EXPANDED PROJECT NOTIFICATION FORM

110 Broad Street

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

Submitted by:
New Boston Ventures, LLC
540 Tremont Street, Suite 8
Boston, MA 02116

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

In Association with:
Finegold Alexander + Associates, Inc
Goulston & Storrs
Howard/Stein Hudson Associates, Inc.
Vanasse Hangen Brustlin, Inc
McPhail Associates, LLC
RWDI
Exclusive Real Estate

January 2, 2015

Epsilon
ASSOCIATES INC.

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Chapter 1.0

Introduction/ Project Description

1.0 INTRODUCTION/ PROJECT DESCRIPTION

1.1 Introduction

New Boston Ventures, LLC (the Proponent), proposes to redevelop an approximately 7,680 square foot (sf) site (the Project site) at 102 to 112 Broad Street in downtown Boston. The Project site contains two existing buildings. One of those buildings, the historic Bulfinch Building at 102 Broad Street, will be restored and fully integrated with the Project and will serve as the residential lobby and residential space. The second building, a five-story commercial building at 110-112 Broad Street will be demolished to allow for the construction of a new residential building with ground floor commercial/café space. Together, the restored Bulfinch Building and the new building will result in an approximately 83,500 sf building with 52 residential units (the Project).

The Project will continue the improvement of the area by filling in a gap along the Rose Fitzgerald Kennedy Greenway (the Greenway) with ground floor commercial space that will extend the pedestrian connection from the Greenway to Broad Street and provide amenities to the neighbors and building residents. The pedestrian realm will be improved through the use of high-quality lighting, landscaping, and other sidewalk improvements as well as a potential sidewalk café with seating area to support the commercial tenant. In addition to the benefits to the public realm, and a design that will complement the existing architecture of the area, the Project will also provide much-needed downtown housing (including new affordable housing), construction and permanent jobs, and increased tax revenues for the City.

Because the proposed Project exceeds 50,000 square feet of gross floor area, the Project is subject to the requirements of Large Project Review pursuant to Article 80 of the Boston Zoning Code (the Code). This Expanded Project Notification Form (PNF) 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.

1.2 Project Identification

Address/Location:	110 Broad Street
Developer:	New Boston Ventures, LLC 540 Tremont Street, Suite 8 Boston, MA 02116 617-542-3500 Dennis Kanin David Goldman

Architect:	Finegold Alexander + Associates Inc 77 North Washington Street Boston, MA 02114 617-227-9272 Jim Alexander Tony Hsiao
Landscape Architect	Copley Wolff Design Group 160 Boylston Street Boston, MA 02116 617-654-9001 John Copley Marcus Cantu
Legal Counsel:	Goulston & Storrs 400 Atlantic Avenue Boston, MA 02110 Matthew Kiefer David Lewis
Permitting Consultants:	Epsilon Associates, Inc. 3 Clock Tower Place, Suite 250 Maynard, MA 01754 (978) 897-7100 Cindy Schlessinger Doug Kelleher Talya Moked
Transportation and Parking Consultant	Howard/Stein Hudson Associates, Inc 38 Chauncy Street, 9th Floor Boston, MA 02111 617-482-7080 Mike Santos
Civil Engineer	Vanasse Hangen Brustlin, Inc 99 High Street Boston, MA 02110 617-607-2916 Mark Junghans

MEP Engineer	WSP Flack + Kurtz 88 Black Falcon Avenue, Suite 210 Boston, MA 02210 617-426-0110 Mike Brown
Geotechnical Consultant:	McPhail Associates 2269 Massachusetts Avenue Cambridge, MA 02140 617-868-1420 Ambrose Donovan
Community Outreach:	Exclusive Real Estate 10 Derne Street Boston, MA 02114 (617) 263-1157 Harry Collings

1.3 Project Description

1.3.1 Project Site

The Project site is an approximately 7,680 square foot parcel located at 102 to 112 Broad Street. Currently located on part of the Project site is a historic Bulfinch Warehouse at 102 Broad Street and a five-story commercial building at 112 Broad Street. The Project site is at the southeastern termination of Broad Street, and is bounded by Wharf Street to the northwest, and John F. Fitzgerald Surface Artery (Surface Artery) to the east. The Project site is within the Custom House National Register Historic District (the Custom House Historic District), and the Rose Fitzgerald Kennedy Greenway is across the Surface Artery from the Project site. The Project site is also identified in the BRA's Greenway District Planning Study as being part of the Town Cove District. See Figure 1-1 for an aerial locus map and Figures 1-2 and 1-3 for photographs of existing conditions on the Project site.

1.3.2 Area Context

The Project site is located in downtown Boston in a prominent location along the Rose Fitzgerald Kennedy Greenway. The area is a transitional one between a dense commercial district, new residential development, the Greenway, the waterfront, and Rowes Wharf. Nearby, large 19th, 20th and 21st century buildings are interspersed with older structures. Significant historic structures in the District include the Grainery Exchange Building, the Batterymarch Building, and numerous "Bulfinch" warehouses. Dominant nearby features also include International Place and the Custom House Tower.

Data Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division - Data Obtained March 2014

110 Broad Street Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 1-1
Aerial Locus Map

110 Broad Street Boston, Massachusetts

Finegold Alexander + Associates Inc

Figure 1-2

Existing View Towards Downtown

Figure 1-3

Existing View Towards the Greenway

The site is located within one half mile of several Massachusetts Bay Transportation Authority (MBTA) (Red, Orange, Green and Blue line) Stations, South Station (Amtrak, MBTA's commuter rail), the MBTA's South Station Bus Terminal (the main gateway for interstate buses into Boston), several Zipcar sites and several Hubway bike sharing stations along the harbor, and MBTA Harbor Express and water taxi service to Logan Airport and coastal communities beyond. This proximity to public transit makes the area an ideal location for transit-oriented development.

1.3.3 Proposed Project

The Project, as shown in Table 1-1, will be an approximately 83,500 sf, twelve-story residential building that will include approximately 52 residential units and 3,500 sf of commercial/café space or other allowed retail use on the ground floor. The Project will include approximately 35 parking spaces in a below grade, automated garage. The residential units will be a variety of sizes, including one bedroom, two bedroom and three bedroom units. Secure bicycle storage for residents (one per residential unit) will be included within the building. See Appendix A for floor plans and elevations.

Table 1-1 Project Program

Project Element	Approximate Dimension
Residential	80,000 SF
1-bedroom	11
2-bedroom	26
3-bedroom	11
Penthouse	4
Total Units	52
Commercial/café	3,500 SF
Total Gross Floor Area*	**83,500 SF**
Parking	35 spaces (automated garage)
Height*	12 stories/120 feet
Parcel Area	7,680 sf square feet
FAR	10.9 (bldg zoning sf/parcel sf)

*Measured in accordance with the Boston Zoning Code

The Project will restore and reuse the historic ca. 1805—1807 Bulfinch Warehouse at 102 Broad Street for reuse as Project lobby and as residential space. A significant component of the Project is the restoration and interpretation of the Bulfinch Building as part of a distinct group of "Bulfinch" Warehouses located in the Custom House Historic District. Currently existing exterior signage, lighting, and "decorative" additions that are inappropriate for the historic context will be removed from the Project site, and interpretative information in the form of self-guided tours or lobby displays will be incorporated into the Project in a manner consistent with the plan for documenting the Bulfinch era of the city waterfront warehouse district.

The adjacent commercial building at 112 Broad Street, an early 20th century building that is a non-contributing structure with respect to the Custom House Historic District, and will be demolished to allow construction of a new building on the Project site. The program for the new mixed use residential building includes upper story residential units accessed via a ground floor lobby, a ground floor café/commercial area with building support space, underground parking, and a new streetscape and landscaping for an outdoor café. See Figure 1-4 for a ground floor site plan and Figure 1-5 for the proposed landscape plan.

The Project's design is conceived as a new gateway to Broad Street with a strong connection to its existing context along Broad Street, but with a new face on the Greenway (see Figure 1-6). The proposed design represents the vocabulary of the area—punched windows, glazed bays, balconies, and a transparent ground floor for commerical/café use. The building will have a varied window pattern to distinguish its contemporary design and enhance its residential character. The design will preserve the view corridors along Broad, Wells and India streets to the waterfront.

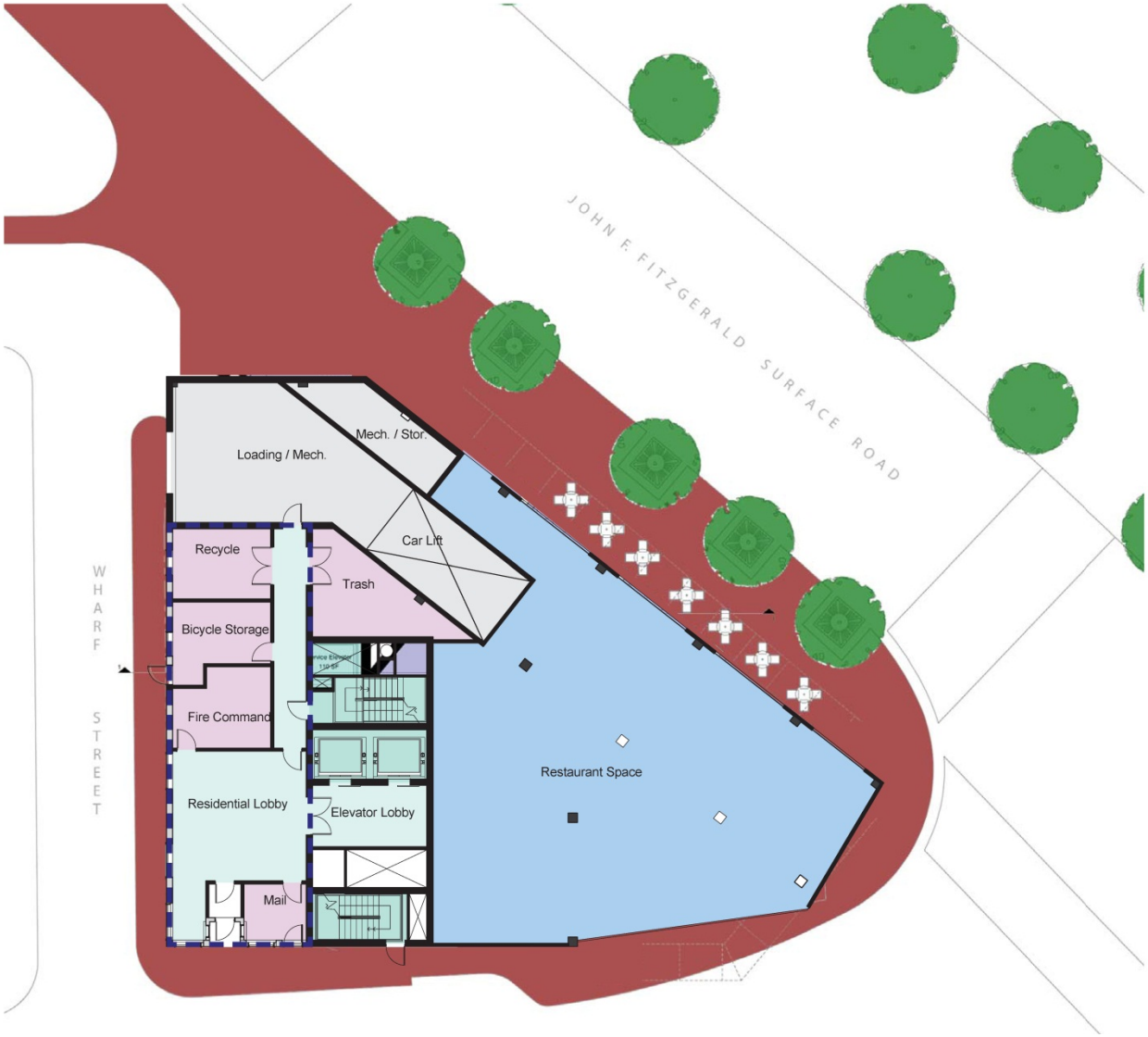
The Project will preserve and expand the variety of residential choices in the financial/waterfront district as reflected in other Broad Street projects such as Folio and Broad Lux. The Project will restore the historic Bulfinch Warehouse, fill in a gap in the urban fabric along the Greenway and create additional activity along the Greenway.

1.3.4 Consistency with the Greenway District Planning Study

The Project site is located within the boundaries of the Greenway District Planning Study Use and Development Guidelines, which was adopted by the BRA in July of 2010. The Study is made of up seven sub-districts, with the Project site falling in the Town Cove sub-district. The Study calls for future development in this area to focus on repairing the eastern edges that were damaged by the elevated highway, while "preserving the scale, character and historic street patterns that mark Town Cove as a distinct and legible Boston neighborhood." (page 22).

The Project is consistent with the goals stated in the Study by achieving the following:

- Aligning in height with the adjacent buildings at 120 feet;



110 Broad Street Boston, Massachusetts

Finegold Alexander + Associates Inc

Figure 1-4

Ground Level Plan

110 Broad Street Boston, Massachusetts

Finegold Alexander + Associates Inc

Figure 1-5

Proposed Landscape Plan

110 Broad Street Boston, Massachusetts

Finegold Alexander + Associates Inc

Figure 1-6

View from the Greenway

- Extending the Project to the edge of the property line;
- Creating a commercial entrance facing the Greenway;
- Restoring the Bulfinch Building and preserving its historic character;
- Retaining and enhancing the small scale streets; and
- Animating the park edge with new and restored sidewalks, as well as streetscaping and landscaping for an outdoor café.

1.4 Public Benefits

The Project transforms an under-utilized parcel with a currently uninviting Greenway frontage into a lively, mixed-use residential and commercial building that retains and incorporates a historically significant Bulfinch building on the Project site. In addition to helping satisfy housing demand and generating direct and indirect economic benefits, the Project will contribute substantially to the pedestrian environment, the retail and service vitality of the neighborhood, and the urban design and architectural character of the Greenway and the Custom House Historic District. Specific public benefits include:

Urban Design Benefits

Strengthened John F. Fitzgerald Surface Artery (Surface Artery) Street Wall – The Project will define a stronger street wall along Surface Artery by orienting the building on the site along Surface Artery and creating pedestrian entrances to the Project along Surface Artery and Broad Street. The Project will be oriented parallel to the Greenway, improving upon the oblique orientation of the current building on the Project site.

High Quality Architecture – The Project will improve the overall urban design and character of the site by replacing the existing unremarkable five-story building with a new building of high-quality architectural finish and thoughtful design.

Improved Ground Floor Retail and Street Activation – The Project will provide approximately 3,500 square feet of ground-floor commerical/café space, which will extend the pedestrian connection from the Greenway to Broad Street and provide amenities to the neighbors and building residents.

Enhanced Streetscape and Public Realm – The Proponent anticipates enhancing the streetscape and the pedestrian experience near the building through the use of high-quality lighting, landscaping, and other sidewalk improvements as well as a potential sidewalk café with seating area supporting the ground floor commercial/café tenant.

Preservation of an Historic Structure – The historic four-story brick building designed by renowned late 18th and early 19th century architect Charles Bulfinch will undergo a complete exterior restoration and will be fully integrated into the Project.

Economic and Community Benefits

New Housing Units – The Project will provide approximately 52 new units of ownership housing in downtown Boston and comply with the Mayor's Executive Order Relative to Affordable Housing.

Innovative Parking Technology – The Project will include approximately 35 new parking spaces accessory to the Project. To incorporate the residential accessory parking, the Project will introduce to the Financial District a space-efficient, environmentally-beneficial, and safe automated mechanical parking lift technology.

New Job Creation – The Project will create new job opportunities and a source of customers for local retail and/or restaurant establishments through the creation of approximately:

- 175 new construction jobs in a variety of trades;
- 20 new transit-accessible employment opportunities (permanent part-time and full-time jobs).

Property Taxes – The Project will also contribute additional real estate tax revenues to the City of Boston by increasing the Property's assessed value.

Green Building/Sustainability Features – The Project will comply with the energy efficiency requirements of the Massachusetts Stretch Energy Code through high-efficiency insulation, an overall glazed surface to wall ratio of under 50 percent, motion-sensor light controls, condensing boilers, variable frequency/high-efficiency heat pumps, and a heat recovery system. Other green building features will include recycled material in finishings, dual-flush toilets, dedicated recycling room, internal bike storage, and low VOC paints and adhesives.

1.5 Regulatory Controls and Permits

Zoning

The Project site is located within the Wharf Street Restricted Growth District of the Government Center/Markets District and within the recently adopted Greenway Overlay District of the Boston Zoning Code (the "Code"). The Project has been designed to comply with applicable zoning requirements, which include a maximum height of 120 feet and a maximum FAR of 12.0. In addition, the Project site is within the Restricted Parking Overlay District, which limits any new parking for commercial purposes, and no commercial parking is proposed as part of the Project.

Article 80 – Large Project Review

The proposed building exceeds 50,000 square feet of gross floor area, and is therefore subject to Large Project Review pursuant to Article 80 of the Code. Based on a comprehensive approach to addressing potential impacts and mitigation equivalent to the level of information normally presented in a Draft Project Impact Report (DPIR), the Proponent requests that the BRA, after reviewing public and agency comments on this expanded PNF and any further responses to comments made by the Project team, issue a Scoping Determination Waiving Further Review pursuant to the Article 80B process. This expanded PNF includes as exhibits a completed Climate Change Questionnaire pursuant to BRA policy and a LEED Checklist pursuant to Article 37 of the Code. The Proponent anticipates entering into a Cooperation Agreement and an Affordable Housing Agreement with the BRA as part of the Large Project Review process.

Boston Landmarks Commission Review

The Bulfinch Building is a designated City of Boston landmark, and, as such, the proposed exterior restoration of that building is subject to design review by the Boston Landmarks Commission (BLC). The Proponent has consulted with the BLC about the Project, specifically requesting an advisory review of the Project. On November 25, 2014 the Project team presented the Project to the BLC seeking input on the proposed scope of the exterior restoration of the Bulfinch Building. The exterior restoration work is consistent with the standards and criteria of the landmark designation.

Because the building at 110-112 Broad Street is greater than 50 years old (having been constructed ca. 1905), the proposed demolition of that building is subject to BLC's Article 85 (Demolition Delay) review. Given that the building was identified as "noncontributing" to the Custom House Historic District, it is not anticipated that the BLC will invoke the demolition delay. An Article 85 application will be filed for the demolition of 110-112 Broad Street with BLC concurrent with the filing of the design review application for the Bulfinch Building.

1.6 Legal Information

1.6.1 Legal Judgments Adverse to the Proposed Project

There are no legal judgments adverse to the proposed Project.

1.6.2 History of Tax Arrears on Property

The Proponent does not have a history of tax arrears on property that it owns in the City of Boston.

1.6.3 Site Control/ Public Easements

The Proponent owns the Project site. At this time, the Proponent is not aware of any easements on the Project site. See Appendix B for a site survey.

1.7 Anticipated Permits

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

Table 1-2 Anticipated Permits and Approvals

Agency	Approval
City of Boston	
Boston Air Pollution Control Commission	Parking Freeze Exemption
Boston Civic Design Commission	Design Review, as required
Boston Employment Commission	Construction Employment Plan
Boston Fire Department	Flammable Storage License
Boston Inspectional Services Department	Building Permit; Other construction-related permits; Certificates of Occupancy
Boston Parks and Recreation	Approval of Construction Within 100 feet of a Park
Boston Public Works Department	Curb Cut Permit(s); Sidewalk Occupancy Permit (as required)
Boston Redevelopment Authority	Article 80B Large Project Review; Cooperation Agreement; Affordable Housing Agreement;
Boston Landmarks Commission	Design Review (Bulfinch Building) Article 85/Demolition Delay Review (110-112 Broad Street)
Boston Transportation Department	Transportation Access Plan Agreement; Construction Management Agreement
Boston Water and Sewer Commission	Site Plan Review; Water and Sewer connection permits; Temporary Construction Dewatering Permit
Public Improvement Commission	Agreement for Temporary Earth Retention Systems, Tie-Back Systems and Temporary Support of Subsurface Construction (as required); Air and Subsurface Discontinuances; Permits/Canopy Licenses for signs and awnings (as required); Specific Repair Plan
Public Safety Commission Committee on Licenses	Permit to Erect and Maintain Garage; Flammable Storage License

Table 1-2 Anticipated Permits and Approvals (Continued)

Agency	Approval
Commonwealth of Massachusetts	
Department of Environmental Protection	Fossil Fuel Utilization Permit [if required]
Massachusetts Historical Commission	State Register Review [if below permit is required]
Massachusetts Water Resources Authority	Temporary Construction Dewatering Permit
Federal	
Environmental Protection Agency	NPDES Construction General Permit

1.8 Public Participation

The Proponent has communicated with the following organizations regarding the Project: A Better City, the New England Aquarium, the Greenway Conservancy, Wharf District Council, Harbor Towers residents, residents at the Intercontinental, and the Rowes Wharf Condo Association. In addition to these groups, the Proponent has met with public agencies and public officials, including City Councilor Sal LaMattina and State Representation Aaron Michlewitz.

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

1.9 Schedule

Construction is anticipated to begin in Summer of 2015 with completion in the Winter of 2016.

Chapter 2.0

Transportation Component

2.0 TRANSPORTATION

2.1 Introduction

Howard/Stein-Hudson Associates, Inc. (HSH) has conducted an evaluation of the transportation impacts of the Project. The transportation study adheres to the Boston Transportation Department (BTD) *Transportation Access Plan Guidelines* and Article 80 development review process. Included in the study is an evaluation of existing conditions, future conditions with and without the Project, projected parking demand, loading operations, transit services, and pedestrian activity. In summary, the Project will have minimal impact on the study area intersections, the public transportation services, and the pedestrian facilities in the vicinity of the Project site. The Project's proximity to numerous transit options and its location in a pedestrian and bike friendly neighborhood minimizes traffic impacts associated with the proposed uses.

2.1.1 Project Description

The Project site is located at 102 to 112 Broad Street in downtown Boston, as shown in Figure 2-1. The site is bounded by Wharf Street to the northwest, Broad Street to the southwest, and John F. Fitzgerald Surface Artery/Rose Kennedy Greenway to the east. The Project site currently contains four residential units, the Times Irish Pub and Restaurant, the Littlest Bar, and a small amount of office space.

The Project will replace the existing uses with 52 new residential condominium units and approximately 3,500 square foot (sf) of commercial/café space. For purposes of the transportation analysis, restaurant uses were considered as they are a more intense use than retail space and therefore provides a more conservative analysis. A total of approximately 35 parking spaces will be located in an underground automated parking structure. Access to the automated parking structure will be provided at the corner of Wharf Street and Well Street. In addition, the Proponent is exploring the feasibility of reconstructing Wharf Street and Well Street between Broad Street and Franklin Street to be at-grade with the existing sidewalk and the new crosswalk that was recently installed at the intersection with Broad Street. It is anticipated that should these improvements be accepted by the Boston Transportation Department and other City agencies, these improvements will be implemented and coordinated with the BRA Board-approved residential project at 55 India Street, located immediately north of the Project site along Well Street. Bringing Wharf Street and Well Street to the same elevation as the sidewalk will create a shared space to be used by pedestrians, bicycles, and vehicles. It will also allow for easier delivery and parking maneuvers for both the proposed Project and the project at 55 India Street. The design is consistent with the segment of Well Street between Franklin Street and Custom House Road.

2.1.2 Study Area

The study area is generally bounded by Milk Street to the north, India Street and Franklin Street to the west, Broad Street to the south, and Atlantic Avenue to the east. It includes the following 10 intersections, also shown on Figure 2-1:

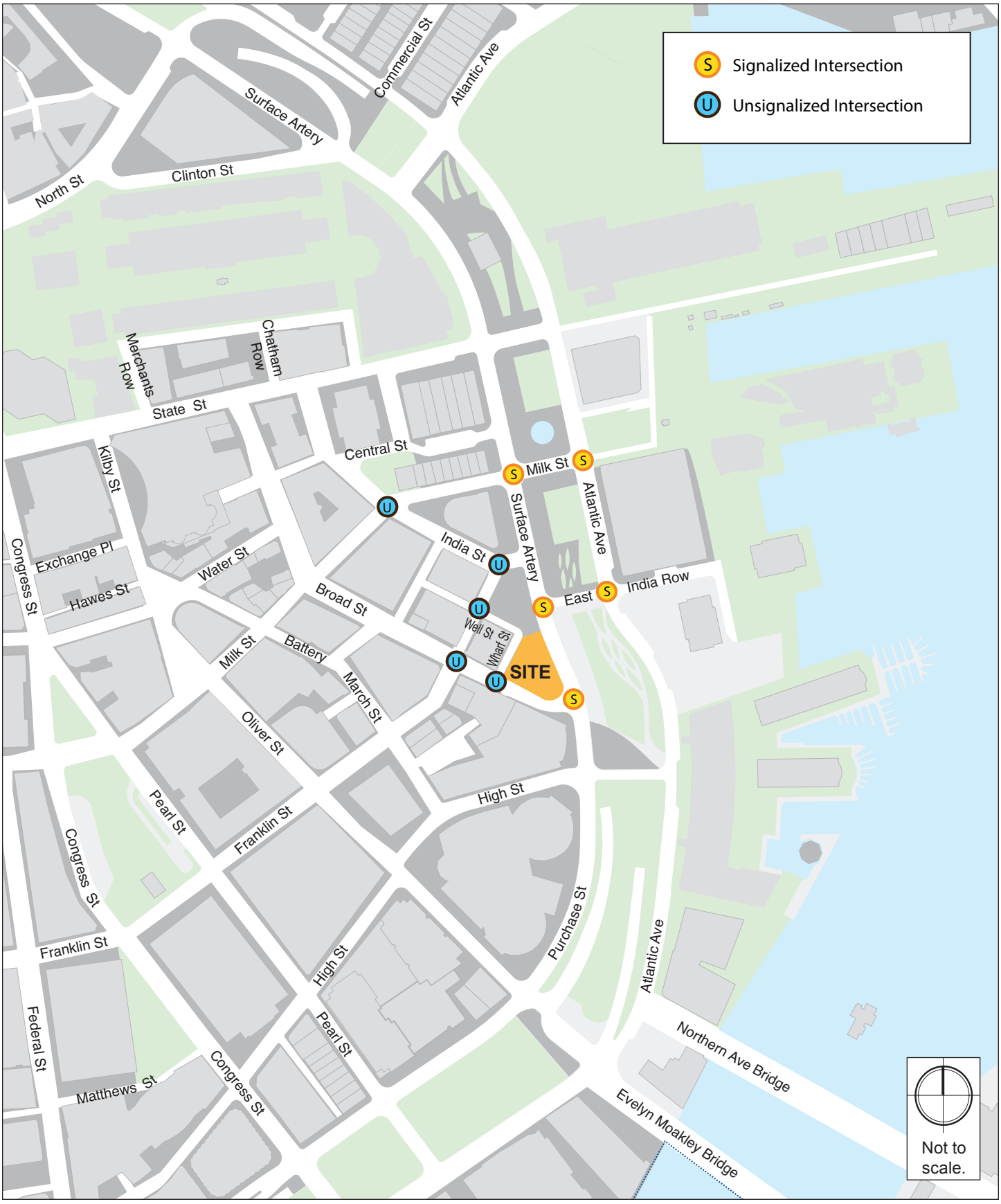
- Surface Artery/Milk Street;
- Atlantic Avenue/Milk Street;
- Surface Artery/India Street;
- Atlantic Avenue/East India Row;
- Purchase Street/Broad Street;
- Milk Street/India Street;
- India Street/Franklin Street;
- Franklin Street/Well Street;
- Franklin Street/Broad Street; and
- Broad Street/Wharf Street.

2.1.3 Study Methodology

This transportation study and supporting analyses were conducted in accordance with BTD guidelines and are described below.

The existing conditions analysis includes an inventory of the existing transportation conditions such as traffic characteristics, parking and curb usage, transit, pedestrian circulation, bicycle facilities, loading, and site conditions. Existing counts for vehicles, bicycles, and pedestrians were collected on July, 18th 2013 at the study area intersections. The traffic counts form the basis for the transportation analysis conducted as part of this evaluation.

The future transportation conditions analysis evaluates potential transportation impacts associated with the Project. Long-term impacts are evaluated for the year 2019, based on a five-year horizon from the filing of this study. Expected roadway, parking, transit, pedestrian, bicycle accommodation, and loading capacities and deficiencies are identified. This section includes the following scenarios:



110 Broad Street Boston, Massachusetts

Howard/Stein-Hudson Associates, Inc.
CREATIVE SOLUTIONS • EFFECTIVE PARTNERING

Figure 2-1
Study Area Intersections

- The 2019 No-Build conditions scenario includes both general background traffic growth and traffic growth associated with specific developments and transportation improvements that are planned in the vicinity of the Project site.

- The 2019 Build conditions scenario includes Project-generated traffic volume estimates added to the traffic volumes developed as part of the 2019 No-Build conditions scenario.

The final part of the transportation study identifies measures to mitigate Project-related impacts and to address any traffic, pedestrian, bicycle, transit, safety, or construction related issues that are necessary to accommodate the Project.

An evaluation of short-term traffic impacts associated with construction activities is also provided.

2.2 Existing Conditions

2.2.1 Existing Roadway Conditions

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

Broad Street

Broad Street, classified as an urban collector, is located to the south side of the Project site. Broad Street runs in a northwest-southeast direction between State Street to the north and Purchase Street to the east. Broad Street is currently being reconstructed in accordance with the Boston Complete Streets design guidelines. Sidewalks are provided along both sides of the roadway.

Purchase Street (Surface Artery Southbound)

Purchase Street, classified as an urban principal arterial, is located to the east side of the Project site. Purchase Street runs in a north-south direction between New Chardon Street to the north and the South Station Connector to the south. Purchase Street runs adjacent to the westerly side of the Greenway. The roadway is named John F. Fitzgerald Surface Artery north of Broad Street and Purchase Street south of Broad Street. Surface Artery/Purchase Street is one-way in the southbound direction and generally consists of three travel lanes and an exclusive bicycle lane. Sidewalks are provided along both sides of the roadway.

Wharf Street

Wharf Street, classified as a local roadway, in located to the west of the Project site. Wharf Street runs in a north-south direction between Well Street and Broad Street. Wharf Street accommodates two-way travel and has sidewalks along both sides of the roadway.

Well Street

Well Street, classified as a local roadway, is located immediately west of the Project site. Well Street runs in an east-west direction between Custom House Road to the west and Wharf Street to the east. Well Street Accommodates two-way travel, however Well Street is only wide enough to allow passage of a single vehicle in either direction. Sidewalks are provided along both sides of Well Street.

India Street

India Street, classified as an urban collector, is located north of the Project site. India Street runs in a northwest-southeast direction between State Street to the north and Surface Artery/Rose Kennedy Greenway to the southeast. India Street is one-way in the northwestbound direction and consists of a single travel lane with sidewalks provided along both sides of the roadway.

Franklin Street

Franklin Street, classified as an urban collector, is located west of the Project site. Franklin Street runs in a northeast-southwest direction between India Street to the north and Washington Street to the west. Franklin Street is one-way in the southbound direction south of Broad Street and one-way in the northbound direction north of Broad Street. Sidewalks are provided along both sides of the roadway.

Atlantic Avenue

Atlantic Avenue, classified as an urban principal arterial, is located east of the Project site. Atlantic Avneue runs in a north-south direction between Kneeland Street to the south and New Chardon Street to the north. Atlantic Avenue is one-way in the northbound direction and generally consists of two to three travel lanes and an exclusive bicycle lane. Sidewalks are provided along both sides of the roadway.

Milk Street

Milk Street, classified as an urban collector, is located north of the Project site. Milk Street runs in an east-west direction between Washington Street to the west and Central Wharf to the east. Milk Street is one-way in the eastbound direction east of Devonshire Street and two-way west of Devonshire Street. Sidewalks are provided along both sides of the roadway.

2.2.2 Existing Intersection Conditions

Existing conditions at each of the study area intersections are described below.

Surface Artery/Milk Street

Surface Artery/Milk Street is a four-legged, signalized intersection under BTD jurisdiction. Milk Street is one-way eastbound and consists of a through lane and a shared through/right-turn lane. Surface Artery is one-way southbound and consists of a shared left-turn/through lane, two through lanes, and a five-foot wide bicycle lane. Crosswalks with handicap-accessible ramps and pedestrian signal equipment are provided across all legs of the intersection.

Atlantic Avenue/Milk Street

Atlantic Avenue/Milk Street is a four-legged, signalized intersection under BTD jurisdiction. Milk Street is one-way eastbound west of the intersection and consists of two exclusive left-turn lanes and a through lane. Milk Street westbound consists of a single exclusive right-turn lane. Atlantic Avenue is one-way northbound and consists of a shared left-turn/through lane, a through lane, and a five-foot wide bicycle lane. Crosswalks with handicap-accessible ramps and pedestrian signal equipment are provided across all legs of the intersection.

Surface Artery/India Street

Surface Artery/India Street is a four-legged, signalized intersection under BTD jurisdiction. India Street is one-way westbound and consists of two exclusive left-turn lanes and a through lane. Surface Artery is one-way southbound and consists of two through lanes, a shared through/right-turn lane, and a five-foot wide bicycle lane. Crosswalks with handicap-accessible ramps and pedestrian signal equipment are provided across all legs of the intersection.

Atlantic Avenue/East India Row

Atlantic Avenue/East India Row is a four-legged, signalized intersection under BTD jurisdiction. East India Row westbound consists of a shared through/right-turn lane. East India Row is one-way westbound to the west of the intersection. Atlantic Avenue is one-way northbound and consists of a shared left-turn/through lane, a shared through/right-turn lane, and a five-foot wide bicycle lane. Crosswalks with handicap-accessible ramps and pedestrian signal equipment are provided across all legs of the intersection.

Purchase Street/Broad Street

Purchase Street/Broad Street is a three-legged, signalized intersection under BTD jurisdiction. Broad Street eastbound consists of an exclusive right-turn lane. Purchase Street is one-way southbound and consists of two through lanes, a shared through/right-turn lane, and a five-foot wide bicycle lane. Crosswalks with handicap-accessible ramps and pedestrian signal equipment are provided across all legs of the intersection.

Milk Street/India Street

Milk Street/India Street is a four-legged, unsignalized intersection under BTD jurisdiction. India Street is one-way westbound and consists of a single travel lane. Milk Street is one-way northbound and consists of a single travel lane under STOP-sign control. Crosswalks with handicap-accessible ramps are provided across all legs of the intersection.

India Street/Franklin Street

Milk Street/India Street is a three-legged, unsignalized intersection under BTD jurisdiction. India Street is one-way westbound and consists of a single travel lane. Franklin Street is one-way northbound and consists of a single travel lane under STOP-sign control. Crosswalks are not provided at the intersection.

Franklin Street/Well Street

Franklin Street/Well Street is a three-legged, unsignalized intersection under BTD jurisdiction. Well Street consists of a shared through/right-turn lane that accommodates two-way travel. Due to the limited width of Well Street, two vehicles cannot pass each other in opposite directions of travel. Franklin Street is one-way northbound and consists of a shared left-turn/ through/right-turn lane. Traffic control and crosswalks are not provided at the intersection.

Franklin Street/Broad Street

Franklin Street/Broad Street is a four-legged, unsignalized intersection under BTD jurisdiction. Broad Street eastbound and westbound both consist of single travel lanes separated by a double-yellow centerline. Franklin Street is one-way southbound south of the intersection and one-way northbound north of the intersection. Crosswalks with handicap-accessible ramps are provided across both Franklin Street legs and the Broad Street eastbound leg of the intersection.

Broad Street/Wharf Street

Broad Street/Wharf Street is a three-legged, unsignalized intersection under BTD jurisdiction. Broad Street eastbound and westbound both consist of single travel lanes separated by a double-yellow centerline. Wharf Street southbound operates under STOP

control and consists of a shared left-turn/right-turn lane that accommodates two-way travel. Due to the width of Wharf Street, two vehicles cannot pass each other in opposite directions of travel. Crosswalks are not provided at the intersection.

2.2.3 Existing Traffic Conditions

Traffic movement data was collected at the study area intersections on July, 18th 2013. Manual turning movement counts (TMCs) and vehicle classification counts were conducted during the weekday a.m. and p.m. peak periods (7:00-9:00 a.m. and 4:00-6:00 p.m., respectively) for the following six intersections:

- Surface Artery/Milk Street;
- Atlantic Avenue/Milk Street;
- Surface Artery/India Street;
- Atlantic Avenue/East India Row;
- Purchase Street/Broad Street; and
- Milk Street/India Street.

The vehicle classification counts included car, truck, pedestrian, and bicycle movements. Based on the TMCs, the peak hours of vehicular traffic throughout the study area are 8:00-9:00 a.m. and 4:15-5:15 p.m.

Additional vehicular, pedestrian, and bicycle counts were conducted during the a.m. and p.m. peak hours (8:00-9:00 a.m. and 4:15-5:15 p.m., respectively) at the remaining four study area intersections:

- India Street/Franklin Street;
- Franklin Street/Well Street;
- Franklin Street/Broad Street; and
- Broad Street/Wharf Street.

The detailed traffic counts are provided in Appendix C.

Seasonal Adjustment

In order to account for seasonal variation in traffic volumes throughout the year, data provided by the Massachusetts Department of Transportation (MassDOT) were reviewed. Typically, nearby continuous traffic count stations are used to determine monthly

fluctuations in traffic volumes. However, monthly traffic counts for the nearby continuous count stations located on Interstate 93 were not available at the time of this study. Therefore, the most recent (2011) MassDOT Weekday Seasonal Factors were used to determine the need for seasonal adjustments to the July 2013 TMCs. The 2011 seasonal adjustment factor for July for roadways similar to the study area is 0.92, which indicates that average month traffic volumes are approximately 92 percent of typical July traffic volumes. To provide a conservative analysis, the July counts were not adjusted downward to reflect average month conditions. The 2013 Existing weekday a.m. and p.m. peak hour traffic volumes are shown in Figure 2-2 and Figure 2-3, respectively.

2.2.4 Existing Traffic Operations

The criterion for evaluating traffic operations is level of service (LOS), which is determined by assessing average delay experienced by vehicles at intersections and along intersection approaches. Trafficware's Synchro (version 6) software package was used to calculate average delay and associated LOS at the study area intersections. This software is based on the traffic operational analysis methodology of the Transportation Research Board's 2000 Highway Capacity Manual (HCM). Field observations were performed by HSH to collect intersection geometry such as number of turning lanes, lane length, and lane width that were then incorporated into the operations analysis.

LOS designations are based on average delay per vehicle for all vehicles entering an intersection. Table 2-1 displays the intersection LOS criteria. LOS A indicates the most favorable condition, with minimum traffic delay, while LOS F represents the worst condition.

Table 2-1 Level of Service Criteria

Level of Service	Average Stopped Delay (sec./veh.)	
	Signalized Intersections	Unsignalized Intersections
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50
Source: 2000 Highway Capacity Manual, Transportation Research Board.		

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

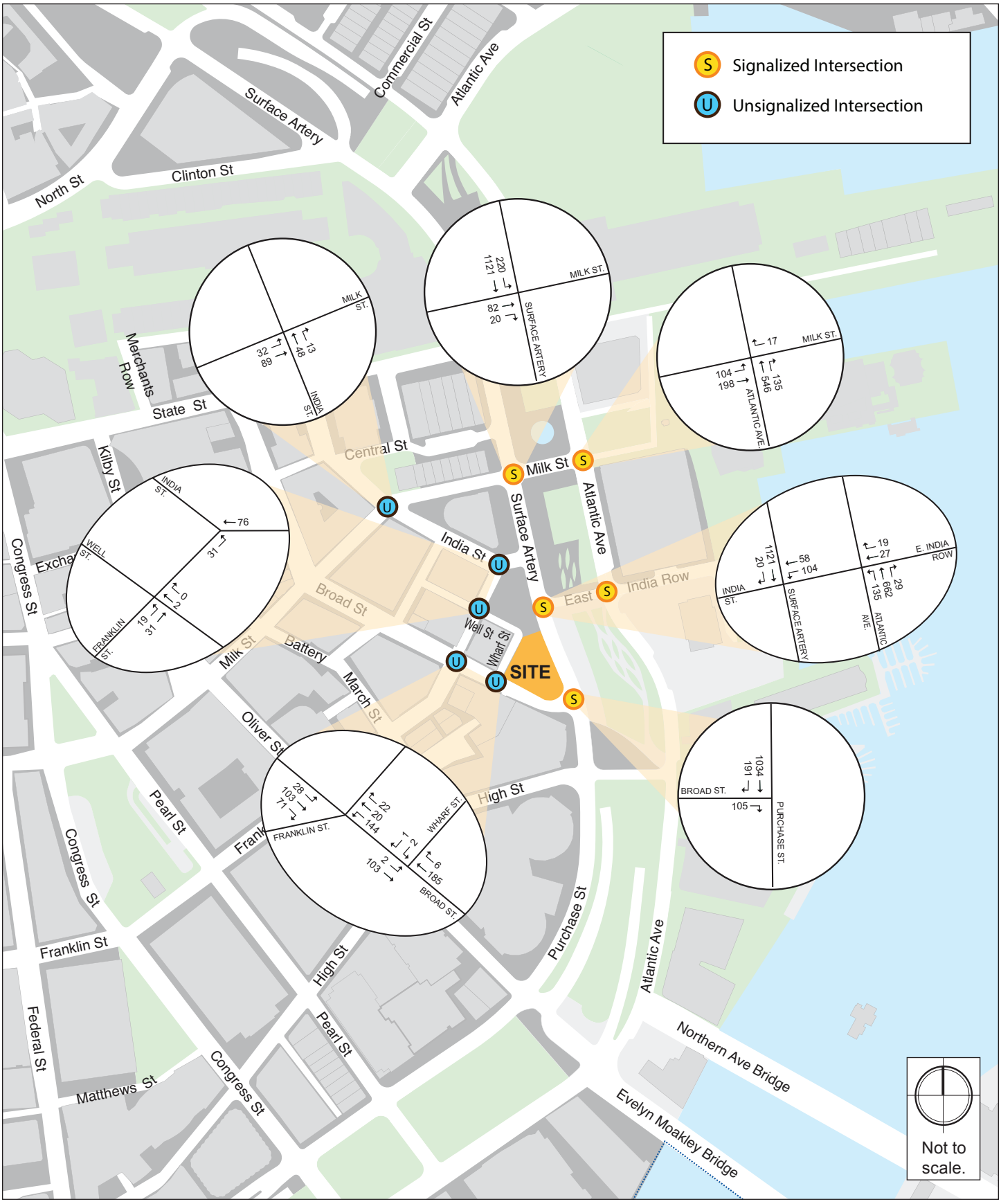


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Figure 2-2

Existing Conditions (2013) Turning Movement Volumes, a.m. Peak Hour (8:00-9:00 a.m.)

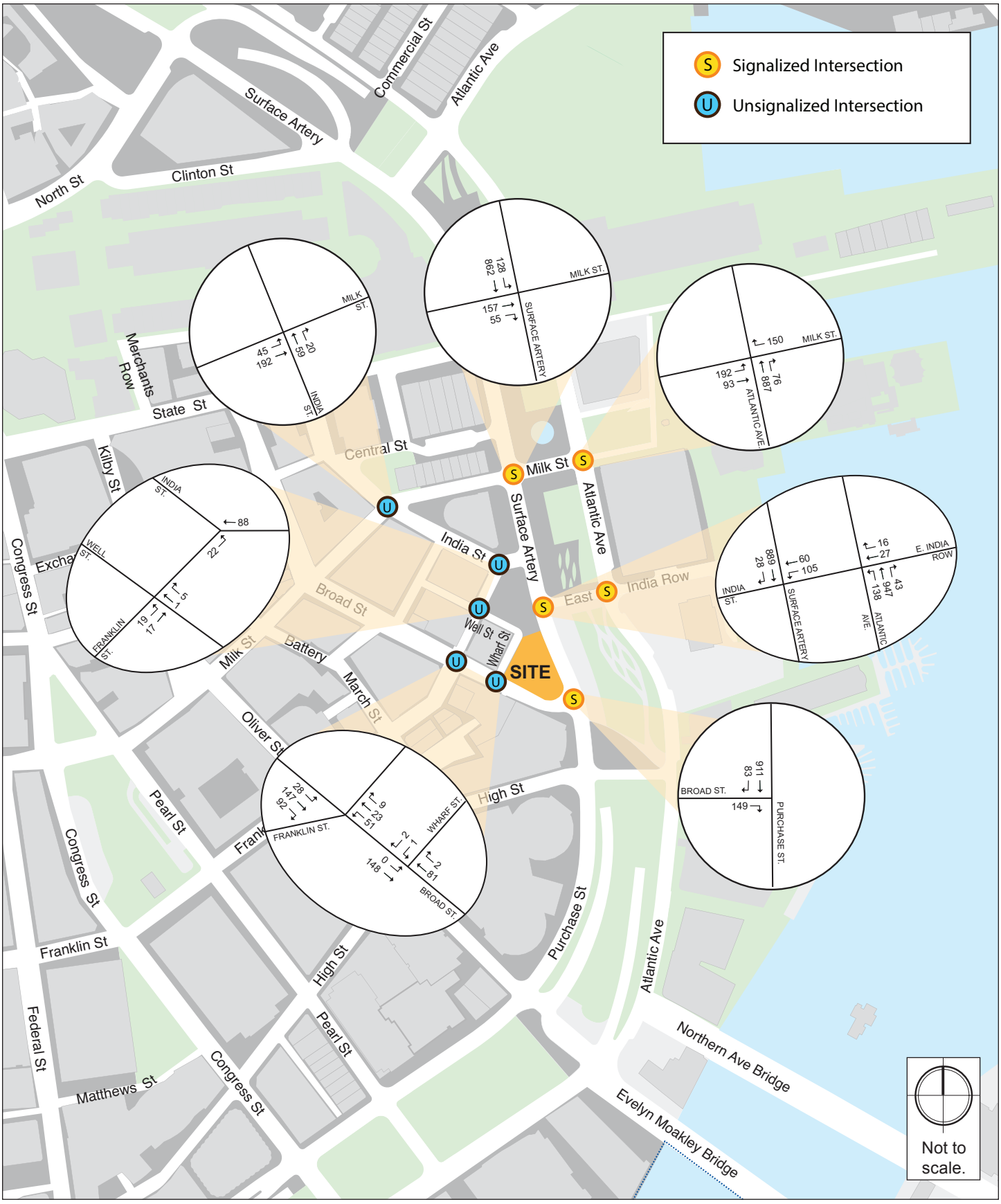

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Figure 2-3

Existing Conditions (2013) Turning Movement Volumes, p.m. Peak Hour (4:15-5:15 p.m.)

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

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

The 95th percentile queue length, measured in feet, represents the farthest extent of the vehicle queue (to the last stopped vehicle) upstream from the stop line during five percent of all signal cycles. The 95th percentile queue will not be seen during each cycle. The queue would be this long only five percent of the time and would typically not occur during off-peak hours. Since volumes fluctuate throughout the hour, the 95th percentile queue represents what can be considered a "worst case" scenario. Queues at the intersection are generally below the 95th percentile queue throughout the course of the peak hour. It is also unlikely that the 95th percentile queues for each approach to the intersection will occur simultaneously.

Table 2-2 and Table 2-3 presents the 2013 Existing conditions operational analysis for the study area intersection during the a.m. and p.m. peak hours, respectively. The detailed analysis sheets are provided in Appendix C.

Table 2-2 Existing Conditions (2013), Capacity Analysis Summary, a.m. Peak Hour

Intersection	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue Length (ft)	95th Percentile Queue Length (ft)
Signalized Intersections					
Surface Artery/Milk Street	**C**	**22.4**	—	—	—
Milk EB thru | thru/right	C	22.8	0.15	23	47
Surface Artery SB left/thru | thru |	C	22.3	0.70	258	314
Atlantic Avenue/Milk Street	**D**	**35.5**	—	—	—
Milk EB left l left	C	24.2	0.21	19	m29
Milk EB thru	F	>80.0	0.74	100	150
Milk WB right	A	0.2	0.05	0	0
Atlantic NB thru l thru/right	C	23.0	0.72	78	#176
Surface Artery/India Street	**A**	**8.3**	—	—	—
India WB left l left	D	39.3	0.32	34	61
India WB thru	D	41.1	0.32	40	77
Surface Artery SB thru l thru l	A	3.7	0.40	66	91
Atlantic Avenue/East India Row	**A**	**9.1**	—	—	—
East India Row WB thru/right	C	20.9	0.18	19	40
Atlantic NB left/thru l thru/right	A	8.3	0.49	125	165

Table 2-2 Existing Conditions (2013), Capacity Analysis Summary, a.m. Peak Hour (Continued)

Intersection	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue Length (ft)	95th Percentile Queue Length (ft)
Signalized Intersections					
Purchase Street/Broad Street	**A**	**1.2**	—	—	—
Broad EB right	A	1.1	0.23	0	0
Purchase SB thru l thru l thru/right	A	1.2	0.43	26	30
Unsignalized Intersections					
Milk Street/India Street	—	—	—	—	—
India WB thru/right	A	0.0	0.05	—	0
Milk NB left/thru	B	10.4	0.20	—	18
India Street/Franklin Street	—	—	—	—	—
India WB thru	A	0.0	0.05	—	0
Franklin NB left	A	9.2	0.04	—	3
Franklin Street/Well Street	—	—	—	—	—
Well WB thru/right	A	9.9	0.01	—	1
Franklin NB left/thru	A	3.3	0.02	—	2
Franklin Street/Broad Street	—	—	—	—	—
Broad EB left/thru/right	A	1.6	0.03	—	2
Broad WB left/thru/right	A	6.7	0.15	—	13
Broad Street/Wharf Street	—	—	—	—	—
Broad EB left/thru	A	0.3	0.00	—	0
Broad WB thru/right	A	0.0	0.14	—	0
Wharf SB left/right	B	11.1	0.02	—	2

# = 95th percentile volume exceeds capacity. Queue may be longer. Queue shown is the maximum after 2 cycles.
m = Volume for the 95th percentile queue is metered by the upstream signal.
Grey shading indicates LOS E or LOS F.

