Project Notification Form

Submitted Pursuant to Article 80 of the Boston Zoning Code

PARCEL Q1

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

Submitted by:
SCD Drydock Q1 LLC
101 Seaport Boulevard, Suite 200
Boston, MA 02110

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

In Association with:
Spagnolo Gisness & Associates, Inc.
Goodwin Procter
Vanasse & Associates, Inc.
Bohler Engineering
GEI Consultants

August 29, 2016

Epsilon
ASSOCIATES INC.

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Chapter 1.0

General Information

1.0 GENERAL INFORMATION

1.1 Introduction

SCD Drydock Q1 LLC (the Proponent) proposes the development of a mixed-use commercial building at "Parcel Q1" (the Project site) located within the Raymond L. Flynn Marine Park (RFMP), formerly known as the Boston Marine Industrial Park. The site is bound by Drydock Avenue to the east, Channel Street to the north, and a federally-owned parcel of land to the west.

Parcel Q1 is located near the Summer Street entrance to the RFMP. The proposed development includes the construction of an approximately 13-story office building with ground floor retail space and three levels of above-grade parking (the Project). The Project will transform a currently vacant site into an architecturally distinct building that will highlight the entrance to the RFMP, an area that has become increasingly active with new buildings and businesses over the past several years. The Project will also provide numerous public benefits, including street-level retail space, new publicly accessible open space, street trees and landscaping, and increased tax revenues and employment opportunities.

This Expanded Project Notification Form (PNF) is being submitted to the BRA to initiate review of the Project under Article 80B, Large Project Review, of the Boston Zoning Code. The PNF offers a description of the Projects and its benefits to the RFMP and the City of Boston.

1.2 Project Identification and Team

Address/Location:	Drydock Avenue, Raymond L. Flynn Marine Park, South Boston
Proponent:	SCD Drydock Q1 LLC 101 Seaport Boulevard, Suite 200 Boston, MA 02210 (617) 574-1485 Mark McGowan Chris Wholey

Architect:	Spagnolo Gisness & Associates, Inc. 200 High Street Boston, MA 02110 (857) 300-2610 Al Spagnolo John Sullivan Kristen O'Gorman
Legal Counsel:	Goodwin Procter 100 Northern Avenue Boston, MA 02210 (617) 570-1000 Martin Healy Jennifer Schultz
Permitting Consultants:	Epsilon Associates, Inc. 3 Clock Tower Place, Suite 250 Maynard, MA 01754 (978) 897-7100 Geoff Starsiak
Transportation Consultant:	Vanasse & Associates, Inc. 35 New England Business Center Drive, Suite 140 Andover, MA 01810 (978) 474-8800 Shaun Kelly
Civil Engineer:	Bohler Engineering 75 Federal Street, Suite 620 Boston, MA 02110 (617) 849-8040 Stephen Martorano Mark Wixted Timothy Hayes

1.3 Public Benefits

The Project will transform a vacant site with a development that will provide employment opportunities in proximity to public transportation, as well as new, landscaped open space that will improve the public realm in the South Boston Waterfront neighborhood of Boston. The Project will include numerous benefits to the City of Boston, including but not limited to:

- The Project will create approximately 450 construction jobs, and approximately 50 permanent jobs related to building maintenance, the proposed retail space, as well as jobs related to the future tenants of the office space.
- The Project will generate new property taxes and provide Housing and Jobs linkage contributions.
- The Project will improve the site's edges along Drydock Avenue and Summer Street.
- The Project will contribute office and retail components to the evolving, mixed-use neighborhood.

The Project will provide a variety of urban design benefits to the surrounding neighborhood, including:

- The Project will incorporate thoughtful contemporary design that also respects the area context.
- The Project will construct an architecturally distinct building that will define the entrance to the Raymond L. Flynn Marine Park.
- The site will include new landscaped areas that will reduce stormwater runoff from the site.
- The Project will improve the pedestrian experience by adding a new urban plaza, new active ground-floor uses, and improved streetscaping amenities for pedestrians and bicyclists along Drydock Avenue and Summer Street.

1.4 Legal Information

1.4.1 Legal Judgments Adverse to the Proposed Project

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

1.4.2 History of Tax Arrears on Property

The Proponent is not aware of any back taxes owed, tax liens or tax titles related to the site.

1.4.3 Site Control/Public Easements

The Proponent is the winning bidder in response to a request for proposals from EDIC that owns the Project site. The Proponent will enter into a long-term Ground Lease with EDIC for the Proponent's redevelopment of the Project site. There currently exists a railroad track easement through the southern corner of the site.

1.5 Public Participation

Since September 2014, the Proponent and its Project team have met with elected officials, the City of Boston, abutters, neighborhood groups and other interested parties to discuss the Project. The Project team will continue to meet with the community as the Project moves forward.

Chapter 2.0

Project Description

2.0 PROJECT DESCRIPTION

2.1 Project Description

2.1.1 Project Site

The Project site is an approximately 36,799 square foot (sf), approximately 0.85-acre, parcel of land located within the RFMP in the South Boston Waterfront neighborhood of Boston (see Figure 2-1 at the end of this chapter). The site is bound by Drydock Avenue to the east, Channel Street to the north and a federally-owned parcel of land to the west. Currently the site includes approximately 55 surface parking spaces, a dormant rail line which runs east to west through the site, and underutilized open space. The site is located along a major Massachusetts Bay Transportation Authority (MBTA) bus route and is within walking distance from several Silver Line stations.

2.1.2 Area Context

The Project site is located within the RFMP, formally known as the Boston Marine Industrial Park on the South Boston waterfront. Refer to Figures 2-2 to 2-8 at the end of this chapter for a context map and photographs of the surrounding area. The area was largely created through landfill projects in the 19th and 20th centuries. The RFMP has been, and continues to be, an important maritime facility in Boston with docks, wharves and rail access. The majority of the buildings and structures were built between 1914 and the mid-1940s as part of the South Boston Naval Annex and South Boston Army Base, which operated between 1920 and 1974. These buildings were robust warehouses and processing centers capable of supporting military equipment, vehicles, and ammunition for deployment around the world.

The Economic Development and Industrial Commission (EDIC) acquired the RFMP in two transactions between 1977 and 1983 with the intent to promote economic growth and maritime industrial development. In the 1990s, following the completion of the Central Artery project and the establishment of the MBTA Silver Line connecting downtown Boston to the Reserved Channel, new growth began in this area.

The existing sites surrounding the Project site support Boston's maritime industries and generally include industrial, manufacturing, research/development, and commercial uses. The parcels surrounding the site include the following:

- To the west is a parcel of land owned by the U.S. Federal Government that currently consists of industrial structures and surface parking spaces.
- To the north of the Project site, a nine-story office building is located at 10 Channel Street.

- Directly to the east of the Project site on Drydock Avenue is Parcel A, which is under development and is planned to include hotel and retail uses.

With future development being considered for other areas within the RFMP and elsewhere in the South Boston Waterfront, the Project presents the opportunity to frame the entrance to a vibrant new economic center suited for local and global business.

2.1.3 Proposed Project

The Project includes the construction of an approximately 298,700 sf, 13-story commercial building that includes approximately 8,400 sf of ground floor retail, approximately 211,700 sf of office space, and three levels of parking to accommodate approximately 150 vehicles. The Project is approximately 163 feet tall and has no below-grade space. See Figures 2-9 and 2-10 at the end of this chapter for existing and proposed site plans.

The Project is positioned to the north of the site between the existing rail line and Channel Street. To the south of the building, an approximately 12,900 sf urban plaza (representing 35 percent of the site) is proposed to introduce additional publicly accessible open space to the district. The ground-floor retail and open space will be oriented towards the urban plaza to encourage a vibrant pedestrian environment at the base of the building, and to complement the mixed-use development proposed for the adjacent Parcel A. A through-block connection created between the primary entrance accessed from the urban plaza and a secondary entrance on Channel Street will provide patrons, visitors and tenants multiple access points during normal business hours and will accommodate and respond to existing pedestrian patterns. Bicycle storage and locker rooms with showers will be provided near the entrances. Figures 2-10 to 2-24 at the end of this chapter show building elevations, massing, sections and perspectives.

Loading docks and vehicular entrances will be located along Channel Street. Public realm improvements, including new paving, street trees and new plant materials will be provided at Channel Street and Drydock Avenue to accentuate a walkable edge in accordance with the Boston Complete Streets guidelines. A west-facing roof terrace on the 11th floor and a rooftop terrace at the penthouse level will offer views of the Seaport District and the Boston skyline while also providing great access to outdoor space for tenants.

The Proponent is aware of the preliminary planning of potential roadway changes that may impact the site. The design includes enough area on the southern side of the site to accommodate the proposed roadway if it is constructed in the future.

2.1.4 Boston Marine Industrial Park Master Plan

The Project site is located within the boundaries of the Boston Marine Industrial Park Master Plan (Master Plan), which was approved by the Executive Office of Environmental Affairs (now Executive Office of Energy and Environmental Affairs) on March 16, 2000. The Master Plan is intended to guide future development within the RFMP "in a manner that

ensures a strong manufacturing and water dependent industrial base in the City of Boston." The proposed Project meets the stated goals of the Master Plan by achieving the following:

- Commercial uses that will generate economic activity and job generation within the RFMP that will promote the neighborhood as an identifiable commerce center;
- Constructing desired office space in proximity to public transportation and downtown Boston;
- Providing active ground floor uses and green space that will energize the pedestrian experience;
- Promoting the use of alternative modes of transportation and minimizing parking on-site, while providing bicycle racks, bicycle storage and amenities; and
- Improving water quality by replacing surface parking with a new building and landscaped open space on-site.

2.2 City of Boston Zoning

The approximately 36,799 sf (0.85-acre) Project site is located in the General Industrial ("I-2") sub-district of the South Boston Zoning District as defined by Map 4: South Boston of the zoning maps of the City of Boston. It is also located within a Restricted Parking Overlay District (RPOD). The general dimensional regulations for the Project site are found in Article 13 of the Boston Zoning Code (the "Code"), the general use regulations in Article 8 of the Code, and the use regulations pertaining to the RPOD in Article 6 of the Code.

The I-2 Subdistrict includes dimensional regulations for Floor Area Ratio (FAR), rear yard depth and parapet setback for buildings other than dwellings that do not directly abut a Residential Subdistrict. The Project is expected to require a variance for FAR, parapet setback and rear yard depth. The I-2 Subdistrict allows office (Use Nos. 39, 39A, 40, 41), local and general retail (Use Nos. 34, 35), retail catering (e.g., take-out restaurants, Use No. 36A), and sit-down/eat-in restaurants and cafeterias (Use No. 37), and common service establishments (e.g., hair salon, laundry, tailor, Use Nos. 43, 44) as of right. The above-grade parking within the building, even if accessory to the otherwise allowed office and retail uses, is a conditional use in the RPOD, and will therefore require a conditional use permit. All necessary zoning relief will be sought for the Project.

For projects subject to Large Project Review, required off-street parking spaces and off-street loading facilities are expected to be determined as a part of the Large Project Review in accordance with the provisions of Article 80 of the Boston Zoning Code. Design elements of the Project will also be reviewed pursuant to Large Project Review.

2.3 Anticipated Permits and Approvals

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

Table 2-1 Anticipated Permits and Approvals

Agency Name	Permit / Approval
Federal	
U.S. Environmental Protection Agency	Notice of Intent for EPA Construction Activities General Discharge Permit with associated SWPPP, if required.
Federal Aviation Administration	Determination of No Hazard to Air Navigation
State	
Executive Office of Energy and Environmental Affairs (MEPA Office)	Review under the Massachusetts Environmental Policy Act
Massachusetts Department of Environmental Protection, Division of Air Quality Control	Fossil Fuel Permit (if required)
Massachusetts Historical Commission	State Register Review (via the MEPA process)
Massachusetts Water Resources Authority	Construction Dewatering Permit (if required); Temporary Construction Dewatering Permit (if required); Sewer Use Discharge Permit (if required)
Local	
Boston Air Pollution Control Commission	Parking Freeze Permit
Boston Civic Design Commission	Review and approval pursuant to Article 28 of the Boston Zoning Code
Boston Conservation Commission	Order of Conditions
Boston Fire Department	Fuel Storage Permit; Approval of Fire Safety Equipment
Boston Inspectional Service Department	Building Permit; Certificate of Occupancy
Boston Parks and Recreation Commission	Design Review (if required)
Boston Public Improvement Commission/ Department of Public Works	Specific Repair Approvals; Tieback/Earth Excavation Approvals (if required); Sidewalk Occupancy Permit
Boston Public Safety Commission, Committee on Licenses	Parking Garage Permit; License for Storage of Inflammables
Boston Public Works Department	Curb Cut Permits; Street Opening Permits; Street/Sidewalk Occupancy Permits

Table 2-1 Anticipated Permits and Approvals (Continued)

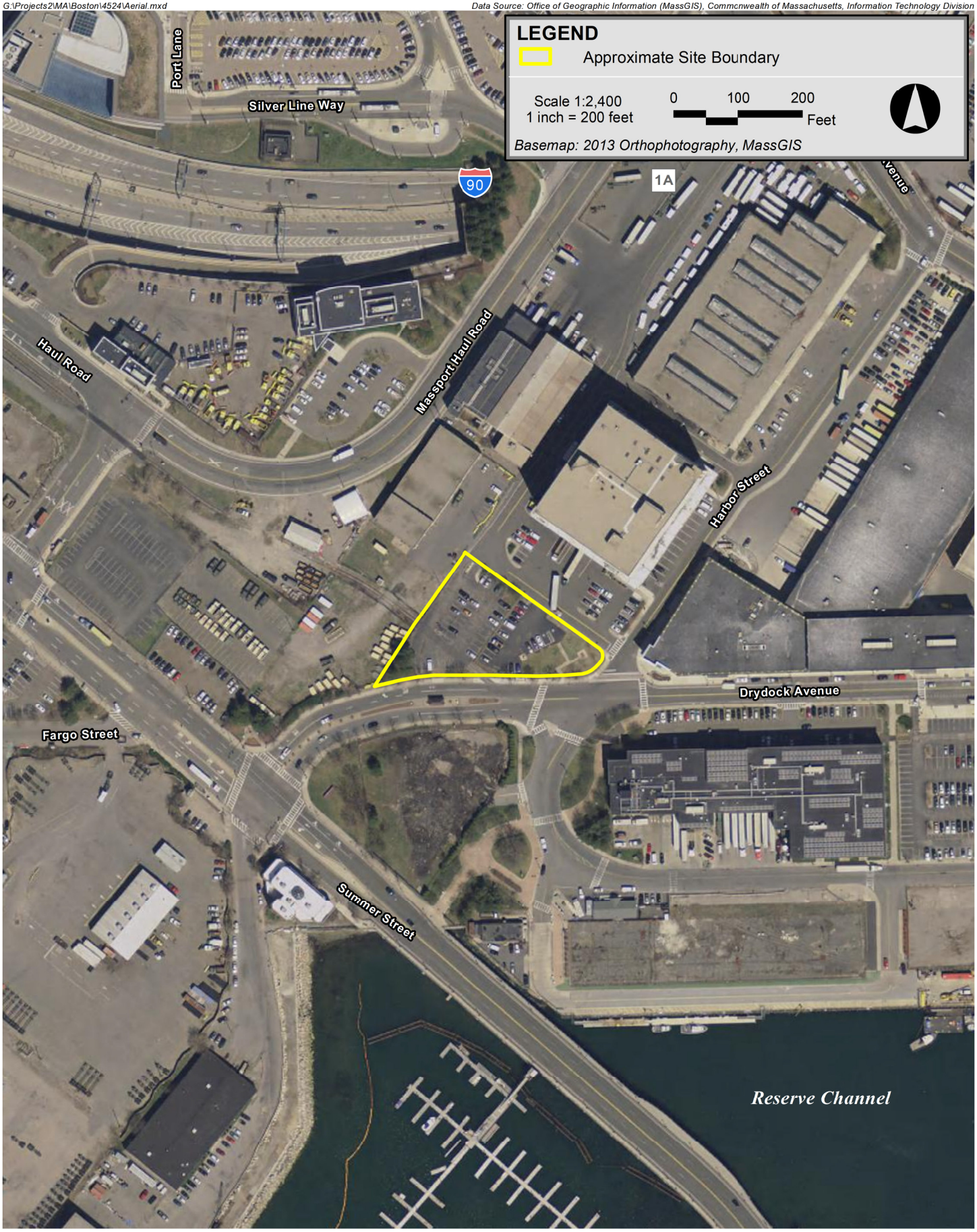
Agency Name	Permit / Approval
Boston Redevelopment Authority	Article 80 Review and Execution of Related Agreements; Cooperation Agreement; Boston Residents Construction Employment Plan Agreement; Certifications of Consistency and Compliance
Boston Transportation Department	Transportation Access Plan Agreement; Review and Approval of a Construction Management Plan
Boston Water and Sewer Commission	Site Plan Approval; Temporary Construction Dewatering Permit (if required); Cross Connection/Backflow Prevention Approval; Storm Drainage Approval
Boston Zoning Board of Appeal	Zoning Code variance(s), Conditional Use Permits (if required)

2.4 Schedule

Construction is anticipated to commence in the third quarter of 2017, with completion anticipated in the third quarter of 2019.

G:\Projects2\MA\Boston\4524\Aerial.mxd

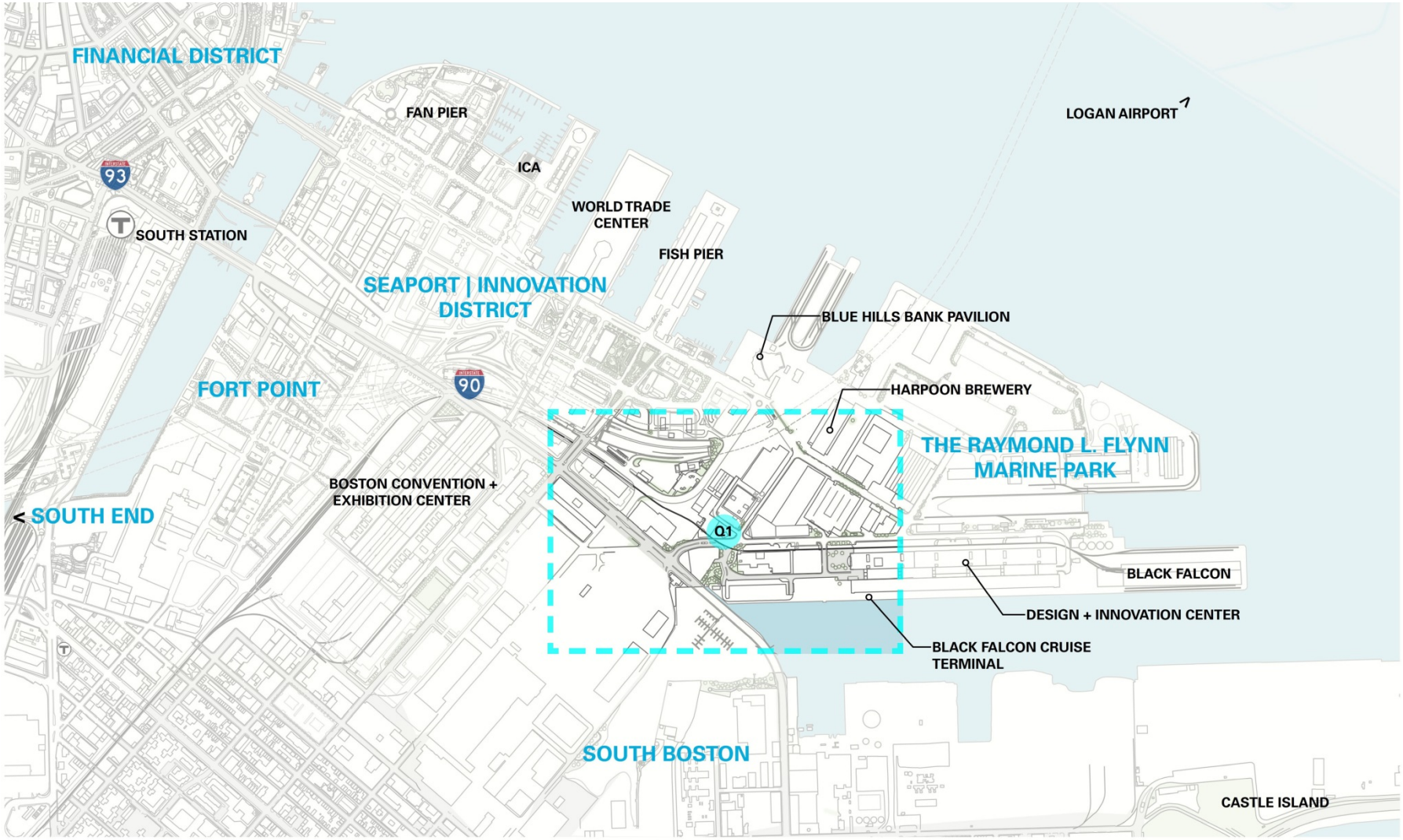
Data Source: Office of Geographic Information (MassGIS), Commcnwealth of Massachusetts, Information Technology Division



Parcel Q1 Boston, Massachusetts

Epsilon ASSOCIATES INC.

Figure 2-1
Aerial Locus Map



Parcel Q1 Boston, Massachusetts

Figure 2-2

Area Context Map

Parcel Q1 Boston, Massachusetts

Figure 2-3

Area Photograph

Parcel Q1 Boston, Massachusetts

Figure 2-4

Area Photograph

Parcel Q1 Boston, Massachusetts

Figure 2-5

Area Photographs

Parcel Q1 Boston, Massachusetts

Figure 2-6

Area Photographs

Parcel Q1 Boston, Massachusetts

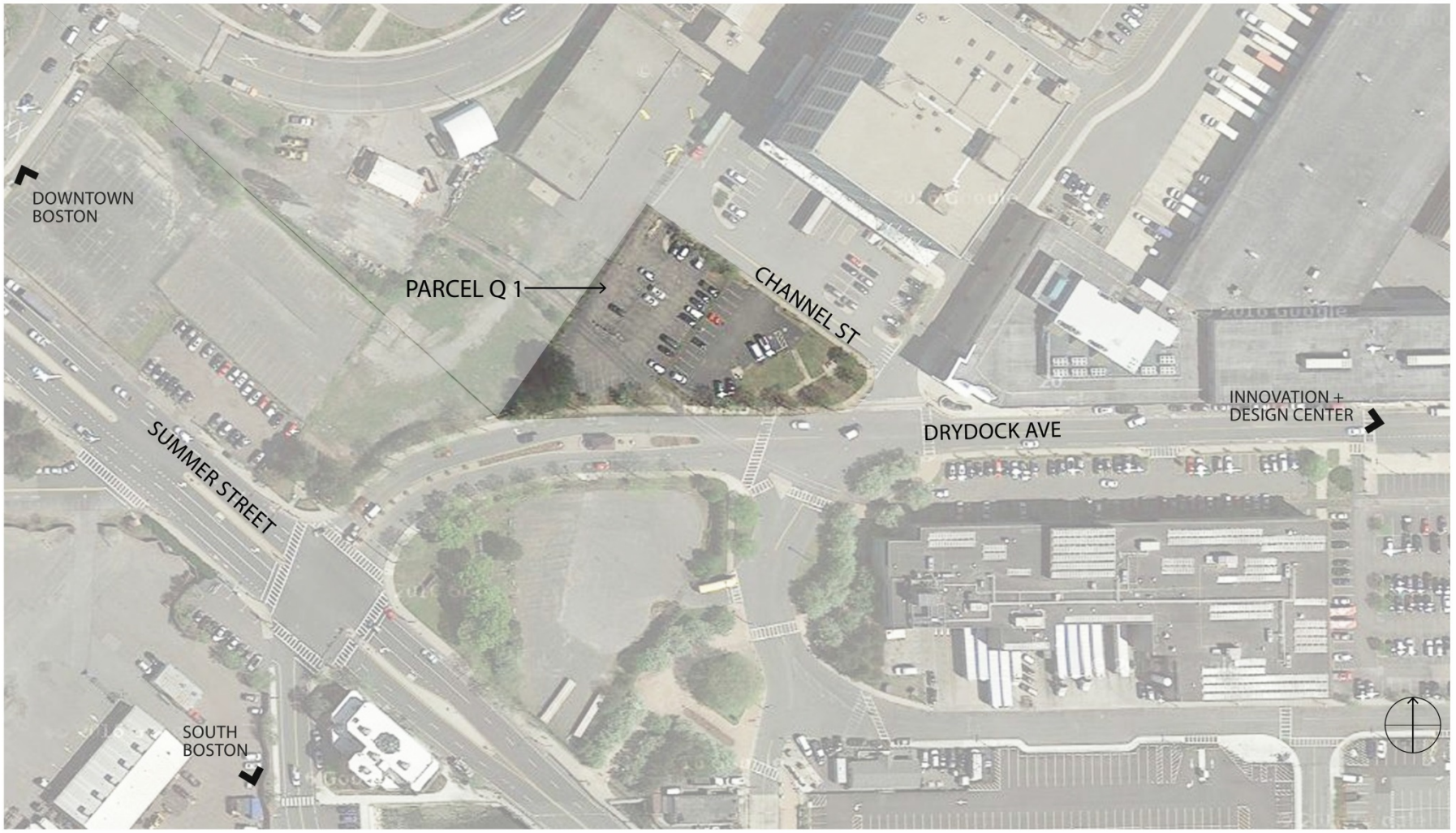
Figure 2-7

Area Photographs

Parcel Q1 Boston, Massachusetts

Figure 2-8

Area Photograph

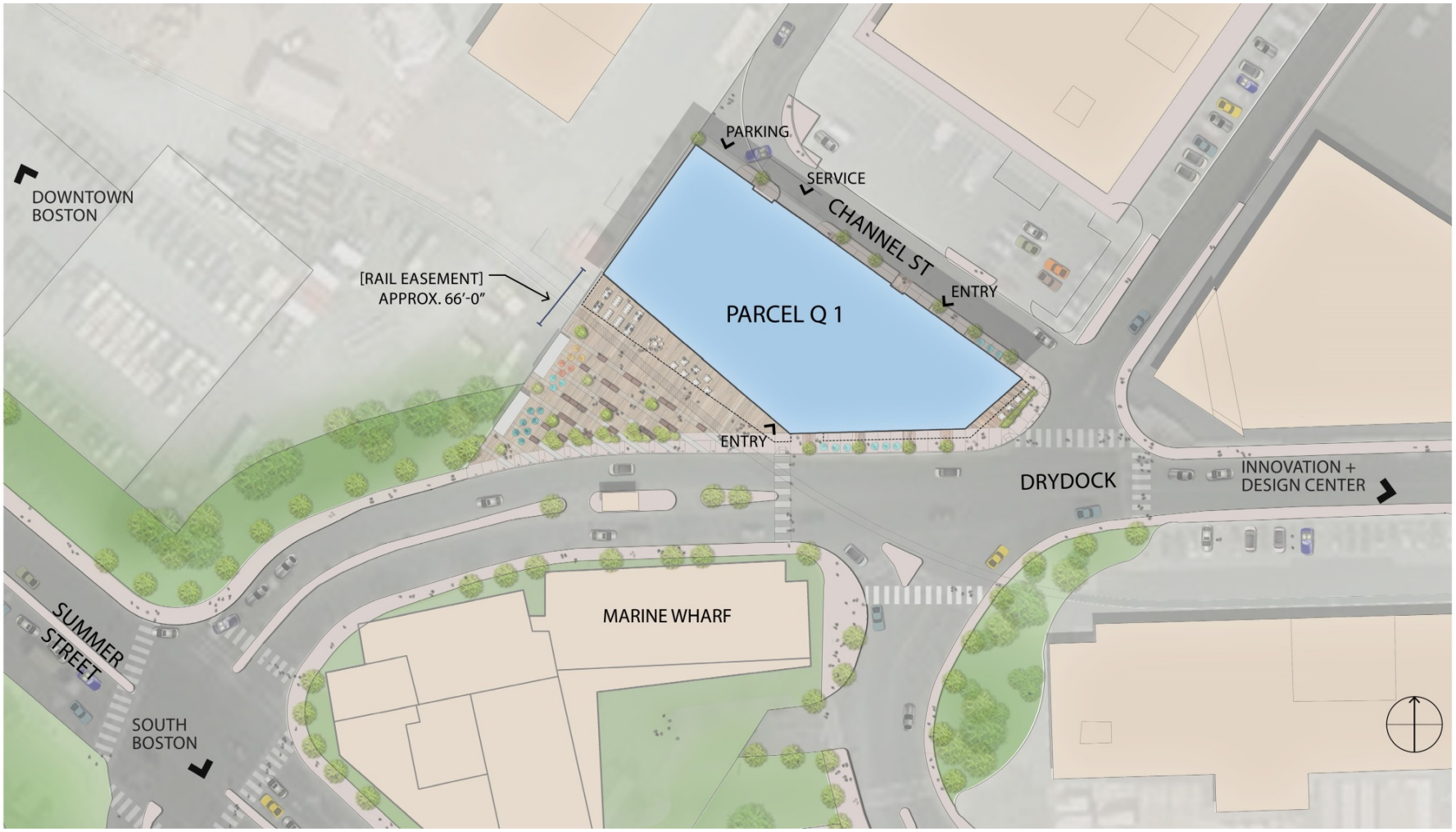


Parcel Q1 Boston, Massachusetts

SGA

Figure 2-9

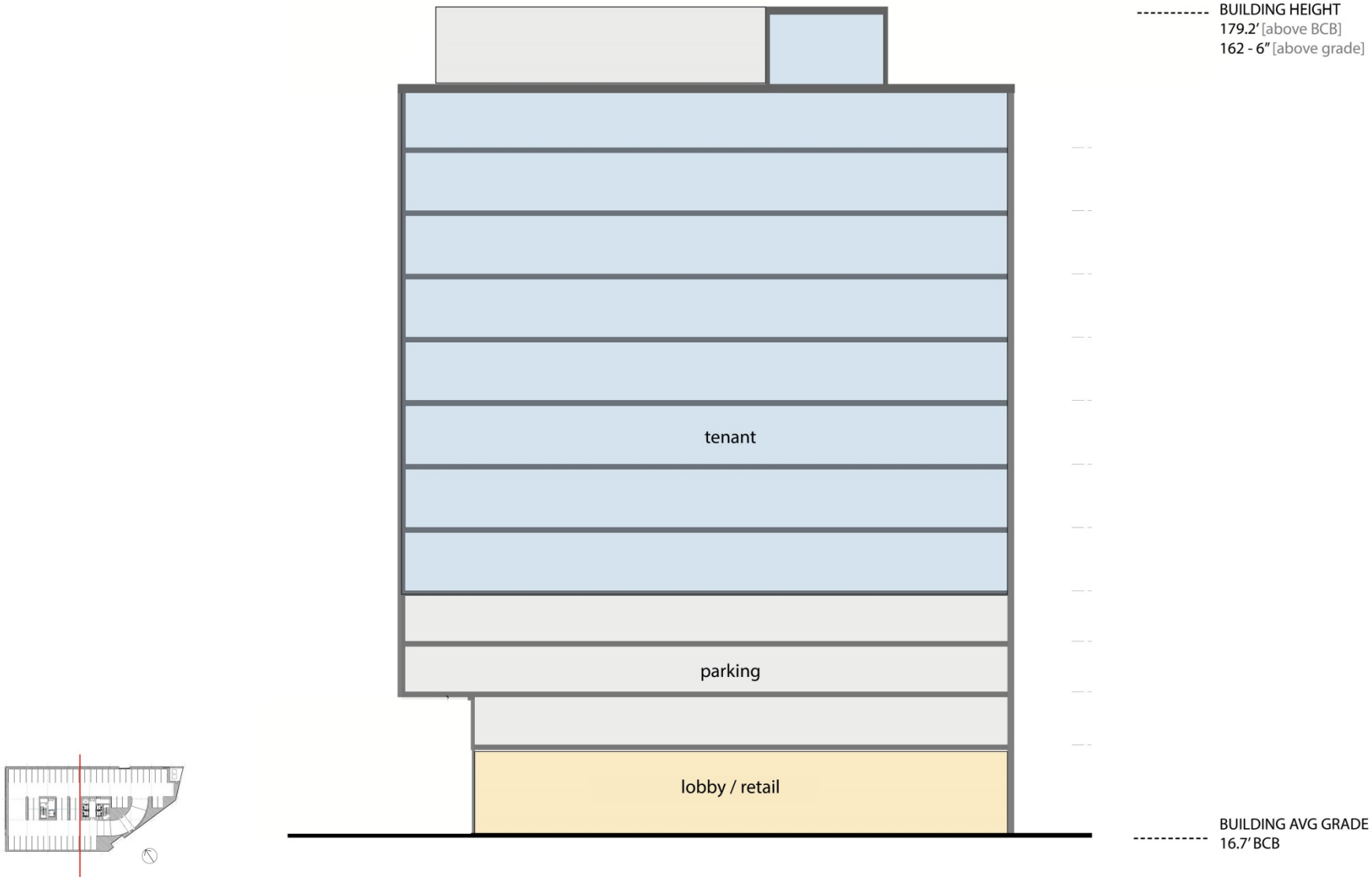
Existing Site Conditions



Parcel Q1 Boston, Massachusetts

Figure 2-10

Proposed Site Conditions



Parcel Q1 Boston, Massachusetts

Figure 2-11

Building Section

Parcel Q1 Boston, Massachusetts

Figure 2-12

Building Elevation Facing North

Parcel Q1 Boston, Massachusetts

Figure 2-13

Building Elevation Facing South

Parcel Q1 Boston, Massachusetts

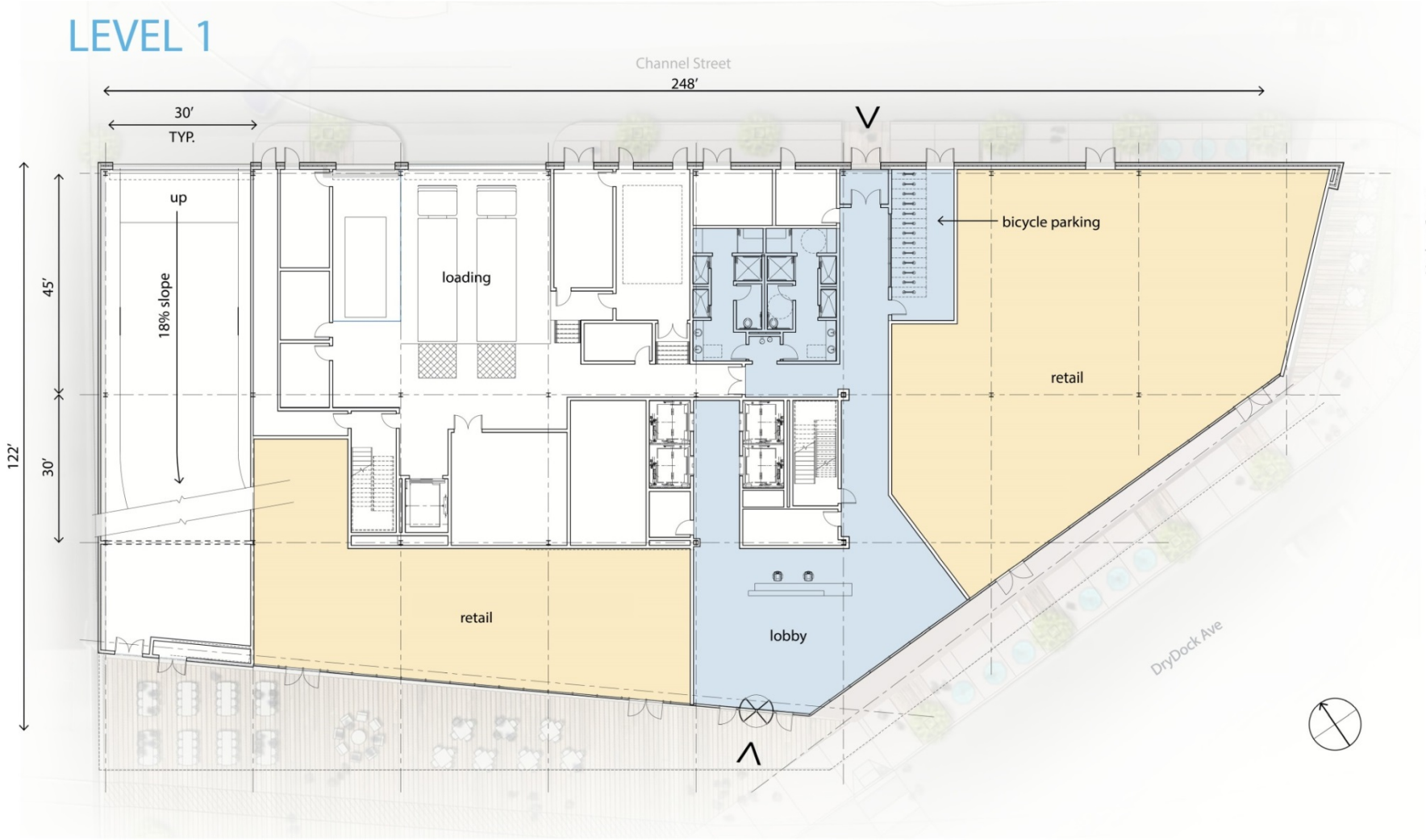
Figure 2-14

Building Elevation Facing East

Parcel Q1 Boston, Massachusetts

Figure 2-15

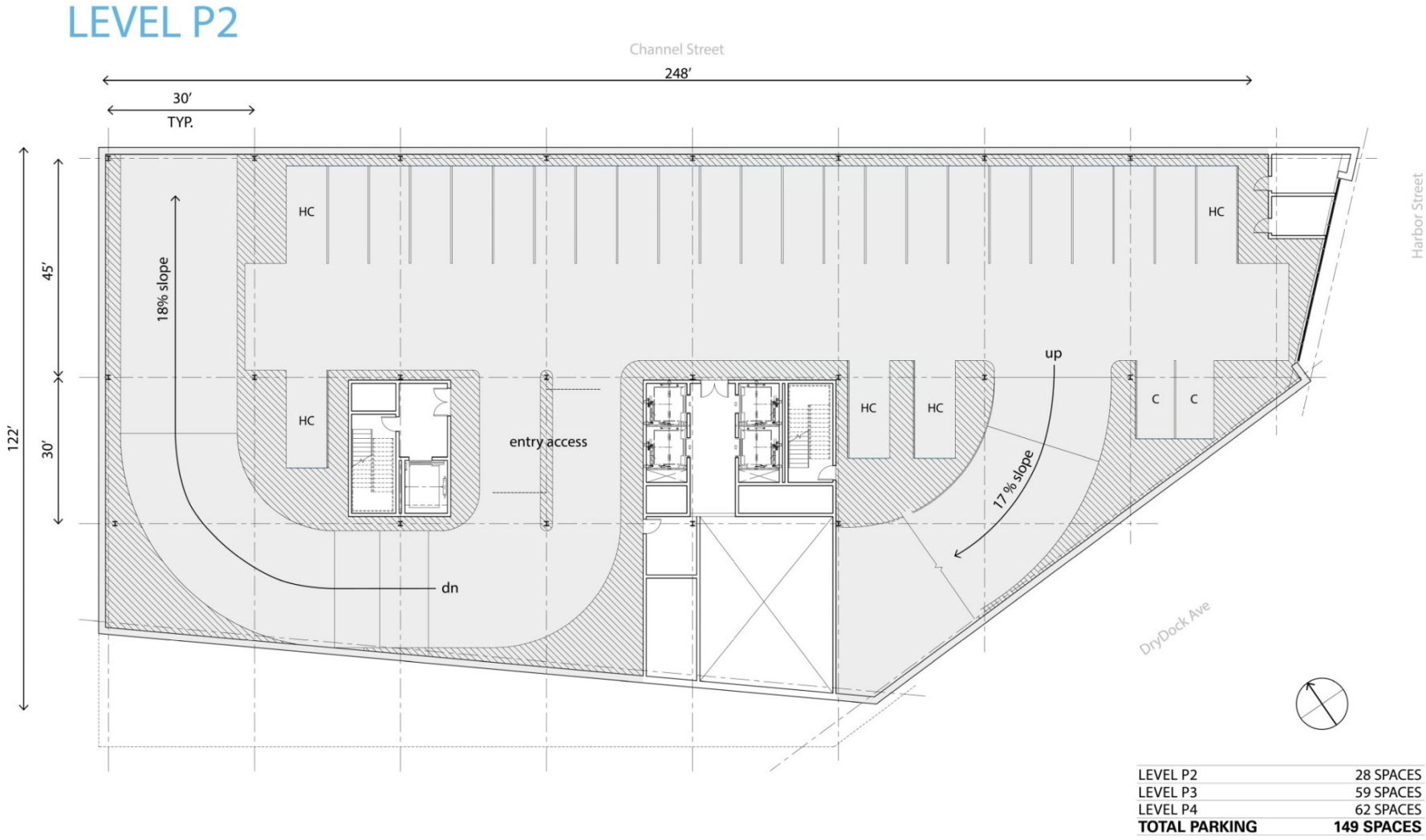
Building Elevation Facing West



Parcel Q1 Boston, Massachusetts

Figure 2-16

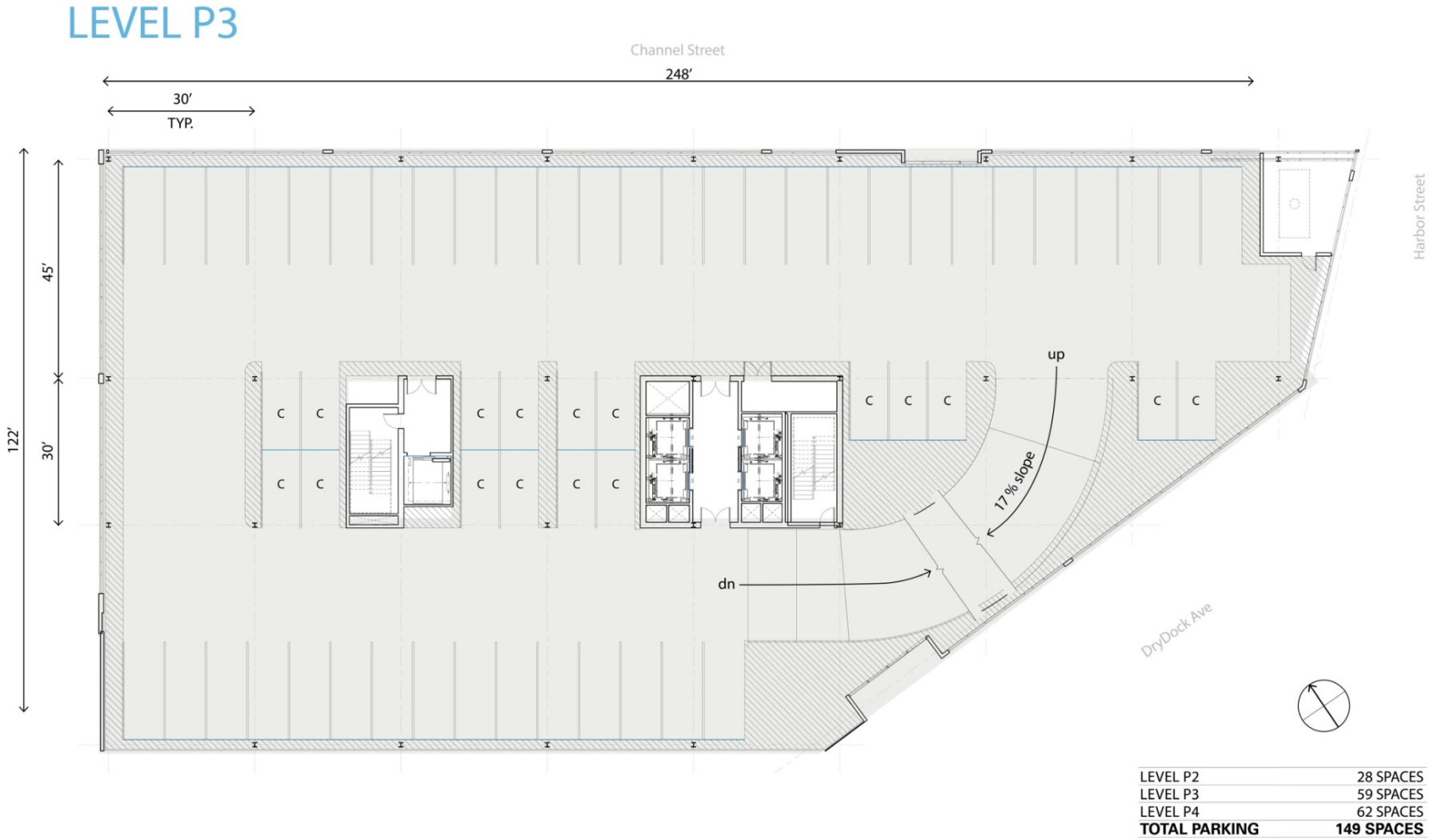
Level 1



Parcel Q1 Boston, Massachusetts

Figure 2-17

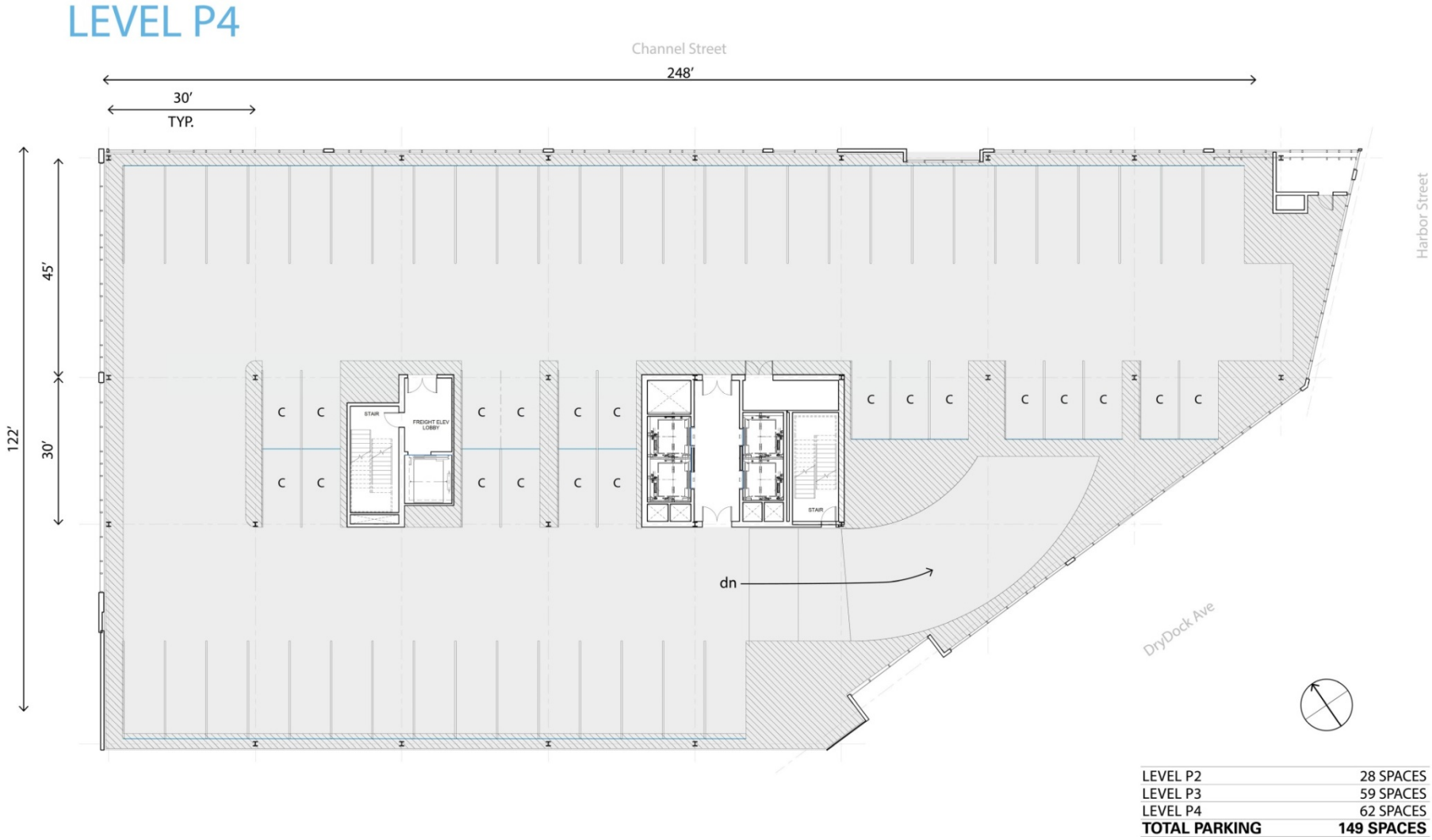
Level P2



Parcel Q1 Boston, Massachusetts

Figure 2-18

Level P3

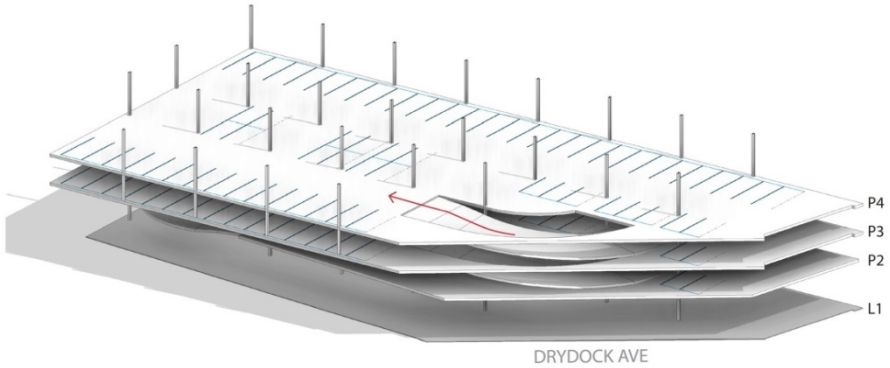


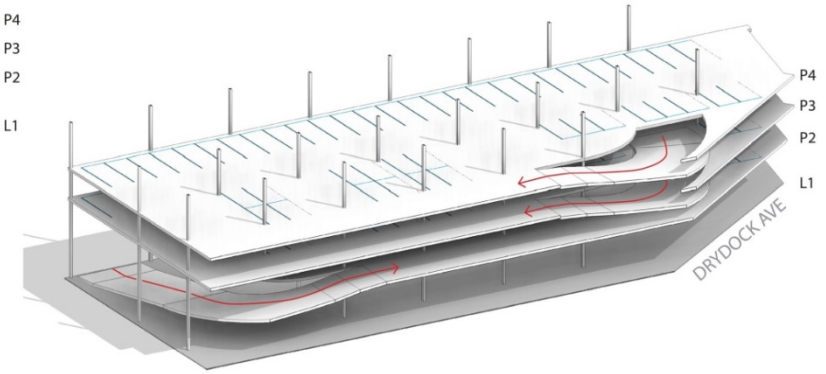
Parcel Q1 Boston, Massachusetts

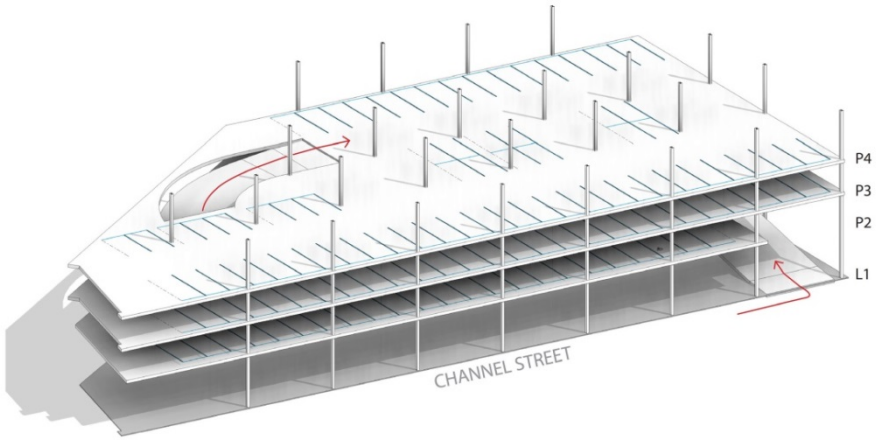
Figure 2-19

Level P4

PARKING DIAGRAMS







LEVEL P2	28 SPACES
LEVEL P3	59 SPACES
LEVEL P4	62 SPACES
TOTAL PARKING	**149 SPACES**

Parcel Q1 Boston, Massachusetts

Figure 2-20

Parking Diagrams

Parcel Q1 Boston, Massachusetts

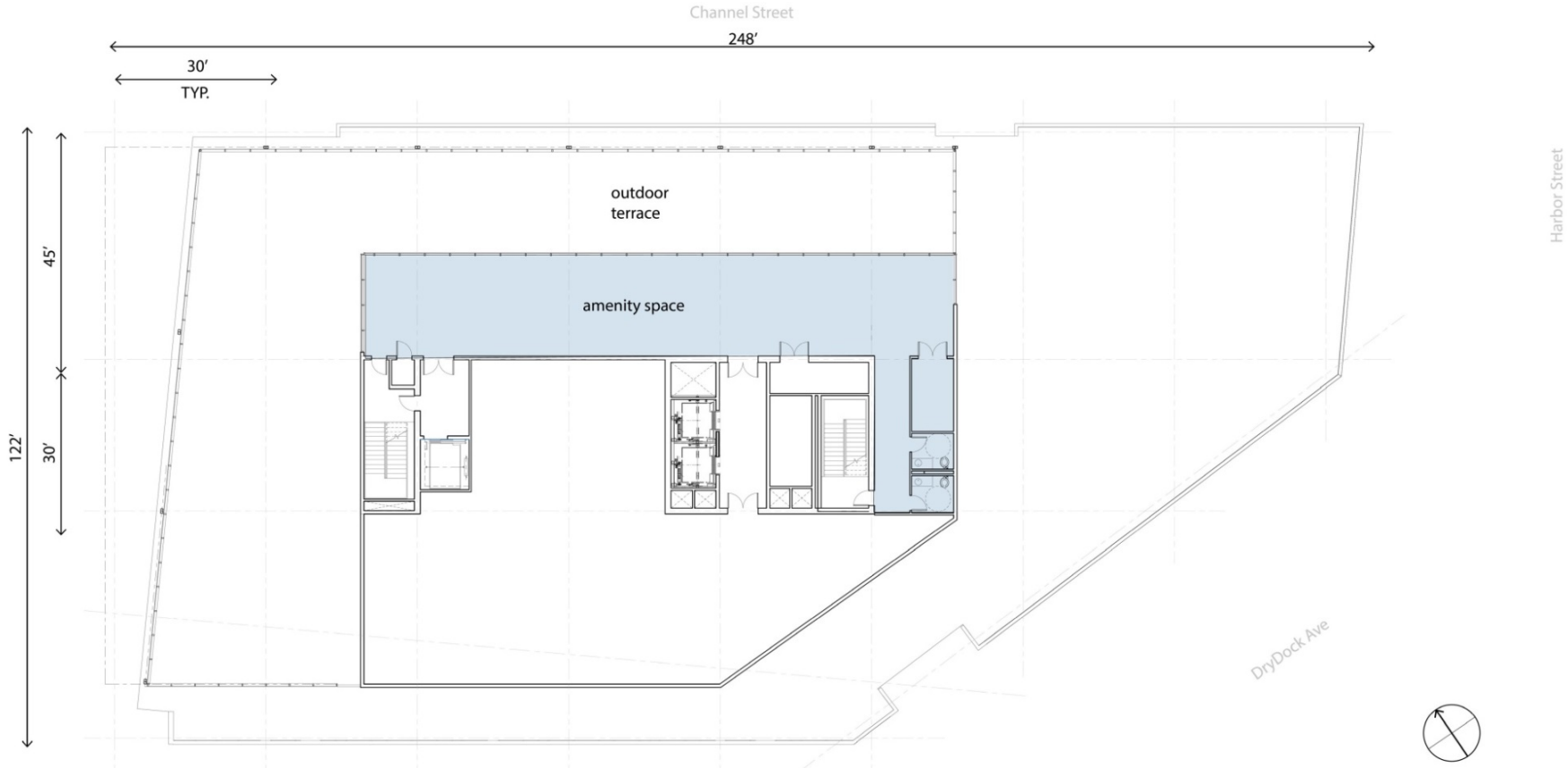
Figure 2-21

Office Level

Parcel Q1 Boston, Massachusetts

Figure 2-22

Upper Level



Parcel Q1 Boston, Massachusetts

Figure 2-23
Roof Deck

VIEW FROM BDC

VIEW OF CHANNEL STREET FACADE

Parcel Q1 Boston, Massachusetts

Figure 2-24

Massing

Chapter 3.0

Transportation

3.0 TRANSPORTATION

3.1 Introduction

Vanasse & Associates, Inc. (VAI) has conducted a Traffic Impact and Access Study (TIAS) to determine the potential impacts on the transportation infrastructure associated with the Project as described in Chapter 2. This study evaluates the following specific areas as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; and identifies and analyzes existing and future conditions, both with and without the Project, on the transportation infrastructure serving the Project site.

This study presents a comprehensive assessment of all elements of the transportation infrastructure serving the Project site. The study area evaluated as a part of this assessment was determined based in consultation with the Boston Transportation Department (BTD) and includes all major roadways and intersections that are expected to convey vehicular and pedestrian traffic to and from the Project site, including seven intersections located along Summer Street, Drydock Avenue, Northern Avenue, D Street, Harbor Street and Channel Street. This study area allows for a full evaluation of the transportation system serving the Project site, both at present and with planned future development in the area. Further, the extent of the study area allows for the development of a transportation improvement program that is designed to incorporate a balanced approach to improving traffic flow, public transportation access, and accessibility for pedestrians and bicyclists. These goals have been advanced as part of the transportation improvement program developed for the Project.

