

Garden Garage



NOTICE OF PROJECT CHANGE

Submitted to:

Boston Redevelopment Authority

One City Hall Square
Boston, Massachusetts 02201

Submitted by:

Equity Residential

1500 Massachusetts Avenue, NW, Suite 25
Washington, DC 20005

Prepared by:

Epsilon Associates, Inc.

3 Clock Tower Place, Suite 250
Maynard, Massachusetts 01754

In Association with:

Elkus Manfredi Architects Ltd.

Howard/Stein-Hudson Associates, Inc.

Nitsch Engineering, Inc.

Rackemann, Sawyer & Brewster

RW Sullivan Engineering

Sanborn, Head & Associates

October 16, 2014

Epsilon
ASSOCIATES INC.

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Chapter 1.0

General Information / Project Description

1.0 GENERAL INFORMATION / PROJECT DESCRIPTION

1.1 Introduction

The Garden Garage project proposed by Equity Residential (the “Proponent”) is located at 35 Lomasney Way at the intersection of Downtown and Boston’s West End (see Figure 1-1). The Project site is bordered by Martha Road, Lomasney Way, and the MBTA Green Line portal to the north, the O’Neill Federal Building and 150 Staniford Street to the East, Longfellow Place to the south, Hawthorne Place to the southwest, Thoreau Path to the west, and 55 and 65 Martha Road to the northwest (see Figure 1-2). The existing site includes the 650-space Garden Garage as well as a small, vacant one-story wooden structure formerly used as the Boston Children’s School Annex.

The Proponent previously proposed a residential project with two towers on the site, ground floor retail, a below-grade parking garage and new open space (the “previously proposed project”). This Notice of Project Change (NPC) is being submitted to the Boston Redevelopment Authority (BRA) to provide information regarding changes to the development. The Proponent is currently proposing a residential development within one building, below-grade parking and an expanded open space on the site (the “NPC Project”).

The NPC Project will create a strong pedestrian connection reconnecting the West End to the Bulfinch Triangle and North End neighborhoods, and will re-energize the Nashua Street area (see Figure 1-3). In addition to activating the public realm, the NPC Project will increase the area of open space surrounding the NPC Project site, will provide new housing to the City, including new affordable housing, construction and permanent jobs, and improved tax revenues for the City.

1.2 Project History

The Proponent submitted a Project Notification Form (PNF) to the BRA on January 7, 2011 which described a 500-unit development within two towers and an approximately 850-space below-grade parking garage. In response to the Scoping Determination issued by the BRA on the PNF and comments from the community, the Proponent submitted a Draft Project Impact Report (DPIR) to the BRA on October 19, 2011 which included environmental impact analyses and minor changes to the development. The Proponent has continued to make revisions to the proposed development in response to City and community concerns, and is submitting this NPC which identifies the significant changes to the development.

1.3 Project

1.3.1 Previously Proposed Project

The previously proposed project described in the DPIR included the replacement of the existing Garden Garage on Lomasney Way with two major buildings with heights of approximately 240 and 310 feet (excluding mechanical penthouses) and an 850-space parking structure that would extend approximately 50 feet below grade. The previously proposed project included a total of approximately 975,000 square feet of development, which would have included approximately 563,000 square feet of residential space (500 units), 18,500 square feet of common area and amenity space for residents, approximately 3,000 square feet of ground-floor retail space, and approximately 390,000 square feet for parking and mechanicals.

The redevelopment of the Garden Garage site included site and landscape improvements, including improved connectivity to and through the development to link North Station and surrounding neighborhoods with the West End and new outdoor gathering spaces for residents that were proposed to replace or enhance existing underutilized or outdated open spaces.

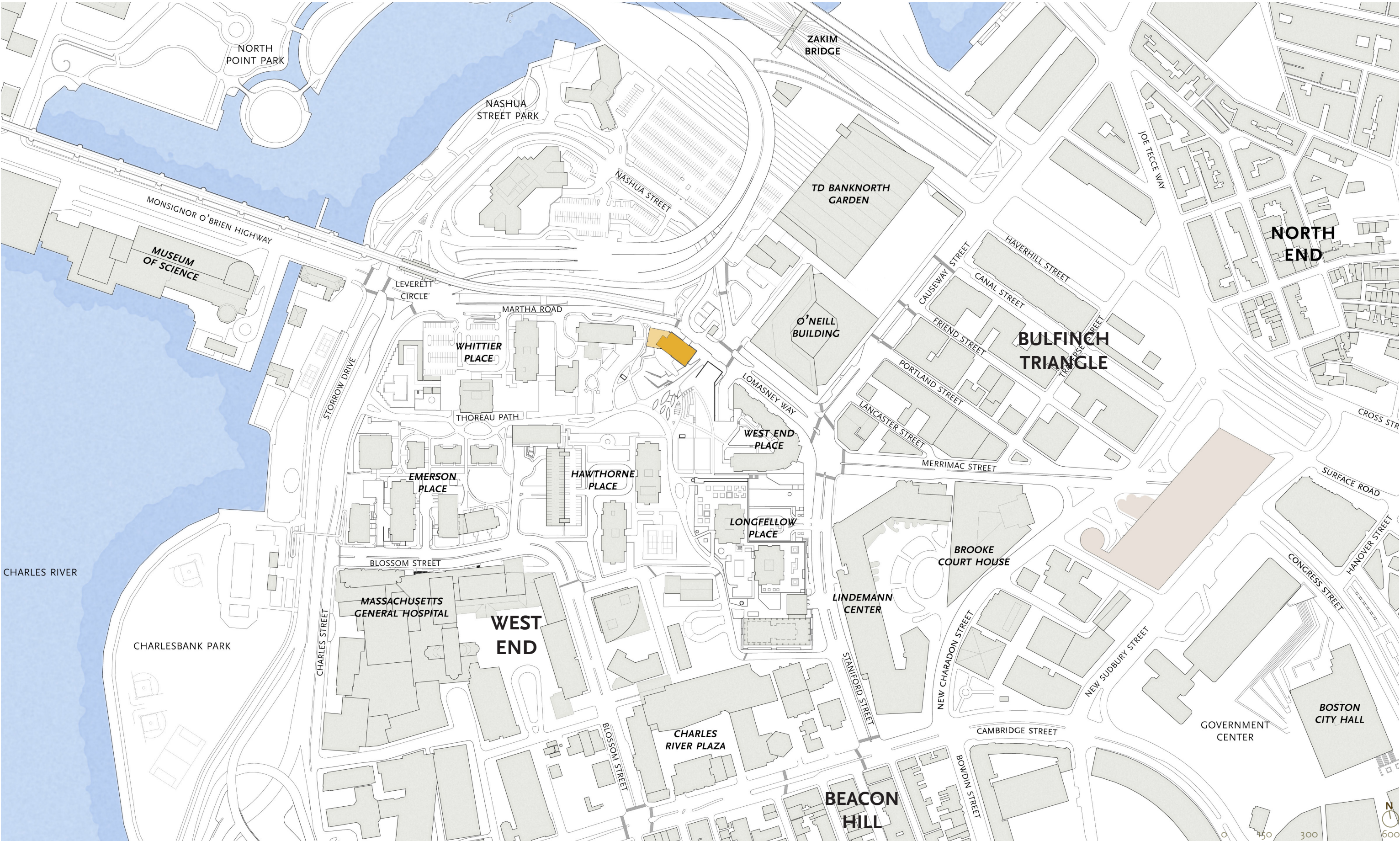
1.3.2 Project Changes

The NPC Project is envisioned as a single residential building located on the site of the existing parking garage (see Figures 1-4 and 1-5). The current scheme, a 46-story structure, is approximately 465 feet tall and will provide a total of approximately 530,000 square feet of development above grade, which will include approximately 510,000 square feet of residential space and approximately 486 units. To reflect market conditions, the NPC Project includes studio, one-bedroom and two-bedroom units. The Proponent has eliminated three-bedroom units due to the fact that the Proponent currently provides 92 three-bedroom units in the West End, and historical data has shown that only 20% of the three-bedroom units are occupied by families. The program will also include approximately 18,000 square feet of common area and amenity space for residents and approximately 2,000 square feet of retail space. The building is located in the northwest corner of the site, which allows for the pedestrian circulation to better connect to Thoreau Path, as well as allow for a significant amount of new sunlight to reach Thoreau Path (see Figure 1-6). The building location and walkway to connect Thoreau Path to Lomasney Way also separate the site to create a semi-private resident yard without the need for fences. The NPC Project includes a five level below-grade parking structure with public and residential parking spaces. The parking garage, which includes approximately 830 spaces, has been redesigned to include two entry/exit points to the north, one incorporated in the west side of the building's footprint accessed from Martha Road, and another to the east of the building accessed from Lomasney Way, which will include the parking garage lobby. Vehicular access to both parking entries will be via a raised driveway level with the existing sidewalk of Lomasney Way.



Garden Garage Redevelopment NPC Boston, Massachusetts



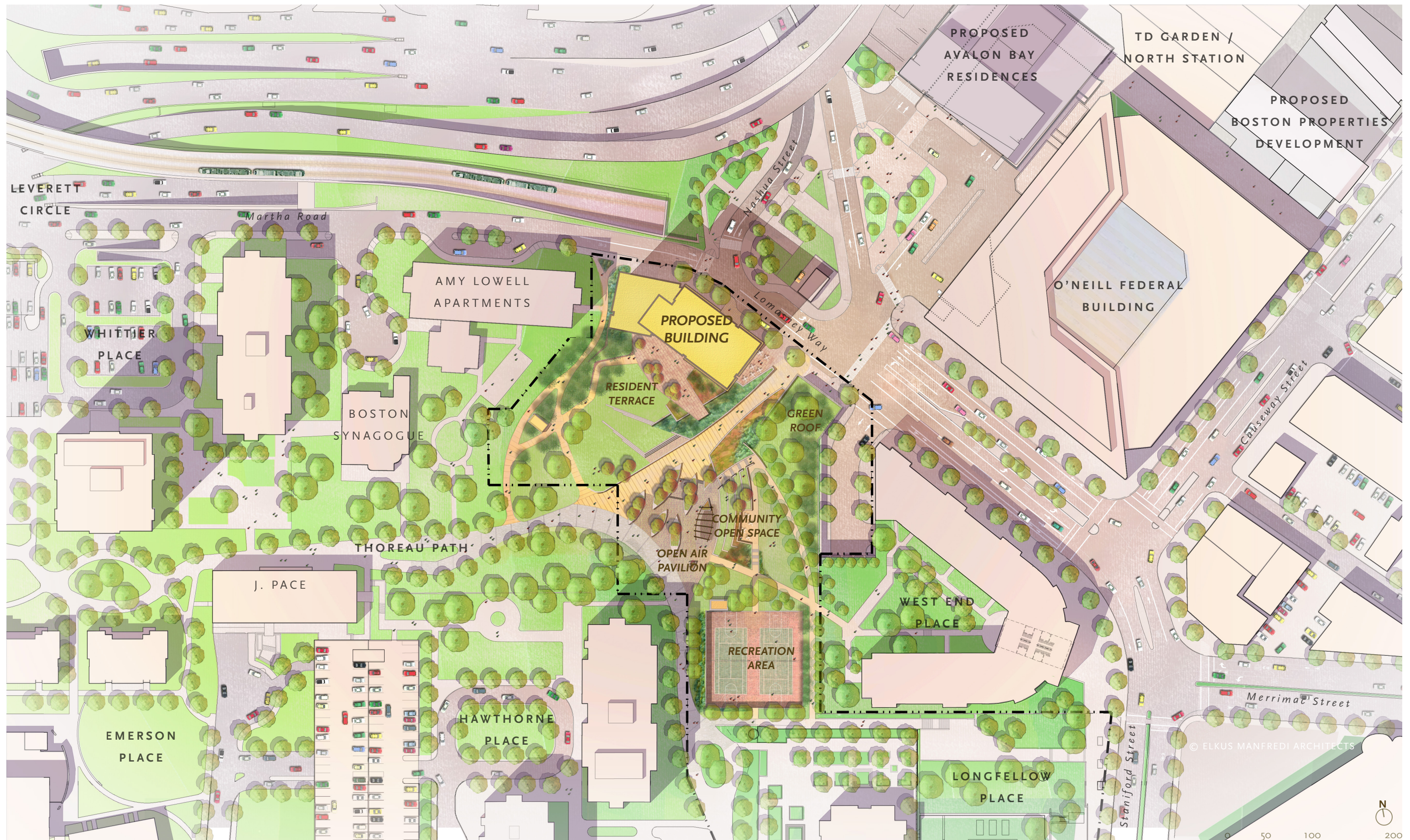


Garden Garage Redevelopment NPC Boston, Massachusetts

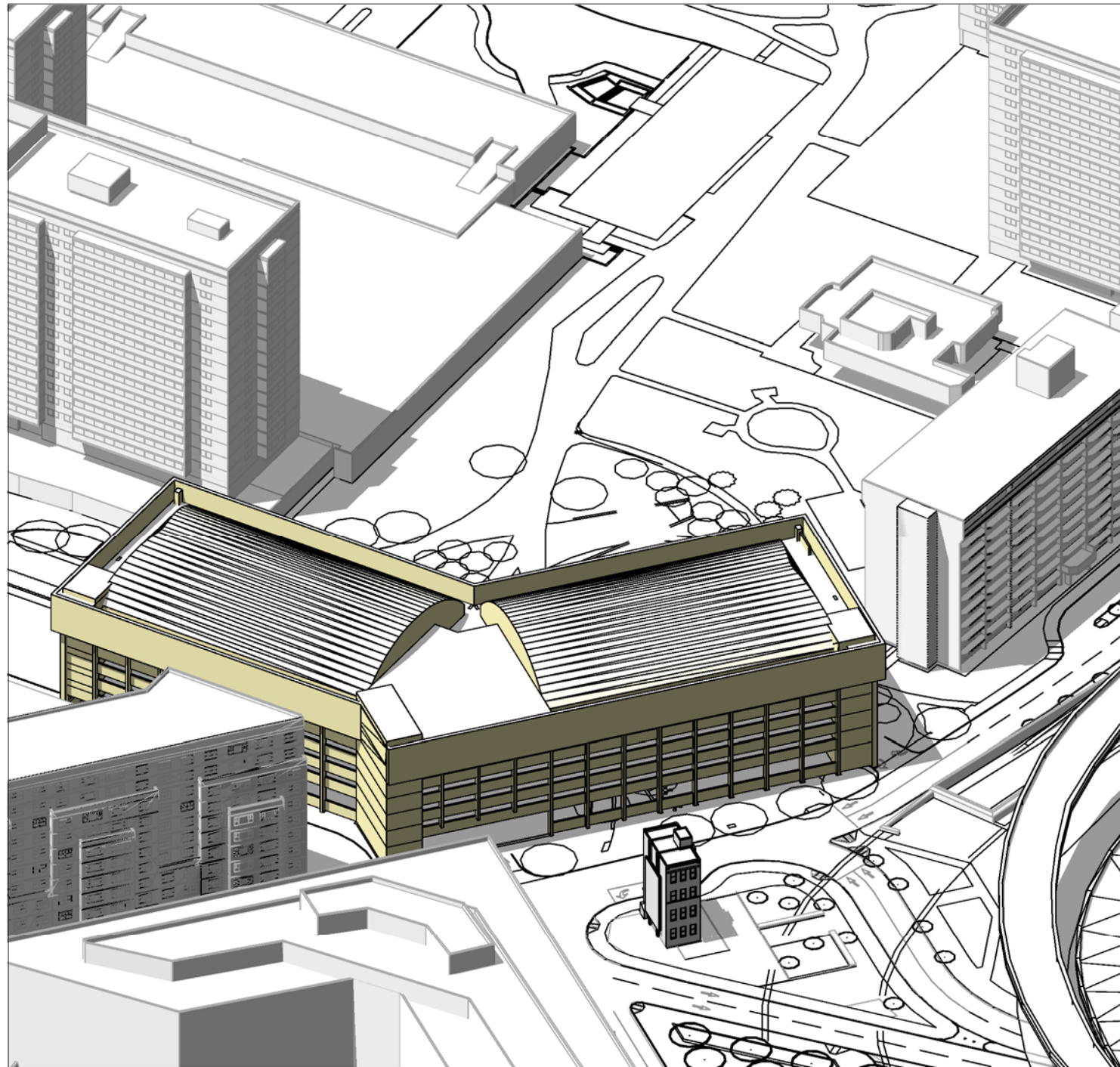


*BUILDING IN NASHUA STREET
PARK NOT SHOWN FOR CLARITY

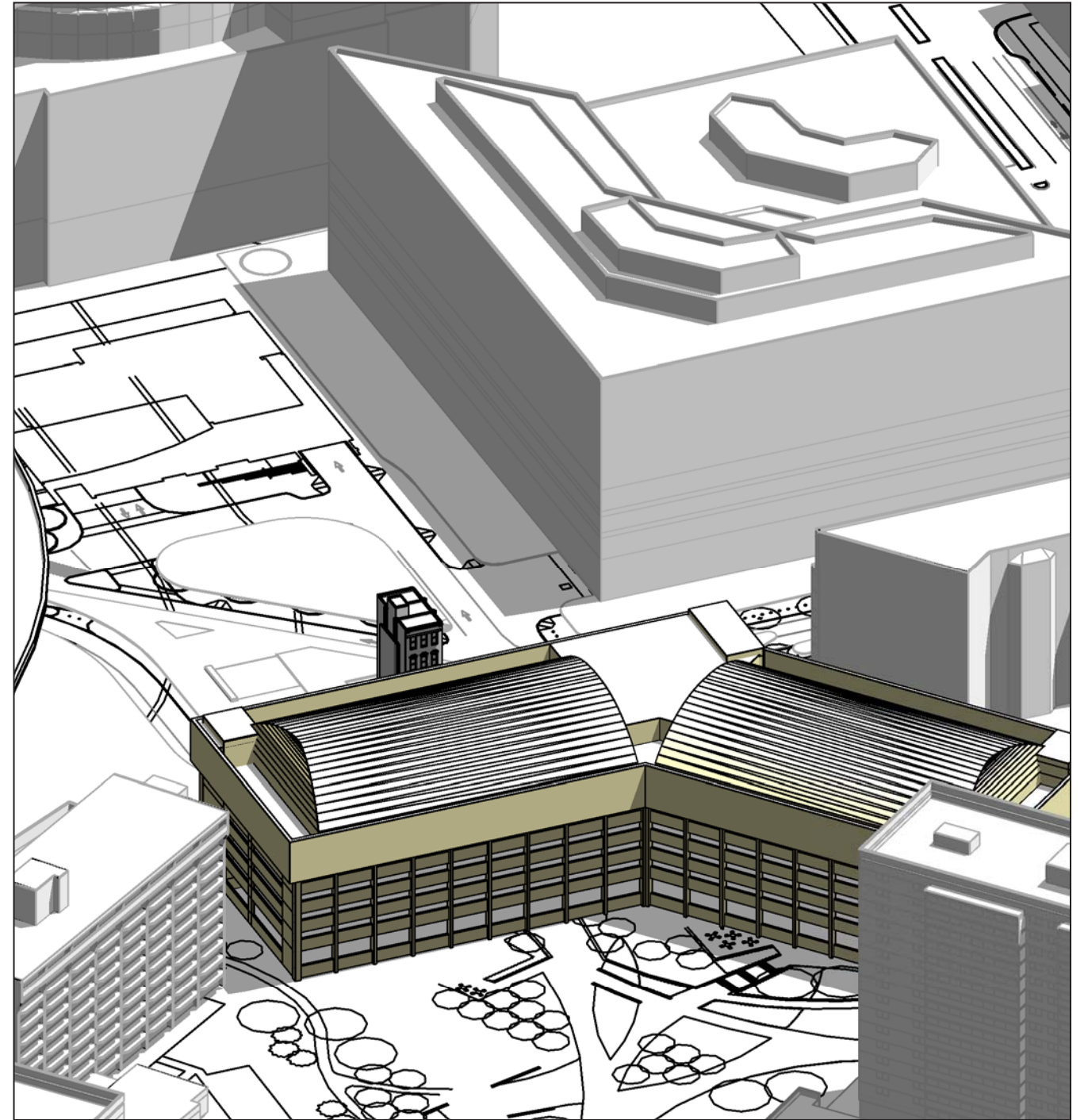
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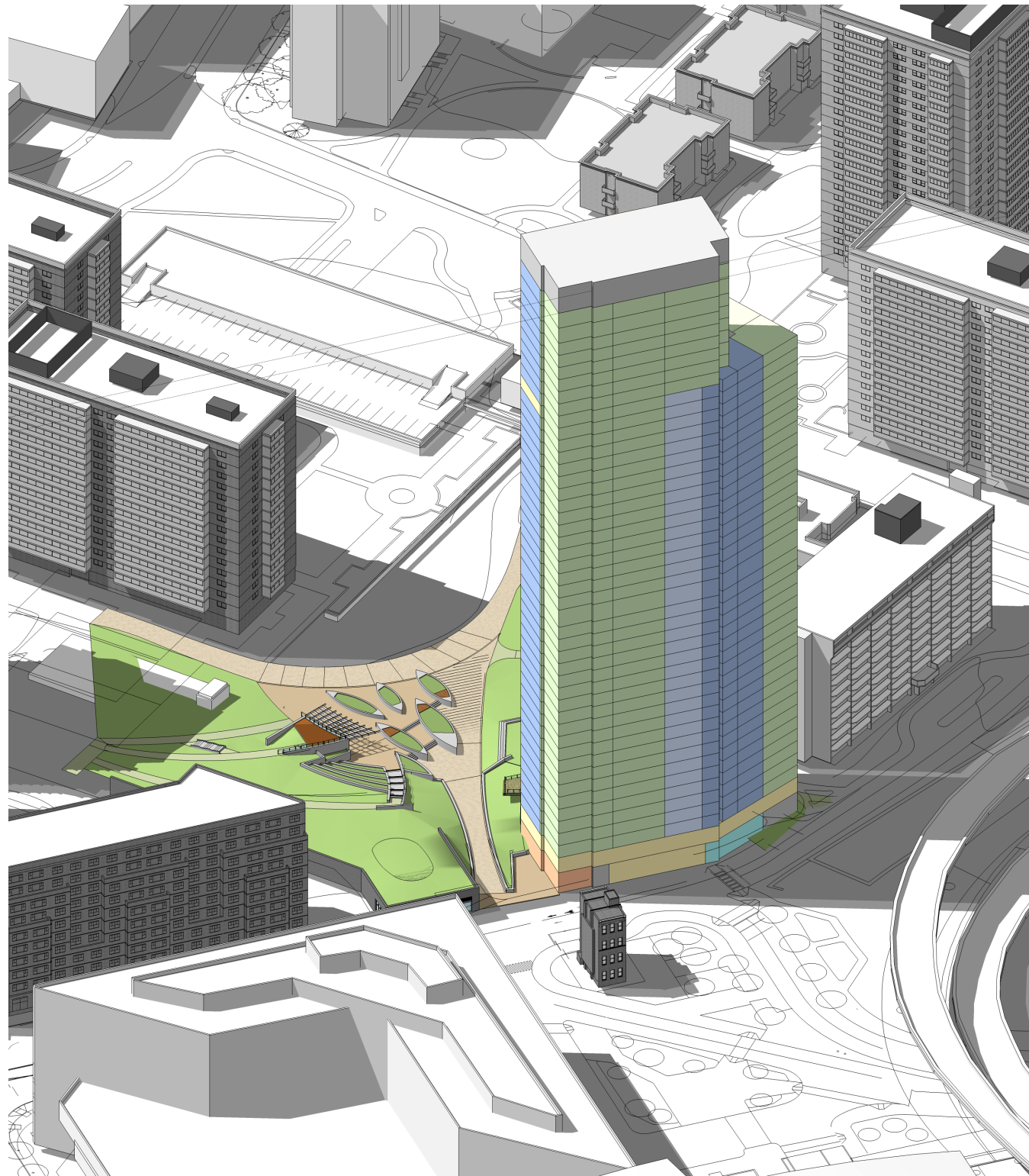
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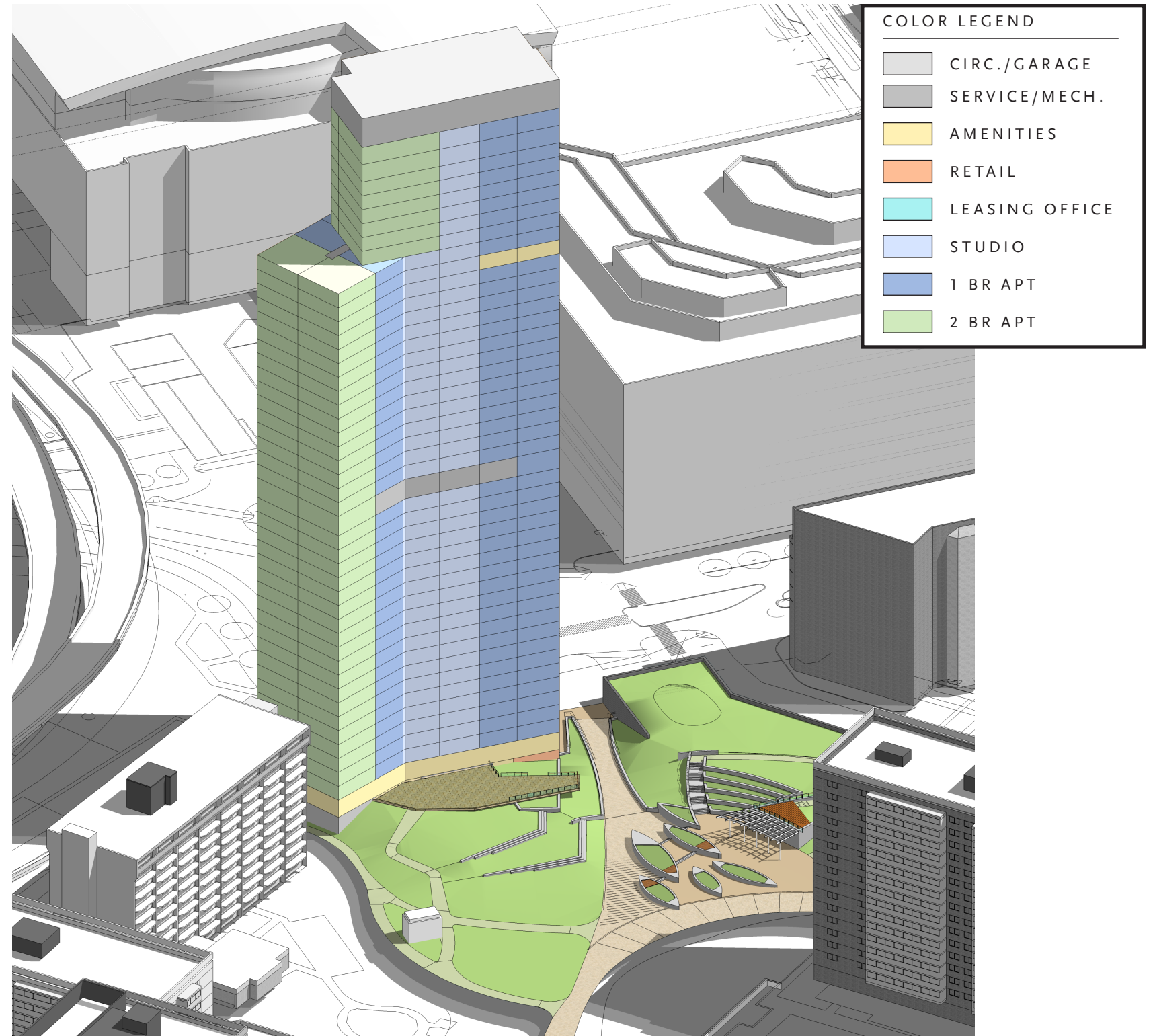
EXISTING MASSING FROM THE NORTH



EXISTING MASSING FROM THE WEST



PROPOSED MASSING FROM THE EAST



PROPOSED MASSING FROM THE WEST

The NPC Project has been revised to be a vital neighbor in the West End community—to provide clear pedestrian access to and through the site, make the best use of the proposed open space, and protect the maximum number of views from the adjacent residential properties. The current proposal embodies all of the key urban design principles discussed in the DPIR: recognizing and reinforcing the existing neighborhood; improving pedestrian access; creating a pedestrian-friendly edge along Lomasney Way; and creating over 2.5 acres of new urban open space—an increase of nearly half an acre over the two-tower scheme, and almost one acre over the existing condition (see Figure 1-7). A detailed list of changes since the initial conception of the development is provided in Section 1.7. Figures 1-8 to 1-17 include floor plans, sections and elevations of the NPC Project. Appendix A includes the Accessibility Checklist.

Table 1-1 provides a comparison of the previously proposed project and the NPC Project.

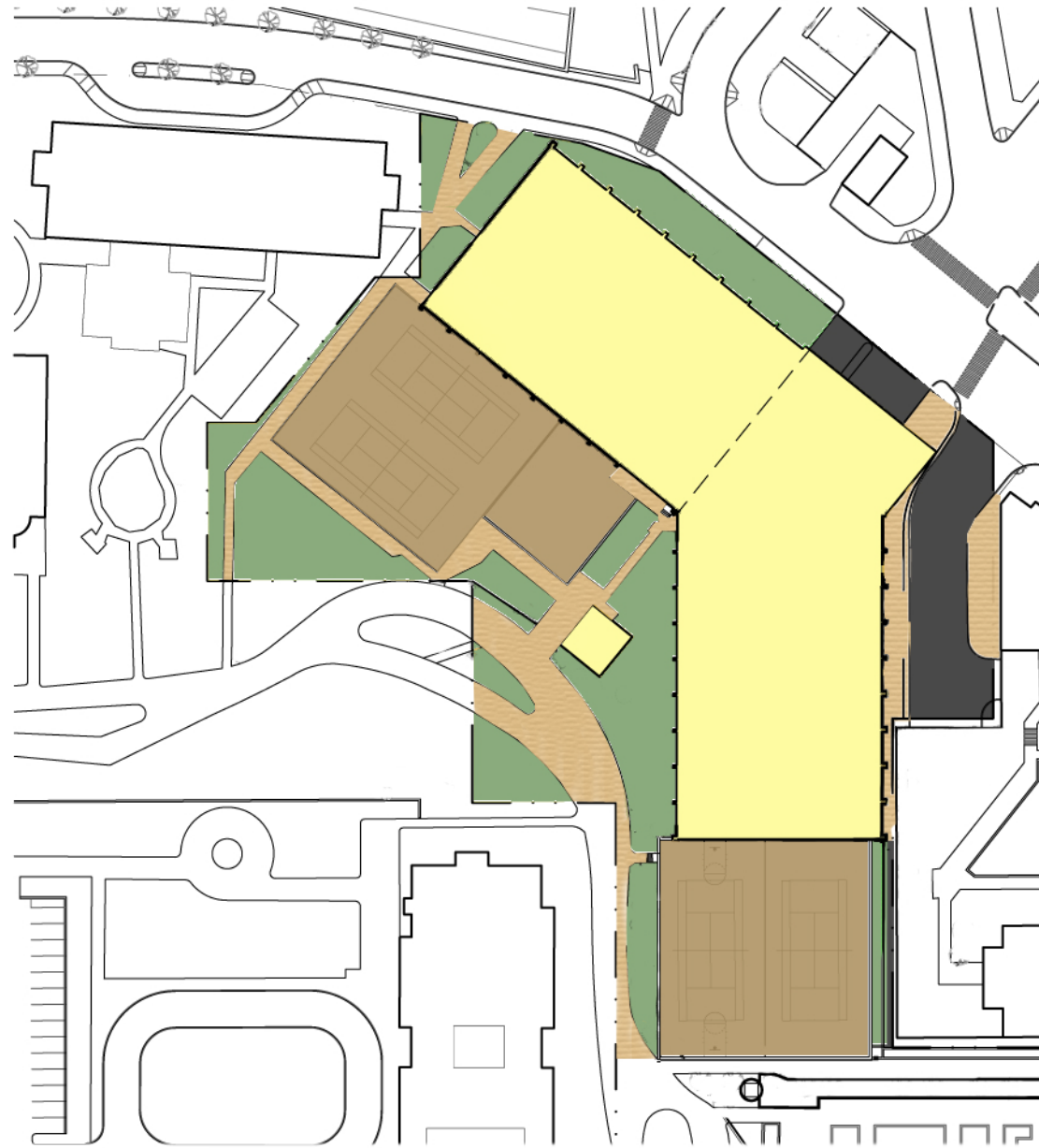
Table 1-1 Program Comparison – Approximate Dimensions

Project Element	Previously Proposed Project	NPC Project
Project Site	3.02 acres (131,600 square feet)	3.02 acres (131,600 square feet)
Building Footprint (at grade)	32,760 square feet (total) East Tower: 20,900 square feet West Tower: 11,860 square feet	11,900 square feet
Residential Space	563,000 square feet / 500 units	510,000 square feet / 486 units
Common Area/Amenities	18,500 square feet	18,000 square feet
Retail	3,000 square feet	2,000 square feet
Parking/Below-Grade Areas	390,000 square feet / 850 spaces	400,000 square feet / 830 spaces
Building Height ¹	Two Buildings: 28 stories/310 feet 21 stories/240 feet	Single Building: 46 stories / 465 feet
Open Space ²	2.12 acres (90,453 square feet)	2.58 acres (112,446 square feet)
Floor Area Ratio for Planned Development Area of which Project site is a part	4.41	4.3

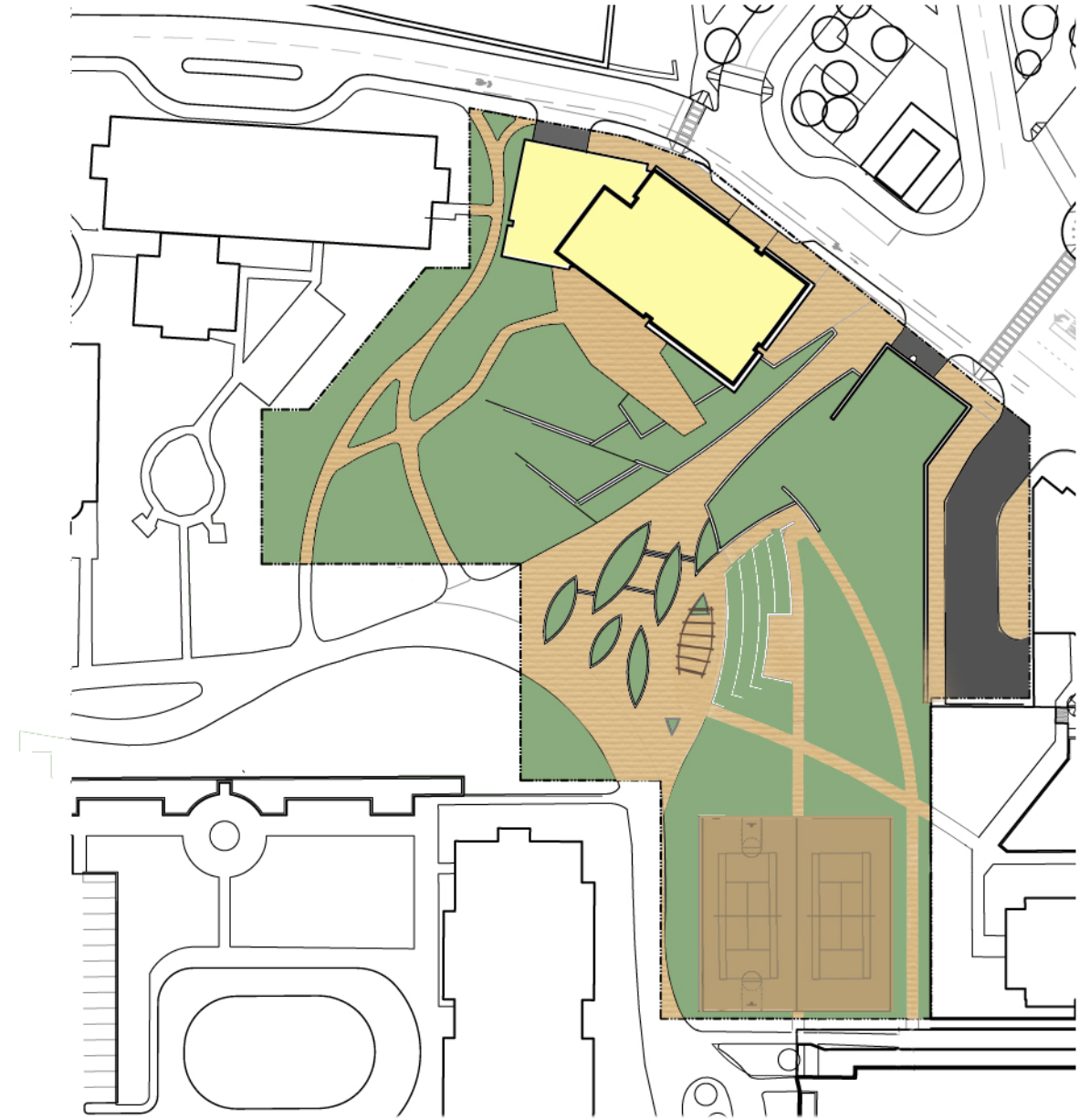
Notes:

1) According to the Boston Zoning Code.

2) Open space includes planting areas, pedestrian walkways, sidewalks, and recreation areas.



EXISTING SITE DEVELOPMENT



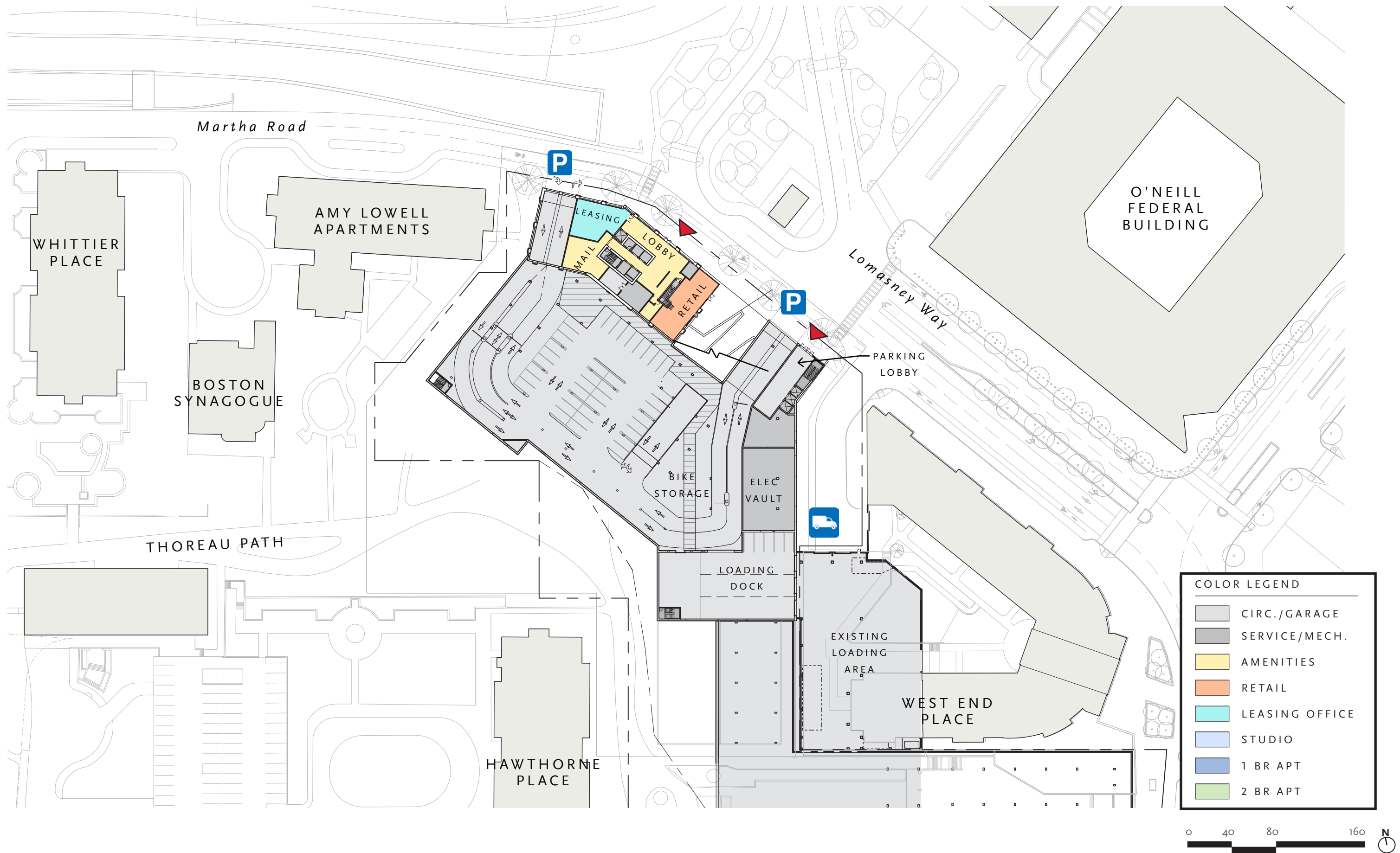
PROPOSED SITE DEVELOPMENT

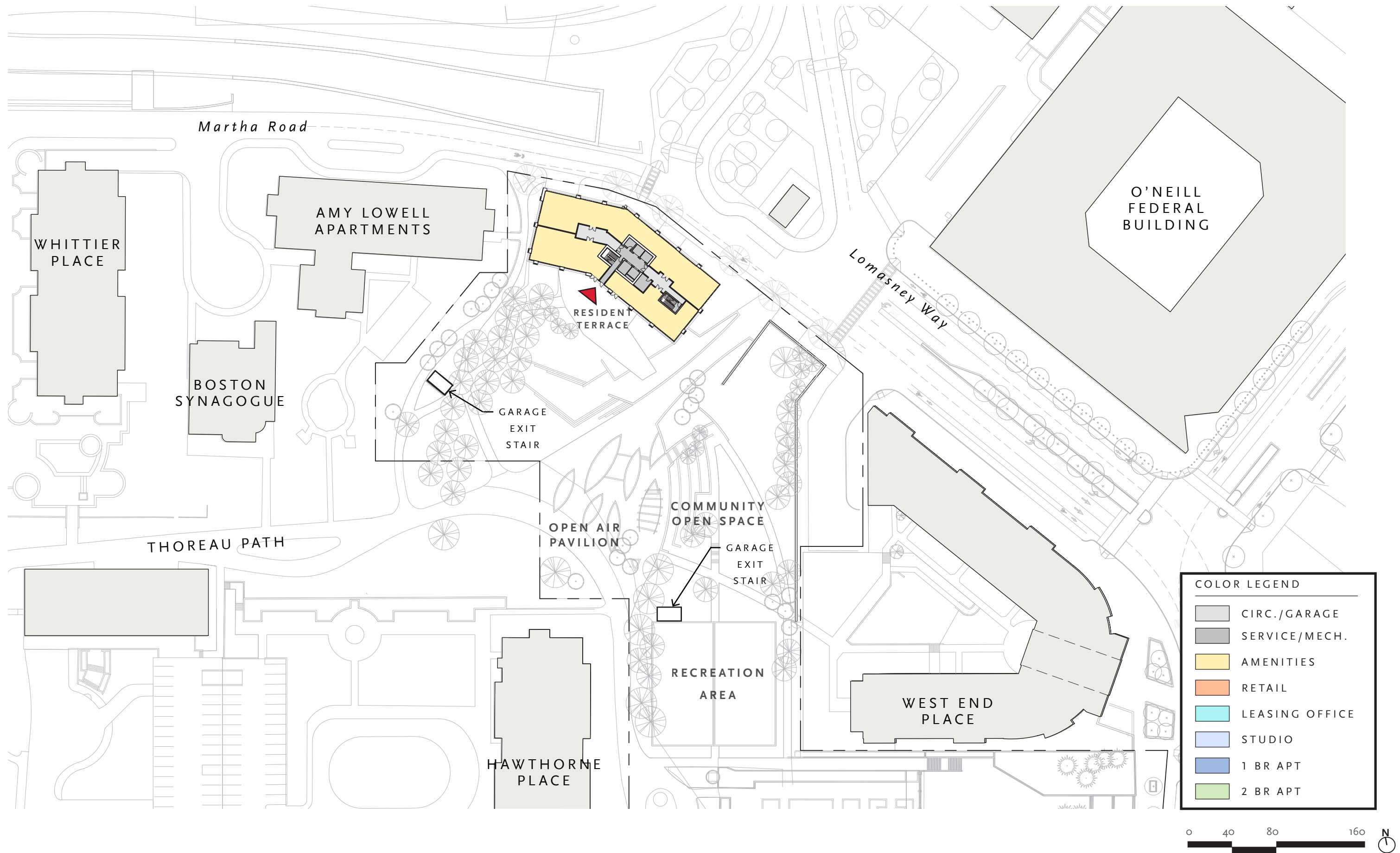
ELEMENT	EXISTING	PROPOSED	CHANGE
 BUILDING FOOTPRINTS	50,150 SQ.FT.	11,814 SQ.FT.	-38,336 SQ.FT.
 PLANTED AREAS	27,248 SQ.FT.	61,424 SQ.FT.	+34,176 SQ.FT.
 HARDSCAPES	43,616 SQ.FT.	50,688 SQ.FT.	+7,072 SQ.FT.
 DRIVEWAY	10,586 SQ.FT.	7,674 SQ.FT.	-2,912 SQ.FT.

TOTAL SITE AREA : 131,600 SQ.FT.

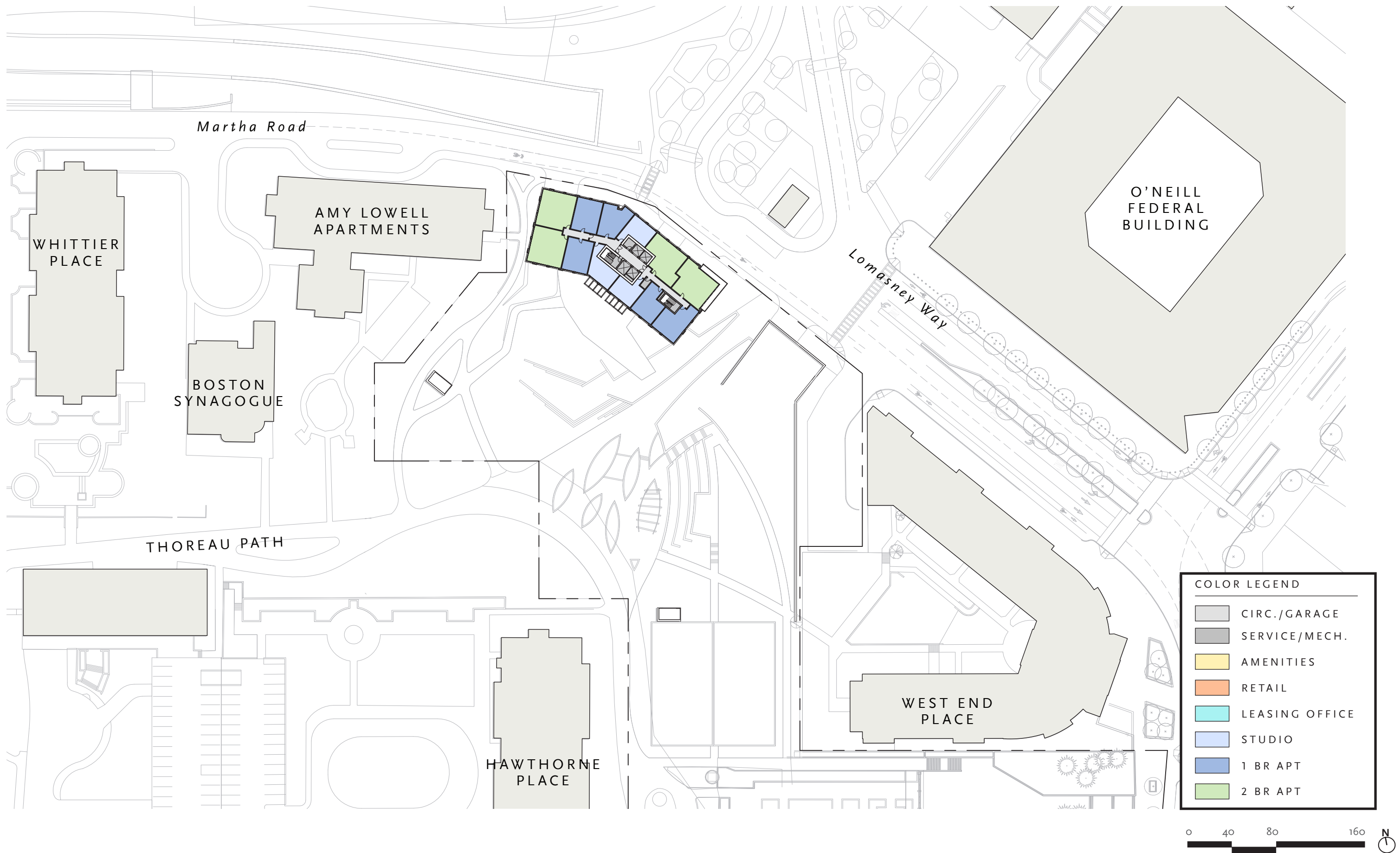
THE STRATEGY OF PLACING THE PARKING BELOW GRADE SIGNIFICANTLY REDUCES THE OVERALL BUILDING FOOTPRINT ON THE SITE AND PROVIDES 41,248 SQUARE FEET (0.95 ACRES) OF NEW USEABLE OPEN SPACE ON THE SITE.

