|505 on Tremont Street.

4.3 Planning Principles and Design Goals

4.3.1 Extend Existing Urban Fabric

The Project mediates between distinct and currently isolated urban fabrics surrounding it. Each of these areas has a particular character defined by scale, material, street width, and use, which is related to the dimensions of its blocks, as well as its period of construction.

The South End residential neighborhood in general has a cohesive and recognizable identity due to its use of materials, continuous streetwalls, massing and alignment. The surrounding Project site area is characterized by the historic mercantile buildings (which are not only brick but include concrete frame, brick and metal panel) of similar height (generally six to eight stories), rhythm of window openings, and architectural language, adjacent to the residential brick four story rowhouses. Within the last ten years there have been numerous new developments near the Project site such as Atelier|505, developed by the Proponent on nearby Tremont Street, Laconia Lofts, Wilkes Passage, Rollins Square and Dover Lofts. Each of the newer developments has used more modern metals, brick, and concrete, materials to redefine the edgy and urban modern nature of this part of the South End neighborhood.

4.3.2 Connections and Restoration of Historic Street Grid

The Project not only fills an urban void but also links together separate clusters of diverse activity and urban fabric. The Project establishes new connections: between the residential scale of Shawmut Avenue and the historic South End, bustling vehicular Washington Street and the east-west city scale connector from South Boston to Back Bay on East Berkeley Street. The Project, by redefining these street edges, stitches together these isolated entities, such as the adjacent and industrial warehouse buildings along Washington Street with the planned future development of Ink Block, 345 Harrison, and 275 Albany Street.

The massing and program uses of the Project are responsive to the scale of the adjacent streets and the design has been informed by these three very distinct and unique streets. The Project is further defined by these street connections and various scales of circulation around the Project, along with the recognition of the importance of the pedestrian. The sidewalk dimensions comply with zoning sidewalk dimensions and the City of Boston Complete Streets guidelines, allowing for differentiation between the building line, pedestrian sidewalk, and a landscape zone, and allow for restaurant uses to spill out onto the sidewalk, further activating the street. The streets, pedestrian connections and newly created accessway are described in more detail below.

East Berkeley Street

Consistent with the Strategic Plan, the Project has recognized the importance and prominent role of this east-west city connector, East Berkeley Street, which led the Project to be identified as "80 East Berkeley Street." The Project will provide a drop-off/pick up outside of the through traffic lane to allow for easy front door access.

Washington Street

As outlined in the Strategic Plan, Washington Street has played a key role in the South End's revitalization by creating vibrant and active pedestrian activities such as stores and restaurants. The proposal from the Strategic Plan is to return Washington Street to a fully functioning two way street to improve circulation and local site access. The Project incorporates both the aims of the Strategic Plan and recent zoning changes. With the new 150 foot building, active ground floor retail, and improved streetscape, the Project will support Washington Street as a retail corridor.

Shawmut Avenue

The Project will improve the landscape through new features such as wider sidewalks, pedestrian lighting, and trees. At grade the building is set back 10 feet to provide additional sidewalk space along Shawmut Avenue. The building projects at floors four and five, and then the massing again sets back 10 feet, (at 70 feet) as contemplated in the Strategic Plan . With the Project's proposed ground floor retail and/or restaurant uses and wider sidewalks along this quieter residential street, it will be ideal for outside restaurant café seating, which is typical along Shawmut Avenue, south of the site. These additions to the landscape will fulfill the Strategic Plan's vision for Shawmut Avenue as a secondary green corridor.

New Accessway Connection

The new accessway connection on the northern side of the site connects Washington Street to Shawmut Avenue with a visually pleasant and physical pedestrian connection – internal to the property – that will help to restore the historic grid and block pattern of this area. This accessway will be used by pedestrians, and will also provide service access to the Project. The accessway creates a new visual corridor and pedestrian-friendly path with landscaped improvements, accessible sidewalk, and lighting, which will invite pedestrian flow.

Garage Entrance /Exit and Loading

Vehicles will enter and exit the parking garage from Washington Street, creating easy and direct vehicular access to two levels of parking below grade. The loading dock is located within the building, and trucks will access the loading dock from Washington Street and exit to Shawmut Avenue.

By integrating the service access and the parking garage entry/exit within the Project site, rather than on adjacent public streets, the Project has been designed to minimize traffic impacts, while reconnecting the vehicular streets and pedestrian connections.

4.4 Massing, Height and Design Diversity

The massing strategy of the Project responds directly to the different urban fabrics of the South End neighborhood with its distinct modern architecture of glass and metal, and specifically addresses the scale of each street and adjacencies with various projections and/or setbacks or insets. The Project, as proposed, is a modern interpretation of a 21st century loft style warehouse building. The Project commenced with a study of massing on the site and its relationship to the neighborhood and the streets. The building floor plans and façades align themselves with the adjacent streetwalls, resulting in an improved relationship to the sidewalk and open spaces. The Project's proposed massing is derived from the site constraints and reflects the mixed-use nature of the building, as shown on Figure 4- 2.

The Project includes one level of articulated retail and/or restaurant space and ten floors of office space above. The retail streetscape is open and transparent, allowing for maximum retail expression and pedestrian-friendly activity and liveliness along the sidewalks on three sides of the building. The office entrance and two-story lobby are located central to the building on East Berkeley Street, prominently defining the street address as a main entrance. The retail base is 16 feet in height and separates itself from the office use above with a continuous canopy around the building on the three street elevations: East Berkeley Street, Shawmut Avenue, and Washington Street. This five foot wide canopy defines the "pedestrian browsing zone" and further distinguishes the active urban retail edges.

The office space above the retail base consists of a consistent articulation which is only broken with two insets and projections. With glass defining the façades of these projections and insets on the upper floors, the overall height and massing of the building is diminished, and the exterior balconies and decks energize the urban nature of these prominent corners of the building at both Washington Street and East Berkeley Street. The patterned opaque metal panel and vision glass accentuates a continuous base articulation, which wraps the four façades of the building. This 150 foot mass is broken along Washington Street and East Berkeley Street by a recessed mass which extends over several floors, giving strong identity to the building at the primary intersection of the streets. A second projection extends along East Berkeley Street and Shawmut Avenue, giving a natural break in the streetwall.

4.5 Materials

Material selection for the building independently articulates the retail base from the office façades above. The design details and materials will continue to evolve through BRA and BCDC design review. The retail base is designed to incorporate continuous vision glass, allowing for maximum transparency and vibrancy. The two story office entrance along East Berkeley Street is differentiated from the base by its stone detailing. The retail streetscape façade is separated from the office exterior by a canopy, which extends along Shawmut Avenue, East Berkeley Street, and Washington Street. The canopy will be exposed metal structure and cladding.

The office exterior materials incorporate an elegant pattern of dark colored metal panel and vision glass, which alternates between each full height window. The dark metal panel is also used to express the horizontal spandrel at the floor lines of the building. The two volumetric projections and insets within the office façades are distinct, and all-glass. Colored elevations of the Project's four façades are presented in Figures 4-3 through 4-6.

4.6 Landscape and Sidewalk Improvements: Sustainable Green Strategies

Streetscape improvements on Washington Street, East Berkeley Street and Shawmut Avenue will include a sidewalk, a tree zone, a pedestrian zone, and a building storefront zone consistent with Article 64 of the Code. Material selection will continue the vibrant sidewalk experience and streetscape design within the South End.

Along with the landscape, and new trees along the streets, green strategies will be incorporated into the Project as described previously in Section 3.0. The massing and design allow for opportunities to provide outdoor decks and fresh air for office tenants and ample daylight within the offices.

Section 5.0

Historic Resources

5.0 HISTORIC AND ARCHAEOLOGICAL RESOURCES

This section describes the historic and archaeological resources within and adjacent to the Project site and describes the potential effects of the Project on these resources.

5.1 Buildings on the Project Site

The Project site is approximately 47,360 square feet (1.09 acres) and is bounded by Shawmut Avenue on the west side, East Berkeley Street on the south, and Washington Street on the east. The Project site contains a surface parking lot along Shawmut Avenue and East Berkeley Street with a wood frame parking attendant's booth. On Washington Street, there is an existing one-story, masonry building used for automotive repair.

The existing late 20th century, flat roof, one-story, automotive repair building, a former gas station, is a utilitarian building that possesses no unique or distinctive architectural characteristics. The small wood frame parking attendant's booth also dates from the late 20th century and is simply a utilitarian structure. The Project includes the removal of both existing structures from the site.

Adjacent to the Project site are two buildings: a seven-story residential building (Waterford Place) and a one-story MBTA substation building, both located on the north side of the site.

The Project site is located within the South End Harrison/Albany Protection Area, an area subject to review by the South End Landmark District Commission ("SELDC"). In addition, the Project site is located within the South End Industrial Area, a survey area included in the Massachusetts Historical Commission's ("MHC") Inventory of Historic and Archaeological Assets of the Commonwealth (the "Inventory"). Neither the South End Harrison/Albany Protection Area nor the South End Industrial Area is listed in the State or National Registers of Historic Places.

5.2 Historic Resources in the Project Vicinity

The South End Landmark District and the South End National Register Historic District are located immediately south and west of the Project site across East Berkeley Street and Washington Street. The South End Harrison/Albany Protection Area and the South End Industrial Area have similar boundaries; however the South End Industrial Area does not extend west of Shawmut Avenue. Table 5-1 below and Figure 5-1 identify the historic resources in the vicinity of the Project site.

Table 5-1 Historic Resources in Vicinity of Project Site

Resource	Designation
South End Harrison/Albany Protection Area	Landmark District Protection Area
South End Landmark District	Landmark District, State Register of Historic Places
South End Historic District	State and National Registers of Historic Places
South End Industrial Area	MHC Inventory

5.3 Impacts to Historic Resources

5.3.1 Design and Visual Impacts

As noted in Section 4.0, the Project will draw upon the positive attributes of the existing context and reinforce a continued vision of the future context of the South End as set forth in the Harrison Albany Corridor Strategic Plan and codified in recent amendments to Article 64 of the Code. The Project's conceptual massing is derived from the site constraints and reflects the mixed-use nature of the building with the ground floor retail and/or restaurant space being open and transparent, with a continuous canopy along Washington Street, East Berkeley Street, and Shawmut Avenue. The upper story office space above the retail/restaurant base will feature opaque metal panel and vision glass that will wrap the four facades of the building. The 150 foot mass is broken along Washington Street and East Berkley Street by a recessed mass which extends over several floors, giving strong identity to the building at the primary intersection of the streets. A second projection extends along East Berkeley Street and Shawmut Avenue, giving a natural break in the streetwall. The materials of the transparent retail/restaurant base and elegant pattern of metal panel and vision glass of the upper floor office levels have been selected to articulate the volumetric massing of the building.

The Project will be visible from the adjacent South End Landmark and National Register districts; however, it is not expected to introduce elements that are visually incompatible with the adjacent district. As envisioned, the Project will be respectful of, and complement, the historic and architectural character of the South End neighborhood, and its uses, massing, and height will help to serve as a transition between the heart of the South End and the new developments east of Washington Street.

5.3.2 Shadow Impacts

While shadow impacts are inevitable given the largely vacant nature of the Project site, impacts to the South End Landmark and South End National Register districts will be minimal given their locations south and west of the Project site.

As discussed in greater detail in Section 3.2, shadow studies were conducted to investigate impacts from the Project at three times of (9:00 a.m., 12:00 noon, and 3:00 p.m.) during each of the vernal equinox (March 21), summer solstice (June 21), autumnal equinox (September 21), and the 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.

As illustrated in the shadow study diagrams (Figures 3.2-1 to 3.2-14), the Project will cast net new shadow on areas almost exclusively outside of the South End Landmark and South End National Register districts. During isolated time periods, the Project may cast shadows on one building within the South End Landmark district; specifically the single story commercial building at 1130 Washington Street, on the corner of East Berkeley Street and Washington Street. During three of the time periods studied (March 21 at 3:00 p.m., June 21 at 3:00 p.m., and September 21 at 3:00 p.m.), new shadow will be cast on the northwest corner of the building at 1130 Washington Street. During the June 21 at 6:00 p.m. time period studied a greater amount of shadow will be cast on the building; however, none of the shadow impacts resulting from the Project will adversely impact the character-defining features of the building at 1130 Washington Street or the greater South End Landmark District or South End National Register District.

5.4 Archaeological Resources

The Project site consists of a previously developed urban parcel. No archaeological resources have been identified as occurring within the Project site. Due to previous development activities and disturbances, including site grading activities, it is not anticipated that the site contains significant archaeological resources. No impacts to archaeological resources are anticipated as a result of the Project.

5.5 Status of Project Reviews with Historical Agencies

5.5.1 South End Landmark District Commission Review

As noted above, the Project site is located within the South End Harrison/Albany Protection Area; therefore, demolition, land coverage, height of structures, topography, and landscaping are subject to review and approval by the SELDC. An application for a Certificate of Appropriateness will be submitted to the SELDC following the submittal of this PNF to initiate the review process.

5.5.2 Massachusetts Historical Commission Review

The Project is subject to State Register review by the MHC. An MHC PNF will be submitted following submittal of this PNF to initiate the review process. To facilitate the State Register review process, the MHC PNF will be submitted concurrently to the MHC and SELDC.