Table 2-3 Existing Conditions (2013), Capacity Analysis Summary, p.m. Peak Hour

Intersection	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue Length (ft)	95th Percentile Queue Length (ft)
Signalized Intersections					
Surface Artery/Milk Street	**C**	**20.8**	—	—	—
Milk EB thru | thru/right	D	37.7	0.44	80	83
Surface Artery SB left/thru | thru |	B	16.0	0.49	154	191
Atlantic Avenue/Milk Street	**E**	**79.9**	—	—	—
Milk EB left l left	F	>80.0	0.69	95	104
Milk EB thru	F	>80.0	0.50	70	120
Milk WB right	A	2.0	0.34	0	0
Atlantic NB thru l thru/right	C	26.0	0.85	157	#291

Table 2-3 Existing Conditions (2013), Capacity Analysis Summary, p.m. Peak Hour (Continued)

Intersection	LOS	Delay (seconds)	V/C Ratio	50th Percentile Queue Length (ft)	95th Percentile Queue Length (ft)
Signalized Intersections					
Surface Artery/India Street	**A**	**7.4**	—	—	—
India WB left l left	C	33.9	0.30	34	53
India WB thru	D	37.4	0.39	47	66
Surface Artery SB thru l thru l	A	1.5	0.32	14	35
Atlantic Avenue/East India Row	**B**	**10.3**	—	—	—
East India Row WB thru/right	C	21.7	0.16	17	44
Atlantic NB left/thru l thru/right	A	9.8	0.60	188	244
Purchase Street/Broad Street	**A**	**2.3**	—	—	—
Broad EB right	A	1.8	0.34	0	0
Purchase SB thru l thru l thru/right	A	2.3	0.35	1	70
Unsignalized Intersections					
Milk Street/India Street	—	—	—	—	—
India WB thru/right	A	0.0	0.07	—	0
Milk NB left/thru	B	12.5	0.39	—	47
India Street/Franklin Street	—	—	—	—	—
India WB thru	A	0.0	0.07	—	0
Franklin NB left	A	9.6	0.03	—	3
Franklin Street/Well Street	—	—	—	—	—
Well WB thru/right	A	9.4	0.01	—	1
Franklin NB left/thru	A	4.9	0.03	—	2
Franklin Street/Broad Street	—	—	—	—	—
Broad EB left/thru/right	A	1.1	0.03	—	2
Broad WB left/thru/right	A	4.9	0.05	—	4
Broad Street/Wharf Street	—	—	—	—	—
Broad EB left/thru	A	0.0	0.00	—	0
Broad WB thru/right	A	0.0	0.07	—	0
Wharf SB left/right	B	10.8	0.01	—	1

= 95th percentile volume exceeds capacity. Queue may be longer. Queue shown is the maximum after 2 cycles.
Grey shading indicates LOS E or LOS F.

As shown in Table 2-2, during the a.m. peak hour, the signalized intersections operate at LOS D or better overall. All movements at the unsignalized intersections operate at LOS B or better during the a.m. peak hour.

As shown in Table 2-3, during the p.m. peak hour, the majority of the signalized intersections operate at LOS D or better. The intersection of Atlantic Avenue/Milk Street operates at LOS E during the p.m. peak hour. All movements at the unsignalized intersections operate at LOS B or better during the a.m. peak hour.

Based on volume to capacity ratios, the study area intersections were shown to have adequate capacity to accommodate the existing vehicular demand during both the a.m. and p.m. peak hours.

2.2.5 Existing Parking and Curb Usage

On-street parking regulations in the study area consist of a mixture of no parking, commercial parking, metered parking, loading zones, cabstands, and handicapped-designated spaces. A significant number of metered parking spaces lie within the immediate area of the site, mostly on Broad Street, Franklin Street, India Street, Milk Street and Atlantic Avenue. Parking is prohibited on Wharf Street, Well Street, Franklin Street between Broad Street and India Street, and Surface Artery/Purchase Street within the study area. The on-street parking regulations are shown in Figure 2-4.

Approximately 6,830 off-street parking spaces are located in lots and garages within a quarter-mile radius of the Project: 141 lot spaces and 7,007 garage spaces. Of these off-street spaces, 2,543 are in private facilities and 4,464 are open to the public. These parking facilities and associated capacities are identified in Figure 2-5 and Table 2-4 and Table 2-5, respectively, for lots and garages.

Table 2-4 Off-Street Parking Lots within a Quarter-Mile of the Site

Map #	Address	Parking Lot Facility	Private Capacity	Public Capacity
1	53–59 India Street [1]	53–59 India Street	0	14
2	51 India Street [1]	51 India Street	10	0
3	Wendell Street	Wendell Street Lot	15	0
4	47–49 Broad Street	Broad & Water Street Lot	0	21
5	15–17 Northern Avenue	James Hook & Co. Lot	20	0
6	49–51 Chatham Street	Chatham Street Lot A	0	31
7	57 Chatham Street	Chatham Street Lot B	0	30
Lots—Subtotal			**45**	**96**

1 Will be eliminated with the construction of the proposed project at 55 India Street.

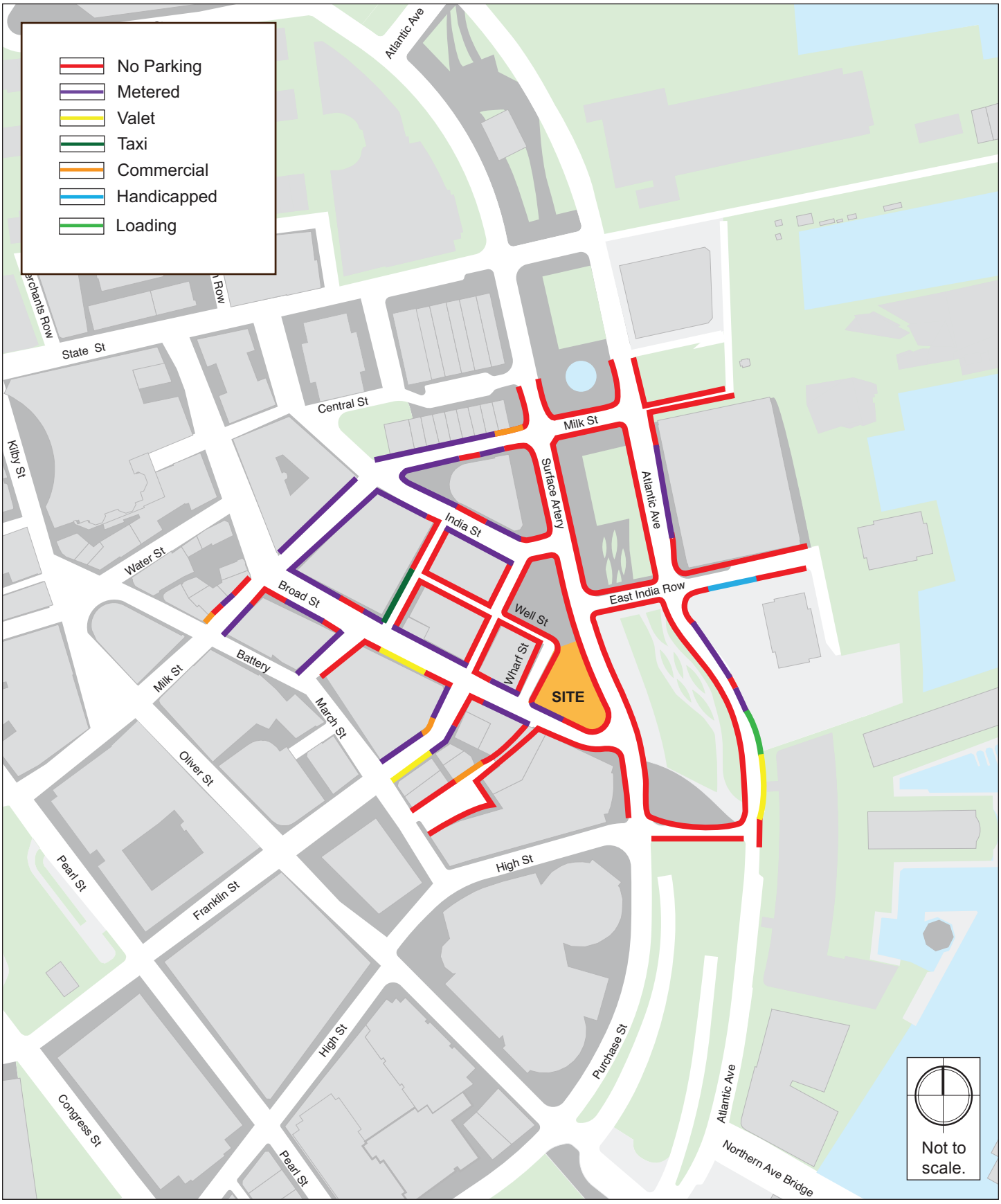

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Figure 2-4
On-street Parking in the Study Area

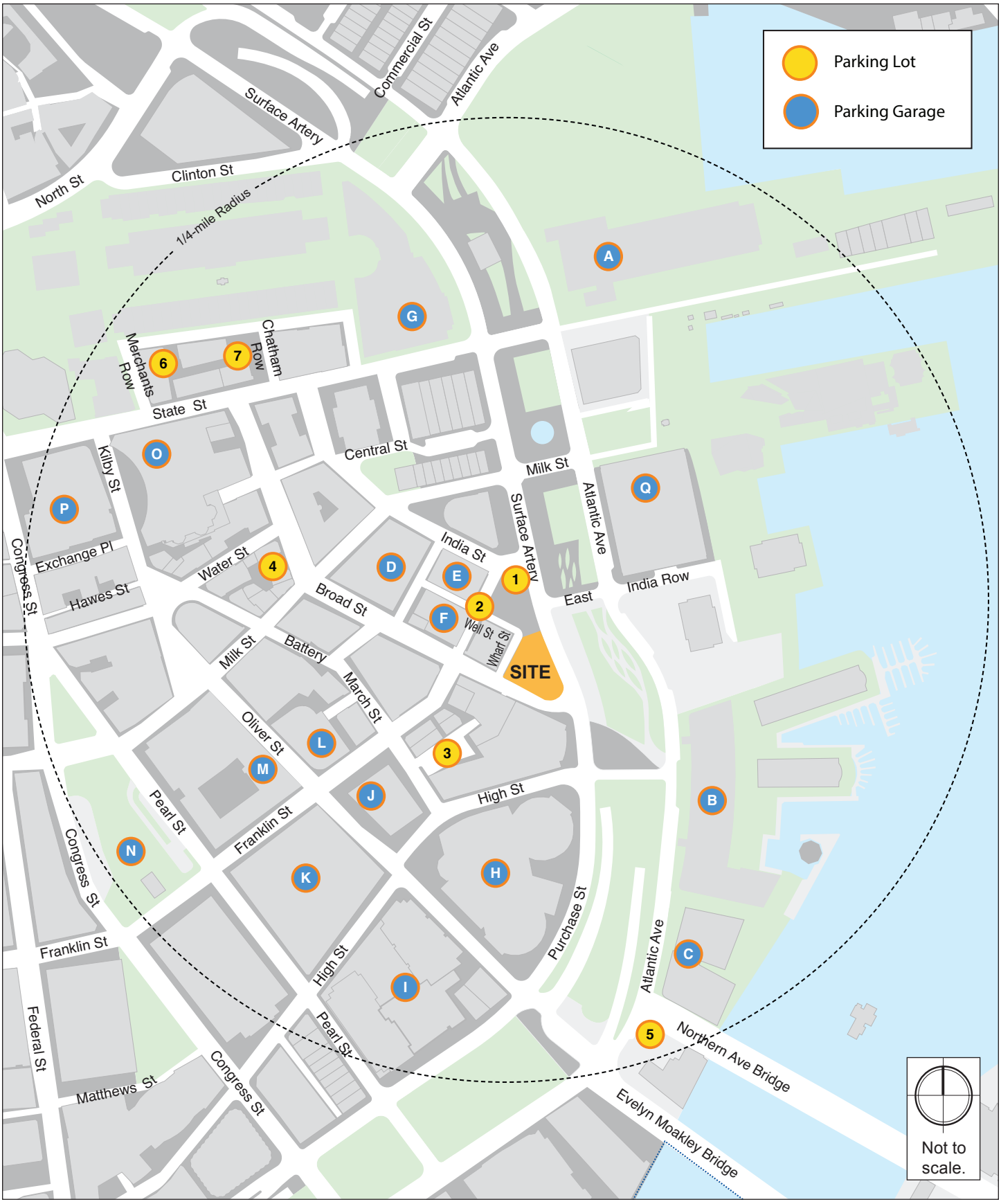

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Figure 2-5
Off-street Parking in the Study Area

Table 2-5 Off-Street Parking Garages within a Quarter-Mile of the Site

Map #	Address	Parking Garage Facility	Private Capacity	Public Capacity
A	New Atlantic Ave. @ State St.	Long Wharf Hotel	190	0
B	10–30 Rowes Wharf	Rowes Wharf Garage	420	280
C	470 Atlantic Avenue	470 Atlantic Avenue	119	0
D	20 Custom House Street	20 Custom House Street Garage	62	0
E	21 Custom House Street	21 Custom House Street Garage	42	0
F	80 Broad Street	Folio	88	30
G	200 State Street	Marketplace Center Garage	0	120
H	High Street	International Place	0	827
I	125 High Street	125 High St Garage	700	150
J	265 Franklin Street	Paine Webber Building	128	0
K	225 Franklin Street	State Street Bank Building	0	200
L	260 Franklin Street	Franklin Street Garage	83	0
M	1 Post Office Square	One Post Office Sq. Garage	318	82
N	Post Office Square	New Post Office Sq. Garage	0	900
O	75 State Street	75 State Street Garage	0	700
P	53 State Street	Exchange Place	93	0
Q	70 East India Row	Aquarium Garage	300	1,175
Garage Subtotal			**2,543**	**4,464**
Quarter-mile Radius Lots + Garages			**2,588**	**4,560**
Quarter-mile Radius Total Capacity			**7,148**	

Source: Boston Air Pollution Control Commission.

2.2.6 Existing Public Transportation

The Project site is well served by public transportation. The MBTA public transportation services are shown in Figure 2-6 and summarized in Table 2-6.

Within a quarter-mile of the Project site are the MBTA Aquarium and State Street stations, which provide access to both the Orange Line and the Blue Line. MBTA Bus Route 4, Route 92, and Route 93 also operate near the Project site, with stops located about one-third mile west of the site near the intersection of State Street and Congress Street.

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Figure 2-6
Public Transportation in the Study Area

Also in proximity to the site are three MBTA commuter ferries: the Hingham ferry, running between Rowes Wharf and Hingham; the Charlestown Navy Yard ferry, running between Long Wharf (Central) and the Charlestown Navy Yard; and the Hingham/Hull/Logan ferry, running between Long Wharf and Hingham, Hull, and Logan Airport. South Station, which provides connections to the MBTA Red Line, South Side commuter rail service, and AMTRAK service is slightly farther from the site but is within easy walking distance – approximately one half mile away - along the Greenway.

Table 2-6 MBTA Transit Service in the Study Area

Transit Service	Description	Peak-hour Headway (in minutes) [1]
Rapid Transit Routes		
Blue Line	Bowdoin – Wonderland	5
Orange Line	Forest Hills – Oak Grove	6
Local Bus Routes		
4	North Station-World Trade Center via Federal Courthouse and South	~12
92	Assembly Square Mall – Downtown	~15
93	Sullivan Square Station – Downtown	~7
Commuter Ferry Routes		
	Hingham Shipyard to Rowes Wharf	~15-30
	Charlestown Navy Yard to Long Wharf (Central)	~20-35
	Hingham/Hull/Logan to Long Wharf	~15

1 Headway is the scheduled time between trains or buses, as applicable. Source: MBTA.com.

2.2.7 Existing Pedestrian Conditions

The Project site is conveniently located adjacent to the Rose Kennedy Greenway, which provides approximately 1.5 miles of biking, walking, and jogging paths between South Station and the North End.

Currently, sidewalks in the study area are generally in good condition and supply more than adequate capacity. In addition, Broad Street was recently reconstructed as a part of Boston's Crossroads Initiative. The Broad Street design consists of a wider, tree-lined pedestrian area, connecting the Greenway to State Street, Government Center, and the Faneuil Hall marketplace. The design will improvethe street for multi-modal transportation including improved accessibility and bicycle accommodations as well as new bicycle storage racks.

Pedestrian counts were conducted concurrent with the vehicular Turning Movement Counts and are presented in Figure 2-7 for the a.m. and p.m. peak hours. As shown, pedestrian volumes are heaviest along the roadways adjacent to the Greenway.

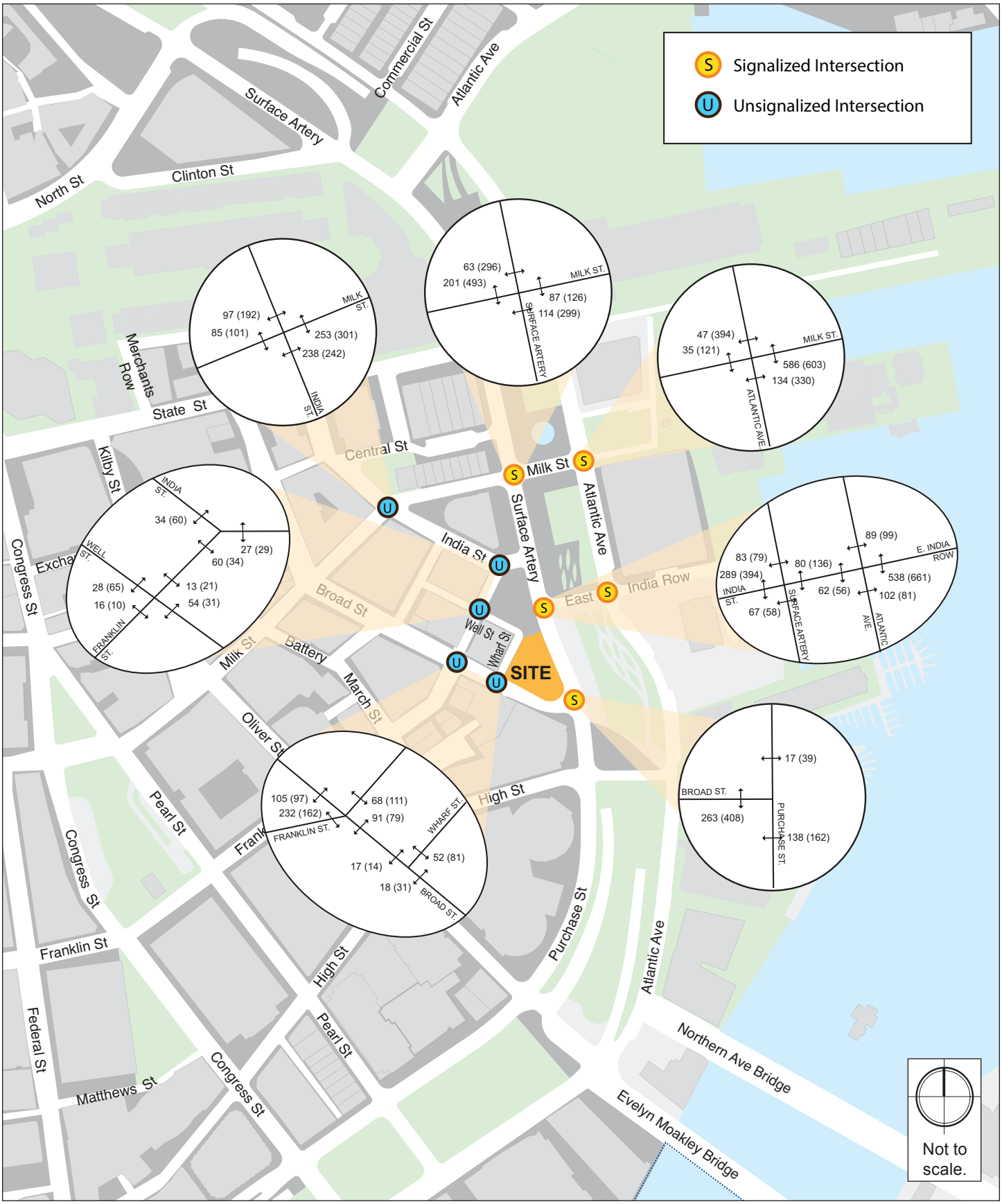

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Figure 2-7

Existing Conditions (2013) Pedestrian Volumes, a.m. and p.m. Peak Hours

2.2.8 Existing Bicycle Facilities

In recent years, bicycle use has increased dramatically throughout the City of Boston. The Project is located adjacent to the Greenway, which follows Atlantic Avenue, Surface Artery, and Purchase Street between Chinatown and the North End. Bicycle lanes are provided on Atlantic Avenue in the northbound direction and Surface Artery/Purchase Street in the southbound direction along the Greenway. Sharrows are provided along Milk Street and a faded bicycle lane is provided along Franklin Street in the southbound direction, south of Broad Street. The following roadways within the study area are designated bicycle routes on the City of Boston's "Bike Routes of Boston" map:

- Atlantic Avenue is designated as an intermediate route suitable for riders with some on-road experience. Atlantic Avenue has an exclusive bicycle lane.

- Milk Street is designated as an intermediate route suitable for riders with some on-road experience.

Hubway is a bicycle sharing system in the Boston area, which was launched in 2011 and consists of over 140 stations and 1,300 bicycles. There are three Hubway stations in close proximity to the Project site:

- Aquarium Station – Located at the intersection of Atlantic Avenue and State Street, this Hubway station has an overall capacity of 19 bicycles.

- Post Office Square – Located at the intersection of Milk Street and Pearl Street, this Hubway station has an overall capacity of 19 bicycles.

- Rowes Wharf – Located at Rowes Wharf along Atlantic Avenue, this Hubway station has an overall capacity of 15 bicycles.

- Milk Street at India Street – Located along Milk Street, this Hubway station has an overall capacity of 19 bicycles.

The nearby Hubway stations are shown in Figure 2-8.

Bicycle counts were conducted concurrent with the vehicular TMCs and are presented in Figure 2-9 for the a.m. and p.m. peak hours. As shown in Figure 2-9, bicycle volumes are heaviest along Surface Artery/Purchase Street and Atlantic Avenue.

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Figure 2-8
Shared Bicycle/Cars in the Study Area

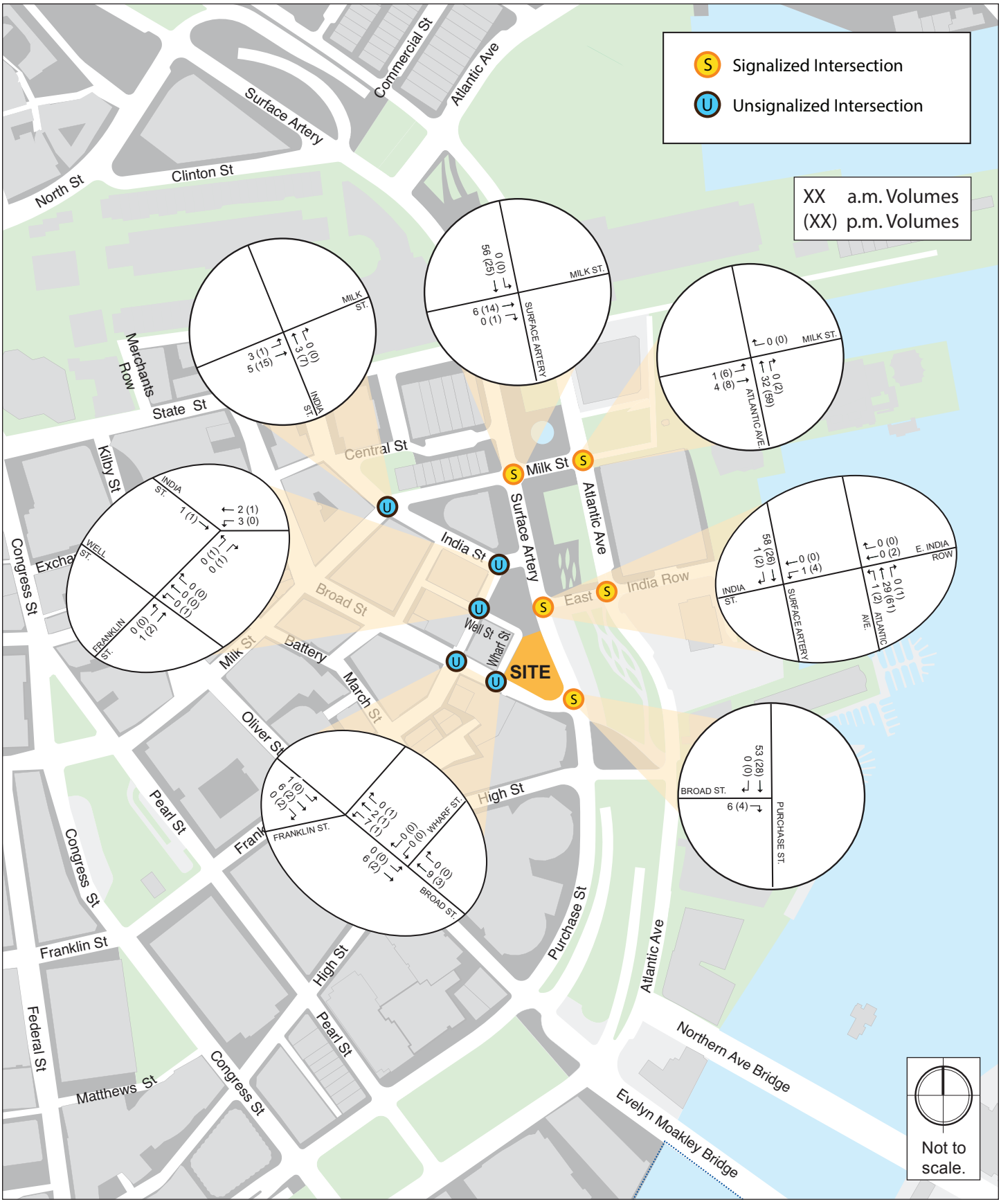

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Figure 2-9
Existing Conditions (2013) Bicycle Volumes, a.m. and p.m. Peak Hours

2.2.9 Car Sharing Services

Car sharing, predominantly served by Zipcar in the Boston area, provides easy access to vehicular transportation for those who want short term access to a vehicle. Vehicles are rented on an hourly or daily basis, and all vehicle costs (gas, maintenance, insurance, and parking) are included in the rental fee. Vehicles are checked out for a specific time period and returned to their designated location.

There are six car sharing locations within a quarter-mile of the Project site, including spaces in the parking lot adjacent to the Project site. The nearby Zipcar locations are shown in Figure 2-8. The Zipcar spaces that are currently located north of the Project site will be eliminated with the construction of the BRA Board-approved project at 55 India Street.

2.3 Future Conditions

For transportation impact analyses, it is standard practice to evaluate two future conditions: No-Build conditions (without the proposed project) and Build conditions (with the proposed project). In accordance with BTD guidelines, these conditions are projected to a future date five years from the year of filing this document. For this evaluation of this Project, 2019 was selected as the horizon year for the future conditions analyses.

This section presents a description of the 2019 future conditions scenarios and includes an evaluation of the transportation facilities under the No-Build and Build conditions.

2.3.1 No-Build Conditions

The No-Build conditions reflect a future scenario that incorporates any anticipated traffic volume changes independent of the Project and any planned infrastructure improvements that will affect travel patterns throughout the study area. Infrastructure improvements include roadway, public transportation, pedestrian and bicycle improvements. Traffic volume changes are based on two factors: annual background growth and growth associated with specific developments near the Project.

2.3.1.1 Background Traffic Growth

Two methodologies are used to account for future traffic growth, independent of the Project. The first methodology accounts for general background traffic growth that may be affected by changes in demographics, automobile usage, and automobile ownership. The second methodology accounts for specific developments proposed in the vicinity of the Project site. Based on a review of recent traffic studies conducted for nearby projects and to account for any additional unforeseen traffic growth, a one-percent per year annual traffic growth rate was used to develop the future conditions traffic volumes.

The second methodology identifies any specific planned developments that are expected to affect traffic patterns throughout the study area within the future analysis time horizon. The following project is located in the vicinity of the study area and traffic volumes associated with this project were also incorporated into the future conditions traffic volumes.

- **55 India Street** – This BRA Board-approved project includes the construction of 44 new residential units and a 4,000 sf restaurant that will replace the existing parking lot and Zipcar spaces on the site. This project is located adjacent to the north side of the Project site along the John F. Fitzgerald Surface Artery.

The one-percent per year annual growth rate was applied to the 2013 Existing conditions traffic volumes, then the traffic volumes associated with the background development project listed above were added to develop the 2019 No-Build conditions traffic volumes. The 2019 No-Build a.m. and p.m. peak hour traffic volumes are shown on Figure 2-10 and Figure 2-11, respectively.

2.3.1.2 Proposed Infrastructure Improvements

A review of planned improvements to roadway, transit, bicycle, and pedestrian facilities was conducted to determine if there are any nearby projects in the vicinity of the study area. The following project is currently under construction:

- **Broad Street – Crossroads Initiative** – This project, undertaken by the BRA, is currently under construction and entails improvements along Broad Street between State Street and Surface Artery/ Greenway including the widening of sidewalks, new street lighting, improved handicap accessibility, and the addition of new trees to the streetscape.

2.3.1.3 No-Build Conditions Traffic Operations

The 2019 No-Build conditions scenario analysis uses the same methodology as the 2013 Existing conditions scenario analysis. Table 2-7 and Table 2-8 present the 2019 No-Build conditions operations analysis for the a.m. and p.m. peak hours, respectively. The shaded cells in the tables indicate a worsening to LOS E or LOS F between the 2013 Existing conditions and the 2019 No-Build conditions. The detailed analysis sheets are provided in Appendix C.

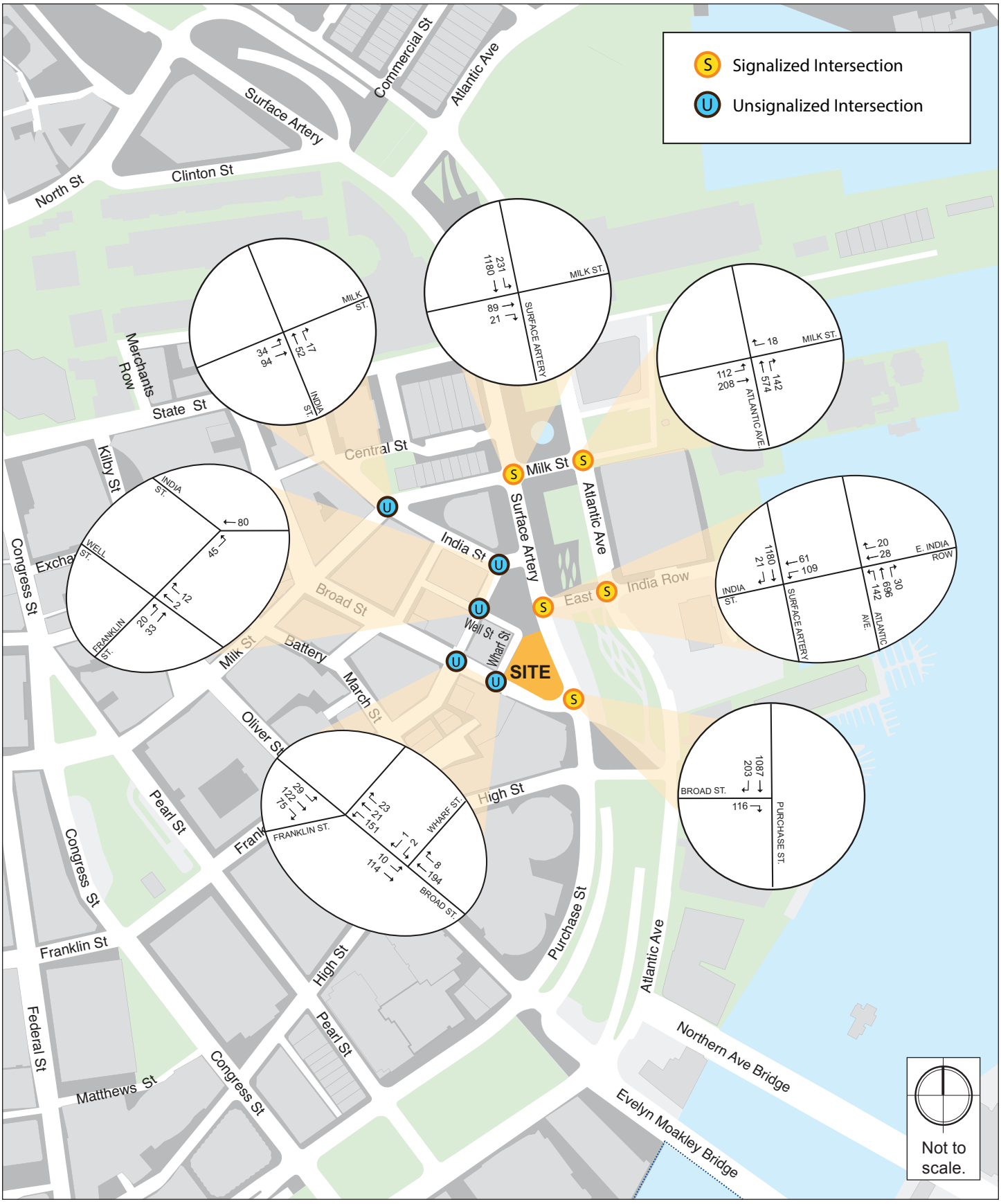

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Figure 2-10

No-Build Conditions (2019) Turning Movement Volumes, a.m. Peak Hour

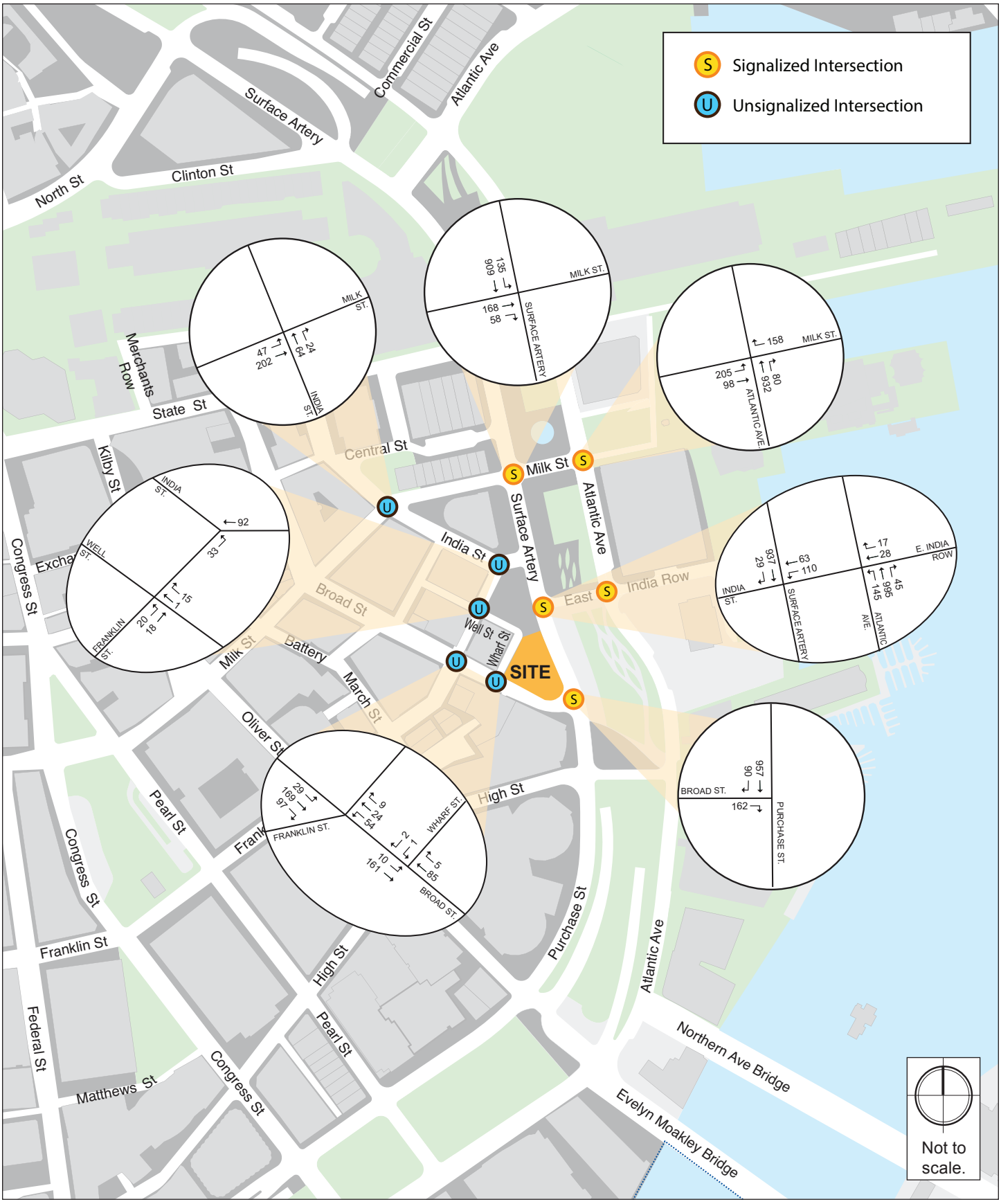

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Figure 2-11

No-Build Conditions (2019) Turning Movement Volumes, p.m. Peak Hour

Table 2-7 No-Build Conditions (2019), Capacity Analysis Summary, a.m. Peak Hour

Intersection	LOS	Delay (seconds)	V/C Ratio	50% Queue Length (ft)	95% Queue Length (ft)
Signalized Intersections					
Surface Artery/Milk Street	**C**	**23.6**	—	—	—
Milk EB thru | thru/right	C	23.1	0.17	26	51
Surface Artery SB left/thru | thru |	C	23.7	0.74	284	344
Atlantic Avenue/Milk Street	**D**	**45.2**	—	—	—
Milk EB left l left	C	26.2	0.22	21	m33
Milk EB thru	F	>80.0	0.75	112	m169
Milk WB right	A	0.2	0.05	0	0
Atlantic NB thru l thru/right	C	25.7	0.78	84	#316
Surface Artery/India Street	**A**	**8.4**	—	—	—
India WB left l left	D	39.2	0.34	36	64
India WB thru	D	41.3	0.34	43	81
Surface Artery SB thru l thru l	A	3.8	0.43	67	92
Atlantic Avenue/India Street	**A**	**9.5**	—	—	—
India WB thru/right	C	21.0	0.19	20	42
Atlantic NB left/thru l thru/right	A	8.6	0.52	137	182
Purchase Street/Broad Street	**A**	**1.3**	—	—	—
Broad EB right	A	1.3	0.27	0	0
Purchase SB thru l thru l thru/right	A	1.3	0.46	27	31
Unsignalized Intersections					
Milk Street/India Street	—	—	—	—	—
India WB thru/right	A	0.0	0.06	—	0
Milk NB left/thru	B	10.6	0.21	—	20
India Street/Franklin Street	—	—	—	—	—
India WB thru	A	0.0	0.06	—	0
Franklin NB left	A	9.3	0.06	—	5
Franklin Street/Well Street	—	—	—	—	—
Well WB thru/right	A	9.1	0.02	—	2
Franklin NB left/thru	A	3.3	0.02	—	2
Franklin Street/Broad Street	—	—	—	—	—
Broad EB left/thru/right	A	1.5	0.03	—	2
Broad WB left/thru/right	A	6.9	0.16	—	15
Broad Street/Wharf Street	—	—	—	—	—
Broad EB left/thru	A	1.3	0.02	—	1
Broad WB thru/right	A	0.0	0.15	—	0
Wharf SB left/right	B	11.6	0.02	—	2

# = 95th percentile volume exceeds capacity. Queue may be longer. Queue shown is the maximum after 2 cycles.
m = Volume for the 95th percentile queue is metered by the upstream signal.

Table 2-8 No-Build Conditions (2019), Capacity Analysis Summary, p.m. Peak Hour

Intersection	LOS	Delay (seconds)	V/C Ratio	50% Queue Length (ft)	95% Queue Length (ft)
Signalized Intersections					
Surface Artery/Milk Street	**C**	**22.3**	—	—	—
Milk EB thru | thru/right	D	42.3	0.47	88	90
Surface Artery SB left/thru | thru |	B	16.5	0.52	168	208
Atlantic Avenue/Milk Street	**F**	**>80.0**	—	—	—
Milk EB left l left	F	>80.0	0.74	104	110
Milk EB thru	F	>80.0	0.53	75	127
Milk WB right	A	2.3	0.37	0	0
Atlantic NB thru l thru/right	C	31.7	0.90	212	#457
Surface Artery/India Street	**A**	**7.4**	—	—	—
India WB left l left	C	34.0	0.32	35	m54
India WB thru	D	37.7	0.41	48	69
Surface Artery SB thru l thru l	A	1.6	0.35	15	37
Atlantic Avenue/India Street	**B**	**11.0**	—	—	—
India WB thru/right	C	22.0	0.17	18	46
Atlantic NB left/thru l thru/right	B	10.4	0.64	209	272
Purchase Street/Broad Street	**A**	**2.4**	—	—	—
Broad EB right	A	2.1	0.38	0	0
Purchase SB thru l thru l thru/right	A	2.4	0.37	1	74
Unsignalized Intersections					
Milk Street/India Street	—	—	—	—	—
India WB thru/right	A	0.0	0.08	—	0
Milk NB left/thru	B	13.0	0.43	—	54
India Street/Franklin Street	—	—	—	—	—
India WB thru	A	0.0	0.07	—	0
Franklin NB left	A	9.8	0.05	—	4
Franklin Street/Well Street	—	—	—	—	—
Well WB thru/right	A	9.1	0.03	—	2
Franklin NB left/thru	A	4.9	0.03	—	2
Franklin Street/Broad Street	—	—	—	—	—
Broad EB left/thru/right	A	1.1	0.03	—	2
Broad WB left/thru/right	A	5.0	0.05	—	4
Broad Street/Wharf Street	—	—	—	—	—
Broad EB left/thru	A	1.1	0.02	—	2
Broad WB thru/right	A	0.0	0.08	—	0
Wharf SB left/right	B	11.4	0.01	—	1

# = 95th percentile volume exceeds capacity. Queue may be longer. Queue shown is the maximum after 2 cycles.
m = Volume for the 95th percentile queue is metered by the upstream signal.
Grey shading indicates that LOS has worsened to LOS E or LOS F from Existing Conditions.

As shown in Table 2-7, the signalized intersections will continue to operate at LOS D or better during the a.m. peak hour under the 2019 No-Build conditions, with all movements at the unsignalized intersections continuing to operate at LOS B or better.

As shown in Table 2-8, the majority of the signalized intersections will continue to operate at LOS D or better during the p.m. peak hour under the 2019 No-Build conditions. The intersection of Atlantic Avenue/Milk Street will worsen from an overall LOS E to LOS F. All movements at the unsignalized intersections will continue to operate at LOS B or better.

Based on the volume to capacity ratios, the study area intersections were shown to have adequate capacity to accommodate the future vehicular demand during both the a.m. and p.m. peak hours under the No-Build conditions.

2.3.2 Build Conditions

As previously summarized, the Project will consist of 52 residential condominium units and approximately 3,500 sf of commercial/café space. Underground parking will be provided for approximately 35 vehicles in an automated, mechanical garage on the Project site. Secure storage for approximately 52 bicycles will also be provided on site. The 2019 Build conditions reflect a future scenario that adds anticipated Project-generated trips to the 2019 No-Build conditions traffic volumes.

2.3.2.1 Site Access and Circulation

As shown in the Site Access Plan in Figure 2-12, access will be provided to an underground, automated parking structure containing approximately 35 spaces. Drivers will enter a loading bay accessed off of Wharf Street, opposite Well Street and enter the parking structure. A more detailed description of the Project's parking supply is included in Section 2.3.2.8.

In addition, the Proponent is exploring the feasibility of reconstructing the segments of Wharf Street and Well Street between Broad Street and Franklin Street to be at-grade with the existing sidewalk. This roadway modification will be undertaken jointly with the proponent of the development at 55 India Street. By bringing the roadway at-grade with the existing sidewalk, a shared space will be created to be used by pedestrians, bicycles, and vehicles. It will also allow easier two-way travel along Well Street, which is currently only wide enough to accommodate a single vehicle in one direction. It will also allow for easier maneuvers to and from the loading and parking bay and better access for emergency vehicles.

Pedestrian access to the residences will be provided off of Broad Street, with doors opening to the residential lobby of the building and to the stairwell providing access to the upper levels. Pedestrian access to the commercial space will be provided at the corner of Broad Street and Surface Artery.

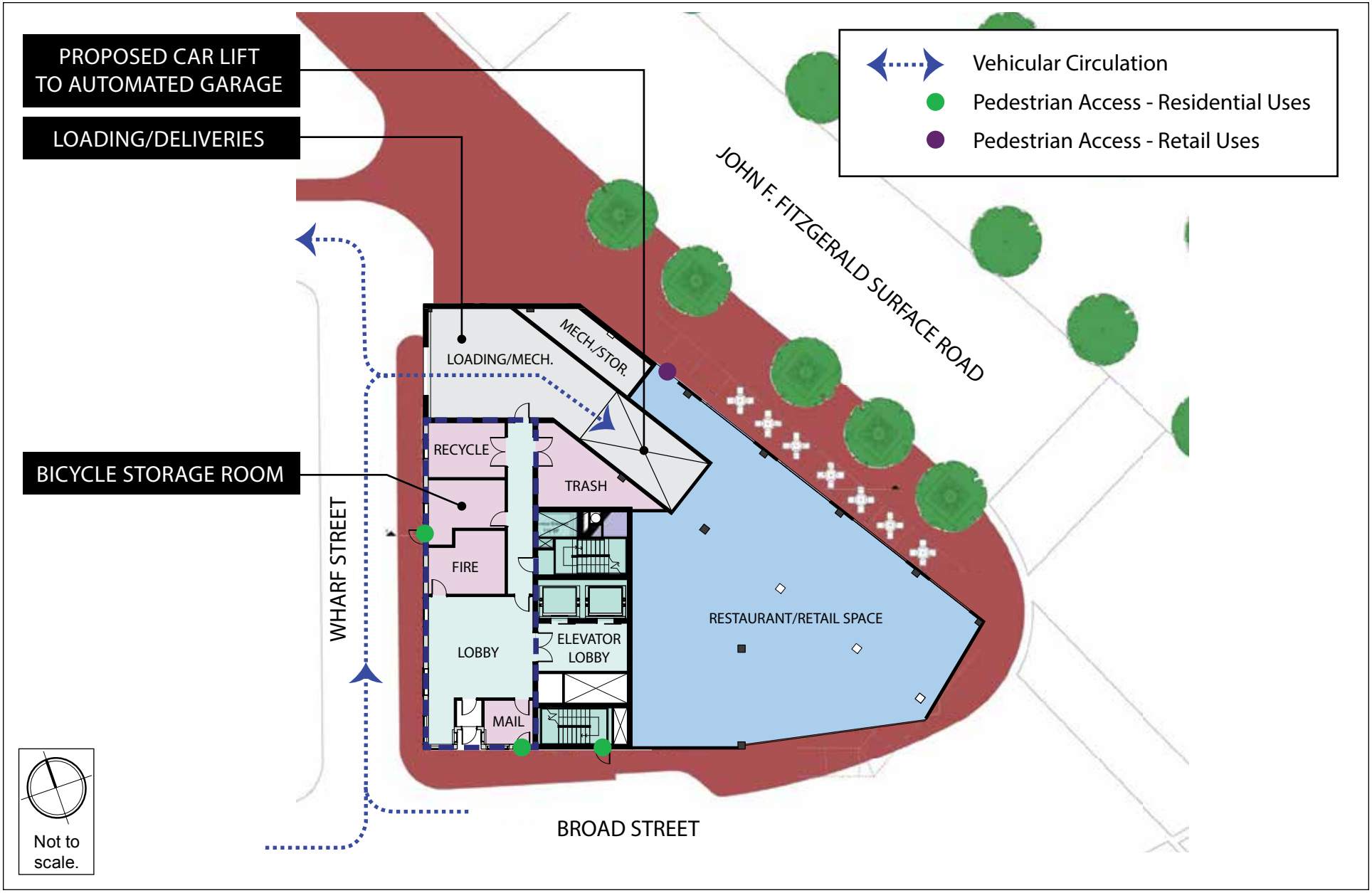

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Figure 2-12
Site Access Plan

2.3.2.2 Trip Generation

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

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

To estimate the number of vehicular trips for the Project, the following ITE land use codes (LUCs) were used:

LUC 230 – Residential Condominium/Townhouse. The residential condominium/ townhouse land use is defined as an ownership unit with at least one other owned unit within the same building structure. Trip generation estimates are based on average vehicular rates per unit.

LUC 932 – High-Turnover (Sit-Down) Restaurant. The high-turnover (sit-down) restaurant land use is defined as a full-service eating establishment with a typical stay duration of approximately one hour. Trip generation estimates are based on average vehicular rates per 1,000 sf of gross floor area.