USEABLE OPEN SPACE INCLUDES: PLANTING AREAS, WALKWAYS, AND HARDSCAPE.

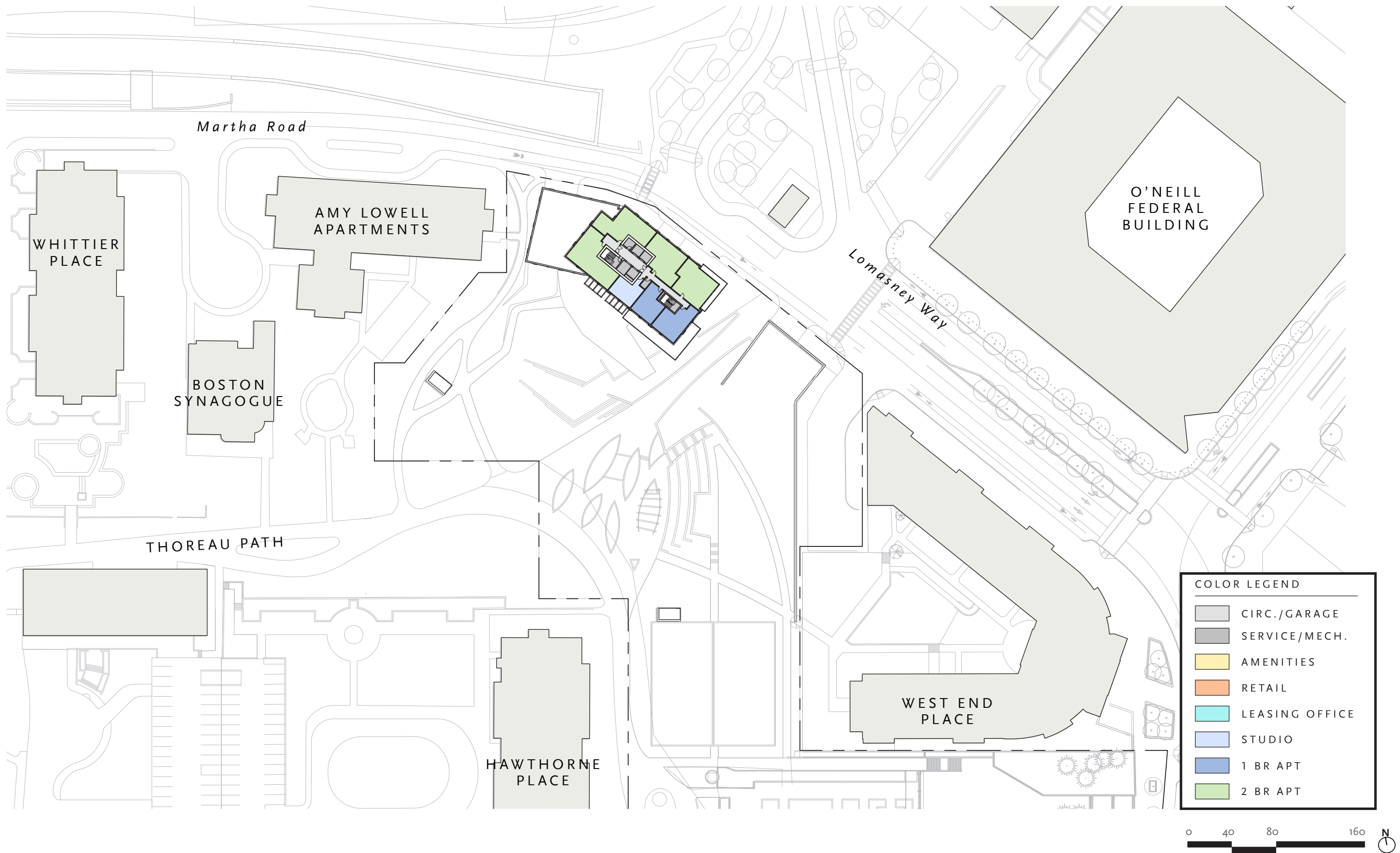


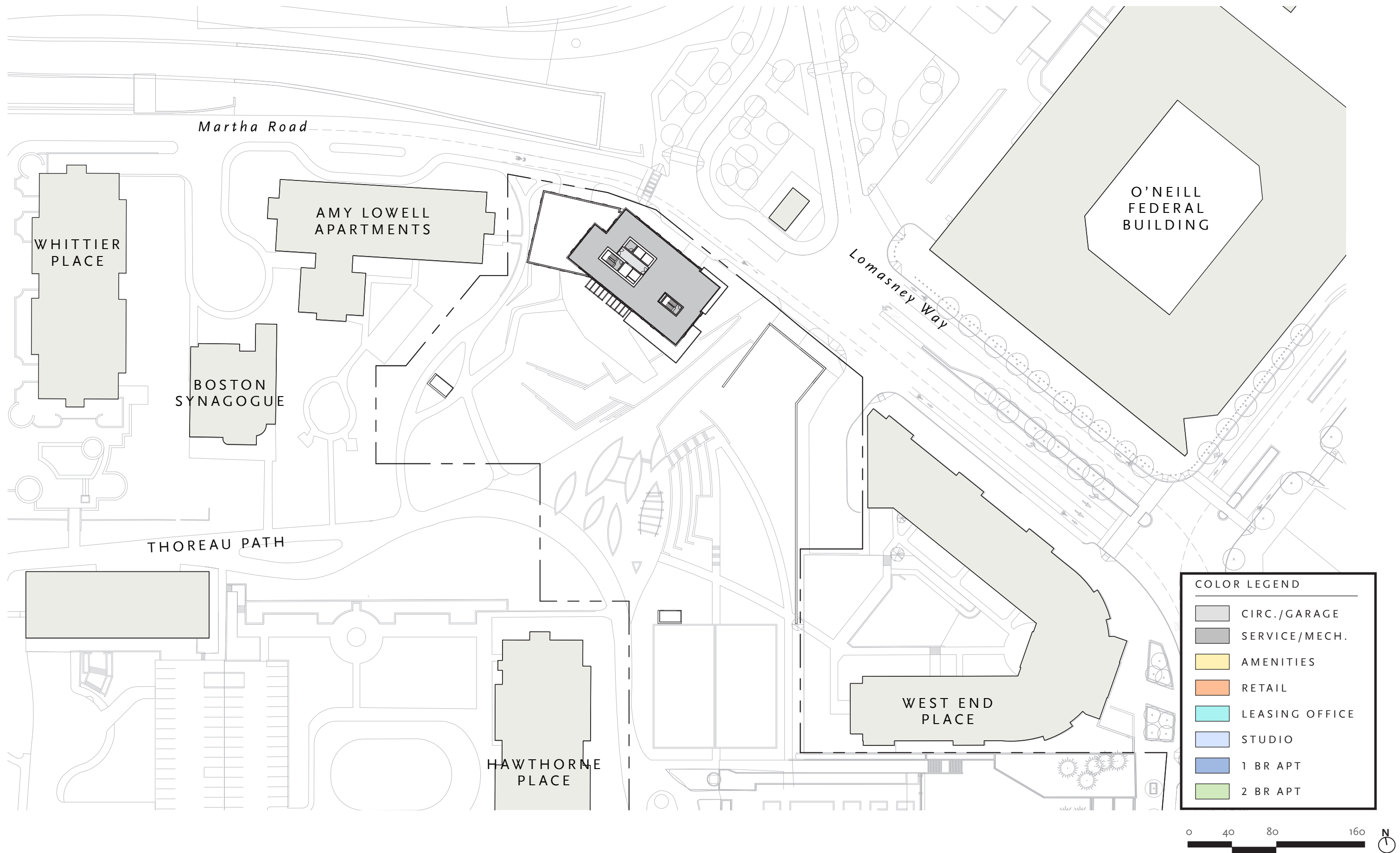


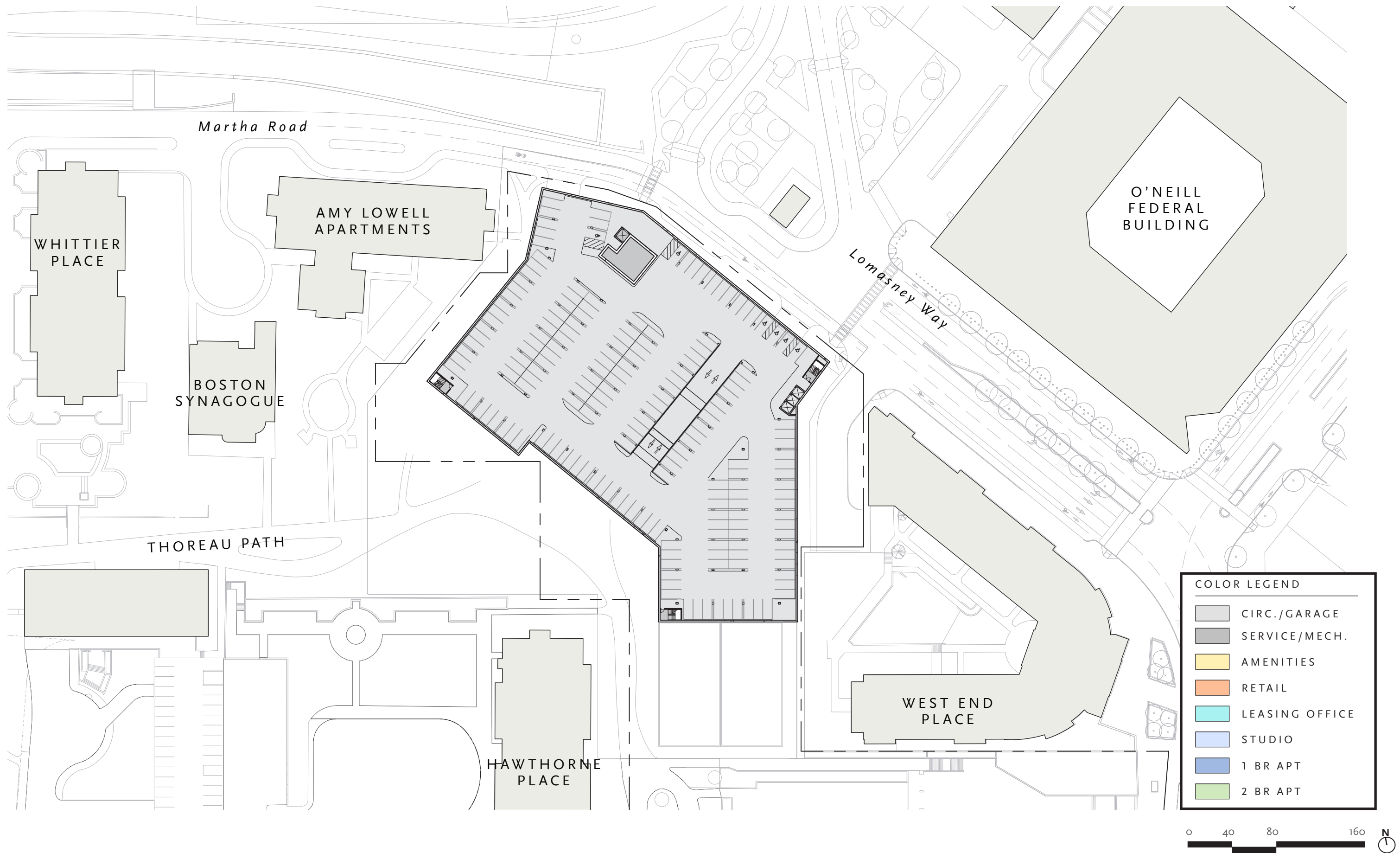
Garden Garage Redevelopment NPC Boston, Massachusetts



Garden Garage Redevelopment NPC Boston, Massachusetts







COLOR LEGEND

CIRC./GARAGE

SERVICE/MECH.

AMENITIES

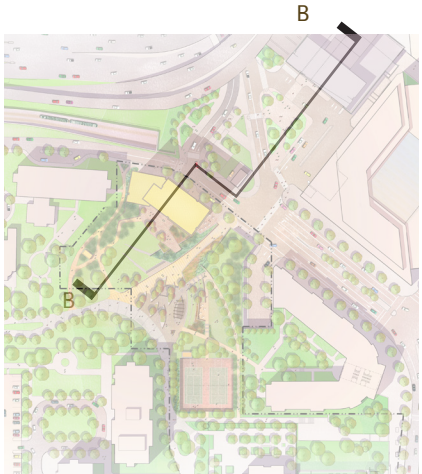
RETAIL

LEASING OFFICE

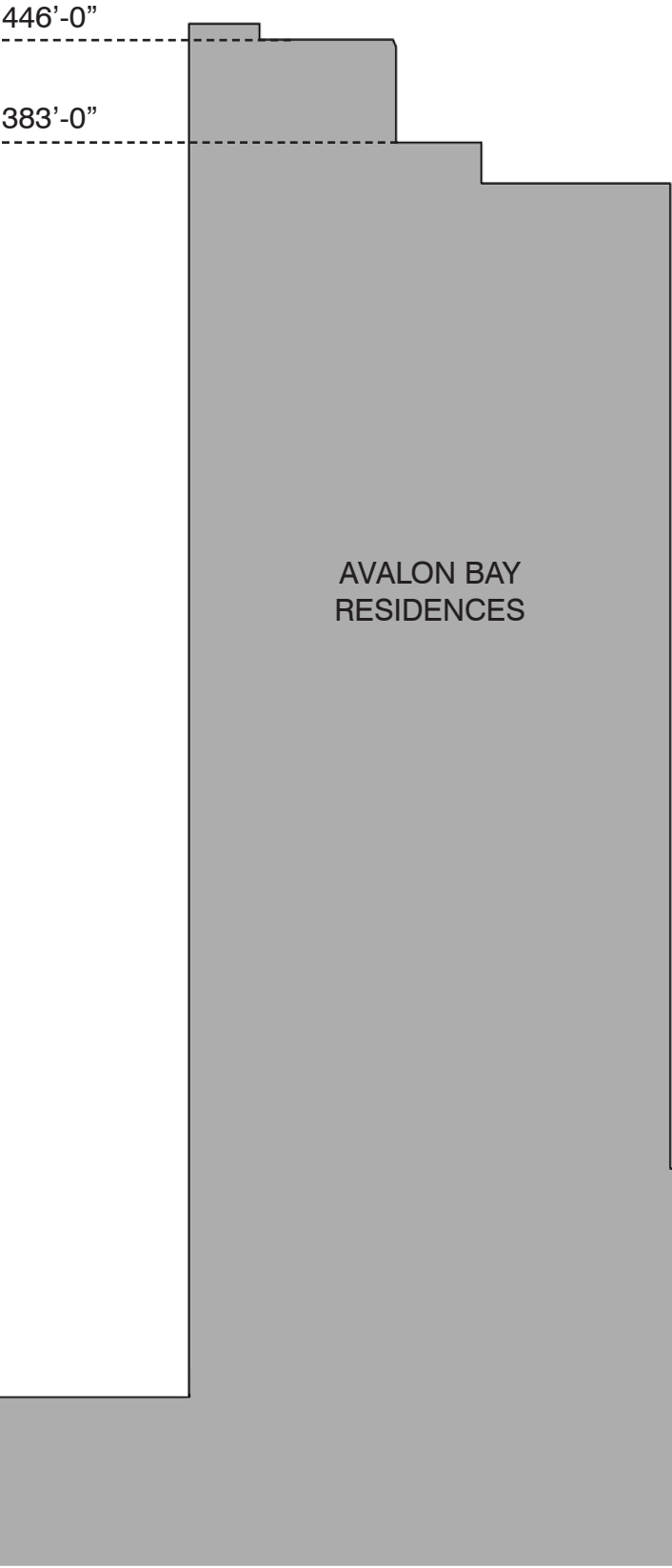
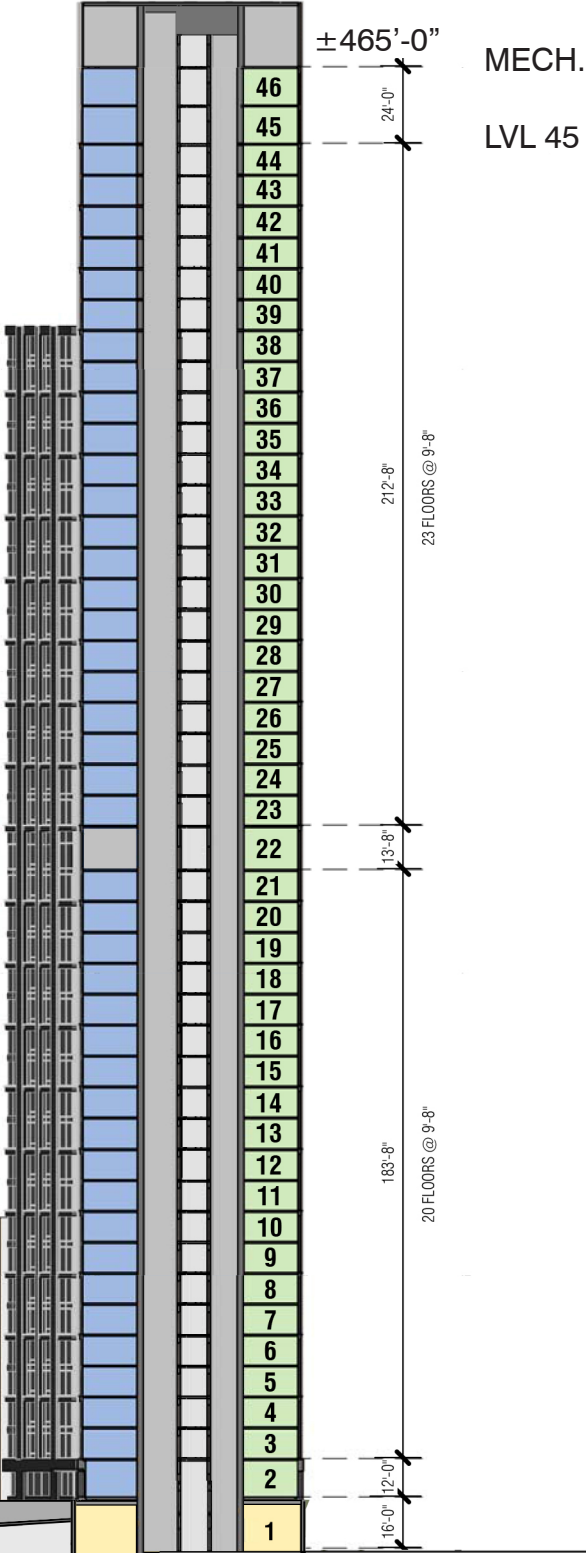
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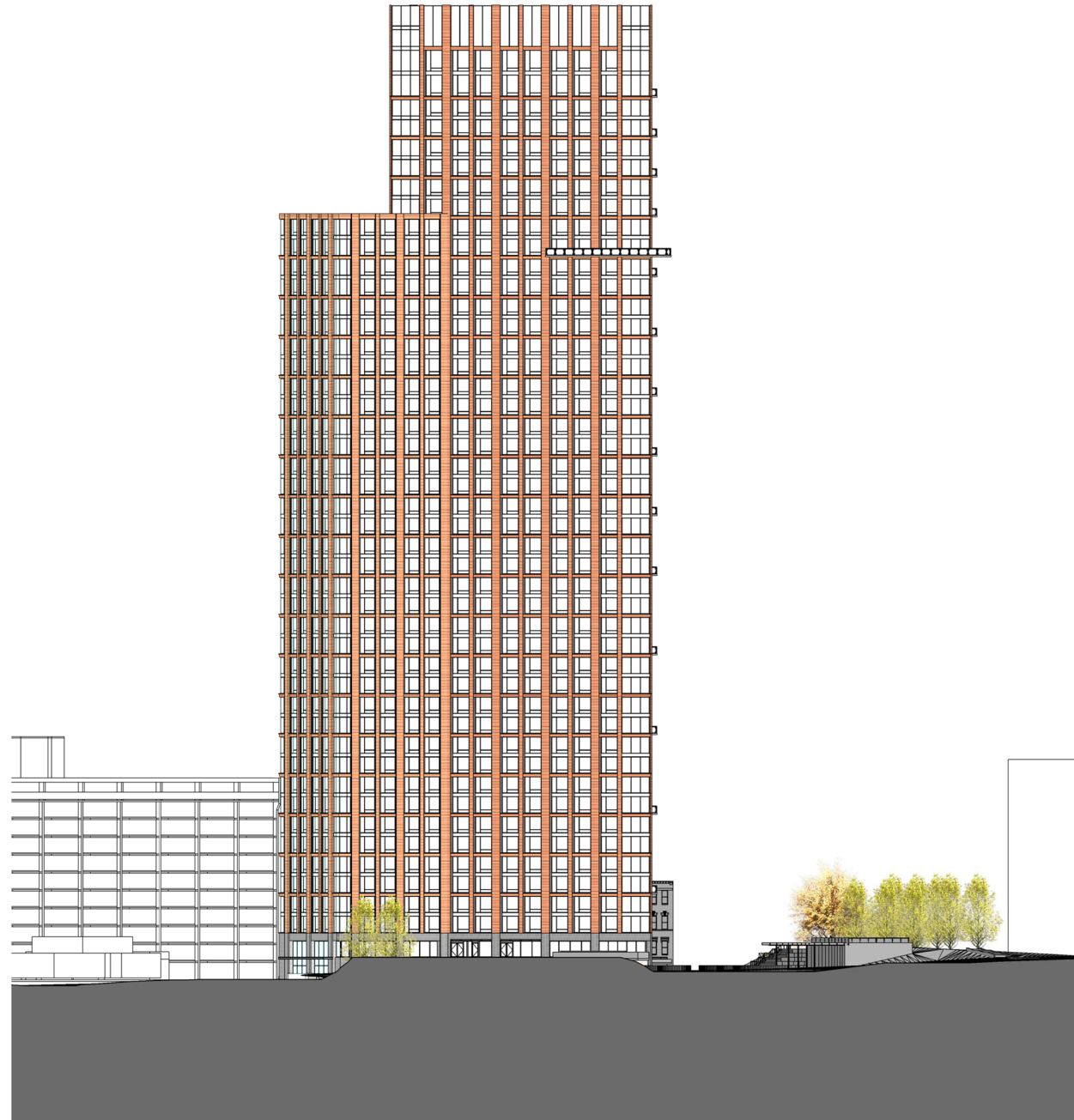
1 BR APT

2 BR APT

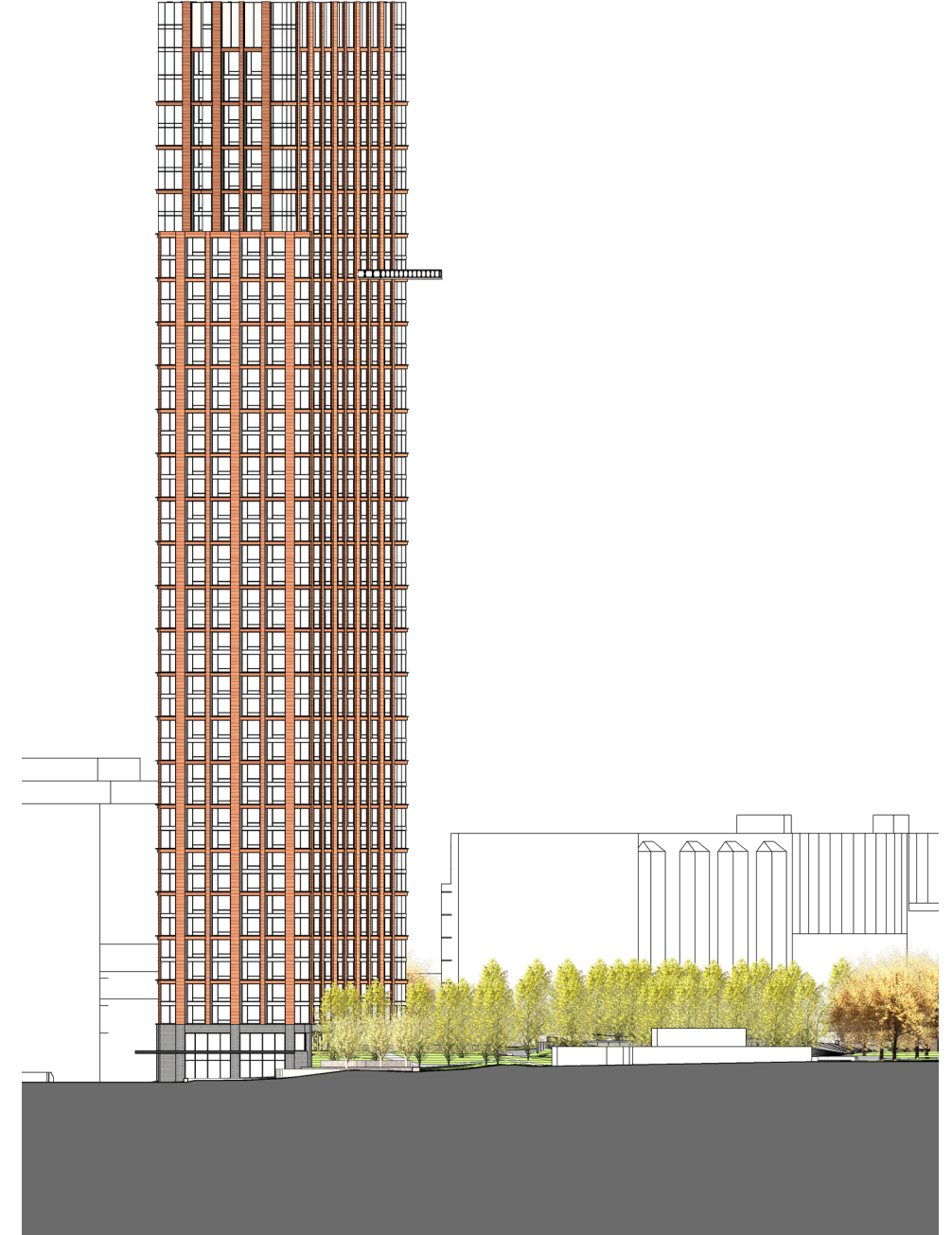


AMY LOWELL
APARTMENTS





SOUTH ELEVATION

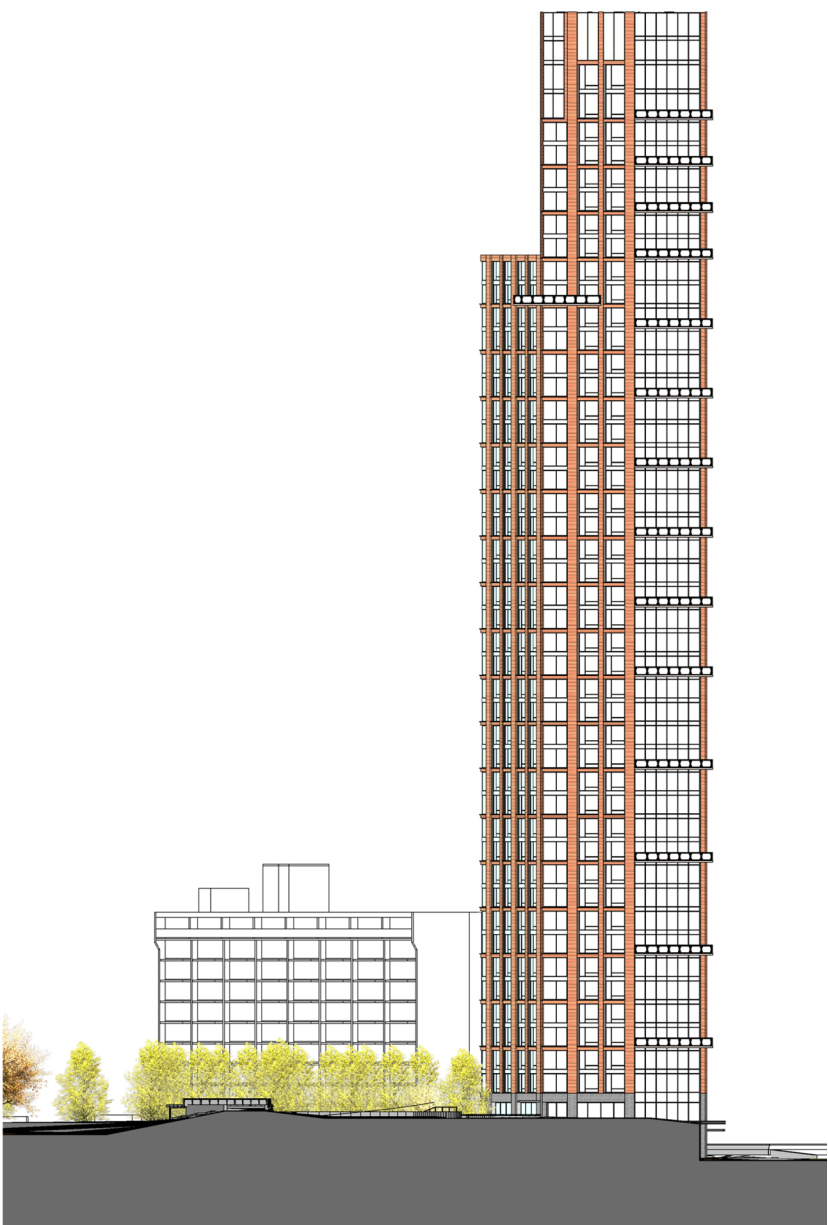


WEST ELEVATION

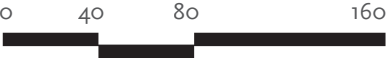




NORTH ELEVATION



EAST ELEVATION



1.4 Public Benefits

The NPC Project will include numerous benefits to the neighborhood and the City of Boston, including:

- ◆ Providing approximately 486 housing units, consistent with the Mayor's initiative to create more housing in Boston;
- ◆ Providing affordable units consistent with the Inclusionary Development Policy dated February 29, 2000 as been amended;
- ◆ Replacing an unattractive above-grade parking structure with a new, appealing residential building (paired with below-grade parking) that complements the surrounding area;
- ◆ Improving the pedestrian environment within Boston's West End neighborhood by providing new lighting, landscaping, and walkways;
- ◆ Creating better pedestrian linkages between North Station and Thoreau Path;
- ◆ Enhancing pedestrian safety and convenience by reducing the curb cut at Lomasney Way;
- ◆ Improving pedestrian and vehicular circulation by incorporating a second garage entrance from Martha Road as well as a below-grade connection to the Longfellow Garage;
- ◆ Providing preferred parking locations for low-emission and fuel-efficient vehicles;
- ◆ Providing electric vehicle charging stations in the proposed garage;
- ◆ Increasing the area of open space on the Project site by almost one acre over the existing condition and approximately one-half acre over the previously proposed project, which will include programmable outdoor spaces such as an open-air pavilion;
- ◆ Setting aside approximately 2,000 square feet for retail;
- ◆ Providing outdoor bike racks for use by residents and the public;
- ◆ Increasing the amount of sunlight reaching spaces such as Thoreau Path (see the Shadow Analysis in Section 2.3);
- ◆ Improving view corridors for some residents on lower floors of adjacent buildings whose views are obstructed by the existing garage;

- ◆ Providing areas suitable for public art;
- ◆ Creating approximately 450 full-time and part-time construction jobs;
- ◆ Creating approximately 10 permanent jobs for operation of the property; and
- ◆ Providing significant property tax revenues for the City of Boston: compared to approximately \$663,000 under existing conditions, the Proponent expects to pay approximately \$700,000 in taxes over the three-year construction period and, as presently calculated, approximately \$2,600,000 per year once the Project is complete.

1.5 Legal Information

1.5.1 Legal Judgments Adverse to the Proposed Project

There are no legal judgments or actions pending against Charles River Park “D” Company (an entity controlled by Equity Residential, the Proponent) or Equity Residential that would impair the Proponent from carrying out the NPC Project.

1.5.2 History of Tax Arrears

There are no tax arrears on the NPC Project site. The Proponent is not delinquent in any tax obligations to the City of Boston.

1.5.3 Site Control / Nature of Public Easements

Charles River Park “D” Company, an entity controlled by Equity Residential, currently holds title to the three-acre Project site. There is no property necessary to construct the Project that is not owned or otherwise controlled by the Proponent. The site is subject to service area easements granted to the neighboring West End Place development including a driveway and sidewalk easement, a loading bay easement, and a drainage and utility easement, which govern space between the buildings on the two properties. The site is also subject to a parking agreement with Amy Lowell Apartments, whereby up to 50 residents of Amy Lowell Apartments are entitled to license parking spaces at prevailing market rates. As of September 2014, eight spaces were under agreement with Amy Lowell Apartments residents.

The approximately three-acre NPC Project site is not a separate legal parcel. For zoning purposes, there is no need to create a separate legal parcel for the Project site.

1.5.4 Zoning

As set forth in the DPIR, the Proponent will seek an amendment to the existing Planned Development Area (PDA) for the NPC Project. Prior to amending the existing PDA, the Proponent will pursue an amendment to Article 27D of the Code in order to accommodate the height of the NPC Project.

1.6 Regulatory Controls and Permits

Table 1-2 contains a list of anticipated 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 1-2 Anticipated Permits and Approvals

AGENCY	APPROVAL
<i>Local</i>	
Boston Civic Design Commission	Schematic Design Review
Boston Committee on Licenses/Public Safety Commission	Flammable Storage License; Permit to erect and maintain parking garage
Boston Landmarks Commission	Article 85, Demolition Delay (completed)
Boston Inspectional Services Department	Building Permit; Demolition Permit; Occupancy Permit
Boston Public Improvement Commission	Specific Repair Plan
Boston Redevelopment Authority	Large Project Review; West End Urban Renewal Plan Modification; Cooperation Agreement; PDA Development Plan Amendment; Amendment to Article 27D of the Zoning Code
Boston Transportation Department	Transportation Access Plan Agreement; Construction Management Plan
Boston Water and Sewer Commission	Water and Sewer Connection Permits; Hydrant Permit; Temporary Construction Dewatering Permit; General Service Application; Site Plan Review
Boston Zoning Commission	PDA Development Plan Amendment; Amendment to Article 27D of the Zoning Code
Board of Street Commissioners	Flammables Permit (parking garage)
Boston Fire Department	Demolition/Alteration/Construction Permit; Approval of Fire Safety Equipment
<i>State</i>	
Department of Environmental Protection	Self-certification for sewer discharges; Construction Dewatering Permit; Groundwater Discharge Permit; Environmental Results Program; Notifications of Demolition and Construction

Table 1-2 Anticipated Permits and Approvals (Continued)

AGENCY	APPROVAL
Executive Office of Energy and Environmental Affairs (Massachusetts Environmental Policy Act)	Environmental Review (completed)
Massachusetts Historical Commission	State Register Review (completed through MEPA review)
Massachusetts Water Resources Authority	Temporary Construction Dewatering Permit
<i>Federal</i>	
Federal Aviation Administration	Determination of No Hazard to Air Navigation
U.S. Environmental Protection Agency	National Pollutant Discharge Elimination System (NPDES) Construction Permit

1.7 Community Group Consultations

The Proponent has met with several community organizations to introduce the NPC Project and discuss its effects on, and benefits to, the neighborhood. These outreach efforts have included presentations to the following groups:

- ◆ Downtown North Association;
- ◆ Several developer-sponsored meetings with individuals and groups based on, among others, the prior Impact Advisory Group (IAG) constituted for the Emerson Place Project;
- ◆ West End Place;
- ◆ Amy Lowell House;
- ◆ Massachusetts General Hospital;
- ◆ City Councilors Ross and Zakim;
- ◆ Representative Jay Livingstone; and
- ◆ Senator Anthony Petrucci's office.

In 2011, the BRA and the Mayor's Office of Neighborhood Services identified the IAG members for the previously proposed project, and meetings were held on January 25, February 24, March 28, 2011, April 17, 2013, May 22, 2013, September 3, 2014, September 23, 2014 and October 14, 2014. Community meetings were held on January 25, 2011, February 7, 2011, August 13, 2013 and September 10, 2014. In direct response to recommendations and requests from the community, the Proponent has made the following changes since the development's initial conception resulting in the currently proposed NPC Project:

- ◆ Reshaped the building massing to better accommodate pedestrians, and relocating the retail space adjacent to the main pedestrian walkway system;
- ◆ Shifted placement of the building on the site and angled the proposed design, thus minimizing the impact to some views of the Zakim Bridge and the Custom House Tower while improving view corridors for some residents on lower floors of adjacent buildings whose views are obstructed by the existing garage;
- ◆ Refined the interface between the NPC Project and the Nashua Street area to be responsive to the Connect Historic Boston project and future improvements envisioned for Nashua Street Residences;
- ◆ Incorporated a second entrance to the proposed garage from Martha Road to create a safer pedestrian edge along the street;
- ◆ Refined the proposed pedestrian walkway system to create a hierarchy of paths;
- ◆ Increased the amount of programmed recreation area to include two multi-surface sport courts;
- ◆ Increased open space by an additional approximately 21,993 square feet;
- ◆ Enhanced the open connection to and through West End Place as part of the circulation of Thoreau Path;
- ◆ Refined the plaza to create more active areas adjacent to the proposed building; and
- ◆ Created more open space and wider sidewalks to enhance the pedestrian experience on the site.

1.8 Schedule

Construction of the NPC Project is anticipated to commence in the first quarter of 2016, with completion anticipated by the first quarter of 2019.

Chapter 2.0

Development Review Component

2.0 DEVELOPMENT REVIEW COMPONENT

2.1 Transportation

2.1.1 Introduction

This section presents the transportation impacts associated with the NPC Project. The changes to the NPC Project will decrease the impacts of the NPC Project in terms of transportation as compared to the previously proposed project.

2.1.2 Site Access

As presented in Figure 1-8, vehicular access to the NPC Project site will remain largely unchanged from that proposed in the DPIR. The new garage will be provided via four entrance and exit gates (versus five today), including two on Lomasney Way and two on Martha Road. The proposed driveway on Lomasney Way will be positioned in generally the same location as the existing driveway; however, the existing driveway will be reduced in width, which will substantially reduce the pedestrian crossing distance and thus improve pedestrian conditions in front of the site. A second driveway on Martha Road will be located approximately 50 feet west of Nashua Street and will provide for only right-turns in and right-turns out. Provision of the second driveway will help diffuse vehicular volume along Lomasney Way and reduce pedestrian – vehicular conflicts. In addition, the NPC Project will maintain the existing vehicular connection between the new parking garage and the Longfellow Garage for use during events, and other high demand periods, to further disperse traffic volumes.

The NPC Project also proposes a short-term pick-up/drop off area adjacent to the site along Lomasney Way to accommodate up to two vehicles (e.g., taxis). This zone would help ensure smooth, and unobstructed, traffic flow along Lomasney Way southbound adjacent to the site.

Primary pedestrian access to the proposed residential lobby will be provided from Lomasney Way. Secondary pedestrian connections will also link the building with Thoreau Path from the rear of the building. The Project will significantly improve the pedestrian environment with the new walkway, new sidewalks, handicapped-accessible ramps, street trees, bicycle racks, and the creation of public open spaces.

The design of the new driveways and sidewalk/pathway improvements will be coordinated with the appropriate City agencies, including BRA, Boston Transportation Department (BTD), and the Public Works Department. Final design will be codified in the Transportation Access Plan Agreement (TAPA) and approved by the Public Improvement Commission, as necessary.

2.1.3 Trip Generation

Following standard traffic engineering procedures, trip generation estimates are derived from the Institute of Transportation Engineers' (ITE) Trip Generation (9th edition, 2012) trip rates. Travel mode split data for the West End supplied by the BTM are then applied to the trip rates for each land use to estimate trips across mode shares. Travel mode shares for the area of the City of summarized in Table 2-1.

Table 2-1 Mode Split Assumptions

Land Use		Walk/Bike Share ¹	Transit Share ¹	Auto Share ¹	Local Vehicle Occupancy Rate ²
<i>Daily</i>					
Residential	In	65%	14%	21%	1.1
	Out	65%	14%	21%	1.1
Retail	In	54%	31%	15%	1.8
	Out	54%	31%	15%	1.8
<i>A.M. Peak Hour</i>					
Residential	In	68%	15%	17%	1.1
	Out	70%	13%	17%	1.1
Retail	In	57%	16%	27%	1.8
	Out	60%	13%	27%	1.8
<i>P.M. Peak Hour</i>					
Residential	In	70%	13%	17%	1.1
	Out	68%	15%	17%	1.1
Retail	In	60%	13%	27%	1.8
	Out	57%	16%	27%	1.8

1. Source: Boston Transportation Department, Area 1 for residential and retail uses.

2. Source: U.S. Census Tract #203 and 2001 National Household Travel Survey, FHWA.

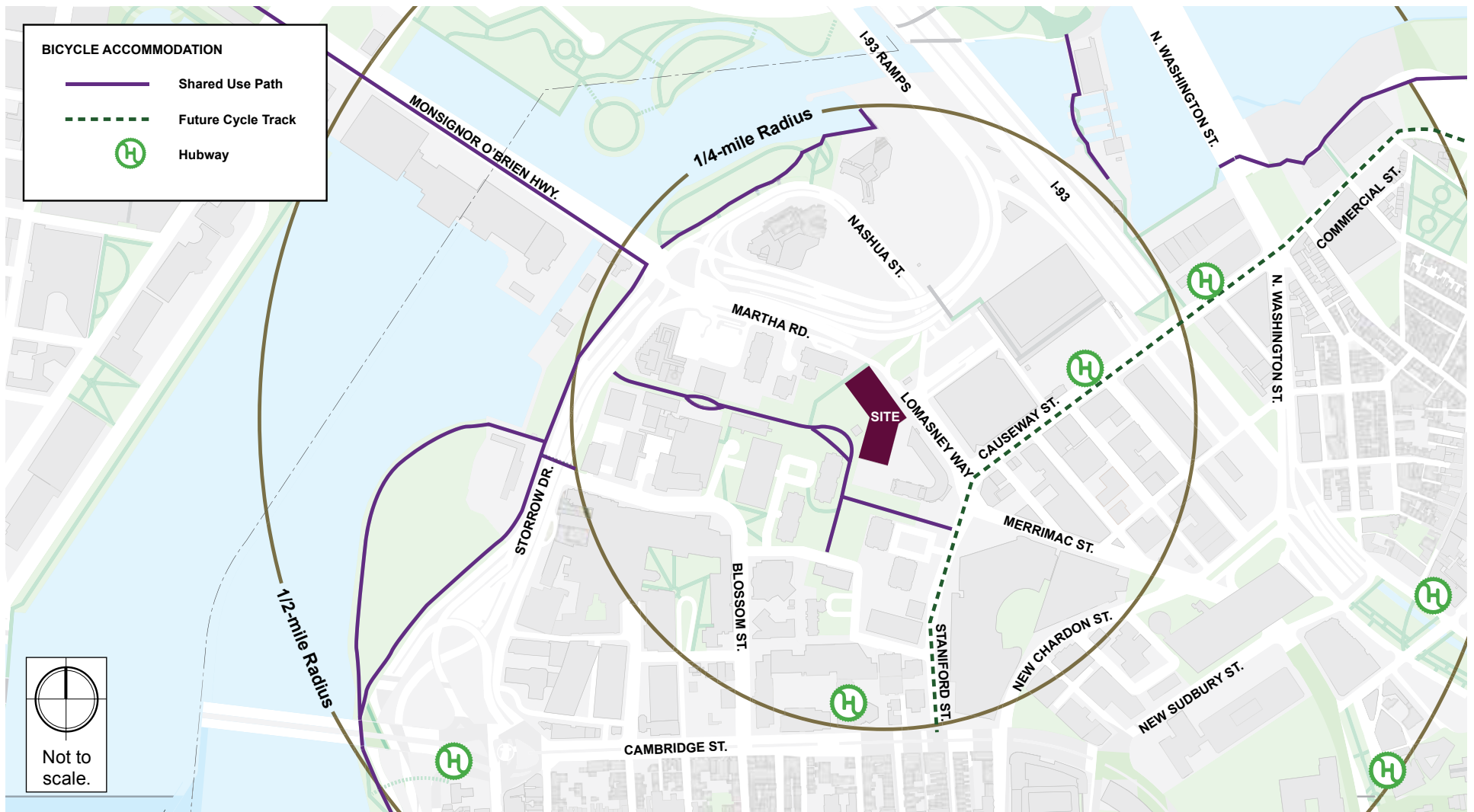
As expected, given the NPC Project site's convenient location to Downtown, area institutions and businesses, and a wide variety of public transit alternatives, between 73% and 85% (see Table 2-1) of all trips in this area of the City are made by non-auto modes of transportation (i.e., walk, bike and transit). The availability of MBTA public transit, Hubway bicycle share stations, and shared car services are illustrated in Figure 2-1, Figure 2-2, and Figure 2-3, respectively.

2.1.3.1 Vehicle Trips

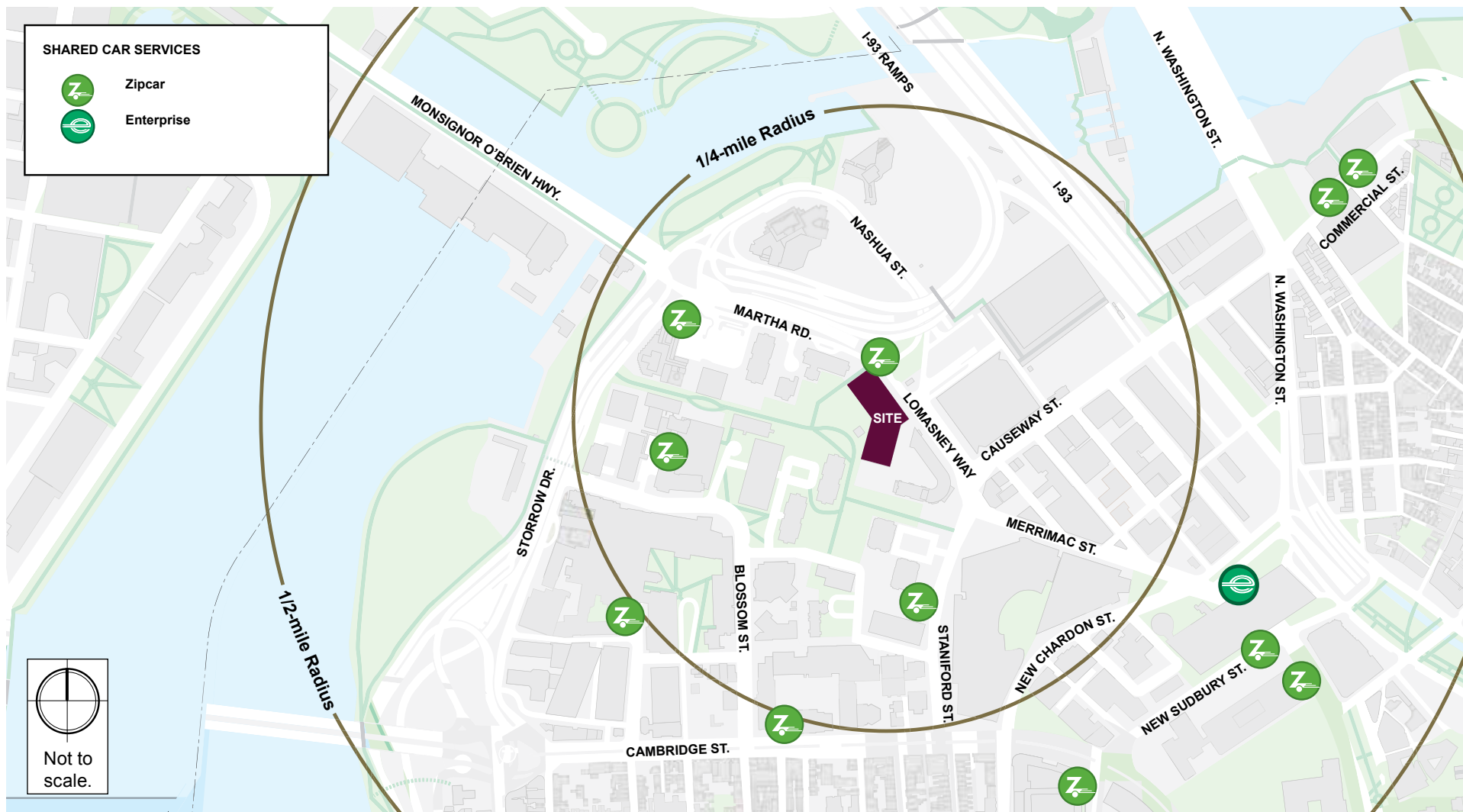
The overall trip generation estimated for the NPC Project is expected to be slightly lower than the previously proposed project due to the decrease of residential units (approximately 14 fewer units) and retail spaces (approximately 1,000 sf smaller).