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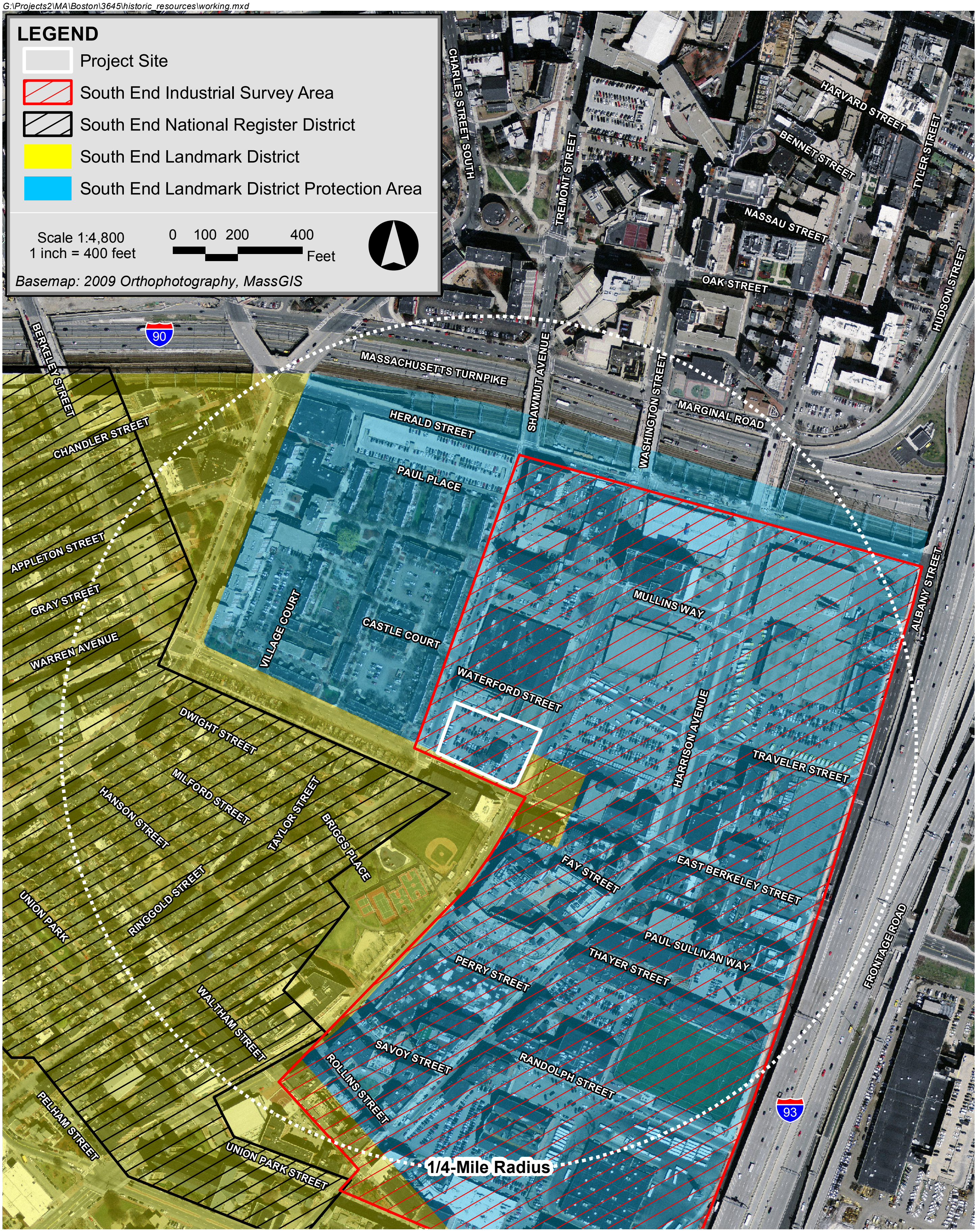


80 East Berkeley Street Boston, Massachusetts

Figure 5-1

Historic Resources

Section 6.0

Infrastructure Systems Component

6.0 INFRASTRUCTURE SYSTEMS COMPONENT

6.1 Introduction

The Infrastructure Systems Component 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 eastern portion of the site fronting on Washington Street and East Berkeley Street is currently used as an auto repair facility, and the western portion of the Project site fronting on Shawmut Avenue and East Berkeley Street is used as a surface public parking lot. The auto repair facility is paved and has a small, one story building with approximately 31 accessory parking spaces. The public parking lot contains 89 public parking spaces and an attendant's booth and is otherwise undeveloped.

The Project includes the development of an approximately 308,000 sf, building including approximately 290,000 sf of office space and approximately 18,000 sf of ground-level retail and/or restaurant space. For the purposes of the wastewater generation and water consumption analyses, it is assumed that the Project will include 12,000 sf of retail space and 6,000 sf of restaurant space, comprising 150 restaurant seats.

6.2 Wastewater

6.2.1 Sewer Infrastructure

Existing BWSC sanitary sewer mains are located adjacent to the Project site in Shawmut Avenue, East Berkeley Street, and Washington Street. There is an 18-inch sanitary sewer beneath East Berkeley Street which increases to a 36-inch sanitary sewer flowing in an easterly direction. There is a 15-inch sanitary sewer beneath Shawmut Avenue which flows in a southerly direction into the 36-inch sanitary sewer on East Berkeley Street. There is an 18-inch sanitary sewer beneath Washington Street which flows in a southerly direction into the 36-inch sanitary sewer on East Berkeley Street.

The 36-inch BWSC sanitary sewer in East Berkeley Street flows easterly and connects to the combined sewers beneath Albany Street. At the intersection of East Berkeley Street and Albany Street, the main is directed either into the New Boston Main combined sewer, which flows in a southerly direction, or, during times of high flow, to a combined sewer overflow that directs flow into the Fort Point Channel. The New Boston Main ultimately flows to the Massachusetts Water Resources Authority ("MWRA") Deer Island Waste Water Treatment Plan for treatment and disposal.

The existing building's sewer service will be removed as part of the Project. The existing sewer system is illustrated in Figure 6-1.

6.2.2 Wastewater Generation

The Project's sewage generation rates were estimated using the Massachusetts Division of Water Pollution Control Sewer System Extension and Connection Permit Program at 314 CMR 7.00 and the proposed building program. The typical sewage generation values for the proposed sources set forth in 314 CMR 7.00 are shown in Table 6-1. These typical generation values are conservative values for estimating the sewage flows from new construction and are used to evaluate new sewage flows or an increase in flows to existing connections generated by new projects. Table 6-1 describes the increased sewage generation in gallons per day (gpd) due to the Project.

Table 6-1 Proposed and Existing Wastewater Generation

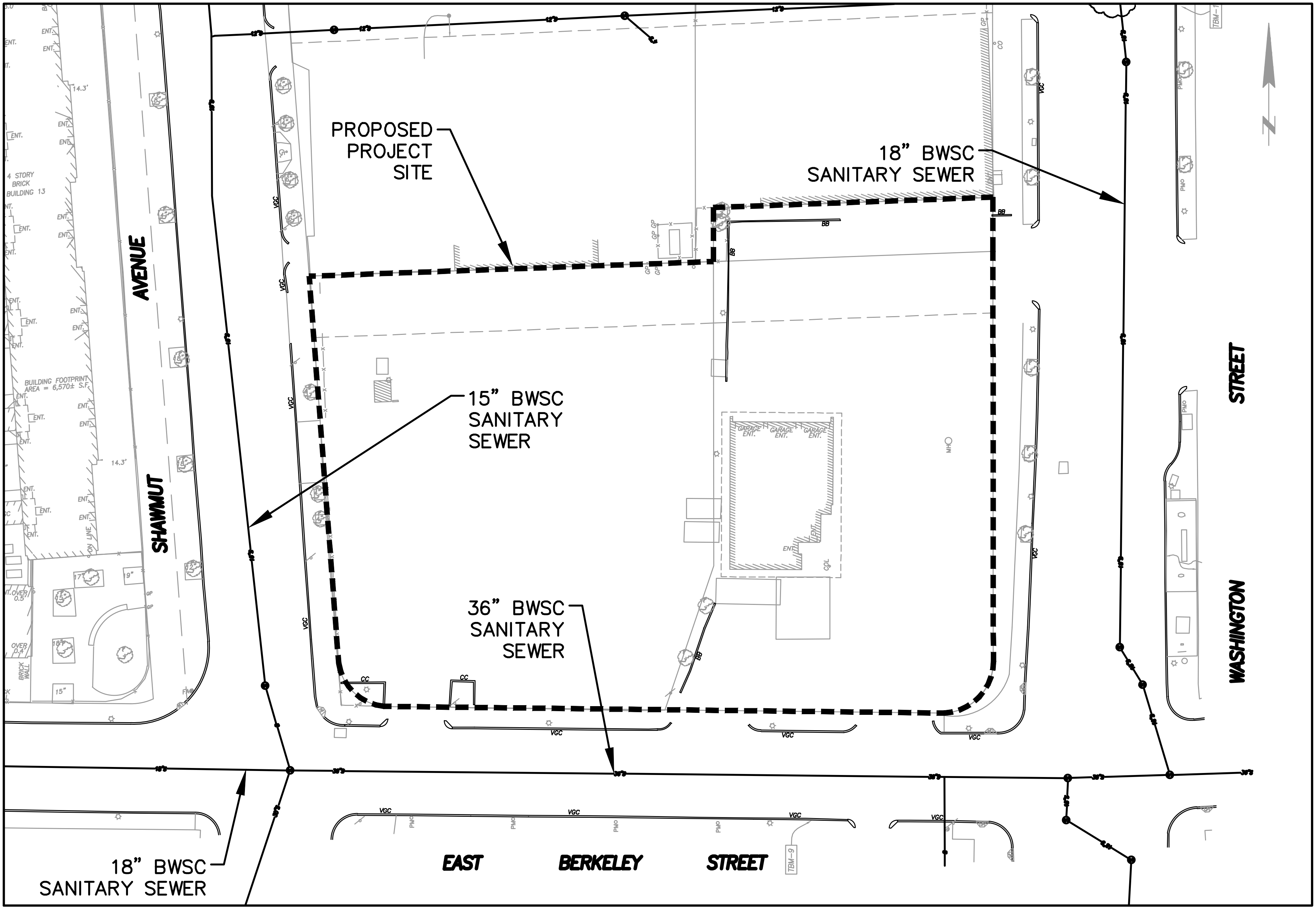
Use	Size		314 CMR Value (gpd/unit)		Total Flow (gpd)
Retail	12,000	sf	50	/1,000 s.f.	600
Restaurant	150	seats	35	/seat	5,250
Office	290,000	sf	75	/1,000 s.f.	21,750
Proposed Sewer Flows (gpd)					**27,600**

General Use	2,117	sf	50	/1,000 s.f.	106
Existing Sewer Flows (gpd)					**106**

<u>Total Change In Sewer Flows Due to the Proposed Building</u>

Total change in sewer flows = Proposed Sewer Flows - Existing Sewer Flows

	Proposed Flows (gpd)n	Existing Flows (gpd)	Difference (gpd)	
	27,600	106	27,494	Total increase in sewer flows due to proposed building (gpd)



80 East Berkeley Street Boston, Massachusetts

SCALE: 1"=50'

Nitsch Engineering

Figure 6-1

Existing Sewer System

6.2.3 *Sewage Capacity & Impacts*

The Project's impact on the existing BWSC systems in Shawmut Avenue, East Berkeley Street and Washington Street was analyzed. The existing sewer system capacity calculations are presented in Table 6-2.

Table 6-2 Sewer Hydraulic Capacity Analysis

Manhole (BWSC Number)[1]	Distance (feet)	Invert Elevation (up)	Invert Elevation (down)	Slope (%)	Diameter (inches)	Manning's Number[2]	Flow Capacity (cfs)[3]	Flow Capacity (MGD)[4]
Shawmut Avenue								
72 to 73	297	5.7	-0.04	1.9%	15	0.013	8.98	5.80
73 to 151	34	-0.05	-1.15	3.2%	15	0.013	11.62	7.51
						Minimum Flow Analyzed:	8.98	5.80
Washington Street								
88 to 312	27	3.40	2.90	1.9%	18	0.013	14.29	9.24
312 to 313	228	2.70	2.50	0.1%	18	0.013	3.11	2.01
313 to 92	24	2.40	1.76	2.7%	18	0.013	17.15	11.09
92 to 291	37	-0.20	-0.50	0.8%	18	0.013	9.46	6.11
						Minimum Flow Analyzed:	3.11	2.01
East Berkeley Street								
145 to 151	383	-0.02	-0.6	0.2%	18	0.013	4.09	2.64
151 to 192	303	-0.9	-1.9	0.3%	36	0.013	38.32	24.77
192 to 291	40	-2.2	-2.4	0.5%	36	0.013	47.16	30.48
						Minimum Flow Analyzed:	4.09	2.64

Note:

1. Manhole numbers taken from BWSC Sewer system Map no. 21J, 21K, 22J, and 22K.
2. Flow Calculations based on Manning Equation.
3. cfs = cubic feet per second
4. MGD = million gallons per day

6.2.4 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 27,494 gallons per day. Because the net sanitary flow is less than or equal to 50,000 gpd, but greater than 15,000 gpd certification under 314 CMR 7.00 in the form of a MassDEP Sewer Compliance Certification will be required. We note, however, that MassDEP is in the process of eliminating its Sewer Connection Permit program. Depending on if and when this program is eliminated, the Project may not be required to submit such Certification to MassDEP and would instead be required to obtain approval for the increase in sanitary flow from BWSC.

The sewer services for the Project will connect to the existing combined sewer mains located in Shawmut Avenue, East Berkeley Street, and/or Washington Street described above.

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 proposed service connections, an assessment of Project demands and system capacity, and the establishment of service accounts.

6.2.5 Proposed Impacts

The adjacent roadway sewer systems in Shawmut Avenue, East Berkeley Street and Washington Street and potential building service connections to the sewer system were analyzed.