2.3.2.3 Mode Share

The BTD publishes vehicle, transit, and walking/bicycling mode split rates for different areas of Boston. The Project site is located within BTD's designated Area 2. The unadjusted vehicular trips were converted to person trips by using vehicle occupancy rates published by the Federal Highway Administration (FHWA)[2]. The BTD's travel mode share data for Area 2 are shown in Table 2-9.

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1 *Trip Generation Manual*, 9th Edition; Institute of Transportation Engineers; Washington, D.C.; 2012.

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

Table 2-9 Travel Mode Shares

Land Use	Direction	Walk/ Bicycle Share	Transit Share	Auto Share	Local Vehicle Occupancy Rate
Daily					
Condominium	In	42%	30%	28%	1.13
	Out	42%	30%	28%	1.13
Commercial/café	In	59%	20%	21%	2.20
	Out	59%	20%	21%	2.20
a.m. Peak Hour					
Condominium	In	7%	52%	41%	1.13
	Out	51%	18%	31%	1.13
Commercial/café	In	14%	46%	40%	2.20
	Out	58%	10%	32%	2.20
p.m. Peak Hour					
Condominium	In	51%	18%	31%	1.13
	Out	7%	52%	41%	1.13
Commercial/café	In	58%	10%	32%	2.20
	Out	14%	46%	40%	2.20

2.3.2.4 Existing Site Trip Generation

The Project site currently contains four residential apartment units, the Times Restaurant and Pub, the Littlest Bar, and approximately 1,650 sf of occupied office space. In order to account for the effect of these uses on the trip generating characteristics of the Project, the existing vehicular trips were estimated using the following ITE LUCs:

LUC 220 – Apartment. The apartment land use can be a rental dwelling unit located within the same building with at least three other dwelling units. Trip generation estimates are based on average vehicular rates per unit.

LUC 710 – General Office Building. The general office building land use was used for the office space associated with the existing site uses. The general office building land use encompasses a wide variety of office-related uses and was selected as the most appropriate LUC to develop the trip generation characteristics for the existing office space on the Project site. Trip generation estimates are based on average vehicular rates per 1,000 of gross floor area.

LUC 925 – Drinking Place. The drinking place land use is defined as a bar where alcoholic beverages and food are sold and possibly some type of entertainment such as music, television screens, video games, or pool tables. This LUC was selected to estimate the trip generation characteristics of The Littlest Bar. Trip generation estimates are based on average vehicular rates per 1,000 sf of gross floor area.

LUC 932 – High-Turnover (Sit-Down) Restaurant. The high-turnover (sit-down) restaurant land use is defined as a full-service eating establishment with a typical stay duration of approximately one hour. This LUC was selected to estimate the trip generation characteristics of The Times Restaurant and Pub. Trip generation estimates are based on average vehicular rates per 1,000 sf of gross floor area.

Based on the land use trip rates and travel mode share assumptions published by BTD for Area 2, the existing trips are shown in Table 2-10.

Table 2-10 Trip Generation – Existing Land Uses

Land Use		Walk/Bicycle Trips	Transit Trips	Vehicle Trips
Daily				
Residential *4 apartment units*	In Out	6 6	4 4	4 4
Restaurant – The Times Restaurant and Pub *2,740 sf*	In Out	223 223	76 76	36 36
Drinking Place – The Littlest Bar *1,630 sf*	In Out	91 91	31 31	15 15
Office *1,650 sf (occupied)*	In Out	3 3	4 4	2 2
Total	**In** **Out**	**323** **323**	**115** **115**	**57** **57**
a.m. Peak Hour				
Residential *4 apartment units*	In Out	0 1	0 0	0 1
Restaurant – The Times Restaurant and Pub *2,740 sf*	In Out	0 0	0 0	0 0
Drinking Place – The Littlest Bar *1,630 sf*	In Out	0 0	0 0	0 0
Office *1,650 sf(occupied)*	In Out	0 0	2 0	1 0
Total	**In** **Out**	**0** **1**	**2** **0**	**1** **1**

Table 2-10 Trip Generation – Existing Land Uses (Continued)

Land Use		Walk/Bicycle Trips	Transit Trips	Vehicle Trips
p.m. Peak Hour				
Residential *4 apartment units*	In	1	0	0
	Out	0	1	0
Restaurant – The Times Restaurant and Pub *2,740 sf*	In	20	4	5
	Out	3	11	4
Drinking Place – The Littlest Bar *1,630 sf*	In	15	3	4
	Out	2	6	2
Office *1,650 sf(occupied)*	In	0	0	1
	Out	0	1	1
Total	**In**	**36**	**7**	**10**
	Out	**5**	**19**	**7**

2.3.2.5 Vehicle Trip Generation

To develop the overall trip generation characteristics of the Project, the adjusted vehicular trips associated with both the existing uses on the Project site and the proposed Project were estimated. The Project-generated new vehicle trips are summarized in Table 2-11, with the detailed trip generation information provided in Appendix C.

Table 2-11 Project Vehicle Trip Generation

Time Period	Direction	Condominium [1]	Restaurant [2]	Total	Existing Uses	Net New Trips
Daily	In	42	71	113	57	56
	Out	42	71	113	57	56
	Total	**84**	**142**	**226**	**114**	**112**
a.m. Peak Hour	In	2	13	15	1	14
	Out	6	8	14	1	13
	Total	**8**	**21**	**29**	**2**	**27**
p.m. Peak Hour	In	6	10	16	10	6
	Out	4	8	12	7	5
	Total	**10**	**18**	**28**	**17**	**11**

1 Based on ITE LUC 230 – Residential Condominium/Townhouse for 52 units.
2 Based on ITE LUC 932 – High-Turnover (Sit-Down) Restaurant for 4,000 sf.

As shown in Table 2-11, the Project is expected to generate approximately 112 new daily vehicle trips (56 entering and 56 exiting), with 27 new vehicle trips during the a.m. peak hour (14 entering and 13 exiting) and 11 new vehicle trips during the p.m. peak hour (6 entering and 5 exiting).

2.3.2.6 Trip Distribution

The trip distribution identifies the various travel paths for vehicles arriving and leaving the Project site. Trip distribution patterns for the Project were based on BTD's origin-destination data for Area 2 and trip distribution patterns presented in traffic studies conducted for nearby project[3,4]. The trip distribution patterns for the Project are illustrated in Figure 2-13 and Figure 2-14 for the entering and exiting trips, respectively.

The Project-generated vehicle trips were assigned to the study area roadway network based on the trip distribution patterns shown in Figures 2-13 and 2-14 and are shown in Figure 2-15 and Figure 2-16 for the a.m. and p.m. peak hours, respectively. The Project-generated trips were added to the 2019 No-Build conditions traffic volumes to develop the 2019 Build conditions peak hour traffic volume networks and are shown in Figure 2-17 and Figure 2-18 for the a.m. and p.m. peak hours, respectively.

2.3.2.7 Build Conditions Traffic Operations

The 2019 Build conditions scenario analyses use the same methodology as the 2013 Existing and 2019 No-Build conditions scenario analyses. The results of the 2019 Build condition traffic analysis at study area intersections are presented in Table 2-12 and Table 2-13 for the a.m. and p.m. peak hours, respectively. The detailed analysis sheets are provided in Appendix C.

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[3] *Harbor Garage Redevelopment – Project Notification Form*; Boston, Massachusetts; Howard/Stein-Hudson Associates; April 16, 2009.

[4] *55 India Street – Expanded Project Notification Form*; Boston, Massachusetts; Howard/Stein-Hudson Associates; June 16, 2014.

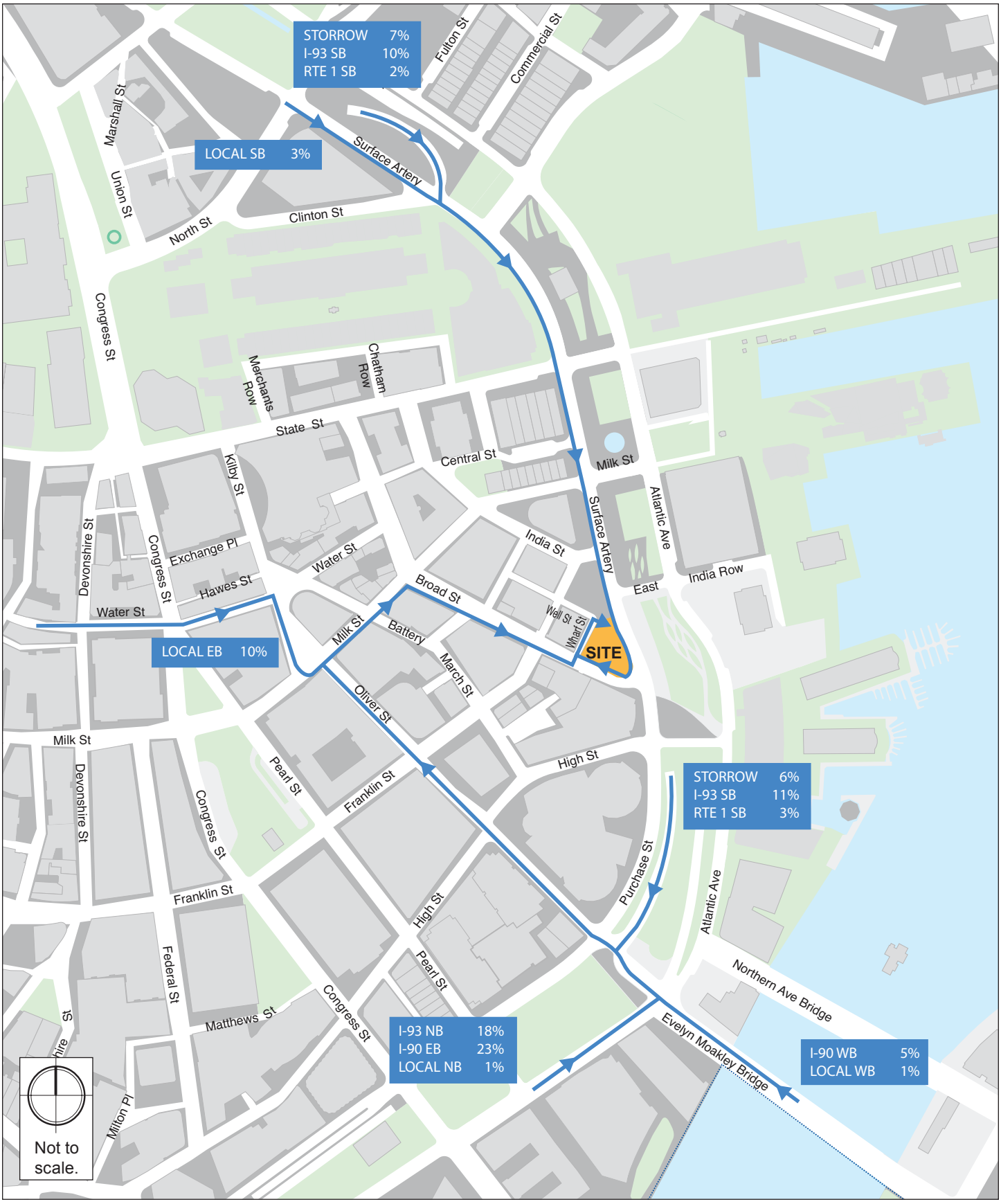

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Figure 2-13
Vehicle Trip Distribution: Entering

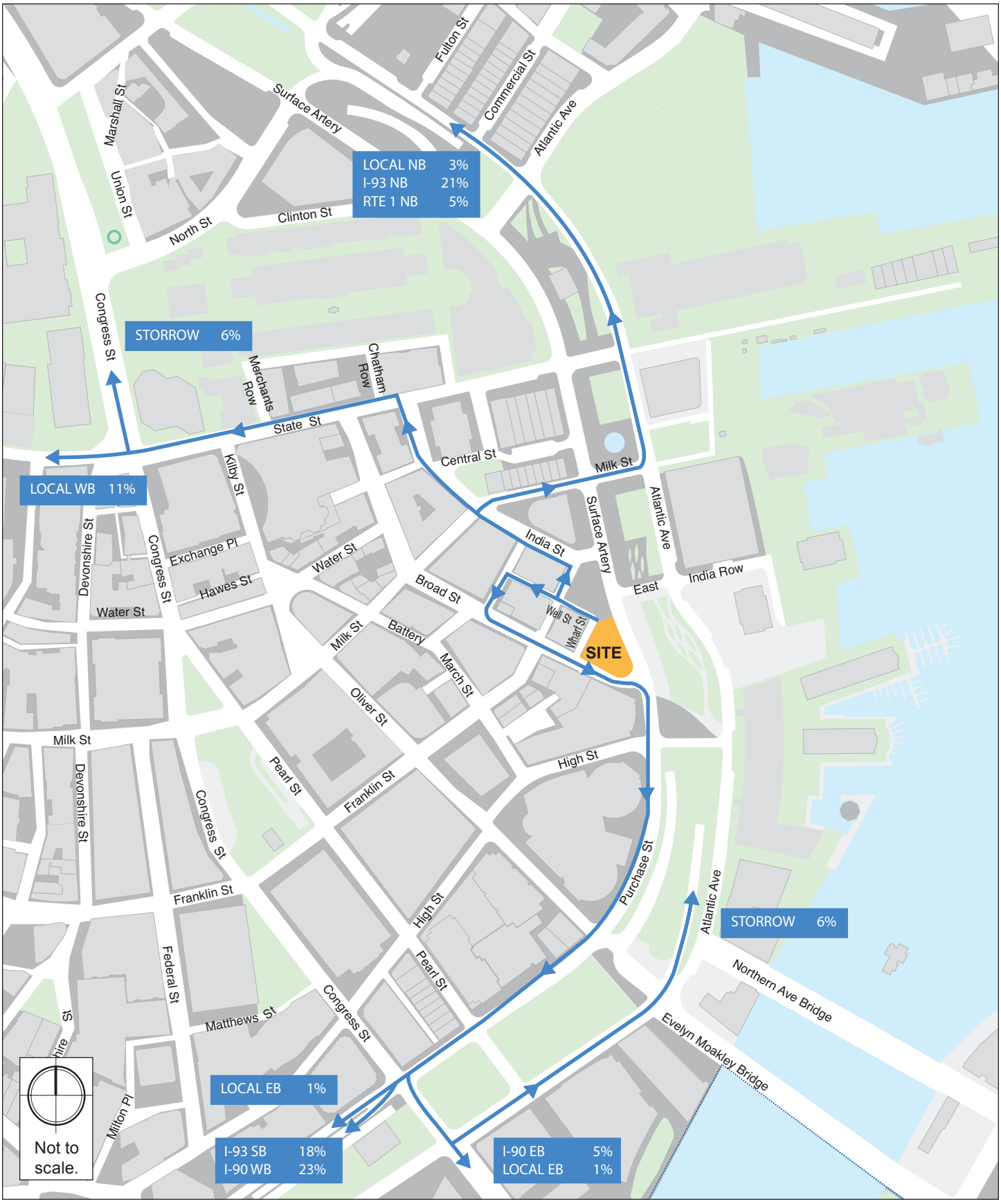

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Figure 2-14
Vehicle Trip Distribution: Exiting

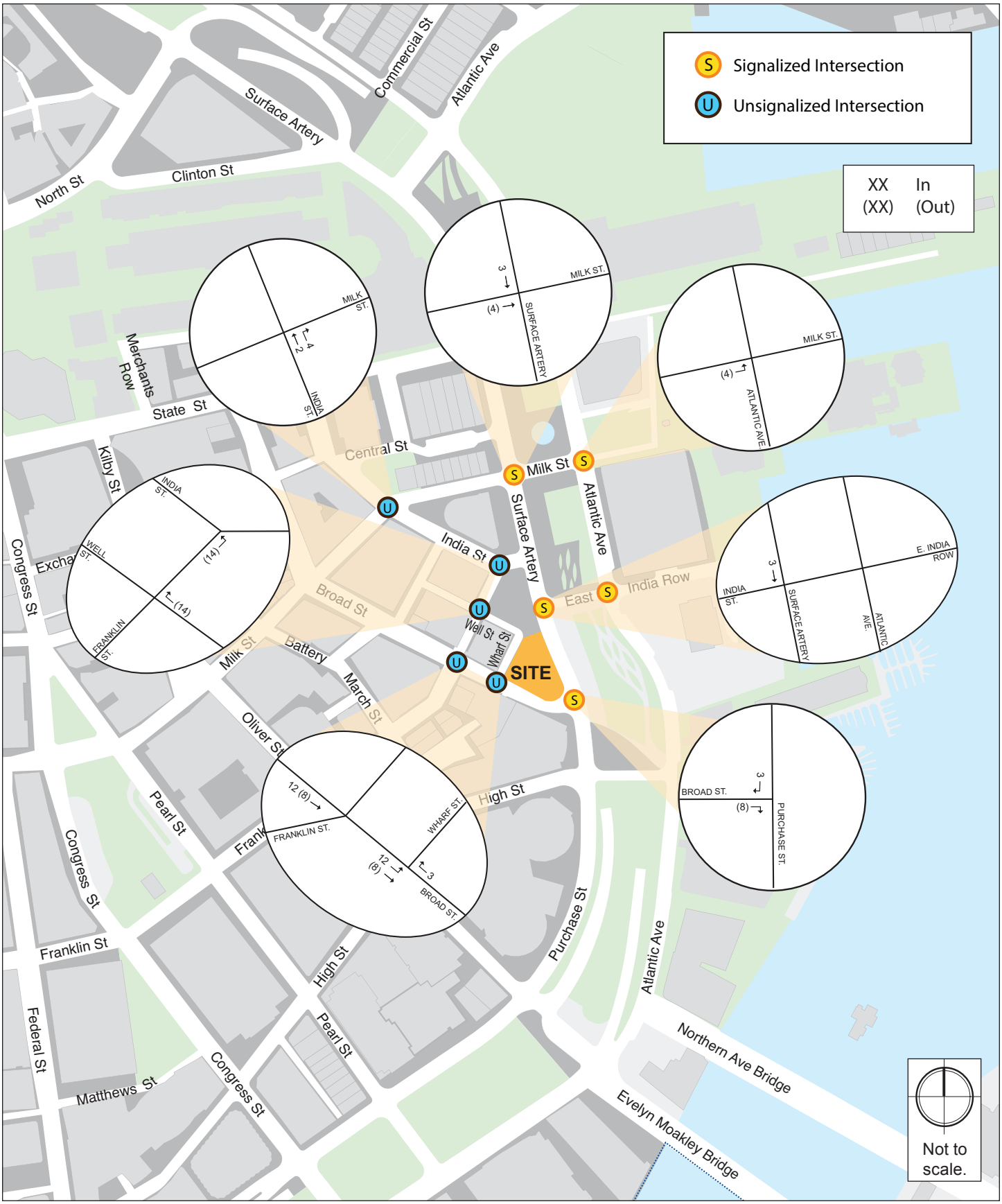

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Figure 2-15
Project Generated Trips, a.m. Peak Hour

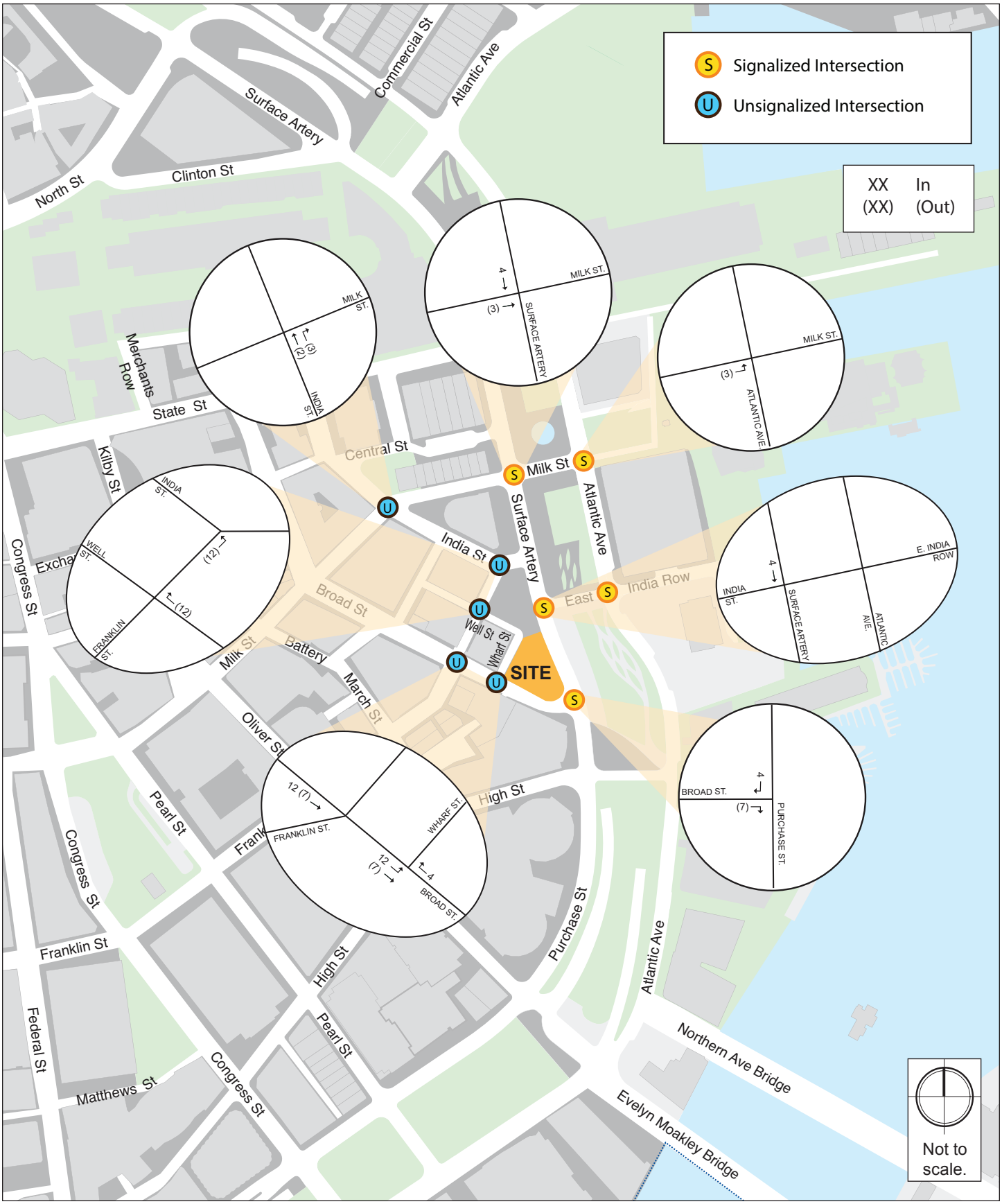

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Figure 2-16
Project Generated Trips, p.m. Peak Hour

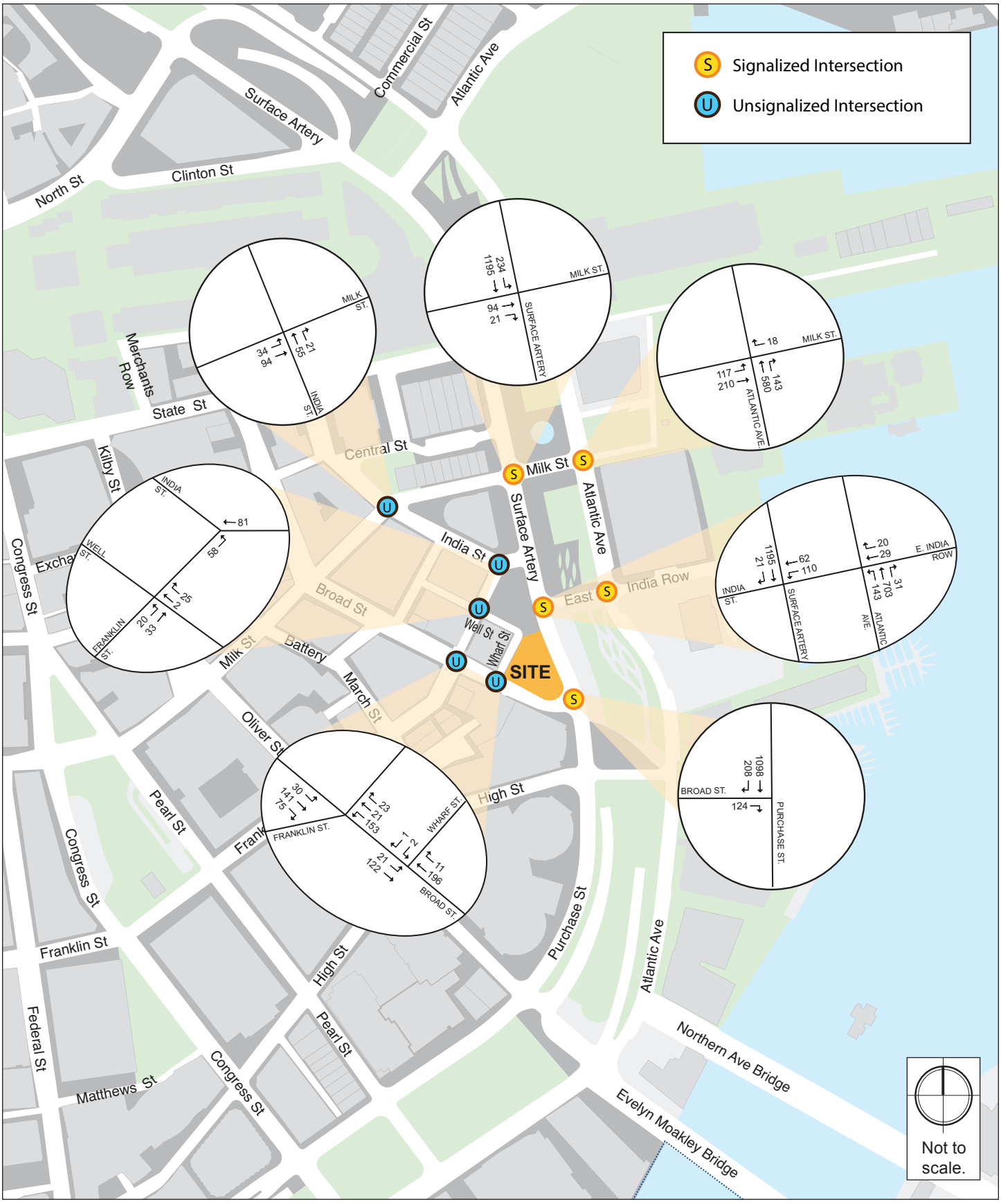

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Figure 2-17

Build Conditions (2019) Turning Movement Volumes, a.m. Peak Hour

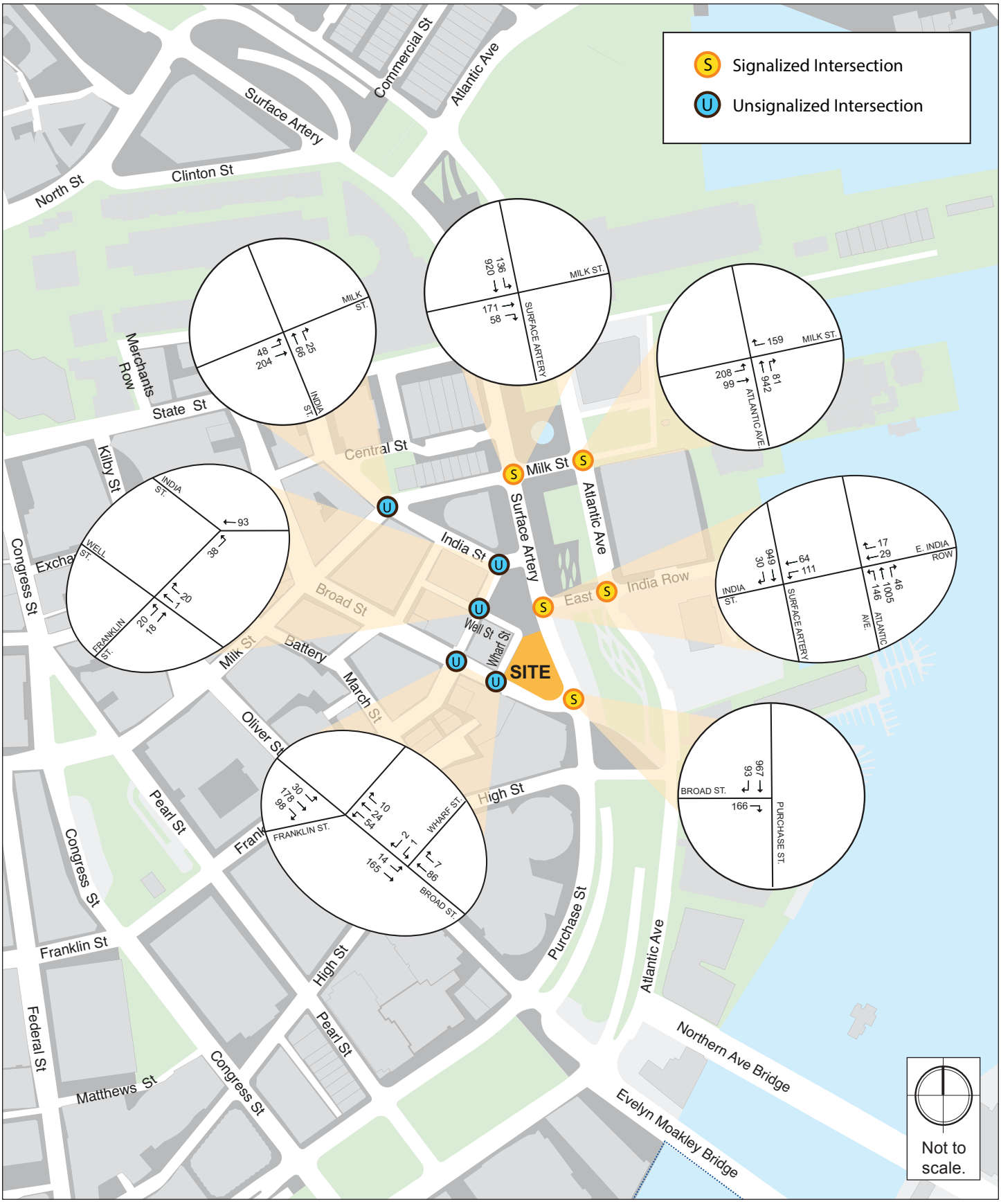

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Figure 2-18

Build Conditions (2019) Turning Movement Volumes, p.m. Peak Hour

Table 2-12 Build Conditions (2019), Capacity Analysis Summary, a.m. Peak Hour

Intersection	LOS	Delay (seconds)	V/C Ratio	50% Queue Length (ft)	95% Queue Length (ft)
Signalized Intersections					
Surface Artery/Milk Street	**C**	**23.7**	—	—	—
Milk EB thru | thru/right	C	23.4	0.17	27	52
Surface Artery SB left/thru | thru |	C	23.7	0.75	285	345
Atlantic Avenue/Milk Street	**D**	**45.6**	—	—	—
Milk EB left l left	C	26.4	0.23	22	m35
Milk EB thru	F	>80.0	0.75	113	m169
Milk WB right	A	0.2	0.05	0	0
Atlantic NB thru l thru/right	C	25.7	0.78	84	#316
Surface Artery/India Street	**A**	**8.4**	—	—	—
India WB left l left	D	39.2	0.34	36	64
India WB thru	D	41.3	0.34	43	81
Surface Artery SB thru l thru l	A	3.8	0.43	66	94
Atlantic Avenue/India Street	**A**	**9.5**	—	—	—
India WB thru/right	C	21.0	0.19	20	42
Atlantic NB left/thru l thru/right	A	8.6	0.52	137	182
Purchase Street/Broad Street	**A**	**1.3**	—	—	—
Broad EB right	A	1.4	0.28	0	0
Purchase SB thru l thru l thru/right	A	1.3	0.46	27	31
Unsignalized Intersections					
Milk Street/India Street	—	—	—	—	—
India WB thru/right	A	0.0	0.06	—	0
Milk NB left/thru	B	10.7	0.22	—	20
India Street/Franklin Street	—	—	—	—	—
India WB thru	A	0.0	0.06	—	0
Franklin NB left	A	9.4	0.08	—	6
Franklin Street/Well Street	—	—	—	—	—
Well WB thru/right	A	8.9	0.04	—	3
Franklin NB left/thru	A	3.3	0.02	—	2
Franklin Street/Broad Street	—	—	—	—	—
Broad EB left/thru/right	A	1.4	0.03	—	2
Broad WB left/thru/right	A	6.9	0.17	—	15
Broad Street/Wharf Street	—	—	—	—	—
Broad EB left/thru	A	2.2	0.04	—	3
Broad WB thru/right	A	0.0	0.15	—	0
Wharf SB left/right	B	12.1	0.02	—	2

# = 95th percentile volume exceeds capacity. Queue may be longer. Queue shown is the maximum after 2 cycles.
m = Volume for the 95th percentile queue is metered by the upstream signal.

Table 2-13 Build Conditions (2019), Capacity Analysis Summary, p.m. Peak Hour

Intersection	LOS	Delay (seconds)	V/C Ratio	50% Queue Length (ft)	95% Queue Length (ft)
Signalized Intersections					
Surface Artery/Milk Street	**C**	**22.4**	—	—	—
Milk EB thru | thru/right	D	42.8	0.47	88	90
Surface Artery SB left/thru | thru |	B	16.5	0.52	168	208
Atlantic Avenue/Milk Street	**F**	**>80.0**	—	—	—
Milk EB left l left	F	>80.0	0.75	104	111
Milk EB thru	F	>80.0	0.53	75	128
Milk WB right	A	2.3	0.37	0	0
Atlantic NB thru l thru/right	C	31.7	0.90	212	#457
Surface Artery/India Street	**A**	**7.4**	—	—	—
India WB left l left	C	34.0	0.32	35	m54
India WB thru	D	37.7	0.41	48	69
Surface Artery SB thru l thru l	A	1.6	0.35	15	37
Atlantic Avenue/India Street	**B**	**11.0**	—	—	—
India WB thru/right	C	22.0	0.17	18	46
Atlantic NB left/thru l thru/right	B	10.4	0.64	209	272
Purchase Street/Broad Street	**A**	**2.4**	—	—	—
Broad EB right	A	2.2	0.39	0	0
Purchase SB thru l thru l thru/right	A	2.4	0.37	1	74
Unsignalized Intersections					
Milk Street/India Street	—	—	—	—	—
India WB thru/right	A	0.0	0.08	—	0
Milk NB left/thru	B	13.1	0.43	—	54
India Street/Franklin Street	—	—	—	—	—
India WB thru	A	0.0	0.07	—	0
Franklin NB left	A	9.8	0.06	—	5
Franklin Street/Well Street	—	—	—	—	—
Well WB thru/right	A	9.1	0.04	—	3
Franklin NB left/thru	A	4.9	0.03	—	2
Franklin Street/Broad Street	—	—	—	—	—
Broad EB left/thru/right	A	1.1	0.03	—	2
Broad WB left/thru/right	A	5.0	0.05	—	4
Broad Street/Wharf Street	—	—	—	—	—
Broad EB left/thru	A	1.5	0.03	—	2
Broad WB thru/right	A	0.0	0.09	—	0
Wharf SB left/right	B	11.6	0.01	—	1

# = 95th percentile volume exceeds capacity. Queue may be longer. Queue shown is the maximum after 2 cycles.
m = Volume for the 95th percentile queue is metered by the upstream signal.

As shown in Table 2-12 and Table 2-13, the intersections will continue to operate at the same LOS as under the No-Build conditions during both the a.m. and p.m. peak hours. The Project will have minimal impact on the study area intersections. No specific intersection improvements are necessary to accommodate the Project-generated traffic volumes.

2.3.2.8 Parking

This section presents the Project's parking supply and an evaluation of the Project's parking demand. The Project will provide approximately 35 parking spaces on site to be located in an underground, automated parking structure. Access to a loading bay will be provided along Wharf Street, opposite Well Street. Drivers will enter the loading bay and park on a mechanical lift, where they will exit the vehicle. The lift will deliver the vehicles to an underground vehicle storage structure where the vehicle will remain secure. To retrieve the vehicles, drivers will be able to contact the automated lift remotely through cell phone or wireless technology or through a panel that will be located near the entrance of the loading bay. This type of automated system requires significantly less space than a traditional parking structure. It also reduces the amount of idling and exhaust produced by vehicular parking in a traditional parking structure, allowing for a more environmentally friendly parking experience. For more information and demonstrations of automated parking structures, please visit http://www.unitronics.com/automated-parking/videos. Public parking will not be provided at the Project site.

A parking ratio of approximately 0.67 parking spaces per unit will be provided for the residential component of the Project, which is in line with the current BTD district-based parking goals for the downtown area of 0.5 to 1.0 parking spaces per unit. Recent studies have shown that parking demand at some residential buildings throughout Boston is lower than 0.5 parking spaces per unit, indicating that there may be some excess parking associated with the Project. The Proponent anticipates selling or leasing the parking spaces independently of the residential units, allowing the potential to sell or lease parking to nearby residential buildings, including the project at 55 India Street, which does not have any on-site parking associated with it.

No parking will be provided for the commercial/café use on the Project site. Patrons of the commercial/café that arrive by vehicle will use the nearby public lots or garages.

2.3.2.9 Public Transportation

Based on the transit mode shares presented earlier, the future transit trips associated with the Project were estimated and are summarized in Table 2-14.

Table 2-14 Project Transit Trips

Time Period	Direction	Condominium	Restaurant	Total	Existing Uses	Net New Trips
Daily	In	51	150	201	115	86
	Out	51	150	201	115	86
	Total	102	300	402	230	172
a.m. Peak Hour	In	2	32	34	2	32
	Out	4	6	10	0	10
	Total	6	38	44	2	42
p.m. Peak Hour	In	4	7	11	7	4
	Out	5	21	26	19	7
	Total	9	28	37	26	11

As shown in Table 2-14, the Project will generate an estimated 172 new transit trips on a daily basis. Approximately 42 new transit trips will occur during the a.m. peak hour (32 alighting and 10 boarding) and 11 new trips will occur during the p.m. peak hour (4 alighting and 7 boarding).

The transit trips will be mostly dispersed between the Blue Line station at the Aquarium, the Orange Line/Blue Line Station at State Street, and the nearby MBTA bus routes. The additional transit trips will be accommodated by the existing public transportation facilities that serve the Project study area.

2.3.2.10 Pedestrians

Based on the walk mode shares presented earlier, the future walk trips were estimated and are summarized in Table 2-15.

Table 2-15 Project Pedestrian Trips

Time Period	Direction	Condominium	Restaurant	Total	Existing Trips	Net New Trips
Daily	In	72	441	513	323	190
	Out	72	441	513	323	190
	Total	144	882	1,026	646	380
a.m. Peak Hour	In	0	10	10	0	10
	Out	11	33	44	1	43
	Total	11	43	54	1	53
p.m. Peak Hour	In	10	41	51	36	15
	Out	1	6	7	5	2
	Total	11	47	58	41	17

Over the course of a day, the Project will generate an estimated 380 new pedestrian trips and an additional 172 new transit trips that will require a walk to or from the Project site. Combined, the Project will result in an additional approximately 552 new pedestrian trips per day. Approximately 53 new pedestrian trips will occur during the a.m. peak hour and 17 new pedestrian trips will occur during the p.m. peak hour in addition to the new transit trips that will also require a walk to or from the site. The Project site is located in proximity to the Greenway, which provides pedestrian access to the North End, the financial district, South Station, and Chinatown. The existing pedestrian facilities that serve the Project site will accommodate all additional pedestrian trips generated by the Project.

2.3.2.11 Bicycle Accommodations

BTD has established guidelines requiring projects subject to Transportation Access Plan Agreements to provide secure bicycle parking for residents and employees and short-term bicycle racks for visitors. The Project will provide a total of approximately 52 covered and secure bicycle storage spaces on-site for residents and employees of the Project. Additional storage will be provided by outdoor bicycle racks accessible to visitors to the Project site in accordance with BTD guidelines.

All bicycle racks, signs, and parking areas will conform to BTD guidelines and will be located in safe, secure locations. The Proponent will work with BTD to identify the most appropriate quantity and location for bicycle racks on the Project site as part of the Transportation Access Plan Agreement (TAPA) process.

2.3.2.12 Build Conditions Loading and Service Activity

Loading and service operations will occur within the loading bay located off of Wharf Street, opposite Well Street. The loading bay is sized to serve a 36-foot long single unit box truck (SU-36). Vehicles will access this area by traveling along Wharf Street, turning left on to Well Street and backing into the bay. All trash activity will also occur within the loading bay. No loading activity will take place on the surrounding roadway network.

A summary of anticipated loading/service activity by land use is presented in Table 2-16; the sources of the assumptions are presented below. Delivery trip estimates were based on data provided in the Truck Trip Generation Rates by Land Use in the Central Artery/Tunnel Project Study Area report[5]. Deliveries to the Project site will be mostly limited to SU-36 trucks and smaller delivery vehicles.

Restaurant. Restaurants depend on more frequent food deliveries from smaller trucks. Based on the CTPS report, restaurant uses generate approximately 0.70 light truck trips per 1,000 sf of floor area and 0.07 medium/heavy truck trips per 1,000 sf of gross floor area.

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[5] *Truck Trip Generation Rates by Land Use in the Central Artery/Tunnel Project Study Area*; Central Transportation Planning Staff; September 1993.

Residential. Residential units primarily generate delivery trips related to small packages and prepared food. Based on the CTPS report, residential uses generate approximately 0.01 light truck trips per 1,000 sf of gross floor area and 0.001 medium/heavy truck trips per 1,000 sf of gross floor area.

Table 2-16 Delivery Activity by Land Use

Land Use	Number of Deliveries			General Delivery Times
	SU-30 or smaller	*Larger than SU-30*	*Total*	
Restaurant	3	0	3	10% before 7:00 a.m.70% between 7:00 a.m. and 1:00 p.m. 20% after 1:00 p.m.
Residential	1	0	1	
Total	**4**	**0**	**4**	

The Project is expected to generate approximately four deliveries per day. It is anticipated that the majority of these deliveries will occur between 7:00 a.m. and 1:00 p.m. These numbers do not include trash truck trips. For this area, trash truck trips generally occur between 5:00 a.m. and 7:00 a.m. and do not coincide with the regular delivery activities. The low number of anticipated deliveries will have minimal impact on the vehicular operations along Well Street and Wharf Street, which are both very low-volume roadways.

2.4 Transportation Mitigation Measures

While the traffic impacts associated with the new trips are minimal, the Proponent will continue to work with the City of Boston to create a Project that efficiently serves vehicle trips, improves the pedestrian environment, and encourages transit and bicycle use.

The Proponent is exploring the feasibility of reconstructing the segments of Wharf Street and Well Street between Broad Street and Franklin Street to be at-grade with the existing sidewalk. By bringing the roadway at-grade with the existing sidewalk, a shared space will be created to be used by pedestrians, bicycles, and vehicles. It will also allow easier two-way travel along Well Street, which is currently only wide enough to accommodate a single vehicle in one direction. Wharf Street and Well Street are both low volume and low speed roadways, allowing for a shared space that will be more efficient at accommodating all modes of transportation, including emergency vehicles.

The Proponent is responsible for preparation of the TAPA, a formal legal agreement between the Proponent and the BTD. The TAPA formalizes the findings of the transportation study, mitigation commitments, elements of access and physical design, travel demand management measures, and any other responsibilities that are agreed to by both the Proponent and the BTD. Because the TAPA will incorporate the results of the technical analysis, it must be executed after these other processes have been completed. The Proponent will work closely with BTD to determine the level of additional

transportation mitigation that will be necessary to accommodate the Project. Any transportation improvements to be undertaken as part of this Project will be defined and documented in the TAPA.

The Proponent will also produce a Construction Management Plan (CMP) for review and approval by BTD. The CMP will detail the schedule, staging, parking, delivery, and other associated impacts of the construction of the Project.

2.5 Transportation Demand Management

The Proponent is committed to implementing Transportation Demand Management (TDM) measures to minimize automobile usage and Project related traffic impacts. TDM will be facilitated by the nature of the Project (which does not generate significant peak hour trips) and its proximity to numerous public transit alternatives.

On-site management will keep a supply of transit information (schedules, maps, and fare information) to be made available to the residents and patrons of the site. The Proponent will work with the City to develop a TDM program appropriate to the Project and consistent with its level of impact.

The Proponent is prepared to take advantage of good transit access in marketing the site to future residents by working with them to implement the following demand management measures to encourage the use of non-vehicular modes of travel.

The TDM measures for the Project may include but are not limited to the following:

- **Orientation Packets**: The Proponent will provide orientation packets to new residents and tenants containing information on available transportation choices, including transit routes/schedules and nearby Zipcar locations. On-site management will work with residents and tenants as they move in to help facilitate transportation for new arrivals.

- **Bicycle Accommodation**: The Proponent will provide bicycle storage in secure, sheltered areas for residents. Secure bicycle storage will also be made available to employees to encourage bicycling as an alternative mode of transportation. Subject to necessary approvals, public use bicycle racks for visitors will be placed near building entrances.

- **Transportation Coordinator**: The Proponent will designate a transportation coordinator to oversee transportation issues, including parking, service and loading, and deliveries and will work with residents as they move in to raise awareness of public transportation, bicycling, and walking opportunities.

- **Project Web Site**: The web site will include transportation-related information for residents, workers, and visitors.

2.6 Evaluation of Short-term Construction Impacts

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 a Construction Management Plan (CMP) to be filed with BTD in accordance with the City's transportation maintenance plan requirements. The CMP will also address the need for pedestrian detours, lane closures, and/or parking restrictions, if necessary to accommodate a safe and secure work zone.

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

- Construction workers will be encouraged to use public transportation and/or carpool;
- A subsidy for MBTA passes will be considered for full-time employees; and
- Secure spaces will be provided on-site for workers' supplies and tools so they do not have to be brought to the site each day.

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

Chapter 3.0

Environmental Review 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) to assess the effect of the proposed Project on local conditions in pedestrian areas around the study 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) conditions were tested by placing specially designed wind sensors at 99 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 under the Build Condition are largely similar to the No Build Condition, and are generally suitable for the intended uses.

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

The study involved wind simulations on a 1:400 scale model of the proposed building and surroundings. These simulations were then 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. Information concerning the site and surroundings was derived from site photographs; information on surrounding buildings and terrain; and site plans and elevations of the proposed Project

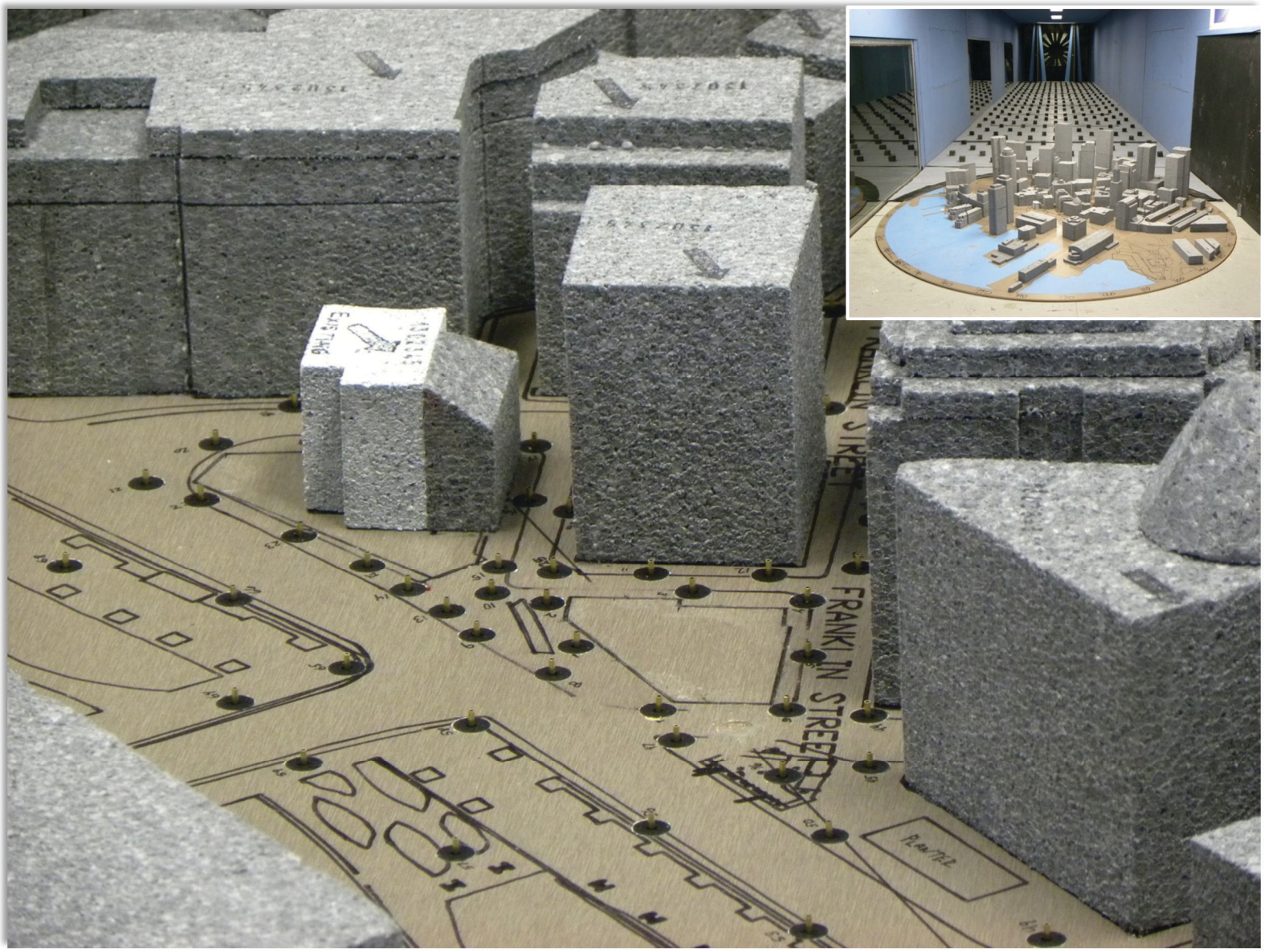
provided by the Proponent and the architect Finegold Alexander + Associates. The criteria recommended by the BRA were used in this study. The following section includes a discussion of the methods and the results of the wind tunnel simulations. The following configurations were simulated:

- No Build Configuration: existing site, in the presence of existing and approved surroundings; and
- Build Configuration: 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 proposed Project and all 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 99 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 99 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 1973 to 2011 at Boston's 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.