3.1.1 Project Impact Summary

The Project is projected to result in 766 new automobile trips (two-way, 24-hour volume) on an average weekday, with 1,428 new transit trips and 584 new pedestrian/bicycle trips. During the weekday morning peak hour, the Project is projected to generate 123 automobile trips, 242 transit trips and 53 pedestrian/bicycle trips. During the weekday evening peak hour, the Project is projected to generate 97 new automobile trips, 147 transit trips and 134 pedestrian/bicycle trips.

As a result of the analyses presented herein, a comprehensive transportation improvement program has been developed for the Project that has been designed to: i) address the potential impact of the Project on the transportation infrastructure; ii) encourage the use of alternative modes of transportation for those accessing the Project; and iii) address transportation infrastructure deficiencies identified as a part of this study or by the City.

The planned improvements encompass the following general elements:

- Sidewalk and streetscape improvements along the Drydock Avenue and Channel Street corridors to accommodate pedestrian activity within the vicinity of the Project;
- Reconstruction of segments of the existing sidewalk system that surrounds the Project site;
- Pedestrian and bicycle access and safety improvements, including provision of on-site bicycle storage for employees and patrons of the Project;
- Advancement of a comprehensive Transportation Demand Management (TDM) program to include specific elements designed to encourage the use of public transportation services, car and vanpooling, and pedestrian and bicycle use; and
- Implementation of a detailed Construction Management Plan (CMP) that is designed to reduce impacts during the construction phase of the Project.

The implementation of the identified improvements will serve to provide additional capacity and enhancements to the transportation system, and facilitate access to the Project site in a safe and efficient manner.

3.1.2 Project Description

The Project entails the development of an approximate 36,799 sf parcel of land that is currently undeveloped within the Raymond L. Flynn Marine Park in South Boston. At the time of this study, the development included approximately 230,000 sf of office uses and an approximately 150-space parking garage. Since the time that the TIAS was completed, the Project has been refined to include a total of approximately 220,100 square feet of office and support retail. This change will have a minimal impact on traffic generation, and the study's findings, conclusions and recommendations are still valid.

Figure 3-1 depicts the Project site location in relation to the existing roadway network.

3.1.3 Study Methodology

This study was prepared in consultation with BTD; was performed in accordance with the Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs (EEA)/Massachusetts Department of Transportation (MassDOT) Guidelines for Environmental Impact Report/Environmental Impact Statement Traffic Impact Assessments (TIAs), and the standards of the Traffic Engineering and Transportation Planning professions for the preparation of such reports; and was conducted in three distinct stages.

Parcel Q1 Boston, Massachusetts

Figure 3-1
Site Location Map

The first stage involved an assessment of existing conditions in the study area and included an inventory of roadway geometrics, pedestrian and bicycle facilities, public transportation services, on- and off-street parking, observations of traffic flow, and collection of peak period pedestrian, bicycle and vehicle counts.

In the second stage of the study, future conditions were projected and analyzed. Specific travel demand forecasts for the Project were assessed along with future demands due to expected growth independent of the Project. A seven-year time horizon was selected for analyses consistent with state guidelines for traffic impact assessments. The future conditions analysis conducted in stage two identifies existing or projected future capacity, safety, and site access issues.

The third stage of the study presents and evaluates measures to address the projected impact of the Project on the transportation infrastructure as identified in stage two of the study, and to facilitate safe and efficient travel to and from the Project site.

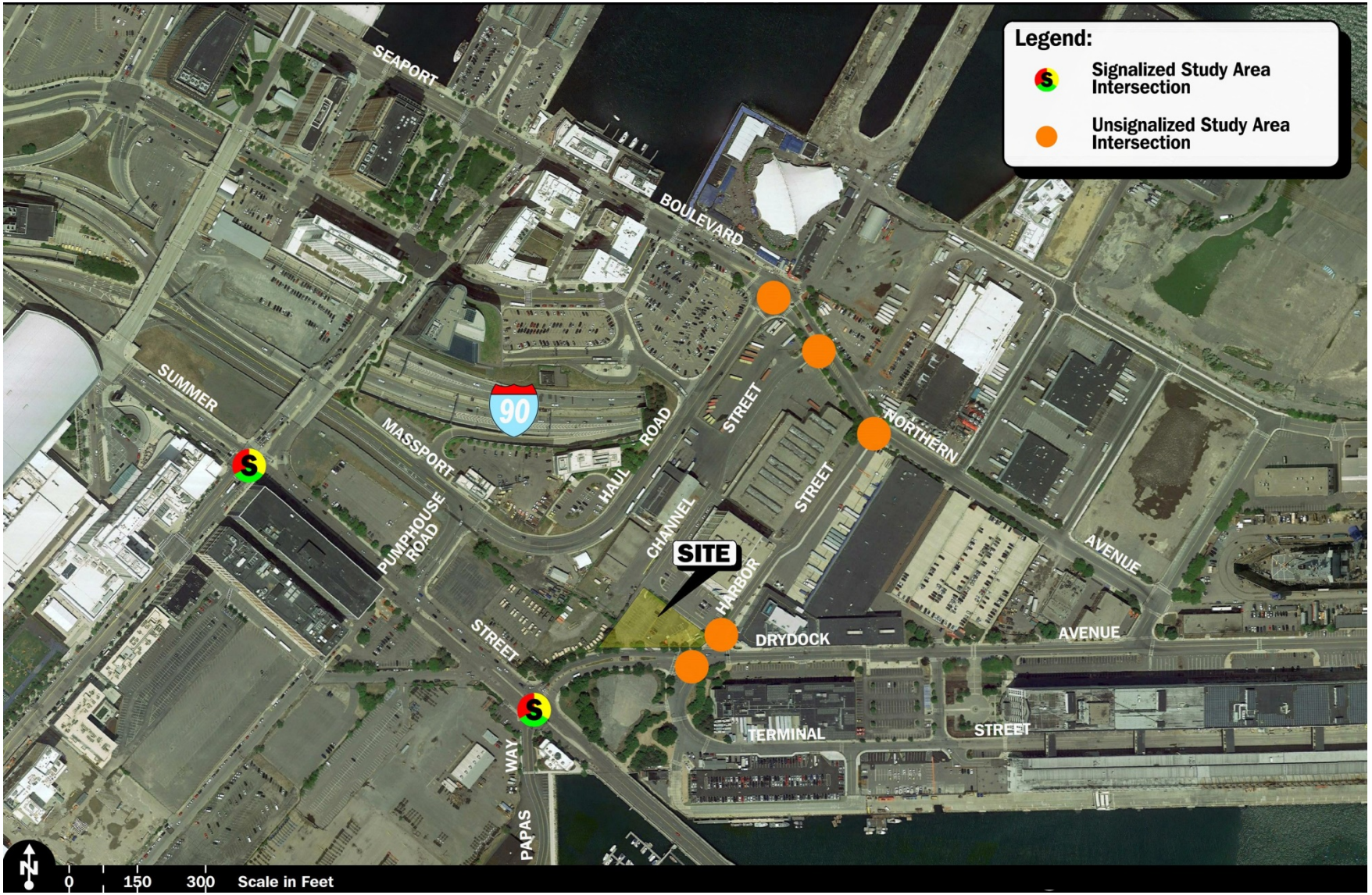
3.2 Existing Conditions

A comprehensive field inventory of the study area roadways and intersections was conducted in May 2016. The field investigation consisted of an inventory of existing roadway geometrics, pedestrian and bicycle facilities, on- and off-street parking, public transportation services, traffic volumes, operating characteristics posted speed limits, and land use information within the study area.

3.2.1 Study Area

The study area assessed for the Project was identified in initial consultation meetings with BTD and was selected to contain the major roadways providing access to the Project site including: Summer Street, Drydock Avenue, Northern Avenue, D Street, Harbor Street and Channel Street, as well as seven major intersections located along these roadways through which Project-related traffic will travel. The seven study intersections, as depicted in Figure 3-2, include:

1. Summer Street at D Street
2. Summer Street at Drydock Avenue and Pappas Way
3. Drydock Avenue at Harbor Street and Terminal Street
4. Harbor Street at Channel Street
5. Northern Avenue at Massport Haul Road
6. Northern Avenue at Channel Street
7. Northern Avenue at Harbor Street



Parcel Q1 Boston, Massachusetts

Figure 3-2

Study Area Intersections

3.2.2 Geometry

A field inventory of the study area roadways, intersection geometrics, pedestrian accommodations and bicycle facilities was conducted in May 2016 and is summarized in the following sections.

3.2.2.1 Roadways

Summer Street is an urban principal arterial under the jurisdiction of the City of Boston, located south of the Project site that traverses the study area in a general east-west orientation between Washington Street to the west and East First Street to the east. Within the study area, Summer Street provides two lanes of travel in each direction, separated by a raised median island. On-street parking along Summer Street is generally prohibited within the study area. Land use along Summer Street in the vicinity of the Project site consists primarily of a mix of office, commercial and industrial properties. Sidewalks are provided along both sides of the corridor, with signalized pedestrian crossings provided at signalized intersections along the corridor.

Northern Avenue is an urban minor arterial under the jurisdiction of the City of Boston, located north of the Project site that traverses the study area in a general east-west orientation between Seaport Boulevard to the west and Tide Street to the east. Within the study area, Northern Avenue provides one lane of travel in each direction separated by a double-yellow centerline. On-street parking along Northern Avenue is generally prohibited within the study area. Land use along Northern Avenue, in the vicinity of the Project site, consists primarily of a mix of residential, office, commercial and industrial properties. Sidewalks are provided along both sides of the corridor within the study area.

Massport Haul Road is an urban minor arterial under the jurisdiction of the City of Boston, located west of the Project site that traverses the study area in a general north-south orientation between the South Boston Bypass Road to the south and Northern Avenue to the north. Within the study area Massport Haul provides one lane of travel in each direction separated by a double-yellow centerline. On-street parking along Massport Haul Road is generally prohibited within the study area. Within the study area, a sidewalk is provided along the western side of the corridor.

Drydock Avenue is a local roadway under the jurisdiction of the City of Boston that traverses the study area in a general east-west orientation between Summer Street to the west and Black Falcon Avenue to the east. Drydock Avenue provides one lane of travel in each direction separated by a double-yellow centerline. On-street parking is generally prohibited along the corridor within the study area. Sidewalks are provided along both the northern and southern sides of Drydock Avenue.

D Street is an urban minor arterial under the jurisdiction of the City of Boston that traverses the study area in a general north-south orientation between Dorchester Avenue to the south

and Northern Avenue to the north. D Street, within the study area, generally provides two lanes of travel in each direction, separated by a raised median island. To the north of Congress Street, the northbound and southbound barrels of D Street diverge forming the D Street Couplet. On- street parking is generally prohibited along D Street, with the exception of on-street parking on the eastern side of the roadway immediately south of Congress Street, and on the eastern side of the southbound barrel between Congress Street and Seaport Boulevard. Sidewalks are provided along both sides of D Street within the study area.

3.2.2.2 Intersections

The following section provides a description of the roadway geometry, traffic control, parking restrictions and land uses for each study area location as observed in May 2016.

1. **Summer Street / D Street -** Summer Street meets D Street from the east and west to form a four-way intersection that operates under traffic signal control. The Summer Street eastbound approach provides an approximate 11-foot wide exclusive left-turn lane, an approximate 11-foot wide through lane and an approximate 15-foot wide shared through/right-turn lane. The Summer Street westbound approach provides an approximate 12-foot wide shared left- turn/through lane, an approximate 16-foot wide through lane and an approximate 24-foot wide channelized exclusive right-turn lane. The D Street northbound approach provides an approximate 12-foot wide exclusive left-turn lane, an approximate 12-foot wide through lane and an approximate 12-foot wide shared through/right-turn lane. The D Street southbound approach provides an approximate 11-foot wide exclusive left-turn lane, an approximate 11-foot wide shared left-turn/through lane and an approximate 15-foot wide through/right-turn lane. On-street parking is provided along the northern edge of Summer Street west of D Street, and along both the eastern and western sides of D Street south of Summer Street. Crosswalks and wheelchair ramps are provided at all four intersection approaches at this location.

2. **Summer Street / Drydock Avenue -** Summer Street meets Drydock Avenue and Pappas Way from the east and west to form a four-way intersection that operates under traffic signal control. The Summer Street eastbound approach provides an approximate 12-foot wide exclusive left-turn lane, an approximate 12-foot wide through lane and an approximate 16-foot wide shared through/right-turn lane. The Summer Street westbound approach provides an approximate 12-foot wide exclusive left-turn lane, an approximate 12-foot wide through lane and an approximate 12-foot wide shared through/right-turn lane. The Pappas Way northbound approach provides an approximate 15-foot wide general purpose travel lane. The Drydock Avenue southbound approach provides an approximate 12-foot wide shared left-turn/through lane and an approximate 13-foot wide exclusive right-turn lane. On-street parking is prohibited along all four approaches to this location. Crosswalks and wheelchair ramps are provided at all four intersection approaches at this location.

3. **Drydock Avenue / Harbor Street and Terminal Street -** Drydock Avenue meets Harbor Street and Terminal Street from the east and west to form a four-way intersection that operates under STOP-sign control. The Drydock Avenue eastbound approach provides an approximate 12-foot wide shared left-turn/through lane and an approximate 12-foot wide exclusive right-turn lane that is separated by through traffic by a serrated concrete median island. The Drydock Avenue westbound approach provides an approximate 12-foot wide general purpose travel lane. Directional travel along Drydock Avenue are separated by a raised landscaped median west of Harbor Street, and by a double-yellow centerline east of Harbor Street. The Terminal Street northbound approach provides an approximate 13-foot wide exclusive left-turn lane and an approximate 13-foot wide shared/right-turn lane that operate under STOP-sign control. The Harbor Street southbound approach provides an approximate 15-foot wide general purpose travel lane that operates under STOP-sign control. Directional travel along both Harbor Street and Terminal Street are separated by a double-yellow centerline. Crosswalks and wheelchair ramps are provided at all four intersection approaches at this location.

4. **Harbor Street / Channel Street -** Channel Street intersects Harbor Street from the west to form this three-way intersection that operates under STOP-sign control. The Channel Street eastbound approach provides an approximate 12-foot wide general purpose travel lane that operates under STOP-sign control. The Harbor Street northbound and southbound approaches to this location provide an approximate 12-foot wide general purpose travel lane. Directional travel on all three intersection approaches are separated by a double-yellow centerline. Crosswalks and wheelchair ramps are provided along the Channel Street eastbound approach, and immediately south of this intersection at the Harbor Street southbound approach to Drydock Avenue.

5. **Northern Avenue / Massport Haul Road -** The Massport Haul Road and Yankee Lobster driveway intersect Northern Avenue from the south and north, respectively, to form a four-legged roundabout. The Northern Avenue eastbound approach provides a shared left-turn/through lane and an exclusive right-turn lane. The Northern Avenue westbound approach provides two general purpose travel lanes. The Massport Haul Road northbound approach provides a general purpose travel lane and an exclusive right-turn lane. The Yankee Lobster southbound approach provides a single travel lane. Directional travel along both Northern Avenue approaches and the northbound Massport Haul Road approach to the roundabout are separated by a raised median, with directional travel along the Yankee Lobster driveway separated by a painted centerline. On-street parking is prohibited along all four approaches to this intersection, with the exception of metered parking along Northern Avenue west of this location. Sidewalks are provided around the perimeter of the roundabout with painted crosswalks provided along all four roadway approaches to this intersection.

6. **Northern Avenue / Channel Street -** Channel Street intersects Northern Avenue from the south to form this three-way intersection that operates under STOP-sign control. The

Northern Avenue eastbound and westbound approach provides an approximate 20-foot wide general purpose travel lane and bicycle lane. The Channel Street northbound approach to this location provides an approximate12-foot wide general purpose travel lane that operates under STOP-sign control. Directional travel on the Northern Avenue eastbound and westbound approaches are separated by a raised island and painted cross-hatched island, respectively. Directional travel on the Channel Street northbound approach is separated by a double-yellow centerline. Crosswalk and wheelchair ramps are provided along the Channel Street northbound approach to this intersection.

7. Northern Avenue / Harbor Street - Harbor Street intersects Northern Avenue from the south to form this three-way intersection that operates under STOP-sign control. The Northern Avenue eastbound and westbound approach provides an approximate 20-foot wide general purpose travel lane and bicycle lane. The Harbor Street northbound approach to this location provides an approximate 11-foot wide general purpose travel lane that operates under STOP-sign control. Directional travel on the Northern Avenue eastbound and westbound approaches are separated by a raised island and painted cross-hatched island, respectively. Directional travel on the Harbor Street northbound approach is separated by a double-yellow centerline. Crosswalk and wheelchair ramps are provided along the Channel Street northbound approach to this intersection.

3.2.3 Traffic Volumes

To determine existing traffic-volume demands and flow patterns within the study area, manual turning movement counts (TMCs) and vehicle classification counts were completed in May 2016. The TMCs were conducted at the study intersections during the weekday morning (7:00 to 9:00 a.m.) and weekday evening (4:00 to 6:00 p.m.) peak periods, the critical time periods for both the Project and the adjacent roadway network.

Seasonal Adjustments

In order to evaluate the potential for seasonal fluctuation of traffic volumes within the study area, MassDOT weekday seasonal factors for Group 6 roadways (urban arterials, collectors and rural arterials, the MassDOT functional classification for the study area roadways) were reviewed.[1] Based on a review of this data, it was determined that traffic volumes for the months of May are approximately 9 percent above average-month conditions. In order to provide a conservative (above average) analysis scenario, the traffic volumes collected as a part of this study were not adjusted downward to average-month conditions. The 2016 Existing weekday morning and weekday evening peak-hour traffic volumes are depicted on Figures 3-3 and 3-4, respectively.

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[1] MassDOT Traffic Volumes for the Commonwealth of Massachusetts; 2011 Weekday Seasonal Factors, Group 6 - Urban Arterials, Collectors and Rural Arterials.

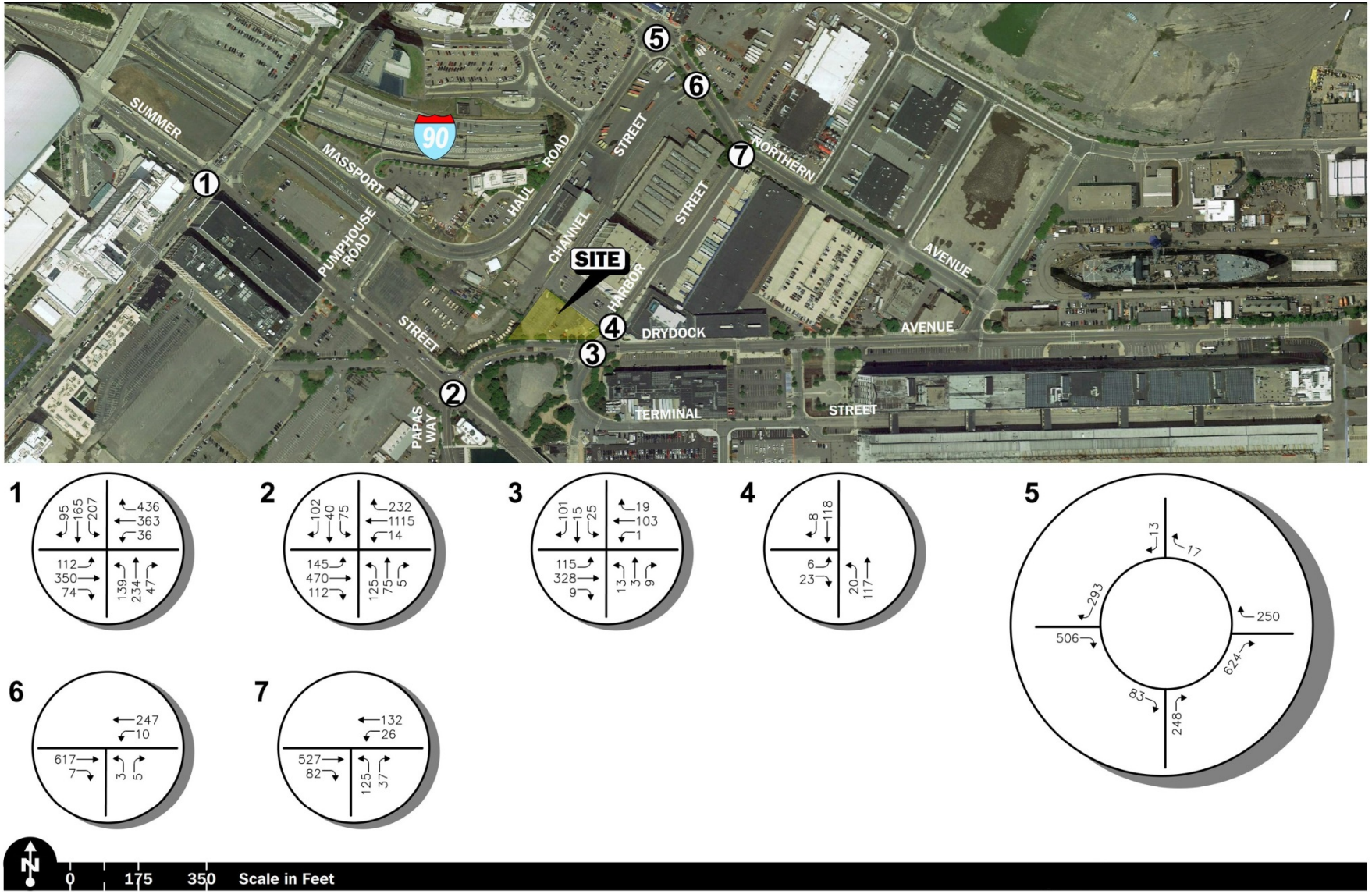

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Figure 3-3

2016 Existing Weekday Morning Peak Hour Traffic Volumes

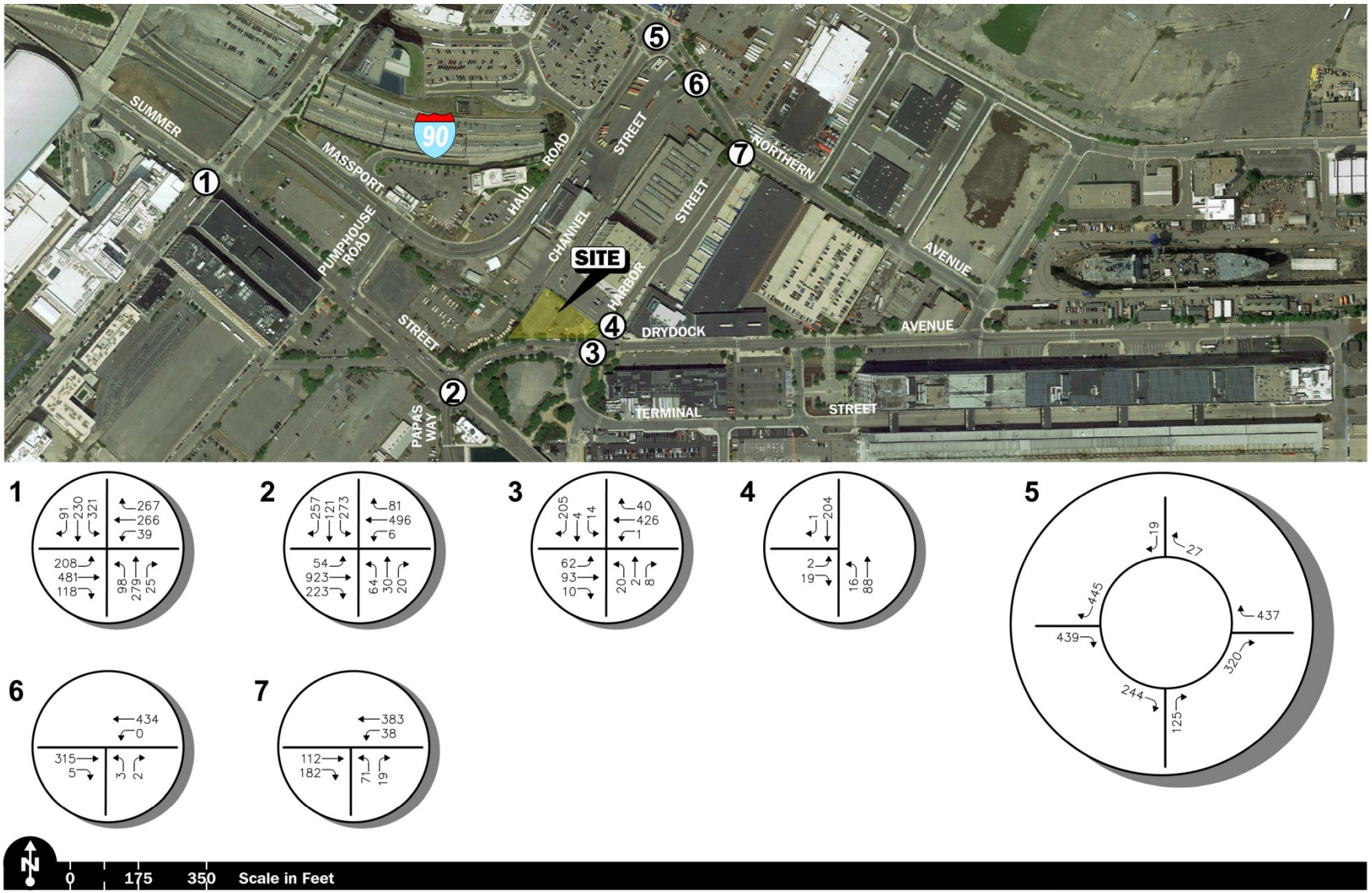

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Figure 3-4

2016 Existing Weekday Evening Peak Hour Traffic Volumes

A review of the peak-period traffic counts indicates that the weekday morning peak hour generally occurs between 8:00 and 9:00 a.m., while the weekday evening peak hour generally occurs between 4:45 and 5:45 p.m. In all instances, the individual peak hours of intersection traffic were utilized for analysis purposes.

3.2.4 Pedestrian and Bicycle Facilities

A comprehensive field inventory of pedestrian and bicycle facilities was performed in May 2016. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study roadways and at the study intersections, as well as the location of existing bicycle facilities. Pedestrian and bicycle counts were conducted at each of the study intersections during weekday morning (7:00 to 9:00 a.m.) and weekday evening (4:00 to 6:00 p.m.) peak periods. Figures 3-5 and 3-6 depict the 2016 Existing weekday morning and weekday evening peak hour pedestrian volumes, respectively.

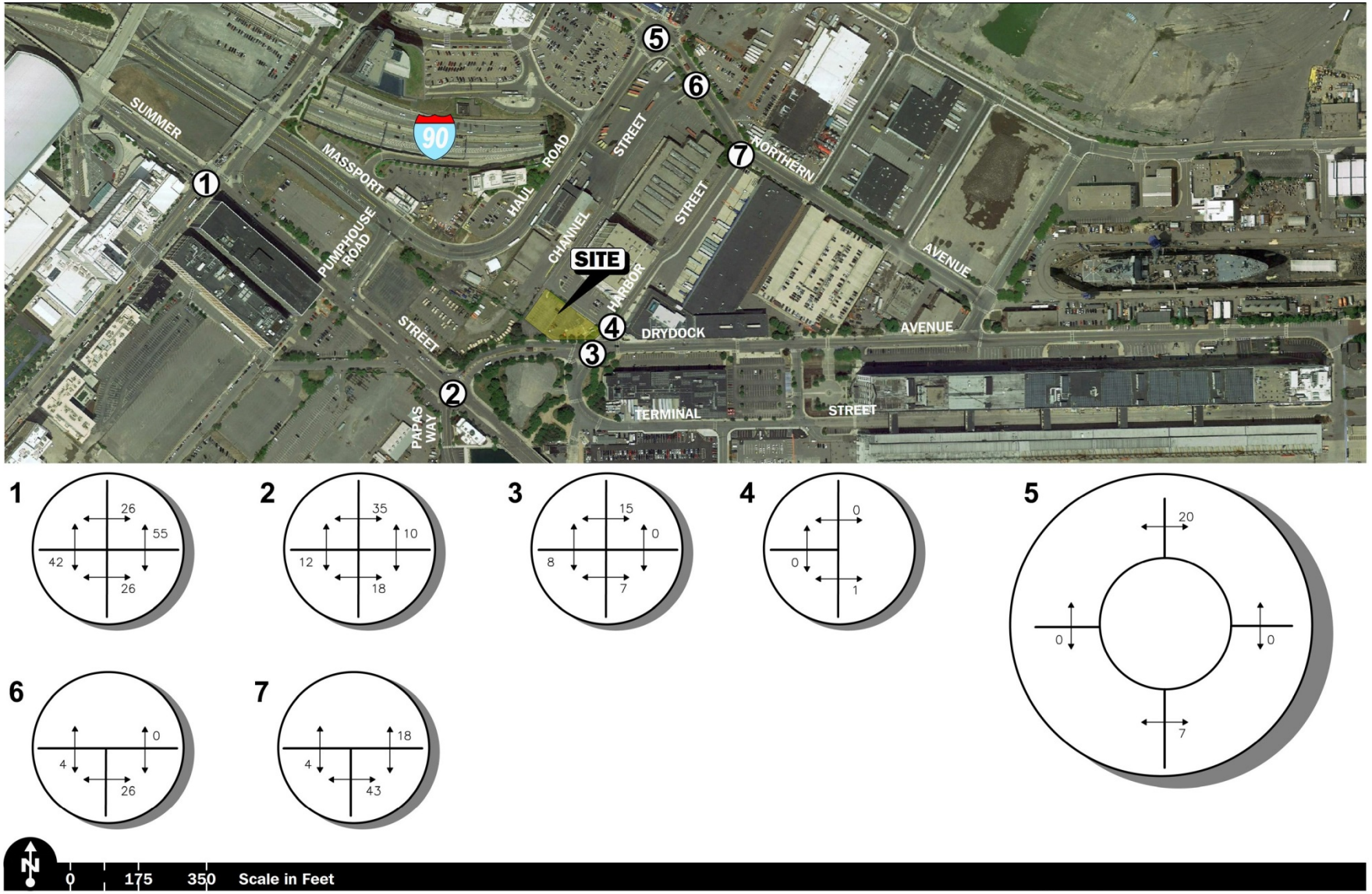
3.2.4.1 Pedestrian Facilities

Sidewalks are generally provided along both sides of each study area roadway proximate to the Project site, with painted crosswalks provided at signalized and unsignalized intersections within the study area. At the majority of study area locations, signalized pedestrian crossings occur concurrent with vehicular movements, with the exceptions of the intersections of Summer Street with Drydock Avenue and Pappas Way.

3.2.4.2 Bicycle Facilities

Within the study area, bicycle accommodations are provided along segments of Northern Avenue, Drydock Avenue, Summer Street and D Street, including painted sharrows on roadways providing access to the Project site.

Within close proximity of the Project site, the Hubway bicycle sharing program provides two bicycle stations at the Innovation and Design Building located east of the Project site on Drydock Avenue. A total of 35 bicycles are located at this location. The Hubway bike sharing program was introduced in the City of Boston in July 2011 and included 600 bicycles at 60 stations located throughout the City. Since its introduction, the program has expanded to include over 140 stations and in excess of 1,300 bicycles, with the service area extended to Brookline, Cambridge and Somerville.



Parcel Q1 Boston, Massachusetts

Figure 3-5

2016 Existing Weekday Morning Peak Hour Pedestrian Volumes

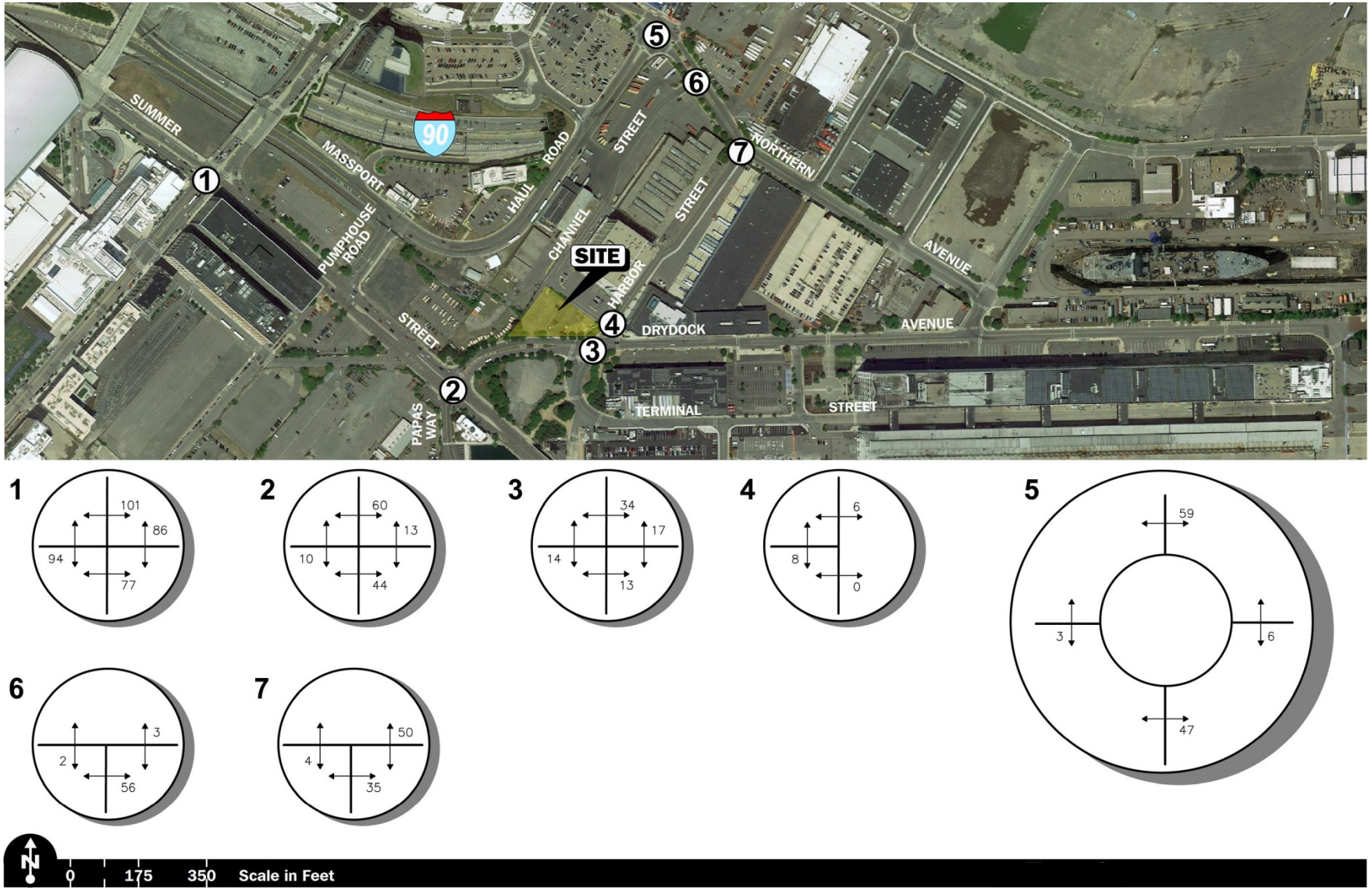


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Figure 3-6

2016 Existing Weekday Evening Peak Hour Pedestrian Volumes

3.2.5 Public Transportation

The Project site is situated in close proximity to transit service offered by the Massachusetts Bay Transit Authority (MBTA). The Project site is served by a number of public transportation services, including local bus service and the Silver Line. The Silver Line Way Station is located less than 10 minutes from the Project site via Northern Avenue to Harbor Street.

Local bus and Silver Line routes serving the Project site provide connections to both South Station and North Station, which provide connections to regional commuter rail lines that serve communities located north, south and west of Boston, Amtrak trains and rapid transit lines operated by the MBTA.

Figure 3-7 depicts the available public transportation services in the area. The following sections describe the available public transportation services within the study area that serve the Project site.

3.2.5.1 Local Bus Service

The MBTA operates the following six public bus routes within the study area:

Route 4: North Station – World Trade Center via Federal Courthouse and South Station - The MBTA Route 4 bus route provides service between North Station, State Street, Northern Avenue and the Raymond L. Flynn Marine Park. Weekday service along this route begins at 6:44 a.m. and runs until 6:51 p.m., with peak hour headways of approximately 10 to 15 minutes.

Route 7: City Point – Otis and Summer Streets via Summer Street and South Station - The MBTA Route 7 bus route provides service between City Point, Summer Street, South Station and Otis Street. Service along this bus route is provided to Summer Street in close proximity to the Project site. Weekday service along this route begins at 5:15 a.m. and runs until 11:58 p.m., with peak hour headways of approximately five minutes.

3.2.5.2 Rapid Transit Routes

The Project site and the immediate study area is served by the MBTA Silver Line. The Silver Line provides transit service within the study area via the SL1 and SL2 routes. A summary of each route is provided below.

Route SL1: Logan Airport - South Station via Waterfront - The SL1 transit route provides service between South Station, World Trade Center and Logan Airport, with service within the study area provided via the Silver Line Way Station. Weekday service along this route begins at 5:40 a.m., with peak hour headways of approximately 8 to 10 minutes.

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Route SL2: Design Center - South Station via Waterfront - The SL2 transit route provides service between South Station, World Trade Center and Logan Airport, with service within the study area provided directly to the Raymond L. Flynn Marine Park via Drydock Avenue. Weekday service along this route begins at 6:03 a.m., with peak hour headways of approximately 5 minutes.

3.2.6 Parking

To assess the availability of parking proximate to the Project site, an inventory of on-street parking located within the study area was conducted in May 2016. The inventory included publicly available parking located on-street within walking distance of the site. Within the study area, on-street parking is typically prohibited, with the exception of limited on-street metered parking along segments of Northern Avenue and short-term visitor parking along segments of Drydock Avenue. On-street parking restrictions and available on-street parking within the study area are depicted in Figure 3-8. As previously described, the Project includes an approximately 150-space parking garage that will be accessed via a full access-egress driveway onto Channel Street.

3.3 Future Conditions

Existing conditions in the study area were projected to the year 2023, which reflects a seven-year planning horizon consistent with state traffic study guidelines. Independent of the Project, conditions on the transportation system in the year 2023 under No-Build conditions are influenced by changes in the transportation system resulting from: i) specific development projects by others; ii) population and demographic shifts; and iii) capital investments made by the local, state and/or federal government or private interests. Anticipated Project-generated trips superimposed upon the 2023 No-Build condition transportation network reflect 2023 Build conditions with the Project.

3.3.1 Future Growth

Future growth is a function of the expected land development in the immediate area and the surrounding region. Several methods can be used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all volumes under study. The drawback to such a procedure is that some volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the trips that are to be generated, and assigns the resultant values to the area transportation network. This procedure produces a more realistic estimate of growth for local conditions; however, the drawback of this procedure is that potential growth in population and development external to the study area would not be accounted for in the projections.

To provide a conservative analysis framework, both procedures were used, the salient components of which are described below.

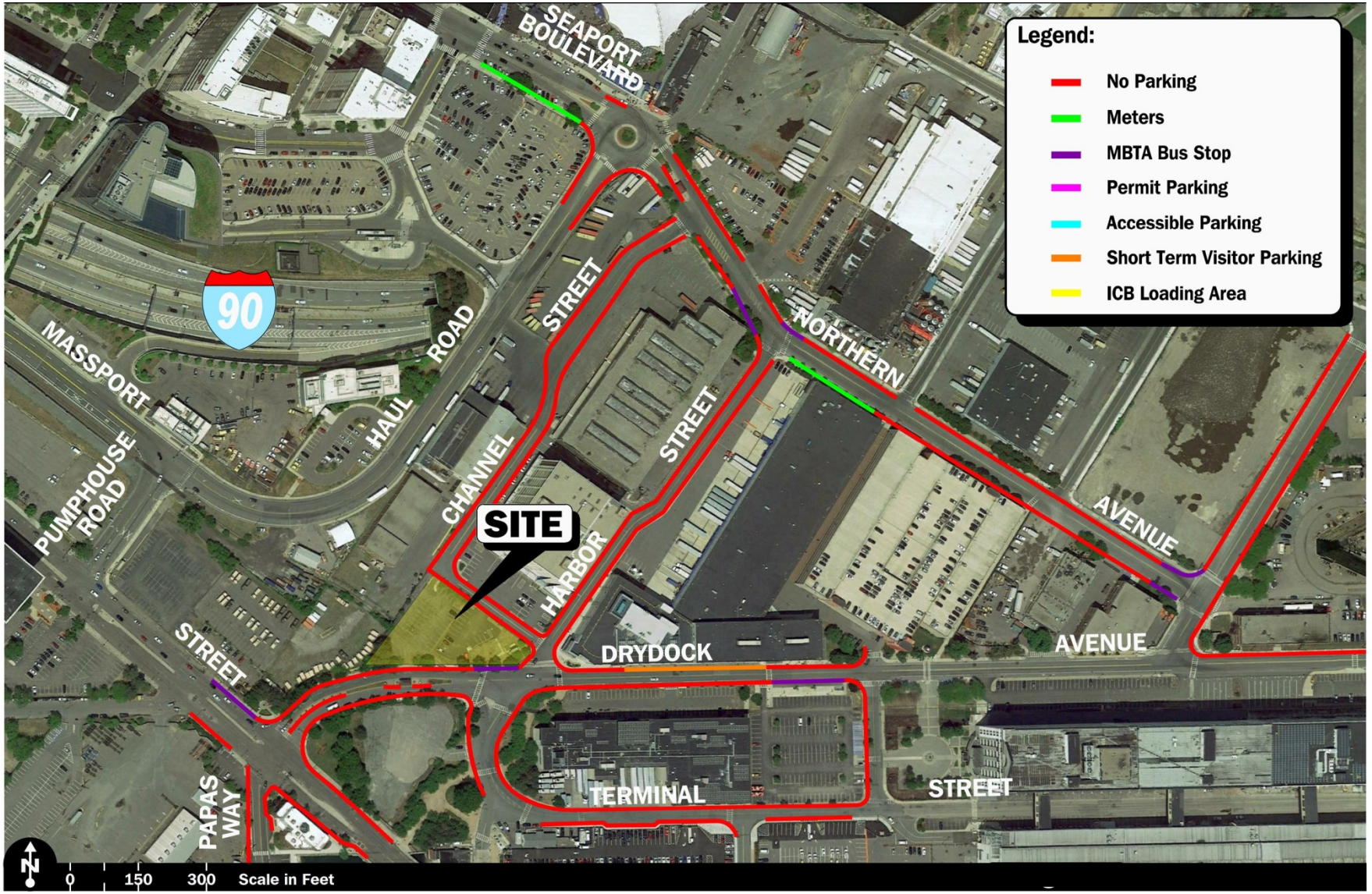

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Figure 3-8

On-Street Curbside Parking Inventory

3.3.1.1 Specific Development by Others

The BTD was contacted in order to determine if there are any projects planned within the study area that would have an impact on future traffic conditions at the study area intersections. Based on these discussions, the following projects were identified for inclusion in this study:

Parcel K - The Parcel K project consists of a mixed-use development including 304 apartment residences, a 247 room boutique hotel, approximately 16,200 sf of office space, approximately 17,200 sf of retail space and approximately 7,800 sf of restaurant space.

Seaport Square - The Seaport Square development entails the construction of approximately 6.5 million sf of total development on multiple parcels of land along Seaport Boulevard, consisting of 2.5 million sf of residential space, 1.5 million sf of new office space, two hotels, a cultural and educational center and 1.5 million sf of multi-level retail, restaurant and entertainment space.

Pier 4 - The Pier 4 project includes approximately one million square feet of mixed-use development, including an initial phase of 383 residential units, 12,600 sf of restaurant retail space, civic space and a subsurface parking garage below Seaport Boulevard.

411 D Street - The 411 D Street project entails the development of two separate 5- and 6-story residential buildings totaling approximately 197,000 sf that will provide a total of 197 units of residential housing as well as 129 on-site parking spaces.

Waterside Place - Waterside Place Phase 1B entails the construction of a 23-story building totaling approximately 345,000 sf, containing 312 residential rental units, approximately 2,000 square feet of street-lev el retail space and an 84 space parking garage.

6 Tide Street - The Innovation Square at Northern Avenue project located at 6 Tide Street entails the development of a 4-story approximately 355,000 sf multi-tenant research and development building, as well as 60 parking spaces.

Boston Cargo Terminal - The Boston Cargo terminal project entails the construction of an intermodal marine industrial facility, consisting of three separate buildings and a 4.3 acre bulk cargo handling facility site.

It is noted that a project is proposed on Parcel A across from the site (known as Marine Wharf). At the time that the TIAS for Parcel Q1 was completed, project information for Marine Wharf was not available, and therefore, additional traffic volumes associated with the Marine Wharf development have not been included in the analysis of future traffic operations.

No other projects were identified at this time that are expected to impact future traffic volumes within the study area beyond the general background traffic growth rate.

3.3.1.2 General Background Traffic Growth

Traffic-volume data and historic traffic counts in the area were reviewed in order to determine general traffic growth trends. Based on a review of this data, it was determined that traffic volumes within the City of Boston have remained relatively stable over the past 10 years (i.e., none or nominal growth). In order to account for future traffic growth and presently unforeseen development within the study area, a 1.0 percent per year compounded annual background traffic growth rate was applied to the existing traffic volumes over the seven-year planning horizon, which is consistent with the background growth rate used for other recent area development projects.

3.3.1.3 Planned Transportation Improvements

The BTD was consulted in order to determine if there are any planned transportation improvement projects expected to be completed within the study area. Based on this consultation, no improvement projects were identified.

3.3.1.4 No-Build Traffic Volumes

The 2023 No-Build condition peak-hour traffic-volume networks were developed by increasing the 2016 Existing peak-hour traffic volumes by 1.0 percent per year between 2016 and 2023, and then superimposing the peak-hour traffic volumes expected to be generated by the previously identified specific development projects by others. The resulting 2023 No-Build condition weekday morning and weekday evening peak-hour traffic-volume networks are shown on Figures 3-9 and 3-10, respectively.

3.3.1.5 No-Build Pedestrian Volumes

The future 2023 No-Build condition pedestrian volume networks were developed by applying a conservative 2.0 percent per year compounded annual growth rate to the 2016 Existing peak-hour pedestrian volumes, consistent with the methodology used for developing the future condition traffic volume networks beyond 2023. The resulting 2023 No-Build weekday morning and weekday evening peak-hour pedestrian-volume networks are shown on Figures 3-11 and 3-12, respectively.

3.3.2 Project-Generated Trips

Design year (2023 Build) automobile, pedestrian and public transportation trips for the study area were determined by estimating the trip characteristics of the Project and assigning these volumes on the transportation system. The following sections describe the procedures used to develop Build conditions (with the Project) within the study area.

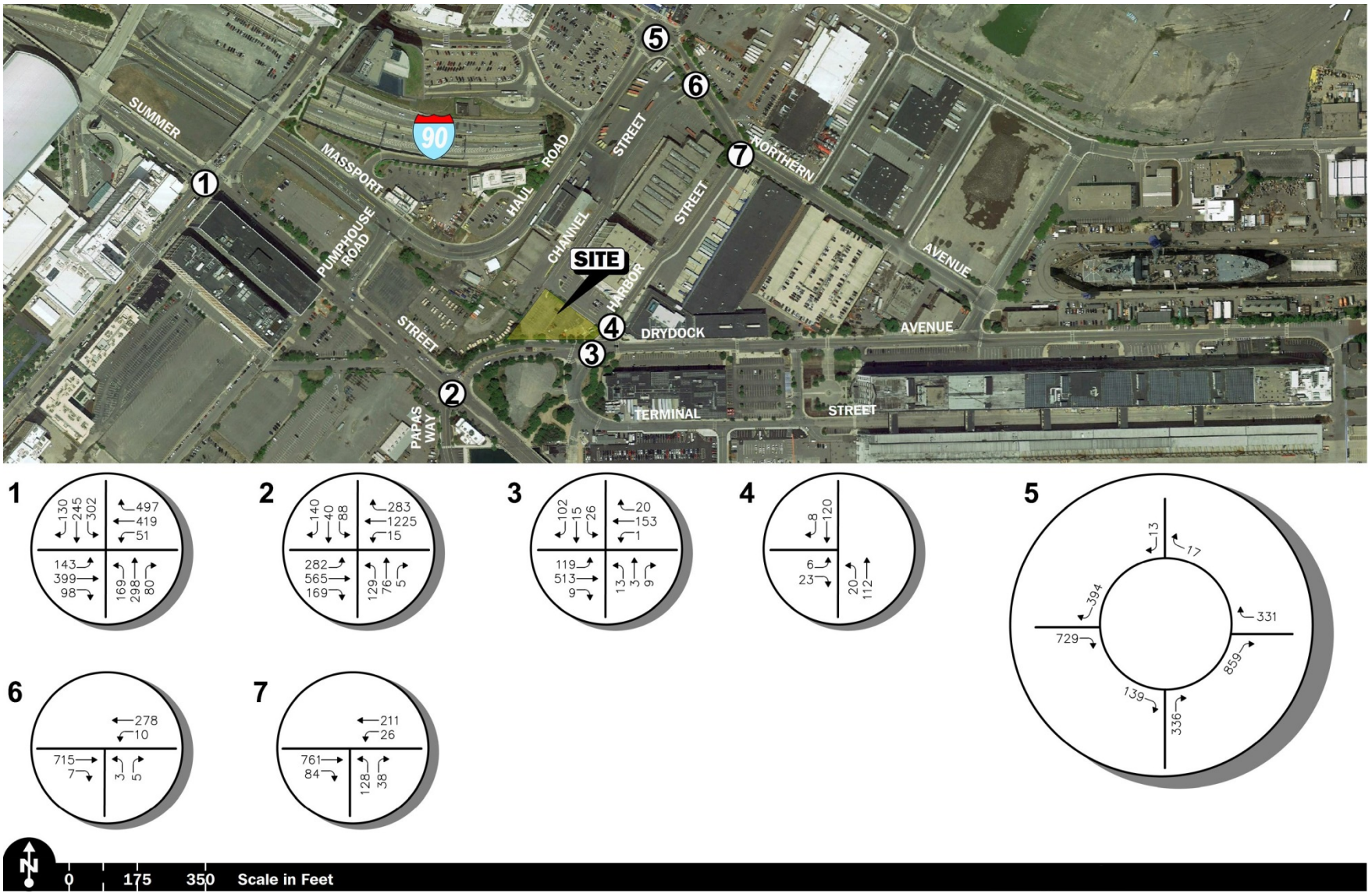

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Figure 3-9

2023 No-Build Weekday Morning Peak Hour Traffic Volumes

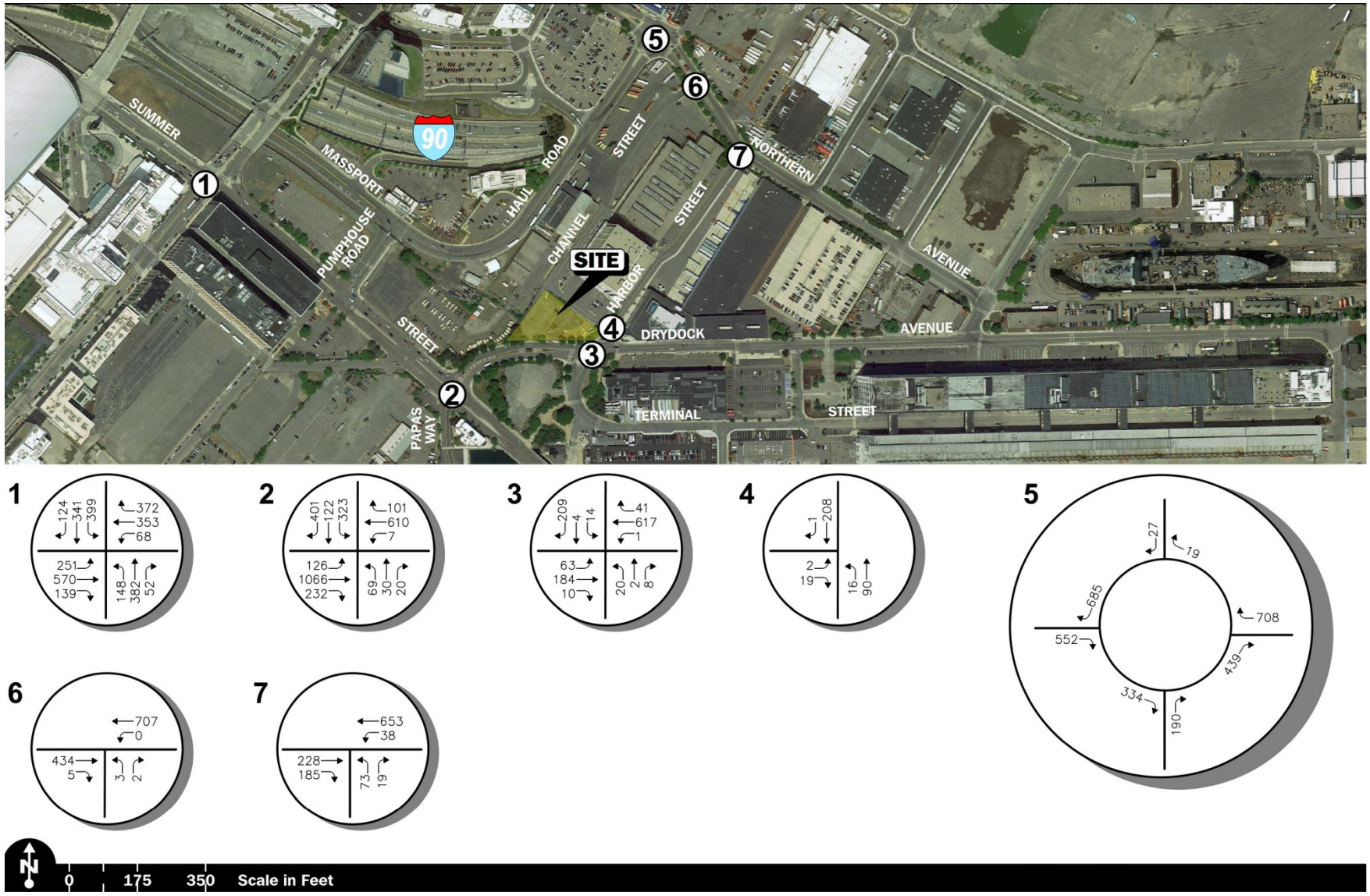

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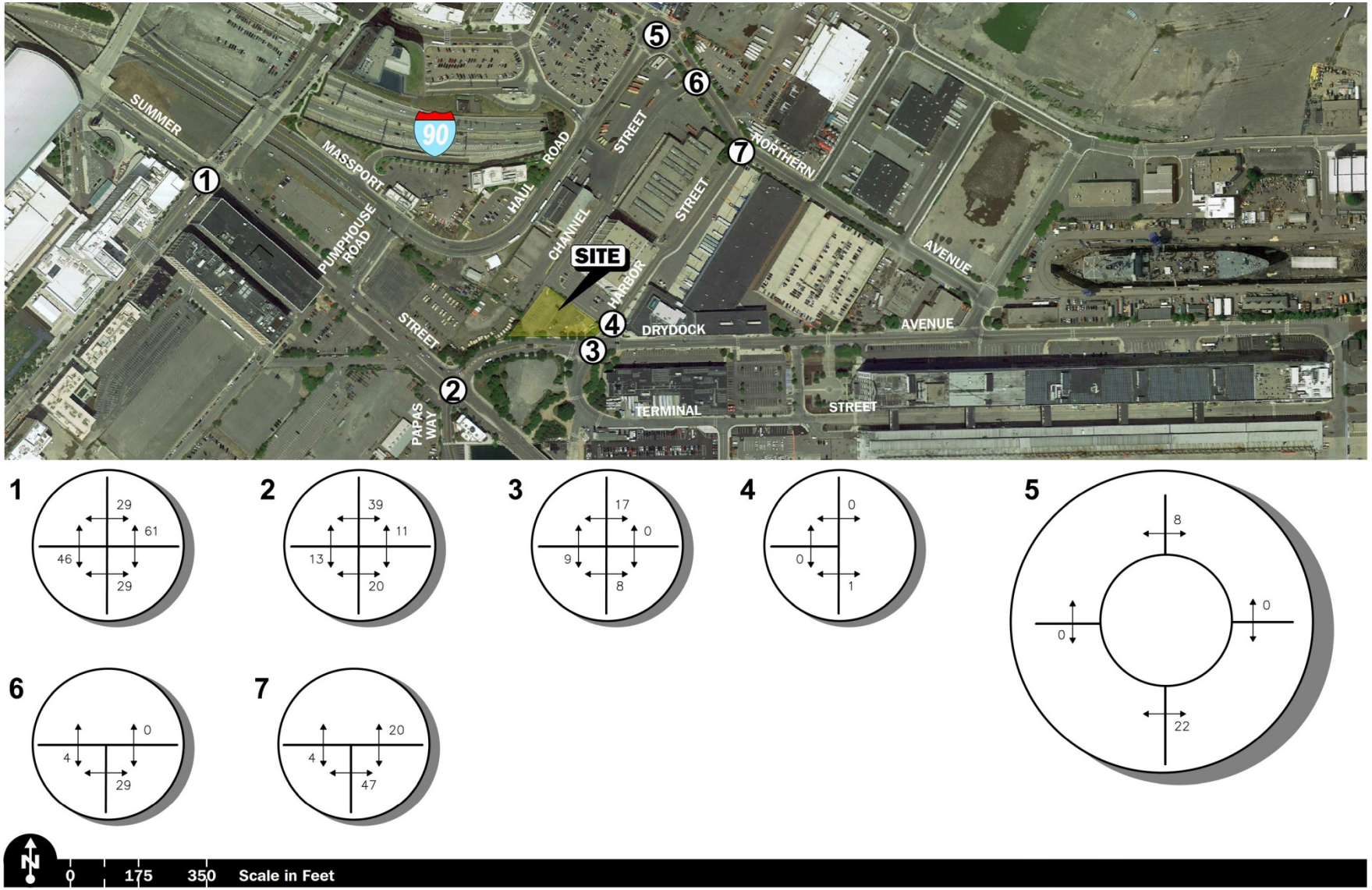
Figure 3-10

2023 No-Build Weekday Evening Peak Hour Traffic Volumes



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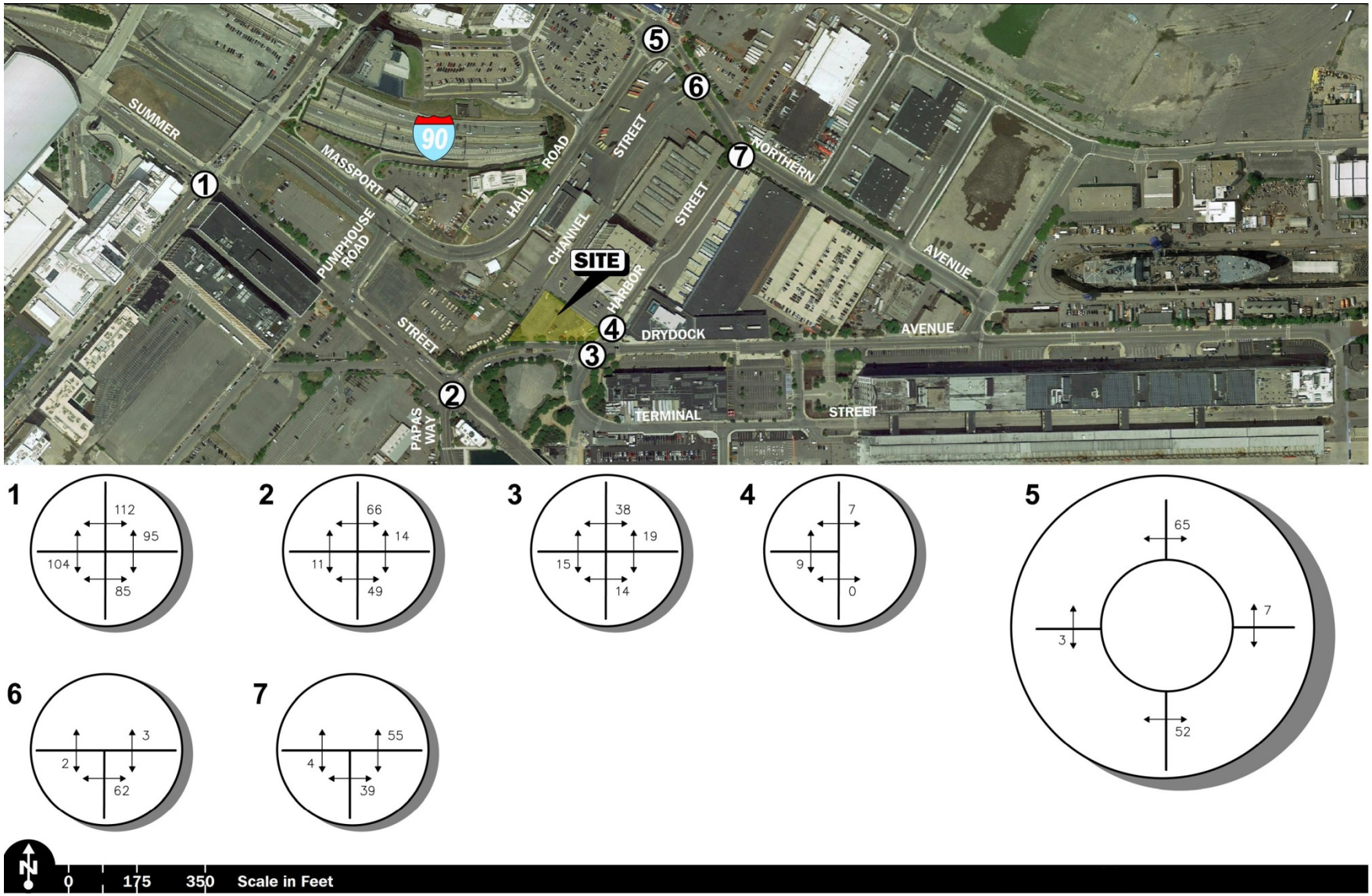

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Figure 3-12

2023 No-Build Weekday Evening Peak Hour Pedestrian Volumes

3.3.2.1 Methodology

As described previously, the developed studied in this TIAS includes the construction of approximately 230,000 sf of general office space. As mentioned in Section 3.1.2, since the time that this TIAS was completed, the Project has been refined to including approximately 220,100 sf of office and support retail; however, this change will have a minimal impact on traffic generation, and the study's findings, conclusions and recommendations are still valid. In order to develop the base trip characteristics of the Project, trip- generation statistics published by the ITE[2] for a similar land use as proposed were used. Specifically, ITE Land Use Code (LUC) 710, General Office Building were used to develop the base trip estimates for the Project.