Table 6-2 shows the hydraulic capacity of the 15-inch sanitary sewer within Shawmut Avenue, 36-inch sanitary sewer system within East Berkeley Street, and the 18-inch sanitary sewer in Washington Street near the Project site. The minimum hydraulic capacity is 5.80 million gallons per day (MGD) or 8.98 cubic feet per second (cfs) for the 15-inch system in Shawmut Avenue, 2.64 MGD or 4.09 cfs for the 36-inch system in East Berkeley Street, and 2.01 MGD or 3.11 cfs for the 18-inch system in Washington Street. Based on an average daily flow estimate for the Project of 27,494 gpd or 0.027 MGD; and with a factor of safety of 10 (total estimate = 0.027 MGD x 10 = 0.27 MGD), no capacity problems are expected within the Shawmut Avenue, East Berkeley Street, or Washington Street systems.

6.3 Water Supply

6.3.1 Water Infrastructure

Water for the Project site will be provided by the existing BWSC systems in Shawmut Avenue, Washington Street, and/or East Berkeley Street. 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 is a 12-inch Southern Low main beneath Shawmut Avenue. There is also a 16-inch Southern High Main and an 8-inch which increases to a 12-inch Southern High main on Washington Street. There is a 12-inch Southern Low main, a 20-inch Southern Low main, and a 12-inch Southern High main on East Berkeley Street. The existing water system in the Project area is illustrated in Figure 6-2.

The existing building's water service(s) will be removed as part of the Project.

6.3.2 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 which were calculated with 314 CMR 7.00 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 30,360 gpd. As noted above, the water for the Project will be supplied by the existing BWSC systems in Shawmut Avenue, Washington Street, and/or East Berkeley Street.

The Project will include features that attempt to reduce water consumption. For example, aeration fixtures and appliances will be chosen for water conservation qualities, and, in public areas, sensor operated faucets and toilets will be installed.

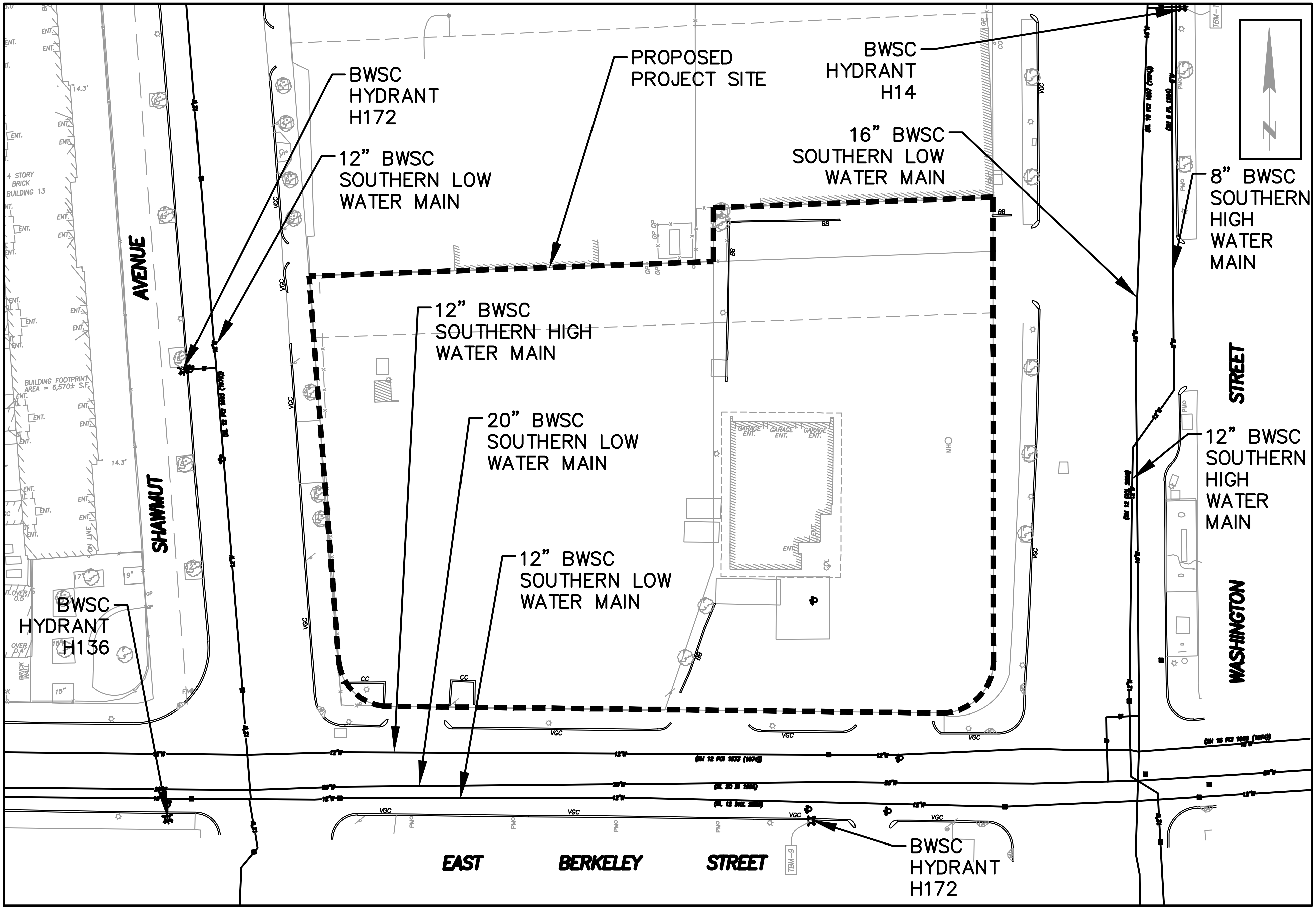
New water services will be installed in accordance with the latest local, state, and federal codes and standards. Backflow preventers will be installed at both domestic and fire protection service connections. New meters will be installed with Meter Transmitter Units (MTU's) as part of the BWSC's Automatic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

6.3.3 Existing Water Capacity and Impacts

Although the Proponent requested BWSC record flow test data containing actual flow and pressure for hydrants within the vicinity of the Project site, BWSC did not have this data. As the design progresses, the Proponent will request that hydrant flows be conducted by BWSC adjacent to the Project site.

6.3.4 Proposed Project

The domestic and fire protection water services for the Project will connect to the existing BWSC water mains in Shawmut Avenue, Washington Street, and/or East Berkeley Street.



80 East Berkeley Street **Boston, Massachusetts**

SCALE: 1"=50'

Figure 6-2

Existing Water System

Nitsch Engineering

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.

6.3.5 Proposed Impacts

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

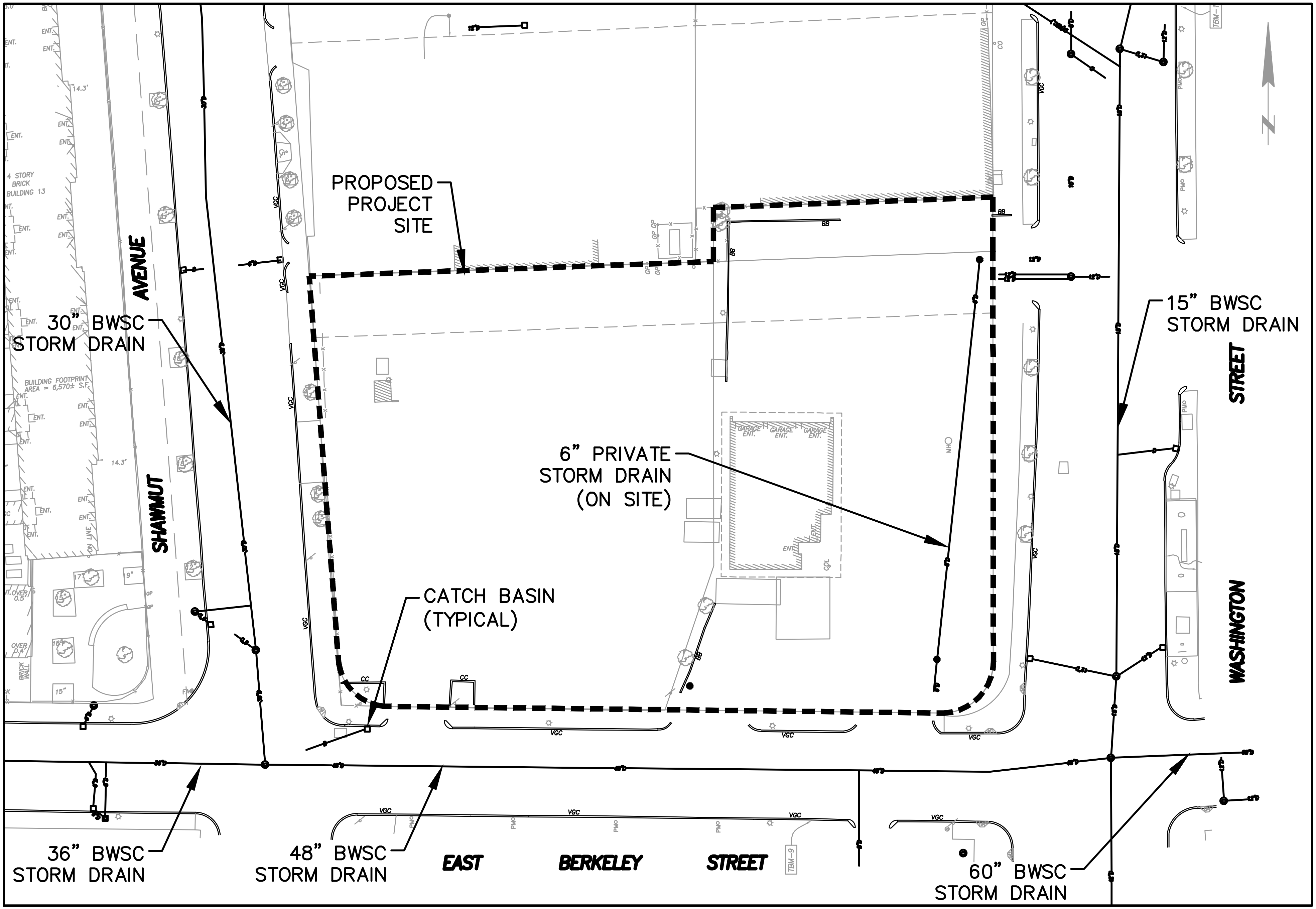
6.4 Stormwater

There are existing BWSC storm drains in Shawmut Avenue, East Berkeley Street, and Washington Street, which are illustrated in Figure 6-3. There is a 30-inch storm drain main within Shawmut Avenue that flows in a southerly direction to East Berkeley Street. There is also a 15-inch storm drain main within Washington Street that flows southerly to East Berkeley Street. Within East Berkeley Street, there is a 30-inch storm drain main that increases to a 48-inch main at the intersection of Shawmut Avenue and East Berkeley Street and then increases to a 60-inch main at the intersection of East Berkeley Street and Washington Street, flowing in an easterly direction toward Albany Street, where it increases to 44-inch x 54-inch and then decreases to a 48-inch main. At the intersection of East Berkeley Street and Albany Street, the 48-inch storm drain main flows either to the Fort Point Channel or to the New Boston main combined sewer.

There is an existing closed drainage system on the Project site. There are two catch basins connecting to a 6-inch drain line that flows to the 48-inch storm drain main within East Berkeley Street. Stormwater runoff from the existing parking lot and building sheet that is not captured by this on-site system flows to the adjacent properties and then to the storm drains within the closed drainage system in Shawmut Avenue, East Berkeley Street, and Washington Street.

6.4.1 Proposed Project

Stormwater runoff collected from the roof of the Project will be directed to a storage tank in the building and pumped to a subsurface recharge system on site, which will overflow to an adjacent BWSC storm drain. Site runoff will be collected by a closed drainage system, treated and recharged into the ground before overflowing to the BWSC storm drainage system.



80 East Berkeley Street **Boston, Massachusetts**

SCALE: 1"=50'

Nitsch Engineering

Figure 6-3

Existing Storm Drain System

The Project will slightly increase the amount of impervious area at the site compared to the existing condition but will maintain the existing peak rates and volumes of stormwater runoff from the site.

The Project site is located within the City of Boston's Groundwater Conservation Overlay District, and therefore the Project is required under Article 32 of the Code to infiltrate at least one-inch of stormwater runoff from impervious areas into the ground. The proposed stormwater management system will include groundwater recharge systems. It is anticipated that the stormwater recharge systems will work to passively infiltrate runoff into the ground with a gravity recharge system and 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. Section 3.7.5 describes proposed below-grade construction, including stormwater management during foundation construction. In addition, the Proponent has contacted the Boston Groundwater Trust to discuss the Project and measures to protect groundwater during construction.

Improvements and connections to BWSC infrastructure will be reviewed as part of the BWSC's site plan review process. As noted above, the process will include a comprehensive design review of the proposed service connections, assessment of Project demands and system capacity, and compliance with the Code (including Article 32).

6.4.2 Water Quality Impact

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 and will comply with the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System program for stormwater discharges. For example, 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.

6.4.3 MassDEP Stormwater Management Policy Standards

In March 1997, MassDEP adopted a new Stormwater Management Policy to address non-point source pollution. In 1997, MassDEP published the Massachusetts Stormwater Handbook as guidance on the Stormwater Management Policy, which was revised in

February 2008. The Policy, which is administered locally pursuant to M.G.L. c. 131, §40, prescribes specific stormwater management standards (the "Policy Standards") for development projects, including urban pollutant removal criteria for projects that may impact environmental resource areas. Compliance with this Policy is achieved through the implementation of Best Management Practices (BMPs) for each Policy Standard, as set forth in the stormwater management design. The Policy is administered locally pursuant to M.G.L. c. 131, § 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 Policy Standard. The Project site is not located near wetlands or water bodies. Therefore, 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.

Compliance: The Project will comply with this Policy 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 should be 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 types. 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 Policy 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 Policy Standard. Within the Project's limit of work, there will be mostly roof, landscaping, parking, and pedestrian 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 proposed design will comply with this standard, as 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 Policy Standard. The Project will not discharge untreated stormwater to a sensitive area or any other area.