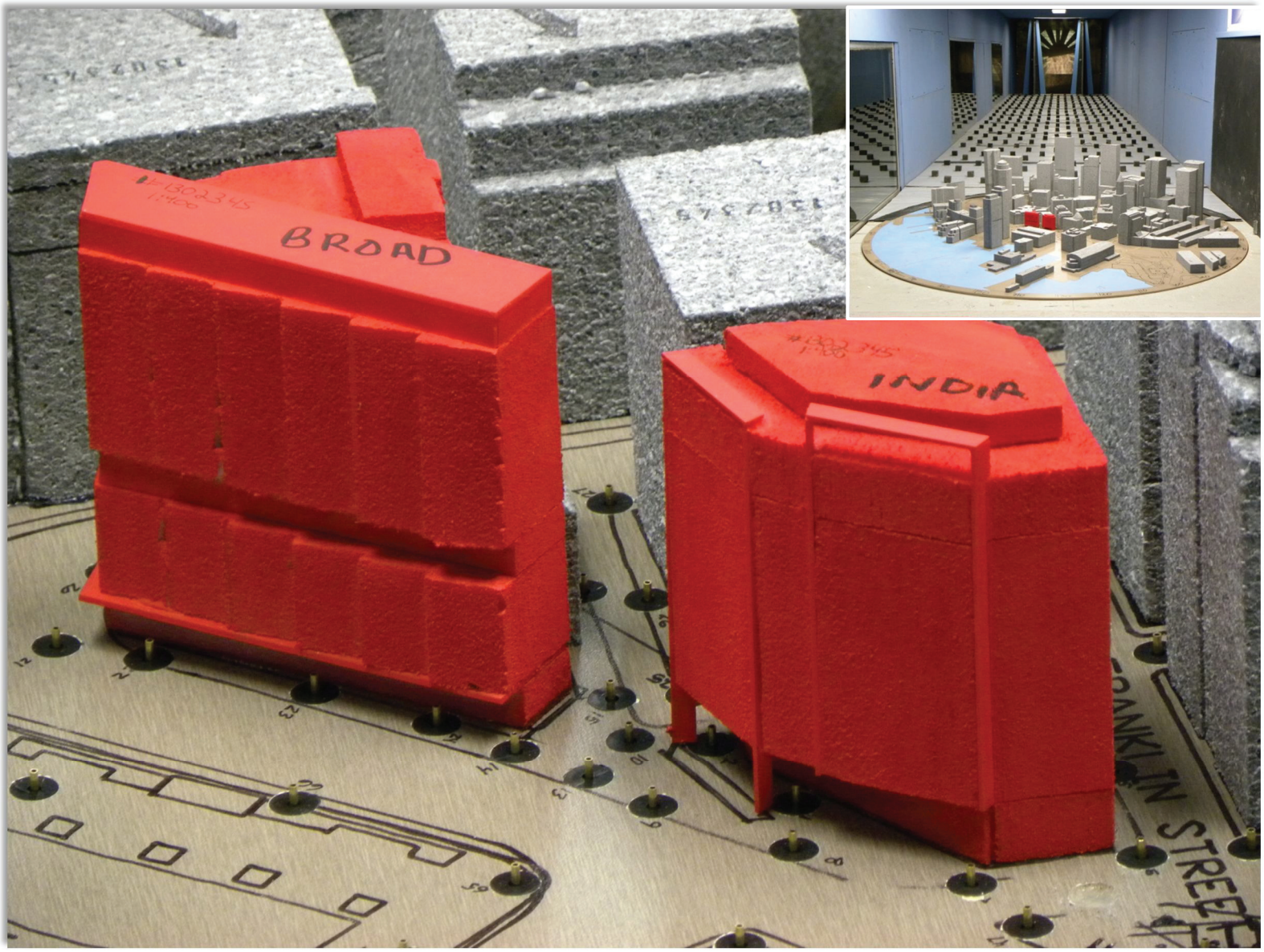
Figures 3.1-3 through 3.1-5 present "wind roses", summarizing the annual and seasonal wind climates in the Boston area, based on the data from Logan Airport. The left side wind rose in Figure 3.1-3, for example, summarizes the spring (March, April, and May) wind data. In general, the prevailing winds at this time of year are from the west-northwest, northwest, west, south-southwest and southwest. In addition to these directions, strong winds are also prevalent from the northeast direction as indicated by the red and yellow color bands on the wind rose.

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



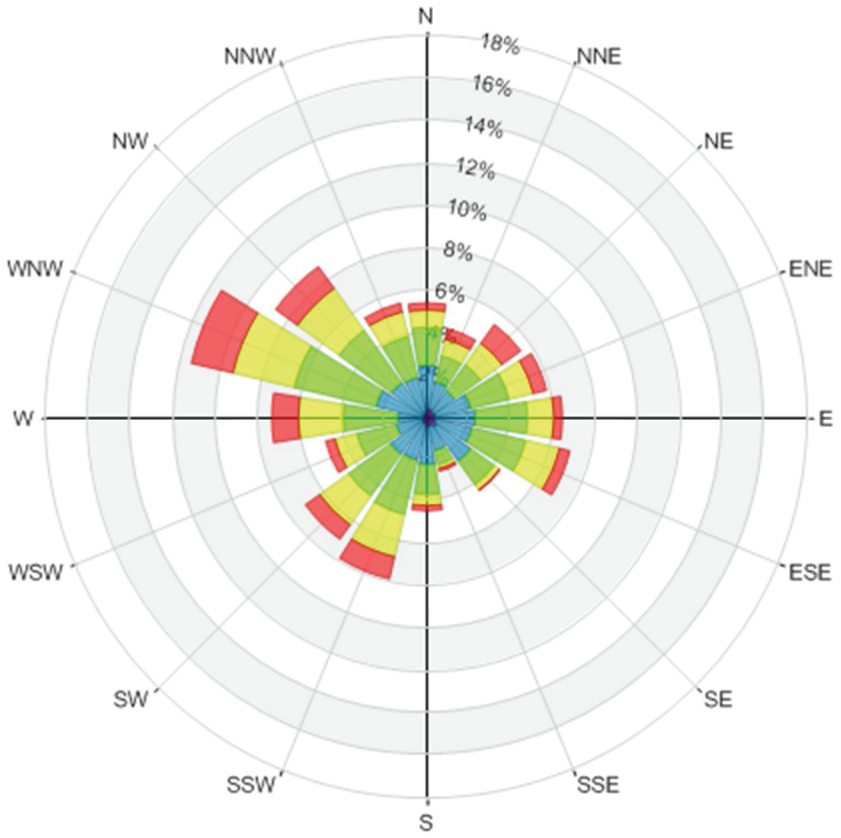
110 Broad Street Boston, Massachusetts

Figure 3.1-1
Wind Tunnel Study - No Build Configuration

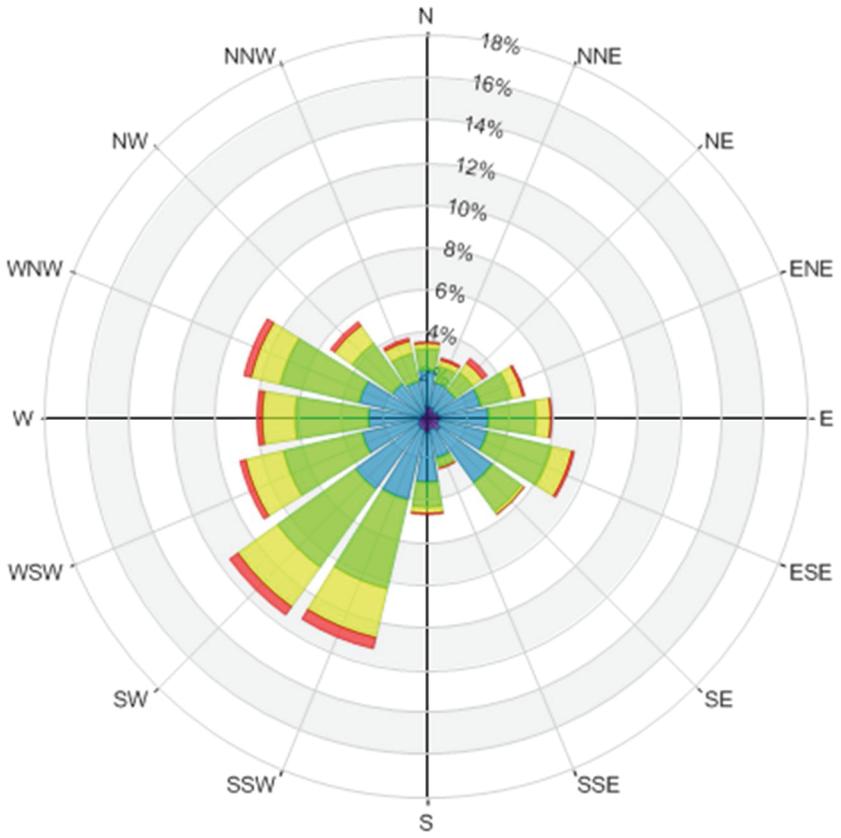


110 Broad Street Boston, Massachusetts

Figure 3.1-2
Wind Tunnel Study - Build Configuration

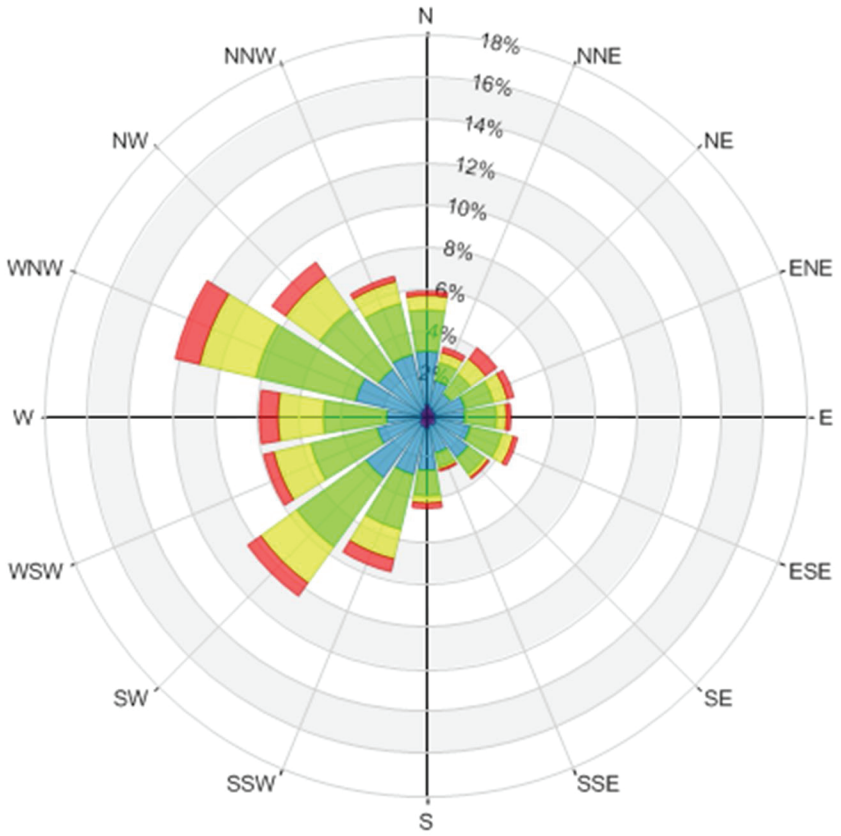


Spring
(March - May)

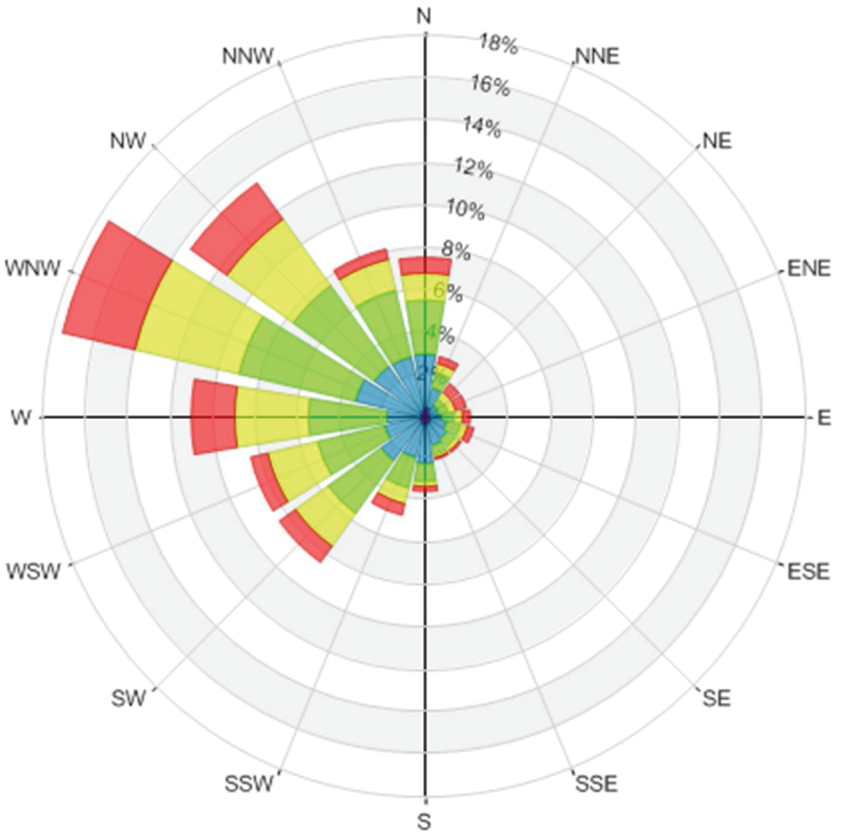


Summer
(June - August)

Wind Speed (mph)	Probability (%) Spring	Summer
Calm	1.4	1.5
1-5	5.7	8.0
6-10	26.8	36.1
11-15	33.5	36.4
16-20	21.4	15.0
>20	11.3	2.9



Fall
(September - November)



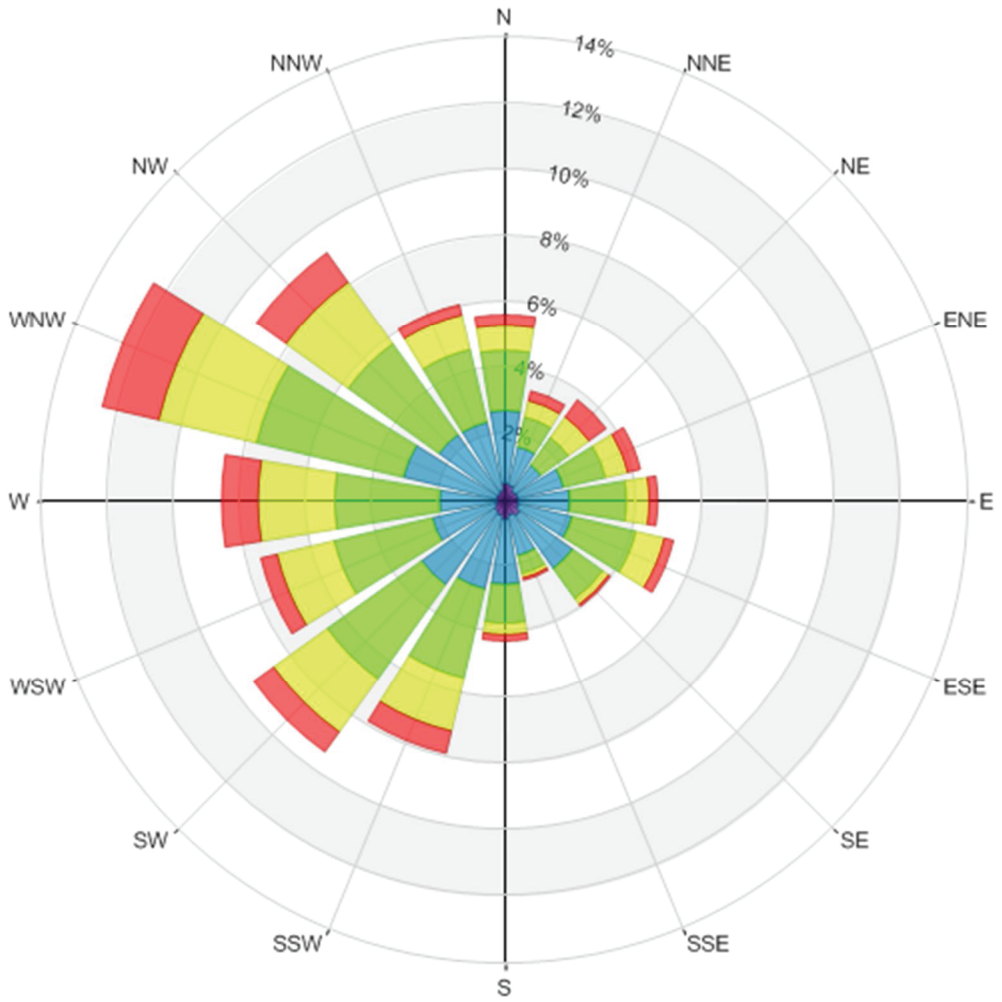
Winter
(December - February)

Wind Speed (mph)	Probability (%) Fall	Winter
Calm	1.6	1.2
1-5	6.9	5.2
6-10	32.0	25.1
11-15	34.7	32.1
16-20	17.7	22.6
>20	7.2	13.7

110 Broad Street Boston, Massachusetts

Figure 3.1-4

Directional Distribution (%) of Winds (Blowing From) Boston Logan International Airport (1973-2011)



Annual Winds

Wind Speed (mph)	Probability (%)
Calm	1.4
1-5	6.4
6-10	30.0
11-15	34.2
16-20	19.2
>20	8.8

Figure 3.1-5

Directional Distribution (%) of Winds (Blowing From) Boston Logan International Airport (1973-2011)

This study involved state-of-the-art measurement and analysis techniques to predict wind conditions at the study site. However, some uncertainty remains in predicting wind comfort. For example, the sensation of comfort among individuals can be quite variable. Variations in age, individual health, clothing, and other human factors can change a particular response of an individual. The comfort limits used in this report represent an average for the total population. Also, unforeseen changes in the Project area, such as the construction or removal of buildings, can affect the conditions experienced at the site. Finally, the prediction of wind speeds is necessarily a statistical procedure. The wind speeds reported are for the frequency of occurrence stated (one percent of the time). Higher wind speeds will occur but on a less frequent basis.

3.1.2 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 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*

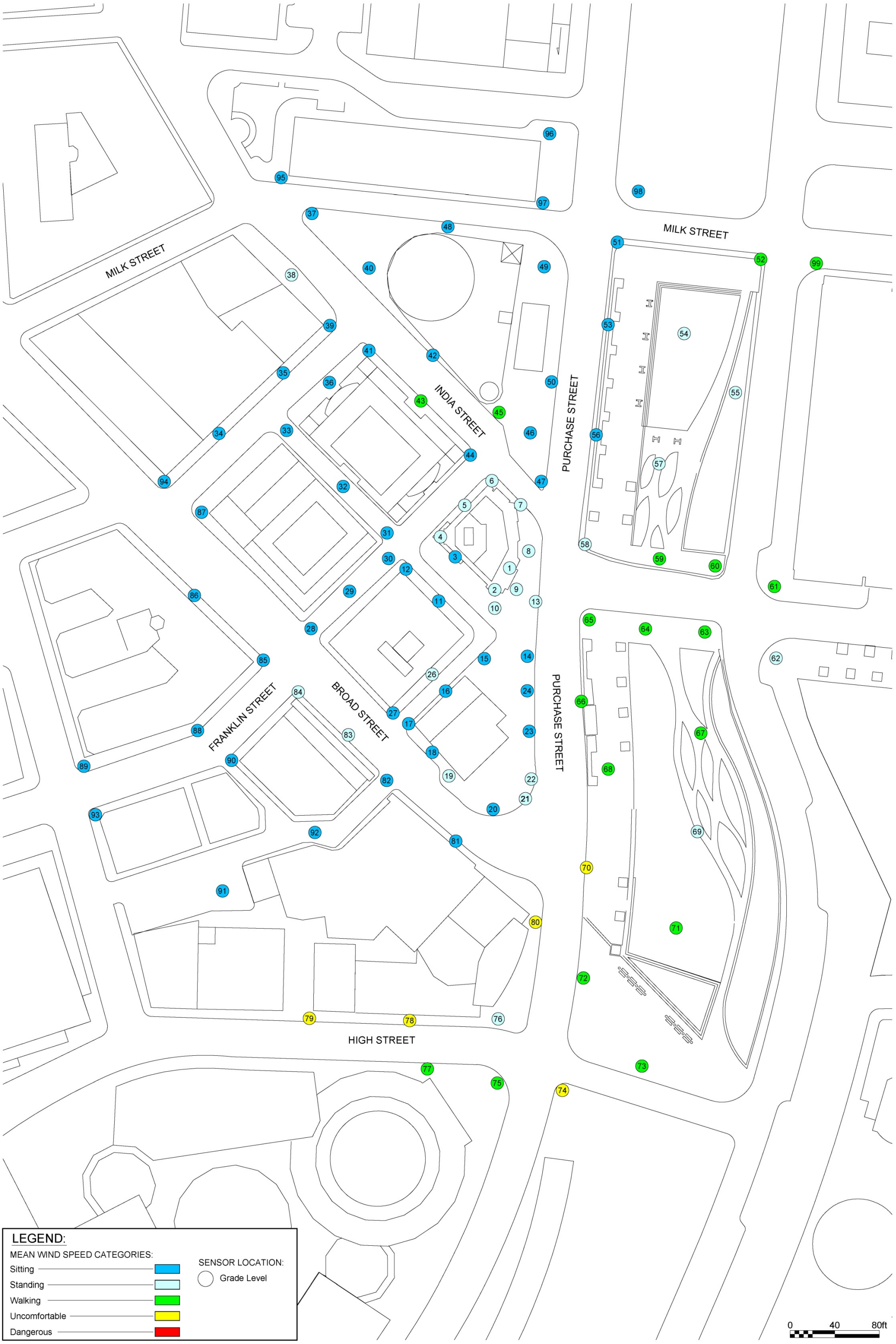
Level of Comfort	Wind Speed
Dangerous	> 27 mph
Uncomfortable for Walking	>19 and <27 mph
Comfortable for Walking	>15 and <19 mph
Comfortable for Standing	>12 and <15 mph
Comfortable for Sitting	<12 mph

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

3.1.3 Test Results

Appendix D presents the mean and effective gust wind speeds for each season as well as annually. Figures 3.1-6 and 3.1-7 graphically depict the mean wind speed conditions at each wind measurement location based on the annual winds. Figures 3.1-8 and 3.1-9 depict the effective gust wind speed conditions. Typically, the summer and fall winds tend

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

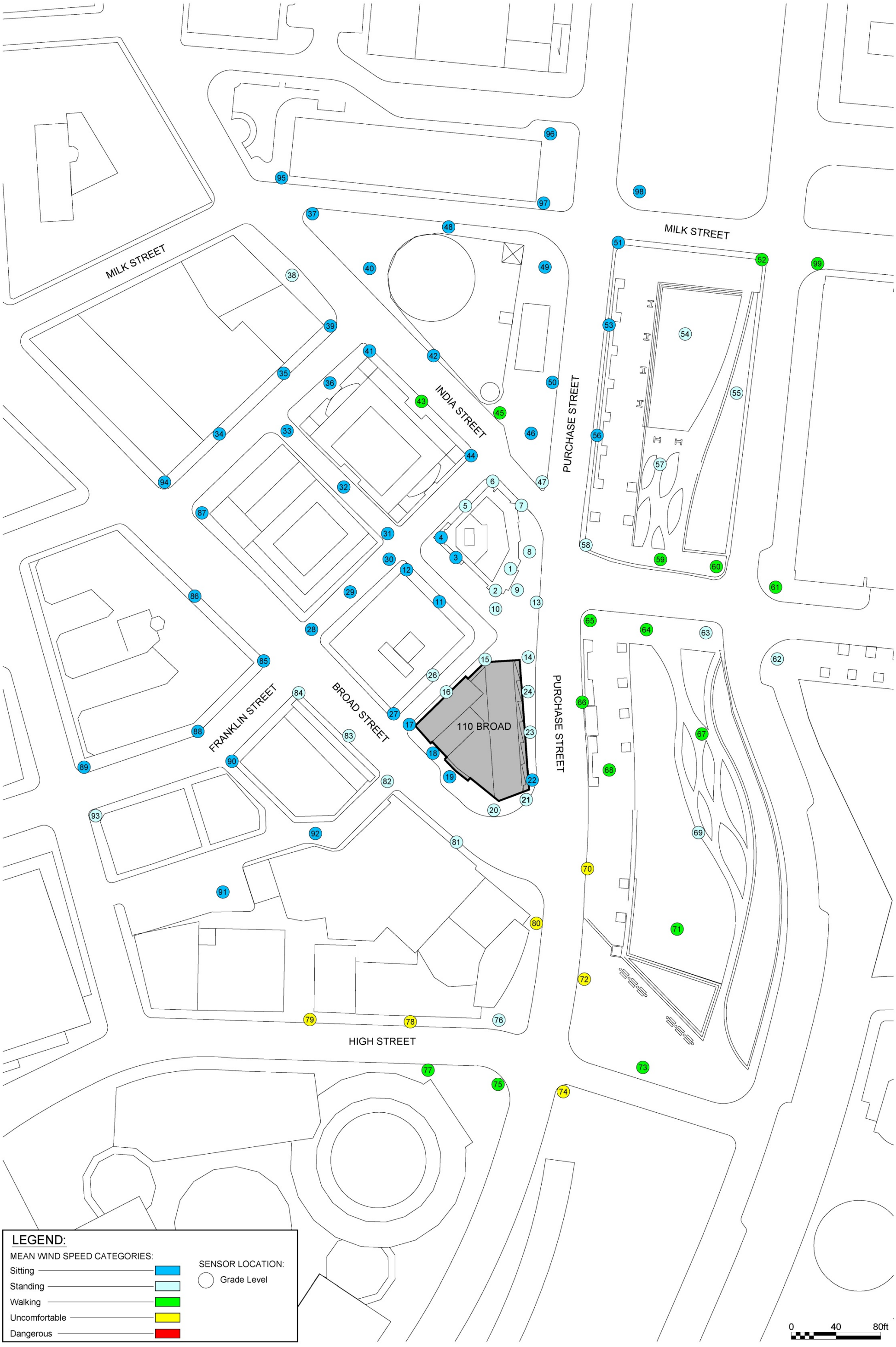


110 Broad Street Boston, Massachusetts

Figure 3.1-6

Pedestrian Wind Conditions – Mean Speed – No Build

Annual (January to December, 0:00 to 23:00)



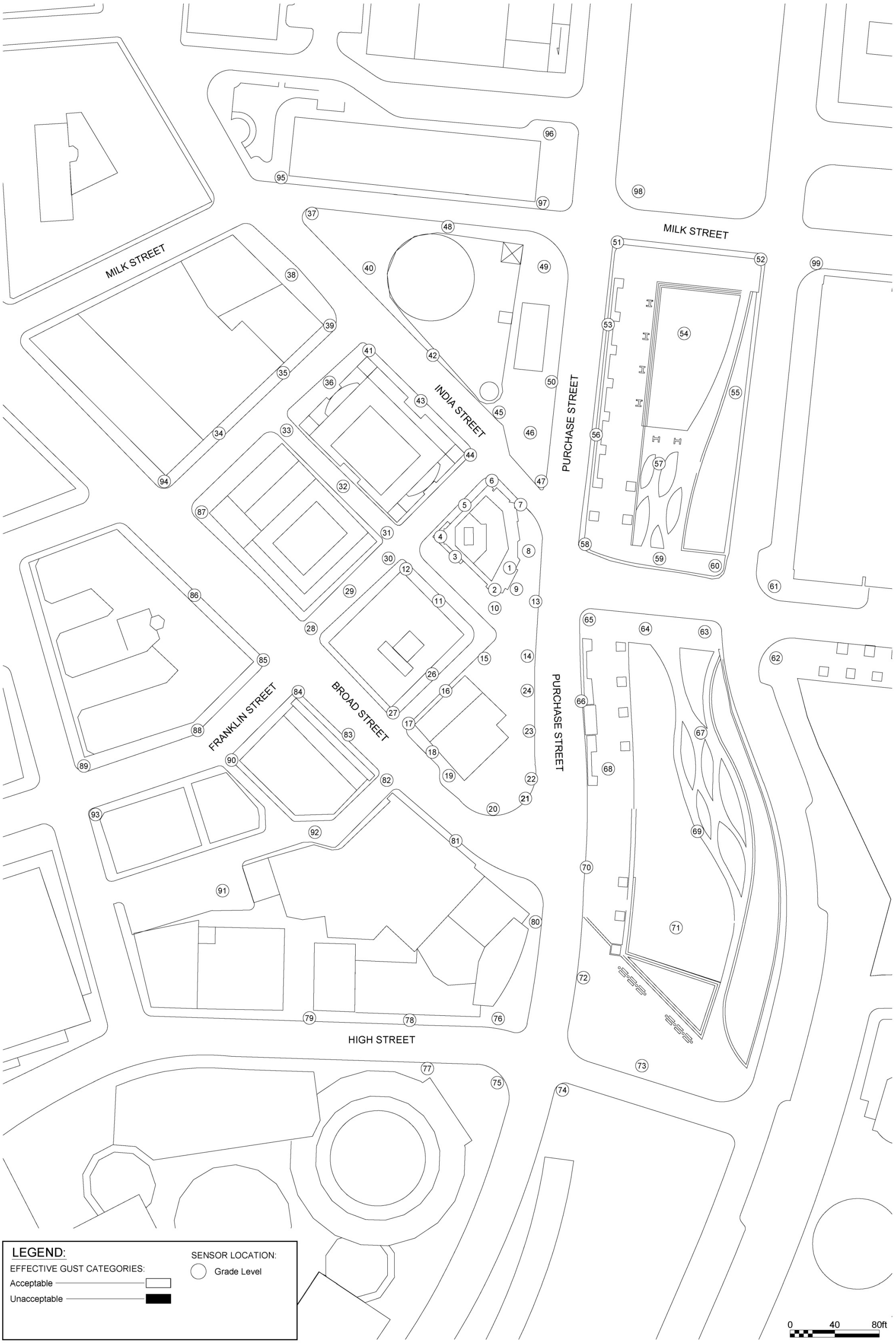
110 Broad Street Boston, Massachusetts

RWDI

Figure 3.1-7

Pedestrian Wind Conditions – Mean Speed – Build

Annual (January to December, 0:00 to 23:00)

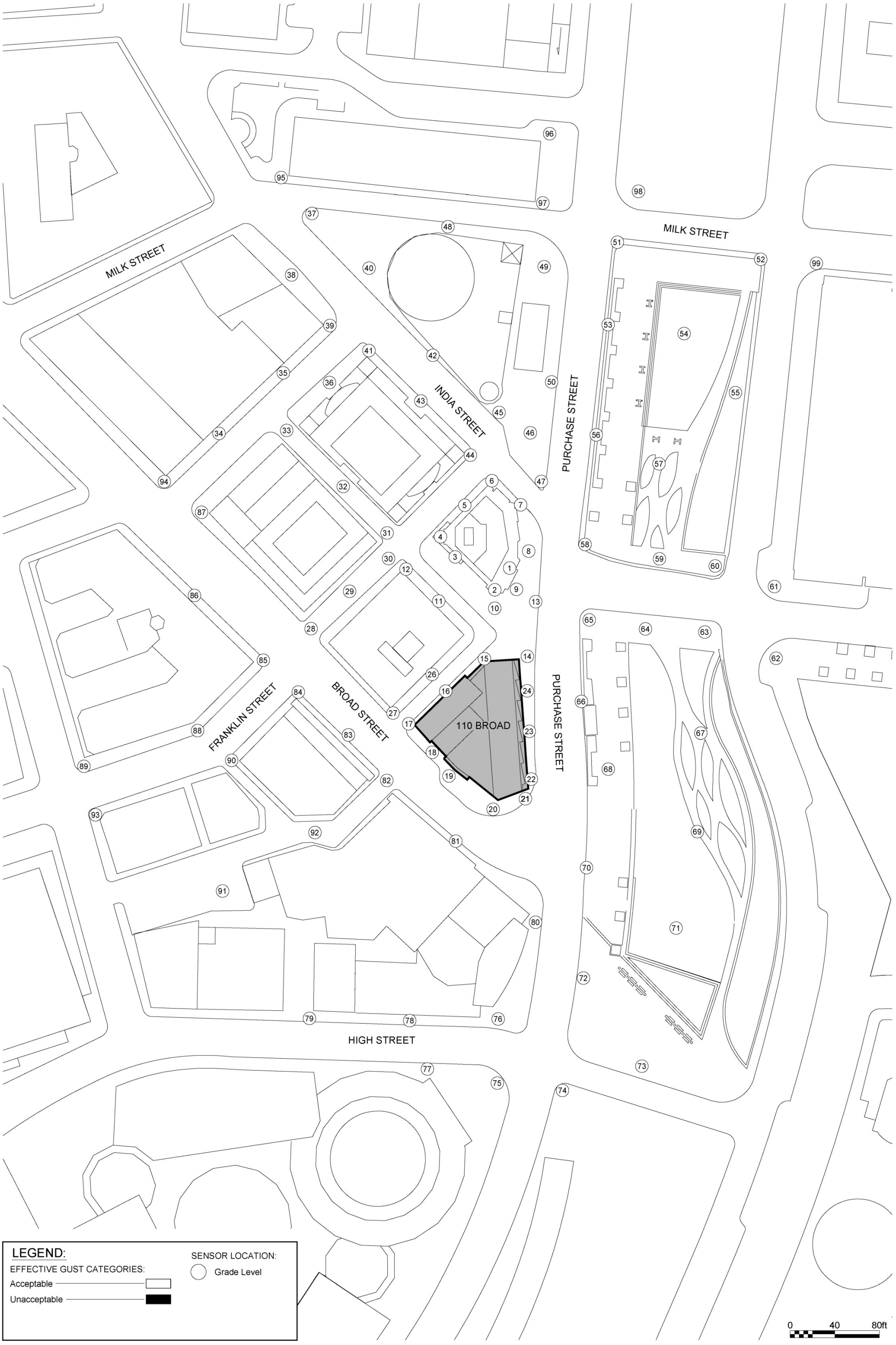


110 Broad Street Boston, Massachusetts

Figure 3.1-8

Pedestrian Wind Conditions – Effective Gust Speed – No Build

Annual (January to December, 0:00 to 23:00)



110 Broad Street Boston, Massachusetts

Figure 3.1-9

Pedestrian Wind Conditions – Effective Gust Speed – Build

Annual (January to December, 0:00 to 23:00)

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.

3.1.3.1 No Build Configuration

On-Site Building Entrances and Sidewalks

As shown in Figure 3.1-6, under the No Build configuration, all locations are predicted to be suitable for sitting or standing annually. In addition, the effective gust criterion was met seasonally and annually at all locations (See Appendix D and Figure 3.1-8).

Off-Site Walkways

For the majority of test locations, wind conditions are predicted to be suitable for walking or better on an annual basis. Uncomfortable wind conditions were predicted on an annual basis at five locations to the south of the Project site, near the intersection of Purchase Street and Broad Street, and along High Street (Locations 70, 74, 78, 79 and 80 on Figure 3.1-6).

The effective gust criterion was met annually at all locations (Figure 3.1-8).

3.1.3.2 Build Configuration

On-Site Building Entrances and Sidewalks

Under the Build configuration, all on-site locations are predicted to have conditions suitable for sitting or standing on an annual basis (Figure 3.1-7). Additionally, the effective gust criterion was met annually at all locations (Figure 3.1-9).

Off-Site Walkways

Under the Build configuration, wind conditions at the off-site walkways are predicted to remain suitable for walking or better in most locations. Six locations in the areas of the intersection of Purchase and Broad Street and High Street were uncomfortable on an annual basis (Figure 3.1-7). Only one of the six locations changed as a result of the Project. The effective gust criterion was met annually at all locations (Figure 3.1-9).

3.1.3.3 Conclusion

The wind analysis shows that the overall wind conditions expected in the surrounding area under the Build Condition are largely similar to the No Build Condition, and are generally suitable for the intended uses.

The Build configuration is predicted to result in only one additional location with uncomfortable annual wind conditions. Additionally, under the Build configuration the effective gust criterion was met annually at all locations.

The wind results presented pertain to the model of the proposed Project shown in Figure 3-2. RWDI reviewed the revised design drawings on November 3, 3014, and in their opinion, the changes will not have a significant impact on these results.

3.2 Shadow

3.2.1 Introduction and Methodology

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

The Code requires that the Project be "arranged and designed in a way to minimize, to the extent reasonably practicable, shadows on [the Greenway]" and notes that projects will be "judged according to several factors, including the extent of the shadow as compared to what would be created by as-of-right build-out" among other factors. The Project is as-of-right with respect to building height and bulk on the Project site. Therefore, the Project has no shadow impacts above those allowed by an as-of-right project. The following analysis demonstrates how the Project affects existing conditions, including the existing conditions on the Greenway. The shadow analysis presents the existing shadow and new shadow that would be created by the proposed Project, illustrating the incremental impact of the Project. The analysis focuses on nearby open spaces, sidewalks and bus stops adjacent to and in the vicinity of the Project site. Shadows have been determined using the applicable Altitude and Azimuth data for Boston. Figures showing the net new shadow from the Project are provided in Figures 3.2-1 to 3.2-14 at the end of this section.

The results of the analysis show that new shadow from the Project is generally limited to nearby streets and sidewalks. Of the 14 time periods studied, no new shadow is cast onto any bus stops in the vicinity of the Project and no new shadow will be cast onto any open space during ten of the time periods studied. New shadow will be cast onto the Greenway

during four of the time periods studied (March 21 at 3:00 p.m., June 21 at 3:00 p.m., June 21 at 6:00 p.m., and September 21 at 3:00 p.m.). No new shadow is cast onto other open spaces in the vicinity of the Project.

3.2.2 Vernal Equinox (March 21)

At 9:00 a.m. during the vernal equinox, no new shadow will be cast onto nearby bus stops or open spaces. New shadow from the Project will be cast to the northwest onto a small portion of Wharf Street and its sidewalks, Well Street and its sidewalks, and a small portion of Franklin Street and its sidewalks.

At 12:00 p.m., no new shadow will be cast onto nearby bus stops or open spaces. New shadow will be cast to the north onto a small portion of Well Street, and onto Surface Artery and its southern sidewalk.

At 3:00 p.m., no new shadow will be cast onto nearby bus stops. New shadow will be cast to the northeast onto Surface Artery and onto a portion of the Greenway. No new shadow will be cast onto other open spaces.

3.2.3 Summer Solstice (June 21)

At 9:00 a.m., no new shadow will be cast onto nearby bus stops or open spaces. During the summer solstice, new shadow from the Project will be cast to the northwest onto Wharf Street and its sidewalks, and onto a small portion of Broad Street and its northern sidewalk.

At 12:00 p.m., no new shadow will be cast onto nearby bus stops or open spaces. New shadow will be cast to the north onto a small portion of Well Street and its southern sidewalk, and onto a portion of Surface Artery and its western sidewalk.

At 3:00 p.m., no new shadow will be cast onto nearby bus stops. New shadow will be cast to the east onto Surface Artery and its sidewalks, and onto a portion of the Greenway. No new shadow will be cast onto other open spaces.

At 6:00 p.m., no new shadow will be cast onto nearby bus stops. New shadow will be cast to the southeast onto Atlantic Avenue and its sidewalks and onto a portion of the Greenway. No new shadow will be cast onto other open spaces.

3.2.4 Autumnal Equinox (September 21)

At 9:00 a.m., no new shadow will be cast onto nearby bus stops or open spaces. During the autumnal equinox, new shadow from the Project will be cast to the northwest onto a small portion of Wharf Street, Well Street and Franklin Street and their sidewalks

At 12:00 p.m., no new shadow will be cast onto nearby bus stops or open spaces. New shadow from the Project will be cast to the north onto Surface Artery and its sidewalks.

At 3:00 p.m., no new shadow will be cast onto nearby bus stops. New shadow will be cast to the northeast onto a portion of Surface Artery and onto a portion of the Greenway. No new shadow will be cast onto other open spaces.

At 6:00 p.m., most of the area is under existing shadow. No new shadows will be cast onto nearby streets, sidewalks, open spaces or bus stops.

3.2.5 Winter Solstice (December 21)

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

At 9:00 a.m., most of the area is under existing shadow. No new shadows will be cast onto nearby streets, sidewalks, open spaces or bus stops.

At 12:00 p.m., no new shadows will be cast onto nearby streets, sidewalks, open spaces or bus stops.

At 3:00 p.m., most of the area is under existing shadow. No new shadows will be cast onto nearby streets, sidewalks, open spaces or bus stops.

3.2.6 Conclusions

The results of the shadow analysis show that new shadow from the Project is generally limited to nearby streets and sidewalks. Of the 14 time periods studied, no new shadow is cast onto any bus stops in the vicinity of the Project and no new shadow will be cast onto any open space during ten of the time periods studied. New shadow will be cast onto the Greenway during four of the time periods studied (March 21 at 3:00 p.m., June 21 at 3:00 p.m., June 21 at 6:00 p.m., and September 21 at 3:00 p.m.). No new shadow is cast onto other open spaces in the vicinity of the Project.