Garden Garage Redevelopment NPC Boston, Massachusetts



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Garden Garage Redevelopment NPC Boston, Massachusetts

As presented in Table 2-2, the NPC Project is expected to result in 32 fewer average daily vehicle trips as compared to the previously proposed project. The NPC Project would result in a decrease of four vehicle trips during the morning peak hour and nine vehicle trips in the evening peak hour, as compared to the previously proposed project. This level of negated vehicle trips associated with the NPC Project will be imperceptible to the traffic operations assessment presented in the DPIR.

Table 2-2 Vehicle Trip Generation Comparison

Time Period	Direction	DPIR	NPC	Change
Daily	In	263	247	-16
	Out	263	247	-16
	Total	526	494	-32
a.m. Peak Hour	In	10	8	-2
	Out	23	21	-2
	Total	33	29	-4
p.m. Peak Hour	In	27	23	-4
	Out	21	16	-5
	Total	48	39	-9

2.1.3.2 Transit Trips

Table 2-3 presents the expected transit trip generation of the NPC Project compared to the previously proposed project. When compared to the previously proposed project, the NPC Project will result in 26 fewer transit trips over the course of the day, three fewer transit trips during the a.m. peak hour, and seven fewer transit trips during the p.m. peak hour.

Table 2-3 Transit Trip Generation Comparison

Time Period	Direction	DPIR	NPC	Change
Daily	In	196	183	-13
	Out	196	183	-13
	Total	392	366	-26
a.m. Peak Hour	In	11	9	-2
	Out	19	18	-1
	Total	30	27	-3
p.m. Peak Hour	In	23	20	-3
	Out	21	17	-4
	Total	44	37	-7

2.1.3.3 Pedestrian/Bicycle Trips

Table 2-4 similarly shows the expected pedestrian/bicycle trip generation for the previously proposed project and the NPC Project. The NPC Project is expected to generate 102 fewer pedestrian/bicycle trips over the course of the day as compared to the previously proposed project. The NPC Project is also expected to generate 13 fewer pedestrian/bicycle trips during the a.m. peak hour, and 38 fewer trips during the p.m. peak hour compared to the previously proposed project.

Table 2-4 Pedestrian/Bicycle Trip Generation Comparison

Time Period	Direction	DPIR	NPC	Change
Daily	In	889	838	-51
	Out	889	838	-51
	Total	1,778	1,676	-102
a.m. Peak Hour	In	44	37	-7
	Out	102	96	-6
	Total	146	133	-13
p.m. Peak Hour	In	120	102	-18
	Out	91	71	-20
	Total	211	173	-38

2.1.4 Parking

The NPC Project will replace the existing 650-space garage with a new approximately 830-space underground parking garage (approximately 20 fewer spaces than the previously proposed project) for residential, employee, and public use, resulting in a net increase of approximately 180 spaces.

The approximately 180 new parking spaces for the approximately 486 residential units correspond to a parking ratio of 0.37 spaces per unit. The proposed additional parking slightly below BTG Guidelines for this neighborhood of Boston (0.5 to 1.0 spaces per residential unit as a maximum), but is appropriate given the NPC Project's convenient location to a wide range of public transportation alternatives, and proximity to Downtown, hospitals, and area businesses.

The Project will continue to provide up to 50 spaces to residents of Amy Lowell Apartments per an existing lease agreement.

2.1.5 Loading and Building Servicing

All trash, loading, and move-in/move-out activities will occur on-site within an enclosed loading area adjacent to the existing Longfellow Place service area, which is located beneath the West End Place courtyard. Access to the service area is currently, and will continue to be, provided on Lomasney Way via the existing driveway between the NPC Project site and West End Place.

The NPC Project's loading area will be provided with three loading bays and five parking spaces to accommodate residential and commercial deliveries, maintenance needs, and trash storage and removal. The loading area will be able to accommodate a vehicle as large as a WB-50 tractor-trailer; however, it is anticipated that deliveries by vehicles of this size would be infrequent and would typically be made via small vehicles such as passenger cars, vans, and SU-30s (i.e., box trucks). Many of these service and delivery trips will be shared with other residential buildings in the area, reducing the total number of new trips generated. The expected loading and service vehicle demands of the NPC Project are presented in Table 2-5.

Table 2-5 Expected Loading and Service Activity

Land Use	Typical Vehicle & Size	Number of Deliveries	Typical Delivery Periods
Residential ¹ (486 units)	Car/Van, SU-30, WB-50 and Trash	6 – 7 per day	7:00 a.m. – 7:00 p.m.
Retail ² (2,000 sf)	Car/Van to SU-30 and Trash	1 – 2 per day	7:00 a.m. – 5:00 p.m.
Total	—	7 – 9 per day	—

1. 0.013 trucks trips per day/unit of Residential per Equity survey of Longfellow Place, November 2011.

2. 0.200 trucks trips per day/1,000 sf of Office per NCHRP Synthesis 298, Truck Trip Generation Data.

As shown in Table 2-5, the NPC Project is expected to be serviced by about 7 to 9 loading and/or service vehicles per day, which corresponds to less than one additional vehicle per hour using the loading and service driveway over the course of the day.

Recycling, trash collection, and loading will occur on-site, during off-peak hours, and within the designated loading zone (i.e., not within the driveway) whenever possible. Permanent "No Idling" signs will be posted in the loading and parking areas. A Transportation Coordinator will be appointed by the Proponent to manage loading activity and coordinate move-in/move-out activities among building residents and with management of the adjacent West End Place residences. A detailed loading and service plan will be developed and agreed upon as part of the TAPA process with BTB.

2.1.6 *Area Infrastructure Improvement Projects*

Connect Historic Boston – the City of Boston and National Park Service have been selected as a recipient of a Transportation Investment Generating Economic Recovery (TIGER) discretionary grant to fund alternative transportation projects under the Connect Historic Boston (CHB) initiative. The \$23 million CHB TIGER project will reconstruct seven streets in Boston as shared or complete streets to improve access between transit and National Park Service sites. The CHB initiative will result in improvements at four separate locations in downtown Boston and Charlestown, including Constitution Road and Water Street in Charlestown; Joy Street from Cambridge Street to Smith Court; the Blackstone Block; and the Connect Historic Boston Bike Trail that will include the full reconstruction of Causeway Street based on the Crossroads design concept.

In the vicinity of the NPC Project site, Staniford Street, Causeway Street including Lowell Square and Keany Square, and a portion of Nashua Street will be reconstructed and all traffic signal equipment will be optimized and brought up to current design standards. In addition, pedestrian and bicycle accommodations will be improved to enhance the safety of all roadway users. The project includes changes to intersection geometry, ADA improvements, bicycle signals, streetscape and utility upgrades.

Construction of the CHB project is expected to commence in early 2015.

Nashua Street Residences Off-site Improvements – the redevelopment project will include improvements to Old Nashua Street and the triangular open space between the site and Nashua Street and Red Auerbach Way. The project will reconstruct improved pedestrian connections from the triangular area and adjoining roadways, and a public pedestrian arcade linking Nashua Street to North Station and TD Garden. The project is currently under construction.

2.1.7 *Mitigation*

Facilitated by the NPC Project's transit-oriented nature and proximity to Downtown, hospitals, and area businesses, between 73% and 85% (see Table 2-1) of all trips generated by the NPC Project will be made by non-auto modes of transportation (i.e., walk, bike, and transit).

The NPC Project is expected to result in an increase of only 29 new vehicle trips (8 new vehicle trips in and 21 new vehicle trips out) during the a.m. peak hour and 39 new vehicle trips (23 new vehicle trips in and 16 new vehicle trips out) during the p.m. peak hour. The increase in traffic associated with the NPC Project corresponds to approximately only one new vehicle trip every two minutes during the a.m. peak hour, and less than one new vehicle trip per minute during the p.m. peak hour, which is a negligible increase on area roadways.

While the NPC Project's impact on the adjacent roadway network is minimal, the NPC Project proposes the following mitigation measures:

1. ***Roadway, Pedestrian, Bicycle, and Streetscape Improvements at the Intersection of Lomasney Way/Nashua Street/Martha Road/Site Driveway*** – The NPC Project team will continue to work collaboratively with BTB and BRA to evaluate potential improvements adjacent to the NPC Project site. Any potential improvements would need to be coordinated with those being implemented by the Nashua Street Residences, the U.S. General Services Administration (GSA) at 10 Causeway Street, and the City of Boston's Connect Historic Boston Project. The exact scope of these improvements would be identified as part of the Transportation Access Plan Agreement (TAPA) process with BTB;
2. ***Enhanced Pedestrian Pathways*** – The NPC Project will provide an enhanced pedestrian connection between Thoreau Path and Lomasney Way via a new landscaped pedestrian pathway through the NPC Project site. The new pathway will also improve the pedestrian connection between North Station and the West End;
3. ***Driveway Improvements*** – Reducing the width of the existing Garden Garage curb cut from five lanes to only two lanes will reduce the distance pedestrians must cross along the Lomasney Way sidewalk adjacent to the site, and will simplify operations at the intersection of Lomasney Way/Nashua Street/Red Auerbach Way/Garden Garage Driveway;
4. ***Sidewalk Improvements*** – The NPC Project includes reconstruction of the sidewalks and accessible curb ramps adjacent to the site along Lomasney Way and Martha Road according to City standards;
5. ***Bicycle Parking*** – The NPC Project includes on-site bicycle storage racks that will be available to the public and accessible via the new pedestrian pathway; and
6. ***Electric Vehicle Charging Stations*** – The Proponent proposes to provide electric vehicle charging stations that will be available to public users of the new garage.

2.1.8 Transportation Demand Management

The Proponent is committed to implementing TDM measures to reduce dependence on automobiles. TDM will be facilitated by the nature of the NPC Project and its proximity to public transit. The Proponent is committed to implementing a TDM program that supports the City's efforts to reduce dependency on the automobile by encouraging travelers to use alternatives to driving alone, especially during peak periods. The Proponent is prepared to take advantage of the site's excellent pedestrian and transit access in marketing to future residents. On-site management will provide transit information (schedules, maps, fare

information) in the building lobbies for residents and guests. On-site management will also work with residents as they move in to raise awareness of non-automobile transportation alternatives.

Additional TDM measures may include, but are not limited to, the following:

- ◆ ***Transportation Coordinator.*** The Proponent will designate a transportation coordinator to oversee transportation issues including parking, service, loading, and move-in/move-out. The transportation coordinator will work with residents as they move in to raise awareness of public transportation alternatives.
- ◆ ***Tenant and Resident Orientation Packet.*** Provision to new tenants of information about the many TDM programs available.
- ◆ ***Website.*** Public transportation information for residents and visitors will be included on the Project website.
- ◆ ***Preferential Parking for Fuel Efficient Vehicles.*** The Proponent will dedicate up to 5% of all parking spaces (up to 42 spaces) to low-emitting and fuel-efficient vehicles, as requested by BTB.
- ◆ ***Electric Vehicle Charging Stations.*** The Project includes a provision for electric vehicle charging stations. The Proponent currently has a national agreement with an electric vehicle charging station provider and will work with them and the City to identify an appropriate number of stations. It is anticipated that charging stations will be added incrementally as demand warrants.
- ◆ ***Bicycle Storage.*** Secure bicycle parking will be provided for residents, employees, and visitors, consistent with the City of Boston Bicycle Parking Guidelines, to promote biking as a transportation alternative.
- ◆ ***Shared Bicycles.*** The NPC Project site is located within close walking distance to two Hubway shared bicycle stations and will promote use of these stations by among site residents, visitors, and workers.
- ◆ ***Shared Car Service.*** The Proponent currently provides approximately 28 shared-car spaces for Zipcar, including approximately 12 vehicles at Garden Garage, 12 vehicles at the West End Garage, and about 4 vehicles at the Longfellow Garage. Numerous additional Zipcar and Enterprise carshare locations are located within convenient walking distance to the site. As demand warrants, the Proponent will continue to coordinate with Zipcar to determine the feasibility of locating additional shared-car spaces on the site.

TDM program elements will be codified in the TAPA.

2.1.9 Construction Period Impacts

Most construction activities will be accommodated within current site boundaries. Details of the overall construction schedule, working hours, number of construction workers, worker transportation and parking, number of construction vehicles, and routes will be addressed in detail in a Construction Management Plan (CMP) to be filed with BTM in accordance with the City's transportation maintenance plan requirements. The NPC Project's contractor would be required to coordinate all construction activities with other on-going construction work to minimize impacts to area roadways.

To minimize transportation impacts during the construction period, the following measures will be incorporated into the CMP:

- ◆ On-site construction worker parking will be limited, and worker carpooling will be encouraged;
- ◆ A subsidy for MBTA passes will be considered for full-time employees;
- ◆ A truck routing plan will be developed to minimize impacts on adjacent roadways; and
- ◆ Secure spaces will be provided on-site for workers' supplies and tools so they do not have to be brought to the site each day.

The most significant impact of construction will be the temporary loss of the existing 650-space garage. The Proponent plans to accommodate the current monthly users of the garage through self-parking and valet parking, if necessary, at the Longfellow Garage, the Asteria Garage, and the Vesta Garage. Other public parking, including event parking, can be accommodated out of unused capacity at Longfellow, Asteria, and Vesta garages, as well as at the North Station Garage. An information campaign will be conducted one month prior to garage demolition to identify replacement options for current garage users.

2.2 Wind

A pedestrian wind study was conducted by Rowan Williams Davies & Irwin Inc. on the NPC Project. The objective of the study was to assess the effect of the proposed development on local conditions in pedestrian areas around the NPC Project site.

The study involved wind simulations on a 1:400 scale model of the proposed building and surroundings. Proposed trees on the NPC Project site were included in the analysis; however, existing trees in the surrounding area were not included in the model, which could lower wind speeds in certain areas under certain conditions. 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 full report is included in Appendix B.

Figures 2-4 and 2-5 show the results of the No Build and Build conditions, respectively. The results of the wind study show that most onsite locations are predicted to have wind conditions comfortable for walking or better. Some locations on the northeast side of the site and on the west side of the building are predicted to have uncomfortable conditions; however, the Proponent is continuing to study mitigation measures that could improve these predicted conditions.

Off-site, most locations continue to be suitable for walking or better, or similar to the No Build condition, especially within Thoreau Path. Uncomfortable locations are located to the northeast of the site and north of the site, as well as to the west of 1-5 Longfellow Place. It is anticipated that measures being considered to improve wind conditions surrounding the site will also improve wind conditions in the surrounding area.

2.3 Shadow

2.3.1 Introduction and Methodology

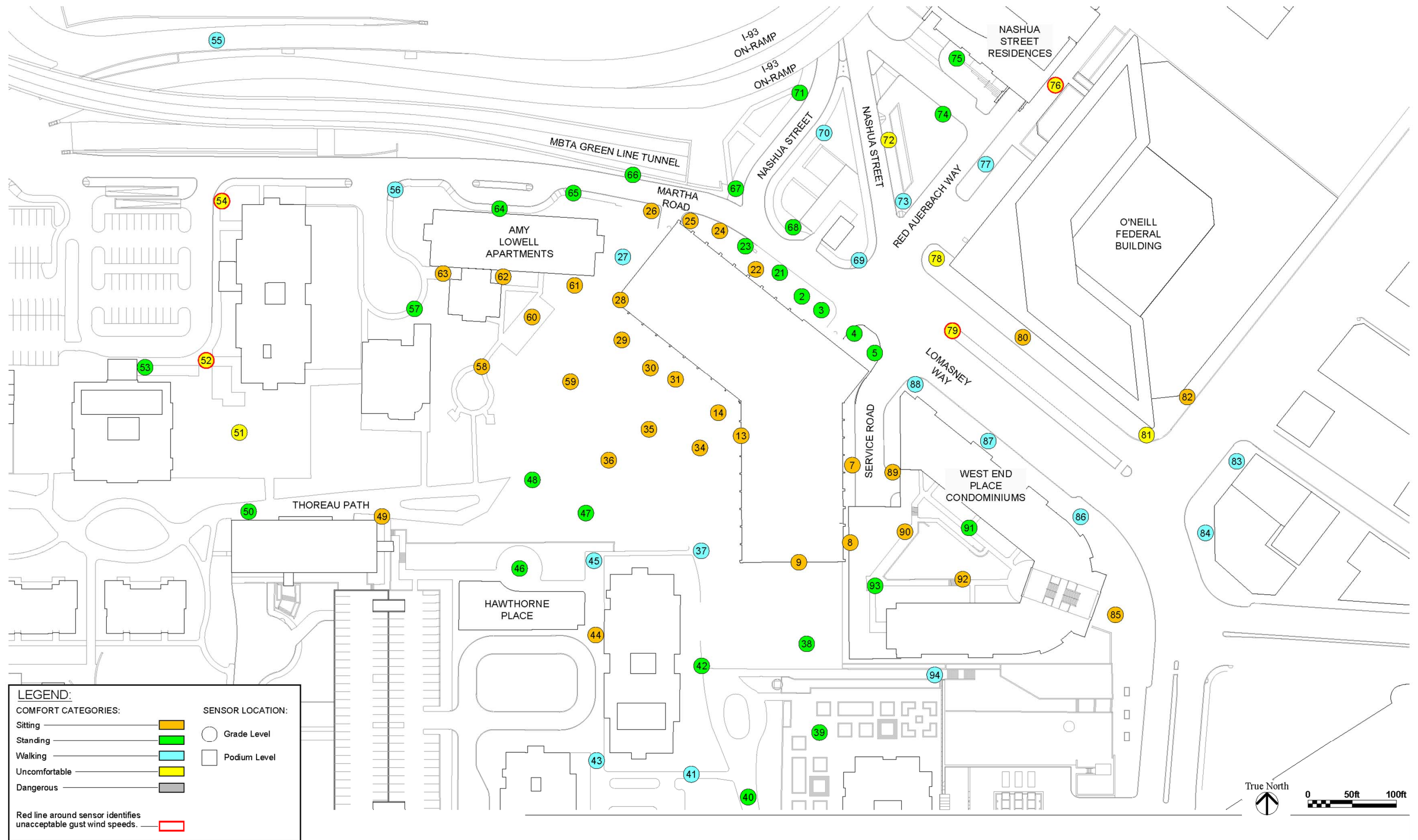
Due to the changes to the NPC Project, a shadow impact analysis was conducted to investigate shadow impacts from the Project during three time periods (9:00 a.m., 12:00 noon, and 3:00 p.m.) during the summer solstice (June 21), autumnal equinox (September 21), vernal equinox (March 21), and the winter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

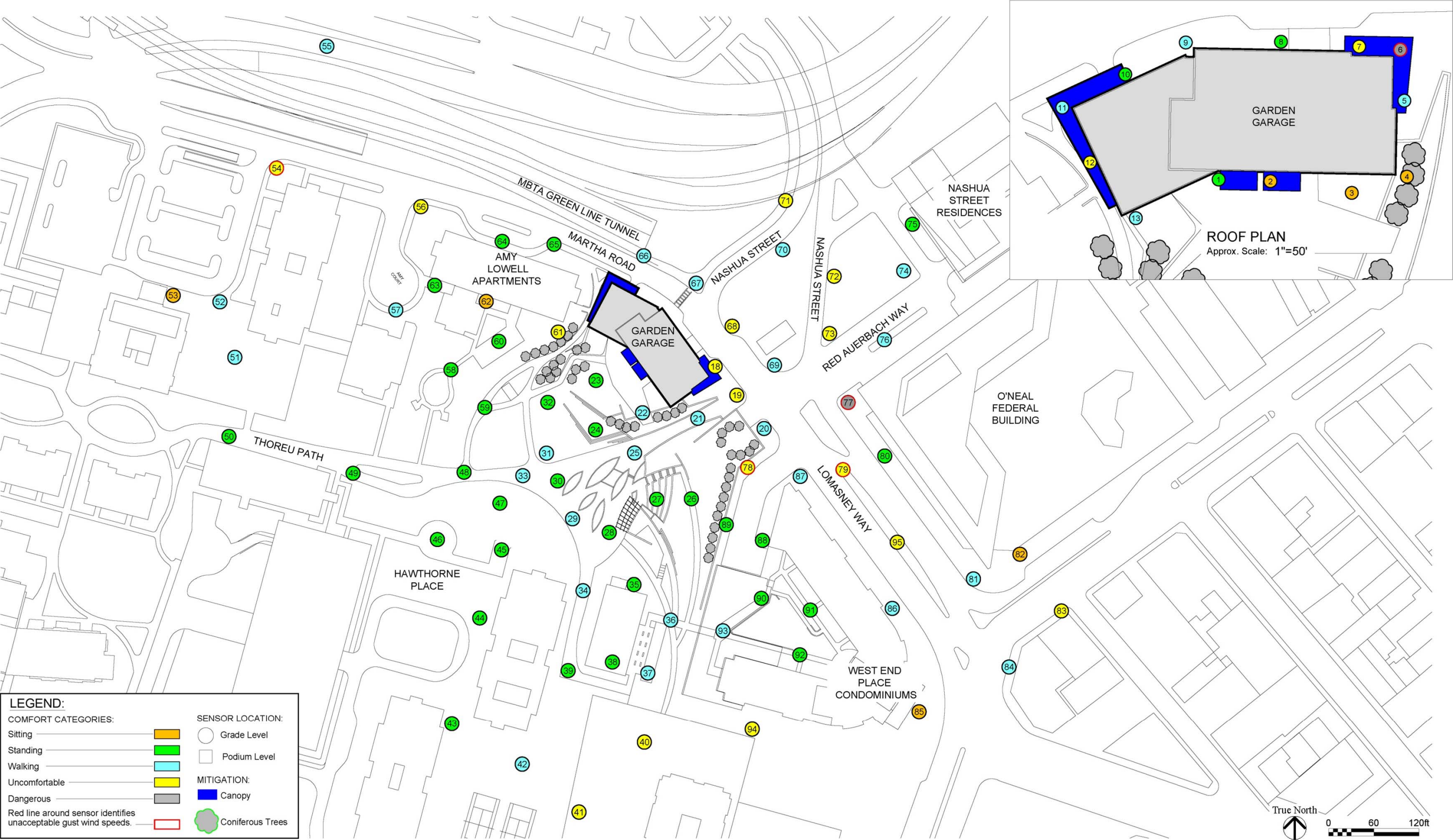
The shadow impact analysis includes the net new shadow and existing shadow. In addition to altering the patterns of shadow in the area, the Project will also result in areas of new daylight that are currently in the shadow cast by the existing garage structure.

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 2-6 to 2-19 at the end of this section.

2.3.2 Vernal Equinox (March 21)

At 9:00 a.m., new shadow from the Project will be cast to the northwest onto the roof of Amy Lowell Apartments, the path to the west of the site and a portion of Martha Road. Shadow will also be cast onto the I-93/Storrow Drive ramps. The Project will result in new sunlight reaching Thoreau Path and the Project's proposed open spaces.





Garden Garage Redevelopment NPC Boston, Massachusetts



Figure 2-5
Pedestrian Wind Conditions – Build

At 12:00 p.m., new shadow from the Project will be cast across the roadways located to the north of the Project site, the small path to the west of the site, as well as onto the West End Park. New shadow will be cast across the Interstate 93/Storrow Drive ramps and onto a portion of the parking lots east of the Suffolk County Jail. New sunlight will reach the proposed open space to the south of the Project site.

At 3:00 p.m., new shadow from the Project will be cast to the northeast across Nashua Street and onto West End Park. New shadow will also be cast onto a portion of the parking lot to the north of Nashua Street Residences. New sunlight will reach the proposed open space to the south and east of the proposed building, as well as onto Lomasney Way and its sidewalks.

2.3.3 Summer Solstice (June 21)

At 9:00 a.m. on the summer solstice, shadow from the Project will be cast to the west over a portion of the open spaces to the west of the proposed building and south of the Amy Lowell Apartments. New sunlight will reach a portion of Thoreau Path and some of the proposed open space and pedestrian walkways on the southern portion of the Project site.

At 12:00 p.m., shadow from the Project will be cast to the north across Martha Road and onto the West End Park. New shadow from the Project will extend onto a minor portion of the I-93/Storrow Drive ramps. New sunlight will reach the open spaces to the south and east of the Project site.

At 3:00 p.m., shadow from the Project will be cast to the northeast across Martha Road and onto the southern portion of Nashua Street, as well as a minor portion of West End Park. New sunlight will reach the open spaces to the south and east of the Project site and onto a portion of Lomasney Way.

At 6:00 p.m., most of the area is under existing shadow. New shadow from the Project will be cast onto a portion of Lomasney Way and its sidewalks, and onto rooftops to the east of the site. New sunlight will reach portions of the open space to the east of the Project site and to the open space adjacent to the West End Condominiums.

2.3.4 Autumnal Equinox (September 21)

At 9:00 a.m., shadow from the Project will be cast to the northwest onto the eastern half of the roof of Amy Lowell Apartments, onto the path to the west of the site, as well as the I-93/Storrow Drive ramps. The proposed condition will create new sunlight on the proposed open space and pedestrian walkways compared to the existing condition.

At 12:00 p.m., shadow from the Project will be cast to the north onto the I-93/Storrow Drive ramps and onto West End Park, as well as onto the parking lot to the east of the Suffolk County Jail. The path on the west side of the site will have new sunlight and new shadow. New sunlight will reach the open spaces to the south and east of the Project site.

At 3:00 p.m., shadow from the Project will be cast to the northeast onto a portion of Nashua Street and West End Park. New sunlight will extend to the south and east of the building and across Lomasney Way and Nashua Street.

At 6:00 p.m., most of the area is under existing shadow, and there will be no new shadow from the Project.

2.3.5 Winter Solstice (December 21)

At 9:00 a.m., shadow from the Project will be cast to the northwest onto the eastern half of the roof of Amy Lowell Apartments, the path on the west side of the site, and the I-93/Storrow Drive ramps, as well as a portion of the Charles River and North Point Park. New sunlight will reach Thoreau Path and will extend across the open space located south of the Amy Lowell Apartments.

At 12:00 p.m., shadow from the Project will be cast to the north onto the I-93/Storrow Drive ramps, as well as portions of the parking lots for the old Spaulding Rehabilitation Hospital and Suffolk County Jail. New shadow will also be cast onto a minor portion of West End Park. New sunlight will reach the open space proposed to the south of the building.

At 3:00 p.m., most of the area is under existing shadow. Shadow from the Project will be cast to the northeast onto the I-93/Storrow Drive ramps, West End Park, Zakim Bridge, and a portion of Boston Inner Harbor. New sunlight will reach the proposed open space to the south of the building.

2.3.6 Conclusion

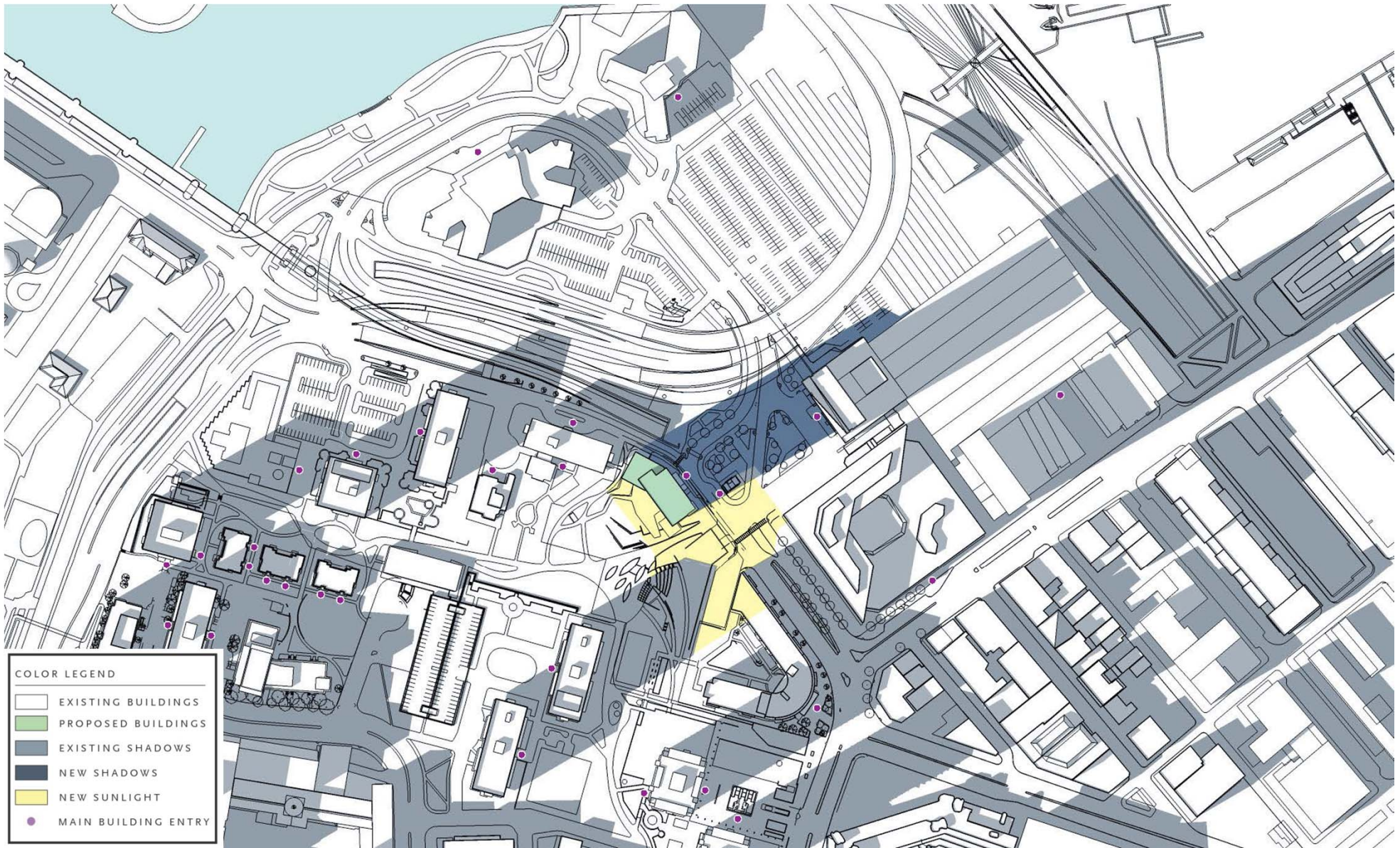
The demolition of the existing garage will eliminate shadow in many areas surrounding the site, including existing and proposed open spaces and paths during 12 of the 14 time periods studied. New shadow will occur on the surrounding streets and parking lots to the north. New shadow will be cast onto West End Park during eight of the 14 time periods studied, at noon and in the afternoon, onto North Point Park during one of the time periods studied, onto the Charles River during one of the time periods studied, and onto Boston Inner Harbor during one of the time periods studied.



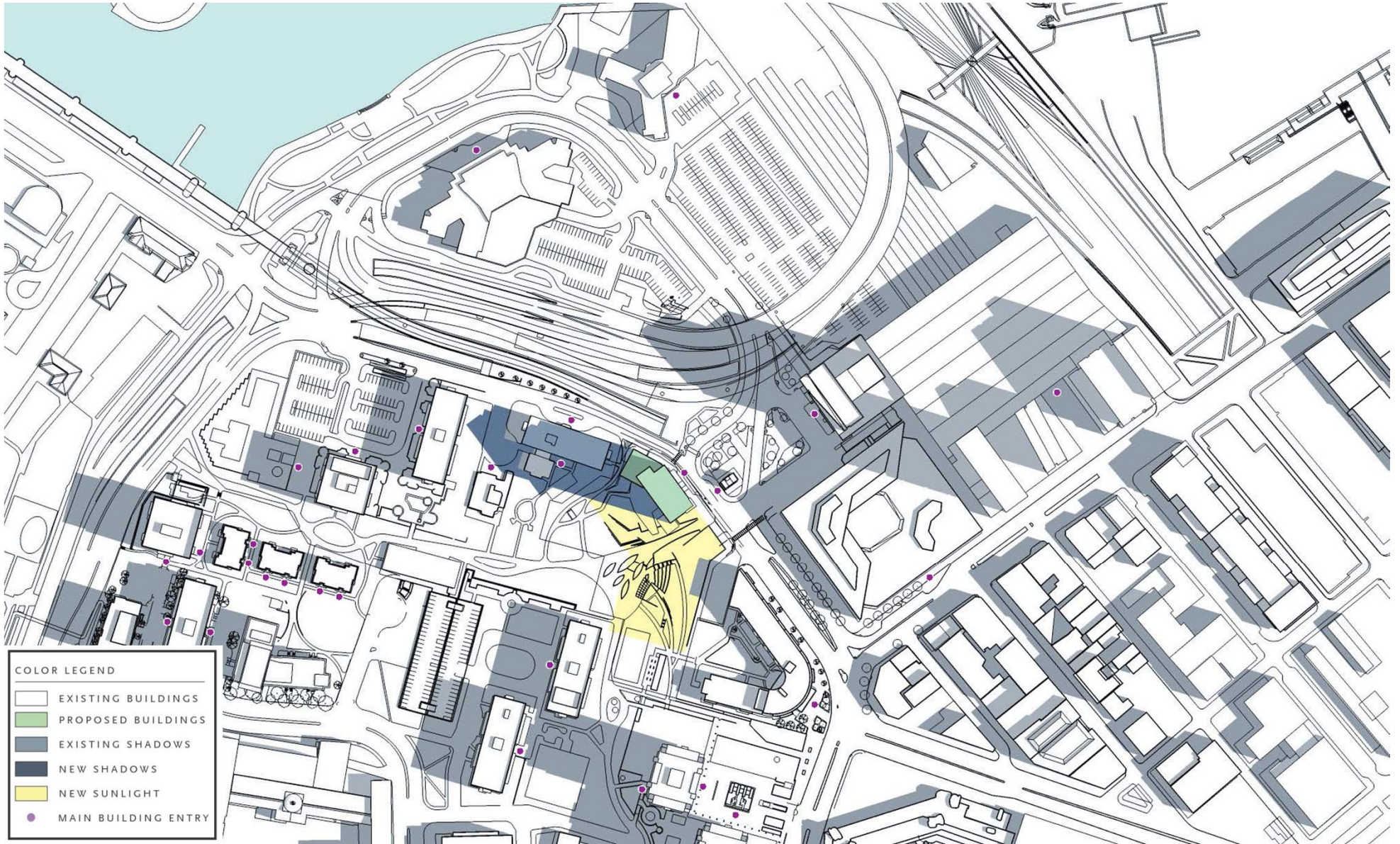
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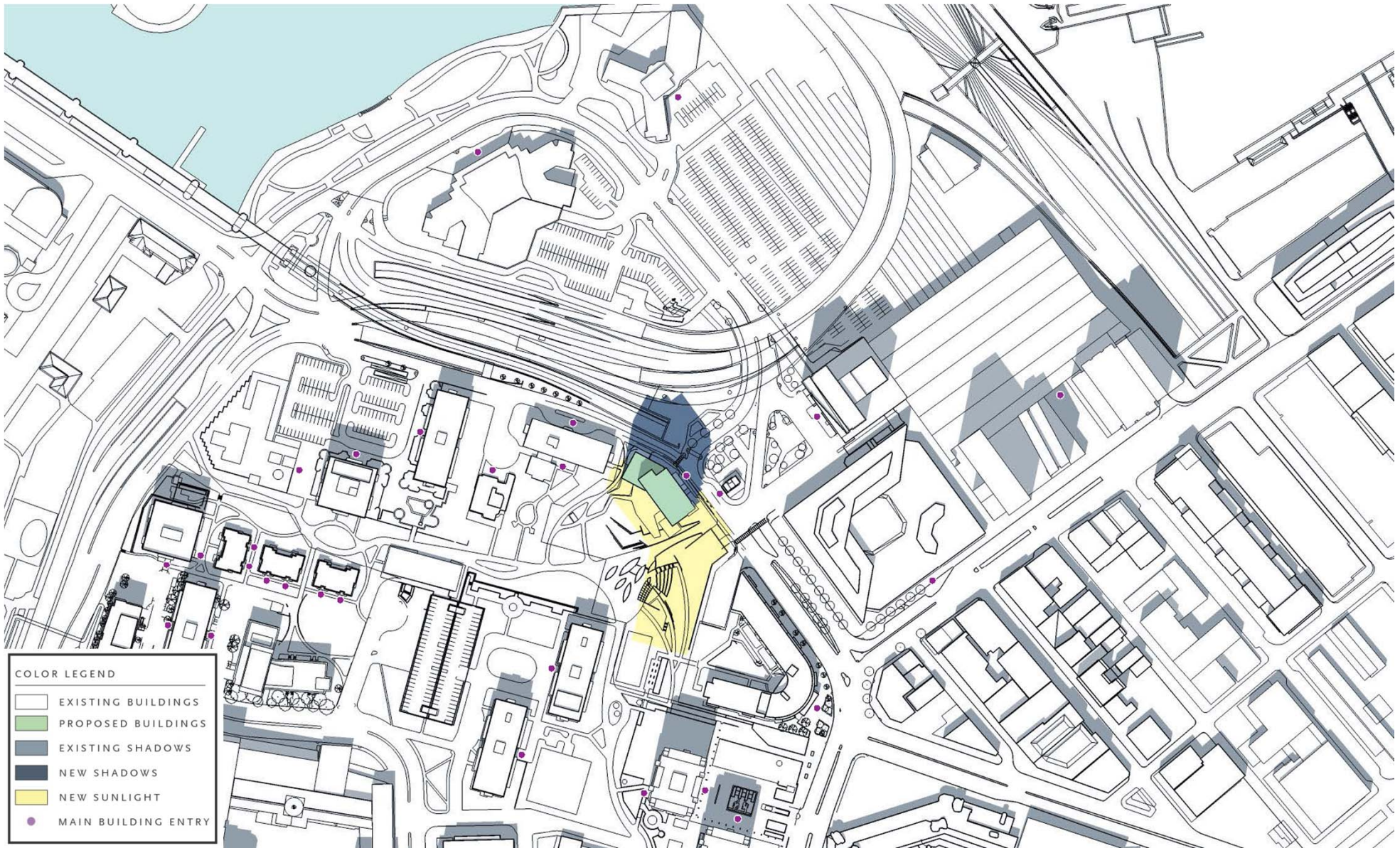
Garden Garage Redevelopment NPC Boston, Massachusetts



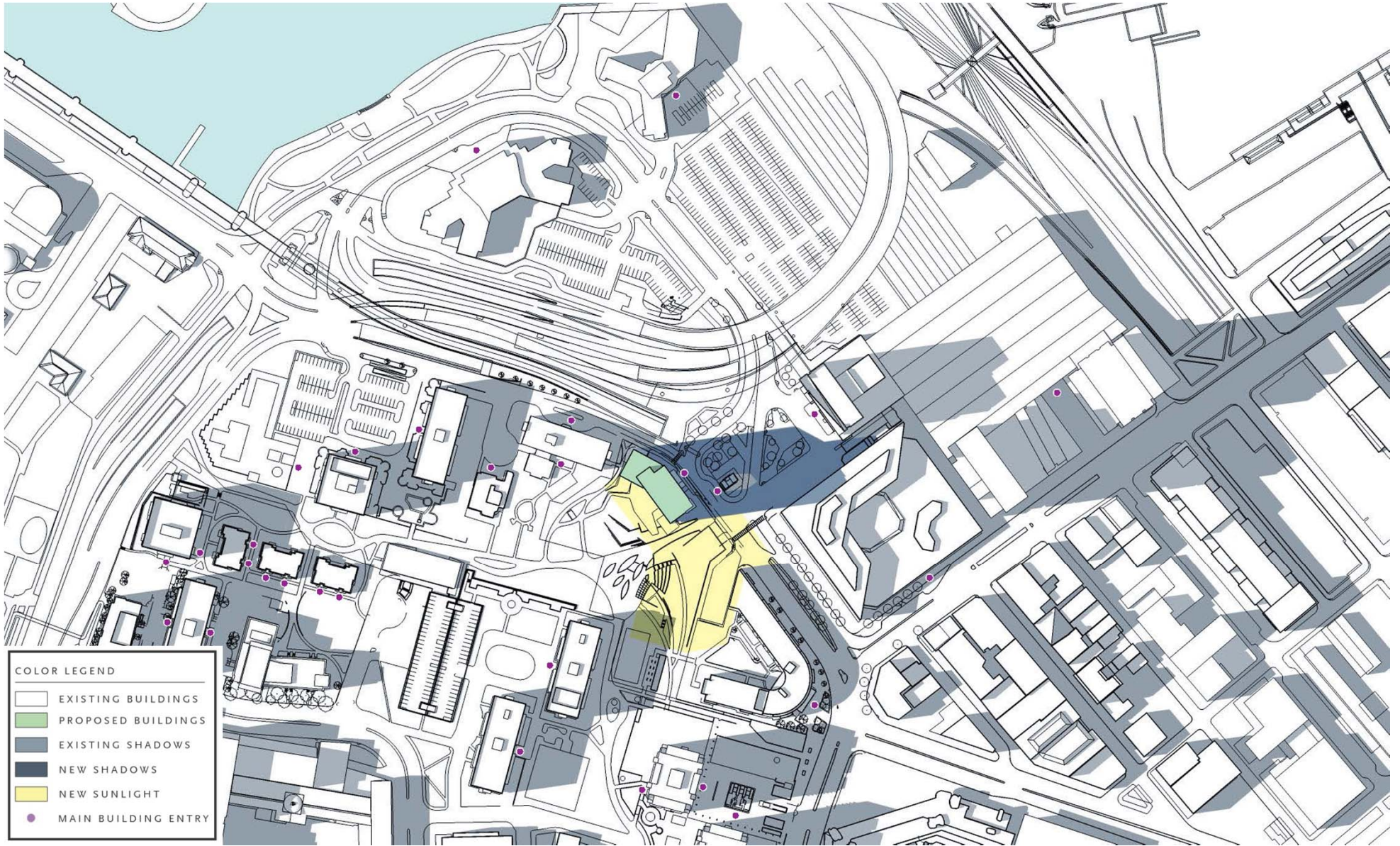
Garden Garage Redevelopment NPC Boston, Massachusetts