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

Compliance: The Project will comply with this Policy Standard. The Project complies with the Stormwater Management Standards as applicable to the redevelopment.

Standard #8: Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.

Compliance: The Project will comply with this Policy Standard. Sedimentation and erosion controls will be incorporated as part of the design of the Project 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 Policy 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 Policy Standard. There will be no illicit connections associated with the Project.

6.5 Protection Proposed 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.

6.6 Conservation of Resources

The Proponent will incorporate into the Project features that meet or exceed the requirements of the State Building Code in order to conserve water, including low-flow toilets and restricted flow faucets, which will help reduce the domestic water demand, sensor-operated sinks with water conserving aerators, and sensor-operated toilets in all restrooms.

6.7 Proposed Energy Usage and Impacts

Electricity for the Project will be provided by NSTAR Electric. The Project's electrical loads are estimated as follows: connected load – 4,980 kVA; design load – 3,320 kW. The energy source for Project heating will be natural gas. As designed, the Project will not require any permits from MassDEP under MassDEP's air pollution control regulations.

Section 7.0

Coordination with Other Governmental Agencies

7.0 COORDINATION WITH OTHER GOVERNMENTAL AGENCIES

7.1 Boston Landmarks Commission / South End Landmark District Commission

The Project site is located within the South End Harrison/Albany Protection Area; therefore, demolition, land coverage, height of structures, topography, and landscaping are subject to review and approval by the SELDC. An application for a Certificate of Appropriateness will be submitted to the SELDC following the submittal of the EPNF to initiate the review process. The Proponent will coordinate SELDC review with review by the Boston Civic Design Commission.

7.2 Massachusetts Historical Commission

The Project is subject to State Register Review by the Massachusetts Historical Commission (MHC). A MHC Project Notification Form will be submitted to initiate the review. The Proponent will coordinate MHC's review of the Project with the Boston Landmarks Commission.

7.3 Massachusetts Environmental Policy Act

If the Project requires review under the Massachusetts Environmental Policy Act, an Environmental Notification Form will be filed.

Project's Certification

Project Certification

This form has been submitted to the Boston Redevelopment Authority as required by the Boston Zoning Code, Article 80.

Signature of Proponent's Representative

The Druker Company, Ltd.
50 Federal Street, Suite 1000
Boston, MA 02110
(617) 357-5700

8/8/2013
Date

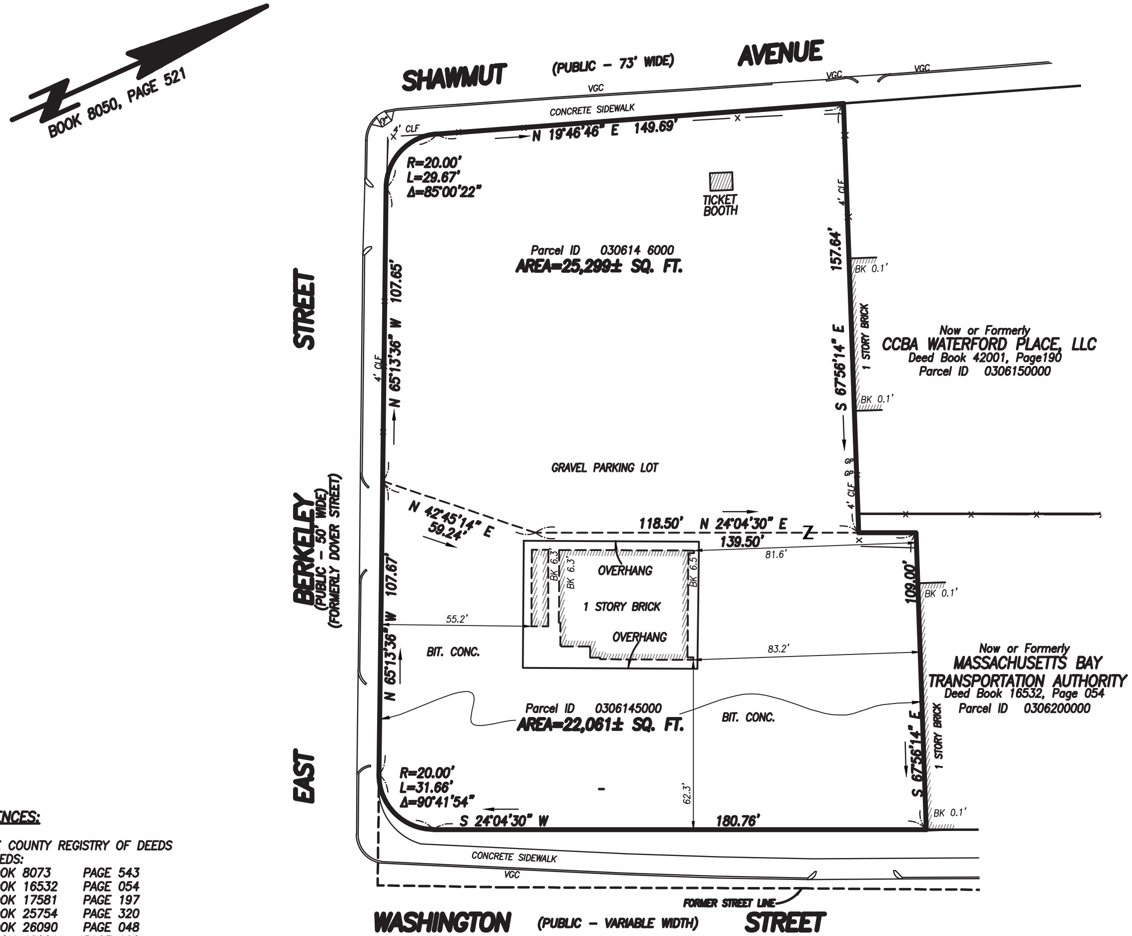
Signature of Preparer

Epsilon Associates, Inc.
3 Clock Tower Place, Suite 250
Maynard, MA 01754
(978) 897-7100

8/8/2013
Date

Appendix A

Survey and Parcel Description



LEGEND:

REC	RECORD
CALC	CALCULATED
VGC	VERTICAL GRANITE CURB
CLF	CHAIN LINK FENCE
SQ. FT.	SQUARE FEET
LCC	LAND COURT CASE
BIT	BITUMINOUS
CONC.	CONCRETE
BK	BACK
• GP	GATE POST
—x———x—	FENCE

NOTES:

1) NOT ALL IMPROVEMENTS ON LOCUS PARCELS ARE SHOWN.

OWNERS:
ROBERT J. GOTTLIEB, LLC.
AND
TELEPHONE ASSOCIATES V.D TRUST LLC

REFERENCES:

SUFFOLK COUNTY REGISTRY OF DEEDS
DEEDS:
BOOK 8073 PAGE 543
BOOK 16532 PAGE 054
BOOK 17581 PAGE 197
BOOK 25754 PAGE 320
BOOK 26090 PAGE 048
BOOK 42001 PAGE 190

PLANS:
BOOK 8050 PAGE 521
BOOK 8073 PAGE 543
BOOK 8375 PAGE 563
BOOK 8502 PAGE 652
BOOK 9808 PAGE 274
BOOK 15606 PAGE 077

MASSACHUSETTS LAND COURT
LCC 1159A
LCC 5597A
LCC 6404A
LCC 8589B
LCC 8663A
LCC 17790B
LCC 19508C

REDUCED COPY

PLOT PLAN
#80 EAST BERKELEY STREET
BOSTON, MASS.

SCALE: 1"=30' — JULY 25, 2013
HARRY R. FELDMAN, INC. — LAND SURVEYORS
112 SHAWMUT AVENUE — PHONE: (617)357-9740
BOSTON, MASS. 02118 — www.harryrfeldman.com

FELDMAN
Professional Land Surveyors

30 0 15 30 60 120
GRAPHIC SCALE

RESEARCH RDN	FIELD CHIEF KP	CHECKED BY	APPROVED	SHEET NO. 1 OF 1
CALC RDN	CADD RDN	FIELD CHECKED	CRD FILE 12985	JOB NO. 12985

FILENAME: S:\PROJECTS\12900s\12985\12985B\12985B – figure a-1.dwg

Attachment A

Legal Description

Parcel I

These certain Parcels of Land together with any improvements thereon located in Boston, Suffolk County, Massachusetts, being shown as Parcels A & B on Plan entitled "Compiled Plan of Land in Boston, MA" dated March, 1970 prepared by Whitman & Howard, Inc. Engineers and recorded in Book 8502 Page 652.

Located within Parcel B is the following parcel of registered land:

That certain parcel of land and any improvements thereon, situated in said Boston, bounded and described as follows:

NORTHEASTERLY	by the southwesterly line of Garland Street, fifty nine and 90/100 (59.90) feet;
SOUTHEASTERLY	by Lot 2 as shown on plan hereinafter mentioned, twenty three and 25/100 (23.25) feet;
SOUTHWESTERLY	by land now or formerly of Boston Redevelopment Authority, fifty nine and 01/100 (59.01) feet; and
NORTHWESTERLY	by the southeasterly line of Garland Place, twenty and 46/100 (20.46) feet.

Said land is shown as Lot 1 on subdivision plan drawn by Whitman & Howard Inc., Surveyors, dated May 1965, as approved by the Land Court, filed in the Land Registration Office as Plan No. 8589-B, a copy of a portion of which is filed with Certificate of Title 75530.

Parcel II

That certain parcel of land in said Boston known as Parcel 3B-1 shown on a plan entitled "South End Urban Renewal Area Project, Mass. R-56, Boston, Suffolk County, Massachusetts," prepared by Charles A. Maguire & Associates dated May, 1969, which plan is recorded with the Suffolk County Registry of Deeds in Book 8375 Page 563. Said Parcel of land in bounded and described as follows:

Beginning at a point on the proposed Westerly side line of Washington Street, said point being located through two courses and distances from the point of intersection of the Easterly side line of Shawmut Avenue, extended, and the Northerly side line of East Berkeley Street, extended, S65° 13' 36" E by said Northerly side line of East Berkeley Street two hundred fifty three and ninety hundredths (253.90) feet and from the point of intersection of said Northerly side line of Berkeley Street, extended, and the proposed Westerly side line of Washington Street, extended N24° 04' 30" E by said proposed Westerly side line of Washington Street one hundred eighty and two hundredths (180.02) feet;

Thence running S 67° 56’ 14” W by land (Parcel 3A, Southerly) now or formerly of the Boston Redevelopment Authority one hundred nine and no hundredths (109.00) feet to a point;

Thence turn and running N24° 04’ 30” E by land (Parcel 3B-2) now or formerly of the Boston Redevelopment Authority twenty one and no hundredths (21.00) feet to a point;

Thence turning and running S67° 56’ 14” E still by land (Parcel 3B-2) now or formerly of said Boston Redevelopment Authority one hundred nine and no hundredths (109.00) feet to a point on the proposed Westerly side line of Washington Street;

Thence turning and running 24° 04’ 30” W by said proposed Westerly side line of Washington Street twenty one and no hundredths (21.00) feet to the point of beginning.

Containing a total of 2,288 square feet, more or less, according to said plan.

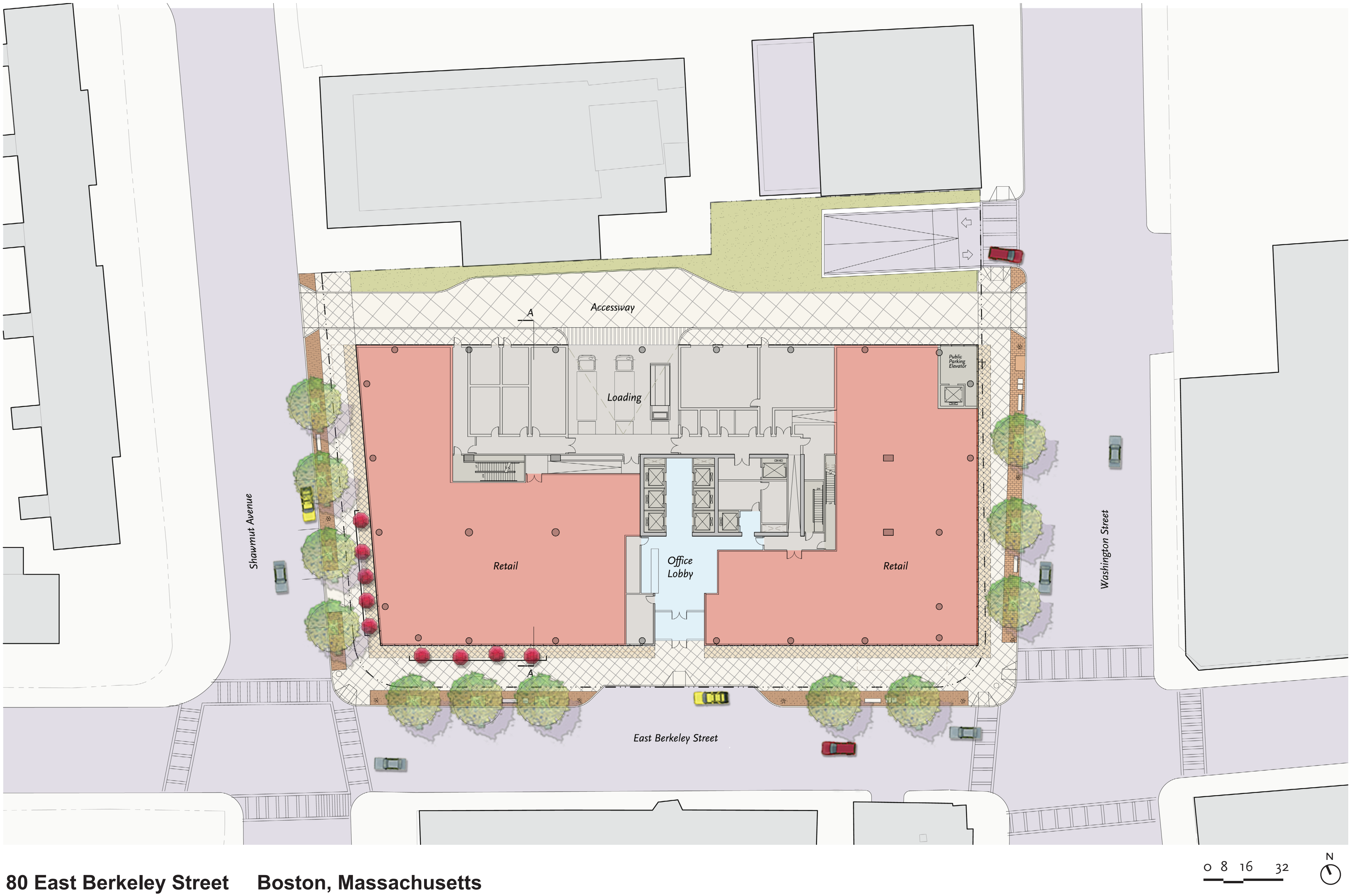
Said Parcel II is also shown as Parcel C on plan entitled “Compiled Plan of Land in Boston, Mass.” dated March 1970, prepared by Whitman & Howard, Inc. and recorded in Book 8502 Page 652.