110 Broad Street Boston, Massachusetts

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Figure 3.2-1

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

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Figure 3.2-2

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

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Figure 3.2-3

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

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Figure 3.2-4

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

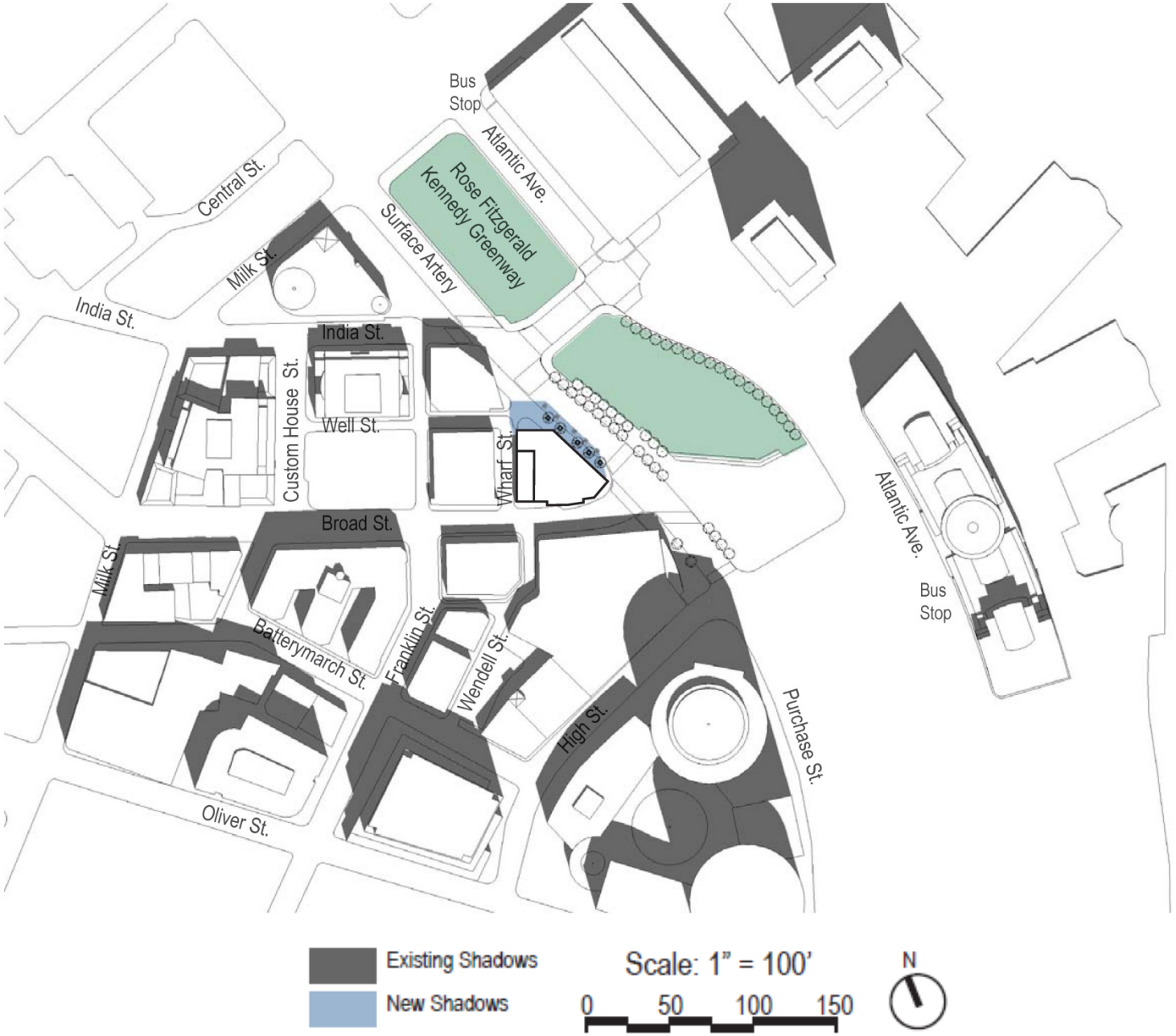

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Figure 3.2-5

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

110 Broad Street Boston, Massachusetts

Figure 3.2-6

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

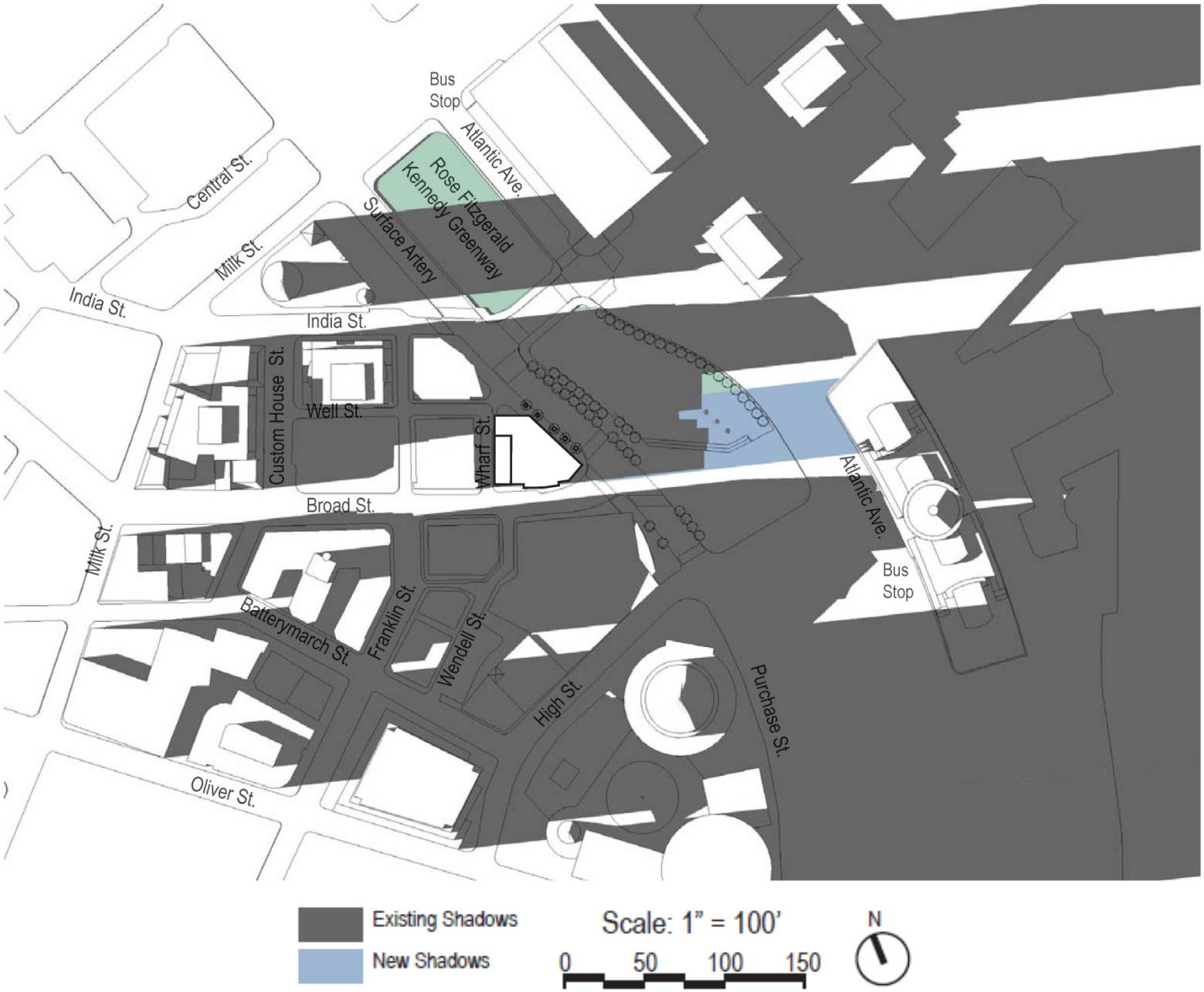

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Figure 3.2-7

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

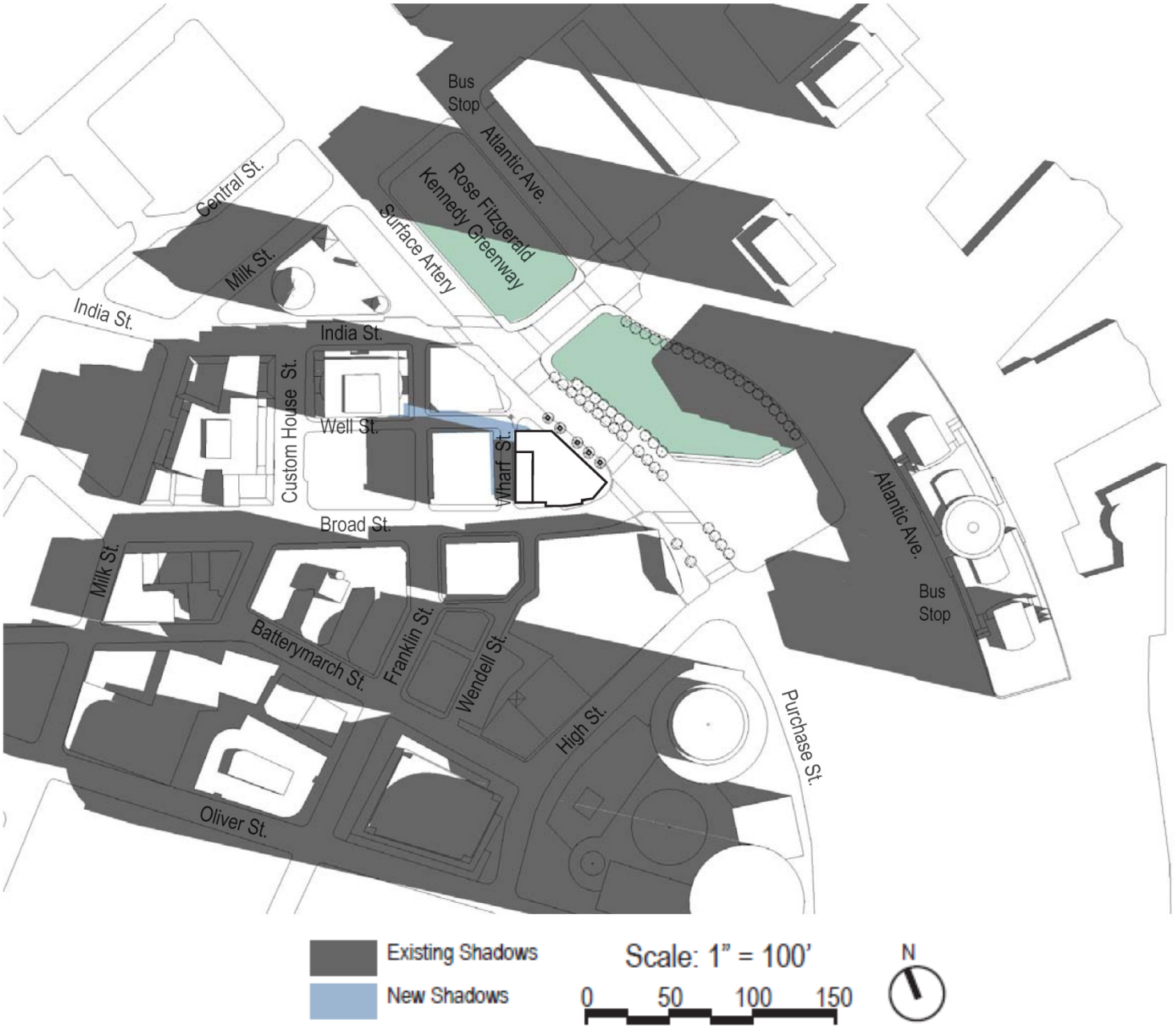

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Figure 3.2-8

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

110 Broad Street Boston, Massachusetts

Figure 3.2-9

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

110 Broad Street Boston, Massachusetts

Figure 3.2-10

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

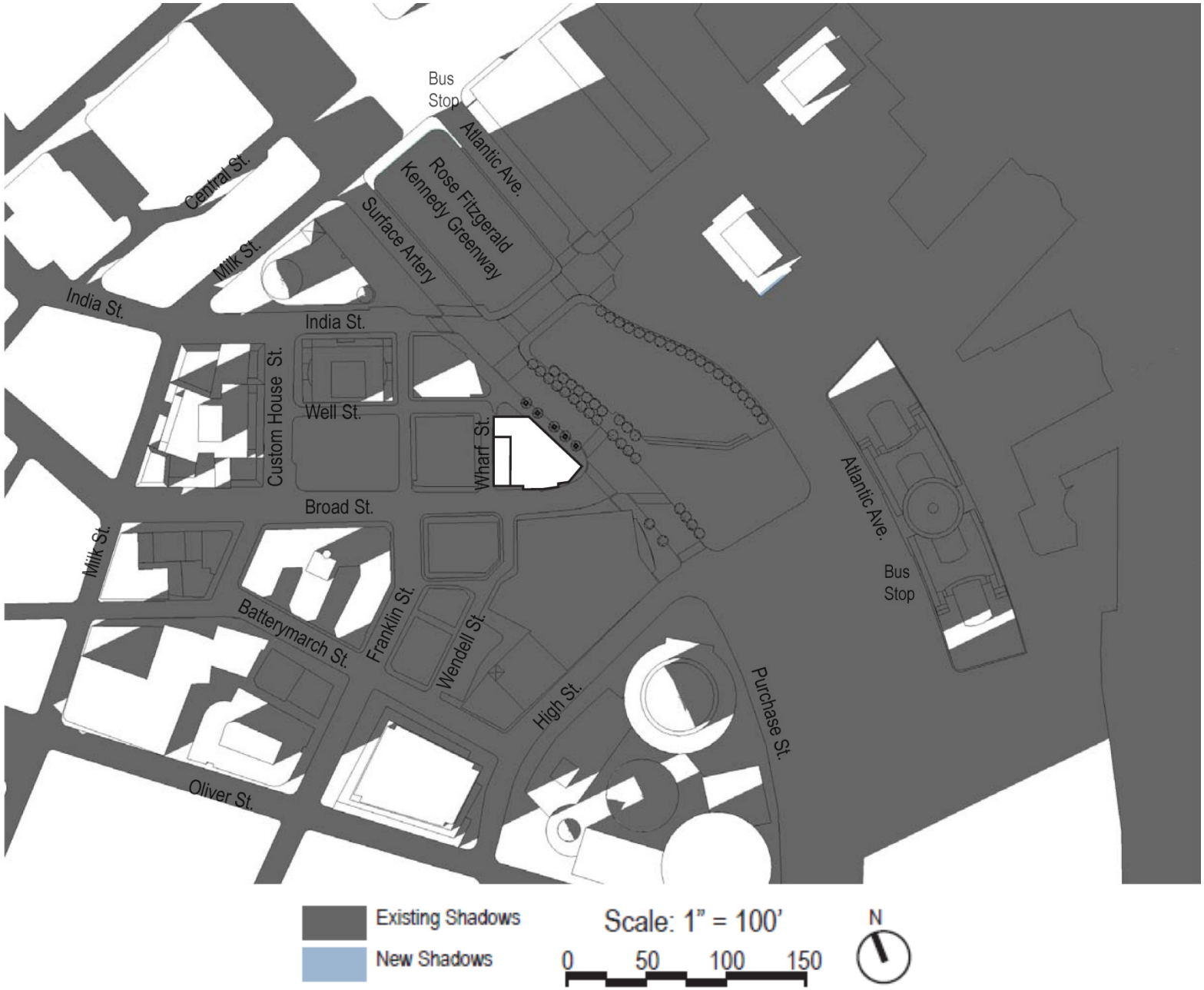

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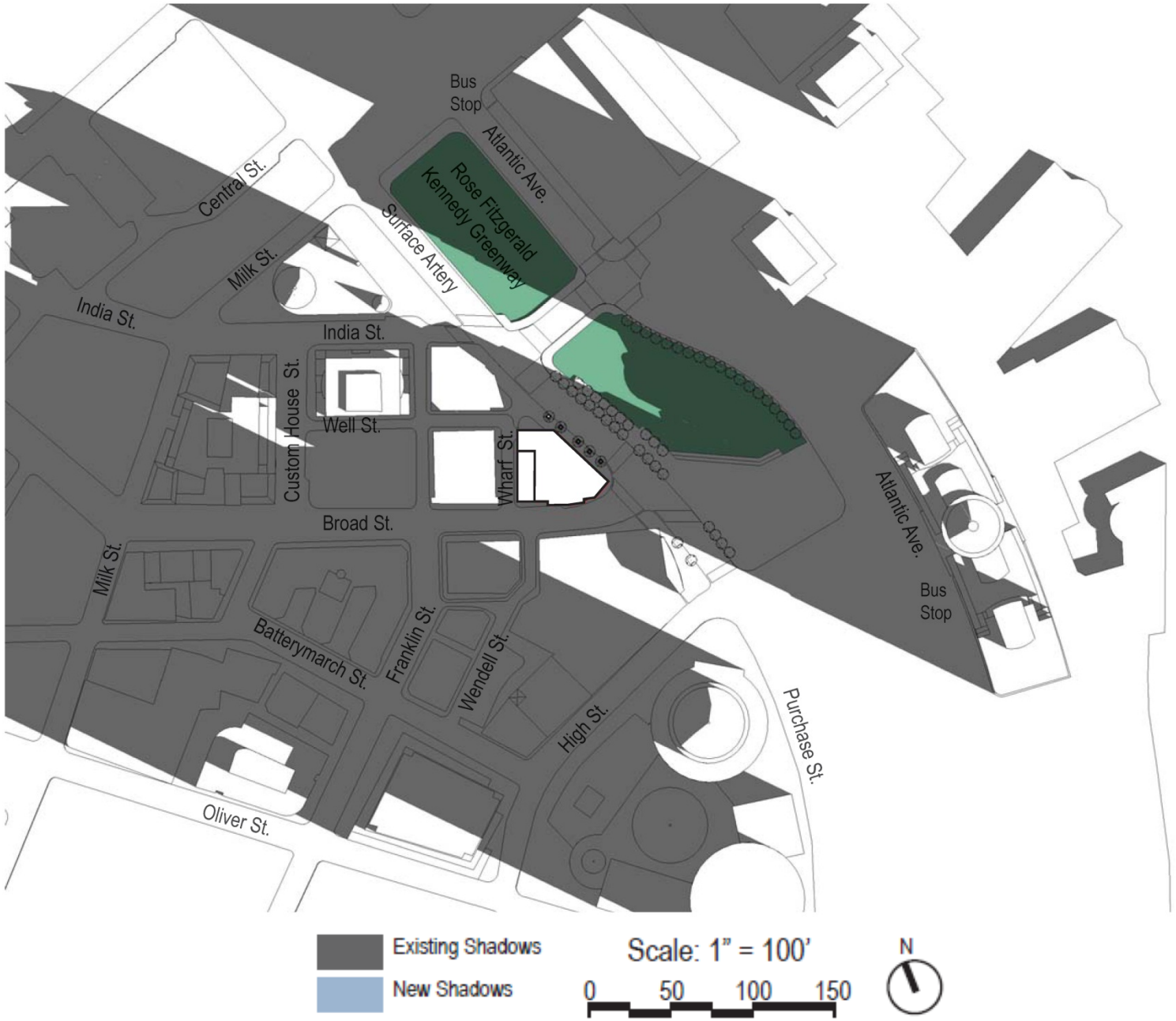
Figure 3.2-11

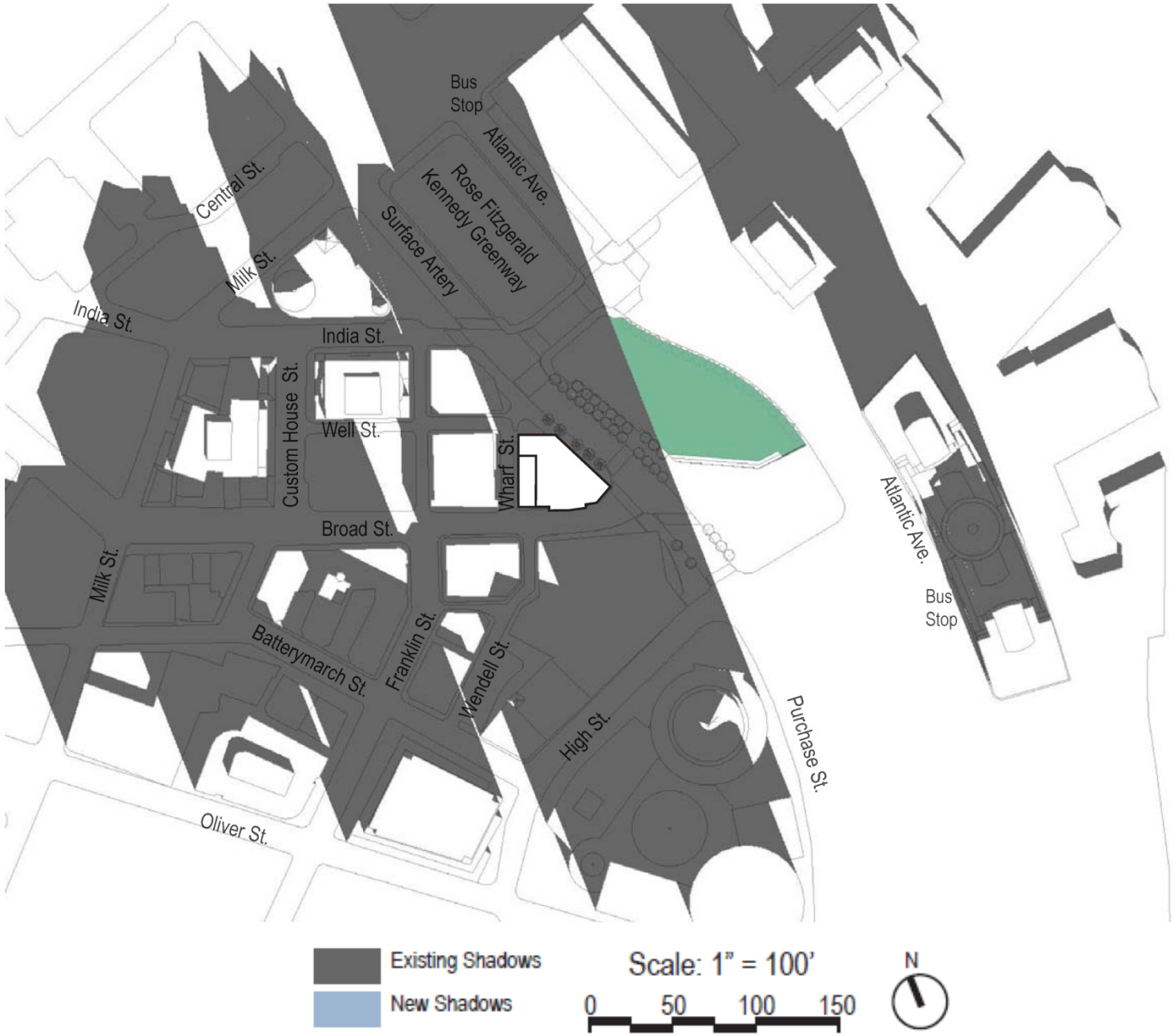
Shadow Study: September 21, 6:00 p.m.



110 Broad Street Boston, Massachusetts

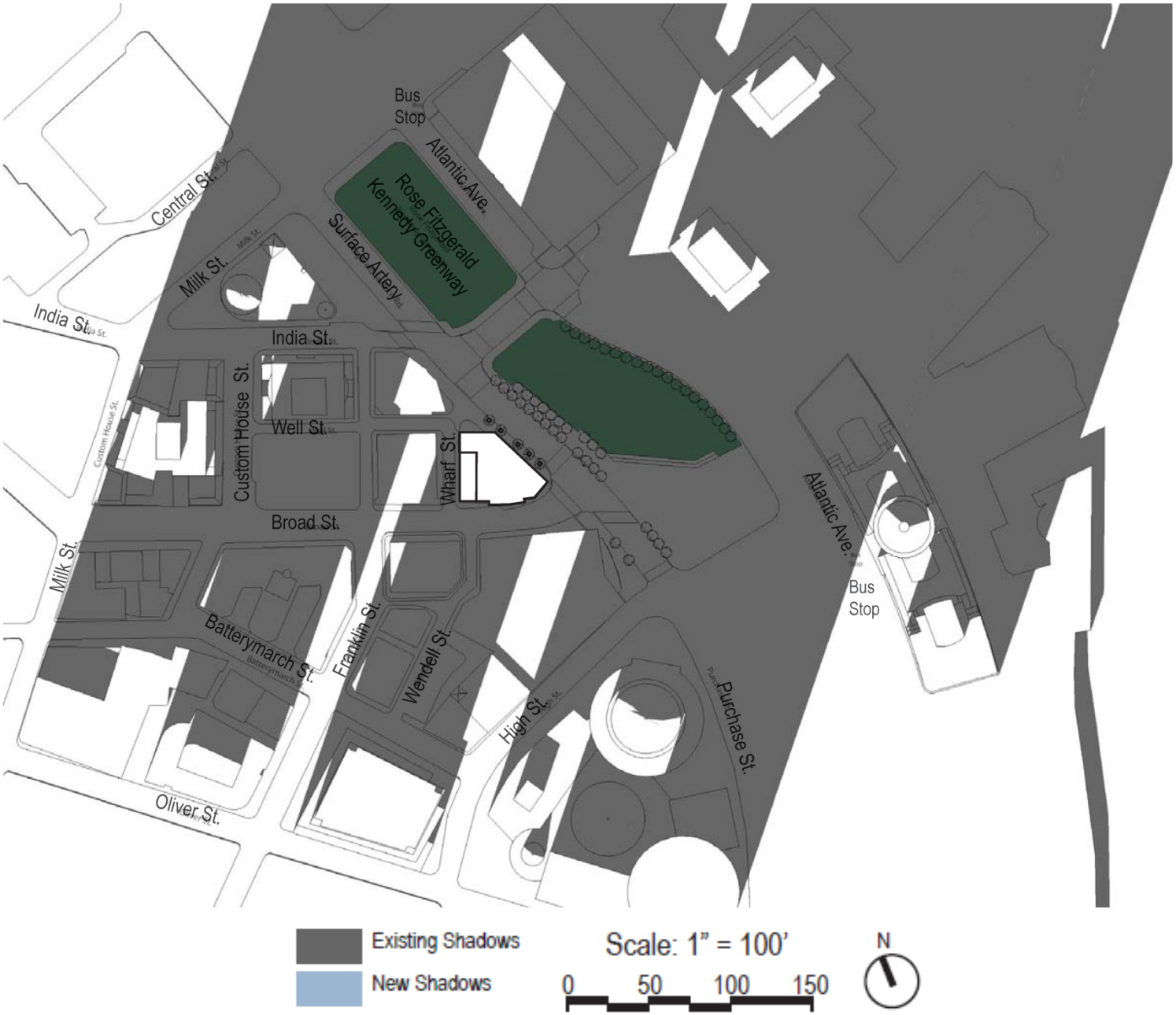
Figure 3.2-12

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



110 Broad Street Boston, Massachusetts

Figure 3.2-13
Shadow Study: December 21, 12:00 p.m.



110 Broad Street Boston, Massachusetts

Figure 3.2-14

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

3.3 Daylight Analysis

3.3.1 Introduction

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

Because the Project site currently consists of a low-rise building and is not built to the property line, the proposed Project will increase daylight obstruction; however, the resulting conditions will be typical of the area and other 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 proposed building. The façade of the building facing the viewpoint, including heights, setbacks, corners and other features, is plotted onto a base map using lateral and elevation angles. The two-dimensional base map generated by BRADA represents a figure of the building in the "sky dome" from the viewpoint chosen. The BRADA program calculates the percentage of daylight that will be obstructed on a scale of 0 to 100 percent based on the width of the view, the distance between the viewpoint and the building, and the massing and setbacks incorporated into the design of the building; the lower the number, the lower the percentage of obstruction of daylight from any given viewpoint.

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

Two viewpoints were chosen to evaluate the daylight obstruction for the Existing and Proposed Conditions: one from Surface Artery, and one from Broad Street. Two area context points were considered in order to provide a basis of comparison to existing conditions in the surrounding area. The viewpoint and area context viewpoints were taken in the following locations and are shown on Figure 3.3-1.

- **Viewpoint 1:** View from Surface Artery facing southwest toward the Project site

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

Data Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division - Data Obtained March 2014

110 Broad Street Boston, Massachusetts

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Figure 3.3-1
Viewpoint Location Map

- **Viewpoint 2:** View from Broad Street facing northeast toward the Project site
- **Area Context Viewpoint AC1:** View from Broad Street facing northeast toward the building at 88 Broad Street
- **Area Context Viewpoint AC2:** View from India Street facing southwest toward the building at 43 India Street

3.3.3 Results

The results for each viewpoint are described in Table 3.3-1. Figures 3.3-2 through 3.3-4 illustrate the BRADA results for each analysis.

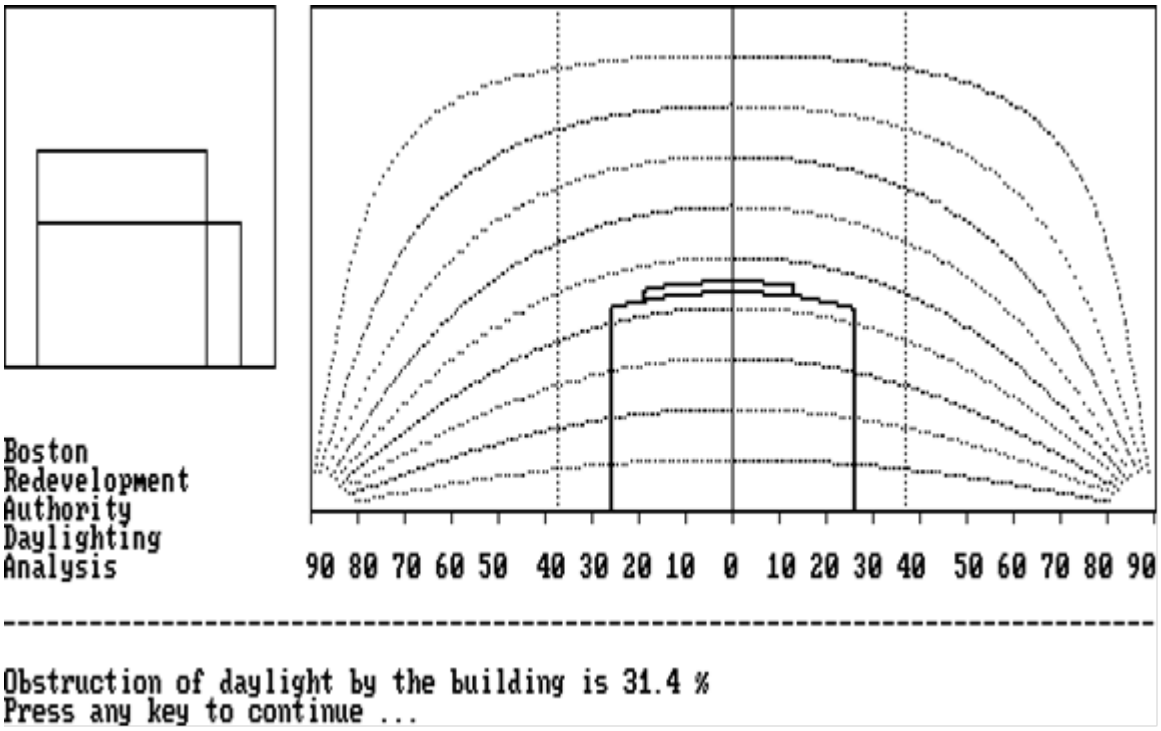
Table 3.3-1 Daylight Analysis Results

Viewpoint Locations		Existing Conditions	Proposed Conditions
Viewpoint 1	View from Surface Artery facing southwest toward the Project site	31.4%	80.3%
Viewpoint 2	View from Broad Street facing northeast toward the Project site	69.4%	81.6%
Area Context Points			
AC1	View from Broad Street facing northeast toward the building at 88 Broad Street	89.2%	N/A
AC2	View from India Street facing southwest toward the building at 43 India Street	88.7%	N/A

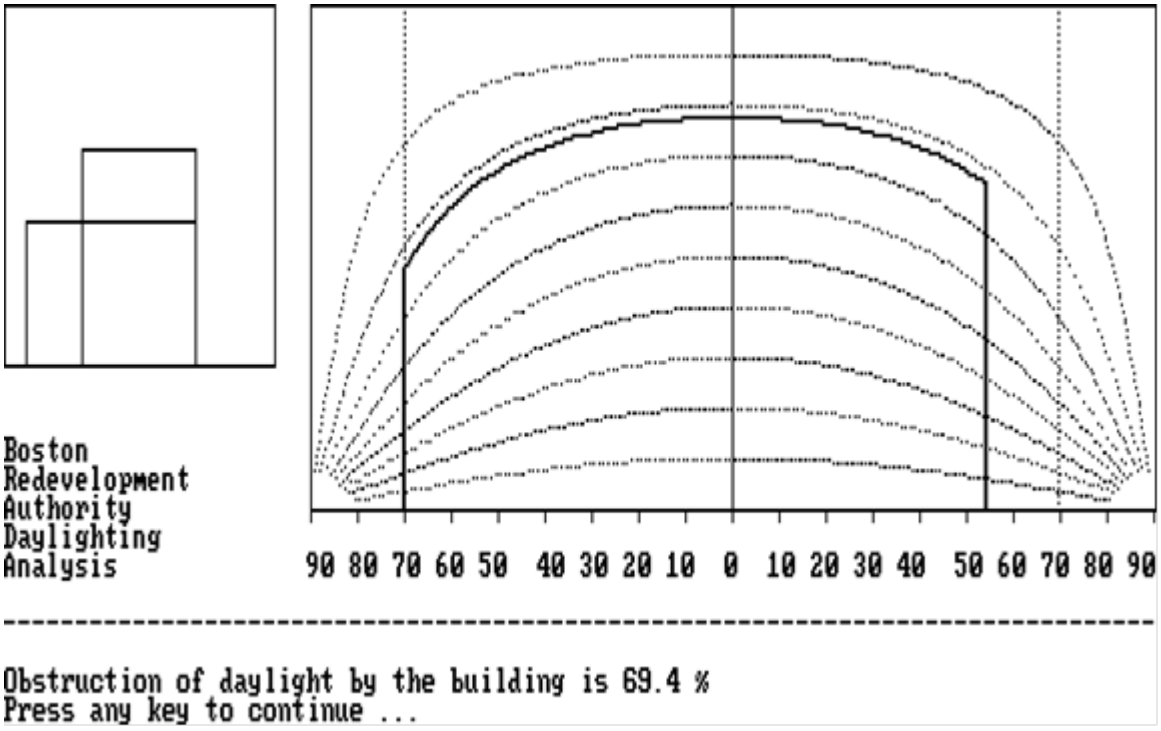
John F Fitzgerald Surface Road – Viewpoint 1

Surface Artery runs along the northeastern edge of the Project site. Viewpoint 1 was taken from the center of Surface Artery looking directly southwest toward the Project site. From this viewpoint, the existing building only occupies a portion of the site and has an existing daylight obstruction value of 31.4%. The development of the Project will result in a daylight obstruction value of 80.3%. While this is an increase over existing conditions, the daylight obstruction value is consistent with other buildings in the area, including the Area Context buildings.

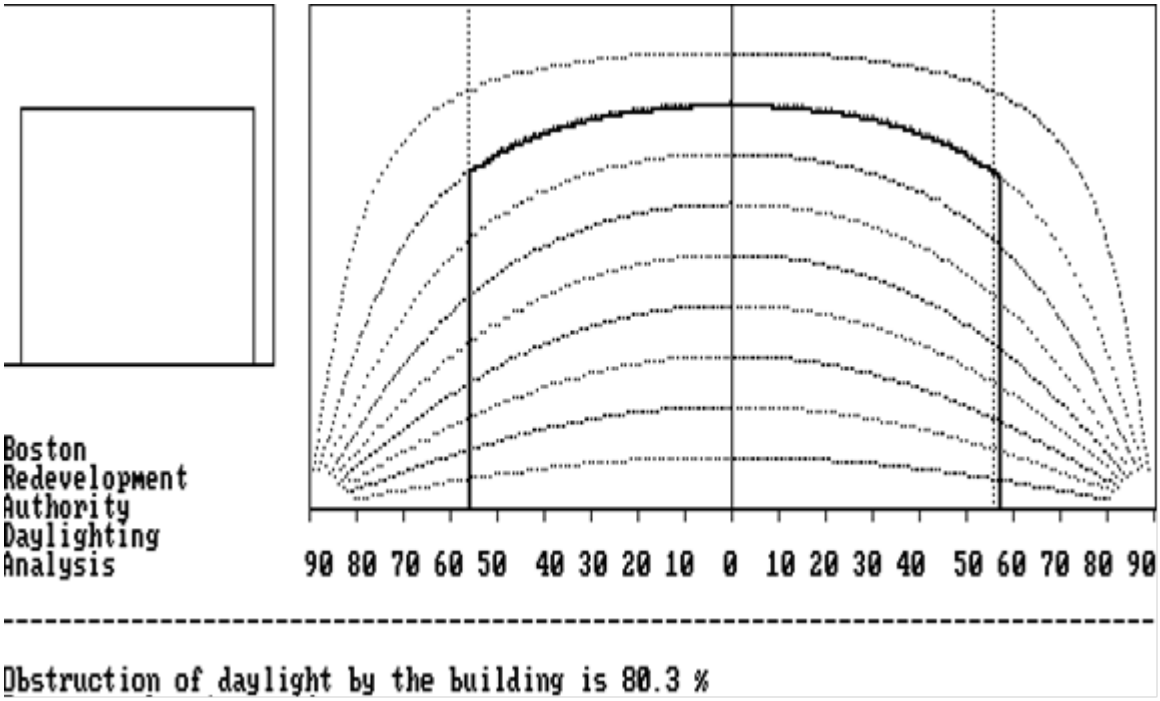
Viewpoint 1: View from John F Fitzgerald Surface Artery facing southwest toward the Project site



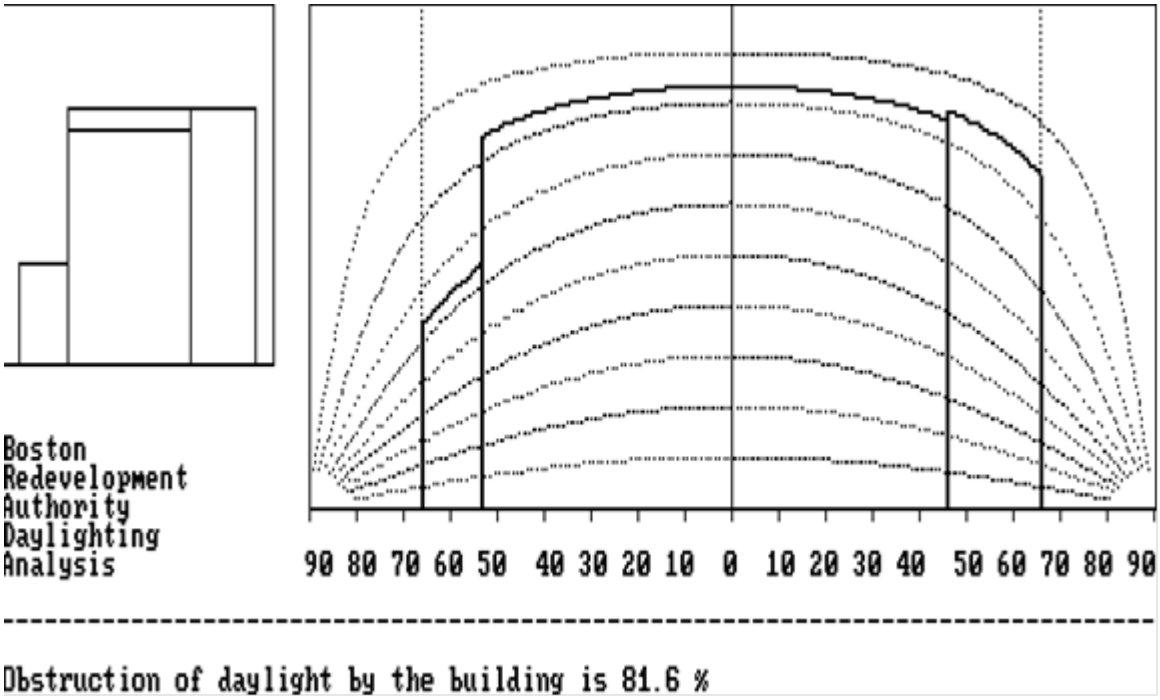
Viewpoint 2: View from Broad Street facing northeast toward the Project site



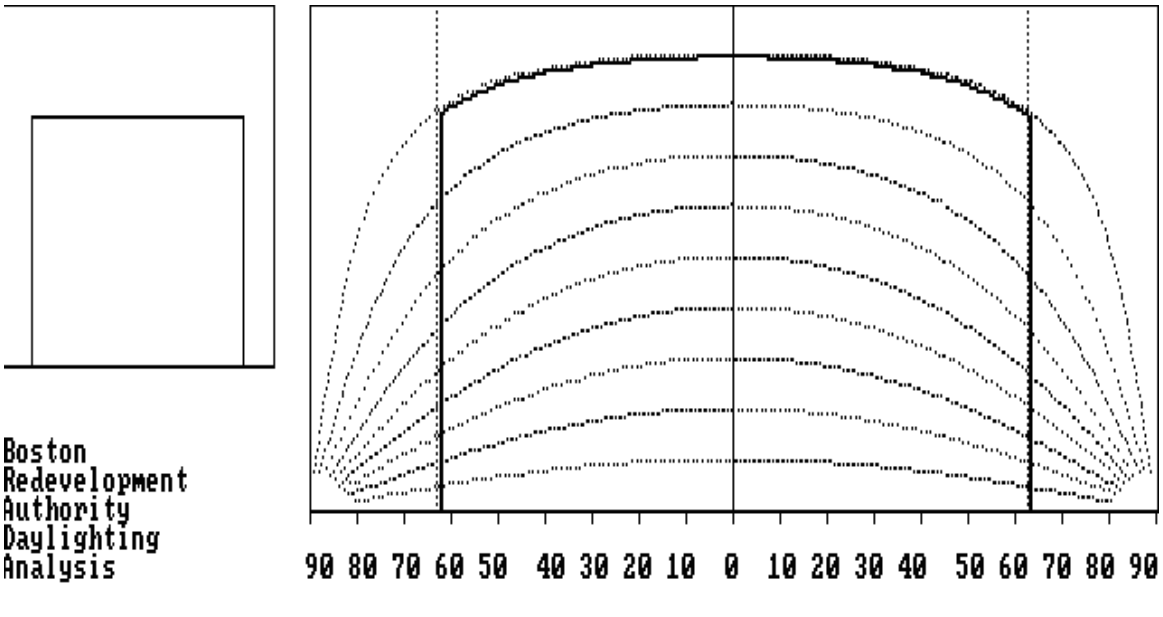
Viewpoint 1: View from John F Fitzgerald Surface Artery facing southwest toward the Project site



Viewpoint 2: View from Broad Street facing northeast toward the Project site

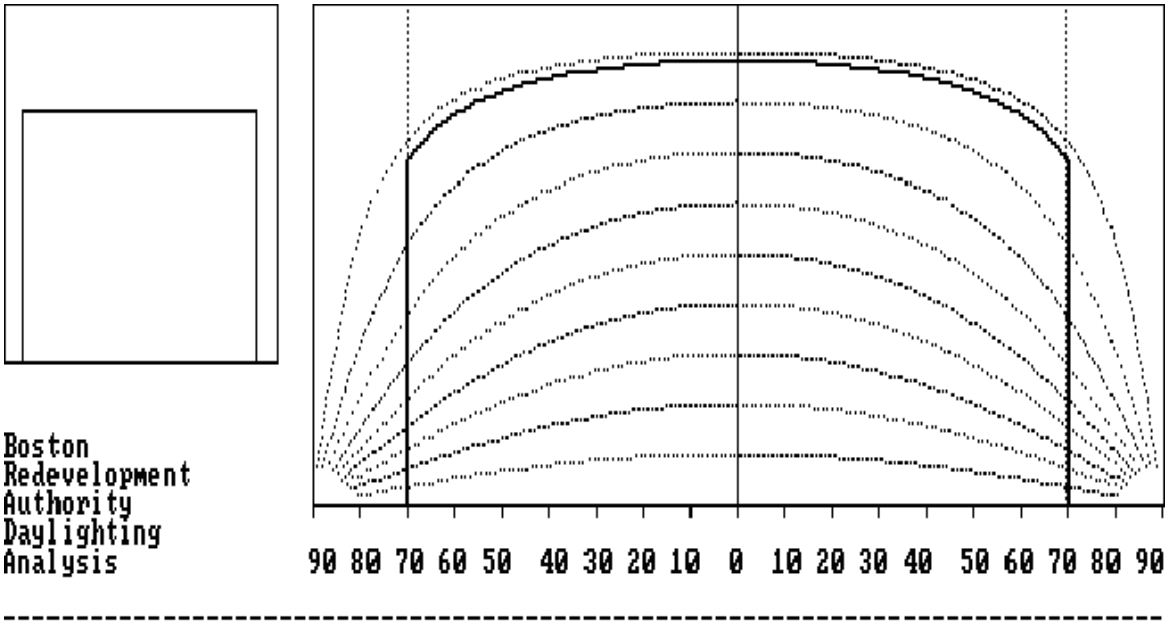


AC 1: View from Broad Street facing northeast toward the building at 88 Broad Street



Obstruction of daylight by the building is 89.2 %

AC 2: View from India Street facing southwest toward the building at 43 India Street



Obstruction of daylight by the building is 88.7 %

Broad Street – Viewpoint 2

Broad Street runs along the southwestern edge of the Project site. Viewpoint 2 was taken from the center of Broad Street facing northeast toward the Project site. The site has an existing daylight obstruction value of 69.4%. The development of the Project will result in a daylight obstruction value of 81.6%%. While this is an increase over existing conditions, the daylight obstruction value is consistent with other buildings in the area, including the Area Context buildings, and is typical of dense urban areas.

Area Context Views

The Project area currently consists of mostly mid-rise buildings with a mix of uses. To provide a larger context for comparison of daylight conditions, obstruction values were calculated for the two Area Context Viewpoints described above and shown on Figure 3.3-1. The daylight obstruction values ranged from 88.7% for AC2 to 89.2% for AC1. Daylight obstruction values for the Project are consistent with the Area Context values.

3.3.4 Conclusions

The daylight analysis conducted for the Project describes existing and proposed daylight obstruction conditions at the Project site and in the surrounding area. The results of the BRADA analysis indicate that while the development of the Project will result in increased daylight obstruction relative to existing conditions, the resulting conditions will be similar to the daylight obstruction values within the surrounding area and typical of densely built urban areas. The increased daylight obstruction value is mainly due to the location of the Project along the street edge, which is the preferred urban design of this area and a requirement of the applicable zoning.

3.4 Solar Glare

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

3.5 Air Quality Analysis

The BRA requires that project-induced impacts to ambient air quality be addressed. A microscale analysis is used to determine the effect on air quality of the increase in traffic generated by the Project. This microscale analysis may be required for a 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 (ADT) on roadways providing access to a single location.

The proposed Project does not generate 3,000 ADT, nor does it increase traffic volumes by 10 percent or 100 vehicles per hour. As discussed in Chapter 2, all intersections studied will continue to operate at the same LOS as under the No Build conditions during both the a.m. and p.m. peak hours. Therefore, no quantitative analysis is required. Given the generally well-operating intersections, and the small increases in volume at the worst intersections, it is expected that there would be no violations of the NAAQS for CO at any intersections associated with Project-related traffic.

It is expected that the majority of the Project's stationary sources (boilers, engines, etc) will be subject to the MassDEP's Environmental Results Program (ERP). The ERP applies to new emergency generators greater than 37 kW. New engines are generally subject to emission standards, recordkeeping, certification, and compliance with the MassDEP noise policy. Because the generator maximum rating capacity will be greater than the ERP limit of 37 kW, it will be subject to the ERP. Per the ERP, a generator owner generally must limit operation of the generator to less than 300 hours per year and submit a certification form to MassDEP within 60 days of installation.

3.6 Solid and Hazardous Waste

3.6.1 Hazardous Waste

Prior to construction, assessments will be performed of both the Project site and the existing buildings to determine whether any contaminated soils, groundwater, asbestos, lead paint, or other hazardous materials are present. 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 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) will be performed under the provisions of MGL c21 /2C, OSHA, and the Massachusetts Contingency Plan (MCP) by specialty contractors experienced and licensed in handling materials of this nature. The soils transported off site will be disposed of in accordance with the MCP and other regulatory requirements. Disposal of materials will be tracked via Material Shipping Records, Bills of Lading and/or other methods, as required to ensure their proper and legal disposal.

3.6.2 Operation Solid and Hazardous Waste Generation

The Project will generate solid waste typical of residential and commercial/café uses. Solid waste is expected to include wastepaper, cardboard, glass bottles and food. Recyclable materials will be recycled through a program implemented by building management. The Project is anticipated to generate approximately 99 tons of solid waste per year.

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

3.6.3 Recycling

The Project's dedicated recyclables storage and collection program will facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills. The Project's recycling program will be fully developed in accordance with LEED standards as described in Chapter 4. The Project will include either a single trash/recycle chute with a 'bi-sorter' or two separate chutes; one each for trash and recycling, leading to the trash room on the ground level. The trash will have a compactor and the recycling will be single stream, which collects more types of recycled materials and results in more recycling because there is no need to separate different types of materials.

3.7 Noise Impacts

3.7.1 Introduction

A noise analysis was conducted for the Project, including an estimate of future sound levels once the Project is in operation. The analysis was conducted in accordance with the BRA's typical guidance to address potential impacts solely from the Project.

Baseline noise levels were measured in the vicinity of the Project. Future Project related sound levels were calculated based on reference sound data for likely mechanical equipment identified by the Proponent for the Project. These predicted noise levels were compared to the City of Boston Zoning District Noise Standards (City Noise Standards). The analysis indicates that predicted noise levels from Project-related mechanical equipment with appropriate noise mitigation will comply with the City Noise Standards.

3.7.2 Noise Terminology

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

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

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

The sound-level meter used to measure noise is a standardized instrument.[3] It contains "weighting networks" to adjust the frequency response of the instrument to approximate that of the human ear under various circumstances. One network is the A-weighting network (there are also B- and C-weighting networks). The A-weighted scale (dBA) most closely approximates how the human ear responds to sound at various frequencies. Sounds are frequently reported as detected with the A-weighting network of the sound-level meter. A-weighted sound levels emphasize the middle frequency (i.e., middle pitched—around 1,000 Hertz sounds), and de-emphasize lower and higher frequency sounds.

Because the sounds in our environment vary with time, they cannot simply be described with a single number. Two methods are used for describing variable sounds, exceedance levels and the equivalent level, both of which are derived from a large number of moment-to-moment, A-weighted sound-level measurements. Exceedance levels are values from the cumulative amplitude distribution of all of the sound levels observed during a measurement period. Exceedance levels are designated L_n, where n can have a value of 0 to 100 percent. Several sound-level metrics that are commonly reported in community noise studies are described below.

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

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

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

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

- L_{eq}, the equivalent level, 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. The equivalent level is designated L_{eq} and is also A-weighted. The equivalent level represents the time average of the fluctuating sound pressure, but because sound is represented on a logarithmic scale and the averaging is done with linear mean square sound pressure values, the L_{eq} is mostly determined by occasional loud, intrusive noises.

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[3] *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.

By using various noise metrics, it is possible to separate prevailing, steady sounds (the L_{90}) from occasional, louder sounds (L_{10}) in the noise environment or combined average levels (L_{eq}). This analysis of sounds expected from the Project treats all noises as though they will be steady and continuous, and hence the L_{90} exceedance level was used. In the design of noise control treatments, it is essential to know something about the frequency spectrum of the noise of interest. Noise control treatments do not function like the human ear, so simple A-weighted levels are not useful for noise-control design. The spectra of noises are usually stated in terms of octave-band sound pressure levels, in dB, with the octave frequency bands being those established by a generally-accepted standard. To facilitate the noise-control design process, the estimates of noise levels in this analysis are also presented in terms of octave-band sound pressure levels.

3.7.3 Noise Regulations and Criteria

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

Table 3.7-1 below presents the "Zoning District Noise Standards" contained in Regulation 2.5 of the APCC "Regulations for the Control of Noise in the City of Boston," adopted December 17, 1976. These maximum allowable sound pressure levels apply at the property line of the receiving property. The "Residential Zoning District" limits apply to any lot located within a residential zoning district or to any residential use located in another zone except an Industrial Zoning District, according to Regulation 2.2. Similarly, per Regulation 2.3, business limits apply to any lot located within a business zoning district not in residential or institutional use.

Table 3.7-1 City Noise Standards, Maximum Allowable Sound Pressure Levels

Octave-band Center	Residential Zoning District		Residential Industrial Zoning District		Business Zoning District	Industrial Zoning District
Frequency (Hz)	Daytime (dB)	All Other Times (dB)	Daytime (dB)	All Other Times (dB)	Anytime (dB)	Anytime (dB)
32	76	68	79	72	79	83
63	75	67	78	71	78	82
125	69	61	73	65	73	77
250	62	52	68	57	68	73
500	56	46	62	51	62	67
1000	50	40	56	45	56	61
2000	45	33	51	39	51	57
4000	40	28	47	34	47	53
8000	38	26	44	32	44	50
A-Weighted (dBA)	**60**	**50**	**65**	**55**	**65**	**70**
Notes:	1. Noise standards from Regulation 2.5 "Zoning District Noise Standards", City of Boston Air Pollution Control Commission, "Regulations for the Control of Noise in the City of Boston", adopted December 17, 1976. 2. All standards apply at the property line of the receiving property. 3. dB and dBA based on a reference pressure of 20 micropascals. 4. Daytime refers to the period between 7:00 a.m. and 6:00 p.m. daily, except Sunday.					

3.7.4 Existing Conditions

3.7.4.1 Baseline Noise Environment

An ambient noise-level survey was conducted to characterize the "baseline" acoustical environment in the vicinity of the Project site. Existing noise sources consisted of: vehicular traffic (including buses and trucks) on the local roadways, pedestrians, occasional aircraft, birds, and the general din of the city.

3.7.4.2 Noise Measurement Locations

The selection of the sound-monitoring locations was based upon a review of the current land uses in the Project area. Four monitoring locations were selected as representative in obtaining a sampling of the ambient baseline noise environment. The measurement locations are depicted in Figure 3.7-1 and are described below.

- Location 1 is located at 65 East India Row, at the corner of East India Row and Atlantic Avenue, northeast of the Project site. This location is representative of the residential buildings (Harbors Towers) to the east of the Project. Noise sources at this location include vehicular and pedestrian traffic, birds chirping (daytime only), horns honking from a nearby roadway, vehicle unloading (daytime only), leaf rustle, and a helicopter over-flight (nighttime only).

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Figure 3.7-1

Sound Level Measurement Locations

- Location 2 is located at 89 Broad Street, at the corner of Broad Street and Franklin Street, west of the Project site. This location is representative of the noise-sensitive buildings (including the Hilton Hotel) to the west of the Project. Noise sources at this location include vehicular and pedestrian traffic, distant leaf-blower (daytime only), horns honking from the nearby roadways, helicopter over-flight (daytime only), leaf rustle, and emergency sirens (nighttime only).

- Location 3 is located at 131 Broad Street, at the corner of Broad Street and John F. Fitzgerald Surface Road, southeast of the Project site. This location is representative of the business receptors to the south of the Project. Noise sources at this location include vehicular and pedestrian traffic, horns honking, emergency sirens, a ventilation fan (daytime only), music from vehicles on nearby roads (nighttime only), and a street sweeper (nighttime only).

- Location 4 is at the north end of the site across from the BRA board approved 55 India Street project at the corner of Wharf and Well streets. Noise sources include vehicular and pedestrian traffic, birds chirping (daytime only), helicopter passing by overhead (daytime only), music from vehicles on nearby roads (nighttime only), horns honking on nearby roadways, noise from weekly trash collection (nighttime only).

3.7.4.3 Noise Measurement Methodology

Sound level measurements were taken for approximately 20 minutes per location during the daytime (12:00 p.m. to 3:00 p.m.) on April 10, 2014, and during nighttime hours (12:00 a.m. to 2:00 a.m.) on April 11, 2014. Since noise impacts are greatest at night when existing noise levels are 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 exclude peak traffic conditions.

The sound levels were measured at publicly-accessible locations at a height of approximately 1.5 meters above the ground. The measurements were made under low wind conditions. All measurements were performed while roadway surfaces were dry with the exception of the nighttime measurement at Location 2 where drizzle occurred for the last 5 minutes of the measurement. This precipitation had negligible effect on the sound levels during this period. 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, including wind speed, temperature, and relative humidity, as well as 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 proposed Project.