Given the availability of public transportation to the Project site (bus and Silver Line services) and the extensive sidewalk network that links the Project site to surrounding neighborhoods and pedestrian destinations, it is expected that a significant portion of the trips generated by the Project will be made by public transportation or will include pedestrian/bicycle trips. In order to disseminate the ITE trip characteristics of the Project, which are expressed in vehicle trips, to the modes of travel that will be available to the Project (automobile, public transportation and pedestrian/bicycle), vehicle occupancy ratios (VORs) and travel mode data obtained from BTD were reviewed. Table 3.3-1 summarizes the VOR and travel mode data used for the individual components of the Project.

[2] Ibid.

Table 3.3-1 Travel Mode Split and Vehicle Occupancy Ratio*

	Mode of Travel									
	Automobile (Percent)			Transit (Percent)			Pedestrian/Bicycle (Percent)			VOR
Land Use	Weekday daily	AM Peak Hour	PM Peak Hour	Weekday Daily	AM Peak Hour	PM Peak Hour	Weekday Daily	AM Peak Hour	PM Peak Hour	(Persons per Vehicle)
Office:										
Entering	31	33	29	49	55	37	20	12	34	1.18
Exiting	31	33	29	49	55	37	20	12	34	1.18

*Source: Boston Transportation Department Area 13 Mode Shares.

Table 3.3-2 summarizes the anticipated trip characteristics of the Project using the above methodology.

Table 3.3-2 Project Trip Generation Summary

Time Period/Direction	ITE Trips	Total Person Trips	Person Trips: Automobile Trips	Person Trips: Transit Trips	Person Trips: Pedestrian /Bicycle Trips	Vehicle Trips: Automobile Trips
Average Weekday Daily:						
Entering	1,236	1,458	452	714	292	383
Exiting	1,236	1,458	452	714	292	383
Total	2,472	2,916	904	1,428	584	766
Weekday Morning Peak Hour:						
Entering	328	387	128	213	46	108
Exiting	45	53	17	29	7	15
Total	373	440	145	242	53	123
Weekday Evening Peak Hour:						
Entering	57	67	19	25	23	16
Exiting	279	329	96	122	111	81
Total	336	396	115	147	134	97

3.3.2.2 Project-Generated Trip Summary

As summarized in Table 3.3-2, the Project is projected to result in 766 new automobile trips (383 vehicles entering and 383 exiting) on an average weekday, with 1,428 transit trips and 584 pedestrian/bicycle trips. During the weekday morning peak hour, the Project is projected to generate 123 new automobile trips (108 vehicles entering and 15 exiting), with 242 transit trips and 53 pedestrian/bicycle trips. During the weekday evening peak hour, the Project is projected to generate 97 new automobile trips (16 vehicles entering and 81 exiting), with 147 transit trips and 134 pedestrian/bicycle trips.

3.3.2.3 Vehicle Trip Distribution and Assignment

The directional distribution of automobile trips to and from the Project site was determined based on BTD origin-destination data for this section of Boston, and a review of existing travel patterns within the study area and the roadway network serving the Project site. In general, automobile trips associated with the Project were distributed 20 percent to and from Northern Avenue west of D Street, 27 percent to and from D Street to Northern Avenue, 20 percent to and from D Street to Summer Street, 10 percent to and from D Street south of Summer Street, 10 percent from Massport Haul Road, 7 percent to and from

Summer Street east of Drydock Avenue and 6 percent to and from Summer Street west of D Street.

The additional automobile trips expected to be generated by the Project were assigned on the study area roadway network as shown on Figures 3-13 and 3-14 for the weekday morning and weekday evening peak hours, respectively.

3.3.2.4 Pedestrian Trip Distribution and Assignment

The distribution of pedestrian trips to and from the Project was developed based on a review of existing pedestrian volumes and patterns along Summer Street, Northern Avenue and D Street, and was then refined to include pedestrian trips from nearby MBTA bus stops and Silver Line stations. The additional pedestrian trips expected to be generated by the Project were assigned on the study area pedestrian network as shown on Figures 3-15 and 3-16 for the weekday morning and weekday evening peak hours, respectively.

3.3.3 Future Build Conditions

3.3.3.1 Build Traffic Volumes

The 2023 Build condition traffic volumes were developed by adding the anticipated Project-generated automobile trips to the respective 2023 No-Build condition peak-hour traffic volumes. The resulting 2023 Build condition weekday morning and weekday evening peak-hour traffic-volume networks are graphically depicted on Figure 3-17 and 3-18, respectively.

3.3.3.2 Build Pedestrian Volumes

The 2023 Build condition peak-hour pedestrian volume networks were developed by adding the anticipated peak-hour Project-generated pedestrian volumes to the 2023 No-Build pedestrian volumes. The resulting 2023 Build condition weekday morning and weekday evening peak-hour pedestrian-volume networks are graphically depicted on Figures 3-19 and 3-20, respectively.

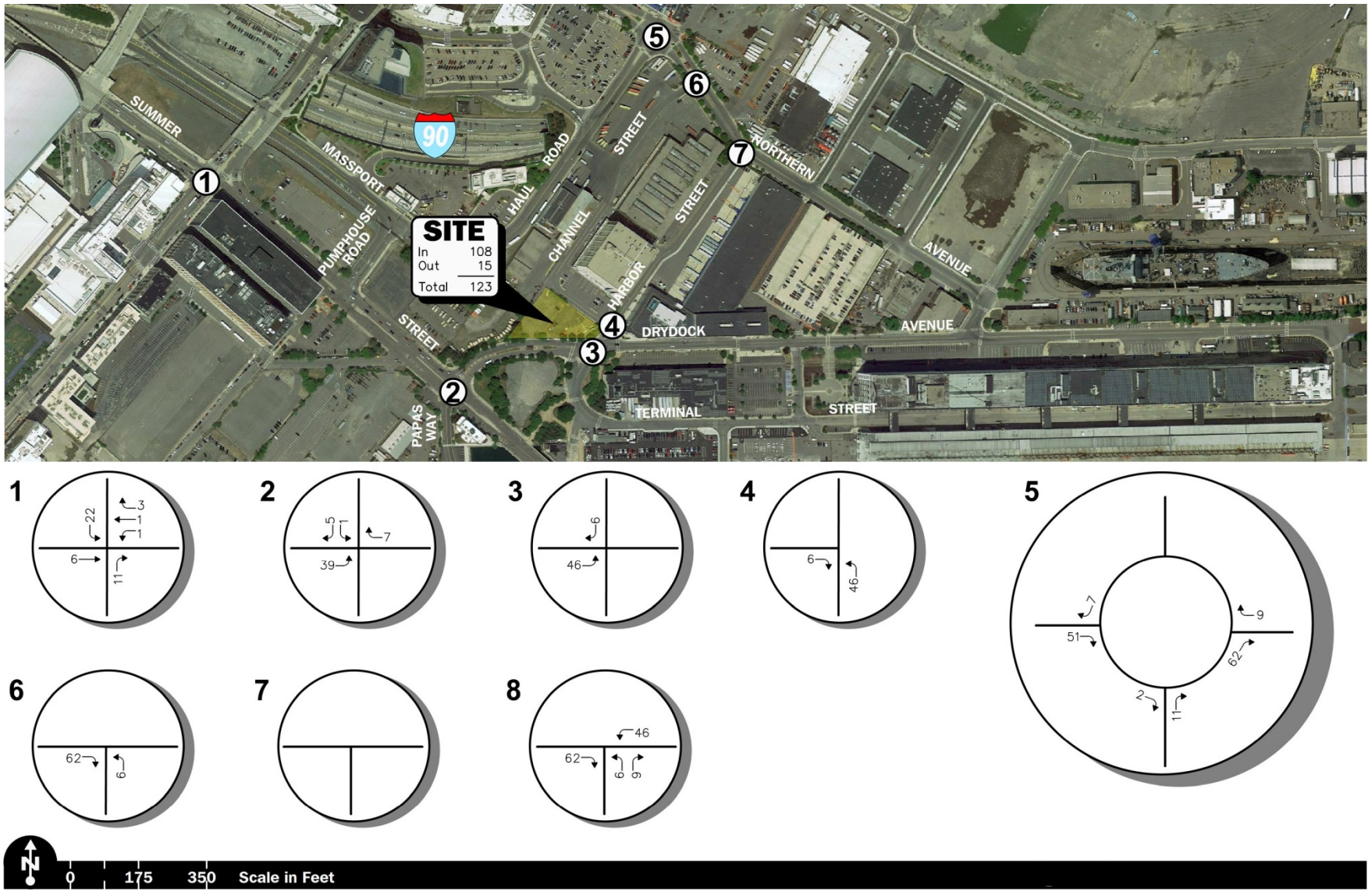

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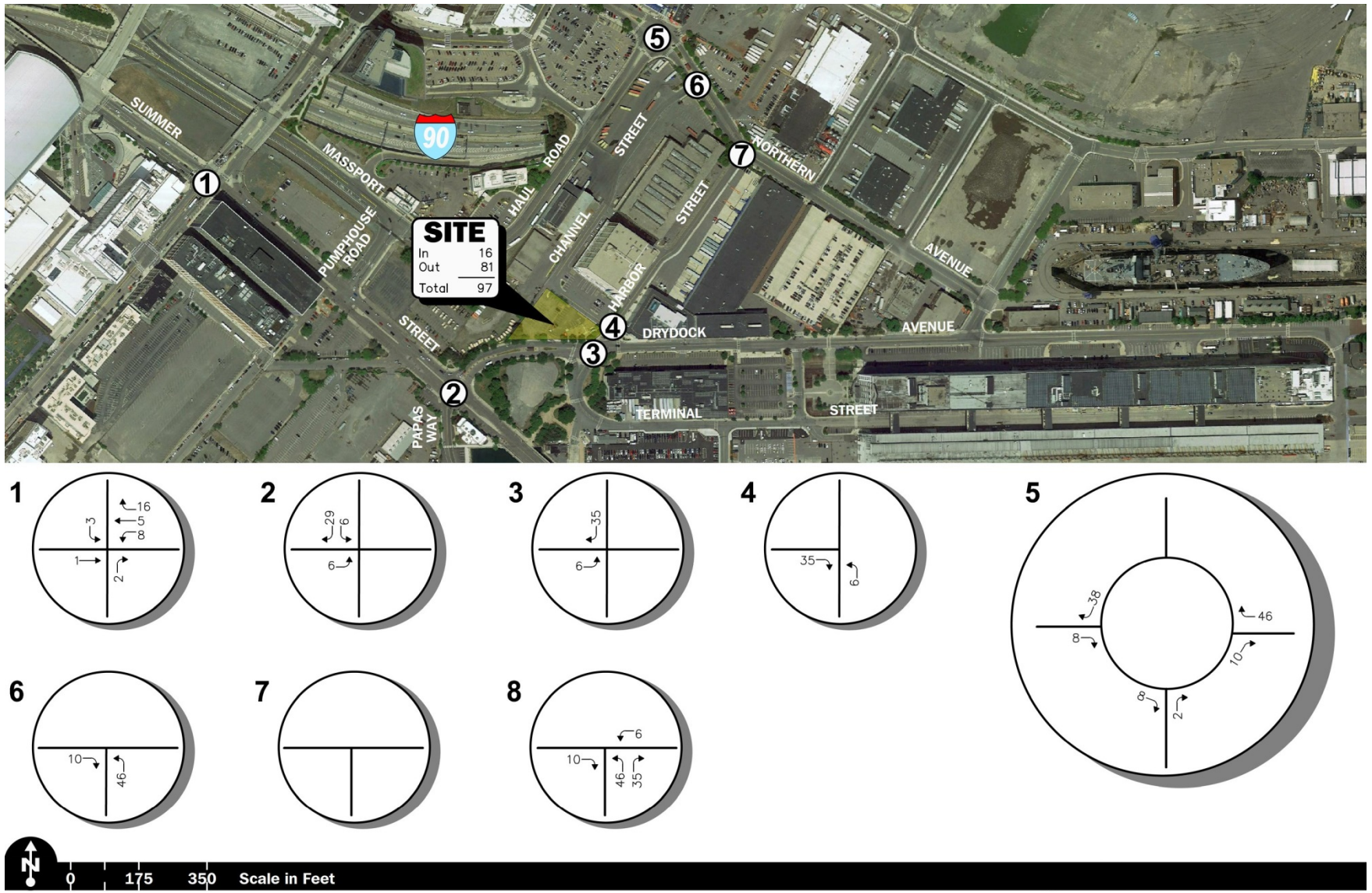
Figure 3-13

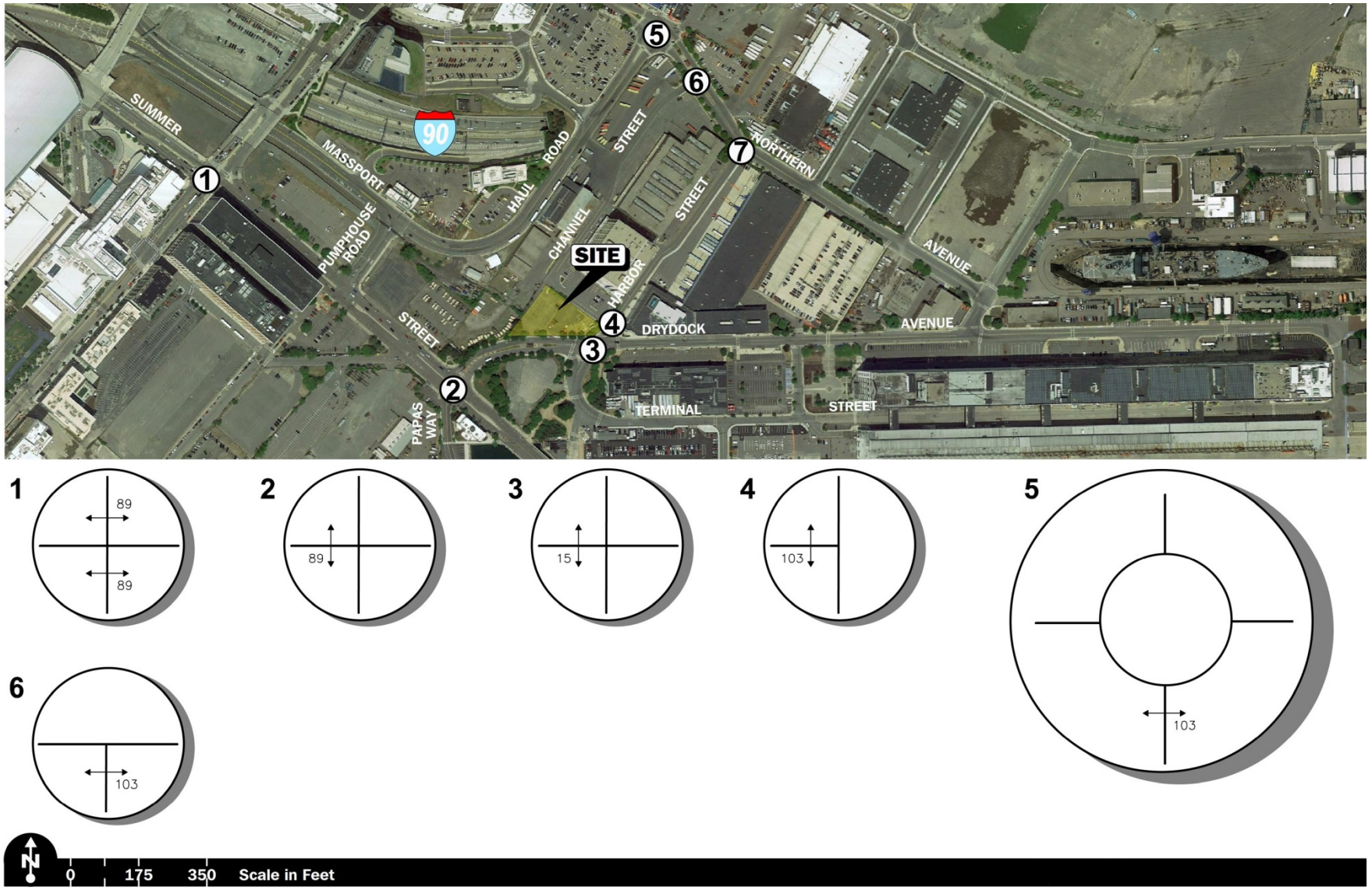
Site-Generated Weekday Morning Peak Hour Traffic Volumes



Parcel Q1 Boston, Massachusetts

Figure 3-14

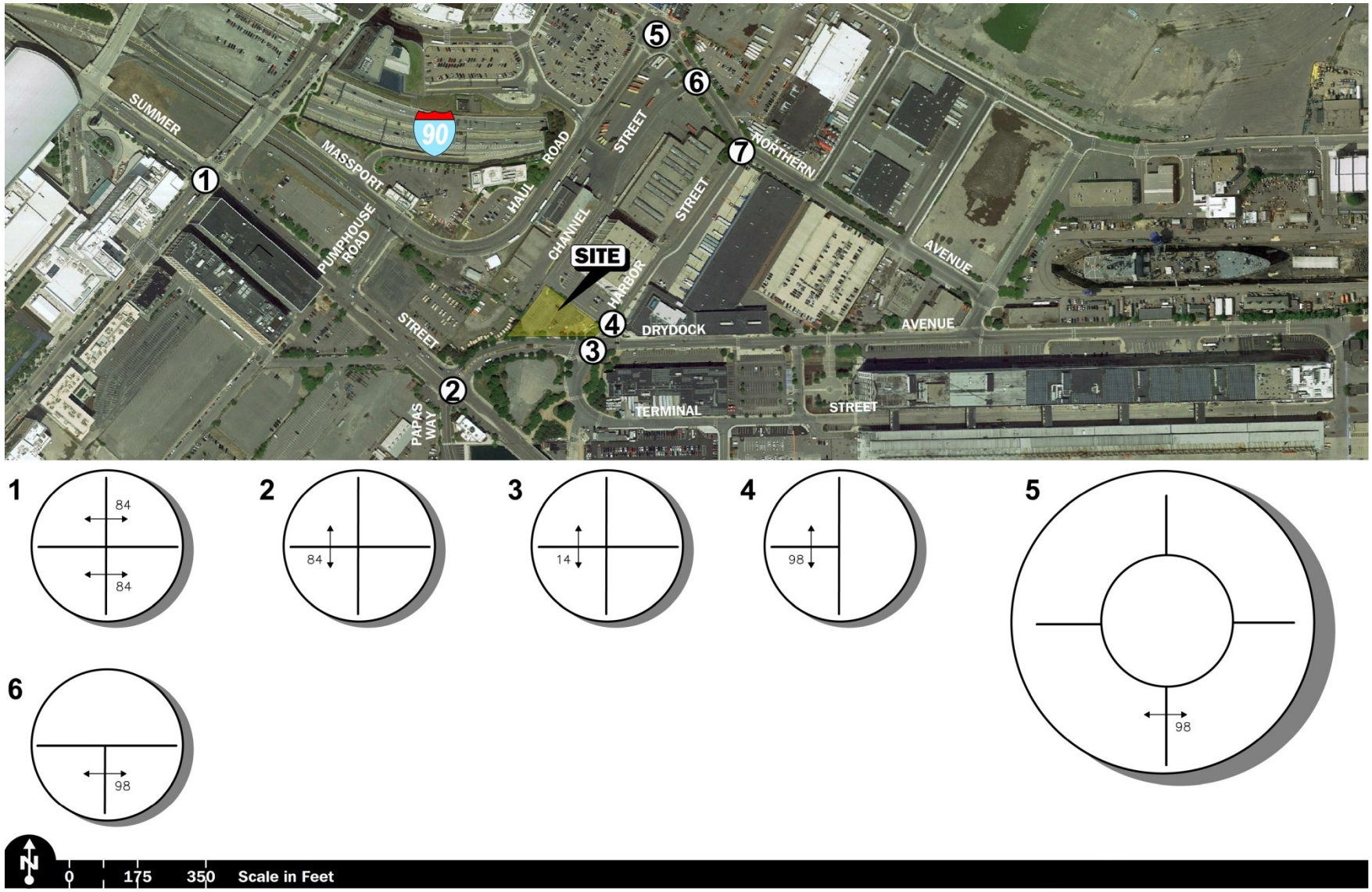
Site-Generated Weekday Evening Peak Hour Traffic Volumes



Parcel Q1 Boston, Massachusetts

Figure 3-15

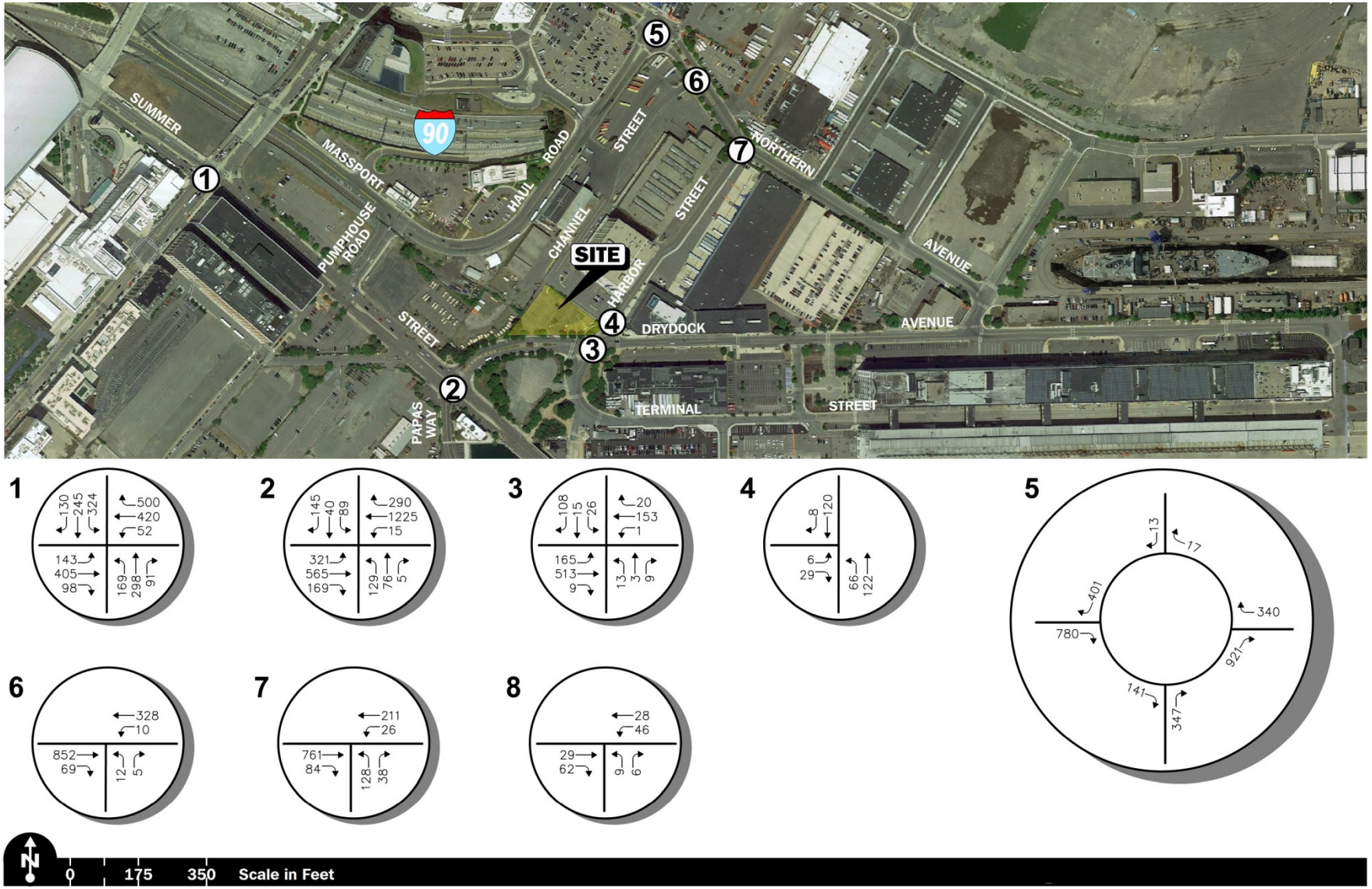
Site-Generated Weekday Morning Peak Hour Pedestrian Volumes



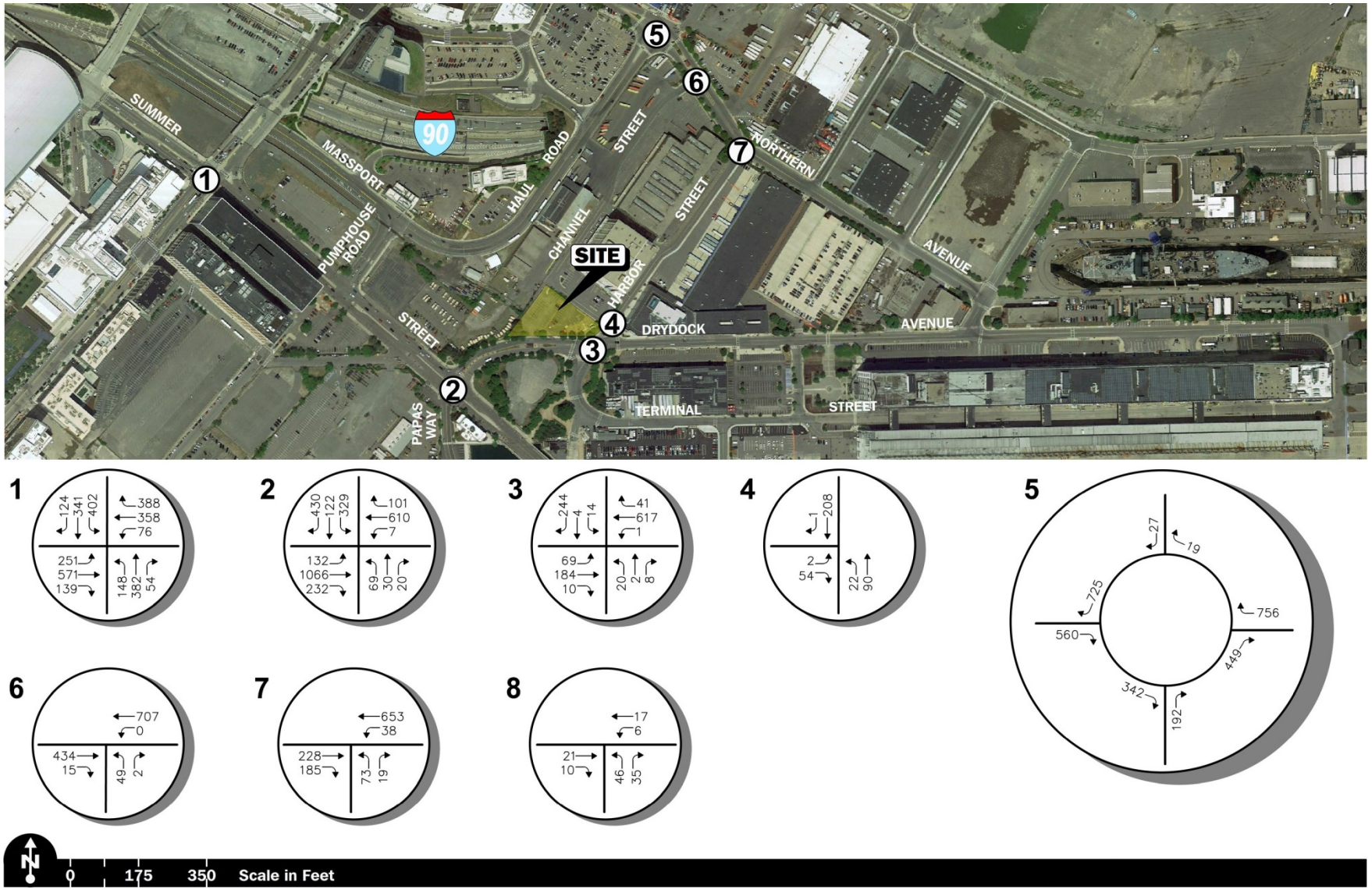
Parcel Q1 Boston, Massachusetts

Figure 3-16

Site-Generated Weekday Evening Peak Hour Pedestrian Volumes



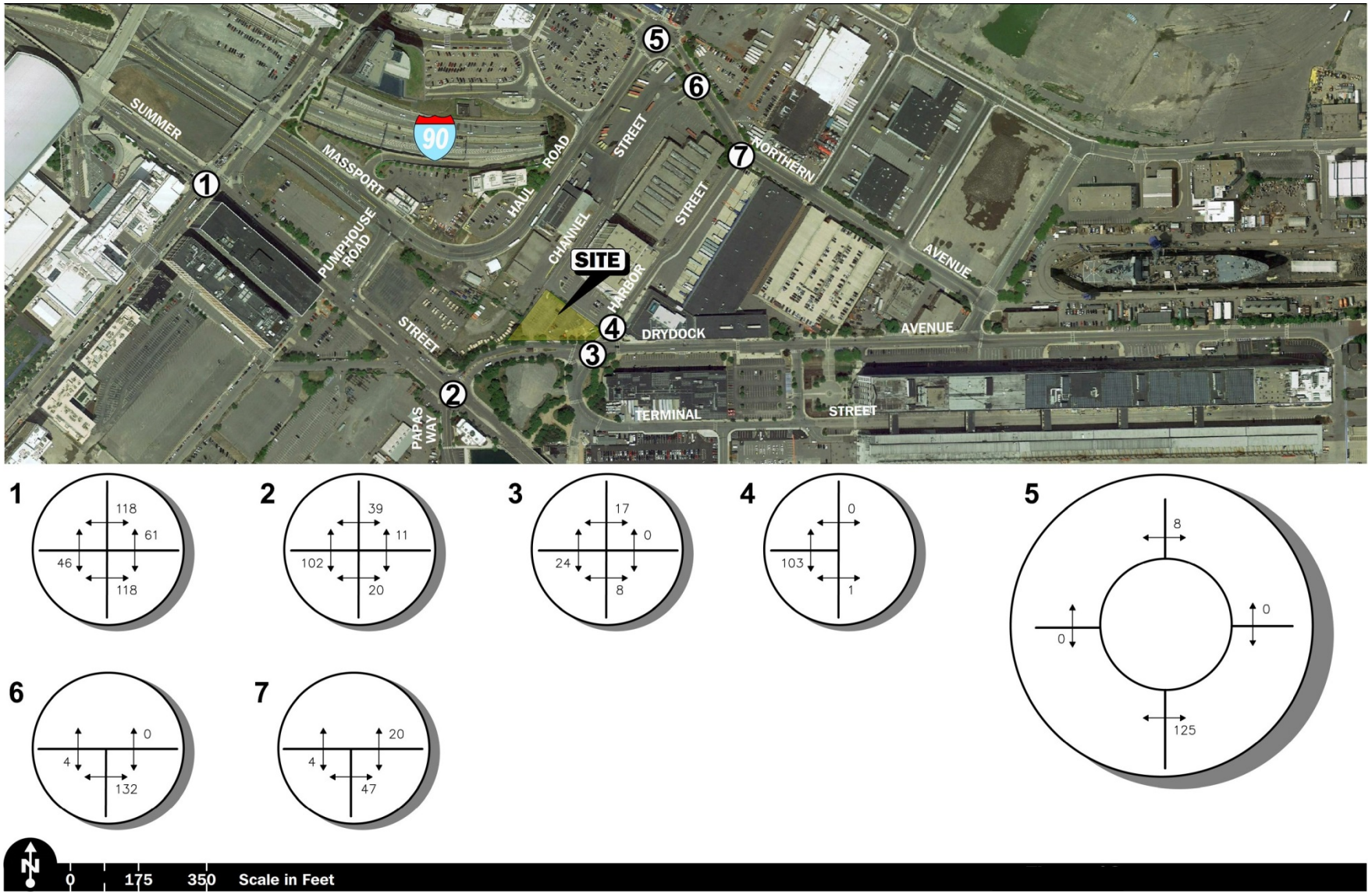
Parcel Q1 Boston, Massachusetts



Parcel Q1 Boston, Massachusetts

Figure 3-18

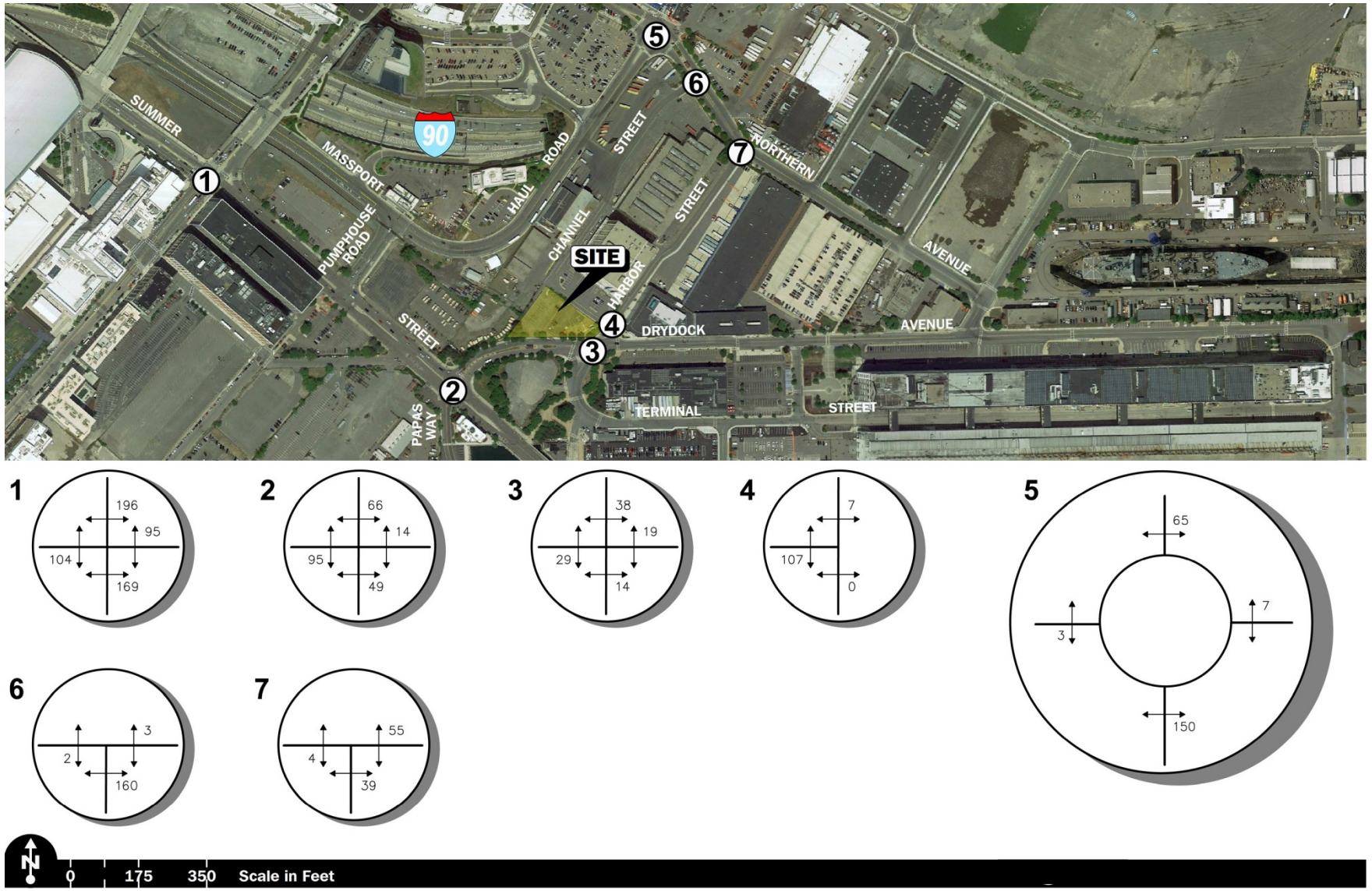
2023 Build Weekday Evening Peak Hour Traffic Volumes



Parcel Q1 Boston, Massachusetts

Figure 3-19

2023 Build Weekday Morning Peak Hour Pedestrian Volumes



Parcel Q1 Boston, Massachusetts

3.4 Transportation System Operations Analysis

Measuring existing and future vehicle, pedestrian, bicycle and transit volumes quantifies flow within the study area. To assess the quality of operation of the transportation system, capacity analyses were conducted at the study intersections, under Existing, No-Build, and Build conditions. Capacity analyses provide an indication of how well the transportation system serves the demands placed upon the system, providing a measure of the operational characteristics of an intersection or section of roadway under study.

3.4.1 Intersection Capacity Analysis

3.4.1.1 Methodology

Levels of Service - A primary result of capacity analyses is the assignment of level of service (LOS) to traffic facilities under various traffic-flow conditions.[3] The concept of LOS is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A LOS definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F representing congested or constrained operating conditions.

Since the LOS of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

Signalized Intersections - The six levels of service for signalized intersections may be described as follows:

LOS A describes operations with very low control delay; most vehicles do not stop at all.

LOS B describes operations with relatively low control delay. However, more vehicles stop than LOS A.

LOS C describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

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[3] The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2010.

LOS D describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop and individual cycle failures are noticeable.

LOS E describes operations with high control delay values. Individual cycle failures are frequent occurrences.

LOS F describes operations with high control delay values that often occur with over-saturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Levels of service for signalized intersections are calculated using the operational analysis methodology of the 2010 Highway Capacity Manual. This method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on delay. LOS designations are based on the criterion of control or signal delay per vehicle. Control or signal delay is a measure of driver discomfort, frustration, and fuel consumption, and includes initial deceleration delay approaching the traffic signal, queue move-up time, stopped delay and final acceleration delay. Table 3.4-1 summarizes the relationship between LOS and control delay. The tabulated control delay criterion may be applied in assigning LOS designations to individual lane groups, to individual intersection approaches, or to entire intersections.

Table 3.4-1 Level of Service Criteria for Signalized Intersections

Level of Service	Control (Signal) Delay Per Vehicle (Seconds)
A	≤10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55
E	55.1 to 80.0
F	>80.0

Unsignalized Intersections - The six levels of service for unsignalized intersections may be described as follows:

LOS A represents a condition with little or no control delay to minor street traffic.

LOS B represents a condition with short control delays to minor street traffic.

LOS C represents a condition with average control delays to minor street traffic.

LOS D represents a condition with long control delays to minor street traffic.

LOS E represents operating conditions at or near capacity level, with very long control delays to minor street traffic.

LOS F represents a condition where minor street demand volume exceeds capacity of an approach lane, with extreme control delays resulting.

The levels of service of unsignalized intersections are determined by application of a procedure described in the 2010 Highway Capacity Manual. The SIDRA capacity analysis software, which is approved by the Massachusetts Department of Transportation for roundabout analysis was utilized for the intersection of Northern Avenue with the Massport Haul Road. LOS is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study, and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP-sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for LOS at unsignalized intersections are also given in the 2000 Highway Capacity Manual. Table 3.4-2 summarizes the relationship between LOS and average control delay for unsignalized intersections.

Table 3.4-2 Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (Seconds Per Vehicle)
A	≤10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35
E	35.1 to 50.0
F	>50.0

3.4.1.2 Analysis Results

Capacity analyses were conducted for 2016 Existing, 2023 No-Build, and 2023 Build conditions for the intersections within the study area. The results of the intersection capacity analyses are summarized for the signalized and unsignalized study intersections in Tables 3.4-3 and 3.4-4, respectively, and are described in the following sections. The detailed analysis results are presented in Appendix B.

3.4.1.3 Signalized Intersections

The addition of Project-related traffic to the signalized study area intersections is not predicted to result in a reduction to overall levels of service as compared to future No-Build conditions. In the majority of instances, signalized study area locations were found to be operating at LOS D or better during the peak hours under all analysis conditions, which is considered acceptable in an urban environment. In all instances, Project-related traffic increases are projected to amount to minimal increases in overall delays as compared to future No-Build conditions.

Table 3.4-3 Signalized Intersection Level of Service Summary

Signalized Intersection/Peak Hour/Movement	2016 Existing V/C[a]	2016 Existing Delay[b]	2016 Existing LOS[c]	2023 No-Build V/C	2023 No-Build Delay	2023 No-Build LOS	2023 Build V/C	2023 Build Delay	2023 Build LOS
Summer Street at D Street									
Weekday Morning:									
Summer Street EB LT	0.40	31	C	0.50	33	C	0.50	33	C
Summer Street EB TH/RT	0.42	25	C	0.44	24	C	0.45	24	C
Summer Street WB LT/TH	0.68	44	D	0.76	37	D	0.77	36	D
Summer Street WB RT	0.65	10	B	0.66	8	A	0.66	8	A
D Street NB LT	0.45	42	D	0.66	53	D	0.67	53	D
D Street NB TH/RT	0.46	37	D	0.74	47	D	0.76	47	D
D Street SB LT	0.51	35	C	0.76	52	D	0.82	58	E
D Street SB TH/RT	0.45	25	C	0.72	33	C	0.75	35	D
Overall	--	**29**	**C**	--	**32**	**C**	--	**33**	**C**
Weekday Evening:									
Summer Street EB LT	0.69	44	D	0.76	46	D	0.77	47	D
Summer Street EB TH/RT	0.61	30	C	0.58	26	C	0.57	25	C
Summer Street WB LT/TH	0.79	49	D	0.87	45	D	0.90	47	D
Summer Street WB RT	0.53	10	A	0.57	7	A	0.58	7	A
D Street NB LT	0.28	36	D	0.64	52	D	0.66	54	D
D Street NB TH/RT	0.44	36	D	0.93	66	E	0.96	73	E
D Street SB LT	0.65	41	D	0.91	73	E	0.92	75	E
D Street SB TH/RT	0.66	32	C	0.97	59	E	0.97	60	E
Overall	**–**	**34**	**C**	**–**	**45**	**D**	**0.97**	**46**	**D**
Summer Street at Drydock Avenue and Pappas Way									
Weekday Morning:									
Summer Street EB LT	0.51	40	D	0.83	45	D	0.93	57	E
Summer Street EB TH/RT	0.69	40	D	0.42	15	B	0.42	16	B
Summer Street WB LT	0.17	44	D	0.06	22	C	0.06	22	C
Summer Street WB TH/RT	0.65	20	C	>1.2	>80	F	>1.2	>80	F
Pappas Way NB LT/TH/RT	0.24	10	A	0.49	30	C	0.49	30	C
Drydock Avenue SB LT/TH	0.17	9	A	0.37	28	C	0.37	28	C
Drydock Avenue SB RT	0.13	<5	A	0.28	<5	A	0.20	<5	A
Overall	**–**	**26**	**C**	**–**	**>80**	**F**	**–**	**>80**	**F**
Weekday Evening:									
Summer Street EB LT	0.23	22	C	0.61	32	C	0.64	34	C
Summer Street EB TH/RT	0.85	33	C	0.92	39	D	0.92	39	D
Summer Street WB LT	0.11	29	C	0.12	30	C	0.12	30	C
Summer Street WB TH/RT	0.66	32	C	0.85	40	D	0.85	41	D
Pappas Way NB LT/TH/RT	0.20	16	B	0.25	17	B	0.26	17	B
Drydock Avenue SB LT/TH	0.65	26	C	0.77	33	C	0.78	33	C
Drydock Avenue SB RT	0.30	<5	A	0.44	<5	A	0.47	<5	A
Overall	**–**	**28**	**C**	**–**	**33**	**C**	**–**	**33**	**C**

a Volume-to-capacity ratio
b Control (signal) delay per vehicle in seconds rounded to nearest second – rounded value may not correspond to LOS designation.
c Level of Service
EB = eastbound; WB = westbound; NB = northbound; SB = southbound; LT = left turning movements; TH = through movements; RT = right-turning movements

Table 3.4-4 Unsignalized Intersection Level of Service and Vehicle Queue Summary

Unsignalized Intersection/Peak Hour/Movement	2016 Existing Demand[a]	2016 Existing Delay[b]	2016 Existing LOS[c]	2023 No-Build Demand	2023 No-Build Delay	2023 No-Build LOS	2023 Build Demand	2023 Build Delay	2023 Build LOS
Drydock Avenue at Harbor Street									
Weekday Morning:									
Terminal Street NB	25	19	C	25	28	D	25	34	D
Harbor Street SB	142	14	B	143	19	C	149	22	C
Weekday Evening:									
Terminal Street NB	30	35	D	30	>50	F	30	>50	F
Harbor Street SB	223	24	C	227	>50	F	262	>50	F
Harbor Street at Channel Street									
Weekday Morning:									
Channel Street EB	29	10	A	29	10	A	35	10	B
Weekday Evening:									
Channel Street EB	21	10	B	21	10	B	56	10	B
Northern Avenue at Massport Haul Road									
Weekday Morning:									
Northern Avenue EB	538	9	A	776	13	B	830	15	C
Northern Avenue WB	278	7	A	368	9	A	378	9	A
Massport Haul Road NB	314	11	B	425	18	C	439	21	C
Private Drive SB	15	6	A	15	7	A	15	7	A
Weekday Evening:									
Northern Avenue EB	467	8	A	587	11	B	596	11	B
Northern Avenue WB	486	12	B	789	33	D	840	43	E
Massport Haul Road NB	158	7	A	241	9	A	243	9	A
Private Drive SB	31	7	A	31	10	B	31	11	B
Northern Avenue at Channel Street									
Weekday Morning:									
Channel Street NB	8	15	B	8	17	C	17	20	C
Weekday Evening:									
Channel Street NB	5	13	B	5	16	C	51	22	C
Northern Avenue at Harbor Street									
Weekday Morning:									
Harbor Street NB	162	32	D	166	>50	F	166	>50	F
Weekday Evening:									
Harbor Street NB	90	16	C	92	30	D	92	30	D

a Demand in vehicles per hour
b Average control delay per vehicle, in seconds, rounded to nearest second – rounded value may not correspond to LOS designation.
c Level of Service
EB = eastbound; WB = westbound; NB = northbound; SB = southbound; LT = left-turning movements; TH = through movements; RT = right-turning movements

Table 3.4-4 Unsignalized Intersection Level of Service and Vehicle Queue Summary

Unsignalized Intersection/Peak Hour/Movement	2016 Existing			2023 No-Build			2023 Build		
	Demand[a]	Delay[b]	LOS[c]	Demand	Delay	LOS	Demand	Delay	LOS
Drydock Avenue at Harbor Street									
Weekday Morning:									
Terminal Street NB	25	19	C	25	28	D	25	34	D
Harbor Street SB	142	14	B	143	19	C	149	22	C
Weekday Evening:									
Terminal Street NB	30	35	D	30	>50	F	30	>50	F
Harbor Street SB	223	24	C	227	>50	F	262	>50	F
Harbor Street at Channel Street									
Weekday Morning:									
Channel Street EB	29	10	A	29	10	A	35	10	B
Weekday Evening:									
Channel Street EB	21	10	B	21	10	B	56	10	B
Northern Avenue at Massport Haul Road									
Weekday Morning:									
Northern Avenue EB	538	9	A	776	13	B	830	15	C
Northern Avenue WB	278	7	A	368	9	A	378	9	A
Massport Haul Road NB	314	11	B	425	18	C	439	21	C
Private Drive SB	15	6	A	15	7	A	15	7	A
Weekday Evening:									
Northern Avenue EB	467	8	A	587	11	B	596	11	B
Northern Avenue WB	486	12	B	789	33	D	840	43	E
Massport Haul Road NB	158	7	A	241	9	A	243	9	A
Private Drive SB	31	7	A	31	10	B	31	11	B
Northern Avenue at Channel Street									
Weekday Morning:									
Channel Street NB	8	15	B	8	17	C	17	20	C
Weekday Evening:									
Channel Street NB	5	13	B	5	16	C	51	22	C
Northern Avenue at Harbor Street									
Weekday Morning:									
Harbor Street NB	162	32	D	166	>50	F	166	>50	F
Weekday Evening:									
Harbor Street NB	90	16	C	92	30	D	92	30	D

a Demand in vehicles per hour
b Average control delay per vehicle, in seconds, rounded to nearest second – rounded value may not correspond to LOS designation.
c Level of Service
EB = eastbound; WB = westbound; NB = northbound; SB = southbound; LT = left-turning movements; TH = through movements; RT = right-turning movements

Summer Street at D Street - Under 2016 Existing conditions, this signalized intersection currently operates at an overall LOS C during the weekday morning and weekday evening peak hours. Under 2023 No-Build conditions, this location is projected to operate at an overall LOS C and D during the weekday morning and weekday evening peak hours, respectively. Under 2023 Build conditions, this location is projected to continue to operate at LOS C and D during the weekday morning and weekday evening peak hours, respectively. The addition of Project-related traffic is not projected to result in a notable increase to overall vehicular delays as compared to 2023 No-Build conditions.

Summer Street at Drydock Avenue and Pappas Way - Under 2016 Existing conditions, this signalized intersection currently operates at an overall LOS B and C during the weekday morning and weekday evening peak hours, respectively. Under 2023 No-Build conditions, this location is projected to operate at an overall LOS F and C during the weekday morning and weekday evening peak hours, respectively, with overall operations in the morning exhibiting LOS F operations due to delays experienced by westbound traffic on Summer Street. Under 2023 Build conditions, this location is projected to continue to operate at LOS F and C during the weekday morning and weekday evening peak hours, respectively. The addition of Project-related traffic is not projected to result in a notable increase to overall vehicular delays as compared to 2023 No-Build conditions.

3.4.1.4 Unsignalized Intersections

The addition of Project-related traffic to the unsignalized study area intersections was not shown to result in a change in the overall LOS over anticipated future conditions without the Project (i.e., No-Build conditions).

Drydock Avenue at Harbor Street and Terminal Street - Under 2016 Existing conditions, critical movements at this intersection (all turns from Harbor Street and Terminal Street) currently operate at an overall LOS B and C during the weekday morning peak hour, respectively and at LOS C and E during the weekday evening peak hour, respectively. Under 2023 No-Build conditions, critical movements are projected to operate at LOS C and D during the weekday morning peak hour, and at LOS F during the weekday evening peak hour. Under 2023 Build conditions, critical movements at this location are projected to continue to operate at LOS C and D during the weekday morning peak hour and at LOS F during the weekday evening peak hour.

Harbor Street at Channel Street - Under 2016 Existing, 2023 No-Build and 2023 Build conditions, critical movements at this intersection (turns from Channel Street) were shown to operate at LOS B or better during the weekday morning and weekday evening peak hours for all three analysis scenarios. Project-related traffic increases are not projected to result in a notable increase to delays at this location.

Northern Avenue at Massport Haul Road - Under 2016 Existing conditions, all movements at this roundabout intersection were found to operate at LOS B or better during both the weekday morning and weekday evening peak hours. Under 2023 No-Build conditions, all movements at this location are projected to operate at LOS C or better. Under 2023 Build conditions, all movements at this roundabout location are projected to operate at LOS D or better, with Project-related traffic increases resulting in increases to approach delays of approximately 1 to 10 seconds per vehicle as compared to future No-Build conditions.

Northern Avenue at Channel Street - Under 2016 Existing conditions, critical movements at this intersection (all turns from Channel Street) were shown to operate at LOS B during the weekday morning and weekday evening peak hours, respectively. Under 2023 No-Build conditions, critical movements are projected to operate at LOS C during the weekday morning and weekday evening peak hours. Under 2023 Build conditions, critical movements are projected to continue to operate at LOS C during the weekday morning and weekday evening peak hours, respectively. The addition of Project-related traffic is not projected to result in a notable increase to overall vehicular delays as compared to 2023 No-Build conditions.

Northern Avenue at Harbor Street - Under 2016 Existing conditions, critical movements at this intersection (all turns from Harbor Street) were shown to operate at LOS D and C during the weekday morning and weekday evening peak hours, respectively. Under 2023 No-Build conditions, critical movements are projected to operate at LOS F and D during the weekday morning and weekday evening peak hours, respectively. Under 2023 Build conditions, critical movements are projected to continue to operate at LOS F and D conditions during the weekday morning and weekday evening peak hours, respectively. The addition of Project-related traffic is not projected to result in a notable increase to overall vehicular delays as compared to 2023 No-Build conditions.

3.5 Transportation Improvement Program

The previous sections of this assessment have quantified and evaluated in detail the impact of the Project on the transportation infrastructure. This section presents a summary of Project-related improvements that are designed to: i) address existing deficiencies identified as a part of this assessment; ii) minimize the impact of the Project on the transportation system and proximate neighborhood areas; and iii) provide safe and efficient access to the Project site.

3.5.1 Recommendations

The Proponent is committed to the implementation of a comprehensive transportation improvement program that is designed to reduce the impact of the planned development on the transportation infrastructure. The following improvements have been recommended as a part of this evaluation specifically related to the Project, and will be completed subject to receipt of all necessary rights, permits and approvals, and will be formalized in the

Transportation Access Plan Agreement (TAPA) to be executed between the Project proponent and the BTD. The major elements of the improvement program can be separated into three primary categories: i) Project site access accommodations; ii) off-site improvements; and iii) TDM measures. In addition, the framework of a construction traffic management plan has also been developed for the Project. The elements of the planned transportation improvement program are discussed in detail in the following sections.