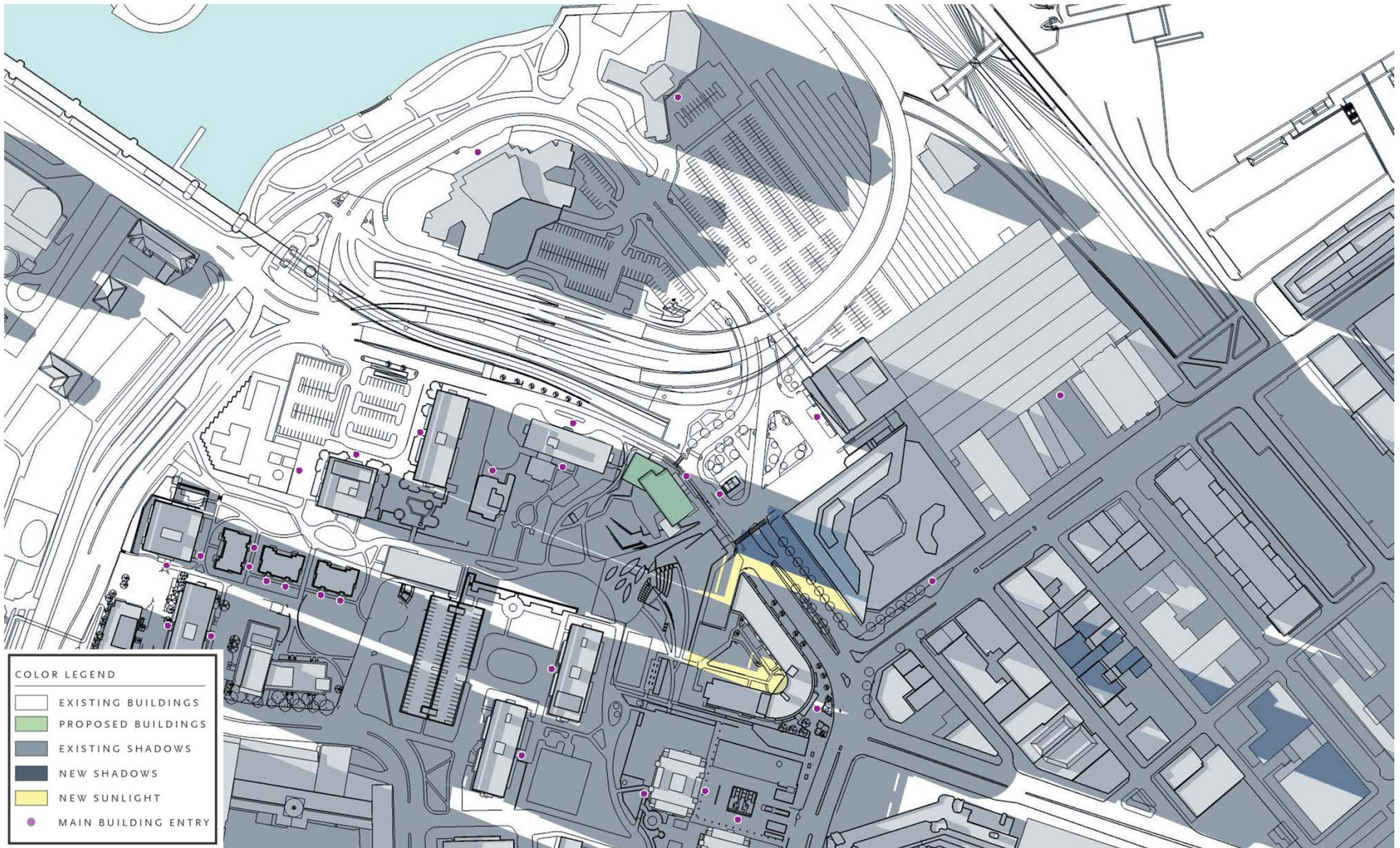
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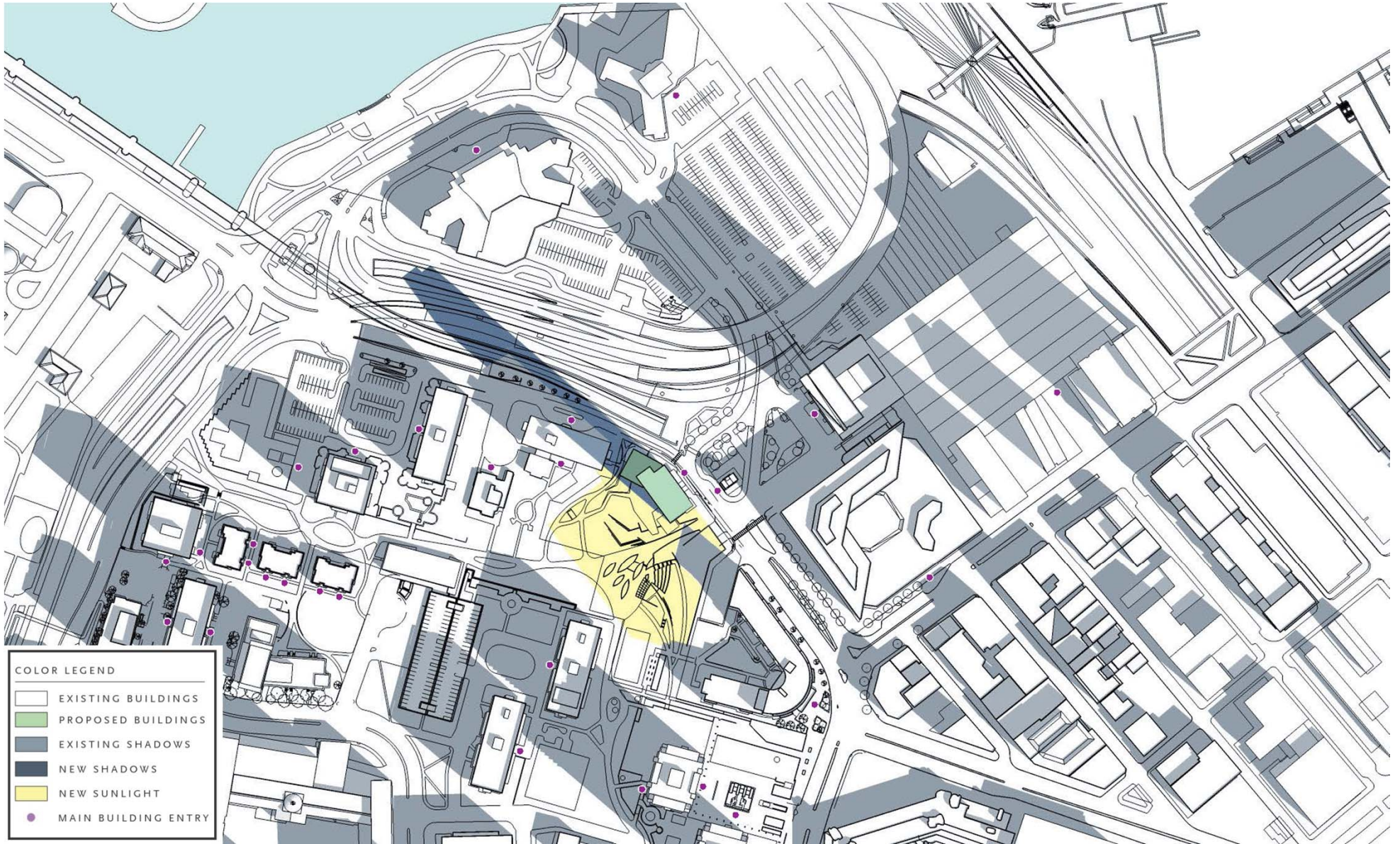
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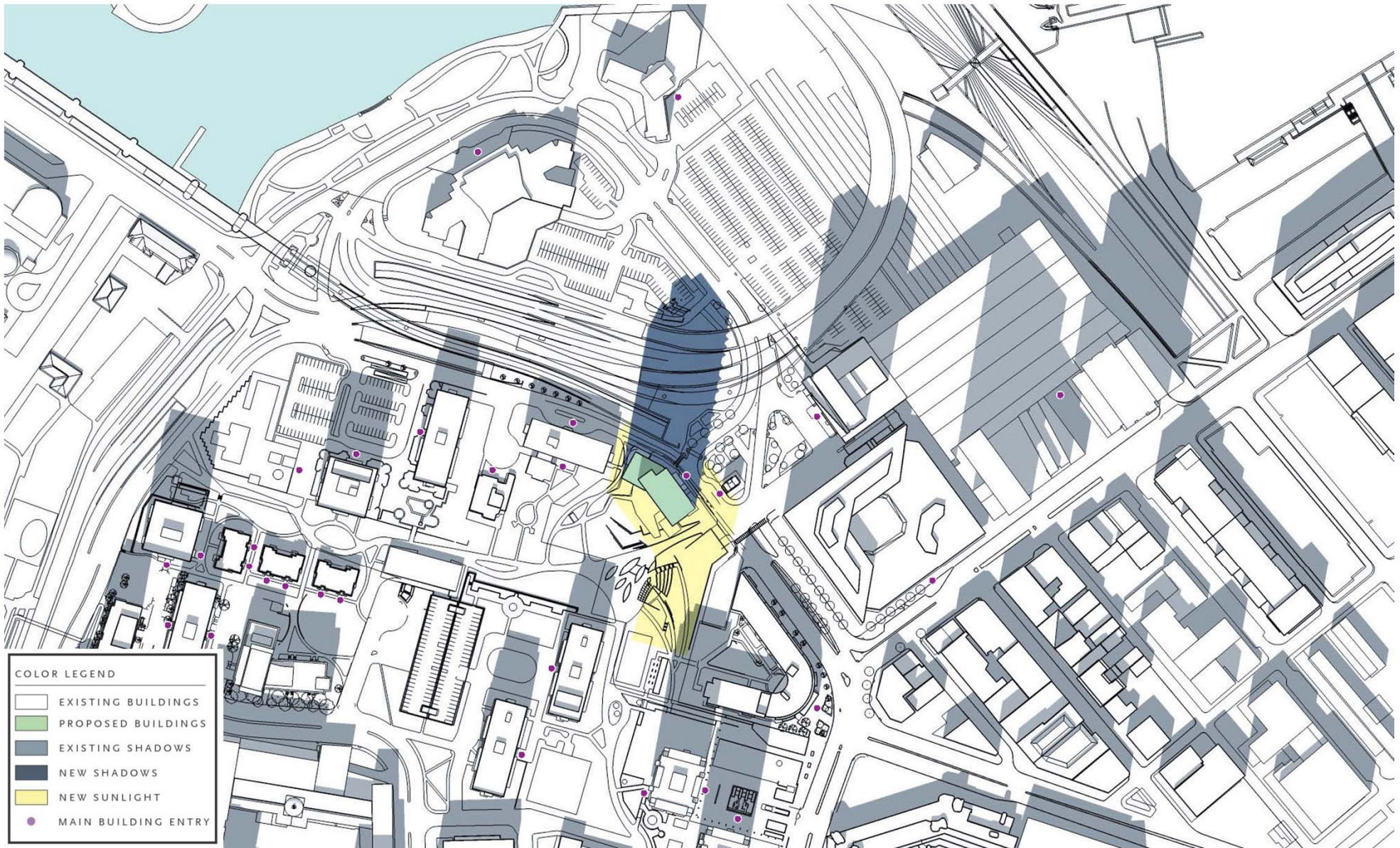
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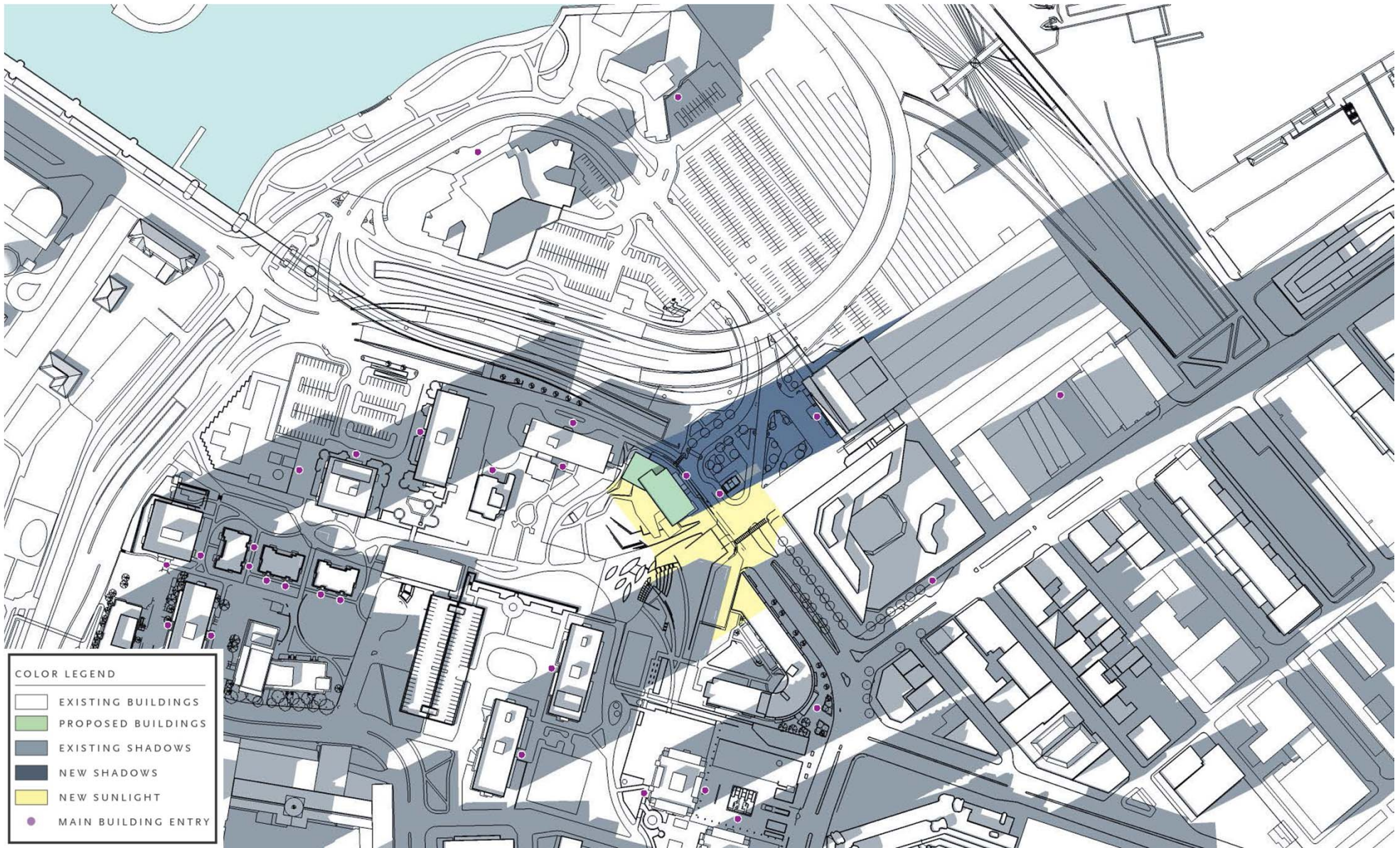
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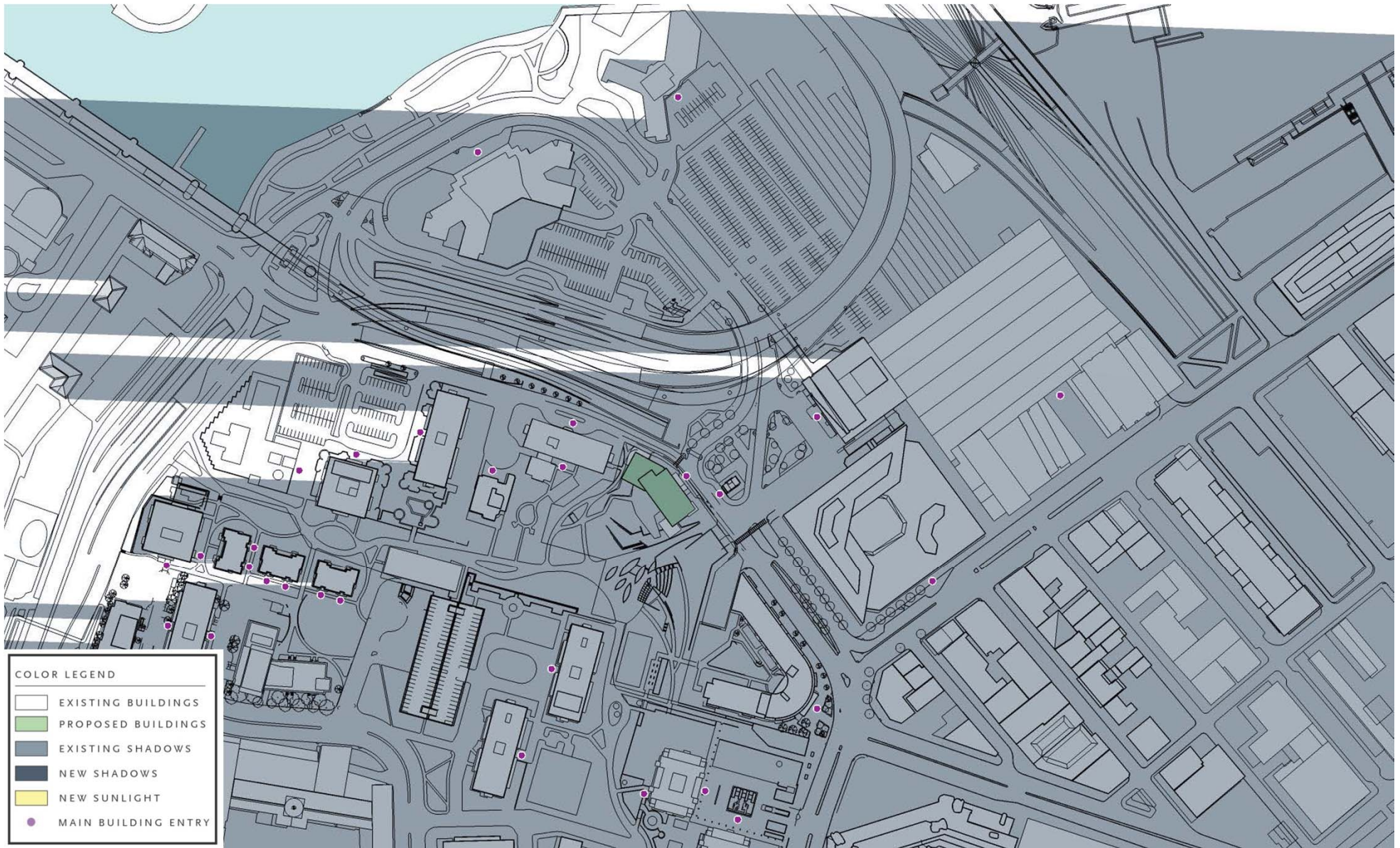
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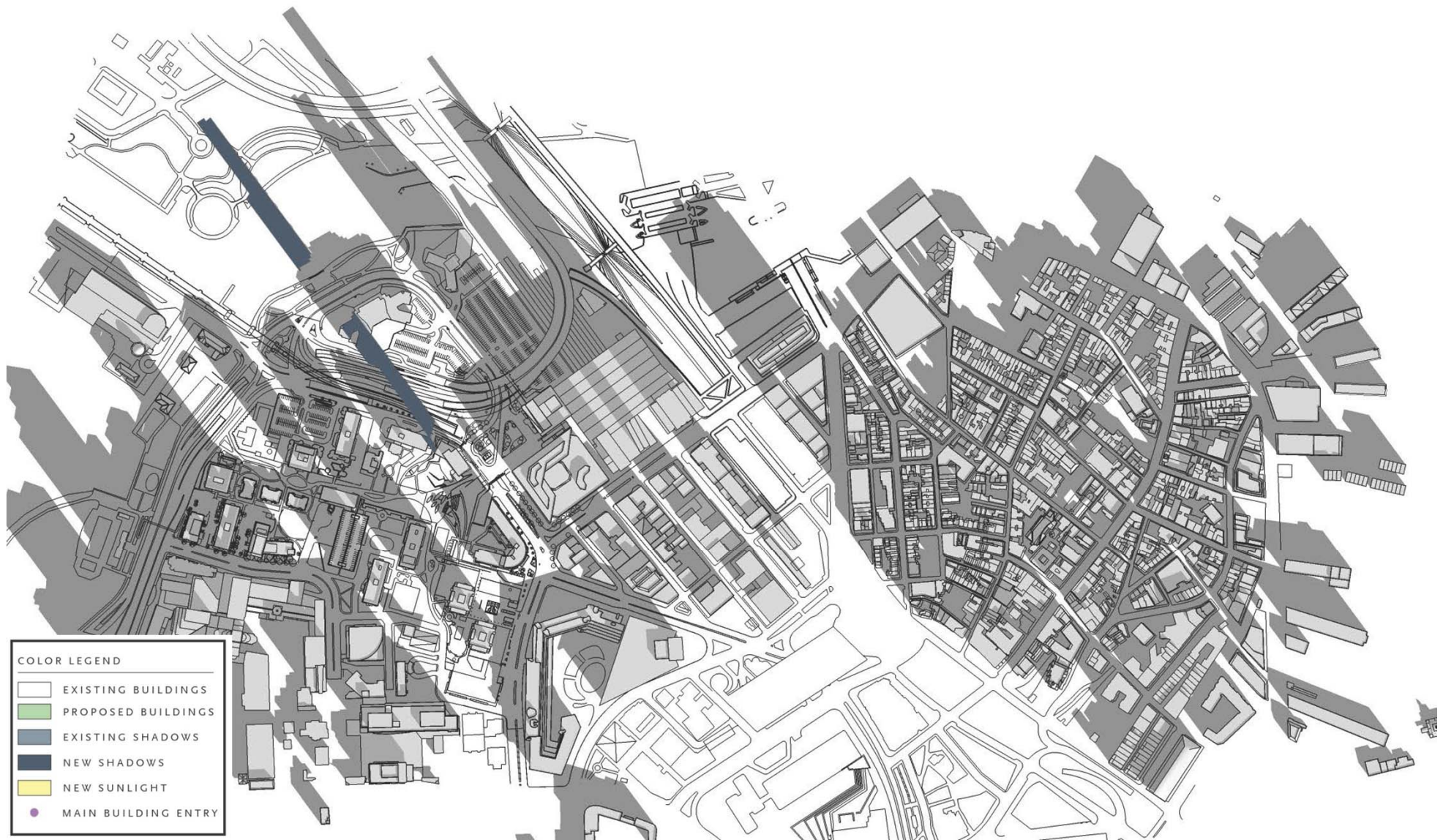
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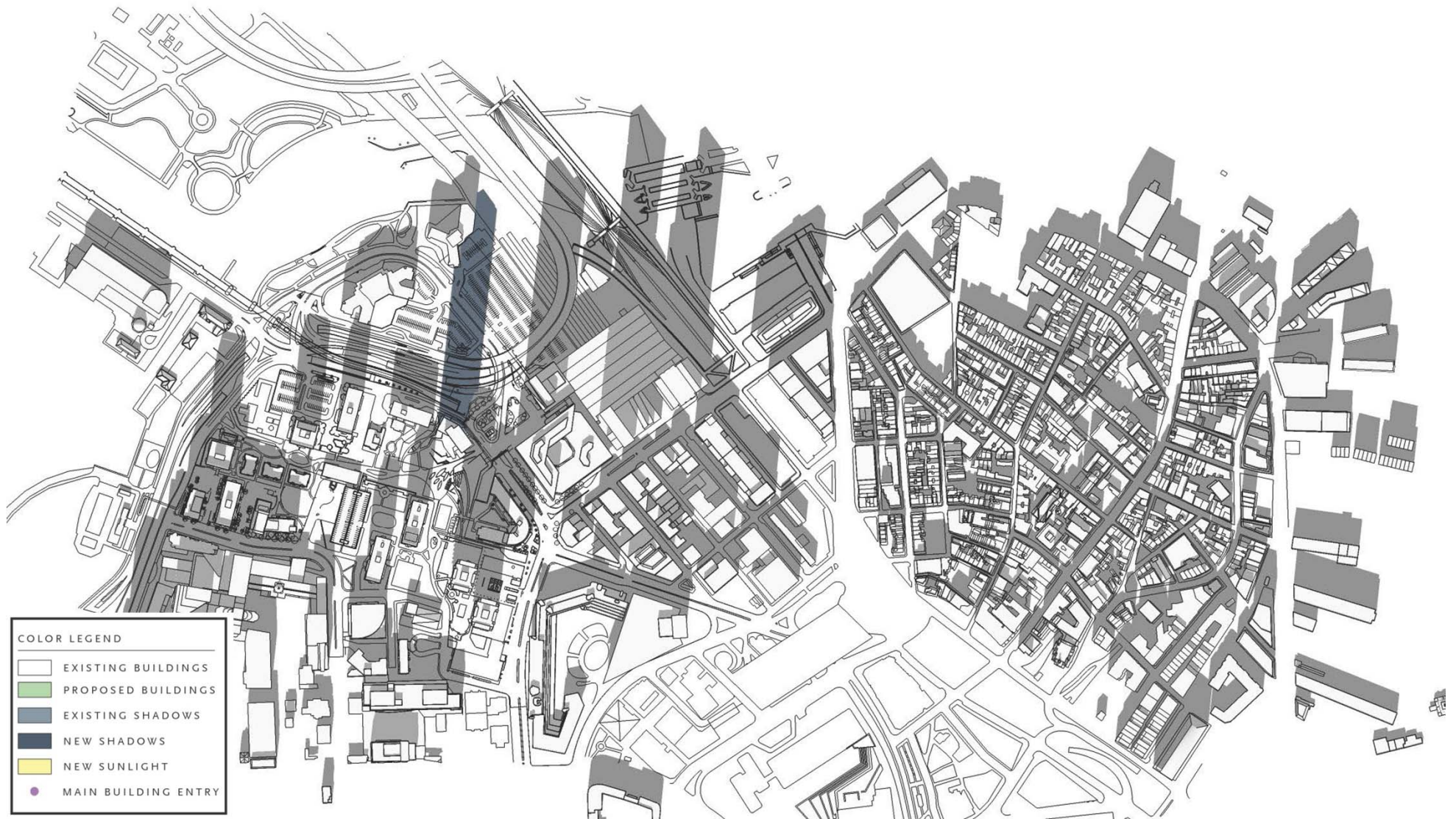
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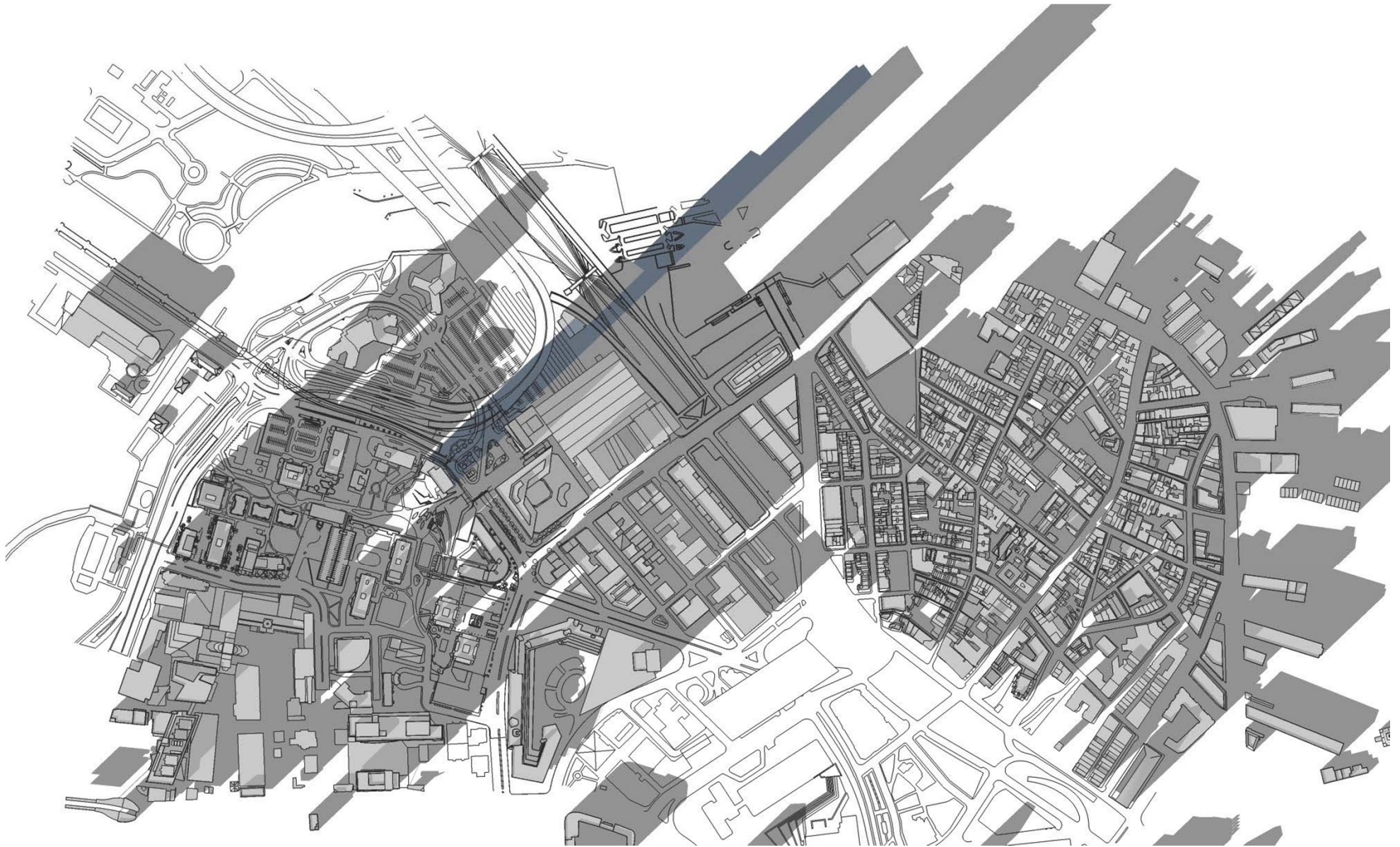
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Garden Garage Redevelopment NPC Boston, Massachusetts



Garden Garage Redevelopment NPC Boston, Massachusetts



Garden Garage Redevelopment NPC Boston, Massachusetts

2.4 Daylight

2.4.1 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 the project site.

A daylight analysis was completed for the previously proposed project and was included in the DPIR. The NPC Project has been studied from the same viewpoints as the previously proposed project, with the exception of Viewpoint 5 which was not applicable given the changes to the NPC Project. The viewpoint locations are included in Figure 2-20.

2.4.2 Daylight Analysis Results

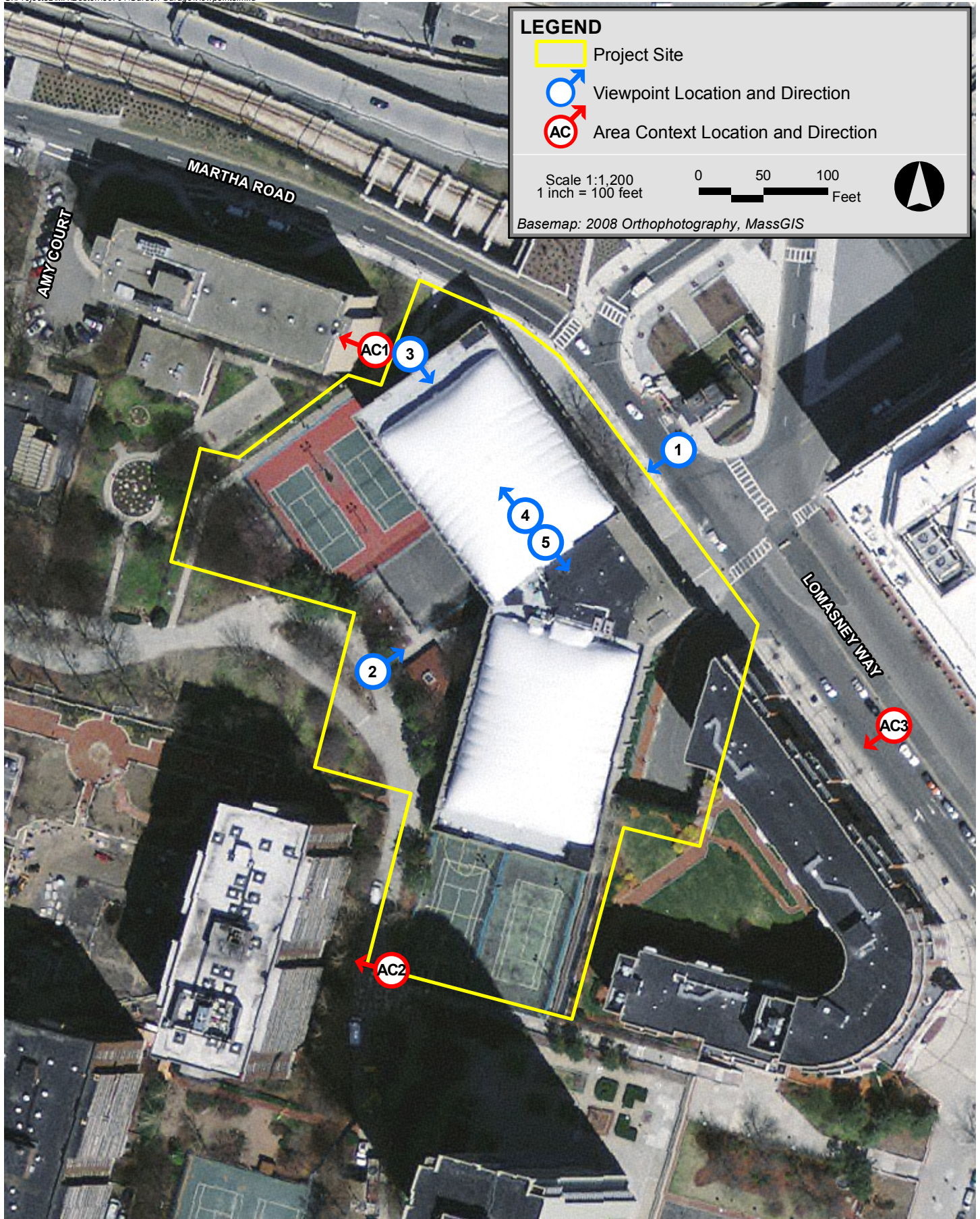
Results for each viewpoint under each condition are described in Table 2-6. Figures 2-21 through 2-24 illustrate the BRADA results for each analysis.

Table 2-6 Viewpoint Locations

Viewpoint Locations		Existing Conditions	DPIR Conditions	NPC Proposed Conditions
Viewpoint 1	Martha Road looking south at the site	57.1%	21.0%	75.1
Viewpoint 2	Thoreau Path looking north at the site	30.7%	23.3%	35.7
Viewpoint 3	Path on the west side of the site looking east	75.5%	89.0%	38.1
Viewpoint 4	Between the proposed buildings looking west		77.2%	44.6
Viewpoint 5	Between the proposed buildings looking east		58.9%	N/A
AC1	Looking west at the Amy Lowell Apartments	70.5%		
AC2	Looking west at Hawthorne Place	80.5%		
AC3	Lomasney Way looking south at the West End Place Condominiums	67.5%		

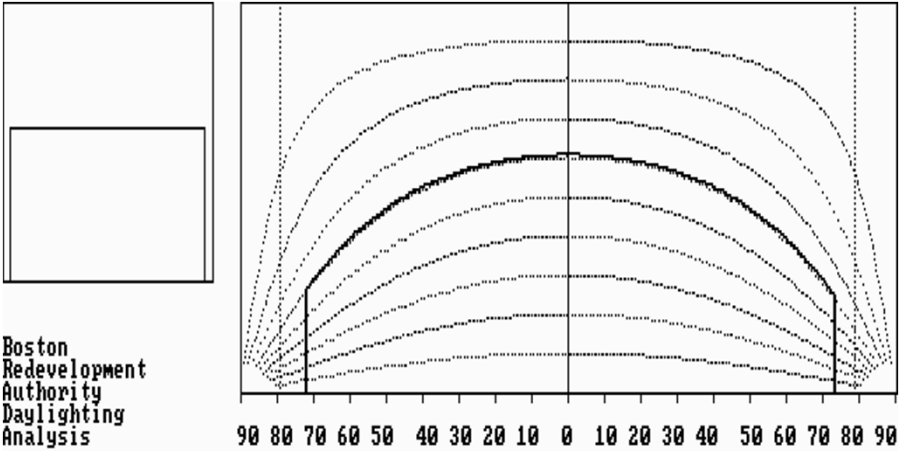
Viewpoint 1

Viewpoint 1 was taken from the center of Martha Road looking south at the Project site. The daylight obstruction value is 57.1% for the existing condition and 21.0% for the DPIR condition. The daylight obstruction value for the proposed condition is 75.1%. This value is higher than for the other viewpoints studied, but is similar to daylight obstruction values of other buildings, including the Area Context buildings.

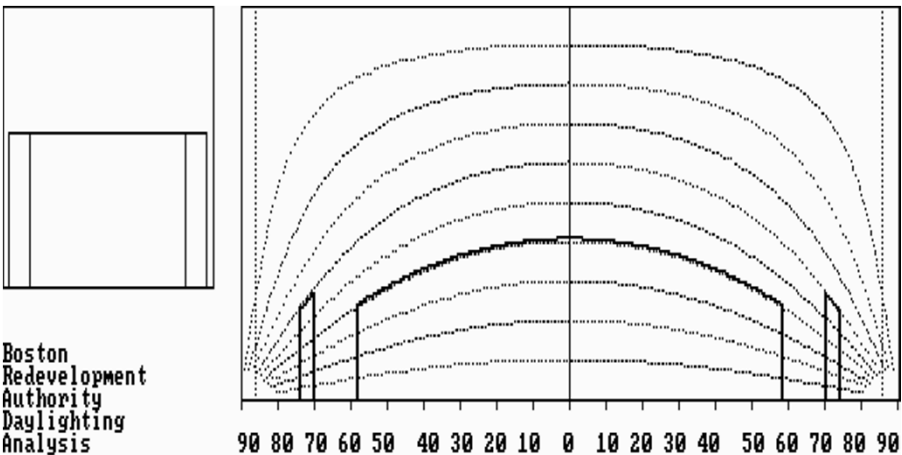


Garden Garage Redevelopment NPC Boston, MA

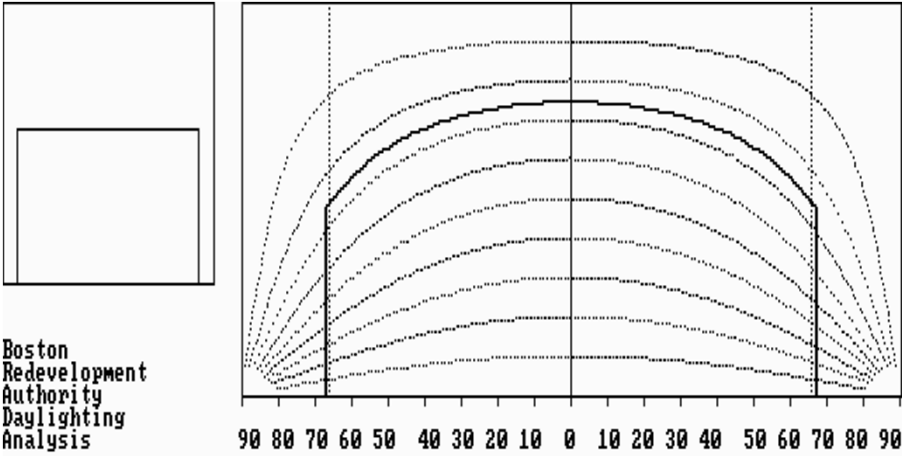
Viewpoint 1: Martha Road Looking South at the Site



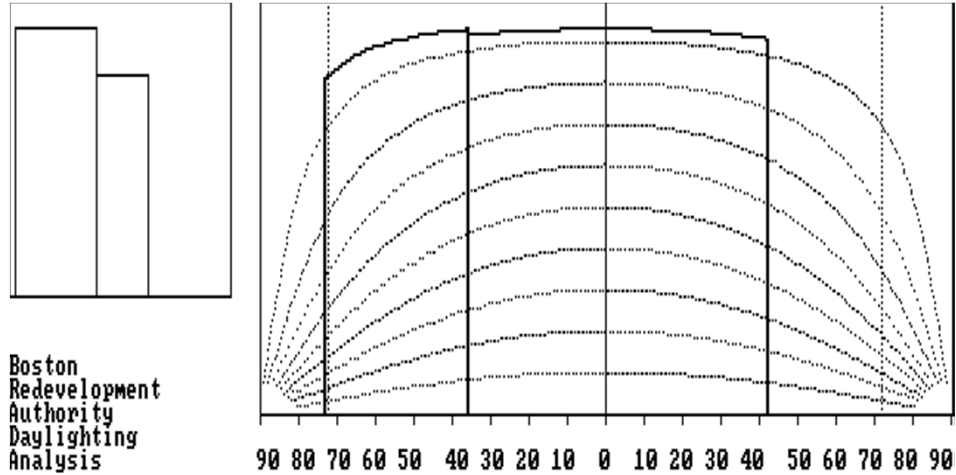
Viewpoint 2: Thoreau Path Looking North at the Site



Viewpoint 3: Path on the West Side of the Site Looking East

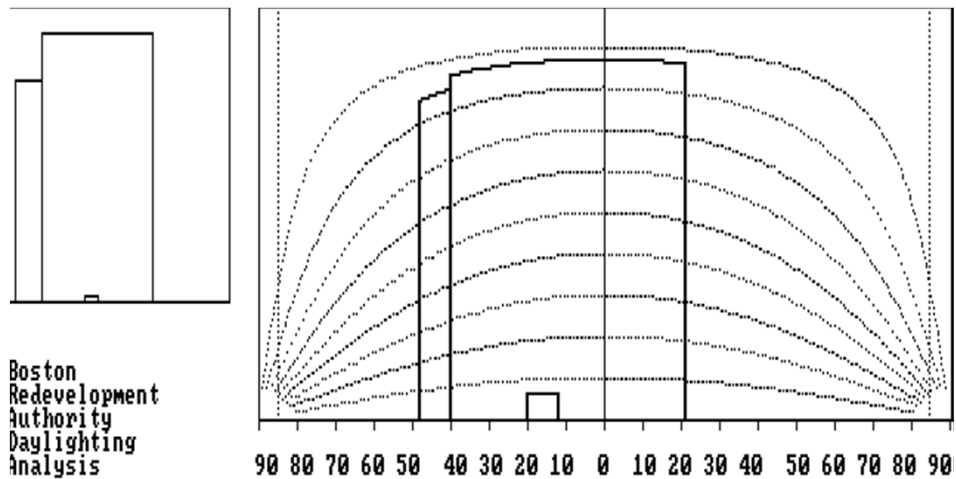


Viewpoint 1: Martha Road looking south at the site



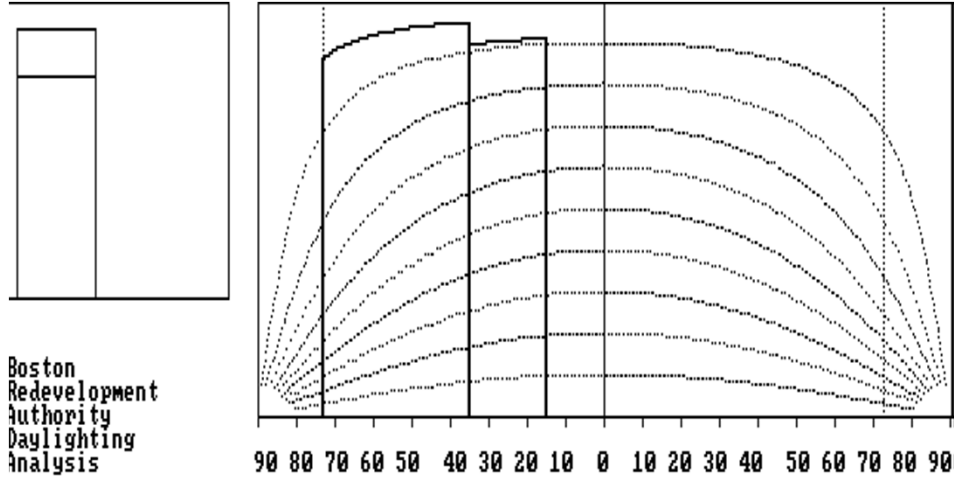
Obstruction of daylight by the building is 75.1 %

Viewpoint 2: Thoreau Path looking north at the site



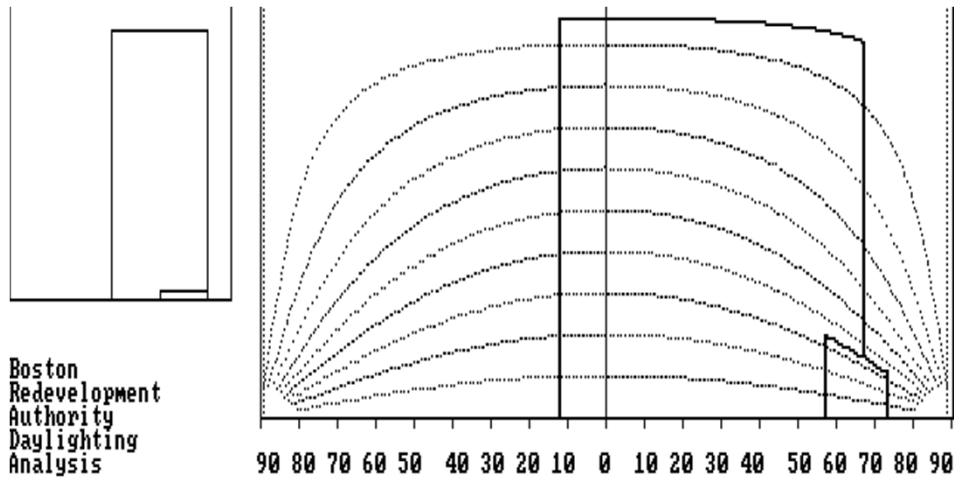
Obstruction of daylight by the building is 35.7 %

Viewpoint 3: Path on the west side of the site looking east



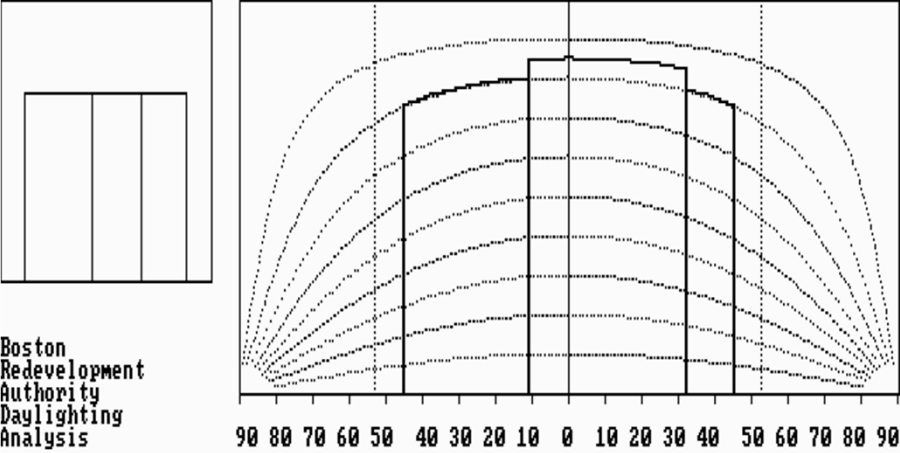
Obstruction of daylight by the building is 38.1 %

Viewpoint 4: Between the proposed buildings looking west

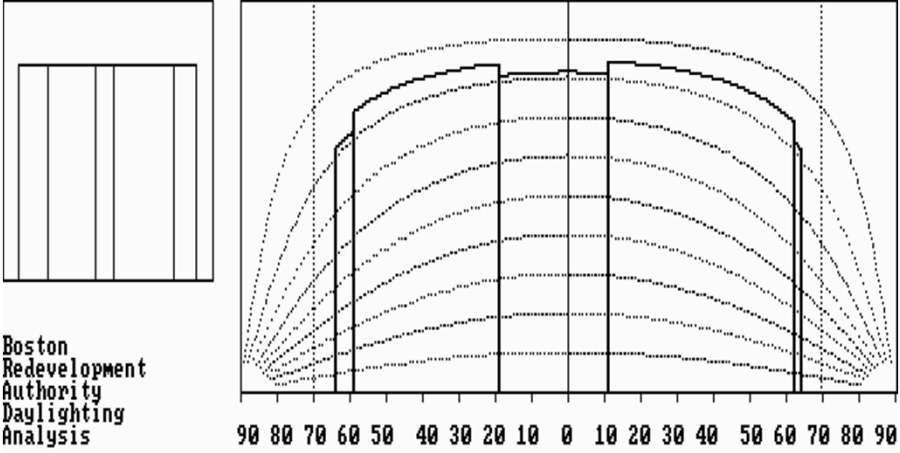


Obstruction of daylight by the building is 44.6 %

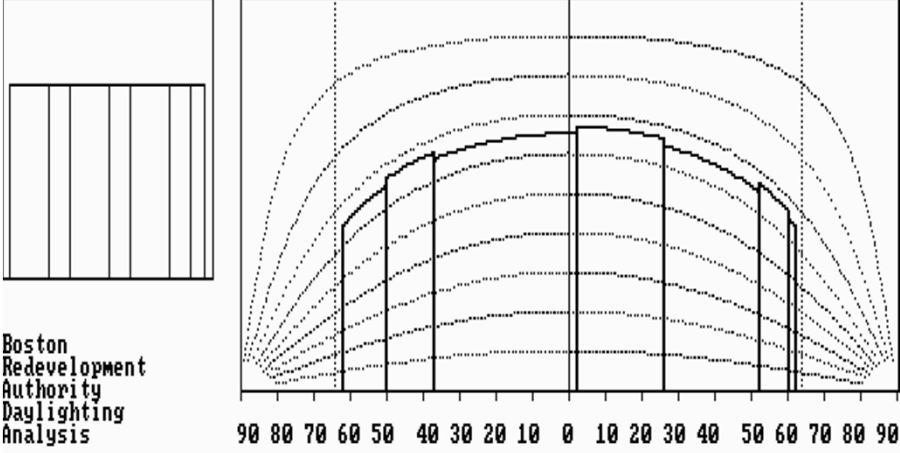
Area Context 1: Looking West at the Amy Lowell Apartments



Area Context 2: Looking West at Hawthorne Place



Area Context 3: Lomasney Way Looking South at the West End Place Condominiums



Viewpoint 2

Viewpoint 2 was taken from the center of Thoreau Path looking north at the Project site. The path is a significant distance from the existing and proposed buildings, minimizing the Project impact on the sky-dome. The daylight obstruction values for the existing and DPIR conditions are 30.7% and 23.3%, respectively. The daylight obstruction value for the proposed condition is 35.7%, which is only slightly higher than the existing condition.

Viewpoint 3

Viewpoint 3 was taken from the center of the path on the west side of the Project site. The existing and DPIR daylight obstruction values for the Project site are 75.5% and 89.0%, respectively. The daylight obstruction value for the proposed condition is 38.1% because from this viewpoint the proposed building is located on only a portion of the site, while the other half of the site is open space with significant views of the sky.

Viewpoints 4 and 5

Viewpoints 4 and 5 were taken from the space between the proposed DPIR buildings looking at each building. The daylight obstruction values for these two points in the DPIR were, 77.2% and 58.9%. The proposed Project no longer consists of two buildings, and there will only be daylight obstruction at Viewpoint 4, on the path looking west. The daylight obstruction at Viewpoint 4 for the proposed condition will be 44.6%.

Area Context Viewpoints

The area surrounding the Project site has a mixture of building heights up to approximately 380 feet. Three viewpoints in the immediate vicinity were analyzed to find the approximate range of daylight obstruction values adjacent to the Project site: AC1, looking west at the Amy Lowell Apartments; AC2, looking west at Hawthorne Place; and AC3, Lomasney Way looking south at the West End Place Condominiums. The daylight obstruction values for these locations ranged from 67.5% to 80.5%. One location at Emerson Place was analyzed for reference to the surrounding area outside of the Project's immediate vicinity. The daylight obstruction value for this location was 86.0%.

2.4.3 Conclusion

The daylight analysis conducted for the Project describes existing, DPIR, and proposed obstruction conditions at the Project site, as well as daylight obstruction values in the immediate vicinity. The Project site currently includes a parking garage. Surrounding the Project site is Thoreau Path and buildings with heights up to approximately 380 feet. The Project will result in similar daylight obstruction values as the existing and DPIR conditions. The existing building is located close to the street and does not have variation in its massing. The daylight obstruction values of the proposed Project are also similar to those

found in the immediate vicinity. The viewpoint looking south at the site from Martha Road will have the highest daylight obstruction value. However, this value is similar to the daylight obstruction values found in the immediate vicinity of the Project site.

2.5 Solid and Hazardous Waste

The Project will generate solid waste typical of residential developments. Solid waste generated by residents will be collected and disposed of off-site by a licensed contractor. The Proponent will implement an aggressive recycling program throughout the Project, and residents will be encouraged to recycle. Recycled materials are expected to include newspaper, plastics, glass, cardboard, cans, and bottles.

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

2.6 Geotechnical/Groundwater

The foundation design will likely be similar to that described in the DPIR. In addition, as discussed in the DPIR, the proposed construction does not present a long-term risk to the shallow groundwater table.

2.7 Air Quality

The DPIR included stationary source and microscale air quality analyses concluding that the previously proposed project, using conservative estimates, will be below the National Ambient Air Quality Standards (NAAQS) thresholds for SO₂, CO, NO₂, PM-10 and PM-2.5.

The changes to the NPC Project will not significantly change the Project's air quality impacts related to proposed mechanical equipment or traffic. The emergency generators will be permitted through the Massachusetts Department of Environmental Protection's (MassDEP) Environmental Results Program (ERP) which requires an analysis of the emergency generators.

2.8 Noise

The DPIR included an analysis of the Project's mechanical equipment in regard to noise impacts, and concluded that the previously proposed project, with appropriate mitigation, will not introduce significant outdoor mechanical equipment noise into the surrounding community. The NPC Project will include appropriate measures to ensure compliance with the City of Boston Zoning District Noise Standards and the MassDEP Noise Policy.

2.9 Construction

The construction-related impacts, and anticipated mitigation regarding air quality, noise and construction waste, are anticipated to be similar to those described in the DPIR.

The Proponent will follow City and MassDEP guidelines which will direct the evaluation and mitigation of construction impacts. Given the number of projects proposed in the surrounding area, coordination with the City and other developers will be essential to minimize construction-related impacts to the surrounding community.

A Construction Management Plan (CMP) will be submitted to BTM 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. Techniques such as barricades, walkways, painted lines, and signage will be used as necessary. Construction management and scheduling—including plans for construction worker commuting and parking, routing plans and scheduling for trucking and deliveries, protection of existing utilities, maintenance of fire access, and control of noise and dust—will minimize impacts on the surrounding environment. Throughout Project construction, a secure perimeter will be maintained to protect the public from construction activities.

2.10 Sustainable Design and Climate Change Resilience

2.10.1 *Green Building*

The NPC Project's location within the mature environment of the West End allows new development to occur with minimal impact on existing infrastructure. Due to the NPC Project's proximity to mass transit (i.e., commuter rail, MBTA rapid service, and bus) and shared transportation services (i.e., Zipcar, Hubway, Enterprise) as well as vehicular access to highways, the NPC Project supports the objectives of smart growth (i.e., new development at existing nodes of excellent transportation facilities).