3.7.4.4 Measurement Equipment

A Larson Davis model 831 Sound Level Analyzer, equipped with a Larson Davis model PRM831 Preamplifier, a PCB Piezotronics half-inch microphone, and a manufacturer windscreen were used to collect broadband and octave band ambient sound pressure level data. The instrumentation meets the "Type 1 – Precision" requirements set forth in American National Standards Institute (ANSI) S1.4 for acoustical measuring devices. The meter was tripod-mounted at a height of approximately 1.5 meters above ground level (AGL). The meter has data logging capability and was programmed to log statistical data for each 20-minute sampling period for the following parameters: L_{10}, L_{50}, L_{90}, L_{max}, and L_{eq}.

All measurement equipment was calibrated in the field before and after the surveys with a LD CAL200 acoustical calibrator, which meets the standards of IEC 942 Class 1L and ANSI S1.40-1984. The meters were calibrated and certified as accurate to standards set by the National Institute of Standards and Technology. These calibrations were conducted by an independent laboratory within the past 12 months.

3.7.4.5 Baseline Ambient Noise Levels

The existing ambient noise environment consists primarily of vehicular traffic on nearby roadways, pedestrian activity, and occasional aircraft. Baseline noise monitoring results are presented in Table 3.7-2, and summarized below.

- The daytime residual background (L_{90}) measurements ranged from 58 to 67 dBA;
- The nighttime residual background (L_{90}) measurements ranged from 54 to 59 dBA;
- The daytime equivalent level (L_{eq}) measurements ranged from 63 to 70 dBA; and
- The nighttime equivalent level (L_{eq}) measurements ranged from 61 to 66 dBA.

3.7.5 Overview of Potential Project Noise Sources

The building will be primarily composed of residential units. The tenant/use for the ground floor commercial space has not been decided at this time, although a restaurant or café are currently being considered. The primary sources of continuous sound exterior to the Project will consist of ventilation, heating, cooling, and emergency power noise sources. Multiple noise sources will be located on the roof and there will be intake and/or exhaust fans on the northern and eastern façades of the building. Conservatively noise sources associated with a restaurant (intake and exhaust fans) have been included in this analysis.

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Figure 3.7-2

Sound Level Modeling Locations

Table 3.7-2 Baseline Ambient Sound Level Measurements

Receptor I.D	Start Time	L_{eq}	L_{max}	L_{10}	L_{50}	L_{90}	L_{90} Sound Level (dB) per Octave Band Center Frequency (Hz)								
		(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	31.5	63	125	250	500	1000	2000	4000	8000
1-Day	11:59 AM	64	78	67	62	59	68	68	63	59	56	54	47	40	32
2-Day	1:51 PM	63	79	65	61	58	68	67	63	57	56	53	47	39	30
3-Day	2:16 PM	70	80	72	69	67	71	72	74	65	63	63	58	53	48
4-Day	2:40 PM	68	84	71	63	59	68	68	64	59	56	53	47	40	33
1-Night	12:17 AM	66	85	68	63	59	65	67	62	57	54	55	50	40	29
2-Night	1:28 AM	61	79	63	58	54	64	62	56	55	52	49	44	35	24
3-Night	1:04 AM	63	82	65	59	56	64	64	59	55	53	51	46	36	25
4-Night	12:41 AM	66	86	69	61	55	63	64	60	55	51	51	45	35	23

Notes:

1. Daytime weather: Temperature = 56˚ F, Relative Humidity = 23%, mostly clear skies, south south-east winds 0-2 miles per hour.
   Nighttime weather: Temperature = 53˚ F, Relative Humidity = 48%, variable cloudiness, south winds 0-3 miles per hour.
2. Sampling periods were at least 20 minutes in duration.
3. All measurements were performed under dry road conditions except for the nighttime measurement at Location 2 where drizzle occurred during the last 5 minutes.
4. Daytime measurements were collected on April 10, 2014.
   Nighttime measurements were collected on April 11, 2014.

It is anticipated at this point in the design that the major sources of sound exterior to the Project will be: one 12,200 CFM energy recovery unit (ERV), twelve 480 kBtu/h air cooled condenser units (ACCU), one 17,625 CFM grease exhaust fan, one 5,379 CFM garage exhaust fan, one 5,379 CFM garage intake fan, one 10,336 CFM vault exhaust fan, one 10,336 CFM vault intake fan, one 20,000 CFM restaurant intake fan[4], and one 300 kW emergency generator.

The garage intake and exhaust, along with the vault intake and exhaust will be located along the northern façade of the proposed building approximately 16 feet above ground level (AGL). The restaurant intake will be located along the eastern façade approximately 16 feet AGL. All other modeled noise sources were located on various tiers of the roof.

A tabular summary of the modeled mechanical equipment proposed for the Project is presented below in Table 3.7-3a. Sound power levels used in the acoustical modeling of each piece of equipment are presented in Table 3.7-3b. Sound power level data were provided by the manufacturer of each piece of equipment except for the ACCUs and the emergency generator. The sound power level of the an individual ACCU was calculated using the sound-pressure levels provided by the manufacturer at a reference distance of 3 feet while the sound power level of the emergency generator was calculated using the sound-pressure levels provided by the manufacturer at a reference distance of 49 feet.

The Project includes various noise-control measures that are necessary to achieve compliance with the applicable noise regulations. If mechanical equipment changes as the design progresses, appropriate measures will be taken to ensure compliance with the City Noise Standards. Acoustical louvers will be utilized at the garage, vault, and restaurant fan exhaust/intake points. Additional mitigation in the form of a duct silencer will be installed for the garage and vault intake and exhaust fans. On the roof, a silencer will be attached to the grease exhaust fan. Also a 3-sided 10 foot barrier will be located around the six ACCUs on the eastern side of the roof. Sound levels from the ERV will need to be mitigated. This will be accomplished through a sound mitigation package supplied by the vendor or through the selection of quieter equipment from an alternate manufacturer. The emergency generator will be controlled using a SA Canopy enclosure with an exhaust silencer. To further limit impacts from the standby generator, its required periodic, routine testing will be conducted during daytime hours, when background sound levels are highest. A summary of the noise mitigation proposed for the Project is presented below in Table 3.7-3c.

[4] *Modeled as two 10,336 CFM fans.*

Table 3.7-3a Modeled Noise Sources

Noise Source	Quantity	Approximate Location	Size/Capacity
Energy Recovery Unit	1	Roof (120′ tier)	12,200 CFM
Air Cooled Condenser Unit	12	Roof (120′ tier)	480 kBtu/h
Grease Exhaust Fan	1	Roof (120′ tier)	17,625 CFM
Garage Exhaust Fan	1	Northern façade; 16′ AGL	5,379 CFM
Garage Intake Fan	1	Northern façade; 16′ AGL	5,379 CFM
Vault Exhaust Fan	1	Northern façade; 16′ AGL	10,336 CFM
Vault Intake Fan	1	Northern façade; 16′ AGL	10,336 CFM
Restaurant Intake Fan[1]	1	Eastern façade; 16′ AGL	20,000 CFM
Emergency Generator	1	Roof (110′ tier)	300 kW

Notes: Modeled as two 10,336 CFM fans

Table 3.7-3b Modeled Sound Power Levels per Noise Source

Noise Source	Broadband (dBA)	Sound Level (dB) per Octave Band Center Frequency (Hz)								
		31.5	63	125	250	500	1k	2k	4k	8k
Energy Recovery Unit – Supply[1]	92	82[8]	82	84	93	89	87	83	80	76
Energy Recovery Unit – Exhaust[1]	98	94[8]	94	91	98	95	94	89	84	80
Air Cooled Condenser Unit[2]	86	85[8]	85	84	86	85	80	72	63	55
Grease Exhaust Fan – 17,625 CFM[3]	95	96[8]	96	95	90	90	89	88	85	82
Garage Exhaust Fan – 5,379 CFM[4]	86	91[8]	91	88	91	82	77	75	71	66
Garage Intake Fan – 5,379 CFM[4]	86	91[8]	91	88	91	82	77	75	71	66
Vault Exhaust Fan – 10,336 CFM[5]	88	91[8]	91	87	91	84	81	78	77	73
Vault Intake Fan – 10,336 CFM[5]	88	91[8]	91	87	91	84	81	78	77	73
Restaurant Intake Fan – 10,336 CFM[5]	88	91[8]	91	87	91	84	81	78	77	73
Ruskin A-36 Silencer Self Noise for Garage Intake/Exhaust[6]	52	55[8]	55	48	44	45	45	44	44	46
Ruskin A-36 Silencer Self Noise for Vault Intake/Exhaust[6]	55	58[8]	58	51	47	48	48	47	47	49
300 kW Emergency Generator – Includes Enclosure[7]	97	109[8]	109	104	101	95	88	84	83	79

Notes:
Sound power levels do not include mitigation identified in Table 3.7-3c.

1. XeteX AVR-2250-CD-DXH-HP
2. Toshiba Carrier AP2404FT9UL
3. Greenheck SFB-25-200
4. Greenheck BSQ-200-50
5. Greenheck BSQ-300HP-75
6. Airflow generated sound power levels resulting from the installation of the silencer for mitigation.
7. Caterpillar diesel generator set.
8. No data provided by manufacturer. Octave band sound level assumed to be equal to dB level in 63 Hz band.

Table 3.7-3c Attenuation Values Applied to Mitigate Each Noise Source

Noise Source	Form of Mitigation	Sound Level (dB) per Octave Band Center Frequency (Hz)								
		31.5	63	125	250	500	1k	2k	4k	8k
Garage Intake Fan	Acoustical Louver[1,2]	2[6]	5	4	5	6	9	13	14	13
Garage Intake Fan	Silencer[3]	0[2]	7	10	20	30	38	29	16	11
Garage Exhaust Fan	Acoustical Louver[1,2]	2[6]	5	4	5	6	9	13	14	13
Garage Exhaust Fan	Silencer[3]	0[6]	5	7	17	27	35	32	20	13
Vault Intake Fan	Acoustical Louver[1,2]	2[6]	5	4	5	6	9	13	14	13
Vault Intake Fan	Silencer[3]	0[6]	7	10	20	30	38	29	16	11
Vault Exhaust Fan	Acoustical Louver[1,2]	2[6]	5	4	5	6	9	13	14	13
Vault Exhaust Fan	Silencer[3]	0[6]	5	7	17	27	35	32	20	13
Restaurant Intake Fan	Acoustical Louver[1]	2[6]	5	4	5	6	9	13	14	13
Energy Recovery Unit - Inlet	Alternative/Modified Unit[4]	0	1	2	5	5	6	7	5	2
Energy Recovery Unit - Exhaust	Alternative/Modified Unit[4]	0	1	2	5	5	6	7	5	2
Grease Exhaust Fan	Silencer[5]	0	1	2	5	5	6	7	5	2

Notes:
1. IAC Acoustics Slimshield Acoustic Louver (SL-100)
2. Reduction applied to silencer self-noise as well.
3. Ruskin Silencer Model A-36
4. The Proponent will consult with the manufacturer to identify mitigation options to achieve at least the attenuation values presented or select a unit from an alternate manufacturer meeting the mitigated modeled sound levels.
5. Modeled attenuation presented; specific manufacturer/model not selected at this time.
6. Estimated sound level reduction.

3.7.6 Modeling Methodology

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

3.7.6.1 Future Sound Levels – Nighttime

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. Seven modeling locations were included in the analysis. Locations A through D are similar to measurement Locations 1 through 4. Three additional modeling locations, E, F, and G, were added for additional residential uses in the vicinity of the Project. The modeling receptors, which correspond to the closest residential use locations with the exception of C which is a business location, are depicted in Figure 3.7-2. The predicted exterior Project-only sound levels range from 40 to 45 dBA at nearby receptors. According to data available through the Massachusetts Office of Geographic Information (MassGIS), the immediate area in the vicinity of the Project site is zoned mixed use. Residential uses were identified based on personal observations and a review of publicly available information. As a result, six of the seven modeling locations were identified as residential use. Therefore, the City of Boston Residential limits have been applied to these locations. For the remaining location, Location C, the Business limits were applied. Predicted sound levels from Project-related equipment are within the broadband and octave-band nighttime limits under the City Noise Standards at the modeling locations. The evaluation is presented in Table 3.7-4.

Table 3.7-4 Comparison of Future Predicted Project-Only Nighttime Sound Levels to the City of Boston Limits

Modeling Location ID	Zoning / Land Use	Broadband (dBA)	Sound Level (dB) per Octave Band Center Frequency (Hz)								
			31.5	63	125	250	500	1k	2k	4k	8k
A	Recreational	45	53	49	46	48	44	39	31	22	9
B	Residential	40	49	47	43	42	39	34	26	21	12
C	Business	45	55	52	48	50	43	37	30	27	21
D	Residential	44	68	60	55	49	38	32	24	23	23
E	Residential	41	52	48	44	45	40	34	26	20	7
F	Residential	42	53	49	44	45	41	36	29	25	16
G	Residential	44	46	44	43	45	42	39	33	28	16
City of Boston Limits	Residential	50	68	67	61	52	46	40	33	28	26
City of Boston Limits	Business	65	79	78	73	68	62	56	51	47	44

3.7.6.2 Future Sound Levels – Daytime

As noted above, the emergency generator will only operate during the day for brief, routine testing when the background sound levels are high, or during an interruption of power from the electrical grid. A second analysis combined noise from the Project's mechanical

equipment and its emergency generator to reflect worst-case conditions. The sound levels were calculated at the same receptors as in the nighttime analysis, and then were evaluated against daytime limits. The predicted exterior Project-only daytime sound levels range from 43 to 53 dBA at nearby receptors. Predicted sound levels from Project-related equipment are within the daytime broadband and octave-band limits under the City Noise Standards at each of the modeling locations. This evaluation is presented in Table 3.7-5.

Table 3.7-5 Comparison of Future Predicted Project-Only Daytime Sound Levels to City Noise Standards

Modeling Location ID	Zoning / Land Use	Broadband (dBA)	Sound Level (dB) per Octave Band Center Frequency (Hz)								
			31.5	63	125	250	500	1k	2k	4k	8k
A	Recreational	45	55	53	48	49	44	39	31	22	9
B	Residential	53	64	64	60	56	51	43	39	36	26
C	Business	51	64	63	58	55	49	41	34	31	22
D	Residential	45	68	60	55	49	39	32	25	24	24
E	Residential	43	56	54	49	47	40	36	30	24	8
F	Residential	53	65	65	60	57	51	42	36	32	24
G	Residential	51	60	60	56	55	50	43	38	34	20
City of Boston Limits	Residential	60	76	75	69	62	56	50	45	40	38
City of Boston Limits	Business	65	79	78	73	68	62	56	51	47	44

3.7.7 Conclusion

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

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

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

3.8 Flood Hazard Zones/ Wetlands

The existing Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the Project site indicates that it is located outside of a designated flood zone (FIRM, City of Boston, Community-Panel Number 25025C0081G, Effective Date September 25, 2009). However, a "preliminary" revised floodplain map for the site area was recently released by FEMA which shows the site as lying within the 100-year flood zone (FIRM, Suffolk County, Massachusetts; Panel 0081J, Map Number 25025C0081J, Map Revised, Preliminary November 15, 2013). As discussed in Chapter 4, the design of the site and buildings will recognize and account for the site's location proximate to the harbor and within this newly designated flood zone, as well as the potential impacts of sea level rise.

The site does not contain wetlands.

3.9 Geotechnical Impacts

This section describes the anticipated site subsurface soil, rock and groundwater conditions, planned below-grade construction activities for the Project, and mitigation measures for protection of adjacent structures and for avoiding adverse impacts to groundwater levels in the Project area during excavation and foundation construction.

3.9.1 Subsurface Soil Conditions

Based on available subsurface data from the site and in the immediate Project area, the general subsurface soil and rock conditions are described below. Elevations as referenced herein are in feet and refer to the CA/T Datum which is 100 feet below the National Geodetic Vertical Datum (NGVD).

Based upon available subsurface data obtained from boreholes performed at the Project site and in the immediate Project area, it is anticipated that the site is underlain by a 15 to 18-foot thick fill deposit. The fill deposit is underlain by a deposit of very dense glacial till. The glacial till deposit was observed to extend to the surface of the bedrock at depths ranging from about 104 to 108 feet below the existing ground surface. The bedrock was indicated to consist of argillite.

3.9.2 Groundwater

The groundwater levels were observed in the borings at depths ranging from approximately 14 to 23 feet below the existing ground surface.

Groundwater levels at and near the site could also 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.

The Project is not located within the Groundwater Conservation Overlay District ("GCOD") as defined by Article 32 of the Boston Zoning Code.

3.9.3 Proposed Foundation Construction

The proposed 12-story mixed-use building is planned to include three below-grade levels for use as parking, mechanical and storage. The lowest level footprint is understood to be about 7,680 square feet. The exterior of the historic Bulfinch building will be fully restored and integrated into the new structure. The renovations will include lowering of the existing basement several feet to match the basement level of the new building.

The proposed building will be supported on a shallow foundation system consisting of spread footings or a structural mat foundation. Depending upon the subsurface conditions, the lowest level slab will consist of a pressure-relieved slab-on-grade or a waterproofed structural mat designed to resist hydrostatic uplift pressure.

Construction of the below-grade levels will require an excavation approximately 29 feet deep throughout the entire building footprint. The lateral earth support system will consist of an internally-braced, reinforced concrete diaphragm wall (i.e. slurry wall) extending into the glacial till deposit. The slurry wall will also provide foundation support for the perimeter walls of the building and function as the permanent wall for the below grade levels. Additionally, the slurry wall will provide a positive groundwater cut-off during the construction phase of the Project.

3.9.4 Potential Impacts during Excavation and Foundation Construction

Potential impacts during excavation and foundation construction include impacts to area groundwater levels, ground vibrations, noise and ground movement due to excavation. The foundation design and construction will be conducted to limit potential adverse impacts, especially to the Bulfinch building and other adjacent structures and to groundwater levels.

The foundation design and preparation of the contract documents will be based on the encountered subsurface conditions, and engineering analyses performed to assess the potential impact to adjacent structures and the site groundwater level. The subsurface conditions at the site will be observed in borings and/or test pits and will include observations of the foundation conditions of the existing Bulfinch building to provide recommendations for underpinning and/or shoring of the building.

Excavation for the below-grade portion of the structure will extend approximately 10 to 15 feet below the site groundwater level. The slurry wall will extend into the glacial till deposit below the bottom of the excavation to provide a groundwater cut-off during the construction period in order to minimize impact to the surrounding preconstruction groundwater level.

As the excavation depth will extend about 10 to 15 feet below the site groundwater level and the excavation will be performed within a slurry wall cofferdam designed to serve as a groundwater cut-off, construction dewatering within the excavation is anticipated to be accomplished using conventional sumping. Construction dewatering is anticipated to be relatively limited in duration and include relatively low flow.

In the event that dewatering effluent is discharged from the site into the adjacent storm drains, a temporary construction dewatering permit will be obtained from the appropriate governing agencies prior to such discharge. Chemical testing of the effluent would be conducted in accordance with the permit criteria.

During excavation, all excess excavated soil will be managed for off-site disposal in accordance with current MassDEP regulations and policies.

3.9.5 Mitigation Measures

Provisions will be incorporated into the design and construction documents to limit potential adverse impacts, including the following:

- The design team will conduct studies, prepare designs and specifications, and review the contractor's submittals for conformance to the Project contract documents with specific attention to protection of nearby structures and facilities and to avoid lowering of preconstruction groundwater level. In particular, selection of the building foundation and excavation support systems and their details will be made with specific attention to mitigating adverse temporary and long-term impacts external the site.

- Performance criteria (threshold and limiting values) will be established in the Project specifications for the lateral excavation support system with respect to control of vertical and lateral movements, water-tightness, and the construction sequence of the below-grade portion of the work. The contractor will be required to develop, employ, and modify as necessary, construction means and methods and take all necessary steps during the work to protect nearby buildings and other facilities.

- Performance criteria (threshold and limiting values) will be established in the Project specifications for the underpinning/shoring of the Bulfinch building, if determined to be necessary, with respect to vertical movement. The contractor will be required to submit for review an underpinning and/or shoring design, including calculations and drawings prepared and stamped by a professional engineer who is registered in the Commonwealth of Massachusetts and employed by the Contractor.

- 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. Vertical and in some cases lateral movements of the ground, streets, buildings and other nearby structures, particularly the Bulfinch building, will be monitored.

- Preconstruction condition surveys will be conducted, as needed, on buildings adjacent to the site to establish existing building conditions prior to the commencement of below-grade construction.

- A vibration monitoring program will be implemented to document pre-construction ambient and construction phase vibrations. Vibration levels in the vicinity of the site will be obtained prior to construction to establish "background" conditions. Vibration levels will be monitored, as needed, at various locations adjacent to the site during demolition activities, or other potentially vibration-causing activities for conformance with the Project documents. Vibration threshold values will be established in the Project specifications.

3.10 Construction Impacts

3.10.1 Introduction

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

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

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

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

3.10.2 Construction Methodology/Public Safety

Construction methodologies that ensure public safety and protect neighbors will be employed. Techniques such as barricades and signage will be used. Construction management and scheduling will minimize impacts on the surrounding environment and will include plans for construction worker commuting and parking, routing plans for trucking and deliveries, and the control of noise and dust.

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

3.10.3 Construction Schedule

The Proponent anticipates that the Project will commence construction in Summer of 2015 with completion in the Winter of 2016.

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

3.10.4 Construction Staging/Access

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

Although specific construction and staging details have not been finalized, the Proponent and its construction management consultant will work to ensure that staging areas will be located to minimize impacts to pedestrian and vehicular flow. Secure fencing and

barricades will be used to isolate construction areas from pedestrian traffic adjacent to the site. Construction procedures will be designed to meet all Occupational Safety and Health Administration (OSHA) safety standards for specific site construction activities.

3.10.5 Construction Mitigation

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

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

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

3.10.6 Construction Employment and Worker Transportation

The number of workers required during the construction period will vary. It is anticipated that approximately 175 construction jobs will be created over the length of construction. The Proponent will make reasonable good-faith efforts to have at least 50% of the total employee work hours be for Boston residents, at least 25% of total employee work hours be for minorities and at least 10% of the total employee work hours be for women. The Proponent will enter into jobs agreements with the City of Boston.

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

3.10.7 Construction Truck Routes and Deliveries

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

be mandated as a part of all subcontractors' contracts for the development. The construction team will provide subcontractors and vendors with Construction Vehicle & Delivery Truck Route Brochures in advance of construction activity.

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

3.10.8 Construction Air Quality

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

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

3.10.9 Construction Noise

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

Mitigation measures are expected to include:

- Instituting a proactive program to ensure compliance with the City of Boston noise limitation policy;
- Using appropriate mufflers on all equipment and ongoing maintenance of intake and exhaust mufflers;

- Muffling enclosures on continuously running equipment, such as air compressors and welding generators;
- Replacing specific construction operations and techniques by less noisy ones where feasible;
- Selecting the quietest of alternative items of equipment where feasible;
- Scheduling equipment operations to keep average noise levels low, to synchronize the noisiest operations with times of highest ambient levels, and to maintain relatively uniform noise levels;
- Turning off idling equipment; and
- Locating noisy equipment at locations that protect sensitive locations by shielding or distance.

3.10.10 Construction Vibration

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

3.10.11 Construction Waste

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

3.10.12 Protection of Utilities

Existing public and private infrastructure located within the public right-of-way will be protected during construction. The installation of proposed utilities within the public way will be in accordance with the MWRA, BWSC, Boston Public Works, Dig Safe, and the governing utility company requirements. All necessary permits will be obtained before the

commencement of the specific utility installation. Specific methods for constructing proposed utilities where they are near to, or connect with, existing water, sewer and drain facilities will be reviewed by BWSC as part of its site plan review process.

3.10.13 Rodent Control

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

3.10.14 Wildlife Habitat

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

Chapter 4.0

Sustainable Design and Climate Change

4.0 SUSTAINABLE DESIGN AND CLIMATE CHANGE PREPAREDNESS

4.1 Leadership in Energy and Environmental Design

To comply with Article 37, the Proponent intends to measure the results of their sustainability initiatives using the framework of the Leadership in Energy and Environmental Design (LEED) rating system. The Project will use the LEED-NC v2009 as the rating system to show compliance with Article 37. The LEED rating system tracks the sustainable features of a project by achieving points in the following categories: Sustainable Sites; Water Efficiency; Energy and Atmosphere; Materials and Resources; Indoor Environmental Quality; and Innovation in Design.

A LEED checklist is included at the end of this section, and shows the credits the Project anticipates achieving. The checklist will be updated regularly as the design develops and engineering assumptions are substantiated. Presently, 51 points have been targeted, not including any of the potential Boston Zoning Code Article 37 points. Points that are still being studied and marked as "maybe" on the LEED checklist are italicized below.

Sustainable Sites

Sustainable Sites, Prerequisite 1, Construction Activity Pollution Prevention: The construction manager will submit and implement an Erosion and Sedimentation Control (ESC) Plan for construction activities related to the demolition of existing conditions and the construction of the new development specific to this 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.

Sustainable Sites, Credit 1, Site Selection: The Project site is located on a previously developed site in a dense area of downtown Boston, and does not meet the criteria outlined in the credit regarding areas not to be developed.

Sustainable Sites, Credit 2, Development Density & Community Connectivity: The Project is located at the edge of the Financial District, which is a dense urban area with a mix of commercial and residential uses. For this credit, the Project will pursue the compliance path for Option 1, Development Density.

Sustainable Sites, Credit 4.1, Alternative Transportation - Public Transportation Access: The Project is located within one-half mile walking distance of public transportation. There are three subway stations within the radius that provide access to the Red Line, the Silver Line and the commuter rail line. There are also at least four bus stops within the radius. The proximity of the Project to several forms of public transportation fulfills the LEED credit requirements and helps to prevent pollution from automobile usage. The transportation access meets the exemplary performance requirements to earn an Innovation Credit.

Sustainable Sites, Credit 4.2, Alternative Transportation – Bicycle Storage and Changing Rooms: The Project includes covered bicycle storage for over 15% of the building occupants, as required for residential projects. Shower facilities will be provided as required for the commercial spaces at the first floor.

Sustainable Sites, Credit 5.1, Protect or Restore Habitat: The Project will pursue vegetated areas for 20% of the site, inclusive of vegetated roofs. All vegetation will be native or adapted species and will be selected to promote biodiversity.

Sustainable Sites, Credit 5.2, Maximize Open Space: The Project will provide pedestrian hardscape and vegetated areas for a minimum of 20% of the site. A minimum of 25% of the hardscape will be vegetated.

Sustainable Sites, Credit 7.1, Heat Island Effect – Non-Roof: Hardscape materials will meet the LEED SRI requirements of at least 29.

Sustainable Sites, Credit 7.2, Heat Island Effect – Roof: The Project will utilize roofing materials that meet the LEED SRI requirements.

Sustainable Sites, Credit 8, Light Pollution Reduction: The Project will pursue interior luminares sufficiently reduced in illuminance with line of sight to the exterior windows by 50% between 11 PM and 5 AM. It will also reduce exterior lighting illuminance to comply with LZ3 zone requirements.

Water Efficiency

Water Efficiency, Prerequisite 1, Water Use Reduction 20 Percent: The Project will specify plumbing fixtures that meet the minimum of a 20-percent reduction in water use compared to the baseline for the building.

Water Efficiency, Credit 1, Water Efficient Landscaping: Any landscaping that is installed will incorporate native and adaptive plant materials that will not require irrigation beyond initial planting phases.

Energy and Atmosphere

Energy & Atmosphere, Prerequisite 1, Fundamental Commissioning of the Building Energy Systems: Building systems will be commissioned in accordance with the USGBC LEED requirements. The commissioning services provided will include the Owner's Project Requirements (OPR) and Basis of Design (BOD) documents, development of a commissioning plan, incorporation of a commissioning specification section into the construction documents, and verification through startup observation and functional testing that the installed systems are operating in accordance with the OPR, BOD, and construction documents. The previously named services apply to the following commissioned systems: HVAC, lighting controls, and domestic hot water systems.

Energy & Atmosphere, Prerequisite 2, Minimum Energy Performance: The Project will be designed to comply with the ASHRAE 90.1-2007 Energy Standard per the newest version of LEED 2009.

Energy & Atmosphere, Prerequisite 3, Fundamental Refrigerant Management: The Project will specify equipment and systems with no chlorofluorocarbon (CFC) based refrigerants.

Energy & Atmosphere, Credit 1, Optimize Energy Performance: The Project will be designed with the goal of exceeding the ASHRAE 90.1-2007 Energy Standard by 20 percent. This will be demonstrated with a whole building energy model.

Energy & Atmosphere, Credit 3, Enhanced Commissioning: In addition to the commissioning practices that will be implemented under the Prerequisite, all requirements for enhanced commissioning per the USGBC LEED requirements will be followed. An independent, third-party commissioning agent will perform the services.

Energy & Atmosphere, Credit 4, Enhanced Refrigerant Management: Refrigerants for the HVAC equipment will be selected based on their capacity to minimize the impacts of ozone depletion and global warming.

Materials and Resources

Materials & Resources, Prerequisite 1, Storage and Collection of Recyclables: The Project will reduce the amount of building waste that is taken to landfills by supporting occupant recycling efforts. A central area for the collection of recyclables will be included in the building.

Materials & Resources, Credit 2, Construction Waste Management: The Project will implement a Construction Waste Management Plan to ensure that a minimal amount of waste debris is disposed of in a landfill. The Project goal is to recycle and/or salvage at least 75 percent of construction waste.

Materials & Resources, Credit 4, Recycled Content: The Project will specify materials and products with recycled content. For credit compliance, the goal will be to specify materials with recycled content so that the sum of postconsumer recycled content plus one-half of the pre-consumer content constitutes at least 10 percent, based on cost, of the total value of the materials in the Project.

Materials & Resources, Credit 5, Regional Materials: The Project will specify materials and products that have been extracted, harvested or recovered, as well as manufactured within 500 miles of the Project site. The goal will be to achieve 20 percent, based on cost, of the total materials value.

Indoor Environmental Quality

Indoor Environmental Quality, Prerequisite 1, Minimum IAQ Performance: The Project will be designed to comply with the ASHRAE 62.1-2007 Ventilation Standard per the newest version of LEED 2009.

Indoor Environmental Quality, Prerequisite 2, Environmental Tobacco Smoke Control: As a residential project, to comply with this Prerequisite, the Project will implement one of the following options:

1. It will be written into the condominium documents that smoking is prohibited in all areas of the building, including adjacent outdoor spaces.

OR

2. The project will implement the following measures per the USGBC-

- Prohibit smoking in all common areas of the building.
- Locate any exterior designated smoking areas, including balconies where smoking is permitted, at least 25 feet from entries, outdoor air intakes and operable windows opening to common areas.
- Prohibit on-property smoking within 25 feet of entries, outdoor air intakes and operable windows. Provide signage to allow smoking in designated areas, prohibit smoking in designated areas, or prohibit smoking on the entire property.
- Weather-strip all exterior doors and operable windows in the residential units to minimize leakage from outdoors.
- Minimize uncontrolled pathways for environmental tobacco smoke transfer (ETS) between individual residential units by sealing penetrations in walls, ceilings and floors in the residential units and by sealing vertical chases adjacent to the units.
- Weather-strip all doors in the residential units leading to common hallways to minimize air leakage into the hallway.
- Demonstrate acceptable sealing of residential units by a blower door test conducted in accordance with ANSI/ ASTM-E779-03, Standard Test Method for Determining Air Leakage Rate By Fan Pressurization.

- Use the progressive sampling methodology defined in Chapter 4 (Compliance Through Quality Construction) of the Residential Manual for Compliance with California's 2001 Energy Efficiency Standards (http://www.energy.ca.gov/title24/residential_manual). Residential units must demonstrate less than 1.25 square inches leakage area per 100 square feet of enclosure area (i.e., sum of all wall, ceiling and floor areas).

Indoor Environmental Quality, Credit 3.1, Construction IAQ Management Plan – During Construction: The Project will implement a Construction Indoor Air Quality Management Plan (CIAQMP) per the USGBC requirements to improve the indoor air quality during construction.

Indoor Environmental Quality, Credit 4.1, Low-Emitting Materials – Adhesives & Sealants: The Project will specify adhesives and sealants that comply with the South Coast Air Quality Management District (SCAQMD) Rule #1168 and Green Seal Standard. The VOC limits stated in these standards will not be exceeded for any of the adhesives and sealants used on the interior of the building envelope.

Indoor Environmental Quality, Credit 4.2, Low-Emitting Materials – Paints & Coatings: The Project will specify that all paints and coatings applied inside the building envelope will comply with the Green Seal Standard GS-11 for paints and primers; Green Seal Standard GS-03 for anti-corrosive paints; and the SCAQMD Rule #1113 for wood finishes, stains, and sealers.

Indoor Environmental Quality, Credit 4.3, Low-Emitting Materials – Flooring Systems: The Project will specify that all flooring systems must comply with the appropriate standard for carpet, carpet cushion, carpet adhesive, hard surface flooring, floor sealers, stains and finishes, and tile setting adhesives and grout.

Indoor Environmental Quality, Credit 4.4, Low-Emitting Materials – Composite Wood & Agrifiber Products: The Project will not specify composite wood and agrifiber products inside the building envelope that contain urea-formaldehyde resins.

Indoor Environmental Quality, Credit 5, Indoor Chemical and Pollutant Source Control : The Project will meet the requirements of this credit, by means of permanent entryway systems, exhaust where required, proper air filtration media, and containment for appropriate disposal of hazardous liquid waste.

Indoor Environmental Quality, Credit 6.1, Controllability of Systems - Lighting: The Project will provide individual lighting controls for 90 percent of the building occupants as well as lighting controls for all shared multi-occupant spaces.

Indoor Environmental Quality, Credit 6.2, Controllability of Systems – Thermal Comfort: The Project will provide individual thermal comfort controls for at least 50 percent of the building occupants as well as thermal comfort controls for all shared multi-occupant spaces.

Indoor Environmental Quality, Credit 7.1, Thermal Comfort – Design: The Project will be designed to comply with the requirements of ASHRAE Standard 55-2004.

Indoor Environmental Quality, Credit 8.1, Daylight & Views – Daylight for 75 Percent of Spaces: The Project, which is predominantly a residential building, will be designed to maximize interior daylighting in regularly occupied spaces. The goal will be to achieve daylight illuminance levels between 25 and 500 foot candles in 75 percent of the regularly occupied spaces.

Indoor Environmental Quality, Credit 8.2, Daylight & Views - Views for 90 Percent of Spaces: The Project will be designed so that building occupants in 90 percent of the regularly occupied areas will have a direct line of sight to the outdoors.

Innovation and Design Process

The Proponent intends to achieve four Innovation credits.

As credits under other LEED rating systems can be pursued as Innovation credits, the Project will pursue the LEED-CI Credit for installing a minimum of 70 percent of the equipment and appliances as EnergyStar Certified.

The Project will install permanent signage within lobbies indicating the sustainable design strategies utilized.

Exemplary Performance for SSc4.1. The Project site is located on several bus routes and rail lines with a frequency of service that includes over 200 transit rides per day.

Innovation In Design, Credit 2.0, LEED Accredited Professional: The Project team will include at least one LEED AP

Regional Priority Credits

The following are the Regional Priority Credits for Boston that will be pursued:

Sustainable Sites Credit 7.1: Heat Island Effect – Non-roof

Sustainable Sites Credit 7.2: Heat Island Effect – Roof

LEED 2009 for New Construction and Major Renovations

Project Checklist

110 Broad - PRELIMINARY CHECK LIST

Nov-14

Sustainable Sites — Possible Points: 26

Y	?	N			
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
5			Credit 2	Development Density and Community Connectivity	5
	1		Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
	1		Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
		3	Credit 4.3	Alternative Transportation—Low-Emitting and 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

Water Efficiency — Possible Points: 10

Y	?	N			
Y			Prereq 1	Water Use Reduction—20% Reduction	
4			Credit 1	Water Efficient Landscaping	2 to 4
		2	Credit 2	Innovative Wastewater Technologies	2
		4	Credit 3	Water Use Reduction	2 to 4

Energy and Atmosphere — Possible Points: 35

Y	?	N			
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
5		14	Credit 1	Optimize Energy Performance	1 to 19
		7	Credit 2	On-Site Renewable Energy	1 to 7
2			Credit 3	Enhanced Commissioning	2
2			Credit 4	Enhanced Refrigerant Management	2
		3	Credit 5	Measurement and Verification	3
		2	Credit 6	Green Power	2

Materials and Resources — Possible Points: 14

Y	?	N			
Y			Prereq 1	Storage and Collection of Recyclables	
		3	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2
	2		Credit 3	Materials Reuse	1 to 2

Materials and Resources, Continued

Y	?	N			
1		1	Credit 4	Recycled Content	1 to 2
2			Credit 5	Regional Materials	1 to 2
		1	Credit 6	Rapidly Renewable Materials	1
		1	Credit 7	Certified Wood	1

Indoor Environmental Quality — Possible Points: 15

Y	?	N			
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
		1	Credit 1	Outdoor Air Delivery Monitoring	1
		1	Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
		1	Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
1			Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems—Lighting	1
1			Credit 6.2	Controllability of Systems—Thermal Comfort	1
1			Credit 7.1	Thermal Comfort—Design	1
		1	Credit 7.2	Thermal Comfort—Verification	1
1			Credit 8.1	Daylight and Views—Daylight	1
1			Credit 8.2	Daylight and Views—Views	1

Innovation and Design Process — Possible Points: 6

1			Credit 1.1	Innovation in Design: Specific Title - Education Program	1
1			Credit 1.2	Innovation in Design: LEED CI - 70% Energy Star Appliances	1
1			Credit 1.3	Innovation in Design: Public Transport Access - Exemplary Perf	1
		1	Credit 1.4	Innovation in Design	1
		1	Credit 1.5	Innovation in Design: Specific Title	1
1			Credit 2	LEED Accredited Professional	1

Regional Priority Credits — Possible Points: 4

		1	Credit 1.1	Regional Priority: Specific Credit - Brownfield redevlopment	1
1			Credit 1.2	Regional Priority: Specific Credit - Heat Island Roof	1
1			Credit 1.3	Regional Priority: Specific Credit - Heat Island Non-Roof	1
		1	Credit 1.4	Regional Priority: Specific Credit	1

51	5	54	**Total**		Possible Points: 110

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

4.2 Climate Change Preparedness

Projects subject to Article 80, Large Project Review are required to complete the Climate Change Preparedness Checklist. Climate change conditions considered include sea level rise, higher maximum and mean temperatures, more frequent and longer extreme heat events, more frequent and longer droughts, more severe freezing rain and heavy rainfall events, and increased wind gusts.

The expected life of the Project is anticipated to be approximately 50 years. Therefore, the Proponent planned for climate-related conditions projected 50 years into the future. A copy of the completed Checklist is included in Appendix E. Given the preliminary level of design, the responses are also preliminary and may be updated as the Project design progresses.

Extreme Heat Events

The Intergovernmental Panel on Climate Change (IPCC) has predicted that in Massachusetts the number of days with temperatures greater than 90°F will increase from the current five-to-twenty days annually, to thirty-to-sixty days annually[1]. The Project design will include measures such as operable windows and high reflective roof materials to minimize the impact of high temperature events, including.

Energy modeling for the Project has not yet been completed; however, the Proponent will strive to reduce the Project's overall energy demand and GHG emissions that contribute to global warming. The Project's proposed TDM program described in Section 2.5 will also help to lessen fossil fuel consumption and greenhouse gas emissions associated with the Project.

Sea Level Rise

According to the IPCC, if the sea level continues to rise at historic rates, the sea level in Massachusetts as a whole will rise by one foot by the year 2100. However, using a high emissions scenario of climate change, sea level rise could reach six feet by 2100. Adding this potential rise to the mean higher high water (MHHW) level, in 50 years the MHHW could be as high as 15.2 feet Boston City Base (BCB), assuming a sea level rise of approximately four feet.[2] The first floor elevation of the Project is approximately 18 feet BCB.

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[1] 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.

[2] "Preparing for the Rising Tide". The Boston Harbor Association. February 2013.

Sea level rise is also a concern when combined with a large storm. If a major storm, such as another "Superstorm Sandy" with significant storm surge, were to impact Boston at high tide, the potential for flooding would markedly increase. Such a storm would be anticipated to increase sea level to approximately 18.7 feet BCB, which would impact the first floor of the building.[3] To minimize the impact of flooding, critical mechanical equipment is located above the first floor and the utility conduits will be water tight.

During a flood event, an elevator recall system will be activated that will send the elevator cab to the third floor so that the elevator will remain operable on the upper levels.

The Proponent is evaluating options for flood proofing the mechanical equipment associated with the garage and will continue to explore options as the design progresses.Rain Events

As a result of climate change, the Northeast is expected to experience more frequent and intense storms. To mitigate this, the Proponent will take measures to minimize stormwater runoff and protect the Project's mechanical equipment. These measures include:

- Striving to infiltrate one-inch of stormwater runoff from impervious areas into the ground to the greatest extent possible;
- Locating critical mechanical and electrical equipment at the highest elevation possible to prevent exposure to flood waters;
- Locating the backup generator on the roof; and
- Studying the incorporation of pervious paving along portions of the sidewalks surrounding the building where possible if the soils are suitable for infiltration.

Drought Conditions

Under the high emissions scenario, the occurrence of droughts lasting one to three months could go up by as much as 75% over existing conditions by the end of the century. To minimize the Project's susceptibility to drought conditions, the landscape design is anticipated to incorporate native and adaptive plant materials and an irrigation system will not be required. Aeration fixtures and appliances will be chosen for water conservation qualities, conserving potable water supplies. In public areas, sensor operated faucets and toilets will be installed.

[3] Ibid.

Chapter 5.0

Urban Design

5.0 URBAN DESIGN

5.1 History of the Site

The Project site at 110 Broad Street is at the southeastern termination of Broad Street, and abuts the Greenway roadway. The realization of the Greenway is an important achievement in both the life and history of the City of Boston. In addition to actively reconnecting the torn historic fabric of the City, the Greenway is also a powerful symbol of Boston's future. The edges along the Greenway, including the Project site, will architecturally engage and enhance this bold new condition in the City fabric.

The Project site contains two existing buildings. The historic ca. 1805 Bulfinch Building at 102 Broad Street, a designated Boston landmark, is one of a small number of surviving warehouse buildings attributed to the planning and design of Charles Bulfinch. The building will undergo a complete exterior restoration and will serve as the new entry lobby for the residential tenants. The adjacent ca. 1905 building at 112 Broad Street is a five story commercial building that has been identified as a non-contributing component of the Custom House Historic District and is proposed for demolition. The resulting site contains approximately 7,680 sf (including the Bulfinch Warehouse).

The parcel in its current form is a result of the construction of the Central Artery in the 1950s, which cut across the traditional streets that provided access to the Boston Waterfront. The creation of the Artery required the demolition of numerous buildings, leaving a jagged edge comprised of small triangles of vacant land and the backs of surviving buildings exposed to the raised central artery. The subsequent demolition of the artery left these fragmented sites and rear facades facing the public parkland of the Greenway. The design of 110 Broad Street presents the opportunity to heal the decades old scar from the Central Artery by activating this edge of the Greenway, enhancing the pedestrian experience and further linking the park to the Financial District.

5.2 Design Goals

The design team adopted the key overall recommendations of the BRA's Greenway District Planning Study, as well as the specific criteria for urban design in the Town Cove district, of which 110 Broad Street is a part. The Project site is one of the two sites in the Town Cove District that were identified as potential development sites. The design of the Project achieves the following goals:

A. The historic view corridors to the water are preserved by appropriate alignment of the new structure with both the adjacent buildings and the surviving Bulfinch Warehouse. The classic views from Broad Street to the water through the arch of Rowes Wharf and along Wells and Wharf streets to the Greenway will be

maintained (see Figures 5-1 and 5-2 at the end of this section). The area will be activated with new landscape elements, ground floor commercial/café space, a restored historic landmark and new wayfinding.

B. The new residential structure relates to the surrounding area with appropriate scale, height and details to act as a transitional structure between the high density surrounding commercials structures, the historic buildings of the district and the small scale street pattern. The new structure also provides a transition in scale along the Greenway form the heights of the Financial District (International Place) to the smaller scale (Grain Exchange) of the historic buildings of the Town Cove and Wharf Districts. At the same time the design creates a new face on the Greenway – appropriate to that large scale open space. See Figures 5-3 and 5-4.

C. Views of the Custom House Tower are preserved by aligning the new building with the existing street wall along Broad Street, the Greenway, and Surface Artery, and the adjacent small scale streets. The new building will slightly diminish views of the Custom House Tower from the Greenway adjacent to the site; however, its moderate height will not diminish the views of this iconic tower on the Boston Skyline. The Project will be 12 stories and approximately 120 feet in height which is in harmony with other structures in the Town Cove District (See Figure 5-5). The reuse of the Bulfinch Warehouse will anchor the corner of Broad and Wharf streets. The design acts as a volumetric infill that resolves the awkward three dimensional void between the new open space of the Greenway and the historic Broad Street corridor.

Figures 5-6 and 5-7 present views of the Project from Broad Street looking towards downtown Boston and the Greenway, respectively. Figure 5-8 presents an additional view of the Project from the Greenway.

The building will include materials such as brick, metal panel, wood, masonry and cementitious materials. Figure 5-9 illustrates the design of the proposed building.

5.3 Evolution of Design

The initial concept for the site was a 20-story, 240 foot high 145,000 sf glass tower which was envisioned to complement the dramatic and unusual Museum proposals for the Greenway. The current Project represents a scaled back 12-story, 120 foot high approximately 83,500 sf building designed to respond to input from the surrounding community, BRA design staff, and the results of the Greenway District Planning Study, which recommended a 130 foot height limit.

While distinctive in design as a "Gateway" building to Broad Street from the Greenway, the current proposal relates to the existing context through use of punched window walls, glazed bays, open articulation and activation of the ground floor, and the development of a two-story pedestrian scale at the base to further relate to the existing Bulfinch warehouse. The existing historic building will be featured and will serve as the new main entrance to the Project. The proposal has been tailored to its context without sacrificing a dramatic architectural statement.