A detailed transportation improvement program has been developed for the Project that is designed to provide safe and efficient access to the Project site, while minimizing impacts to motorists traveling along adjacent roadways.

3.5.1.1 Project Access

Access to the Project site will be provided by way of a new driveway onto the southern side of Channel Street that will provide access to the parking garage for the Project. An additional access drive for service and delivery vehicles is proposed to the east of this location onto Channel Street. The following recommendations are anticipated with respect to the design and operation of the Project driveways and the Project site:

- The full access Project site driveway is anticipated to be a minimum of 24-feet in width and accommodate two-way travel.
- Vehicles exiting the Project site are anticipated to be placed under STOP-sign control with illumination (lighting) provided.
- All signs and pavement markings to be installed as a part of the Project will conform to the applicable standards of the Manual on Uniform Traffic Control Devices (MUTCD).[4]
- Signs and landscaping adjacent to the Project site driveways and within the Project site are anticipated to be designed and maintained so as not to restrict lines of sight.
- Marked crosswalks and wheelchair ramps are anticipated to be provided for crossing the Project site driveways or the driveways will be designed to be flush with the sidewalk and then ramp down to the intersecting roadway (i.e., a "pan-type" driveway).

[4] *Manual on Uniform Traffic Control Devices* (MUTCD); Federal Highway Administration; Washington, DC; 2009.

3.5.1.2 Transportation Demand Management Program

The Project site is served by public transportation resources provided by the MBTA, and is served by an interconnected sidewalk infrastructure, both of which serve to provide an opportunity to reduce automobile trips associated with the Project. In an effort to facilitate trip-reduction measures for the Project, a comprehensive TDM program will be implemented in conjunction with the Project and is anticipated to include the following major elements:

- A Transportation Coordinator will be assigned;
- Join the local Seaport Transportation Management Association (TMA);
- Coordinate with MassRIDES through the Seaport TMA to provide commuter services to employees of the Project;
- Make available information regarding public transportation services, maps, schedules and fare information;
- Participate in the MBTA Corporate T-Pass Program to the extent practical and as allowable pursuant to commercial tenant lease requirements;
- Promote the use of public transportation to employees of the Project in website based materials, including links to the appropriate homepages of the MBTA and MassRIDES;
- Provide a periodic newsletter or bulletin concerning commuting options as provided through the Seaport TMA;
- Encourage employees to participate in MassRIDES' NuRide program which rewards employees that choose to walk, bicycle, carpool, vanpool or use public transportation;
- Offer a "Guaranteed Ride Home" through the Seaport TMA to all employees that commute to the Project by means other than private automobile;
- Work with the Seaport TMA and tenants to develop an informational packet of commuting alternatives to be made available to employees;
- Work with the Seaport TMA to provide information regarding bicycle commuting and area bicycle and pedestrian facilities, including the Harborwalk;
- Provide short-term exterior bicycle parking spaces proximate to the Project building entrances, and long-term bicycle parking within the parking garage;

- Provide dedicated parking for car sharing services (Zipcar), car/vanpools and alternatively fueled vehicles within the parking garage; and

- Provide electric vehicle charging stations within the parking garage.

3.5.1.3 Annual Monitoring and Reporting Program

An Annual Monitoring Report will be provided to BTD that will document the basic transportation and commuting characteristics of the employees of the Project. The Annual Monitoring Report will be developed in conjunction with the Seaport TMA, and will include an employee survey of commuting modes, traffic monitoring of the parking garage (parking utilization and number of vehicles serviced), and documentation concerning the elements of the TDM program currently available to employees. The results of the annual monitoring program will be provided to the BRA and the BTD. The monitoring program will commence upon full completion and occupancy of the Project, and will continue for a period of two years thereafter.

3.5.1.4 Loading and Deliveries

The Project has been designed to accommodate all loading and delivery functions on-site in a safe and efficient manner. Designated loading areas have been provided within the Project site off Channel Street to accommodate deliveries in a safe and efficient manner, and separate from vehicular and pedestrian traffic. Truck routes and hours of deliveries will be scheduled to the extent possible to minimize truck activity during the commuter peak hours. Reasonable efforts will be made to use service vendors currently serving the Project vicinity in an effort to reduce the overall number of new trucks in the area.

With implementation of the above recommendations, safe and efficient access will be provided to the Project site, and the Project can be constructed with minimal impact on the roadway system.

3.5.1.5 Construction Management Plan

An important component of the transportation plan for the Project is an effective series of measures that are designed to minimize traffic flow and safety impacts during the Project's construction phase. Summarized below are several measures which are anticipated to be undertaken during the construction phase of the Project.

- The Proponent and the general contractor will coordinate with Massport and BTD regarding all transportation-related construction impacts of the Project.

- Designated truck routes will be established to govern how trucks access the Project site. The goal of this commitment is to have construction trucks use only the regional highway system (I-90), the South Boston By-Pass Road and Massport Haul Road, and to avoid travelling through residential areas and pedestrian-oriented corridors to the extent practical.

- Secure fencing will be provided in areas affected by construction to protect nearby pedestrian and vehicular traffic. Gate entrances into the construction area will be established to minimize impacts on adjacent ways.

- During construction activities, a police detail will be employed as necessary to manage pedestrian and vehicle traffic at the construction access to the Project site.

- Secure on-site storage will be provided for tools and equipment in an effort to minimize construction-related vehicle trips to the site.

- Full or partial street closures will be avoided to the extent possible. Should a partial street closure be necessary in order to off-load construction materials and/or complete construction-related activities, the closure will be limited to off-peak periods. Police details will be used as necessary to manage vehicle circulation. Prior to the implementation of any planned construction activities within the public right-of-way, the contractor will prepare a traffic and pedestrian management plan for public review.

- Construction worker parking will be provided within the Project site and expressly prohibited along Northern Avenue, D Street, Summer Street, Massport Haul Road, Drydock Avenue and within nearby residential neighborhoods.

- The general contractor will work with the Seaport TMA to implement appropriate measures to encourage ridesharing and the use of public transportation services by employees and subcontractors working on the Project.

With implementation of the above elements of the Construction Management Plan, construction-related impacts associated with the Project will be appropriately managed, and safe and efficient access for vehicles, pedestrians and bicyclists will be maintained.

3.5.2 Conclusion

With implementation of the elements of the transportation improvement program described in the previous section, the Project can be accommodated within the confines of the transportation system in a safe and efficient manner. The Proponent will formalize the commitments to mitigation as a part of the City of Boston TAPA to ensure that proper Project mitigation will be implemented as may be required to accommodate the Project and commensurate with the planned build-out and occupancy of the development.

Chapter 4.0

Environmental Review Component

4.0 ENVIRONMENTAL REVIEW COMPONENT

4.1 Wind

4.1.1 Introduction

A pedestrian wind study was conducted by RWDI for the proposed Project. The objective of the study was to assess the impact that the Project may have on existing local pedestrian level wind conditions around the study site.

The study involved wind simulations on a 1:300 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. The criteria recommended by the BRA were used in this study. This section describes the methods and presents the results of the wind tunnel simulations.

4.1.2 Overview

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

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

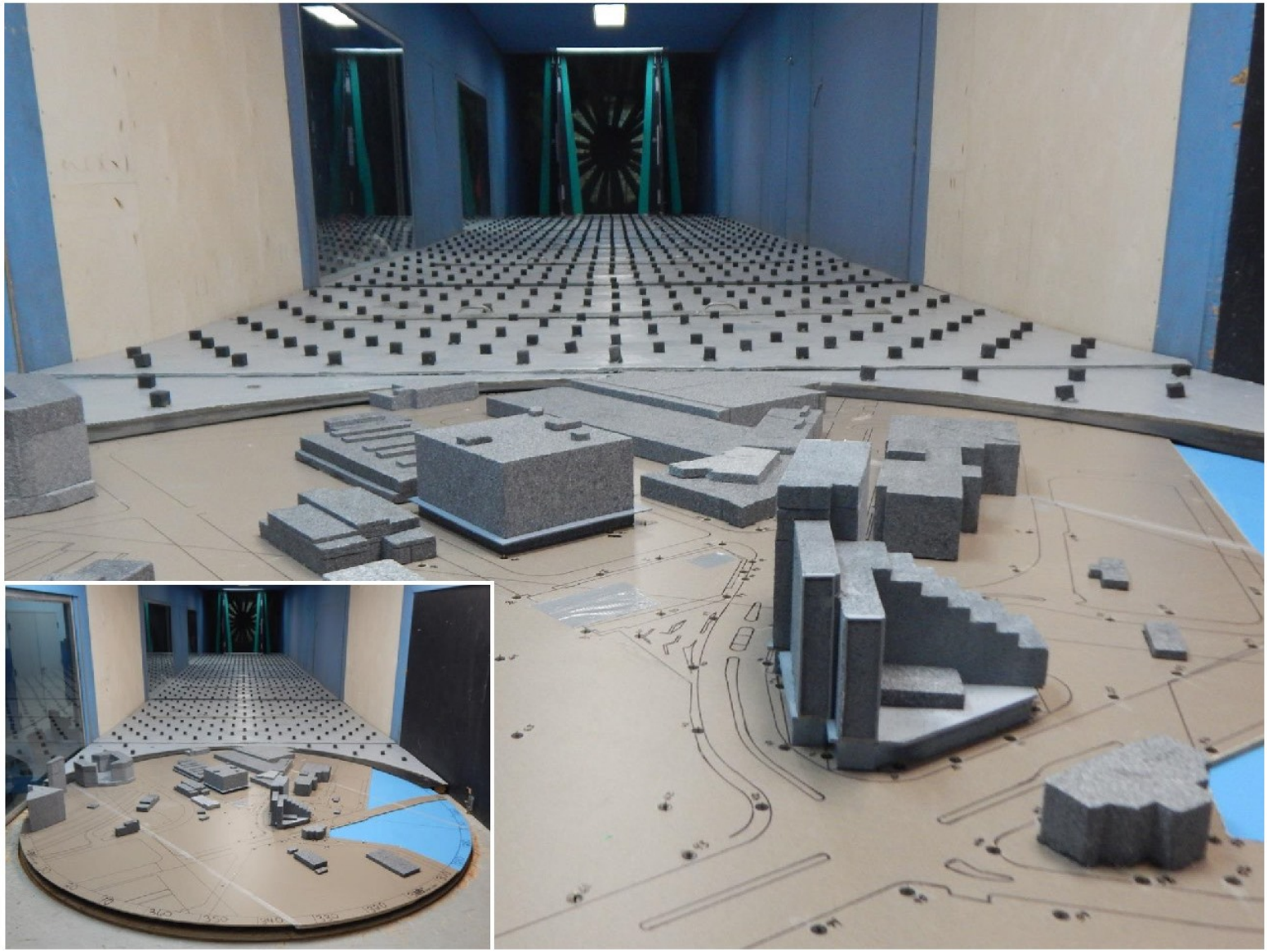
4.1.3 Methodology

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 development provided by the design team. The following configurations were simulated:

- No-Build: includes the existing site and all existing and BRA approved surroundings, as well as the Marine Wharf project located on Parcel A; and,
- Build: includes the proposed Parcel Q1 project and all existing and BRA approved surroundings, as well as the Marine Wharf project located on Parcel A.

As shown in Figures 4.1-1 and 4.1-2, the wind tunnel model included the proposed development and all relevant surrounding buildings and topography within a 1,200 foot radius of the study site. The mean speed profile and turbulence of the natural wind approaching the modelled area were also simulated in RWDI's boundary layer wind tunnel. The scale model was equipped with 95 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. 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 1990 through 2015 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.

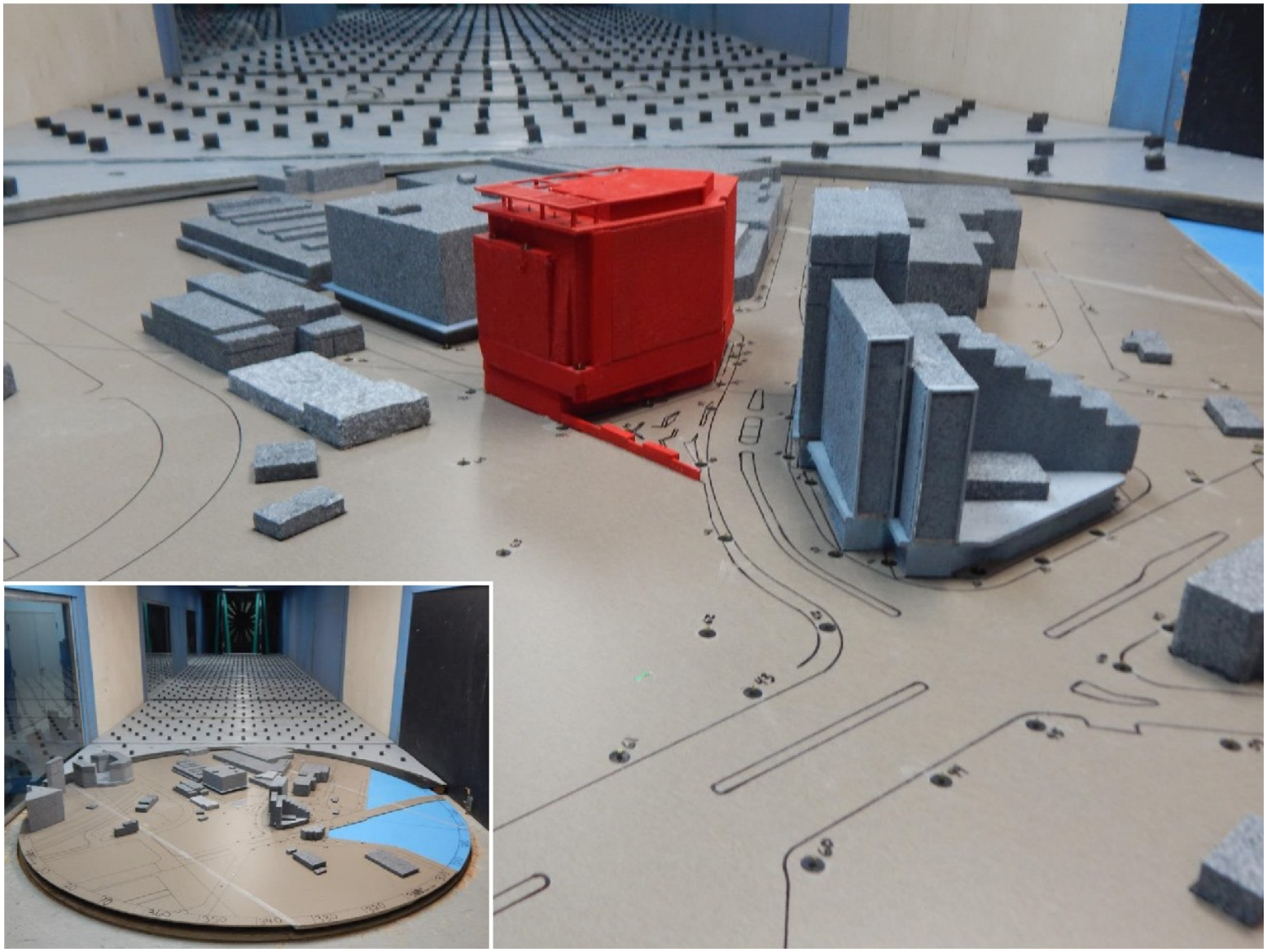
Figures 4.1-3 to 4.1-5 present "wind roses" summarizing the seasonal and annual wind climates in the Boston area, based on the data from Logan International Airport. Although the prevailing wind directions change throughout the year from season to season, winds from the easterly, southwesterly and west-northwesterly directions tend to be the most frequent throughout the year. Strong winds (speeds greater than 20 miles per hour (mph), shown by the red bands in the wind rose diagrams of Figures 4.1-3 to 4.1-5) are most frequent during the winter (13.1% of the time). Strong winter winds are most frequently from the southwest and west through northwest. On an annual basis (the last wind rose in Figure 4.1-5) the most common wind directions are those between south-southwest and northwest. Winds from the east and east-southeast are also relatively common. In the case of strong winds, winds from the southwesterly and west-northwesterly directions are most common, with winds from the northeasterly directions also being relatively frequent.



Parcel Q1 Boston, Massachusetts

Figure 4.1-1

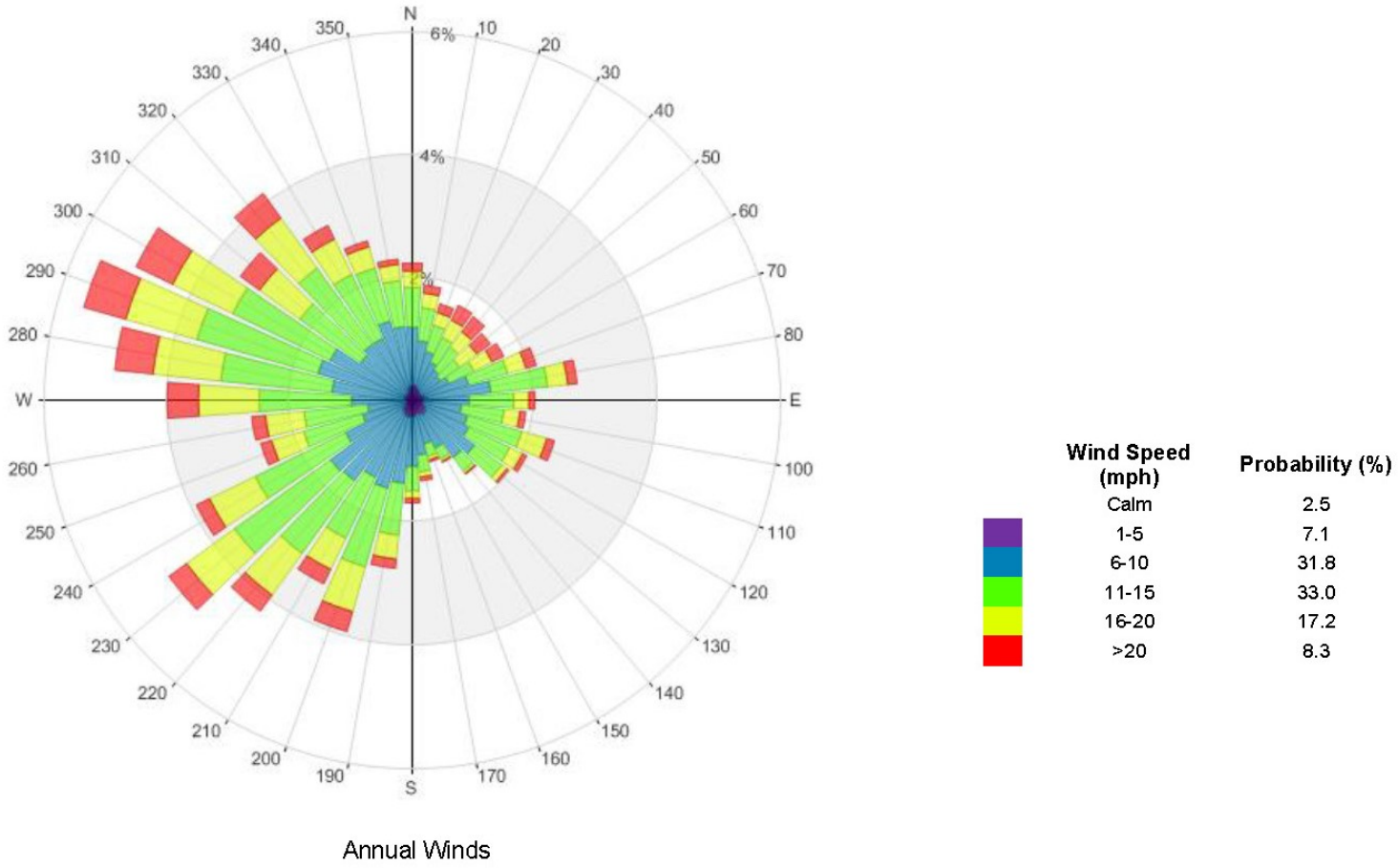
Wind Tunnel Study – No Build



Parcel Q1 Boston, Massachusetts

Figure 4.1-2

Wind Tunnel Study – Build

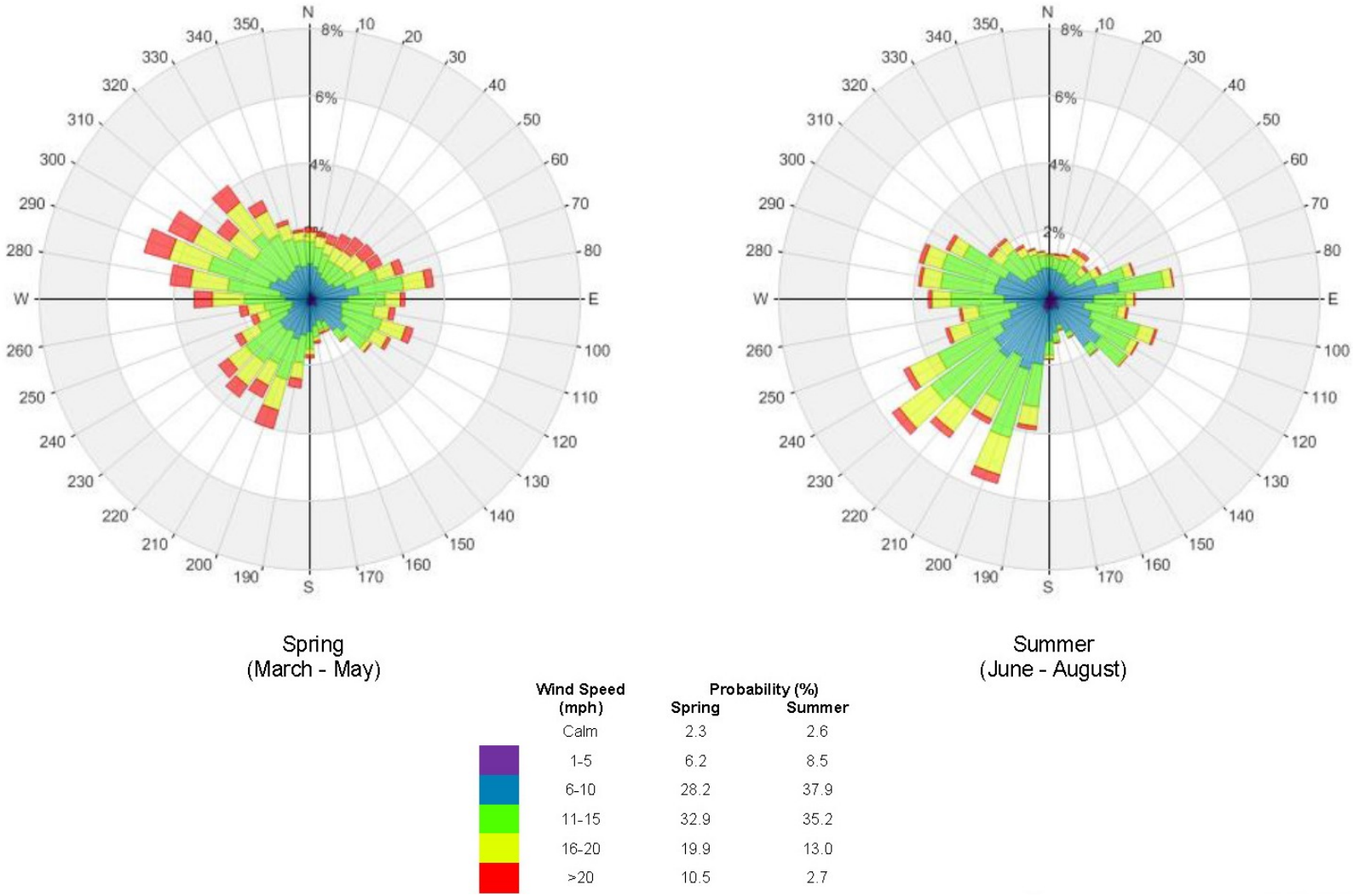


Annual Winds

Parcel Q1 Boston, Massachusetts

Figure 4.1-3

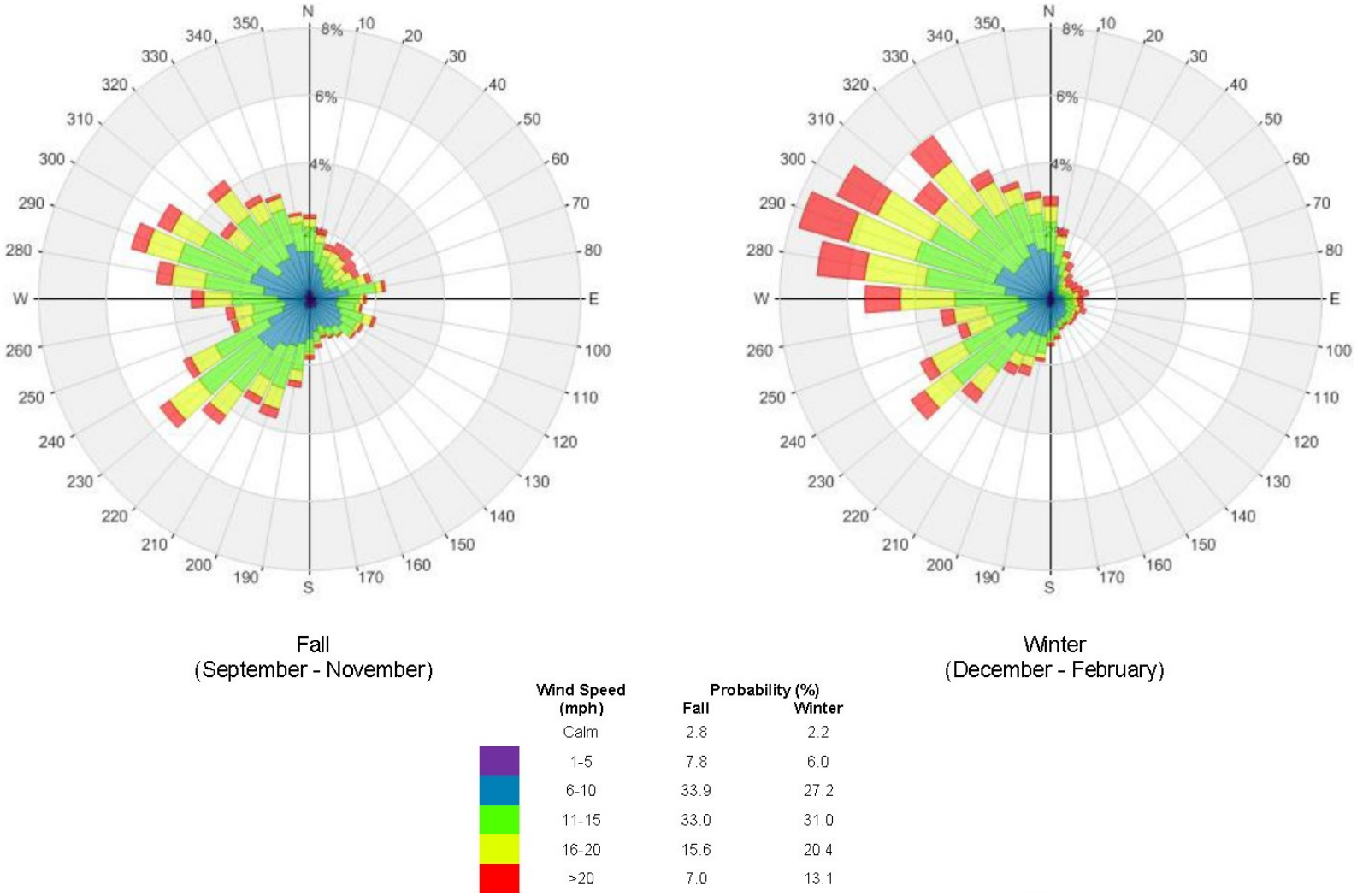
Directional Distribution (%) of Winds (Blowing from) Boston Logan International Airport (1990 – 2015)



Parcel Q1 Boston, Massachusetts

Figure 4.1-4

Directional Distribution (%) of Winds (Blowing From) Boston Logan International Airport (1990 – 2015)



Parcel Q1 Boston, Massachusetts

Figure 4.1-5

Directional Distribution (%) of Winds (Blowing From) Boston Logan International Airport (1990 – 2015)

This study involved state of the art measurement and analysis techniques to predict wind conditions at the Project site. Nevertheless, some uncertainty remains in predicting wind comfort, and this must be kept in mind. For example, the sensation of comfort among individuals can be quite variable. Variations in age, individual health, clothing, and other human factors can change a particular response of an individual. The comfort limits used in this 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.

4.1.4 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 1% of the time (i.e., the 99-percentile mean wind speed), as shown in Table 4.1-1.

Table 4.1-1 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.

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

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

4.1.5 Test Results

Figures 4.1-6 through 4.1-9 graphically depict the mean and gust wind conditions at each wind measurement location based on the annual winds only. Figure 4.1-10 is a graphical representation of the mean speed category changes from No-Build to Build configurations. The table in Appendix C presents the mean and effective gust wind speeds at each measurement location for each season, as well as those on an annual basis. Typically, the summer and fall winds tend to be more comfortable than the annual winds, while the winter and spring winds are less comfortable than the annual winds. The following discussion of pedestrian wind comfort is based on the annual winds for each configuration tested, except where noted below in the text.

4.1.5.1 Mean Speed Criterion

A mean speed categorization of walking is considered appropriate for sidewalks. Lower wind speeds conducive to standing are preferred at building entrances. Wind conditions comfortable for sitting are desired at above grade terraces during the summer when the areas would be in use.

No-Build Configuration

Wind conditions are generally expected to be comfortable for walking or better at the sidewalks on and around the Project site (Figure 4.1-6). Uncomfortable wind conditions are expected along Drydock Avenue to the south of the Project site (Locations 6, 10, 33, 34, 37, 38, 39, 41, 42, 62, 71, 73, 88 and 89 in Figure 4.1-6), along Harbor Street and to the northeast of the Project site (Locations 67, 77 and 83 in Figure 4.1-6) and along Summer Street and Pappas Way (Locations 22 and 56 in Figure 4.1-6), on an annual basis. Dangerous wind conditions are currently expected at the corner of an existing building to the north of the Project site (Location 85 in Figure 4.1-6) on an annual basis, as well as in the spring and winter and at one location along Harbor Street to the north of the site during the winter (Location 67 in the table in Appendix C). These conditions are typical of the Boston Seaport area.

Build Configuration

With the addition of the Project, wind conditions improve to be comfortable for walking or better at most locations on and around the proposed development (Figure 4.1-7) in particular along Drydock Avenue, where wind conditions were generally uncomfortable in the No-Build configuration (Figure 4.1-6). Overall, the addition of the Project results in seven locations improving from Uncomfortable to Comfortable for Walking or better; five locations worsening from Comfortable for Walking or better to Uncomfortable; one location improving from Dangerous to Uncomfortable; and one location worsening from Uncomfortable to Dangerous.

Uncomfortable conditions are still expected at the intersection of Drydock Avenue and Harbor Street (Locations 6, 33, 34, 38, 39, 67, 69, 71, 73, 87 and 95 in Figure 4.1-7), at the northwest corner of the proposed build (Location 92 on Figure 4.1-7), at two locations around the corners of existing buildings to the north of the site (Locations 83 and 85 in Figure 4.1-7), and along Summer Street and Pappas Way (Locations 22, 47 and 56 in Figure 4.1-7) on an annual basis. Winds at a number of these locations were reported to be uncomfortable for walking in the No-Build configuration (Figure 4.1-6). With addition of the proposed development, wind condition categorized by Melbourne as Dangerous at Location 85 at the corner of an existing building to the north of the site (on an annual basis) is eliminated (Figure 4.1-7). Wind conditions categorized as Dangerous are predicted at a localized location along Drydock Avenue to the south of the proposed development on an annual basis (Location 89 in Figure 4.1-7) and at a corner of an existing building to the north of the site (Locations 85) and the north corner of the proposed development (Location 92) during the winter (Appendix C).

Locations 36, 88, 89, 90 and 94 are close to the main entrances to the proposed building. The predicted standing conditions at Locations 88 and 94 are considered appropriate; however, walking or uncomfortable conditions are considered higher-than-desired for an entrance area where pedestrians are apt to linger.

With the addition of the proposed development to the site, wind speeds at most areas are expected to reduce by one or two comfort categories (at total of 18 locations), or remain unchanged, compared to the No-Build configuration (Figure 4.1-10). However, slightly higher wind speeds (one comfort category change) are expected at localized areas along Drydock Avenue and Summer Street (a total of 11 locations) (Figure 4.1-10). Wind speeds at the north corner of the proposed development are expected to increase which, results in 2 level changes in comfort category (Location 92 in Figure 4.1-10).

Overall, the mean wind speed categorizations at most areas are predicted to remain similar to those expected in the No-Build configuration, except for localized wind accelerations leading to increased wind speeds as detailed in this section.

4.1.5.2 Effective Gust Criterion

No-Build Configuration

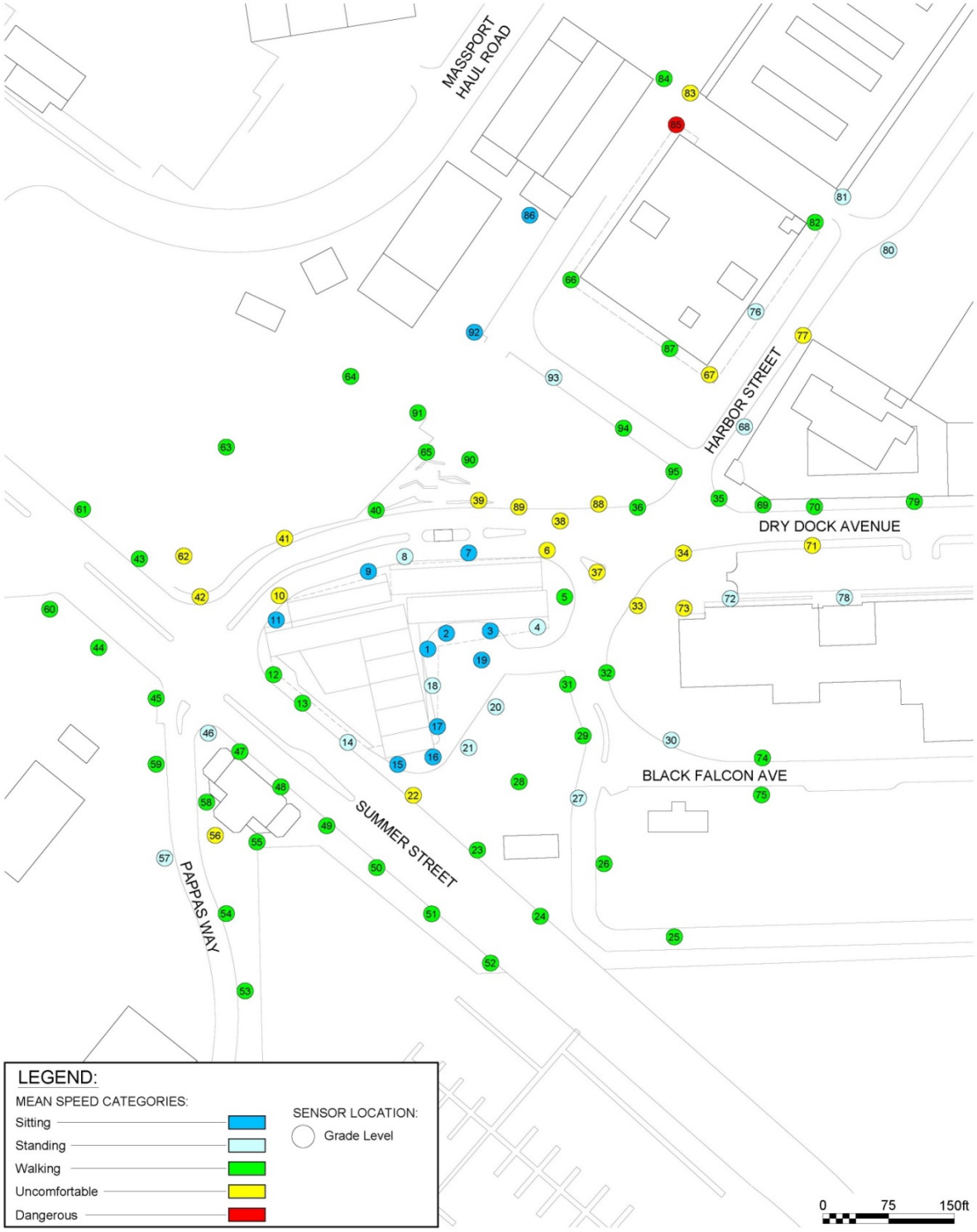
For the No-Build configuration, the effective gust criterion is met at most locations on and around the project site with the exception of two locations at the corners of an existing building to the north of the project site on an annual basis (Locations 67 and 85 in Figure 4.1-8). Additionally the effective gust criterion was not met at Locations 10, 22, 38, 39 and 89 during the winter and at Locations 37, 73 and 77 during the spring and winter (Appendix C).

Build Configuration

The addition of the proposed development is expected to eliminate the exceedance of the effective gust criterion at Location 67 (on an annual basis). However, the criterion is expected to be exceeded at Locations 73, 85, 89 and 92 on an annual basis (Figure 4.1-9). Winds at Location 85 exceeded the criterion in the No-Build configuration as well. Additionally, exceedance of gust criterion is expected at Locations 6, 22, 67, 87 and 95 during the winter and at Location 34 during the spring and winter (Appendix C) where winds at Location 22 exceeded the criterion in the No-Build configuration as well during the winter. Location 89 and 95 are close to the main entrance to the development where frequent pedestrian activity is expected. Overall, one location will improve to be compliant with the wind gust criterion from the No-Build configuration to the Build configuration, and three locations will exceed the criterion from the No-Build configuration to the Build configuration.

4.1.6 Conclusion

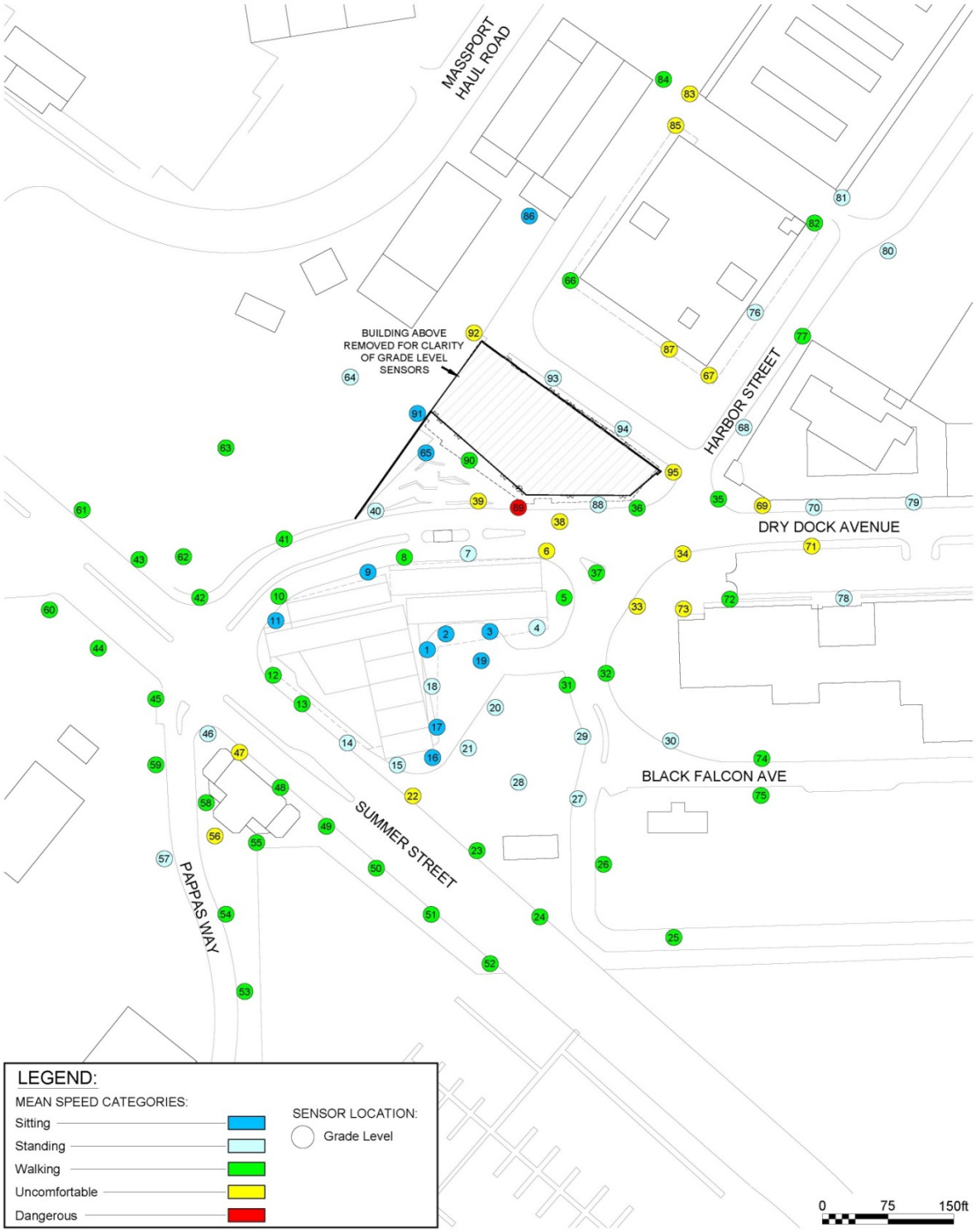
The development of the Project will result in an improvement of annual wind conditions over the No-Build configuration with seven locations improving from Uncomfortable to Comfortable for Walking or better; five locations worsening from Comfortable for Walking or better to Uncomfortable; one location improving from Dangerous to Uncomfortable; and one location worsening from Uncomfortable to Dangerous. The Project will result in three new locations that exceed the gust criterion. The Proponent will evaluate mitigation measures, such as landscaping and wind screens, to improve adverse wind conditions as necessary.



Parcel Q1 Boston, Massachusetts

Figure 4.1-6

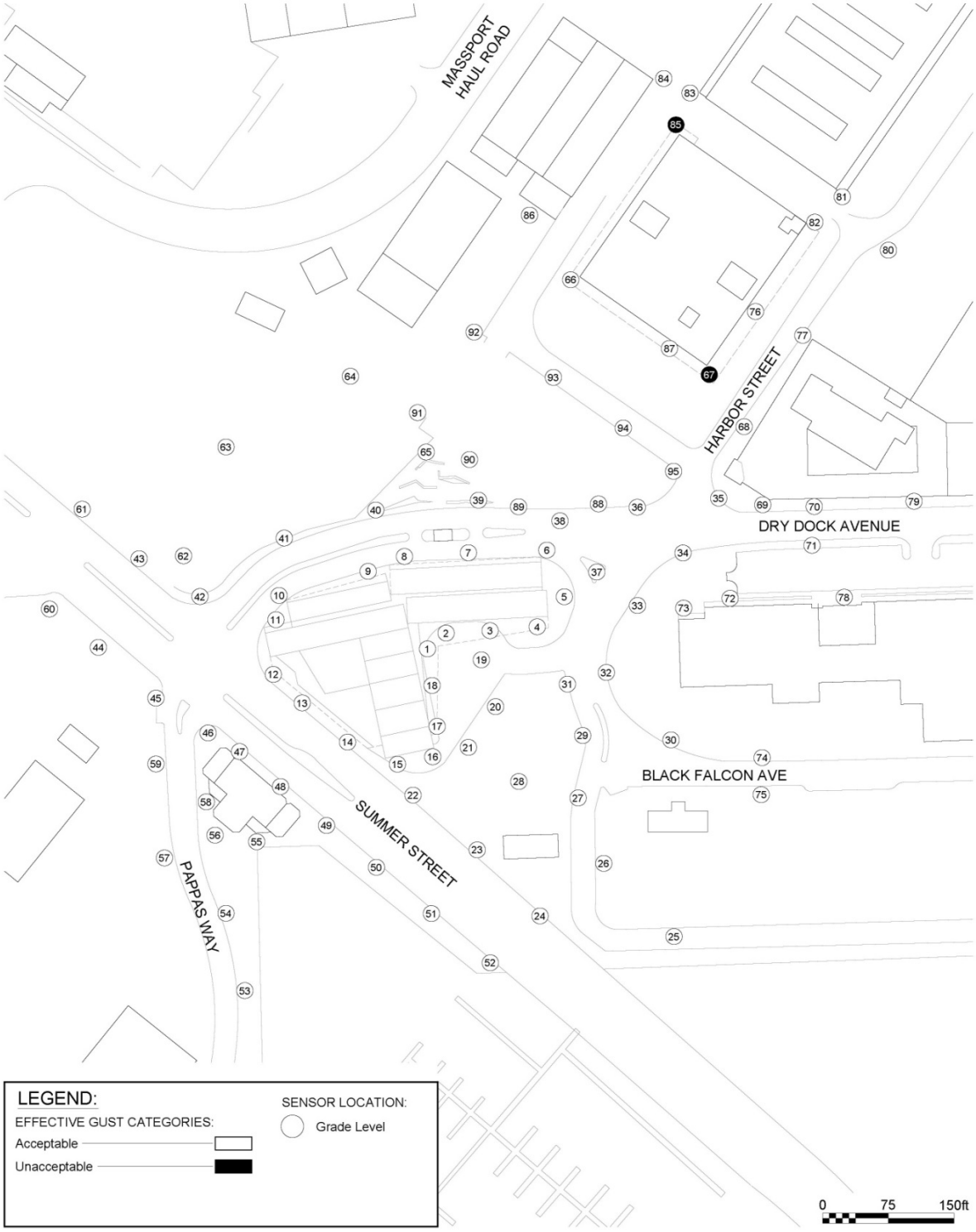
Pedestrian Wind Conditions – Mean Speed – No-Build, Annual



Parcel Q1 Boston, Massachusetts

Figure 4.1-7

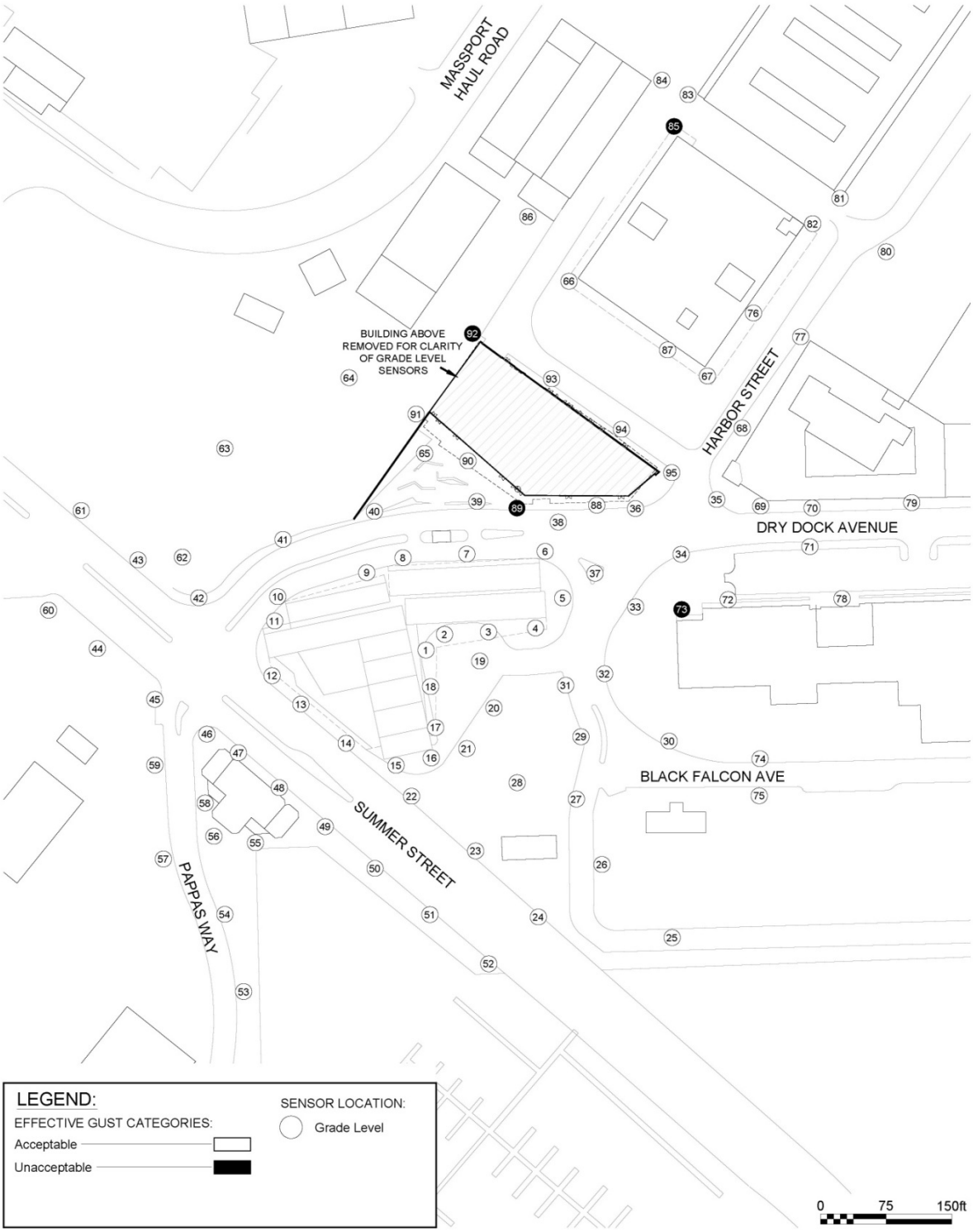
Pedestrian Wind Conditions – Mean Speed – Build, Annual



Parcel Q1 Boston, Massachusetts

Figure 4.1-8

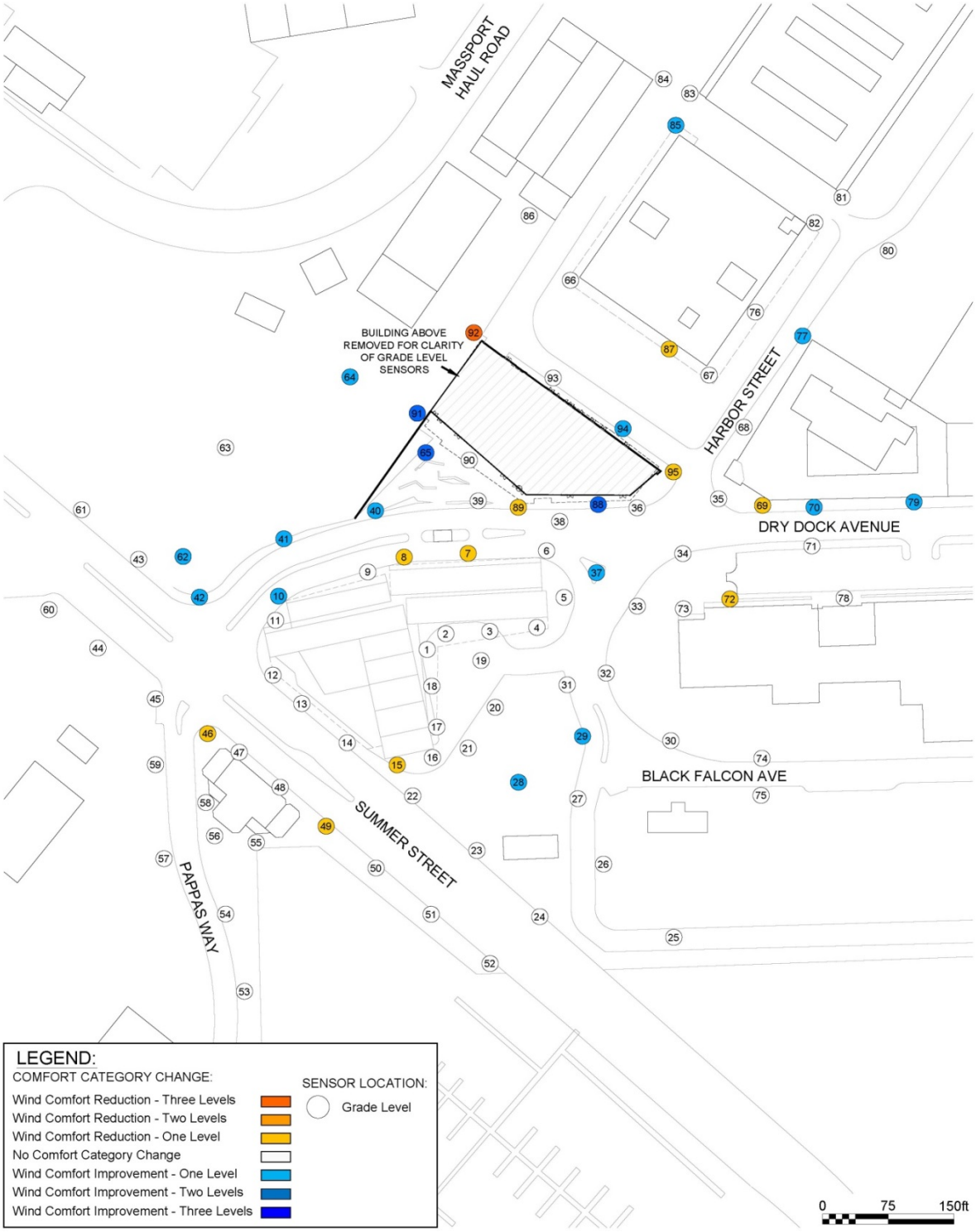
Pedestrian Wind Conditions – Effective Gust Speed – No-Build, Annual



Parcel Q1 Boston, Massachusetts

Figure 4.1-9

Pedestrian Wind Conditions – Effective Gust Speed – Build, Annual



Parcel Q1 Boston, Massachusetts

Figure 4.1-10

Pedestrian Wind Conditions – Comfort Category Change, No-Build to Build

4.2 Shadow

4.2.1 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 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 4.2-1 to 4.2-14 at the end of this section.

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

4.2.2 Vernal Equinox (March 21)

At 9:00 a.m. during the vernal equinox, new shadow from the Project will be cast to the northwest. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast onto a sliver of Massport Haul Road and its southern sidewalk.

At 12:00 p.m., new shadow from the Project will be cast to the north. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast onto Channel Street and its sidewalks.

At 3:00 p.m., new shadow from the Project will be cast to the northeast. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast onto Channel Street and its sidewalks.

4.2.3 Summer Solstice (June 21)

At 9:00 a.m. during the summer solstice, new shadow from the Project will be cast to the west. No new shadow will be cast onto nearby bus stops or existing public open spaces. A small portion of the Project's proposed open space will be under shadow.

At 12:00 p.m., new shadow from the Project will be minimal. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast to the north onto a portion of Channel Street and its southern sidewalk.

At 3:00 p.m., new shadow from the Project will be cast to the east. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast onto Channel Street and its sidewalks, as well as onto a portion of Harbor Street and its western sidewalk.

At 6:00 p.m., new shadow from the Project will be cast to the southeast. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast onto a portion of Channel Street and its sidewalks, onto a portion of Harbor Street and its sidewalks, and onto Drydock Avenue and its sidewalks.

4.2.4 Autumnal Equinox (September 21)

At 9:00 a.m., during the autumnal equinox, new shadow from the Project will be cast to the northwest. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast onto a sliver of Massport Haul Road and its sidewalks.

At 12:00 p.m., new shadow from the Project will be cast to the north. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast onto Channel Street and its sidewalks.

At 3:00 p.m., new shadow from the Project will be cast to the northeast. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast onto a portion of Channel Street and its sidewalks, as well as onto a sliver of Harbor Street and its western sidewalk.

At 6:00 p.m., most of the surrounding area is covered by existing shadow. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast onto a portion of Channel Street and its sidewalks and onto Harbor Street and its sidewalks.

4.2.5 Winter Solstice (December 21)

The winter solstice creates the least favorable conditions for sunlight in New England. Because the sun angle during the winter is lower than in other seasons, shadows are made longer and reach further into the surrounding area.