Energy conservation and other sustainable design measures will be integral parts of the proposed NPC Project. The buildings will employ energy and water efficient features for mechanical, electrical, architectural, and structural systems, assemblies, and materials where possible. Sustainable design elements relating to building energy management systems, lighting, recycling, conservation measures, local building materials, and clean construction vehicles will be included, as practicable.

The City of Boston requires sustainable design in new development projects. Article 37 of the Boston Zoning Code requires that projects be designed as certifiable under the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) program based on the most appropriate LEED building rating system. The Project will comply with this Article 37 requirement for "LEED Certifiable" status. A preliminary LEED

for New Construction (LEED-NC) v2009 checklist that identifies the green design goals for this NPC Project is included at the end of this section. For each credit identified as a “yes” on the checklist, the following narrative provides a brief description of the implementation measures to the extent that they are defined at this stage of design.

The Proponent has the goal of achieving the Gold level, as shown in the LEED checklist, although as the design progresses, the number of credits achievable may be adjusted up or down.

The following narrative discusses the LEED-NC v2009 credits applicable to the NPC Project. Credits that are still being studied are italicized.

Sustainable Sites

Sustainable Sites, Prerequisite 1, Construction Activity Pollution Prevention: The NPC Project will include a full erosion and sedimentation control program. This program will include a Stormwater Pollution Prevention Plan (SWPPP) that describes how to protect the existing stormwater collection system during construction. The program will be developed further in the design process.

Sustainable Sites, Credit 1, Site Selection: The NPC Project meets all of the criteria for site selection: the NPC Project site is not prime farmland, was previously developed, does not have endangered species habitat, is not within 100 feet of a wetland, and is not a public park.

Sustainable Sites, Credit 2, Development Density & Community Connectivity: The NPC Project is located in Boston’s West End, which is a dense urban area with a mix of residential and commercial uses. The Project will pursue the compliance path for Option 2, Community Connectivity. Within a one-half-mile radius of the NPC Project’s main entrance, there are several residential developments including the West End Residences, Whittier Place, Hawthorne Place, Amy Lowell Apartments, West End Place, and the Avenir. Within the same radius, there are also many basic services with pedestrian access, including banks, convenience grocery stores, day care centers, cleaners, parks, pharmacies, a post office, restaurants, fitness centers, and a museum.

Sustainable Sites, Credit 3, Brownfield Redevelopment: The existing building areas to be replaced include asbestos-containing materials (ACMs). The Construction Manager will implement a compliant ACM abatement and removal plan. Local, state, and federal regulations will be followed regarding the safe removal and disposal of ACMs.

Sustainable Sites, Credit 4.1, Alternative Transportation - Public Transportation Access: The NPC Project is located within one-half-mile walking distance of public transportation. There are subway stations within the radius that provide access to the Red Line, Green Line, Blue Line, Orange Line, and commuter rail line. There are also at least 21 bus stops, one

commuter rail station (North Station), and five rapid transit stations (North Station, Science Park, Charles MGH, Bowdoin, and Government Center) within this one-half-mile radius. The proximity of the Project to several forms of public transportation fulfills the LEED credit requirements and helps avoid pollution from automobile usage.

Sustainable Sites, Credit 4.2, Alternative Transportation - Bicycle Storage and Changing Rooms: The NPC Project will pursue Case 2 for Residential Projects. The Project will include significant space within the below-grade parking garage for bicycle parking and secure storage. This area will provide one bicycle space for each unit, far in excess of LEED requirements.

Sustainable Sites, Credit 4.3, Alternative Transportation – Low-Emitting and Fuel-Efficient Vehicles: Within the below-grade parking garage, areas designating priority parking for low-emitting and fuel-efficient vehicles will be provided. Priority locations will be divided amongst the levels of the parking garage and adjacent to the private resident route and public routes. The NPC Project will include spaces equaling or exceeding 5% of the total garage capacity.

Sustainable Sites, Credit 4.4, Alternative Transportation - Parking Capacity: The NPC Project will pursue Case 2, Option 1 for Residential Projects. The Project includes approximately 830 parking spaces that will be provided in a structured garage on five below-ground levels. This parking will serve approximately 486 residential units, existing commercial uses, existing lease commitments (e.g., Amy Lowell Apartments), and the general public; Section 2.1 contains a more detailed discussion of parking. The proposed ratio for new residential parking spaces is 0.37 spaces per unit, which is below the local zoning requirements for new residential parking.

Sustainable Sites, Credit 5.2, Site Development -Maximize Open Space: The NPC Project replaces the existing parking garage with a below-grade parking and new building. The building footprint is significantly reduced; it occupies less than 10% of the entire site area. The remaining open space is primarily landscaped with both vegetated areas and pedestrian oriented hardscape. The site improvements create usable open space and a pedestrian link to the Thoreau Path.

Sustainable Sites, Credit 6.1, Stormwater Design – Quantity Control: The NPC Project will pursue Case 2 for Sites with Existing Imperviousness Greater Than 50%. The NPC Project site is approximately 131,600 square feet and currently holds the existing parking garage with an approximately 50,150 square foot footprint. The remainder of the site includes approximately 27,248 square feet of planted areas, approximately 43,616 square feet of hardscape and approximately 10,586 square feet of driveway. The proposed design reduces the building footprint significantly to approximately 11,814 square feet. The remaining space will become planted areas or hardscape, with the majority of the site paths

and sidewalks being of pervious materials. The increased planted areas and pervious hardscapes will allow for on-site stormwater filtration and decrease the volume of runoff by more than 25%.

Sustainable Sites, Credit 6.2, Stormwater Design – Quality Control: *The stormwater management plan includes improving the quality of the stormwater run off. The majority of the site stormwater will be directed through interceptors and/or water quality structures. Additionally, the team is considering including a stormwater recharge system. It is likely the NPC Project will be able to demonstrate that the equivalent of one inch of stormwater over the impervious site area will be treated to remove phosphorus and suspended solids and then recharged into the existing groundwater system.*

Sustainable Sites, Credit 7.1, Heat Island Effect – Non-Roof: The NPC Project will pursue Option 2, with all of the parking spaces under cover. The cover for parking will be a vegetated green roof and all hardscapes above will have a solar reflectance index (SRI) value of at least 29. As 100% of the parking will be below grade, this will also qualify for an Innovation in Design credit for exemplary performance.

Sustainable Sites, Credit 7.2, Heat Island Effect - Roof: Roofing material will be selected to meet the LEED credit guidelines for a SRI equal to or greater than 78 for a low-sloped roof.

Water Efficiency

Water Efficiency, Prerequisite 1, Water Use Reduction 20%: The NPC Project will specify EPA WaterSense or equal plumbing fixtures to implement water use reduction strategies that use, at a minimum, 20% less potable water than the water use baseline calculated for the building (not including irrigation) after meeting Energy Policy Act of 1992 fixture performance requirements.

Water Efficiency, Credit 1.1, Water Efficient Landscaping: The NPC Project will utilize native plantings as required to minimize the need for irrigation. The species and density will be designed to achieve a reduction in potable water consumption by 50% compared to the mid-summer day baseline case.

Water Efficiency, Credit 3, Water Use Reduction: The NPC Project intends to utilize low-flow fixtures and fittings to achieve 35% less water use than the calculated baseline case. Residential fixtures to be used include EPA WaterSense or equal toilets, lavatory faucets, kitchen faucets and showerheads.

Energy and Atmosphere

Energy & Atmosphere, Prerequisite 1, Fundamental Commissioning of the Building Energy Systems: Building systems will be commissioned in accordance with LEED requirements. The commissioning services provided will include the Owner's Project Requirements (OPR) and Basis of Design (BOD) documents, development of a commissioning plan,

incorporation of a commissioning specification section into the construction documents, and verification through startup observation and functional testing that the installed systems are operating in accordance with the OPR, BOD, and construction documents. The aforementioned services will apply to the following commissioned systems: heating, ventilation, and air conditioning (HVAC); lighting controls; and domestic hot water systems.

Energy & Atmosphere, Prerequisite 2, Minimum Energy Performance:

The NPC Project design will comply with the ASHRAE 90.1-2007 Energy Standard per the newest version of LEED 2009. The building performance rating will demonstrate at a minimum, a 10% improvement in energy use by cost when compared to a baseline building performance as calculated using the rating method in Appendix G of ANSI/ASHREA/IESNA Standard 90.1-2007. This requirement is met by the design of a high performance building envelope; the design and selection of efficient building systems equipment; and a lighting power density that is below code. The team will develop a whole building energy model to demonstrate the expected performance rating of the designed building systems. Below, please find a summary of the proposed building systems:

- ◆ Three gas-fired high efficiency condensing hot water boilers 6,000 MBH each, similar to AERCO Benchmark 6000, inline pumps, expansion tanks and water treatment system, located in the penthouse mechanical room, will provide heating for the residential and retail condenser water loop.
- ◆ One (two-cell) roof-mounted 1200 Ton high efficiency cooling tower similar to BAC 3000 will provide cooling for the building condenser water loop via a set of heat exchangers. Base-mounted, end suction centrifugal cooling tower water pumps with variable frequency drives, chemical treatment system, and a side-stream filtration system will be located in the penthouse mechanical room.
- ◆ Each dwelling unit will be provided with one or two high efficiency vertical stacked water cooled air conditioners with hydronic heat units (hybrid units) similar to Whalen Whisperpack units. Each unit will be equipped with a wall-mounted seven-day programmable DDC thermostat and will be capable of heating and cooling.
- ◆ Each dwelling unit will be provided with a vent-less condensing dryer.
- ◆ Each residential unit will have a recirculation type kitchen exhaust hood with an integral exhaust fan controlled by a hood-mounted switch.
- ◆ Two 23,000 CFM water cooled Energy Recovery Units (ERU) will be provided to supply conditioned outside ventilation air to the residential apartments. ERU's will also provide bathroom exhaust and general exhaust for each apartment. The cooling section of the units will be connected to the building condenser water loop. The units will be equipped with heating coils that will be connected to the building heating loop.

- ◆ Two 16,000 CFM water cooled 100% outdoor air Make-up Air Units (MAU) will be provided to supply conditioned outside air to the public corridors and common areas. The cooling section of the units will be connected to the building condenser water loop. The units will be equipped with heating coils that will be connected to the building heating loop.

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

Energy & Atmosphere, Credit 1, Optimize Energy Performance: The NPC Project will be designed with the goal of exceeding the ASHRAE 90.1-2007 Energy Standard by 20 percent as a cost reduction compared to the baseline case. See EAp2 above for further information.

Energy & Atmosphere, Credit 3, Enhanced Commissioning: In addition to the commissioning practices that will be implemented under the Prerequisite, all requirements for enhanced commissioning per LEED requirements will be followed. An independent third-party commissioning agent will perform the services. The CxA will verify the building systems are installed, calibrated and perform to the building owner's project requirements.

Energy & Atmosphere, Credit 4, Enhanced Refrigerant Management: *Refrigerants for the HVAC equipment will be selected based on their capacity to minimize the impacts of ozone depletion and global warming. Once the refrigerant containing equipment has been submitted, approved final refrigerant quantity calculations will be performed to confirm if the credit criteria are met.*

Energy & Atmosphere, Credit 5, Measurement and Verification: The NPC Project will pursue Option 3, meeting MPR 6 through compliance option 1: energy and water data release form. An account in Energy Star's portfolio manager will be created and the results will be included in the documentation.

Energy & Atmosphere, Credit 6, Green Power: *The owner is exploring purchasing 'green power' for a two-year period renewable energy contract to provide a minimum of 35% of the building's electricity from renewable sources.*

Materials and Resources

Materials & Resources, Prerequisite 1, Storage and Collection of Recyclables: Recycling areas that serve the entire building will be provided for paper, corrugated cardboard, glass, plastics, and metals. The recyclables will be collected by a contracted waste management company on a regular basis.

Materials & Resources, Credit 2, Construction Waste Management: The NPC Project manual will include direction for the Construction Manager to submit and implement a Construction Waste Management Plan to ensure that a minimal amount of waste debris is disposed of in landfills and to pursue the goal of recycling or salvaging at least 75 percent of the NPC Project-generated construction waste.

Materials & Resources, Credit 4, Recycled Content: The NPC Project will specify materials and products to include pre- and or post-consumer recycled content, where applicable. During construction, materials and products submittals will include documentation of the percentage of pre-/post-consumer recycled content. The Construction Manager will track the recycled content with a goal to achieve 10% recycled-content materials based on overall materials costs.

Materials & Resources, Credit 5, Regional Materials: The NPC Project will specify materials and products that have been extracted, harvested, recovered, or manufactured within 500 miles of the NPC Project site. During construction, materials and products submittals will include documentation of the harvest/extraction and manufacture distance to the NPC Project site. The Construction Manager will track the regional information. The goal will be to achieve 10 percent, based on cost, of the total materials value.

Materials & Resources, Credit 7, Certified Wood: The NPC Project specifications will include wood materials to be from FSC certified forests and from compliant manufacturers and millwork shops. The Construction Manager will track the submitted and installed wood materials and products. Once the buyout is complete, the development team will assess if the credit criteria are met.

Indoor Environmental Quality

Indoor Environmental Quality, Prerequisite 1, Minimum IAQ Performance: The NPC Project will be designed to comply with the ASHRAE 62.1-2007 Ventilation Standard per LEED NC v2009. The residential units will have operable windows; however, the units will all have mechanical ventilation. A summary description of the proposed ventilation system is included below:

- ◆ Two 23,000 CFM water cooled ERUs will be provided to supply conditioned outside ventilation air to the residential apartments. ERUs will also provide bathroom exhaust and general exhaust for each apartment. The cooling section of the units will be connected to the building condenser water loop. The units will be equipped with heating coils that will be connected to the building heating loop. One unit will serve the lower 22 stories, and the other unit will serve the top 24 stories. Vertical ductwork will extend through the building and supply and exhaust air at each floor.

- ◆ Two 16,000 CFM water cooled 100% outdoor air MAUs will be provided to supply conditioned outside air to the public corridors and common areas. The cooling section of the units will be connected to the building condenser water loop. The units will be equipped with heating coils that will be connected to the building heating loop. One unit will serve the lower 22 stories, and the other unit will serve the top 24 stories. Vertical ductwork will extend through the building and supply air at each floor. Terminal air distribution for the corridors on each floor will be accomplished with sidewall supply registers.

Indoor Environmental Quality, Prerequisite 2, Environmental Tobacco Smoke Control: As a residential project, to comply with this Prerequisite, the NPC Project will not allow smoking within any interior public/common areas of the building, or on the exterior within 25 feet of the NP Project. Designated smoking areas, including balconies, will be located a minimum of 25 feet from any openings, (doors, windows, etc), into the building. The NPC Project may choose to implement all of the requirements necessary to allow smoking within individual units ONLY as follows:

- ◆ Weather-strip all exterior doors and operable windows in the residential units to minimize leakage from outdoors;
- ◆ Minimize uncontrolled pathways for environmental tobacco smoke transfer between individual residential units by sealing penetrations in walls, ceilings and floors in the residential units and by sealing vertical chases adjacent to the units;
- ◆ Weather-strip all doors in the residential units leading to common hallways to minimize air leakage into the hallway;
- ◆ Demonstrate acceptable sealing of residential units by a blower door test conducted in accordance with ANSI/ ASTM-E779-03, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization; and
- ◆ Use the progressive sampling methodology defined in Chapter 4 (Compliance through Quality Construction) of the Residential Manual for Compliance with California's 2001 Energy Efficiency Standards¹. Residential units must demonstrate less than 1.25 square inches of leakage area per 100 square feet of enclosure area (i.e., sum of all wall, ceiling and floor areas).

Indoor Environmental Quality, Credit 1 Outdoor Air Delivery Monitoring: The design includes monitoring of outdoor air delivery. Each air handling unit will have airflow measurement devices to track the airflow delivered to applicable spaces; automatic adjustments to the OA air flow will be made based on the information provided by the tracking devices.

¹ http://www.energy.ca.gov/title24/residential_manual

Indoor Environmental Quality, Credit 3.1, Construction IAQ Management Plan – During Construction: The project manual will include direction for the Construction Manager to develop and implement an Indoor Air Quality Management Plan for the construction and pre-occupancy phases of the development to meet/exceed the recommended Control Measures of the SMACNA IAQ Guidelines for Occupied buildings Under Construction 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter3).

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

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

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

Indoor Environmental Quality, Credit 5, Indoor Chemical and Pollutant Source Control: The NPC Project will include walk off mats at regularly used building entries to minimize and control the entry of pollutants into the building and to contain chemical use areas. Janitors closets located in the building core will be exhausted, have self closing doors and deck to deck partitions.

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

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

Indoor Environmental Quality, Credit 7.1, Thermal Comfort Design: The NPC Project HVAC design will be in compliance with ASHRAE 55 for all applicable mechanically ventilated regularly occupied spaces. The base building system will be designed to maintain comfort within the Acceptable Range of operative temperature and humidity as

defined by ASHRAE 55-2004, based on the anticipated activity levels (1.0-1.3 met) and the anticipated uses of the building, and also based on the anticipated clothing for the activities in the building (0.5-1.0 clo).

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

Innovation and Design Process

Innovation In Design, Credits 1.1-1.5: The Proponent intends to attempt all five Innovation and Design credits as follows:

- ◆ The NPC Project is located within one-quarter mile of multiple modes of public transportation achieving exemplary performance for Sustainable Sites Credit 4.1, Alternative Transportation – Public Transportation Access.
- ◆ The NPC Project will provide extensive open space and will provide a minimum of double the Open Space required to achieve an exemplary performance credit for SSs5.2, Site Development – Maximize Open Space.
- ◆ The NPC Project will provide 100% of the parking spaces below grade for an exemplary performance credit for Sustainable Sites Credit 7.1, Heat Island Effect - Non-roof.
- ◆ The NPC Project will explore using low mercury containing light fixture and pursue an ID credit for Low Mercury Lighting.
- ◆ The NPC Project will explore the criteria for the Pilot Credit: Walkable Streets and confirm if the requirements can be met. Alternatively, the NPC Project may implement a green cleaning policy for the common areas.

Innovation In Design, Credit 2, LEED Accredited Professional: The Project team includes at least one LEED Accredited Professional.

Regional Priority Credits

Regional Priority, Credits 1.1-1.4: The following are the Regional Priority Credits for Boston:

- ◆ Sustainable Sites Credit 3: Brownfield Redevelopment;
- ◆ Sustainable Sites Credit 6.1: Stormwater Design – Quantity Control;
- ◆ Sustainable Sites Credit 7.1: Heat Island Effect – Non-roof;
- ◆ Sustainable Sites Credit 7.2: Heat Island Effect – Roof;



LEED for New Construction and Major Renovation 2009 Garden Garage Redevelopment

	Yes	?	No	
Phase	23	1	2	26

C	Y			Prereq 1	Construction Activity Pollution Prevention	Required
D	1			Credit 1	Site Selection	1
D	5			Credit 2	Development Density & Community Connectivity	5
D	1			Credit 3	Brownfield Redevelopment*** RP	1
D	6			Credit 4.1	Alternative Transportation, Public Transportation Access	6
D	1			Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
D	3			Credit 4.3	Alternative Transportation, Low-Emitting & Fuel-Efficient Vehicles	3
D	2			Credit 4.4	Alternative Transportation, Parking Capacity	2
C			1	Credit 5.1	Site Development, Protect or Restore Habitat	1
D	1			Credit 5.2	Site Development, Maximize Open Space	1
D	1			Credit 6.1	Stormwater Design, Quantity Control	1
D		1		Credit 6.2	Stormwater Design, Quality Control	1
C	1			Credit 7.1	Heat Island Effect, Non-Roof*** RP	1
D	1			Credit 7.2	Heat Island Effect, Roof	1
D			1	Credit 8	Light Pollution Reduction	1

	Yes	?	No	
	5	1	4	10

D	Y			Prereq 1	Water Use Reduction, 20% Reduction	Required
D	2			Credit 1.1	Water Efficient Landscaping, Reduce by 50%	2
D			2	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	2
D			2	Credit 2	Innovative Wastewater Technologies	2
D	3	1		Credit 3	Water Use Reduction	2 to 4

	Yes	?	No	
	8	11	16	35

C	Y			Prereq 1	Fundamental Commissioning of the Building Energy Systems	Required
D	Y			Prereq 2	Minimum Energy Performance	Required
D	Y			Prereq 3	Fundamental Refrigerant Management	Required
D	5	7	7	Credit 1	Optimize Energy Performance	1 to 19
D			7	Credit 2	On-Site Renewable Energy	1 to 7
C	2			Credit 3	Enhanced Commissioning	2
D		2		Credit 4	Enhanced Refrigerant Management	2
C	1		2	Credit 5	Measurement & Verification	3
C		2		Credit 6	Green Power	2

	Yes	?	No	
	4	3	7	14

D	Y			Prereq 1	Storage & Collection of Recyclables	Required
C			3	Credit 1	Building Reuse	1 to 3
C			1	Credit 1.2	Building Reuse: Maintain 50% of Interior Non-Structural Elements	1
C	1			Credit 2.1	Construction Waste Management, Divert 50% from Disposal	1
C	1			Credit 2.2	Construction Waste Management, Divert 75% from Disposal	1
C			1	Credit 3.1	Materials Reuse, 5%	1

Garden Garage Redevelopment

C			1	Credit 3.2	Materials Reuse, 10%	1
C	1			Credit 4.1	Recycled Content, 10% (post-consumer + ½ pre-consumer)	1
C		1		Credit 4.2	Recycled Content, 20% (post-consumer + ½ pre-consumer)	1
C	1			Credit 5.1	Regional Materials, 10% Extracted, Processed & Manufactured Regionally	1
C		1		Credit 5.2	Regional Materials, 20% Extracted, Processed & Manufactured Regionally	1
C			1	Credit 6	Rapidly Renewable Materials	1
C		1		Credit 7	Certified Wood	1

Yes	?	No	
10	1	4	15

	Y			Prereq 1	Minimum IAQ Performance	Required
	Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
D	1			Credit 1	Outdoor Air Delivery Monitoring	1
D			1	Credit 2	Increased Ventilation	1
C	1			Credit 3.1	Construction IAQ Management Plan, During Construction	1
C			1	Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
C	1			Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
C	1			Credit 4.2	Low-Emitting Materials, Paints & Coatings	1
C	1			Credit 4.3	Low-Emitting Materials, Flooring Systems	1
C		1		Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products	1
D	1			Credit 5	Indoor Chemical & Pollutant Source Control	1
D	1			Credit 6.1	Controllability of Systems, Lighting	1
D	1			Credit 6.2	Controllability of Systems, Thermal Comfort	1
D	1			Credit 7.1	Thermal Comfort, Design	1
D			1	Credit 7.2	Thermal Comfort, Verification	1
D			1	Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
D	1			Credit 8.2	Daylight & Views, Views for 90% of Spaces	1

Yes	?	No	
6	0	0	6

D	1			Credit 1.1	Innovation in Design: Exemplary Performance SSc4.1	1
D	1			Credit 1.2	Innovation in Design: Exemplary Performance SSc5.2	1
D	1			Credit 1.3	Innovation in Design: Exemplary Performance SSc7.1	1
C	1			Credit 1.4	Innovation in Design: Low Mercury Lighting	1
C	1			Credit 1.5	Innovation in Design: Pilot Credit Walkable Streets	1
C	1			Credit 2	LEED® Accredited Professional	1

Yes	?	No	
4	0	0	4

					Boston MA: SSc3; SSc6.1; SSc7.1; SSc7.2; EAc2 1%; MRc1.1(75%)	
	1			Credit 1.1	Regional Priority Credit: SSc3	1
	1			Credit 1.2	Regional Priority Credit: SSc6.1	1
	1			Credit 1.3	Regional Priority Credit: SSc7.2	1
	1			Credit 1.4	Regional Priority Credit: SSc7.1	1

Yes	?	No	
60	17	33	110

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

- ◆ Energy and Atmosphere Credit 2: On-Site Renewable Energy, 1 percent; and
- ◆ Materials and Resources Credit 1.1: Building Reuse – Maintain Existing Walls, Floors and Roof, 75 percent.

The NPC Project will pursue four Regional Priority Credits, including Sustainable Sites Credit 3: Brownfield Redevelopment, Sustainable Sites Credit 6.1: Stormwater Design – Quantity Control, Sustainable Sites Credit 7.1 (Heat Island Effect – Non-roof), and Sustainable Sites Credit 7.2 (Heat Island Effect – Roof).

2.10.2 Climate Change Resilience

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

The expected life of the NPC Project is anticipated to be approximately 50 years. Therefore, the Proponent planned for climate change conditions projected at a 50 year time span. A copy of the completed checklist is included in Appendix C. Given the preliminary level of design, the responses are also preliminary and may be updated as the NPC Project design progresses.

Extreme Heat Events

The Intergovernmental Panel on Climate Change (IPCC) has predicted that in Massachusetts the number of days with temperatures greater than 90°F will increase from the current five-to-twenty days annually, to thirty-to-sixty days annually². The Project design will incorporate a number of measures to minimize the impact of high temperature events, including:

- ◆ New open space with significant new landscaping;
- ◆ Installing operable windows where possible;
- ◆ Using Energy Recovery Ventilation to reduce cooling loads;
- ◆ High-albedo roofing and hardscape materials to minimize the heat island effect; and
- ◆ Planting new street trees to shade the sidewalks adjacent to the site.

² 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.

Energy modeling for the Project has not yet been completed; however, as indicated on the LEED Checklist, the Proponent will strive to reduce the Project's overall energy demand and GHG emissions that contribute to global warming. The Project's proposed TDM program will also help to lessen fossil fuel consumption.

Sea Level Rise

According to the IPCC, if the sea level continues to rise at historic rates, the sea level in Massachusetts as a whole will rise by one foot by the year 2100. However, if sea level rise is projected using a high emissions scenario of climate change, sea level rise could reach six feet. Adding this potential rise to the mean higher high water (MHHW) level, in 50 years the MHHW could be as high as 15.2 feet Boston City Base (BCB), assuming a sea level rise of approximately four feet.³ Although the first floor is at 17 feet BCB, the building will allow the parking garage to be inundated, the electrical transformers will be located above the potential flood level, and the rear portion of the building will exit at the second floor due to the grade change from the street towards the back of the building.

Sea level rise is also a concern when combined with a large storm. If a major storm, such as another "Superstorm Sandy" with significant storm surge, were to impact Boston at high tide, the potential for flooding would markedly increase. Such a storm could be anticipated to increase sea level to approximately 18.7 feet BCB, and the NPC Project has considered this level in the design.⁴

Rain Events

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

- ◆ Areas of vegetated water capture;
- ◆ Significant new landscaped open space;
- ◆ Locating critical mechanical and electrical equipment at the highest elevation possible to prevent exposure to flood waters;
- ◆ Locating the backup generator above the potential 100-year flood level;
- ◆ Considering directing stormwater runoff from the roof to a subsurface recharge system on-site; and
- ◆ Wastewater and stormwater back flow prevention.

³ "Preparing for the Rising Tide". The Boston Harbor Association. February 2013.

⁴ Ibid.

Drought Conditions

Under the high emissions scenario, the occurrence of droughts lasting one to three months could go up by as much as 75% over existing conditions by the end of the century. To minimize the NPC Project's susceptibility to drought conditions, the landscape design is anticipated to incorporate native and adaptive plant materials and a reduction in potable water use for irrigation when compared to a mid-summer baseline. Aeration fixtures and appliances will be chosen for water conservation qualities, conserving potable water supplies. In public areas, sensor operated faucets and toilets will be installed.

2.11 Urban Design

2.11.1 *Existing Urban Fabric*

The character of the West End is largely described by the principal use functions, which include health care and research, housing for a diverse population, a park, and recreation. Ancillary functions include retail, office, worship, parking structures, and transportation. The existing 1960's residential buildings of Charles River Park are a collection of modern high-rise structures with building heights of 16 stories/160 feet, 24 stories/240 feet, and 38 stories/380 feet. These older buildings, planned as part of the grand urban renewal strategy, are separate and distinct objects in the park. The park is an urban pedestrian district which is connected internally by Thoreau Path but remains to this day with minimal connections to the surrounding urban fabric. Over the past decade, the urban character of the West End has been enhanced with the additions of the West End Place Condominiums, an 11-story residential building, and five new residential buildings (ranging from 3 to 14 stories) at the West End Apartments to complement the existing buildings. Both projects strive to create strong urban streetwalls and better internal and external connectivity.

2.11.2 *Proposed Design*

The NPC Project's program includes approximately 486 residential units in a single, approximately 465-foot-tall building and approximately 830 below-grade parking spaces. The main residential lobby will be accessed directly from Lomasney Way. The building design also incorporates a secondary residential entrance oriented toward Thoreau Path to allow direct access to the established pedestrian network and open space.

Two vehicular points of access to the garage - which will provide public, residential exempt, and non-residential exempt parking spaces. - will be provided on Lomasney Way and Martha Road. The proposed driveway on Lomasney Way will be positioned in generally the same location as the existing driveway; however, the driveway will be narrowed to two lanes (compared to five lanes existing), which will substantially reduce the crossing distance for pedestrians and, thus, improve pedestrian conditions in front of the site. The driveway on Martha Road will be located approximately 50 feet west of Nashua

Street and will provide only for right-turns in and right-turns out. The garage has also been planned with a below-grade connection to the existing Longfellow Place Garage to provide additional exiting capacity after events.

2.11.2.1 Urban Design Principles

The design of the Project embodies several key urban design principles specific to the West End and the NPC Project site, which include:

- ◆ Development that recognizes the character of the existing residential neighborhood and strives to improve connectivity;
- ◆ Improved pedestrian access into, through, and around the site;
- ◆ Creation of an active, pedestrian-friendly edge along Lomasney Way; and
- ◆ Creation of new urban open space.

2.11.2.2 Massing, Form, and Response to the Urban Context

The proposed development is designed and sited to respect and complement the established arrangement of buildings and open space, and to strengthen the cohesive residential quality of the West End. The siting of the proposed building significantly reduces the environmental impact of previous schemes on the surrounding buildings while maintaining and enhancing the visual connection to surrounding areas. The strategy of placing the parking below grade reduces the overall building footprint on the site, and responds to a long-standing community desire to provide new landscaped open space and enhance the pedestrian realm. Minimizing the building footprint and orienting the development along the north edge of the precinct allows light to penetrate the additional shared open space of the site.

The massing of the building is intended to complement the scale and character of surrounding buildings. While taller than the other buildings located within the West End neighborhood, the dimensions have been kept very slender to minimize the shadow impact. The footprint of approximately 11,900 sf has been reduced from the two-building scheme previously proposed by over 50%. This opens up the site for the residents and public, providing over 41,000 square feet of new open space compared to the existing conditions. The building's location defines a perimeter to the West End neighborhood while still allowing for visual and physical connection to Lomasney Way and Nashua Street, and provides similar context to new developments to the northeast of the site. The design for the building incorporates a stepped massing and provides a narrowing of the building and visual variety to the skyline. The building materials and bay spacing at the base adds scale and definition to the new entry and retail space. The entry to the parking garage

further defines the streetfront along Lomasney Way while providing direction to users of the garage, new building residents, and pedestrians headed to Thoreau Path. Figures 2-25 to 2-50 at the end of this chapter include perspectives of the NPC Project.

The placement of the building is deliberate to provide wider view corridors from neighboring residential buildings and Thoreau Path, visually connecting the West End to other neighborhoods and providing a sense of connection to the city as a whole. The height and density of the massing is appropriately concentrated on the northern edge of the site, against the bustling Leverett Connector ramps and North Station; this shields the enclave-like open space from the noise of the city and minimizes the potential impacts to adjacent buildings. Locating the building massing to the north also helps minimize the impact to established east-west view corridors from adjacent buildings and maximize light to Thoreau Path.

Additionally, in removing the existing above-grade structure and siting the building to the northwest edge of the site, the east edge of the site has been opened to the courtyard space of adjacent West End Place. The site has been further designed to establish this visual and physical connection and provide another means of accessing Thoreau Path and Lowell Square, the intersections of Causeway Street, Lomasney Way, Staniford Street, and Merrimac Street.

2.11.2.3 Façade Design Fenestration and Building Materials

The facade of the proposed building features a contemporary expression of 21st century residential design that is intended to enrich and complement the character of the neighborhood. The lower floors of the building will be clad in stone to provide a more solid base near the ground, and a scaling element within the pedestrian realm. The distinct stone piers on the primary building grid will be infilled with two-story window wall assemblies with the intent to activate the streetscape with the engaging elements of the program – public retail, resident lobby, leasing office, and other resident amenities. Entries to the building will have canopies to provide scale and protection, and will be of materials complementary to the base of the building.

The upper floors will be clad with a combination of precast concrete panels with two-story punched aluminum windows and window wall assemblies at the corners. The precast concrete will feature a horizontally-banded architectural finish similar to terracotta. The varied width and depth of precast piers will create a hierarchy to the gridded pattern that extends up the building, giving texture to the urban wall. The precast panels will extend to the top of the mechanical penthouse, with the two-story rhythm continuous to the top as the building meets the sky. All of the residential units will feature operable windows. The window wall forms will help to lighten the corners and reduce the mass of the building. The primary window wall façade is on the northeast corner and incorporates balconies at some of the floors, the occurrence of balconies increasing as they extend up the façade, adding pattern and a finer grain.

2.11.2.4 Site Design

The NPC Project site offers many opportunities for dramatic views and movement due to an elevation grade change between Lomasney Way and Thoreau Path. The primary goal of the site design is to improve and enhance the pedestrian circulation between the heart of the West End, North Station, TD Garden and the surrounding neighborhood.

To enhance the experience of rising into the site from Lomasney Way, terraced landforms have been introduced to the design. These forms will also serve to provide subtle definition for open space and will direct pedestrian circulation through the site. The largest of the proposed elevated terraces will allow the below-grade parking deck to be completely buried, enhancing the overall visual experience and increasing the useable open space on the site.

New open spaces formed by the proposed landforms include intimate seating pockets, gathering terraces, and overlooks to Thoreau Path, as well as a larger community gathering space. A new open-air pavilion is included in the community space to provide a place for seating and shade, as well as a center for functions and events. In addition, certain open spaces adjacent to the major view corridors of Thoreau Path will offer opportunities for public art.

The terraces will be simple, accessible lawns accented with flowering trees for seasonal interest and specimen canopy trees which provide shade and pedestrian scale to the open space. Shrubs will be used minimally to offer screening and privacy where needed, and low perennials and groundcovers will be planted in soils on structures (e.g., green roofs).

The primary pedestrian circulation adjacent to the residential building will occur on walks sloping at under five percent. Secondary circulation will occur through a filtered seating area referred to as the “Petal Garden”, a space that provides a buffered threshold between Thoreau Path and the access to Lomasney Way. Low seat walls will be incorporated to direct circulation and absorb changes in grade where needed within the Petal Garden. The views and physical connections to and from Thoreau Path will account for the primary and secondary desire lines. Differing walk widths and surface materials will define the hierarchy of importance. Figure 2-51 includes a circulation plan through the site and surrounding area.

Views from adjacent properties have been considered in the overall Project design. A new visual connection from West End Place to Thoreau Path has been provided in the site design. A future walkway connection within this open space is possible if desired by the residents of West End Place. The pedestrian connections to and from North Station will also be physically and visually strengthened by splitting the parking and service entrances into two smaller locations. This will allow the streetscape between the building and the primary parking entrance to remain cohesive along Lomasney Way, thereby creating a more welcoming opening when approaching from North Station.

2.12 Historic Resources

As discussed in the DPIR, the development of the site will not have a direct impact on historic resources. Fleeting new shadow will be cast onto additional new rooftops in the Bulfinch Triangle Historic District on June 21 at 6:00 p.m.; however, much of the District is already under existing shadow.

2.13 Infrastructure

2.13.1 Introduction

The following sections describe the anticipated water consumption and sewage generation rates for the NPC Project. The modified proposed program results in a slight reduction in the potable water demand and sewage generated as noted below.

As previously indicated in the DPIR, the Proponent will coordinate the design of the proposed water, drainage, and sewer connections with the BWSC. The appropriate permits and approvals will be acquired prior to construction. Utility connections will be designed to minimize adverse effects within the surrounding area, including existing business operations. Based on the original DPIR analysis and the updated sewage generation rates herein, there is adequate drainage and sewage capacity in the area to accommodate the Project.

2.13.2 Anticipated Water Consumption

The Project's updated average potable water demand is estimated as 110% of the sewage generation, or 79,728 gallons per day (GPD), resulting in a slight decrease in the anticipated water demand when compared to the previously proposed project. The previously proposed project's average potable water demand was estimated to be 79,981 GPD.

2.13.3 Sewage Generation

The existing and proposed sewage generation rates for the previously proposed project and NPC Project programs are provided in Tables 2-7, 2-8 and 2-8a, respectively. These rates were estimated using Massachusetts State Environmental Code (Title 5) 310 CMR 15.203. Based on these estimates, the NPC Project is expected to increase the total effluent sewage discharge from the site when compared to existing conditions by 71,080 GPD, but will increase effluent sewage discharge less than the previously proposed project.

Table 2-7 Existing Sewage Generation

Use	Area (square feet)	Units	Sewage Generation Rate (GPD)	Total (GPD)
Parking Garage			None	0
Athletic Club		60 lockers	20 per locker	1,200
Boston Children's School Annex (Daycare)	812	20 persons	10 per person	200
TOTAL				1,400

Table 2-8 Proposed Sewage Generation (DPIR)

Use	Area (square feet)	Units	Sewage Generation Rate (GPD)	Total (GPD)
Proposed Residences		661 bedrooms ¹	110 per bedroom	72,710
Garage	360,000		None	0
TOTAL				72,710

¹ 109 studio, 242 one-bedroom, 137 two-bedroom, and 12 three-bedroom units.

Table 2-8a Proposed Sewage Generation (NPC Project)

Use	Area (square feet)	Units	Sewage Generation Rate (GPD)	Total (GPD)
Proposed Residences		658 bedrooms ¹	110 per bedroom	72,380
Garage	360,000		None	0
Retail	2,000		50 per 1,000 sq. ft.	100
TOTAL				72,480

¹ 120 studio, 202 one-bedroom, and 168 two-bedroom units.

2.13.4 Sewer and Stormwater Mitigation

To minimize sewage generation, the NPC Project will meet applicable code requirements for the installation of low-flow fixtures.

In terms of stormwater, given that the NPC Project will not increase the amount of impervious area on the site, post-construction stormwater run-off rates will not exceed existing rates. Furthermore, by upgrading garage stormwater collection systems, the NPC Project will significantly improve the quality of stormwater runoff. Stormwater collected from the loading dock and lower levels of the garage will be collected and directed through MWRA-compliant gas, sand, and oil interceptors. Stormwater collected from parking areas

and ramps receiving direct rainfall will be directed through water quality structures (e.g., Stormceptor or similar) before discharging to the municipal system. All catch basins will include deep sumps and hoods for additional oil and sediment removal.

The NPC Project will also include a stormwater management system to address the phosphorus content of stormwater runoff within the Charles River Watershed. The Proponent is considering a stormwater recharge system consisting of perforated pipe and crushed stone to remove phosphorus from runoff. It is anticipated that the equivalent of one-inch over the site's impervious area can be recharged as prescribed in the BWSC's Site Plan Requirements. The Proponent will coordinate with the BWSC to determine the appropriate level and method of phosphorus removal.

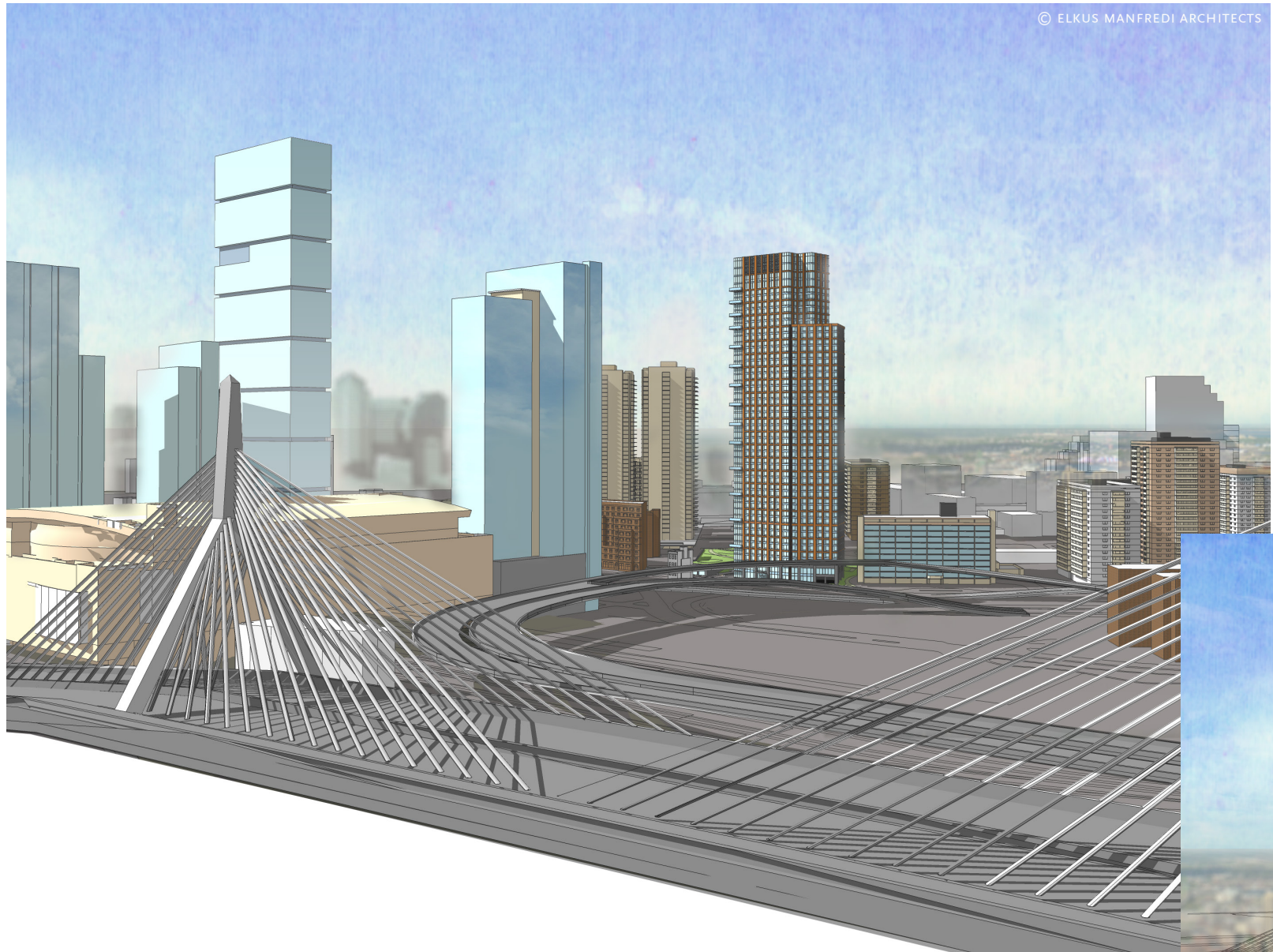


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Garden Garage Redevelopment NPC Boston, Massachusetts



Garden Garage Redevelopment NPC Boston, Massachusetts



FROM THE NORTH

FROM THE WEST



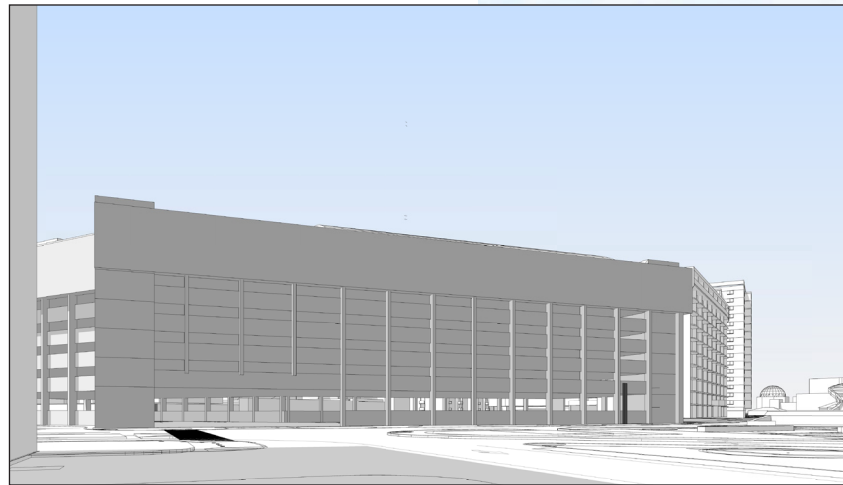


FROM THE EAST

FROM THE SOUTH



Garden Garage Redevelopment NPC Boston, Massachusetts



EXISTING VIEW



*BUILDING IN NASHUA STREET
PARK NOT SHOWN FOR CLARITY

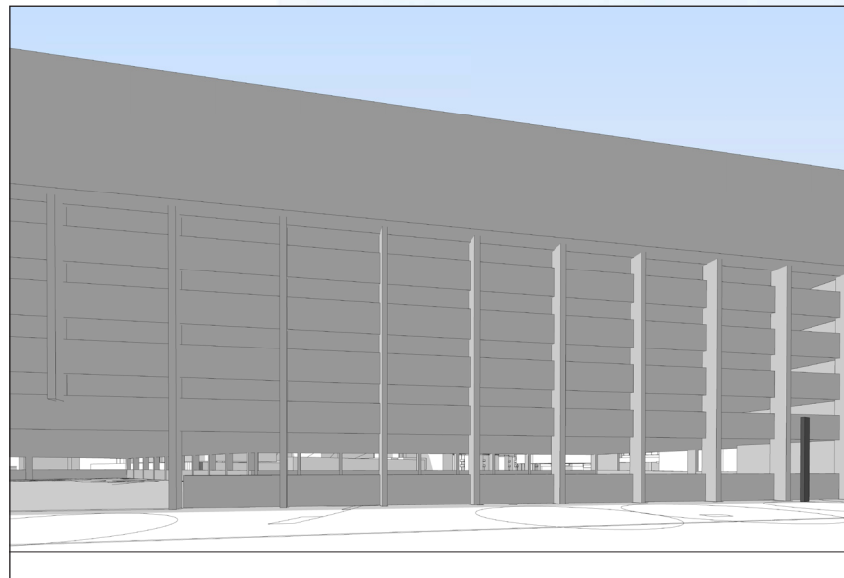
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PROPOSED VIEW

Garden Garage Redevelopment NPC Boston, Massachusetts



Garden Garage Redevelopment NPC Boston, Massachusetts



EXISTING VIEW



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PROPOSED VIEW

Garden Garage Redevelopment NPC Boston, Massachusetts



EXISTING VIEW

PROPOSED VIEW

Garden Garage Redevelopment NPC Boston, Massachusetts



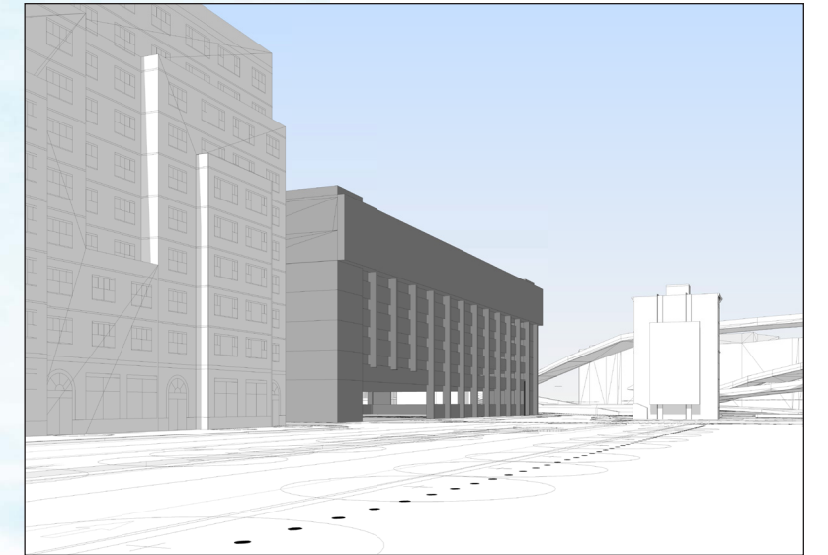
EXISTING VIEW



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PROPOSED VIEW

Garden Garage Redevelopment NPC Boston, Massachusetts



EXISTING VIEW

PROPOSED VIEW

Garden Garage Redevelopment NPC Boston, Massachusetts



Garden Garage Redevelopment NPC Boston, Massachusetts



Garden Garage Redevelopment NPC Boston, Massachusetts



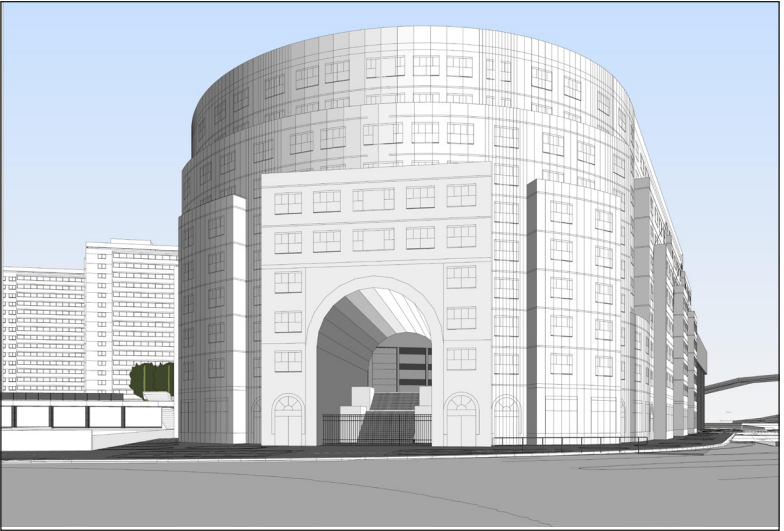
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PROPOSED VIEW