110 Broad Street Boston, Massachusetts

Figure 5-1
View of Rowes Wharf from the Project Site

110 Broad Street Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 5-2
View of Wharf Street

110 Broad Street Boston, Massachusetts

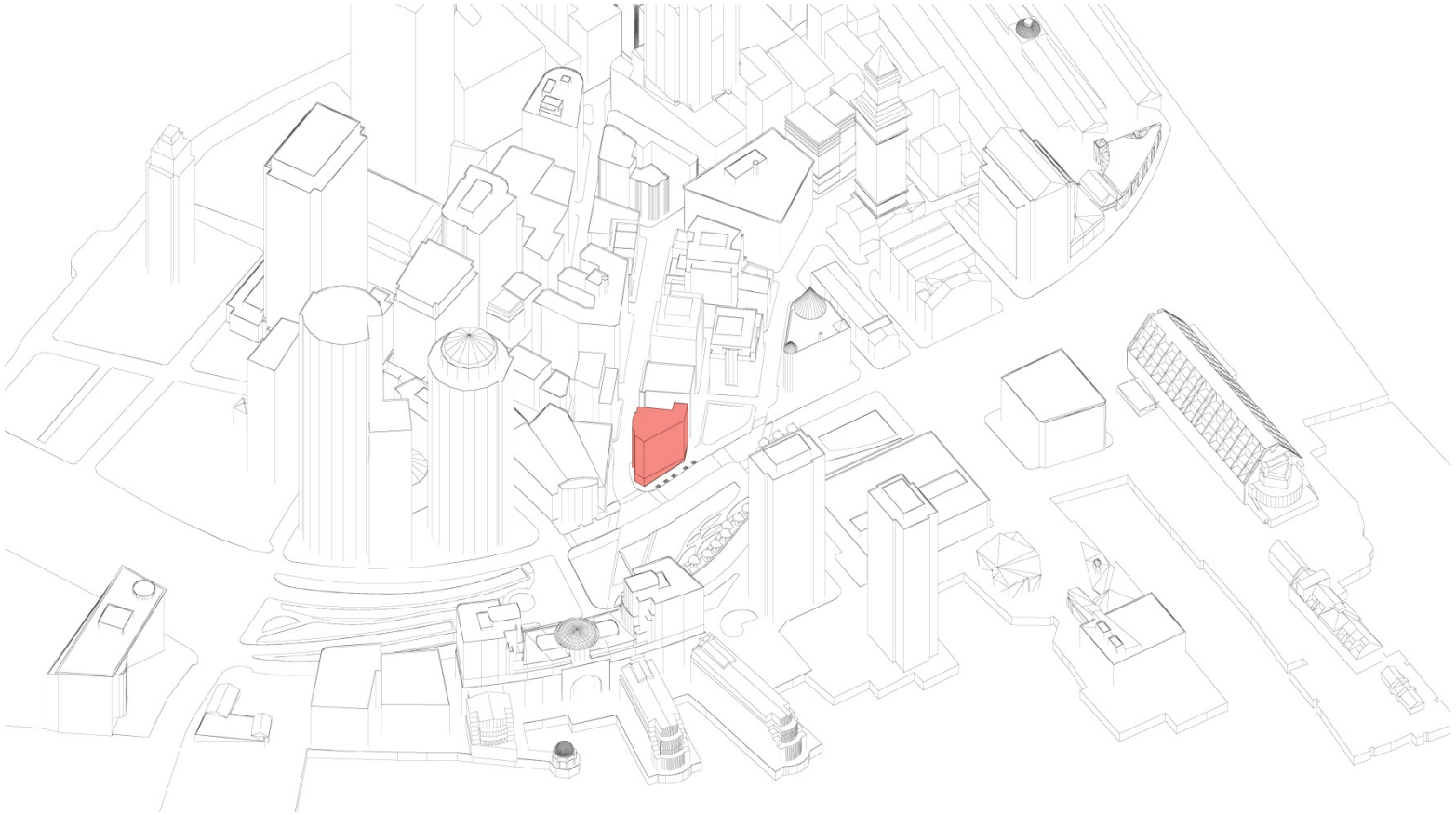
Finegold Alexander + Associates Inc

Figure 5-3

View from the Greenway Facing Southwest

Existing Greenway View

Proposed Greenway View



110 Broad Street Boston, Massachusetts

Finegold Alexander + Associates Inc

Figure 5-5

Proposed 120' Building

Existing Broad Street towards Downtown View

Proposed Broad Street towards Downtown View

110 Broad Street Boston, Massachusetts

Finegold Alexander + Associates Inc

Figure 5-6

Proposed Views Towards Downtown

Existing Broad Street towards Greenway View

Proposed Broad Street towards Greenway View

Existing Greenway View

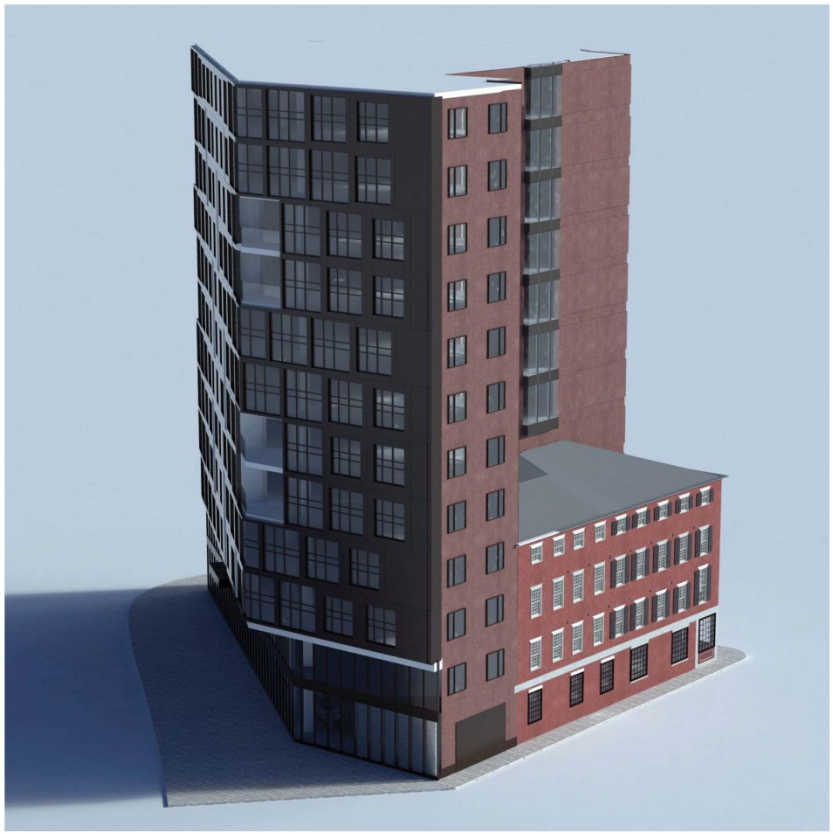
Proposed GreenwayView

110 Broad Street Boston, Massachusetts

Finegold Alexander + Associates Inc

Figure 5-8

View from the Greenway Facing Southwest



110 Broad Street Boston, Massachusetts

Finegold Alexander + Associates Inc

Figure 5-9

Building Design

Chapter 6.0

Historic and Archaeological Resources

6.0 HISTORIC AND ARCHAEOLOGICAL RESOURCES

This section describes the historic and archaeological resources within and in the vicinity of the Project site and describes the potential project-related impacts to these resources.

6.1 Project Site

The Project site is an approximately 7,680 square foot parcel located at 110 Broad Street in downtown Boston that currently consists of two buildings, the ca. 1805 Bulfinch Warehouse (102 Broad Street) and a ca. 1905 commercial building (110-112 Broad Street). The Project site is at the southeastern termination of Broad Street in the Custom House National Register Historic District, and abuts the Surface Artery and Greenway. The site is also identified in the BRA's Greenway District Planning Study as being part of the Town Cove District.

The Project site is located in a prominent location along the Greenway. The site is a transitional one between the dense commercial district, new residential development, the Greenway and the nearby waterfront and Rowes Wharf. Large 19th, 20th and 21st century buildings are interspersed with older structures. Significant nearby historic structures in the area include the Grainery Exchange Building, the Batterymarch Building, and numerous other "Bulfinch" warehouses. Dominant nearby buildings include International Place and the Custom House Tower.

The area around and including the Project site was laid out in 1805, when the first India Wharf and India and Broad Street Stores designed by Charles Bulfinch including 102 Broad Street (a City of Boston landmark) were constructed. The adjacent ca. 1905 five-story, commercial building located at 110-112 Broad Street was constructed at the east elevation of the Bulfinch building with additional buildings constructed proceeding eastward along Broad Street. The area was dramatically affected by the construction of the elevated John F. Fitzgerald Expressway (Interstate 93) in the 1950s when numerous abutting and nearby buildings were demolished. The present billboard atop 110 Broad Street is a remnant from the elevated Expressway, which passed adjacent to the building, the building itself bears the outline of the former (demolished) abutting building as an exposed party wall on its east elevation. The Expressway's removal and construction of the Central Artery/Tunnel Project (CA/T) in the past decades was another significant change opening up the area. The site now benefits from the construction of the Greenway providing expansive views north and south of the City.

The Project site is located within the Custom House Historic District, which was listed in the National Register of Historic Places in 1973. The Bulfinch Building is identified as a "contributing" building to the historic district, whereas, the ca. 1905 building at 110-112 Broad is identified as "noncontributing" to the district. Adjacent to the Project site are three properties within the National Register District: the 1903, nine-story, brick commercial building located across Wharf Street (88 Broad Street); a ca. 1860, five and a half-story

granite block commercial building to the south (109-133 Broad Street); and a ca. 1857 nine-story granite block commercial building to the south (99 Broad Street). The John F. Fitzgerald Surface Artery and Greenway are to the north and east of the Project site.

6.2 Historic Resources in the Project Vicinity

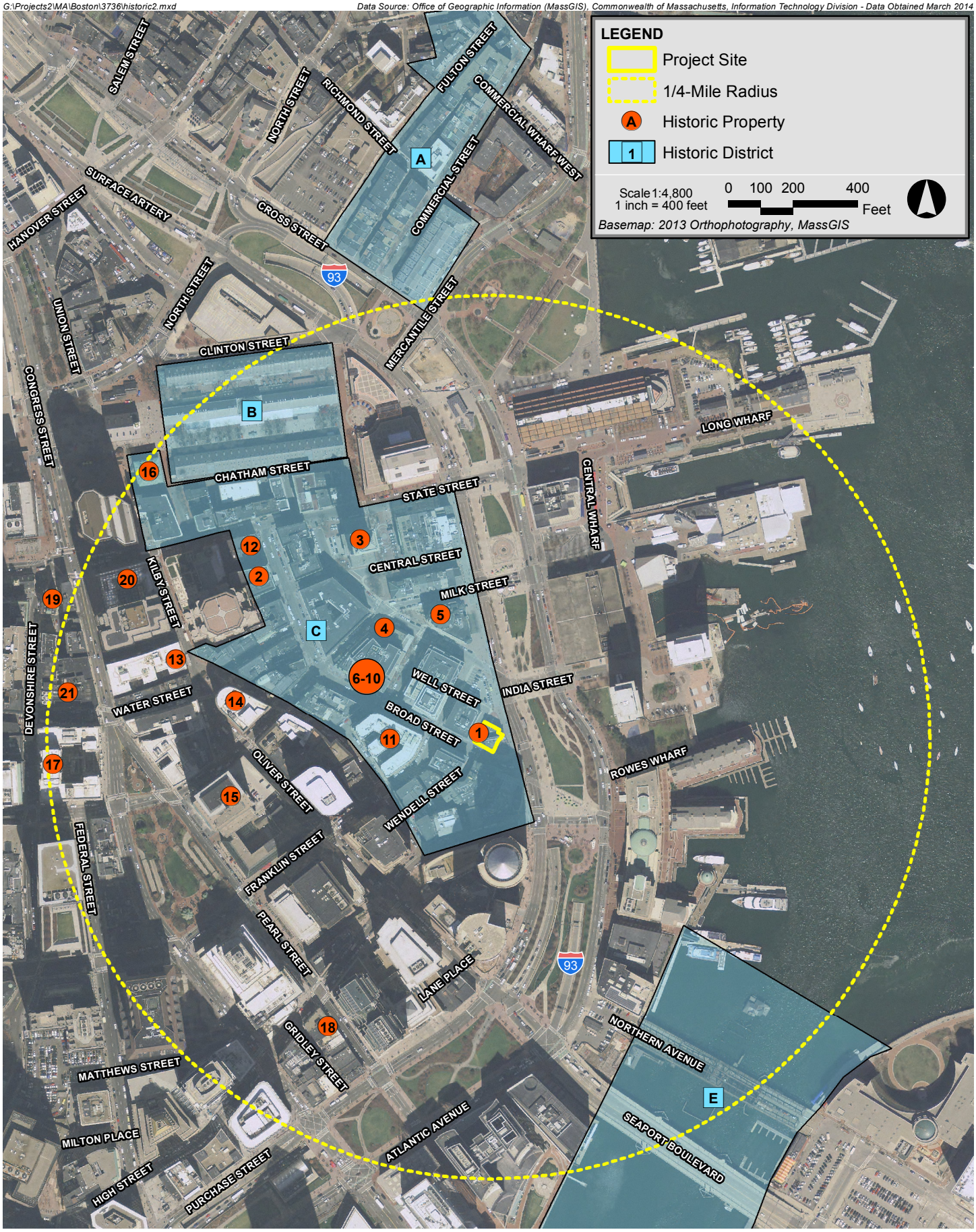
The Project site is located within the Custom House Historic District, a district listed in the National Register of Historic Places. In addition, there are numerous properties and districts that are also included in the State and National Registers of Historic Places. Historic districts in the vicinity of the Project site include the Long Wharf District, which is listed in the National Register, located to the northeast of the Project site. To the northwest of the Project site are other National Register properties, including Quincy Market and to the south is the Fort Point Channel Historic District. There are additional historic properties within a quarter mile of the Project site listed in the State and National Registers. Table 6-1 below lists historic resources within a one-quarter mile radius of the Project site; the locations of these resources are depicted on Figure 6-1.

Table 6-1 Historic Resources in the Vicinity of the Project

Map	State/National Register Properties	Designation*
A	Custom House Historic District	NRDIS
B	Quincy Market – Faneuil Hall Market	NHL, NRDIS, LL
C	Fulton Street - Commercial Street Historic District	NRDIS
D	Long Wharf and Custom House Block	NHL, NRDIS
E	Fort Point Channel Historic District	NRDIS, LL
1	102 Broad Street	NRDIS, LL
2	9 Broad Street	NRDIS, LL
3	United States Custom House, McKinley Square	NRDIS, LL
4	25-27 India Street	NRDIS, LL
5	Flour and Grain Exchange, 177 Milk Street	NRDIS, LL
6	50-52 Broad Street	NRDIS, LL
7	64-64A Broad Street	NRDIS, LL
8	66 Broad Street	NRDIS, LL
9	68-70 Broad Street	NRDIS, LL
10	72 Broad Street	NRDIS, LL
11	Batterymarch Building, 54 Batterymarch St.	NRDIS, LL
12	5-7 Broad Street	NRDIS, LL
13	Codman Building (10 Liberty Square Building)	NRIND
14	Samuel Appleton Building, 110-114 Milk St.	NRDOE
15	Federal Reserve Bank Building, 30 Pearl St.	LL
16	Faneuil Hall	NHL, NRIND, LL
17	J.W. McCormack Federal Building & Courthouse, Post Office Sq.	NRIND, NRDOE, LL
18	Richardson Block, 115-151 Pearl St.	NRIND
19	Second Brazer Building, 25-29 State St.	NRIND, LL
20	Stock Exchange Building, 43-65 State St.	LL
21	National Shawmut Bank Building, 20-42 Water St.	NRDOE

*NHL: National Historic Landmark; NRIND: National Register individual property; NRDIS: National Register Historic District; NRDOE: Determined eligible for National Register; LL: Boston landmark

Data Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division - Data Obtained March 2014



110 Broad Street Boston, Massachusetts

Epsilon Associates Inc.

Figure 6-1

Historic Resources Map

6.3 Impacts to Historic Resources

6.3.1 Design and Visual Impacts

As noted in Section 5.0, the Project has been developed in accordance with the Greenway District Planning Study Use and Design Guidelines and the Town Cove sub district. The Project restores and reuses the existing ca. 1805 Bulfinch Warehouse at 102 Broad Street for lobby and residential space. A significant component of the Project is the restoration and interpretation of the Bulfinch Building as part of a distinct group of "Bulfinch" Warehouses in the Custom House Historic District. Inappropriate exterior signage, lighting, fire escapes, electrical conduit and later additions will be removed from the Bulfinch Building. The masonry will be cleaned and repointed and window openings will be restored with historically appropriate wood windows. The existing mechanical penthouse will be removed and a new slate roof installed along with a new cornice and gutter. Interpretative information in the form of self-guided tours or lobby displays will be developed as part of the long range plan for documenting the Bulfinch era of the city waterfront warehouse district.

The adjacent 110-112 Broad Street, a non-contributing ca. 1905 building within the district will be demolished to allow construction of a new building on the site. The building has suffered alterations including inappropriate replacement windows, a rooftop billboard, inappropriate storefront modifications and significant damage to the masonry. The east elevation is a former party wall to an adjacent building (not extant) that has been patched with concrete and altered with conduits and window installations further degrading the masonry. The program for the new mixed use residential building includes access for a ground floor commercial/café area, underground parking and landscaping for an outdoor café.

The proposed 12-story building draws its conceptual massing from the site constraints and reflects the mixed-use nature of the building with commercial frontage along the Greenway edge. The new design represents the vocabulary of this area with punched window openings, glazed bays, balconies, and a transparent ground floor for commercial/café use. The building has a varied window pattern to distinguish its contemporary design and enhance its residential character. The design preserves the view corridors along Broad and Wharf Streets to the waterfront. In addition to restoring the Bulfinch Warehouse, the Project will, fill in a gap in the streetscape along the Greenway and Broad Street and create additional activity along the Greenway. The ground floor face of the Project is set back from the lot line to create a larger, more appropriately scaled pedestrian zone along the Greenway. This generous pedestrian zone is accentuated by potential outdoor café seating directly in front of the building and sheltered by the building overhang above. The design reflects an important district-wide goal, that ground floor uses and orientations relate to adjacent features and uses along the Greenway.

Given its location within the Custom House Historic District, the Project will be visible from, and has the potential to affect views of historic properties within the district; however, it is not expected to introduce elements that are visually incompatible to the district. As envisioned, the Project's design will be respectful of, and complement, the historic and architectural character of the Custom House Historic District, and its uses, massing, and height will help to serve as appropriate new infill construction of an unfinished edge of the street wall along the Greenway (a Town Cove District goal). The new construction at the Project site has the potential to affect viewsheds of historic properties; however, as designed, the Project will affect views from portions of the immediately surrounding streets and the Greenway only, and those affected views are mainly from points outside of the historic district. Additionally, the proposed Project will be in harmony with the existing Greenway street wall to the north and south of the Project site.

The proposed massing and materials are respectful to the historic character of the area and complimentary to the surrounding buildings. The surrounding buildings include a variety of heights and are predominantly masonry in construction with materials including concrete, cut stone, and brick. The Project's 12-story height is comparable to that of the adjacent nine-story building at 88 Broad Street but shorter than other buildings along Broad, High and India Streets such as the Batterymarch Building, International Place and the Custom House Tower. Therefore, the Project's proposed height will not be obtrusive for being either too tall or too short and will contribute to creating a consistent street wall along the Greenway.

The Project facades along the Greenway were conceived as a series of facets that help negotiate the existing undulating street wall and utilize brick to compliment the Bulfinch building. The Project will fit seamlessly into the existing palette of materials by using a combination of masonry (concrete and brick), metal panels and glass on the exterior. The fine scaled detailing of the Project, including a cast stone base and brick masonry provide the rich materiality consistent with the close-up human scaled experience of the area's tight street network. Through the use of brick masonry, façade proportions, massing alignments and appropriate cornice heights, the Project respectfully nestles into the context of the Town Cove sub district). The Project's massing respects the street walls along Broad and Wharf Streets and the Greenway and provides an active residential lobby entry at the intersection of Franklin and the Surface Artery.

6.3.2 Shadow Impacts

While shadow impacts are inevitable given the largely underutilized Project site, impacts to the Custom House Historic District will be minimal given their locations north, 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 four times of day (9:00 a.m., 12:00 noon, 3:00 p.m. and 6:00 p.m.) during each of the vernal equinox (March 21), summer solstice (June 21), autumnal equinox (September 21), and the winter solstice (December 21).

As illustrated in the shadow study diagrams (Figures 3.2-1 to 3.2-14), the Project will cast net new shadow primarily on areas outside of the Custom House Historic District or on "non-contributing," non-historic properties within the district such as 55 India Street presently a surface parking lot proposed for redevelopment. During isolated time periods, the Project may cast shadows on portions of the Broad Exchange Building at 88 Broad Street. Specifically, during three of the time periods studied (March 21 at 9:00 a.m., June 21 at 9:00 a.m., and September 21 at 9:00 a.m.), new shadow may be cast on the northeast corner of the Broad Exchange Building. However, none of the shadow impacts resulting from the Project will adversely impact the character-defining features of the Broad Exchange Building, or any other buildings within the Custom House Historic District, that make them eligible for inclusion in the National Register.

6.4 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 construction of adjacent buildings it is not anticipated that the site contains significant archaeological resources. No impacts to archaeological resources are anticipated as a result of the Project.

6.5 Status of Project Reviews with Historical Agencies

6.5.1 Massachusetts Historical Commission Review

In the event the Project requires a state action, the Project may be subject to the Massachusetts Historical Commission's (MHC) State Register Review (950 CMR 71). If MHC review is required, a Project Notification Form will be filed to initiate the State Register Review process.

6.5.2 Boston Landmarks Commission Review

As noted above, the Bulfinch Building is a designated City of Boston landmark, and as such the proposed exterior restoration of the building is subject to design review by the BLC\. The Proponent has consulted with the BLC about the Project, specifically requesting an advisory review of the Project. On November 25, 2014 the Project team presented the Project to the BLC seeking input on the proposed scope of the exterior restoration of the Bulfinch Building. At the appropriate time, a formal design review application will be filed with BLC for the Project.

Because the ca. 1905 building at 110-112 Broad Street is greater than 50 years old, the proposed demolition of the building is subject to BLC's Article 85 (Demolition Delay) review. Given that the building was identified as "noncontributing" to the Custom House Historic District, it is not anticipated that the BLC will invoke the demolition delay. An Article 85 application will be filed for the demolition of 110-112 Broad Street with BLC concurrent with the filing of the design review application for the Bulfinch Building.

Chapter 7.0

Infrastructure

7.0 INFRASTRUCTURE

7.1 Introduction

This chapter describes the infrastructure systems that will support the Project. The Project will connect to existing city and utility company systems in the adjacent public streets. Initial investigations with the appropriate agencies and utility companies indicate that the existing infrastructure systems are adequately sized to accept the incremental increase in demand associated with the development and operation of the Project. The following utilities are evaluated: wastewater, water, stormwater management, natural gas, electricity, and telecommunications.

The final design process for the Project will include required engineering analyses and will adhere to applicable protocols and design standards, ensuring that the proposed buildings are properly supported by and, in turn, properly use the City's infrastructure. Detailed design of the Project's utility systems will proceed in conjunction with the final design of the buildings and their interior mechanical systems.

The systems discussed below include those owned or managed by the Boston Water and Sewer Commission (BWSC), private utility companies, and on-site infrastructure systems. There will be close coordination among these entities and with the Project engineers and architects during the construction process.

All improvements and connections to BWSC infrastructure will be reviewed by BWSC as part of the BWSC site plan review process. This process includes a comprehensive design review of the proposed service connections, assessment of system demands, capacity and establishment of service accounts.

Regulatory Framework

This chapter, in addition to a description of existing and future infrastructure connections, discusses the regulatory framework of utility connection reviews and standards. All connections will be designed and constructed in accordance with city, state and federal standards.

- BWSC approval will be required for all water, sewer and stormwater systems.
- The Boston Fire Department will review the Project with respect to fire protection measures such as siamese connections, hydrants and standpipes.
- Design of the site access, hydrant locations, and energy systems (gas and electric) will be coordinated with the respective system owners.
- New utility connections will be authorized by the Boston Public Works Department through the street opening permit process, as required.

- Additional information on the regulatory framework for each utility system is included in subsequent sections of this chapter.

A more complete list of the state and local permits anticipated in connection with the Project infrastructure is included in Section 1.7.

7.2 Wastewater

7.2.1 Existing Wastewater System

Local sanitary sewer service in the City is provided by the BWSC. The Project site is adjacent to sewer mains in the public streets, including a 66-inch line in Wharf Street and a 66-inch main in Broad Street. All sewer flows from the area discharge through the East Side Interceptor which ultimately flows to the MWRA Deer Island Treatment Plant.

7.2.2 Project Generated Wastewater Generation

The typical daily sewage generation rate is established using the rates identified in the MassDEP State Environmental Code, Title 5, 310 CMR 15.203: System Sewage Flow Design Criteria. Table 7-1 demonstrates the anticipated flow rates for the proposed Project.

Table 7-1 Proposed Project Wastewater Generation

Program Type[1]	Area	Generation Rate	Sewer Flow (GPD)[2]
Residential (52 Units)	109 Bedrooms	110 GPD/Bed	11,990
Commercial[3] /café	150 Seats	35 GPD/Seat	5,250
Total			17,240

[1] Program based on Scheme W dated November 10, 2014 from Finegold Alexander + Associates, Inc.
[2] GPD = gallons per day
[3] Commercial area may be a café or retail. Number of café seats is estimated at 150. If commercial use is retail instead of café the sewer flow would be 3,500 SF x 50 GPD/KSF = 175 GPD, for a total program flow of 12,165 GPD.

7.2.3 Proposed Connection

The sewer service for 110 Broad Street is anticipated to be on Wharf Street, utilizing the 66-inch East Side interceptor.

The Proponent will coordinate with the BWSC on the design and capacity of the proposed connection to the sewer system. It is anticipated that the existing sewer system is adequately sized to accept the incremental increase associated with the Project. In addition, the Proponent will submit a General Service Application and site plan for review as the Project progresses.

7.3 Domestic Water and Fire Protection

7.3.1 Existing Water Supply System

Domestic and fire protection water is provided by the BWSC. Within the City, there are five different water systems/service districts, each of which 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 also a separate high pressure fire service which cannot be utilized for building services.

In the immediate Project area, there are 12-inch southern high, southern low and high pressure fire mains in Broad Street and in Surface Artery, and a 12-inch southern high main in Wharf Street.

7.3.2 Proposed Water Use

Domestic water demand is based on estimated sewage generation with an added factor of 10 percent for consumption, system losses, and other use. Based upon these assumptions, the Project will require approximately 18,964 gallons of water per day with the café use, or 13,382 gallons of water per day with a retail commercial use.

The Project's design will include efforts to reduce water consumption. Aeration fixtures and appliances will be chosen for water conservation qualities. In public areas, sensor operated faucets and toilets will be installed.

7.3.3 Proposed Connections

The Project will connect to the BWSC's low service system located in Broad Street. Service connections required by the Project will meet the applicable city and state codes and standards, including cross-connection backflow prevention.

Compliance with the standards for the water system service connections will be reviewed as part of BWSC's Site Plan Review process. The review includes, but is not limited to, sizing of domestic water and fire protection services, calculation of meter sizing, backflow prevention design, and location of hydrants and siamese connections to conform to BWSC and Boston Fire Department requirements.

In addition to the water service connection, the water mains located along Surface Artery frontage will be relocated outside of the proposed building footprint.

7.4 Stormwater Management

Since the Project site is already impervious to rainfall percolation, construction of the Project will not produce increases in the rate of stormwater runoff, and measures to reduce the volume of stormwater runoff will be evaluated.

Stormwater management controls will be established in compliance with BWSC standards, and the Project will not result in the introduction of any peak flows, pollutants, or sediments that would potentially impact the receiving waters of the local BWSC stormwater drainage system.

7.4.1 Existing Conditions

The Project site is serviced by a separated drain system in Broad Street and Wharf Street which flows to the north and is tributary to a system which discharges into the Boston Harbor near the New England Aquarium. The site is not located in the Charles River watershed or the City's Groundwater Conservation Overlay District (GCOD).

The existing site is 100% impervious to rainfall infiltration and includes little to no stormwater controls. Much of the site runoff discharges untreated to the drainage systems in the surrounding streets.

7.4.2 Proposed Conditions

The Project will pursue a decrease in the rate and quantity of stormwater runoff from the site. No new surface control structures are proposed or appropriate in light of the proposed building coverage. Measures to improve the drainage water quality condition by evaluating upgrade drainage infrastructure that may incorporate infiltration facilities and potential capture of water for re-use will be explored. As part of BWSC's review process, the Proponent will consider measures, where applicable, to minimize flows from the site while considering soil conditions, proximity to the central artery tunnel, and other site constraints.

Stormwater Quality

The Project team is evaluating the implementation of vegetated rooftop areas as part of the Project's sustainable design strategy. Inclusion of a vegetated roof will have a positive impact on the quality of the stormwater discharged from the site. Rooftop vegetation and subsurface stormwater infiltration create an opportunity to support the natural water cycle in a dense urban core environment.

Stormwater management controls will be established in compliance with BWSC standards, and the Project will maintain or reduce peak flows, pollutants, or sediments that would potentially impact the Boston Harbor. In conjunction with the site plan and the General Service Application, the Proponent will submit a stormwater management plan to the BWSC. The final site design will be reviewed as part of the BWSC Site Plan Review Process.

7.4.3 Compliance with MassDEP Stormwater Management Standards

In 1996, MassDEP issued the Stormwater Policy that established Stormwater Management Standards aimed at encouraging recharge and preventing stormwater discharges from causing or contributing to the pollution of the surface waters and groundwaters of the Commonwealth. In 1997, MassDEP published the Massachusetts Stormwater Handbook as guidance on the Stormwater Policy. In 2008, MassDEP revised the Stormwater Management Standards and Massachusetts Stormwater Handbook to promote increased stormwater recharge, the treatment of more runoff from polluting land uses, low impact development (LID) techniques, pollution prevention, the removal of illicit discharges to stormwater management systems, and improved operation and maintenance of stormwater best management practices (BMPs). MassDEP applies the Stormwater Management Standards pursuant to its authority under the Wetlands Protection Act, M.G.L. c. 131, § 40, and the Massachusetts Clean Waters Act, M.G.L .c. 21, §§ 26-53. The revised Stormwater Management Standards have been incorporated in the Wetlands Protection Act Regulations, 310 CMR 10.05(6)(k) and the Water Quality Certification Regulations, 314 CMR 9.06(6)(a).

To demonstrate the ways in which the Project will be consistent with the Stormwater Management Policy, a discussion of each Stormwater Management Standard follows:

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 treat the runoff contributed by plazas and sidewalk areas within the boundaries of the Project site through appropriate stormwater measures. MassDEP Management Standards identify rooftop runoff (except certain metal roofs) as uncontaminated for the purposes of the Stormwater Management Standards.

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

Compliance: The Project's post-development peak discharge rates will not exceed pre-development discharge rates as the existing site is 100 % impervious. The applicant will explore opportunities to reduce the impervious surface area and evaluate measures to reduce peak discharge rates. The evaluation may incorporate infiltration facilities, vegetated rooftops and potential capture of water for re-use in the building.

Standard #3: Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmental sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil

type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Compliance: The MassDEP Stormwater Management Standards require the infiltration of 0.6 inch of runoff over the impervious areas of the site for the best soil types (Type A soils). The BWSC regulations require the infiltration of the first inch of stormwater times the impervious area on the site. The site is 100 percent impervious under existing conditions and is in close proximity to the Central Artery Tunnel, which may limit infiltration practices. Therefore, the applicant will work with the BWSC to implement the appropriate stormwater measures during the site plan review process to promote recharge to groundwater.

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 site will be occupied almost entirely by building area and thus this standard will not apply to the Project site. However, the applicant is evaluating a vegetated rooftop area that would improve the water quality of the building stormwater discharge. The applicant will also explore infiltration system feasibility, as discussed above, to further promote water quality improvement.

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 commercial portion of the Project may be considered a land use with higher potential pollutant load (LUHPPL). The recommended mitigation for a LUHPPL is pollution prevention and source control. The loading areas and vehicular parking associated with the Project are protected from rainfall, mitigating the Project's impacts as a potential LUHPPL.

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 site does not contain any of the critical areas identified above.

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

Compliance: The Project is considered a redevelopment; however, it will be in compliance with the stormwater management standards to the maximum extent practicable as described herein.

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

Compliance: The Project's construction documents will include measures and specifications regarding erosion and sediment controls and barriers (e.g., silt fence, and catch basin sacks). Construction dewatering discharges will be appropriately controlled and discharged in accordance with National Pollutant Discharge Elimination System (NPDES) state and local dewatering standards.

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: Measures aimed at minimizing the disposition of site soils to off-site areas, primarily the surrounding streets and existing drainage collection systems, will be a part of the Construction Management Plan prepared in accordance with BTD's standards. In addition, the Proponent will apply for all appropriate permits for construction activity and dewatering. Efforts will be made to contain sediment, pollutants, and any other construction-related materials within the site. Stabilized construction exits will be installed at each access point of the work areas to minimize off-site transport of soil by construction vehicles. These exits will remain in place until site areas have been stabilized. In addition, the Proponent will use Best Management Practices (BMPs) during construction including installing silt sacks on catch basins, a truck-trailer wheel wash station, anti-tracking pads, and covering material piles.

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

Compliance: The Project site does not include any known illicit discharges. If any illicit discharges are encountered during the construction process, they will be eliminated.

7.5 Electrical Service

NSTAR owns the electrical system in the vicinity of the proposed Project. Broad Street includes a primary service line and multiple electrical vaults in close proximity to the site. The Proponent and Project electrical engineer will work with NSTAR representatives to define building needs and the new service configuration. It is anticipated that adequate service is available in Broad Street to serve the Project.

7.6 Telecommunication Systems

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

7.7 Gas Systems

National Grid has a low pressure 8-inch gas service in Broad Street that serves the existing on-site buildings. The Proponent will work with National Grid to confirm adequate system capacity as the Project design is finalized.

7.8 Utility Protection During Construction

Existing public and private infrastructure located within the public right-of-way will be protected during construction. The installation of proposed utilities within the public way will be in accordance with BWSC, Boston Public Works Department, the Dig-Safe Program, and governing utility company requirements. All necessary permits will be obtained before the commencement of work. 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.

Chapter 8.0

Coordination with other Governmental Agencies

8.0 COORDINATION WITH OTHER GOVERNMENTAL AGENCIES

8.1 Architectural Access Board Requirements

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

8.2 Massachusetts Environmental Policy Act (MEPA)

The Project is not anticipated to exceed any of the review thresholds for the filing of an Environmental Notification Form under MEPA.

8.3 Massachusetts Historical Commission

In the event the Project requires a state permit, the Project may be subject to State Register Review (950 CMR 71) given its location within the Custom House Historic District. If State Register Review is required, a Project Notification Form will be filed with the Massachusetts Historical Commission to initiate the State Register Review process. This process is normally coordinated with review by the Boston Landmarks Commission.

8.4 Boston Civic Design Commission

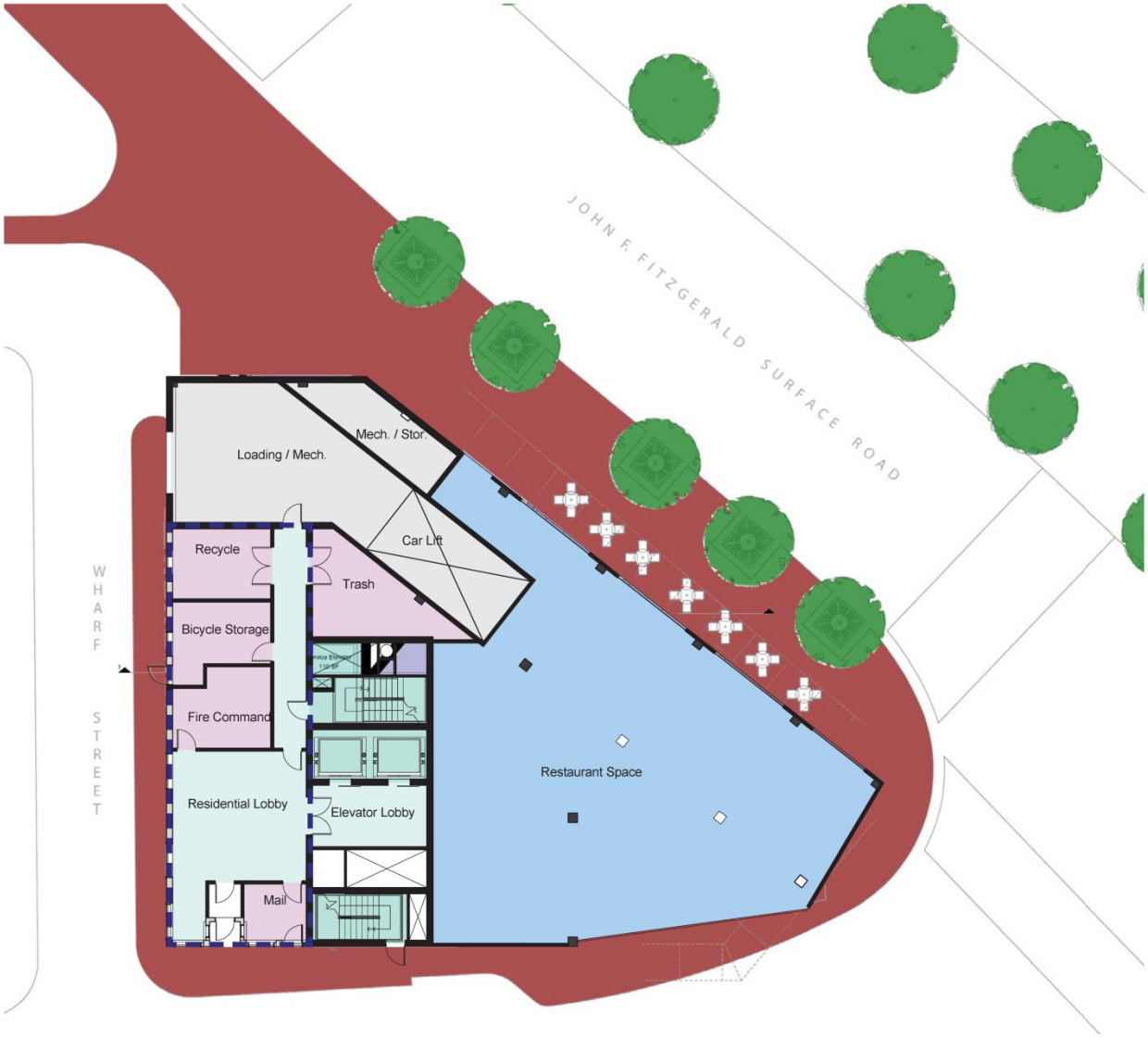
Although the Project is less than 100,000 square feet in size, because of its location along the Greenway and in the Greenway Overlay District, it may be subject to review by the Boston Civic Design Commission (BCDC) under the provisions of Articles 28 and 49A of the Code.

8.5 Boston Parks and Recreation Commission and Rose Kennedy Greenway Conservancy

The Project will involve construction of a new building within 100 feet of the Rose Kennedy Greenway, so the Project will require review and approval by the Boston Parks and Recreation Commission, subject to advice from the Greenway Conservancy.

Appendix A

Floor Plans



110 Broad Street Boston, Massachusetts

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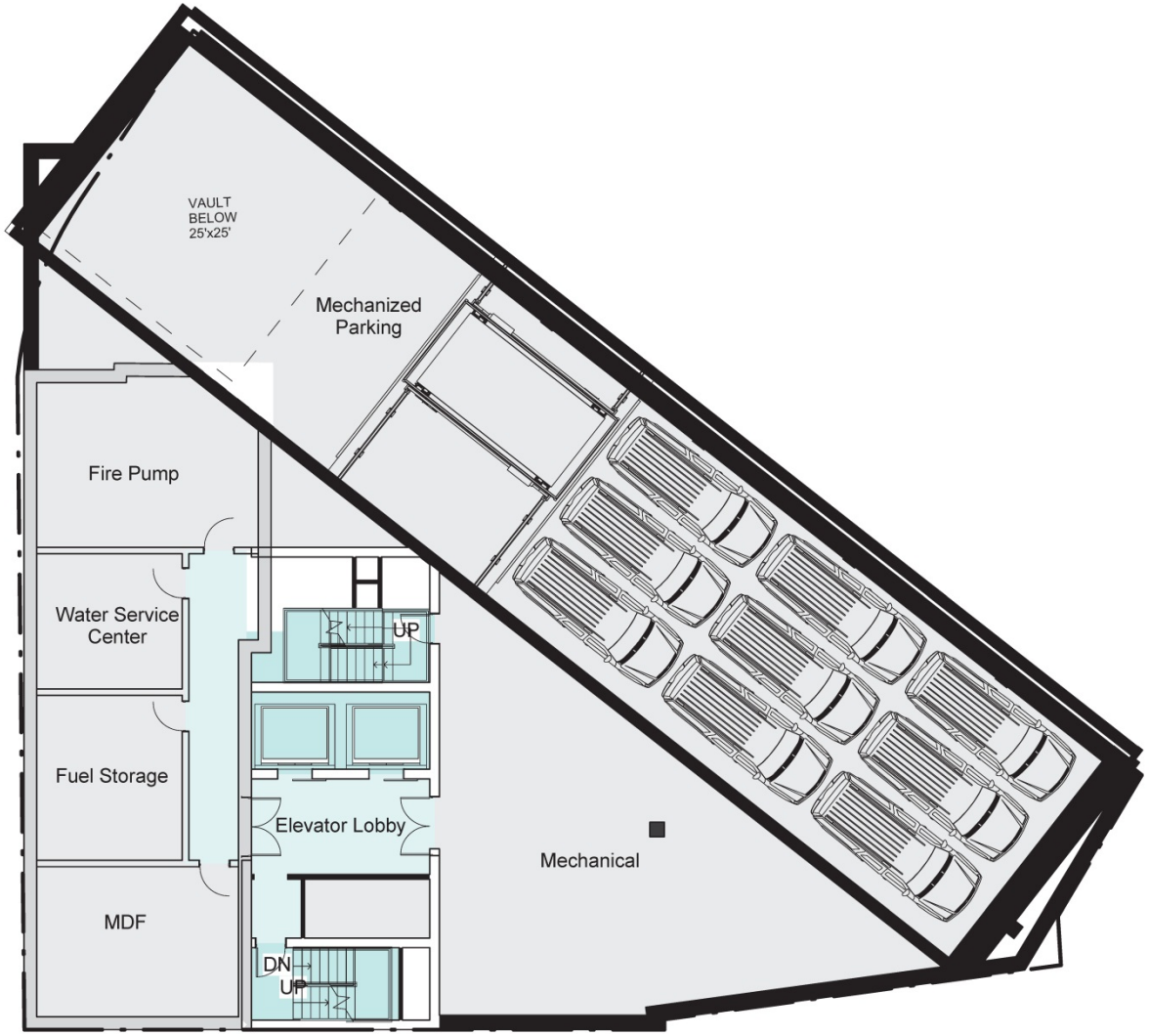
Figure A-1

Ground Level Plan



110 Broad Street Boston, Massachusetts

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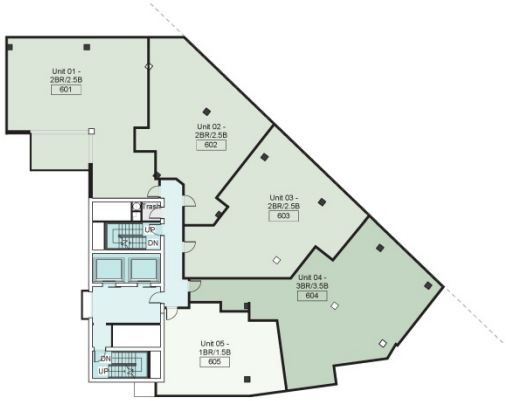
Figure A-2

Basement Plan

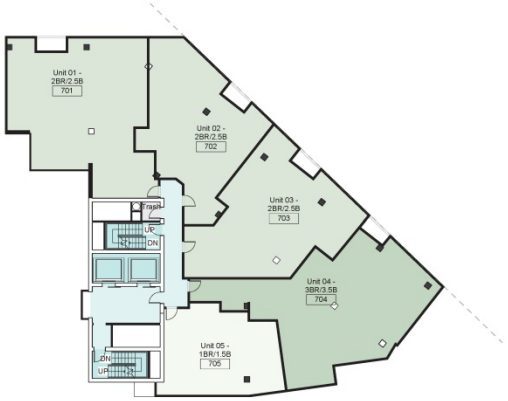
Level 2

Level 3

Levels 4-5



Level 6



Levels 7-11

Level 12

110 Broad Street Boston, Massachusetts

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Figure A-3

Floor Plans

110 Broad Street Boston, Massachusetts

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Figure A-4

Greenway Elevation

110 Broad Street Boston, Massachusetts

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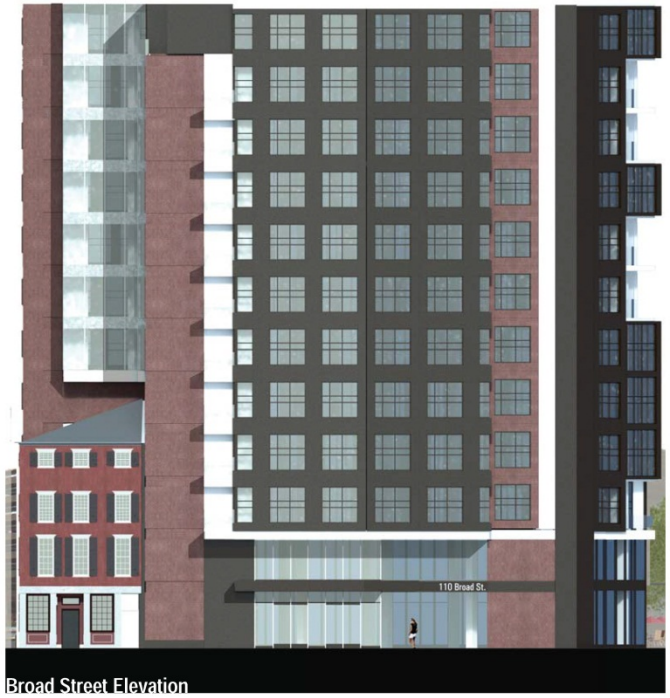
Figure A-5

Broad Street Elevation



110 Broad Street Boston, Massachusetts

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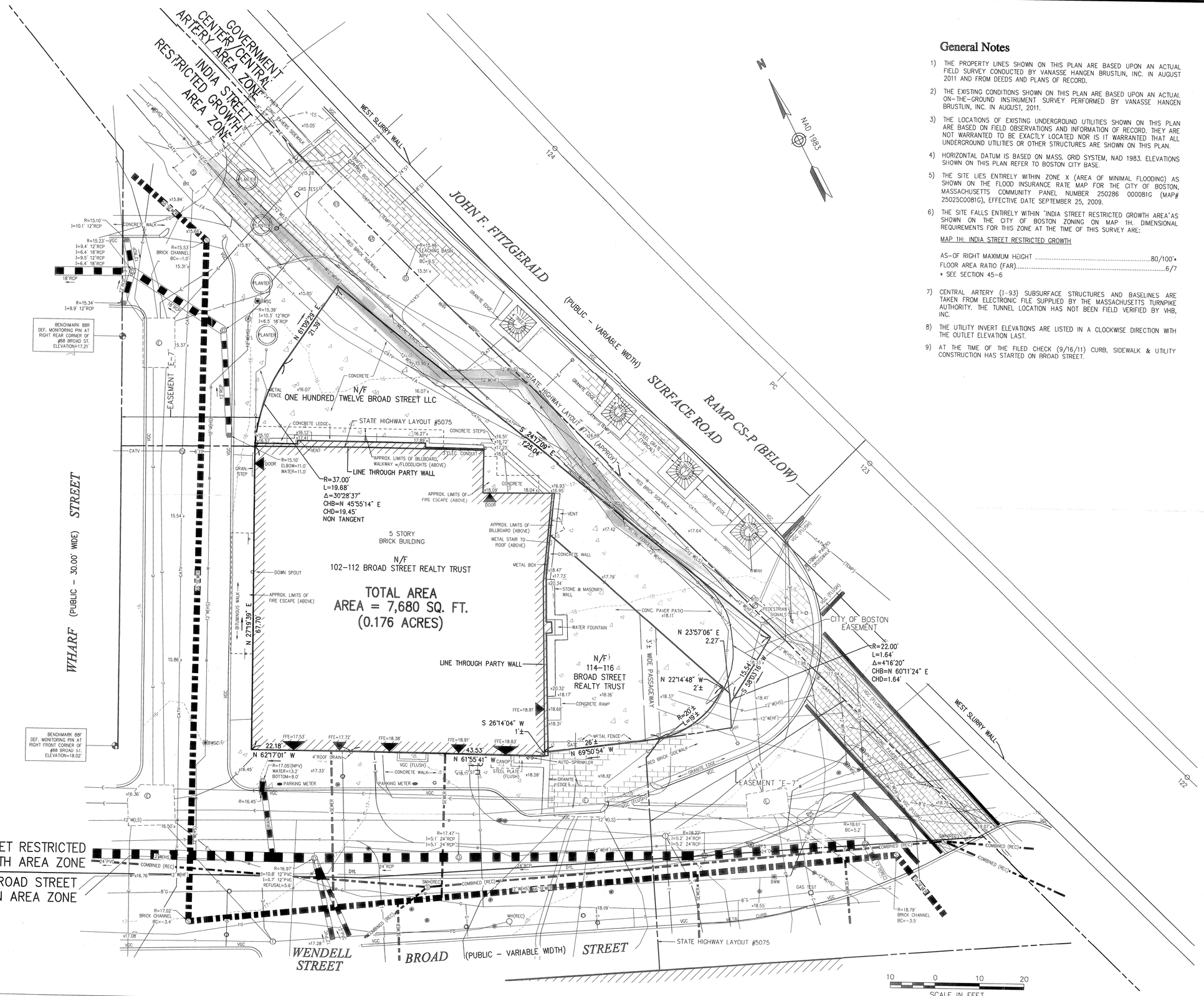
Figure A-6

Elevations

Appendix B

Site Survey



General Notes

1) THE PROPERTY LINES SHOWN ON THIS PLAN ARE BASED UPON AN ACTUAL FIELD SURVEY CONDUCTED BY VANASSE HANGEN BRUSTLIN, INC. IN AUGUST 2011 AND FROM DEEDS AND PLANS OF RECORD.

2) THE EXISTING CONDITIONS SHOWN ON THIS PLAN ARE BASED UPON AN ACTUAL ON-THE-GROUND INSTRUMENT SURVEY PERFORMED BY VANASSE HANGEN BRUSTLIN, INC. IN AUGUST, 2011.

3) THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES SHOWN ON THIS PLAN ARE BASED ON FIELD OBSERVATIONS AND INFORMATION OF RECORD. THEY ARE NOT WARRANTED TO BE EXACTLY LOCATED NOR IS IT WARRANTED THAT ALL UNDERGROUND UTILITIES OR OTHER STRUCTURES ARE SHOWN ON THIS PLAN.

4) HORIZONTAL DATUM IS BASED ON MASS. GRID SYSTEM, NAD 1983. ELEVATIONS SHOWN ON THIS PLAN REFER TO BOSTON CITY BASE.

5) THE SITE LIES ENTIRELY WITHIN ZONE X (AREA OF MINIMAL FLOODING) AS SHOWN ON THE FLOOD INSURANCE RATE MAP FOR THE CITY OF BOSTON, MASSACHUSETTS COMMUNITY PANEL NUMBER 250286 0000816 (MAP# 25025C0081G), EFFECTIVE DATE SEPTEMBER 25, 2009.

6) THE SITE FALLS ENTIRELY WITHIN "INDIA STREET RESTRICTED GROWTH AREA" AS SHOWN ON THE CITY OF BOSTON ZONING ON MAP 1H. DIMENSIONAL REQUIREMENTS FOR THIS ZONE AT THE TIME OF THIS SURVEY ARE:

MAP 1H: INDIA STREET RESTRICTED GROWTH

AS-OF RIGHT MAXIMUM HEIGHT .....80/100'*
FLOOR AREA RATIO (FAR).....6/7
* SEE SECTION 45-6

7) CENTRAL ARTERY (I-93) SUBSURFACE STRUCTURES AND BASELINES ARE TAKEN FROM ELECTRONIC FILE SUPPLIED BY THE MASSACHUSETTS TURNPIKE AUTHORITY. THE TUNNEL LOCATION HAS NOT BEEN FIELD VERIFIED BY VHB, INC.