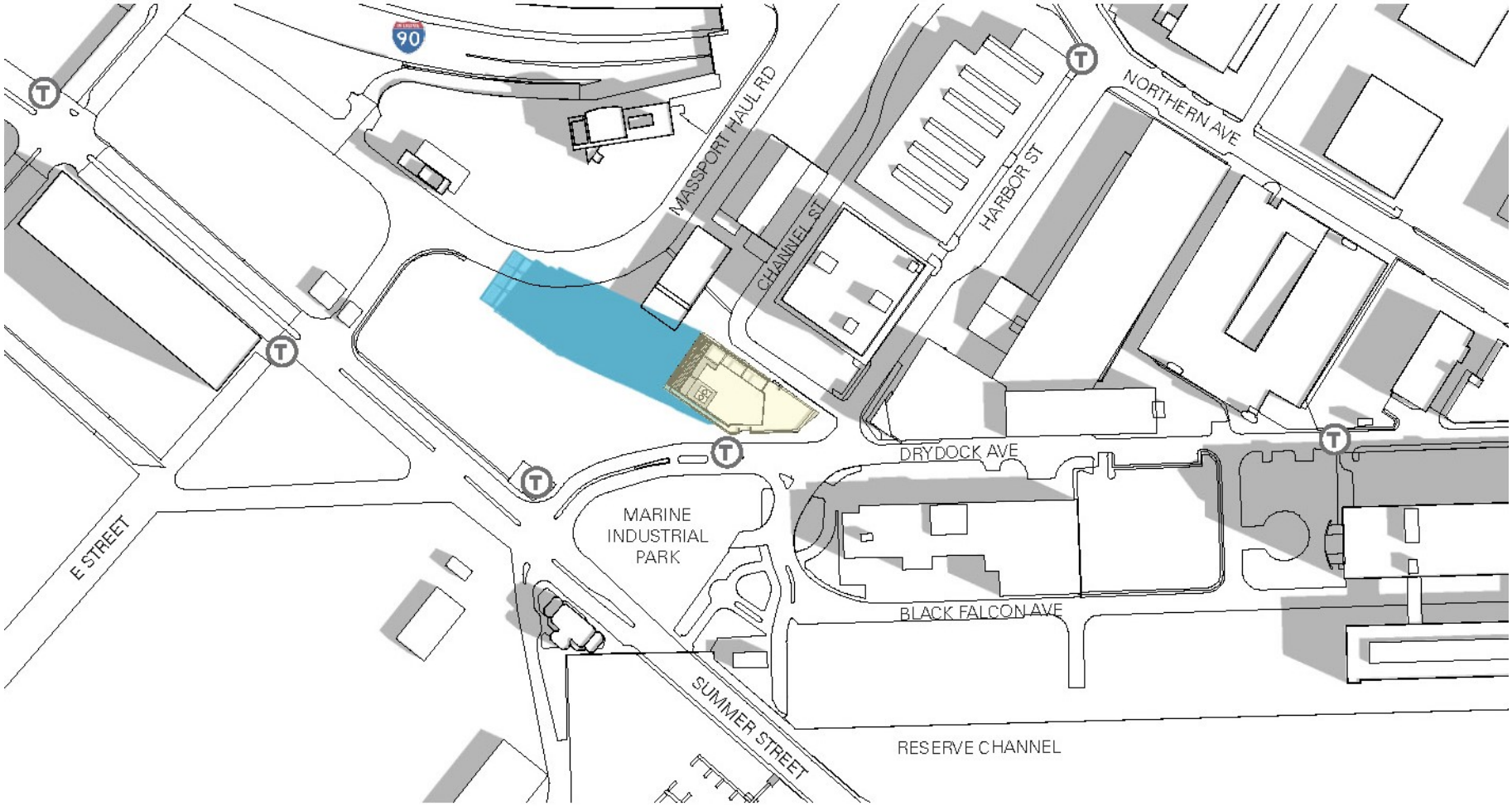
At 9:00 a.m., new shadow from the Project will be cast to the northwest. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast onto a portion of Massport Haul Road and its sidewalks, onto Silver Line Way, and onto Interstate 90.

At 12:00 p.m., new shadow from the Project will be cast to the north. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast onto Channel Street and its sidewalks and onto a portion of Massport Haul Road and its southern sidewalk.

At 3:00 p.m., most of the area is under existing shadow. No new shadow will be cast onto nearby bus stops or existing public open spaces. New shadow will be cast to the northeast onto Channel Street and its sidewalks, onto Harbor Street and its sidewalks, and onto Northern Avenue and its sidewalks.

4.2.6 Conclusions

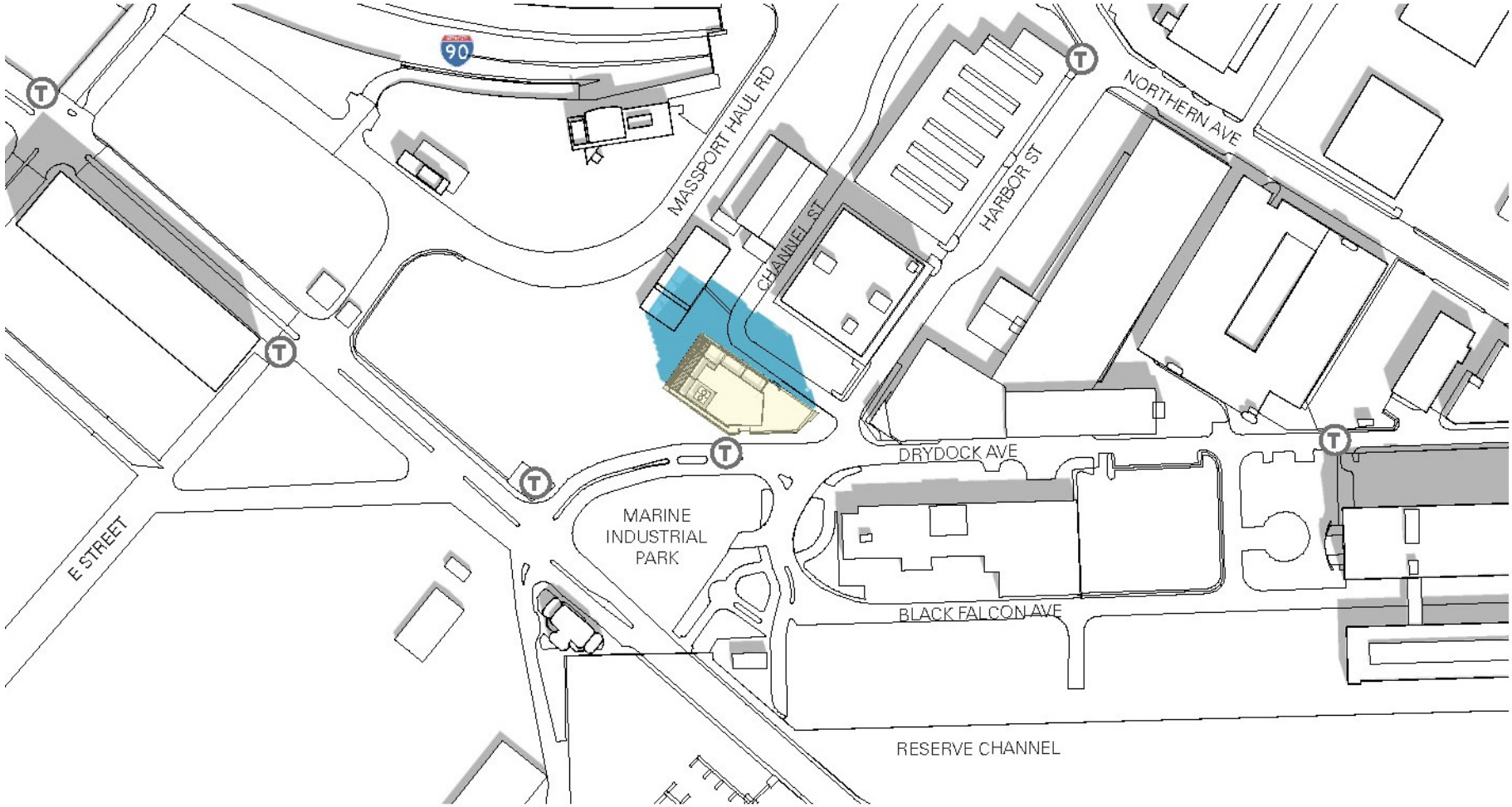
The shadow impact analysis looked at net new shadow created by the Project during 14 time periods. New shadow will generally be limited to the immediately surrounding streets and sidewalks. No new shadow will be cast onto existing bus stops or public open spaces.



Parcel Q1 Boston, Massachusetts

Figure 4.2-1

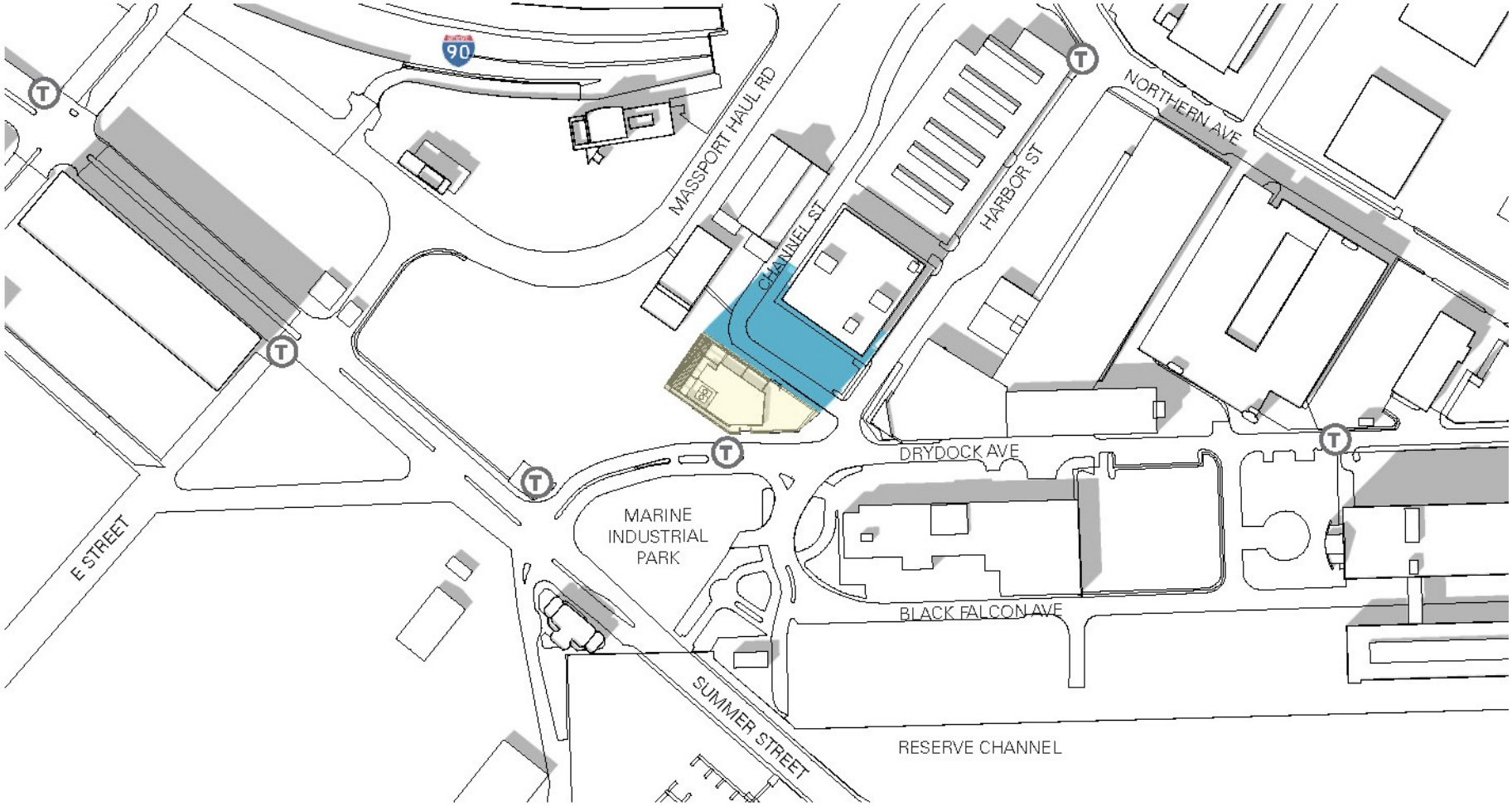
Shadow Study, March 21 9:00 a.m.



Parcel Q1 Boston, Massachusetts

Figure 4.2-2

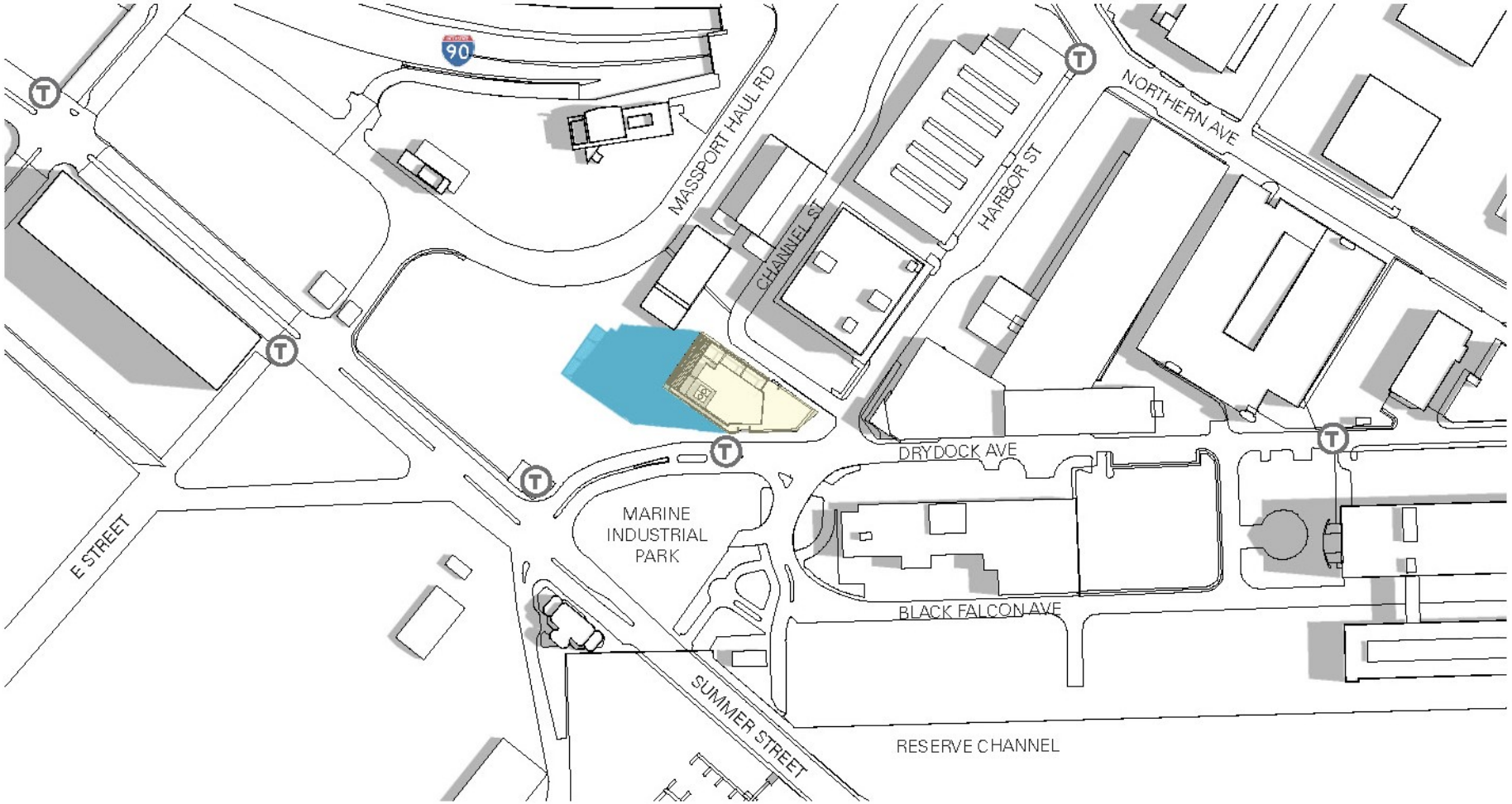
Shadow Study, March 21 12: 00 p.m.



Parcel Q1 Boston, Massachusetts

Figure 4.2-3

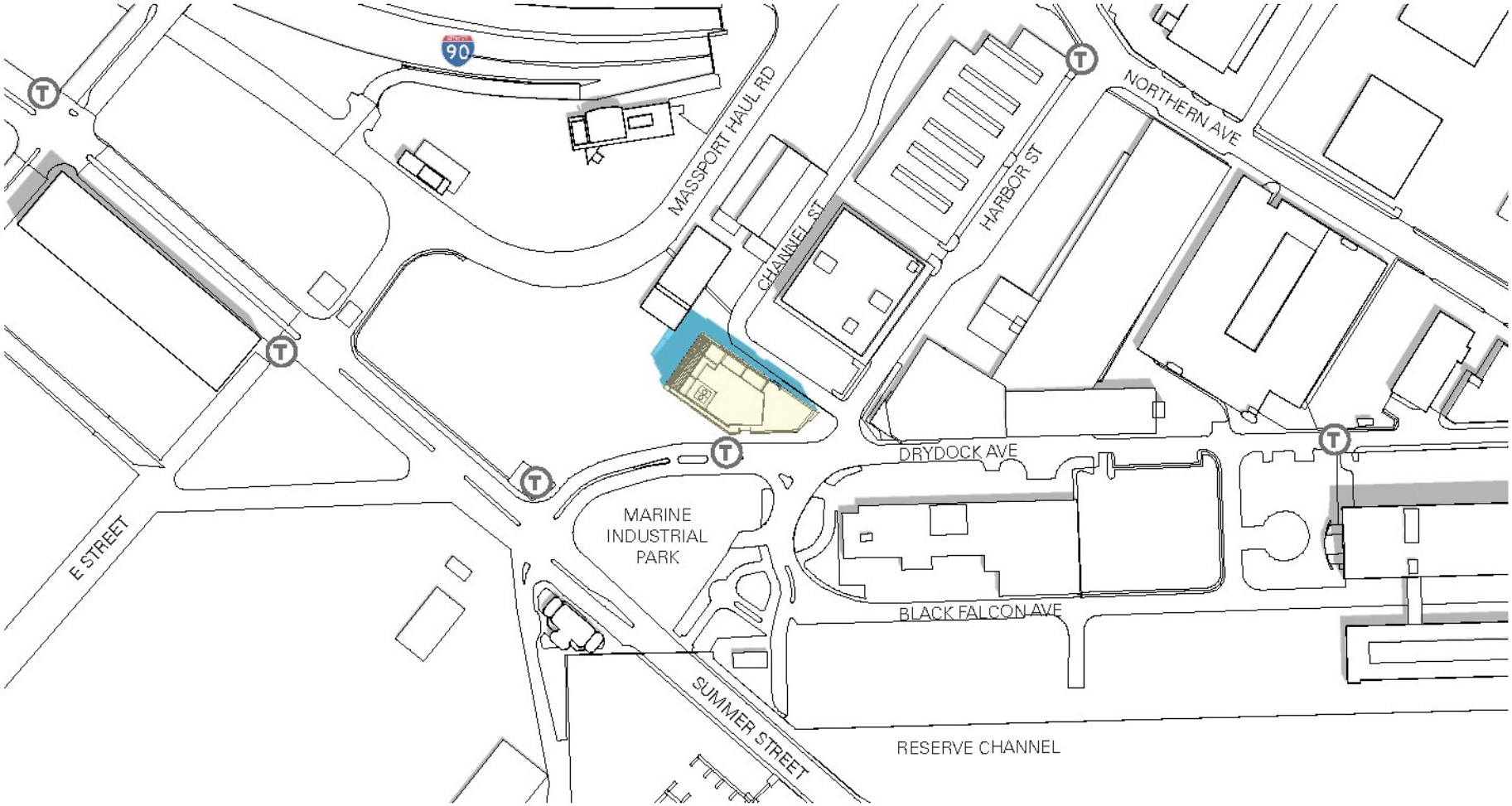
Shadow Study, March 21 3:00 p.m.



Parcel Q1 Boston, Massachusetts

Figure 4.2-4

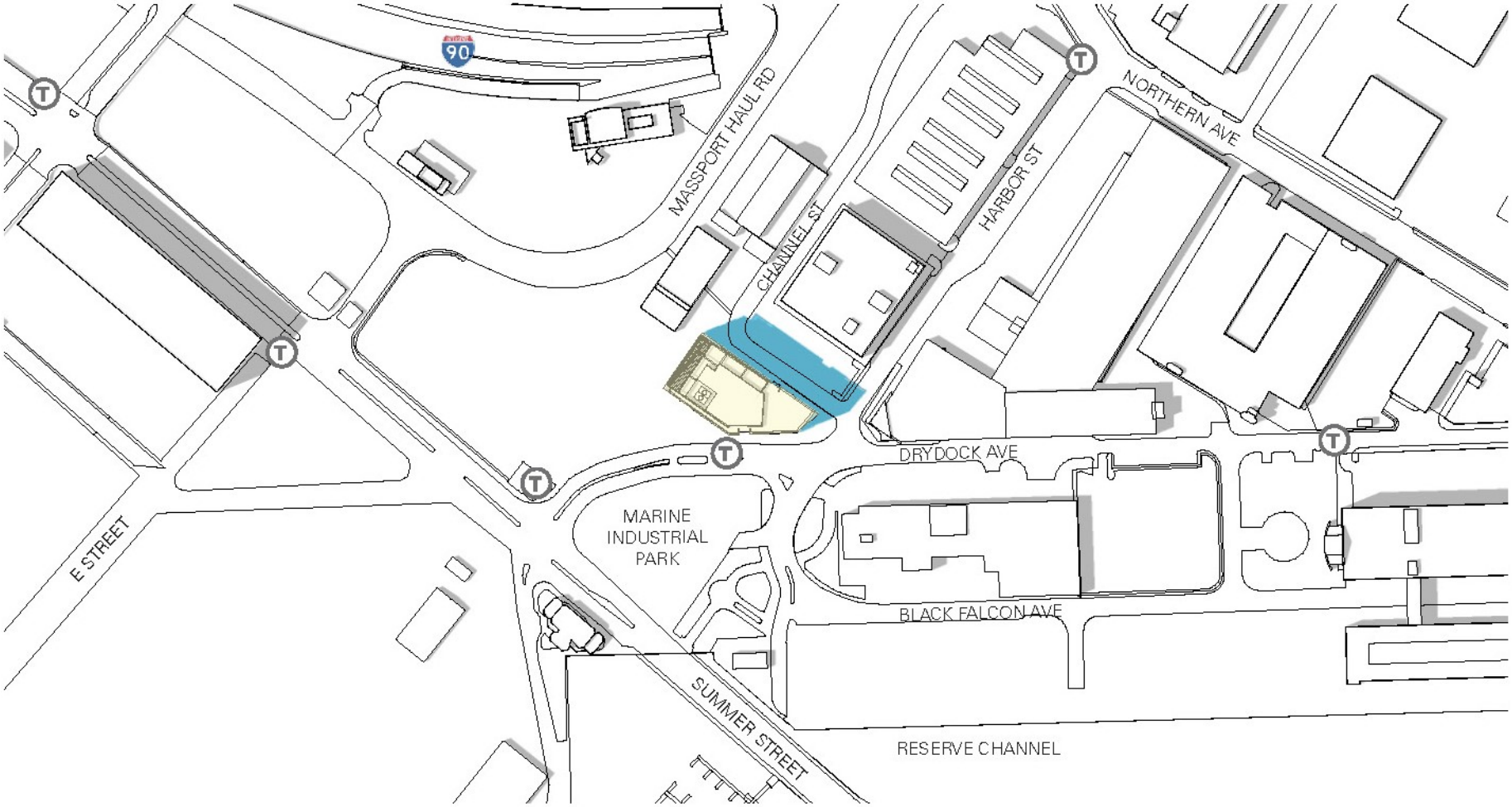
Shadow Study, June 21 9:00 a.m.



Parcel Q1 Boston, Massachusetts

Figure 4.2-5

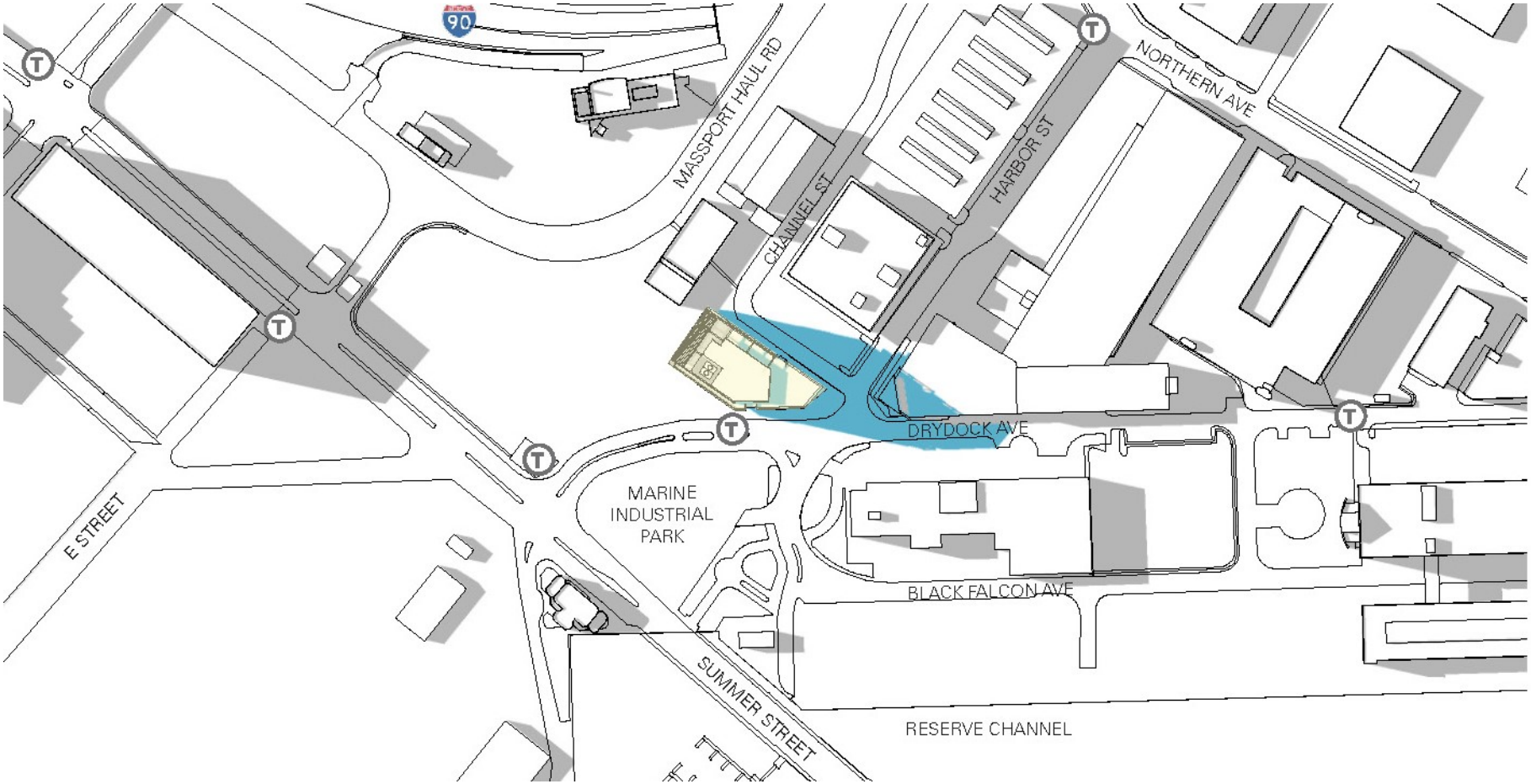
Shadow Study, June 21 12:00 p.m.



Parcel Q1 Boston, Massachusetts

Figure 4.2-6

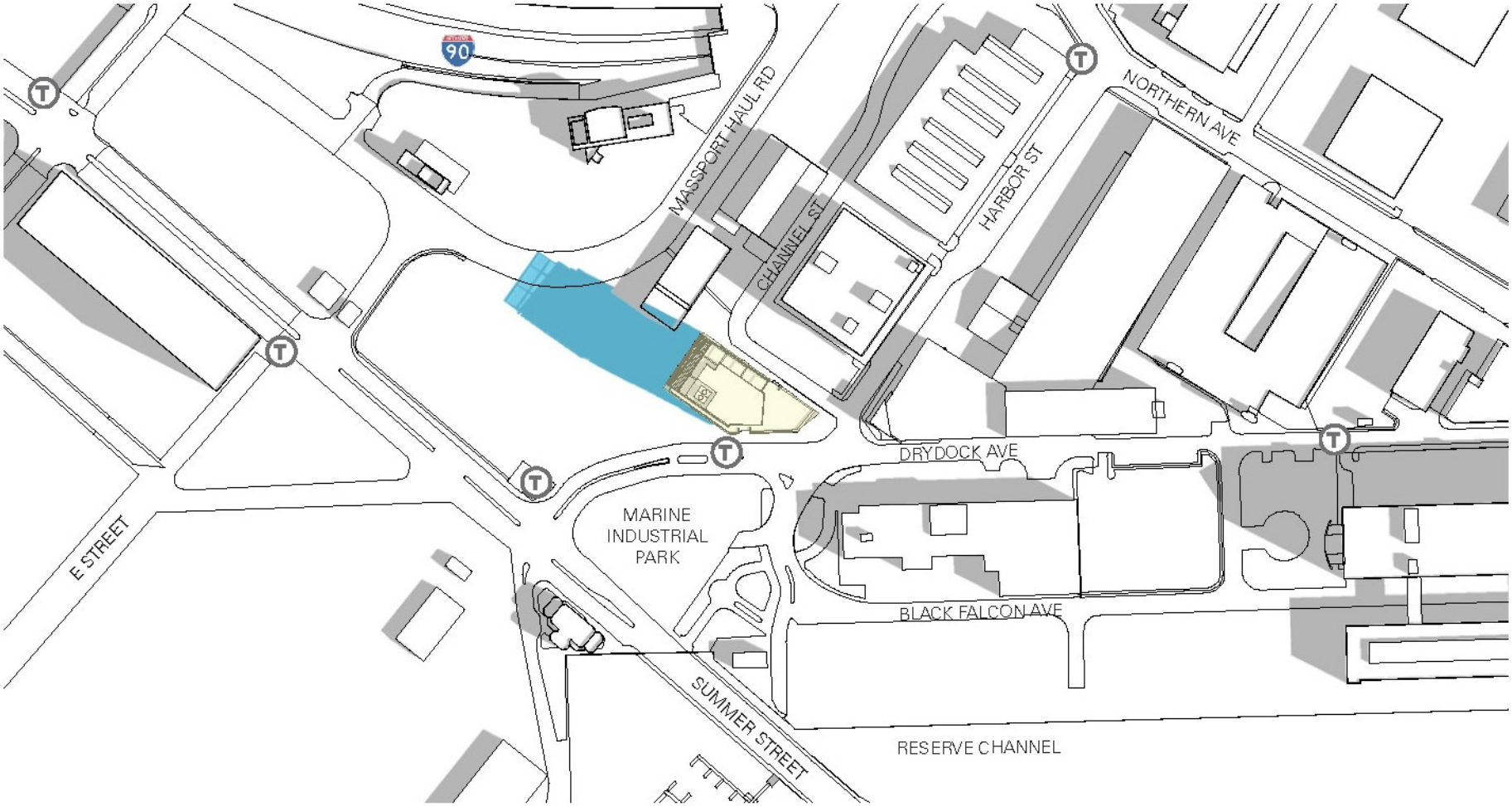
Shadow Study, June 21 3:00 p.m.



Parcel Q1 Boston, Massachusetts

Figure 4.2-7

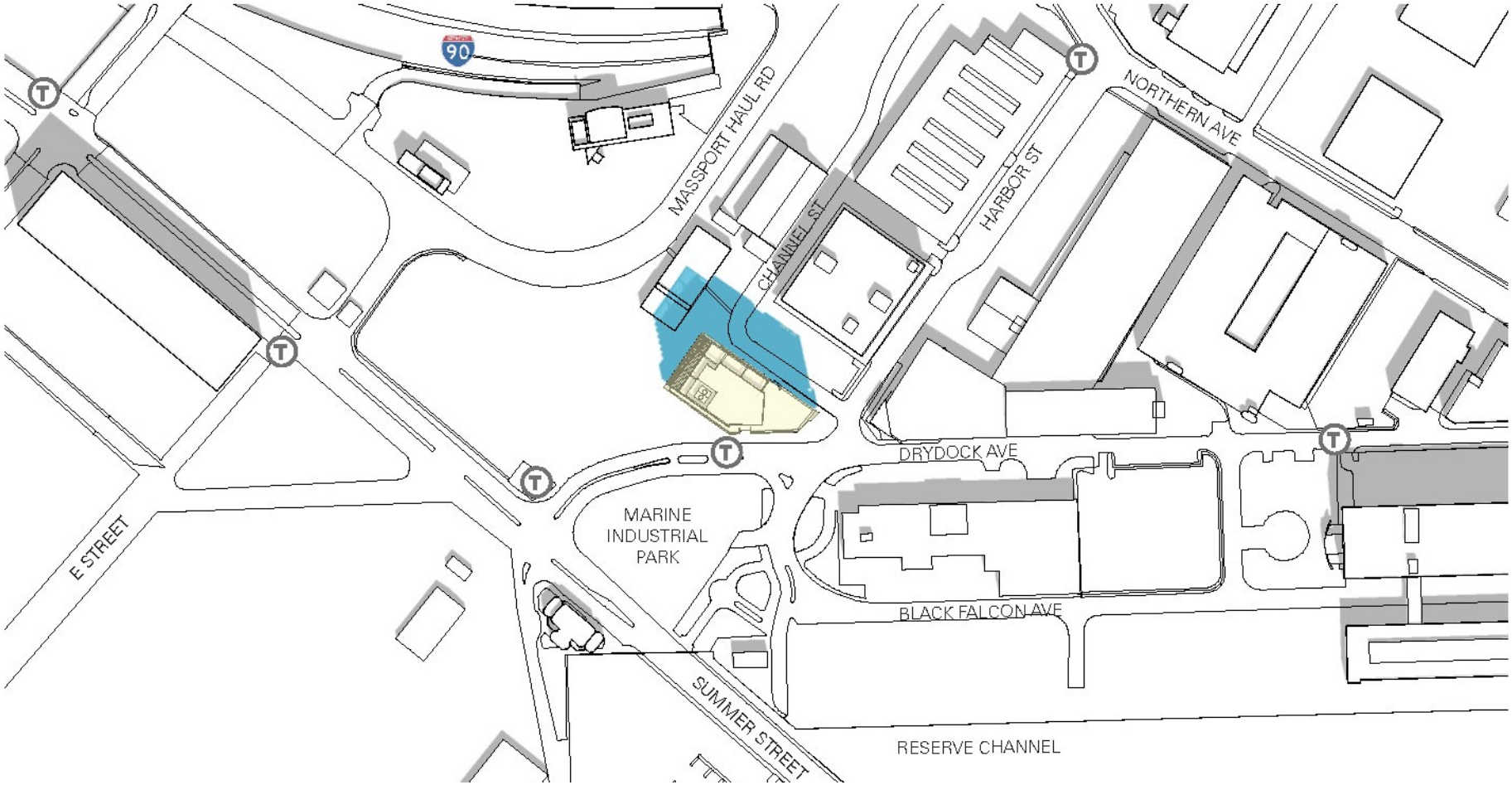
Shadow Study, June 21 6:00 p.m.



Parcel Q1 Boston, Massachusetts

Figure 4.2-8

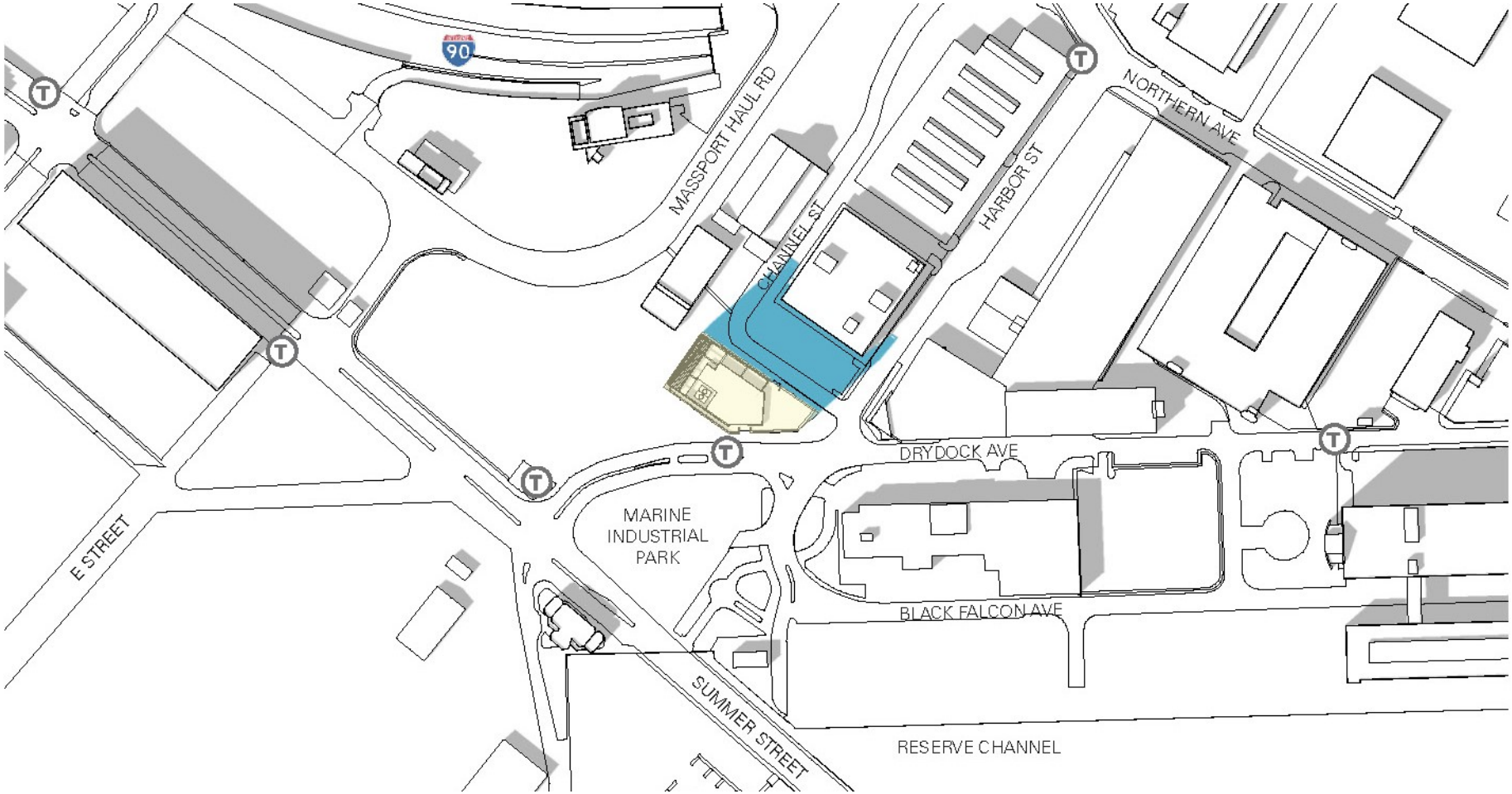
Shadow Study, September 21 9:00 a.m.



Parcel Q1 Boston, Massachusetts

Figure 4.2-9

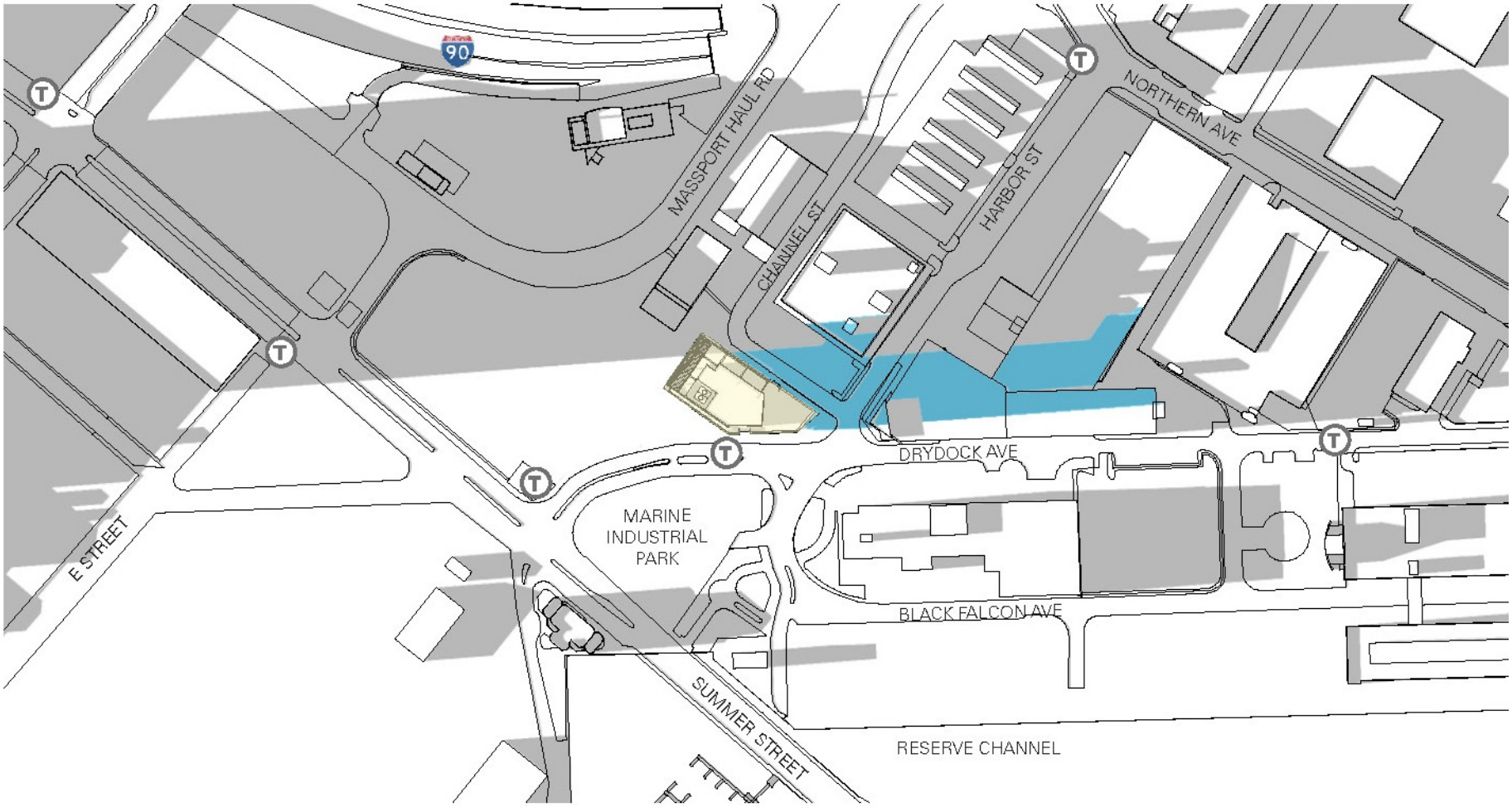
Shadow Study, September 21 12:00 p.m.



Parcel Q1 Boston, Massachusetts

Figure 4.2-10

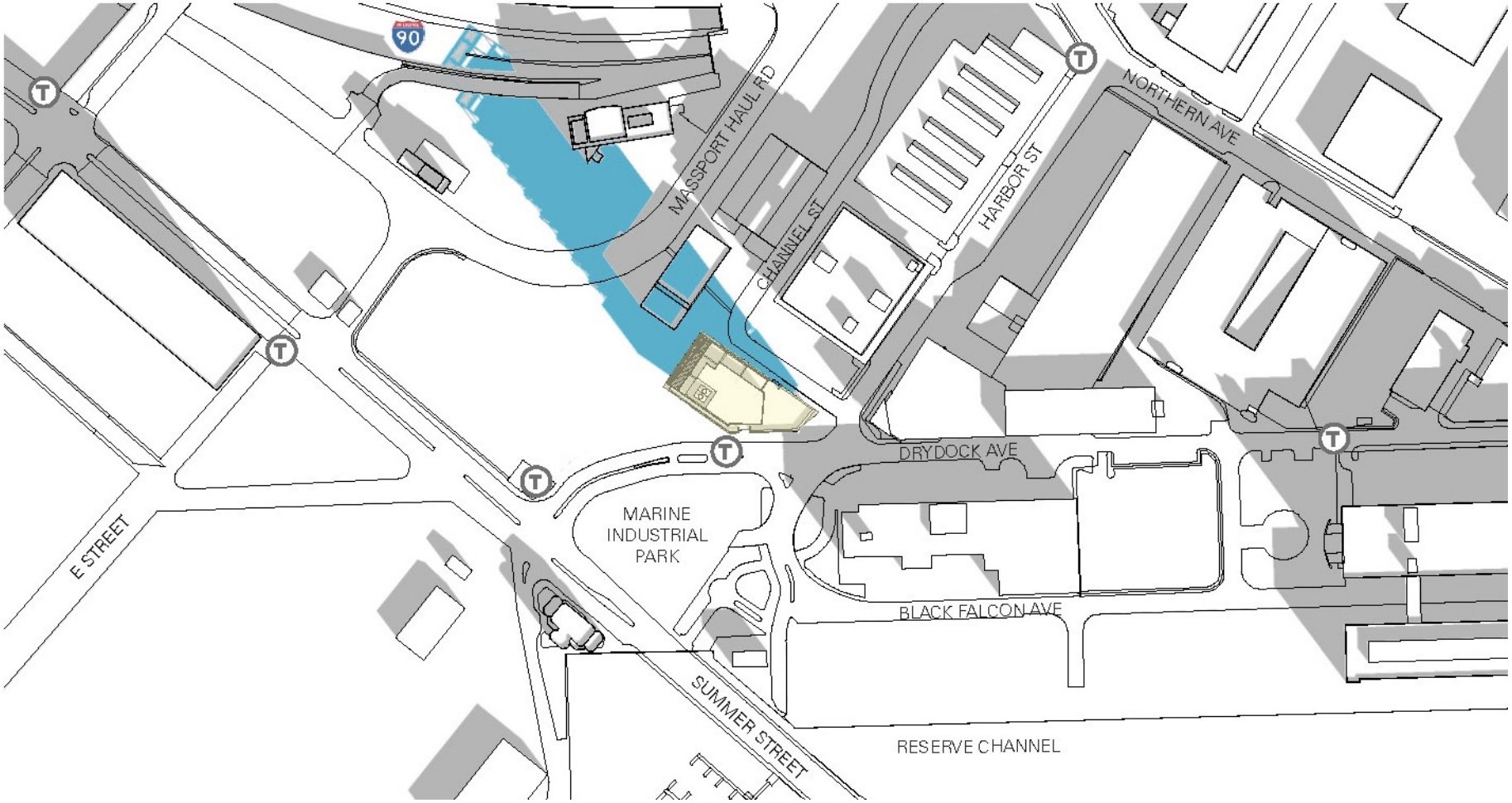
Shadow Study, September 21 3:00 p.m.



Parcel Q1 Boston, Massachusetts

Figure 4.2-11

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



Parcel Q1 Boston, Massachusetts

Figure 4.2-12

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

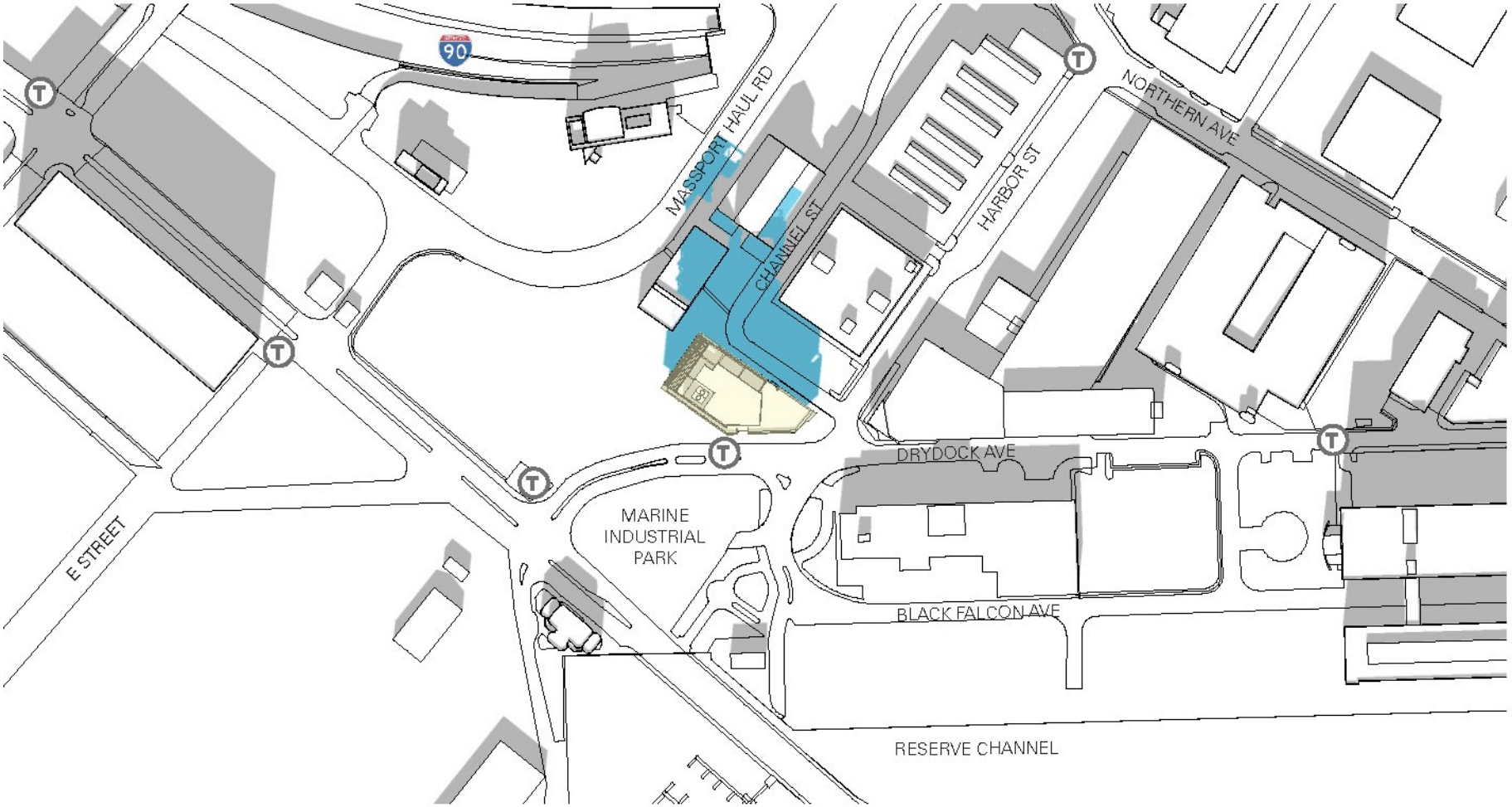


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Figure 4.2-13

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

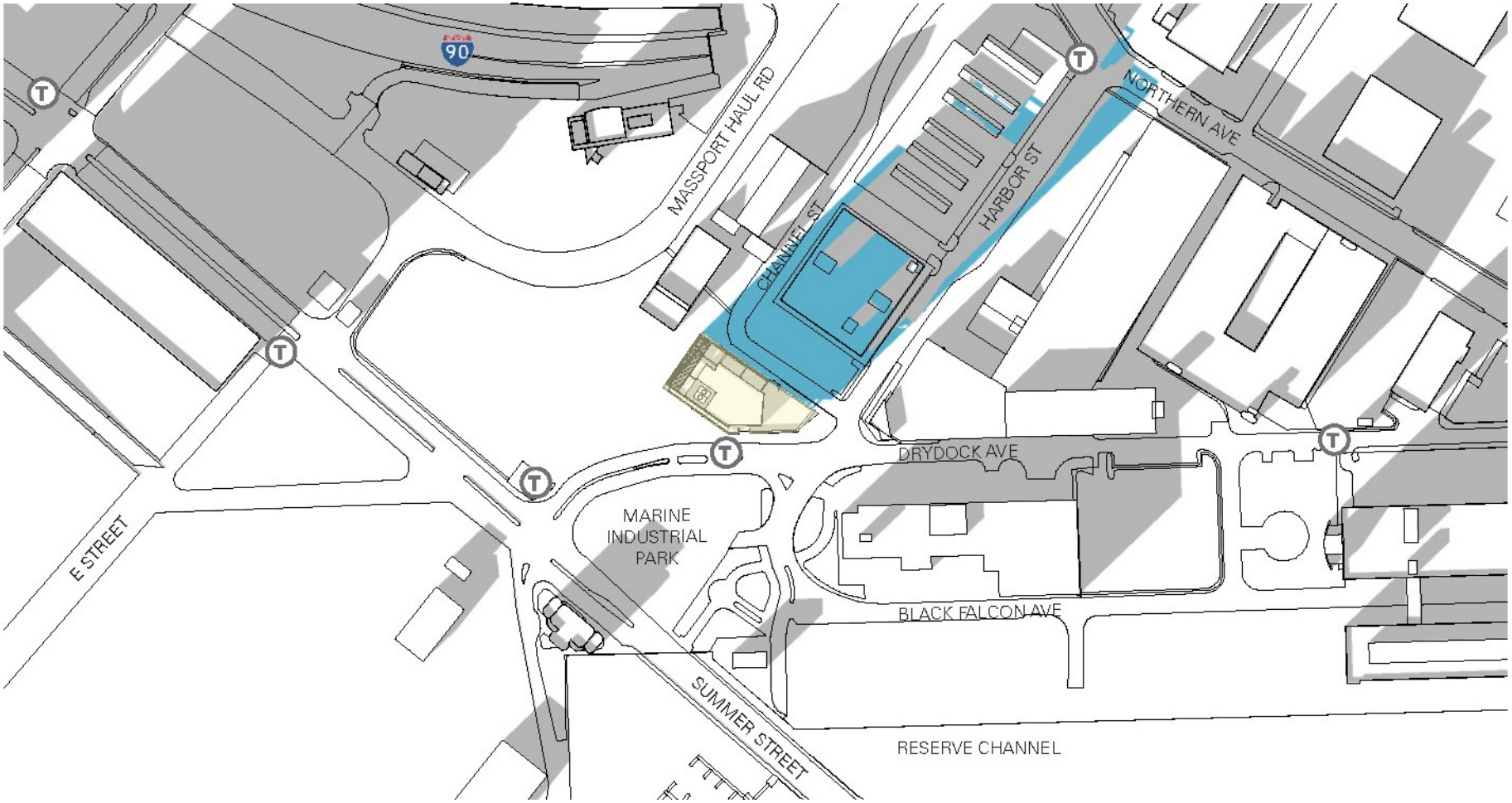

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Figure 4.2-14

Shadow Study December 21 3:00 p.m.

4.3 Daylight Analysis

4.3.1 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 sidewalks in the immediate vicinity of a project site. The daylight analysis for the Project considers the existing and proposed conditions, as well as typical daylight obstruction values of the surrounding area.

Because the Project site is currently vacant, the proposed Project will increase daylight obstruction; however, the resulting conditions will be typical of the surrounding area.

4.3.2 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. Four area context points were considered to provide a basis of comparison to existing conditions in the surrounding area. The viewpoint and area context viewpoints were taken in the following locations and are shown on Figure 4.3-1.

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

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

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Figure 4.3-1

Viewpoint and Area Context Locations

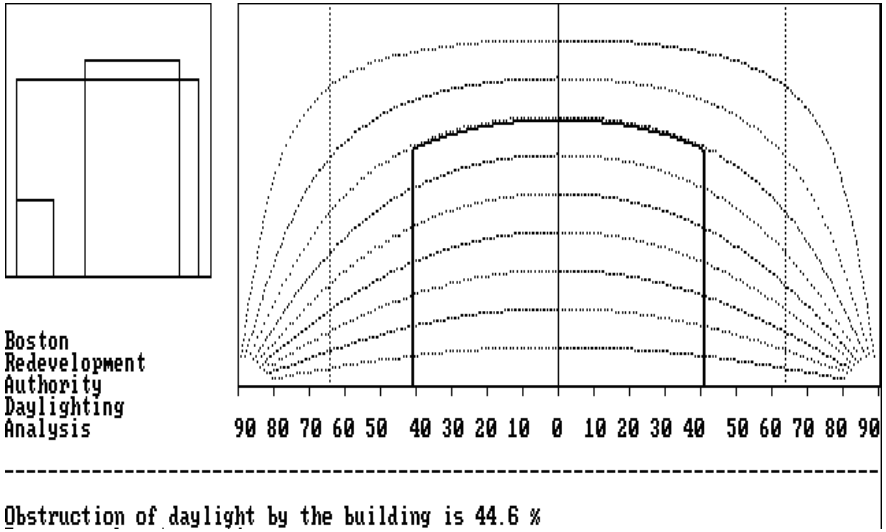
- **Viewpoint 1:** View from Drydock Avenue facing northeast toward the Project site
- **Viewpoint 2:** View from Harbor Street facing northwest toward the Project site
- **Viewpoint 3:** View from Channel Street facing southwest toward the Project site
- **Area Context Viewpoint AC1:** View from Harbor Street facing northwest toward 12 Channel Street
- **Area Context Viewpoint AC2:** View from Drydock Avenue facing south toward 1 Design Center Place.
- **Area Context Viewpoint AC3:** View from D Street facing southeast toward 451 D Street
- **Area Context Viewpoint AC4:** View from D Street facing southeast toward 601 Congress Street

4.3.3 Results

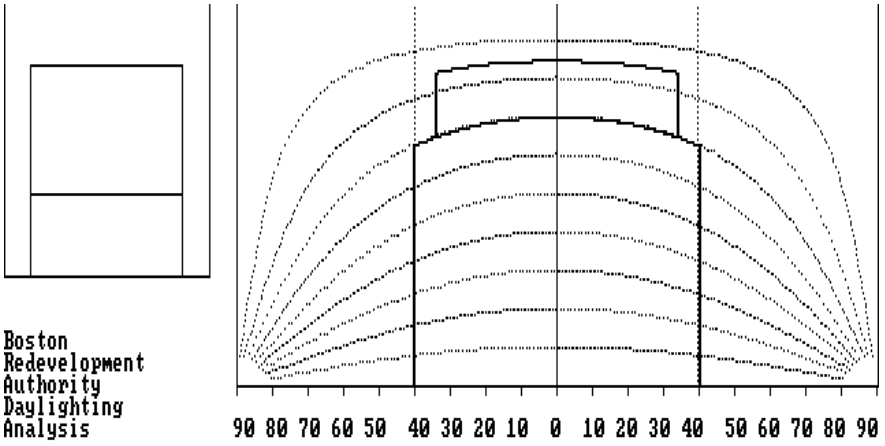
The results for each viewpoint are described in Table 4.3-1. Figures 4.3-2 to 4.3-3 illustrate the BRADA results for each analysis.