Garden Garage Redevelopment NPC Boston, Massachusetts

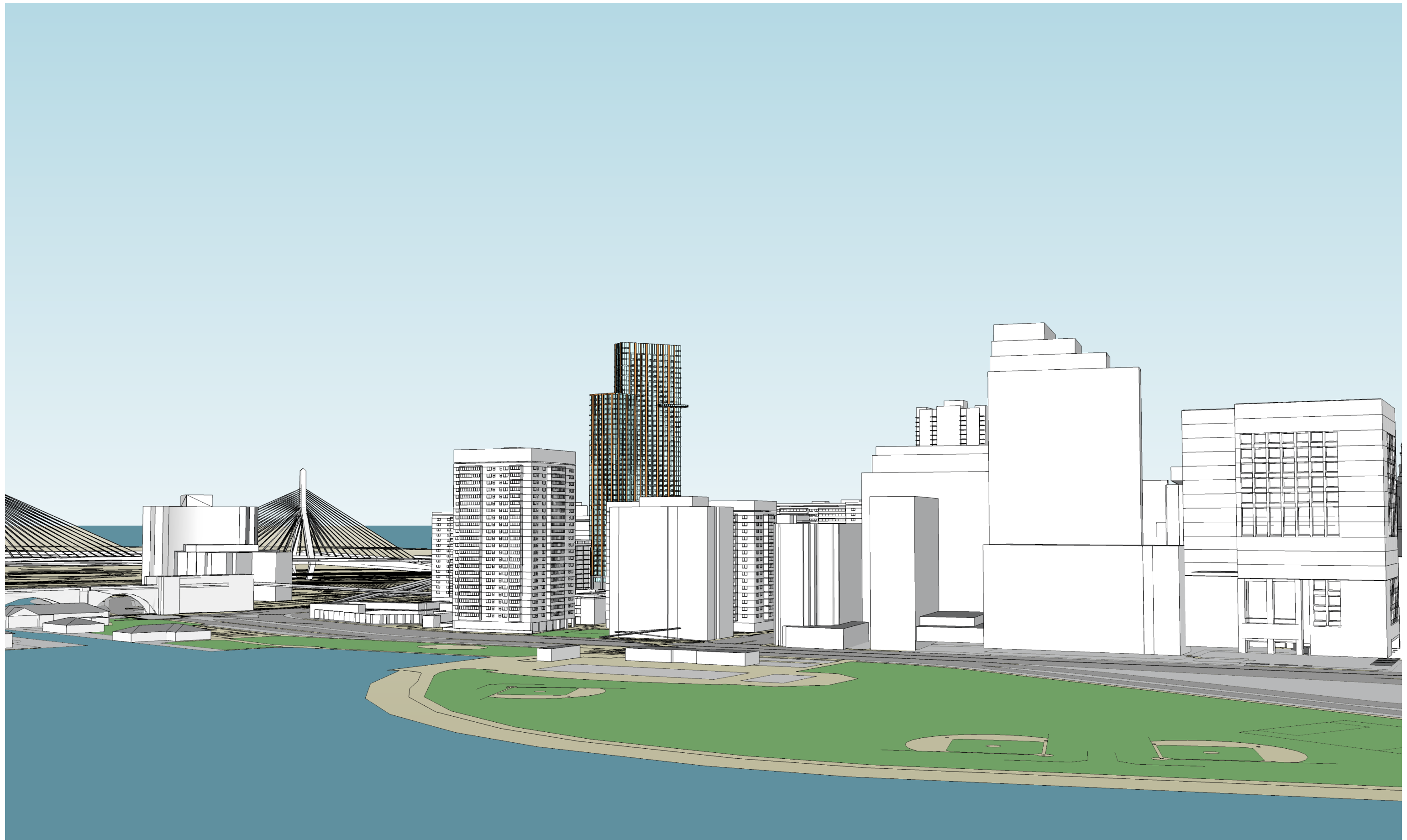


PROPOSED VIEW

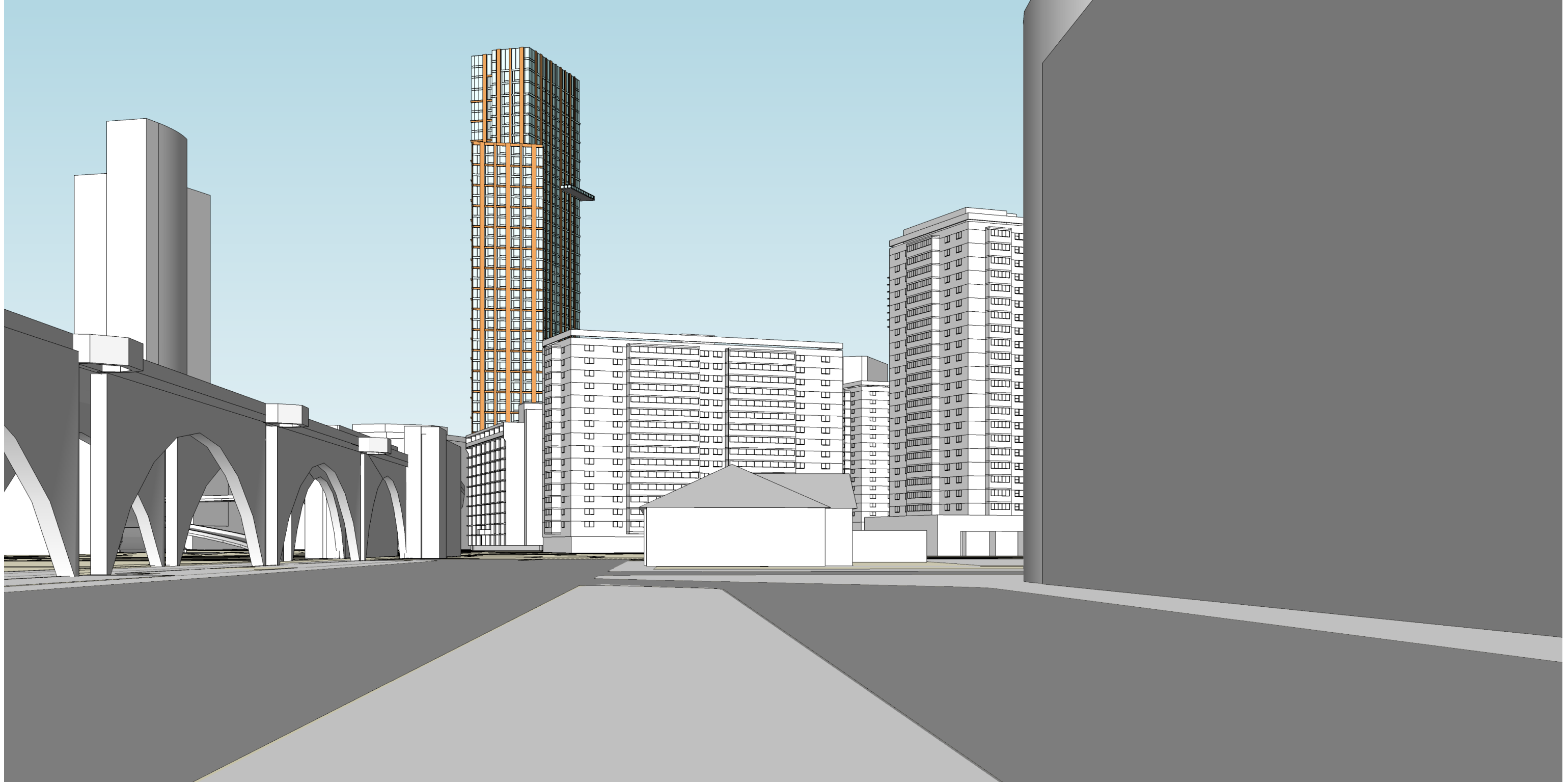


EXISTING VIEW

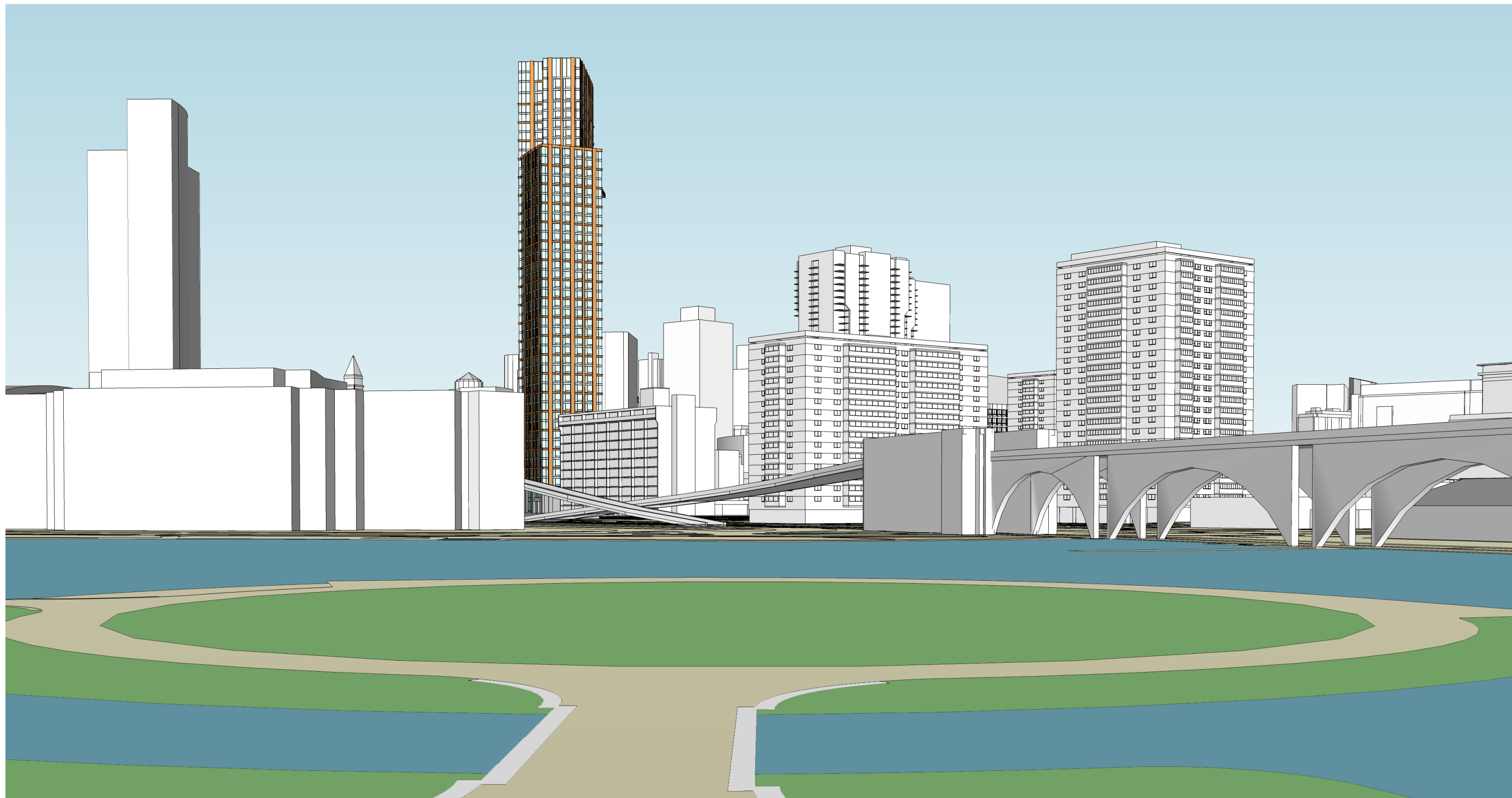
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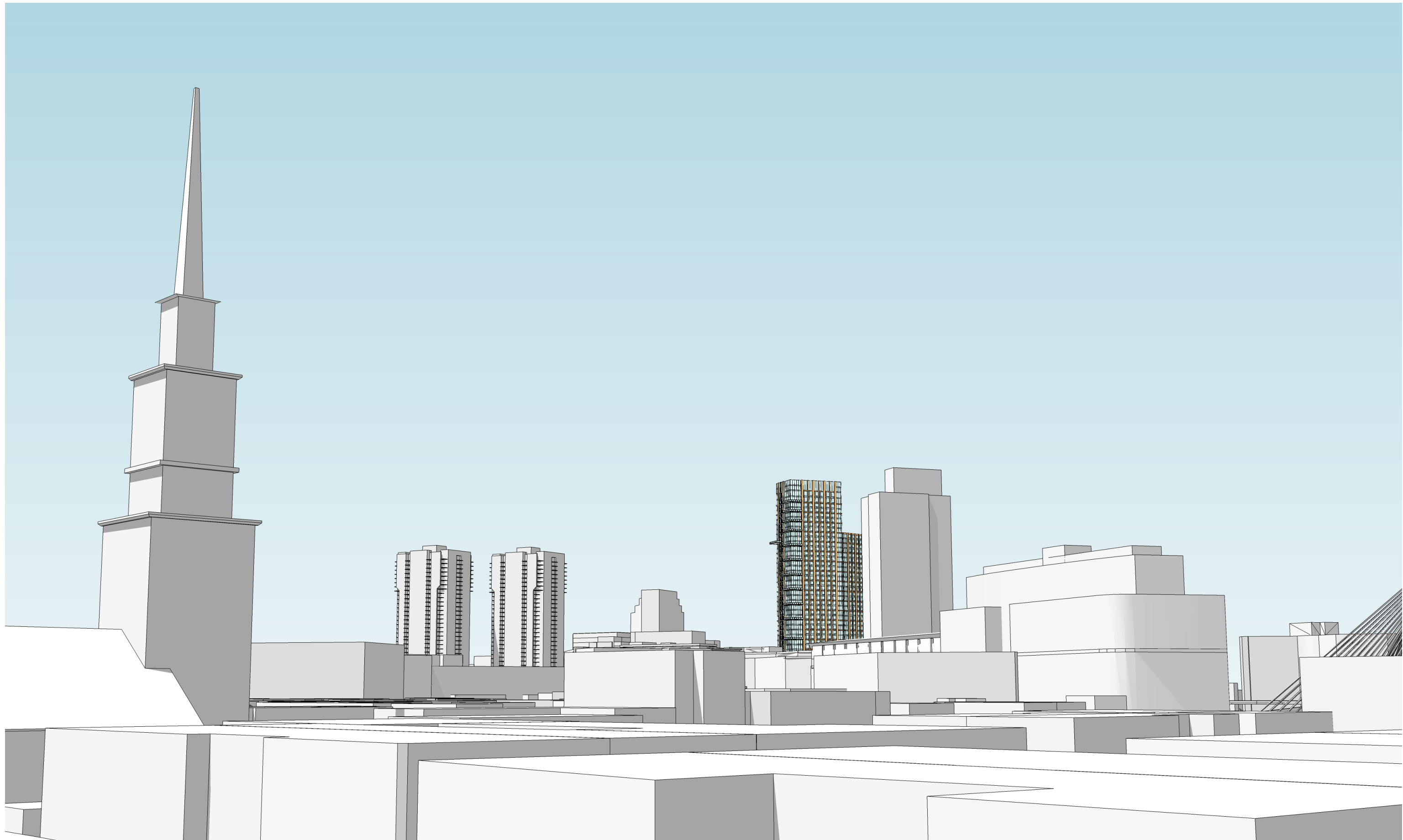
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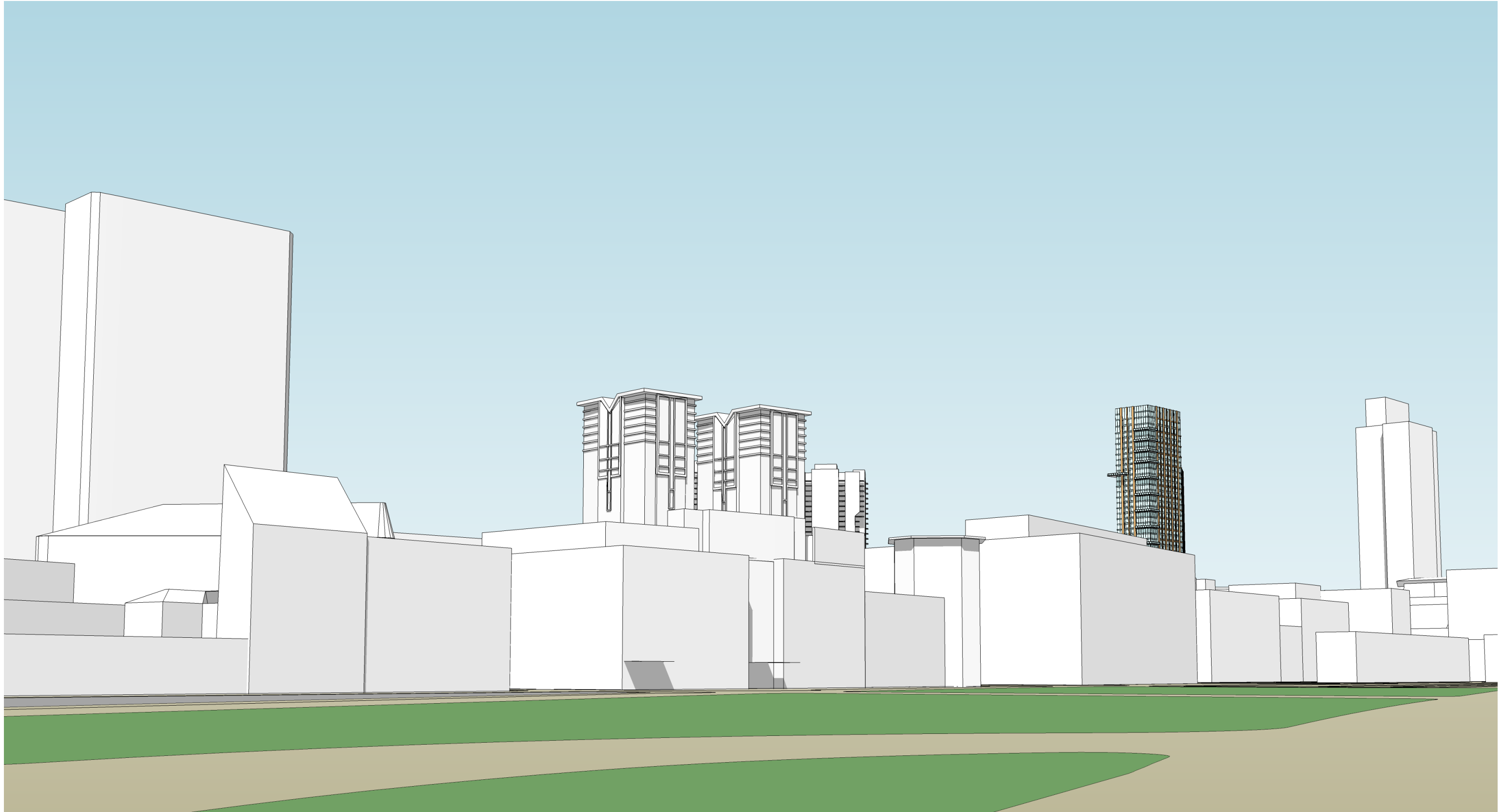
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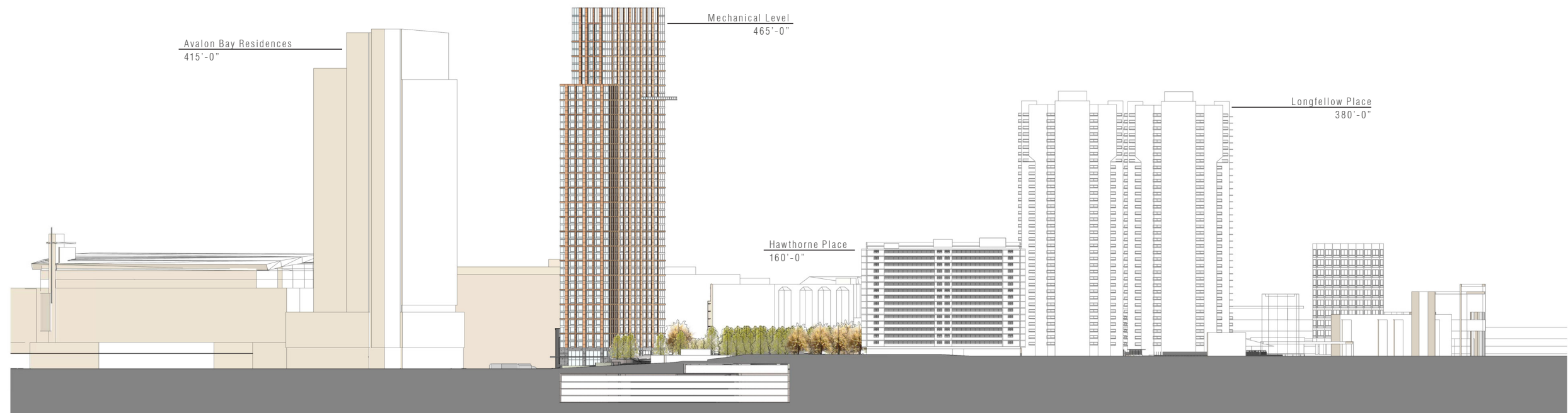
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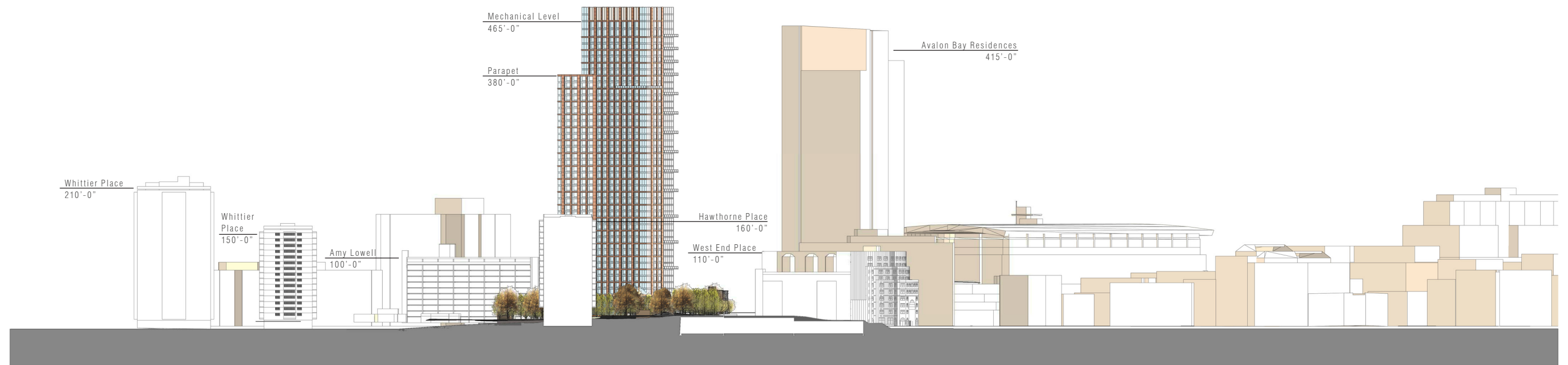
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Garden Garage Redevelopment NPC Boston, Massachusetts

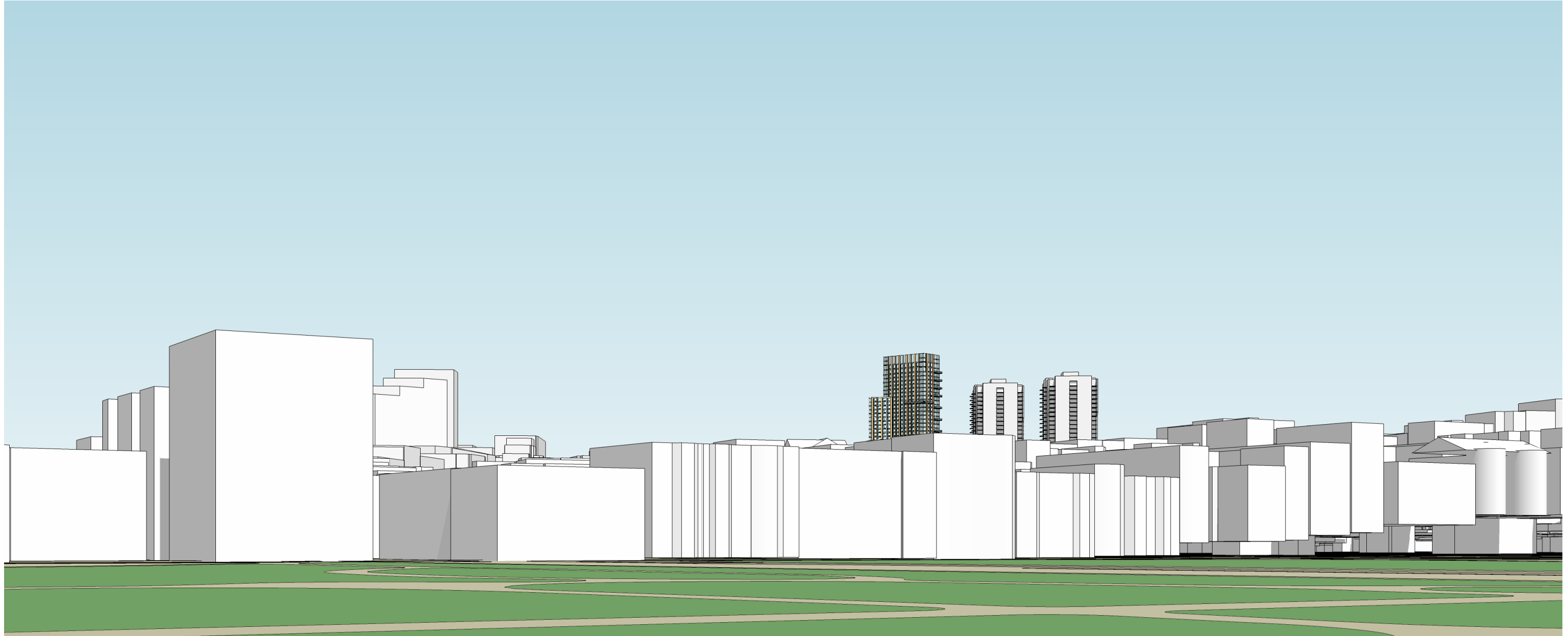


NORTH-SOUTH NEIGHBORHOOD SECTION LOOKING EAST

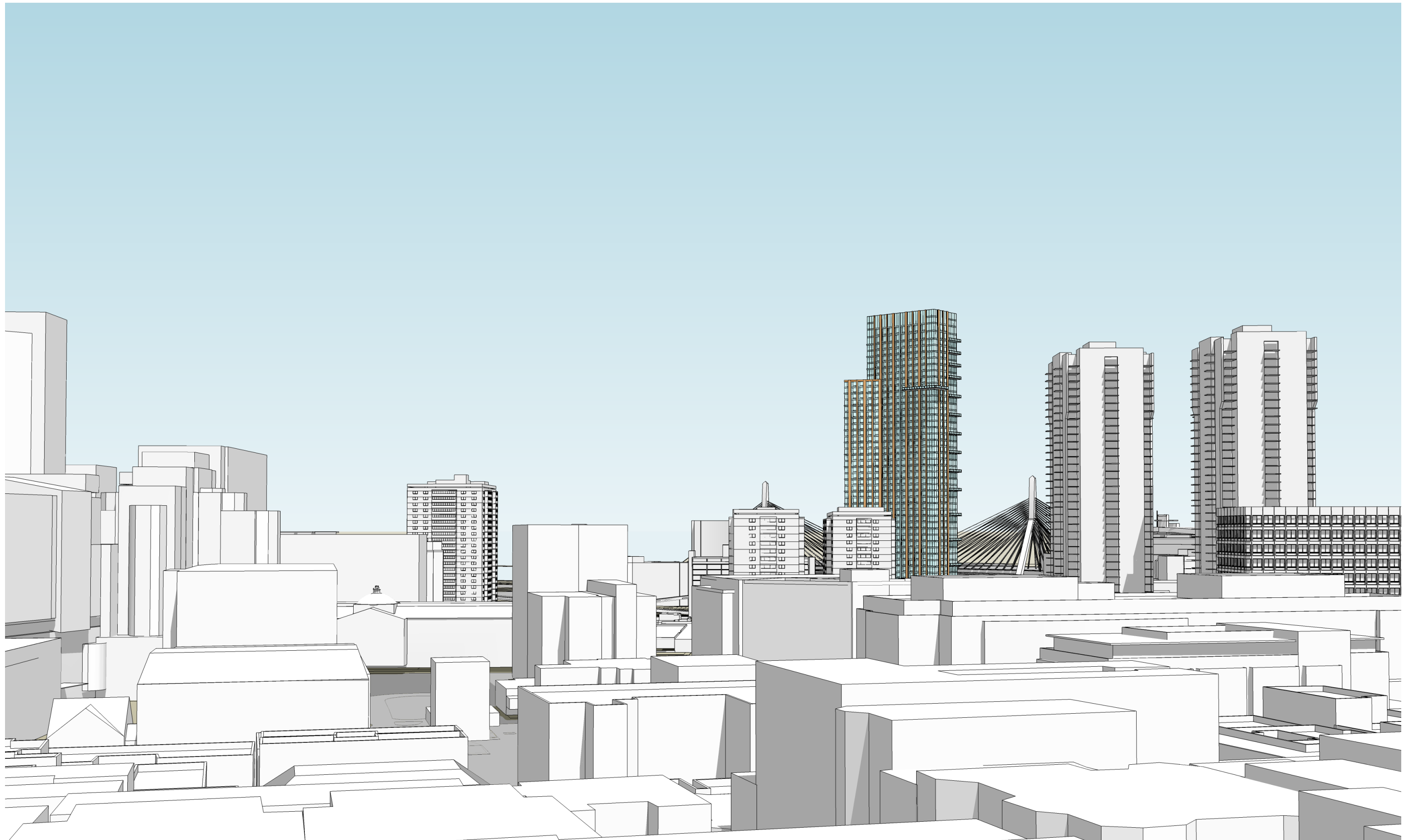


EAST-WEST NEIGHBORHOOD SECTION LOOKING NORTH

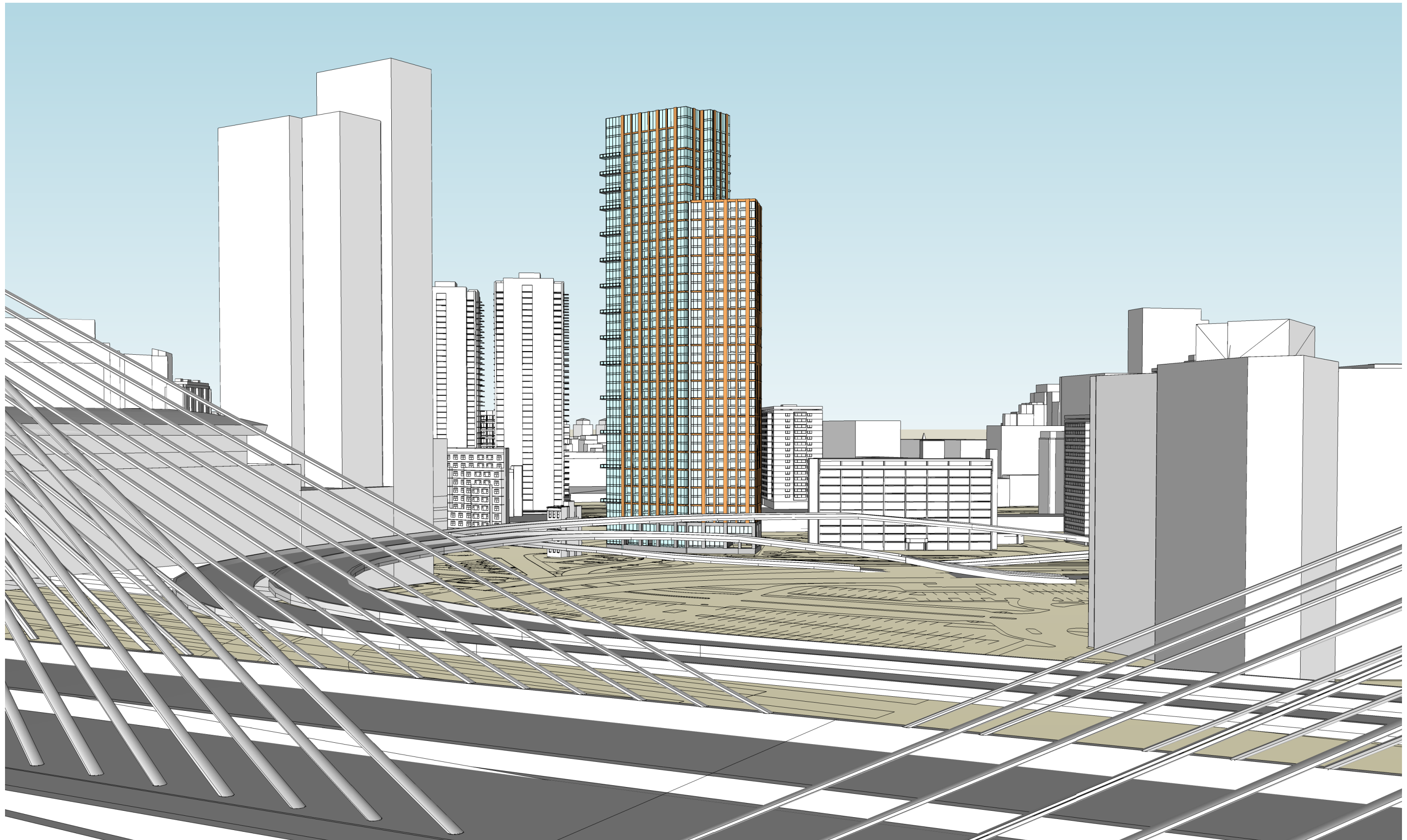




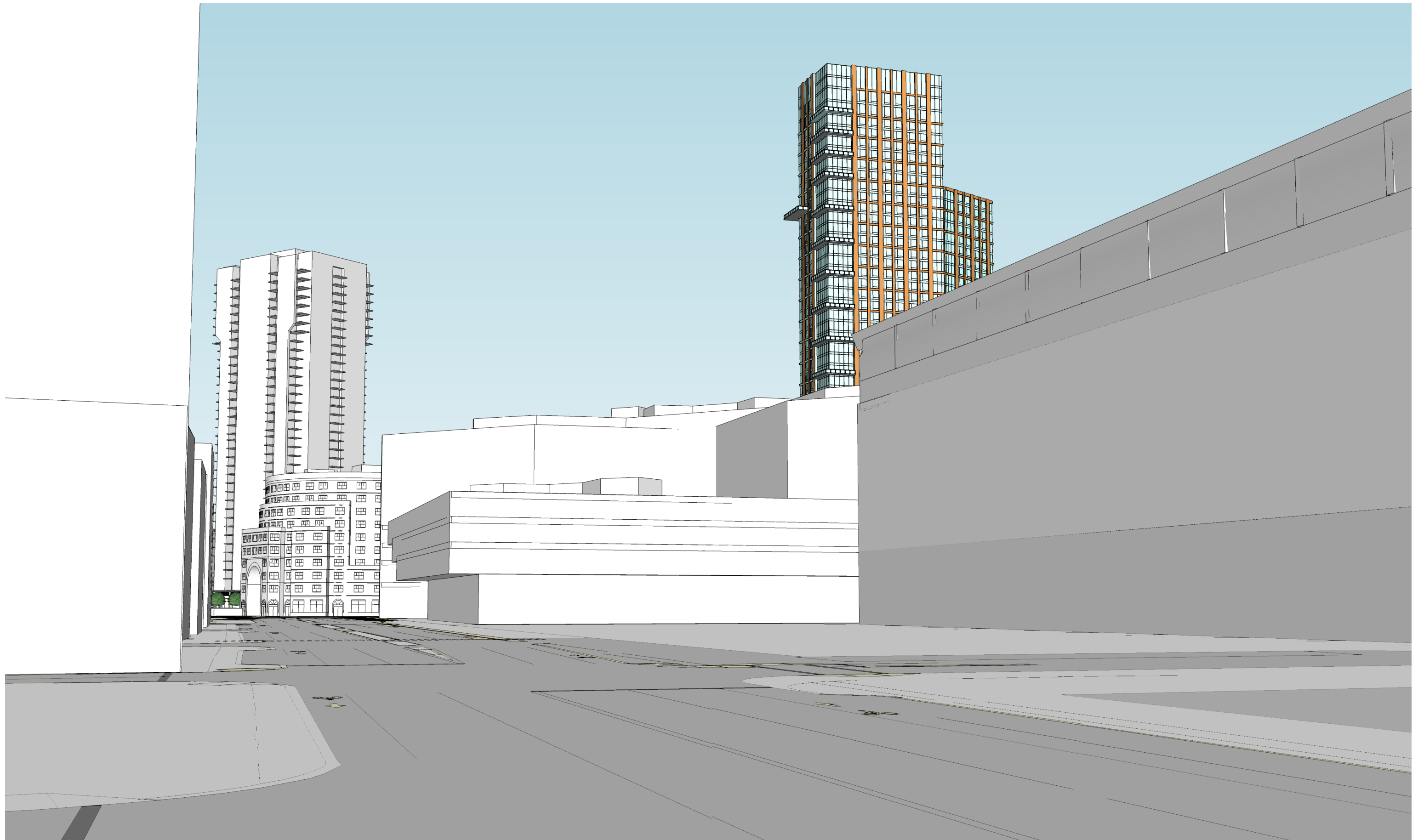
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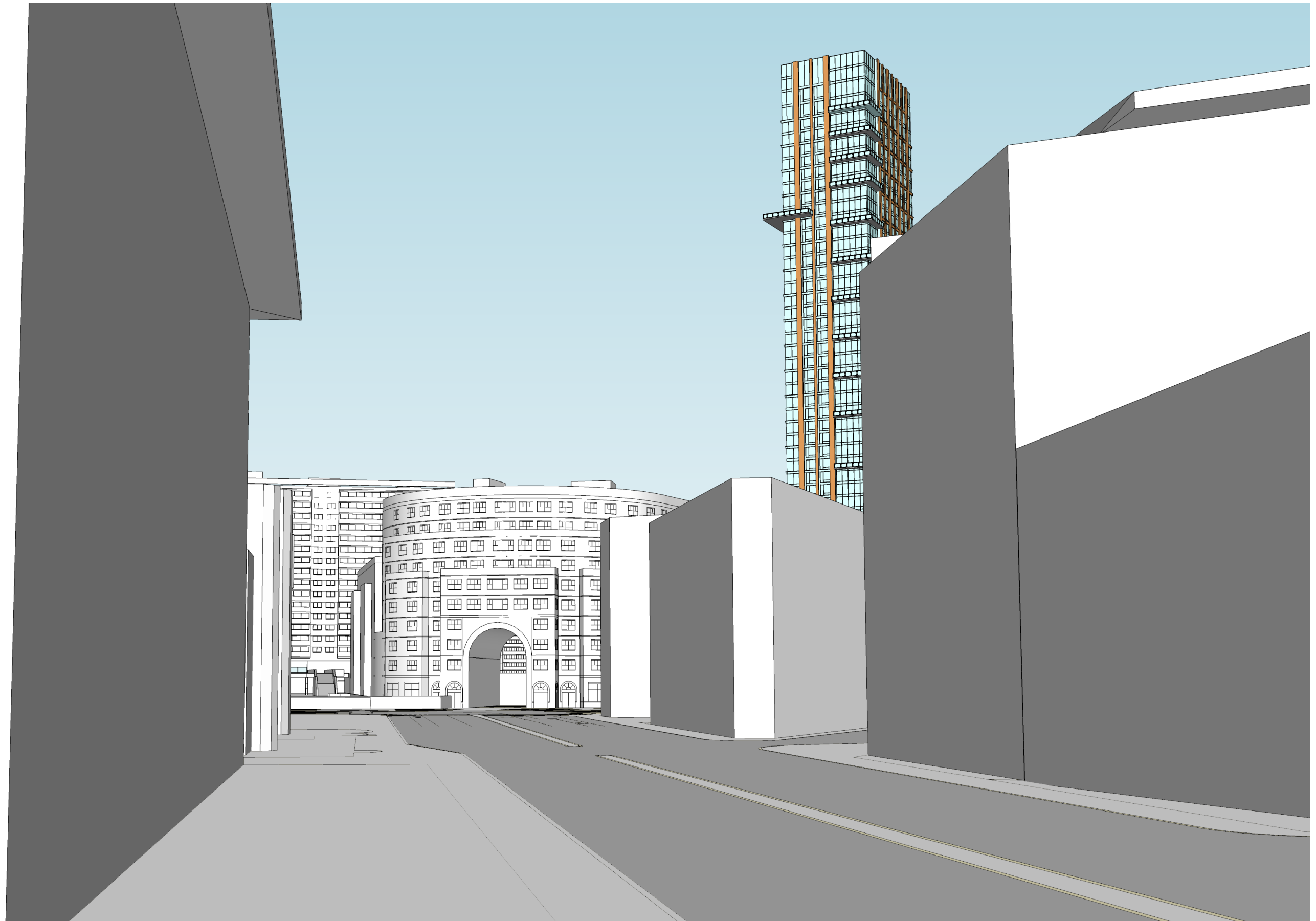
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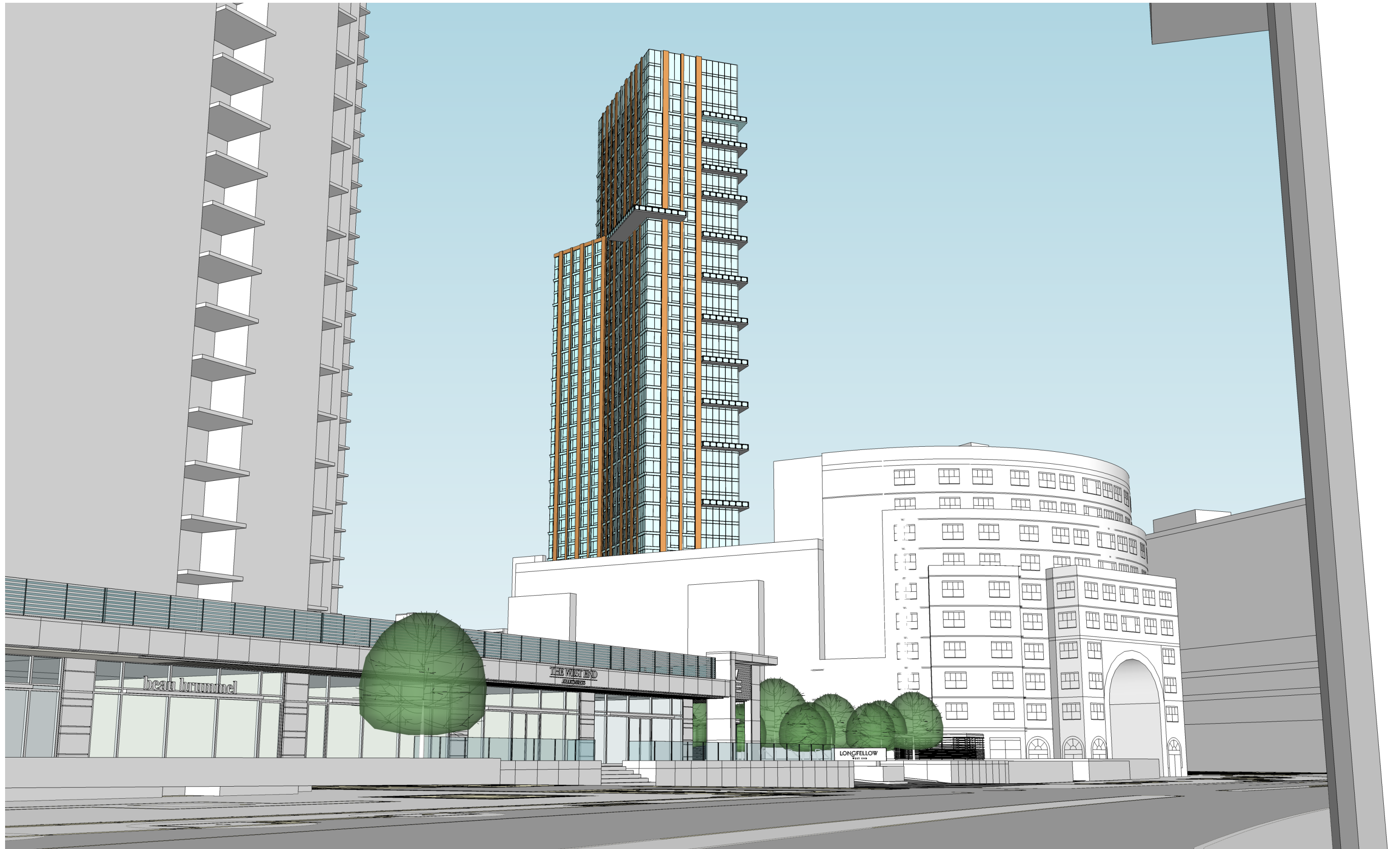
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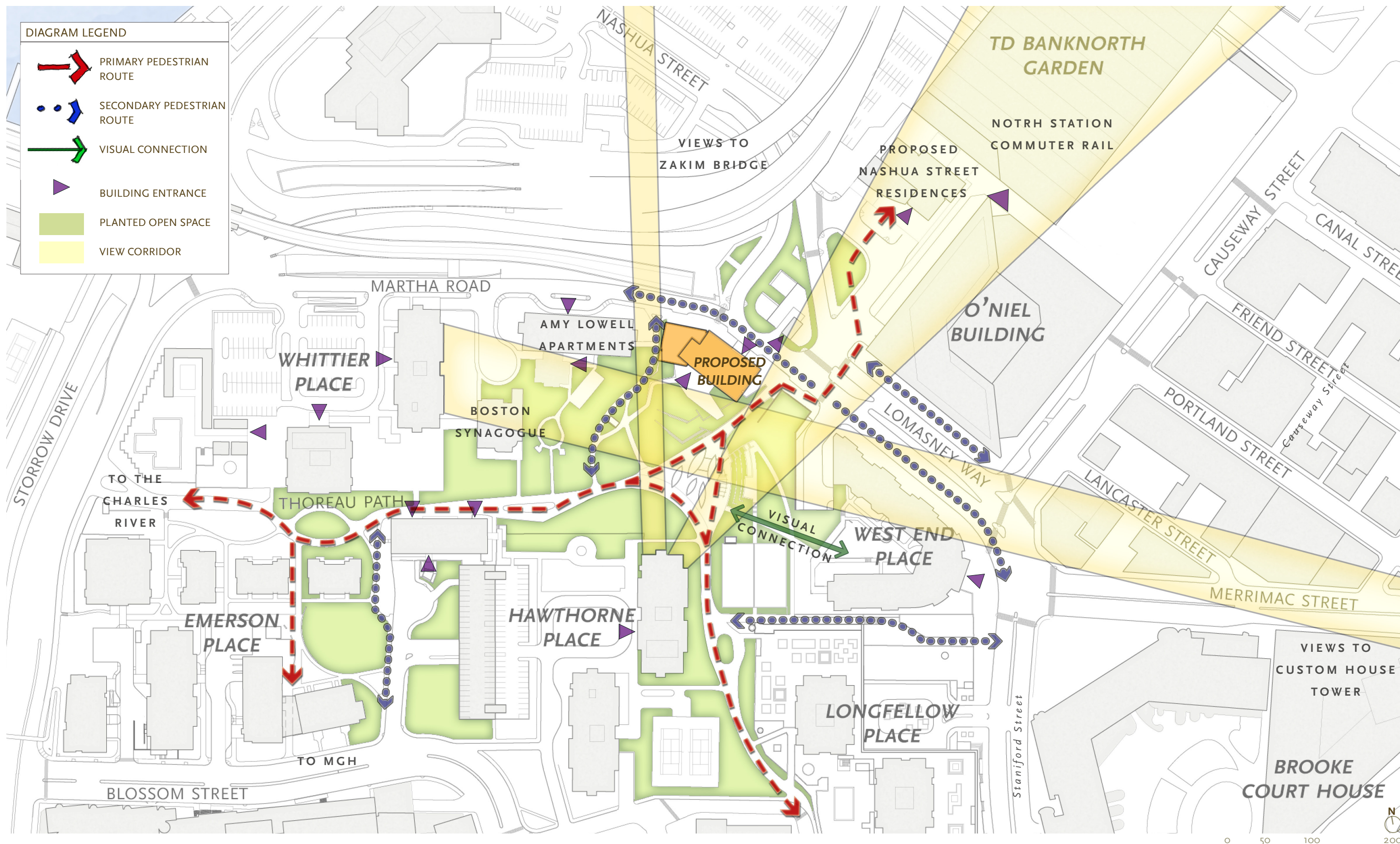
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Garden Garage Redevelopment NPC Boston, Massachusetts



Garden Garage Redevelopment NPC Boston, Massachusetts

Appendix A

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/

Project Information

Project Name:	Garden Garage Redevelopment
Project Address Primary:	35 Lomasney Way Boston, MA 02114
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	Paul Barrett, Vice President of Development, Equity Residential, pbarrett1@eqr.com, (617) 648-2162

Team Description

Owner / Developer:	Equity Residential
Architect:	Elkus Manfredi Architects
Engineer (building systems):	RW Sullivan
Sustainability / LEED:	The Green Engineer
Permitting:	Epsilon Associates, Inc.
Construction Management:	

Project Permitting and Phase

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

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

Article 80 | ACCESSIBILITY CHECKLIST

Building Classification and Description

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

Residential – One to Three Unit	☒ Residential - Multi-unit, Four +	☐ Institutional	☐ Education
☐ Commercial	☐ Office	☒ Retail	☐ Assembly
☐ Laboratory / Medical	☐ Manufacturing / Industrial	☐ Mercantile	☐ Storage, Utility and Other
First Floor Uses (List) <i>Residential Lobby, Residential service areas, Retail, Parking Entry Lobby</i>			

What is the Construction Type – select most appropriate type?