8) THE UTILITY INVERT ELEVATIONS ARE LISTED IN A CLOCKWISE DIRECTION WITH THE OUTLET ELEVATION LAST.

9) AT THE TIME OF THE FILED CHECK (9/16/11) CURB, SIDEWALK & UTILITY CONSTRUCTION HAS STARTED ON BROAD STREET.

Legend

- DRAIN MANHOLE
- CATCH BASIN
- SEWER MANHOLE
- ELECTRIC MANHOLE
- TELEPHONE MANHOLE
- MANHOLE
- HAND HOLE
- WATER GATE
- FIRE HYDRANT
- GAS GATE
- STREET SIGN
- LIGHT POLE
- UTILITY POLE
- GUY POLE
- GUY WIRE
- MONITORING WELL
- FLOOD LIGHT
- WELL
- CNO COULD NOT OPEN
- NPV NO PIPES VISIBLE
- FFE=123.45' FIRST FLOOR ELEVATION
- EOP EDGE OF PAVEMENT
- CC CONCRETE CURB
- VGC VERTICAL GRANITE CURB
- SGE SLOPED GRANITE EDGE
- BB BITUMINOUS BERM
- BC BITUMINOUS CURB
- GUARD RAIL
- CHAIN LINK FENCE
- DRAINAGE LINE
- SEWER LINE
- OHW OVERHEAD WIRE
- STONE WALL
- TREE LINE

VHB

Vanasse Hangen Brustlin, Inc.

Transportation
Land Development
Environmental Services

101 Walnut Street, P.O. Box 9151
Watertown, Massachusetts 02471-9151
617 924 1770 • FAX 617 924 2286

No.	Revision	Date	Appvd.

Designed by	Drawn by	Checked by
CAD checked by	Approved by	
Scale 1"=10'	Date September 21, 2011	

Project Title

110 Broad Street

Boston, Massachusetts
Issued for

Drawing Title

Existing Conditions Plan of Land

Drawing Number

Sv-1

Sheet 1 of 1

Project Number
11712.00

\\vhbos\projects\11712.00\cad\sr\planset\11712.00-EX.DWG

Appendix C

Transportation

Available Upon Request

Appendix D

Wind Appendix

Table 1: 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	15		Standing	23		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	21		Acceptable
	B	Spring	15		Standing	25		Acceptable
		Summer	12		Sitting	20	+ 11 %	Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15		Standing	24		Acceptable
		Annual	14		Standing	23		Acceptable
2	A	Spring	15		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15	+ 15 %	Standing	22		Acceptable
		Annual	15	+ 15 %	Standing	21		Acceptable
3	A	Spring	9		Sitting	14		Acceptable
		Summer	7		Sitting	12		Acceptable
		Fall	8		Sitting	13		Acceptable
		Winter	8		Sitting	14		Acceptable
		Annual	8		Sitting	13		Acceptable
	B	Spring	10	+ 11 %	Sitting	16	+ 14 %	Acceptable
		Summer	9	+ 29 %	Sitting	14	+ 17 %	Acceptable
		Fall	9	+ 13 %	Sitting	14		Acceptable
		Winter	9	+ 13 %	Sitting	15		Acceptable
		Annual	10	+ 25 %	Sitting	15	+ 15 %	Acceptable
4	A	Spring	14		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		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.

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 1: 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
5	A	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	16		Walking	24		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	15		Standing	22		Acceptable
6	A	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	15		Standing	22		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
7	A	Spring	15		Standing	24		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	12		Sitting	20		Acceptable
		Winter	14		Standing	23		Acceptable
		Annual	13		Standing	22		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
8	A	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	14		Standing	22		Acceptable
		Summer	10	- 17 %	Sitting	17		Acceptable
		Fall	12	- 14 %	Sitting	19		Acceptable
		Winter	14		Standing	22		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.

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 1: 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
9	A	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		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	15		Standing	22		Acceptable
		Annual	14		Standing	21		Acceptable
10	A	Spring	14		Standing	21		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	15		Standing	21		Acceptable
		Summer	12	+ 20 %	Sitting	17		Acceptable
		Fall	13		Standing	18		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
11	A	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	20		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15	- 12 %	Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	18		Acceptable
12	A	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	11		Sitting	16		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	16		Acceptable
	B	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		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 1: 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
13	A	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	15		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	16		Walking	22		Acceptable
		Summer	12		Sitting	17	+ 13 %	Acceptable
		Fall	14		Standing	19		Acceptable
		Winter	16	+ 14 %	Walking	22		Acceptable
		Annual	15	+ 15 %	Standing	20		Acceptable
14	A	Spring	14		Standing	21		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	14		Standing	22		Acceptable
		Summer	12	+ 20 %	Sitting	18	+ 13 %	Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	21	+ 11 %	Acceptable
15	A	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	15	+ 25 %	Standing	22	+ 22 %	Acceptable
		Summer	10	+ 11 %	Sitting	16		Acceptable
		Fall	13	+ 30 %	Standing	19	+ 19 %	Acceptable
		Winter	12		Sitting	20	+ 11 %	Acceptable
		Annual	13	+ 18 %	Standing	19	+ 12 %	Acceptable
16	A	Spring	11		Sitting	18		Acceptable
		Summer	8		Sitting	14		Acceptable
		Fall	9		Sitting	16		Acceptable
		Winter	10		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	15	+ 36 %	Standing	22	+ 22 %	Acceptable
		Summer	11	+ 38 %	Sitting	16	+ 14 %	Acceptable
		Fall	13	+ 44 %	Standing	19	+ 19 %	Acceptable
		Winter	12	+ 20 %	Sitting	19	+ 12 %	Acceptable
		Annual	13	+ 30 %	Standing	19	+ 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 1: 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
17	A	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	9	- 18 %	Sitting	14	- 18 %	Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	11	- 15 %	Sitting	17	- 15 %	Acceptable
		Annual	11		Sitting	17	- 11 %	Acceptable
18	A	Spring	12		Sitting	18		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	9	- 25 %	Sitting	15	- 17 %	Acceptable
		Summer	7	- 13 %	Sitting	11	- 15 %	Acceptable
		Fall	8	- 20 %	Sitting	13	- 13 %	Acceptable
		Winter	9	- 18 %	Sitting	14	- 18 %	Acceptable
		Annual	8	- 20 %	Sitting	13	- 19 %	Acceptable
19	A	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	12	- 14 %	Sitting	18	- 14 %	Acceptable
		Summer	9	- 18 %	Sitting	14	- 13 %	Acceptable
		Fall	10	- 17 %	Sitting	15	- 17 %	Acceptable
		Winter	12		Sitting	18	- 14 %	Acceptable
		Annual	11	- 15 %	Sitting	16	- 16 %	Acceptable
20	A	Spring	13		Standing	21		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	16	+ 23 %	Walking	23		Acceptable
		Summer	13	+ 30 %	Standing	18	+ 20 %	Acceptable
		Fall	13		Standing	20	+ 11 %	Acceptable
		Winter	15	+ 25 %	Standing	22	+ 16 %	Acceptable
		Annual	14	+ 17 %	Standing	21	+ 11 %	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 1: 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
21	A	Spring	17		Walking	26		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	15		Standing	24		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	16		Walking	25		Acceptable
		Summer	12	- 14 %	Sitting	19		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	23		Acceptable
22	A	Spring	15		Standing	24		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	13		Standing	22		Acceptable
		Annual	13		Standing	21		Acceptable
	B	Spring	13	- 13 %	Standing	21	- 13 %	Acceptable
		Summer	10		Sitting	16	- 11 %	Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	12		Sitting	19		Acceptable
23	A	Spring	13		Standing	22		Acceptable
		Summer	10		Sitting	17		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	20		Acceptable
	B	Spring	15	+ 15 %	Standing	24		Acceptable
		Summer	12	+ 20 %	Sitting	18		Acceptable
		Fall	13		Standing	21	+ 11 %	Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	14	+ 17 %	Standing	21		Acceptable
24	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	17	+ 31 %	Walking	25	+ 25 %	Acceptable
		Summer	13	+ 30 %	Standing	19	+ 19 %	Acceptable
		Fall	15	+ 36 %	Standing	22	+ 22 %	Acceptable
		Winter	16	+ 33 %	Walking	24	+ 20 %	Acceptable
		Annual	15	+ 25 %	Standing	23	+ 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 1: 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
25	A	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	11		Sitting	16		Acceptable
	B	Spring	14	+ 27 %	Standing	21	+ 17 %	Acceptable
		Summer	11	+ 22 %	Sitting	16	+ 14 %	Acceptable
		Fall	12	+ 20 %	Sitting	17	+ 13 %	Acceptable
		Winter	13	+ 18 %	Standing	20	+ 18 %	Acceptable
		Annual	13	+ 18 %	Standing	19	+ 19 %	Acceptable
26	A	Spring	15		Standing	23		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	13		Standing	21		Acceptable
	B	Spring	16		Walking	24		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15	+ 15 %	Standing	22		Acceptable
		Annual	14		Standing	21		Acceptable
27	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	11		Sitting	17		Acceptable
28	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		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.

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 1: 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	13		Standing	19		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	11	- 15 %	Sitting	18		Acceptable
		Summer	8	- 20 %	Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	10	- 17 %	Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
30	A	Spring	14		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	14		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	18		Acceptable
31	A	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	10		Sitting	16		Acceptable
		Summer	8	- 11 %	Sitting	12		Acceptable
		Fall	9		Sitting	14		Acceptable
		Winter	9	- 18 %	Sitting	15	- 12 %	Acceptable
		Annual	9		Sitting	14	- 13 %	Acceptable
32	A	Spring	7		Sitting	11		Acceptable
		Summer	5		Sitting	9		Acceptable
		Fall	6		Sitting	10		Acceptable
		Winter	6		Sitting	11		Acceptable
		Annual	6		Sitting	10		Acceptable
	B	Spring	6	- 14 %	Sitting	10		Acceptable
		Summer	5		Sitting	8	- 11 %	Acceptable
		Fall	6		Sitting	9		Acceptable
		Winter	6		Sitting	10		Acceptable
		Annual	6		Sitting	9		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 1: 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
33	A	Spring	8		Sitting	13		Acceptable
		Summer	6		Sitting	10		Acceptable
		Fall	8		Sitting	12		Acceptable
		Winter	8		Sitting	13		Acceptable
		Annual	8		Sitting	12		Acceptable
	B	Spring	8		Sitting	13		Acceptable
		Summer	6		Sitting	10		Acceptable
		Fall	7	- 13 %	Sitting	12		Acceptable
		Winter	8		Sitting	12		Acceptable
		Annual	7	- 13 %	Sitting	12		Acceptable
34	A	Spring	13		Standing	21		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	13		Standing	22		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	19		Acceptable
35	A	Spring	9		Sitting	15		Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	8		Sitting	13		Acceptable
		Winter	8		Sitting	14		Acceptable
		Annual	8		Sitting	13		Acceptable
	B	Spring	13	+ 44 %	Standing	21	+ 40 %	Acceptable
		Summer	10	+ 43 %	Sitting	15	+ 36 %	Acceptable
		Fall	12	+ 50 %	Sitting	18	+ 38 %	Acceptable
		Winter	12	+ 50 %	Sitting	18	+ 29 %	Acceptable
		Annual	12	+ 50 %	Sitting	18	+ 38 %	Acceptable
36	A	Spring	9		Sitting	14		Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	8		Sitting	13		Acceptable
		Winter	9		Sitting	14		Acceptable
		Annual	8		Sitting	13		Acceptable
	B	Spring	9		Sitting	15		Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	8		Sitting	13		Acceptable
		Winter	8	- 11 %	Sitting	14		Acceptable
		Annual	8		Sitting	13		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 1: 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
37	A	Spring	11		Sitting	17		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	10		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	11		Sitting	17		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10	+ 11 %	Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
38	A	Spring	13		Standing	21		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
39	A	Spring	11		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	11		Sitting	18		Acceptable
40	A	Spring	9		Sitting	15		Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	8		Sitting	13		Acceptable
		Winter	9		Sitting	15		Acceptable
		Annual	8		Sitting	14		Acceptable
	B	Spring	9		Sitting	15		Acceptable
		Summer	7		Sitting	12		Acceptable
		Fall	8		Sitting	14		Acceptable
		Winter	10	+ 11 %	Sitting	16		Acceptable
		Annual	9	+ 13 %	Sitting	15		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 1: 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
41	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
42	A	Spring	11		Sitting	17		Acceptable
		Summer	8		Sitting	14		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	10		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	9	+ 13 %	Sitting	14		Acceptable
		Fall	10	+ 11 %	Sitting	15		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
43	A	Spring	18		Walking	26		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	18		Walking	26		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
44	A	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	16		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	16		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 1: 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
45	A	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	22		Acceptable
	B	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	16		Walking	22		Acceptable
46	A	Spring	13		Standing	21		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
47	A	Spring	13		Standing	22		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	20		Acceptable
	B	Spring	14		Standing	22		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
48	A	Spring	13		Standing	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	13		Standing	19		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 1: 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
49	A	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	11		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
50	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
51	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	10	+ 11 %	Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	12		Sitting	18		Acceptable
52	A	Spring	19		Walking	28		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	25		Acceptable
	B	Spring	19		Walking	28		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	25		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
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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 1: 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
53	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	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
54	A	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
55	A	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
56	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	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 1: 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	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	24		Acceptable
		Annual	14		Standing	22		Acceptable
58	A	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
59	A	Spring	18		Walking	26		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	24		Acceptable
	B	Spring	18		Walking	26		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	16		Walking	24		Acceptable
60	A	Spring	19		Walking	27		Acceptable
		Summer	15		Standing	22		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	25		Acceptable
	B	Spring	19		Walking	27		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	18		Walking	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
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	Comfortable for Walking:	> 15 and ≤ 19 mph		
	Uncomfortable for Walking:	> 19 and ≤ 27 mph		
	Dangerous Conditions:	> 27 mph		

Table 1: 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
61	A	Spring	20		Uncomfortable	28		Acceptable
		Summer	17		Walking	24		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	18		Walking	27		Acceptable
	B	Spring	20		Uncomfortable	29		Acceptable
		Summer	17		Walking	24		Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	19		Walking	27		Acceptable
62	A	Spring	15		Standing	24		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	24		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	15		Standing	24		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	14		Standing	22		Acceptable
63	A	Spring	17		Walking	25		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	17		Walking	25		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	24		Acceptable
64	A	Spring	19		Walking	26		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	25		Acceptable
	B	Spring	19		Walking	26		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	24		Acceptable

Notes: 1) Wind speeds are for a 1% probability of exceedance; and,
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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 1: 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
65	A	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
66	A	Spring	18		Walking	27		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	17		Walking	25		Acceptable
	B	Spring	18		Walking	27		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	17		Walking	25		Acceptable
67	A	Spring	18		Walking	26		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	24		Acceptable
	B	Spring	18		Walking	26		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	25		Acceptable
68	A	Spring	20		Uncomfortable	27		Acceptable
		Summer	16		Walking	21		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	20		Uncomfortable	28		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	18		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 1: 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
69	A	Spring	16		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	16		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
70	A	Spring	22		Uncomfortable	29		Acceptable
		Summer	18		Walking	24		Acceptable
		Fall	19		Walking	26		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	20		Uncomfortable	27		Acceptable
	B	Spring	22		Uncomfortable	31		Acceptable
		Summer	18		Walking	24		Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	20		Uncomfortable	29		Acceptable
		Annual	20		Uncomfortable	28		Acceptable
71	A	Spring	17		Walking	26		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	27		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	17		Walking	25		Acceptable
72	A	Spring	22		Uncomfortable	28		Acceptable
		Summer	18		Walking	23		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	19		Walking	26		Acceptable
		Annual	19		Walking	26		Acceptable
	B	Spring	22		Uncomfortable	29		Acceptable
		Summer	18		Walking	23		Acceptable
		Fall	19		Walking	26		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	20		Uncomfortable	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 1: 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
73	A	Spring	21		Uncomfortable	28		Acceptable
		Summer	17		Walking	23		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	19		Walking	26		Acceptable
	B	Spring	21		Uncomfortable	29		Acceptable
		Summer	17		Walking	23		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	19		Walking	27		Acceptable
74	A	Spring	21		Uncomfortable	28		Acceptable
		Summer	18		Walking	23		Acceptable
		Fall	18		Walking	24		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	20		Uncomfortable	26		Acceptable
	B	Spring	22		Uncomfortable	28		Acceptable
		Summer	18		Walking	23		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	20		Uncomfortable	26		Acceptable
75	A	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	17		Walking	23		Acceptable
	B	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
76	A	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	14		Standing	22		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	14		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	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 1: 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
77	A	Spring	19		Walking	30		Acceptable
		Summer	16		Walking	26		Acceptable
		Fall	16		Walking	25		Acceptable
		Winter	16		Walking	26		Acceptable
		Annual	17		Walking	27		Acceptable
	B	Spring	19		Walking	30		Acceptable
		Summer	16		Walking	25		Acceptable
		Fall	16		Walking	25		Acceptable
		Winter	16		Walking	26		Acceptable
		Annual	17		Walking	27		Acceptable
78	A	Spring	25		Uncomfortable	32		Unacceptable
		Summer	21		Uncomfortable	27		Acceptable
		Fall	21		Uncomfortable	27		Acceptable
		Winter	22		Uncomfortable	29		Acceptable
		Annual	23		Uncomfortable	29		Acceptable
	B	Spring	25		Uncomfortable	32		Unacceptable
		Summer	21		Uncomfortable	27		Acceptable
		Fall	21		Uncomfortable	27		Acceptable
		Winter	21		Uncomfortable	29		Acceptable
		Annual	22		Uncomfortable	29		Acceptable
79	A	Spring	22		Uncomfortable	29		Acceptable
		Summer	19		Walking	24		Acceptable
		Fall	19		Walking	25		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	20		Uncomfortable	26		Acceptable
	B	Spring	22		Uncomfortable	29		Acceptable
		Summer	19		Walking	24		Acceptable
		Fall	19		Walking	25		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	20		Uncomfortable	26		Acceptable
80	A	Spring	24		Uncomfortable	31		Acceptable
		Summer	20		Uncomfortable	25		Acceptable
		Fall	20		Uncomfortable	27		Acceptable
		Winter	21		Uncomfortable	28		Acceptable
		Annual	22		Uncomfortable	28		Acceptable
	B	Spring	24		Uncomfortable	31		Acceptable
		Summer	20		Uncomfortable	26		Acceptable
		Fall	20		Uncomfortable	27		Acceptable
		Winter	21		Uncomfortable	29		Acceptable
		Annual	22		Uncomfortable	28		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 1: 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
81	A	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	15	+ 36 %	Standing	22	+ 22 %	Acceptable
		Summer	12	+ 33 %	Sitting	17	+ 21 %	Acceptable
		Fall	12	+ 20 %	Sitting	18	+ 20 %	Acceptable
		Winter	14	+ 27 %	Standing	21	+ 24 %	Acceptable
		Annual	13	+ 30 %	Standing	20	+ 25 %	Acceptable
82	A	Spring	14		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
83	A	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	16	+ 14 %	Walking	22		Acceptable
		Summer	12		Sitting	16		Acceptable
		Fall	14	+ 17 %	Standing	20	+ 11 %	Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	15	+ 15 %	Standing	20		Acceptable
84	A	Spring	14		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	14		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.

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 1: 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
85	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	12		Sitting	19		Acceptable
		Summer	10	+ 11 %	Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
86	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		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	11		Sitting	17		Acceptable
		Winter	11		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
87	A	Spring	13		Standing	22		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	11		Sitting	19		Acceptable
		Annual	11		Sitting	19		Acceptable
	B	Spring	13		Standing	22		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	11		Sitting	19		Acceptable
		Annual	12		Sitting	19		Acceptable
88	A	Spring	14		Standing	20		Acceptable
		Summer	10		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	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	11		Sitting	18		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.

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 1: 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
89	A	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	16		Acceptable
		Winter	12		Sitting	19		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	17		Acceptable
90	A	Spring	13		Standing	20		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	11		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	14		Standing	20		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	11		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	12		Sitting	17		Acceptable
91	A	Spring	10		Sitting	16		Acceptable
		Summer	8		Sitting	12		Acceptable
		Fall	10		Sitting	14		Acceptable
		Winter	11		Sitting	16		Acceptable
		Annual	10		Sitting	15		Acceptable
	B	Spring	11		Sitting	16		Acceptable
		Summer	8		Sitting	12		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	15		Acceptable
92	A	Spring	13		Standing	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	9	- 31 %	Sitting	15	- 21 %	Acceptable
		Summer	7	- 22 %	Sitting	11	- 21 %	Acceptable
		Fall	8	- 27 %	Sitting	13	- 24 %	Acceptable
		Winter	9	- 18 %	Sitting	14	- 18 %	Acceptable
		Annual	8	- 27 %	Sitting	14	- 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 1: 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
93	A	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
94	A	Spring	9		Sitting	16		Acceptable
		Summer	7		Sitting	13		Acceptable
		Fall	8		Sitting	14		Acceptable
		Winter	9		Sitting	15		Acceptable
		Annual	9		Sitting	15		Acceptable
	B	Spring	10	+ 11 %	Sitting	17		Acceptable
		Summer	7		Sitting	12		Acceptable
		Fall	8		Sitting	14		Acceptable
		Winter	9		Sitting	15		Acceptable
		Annual	9		Sitting	15		Acceptable
95	A	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
96	A	Spring	13		Standing	20		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	21		Acceptable
		Summer	10		Sitting	15		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 1: 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
97	A	Spring	11		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
98	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	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	12		Sitting	18		Acceptable
99	A	Spring	22		Uncomfortable	29		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	19		Walking	26		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	19		Walking	27		Acceptable
	B	Spring	21		Uncomfortable	29		Acceptable
		Summer	15		Standing	22		Acceptable
		Fall	19		Walking	26		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	19		Walking	27		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		

Appendix E

Climate Change Preparedness Questionnaire

Climate Change Preparedness and Resiliency Checklist for New Construction

In November 2013, in conformance with the Mayor's 2011 Climate Action Leadership Committee's recommendations, the Boston Redevelopment Authority adopted policy for all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding project resiliency, preparedness, and to mitigate any identified adverse impacts that might arise under future climate conditions.

For more information about the City of Boston's climate policies and practices, and the 2011 update of the climate action plan, *A Climate of Progress*, please see the City's climate action web pages at http://www.cityofboston.gov/climate

In advance we thank you for your time and assistance in advancing best practices in Boston.

Climate Change Analysis and Information Sources:

1. Northeast Climate Impacts Assessment (www.climatechoices.org/ne/)
2. USGCRP 2009 (http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/)
3. Army Corps of Engineers guidance on sea level rise (http://planning.usace.army.mil/toolbox/library/ECs/EC11652212Nov2011.pdf)
4. Proceeding of the National Academy of Science, "Global sea level rise linked to global temperature", Vermeer and Rahmstorf, 2009 (http://www.pnas.org/content/early/2009/12/04/0907765106.full.pdf)
5. "Hotspot of accelerated sea-level rise on the Atlantic coast of North America", Asbury H. Sallenger Jr*, Kara S. Doran and Peter A. Howd, 2012 (http://www.bostonredevelopmentauthority.org/planning/Hotspot of Accelerated Sea-level Rise 2012.pdf)
6. "Building Resilience in Boston": Best Practices for Climate Change Adaptation and Resilience for Existing Buildings, Linnean Solutions, The Built Environment Coalition, The Resilient Design Institute, 2103 (http://www.greenribboncommission.org/downloads/Building_Resilience_in_Boston_SML.pdf)

Checklist

Please respond to all of the checklist questions to the fullest extent possible. For projects that respond "Yes" to any of the D.1 – Sea-Level Rise and Storms, Location Description and Classification questions, please respond to all of the remaining Section D questions.

Checklist responses are due at the time of initial project filing or Notice of Project Change and final filings just prior seeking Final BRA Approval. A PDF of your response to the Checklist should be submitted to the Boston Redevelopment Authority via your project manager.

Please Note: When initiating a new project, please visit the BRA web site for the most current Climate Change Preparedness & Resiliency Checklist.

A.1 - Project Information

Project Name:	110 Broad Street
Project Address Primary:	110 Broad Street
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	

A.2 - Team Description

Owner / Developer:	New Boston Ventures, LLC
Architect:	Finegold Alexander + Associates
Engineer (building systems):	WSP Flack + Kurtz
Sustainability / LEED:	Finegold Alexander + Associates
Permitting:	Epsilon Associates, Inc
Construction Management:	
Climate Change Expert:	

A.3 - Project Permitting and Phase

At what phase is the project – most recent completed submission at the time of this response?

☑ PNF / Expanded PNF Submission	☐ Draft / Final Project Impact Report Submission	☐ BRA Board Approved	☐ Notice of Project Change
☐ Planned Development Area	☐ BRA Final Design Approved	☐ Under Construction	☐ Construction just completed:

A.4 - Building Classification and Description

List the principal Building Uses:	Residential, Commercial/Restaurant
List the First Floor Uses:	*Commercial/Restaurant, Residential Lobby*

What is the principal Construction Type – select most appropriate type?

☐ Wood Frame	☐ Masonry	☐ Steel Frame	☑ Concrete

Describe the building?

Site Area:	*7, 680 SF*	Building Area:	*83,500 SF*
Building Height:	*120 Ft.*	Number of Stories:	*12 Flrs.*
First Floor Elevation (reference Boston City Base):	*18.4 Elev.*	Are there below grade spaces/levels, if yes how many:	*No / Number of Levels - 1*

A.5 - Green Building

Which LEED Rating System(s) and version has or will your project use (by area for multiple rating systems)?

Select by Primary Use:	☑ New Construction	☐ Core & Shell	☐ Healthcare	☐ Schools
	☐ Retail	☐ Homes Midrise	☐ Homes	☐ Other
Select LEED Outcome:	☐ Certified	☐ Silver	☐ Gold	☐ Platinum

Will the project be USGBC Registered and / or USGBC Certified?

Registered:	*Yes / No*	Certified:	*Yes / No*

A.6 - Building Energy-

What are the base and peak operating energy loads for the building?

Electric:	*750 (kW)*	Heating:	*3,300 (MMBtu/hr) Domestic Hot Water = 500 MBH*
What is the planned building Energy Use Intensity:	*15 (kWh/SF)*	Cooling:	*250 (Tons/hr)*

What are the peak energy demands of your critical systems in the event of a service interruption?

Electric:	*300 (kW)*	Heating:	*0 (MMBtu/hr)*
		Cooling:	*0 (Tons/hr)*

What is nature and source of your back-up / emergency generators?

Electrical Generation:	*300 (kW)*		Fuel Source:	
System Type and Number of Units:	☑ Combustion Engine	☐ Gas Turbine	☐ Combine Heat and Power	*(Units)*

B - Extreme Weather and Heat Events

Climate change will result in more extreme weather events including higher year round average temperatures, higher peak temperatures, and more periods of extended peak temperatures. The section explores how a project responds to higher temperatures and heat waves.

B.1 - Analysis

What is the full expected life of the project?

Select most appropriate:	☐ 10 Years	☐ 25 Years	☑ 50 Years	☐ 75 Years

What is the full expected operational life of key building systems (e.g. heating, cooling, ventilation)?

Select most appropriate:	☐ 10 Years	☑ 25 Years	☐ 50 Years	☐ 75 Years

What time span of future Climate Conditions was considered?

Select most appropriate:	☐ 10 Years	☐ 25 Years	☑ 50 Years	☐ 75 Years

Analysis Conditions - What range of temperatures will be used for project planning – Low/High?

8/91 Deg.	Based on ASHRAE Fundamentals 2013 99.6% heating; 0.4% cooling

What Extreme Heat Event characteristics will be used for project planning – Peak High, Duration, and Frequency?

95 Deg.	*5 Days*	*6 Events / yr.*

What Drought characteristics will be used for project planning – Duration and Frequency?

30-90 Days	*0.2 Events / yr.*

What Extreme Rain Event characteristics will be used for project planning – Seasonal Rain Fall, Peak Rain Fall, and Frequency of Events per year?

45 Inches / yr.	*4 Inches*	*0.5 Events / yr.*

What Extreme Wind Storm Event characteristics will be used for project planning – Peak Wind Speed, Duration of Storm Event, and Frequency of Events per year?

130 Peak Wind	*10 Hours*	*0.25 Events / yr.*

B.2 - Mitigation Strategies

What will be the overall energy performance, based on use, of the project and how will performance be determined?

Building energy use below code:	***25%***
How is performance determined:	Energy model

What specific measures will the project employ to reduce building energy consumption?

Select all appropriate:	☐ High performance building envelop	☐ High performance lighting & controls	☐ Building day lighting	☑ EnergyStar equip. / appliances
	☐ High performance HVAC equipment	☐ Energy recovery ventilation	☐ No active cooling	☐ No active heating
Describe any added measures:				

What are the insulation (R) values for building envelop elements?

Roof:	*R = 25*	Walls / Curtain Wall Assembly:	*R = 13BATTS + R8 continuous insulation*
Foundation:	*R = 15*	Basement / Slab:	*R =10*
Windows:	*R = / U =0.4*	Doors:	*R = / U =0.7*

What specific measures will the project employ to reduce building energy demands on the utilities and infrastructure?

☐ On-site clean energy / CHP system(s)	☐ Building-wide power dimming	☐ Thermal energy storage systems	☐ Ground source heat pump
☐ On-site Solar PV	☐ On-site Solar Thermal	☐ Wind power	☑ None

Describe any added measures:	

Will the project employ Distributed Energy / Smart Grid Infrastructure and /or Systems?

Select all appropriate:	☐ Connected to local distributed electrical	☐ Building will be Smart Grid ready	☐ Connected to distributed steam, hot, chilled water	☐ Distributed thermal energy ready

Will the building remain operable without utility power for an extended period?

	Yes / No	If yes, for how long:	*Days*
If Yes, is building "Islandable?			
If Yes, describe strategies:			

Describe any non-mechanical strategies that will support building functionality and use during an extended interruption(s) of utility services and infrastructure:

Select all appropriate:	☐ Solar oriented – longer south walls	☐ Prevailing winds oriented	☐ External shading devices	☐ Tuned glazing,
	☐ Building cool zones	☑ Operable windows	☐ Natural ventilation	☐ Building shading
	☐ Potable water for drinking / food preparation	☐ Potable water for sinks / sanitary systems	☐ Waste water storage capacity	☐ High Performance Building Envelop
Describe any added measures:				

What measures will the project employ to reduce urban heat-island effect?

Select all appropriate:	☐ High reflective paving materials	☐ Shade trees & shrubs	☑ High reflective roof materials	☐ Vegetated roofs
Describe other strategies:				

What measures will the project employ to accommodate rain events and more rain fall?

Select all appropriate:	☐ On-site retention systems & ponds	☐ Infiltration galleries & areas	☐ Vegetated water capture systems	☐ Vegetated roofs
Describe other strategies:				

What measures will the project employ to accommodate extreme storm events and high winds?

Select all appropriate:	☐ Hardened building structure & elements	☑ Buried utilities & hardened infrastructure	☐ Hazard removal & protective landscapes	☐ Soft & permeable surfaces (water infiltration)
Describe other strategies:				

C - Sea-Level Rise and Storms

Rising Sea-Levels and more frequent Extreme Storms increase the probability of coastal and river flooding and enlarging the extent of the 100 Year Flood Plain. This section explores if a project is or might be subject to Sea-Level Rise and Storm impacts.

C.1 - Location Description and Classification:

Do you believe the building to susceptible to flooding now or during the full expected life of the building?

Yes / No

Describe site conditions?

Site Elevation – Low/High Points:	*18.4 Boston City Base Elev.(Ft.)*
Building Proximity to Water:	*560 Ft.*

Is the site or building located in any of the following?

Coastal Zone:	Yes / No	Velocity Zone:	Yes / No
Flood Zone:	Yes / No	Area Prone to Flooding:	Yes / No

Will the 2013 Preliminary FEMA Flood Insurance Rate Maps or future floodplain delineation updates due to Climate Change result in a change of the classification of the site or building location?

2013 FEMA Prelim. FIRMs:	Yes / No	Future floodplain delineation updates:	Yes / No

What is the project or building proximity to nearest Coastal, Velocity or Flood Zone or Area Prone to Flooding?

Ft.

If you answered YES to any of the above Location Description and Classification questions, please complete the following questions. ***Otherwise you have completed the questionnaire; thank you!***

C - Sea-Level Rise and Storms

This section explores how a project responds to Sea-Level Rise and / or increase in storm frequency or severity.

C.2 - Analysis

How were impacts from higher sea levels and more frequent and extreme storm events analyzed:

Sea Level Rise:	*3 Ft.*	Frequency of storms:	*0.25 per year*

C.3 - Building Flood Proofing

Describe any strategies to limit storm and flood damage and to maintain functionality during an extended periods of disruption.

What will be the Building Flood Proof Elevation and First Floor Elevation:

Flood Proof Elevation:	*18.4 Boston City Base Elev.(Ft.)*	First Floor Elevation:	*18.4 Boston City Base Elev. (Ft.)*

Will the project employ temporary measures to prevent building flooding (e.g. barricades, flood gates):

	Yes / No	If Yes, to what elevation	*Boston City Base Elev. (Ft.)*
If Yes, describe:			

What measures will be taken to ensure the integrity of critical building systems during a flood or severe storm event:

☑ Systems located above 1st Floor.	☑ Water tight utility conduits	☐ Waste water back flow prevention	☐ Storm water back flow prevention

Were the differing effects of fresh water and salt water flooding considered:

Yes / No

Will the project site / building(s) be accessible during periods of inundation or limited access to transportation:

Yes / No	If yes, to what height above 100 Year Floodplain:	*Boston City Base Elev. (Ft.)*

Will the project employ hard and / or soft landscape elements as velocity barriers to reduce wind or wave impacts?

Yes / No	
If Yes, describe:	

Will the building remain occupiable without utility power during an extended period of inundation:

Yes / No	If Yes, for how long:	*days*

Describe any additional strategies to addressing sea level rise and or sever storm impacts:

C.4 - Building Resilience and Adaptability

Describe any strategies that would support rapid recovery after a weather event and accommodate future building changes that respond to climate change:

Will the building be able to withstand severe storm impacts and endure temporary inundation?

Select appropriate:	*Yes / No*	☐ Hardened / Resilient Ground Floor Construction	☐ Temporary shutters and or barricades	☐ Resilient site design, materials and construction

Can the site and building be reasonably modified to increase Building Flood Proof Elevation?

Select appropriate:	*Yes / No*	☐ Surrounding site elevation can be raised	☐ Building ground floor can be raised	☐ Construction been engineered
Describe additional strategies:				

Has the building been planned and designed to accommodate future resiliency enhancements?

Select appropriate:	*Yes / No*	☐ Solar PV	☐ Solar Thermal	☐ Clean Energy / CHP System(s)
		☐ Potable water storage	☐ Wastewater storage	☐ Back up energy systems & fuel
Describe any specific or additional strategies:				

Thank you for completing the Boston Climate Change Resilience and Preparedness Checklist!

For questions or comments about this checklist or Climate Change Resiliency and Preparedness best practices, please contact: John.Dalzell.BRA@cityofboston.gov

Appendix F

Accessibility Checklist

Accessibility Checklist

(to be added to the BRA Development Review Guidelines)

In 2009, a nine-member Advisory Board was appointed to the Commission for Persons with Disabilities in an effort to reduce architectural, procedural, attitudinal, and communication barriers affecting persons with disabilities in the City of Boston. These efforts were instituted to work toward creating universal access in the built environment.

In line with these priorities, the Accessibility Checklist aims to support the inclusion of people with disabilities. In order to complete the Checklist, you must provide specific detail, including descriptions, diagrams and data, of the universal access elements that will ensure all individuals have an equal experience that includes full participation in the built environment throughout the proposed buildings and open space.

In conformance with this directive, all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding the following:

- improvements for pedestrian and vehicular circulation and access;
- encourage new buildings and public spaces to be designed to enhance and preserve Boston's system of parks, squares, walkways, and active shopping streets;
- ensure that persons with disabilities have full access to buildings open to the public;
- afford such persons the educational, employment, and recreational opportunities available to all citizens; and
- preserve and increase the supply of living space accessible to persons with disabilities.

We would like to thank you in advance for your time and effort in advancing best practices and progressive approaches to expand accessibility throughout Boston's built environment.

Accessibility Analysis Information Sources:

1. Americans with Disabilities Act – 2010 ADA Standards for Accessible Design
    a. http://www.ada.gov/2010ADAstandards_index.htm
2. Massachusetts Architectural Access Board 521 CMR
    a. http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/aab/aab-rules-and-regulations-pdf.html
3. Boston Complete Street Guidelines
    a. http://bostoncompletestreets.org/
4. City of Boston Mayors Commission for Persons with Disabilities Advisory Board
    a. http://www.cityofboston.gov/Disability
5. City of Boston – Public Works Sidewalk Reconstruction Policy
    a. http://www.cityofboston.gov/images_documents/sidewalk%20policy%200114_tcm3-41668.pdf
6. Massachusetts Office On Disability Accessible Parking Requirements
    a. www.mass.gov/anf/docs/mod/hp-parking-regulations-mod.doc
7. MBTA Fixed Route Accessible Transit Stations
    a. http://www.mbta.com/about_the_mbta/accessibility/

Article 80 | ACCESSIBILTY CHECKLIST

Project Information

Project Name:	110 Broad Street
Project Address Primary:	110 Broad Street
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	Ellen Anselone / Project Manager / Finegold Alexander+ Associates Inc. / eka@faainc.com / (617) 227-9272 x 203

Team Description

Owner / Developer:	New Boston Ventures
Architect:	Finegold Alexander + Associates
Engineer (building systems):	WSP USA
Sustainability / LEED:	Finegold Alexander + Associates
Permitting:	Epsilon Associates
Construction Management:	TBD

Project Permitting and Phase

At what phase is the project – at time of this questionnaire?

☑PNF / Expanded PNF Submitted	Draft / Final Project Impact Report Submitted	BRA Board Approved
BRA Design Approved	Under Construction	Construction just completed:

Article 80 | ACCESSIBILTY CHECKLIST

Building Classification and Description

What are the principal Building Uses - select all appropriate uses?

	Residential – One to Three Unit	☑Residential - Multi-unit, Four +	Institutional	Education
	Commercial	Office	Retail	Assembly
	Laboratory / Medical	Manufacturing / Industrial	Mercantile	Storage, Utility and Other
First Floor Uses (List)	*Residential lobby, commercial, loading and parking access*			

What is the Construction Type – select most appropriate type?

	Wood Frame	Masonry	Steel Frame	☑Concrete

Describe the building?

Site Area:	*7,680 SF*	Building Area:	*83,500 SF*
Building Height:	*120 Ft.*	Number of Stories:	*12 Flrs.*
First Floor Elevation:	*18.4 Elev.*	Are there below grade spaces:	*☑Yes / No*

Assessment of Existing Infrastructure for Accessibility:

This section explores the proximity to accessible transit lines and proximate institutions such as, but not limited to hospitals, elderly and disabled housing, and general neighborhood information. The proponent should identify how the area surrounding the development is accessible for people with mobility impairments and should analyze the existing condition of the accessible routes through sidewalk and pedestrian ramp reports.

Provide a description of the development neighborhood and identifying characteristics.	This Project is in the transitional area between the waterfront, the downtown commercial district, and the historic neighborhoods of the Customs House and Fanueil Hall. Streets are narrow and winding, dominated by historic structures.
List the surrounding ADA compliant MBTA transit lines and the proximity to the development site: Commuter rail, subway, bus, etc.	Route 4 - .15 miles Blue Line - .20 miles Hingham-Boston and Charlestown-Boston ferries - .23 miles

	Routes 15,39, 57,92, and 93 - .26 miles Routes 501, 504, 505, 553, 554, 556, 558 - .29 miles
List the surrounding institutions: hospitals, public housing and elderly and disabled housing developments, educational facilities, etc.	Northeastern University, American University of Greece Harvard Vanguard Medical Associates, Paternity Testing Boston
Is the proposed development on a priority accessible route to a key public use facility? List the surrounding: government buildings, libraries, community centers and recreational facilities and other related facilities.	Rose Fitzgerald Kennedy Greenway, Boston Aquarium, Long Wharf, Columbus Park, Faneuil Hall, International Place, Rowe's Wharf Republic Fitness, Fitness International

Surrounding Site Conditions – Existing:

This section identifies the current condition of the sidewalks and pedestrian ramps around the development site.

Are there sidewalks and pedestrian ramps existing at the development site?	Yes
If yes above, list the existing sidewalk and pedestrian ramp materials and physical condition at the development site.	Broad Street Sidewalk - granite curb, brick paver surface in good condition, Wharf Street sidewalk – granite curb, concrete surface with some cracking Curb cut ramps at either end of Broad Street property and at Wharf Street corner
Are the sidewalks and pedestrian ramps existing-to-remain? **If yes,** have the sidewalks and pedestrian ramps been verified as compliant? **If yes,** please provide surveyors report.	No
Is the development site within a historic district? **If yes,** please identify.	Yes – Customs House Historical District

Surrounding Site Conditions – Proposed

This section identifies the proposed condition of the walkways and pedestrian ramps in and around the development site. The width of the sidewalk contributes to the degree of comfort and enjoyment of walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Typically, a five foot wide Pedestrian Zone supports two people walking side by side or two wheelchairs passing each other. An eight foot wide Pedestrian Zone allows two pairs of people to comfortable pass each other, and a ten foot or wider Pedestrian Zone can support high volumes of pedestrians.

Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? See: www.bostoncompletestreets.org	Yes
If yes above, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, Boulevard.	Downtown Commercial
What is the total width of the proposed sidewalk? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone.	Broad Street – 8' pedestrian zone, 5' to 0' intermittent frontage zone Wharf Street – 5' pedestrian zone Greenway - 8' frontage zone, 8' pedestrian zone, 6' furnishing zone
List the proposed materials for each Zone. Will the proposed materials be on private property or will the proposed materials be on the City of Boston pedestrian right-of-way?	Materials – Historical District standard sidewalk materials Granite curb, wire cut brick pavers All sidewalk in City of Boston pedestrian right-of-way
If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the City of Boston Public Improvement Commission?	N/A
Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way?	There is potential for a restaurant/ café. The commercial tenant is under review.
If yes above, what are the proposed dimensions of the sidewalk café or furnishings and what will the right-	The sidewalk programming has not yet been determined.

of-way clearance be?	

Proposed Accessible Parking:

See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirement counts and the Massachusetts Office of Disability Handicap Parking Regulations.

What is the total number of parking spaces provided at the development site parking lot or garage?	35
What is the total number of accessible spaces provided at the development site?	Mechanized parking system – all are accessible
Will any on street accessible parking spaces be required? **If yes,** has the proponent contacted the Commission for Persons with Disabilities and City of Boston Transportation Department regarding this need?	No
Where is accessible visitor parking located?	In the shared mechanized parking vault
Has a drop-off area been identified? **If yes,** will it be accessible?	Yes – it will be accessible to the residential lobby and elevator lobby
Include a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations. Please include route distances.	See attached Accessible Route Diagram

Circulation and Accessible Routes:

The primary objective in designing smooth and continuous paths of travel is to accommodate persons of all abilities that allow for universal access to entryways, common spaces and the visit-ability* of neighbors.

**Visit-ability – Neighbors ability to access and visit with neighbors without architectural barrier limitations*

Provide a diagram of the accessible route connections through the site.	See attached Accessible Route Diagram
Describe accessibility at each entryway: Flush Condition, Stairs, Ramp Elevator.	Residential entrance – flush from sidewalk to elevator lobby; accessible door Commercial tenant entry – flush to sidewalk; accessible door Egress stair entrance – flush to sidewalk; accessible door
Are the accessible entrance and the standard entrance integrated?	Yes
If no above, what is the reason?	
Will there be a roof deck or outdoor courtyard space? If yes, include diagram of the accessible route.	No
Has an accessible routes way-finding and signage package been developed? If yes, please describe.	No – the signage package is still under development

Accessible Units: (If applicable)

In order to facilitate access to housing opportunities this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing choice.

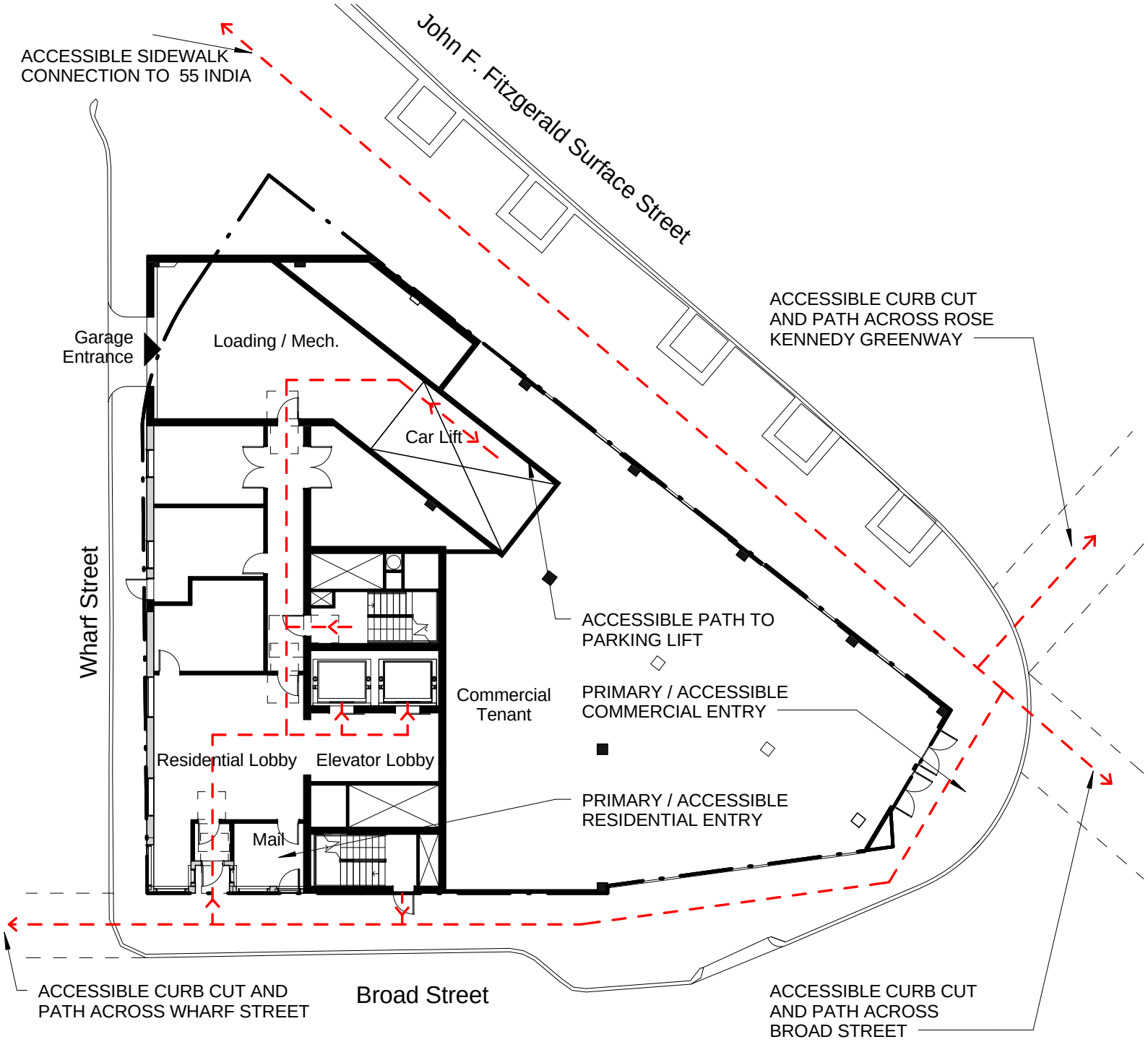
What is the total number of proposed units for the development?	52 units.
How many units are for sale; how many are for rent? What is the market value vs. affordable	All 52 units are for sale. The market versus affordable is to be determined.

breakdown?	
How many accessible units are being proposed?	Units shall meet requirements for Group 1 units per the Architectural Access Board CMR 521
Please provide plan and diagram of the accessible units.	Unit plans are TBD. Units will follow requirements of Architectural Access Board CMR 521
How many accessible units will also be affordable? If none, please describe reason.	Affordable units are to be determined.
Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs at entry or step to balcony. **If yes,** please provide reason.	No
Has the proponent reviewed or presented the proposed plan to the City of Boston Mayor's Commission for Persons with Disabilities Advisory Board?	No – the residential floor and unit plans are still under development
Did the Advisory Board vote to support this project? **If no,** what recommendations did the Advisory Board give to make this project more accessible?	

Thank you for completing the Accessibility Checklist!

For questions or comments about this checklist or accessibility practices, please contact:

kathryn.quigley@boston.gov | Mayors Commission for Persons with Disabilities


ACCESSIBLE SIDEWALK
CONNECTION TO 55 INDIA
John F. Fitzgerald Surface Street
ACCESSIBLE CURB CUT
AND PATH ACROSS ROSE
KENNEDY GREENWAY
Garage
Entrance
Loading / Mech.
Car Lift
Wharf Street
ACCESSIBLE PATH TO
PARKING LIFT
Commercial
Tenant
PRIMARY / ACCESSIBLE
COMMERCIAL ENTRY
Residential Lobby
Elevator Lobby
PRIMARY / ACCESSIBLE
RESIDENTIAL ENTRY
Mail
ACCESSIBLE CURB CUT AND
PATH ACROSS WHARF STREET
Broad Street
ACCESSIBLE CURB CUT
AND PATH ACROSS
BROAD STREET