Together with benefit of the terms of a easement agreement by and between the BRA and Joseph J. Gottlieb et al, dated February 27, 1970 recorded in Book 8375 Page 568.

Together with the benefit of terms and provisions of Easement Agreement dated July 27, 1966 by and between the BRA and City Redevelopment Corporation and recorded in Book 8502 Page 642 and filed as Document 306746.

Appendix B

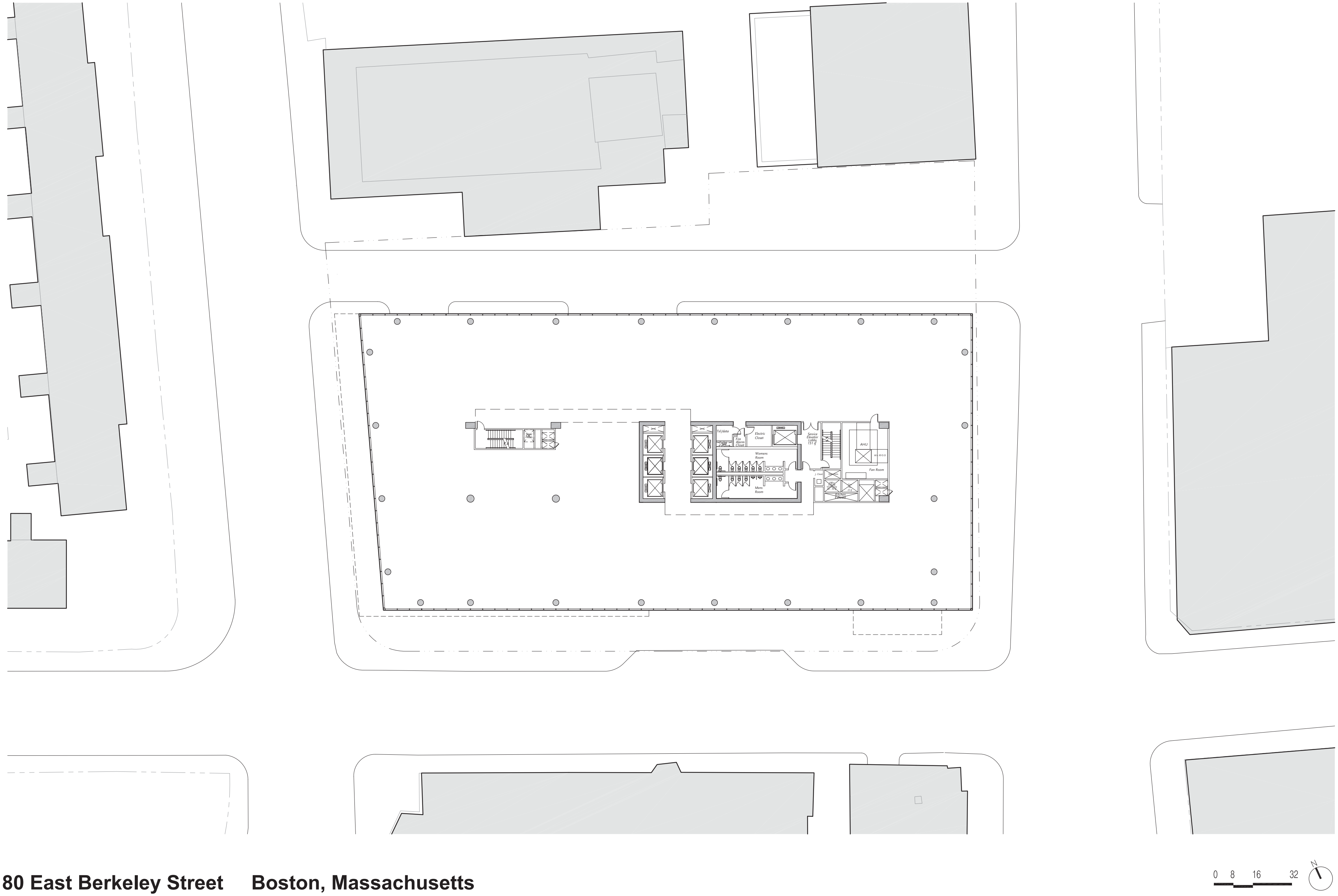
Plans and Section



80 East Berkeley Street   Boston, Massachusetts

ELKUS | MANFREDI
ARCHITECTS

Figure B-1
Site Plan

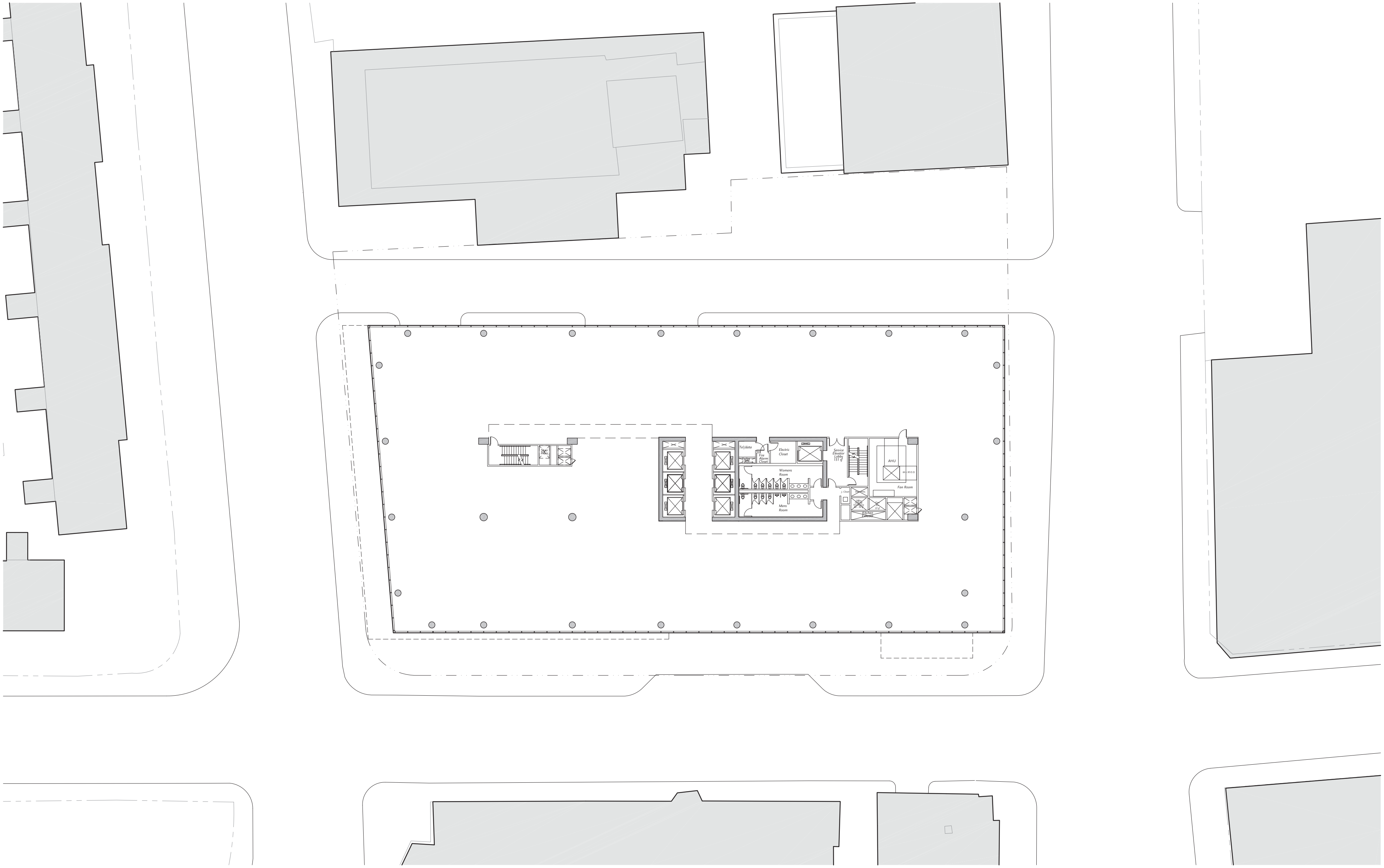


80 East Berkeley Street **Boston, Massachusetts**

ELKUS | MANFREDI ARCHITECTS

Figure B-2

Floor 2 Plan

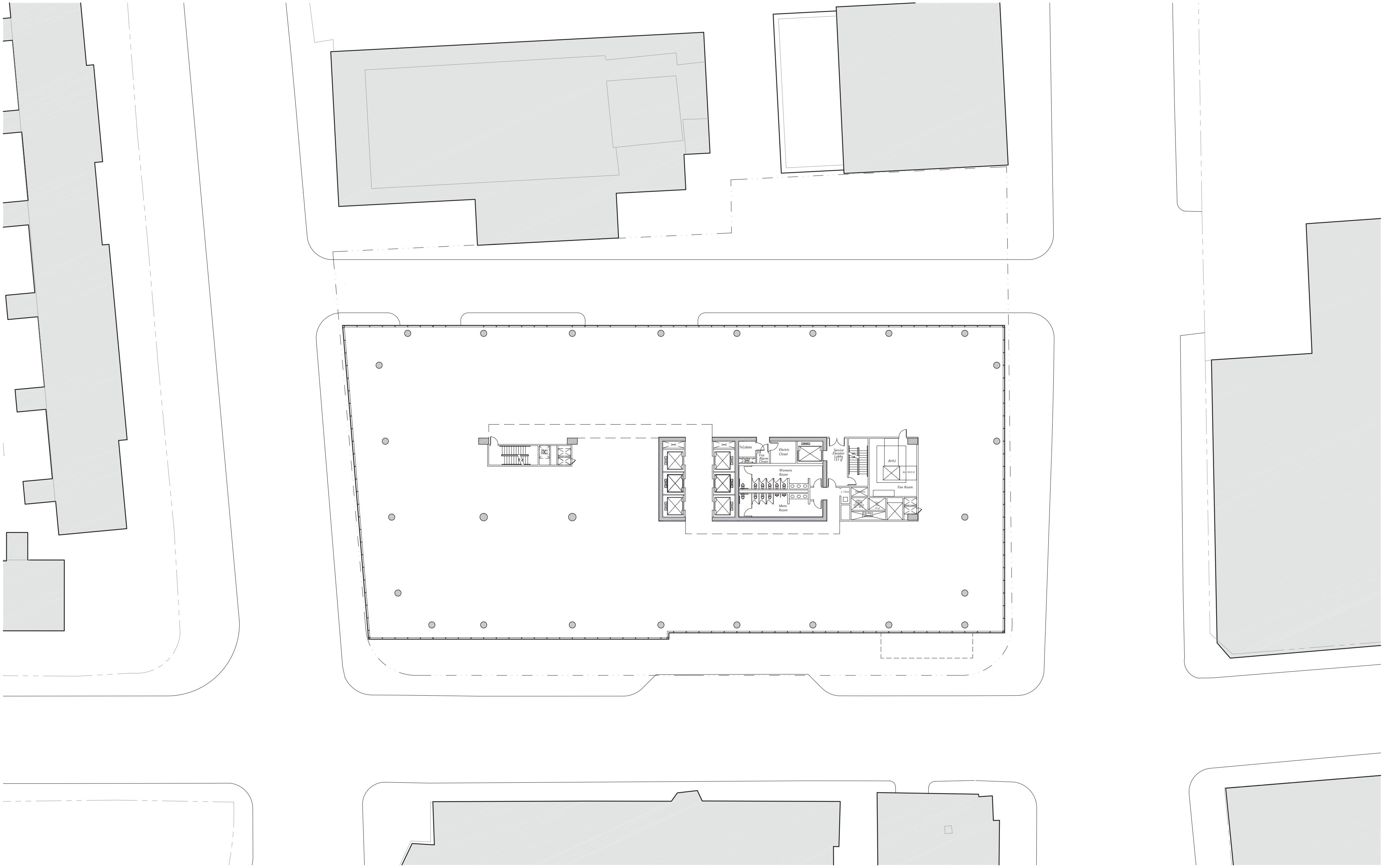


80 East Berkeley Street Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Figure B-3

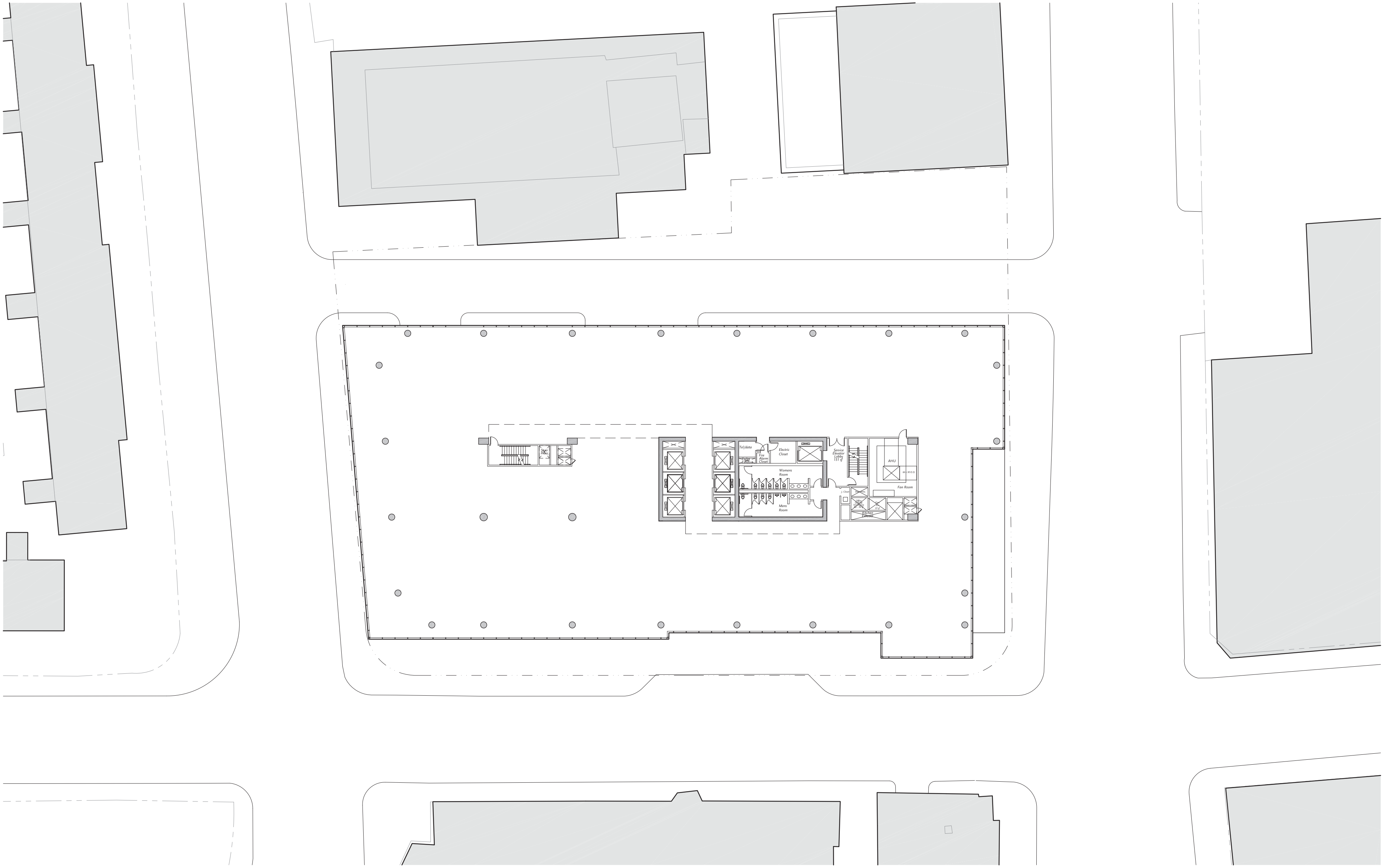
Floors 3, 10, 11 Plan



80 East Berkeley Street   Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Figure B-4
4th Floor Plan

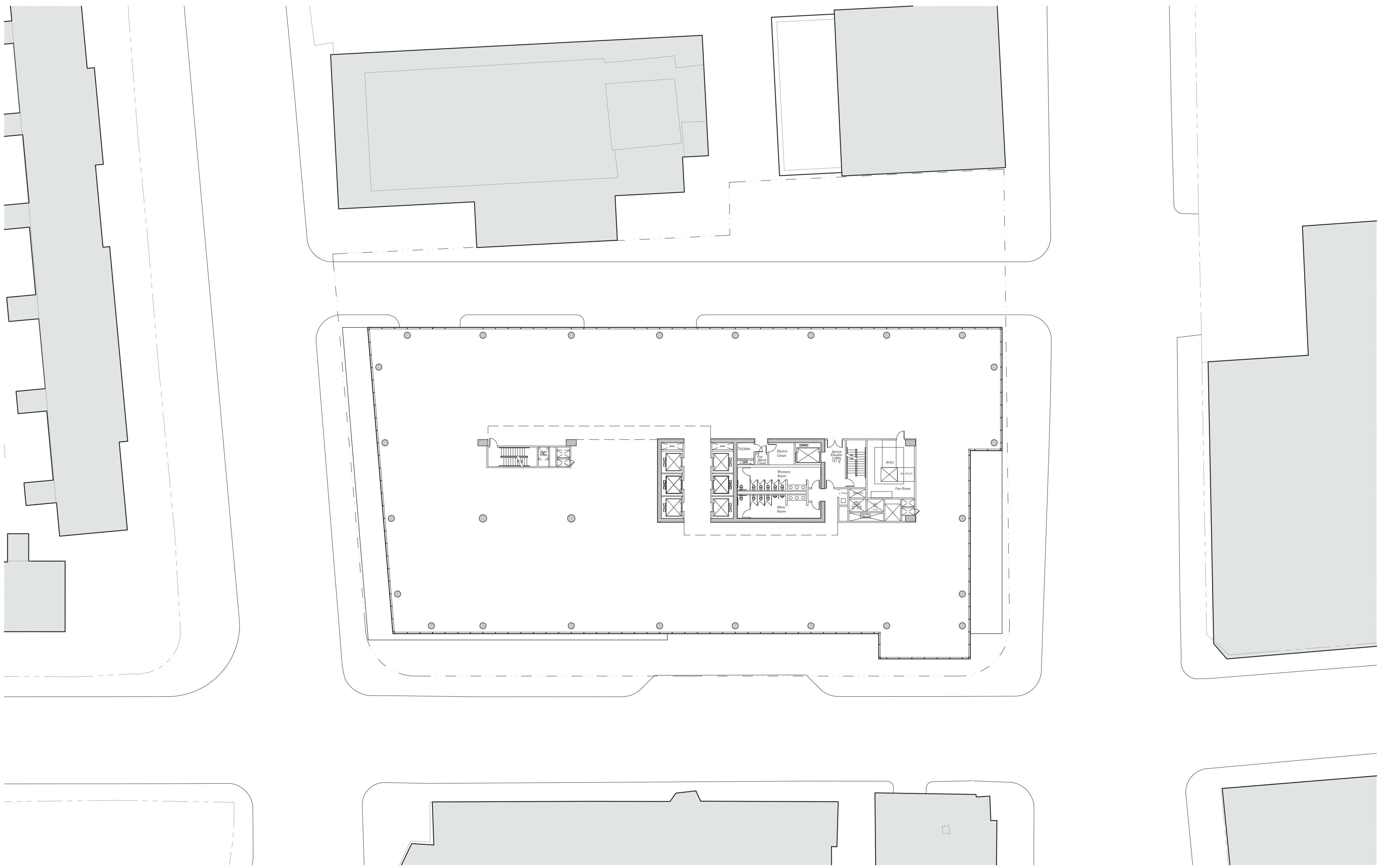


80 East Berkeley Street **Boston, Massachusetts**

ELKUS | MANFREDI ARCHITECTS

Figure B-5

5th Floor Plan

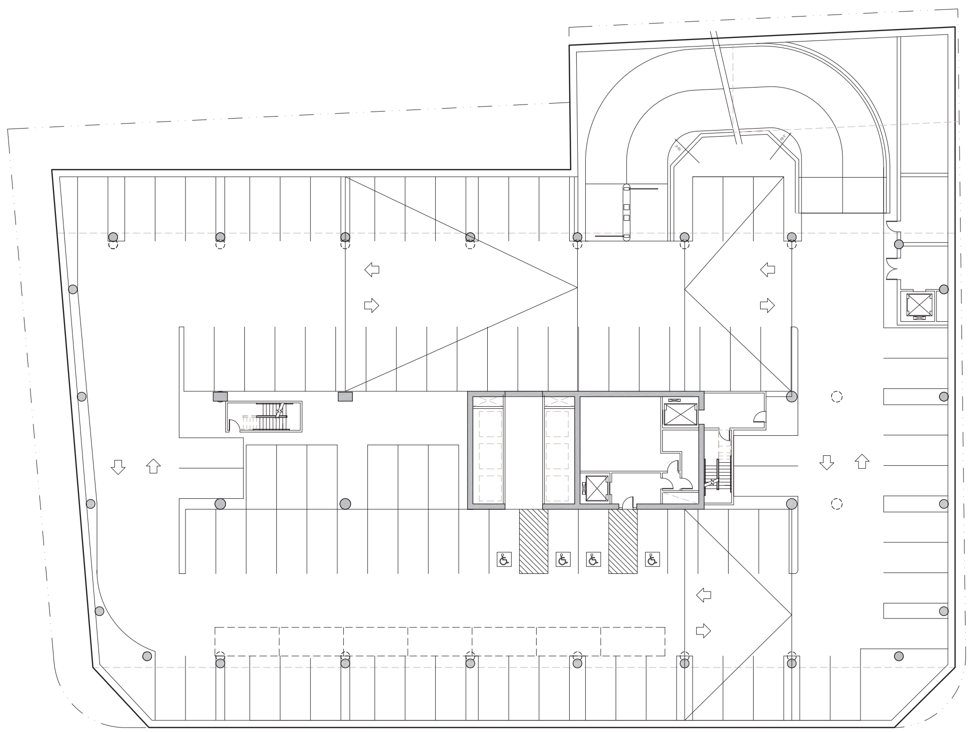


80 East Berkeley Street Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Figure B-6

Floors 6, 7, 8, 9 Plan



80 East Berkeley Street Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Figure B-7

B1 Lower Level Plan

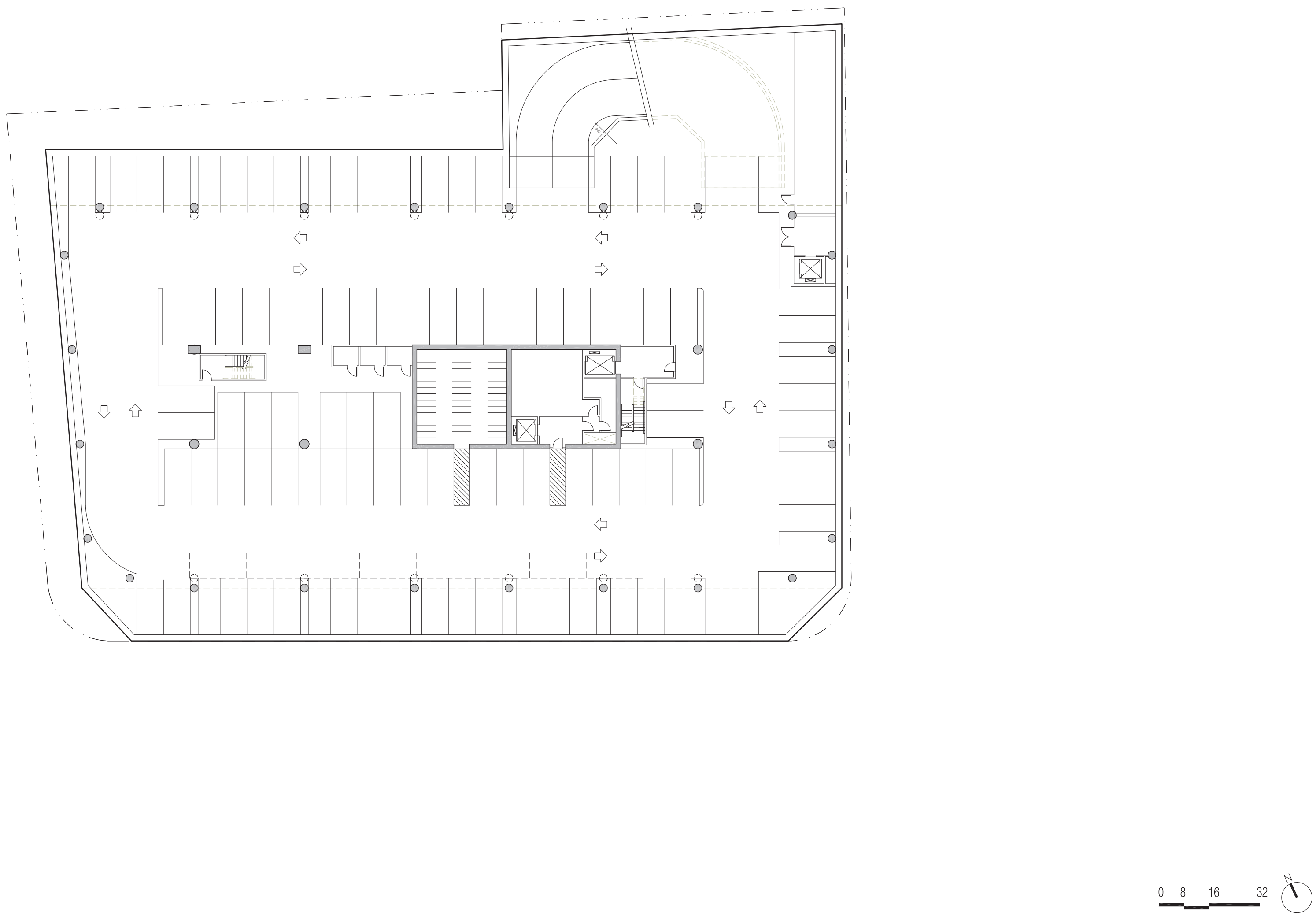
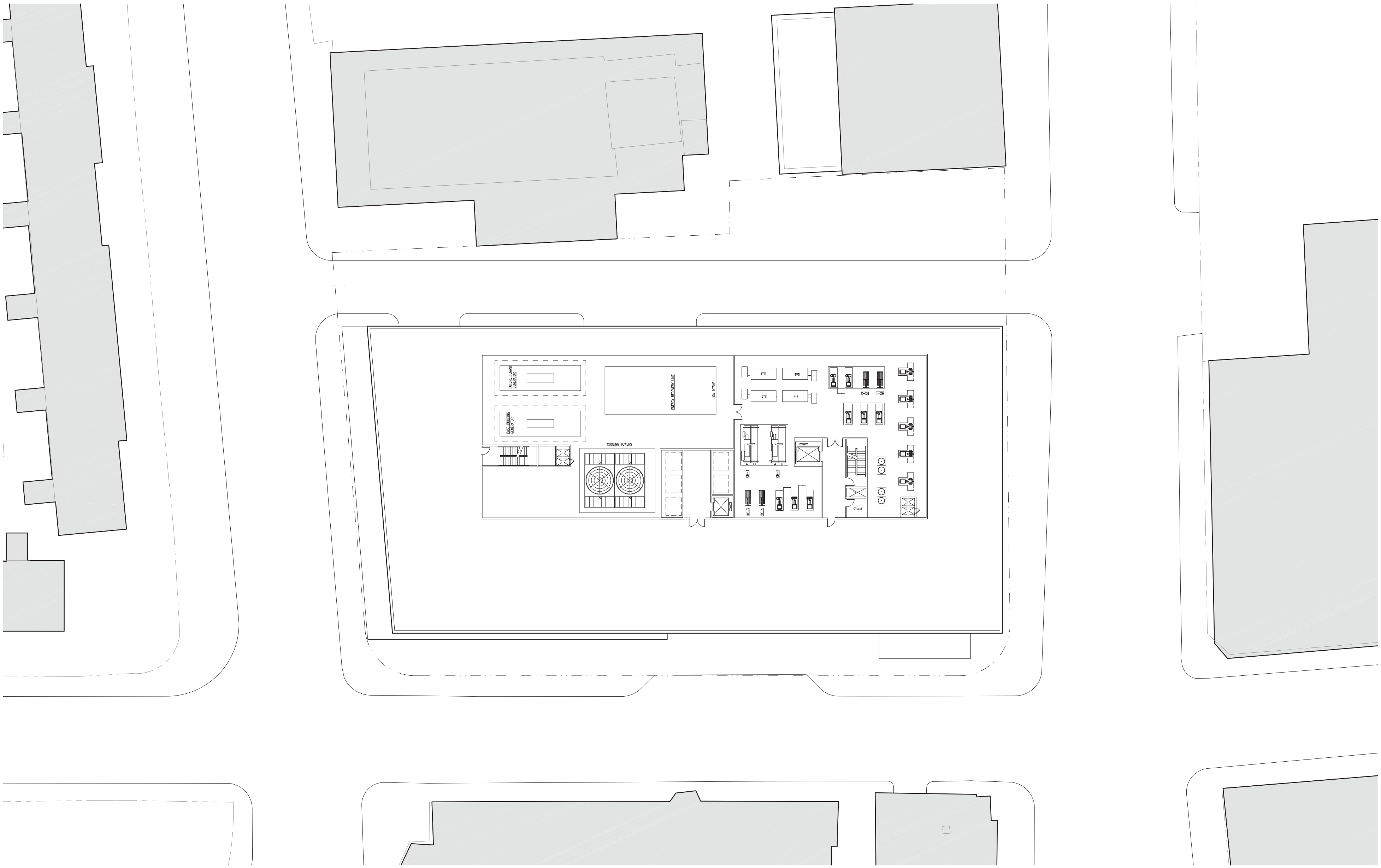


Figure B-8

B2 Lower Level Plan

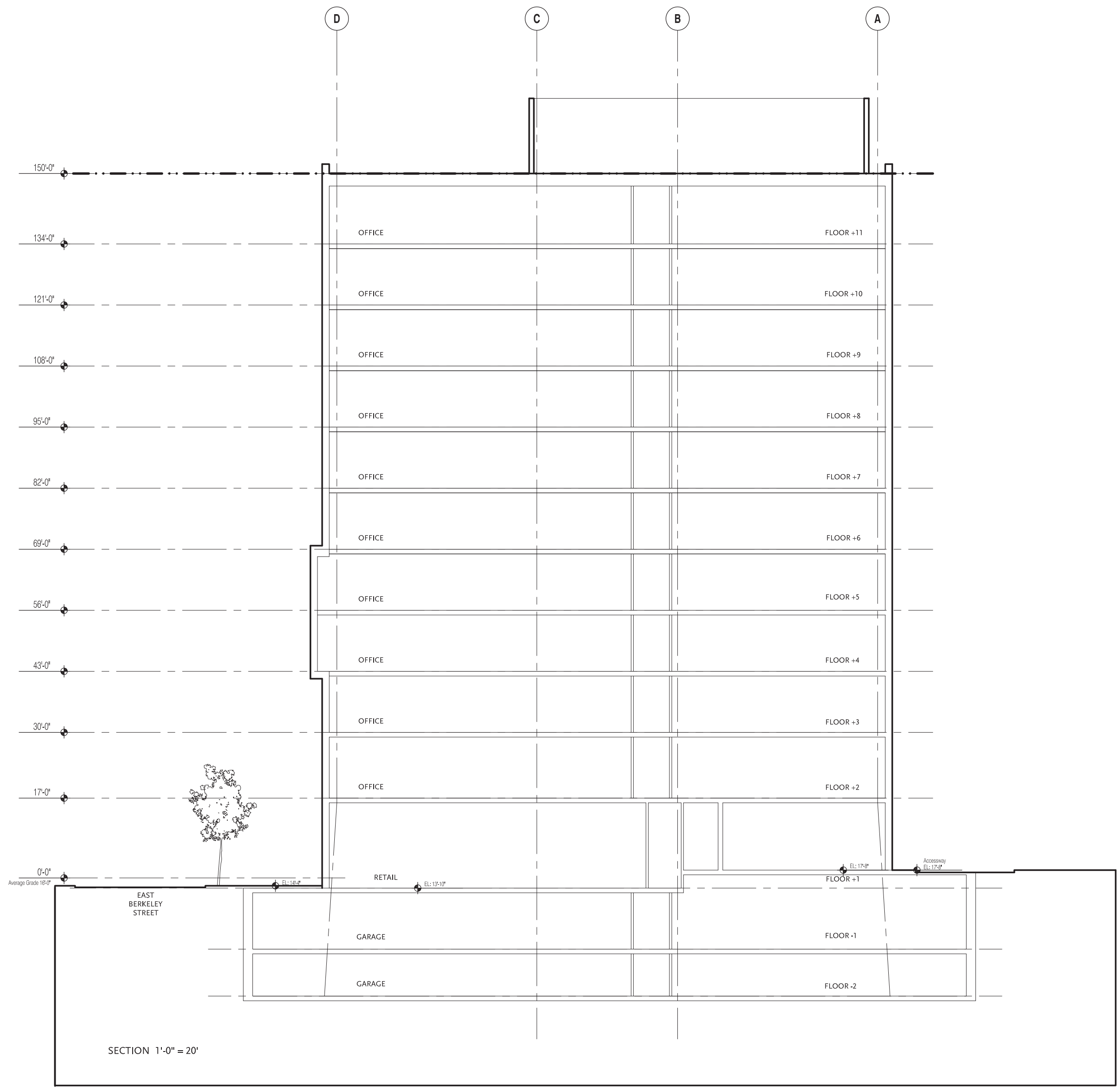


80 East Berkeley Street **Boston, Massachusetts**

ELKUS | MANFREDI ARCHITECTS

Figure B-9

Penthouse Plan



80 East Berkeley Street Boston, Massachusetts

ELKUS | MANFREDI ARCHITECTS

Figure B-10

East Berkeley Street Section A-A'

Appendix C

Transportation

The Transportation Appendix is available upon request

Appendix D

Wind

CONSULTING ENGINEERS
& SCIENTISTS

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
1	A	Spring	17		Walking	23		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	16		Walking	24		Acceptable
2	A	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	19		Walking	26		Acceptable
		Annual	17		Walking	24		Acceptable
	B	Spring	14	-18%	Standing	22		Acceptable
		Summer	11	-21%	Sitting	17	-11%	Acceptable
		Fall	14	-12%	Standing	21		Acceptable
		Winter	16	-16%	Walking	24		Acceptable
		Annual	14	-18%	Standing	22		Acceptable
3	A	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	16	+14%	Walking	23		Acceptable