Table 4.3-1 Daylight Analysis Results

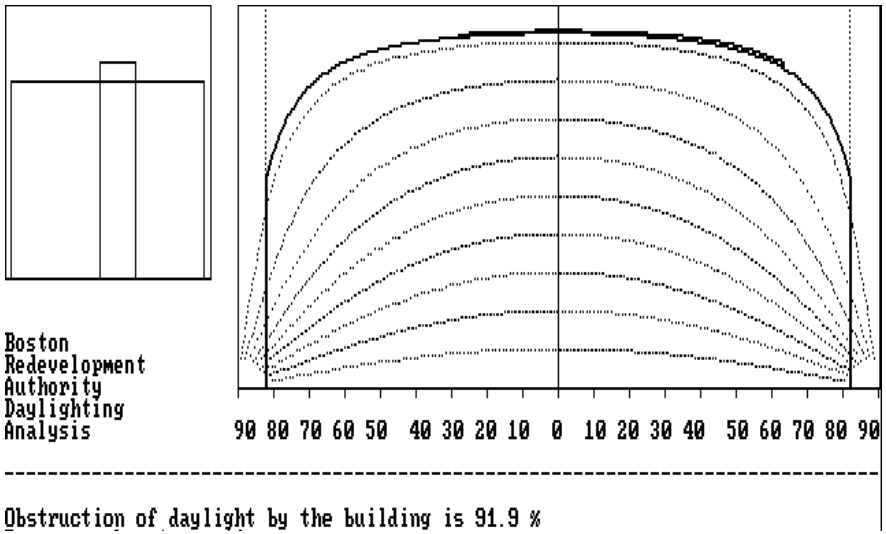
Viewpoint Locations		Existing Conditions	Proposed Conditions
Viewpoint 1	View from Drydock Avenue facing northeast toward the Project site	N/A	44.6%
Viewpoint 2	View from Harbor Street facing northwest toward the Project site	N/A	83.3%
Viewpoint 3	View from Channel Street facing southwest toward the Project site	N/A	91.9%
Area Context Points			
AC1	View from Harbor Street facing northwest toward 12 Channel Street	89.8%	N/A
AC2	View from Drydock Avenue facing south toward 1 Design Center Place.	82.3%	N/A
AC3	View from D Street facing southeast toward 451 D Street	79.6%	N/A
AC4	View from D Street facing southeast toward 601 Congress Street	90.3%	N/A



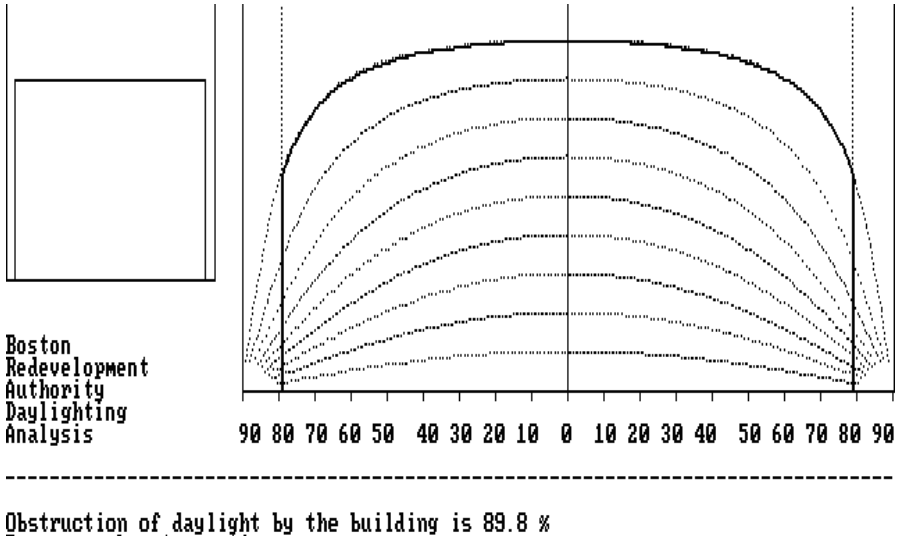
Viewpoint 1 (Proposed): View from Drydock Avenue facing northeast toward the Project site



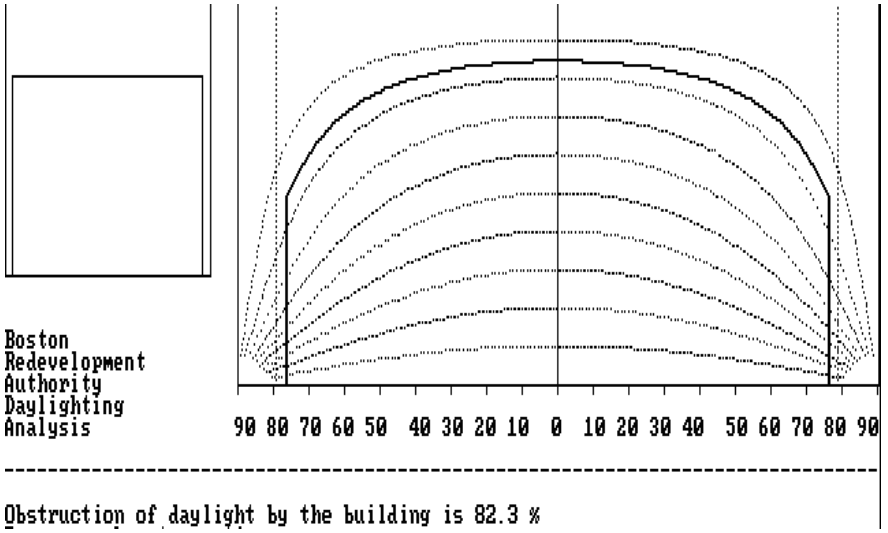
Viewpoint 2 (Proposed): View from Harbor Street facing northwest toward the Project site



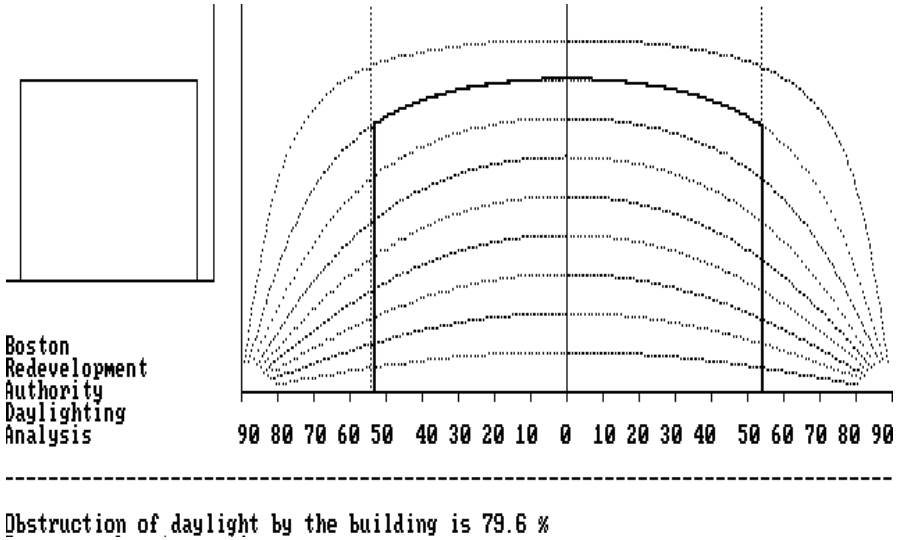
Viewpoint 1 (Proposed): View from Channel Street facing southwest toward the Project site



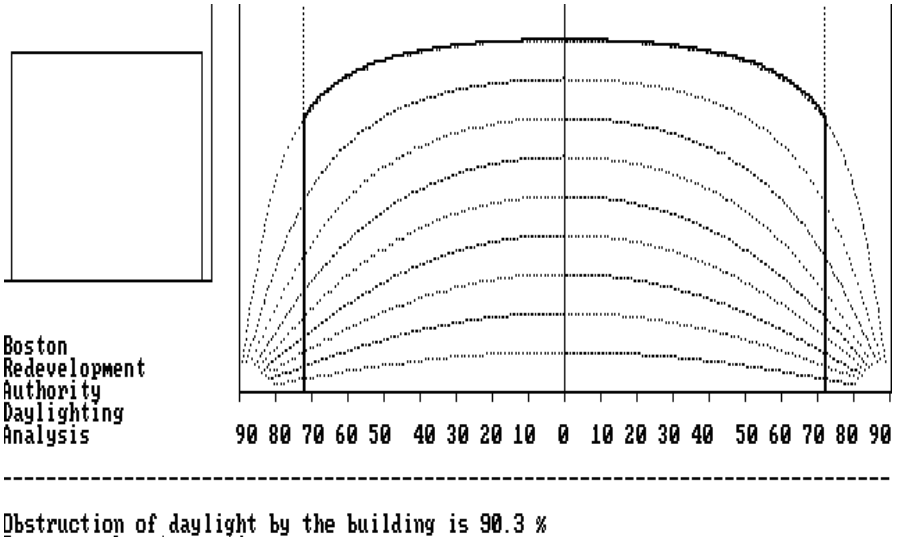
AC1: View from Harbor Street facing northwest toward 12 Channel Street



AC2: View from Drydock Avenue facing south toward 1 Design Center Place



AC3: View from D Street facing southeast toward 451 D Street



AC4: View from D Street facing southeast toward 601 Congress Street

Drydock Avenue – Viewpoint 1

Drydock Avenue runs along the southern edge of the Project site. Viewpoint 1 was taken from the center of Drydock Avenue facing north toward the Project site. Since the site is currently occupied by a surface parking lot, the development of the Project would result in an increased daylight obstruction value of 44.6%. While this is an increase over existing conditions, the daylight obstruction value is less than other areas in the vicinity, including the Area Context viewpoints.

Harbor Street – Viewpoint 2

Harbor Street runs along the eastern edge of the Project site. Viewpoint 2 was taken from the center of Harbor Street facing west toward the Project site. Since the site is currently occupied by a surface parking lot, the development of the Project would result in an increased daylight obstruction value of 83.3%. While this is an increase over existing conditions, the daylight obstruction value is similar to other areas in the vicinity, including the Area Context viewpoints.

Channel Street – Viewpoint 3

Channel Street runs along the northern edge of the Project site. Viewpoint 3 was taken from the center of Channel Street facing south toward the Project site. Since the site is currently occupied by a surface parking lot, the development of the Project would result in an increased daylight obstruction value of 91.9%. While this is an increase over existing conditions, the daylight obstruction value is similar to other areas in the vicinity, including the Area Context viewpoints.

Area Context Views

The surrounding area around the Project site includes buildings varying in height and density, and proposed projects in the immediate vicinity of the Project site will increase the density of the surrounding area. To provide a larger context for comparison of daylight conditions, obstruction values were calculated for the four Area Context Viewpoints described above and shown in Figure 4.3-3. The daylight obstruction values ranged from 79.6% for AC3 to 90.3% for AC4. Daylight obstruction values for the Project site vary, but are similar to buildings in the Project vicinity, including the Area Context values.

4.3.4 Conclusion

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 over existing conditions, the resulting conditions will be similar to or lower than the daylight obstruction values within the surrounding area and typical of urban areas.

4.4 Solar Glare

It is not anticipated that the Project will include the use of highly reflective glass or other reflective materials on the building facades that would result in adverse impacts from reflected solar glare from the Project.

4.5 Air Quality

4.5.1 Introduction

An air quality analysis has been conducted to determine the impact of pollutant emissions from mobile sources generated by the Project. Specifically, a microscale analysis was performed to evaluate the potential air quality impacts of carbon monoxide (CO) resulting from traffic flow around the Project area. Any new stationary sources will be reviewed by the Massachusetts Department of Environmental Protection (MassDEP) during permitting under the Environmental Results Program (ERP).

4.5.2 National Ambient Air Quality Standards and Background Concentrations

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

4.5.2.1 National Ambient Air Quality Standards

The 1970 Clean Air Act was enacted by the US Congress to protect the health and welfare of the public from the adverse effects of air pollution. As required by the Clean Air Act, EPA promulgated NAAQS for the following criteria pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM) (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), ozone (O_3), and lead (Pb). The NAAQS are listed in Table 4.5-1 (shown in micrograms per cubic meter [$\mu g/m^3$]). Massachusetts Ambient Air Quality Standards (MAAQS) are typically identical to NAAQS. Massachusetts Ambient Air Quality Standards (MAAQS) are codified in 310 CMR 6.04, and generally follow the NAAQS but are not identical (highlighted in **bold** in Table 4.5-1).

NAAQS specify concentration levels for various averaging times and include both "primary" and "secondary" standards. Primary standards are intended to protect human health,

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

whereas secondary standards are intended to protect public welfare from any known or anticipated adverse effects associated with the presence of air pollutants, such as damage to vegetation. The more stringent of the primary or secondary standards were applied when comparing to the modeling results for this Project.

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

Table 4.5-1 National (NAAQS) and Massachusetts (MAAQS) Ambient Air Quality Standards

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

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

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

4.5.2.2 Background Concentrations

To estimate background pollutant levels representative of the area, the most recent air quality monitor data reported by the MassDEP in their Annual Air Quality Reports was obtained for 2012 to 2014. The three-hour and 24-hour SO_2 values are no longer reported in the annual reports. Data for these pollutant and averaging time combinations were obtained from the EPA's AirData website.

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

Background concentrations were determined from the closest available monitoring stations to the proposed development. All pollutants are not monitored at every station, so data from multiple locations are necessary. The closest monitor is at East First Street in South Boston, roughly 1.5 kilometers northeast of the Project site. However, this site only samples for SO_2 and NO_2. The next closest site is at Harrison Avenue, roughly 2.4 km west of the Project site. This site samples for the remaining pollutants. A summary of the background air quality concentrations are presented in Table 4.5-2.

Table 4.5-2 Observed Ambient Air Quality Concentrations and Selected Background Levels

Pollutant	Averaging Time	2012	2013	2014	Background Concentration ($\mu g/m^3$)	NAAQS	Percent of NAAQS
SO_2 (1)(6)	1-Hour (5)	31.44	36.68	73.36	47.2	196.0	24%
	3-Hour	27.772	42.706	63.666	63.7	1300.0	5%
	24-Hour	11.79	17.03	21.222	21.2	365.0	6%
	Annual	4.323	4.0086	4.5588	4.6	80.0	6%
PM-10	24-Hour	32	34.0	61	61.0	150.0	41%
	Annual	14.2	15.1	13.9	15.1	50.0	30%
PM-2.5	24-Hour (5)	20.6	15.9	12.7	16.4	35.0	47%
	Annual (5)	8.28	7.3	5.96	7.2	12.0	60%
NO_2 (3)	1-Hour (5)	80.84	88	116.56	95.3	188.0	51%
	Annual	18.2924	22.9	26.32	26.3	100.0	26%
CO (2)	1-Hour	2474.2	2145.3	1963.1	2474.2	40000.0	6%
	8-Hour	2177.4	1375.2	1489.8	2177.4	10000.0	22%
Ozone (4)	8-Hour	121.706	115.817	106.002	121.7	147.0	83%
Lead	Rolling 3-Month	0.014	0.006	0.014	0.014	0.15	9%

Notes:
From 2012-2014 EPA's AirData Website
(1) SO_2 reported parts per billion (ppb). Converted to $\mu g/m^3$ using factor of 1 ppm = 2.62 $\mu g/m^3$.
(2) CO reported in parts per million (ppm). Converted to $\mu g/m^3$ using factor of 1 ppm = 1146 $\mu g/m^3$.
(3) NO_2 reported in ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 1.88 $\mu g/m^3$.
(4) O_3 reported in ppm. Converted to $\mu g/m^3$ using factor of 1 ppm = 1963 $\mu g/m^3$.
(5) Background level is the average concentration of the three years.
(6) The 24-hour and Annual standards were revoked by EPA on June 22, 2010, Federal Register 75-119, p. 35520.

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

For use in the microscale analysis, background concentrations of CO in parts per million (ppm) were required. The corresponding maximum background concentrations in ppm were 2.2 ppm (2,474 $\mu g/m^3$) for one-hour and 1.9 ppm (2,177 $\mu g/m^3$) for eight-hour CO.

4.5.3 Methodology

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

The microscale analysis typically examines ground-level CO impacts due to traffic queues in the immediate vicinity of a project. CO is used in microscale studies to indicate roadway pollutant levels since it is the most abundant pollutant emitted by motor vehicles and can result in so-called "hot spot" (high concentration) locations around congested intersections. The NAAQS standards do not allow ambient CO concentrations to exceed 35 ppm for a one-hour averaging period, and 9 ppm for an eight-hour averaging period, more than once per year at any location. The widespread use of CO catalysts on current vehicles has reduced the occurrences of CO hotspots. Air quality modeling techniques (computer simulation programs) are typically used to predict CO levels for both existing and future conditions to evaluate compliance of the roadways with the standards. The analysis for the Project followed the procedure outlined in EPA's intersection modeling guidance.[4]

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

Baseline (2016) and future year (2023) emission factor data calculated from the MOVES model, along with traffic data, were input into the CAL3QHC program to determine CO concentrations due to traffic flowing through the selected intersections.

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

Existing background values of CO at the nearest monitor location at Kenmore Square were obtained from MassDEP. CAL3QHC results were then added to background CO values of 2.2 ppm (one-hour) and 1.9 ppm (eight-hour), as provided by MassDEP, to determine total air quality impacts due to the Project. These values were compared to the NAAQS for CO of 35 ppm (one-hour) and 9 ppm (eight-hour).

The modeling methodology was developed in accordance with the latest MassDEP modeling policies and federal modeling guidelines.[5]

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

Intersection Selection

Two signalized intersections included in the traffic study meet the above conditions for a microscale analysis (see Chapter 3). The traffic volumes and LOS calculations provided in Chapter 3 form the basis of evaluating the traffic data versus the microscale thresholds. The only intersections found to meet the criteria are the intersection of Summer Street and D Street and the intersection of Summer Street and Drydock Avenue.

Microscale modeling was performed for the intersections based on the aforementioned methodology. The 2016 Existing conditions, and the 2023 No-Build and Build conditions were each evaluated for both morning (a.m.) and afternoon (p.m.) peak hours.

Emissions Calculations (MOVES)

The EPA MOVES computer program was used to estimate motor vehicle emission factors on the roadway network. Emission factors calculated by the MOVES model are based on motor vehicle operations typical of daily periods. The Commonwealth's statewide annual Inspection and Maintenance (I&M) program was included, as well as the county specific vehicle age registration distribution, fleet mix, meteorology, and other inputs. The inputs for MOVES for the Existing (2016) and Build year (2023) are provided by MassDEP.

All link types for the modeled intersection were input into MOVES. Idle emission factors are obtained from factors for a link average speed of 0 miles per hour (mph). Moving emissions are calculated based on speeds at which free-flowing vehicles travel through the intersection as stated in traffic modeling (SYNCHRO) reports. A speed of 30 mph is used for all free-flow traffic. Speeds of 10 and 15 mph were used for right (and U-turns, if necessary) and left turns, respectively. Roadway emissions factors were obtained from MOVES using EPA guidance.[6]

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[5] 40 CFR 51 Appendix W, Guideline on Air Quality Models, 70 FR 68228, Nov. 9, 2005.

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

Winter CO emission factors are typically higher than summer. Therefore, January weekday emission factors were conservatively used in the microscale analyses.

Receptors & Meteorology Inputs

Sets of up to roughly 220 receptors were placed in the vicinity of the modeled intersection. Receptors extended approximately 300 feet on the sidewalks along the roadways approaching the intersection. The roadway links and receptor locations of the modeled intersection are presented in Figure 4.5-1 and Figure 4.5-2.

For the CAL3QHC model, limited meteorological inputs are required. Following EPA guidance[7], a wind speed of one meter per second, stability class D (4), and a mixing height of 1,000 meters were used. To account for the intersection geometry, wind directions from 0° to 350°, every 10° were selected. A surface roughness length of 321 centimeters was selected.[8]

Impact Calculations (CAL3QHC)

The CAL3QHC model predicts one-hour concentrations using queue-links at intersections, worst-case meteorological conditions, and traffic input data. The one-hour concentrations were scaled by a factor of 0.9 to estimate eight-hour concentrations.[9] The CAL3QHC methodology was based on EPA CO modeling guidance. Signal timings were provided directly from the traffic modeling outputs.

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

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

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

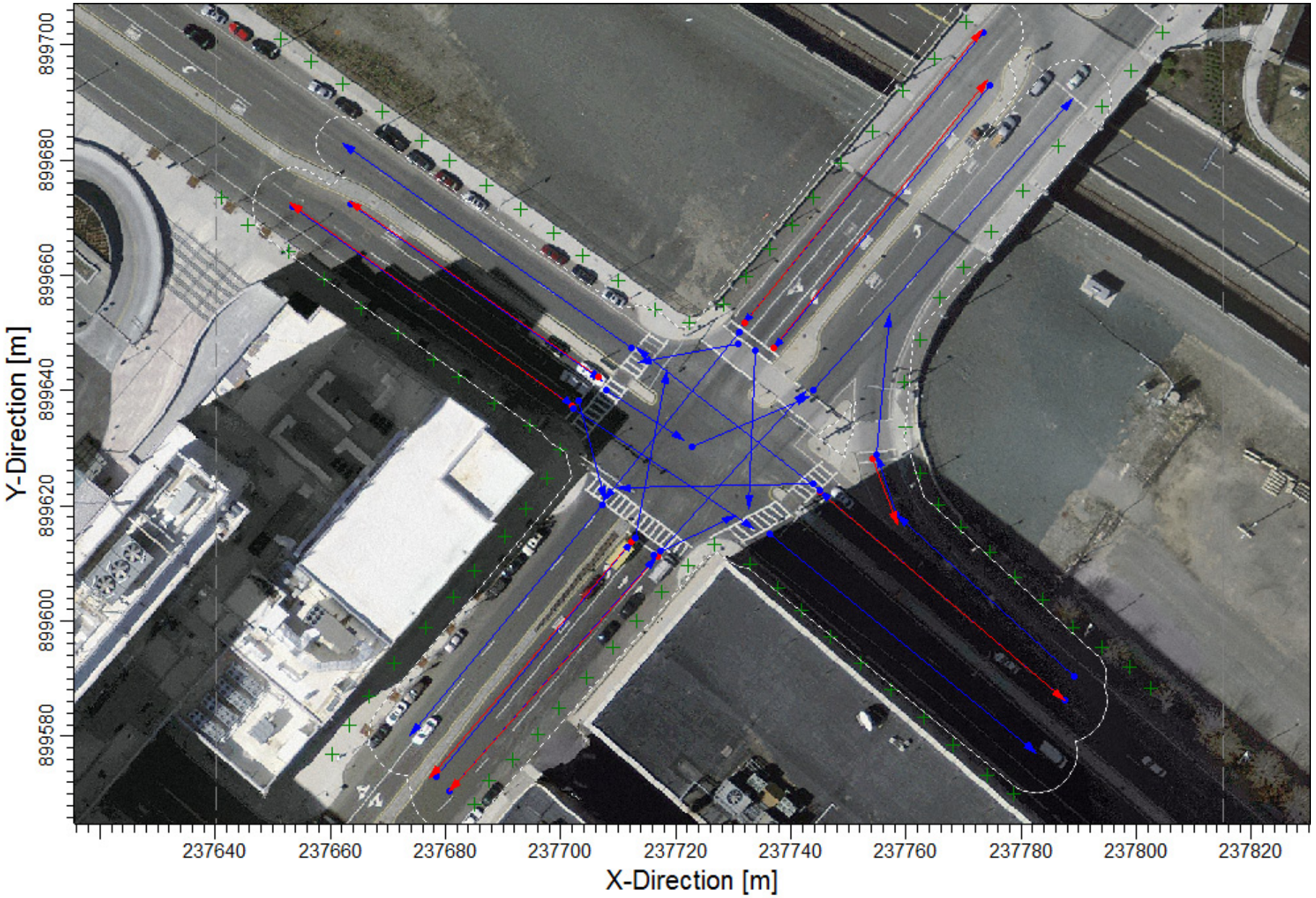

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Figure 4.5-1

Link and Receptor Locations for CAL3QHC modeling of Intersection of Summer St. & D Street

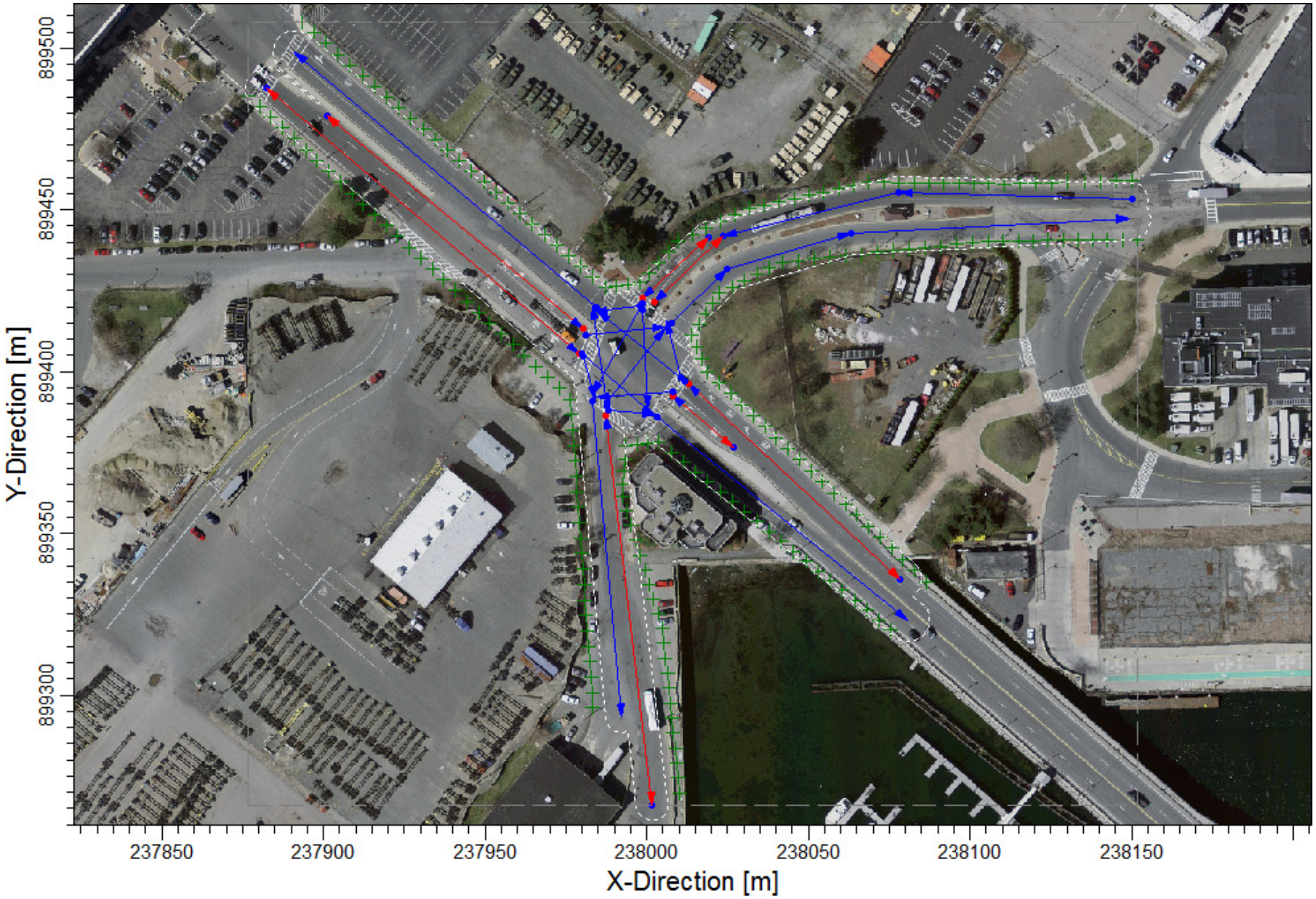

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Figure 4.5-2

Link and Receptor Locations for CAL3QHC modeling of Intersection of Summer St. & Drydock Ave.

4.5.4 Air Quality Results

The results of the maximum one-hour predicted CO concentrations from CAL3QHC are provided in Tables 4.5-3 through 4.5-5 for the 2016 and 2023 scenarios. Eight-hour average concentrations are calculated by multiplying the maximum one-hour concentrations by a factor of 0.9.[10]

The results of the one-hour and eight-hour maximum modeled CO ground-level concentrations from CAL3QHC were added to EPA supplied background levels for comparison to the NAAQS. These values represent the highest potential concentrations at the intersection as they are predicted during the simultaneous occurrence of "defined" worst case meteorology. The highest one-hour traffic-related concentration predicted in the area of the Project, for the modeled conditions (0.3 ppm) plus background (2.2 ppm), is 2.5 ppm for all cases at the intersection of Summer Street and Drydock Avenue and at Summer Street and D Street. The highest eight-hour traffic-related concentration predicted in the area of the Project for the modeled conditions (0.3 ppm) plus background (1.9 ppm) is 2.2 ppm for the same locations and scenarios. All concentrations are well below the one-hour NAAQS of 35 ppm and the eight-hour NAAQS of 9 ppm. Note that since the time of the transportation analysis that was completed for the Project, the development program has been refined; however, the Project is anticipated to continue to be below the one-hour and eight-hour NAAQS.

4.5.5 Conclusions

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

Table 4.5-3 Summary of Microscale Modeling Analysis (Existing 2016)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Summer Street & D Street	AM	0.3	2.2	2.5	35
	PM	0.3	2.2	2.5	35
Summer Street & Drydock Avenue	AM	0.3	2.2	2.5	35
	PM	0.3	2.2	2.5	35

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

Table 4.5-3 Summary of Microscale Modeling Analysis (Existing 2016) (Continued)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
8-Hour					
Summer Street & D Street	AM	0.3	1.9	2.2	9
	PM	0.3	1.9	2.2	9
Summer Street & Drydock Avenue	AM	0.3	1.9	2.2	9
	PM	0.3	1.9	2.2	9
Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.9.					

Table 4.5-4 Summary of Microscale Modeling Analysis (No-Build 2023)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Summer Street & D Street	AM	0.2	2.2	2.4	35
	PM	0.2	2.2	2.4	35
Summer Street & Drydock Avenue	AM	0.3	2.2	2.5	35
	PM	0.3	2.2	2.5	35
8-Hour					
Summer Street & D Street	AM	0.2	1.9	2.1	9
	PM	0.2	1.9	2.1	9
Summer Street & Drydock Avenue	AM	0.3	1.9	2.2	9
	PM	0.3	1.9	2.2	9
Notes: CAL3QHC eight-hour impacts were conservatively obtained by multiplying one-hour impacts by a screening factor of 0.9.					

Table 4.5-5 Summary of Microscale Modeling Analysis (Build 2023)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Summer Street & D Street	AM	0.2	2.2	2.4	35
	PM	0.2	2.2	2.4	35
Summer Street & Drydock Avenue	AM	0.3	2.2	2.5	35
	PM	0.3	2.2	2.5	35
8-Hour					
Summer Street & D Street	AM	0.2	1.9	2.1	9
	PM	0.2	1.9	2.1	9
Summer Street & Drydock Avenue	AM	0.3	1.9	2.2	9
	PM	0.3	1.9	2.2	9

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

4.6 Stormwater/Water Quality

Section 8.4 includes information on stormwater impacts.

4.7 Flood Hazard Zones / Wetlands

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for the Project site indicate that portions of the site lie within the 100-year flood zone (Community Panel Numbered 25025C 0081J, effective March 16, 2016). Along Drydock Avenue a portion of the site is outside the special flood hazard area, with the remainder of the site designated as Zone AE.

The design team is studying the incorporation of a number of measures to mitigate against flood impacts, including:

- Placing essential mechanical equipment above the future flood level;
- Water-tight utility conduits;

- Wastewater backflow prevention;
- Resilient materials on the first floor that can either withstand flooding or easily be replaced; and
- Potentially allowing for the ground floor to be raised.

If the Project site is inundated in the future, as an office building, it would not be open, and therefore will not be accessible and will not need to have systems that can run the building without grid provided electricity.

4.8 Geotechnical Impacts

4.8.1 Sub-soil Conditions

Subsurface conditions are expected to generally consist of approximately 20 feet of miscellaneous urban fill, 10 to 15 feet of organic silt, and 30 to 40 feet of Boston Blue Clay overlying glacial till and bedrock at a depth of 75 to 80 feet. Additional soil borings will be performed to confirm the subsurface conditions and to support final design of the building foundations.

The proposed building is expected to be supported on deep foundations bearing in or on the glacial till and/or bedrock. Deep foundation options include driven end bearing piles and drilled shafts. Driving of end bearing piles will produce more noise and vibrations than the installation of drilled shafts. However, the existing buildings on the abutting parcels are far enough from the proposed building site that impacts to those buildings is not anticipated. Vibration monitoring may be used during construction if determined necessary.

Site grades outside the building limits will not be modified in any significant way causing compression of the underlying organic silt. Consequently, site improvements including sidewalks, pavements, and utilities can be installed without any supplemental support.

4.8.2 Groundwater

Based on available subsurface information and the site location in South Boston, groundwater levels are expected to be influenced by the tides. Measured high groundwater levels were 4 to 5 feet below existing grade.

Groundwater levels are not expected to be affected during or following construction since no below grade space is planned. Some construction dewatering may be required for installation of utilities. The Project site is not located within the Groundwater Conservation Overlay District.

4.9 Solid and Hazardous Waste

4.9.1 Hazardous Waste

If soil disposal is required, the Proponent will obtain site specific information regarding environmental conditions of excavated soils to evaluate for the presence of oil and hazardous materials. Foundation construction for the new building may generate soil requiring off-site transport. Chemical testing of the material will be required by receiving facilities to identify chemical constituents and any contaminants present. Chemical testing of the material will be conducted prior to construction in accordance with facility requirements.

Any material leaving the site will be required to be transported in accordance with local, state and federal requirements. Any regulated soil conditions related to oil and hazardous materials will be managed in accordance with appropriate MassDEP regulatory requirements.

4.9.2 Operation Solid Waste and Recycling

The Project will generate solid waste typical of retail and office uses. Solid waste is expected to include wastepaper, cardboard, glass bottles and food. Recyclable materials will be recycled through a program implemented by building management. The Project will generate approximately 321 tons of solid waste per year. With the exception of household hazardous wastes typical of retail developments (e.g., cleaning fluids and paint), the Project will not involve the generation, use, transportation, storage, release, or disposal of potentially hazardous materials.

4.10 Noise Impacts

The City of Boston has both a noise ordinance and noise regulations. Chapter 16 §26 of the Boston Municipal Code sets the general standard for noise that is unreasonable or excessive: louder than 50 decibels between the hours of 11:00 p.m. and 7:00 a.m., or louder than 70 decibels at all other hours. The Boston Air Pollution Control Commission (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.

Table 4.10-1 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. Zoning District Standards are presented below in Table 4.10-1.

Table 4.10-1 City of Boston Zoning District Noise Standards, Maximum Allowable Sound Pressure Levels

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

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

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

While the details of the mechanical equipment associated with the Project have not yet been precisely determined, steady operational noise from stationary sources will primarily involve heating, cooling, and ventilation equipment for the office and retail spaces, including: cooling towers, fans, gas-fired condensing boilers, energy recovery unit, chillers, variable air handling units and an emergency generator.

At this time, the mechanical equipment and noise controls are conceptual in nature and, during the final design phase of the Project, will be specified to meet the applicable City of Boston and MassDEP noise limits. Reasonable efforts will be made, if necessary, to minimize noise impacts from the Project using routinely employed methods of noise control, including:

- Selection of "low-noise" equipment models;
- Fitting of inlet and discharge vents with duct silencers;
- Installation of screening barriers to provide shielding where appropriate;
- Use of sound-attenuating enclosures, acoustical blankets, or both on continuously operating equipment with outdoor exposure; and
- Siting of noisy equipment at locations that protect sensitive receptors by shielding or with increased distance.

In summary, the Project, with appropriate noise control, is not expected to result in any adverse noise impacts at nearby sensitive receptors. Short-term, intermittent increases in noise levels will occur during Project construction. However, every reasonable effort will be made to minimize the noise impacts and ensure the project complies with the requirements of the City of Boston noise ordinance.

4.11 Construction Impacts

4.11.1 Introduction

A Construction Management Plan (CMP) in compliance with the City's Construction Management Program will be submitted to 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, neighborhood, and RFMP users will be essential to the successful construction of the Project. Construction methodologies, which ensure public safety and protect nearby 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.

4.11.2 Construction Methodology / Public Safety

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

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

4.11.3 Construction Schedule

The Proponent anticipates that the Project will commence construction in the third quarter of 2017.

Typical construction hours will be from 7:00 a.m. to 6:00 p.m., Monday through Friday, with most shifts ordinarily ending at 3:30 p.m. No substantial sound-generating activity will occur before 7:00 a.m. 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. It is noted that some activities such as finishing activities could run beyond 6:00 p.m. 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.

4.11.4 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.

4.11.5 Construction Mitigation

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

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

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

4.11.6 Construction Employment and Worker Transportation

The number of workers required during the construction period will vary. It is anticipated that approximately 450 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.

4.11.7 Construction Truck Routes and Deliveries

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

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

4.11.8 Construction Air Quality

Short-term air quality impacts from fugitive dust may be expected during demolition, excavation and the early phases of construction. Plans for controlling fugitive dust during demolition, excavation and construction include mechanical street sweeping, wetting portions of the site during periods of high wind, and careful removal of debris by covered trucks. The construction contract will provide for a number of strictly enforced measures to be used by contractors to reduce potential emissions and minimize impacts. 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 site; and
- Periodic street and sidewalk cleaning with water to minimize dust accumulations.

4.11.9 Construction Noise

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

Mitigation measures are expected to include:

- Instituting a proactive program to ensure compliance with the City of Boston noise limitation policy;
- Using appropriate mufflers on all equipment and ongoing maintenance of intake and exhaust mufflers;
- Muffling enclosures on continuously running equipment, such as air compressors and welding generators;
- Replacing specific construction operations and techniques by less noisy ones where feasible;
- Selecting the quietest of alternative items of equipment where feasible;

- Scheduling equipment operations to keep average noise levels low, to synchronize the noisiest operations with times of highest ambient levels, and to maintain relatively uniform noise levels;
- Turning off idling equipment; and
- Locating noisy equipment at locations that protect sensitive locations by shielding or distance.

4.11.10 Construction Vibration

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

4.11.11 Construction Waste

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

4.11.12 Protection of Utilities

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

4.12 Rodent Control

A rodent extermination certificate will be filed with the 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.

4.13 Wildlife Habitat

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

Chapter 5.0

Sustainable Design and Climate Change Preparedness

5.0 SUSTAINABLE DESIGN AND CLIMATE CHANGE RESILIENCE

5.1 Green Building

To comply with Article 37, the Proponent intends to incorporate sustainable design and construction principles and practices into the proposed Project. The Proponent intends to target a LEED Gold rating under LEED-NC version 3 (2009) as the rating system to comply with Article 37. The LEED rating system tracks the suitable 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 and 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, 61 points have been targeted, in addition to 31 maybe points. The maybe points represent credits that will continue to be evaluated as the Project design progresses.

The Proponent and the Project design team has, and will continue to evaluate and incorporate sustainable design and energy conservation as the design process continues.

Sustainable Sites

A major sustainable aspect of the Project is its access to public transportation and proximity to diverse community services. Site sustainability will be further enhanced with stormwater management and urban heat island mitigation strategies.

Prerequisite 1: Construction Activity Pollution Prevention. The Project construction documents will include erosion and sedimentation control guidance for on-site implementation by the Construction Manager (CM). The CM is required to implement a compliant erosion and sedimentation control plan that meets local requirements and the U.S. Environmental Protection Agency (EPA) Construction General Permit (Phase I and II) of the National Pollutant Discharge Elimination System (NPDES) Program.

Credit 1: Site Selection. The Project site is a previously developed urban parcel in a densely developed neighborhood. The parcel also meets the other Site Selection criteria: it is not identified as prime farmland or a habitat for a threatened or endangered species. Further, the site is not located within 100 feet of wetlands and was not previously public parkland.

Credit 2: Development Density and Community Connectivity. The Project meets the criteria for Option 2, Community Connectivity. The immediate neighborhood has more than 10 services with pedestrian access including restaurants, a hardware store, a bank, a school, a museum, a beauty salon, and a supermarket within a half mile radius of the site.

Credit 4.1: Alternative Transportation, Access to Public Transit. The Project site is served by two MBTA bus lines and the Silver Line SL2 bus rapid transit system.

Credit 4.2: Alternative Transportation, Bicycle Storage and Changing Room. Covered bike storage will be provided to tenants to encourage non-vehicle travel, reducing the greenhouse gas emissions associated with the Project (see Figure 2-16).

Credit 4.3: Alternative Transportation, Low Emitting Fuel Efficient Vehicles. Preferred parking spaces will be provided for low-emitting/fuel-efficient vehicles.

Credit 6.1: Stormwater Design – Quantity Control & Credit 6.2 – Stormwater Design – Quality Control. A stormwater management plan has been designed to address the rate, runoff, and quality of the stormwater runoff from the Project. Green roofs and vegetated areas improve runoff quality and reduce quantity.

Credit 7.1: Heat Island Effect – Non-Roof. The Project will meet the criteria for this credit by providing 100 percent of the parking under cover.

Credit 7.2: Heat Island Effect – Roof. An SRI-compliant roof membrane product has been specified.

Credit 8: Light Pollution Reduction. The Project will endeavor to meet the LEED Light Pollution Reduction requirements through the specification of compliant exterior and site light fixtures, and minimizing light trespass from the site.

Water Efficiency

The Project is targeting water use reduction over typical baseline quantities through low-flow fixtures and efficient landscape irrigation.

Prerequisite 1: Water Use Reduction, 20% Reduction. Through the specification of low-flow high-efficiency plumbing fixtures, the Project will exceed the required 20% annual potable water use reduction.

Credit 1: Water Efficient Landscaping. The use of potable water for irrigation of landscaping at the Project site will be reduced by 50% over a midsummer baseline case using high efficiency irrigation technology such as efficient drip irrigation systems and selection of plants that are native or adapted. Plants will be hardy and drought tolerant with low water demand after establishment.

Credit 3: Water Use Reduction. Low-flow toilets, urinals, and lavatories reduce the annual volume of water consumption over baseline use beyond the 20% reduction required by the Water Efficiency prerequisite to achieve additional points in the water use reduction category.

Energy and Atmosphere

The 16 credits in the Energy and Atmosphere category include commissioning of building systems, improving energy performance, refrigerant management, and measurement and verification of building system performance.

Prerequisite 1: Fundamental Commissioning of Building Energy Systems. Commissioning verifies that the mechanical systems are installed, calibrated, and perform according to the Owner's Project Requirements, Basis of Design, and Construction Documents. This process improves occupant comfort and reduces building operating cost. Reduced operating cost, through the reduced use of utilities like electricity and municipal water, in turn reduce the emissions contributing to climate change associated with conventional electricity generation, natural gas use, and municipal water treatment.

The Project team is undertaking the following commissioning process activities:

- Designation of an individual as the Commissioning Authority (CxA) to lead, review, and oversee the completion of the commissioning process activities.
- Documentation of the Owner's Project Requirements, development of a basis of design, and review of these documents by the CxA for clarity and completeness.
- Development and incorporation of commissioning requirements into the construction documents.
- Development and implementation of a Commissioning Plan.
- Verification of the installation and performance of the systems to be commissioned.
- Completion of a Summary Commissioning Report.

The following systems will be included in the commissioning process:

- Heating, ventilation, air conditioning, and refrigeration systems (HVAC&R) and associated controls.
- Lighting controls.
- Domestic hot water systems.

Because this is a Core & Shell project, some systems, including lighting and HVAC, will be completed by future tenants; thus, modified testing procedures are being undertaken.

Prerequisite 2: Minimum Energy Performance / Credit 1: Optimize Energy Performance. Unlike the proposed new Stretch Energy Code which will require energy consumption savings relative to ASHRAE 90.1-2013, LEED is based on energy cost savings relative to

ASHRAE 90.1-2007. All major components, including the envelope, HVAC systems, lighting, and domestic hot water systems will be designed to meet the mandatory requirements of ASHRAE 90.1-2007.

Prerequisite 3: Fundamental Refrigerant Management. As per the prerequisite requirements, the specifications for refrigerants used in the building HVAC & R systems will not permit the use of CFC-based refrigerants.

Credit 4: Enhanced Refrigerant Management. In order to reduce damage to the ozone layer associated with the use of chlorofluorocarbon (CFC) based refrigerants, the Project team will specify equipment with zero CFC-based refrigerants for building heating, ventilation, air conditioning, and refrigeration systems.

Credit 5.1: Measurement and Verification. The Project will develop and implement a measurement and verification (M&V) plan consistent with Option D: Calibrated Simulation (Savings Estimation Method 2), as specified in the International Performance Measurement & Verification Protocol (IPMVP), Volume III: Concepts and Options for Determining Energy Savings in New Construction, April 2003. The M&V period will cover at least one year of post-construction occupancy, and a process for corrective action will be provided if the results of the M&V plan indicate that energy savings are not being achieved.

Credit 5.2: Tenant Submetering: The Project will install sub-metering systems so tenants can monitor the energy consumption in their leased spaces. As studies have shown, tenants with individual responsibility over utility use tend to conserve more; this measure will encourage tenants to reduce their electricity use.

Materials and Resources

The Project will specify materials and products with recycled content, those made with certified wood and regionally procurable products to the extent possible. Throughout the construction phase of the Project, the Construction Management team will endeavor to divert Construction and Demolition waste from area landfills and procure materials that are made with Forest Stewardship Council (FSC) certified wood, have recycled content and/or are harvested, extracted and manufactured within 500 miles of the Project site.

Prerequisite 1: Storage and Collection of Recyclables. The Project provides a single-stream recycling program for tenants, with an area designated for the collection of recyclables. This program will help reduce the quantity waste generated by building occupants that is sent to a landfill.

Credit 2: Construction Waste Management. The CM will develop and implement a Construction Waste Management Plan. The CM will endeavor to divert as much demolition debris and construction waste from area landfills as possible with a minimum diversion rate of 75% overall.

Credit 4: Recycled Content. In order to reduce the demand for extraction and processing of virgin materials, the Project team will specify the use of materials with recycled content. The sum of the cost of post-consumer recycled content plus half of the pre-consumer content will comprise at least 20% of the total cost of materials for the Project.

Credit 5: Regional Materials, Extracted, Processed and Manufactured Regionally. The design specifications include some materials to be extracted, harvested, recovered and manufactured within a 500 mile radius of the Project site. The Proponent has established a target for 10 percent of the materials and products installed to be regional materials based on overall Project materials costs. The CM will track the building materials with a goal of achieving the 20% regional materials threshold for an additional LEED point.

Credit 6: Certified Wood. To achieve the Certified Wood credit, the Project team will use FSC certified wood products for 50% or more of the total cost for new wood for the Project. Subcontractors using and installing wood products for the Project will be required to document the material type, FSC content, and chain of custody number. This documentation will be tracked to ensure that the percentage of certified products stays on track during the course of construction.

Indoor Environmental Quality

The interior air quality will be monitored during the construction phase of the Project and prior to occupancy. Low emitting materials, (low-Volatile Organic Compound, or VOC), will be used throughout construction to maintain and improve air quality within the base building.

Prerequisite 1: Minimum IAQ Performance. The building mechanical systems are designed to meet or exceed the requirements of ASHRAE Standard 62.1-2007 sections 4 through 7 and applicable natural ventilation requirements.

Prerequisite 2: Environmental Tobacco Smoke Control. The entire building and the associated site will be non-smoking. This policy will be enforced through posted signage.

Credit 3: Construction Indoor Air Quality Management Plan – During Construction. In order to promote the comfort and well-being of construction workers and building occupants during construction, the Project team is implementing a Construction Indoor Air Quality Management Plan that meets the following requirements:

- During construction, meet or exceed the recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3).

- Protect stored on-site and installed absorptive materials from moisture damage.

- If permanently installed air handlers are used during construction, filtration media must be used at each return air grille that meets the criteria given in the LEED Reference Guide. Replace all filtration media immediately prior to occupancy.

The Project team will document compliance with this credit during the course of construction.

To promote the health and well-being of installers and building occupants, the Project team will reduce the sources of indoor air contaminants that are odorous, irritating, and/or harmful. The Project team will document compliance with the credit requirements for low-emitting adhesives and sealants, paints and coatings, and flooring systems. Adhesives, sealants, and primers will comply with the South Coast Air Quality Management District (SCAQMD) Rule #1168, effective July 1, 2005 and amended January 7, 2005, for volatile organic compound (VOC) limits. Aerosol adhesives will comply with Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000. Paints and coatings will comply with the following criteria:

- Architectural paints and coatings applied to interior walls and ceilings must not exceed the VOC content limits established in Green Seal Standards GS-11, Paints, 1st Edition, May 20, 1993.

- Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates must not exceed the VOC content limit of 250 g/L established in Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 7, 1997.

- Clear wood finishes, floor coatings, stains, primers, and shellacs applied to interior elements must not exceed the VOC content limits established in SCAQMD Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.

All flooring will comply with the following:

- All carpet and carpet cushion installed in the building interior must meet the testing and produce requirements of the Carpet and Rug Institute Green Label Plus program.

- All carpet adhesive must meet the requirements of IEQ Credit 4.1: Adhesives and Sealants, which includes a VOC limit of 50 g/L.

- All hard surface flooring must be certified as compliant with the FloorScore standard by an independent third-party. This includes vinyl, linoleum, laminate, wood, ceramic, and rubber flooring and wall base.

- Concrete, wood, bamboo, and cork floor finishes such as sealer, stain, and finish must meet the requirements of SCAQMD Rule 1113, Architectural Coatings rules in effect on January 1, 2004.

- Tile setting adhesives and grout must meet the SCAQMD Rule 1168. VOC limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.

Requirements will be communicated to subcontractors, and materials brought to the Project site will be inspected. The products used will be documented.

Credit 5: Indoor Chemical and Pollutant Source Control. To reduce pollutants in the interior of the building, several measures are incorporated into the design for the Project. Entryway systems will capture dirt and particulates entering the building. Janitorial and other spaces where gases or chemicals might be present will be contained and sufficiently exhausted to create negative pressure in the space when doors are closed. New MERV 13 filters on mechanical equipment will be installed prior to occupancy.

Credit 7: Thermal Comfort – Design. The design team will ensure the building systems are designed to meet the requirements of ASHRAE 55-2004 for all applicable mechanically-ventilated regularly occupied spaces.

Innovation and Design Process

The Project team has identified several Innovation and Design credits and strategies; the strategies ultimately chosen for implementation will be determined based on final calculations and decisions made by the design team.

Innovation and Design credits may include an educational outreach program for building occupants and visitors, the implementation of green cleaning standards, cooling tower management, low-mercury lamps, and a pilot credit in Assessment and Planning for Resilience. A point will also be earned through the inclusion of a LEED Accredited Professional on the core Project team.

LEED 2009 for Core and Shell Development

Project Checklist

Parcel Q1

8/11/2016

Y	?	N			
22	4	2	**Sustainable Sites**	**Possible Points:**	**28**
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
2			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	2
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
	1		Credit 9	Tenant Design and Construction Guidelines	1
4	4	2	**Water Efficiency**	**Possible Points:**	**10**
Y			Prereq 1	Water Use Reduction—20% Reduction	
2	2		Credit 1	Water Efficient Landscaping	2 to 4
		2	Credit 2	Innovative Wastewater Technologies	2
2	2		Credit 3	Water Use Reduction	2 to 4
16	14	7	**Energy and Atmosphere**	**Possible Points:**	**37**
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
6	8	7	Credit 1	Optimize Energy Performance	3 to 21
	4		Credit 2	On-Site Renewable Energy	4
2			Credit 3	Enhanced Commissioning	2
2			Credit 4	Enhanced Refrigerant Management	2
3			Credit 5.1	Measurement and Verification—Base Building	3
3			Credit 5.2	Measurement and Verification—Tenant Submetering	3
	2		Credit 6	Green Power	2

Y	?	N			
7		6	**Materials and Resources**	**Possible Points:**	**13**
Y			Prereq 1	Storage and Collection of Recyclables	
		5	Credit 1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 5
2			Credit 2	Construction Waste Management	1 to 2
		1	Credit 3	Materials Reuse	1
2			Credit 4	Recycled Content	1 to 2
2			Credit 5	Regional Materials	1 to 2
1			Credit 6	Certified Wood	1
6	5	1	**Indoor Environmental Quality**	**Possible Points:**	**12**
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	Construction IAQ Management Plan—During Construction	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	Controllability of Systems—Thermal Comfort	1
1			Credit 7	Thermal Comfort—Design	1
	1		Credit 8.1	Daylight and Views—Daylight	1
	1		Credit 8.2	Daylight and Views—Views	1
4	2		**Innovation and Design Process**	**Possible Points:**	**6**
1			Credit 1.1	Innovation in Design: Educational Outreach	1
1			Credit 1.2	Innovation in Design: Green Cleaning	1
1			Credit 1.3	Innovation in Design: Assessment & Planning for Resilience	1
	1		Credit 1.4	Innovation in Design: TBD	1
	1		Credit 1.5	Innovation in Design: Exemplary Performance - TBD	1
1			Credit 2	LEED Accredited Professional	1
2	2		**Regional Priority Credits**	**Possible Points:**	**4**
1			Credit 1.1	Regional Priority: Heat Island Effect - Roof	1
1			Credit 1.2	Regional Priority: Stormwater Design - Quantity Control	1
	1		Credit 1.3	Regional Priority: Heat Island Effect - Non-Roof	1
	1		Credit 1.4	Regional Priority: On-Site Renewable Energy	1
61	31	18	**Total**	**Possible Points:**	**110**

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

Regional Priority

Regional priority points are contingent upon meeting the credit requirements of categories deemed especially significant for the Project location. The Project team has identified the following credits as targets:

Sustainable Sites Credit 6.1: Stormwater Quantity;

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

Sustainable Sites Credit 7.2: Heat Island Effect – Roof

Energy and Atmosphere Credit 2: On-Site Renewable Energy will be evaluated as a potential RP credit.

5.2 Climate Change Resilience

5.2.1 Introduction

Climate change conditions considered by the Project team include sea level rise, higher maximum and mean temperatures, more frequent and longer extreme heat events, more frequent and longer droughts, more severe 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 Climate Change Checklist is included in Appendix E. Given the preliminary level of design, the responses to the Checklist are also preliminary.

5.2.2 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 incorporate a number of measures to minimize the impact of high temperature events, including:

- Planting shade trees around the site;
- Installing a high performance building envelope;

[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.

- Installing higher performance light and controls, including automatic LED lighting control;
- Incorporating energy recovery ventilation; and
- Specifying high albedo roof tops and green roofs to minimize the heat island effect.

5.2.3 Sea Level Rise and Future Storms

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 (SLR) could reach approximately six feet by 2100. As described in "Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Options for the Central Artery" recently released by MassDOT (the "MassDOT Report"), "one of the challenges presented by the wide range of SLR projections is the inability to assign likelihood to any particular [SLR] scenario."[2] To be conservative, in the year 2070, SLR could be as high as approximately four feet, resulting in a mean higher high water (MHHW) level of approximately 15.2 feet Boston City Base (BCB).

Alone, MHHW of approximately 15.2 feet BCB would have no impact on the Project site; however, as shown in the MassDOT Report, combined with storm surge at the right tide, flooding would be anticipated to occur at the Project site.[3] The storms in the Boston area that could create these flood conditions would be Nor'easters and tropical storms. Currently, hurricanes occur less frequently than Nor'easters; however, in the future according to the MassDOT Report, it is anticipated that there will be roughly the same number of tropical storms impacting the Boston area as Nor'easters. In addition, the intensity of storms is anticipated to increase. The risks of each type of storm differ: hurricanes are typically shorter in duration, but are more intense and create a larger storm surge; Nor'easters are longer in duration, but created a smaller storm surge. For this reason, a hurricane would need to impact Boston within a short window to create flooding as shown in the MassDOT Report, while Nor'easters are more likely to create flooding given that they have a higher probability of impacting the area during the rising tide and high tide.

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

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

The MassDOT Report shows that in 2070, the Project site has up to a 50% chance of flooding annually. With the anticipated 2070 100-year flood (1% chance flooding annually), the site would be impacted with flood levels of up to approximately 4.5 feet. Although these impacts are not anticipated until much further in the future, the design team is studying the incorporation of a number of measures to mitigate against flood impacts, including:

- Placing essential mechanical equipment above the future flood level;
- Water-tight utility conduits;
- Wastewater backflow prevention;
- Resilient materials on the first floor that can either withstand flooding or easily be replaced; and
- Potentially allowing for the ground floor to be raised.

If the Project site is inundated in the future, as an office building, it would not be open, and therefore will not be accessible and will not need to have systems that can run the building without grid provided electricity.

5.2.4 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. The Project will be designed to reduce the existing peak rates and volumes of stormwater runoff from the site, and promote runoff recharge to the greatest extent practicable. The Project will include a storage tank to collect stormwater runoff to be used within the building's bathrooms.

5.2.5 Drought Conditions

Although more intense rain storms are predicted, extended periods of drought are also predicted due to climate change. Under the high emissions scenario, the occurrence of droughts lasting one to three months could 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 building will include water conserving fixtures.