		Annual	14		Standing	21	+11%	Acceptable
4	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

<u>Configurations</u>

A - No Build
B – Build

<u>Mean Wind Speed Criteria</u>

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

<u>Effective Gust Criteria</u>

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
	B	Spring	16	+33%	Walking	23	+21%	Acceptable
		Summer	13	+30%	Standing	18	+20%	Acceptable
		Fall	15	+25%	Standing	21	+17%	Acceptable
		Winter	17	+31%	Walking	24	+20%	Acceptable
		Annual	15	+25%	Standing	22	+22%	Acceptable
5	A	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	22	+100%	Uncomfortable	29	+61%	Acceptable
		Summer	17	+89%	Walking	23	+64%	Acceptable
		Fall	20	+100%	Uncomfortable	27	+69%	Acceptable
		Winter	22	+100%	Uncomfortable	29	+61%	Acceptable
		Annual	21	+91%	Uncomfortable	28	+65%	Acceptable
6	A	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	13		Standing	18		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	18		Acceptable
7	A	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	18	+20%	Walking	26	+24%	Acceptable
		Summer	14	+17%	Standing	20	+18%	Acceptable
		Fall	17	+21%	Walking	24	+20%	Acceptable
		Winter	19	+27%	Walking	27	+23%	Acceptable
		Annual	18	+29%	Walking	25	+25%	Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - No Build	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria		Mean Wind Speed				Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
8	A	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
9	A	Spring	16		Walking	22		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	14	-12%	Standing	21		Acceptable
		Summer	11		Sitting	16	-11%	Acceptable
		Fall	13	-13%	Standing	20		Acceptable
		Winter	14	-12%	Standing	22		Acceptable
		Annual	13	-13%	Standing	20		Acceptable
10	A	Spring	14		Standing	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	19	+36%	Walking	27	+23%	Acceptable
		Summer	15	+25%	Standing	21	+24%	Acceptable
		Fall	18	+29%	Walking	26	+24%	Acceptable
		Winter	20	+33%	Uncomfortable	29	+26%	Acceptable
		Annual	18	+29%	Walking	26	+24%	Acceptable
11	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - No Build	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
	B	Spring	25	+92%	Uncomfortable	33	+65%	Unacceptable
		Summer	19	+90%	Walking	26	+62%	Acceptable
		Fall	23	+92%	Uncomfortable	31	+63%	Acceptable
		Winter	26	+100%	Uncomfortable	35	+67%	Unacceptable
		Annual	24	+100%	Uncomfortable	32	+68%	Unacceptable
12	A	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	14		Standing	23	+15%	Acceptable