5.3 Renewable Energy

The Proponent will evaluate the potential for a roof-mounted solar photovoltaic (PV) system, and the availability of grants and renewables funding. With a total of approximately 20,607 sf of roof area, approximately 13,455 sf would be devoted to the rooftop terrace, amenity space, and mechanical equipment. The remaining 7,152 sf is

being considered for rooftop solar equipment. Additionally, approximately 50% of the remaining space would be set aside for space around the panels, between panels, etc. Therefore, approximately 2,146 sf would be available for rooftop solar. Assuming 12 watts per square foot, this allows for an approximately 26 kW array. In the location proposed, an installation of this solar array equals an annual generation of approximately 34 MW hours. The Proponent will continue to evaluate the feasibility of installing a solar PV array, including financial incentives and considerations of the electrical network and impacts to aviation, as the design develops.

Chapter 6.0

Urban Design

6.0 URBAN DESIGN

6.1 Evolution of Design

The Project team considered several design options for the building and site layout to address program components, urban design drivers (e.g., the site's transitional nature, the building's role as a "gateway", the building's massing in relation to the existing context, etc.), parking requirements, market viability and cost parameters. The following options were critical to the Project's evolution.

Site Constraints

The building's volume and form directly respond to the site's development constraints. The site's triangular geometry, along with the easement associated with the rail line, informed the building's positioning to the northern portion of the site (between the rail line and Channel Street). Dimensionally, this area of the site could accommodate an efficient floor plate for office use, while allowing the remaining portion of the site (to the south of the rail line) to be utilized as public open space. To achieve the desired use areas, the building cantilevers above the rail easement creating efficiencies in the parking and office levels above, while offering a dramatic architectural expression below at the ground level retail spaces. The eastern edge of the building is also angular in its layout in response to the triangular geometry of the site. The building's height is dictated by the Federal Aviation Administration (FAA) height requirements pertinent to this area. The building height was set at 13 floors (with varying floor-to-floor heights to respond to the uses) to achieve the desired program, while maintaining compliance with the FAA regulations.

Urban Design Considerations

The Project site is located in an urban context on the South Boston Waterfront. The proposed development represents a transition point between the Seaport District, the RFMP and the residential areas of South Boston south of the Reserved Channel. The transitional location of the site offers an opportunity for the Project to serve as an urban "gateway" element to mark the entry to the "Drydock District." The Project design was influenced by the distinct characteristics of the District, specifically the historical industrial architectural forms and vernacular. This can be seen at the roof of the building, where a horizontal architectural element frames the outdoor terrace and serves as a visual marker for the building from downtown Boston. The building's ability to serve as a "gateway" is also reinforced through the design of the urban plaza which offers a vibrant and active setting at the district's entrance, as well as the use of the decorative architectural "scrim" at the lower levels of the building which provides a unique and memorable design element at the building's base. The public realm improvements, as well as the positioning of the retail edges, are also intended to generate synergy with the mixed-use development across Drydock Avenue at Parcel A.

Material Expressions

The site offers an opportunity for the building to establish a new design language that celebrates the emergence of the "Drydock District". The design team recognizes that the building's architectural and material expression "belong" to the district, as opposed to that of the neighboring buildings of the Seaport. Inspired by historic industrial architecture, the design team created a façade which was born out of the repetitive "grid" expression of industrial warehouses and manufacturing structures. A modern interpretation of this "grid", which lessens the repetition and introduces variation, serves as the façade expression for the upper levels of the building. At the lower levels, industrial materials such as coreten steel, weathered metals and wood are being considered for the architectural "scrim" and as accent materials at the building's base. See Figures 6-1 to 6-4 for views of the proposed building. The urban plaza will also utilize similar materials that reference the site's industrial nature and offer opportunities for public art to reflect on the site's history. This open space will celebrate the site's relationship with the waterfront as well as the industrial vernacular of the neighborhood. As a whole, this building will introduce a diverse architectural language to the Drydock District.

At the northern edge of the plaza, a portion of the proposed building cantilevers above the rail line and is articulated with an artistic "scrim" at the parking levels. This decorative architectural detail will be comprised of materials that reference the site's industrial influences and will be recalled by elements within the urban plaza. At the ground level, the plaza will provide new trees, plantings and landscaped elements as well as hardscaped areas to support pedestrian gathering space, events and outdoor retail. Figure 6-5 shows the proposed landscape plan.

Parcel Q1 Boston, Massachusetts

Figure 6-1

View from Drydock Avenue

Parcel Q1 Boston, Massachusetts

Figure 6-2

View from Drydock Avenue

Parcel Q1 Boston, Massachusetts

Figure 6-3

View of the Streetscape

Parcel Q1 Boston, Massachusetts

Figure 6-4

View of the Streetscape

Parcel Q1 Boston, Massachusetts

Figure 6-5

Proposed Landscape Plan

Chapter 7.0

Historic and Archaeological Resources

7.0 HISTORIC AND ARCHAEOLOGICAL RESOURCES

7.1 Introduction

The Project site is in the Raymond L. Flynn Marine Park, formerly known as the Boston Marine Industrial Park. The Boston Marine Industrial Park was renamed to honor the legacy of former ambassador and mayor of the City of Boston Raymond L. Flynn in February 2016. The site is bound by Drydock Avenue to the east, Channel Street to the north, and a federally-owned parcel of land to the west. Parcel Q1 is one of two parcels in the RFMP in which proposed development is not limited to either maritime or industrial projects. Currently the site includes approximately 55 surface parking spaces, a dormant rail line, and underutilized open space.

The RFMP was largely created through landfill projects in the 19th and 20th centuries, and has been, and continues to be an important maritime facility in Boston with docks, wharves, and rail access. The majority of the buildings and structures within the RFMP were built between 1914 and the mid-1940s as part of the South Boston Naval Annex and South Boston Army Base, which operated here between 1920 and 1974. These buildings were robust warehouses and processing centers capable of supporting military equipment, vehicles, and ammunition for deployment around the world. By the 1970s, shipping had declined and the United States government closed the annex in 1974. In the 1990s, following the completion of the Central Artery project and the establishment of the MBTA Silver Line connecting downtown Boston to the Reserved Channel, new growth began in this area. Numerous projects over the last 25 years, including residential, hotel, entertainment, and civic projects, have changed the character of the RFMP and the surrounding area. The RFMP today contains a variety of marine-related, industrial, and light industrial businesses, as well as new commercial enterprises and design showrooms.

7.2 Historic Resources in the Project Vicinity

7.2.1 Historic Resources of the Project Site

The Project site is located within the former Boston Army Supply Base area (MHC # BOS.RT) included in the Inventory of Historic and Archaeological Assets of the Commonwealth (Inventory) and determined eligible for listing in the National Register of Historic Places. There are no buildings on the site.

7.2.2 Historic Resources in the Vicinity of the Project Site

The Project site is in the immediate vicinity of several buildings associated with the World War II development phase of the Boston Army Supply Base. Additionally, review of Massachusetts Historical Commission (MHC) files indicates there are three other inventoried historic resources within one-quarter mile of the Project site; specifically, C Street Industrial Area (MHC #BOS.RU); the Summer (L) Street Bridge over the Reserved

Channel (Note: the Summer (L) Street Bridge was replaced by MassDOT in 2003); and the King Terminal (MHC #BOS.RV). The historic resources within one-quarter mile of the Project site are shown in Figure 7-1, Historic Resources, and listed in Table 7-1.

Table 7-1 Historic Resources within and in the Vicinity of the Project Site

No.	Historic Resource	Address	Designation*
1	Boston Army Supply Base Area	South Boston	MHC Inventory, NRDOE
2	Summer (L) Street Bridge over Reserved Channel (no longer extant)	Summer Street	MHC Inventory
3	King Terminal	East First Street, K Street, Summer Street, and Power House Street	MHC Inventory

*Designation Legend
NRDOE Determined eligible for inclusion in the National Register of Historic Places
MHC Inventory Listing

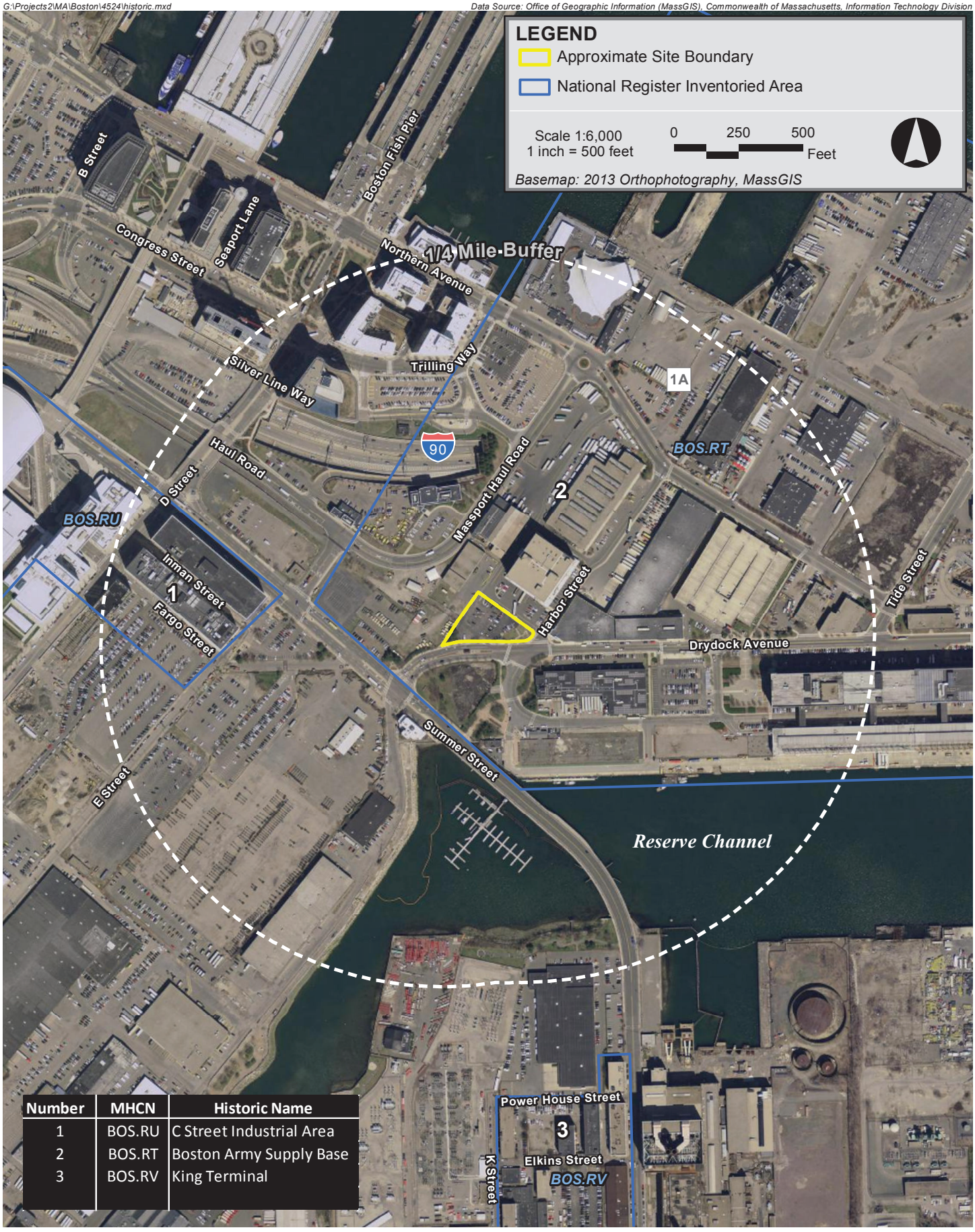
7.3 Archaeological Resources Within the Project Site

The Project site is within filled land that has been previously disturbed by the construction of the Boston Army Supply Base. No previously identified archaeological resources are located within the Project site. No impacts to archaeological resources are expected.

7.4 Impacts to Historic Resources

Although the Project site is within the former Boston Army Supply Base (MHC # BOS.RT) which is included in the Inventory and determined eligible for listing in the National Register of Historic Places, the Project is not anticipated to have adverse visual impacts to the former Boston Army Supply Base. With future development being considered for other areas within the RFMP and elsewhere in the South Boston Waterfront, this Project presents the opportunity to frame the Seaport District and the RFMP beyond. Upon completion, the proposed Project will aid in defining the RFMP's "sense of place" in relation to the nearby South Boston Seaport developments, and by improving the RFMP's connectivity to the adjacent neighborhood. The building has been designed to enhance the pedestrian experience around the site, and to complement the mixed-use development proposed for the adjacent Parcel A. A through-block connection created between the primary entrance accessed from the urban plaza and a secondary entrance on Channel Street will allow pedestrians to walk through the site.

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



Number	MHCN	Historic Name
1	BOS.RU	C Street Industrial Area
2	BOS.RT	Boston Army Supply Base
3	BOS.RV	King Terminal

Parcel Q1 Boston, Massachusetts

Epsilon Associates Inc.

Figure 7-1
Historic Resources Map

7.4.1 Shadow Impacts to Historic Resources

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

As illustrated in the shadow study diagrams (Figures 4.2-1 to 4.2-14), during isolated time periods the Project will cast minimal net new shadow on areas of Drydock Avenue, Massport Haul Road, and Channel Street within the former Boston Army Supply Base. New shadow on two historic resources, Building P-28 and Building 32 within the former Boston Army Supply Base, is limited to new shadow at 9:00 a.m. and 3:00 p.m. on March 21, 9:00 a.m. and 3:00 p.m. on September 21, and 9:00 a.m., 12:00 p.m., and 3:00 p.m. on December 21. For the most part, these historic resources will only have a moving narrow band of new shadow cast upon them. Building P-28, located at 11 Channel Street, was constructed in 1918 as a small one-story, flat-roofed, concrete frame utilitarian structure. Building 32, located at 12 Channel Street, was constructed ca 1940 and 1942. This flat roofed warehouse is nine-stories tall and constructed of reinforced-concrete-frame with brick spandrels and industrial steel windows. The unadorned structure is a typical example of a concrete-frame warehouse building of the period. Net new shadow created on historic resources is limited. The Project will have no significant impacts to historic resources.

7.5 Status of Project Reviews with Historical Agencies

The Project will be subject to State Register Review (950 CMR 71) as a result of the need for a state permit(s) or other state actions. The Proponent will submit a copy of the Environmental Notification Form filed with Executive Office of Energy and Environmental Affairs (EEA) to the MHC to initiate the State Register Review process.

7.5.1 Boston Landmarks Commission Article 80 Review

The submission of this PNF initiates review of the Project by the BLC under the City's Article 80 Review process.

7.5.2 Massachusetts Historical Commission

The MHC has review authority over projects requiring state funding, licensing, permitting and/or approvals that may have direct or indirect impacts to properties listed in the State Register of Historic Places. As stated above, the Proponent will submit a copy of the ENF to be filed with EEA to the MHC to initiate the State Register Review process.

Chapter 8.0

Infrastructure

8.0 INFRASTRUCTURE

8.1 Overview of Utility Services

The Project Site consists of approximately 0.85 acres of land within the City of Boston located in the RFMP. The Project site is situated near the entry of the RFMP on Summer Street. The triangular site is generally bounded by Drydock Avenue to the south, Channel Street to the northeast and Harbor Street to the east. It is adjacent to an industrial property to the northwest and is bisected by an inactive private railroad which starts at Drydock Avenue and runs to the northwest. The general area surrounding the site includes a mix of office and industrial uses.

As shown in Figures 8-1, 8-3 and 8-5, there are existing utilities located in the streets adjacent to the Project site. In Drydock Avenue and Harbor Street, there are existing sanitary sewer, storm drainage, water, gas, electric, and telecommunications lines. There is also separated storm drainage in Channel Street.

Approval of Site Plans and a General Service Application are required from Boston Water and Sewer Commission (BWSC) for the construction and activation of sewer, water, and storm drainage service connections. The sewer and water connections, as well as the Project's stormwater management systems, will be designed in conformance with BWSC's design standards, Requirements for Site Plans, Regulations Governing the Use of Sanitary and Combined Sewers and Storm Drains, and Regulations Governing the Use of the Water Distribution Facilities of the BWSC. The gas, electric and telecommunication utilities will be coordinated with the individual providers.

8.2 Sewer System

8.2.1 Existing Sewer System

BWSC owns, operates, and maintains the sanitary sewer mains in the vicinity of the Project Site. Available record information shows that there are separated sewer mains located in Drydock Avenue and Harbor Street adjacent to the Project site. The sewer in Drydock Avenue is an 18-inch main that flows to the west along the frontage of the site to Summer Street. There are several existing sewer manholes close to the site. Figure 8-1 depicts the existing sanitary sewer system in the vicinity of the site. The sanitary sewer system ultimately flows to the Massachusetts Water Resources Authority's (MWRA's) Deer Island Wastewater Treatment Plant, where it is treated and discharged to Massachusetts Bay. Table 8-1 presents the existing sewer flow capacity of the 18-inch main located in Drydock Avenue.

Table 8-1 Existing Sewer Flow Capacity (Drydock Avenue – 18 inch Main)

Manhole (BWSC Number)	Distance (feet)	Invert Elevation (up)	Invert Elevation (down)	Slope (%)	Diameter (inches)	Manning's Number	Flow Capacity (cfs)	Flow Capacity (MGD)
642 to 490	350	5.60	4.23	0.4	18	0.013	6.64	4.29
490 to 554	300	4.12	3.20	0.3	18	0.013	5.75	3.71
546 to 490	140	7.1	4.23	2.1	8	0.013	1.73	1.12

8.2.2 Project Generated Sanitary Sewer Flow

The Massachusetts Department of Environmental Protection (MassDEP) establishes sewer generation rates for various types of establishments in a section of the State Environmental Code Title V (Title V), 310 CMR 15.203. The Project is expected to produce approximately 16,298 gallons per day (gpd) of sewer flow. Table 8-2 presents the estimated proposed sanitary sewer flows expected to be generated by the Project.

Table 8-2 Proposed Sewer Generation and Water Demand

Use	Approximate Dimension	310 CMR Value (gpd/unit)	Total Flow (gpd)	Approximate Water Demand (gpd)
Office	211,700 sf	75/1,000 sf	15,878	17,466
Retail	8,400 sf	50/1,000 sf	420	462
Total Sewer Generation (gpd)			**16,298**	
Total Sewer Generation (MGD)			**0.016 MGD**	
Total Anticipated Water Demand				**17,928**

In accordance with revisions to 314 CMR 7.00 Sewer Extension and Connection Permitting regulations, promulgated June 20, 2014, the Project is not required to obtain a MassDEP Sewer Connection Permit, therefore the sanitary sewer service connection approval and notification of completion will be through BWSC.

Based on preliminary calculations and discussions with BWSC, sewer and capacity issues are not anticipated in the vicinity of the Project site. The Project's engineer will coordinate with the BWSC on the design and sewer capacity for the Project during the Site Plan Review.

8.2.3 Sanitary Sewer Connection

Due to the program of the Project, one 8-inch sewer service connection to the existing 18-inch BWSC sanitary sewer main in Harbor Street will sufficiently service the proposed development. The proposed connections are expected to be made at the existing 18-inch main near the intersection of Channel Street and Harbor Street. Floor drains from the

loading docks and structured parking will be collected and routed through an approved oil and grease separator prior to discharge into the sanitary sewer system.

The sewer connection will be constructed to minimize effects on adjacent streets, sidewalks, and other areas within the private right-of-way, and will be kept separate from storm drain connections in accordance with BWSC requirements.

8.2.4 Sewer System Mitigation

To minimize indoor water use and wastewater generation, the Project is anticipated to include water conservation measures such as low-flow toilets and urinals, restricted flow faucets, and sensor operated sinks, toilets and urinals.

Since the proposed sewer generation exceeds 15,000 gpd, it is anticipated that the Project will be subject to BWSC inflow and infiltration (I/I) requirements, at a rate of four gallons for every one gallon of new sewer flow, initially calculated at 65,192 gpd. Currently, the BWSC calculates the monetary amount required to fulfill the 4:1 I/I reduction requirement by multiplying the estimated wastewater flow by 4 and then by $2.41. The Proponent will continue to work with BWSC to determine the final payment which will be utilized to fund I/I reduction projects within the city.

8.3 Water System

8.3.1 Existing Water Service

The water distribution systems in the vicinity of the Project site are owned, operated and maintained by BWSC. According to the available record plans, there are high and low pressure water mains near the Project site. There is an existing 16-inch ductile iron (DI) cement lined low pressure water main in Drydock Avenue fronting the Project site on the north side of the street that was built in 1980s. This main transitions to the 12-inch DI cement lined pipe in Harbor Street.

There are two existing fire hydrants off the low pressure main near the Project site. One hydrant is on the north side of Drydock Avenue, and the second is the north side of Channel Avenue. There is also a high pressure main in Drydock Avenue, parallel and to the south of the low pressure main. The high pressure main is a16-inch DI cement lined pipe. BWSC has noted that there have been some corrosion issues within the water mains in the area that will warrant visual inspection prior to connection. The existing water distribution in the vicinity of the Project site is shown on Figure 8-3.

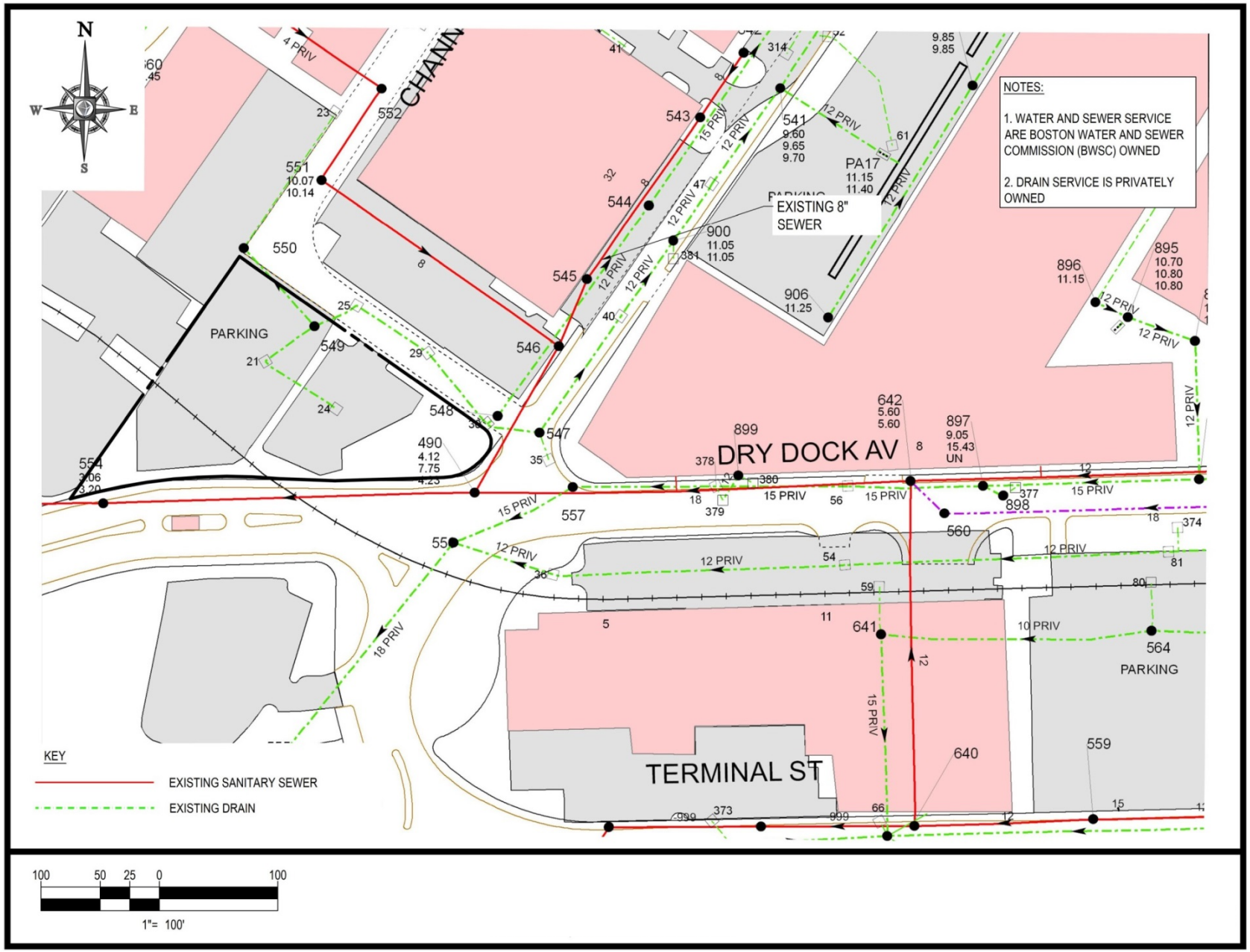


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Figure 8-1

Existing Sanitary Sewer System

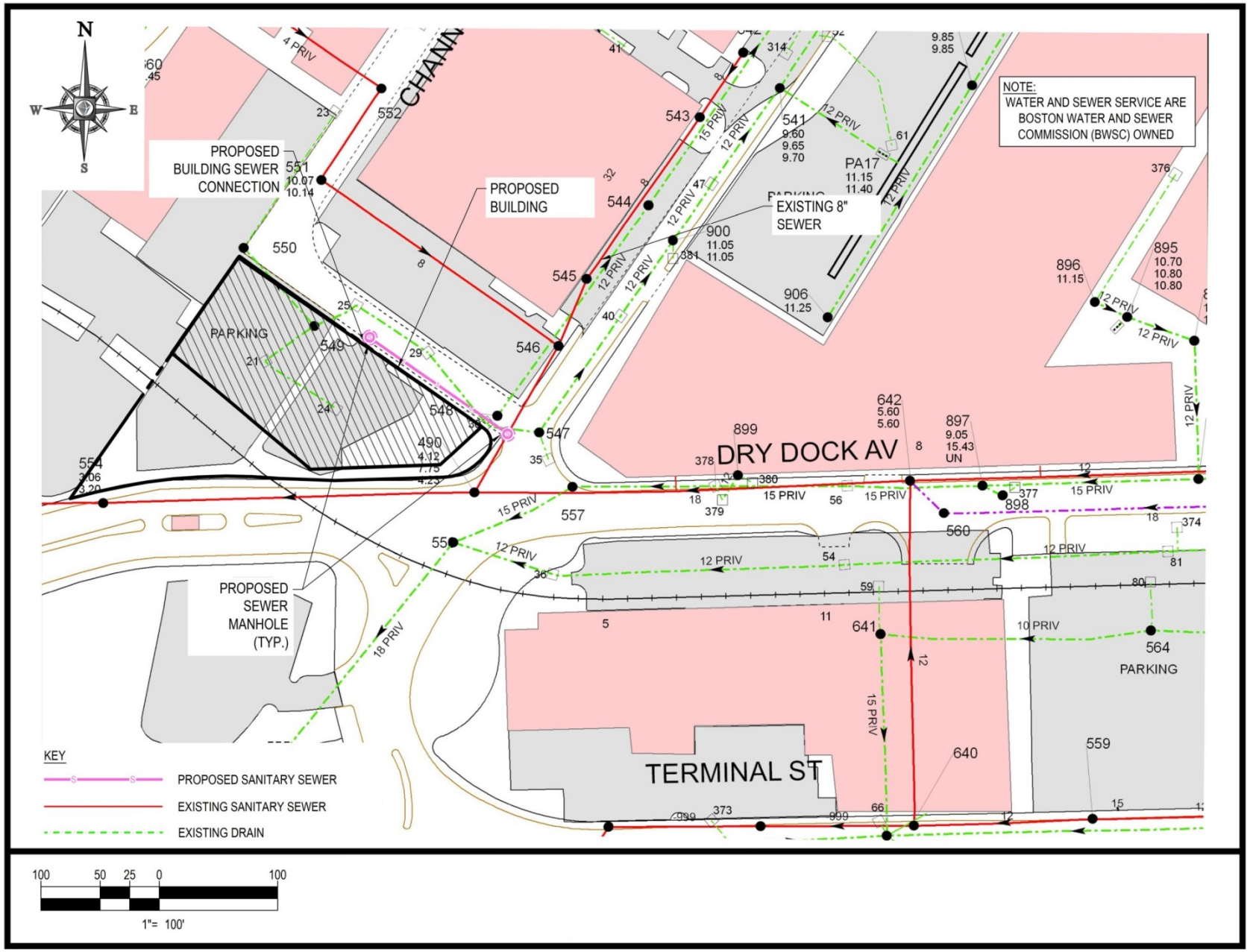

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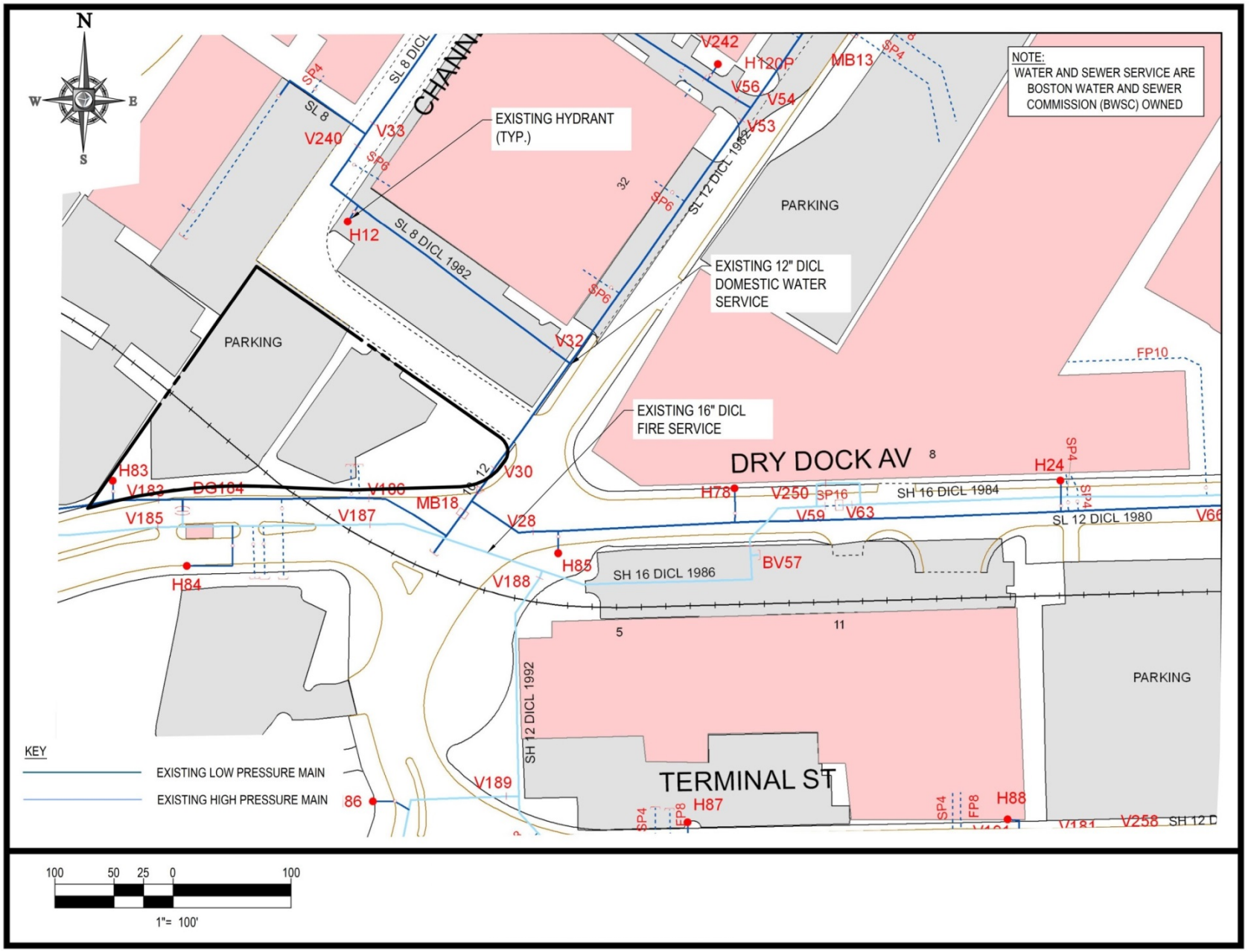
Figure 8-2

Proposed Sanitary Sewer System



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8.3.2 Anticipated Water Consumption

The proposed water demand for the Project is based on the estimated sanitary sewer flow (see Table 8-2) with a factor of 1.1 applied to account for consumption and other losses. Based on this formula, the Project's estimated peak water demand for domestic use is 17,928 gpd. Domestic water will be supplied by the BWSC water system.

Based on initial discussions with BWSC, there are no expected water capacity problems in the vicinity of the Project site, which will be confirmed via flow testing by BWSC prior to the completion of design. The Project's engineer will coordinate water demand and availability with BWSC during the Site Plan Review process to ensure the Project's needs are met while maintaining adequate water flows to the surrounding neighborhood.

8.3.3 Proposed Water Service

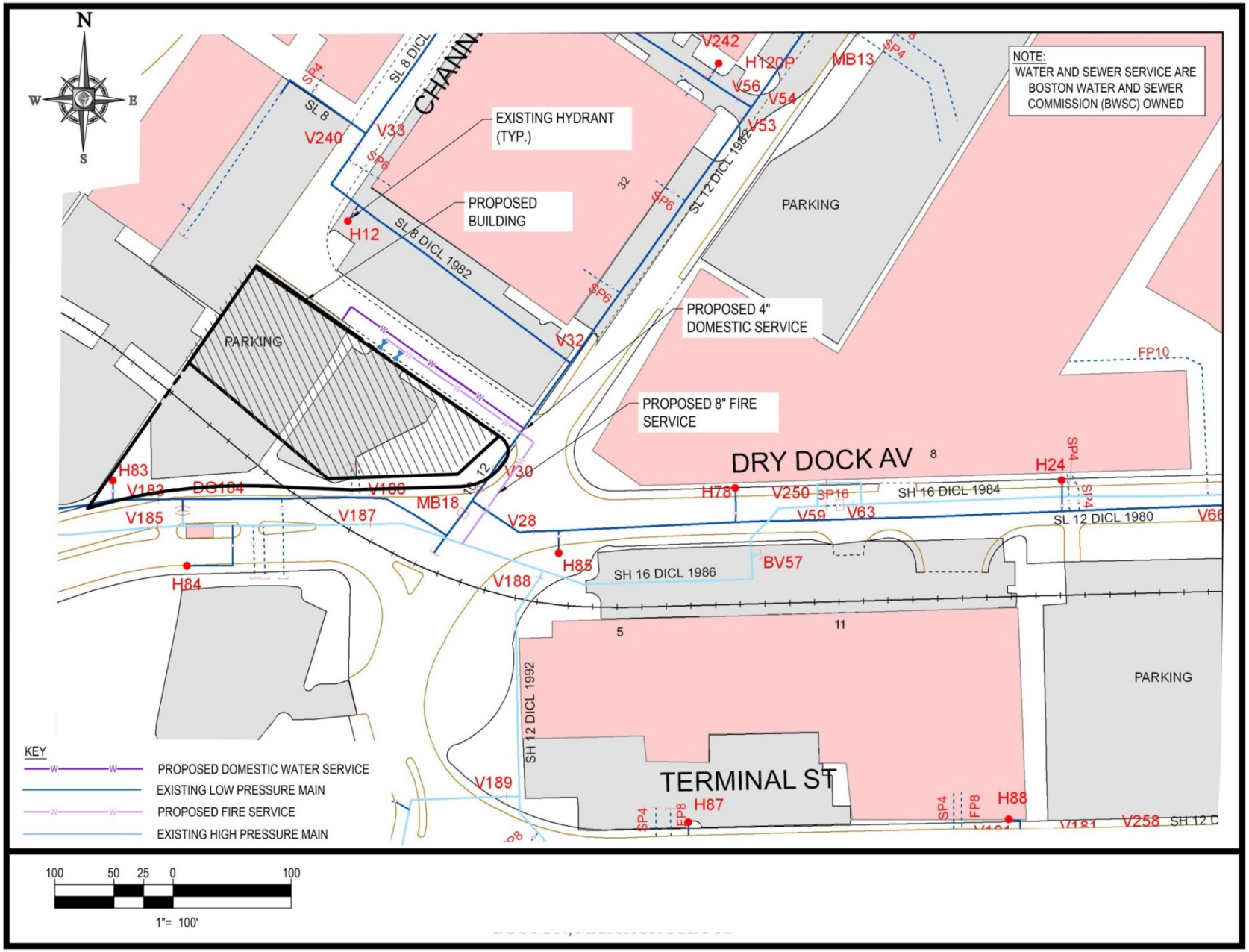
It is anticipated that the Project will be served by a single domestic service connection to the low pressure main in Drydock Avenue. This domestic service connection will tie into the water room on Channel Street (see Figure 8-4). The water main will be metered in accordance with BWSC requirements, including the installation of meter transmission units (MTUs) to comply with BWSC's automatic meter reading system. Appropriate gate valves and backflow prevention devices will also be installed to prevent potential backflow of non-potable water or other contaminants into the public water supply. Per discussions with BWSC, new service pipes will be designed to minimize impacts from corrosion.

Due to the size of the Project, it is anticipated that the building will also be served by two fire service connections that will connect to the high pressure main in Drydock Avenue. If required, the Project will include internal booster pumps to ensure adequate water pressure to all standpipes and sprinkler systems. Final locations and adequacy of the sprinkler systems will be coordinated with the Boston Fire Department Fire Prevention Division. The existing fire hydrants in the vicinity of the Project site are anticipated to be adequate for the Project.

The proposed water system is based on early schematic designs and will be refined as the Project design advances. During the BWSC Site Plan Review process, final sizing of domestic and fire protection service connections will be identified, along with water meter sizing, backflow prevention devices, and locations of fire protection connections.

8.3.4 Water Supply Conservation and Mitigation

As described in Chapter 5, the Project is targeting the Gold level under the LEED-CS rating system. Various water conservation measures such as low-flow toilets and urinals, restricted flow faucets and sensor operated sinks, toilets, and urinals may be incorporated into the Project design. Specific water conservation measures to be included in the Project will be elaborated upon as the building design develops.



Parcel Q1 Boston, Massachusetts

BOHLER ENGINEERING

Figure 8-4

Proposed Water System

8.4 Storm Drainage System

8.4.1 Existing Storm Drainage System

The RFMP owns, operates and maintains the separated storm sewer mains in the vicinity of the Project site. Available records show that there is an existing 12-inch main flowing northeast in Drydock Avenue and an existing 15-inch main flowing to the southwest in Harbor Street. The storm drainage system ultimately discharges to Boston Harbor.

The existing Project site is covered by a combination of parking lots, sidewalks and grassed areas. Stormwater runoff from the parking lots on the north side of the railroad tracks appear to collect stormwater runoff in two onsite catch basins and then discharge to Channel Street. The parking lot on the south side of the railroad tracks appears to flow toward Drydock Avenue. The existing drainage system in the vicinity of the Project site is shown in Figure 8-5.

8.4.2 Proposed Storm Drainage System

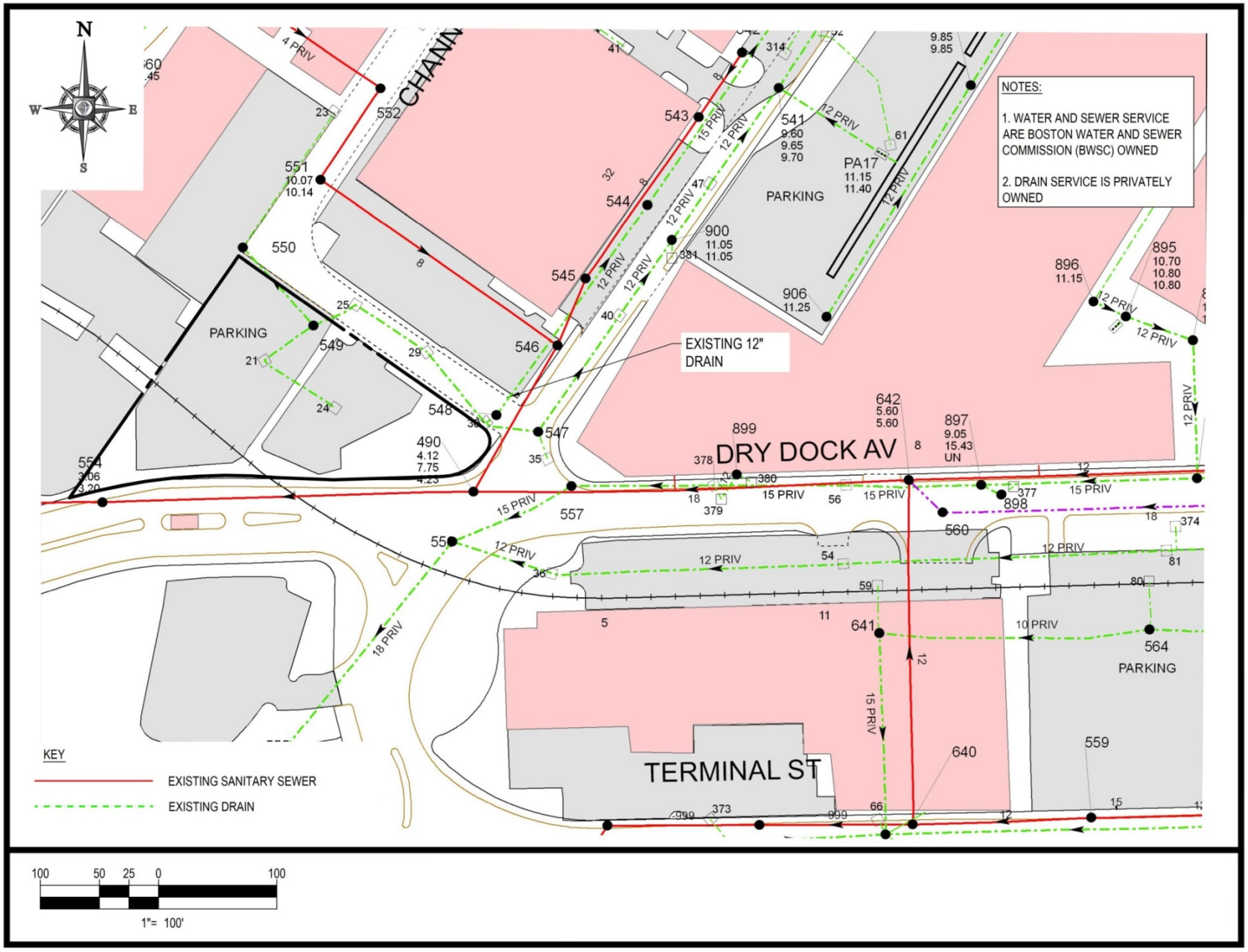
Stormwater runoff from the Project will be collected and treated, as necessary, onsite and then will be routed to infiltration systems to the maximum extent practicable in an effort to reduce the impact on the surrounding drainage system (see Figure 8-6). Overflow from the underground infiltration areas due to larger, less frequent storm events will be routed to the RFMP drainage system.

The drainage system will be designed with the intent of maintaining general pre-development drainage patterns at the Project site. It is currently anticipated that the site will incorporate one drain pipe connection to the storm main in Channel Street.

The Project will incorporate stormwater best management practices (BMPs) to improve the quality of stormwater runoff discharged from the Project site, to promote infiltration to groundwater, and to reduce the peak flows to be at or below existing levels. Specific BMPs proposed for the Project will be described in more detail in the Site Plan application to BWSC.

8.4.3 Groundwater Conservation Overlay District

The Project site does not fall within the City's defined Groundwater Conservation Overlay District. The proposed stormwater management system will be designed to comply with BWSC design requirements.

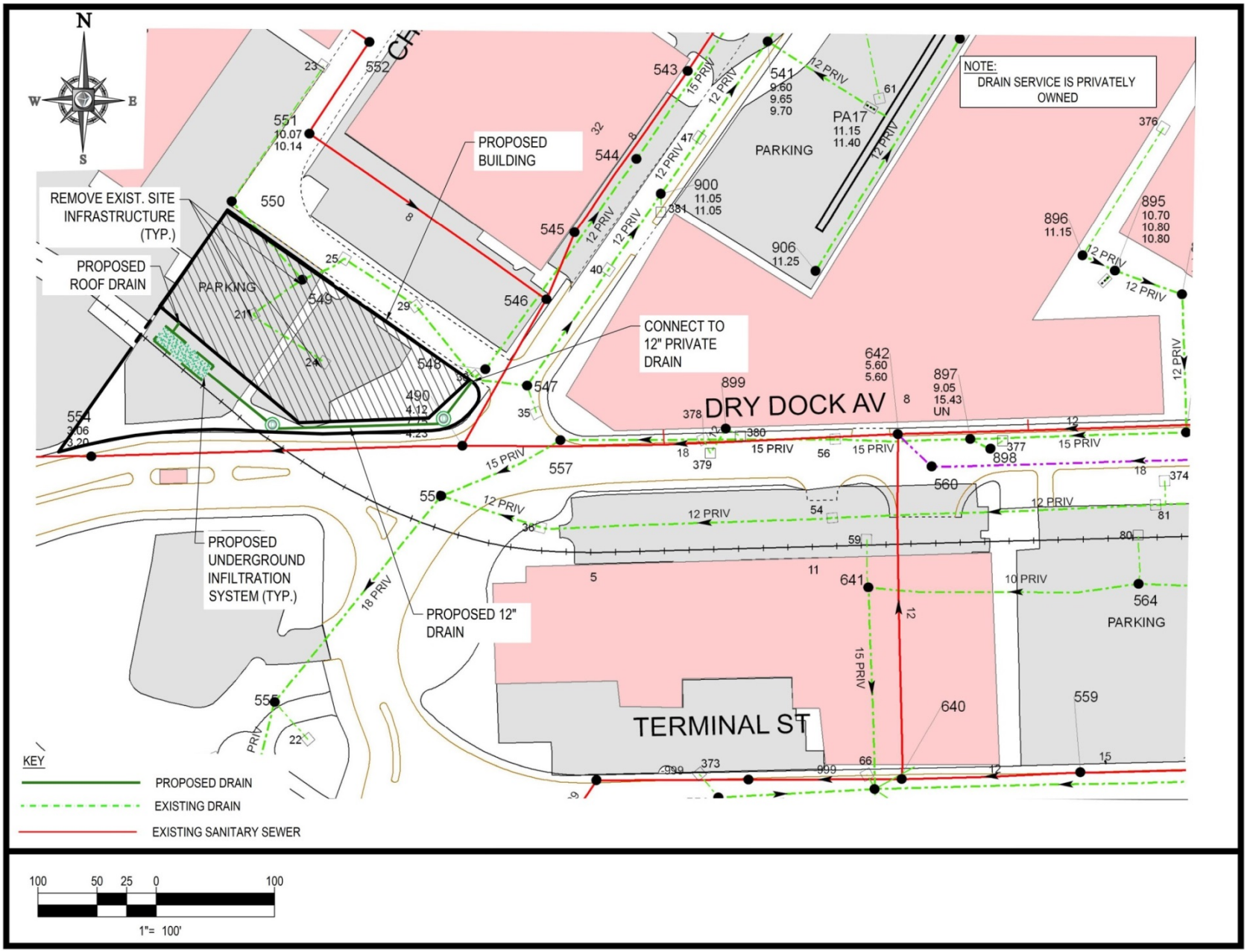


Parcel Q1 Boston, Massachusetts

BOHLER ENGINEERING

Figure 8-5

Existing Drainage System



Parcel Q1 Boston, Massachusetts

BOHLER ENGINEERING

Figure 8-6

Proposed Drainage System

8.4.4 State Stormwater Standards

The Project will comply with MassDEP's Stormwater Management Regulations as described below.

Standard #1 - New Stormwater Conveyances

The Project will comply with this Standard. No new outfalls are proposed.

Standard #2 – Stormwater Runoff Rates

The Project will comply with this Standard. Post development peak discharge rates from the Project site will be at or below existing peak discharge rates for each of the analyzed storm events.

Standard 3 – Groundwater Recharge

The Project will comply with this Standard to the maximum extent practicable. The site does not fall within the City's defined Groundwater Conservation Overlay District. The proposed stormwater management system will be designed to comply with BWSC design requirements.

Standard 4 – Water Quality

The Project will comply with this Standard to the maximum extent practicable. The proposed development consists of building roof, sidewalks, and a park. Efforts will be made to preserve existing trees and vegetation to the maximum extent practicable. As necessary, stormwater runoff will be appropriately treated prior to discharge to the BWSC storm drainage system.

Standard 5 – Land Uses With Higher Potential Pollutant Loads (LUHPPL)

The Project will comply with this Standard. The Project is not associated with Higher Potential Pollutant Loads.

Standard 6 – Stormwater Discharges to a Critical Area

The Project is not subject to Standard 6. The Project will not discharge untreated stormwater to any Critical Areas as defined by MassDEP's Massachusetts Stormwater Handbook or any other area.

Standard 7 – Redevelopment Project

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

Standard 8 – Sedimentation and Erosion Control Plan

The Project will comply with this Standard. Site appropriate sedimentation and erosion controls will be included in the final design documents and implemented during construction.

Standard 9 – Long Term Operation and Maintenance Plan

The Project will comply with this Standard. A long-term operation and maintenance plan will be prepared as part of the final design documents.

Standard 10 –Illicit Discharges to the Stormwater Management System are prohibited

The Project will comply with this Standard. There are no known illicit discharges to the proposed Stormwater Management System.

8.5 Electrical Service

The Project site is served by existing underground electric distribution lines located adjacent to the Project site in Drydock Avenue, Harbor Street and Channel Street. There is 3-phase available for the Project, and it is expected that duct bank would run to the site from one of two existing manholes near the site on Drydock Avenue and Harbor Street. The Proponent will work with Eversource to confirm the system has adequate capacity to support the proposed building demands as the Project design advances.

8.6 Telecommunications Systems

Existing telecommunication systems are located in the vicinity of the Project site. The Proponent will work with each provider to determine the appropriate services and connection locations to support the proposed development.

8.7 Gas Systems

National Grid owns and maintains the gas distribution system in the vicinity of the Project site. The Proponent will work with National Grid to confirm the system has adequate capacity as the Project design advances.

8.8 Utility Protection During Construction

The contractor will notify utility companies and call "Dig-Safe" prior to excavation. During construction, infrastructure will be protected using sheeting and shoring, temporary relocations and construction staging as required. The construction contractor will be required to coordinate all protection measures, temporary supports, and temporary shutdowns of all utilities with the appropriate utility owners and/or agencies. The construction contractor will also be required to provide adequate notification to the utility

owner prior to any work commencing on their utility. Also, in the event a utility cannot be maintained in service during switch over to a temporary or permanent system, the construction contractor will be required to coordinate the shutdown with the utility owners and Project abutters to minimize impacts and inconveniences.

Chapter 9.0

Coordination With Other Governmental Agencies

9.0 COORDINATION WITH OTHER GOVERNMENTAL AGENCIES

9.1 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. See Appendix F for the Accessibility Checklist.

9.2 Massachusetts Environmental Policy Act

It is anticipated that the Project will be required to be reviewed under the Massachusetts Environmental Policy Act (MEPA) Office of the Massachusetts Executive Office of Energy and Environmental Affairs. The site will be leased from the BRA/EDIC, which is a state action, and the Project is anticipated to exceed a review threshold related to transportation. The Project will proceed with review under MEPA following the submission of this PNF.

9.3 Massachusetts Historical Commission

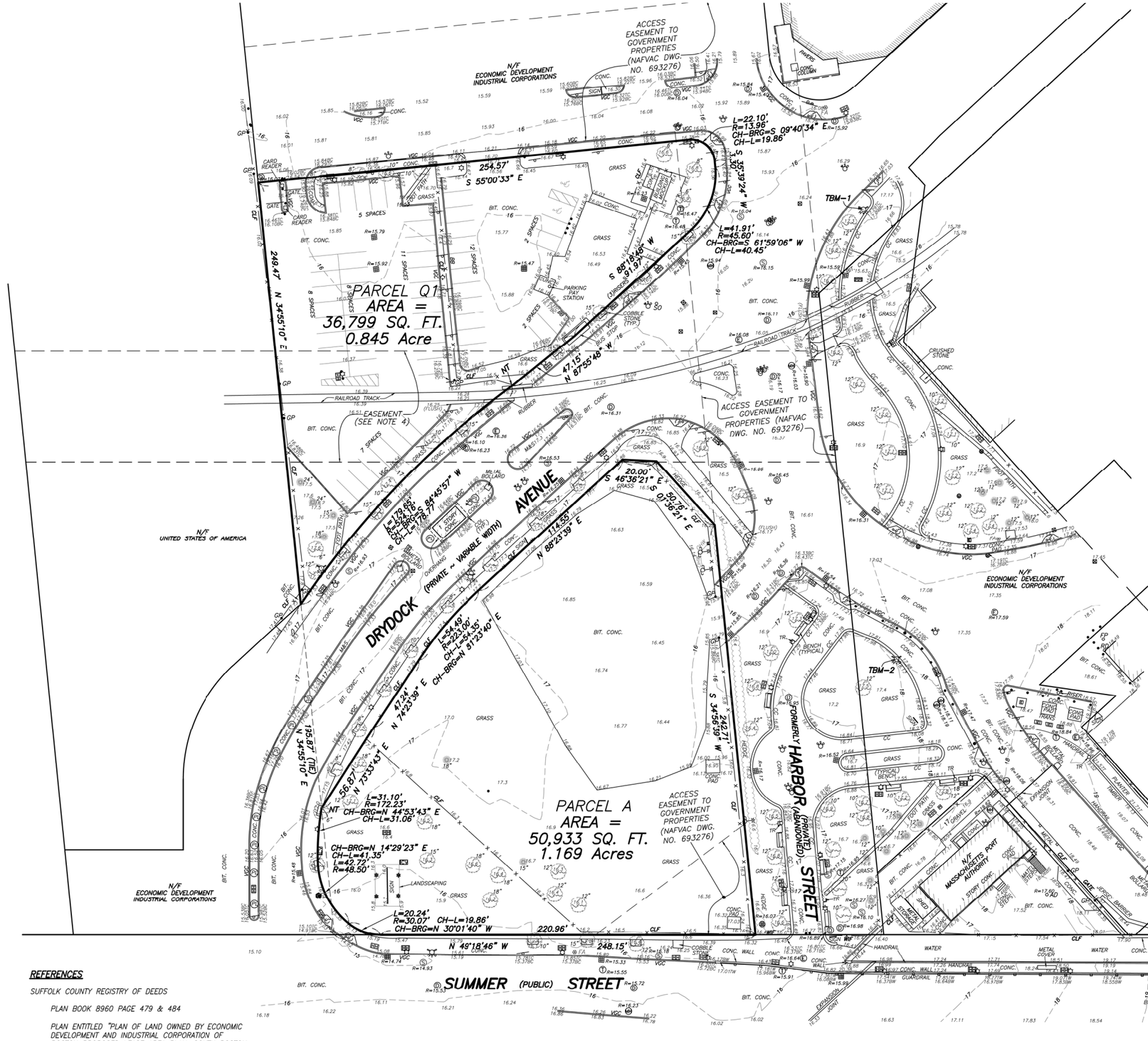
The MHC has review authority over projects requiring state funding, licensing, permitting and/or approvals that may have direct or indirect impacts to properties listed in the State Register of Historic Places. The Proponent will submit a copy of MEPA documentation to be filed with EEA to the MHC to initiate the State Register Review process.

9.4 Boston Civic Design Commission

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

Appendix A

Site Survey



LEGEND

- OBSERVATION WELL
- SEWER MANHOLE
- DRAIN MANHOLE
- ELECTRIC MANHOLE
- TELEPHONE MANHOLE
- MANHOLE
- HYDRANT
- WATER SHUT OFF
- GAS SHUT OFF
- SO SHUT OFF (UNKNOWN)
- BOSTON WATER VALVE
- CATCH BASIN
- ROUND CATCH BASIN
- TRAFFIC SIGNAL
- LIGHT POLE
- BOLLARD
- UTILITY POLE W/ LIGHT
- SIGN
- AD AREA DRAIN
- ELECTRIC HANDHOLE
- ELECTRIC METER
- HANDICAP PARKING SPACE
- DECIDUOUS TREE
- CONIFEROUS TREE
- HANDICAP RAMP
- GP GATE POST
- IRCV IRRIGATION CONTROL VALVE
- CURB RETURN
- FA FIRE ALARM
- FP FLAG POLE
- TBM TEMPORARY BENCH MARK
- N/F NOW OR FORMERLY
- VGC VERTICAL GRANITE CURB
- BB BIT. CONC. BERM
- CC CONCRETE CURB
- CLF CHAIN LINK FENCE
- WIF WROUGHT IRON FENCE
- BIT BITUMINOUS
- CONC CONCRETE
- T TOP
- B BOTTOM
- TS TOP OF STEPS
- BS BOTTOM OF STEPS
- TW TOP OF WALL
- BW BOTTOM OF WALL
- TC TOP OF CURB
- BC BOTTOM OF CURB
- SQ. FT. SQUARE FEET
- M&S MULCH & SHRUBS
- R= RADIUS OR RIM ELEVATION
- L= LENGTH
- CH-BRG CHORD BEARING
- CH-L CHORD LENGTH
- PL PLANTER
- COL. COLUMN
- TYP. TYPICAL
- TR TRASH CAN
- —X——X— METAL FENCE
- ——OHW—— OVERHEAD WIRES

NOTES:

1) BENCH MARK INFORMATION:

   BENCH MARK USED:

   CENTRAL ARTERY DISK "ARTERY–70" LOCATED IN THE CONCRETE SIDEWALK ON THE WESTERN SIDE OF DRY DOCK AVENUE NEAR THE INTERSECTION WITH TIDE STREET AND OPPOSITE SECTION D OF THE BOSTON DESIGN CENTER.
   ELEVATION = 110.62 (CA/T DATUM)
   = 16.27 (B.C.B.)

   TEMPORARY BENCH MARKS SET:

   TBM–1: X–CUT ON BOLT OVER MAIN OUTLET ON HYDRANT LOCATED AT THE SOUTHERLY SIDE OF DRYDOCK AVENUE, AS SHOWN HEREON. ELEVATION = 19.36 (B.C.B.)

   TBM–2: X–CUT ON LEFT BOLT OVER MAIN OUTLET OF HYDRANT LOCATED AT THE SOUTHEASTERLY SIDE OF FORMERLY HARBOR STREET, AS SHOWN HEREON.
   ELEVATION = 19.83 (B.C.B.)

2) ELEVATIONS REFER TO BOSTON CITY BASE.

3) CONTOUR INTERVAL EQUALS ONE (1) FOOT.

4) EASEMENT SHOWN ON PLAN ENTITLED "BOSTON MARINE INDUSTRIAL PARK, LEASE OF PROPERTY, ECONOMIC DEVELOPMENT AND INDUSTRIAL CORPORATION OF BOSTON TO MASSACHUSETTS", DATED 11–7–1979, REVISED ON 5–22–1980, PREPARED BY MASSACHUSETTS PORT AUTHORITY.

5) THIS DOCUMENT IS AN INSTRUMENT OF SERVICE OF FELDMAN LAND SURVEYORS ISSUED TO OUR CLIENT FOR PURPOSES RELATED DIRECTLY AND SOLELY TO FELDMAN LAND SURVEYORS' SCOPE OF SERVICES UNDER CONTRACT TO OUR CLIENT FOR THIS PROJECT. ANY USE OR REUSE OF THIS DOCUMENT FOR ANY REASON BY ANY PARTY FOR PURPOSES UNRELATED DIRECTLY AND SOLELY TO SAID CONTRACT SHALL BE AT THE USER'S SOLE AND EXCLUSIVE RISK AND LIABILITY, INCLUDING LIABILITY FOR VIOLATION OF COPYRIGHT LAWS, UNLESS WRITTEN CONSENT IS PROVIDED BY FELDMAN LAND SURVEYORS.

I CERTIFY THAT THIS PLAN IS BASED ON AN ACTUAL FIELD SURVEY AND THE LATEST PLANS OF RECORD.

ROBERT G. APPLEGATE, PLS (MA# 28514) DATE

REFERENCES

SUFFOLK COUNTY REGISTRY OF DEEDS

PLAN BOOK 8960 PAGE 479 & 484

PLAN ENTITLED "PLAN OF LAND OWNED BY ECONOMIC DEVELOPMENT AND INDUSTRIAL CORPORATION OF BOSTON PROPOSED LEASE AREA PLAN, SOUTH BOSTON, MASSACHUSETTS, SUFFOLK COUNTY", DATED 3–9–94, PREPARED BY STORCH ASSOCIATES.

PLAN ENTITLED "BOSTON MARINE INDUSTRIAL PARK, LEASE OF PROPERTY, ECONOMIC DEVELOPMENT AND INDUSTRIAL CORPORATION OF BOSTON TO MASSACHUSETTS", DATED 11–7–1979, PREPARED BY MASSACHUSETTS PORT AUTHORITY.

TOPOGRAPHIC PLAN OF LAND
PARCELS A AND Q–1
OWNED BY
THE ECONOMIC DEVELOPMENT AND INDUSTRIAL CORPORATION
(SUMMER STREET/ DRYDOCK AVENUE)
BOSTON, MASS.

SCALE: 1"=30' JULY 11, 2014

30 0 15 30 60 120

FELDMAN LAND SURVEYORS
112 SHAWMUT AVENUE PHONE: (617)357–9740
BOSTON, MASS. 02118 www.feldmansurveyors.com
FELDMAN LAND SURVEYORS

RESEARCH SMD	FIELD CHIEF FS	PROJ MGR SMD	APPROVED	SHEET NO. 1 OF 1
CALC GL	CADD GL	FIELD CHECKED	CRD FILE 14267	JOB NO. 14267

FILENAME: S:\PROJECTS\14200s\14267\DWG\14267.dwg

Appendix B

Transportation

Transportation Appendix is Available Upon Request

Appendix C

Wind

Table 1: Mean Speed and Effective Gust 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	10		Sitting	15		Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	9		Sitting	13		Acceptable
		Winter	9		Sitting	14		Acceptable
		Annual	9		Sitting	13		Acceptable
	B	Spring	10		Sitting	15		Acceptable
		Summer	7		Sitting	10		Acceptable
		Fall	9		Sitting	13		Acceptable
		Winter	10	11%	Sitting	14		Acceptable
		Annual	9		Sitting	13		Acceptable
2	A	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	11		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	11		Sitting	16		Acceptable
	B	Spring	12		Sitting	17		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	11		Sitting	16		Acceptable
		Winter	11		Sitting	16		Acceptable
		Annual	11		Sitting	16		Acceptable
3	A	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
	B	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
4	A	Spring	15		Standing	21		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	16		Walking	22		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	15		Standing	21		Acceptable

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

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

Table 1: Mean Speed and Effective Gust 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	19		Walking	27		Acceptable
		Summer	15		Standing	22		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	18		Walking	26		Acceptable
	B	Spring	21		Uncomfortable	29		Acceptable
		Summer	18	20%	Walking	25	14%	Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	19		Walking	27		Acceptable
6	A	Spring	21		Uncomfortable	29		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	23		Uncomfortable	31		Acceptable
		Annual	20		Uncomfortable	28		Acceptable
	B	Spring	23		Uncomfortable	31		Acceptable
		Summer	18	13%	Walking	24		Acceptable
		Fall	22	16%	Uncomfortable	29		Acceptable
		Winter	25		Uncomfortable	33		Unacceptable
		Annual	23	15%	Uncomfortable	30		Acceptable
7	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	16	23%	Walking	22		Acceptable
		Summer	12	20%	Sitting	17	13%	Acceptable
		Fall	15	25%	Standing	21	17%	Acceptable
		Winter	16	23%	Walking	23		Acceptable
		Annual	15	25%	Standing	22	16%	Acceptable
8	A	Spring	16		Walking	24		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	15		Standing	24		Acceptable
	B	Spring	17		Walking	25		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16	14%	Walking	23		Acceptable
		Winter	19	12%	Walking	28		Acceptable
		Annual	17	13%	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
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: Mean Speed and Effective Gust 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	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	10	-17%	Sitting	15	-17%	Acceptable
		Summer	8	-11%	Sitting	12	-14%	Acceptable
		Fall	9	-18%	Sitting	15	-12%	Acceptable
		Winter	11		Sitting	16	-16%	Acceptable
		Annual	10		Sitting	15	-17%	Acceptable
10	A	Spring	23		Uncomfortable	31		Acceptable
		Summer	18		Walking	25		Acceptable
		Fall	21		Uncomfortable	29		Acceptable
		Winter	23		Uncomfortable	32		Unacceptable
		Annual	21		Uncomfortable	30		Acceptable
	B	Spring	19	-17%	Walking	28		Acceptable
		Summer	15	-17%	Standing	22	-12%	Acceptable
		Fall	18	-14%	Walking	27		Acceptable
		Winter	19	-17%	Walking	29		Acceptable
		Annual	18	-14%	Walking	27		Acceptable
11	A	Spring	10		Sitting	17		Acceptable
		Summer	8		Sitting	15		Acceptable
		Fall	9		Sitting	16		Acceptable
		Winter	10		Sitting	18		Acceptable
		Annual	10		Sitting	17		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	8		Sitting	14		Acceptable
		Fall	10	11%	Sitting	17		Acceptable
		Winter	11		Sitting	19		Acceptable
		Annual	10		Sitting	17		Acceptable
12	A	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	19		Walking	26		Acceptable
		Annual	17		Walking	23		Acceptable
	B	Spring	18		Walking	27	13%	Acceptable
		Summer	16	14%	Walking	23	15%	Acceptable
		Fall	17		Walking	25	14%	Acceptable
		Winter	18		Walking	29	12%	Acceptable
		Annual	17		Walking	27	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: Mean Speed and Effective Gust 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	18		Walking	26		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	20		Uncomfortable	29		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	20	11%	Uncomfortable	27		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	22		Uncomfortable	30		Acceptable
		Annual	19		Walking	27		Acceptable
14	A	Spring	15		Standing	22		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
15	A	Spring	12		Sitting	21		Acceptable
		Summer	11		Sitting	20		Acceptable
		Fall	12		Sitting	21		Acceptable
		Winter	13		Standing	23		Acceptable
		Annual	12		Sitting	21		Acceptable
	B	Spring	13		Standing	21		Acceptable
		Summer	12		Sitting	20		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	14		Standing	23		Acceptable
		Annual	13		Standing	21		Acceptable
16	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	17		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	17		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: Mean Speed and Effective Gust 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	11		Sitting	17		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	10		Sitting	15	-12%	Acceptable
		Summer	8		Sitting	12		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	11		Sitting	16		Acceptable
		Annual	10		Sitting	15		Acceptable
18	A	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	16		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13	-13%	Standing	19		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
19	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
20	A	Spring	17		Walking	24		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	15	-12%	Standing	23		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	15		Standing	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: Mean Speed and Effective Gust 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	16		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	15		Standing	22		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
22	A	Spring	23		Uncomfortable	30		Acceptable
		Summer	19		Walking	26		Acceptable
		Fall	22		Uncomfortable	29		Acceptable
		Winter	25		Uncomfortable	33		Unacceptable
		Annual	23		Uncomfortable	30		Acceptable
	B	Spring	23		Uncomfortable	30		Acceptable
		Summer	19		Walking	25		Acceptable
		Fall	22		Uncomfortable	29		Acceptable
		Winter	25		Uncomfortable	33		Unacceptable
		Annual	23		Uncomfortable	30		Acceptable
23	A	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	19		Walking	26		Acceptable
		Annual	17		Walking	23		Acceptable
	B	Spring	17		Walking	23		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	17		Walking	23		Acceptable
24	A	Spring	19		Walking	26		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	20		Uncomfortable	26		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	19		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
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: Mean Speed and Effective Gust 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	19		Walking	26		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	19		Walking	26		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	18		Walking	25		Acceptable
26	A	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	17		Walking	23		Acceptable
	B	Spring	18		Walking	24		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
27	A	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
28	A	Spring	17		Walking	25		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	16		Walking	24		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable

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

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: Mean Speed and Effective Gust 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	17		Walking	25		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	16		Walking	24		Acceptable
	B	Spring	15	-12%	Standing	23		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	14	-13%	Standing	22		Acceptable
		Winter	16	-11%	Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
30	A	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	24		Acceptable
		Annual	14		Standing	22		Acceptable
31	A	Spring	20		Uncomfortable	28		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	20		Uncomfortable	29		Acceptable
		Annual	19		Walking	27		Acceptable
	B	Spring	17	-15%	Walking	25		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16	-16%	Walking	24	-11%	Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	16	-16%	Walking	24	-11%	Acceptable
32	A	Spring	19		Walking	27		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	18		Walking	26		Acceptable
	B	Spring	16	-16%	Walking	23	-15%	Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15	-17%	Standing	22	-12%	Acceptable
		Winter	17	-15%	Walking	25		Acceptable
		Annual	16	-11%	Walking	23	-12%	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: Mean Speed and Effective Gust 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	21		Uncomfortable	30		Acceptable
		Summer	17		Walking	23		Acceptable
		Fall	19		Walking	28		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	20		Uncomfortable	28		Acceptable
	B	Spring	21		Uncomfortable	29		Acceptable
		Summer	17		Walking	23		Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	21		Uncomfortable	29		Acceptable
		Annual	20		Uncomfortable	27		Acceptable
34	A	Spring	21		Uncomfortable	30		Acceptable
		Summer	17		Walking	24		Acceptable
		Fall	19		Walking	28		Acceptable
		Winter	21		Uncomfortable	31		Acceptable
		Annual	20		Uncomfortable	29		Acceptable
	B	Spring	24	14%	Uncomfortable	33		Unacceptable
		Summer	19	12%	Walking	26		Acceptable
		Fall	23	21%	Uncomfortable	30		Acceptable
		Winter	25	19%	Uncomfortable	33		Unacceptable
		Annual	23	15%	Uncomfortable	31		Acceptable
35	A	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	21		Uncomfortable	28		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	18		Walking	26		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	18		Walking	25		Acceptable
36	A	Spring	19		Walking	29		Acceptable
		Summer	15		Standing	23		Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	19		Walking	28		Acceptable
	B	Spring	19		Walking	28		Acceptable
		Summer	17	13%	Walking	23		Acceptable
		Fall	19		Walking	26		Acceptable
		Winter	20		Uncomfortable	29		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		

Table 1: Mean Speed and Effective Gust 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	23		Uncomfortable	32		Unacceptable
		Summer	18		Walking	27		Acceptable
		Fall	21		Uncomfortable	30		Acceptable
		Winter	23		Uncomfortable	33		Unacceptable
		Annual	22		Uncomfortable	31		Acceptable
	B	Spring	20	-13%	Uncomfortable	29		Acceptable
		Summer	17		Walking	25		Acceptable
		Fall	18	-14%	Walking	27		Acceptable
		Winter	20	-13%	Uncomfortable	29	-12%	Acceptable
		Annual	19	-14%	Walking	28		Acceptable
38	A	Spring	22		Uncomfortable	30		Acceptable
		Summer	16		Walking	23		Acceptable
		Fall	20		Uncomfortable	28		Acceptable
		Winter	24		Uncomfortable	33		Unacceptable
		Annual	21		Uncomfortable	30		Acceptable
	B	Spring	21		Uncomfortable	29		Acceptable
		Summer	18	13%	Walking	25		Acceptable
		Fall	20		Uncomfortable	28		Acceptable
		Winter	23		Uncomfortable	31		Acceptable
		Annual	21		Uncomfortable	29		Acceptable
39	A	Spring	21		Uncomfortable	29		Acceptable
		Summer	17		Walking	23		Acceptable
		Fall	20		Uncomfortable	28		Acceptable
		Winter	23		Uncomfortable	32		Unacceptable
		Annual	21		Uncomfortable	29		Acceptable
	B	Spring	22		Uncomfortable	30		Acceptable
		Summer	18		Walking	24		Acceptable
		Fall	22		Uncomfortable	29		Acceptable
		Winter	24		Uncomfortable	31		Acceptable
		Annual	22		Uncomfortable	29		Acceptable
40	A	Spring	20		Uncomfortable	29		Acceptable
		Summer	15		Standing	22		Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	19		Walking	28		Acceptable
	B	Spring	15	-25%	Standing	23	-21%	Acceptable
		Summer	12	-20%	Sitting	18	-18%	Acceptable
		Fall	15	-21%	Standing	22	-19%	Acceptable
		Winter	17	-19%	Walking	25	-17%	Acceptable
		Annual	15	-21%	Standing	23	-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: Mean Speed and Effective Gust 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	22		Uncomfortable	31		Acceptable
		Summer	18		Walking	25		Acceptable
		Fall	21		Uncomfortable	29		Acceptable
		Winter	22		Uncomfortable	31		Acceptable
		Annual	21		Uncomfortable	30		Acceptable
	B	Spring	17	-23%	Walking	26	-16%	Acceptable
		Summer	15	-17%	Standing	22	-12%	Acceptable
		Fall	16	-24%	Walking	24	-17%	Acceptable
		Winter	18	-18%	Walking	26	-16%	Acceptable
		Annual	17	-19%	Walking	25	-17%	Acceptable
42	A	Spring	23		Uncomfortable	31		Acceptable
		Summer	19		Walking	25		Acceptable
		Fall	22		Uncomfortable	29		Acceptable
		Winter	23		Uncomfortable	31		Acceptable
		Annual	22		Uncomfortable	30		Acceptable
	B	Spring	21		Uncomfortable	28		Acceptable
		Summer	17		Walking	23		Acceptable
		Fall	19	-14%	Walking	27		Acceptable
		Winter	20	-13%	Uncomfortable	28		Acceptable
		Annual	19	-14%	Walking	27		Acceptable
43	A	Spring	20		Uncomfortable	28		Acceptable
		Summer	16		Walking	21		Acceptable
		Fall	19		Walking	26		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	19		Walking	26		Acceptable
	B	Spring	18		Walking	25		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	17		Walking	24		Acceptable
44	A	Spring	19		Walking	27		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	17		Walking	24	-11%	Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16	-11%	Walking	23		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	17		Walking	23		Acceptable

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

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

Table 1: Mean Speed and Effective Gust 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	19		Walking	27		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	18		Walking	26		Acceptable
	B	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	19		Walking	26		Acceptable
		Annual	18		Walking	24		Acceptable
46	A	Spring	14		Standing	21		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	21		Acceptable
47	A	Spring	19		Walking	26		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	18		Walking	24		Acceptable
		Winter	21		Uncomfortable	28		Acceptable
		Annual	19		Walking	25		Acceptable
	B	Spring	20		Uncomfortable	27		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	22		Uncomfortable	29		Acceptable
		Annual	20		Uncomfortable	26		Acceptable
48	A	Spring	19		Walking	27		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	19		Walking	27		Acceptable
	B	Spring	20		Uncomfortable	28		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	21		Uncomfortable	30		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		

Table 1: Mean Speed and Effective Gust 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	16		Walking	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
50	A	Spring	16		Walking	23		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	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	22		Acceptable
51	A	Spring	19		Walking	26		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	18		Walking	24		Acceptable
		Winter	20		Uncomfortable	26		Acceptable
		Annual	18		Walking	24		Acceptable
	B	Spring	19		Walking	26		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	18		Walking	24		Acceptable
		Winter	20		Uncomfortable	26		Acceptable
		Annual	18		Walking	24		Acceptable
52	A	Spring	21		Uncomfortable	27		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	19		Walking	25		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	19		Walking	26		Acceptable
	B	Spring	21		Uncomfortable	28		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	19		Walking	26		Acceptable
		Winter	21		Uncomfortable	27		Acceptable
		Annual	19		Walking	26		Acceptable

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

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

Table 1: Mean Speed and Effective Gust 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	16		Walking	23		Acceptable
		Summer	13		Standing	17		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	18		Walking	24		Acceptable
		Annual	16		Walking	22		Acceptable
	B	Spring	17		Walking	23		Acceptable
		Summer	13		Standing	17		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	18		Walking	24		Acceptable
		Annual	16		Walking	22		Acceptable
54	A	Spring	18		Walking	24		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	18		Walking	23		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	18		Walking	24		Acceptable
	B	Spring	19		Walking	24		Acceptable
		Summer	15		Standing	19		Acceptable
		Fall	18		Walking	23		Acceptable
		Winter	21		Uncomfortable	27		Acceptable
		Annual	19		Walking	24		Acceptable
55	A	Spring	19		Walking	26		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	19		Walking	24		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	19		Walking	25		Acceptable
		Annual	17		Walking	23		Acceptable
56	A	Spring	21		Uncomfortable	28		Acceptable
		Summer	16		Walking	21		Acceptable
		Fall	20		Uncomfortable	26		Acceptable
		Winter	24		Uncomfortable	31		Acceptable
		Annual	21		Uncomfortable	28		Acceptable
	B	Spring	21		Uncomfortable	28		Acceptable
		Summer	16		Walking	21		Acceptable
		Fall	20		Uncomfortable	26		Acceptable
		Winter	24		Uncomfortable	31		Acceptable
		Annual	21		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: Mean Speed and Effective Gust 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	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15		Standing	20		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	16		Walking	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	17		Walking	23		Acceptable
		Annual	15		Standing	21		Acceptable
58	A	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	18		Walking	25		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	17		Walking	23		Acceptable
		Winter	19		Walking	26		Acceptable
		Annual	17		Walking	24		Acceptable
59	A	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
60	A	Spring	20		Uncomfortable	27		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	19		Walking	25		Acceptable
	B	Spring	19		Walking	26		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	18		Walking	24		Acceptable
		Winter	19		Walking	26		Acceptable
		Annual	18		Walking	24		Acceptable

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

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

Table 1: Mean Speed and Effective Gust 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	19		Walking	26		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	19		Walking	25		Acceptable
	B	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	17		Walking	24		Acceptable
62	A	Spring	21		Uncomfortable	29		Acceptable
		Summer	17		Walking	23		Acceptable
		Fall	20		Uncomfortable	27		Acceptable
		Winter	21		Uncomfortable	28		Acceptable
		Annual	20		Uncomfortable	27		Acceptable
	B	Spring	19		Walking	26		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	17	-15%	Walking	24	-11%	Acceptable
		Winter	18	-14%	Walking	25		Acceptable
		Annual	18		Walking	24	-11%	Acceptable
63	A	Spring	19		Walking	26		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	17		Walking	24		Acceptable
		Summer	14	-13%	Standing	20		Acceptable
		Fall	16	-11%	Walking	22	-12%	Acceptable
		Winter	17	-15%	Walking	24	-11%	Acceptable
		Annual	16	-11%	Walking	23		Acceptable
64	A	Spring	17		Walking	23		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	16		Walking	24		Acceptable
		Summer	12	-14%	Sitting	19		Acceptable
		Fall	14	-13%	Standing	21		Acceptable
		Winter	16	-11%	Walking	24		Acceptable
		Annual	14	-13%	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: Mean Speed and Effective Gust 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	19		Walking	26		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	11	-42%	Sitting	17	-35%	Acceptable
		Summer	8	-47%	Sitting	14	-33%	Acceptable
		Fall	10	-44%	Sitting	17	-32%	Acceptable
		Winter	11	-45%	Sitting	18	-36%	Acceptable
		Annual	10	-44%	Sitting	17	-32%	Acceptable
66	A	Spring	16		Walking	25		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	24		Acceptable
		Winter	18		Walking	28		Acceptable
		Annual	16		Walking	25		Acceptable
	B	Spring	19	19%	Walking	26		Acceptable
		Summer	15	25%	Standing	20		Acceptable
		Fall	17	13%	Walking	24		Acceptable
		Winter	20	11%	Uncomfortable	27		Acceptable
		Annual	18	13%	Walking	25		Acceptable
67	A	Spring	26		Uncomfortable	34		Unacceptable
		Summer	23		Uncomfortable	30		Acceptable
		Fall	25		Uncomfortable	33		Unacceptable
		Winter	28		Dangerous	36		Unacceptable
		Annual	26		Uncomfortable	34		Unacceptable
	B	Spring	21	-19%	Uncomfortable	29	-15%	Acceptable
		Summer	17	-26%	Walking	23	-23%	Acceptable
		Fall	20	-20%	Uncomfortable	28	-15%	Acceptable
		Winter	22	-21%	Uncomfortable	32	-11%	Unacceptable
		Annual	20	-23%	Uncomfortable	29	-15%	Acceptable
68	A	Spring	14		Standing	20		Acceptable
		Summer	12		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	18	13%	Acceptable
		Fall	14	17%	Standing	22	22%	Acceptable
		Winter	16	14%	Walking	24	14%	Acceptable
		Annual	14		Standing	22	16%	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: Mean Speed and Effective Gust 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	18		Walking	27		Acceptable
		Summer	15		Standing	22		Acceptable
		Fall	17		Walking	26		Acceptable
		Winter	19		Walking	30		Acceptable
		Annual	18		Walking	27		Acceptable
	B	Spring	20	11%	Uncomfortable	29		Acceptable
		Summer	17	13%	Walking	24		Acceptable
		Fall	19	12%	Walking	28		Acceptable
		Winter	22	16%	Uncomfortable	31		Acceptable
		Annual	20	11%	Uncomfortable	29		Acceptable
70	A	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15	-12%	Standing	23		Acceptable
		Annual	14	-13%	Standing	21		Acceptable
71	A	Spring	21		Uncomfortable	30		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	20		Uncomfortable	28		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	20		Uncomfortable	28		Acceptable
	B	Spring	21		Uncomfortable	31		Acceptable
		Summer	16		Walking	23		Acceptable
		Fall	20		Uncomfortable	28		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	20		Uncomfortable	28		Acceptable
72	A	Spring	16		Walking	25		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	18	13%	Walking	25		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable

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

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

Table 1: Mean Speed and Effective Gust 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	23		Uncomfortable	32		Unacceptable
		Summer	20		Uncomfortable	28		Acceptable
		Fall	22		Uncomfortable	30		Acceptable
		Winter	23		Uncomfortable	32		Unacceptable
		Annual	22		Uncomfortable	31		Acceptable
	B	Spring	26	13%	Uncomfortable	34		Unacceptable
		Summer	22		Uncomfortable	29		Acceptable
		Fall	24		Uncomfortable	32		Unacceptable
		Winter	27	17%	Uncomfortable	36	13%	Unacceptable
		Annual	25	14%	Uncomfortable	33		Unacceptable
74	A	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	19		Walking	26		Acceptable
		Annual	18	13%	Walking	24		Acceptable
75	A	Spring	17		Walking	25		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	16		Walking	24		Acceptable
	B	Spring	18		Walking	25		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	24		Acceptable
76	A	Spring	16		Walking	22		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	15		Standing	22		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: Mean Speed and Effective Gust 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	24		Uncomfortable	32		Unacceptable
		Summer	20		Uncomfortable	27		Acceptable
		Fall	22		Uncomfortable	30		Acceptable
		Winter	24		Uncomfortable	33		Unacceptable
		Annual	23		Uncomfortable	31		Acceptable
	B	Spring	18	-25%	Walking	26	-19%	Acceptable
		Summer	13	-35%	Standing	19	-30%	Acceptable
		Fall	17	-23%	Walking	24	-20%	Acceptable
		Winter	17	-29%	Walking	25	-24%	Acceptable
		Annual	17	-26%	Walking	24	-23%	Acceptable
78	A	Spring	16		Walking	25		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	26		Acceptable
		Annual	15		Standing	24		Acceptable
	B	Spring	16		Walking	24		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	15		Standing	23	-12%	Acceptable
		Annual	14		Standing	22		Acceptable
79	A	Spring	17		Walking	25		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	16		Walking	25		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	23		Acceptable
80	A	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	15		Standing	22		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	21		Acceptable

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

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

Table 1: Mean Speed and Effective Gust 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	16		Walking	23		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	15		Standing	23		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
82	A	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	17		Walking	23		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	17		Walking	23		Acceptable
	B	Spring	17		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
83	A	Spring	21		Uncomfortable	29		Acceptable
		Summer	17		Walking	23		Acceptable
		Fall	20		Uncomfortable	27		Acceptable
		Winter	23		Uncomfortable	31		Acceptable
		Annual	21		Uncomfortable	28		Acceptable
	B	Spring	20		Uncomfortable	28		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	19		Walking	26		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	20		Uncomfortable	27		Acceptable
84	A	Spring	18		Walking	26		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	18		Walking	26		Acceptable
	B	Spring	17		Walking	25		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	17		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
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: Mean Speed and Effective Gust 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	29		Dangerous	37		Unacceptable
		Summer	22		Uncomfortable	28		Acceptable
		Fall	27		Uncomfortable	35		Unacceptable
		Winter	31		Dangerous	39		Unacceptable
		Annual	29		Dangerous	36		Unacceptable
	B	Spring	27		Uncomfortable	35		Unacceptable
		Summer	20		Uncomfortable	26		Acceptable
		Fall	25		Uncomfortable	33		Unacceptable
		Winter	29		Dangerous	38		Unacceptable
		Annual	26		Uncomfortable	34		Unacceptable
86	A	Spring	10		Sitting	15		Acceptable
		Summer	8		Sitting	12		Acceptable
		Fall	9		Sitting	14		Acceptable
		Winter	10		Sitting	16		Acceptable
		Annual	9		Sitting	15		Acceptable
	B	Spring	11		Sitting	17	13%	Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10	11%	Sitting	16	14%	Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10	11%	Sitting	16		Acceptable
87	A	Spring	19		Walking	26		Acceptable
		Summer	17		Walking	23		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	18		Walking	26		Acceptable
	B	Spring	21		Uncomfortable	31	19%	Acceptable
		Summer	17		Walking	25		Acceptable
		Fall	20	11%	Uncomfortable	29	16%	Acceptable
		Winter	23	15%	Uncomfortable	34	26%	Unacceptable
		Annual	21	17%	Uncomfortable	31	19%	Acceptable
88	A	Spring	20		Uncomfortable	28		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	20		Uncomfortable	27		Acceptable
		Winter	23		Uncomfortable	31		Acceptable
		Annual	20		Uncomfortable	28		Acceptable
	B	Spring	14	-30%	Standing	22	-21%	Acceptable
		Summer	12	-25%	Sitting	19	-14%	Acceptable
		Fall	13	-35%	Standing	21	-22%	Acceptable
		Winter	15	-35%	Standing	24	-23%	Acceptable
		Annual	14	-30%	Standing	22	-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: Mean Speed and Effective Gust 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	22		Uncomfortable	30		Acceptable
		Summer	17		Walking	23		Acceptable
		Fall	20		Uncomfortable	28		Acceptable
		Winter	24		Uncomfortable	32		Unacceptable
		Annual	21		Uncomfortable	29		Acceptable
	B	Spring	29	32%	Dangerous	37	23%	Unacceptable
		Summer	24	41%	Uncomfortable	30	30%	Acceptable
		Fall	28	40%	Dangerous	36	29%	Unacceptable
		Winter	31	29%	Dangerous	40	25%	Unacceptable
		Annual	29	38%	Dangerous	37	28%	Unacceptable
90	A	Spring	19		Walking	26		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	19		Walking	26		Acceptable
	B	Spring	17		Walking	23	-12%	Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16	-11%	Walking	21	-16%	Acceptable
		Winter	18		Walking	24	-14%	Acceptable
		Annual	16	-16%	Walking	22	-15%	Acceptable
91	A	Spring	18		Walking	25		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	18		Walking	24		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	13	-28%	Standing	20	-20%	Acceptable
		Summer	9	-40%	Sitting	15	-29%	Acceptable
		Fall	12	-33%	Sitting	19	-21%	Acceptable
		Winter	13	-35%	Standing	21	-22%	Acceptable
		Annual	12	-33%	Sitting	19	-24%	Acceptable
92	A	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	27	108%	Uncomfortable	35	75%	Unacceptable
		Summer	21	91%	Uncomfortable	27	59%	Acceptable
		Fall	25	108%	Uncomfortable	33	74%	Unacceptable
		Winter	28	115%	Dangerous	37	76%	Unacceptable
		Annual	26	117%	Uncomfortable	34	79%	Unacceptable

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: Mean Speed and Effective Gust 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	16		Walking	23		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
94	A	Spring	19		Walking	26		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	18		Walking	25		Acceptable
	B	Spring	16	-16%	Walking	23	-12%	Acceptable
		Summer	13	-13%	Standing	18	-14%	Acceptable
		Fall	14	-18%	Standing	21	-13%	Acceptable
		Winter	17		Walking	24	-11%	Acceptable
		Annual	15	-17%	Standing	22	-12%	Acceptable
95	A	Spring	18		Walking	27		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	18		Walking	26		Acceptable
	B	Spring	22	22%	Uncomfortable	31	15%	Acceptable
		Summer	17	13%	Walking	23		Acceptable
		Fall	22	29%	Uncomfortable	30	20%	Acceptable
		Winter	24	20%	Uncomfortable	32	14%	Unacceptable
		Annual	22	22%	Uncomfortable	30	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		

Appendix D

Air Quality

APPENDIX D AIR QUALITY

Introduction

This Air Quality Appendix provides modeling assumptions and backup for results presented in Section 4.5 of the report. Included within this documentation is a brief description of the methodology employed along with pertinent calculations and data used in the emissions and dispersion calculations supporting the microscale air quality analysis.

Motor Vehicle Emissions

The EPA MOVES computer program generated motor vehicle emissions used in the garage stationary source analysis along with the mobile source CAL3QHC modeling and mesoscale analysis. The model input parameters were provided by MassDEP. Emission rates were derived for 2016 and 2023 for speed limits of idle, 10, 15, and 30 mph for use in the microscale analyses.

MOVES CO Emission Factor Summary

Carbon Monoxide Only

		2016	2023
Free Flow	30 mph	2.697	1.844
Right Turns	10 mph	4.447	2.956
Left Turns	15 mph	3.823	2.586
Queues	Idle	9.997	4.102

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

CAL3QHC

For the intersection studied, the CAL3QHC model was applied to calculate CO concentrations at sensitive receptor locations using emission rates derived in MOVES. The intersection's queue links and free flow links were input to the model along with sensitive receptors at all locations nearby each intersection. The meteorological assumptions input into the model were a 1.0 meter per second wind speed, Pasquill-Gifford Class D stability combined with a mixing height of 1000 meters. For each direction, the full range of wind directions at 10 degree intervals was examined. In addition, a surface roughness (z_0) of 321 cm was used for the intersection. Idle emission rates for queue links were based on 0 mph emission rates derived in MOVES. Emission rates for speeds of 10, 15, and 30 mph were used for right turn, left turn, and free flow links, respectively.

Parcel Q1
Background Concentrations

POLLUTANT	AVERAGING TIME	Form	2012	2013	2014	Units	ppm/ppb to $\mu g/m^3$ Conversion Factor	2012-2014 Background Concentration ($\mu g/m^3$)	Location
SO_2 [1][6]	1-Hour [5]	99th %	12	14	28	ppb	2.62	47.2	531A E. 1st St., Boston
	3-Hour	H2H	10.6	16.3	24.3	ppb	2.62	63.7	531A E. 1st St., Boston
	24-Hour	H2H	4.5	6.5	8.1	ppb	2.62	21.2	531A E. 1st St., Boston
	Annual	H	1.65	1.53	1.74	ppb	2.62	4.6	531A E. 1st St., Boston
PM-10	24-Hour	H2H	32.0	34	61	$\mu g/m^3$	1	61	Harrison Ave., Boston
	Annual	H	14.2	15.1	13.9	$\mu g/m^3$	1	15.1	Harrison Ave., Boston
PM-2.5	24-Hour [4]	98th %	20.9	19.9	14.5	$\mu g/m^3$	1	18.4	174 North St, Boston
	Annual [4]	H	9.5	8.8	7.1	$\mu g/m^3$	1	8.5	174 North St, Boston
NO_2 [3]	1-Hour [5]	98th %	43	47	62	ppb	1.88	95.3	531A E. 1st St., Boston
	Annual	H	9.7	12.2	14	ppb	1.88	26.3	531A E. 1st St., Boston
CO [2]	1-Hour	H2H	2.2	1.9	1.7	ppm	1146	2474.2	Harrison Ave., Boston
	8-Hour	H2H	1.9	1.2	1.3	ppm	1146	2177.4	Harrison Ave., Boston
Ozone [4]	8-Hour	H4H	0.062	0.059	0.054	ppm	1963	121.7	Harrison Ave., Boston
Lead	Rolling 3-Month	H	0.014	0.006	0.014	$\mu g/m^3$	1	0.014	Harrison Ave., Boston

Notes:
From 2012-2014 EPA's AirData Website

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

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

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

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

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

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

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

Appendix E

Climate Change Checklist

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:	**Parcel Q1**
Project Address Primary:	**Drydock Avenue, Raymond L. Flynn Marine Park, South Boston**
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	**Mark McGowan | Director – Development | Skanska Commercial Development | 101 Seaport Boulevard | Boston, MA | email: Mark.McGowan@skanska.com | phone: (617) 574-1485**

A.2 - Team Description

Owner / Developer:	**Skanska USA Commercial Development, Inc.**
Architect:	**Spagnolo Gisness & Associates, Inc.**
Engineer (building systems):	**Bohler Engineering**
Sustainability / LEED:	**WSP-Parsons Brinckerhoff**
Permitting:	**Epsilon Associates, Inc.**
Construction Management:	**Skanska USA Building Inc.**
Climate Change Expert:	**Epsilon Associates, Inc.**

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:	Commercial, Retail
List the First Floor Uses:	*Retail, Lobby*

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

☐ Wood Frame	☐ Masonry	☑ Steel Frame	☐ Concrete

Describe the building?

Site Area:	*36,799 SF*	Building Area:	*298,700 SF*
Building Height:	*163 Ft.*	Number of Stories:	*13 Flrs.*
First Floor Elevation (reference Boston City Base):	*16.7 BCB Elev.*	Are there below grade spaces/levels, if yes how many:	*No*

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*	Certified:	*Yes*

A.6 - Building Energy-

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

Electric:	*(kW)*	Heating:	*(MMBtu/hr)*
What is the planned building Energy Use Intensity:	*(kWh/SF)*	Cooling:	*(Tons/hr)*

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

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

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

Electrical Generation:	*600 (kW)*		Fuel Source:	*Diesel*
System Type and Number of Units:	☑ Combustion Engine	☐ Gas Turbine	☐ Combine Heat and Power	*1 (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?

9/91 Deg.

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

90 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?

105 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:	***TBD***
How is performance determined:	

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:	Automatic LED lighting control			

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?

	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

Describe site conditions?

Site Elevation – Low/High Points:	*Varies between +/- 15.0 BCB and +/- 16.75 BCB*
Building Proximity to Water:	*Ft.*

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

Coastal Zone:	*Yes*	Velocity Zone:	*No*
Flood Zone:	*Yes*	Area Prone to Flooding:	*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*	Future floodplain delineation updates:	*Yes*

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

	0 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:	*16.7 ft BCB*	First Floor Elevation:	*~16.7 ft BCB*

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

	TBD	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

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

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?

No

If Yes, describe:

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

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*	☐ 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/

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Project Information

Project Name:	**Parcel Q1**
Project Address Primary:	**Parcel Q1	Raymond L. Flynn Marine Park**
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	**Mark McGowan	Director – Development	Skanska Commercial Development	101 Seaport Boulevard	Boston, MA	email:** Mark.McGowan@skanska.com **| phone: (617) 574-1485**

Team Description

Owner / Developer:	**Skanksa Commercial Development**
Architect:	**Spagnolo Gisness & Associates, Inc.**
Engineer (building systems):	**MEP/FP Engineer: Bala TMP	Structural Engineer: Thornton Tomasetti	Civil Engineer: Bohler Engineering**
Sustainability / LEED:	**WSP**
Permitting:	**Epsilon Associates, Inc.**
Construction Management:	**Skanska USA Building Inc**

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:

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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)	*First Floor Uses include building lobby, retail, bicycle amenity spaces, loading areas and MEP/FP spaces*		

What is the Construction Type – select most appropriate type?

Wood Frame	Masonry	**Steel Frame**	Concrete

Describe the building?

Site Area:	*36,799 SF*	Building Area:	*298,700 SF*
Building Height:	*163 Ft.*	Number of Stories:	*13 Flrs.*
First Floor Elevation:	*16.7 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.	The Project Site is located within the Raymond L. Flynn Marine Park in South Boston. The Project Site is triangular in shape, bound by Drydock Avenue to the east, Channel Street to the north and an adjacent parcel to the west. Located at the entrance to the Raymond L. Flynn Marine Park, the Project Site represents a transition point between the Seaport District, the Marine Park and the residential areas of South Boston south of the Reserved Channel. The parcels of land adjacent to the Project Site are generally industrial in nature and are located within the Marine Park. These sites vary in size and use, but generally support Boston's maritime industries and accommodate related functions including general industrial, manufacturing, research/development and commercial uses.

List the surrounding ADA compliant MBTA transit lines and the proximity to the development site: Commuter rail, subway, bus, etc.	The nearest ADA compliant MBTA transit station is the bus stop (for the #4 line) on Drydock Avenue at the southeast edge of the Project Site. There is also an accessible MBTA transit station for the Silver Line at 21 Drydock Avenue.
List the surrounding institutions: hospitals, public housing and elderly and disabled housing developments, educational facilities, etc.	There are no hospitals, public housing developments, elderly and disabled housing developments or educational facilities within ½ mile of the Project Site.
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.	A Boston Police Harbor Patrol Station and Massachusetts State Police Station E-4 are located within ½ mile of the Project Site. The Boston Convention and Exhibition Center, Blue Hills Bank Pavilion and the Black Falcon Cruise Terminal are located within ½ mile of the Project Site. There are several parks located within ½ mile of the Project Site, including the Lawn on D, Eastport Park and the South Boston Maritime Park.

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.	The sidewalks and pedestrian ramps are concrete and are in fair condition.
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, the proposed design will replace all sidewalks and pedestrian ramps adjacent to and within the Project Site.
Is the development site within a historic district? **If yes,** please identify.	No

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.	Both Drydock Avenue and Channel Street are being considered Industrial Streets (per the Boston Complete Street Guidelines).
What is the total width of the proposed sidewalk? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone.	Drydock Avenue (at building): 14'-0" total sidewalk width | 6'-0" Pedestrian Zone | 8'-0" Greenscape/Furnishings Zone Drydock Avenue (at outdoor plaza): 8'-0" total sidewalk width | 8'-0" Pedestrian Zone Frontage Zones of varying depths are being proposed along Drydock Avenue Channel Street: 7'-0" total sidewalk width | 5'-0" Pedestrian Zone | 2'-0" Greenscape/Furnishings 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?	Concrete paving is being proposed for the 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	Potentially

pedestrian right-of-way?	
If yes above, what are the proposed dimensions of the sidewalk café or furnishings and what will the right-of-way clearance be?	Unknown at this time

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?	150 spaces
What is the total number of accessible spaces provided at the development site?	5 accessible spaces
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 above grade parking levels
Has a drop-off area been identified? **If yes,** will it be accessible?	No
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 Attachments 2 to 5 for the plans noting the accessible routes

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 Attachment 1 noting the accessible route.
Describe accessibility at each entryway: Flush Condition, Stairs, Ramp Elevator.	All entry conditions will be flush.
Are the accessible entrance and the standard entrance integrated?	Yes, the two main building entrances will be for standard and accessible entry.
If no above, what is the reason?	N/A
Will there be a roof deck or outdoor courtyard space? If yes, include diagram of the accessible route.	Yes, there will be a roof terrace as well as an outdoor public plaza. See the attached plan noting the accessible route.
Has an accessible routes way-finding and signage package been developed? If yes, please describe.	No

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?	N/A
How many units are for sale; how many are for rent? What is the market value vs. affordable breakdown?	N/A
How many accessible units are being proposed?	N/A

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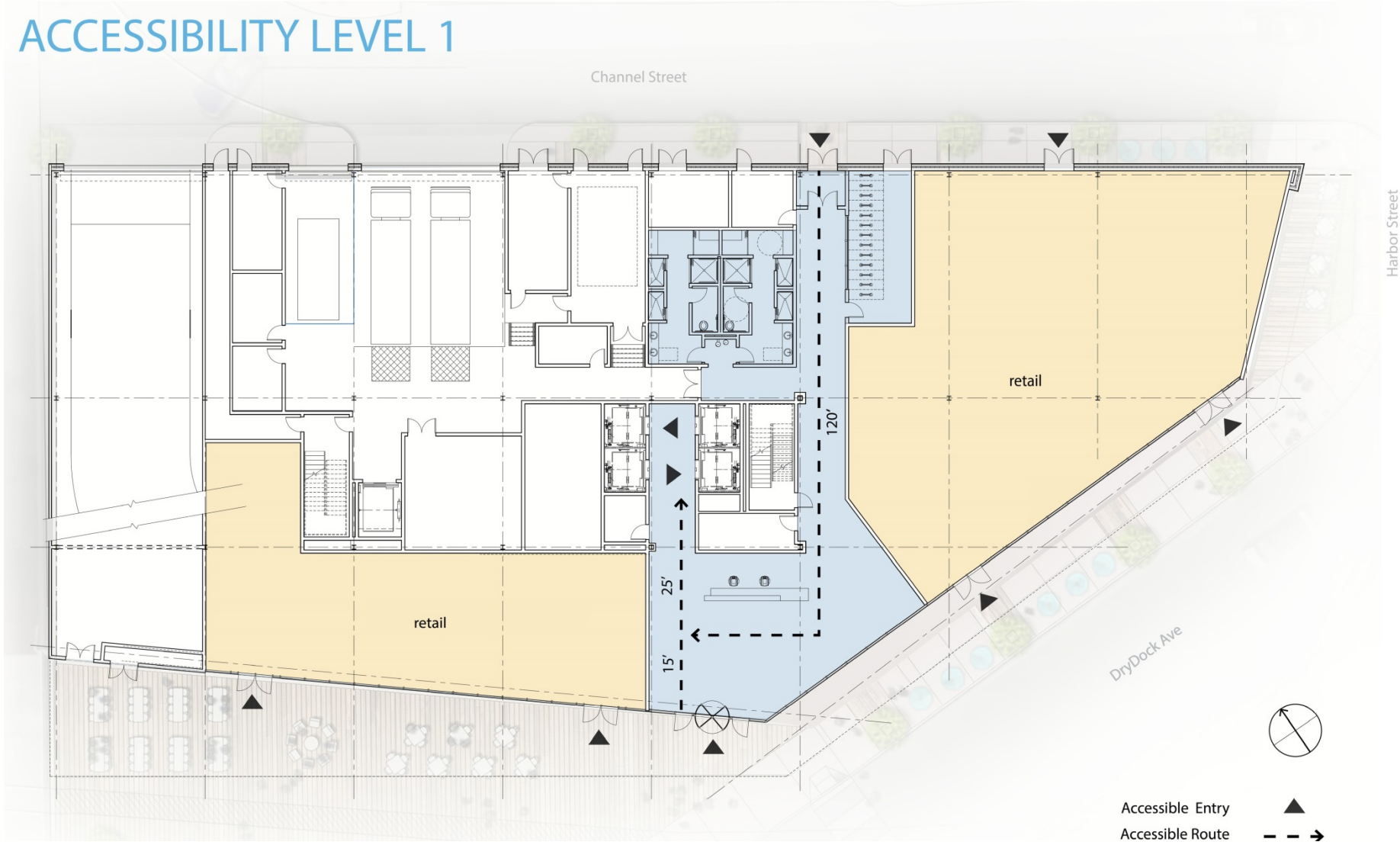
Please provide plan and diagram of the accessible units.	N/A
How many accessible units will also be affordable? If none, please describe reason.	N/A
Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs at entry or step to balcony. **If yes,** please provide reason.	N/A
Has the proponent reviewed or presented the proposed plan to the City of Boston Mayor's Commission for Persons with Disabilities Advisory Board?	N/A
Did the Advisory Board vote to support this project? **If no,** what recommendations did the Advisory Board give to make this project more accessible?	N/A

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

ACCESSIBILITY LEVEL 1



Parcel Q1 **Boston, Massachusetts**

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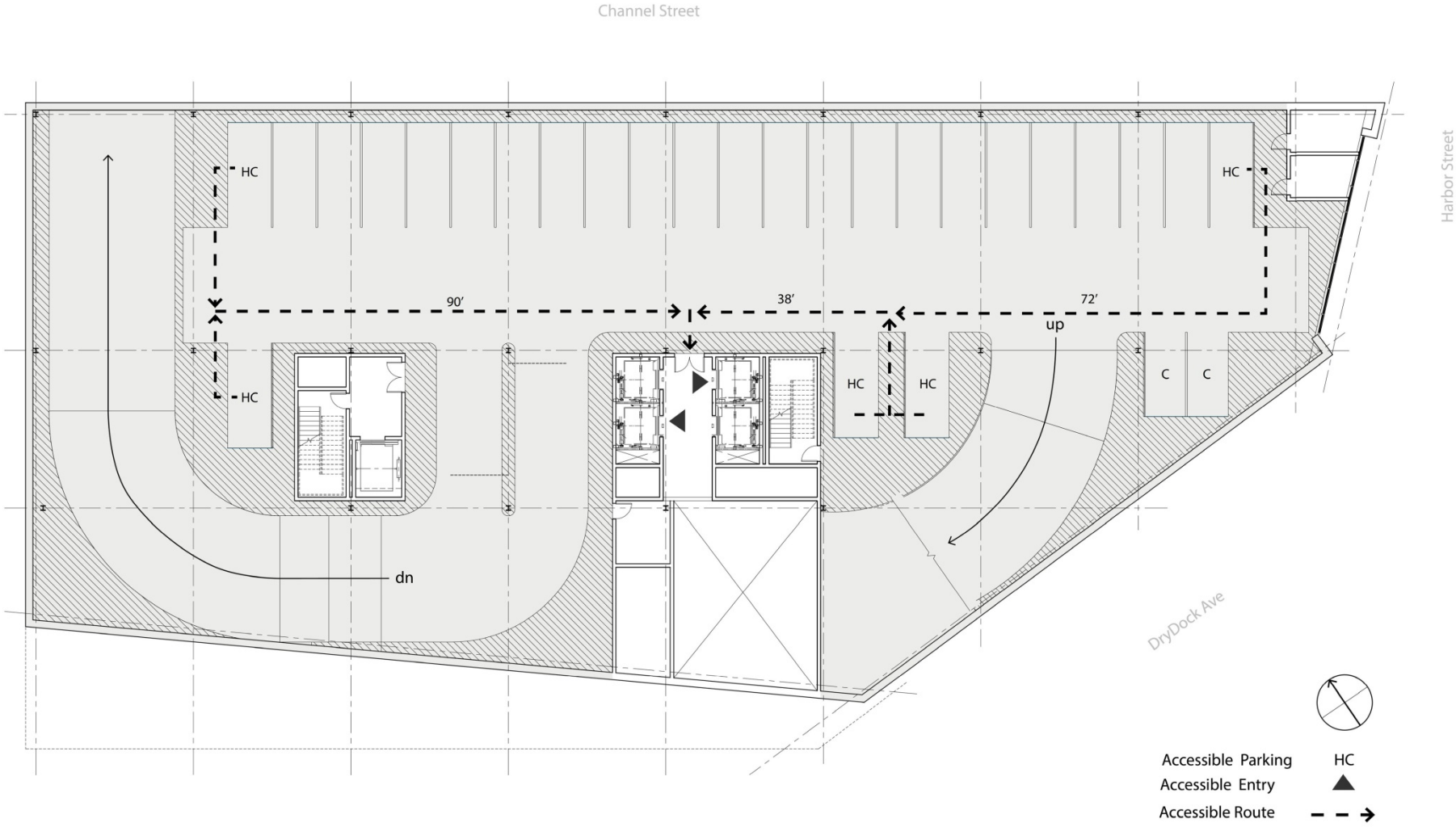
Attachment 1

Accessible Routes - Level 1

ACCESSIBILITY PARKING LEVEL 2



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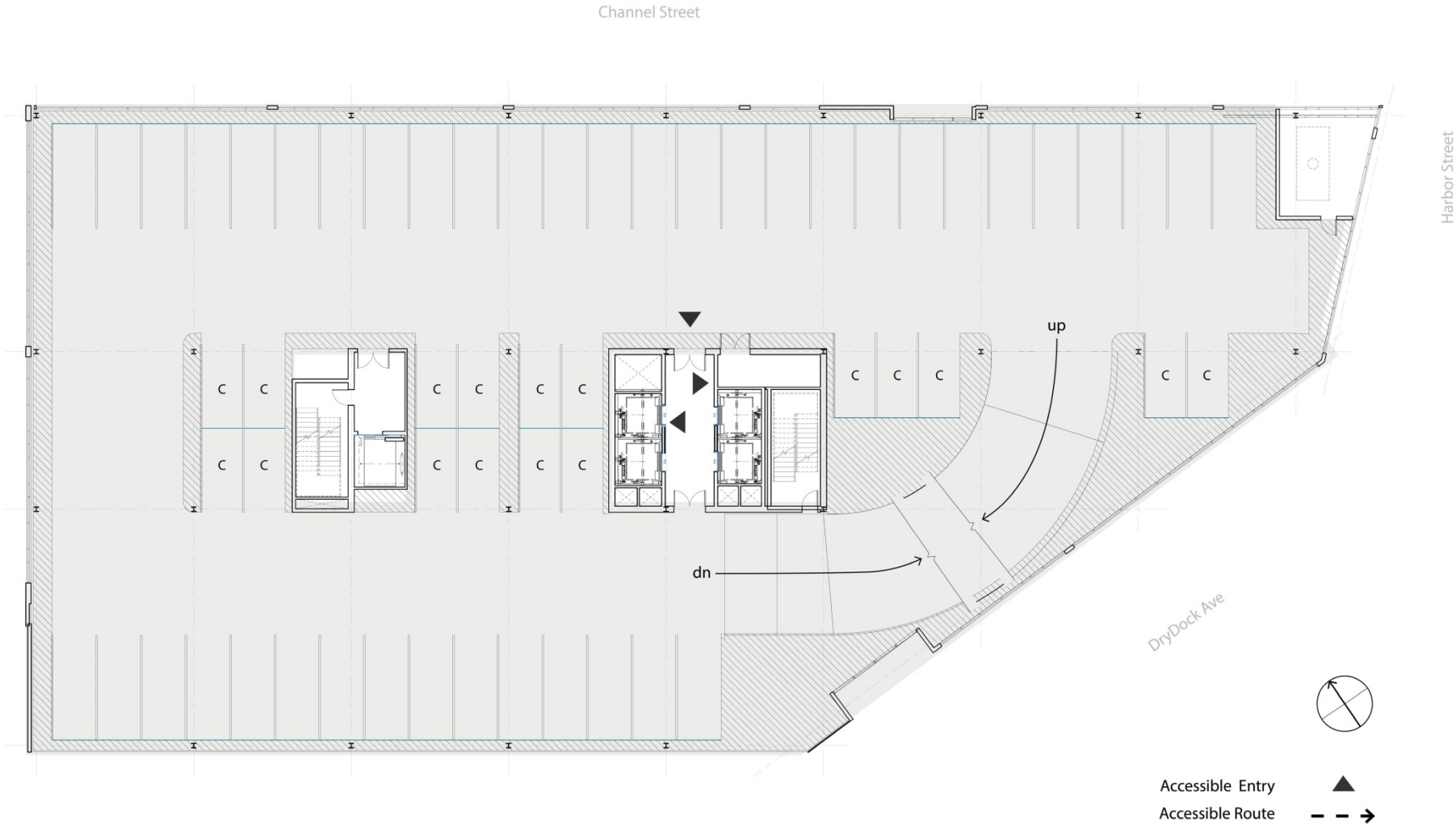
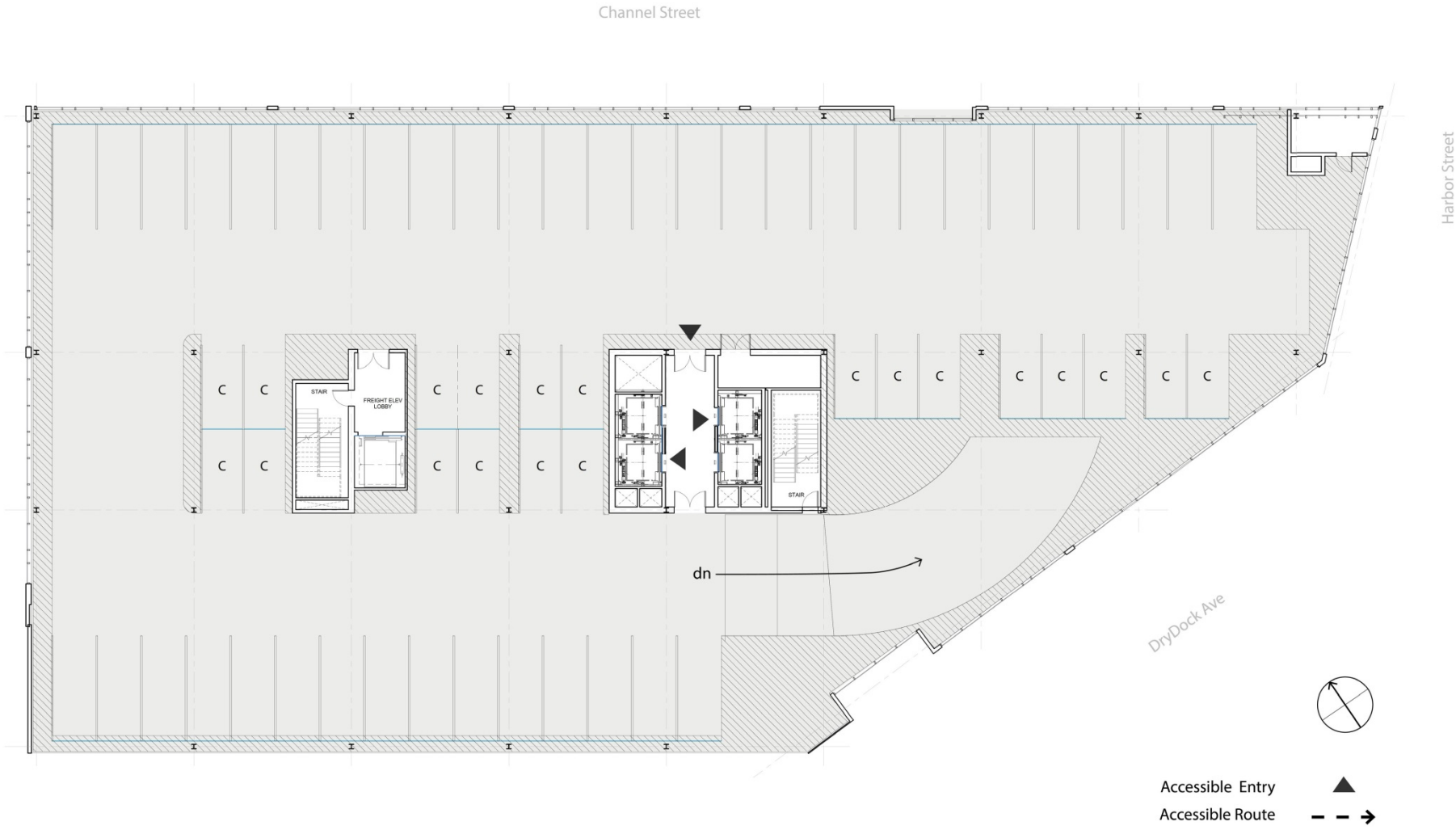
Attachment 2

Accessible Routes - Parking Level 2

ACCESSIBILITY PARKING LEVEL 3



ACCESSIBILITY PARKING LEVEL 4



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Attachment 4

Accessible Routes - Parking Level 4

ACCESSIBILITY LEVELS 5-10

ACCESSIBILITY LEVELS 11-12

ACCESSIBILITY LEVEL 13 - ROOF DECK