		Summer	13	+18%	Standing	20	+25%	Acceptable
		Fall	14	+17%	Standing	21	+11%	Acceptable
		Winter	14		Standing	23		Acceptable
		Annual	14		Standing	22	+16%	Acceptable
13	A	Spring	10		Sitting	17		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	10		Sitting	17		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	17		Acceptable
14	A	Spring	9		Sitting	15		Acceptable
		Summer	8		Sitting	12		Acceptable
		Fall	9		Sitting	14		Acceptable
		Winter	9		Sitting	15		Acceptable
		Annual	9		Sitting	14		Acceptable
	B	Spring	9		Sitting	15		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	9		Sitting	14		Acceptable
		Winter	10	+11%	Sitting	15		Acceptable
		Annual	9		Sitting	14		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations

A - No Build
B – Build

Mean Wind Speed Criteria

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria		Mean Wind Speed				Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
15	A	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
16	A	Spring	12		Sitting	20		Acceptable
		Summer	10		Sitting	17		Acceptable
		Fall	11		Sitting	19		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	13		Standing	21		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	12		Sitting	20		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
17	A	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	20		Acceptable
18	A	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	24		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - No Build	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria		Mean Wind Speed				Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
	B	Spring	19	+12%	Walking	27	+12%	Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	17		Walking	25		Acceptable
19	A	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	13	-19%	Standing	21		Acceptable
		Summer	11	-15%	Sitting	17		Acceptable
		Fall	12	-20%	Sitting	19	-14%	Acceptable
		Winter	13	-19%	Standing	21		Acceptable
		Annual	13	-13%	Standing	20		Acceptable
20	A	Spring	11		Sitting	16		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	11		Sitting	16		Acceptable
		Annual	10		Sitting	15		Acceptable
	B	Spring	11		Sitting	16		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	12		Sitting	17		Acceptable
		Annual	11		Sitting	16		Acceptable
21	A	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	16		Acceptable
		Winter	12		Sitting	17		Acceptable
		Annual	11		Sitting	16		Acceptable
	B	Spring	12		Sitting	18		Acceptable
		Summer	10	+11%	Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations

A - No Build
B – Build

Mean Wind Speed Criteria

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
22	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
23	A	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	9	-18%	Sitting	15	-12%	Acceptable
		Summer	8	-11%	Sitting	13		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	10		Sitting	16		Acceptable
		Annual	9		Sitting	15		Acceptable
24	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
25	A	Spring	15		Standing	22		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	21		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - No Build	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria		Mean Wind Speed				Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
	B	Spring	14		Standing	21		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	21		Acceptable
26	A	Spring	10		Sitting	16		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	11		Sitting	18	+12%	Acceptable
		Summer	9	+12%	Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	19	+12%	Acceptable
		Annual	11		Sitting	17		Acceptable
27	A	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	18		Walking	26		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	19	+12%	Walking	28	+12%	Acceptable
		Annual	18	+12%	Walking	26	+13%	Acceptable
28	A	Spring	18		Walking	25		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	15	-17%	Standing	23		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	14	-12%	Standing	22		Acceptable
		Winter	15	-12%	Standing	23		Acceptable
		Annual	14	-12%	Standing	22		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations

A - No Build
B – Build

Mean Wind Speed Criteria

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
29	A	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	15		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
30	A	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	16		Walking	24		Acceptable
	B	Spring	18		Walking	26		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	20	+11%	Uncomfortable	27		Acceptable
		Annual	18	+12%	Walking	25		Acceptable
31	A	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	12		Sitting	17		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	16		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
32	A	Spring	11		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	11		Sitting	19		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - No Build	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
	B	Spring	11		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	10		Sitting	18		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	11		Sitting	18		Acceptable
33	A	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	14		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	14		Standing	22		Acceptable
34	A	Spring	16		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
35	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - No Build	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
36	A	Spring	11		Sitting	17		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	11		Sitting	17		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
37	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
38	A	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	12	-14%	Sitting	18	-14%	Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11	-15%	Sitting	17	-11%	Acceptable
		Winter	12	-14%	Sitting	18	-18%	Acceptable
		Annual	11	-15%	Sitting	17	-15%	Acceptable
39	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

<u>Configurations</u>

A - No Build
B – Build

<u>Mean Wind Speed Criteria</u>

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

<u>Effective Gust Criteria</u>

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
	B	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
40	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	10	+11%	Sitting	16		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
41	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
42	A	Spring	13		Standing	20		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations

A - No Build
B – Build

Mean Wind Speed Criteria

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
43	A	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
44	A	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	11	-27%	Sitting	17	-23%	Acceptable
		Summer	9	-25%	Sitting	13	-24%	Acceptable
		Fall	10	-29%	Sitting	16	-24%	Acceptable
		Winter	11	-31%	Sitting	18	-22%	Acceptable
		Annual	10	-33%	Sitting	16	-24%	Acceptable
45	A	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	15	+15%	Standing	23	+15%	Acceptable
		Summer	13	+18%	Standing	19	+19%	Acceptable
		Fall	14	+17%	Standing	22	+16%	Acceptable
		Winter	16	+23%	Walking	25	+19%	Acceptable
		Annual	15	+25%	Standing	23	+21%	Acceptable
46	A	Spring	21		Uncomfortable	28		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	19		Walking	25		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	19		Walking	26		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - No Build	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
	B	Spring	21		Uncomfortable	28		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	19		Walking	26		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	19		Walking	26		Acceptable
47	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
48	A	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	17		Walking	25		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	16		Walking	24		Acceptable
49	A	Spring	16		Walking	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - No Build	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
50	A	Spring	17		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	22		Acceptable
	B	Spring	18		Walking	24		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	17		Walking	23		Acceptable
51	A	Spring	16		Walking	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
52	A	Spring	14		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	14		Standing	21		Acceptable
53	A	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	21		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - No Build	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
	B	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	13	-13%	Standing	20		Acceptable
54	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
55	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
56	A	Spring	17		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	15	-12%	Standing	22		Acceptable
		Summer	11	-15%	Sitting	17		Acceptable
		Fall	14	-12%	Standing	21		Acceptable
		Winter	15	-17%	Standing	23		Acceptable
		Annual	14	-12%	Standing	21		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations

A - No Build
B – Build

Mean Wind Speed Criteria

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
57	A	Spring	19		Walking	27		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	20		Uncomfortable	30		Acceptable
		Annual	18		Walking	27		Acceptable
	B	Spring	20		Uncomfortable	29		Acceptable
		Summer	16		Walking	23		Acceptable
		Fall	19		Walking	28		Acceptable
		Winter	22		Uncomfortable	32		Unacceptable
		Annual	20	+11%	Uncomfortable	29		Acceptable
58	A	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
59	A	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
60	A	Spring	16		Walking	24		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	23		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

<u>Configurations</u>

A - No Build
B – Build

<u>Mean Wind Speed Criteria</u>

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

<u>Effective Gust Criteria</u>

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
	B	Spring	18	+12%	Walking	24		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
61	A	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12	-14%	Sitting	19		Acceptable
		Annual	12		Sitting	18		Acceptable
62	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	14		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	20		Acceptable
63	A	Spring	14		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - No Build	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
64	A	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	21		Acceptable
65	A	Spring	16		Walking	24		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	18	+12%	Walking	26		Acceptable
		Summer	15	+25%	Standing	20	+11%	Acceptable
		Fall	17	+13%	Walking	24		Acceptable
		Winter	20	+25%	Uncomfortable	27	+12%	Acceptable
		Annual	18	+20%	Walking	25	+14%	Acceptable
66	A	Spring	12		Sitting	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	14	+17%	Standing	22		Acceptable
		Summer	12	+20%	Sitting	17		Acceptable
		Fall	14	+17%	Standing	21	+11%	Acceptable
		Winter	16	+23%	Walking	24	+14%	Acceptable
		Annual	14	+17%	Standing	22	+16%	Acceptable
67	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations	Mean Wind Speed Criteria		Effective Gust Criteria	
A - No Build	Comfortable for Sitting:	≤ 12 mph	Acceptable:	≤ 31 mph
B – Build	Comfortable for Standing:	> 12 and ≤ 15 mph	Unacceptable:	> 31 mph
	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
	B	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
68	A	Spring	9		Sitting	15		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	10		Sitting	16		Acceptable
		Annual	9		Sitting	15		Acceptable
	B	Spring	11	+22%	Sitting	17	+13%	Acceptable
		Summer	9	+12%	Sitting	14		Acceptable
		Fall	10	+11%	Sitting	16		Acceptable
		Winter	11		Sitting	18	+12%	Acceptable
		Annual	10	+11%	Sitting	16		Acceptable
69	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	19	+46%	Walking	27	+35%	Acceptable
		Summer	16	+60%	Walking	21	+31%	Acceptable
		Fall	18	+50%	Walking	25	+32%	Acceptable
		Winter	21	+50%	Uncomfortable	29	+38%	Acceptable
		Annual	19	+46%	Walking	26	+37%	Acceptable
70	A	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	17	+13%	Walking	25		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16	+14%	Walking	23		Acceptable
		Winter	17	+13%	Walking	25		Acceptable
		Annual	16	+14%	Walking	24		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations

A - No Build
B – Build

Mean Wind Speed Criteria

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons

BRA Criteria			**Mean Wind Speed**			**Effective Gust Wind Speed**		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
71	A	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	15	-12%	Standing	22		Acceptable
		Summer	12		Sitting	17	-11%	Acceptable
		Fall	14	-12%	Standing	20		Acceptable
		Winter	15	-12%	Standing	23		Acceptable
		Annual	14	-12%	Standing	21		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
2) % Change is based on comparison with Configuration A and only those that are greater than 10% are listed.

Configurations

A - No Build
B – Build

Mean Wind Speed Criteria

Comfortable for Sitting:	≤ 12 mph
Comfortable for Standing:	> 12 and ≤ 15 mph
Comfortable for Walking:	> 15 and ≤ 19 mph
Uncomfortable for Walking:	> 19 and ≤ 27 mph
Dangerous Conditions:	> 27 mph

Effective Gust Criteria

Acceptable:	≤ 31 mph
Unacceptable:	> 31 mph

Appendix E

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 MOBILE6.2 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 2013 and 2018 for speed limits of 2.5, 10, 15, and 30 mph for use in the microscale analyses. The 10 mph rate was used to estimate parking garage emissions.

CAL3QHC

For the intersections studied, the CAL3QHC model was applied to calculate CO concentrations at sensitive receptor locations using emission rates derived in MOBILE6.2. 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 all intersections. Idle emission rates for queue links were based on 2.5 mph emission rates derived in MOBILE6.2 and converted from grams per mile to grams per hour. Emission rates for speeds of 10, 15, and 30 mph were used for right turn, left turn, and free flow links, respectively.

East Berkeley Street - Boston, MA
Calculation of Microscale Modeling Emission Factors
Summary of MOBILE6 Output

Carbon Monoxide Only

Queues	Idle
Free Flow	30 mph
Right Turns	10 mph
Left Turns	15 mph

Winter	**2013**	**2018**	**Units**
Idle	46.840	42.335	g/hr
2.5 mph	18.736	16.934	g/mile
10 mph	10.195	9.284	g/mile
15 mph	9.193	8.380	g/mile
30 mph	8.237	7.521	g/mile

Note: Winter CO emission factors are higher than Summer and are conservatively used

Model Input/Output Files

Due to excessive size CAL3QHC, and MOBILE6.2 input and output files are available on digital media upon request.

Appendix F

Climate Change Preparedness Questionnaire

Boston Climate Change Preparedness Questionnaire

Response ID:111 Data

2. Project Information

Project Name and Location

1. Project Contact:

Name : Harold Dennis and Barbara Boylan
Company : The Druker Company
Email Address : tmoked@epsilonassociates.com
Phone Number : 617-357-5700
Title : Executive Vice President

Project Contact:

2. Team Description:

Owner / Developer : The Druker Company, Ltd
Architect : Elkus/Manfredi Architects
Engineer (building systems) : McNamara/ Salvia Inc
Sustainability / LEED : The Green Engineer, Inc/ Erik
Permitting : Epsilon Associates, Inc.
Construction Management : John Moriarty & Associates
Climate Change Expert : The Green Engineer, Inc

3. New Page

3. Is this project a:

Single building

4. At what phase is this project?

PNF Submitted

5. Single building project

5. Project Identification:

Project Name : 80 East Berkeley Street
Primary Project Address : 80 East Berkeley Street

8. Building Classification and Description

6. Building Uses - check all appropriate uses:

Retail
Office

7. Building First Floor Uses - list all:

Retail

8. Construction Type – select most appropriate type:

Concrete Frame

9. Building Size: do not include commas

Site Area (Square Feet) : 47,360
Building Area (Square Feet) : 308,000
Building Height (Feet) : 150
Number of Stories (Floors) : 11
First Floor Elevation (feet above sea level)(Boston City Base Elev.)(Ft.) : 14-17+
Number of below grade levels : 2

9. Green Building

10. Which LEED Rating System(s) has or will your project use (by area for projects using multiple rating systems):

	Rating System
Primary Use	LEED 2009 for Core & Shell
Secondary Use	
Additional Uses	

11. What are the projected LEED Rating System Outcome(s):

	Rating System
Primary Use	Silver
Secondary Use	
Additional Uses	

12. Is or will the Project Register with the US Green Building Council

No

13. Is or will the Project Seek US Green Building Council Certification:

No

10. Higher Temperatures and Heat Waves - Analysis and General Strategies

14. Analysis Sources:

15. What time span of Climate Change was considered:

None

16. Analysis Conditions:

What Low Temperature will be used for project planning (degrees) : 12
What High Temperature will be used for project planning (degrees) : 87

17. What Extreme Heat Event characteristics will be used for project planning:

Peak High (degrees) : 87 design degree day 1% of the time

18. What measures will the project employ to reduce urban heat-island effect:

Other: High albedo membrane being considered
High reflective roof materials

19. Will the project be able to manage hotter and more humid summers without increasing its electrical load; if so how?

No

20. Will the building remain operable without utility power for an extended period; if so for how long and by what strategies?

No

11. High Temperatures and Heat Waves - Active and Passive Strategies

21. What will be the overall energy performance of the project or building (percentage above code)

20%

22. How will project energy performance be determined

Whole Building Energy Model

23. What specific measures will the project employ to reduce building energy consumption

High performance lighting
High performance HVAC equipment
Energy recovery ventilation
Describe any added measures: Variable speed garage fans/demand control ventilation

24. What specific measures will the project employ to reduce building energy demands on the utilities and infrastructure

None

25. Will the project employ Smart Grid Infrastructure and / or Systems

No

26. Describe any non-mechanical strategies that will support building functionality and use during an extended interruption(s) of utility services and infrastructure

None

27. List the R values for building envelope elements:

Roof : 20
Walls : 15.62
Windows : 2.22

12. Sea-Level Rise and Storms – location analysis and description

28. Location Description:

Site Elevation - low point (feet above sea level)(Boston City Base Elev.)(Ft.) : 14
Site Elevation - high point (feet above sea level)(Boston City Base Elev.)(Ft.) : 17.9

29. Location Classification - is the site or building located in any of the following:

	Yes	No
Coastal Zone		✔
Velocity Zone		✔
Flood Zone		✔
Area Prone to Flooding		✔

30. Are updates in the floodplain delineation due to climate change likely to change the classification of the site or building location:

No

31. What is the project or building proximity to nearest Coastal, Velocity or Flood Zone or Area Prone to Flooding (horizontal distance in feet)

1,000

16. Thank You!

Thank you for completing the Boston Climate Change Preparedness Questionnaire!
A copy of the completed questionnaire will be sent to the Email Address provided.

If you need to edit the questionnaire or have questions or comments about this questionnaire or Climate Change Preparedness practices, please contact: John.Dalzell.BRA@cityofboston.gov

Your responses will assist the City of Boston and Boston Redevelopment Authority in understanding best adaption to Climate Change practices and in developing future guidance and policy. For more information about the City of Boston's Climate Change policies and practices, including the 2011 update of the City's Climate Action Plan, "A Climate of Progress", please see the City's Climate Action web pages at: www.cityofboston.gov/climate/

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