☐ Wood Frame	☐ Masonry	☒ Steel Frame	☒ Concrete
-------------------------------------	----------------------------------	---	--

Describe the building?

Site Area:	<i>131,600 SF</i>	Building Area:	<i>895,000 SF</i>
Building Height:	<i>465 Ft.</i>	Number of Stories:	<i>46 Flrs.</i>
First Floor Elevation:	<i>17' Elev.</i>	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 Garden Garage Project will be located on approximately three acres of land at Longfellow Place in Boston's West End. The Project site is bordered by Martha Road, Lomasney Way, and the MBTA Green Line portal to the north, the O'Neill Federal Building and 150 Staniford Street to the East, Longfellow Place to the south, Hawthorne Place to the southwest, Thoreau Path to the west, and 55 and 65 Martha Road to the northwest. The West End is primarily a collection of high- and mid-rise residential buildings organized around a pedestrian network and green spaces with connections to

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List the surrounding ADA compliant MBTA transit lines and the proximity to the development site: Commuter rail, subway, bus, etc.

the Charles River waterfront and the surrounding vehicular street grid.

MBTA Green and Orange Line rapid transit services are located within one-quarter mile of the Project site, with both Orange and Green Line service at North Station, and Green Line Service at Science Park.

Local MBTA bus route #4 is located within one-quarter mile of the site, providing connections between North Station, South Station, and the South Boston Waterfront. The route # 4 does not run on weekends.

Within approximately one-half mile of the site, are Charles/MGH Station on the MBTA Red Line, Bowdoin Station on the Blue Line, and Haymarket Station, which provides connection to MBTA Green and Orange lines and local/regional bus services.

City Water Taxi service can be obtained at Lovejoy Wharf, located approximately one-third of a mile from the Project site. Water taxi service does not run on a set schedule.

List the surrounding institutions: hospitals, public housing and elderly and disabled housing developments, educational facilities, etc.

Massachusetts General Hospital, Massachusetts Eye and Ear Infirmary, Shriners Hospital for Children, Boston Children's School

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.

No. Thomas P. O'Neill, Jr. Federal Building, West End Branch Library, Basketball City, Suffolk County Sheriff's Departments, West End Community Center

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

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If yes above, list the existing sidewalk and pedestrian ramp materials and physical condition at the development site.

Sidewalks throughout the study area are generally in good condition:

Lomasney Way – Sidewalks are in good condition and provided on both sides of Lomasney Way with widths from 14 to 24 feet and are of brick and concrete.

Staniford Street – Sidewalks are provided on both sides of Staniford Street and are generally in good condition. Sidewalks are of concrete.

Red Auerbach Way – Red Auerbach Way serves as an important pedestrian connection between the West End and North Station, but is being redeveloped as part of the Nashua Street Residences project. Sidewalks are in fair condition and are of concrete and asphalt.

Nashua Street – Concrete sidewalks in good condition are provided on both sides of Nashua Street. The western sidewalk varies from approximately 10 to 14 feet in width. The presence of tree pits reduces the effective width to between four and 11 feet. The eastern sidewalk is 10 to 13 feet wide. At tree pits, the effective width is reduced to approximately five feet.

Martha Road – An approximately eight-foot-wide concrete sidewalk is provided along the south side of this roadway which borders the Project site; however, the presence of many street lamps reduces the effective width to approximately five feet.

Thoreau Path – This pedestrian pathway provides access to Longfellow Place, West End Place, Hawthorne Place, Whittier Place, and Emerson Place and connects from Staniford Street in the east to Storrow Drive in the west. Less than one-tenth of a mile south from where Thoreau Path meets Storrow Drive, pedestrians can access a footbridge over Storrow Drive. This bridge provides access to the Charles River Path. Thoreau Path is a mix of concrete and brick. Trees, lighting, and benches line both sides of the walkway, which is between eight and 20 feet in width.

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.

Sidewalks in the areas above are to remain. Pedestrian circulation ways within the boundaries of the Project will be improved or added to connect to the existing sidewalks.

The existing sidewalks and ramps have not been verified as compliant.

Is the development site within a historic district? **If yes**, please identify.

The development site is not within a historic district. The proposed Project will have no direct impacts to historic resources. Indirect impacts to historic resources, including visual, shadow, and wind impacts were considered.

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 comfortably pass each other, and a ten foot or wider Pedestrian Zone can support high volumes of pedestrians.

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Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? See: www.bostoncompletestreets.org

Yes

If yes above, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, Boulevard.

Downtown Commercial

What is the total width of the proposed sidewalk? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone.

Total width: 20.5'
Frontage: 0'
Pedestrian: 14'
Furnishings: 6'
Curb: 0.5'

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?

Pedestrian: Colored concrete pavement
Furnishings: Permeable/Non-permeable concrete unit pavement, unit stone, greenspace
Most of the material will be on private property.

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?

No

Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way?

No

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

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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?

The planned total is approximately 830 parking spaces.

What is the total number of accessible spaces provided at the development site?

The planned number of accessible spaces is 24 with four dedicated van accessible parking 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?

Accessible visitor parking is located on each level of the below-grade parking garage.

Has a drop-off area been identified? **If yes,** will it be accessible?

On-street drop off for two vehicles will be included along Lomasney Way and will be accessible. Short-term tenant parking will be included on the nested level of the parking garage. It will not be dedicated as accessible parking but the path to the building will be all at grade.

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 figures at the end of the Checklist.

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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 figures at the end of the Checklist.

Describe accessibility at each entryway: Flush Condition, Stairs, Ramp Elevator.

Building Lobby – Flush condition
Retail entry – Flush condition
Parking Garage Lobby – Flush condition
Thoreau Path – Flush condition
Loading Dock – Flush condition
Short-term tenant parking area – Flush condition, stairs, elevator
Residential Terrace – Flush condition
Parking Garage stair towers – Stairs (egress only)

Are the accessible entrance and the standard entrance integrated?

Yes

If no above, what is the reason?

Will there be a roof deck or outdoor courtyard space? **If yes**, include diagram of the accessible route.

Yes

Has an accessible routes way-finding and signage package been developed? **If yes**, please describe.

Not yet.

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?

Approximately 486 units.

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How many units are for sale; how many are for rent? What is the market value vs. affordable breakdown?

All units will be for rent. Affordable housing units within the West End Development Area will comply with local regulations.

How many accessible units are being proposed?

5% of the total units will be accessible and 2% will be accessible for the hearing impaired. All units will be adaptable for accessibility.

Please provide plan and diagram of the accessible units.

The design has not advanced to this level at this time.

How many accessible units will also be affordable? If none, please describe reason.

5% of affordable units will be accessible.

Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs at entry or step to balcony. **If yes,** please provide reason.

No.

Has the proponent reviewed or presented the proposed plan to the City of Boston Mayor's Commission for Persons with Disabilities Advisory Board?

Not yet.

Did the Advisory Board vote to support this project? **If no,** what recommendations did the Advisory Board give to make this project more accessible?

Thank you for completing the Accessibility Checklist!

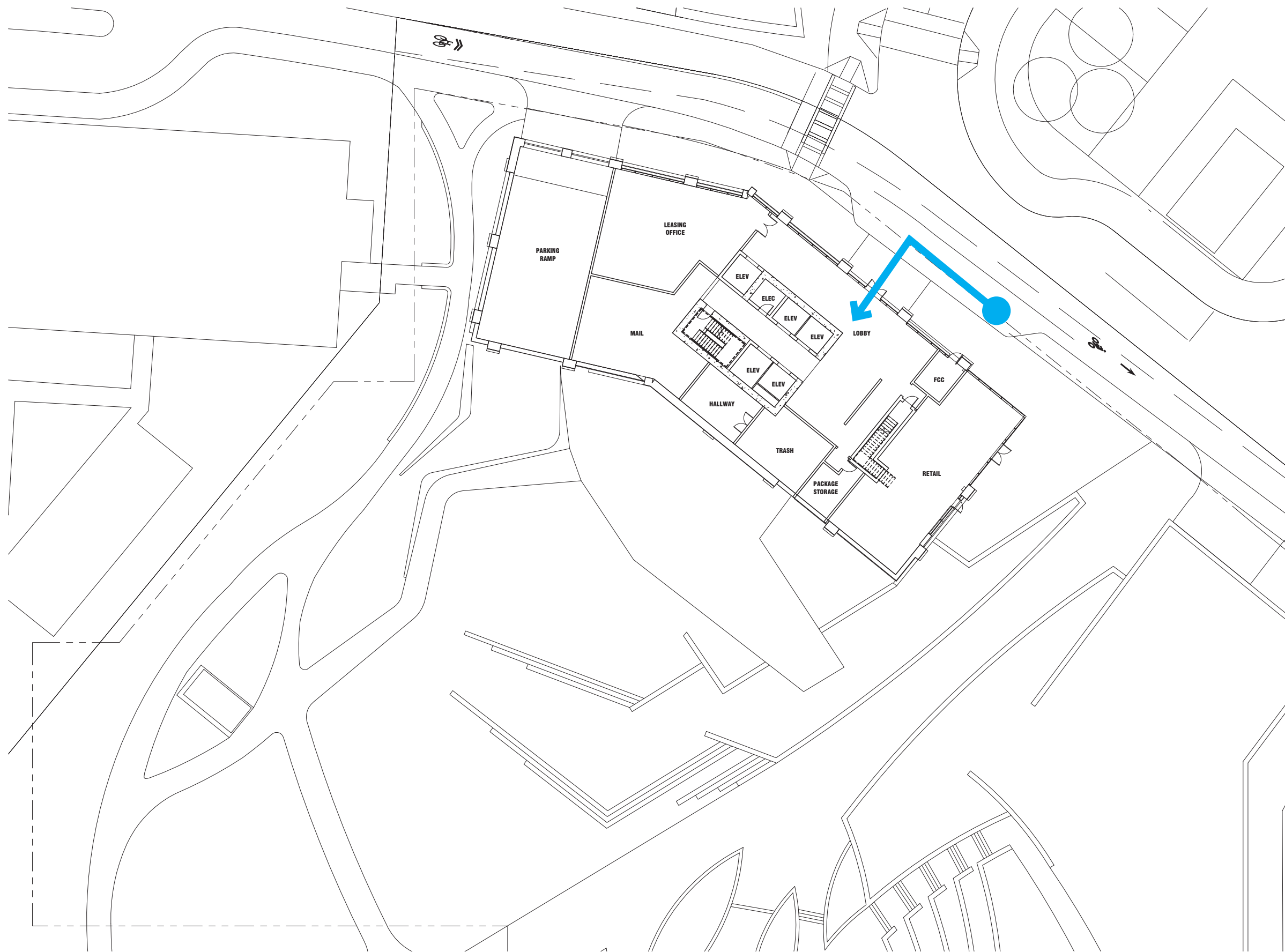
For questions or comments about this checklist or accessibility practices, please contact:

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



- Resident Accessible Route
Max Travel Distance = 49 ft
- Public Accessible Route
Max Travel Distance = 75 ft

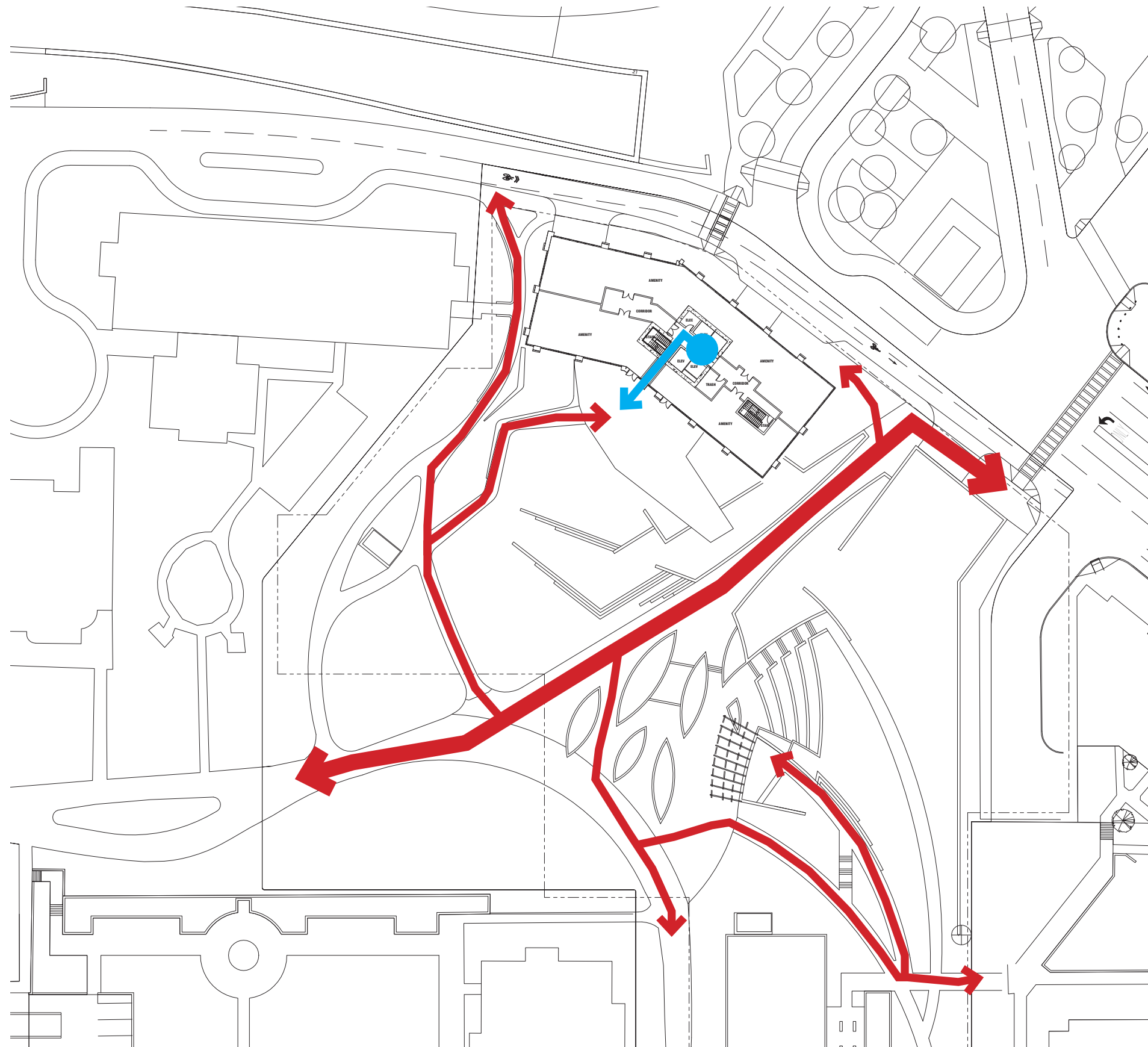
 1/32" = 1'-0"



 Resident Accessible Route
Max Travel Distance = 55 ft



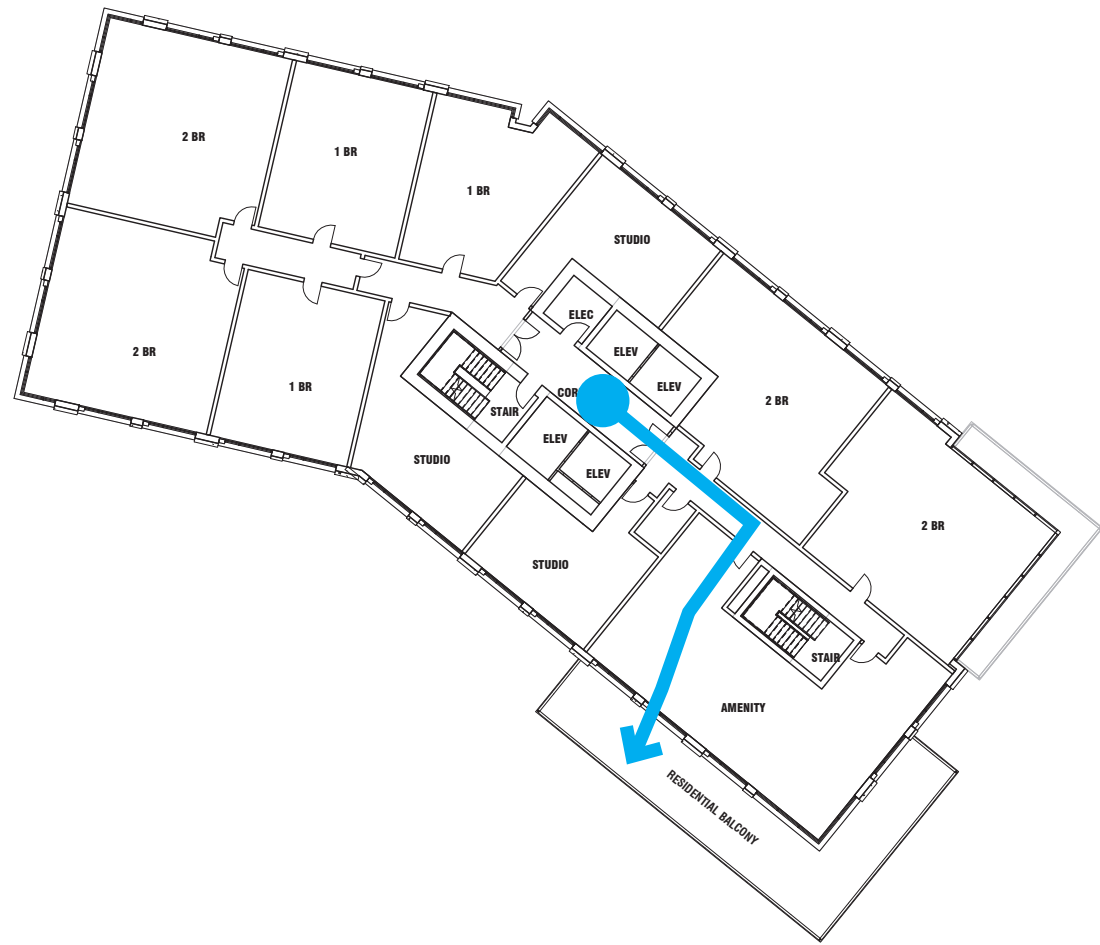
1/32" = 1'-0"



- Resident Accessible Route
- Public Accessible Route

 1/32" = 1'-0"

 Resident Accessible Route



 1/32" = 1'-0"

Appendix B

Wind Analysis



Tel: 519.823.1311
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Garden Garage Development Boston, MA

Draft Report

Pedestrian Wind Consultation RWDI # 1500139 October 16, 2014

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Table 2:	Pedestrian Wind Comfort and Safety Categories – Multiple Seasons – No Build
Table 3:	Pedestrian Wind Comfort and Safety Categories – Multiple Seasons – Build

Figures

Figure 1a:	Wind Tunnel Study Model – No Build
Figure 1b:	Wind Tunnel Study Model – Build
Figure 2a:	Directional Distribution (%) of Winds – Spring and Summer
Figure 2b:	Directional Distribution (%) of Winds – Fall and Winter
Figure 2c:	Directional Distribution (%) of Winds – Annual
Figure 3:	Pedestrian Wind Conditions – No Build
Figure 4:	Pedestrian Wind Conditions – Build

Appendices

Appendix A:	Drawing List for Model Construction
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1. INTRODUCTION

A pedestrian wind study was conducted on the proposed Garden Garage development located in Boston, Massachusetts. The objective of the study was to assess the effect of the proposed development on local conditions in pedestrian areas around the study site and provide recommendations for minimizing adverse effects.

The study involved wind simulations on a 1:400 scale model of the proposed building and surroundings. These simulations were then conducted in RWDI's boundary-layer wind tunnel at Guelph, Ontario, for the purpose of quantifying local wind speed conditions and comparing to appropriate criteria for gauging wind comfort in pedestrian areas. A list of the drawings used for the construction of the model can be found in Appendix A. The criteria recommended by the Boston Redevelopment Authority (BRA) were used in this study. The present report describes the methods and presents the results of the wind tunnel simulations.

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.

3. METHODOLOGY

Information concerning the site and surroundings was derived from: site photographs; information on surrounding buildings and terrain; site plans and elevations and 3D models of the proposed development provided by the design team. The following configurations were simulated:

- No Build:** includes all existing site and surrounding buildings; and,
- Build:** includes the proposed Garden Garage development with coniferous trees and canopies as well as all existing surroundings.

Note that the No-Build condition was tested as part of our earlier work at this site in 2011, and as such represents slightly different conditions than exist today. Namely, the Nashua Building has undergone changes, and the Boston Garden development is not included. On review, it is our opinion that the effect of the Nashua Building is minimal. The Boston Garden development may make No-Build conditions somewhat worse for NNE and NE winds, but most likely better for ENE and E winds. Quantification of these changes would require additional wind tunnel testing.

As shown in Figures 1a and 1b, the wind tunnel model included the proposed development and all relevant surrounding buildings and topography within a 1500 ft 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 94 sensors for the No Build Configuration (previously tested in September, 2011) and 95 sensors for the Build configuration. These specially designed wind speed sensors were connected to the wind tunnel's data acquisition system to record the mean and fluctuating components of wind speed at a full-scale height of 5 feet above local grade in pedestrian areas throughout the study site. Wind speeds were measured for 36 wind directions, in 10 degree increments, starting from true north. The measurements at each sensor location were recorded in the form of ratios of local mean and gust speeds to the reference wind speed in the free stream above the model. The results were then combined with long-term meteorological data, recorded during the years 1983 to 2013 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 2a, 2b and 2c present "wind roses", summarizing the annual and seasonal wind climates in the Boston area, based on the data from Logan Airport. The Left wind roses in Figure 2a, for example summarize the spring (March, April and May) wind data. In general, the prevailing winds at this time of year are from the west-northwest, northwest, west, and south-southwest. In addition to these directions, strong winds are also prevalent from the northeast direction as indicated by the red color bands on the wind rose.

On an annual basis (Figure 2c) the most common wind directions are those between southwest and northwest. Winds from the east and east-southeast are also relatively common. In the case of strong winds, northeast and west-northwest are the dominant wind directions.

This study involved state-of-the-art measurement and analysis techniques to predict wind conditions at the study 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. 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 Melbourne¹. 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 1-hour mean wind speed exceeded 1% of the time (i.e., the 99-percentile mean wind speed). They are as follows:

Table 1: BRA Mean Wind Criteria*

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.

5. TEST RESULTS

Tables 2 and 3 present the mean and effective gust wind speeds for each season as well as annually, for the No Build and Build Configurations, respectively. Figures 3 and 4 graphically depict the wind conditions at each wind measurement location based on the annual winds. 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 results for the No Build Configuration provide baseline wind conditions on the development site and surrounding areas, while the results for the Build Configuration demonstrate the potential wind effects of the proposed development, which are the focus of our discussions below.

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

The following summary of pedestrian wind comfort is based on the annual winds for each configuration tested. Note that, as the No-Build condition was tested in 2011 (as discussed above), the numbering of sensors between the two configurations is different, and some sensors are in slightly different locations.

5.1 Onsite Areas

5.1.1 No Build Configuration (Locations 1 through 35 in Figure 3)

Several sensors (Locations 1, 6, 10-12, 15-20, 32 and 33 in Figure 3) were either on the proposed development or covered by the existing garage and, therefore, wind data was not available for these locations.

In general, the existing wind conditions on site were comfortable for sitting or standing on an annual basis (Figure 3). Slightly higher wind speeds comfortable for walking were measured in the gap between the existing garage and the apartment building to the immediate west. No uncomfortable wind conditions were detected at any test location in any season on the development site.

The effective gust criterion was also met seasonally and annually at all test locations.

5.1.2 Build Configuration (locations 1 through 38 in Figure 4)

A wind comfort categorization of walking is considered appropriate for sidewalks. Lower wind speeds conducive to standing are preferred at building entrances. The preferred wind climate during the summer should be comfortable for standing in the vicinity of building entrances and courtyards. For the Build Configuration, Locations 1 and 2 (Figure 4) represent the main entrances and Location 14 through 38 (Figure 4) represent other onsite areas such as sidewalks, podiums, courtyards and multi-sport courts.

With the addition of the Garden Garage Development Project, winds at most locations are expected to remain comfortable for walking or better on an annual basis, including the main entrances at Locations 1 and 2. Marginal increases in wind speeds are expected locally around the building, with uncomfortable winds expected to the east and west side of the proposed building (Locations 7, 12, 18 and 19 in Figure 4). Localized corner accelerations are also expected to yield wind speeds that are dangerous and exceed the effective gust criterion on windy days at the northeast corner of the proposed development (Location 6 in Figure 4). These conditions are to be mitigated using measures discussed in the following paragraph.

The elevated wind speeds at the east of the proposed building are mainly due to winds approaching from the northeast and northwest directions. Mitigation of this wind condition will be studied, potentially using wind screens and landscaping with proposed canopies. Examples of mitigation strategies are presented below in Image 1. Wind control elements such as canopies larger than those tested are currently being considered by the design team. Additionally, landscaping in this area is also being considered. Implementation of these measures is expected to mitigate the high wind speeds, including the dangerous condition noted on the northeast corner. Further wind tunnel tests can be conducted to quantify the extent of these improvements.



Image 1: Examples of wind screens and landscaping

Wind speeds comfortable for sitting or standing are desirable during the summer for podiums and roofs that are intended for passive activities of building users. For maintenance or mechanical spaces that are not anticipated to be used frequently, higher wind speeds are acceptable.

Winds on the west side podium and east balcony of the proposed Garden Garage Development (Locations 14 through 17) are expected to be dangerous or uncomfortable with unacceptable gust wind speeds annually and in the summer. It is our understanding that these locations will not be occupied by the pedestrians, or wind mitigation will need to be developed.

5.2 Off-site Walkways

5.2.1 No Build Configuration (locations 36 through 94 in Figure 3)

Wind conditions for off-site walkways are generally comfortable for walking or better on an annual basis, which is appropriate for pedestrian usage.

Local flow accelerations and uncomfortable wind conditions were measured in areas between the existing apartment buildings to the west (Locations 51, 52 and 54 in Figure 3) and around the existing O'Neill Federal Building (Locations 72, 76, 78, 79 and 81 in Figure 3).

The effective gust criterion was not met annually at four locations in the above-mentioned two areas (Location 52, 54, 76 and 79 in Figure 3).

5.2.2 Build Configuration (locations 39 through 95 in Figure 4)

With the addition of the proposed Garden Garage Development, overall the wind conditions are expected to be similar to those that currently exist. Uncomfortable winds are detected along Lomasney Way, Martha Road and Nashua Street (Figure 4). Increased wind speeds are measured at Location 77, resulting in dangerous conditions (Figure 4 and Table 3).

With respect to effective gusts, winds at four locations (54, 77, 78 to 79) exceed the criterion on an annual basis (Figure 4), similar to the No Build Configuration. Localized coniferous or marcescent trees are

currently being incorporated into the design along the sidewalks and are expected to improve the unacceptable and dangerous wind conditions measured there.

6. SUMMARY OF RESULTS

The proposed Garden Garage development was tested in the wind tunnel for No Build and Build Configurations. Overall, wind conditions at offsite locations are expected to be similar for both configurations. Most onsite locations are predicted to have wind conditions comfortable for walking or better, but uncomfortable and unacceptable wind conditions still persist at ground level on the northeast corner. Increased canopy size and/or additional landscaping is currently being incorporated to the design in order to further mitigate these conditions, which is likely to result in acceptable conditions.

7. APPLICABILITY OF RESULTS

The results presented in this report pertain to the model of the proposed Garden Garage Development constructed using the architectural design drawings listed in Appendix A. Should there be any design changes that deviate from this list of drawings, the results presented may change. Therefore, if changes in the design are made, it is recommended that RWDI be contacted and requested to review their potential effects on wind conditions.

TABLES

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons – No Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
1	A	Spring Summer Fall Winter Annual	DATA NOT AVAILABLE DATA NOT AVAILABLE DATA NOT AVAILABLE DATA NOT AVAILABLE DATA NOT AVAILABLE					
2	A	Spring Summer Fall Winter Annual	15 11 14 16 15		Standing Sitting Standing Walking Standing	22 16 20 22 21		Acceptable Acceptable Acceptable Acceptable Acceptable
3	A	Spring Summer Fall Winter Annual	15 11 13 15 14		Standing Sitting Standing Standing Standing	22 16 20 22 21		Acceptable Acceptable Acceptable Acceptable Acceptable
4	A	Spring Summer Fall Winter Annual	13 9 12 14 13		Standing Sitting Sitting Standing Standing	21 15 20 23 21		Acceptable Acceptable Acceptable Acceptable Acceptable
5	A	Spring Summer Fall Winter Annual	14 11 13 15 14		Standing Sitting Standing Standing Standing	22 16 20 23 21		Acceptable Acceptable Acceptable Acceptable Acceptable
6	A	Spring Summer Fall Winter Annual	DATA NOT AVAILABLE DATA NOT AVAILABLE DATA NOT AVAILABLE DATA NOT AVAILABLE DATA NOT AVAILABLE					
7	A	Spring Summer Fall Winter Annual	9 7 8 9 8		Sitting Sitting Sitting Sitting Sitting	15 12 14 17 15		Acceptable Acceptable Acceptable Acceptable Acceptable
8	A	Spring Summer Fall Winter Annual	11 10 11 12 11		Sitting Sitting Sitting Sitting Sitting	17 15 16 19 17		Acceptable Acceptable Acceptable Acceptable Acceptable
9	A	Spring Summer Fall Winter Annual	11 11 11 12 11		Sitting Sitting Sitting Sitting Sitting	17 15 16 18 16		Acceptable Acceptable Acceptable Acceptable 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
Comfortable for Standing: > 12 and ≤ 15 mph
Comfortable for Walking: > 15 and ≤ 19 mph
Uncomfortable for Walking: > 19 and ≤ 27 mph
Dangerous Conditions: > 27 mph

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons – No Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
10	A	Spring	DATA NOT AVAILABLE					
		Summer	DATA NOT AVAILABLE					
		Fall	DATA NOT AVAILABLE					
		Winter	DATA NOT AVAILABLE					
		Annual	DATA NOT AVAILABLE					
11	A	Spring	DATA NOT AVAILABLE					
		Summer	DATA NOT AVAILABLE					
		Fall	DATA NOT AVAILABLE					
		Winter	DATA NOT AVAILABLE					
		Annual	DATA NOT AVAILABLE					
12	A	Spring	DATA NOT AVAILABLE					
		Summer	DATA NOT AVAILABLE					
		Fall	DATA NOT AVAILABLE					
		Winter	DATA NOT AVAILABLE					
		Annual	DATA NOT AVAILABLE					
13	A	Spring	8		Sitting	14		Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	8		Sitting	13		Acceptable
		Winter	9		Sitting	15		Acceptable
		Annual	8		Sitting	14		Acceptable
14	A	Spring	8		Sitting	13		Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	8		Sitting	12		Acceptable
		Winter	8		Sitting	14		Acceptable
		Annual	8		Sitting	13		Acceptable
15	A	Spring	DATA NOT AVAILABLE					
		Summer	DATA NOT AVAILABLE					
		Fall	DATA NOT AVAILABLE					
		Winter	DATA NOT AVAILABLE					
		Annual	DATA NOT AVAILABLE					
16	A	Spring	DATA NOT AVAILABLE					
		Summer	DATA NOT AVAILABLE					
		Fall	DATA NOT AVAILABLE					
		Winter	DATA NOT AVAILABLE					
		Annual	DATA NOT AVAILABLE					
17	A	Spring	DATA NOT AVAILABLE					
		Summer	DATA NOT AVAILABLE					
		Fall	DATA NOT AVAILABLE					
		Winter	DATA NOT AVAILABLE					
		Annual	DATA NOT AVAILABLE					
18	A	Spring	DATA NOT AVAILABLE					
		Summer	DATA NOT AVAILABLE					
		Fall	DATA NOT AVAILABLE					
		Winter	DATA NOT AVAILABLE					
		Annual	DATA NOT AVAILABLE					

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

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons – No Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
19	A	Spring Summer Fall Winter Annual	DATA NOT AVAILABLE DATA NOT AVAILABLE DATA NOT AVAILABLE DATA NOT AVAILABLE DATA NOT AVAILABLE					
20	A	Spring Summer Fall Winter Annual	DATA NOT AVAILABLE DATA NOT AVAILABLE DATA NOT AVAILABLE DATA NOT AVAILABLE DATA NOT AVAILABLE					
21	A	Spring Summer Fall Winter Annual	16 12 15 16 15		Walking Sitting Standing Walking Standing	22 17 21 23 21		Acceptable Acceptable Acceptable Acceptable Acceptable
22	A	Spring Summer Fall Winter Annual	11 8 10 11 10		Sitting Sitting Sitting Sitting Sitting	17 13 15 17 16		Acceptable Acceptable Acceptable Acceptable Acceptable
23	A	Spring Summer Fall Winter Annual	14 10 13 14 13		Standing Sitting Standing Standing Standing	21 15 19 22 20		Acceptable Acceptable Acceptable Acceptable Acceptable
24	A	Spring Summer Fall Winter Annual	13 9 12 14 12		Standing Sitting Sitting Standing Sitting	20 14 18 21 19		Acceptable Acceptable Acceptable Acceptable Acceptable
25	A	Spring Summer Fall Winter Annual	11 8 10 12 11		Sitting Sitting Sitting Sitting Sitting	18 13 17 20 18		Acceptable Acceptable Acceptable Acceptable Acceptable
26	A	Spring Summer Fall Winter Annual	13 10 12 13 12		Standing Sitting Sitting Standing Sitting	19 15 18 21 19		Acceptable Acceptable Acceptable Acceptable Acceptable
27	A	Spring Summer Fall Winter	18 13 16 18		Walking Standing Walking Walking	25 20 23 26		Acceptable Acceptable Acceptable 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
Comfortable for Standing: > 12 and ≤ 15 mph
Comfortable for Walking: > 15 and ≤ 19 mph
Uncomfortable for Walking: > 19 and ≤ 27 mph
Dangerous Conditions: > 27 mph

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons – No Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
28	A	Annual	17		Walking	24		Acceptable
		Spring	11		Sitting	16		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
29	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
30	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
31	A	Spring	9		Sitting	14		Acceptable
		Summer	8		Sitting	12		Acceptable
		Fall	8		Sitting	13		Acceptable
		Winter	9		Sitting	15		Acceptable
		Annual	8		Sitting	14		Acceptable
32	A	Spring	DATA NOT AVAILABLE					
		Summer	DATA NOT AVAILABLE					
		Fall	DATA NOT AVAILABLE					
		Winter	DATA NOT AVAILABLE					
		Annual	DATA NOT AVAILABLE					
33	A	Spring	DATA NOT AVAILABLE					
		Summer	DATA NOT AVAILABLE					
		Fall	DATA NOT AVAILABLE					
		Winter	DATA NOT AVAILABLE					
		Annual	DATA NOT AVAILABLE					
34	A	Spring	12		Sitting	18		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
35	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
36	A	Spring	13		Standing	21		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	12		Sitting	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

A - No Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons – No Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
37	A	Winter	14		Standing	23		Acceptable
		Annual	12		Sitting	21		Acceptable
		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
		Spring	14		Standing	22		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	13		Standing	21		Acceptable
38	A	Winter	15		Standing	24		Acceptable
		Annual	14		Standing	22		Acceptable
		Spring	16		Walking	25		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	14		Standing	23		Acceptable
39	A	Winter	16		Walking	26		Acceptable
		Annual	15		Standing	24		Acceptable
		Spring	15		Standing	23		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
40	A	Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
		Spring	19		Walking	26		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	17		Walking	24		Acceptable
41	A	Winter	19		Walking	27		Acceptable
		Annual	17		Walking	24		Acceptable
		Spring	14		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	21		Acceptable
42	A	Winter	15		Standing	23		Acceptable
		Annual	13		Standing	21		Acceptable
		Spring	18		Walking	26		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	17		Walking	24		Acceptable
43	A	Winter	19		Walking	28		Acceptable
		Annual	18		Walking	26		Acceptable
		Spring	11		Sitting	18		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	17		Acceptable
44	A	Winter	11		Sitting	19		Acceptable
		Annual	10		Sitting	17		Acceptable

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

Configurations

A - No Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons – No Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
45	A	Spring	17		Walking	26		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	28		Acceptable
		Annual	17		Walking	25		Acceptable
46	A	Spring	14		Standing	21		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
47	A	Spring	15		Standing	23		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
48	A	Spring	13		Standing	20		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
49	A	Spring	12		Sitting	21		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	19		Acceptable
		Winter	13		Standing	22		Acceptable
		Annual	12		Sitting	20		Acceptable
50	A	Spring	14		Standing	22		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	13		Standing	22		Acceptable
51	A	Spring	23		Uncomfortable	31		Acceptable
		Summer	17		Walking	23		Acceptable
		Fall	21		Uncomfortable	29		Acceptable
		Winter	25		Uncomfortable	34		Unacceptable
		Annual	23		Uncomfortable	31		Acceptable
52	A	Spring	23		Uncomfortable	32		Unacceptable
		Summer	18		Walking	25		Acceptable
		Fall	21		Uncomfortable	30		Acceptable
		Winter	25		Uncomfortable	35		Unacceptable
		Annual	22		Uncomfortable	32		Unacceptable
53	A	Spring	14		Standing	22		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	14		Standing	22		Acceptable

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

Configurations

A - No Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons – No Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
54	A	Spring	23		Uncomfortable	32		Unacceptable
		Summer	16		Walking	23		Acceptable
		Fall	21		Uncomfortable	30		Acceptable
		Winter	25		Uncomfortable	35		Unacceptable
		Annual	22		Uncomfortable	32		Unacceptable
55	A	Spring	20		Uncomfortable	26		Acceptable
		Summer	14		Standing	18		Acceptable
		Fall	18		Walking	24		Acceptable
		Winter	21		Uncomfortable	28		Acceptable
		Annual	19		Walking	26		Acceptable
56	A	Spring	20		Uncomfortable	28		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	17		Walking	26		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	18		Walking	27		Acceptable
57	A	Spring	16		Walking	22		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
58	A	Spring	11		Sitting	17		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	16		Acceptable
59	A	Spring	13		Standing	20		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
60	A	Spring	9		Sitting	16		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	9		Sitting	14		Acceptable
		Winter	10		Sitting	16		Acceptable
		Annual	9		Sitting	15		Acceptable
61	A	Spring	8		Sitting	14		Acceptable
		Summer	7		Sitting	12		Acceptable
		Fall	8		Sitting	13		Acceptable
		Winter	8		Sitting	15		Acceptable
		Annual	8		Sitting	13		Acceptable
62	A	Spring	6		Sitting	10		Acceptable
		Summer	5		Sitting	8		Acceptable
		Fall	6		Sitting	9		Acceptable
		Winter	6		Sitting	11		Acceptable
		Annual	6		Sitting	10		Acceptable

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

Configurations

A - No Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons – No Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
63	A	Spring	8		Sitting	12		Acceptable
		Summer	6		Sitting	9		Acceptable
		Fall	7		Sitting	11		Acceptable
		Winter	8		Sitting	12		Acceptable
		Annual	7		Sitting	12		Acceptable
64	A	Spring	13		Standing	22		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	23		Acceptable
		Annual	13		Standing	21		Acceptable
65	A	Spring	15		Standing	23		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	15		Standing	22		Acceptable
66	A	Spring	14		Standing	21		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	20		Acceptable
67	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	13		Standing	19		Acceptable
68	A	Spring	15		Standing	22		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	22		Acceptable
69	A	Spring	17		Walking	27		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	16		Walking	25		Acceptable
		Winter	19		Walking	30		Acceptable
		Annual	17		Walking	27		Acceptable
70	A	Spring	19		Walking	27		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	29		Acceptable
		Annual	18		Walking	26		Acceptable
71	A	Spring	15		Standing	23		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	24		Acceptable

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

Configurations

A - No Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons – No Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
72	A	Annual	14		Standing	22		Acceptable
		Spring	22		Uncomfortable	30		Acceptable
		Summer	16		Walking	23		Acceptable
		Fall	20		Uncomfortable	28		Acceptable
		Winter	23		Uncomfortable	32		Unacceptable
		Annual	21		Uncomfortable	29		Acceptable
73	A	Spring	18		Walking	27		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	17		Walking	26		Acceptable
		Winter	20		Uncomfortable	29		Acceptable
		Annual	18		Walking	27		Acceptable
74	A	Spring	15		Standing	24		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	14		Standing	23		Acceptable
75	A	Spring	14		Standing	23		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15		Standing	24		Acceptable
		Annual	14		Standing	22		Acceptable
76	A	Spring	26		Uncomfortable	34		Unacceptable
		Summer	19		Walking	25		Acceptable
		Fall	24		Uncomfortable	32		Unacceptable
		Winter	28		Dangerous	37		Unacceptable
		Annual	26		Uncomfortable	34		Unacceptable
77	A	Spring	18		Walking	27		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	18		Walking	26		Acceptable
78	A	Spring	22		Uncomfortable	32		Unacceptable
		Summer	16		Walking	23		Acceptable
		Fall	21		Uncomfortable	29		Acceptable
		Winter	25		Uncomfortable	35		Unacceptable
		Annual	22		Uncomfortable	31		Acceptable
79	A	Spring	23		Uncomfortable	33		Unacceptable
		Summer	17		Walking	24		Acceptable
		Fall	21		Uncomfortable	30		Acceptable
		Winter	24		Uncomfortable	35		Unacceptable
		Annual	22		Uncomfortable	32		Unacceptable
80	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	18		Acceptable

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

Configurations

A - No Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons – No Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
81	A	Winter	13		Standing	21		Acceptable
		Annual	11		Sitting	19		Acceptable
		Spring	21		Uncomfortable	30		Acceptable
		Summer	16		Walking	23		Acceptable
		Fall	20		Uncomfortable	28		Acceptable
		Winter	23		Uncomfortable	32		Unacceptable
82	A	Annual	21		Uncomfortable	29		Acceptable
		Spring	10		Sitting	16		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
83	A	Spring	19		Walking	27		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	19		Walking	27		Acceptable
84	A	Spring	16		Walking	25		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	16		Walking	24		Acceptable
85	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
86	A	Spring	16		Walking	24		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	16		Walking	23		Acceptable
87	A	Spring	19		Walking	28		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	19		Walking	27		Acceptable
88	A	Spring	16		Walking	24		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
89	A	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable

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

Configurations

A - No Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 2: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons – No Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
90	A	Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
		Spring	12		Sitting	19		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
		Spring	13		Standing	21		Acceptable
		Summer	13		Standing	20		Acceptable
91	A	Fall	13		Standing	21		Acceptable
		Winter	14		Standing	23		Acceptable
		Annual	13		Standing	21		Acceptable
		Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
92	A	Fall	10		Sitting	16		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
		Spring	15		Standing	23		Acceptable
		Summer	14		Standing	21		Acceptable
93	A	Fall	15		Standing	22		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
		Spring	18		Walking	27		Acceptable
		Summer	15		Standing	22		Acceptable
94	A	Fall	17		Walking	25		Acceptable
		Winter	20		Uncomfortable	29		Acceptable
		Annual	18		Walking	26		Acceptable

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

Configurations

A - No Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 3: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons - Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
1	B	Spring	13		Standing	20		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
2	B	Spring	11		Sitting	17		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
3	B	Spring	11		Sitting	18		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	18		Acceptable
4	B	Spring	11		Sitting	19		Acceptable
		Summer	10		Sitting	18		Acceptable
		Fall	11		Sitting	19		Acceptable
		Winter	11		Sitting	20		Acceptable
		Annual	11		Sitting	19		Acceptable
5	B	Spring	16		Walking	27		Acceptable
		Summer	15		Standing	25		Acceptable
		Fall	17		Walking	27		Acceptable
		Winter	18		Walking	29		Acceptable
		Annual	17		Walking	27		Acceptable
6	B	Spring	33		Dangerous	38		Unacceptable
		Summer	29		Uncomfortable	33		Unacceptable
		Fall	31		Dangerous	37		Unacceptable
		Winter	33		Dangerous	38		Unacceptable
		Annual	32		Dangerous	37		Unacceptable
7	B	Spring	25		Uncomfortable	29		Acceptable
		Summer	22		Uncomfortable	26		Acceptable
		Fall	24		Uncomfortable	28		Acceptable
		Winter	26		Uncomfortable	30		Acceptable
		Annual	25		Uncomfortable	29		Acceptable
8	B	Spring	15		Standing	21		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
9	B	Spring	19		Walking	27		Acceptable
		Summer	17		Walking	25		Acceptable
		Fall	18		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

B - Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 3: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons - Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
10	B	Winter	20		Uncomfortable	29		Acceptable
		Annual	19		Walking	27		Acceptable
		Spring	15		Standing	23		Acceptable
		Summer	13		Standing	21		Acceptable
		Fall	14		Standing	23		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
11	B	Spring	20		Uncomfortable	28		Acceptable
		Summer	17		Walking	25		Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	19		Walking	27		Acceptable
12	B	Spring	26		Uncomfortable	33		Unacceptable
		Summer	24		Uncomfortable	31		Acceptable
		Fall	25		Uncomfortable	32		Unacceptable
		Winter	27		Uncomfortable	34		Unacceptable
		Annual	25		Uncomfortable	33		Unacceptable
13	B	Spring	17		Walking	25		Acceptable
		Summer	16		Walking	23		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	17		Walking	25		Acceptable
14	B	Spring	34		Dangerous	46		Unacceptable
		Summer	31		Dangerous	43		Unacceptable
		Fall	33		Dangerous	45		Unacceptable
		Winter	36		Dangerous	49		Unacceptable
		Annual	34		Dangerous	46		Unacceptable
15	B	Spring	29		Dangerous	39		Unacceptable
		Summer	27		Uncomfortable	37		Unacceptable
		Fall	29		Dangerous	40		Unacceptable
		Winter	32		Dangerous	43		Unacceptable
		Annual	29		Dangerous	40		Unacceptable
16	B	Spring	28		Dangerous	40		Unacceptable
		Summer	24		Uncomfortable	36		Unacceptable
		Fall	26		Uncomfortable	39		Unacceptable
		Winter	28		Dangerous	42		Unacceptable
		Annual	27		Uncomfortable	40		Unacceptable
17	B	Spring	35		Dangerous	46		Unacceptable
		Summer	32		Dangerous	43		Unacceptable
		Fall	35		Dangerous	46		Unacceptable
		Winter	38		Dangerous	50		Unacceptable
		Annual	36		Dangerous	47		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

B - Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 3: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons - Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
18	B	Spring	25		Uncomfortable	32		Unacceptable
		Summer	22		Uncomfortable	29		Acceptable
		Fall	24		Uncomfortable	31		Acceptable
		Winter	26		Uncomfortable	33		Unacceptable
		Annual	24		Uncomfortable	31		Acceptable
19	B	Spring	21		Uncomfortable	29		Acceptable
		Summer	19		Walking	27		Acceptable
		Fall	20		Uncomfortable	29		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	20		Uncomfortable	29		Acceptable
20	B	Spring	21		Uncomfortable	28		Acceptable
		Summer	17		Walking	24		Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	19		Walking	27		Acceptable
21	B	Spring	16		Walking	25		Acceptable
		Summer	14		Standing	23		Acceptable
		Fall	15		Standing	25		Acceptable
		Winter	16		Walking	26		Acceptable
		Annual	16		Walking	25		Acceptable
22	B	Spring	17		Walking	26		Acceptable
		Summer	16		Walking	24		Acceptable
		Fall	17		Walking	26		Acceptable
		Winter	18		Walking	28		Acceptable
		Annual	17		Walking	26		Acceptable
23	B	Spring	13		Standing	22		Acceptable
		Summer	12		Sitting	20		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	14		Standing	23		Acceptable
		Annual	13		Standing	21		Acceptable
24	B	Spring	14		Standing	22		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
25	B	Spring	16		Walking	25		Acceptable
		Summer	14		Standing	23		Acceptable
		Fall	15		Standing	25		Acceptable
		Winter	16		Walking	26		Acceptable
		Annual	16		Walking	25		Acceptable
26	B	Spring	15		Standing	25		Acceptable
		Summer	14		Standing	23		Acceptable
		Fall	15		Standing	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

B - Build

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

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 3: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons - Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
27	B	Winter	16		Walking	26		Acceptable
		Annual	15		Standing	25		Acceptable
		Spring	15		Standing	23		Acceptable
		Summer	13		Standing	21		Acceptable
		Fall	14		Standing	23		Acceptable
		Winter	15		Standing	24		Acceptable
		Annual	15		Standing	23		Acceptable
		Spring	15		Standing	24		Acceptable
		Summer	14		Standing	22		Acceptable
		Fall	15		Standing	24		Acceptable
28	B	Winter	16		Walking	25		Acceptable
		Annual	15		Standing	24		Acceptable
		Spring	16		Walking	23		Acceptable
		Summer	15		Standing	22		Acceptable
		Fall	16		Walking	23		Acceptable
29	B	Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
		Spring	16		Walking	23		Acceptable
		Summer	15		Standing	22		Acceptable
		Fall	16		Walking	23		Acceptable
30	B	Winter	16		Walking	25		Acceptable
		Annual	15		Standing	24		Acceptable
		Spring	15		Standing	24		Acceptable
		Summer	14		Standing	22		Acceptable
		Fall	15		Standing	24		Acceptable
31	B	Winter	18		Walking	27		Acceptable
		Annual	17		Walking	26		Acceptable
		Spring	17		Walking	26		Acceptable
		Summer	16		Walking	24		Acceptable
		Fall	17		Walking	26		Acceptable
32	B	Winter	14		Standing	22		Acceptable
		Annual	13		Standing	21		Acceptable
		Spring	14		Standing	21		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	13		Standing	21		Acceptable
33	B	Winter	17		Walking	27		Acceptable
		Annual	16		Walking	25		Acceptable
		Spring	16		Walking	25		Acceptable
		Summer	15		Standing	23		Acceptable
		Fall	16		Walking	25		Acceptable
34	B	Winter	19		Walking	28		Acceptable
		Annual	19		Walking	26		Acceptable
		Spring	19		Walking	26		Acceptable
		Summer	17		Walking	24		Acceptable
		Fall	18		Walking	26		Acceptable

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

Configurations

B - Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 3: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons - Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
35	B	Spring	13		Standing	20		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
36	B	Spring	16		Walking	24		Acceptable
		Summer	15		Standing	23		Acceptable
		Fall	15		Standing	24		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	16		Walking	25		Acceptable
37	B	Spring	17		Walking	26		Acceptable
		Summer	17		Walking	25		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	18		Walking	27		Acceptable
38	B	Spring	13		Standing	20		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
39	B	Spring	15		Standing	22		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
40	B	Spring	20		Uncomfortable	29		Acceptable
		Summer	19		Walking	27		Acceptable
		Fall	20		Uncomfortable	29		Acceptable
		Winter	21		Uncomfortable	31		Acceptable
		Annual	20		Uncomfortable	29		Acceptable
41	B	Spring	20		Uncomfortable	29		Acceptable
		Summer	19		Walking	27		Acceptable
		Fall	20		Uncomfortable	29		Acceptable
		Winter	21		Uncomfortable	31		Acceptable
		Annual	20		Uncomfortable	30		Acceptable
42	B	Spring	17		Walking	26		Acceptable
		Summer	16		Walking	24		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	17		Walking	26		Acceptable
43	B	Spring	14		Standing	20		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	13		Standing	20		Acceptable

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

Configurations

Mean Wind Speed Criteria

Effective Gust Criteria

B - Build

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

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 3: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons - Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
44	B	Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
		Spring	13		Standing	20		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
		Spring	15		Standing	22		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	14		Standing	21		Acceptable
45	B	Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
		Spring	14		Standing	22		Acceptable
		Summer	12		Sitting	20		Acceptable
		Fall	13		Standing	21		Acceptable
46	B	Winter	14		Standing	23		Acceptable
		Annual	13		Standing	21		Acceptable
		Spring	14		Standing	22		Acceptable
		Summer	12		Sitting	20		Acceptable
		Fall	13		Standing	21		Acceptable
47	B	Winter	14		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
		Spring	14		Standing	22		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	14		Standing	22		Acceptable
48	B	Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
		Spring	16		Walking	25		Acceptable
		Summer	14		Standing	22		Acceptable
		Fall	15		Standing	24		Acceptable
49	B	Winter	17		Walking	26		Acceptable
		Annual	15		Standing	24		Acceptable
		Spring	14		Standing	23		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	13		Standing	22		Acceptable
50	B	Winter	13		Standing	22		Acceptable
		Annual	13		Standing	22		Acceptable
		Spring	13		Standing	21		Acceptable
		Summer	12		Sitting	20		Acceptable
		Fall	13		Standing	21		Acceptable
51	B	Winter	14		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
		Spring	17		Walking	27		Acceptable
		Summer	15		Standing	24		Acceptable
		Fall	17		Walking	26		Acceptable
		Winter	17		Walking	28		Acceptable
		Annual	17		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

B - Build

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

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 3: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons - Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
52	B	Spring	17		Walking	26		Acceptable
		Summer	16		Walking	24		Acceptable
		Fall	17		Walking	26		Acceptable
		Winter	18		Walking	28		Acceptable
		Annual	17		Walking	26		Acceptable
53	B	Spring	11		Sitting	18		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
54	B	Spring	24		Uncomfortable	32		Unacceptable
		Summer	22		Uncomfortable	30		Acceptable
		Fall	23		Uncomfortable	32		Unacceptable
		Winter	26		Uncomfortable	36		Unacceptable
		Annual	24		Uncomfortable	33		Unacceptable
55	B	Spring	19		Walking	26		Acceptable
		Summer	18		Walking	24		Acceptable
		Fall	19		Walking	25		Acceptable
		Winter	21		Uncomfortable	28		Acceptable
		Annual	19		Walking	26		Acceptable
56	B	Spring	22		Uncomfortable	30		Acceptable
		Summer	19		Walking	26		Acceptable
		Fall	21		Uncomfortable	29		Acceptable
		Winter	21		Uncomfortable	30		Acceptable
		Annual	21		Uncomfortable	29		Acceptable
57	B	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
58	B	Spring	16		Walking	25		Acceptable
		Summer	15		Standing	23		Acceptable
		Fall	15		Standing	24		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	24		Acceptable
59	B	Spring	15		Standing	23		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	23		Acceptable
60	B	Spring	14		Standing	21		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	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

B - Build

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

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 3: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons - Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
61	B	Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
		Spring	26		Uncomfortable	33		Unacceptable
		Summer	23		Uncomfortable	29		Acceptable
		Fall	25		Uncomfortable	31		Acceptable
		Winter	26		Uncomfortable	33		Unacceptable
62	B	Annual	25		Uncomfortable	31		Acceptable
		Spring	7		Sitting	12		Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	7		Sitting	12		Acceptable
		Winter	8		Sitting	12		Acceptable
		Annual	7		Sitting	12		Acceptable
63	B	Spring	15		Standing	23		Acceptable
		Summer	14		Standing	22		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	24		Acceptable
64	B	Spring	14		Standing	23		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	14		Standing	22		Acceptable
		Winter	14		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
65	B	Spring	15		Standing	23		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
66	B	Spring	16		Walking	24		Acceptable
		Summer	14		Standing	22		Acceptable
		Fall	15		Standing	24		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	24		Acceptable
67	B	Spring	18		Walking	28		Acceptable
		Summer	17		Walking	25		Acceptable
		Fall	18		Walking	27		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	18		Walking	27		Acceptable
68	B	Spring	23		Uncomfortable	31		Acceptable
		Summer	20		Uncomfortable	27		Acceptable
		Fall	22		Uncomfortable	30		Acceptable
		Winter	23		Uncomfortable	31		Acceptable
		Annual	22		Uncomfortable	30		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

B - Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 3: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons - Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
69	B	Spring	18		Walking	27		Acceptable
		Summer	16		Walking	24		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	17		Walking	27		Acceptable
		Annual	17		Walking	26		Acceptable
70	B	Spring	19		Walking	26		Acceptable
		Summer	17		Walking	24		Acceptable
		Fall	19		Walking	26		Acceptable
		Winter	21		Uncomfortable	29		Acceptable
		Annual	19		Walking	27		Acceptable
71	B	Spring	21		Uncomfortable	29		Acceptable
		Summer	19		Walking	27		Acceptable
		Fall	20		Uncomfortable	29		Acceptable
		Winter	21		Uncomfortable	31		Acceptable
		Annual	20		Uncomfortable	29		Acceptable
72	B	Spring	21		Uncomfortable	31		Acceptable
		Summer	20		Uncomfortable	29		Acceptable
		Fall	21		Uncomfortable	30		Acceptable
		Winter	23		Uncomfortable	33		Unacceptable
		Annual	21		Uncomfortable	31		Acceptable
73	B	Spring	20		Uncomfortable	29		Acceptable
		Summer	19		Walking	27		Acceptable
		Fall	20		Uncomfortable	29		Acceptable
		Winter	22		Uncomfortable	31		Acceptable
		Annual	20		Uncomfortable	29		Acceptable
74	B	Spring	16		Walking	25		Acceptable
		Summer	15		Standing	24		Acceptable
		Fall	16		Walking	25		Acceptable
		Winter	17		Walking	27		Acceptable
		Annual	16		Walking	25		Acceptable
75	B	Spring	13		Standing	22		Acceptable
		Summer	13		Standing	21		Acceptable
		Fall	13		Standing	22		Acceptable
		Winter	14		Standing	24		Acceptable
		Annual	14		Standing	22		Acceptable
76	B	Spring	17		Walking	26		Acceptable
		Summer	16		Walking	24		Acceptable
		Fall	17		Walking	26		Acceptable
		Winter	19		Walking	28		Acceptable
		Annual	18		Walking	26		Acceptable
77	B	Spring	29		Dangerous	38		Unacceptable
		Summer	27		Uncomfortable	36		Unacceptable
		Fall	29		Dangerous	38		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

B - Build

Mean Wind Speed Criteria

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

Effective Gust Criteria

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 3: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons - Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
78	B	Winter	32		Dangerous	42		Unacceptable
		Annual	29		Dangerous	39		Unacceptable
		Spring	26		Uncomfortable	37		Unacceptable
		Summer	23		Uncomfortable	33		Unacceptable
		Fall	25		Uncomfortable	35		Unacceptable
		Winter	26		Uncomfortable	37		Unacceptable
		Annual	25		Uncomfortable	36		Unacceptable
		Spring	24		Uncomfortable	34		Unacceptable
		Summer	23		Uncomfortable	32		Unacceptable
		Fall	24		Uncomfortable	34		Unacceptable
79	B	Winter	26		Uncomfortable	37		Unacceptable
		Annual	25		Uncomfortable	35		Unacceptable
		Spring	24		Uncomfortable	34		Unacceptable
		Summer	23		Uncomfortable	32		Unacceptable
		Fall	24		Uncomfortable	34		Unacceptable
80	B	Winter	26		Uncomfortable	37		Unacceptable
		Annual	25		Uncomfortable	35		Unacceptable
		Spring	14		Standing	23		Acceptable
		Summer	13		Standing	22		Acceptable
		Fall	14		Standing	23		Acceptable
81	B	Winter	16		Walking	25		Acceptable
		Annual	15		Standing	24		Acceptable
		Spring	19		Walking	27		Acceptable
		Summer	17		Walking	25		Acceptable
		Fall	19		Walking	27		Acceptable
82	B	Winter	20		Uncomfortable	29		Acceptable
		Annual	19		Walking	27		Acceptable
		Spring	10		Sitting	16		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	9		Sitting	16		Acceptable
83	B	Winter	10		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
		Spring	20		Uncomfortable	29		Acceptable
		Summer	19		Walking	27		Acceptable
		Fall	20		Uncomfortable	29		Acceptable
84	B	Winter	22		Uncomfortable	32		Unacceptable
		Annual	21		Uncomfortable	30		Acceptable
		Spring	16		Walking	25		Acceptable
		Summer	15		Standing	23		Acceptable
		Fall	16		Walking	26		Acceptable
85	B	Winter	18		Walking	28		Acceptable
		Annual	16		Walking	26		Acceptable
		Spring	8		Sitting	13		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	9		Sitting	14		Acceptable
		Winter	9		Sitting	14		Acceptable
		Annual	9		Sitting	14		Acceptable

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

Configurations

Mean Wind Speed Criteria

Effective Gust Criteria

B - Build

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

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 3: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons - Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
86	B	Spring	17		Walking	25		Acceptable
		Summer	16		Walking	23		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	19		Walking	27		Acceptable
		Annual	17		Walking	25		Acceptable
87	B	Spring	20		Uncomfortable	28		Acceptable
		Summer	18		Walking	26		Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	21		Uncomfortable	29		Acceptable
		Annual	19		Walking	28		Acceptable
88	B	Spring	15		Standing	22		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
89	B	Spring	13		Standing	19		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
90	B	Spring	12		Sitting	20		Acceptable
		Summer	12		Sitting	20		Acceptable
		Fall	12		Sitting	21		Acceptable
		Winter	13		Standing	22		Acceptable
		Annual	13		Standing	21		Acceptable
91	B	Spring	15		Standing	23		Acceptable
		Summer	14		Standing	22		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
92	B	Spring	14		Standing	22		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
93	B	Spring	17		Walking	26		Acceptable
		Summer	17		Walking	25		Acceptable
		Fall	17		Walking	26		Acceptable
		Winter	18		Walking	28		Acceptable
		Annual	17		Walking	26		Acceptable
94	B	Spring	21		Uncomfortable	30		Acceptable
		Summer	20		Uncomfortable	28		Acceptable
		Fall	21		Uncomfortable	30		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

B - Build

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

Acceptable: ≤ 31 mph
Unacceptable: > 31 mph

Table 3: Pedestrian Wind Comfort and Safety Categories - Multiple Seasons - Build

BRA Criteria			Mean Wind Speed			Effective Gust Wind Speed		
Loc.	Config.	Season	Speed(mph)	%Change	RATING	Speed(mph)	%Change	RATING
95	B	Winter	22		Uncomfortable	32		Unacceptable
		Annual	21		Uncomfortable	30		Acceptable
		Spring	21		Uncomfortable	31		Acceptable
		Summer	20		Uncomfortable	29		Acceptable
		Fall	21		Uncomfortable	31		Acceptable
		Winter	23		Uncomfortable	33		Unacceptable
		Annual	21		Uncomfortable	31		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

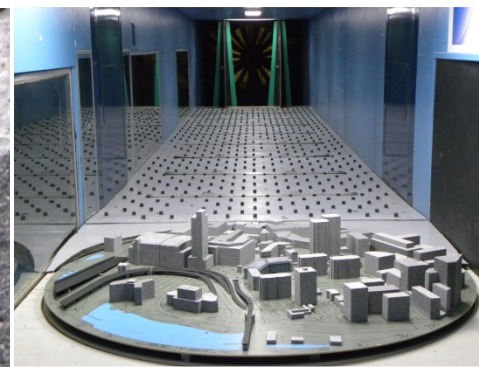
Effective Gust Criteria

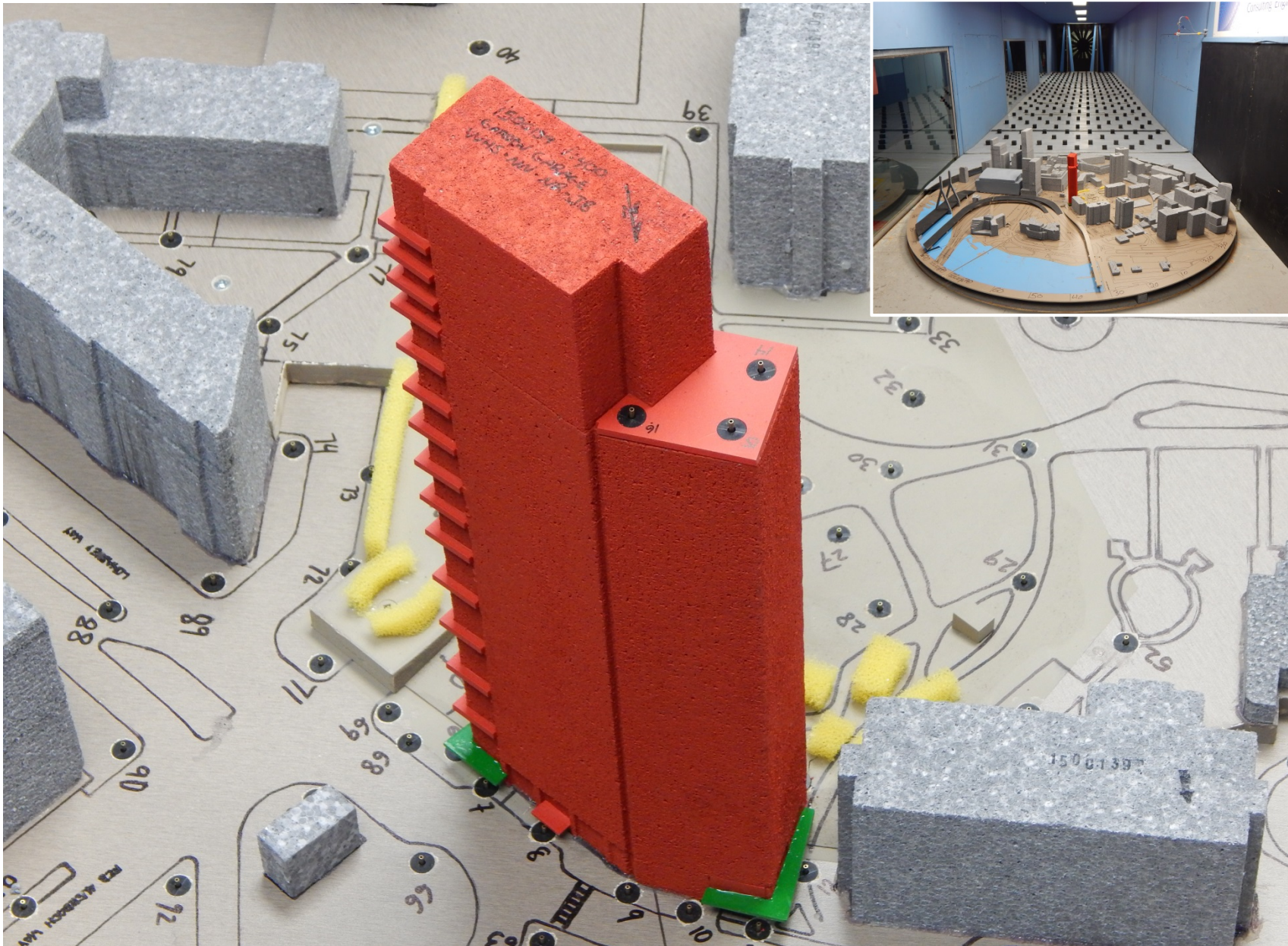
B - Build

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

Acceptable: ≤ 31 mph
 Unacceptable: > 31 mph

FIGURES





Wind Tunnel Study Model Build Configuration

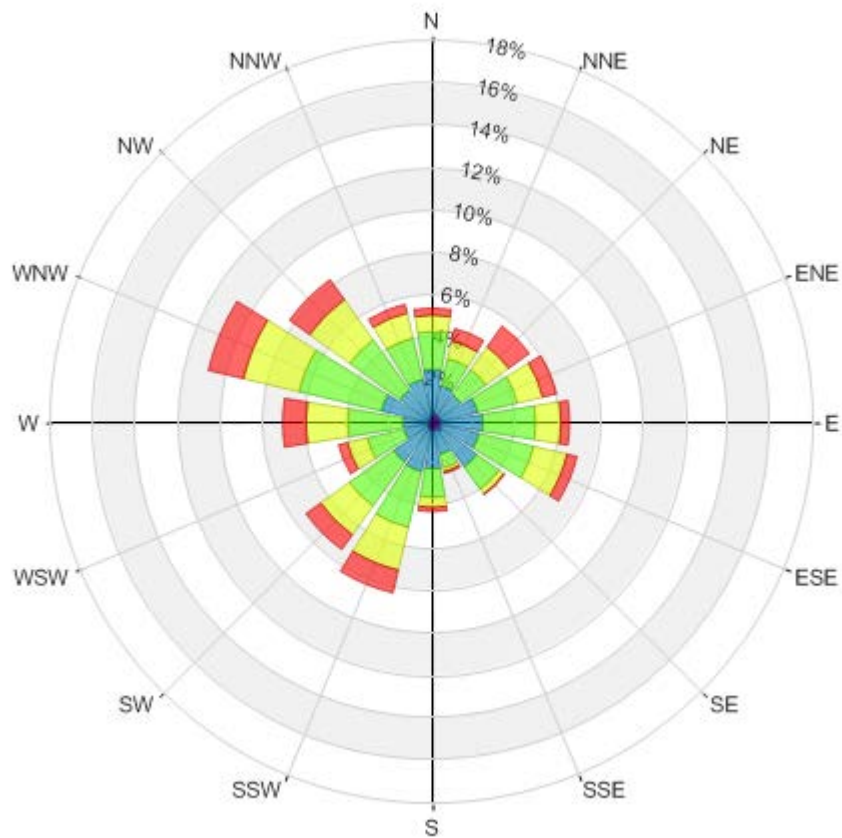
Garden Garage Development – Boston, MA

Figure No. 1b

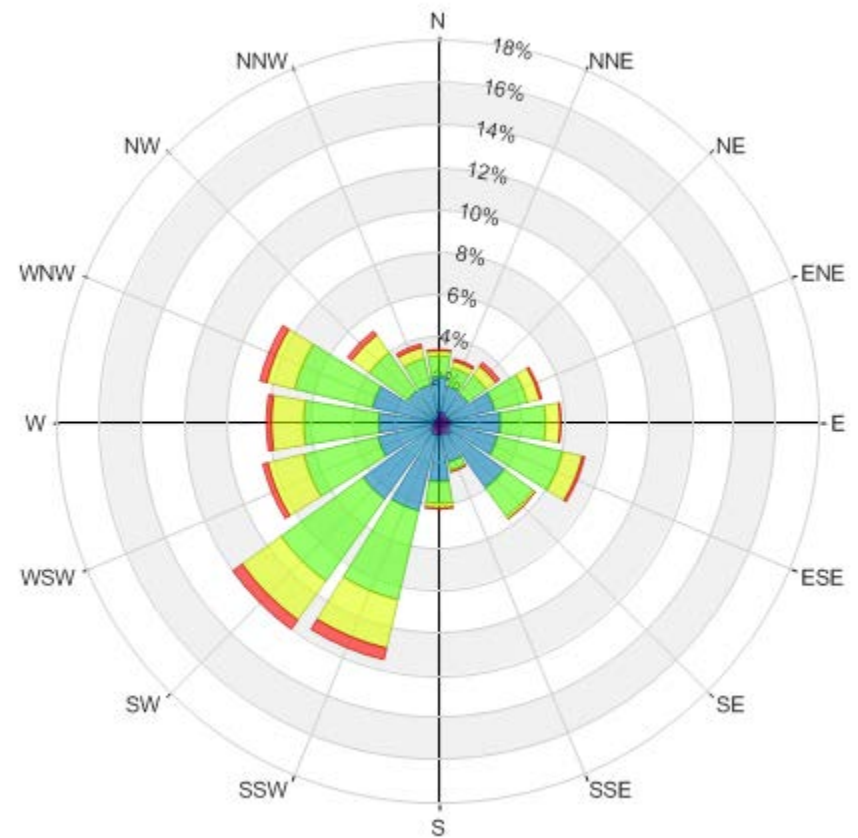
Project #1500139

Date: October 14, 2014





Spring
(March - May)



Summer
(June - August)

	Wind Speed (mph)	Probability (%)	
		Spring	Summer
	Calm	2.0	2.1
	1-5	5.5	7.4
	6-10	27.5	36.6
	11-15	33.5	36.4
	16-20	20.7	14.6
	>20	10.8	3.0

Directional Distribution (%) of Winds (Blowing From) **Boston Logan International Airport (1983 - 2013)**

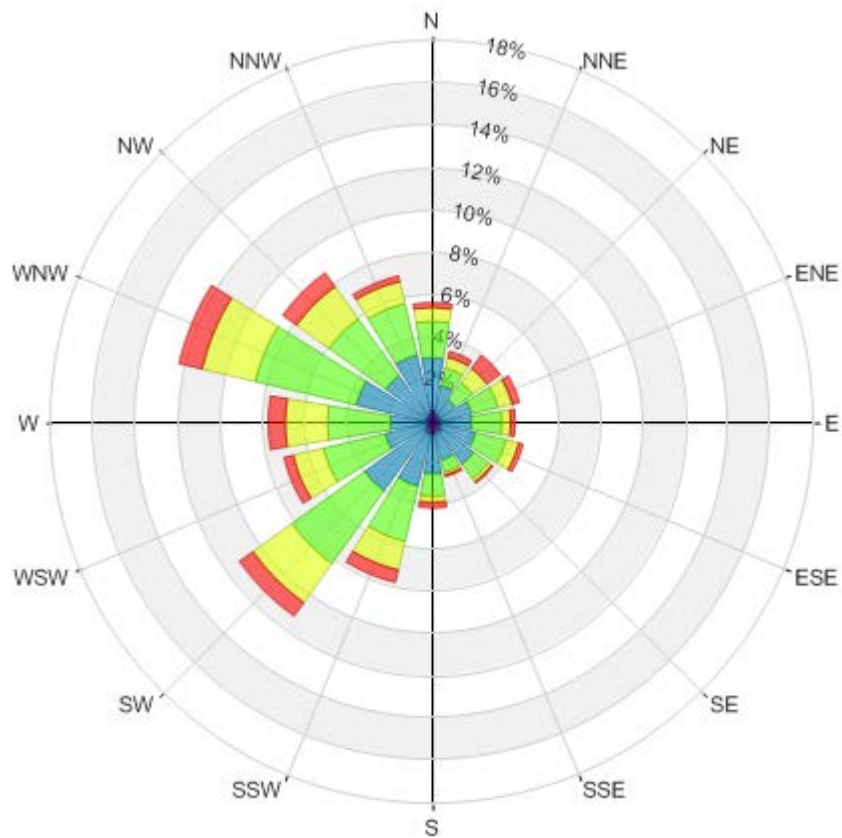
Garden Garage Development – Boston, MA

Project #1500139

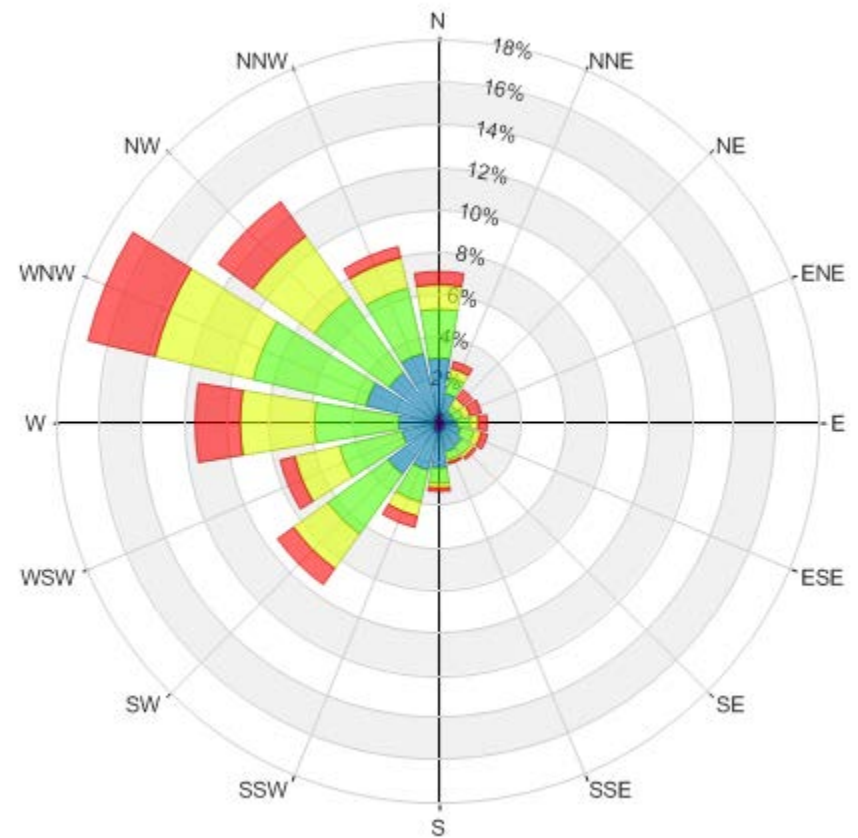
Figure No. 2a

Date: October 14, 2014





Fall
(September - November)



Winter
(December - February)

	Wind Speed (mph)	Probability (%)	
		Fall	Winter
	Calm	2.3	1.8
	1-5	6.9	5.3
	6-10	32.7	26.1
	11-15	33.9	31.8
	16-20	16.8	21.8
	>20	7.3	13.2

Directional Distribution (%) of Winds (Blowing From)
Boston Logan International Airport (1983 - 2013)

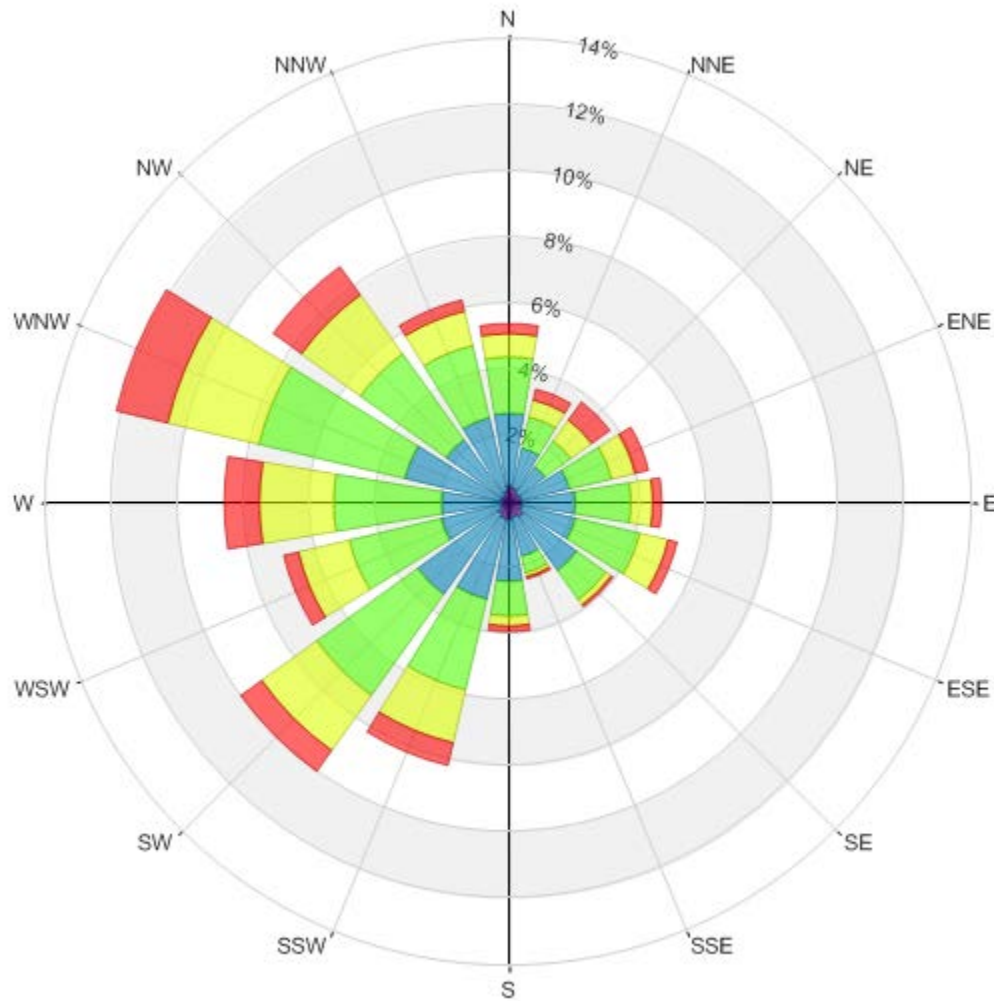
Garden Garage Development – Boston, MA

Project #1500139

Figure No. 2b

Date: October 14, 2014





Annual Winds

**Wind Speed
(mph)**

Probability (%)



Calm	2.0
1-5	6.3
6-10	30.8
11-15	33.9
16-20	18.5
>20	8.6

**Directional Distribution (%) of Winds (Blowing From)
Boston Logan International Airport (1983 - 2013)**

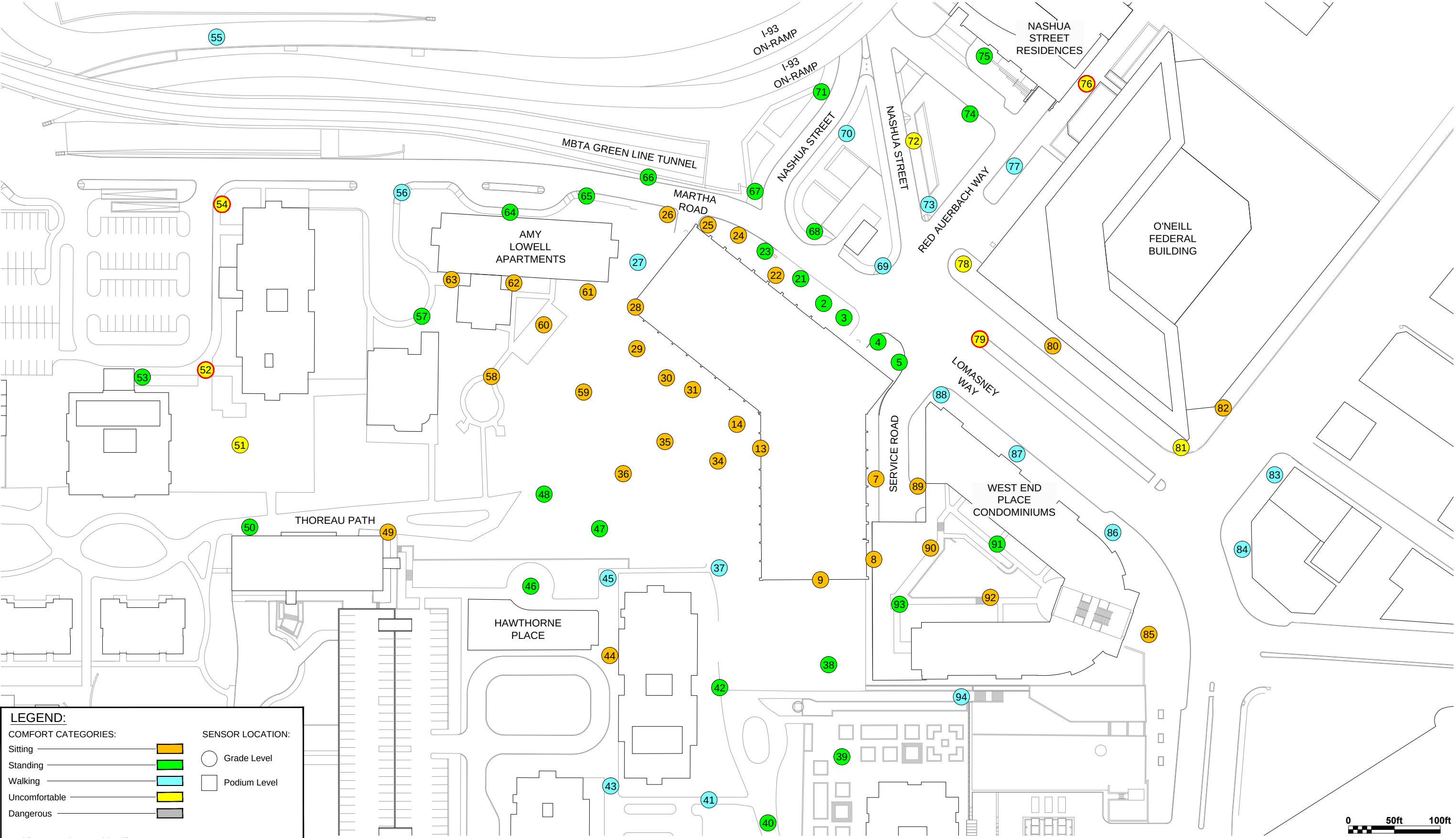
Garden Garage Development – Boston, MA

Project #1500139

Figure No. 2c

Date: October 14, 2014





Pedestrian Wind Conditions - No Build
Annual

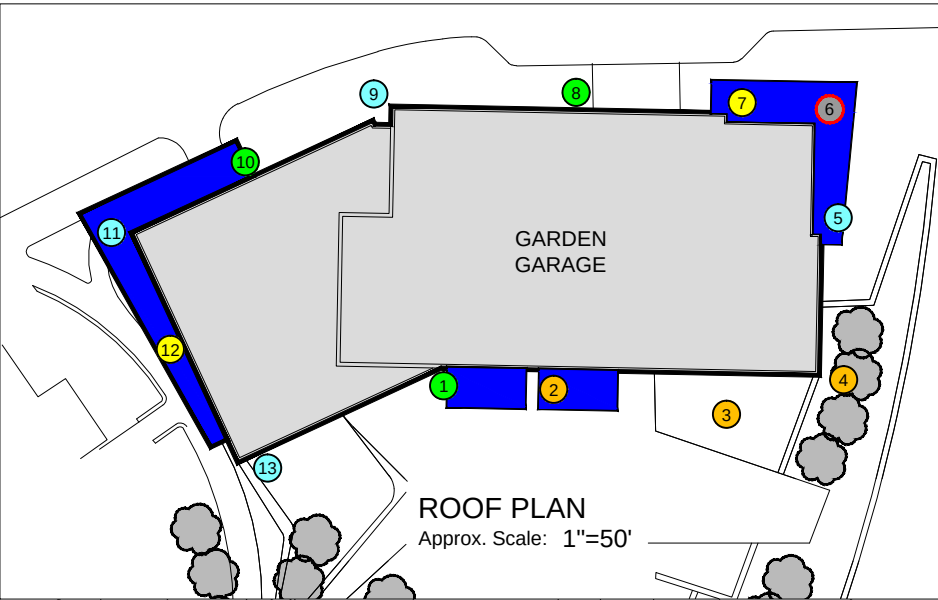
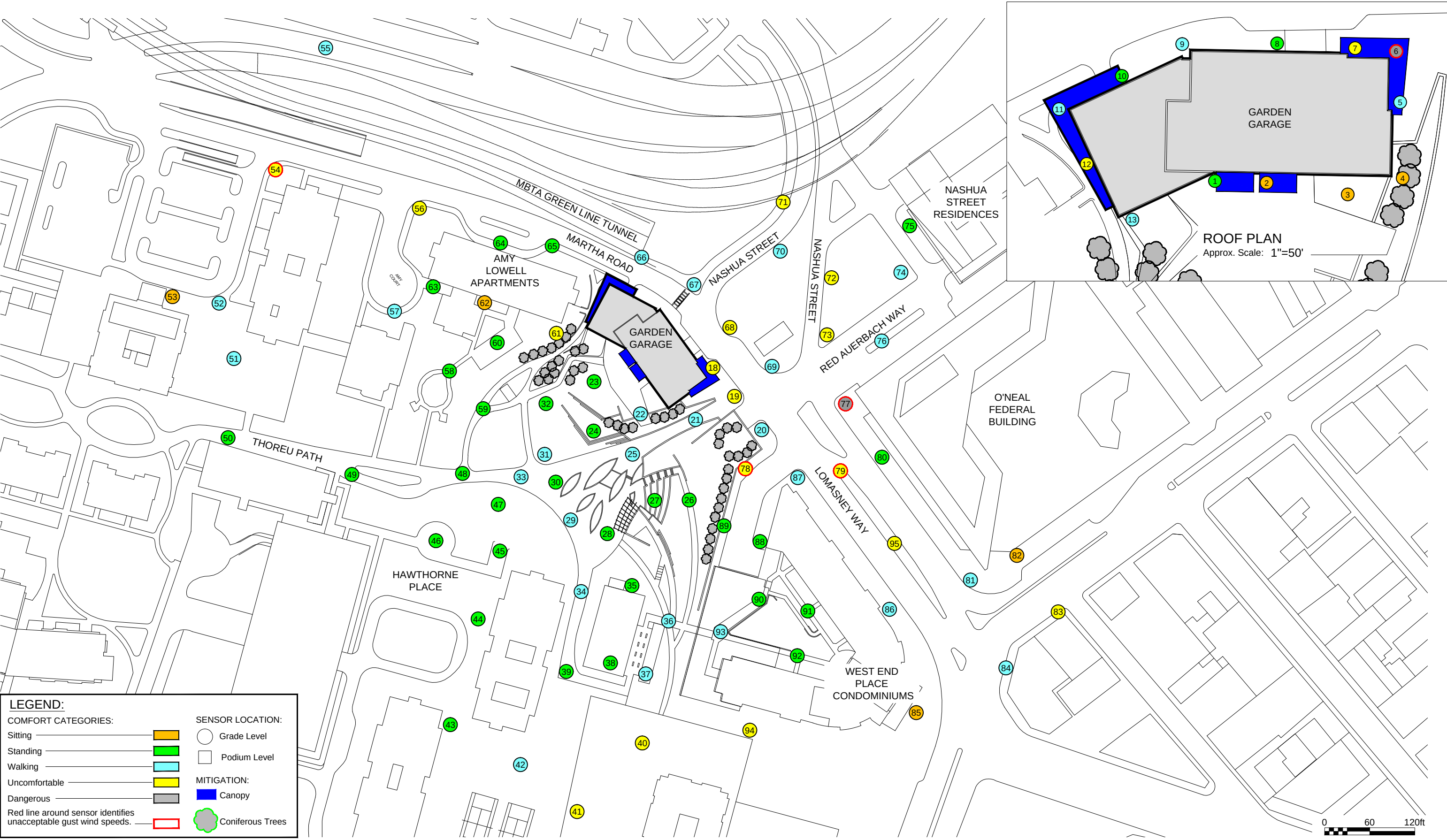
Garden Garage Development - Boston, MA



Project #1102005

Drawn by: SMR	Figure: 3
Approx. Scale: 1"=100'	
Date Revised: Aug 29, 2011	

RWDI



LEGEND:

COMFORT CATEGORIES:	
Sitting	Orange
Standing	Green
Walking	Cyan
Uncomfortable	Yellow
Dangerous	Grey
Red line around sensor identifies unacceptable gust wind speeds.	
SENSOR LOCATION:	
Grade Level	Circle
Podium Level	Square
MITIGATION:	
Canopy	Blue outline
Coniferous Trees	Green tree icon

Pedestrian Wind Conditions - Build Annual

Garden Garage Development - Boston, MA



Drawn by: ARM	Figure: 4
Approx. Scale: 1"=120'	
Date Revised: Oct 10, 2014	



Project #1500139

APPENDIX A

APPENDIX A: DRAWING LIST FOR MODEL CONSTRUCTION

The drawings and information listed below were received from Elkus Manfredi Architects and were used to construct the scale model of the proposed Garden Garage development. Should there be any design changes that deviate from this list of drawings, the results may change. Therefore, if changes in the design area made, it is recommended that RWDI be contacted and requested to review their potential effects on wind conditions.

File Name	File Type	Date Received (dd/mm/yyyy)
Site Plan_No Building	.dwg	10/09/2014
08_0814_Render Site Plan	.jpg	02/09/2014
Site for Revit	.skp	21/08/2014
14_0331_base	.skp	21/08/2014
14_07_Pre Design Model	.rvt	21/08/2014

Appendix C

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](http://www.bostonredevelopmentauthority.org/planning/Hotspot%20of%20Accelerated%20Sea-level%20Rise%202012.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](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](#).

Climate Change Resiliency and Preparedness Checklist

A.1 - Project Information

Project Name:	Garden Garage Redevelopment
Project Address Primary:	Martha Road & Lomansey Way
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	Paul Barrett, Vice President of Development, Equity Residential, pbarrett1@eqr.com, (617) 648-2162

A.2 - Team Description

Owner / Developer:	Equity Residential
Architect:	Elkus Manfredi Architects
Engineer (building systems):	RW Sullivan
Sustainability / LEED:	The Green Engineer
Permitting:	Epsilon Associates
Construction Management:	
Climate Change Expert:	Epsilon Associates

A.3 - Project Permitting and Phase

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

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

A.4 - Building Classification and Description

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

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

☐ Wood Frame	☐ Masonry	☒ Steel Frame	☒ Concrete
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Describe the building?

Site Area:	131,600 SF	Building Area:	895,000 SF
Building Height:	460 Ft.	Number of Stories:	46 Flrs.
First Floor Elevation (reference Boston City Base):	17.0 Elev.	Are there below grade spaces/levels, if yes how many:	Yes, 5 levels

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?

Electric:

5153 (kW)

Heating:

14 (MMBtu/hr)

What is the planned building
Energy Use Intensity:

21.57 (kWh/SF)

Cooling:

1200 (Tons/hr)

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

Electric:

1250 (kW)

Heating:

7 (MMBtu/hr)

Cooling:

15 (Tons/hr)

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

Electrical Generation:

1500 (kW)

Fuel Source:

Diesel

System Type and Number of
Units:

☒ Combustion Engine	☐ Gas Turbine	☐ Combine Heat and Power	1 (Units)
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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
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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
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What time span of future Climate Conditions was considered?

Select most appropriate:

☐ 10 Years	☐ 25 Years	☒ 50 Years	☐ 75 Years
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Analysis Conditions - What range of temperatures will be used for project planning – Low/High?

7/91 Deg.

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

95 Deg.	5 Days	6 Events / yr.
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What Drought characteristics will be used for project planning – Duration and Frequency?

30-90 Days	0.2 Events / yr.
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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.
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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.
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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: 20%

How is performance determined: Energy Model

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

Select all appropriate:

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

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

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

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

☐ On-site clean energy / CHP system(s)	☐ Building-wide power dimming	☐ Thermal energy storage systems	☐ Ground source heat pump
☐ On-site Solar PV	☐ On-site Solar Thermal	☐ Wind power	☐ None
Describe any added measures: CHP is being studied.			

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

☒ Yes / No	If yes, for how long:	8 hours
If Yes, is building "Islandable?" No		
If Yes, describe strategies:		

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

Select all appropriate:

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

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

Select all appropriate:

☒ High reflective paving materials	☒ Shade trees & shrubs	☒ High reflective roof materials	☒ Vegetated roofs
Describe other strategies:			

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

Select all appropriate:

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

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

Select all appropriate:

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

C - Sea-Level Rise and Storms

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

C.1 - Location Description and Classification:

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

Yes / No

Describe site conditions?

Site Elevation – Low/High Points:

17-40 ft Boston
City Base Elev.

Building Proximity to Water:

980 Ft.

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

Coastal Zone:

Yes / ☒ No

Velocity Zone:

Yes / ☒ No

Flood Zone:

Yes / ☒ No

Area Prone to Flooding:

Yes / ☒ No

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

2013 FEMA
Prelim. FIRMs:

☒ Yes / No

Future floodplain delineation updates:

Yes / No

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

~960 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:

4 Ft. (15.2 feet
BCB)

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:

17 feet BCB

First Floor Elevation:

17 feet BCB

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

Yes / No

If Yes, to what elevation

Boston City Base
Elev. (Ft.)

If Yes, describe:

Parking garage will be able to be inundated.

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

☒ Systems located above 1 st Floor.	☐ Water tight utility conduits	☒ Waste water back flow prevention	☒ Storm water back flow prevention
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Were the differing effects of fresh water and salt water flooding considered:

☒ Yes / No
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Will the project site / building(s) be accessible during periods of inundation or limited access to transportation:

☒ Yes / No	If yes, to what height above 100 Year Floodplain:	1.1-17.1 feet
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Will the project employ hard and / or soft landscape elements as velocity barriers to reduce wind or wave impacts?

☒ Yes / No
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If Yes, describe:

Trees to mitigate wind impacts

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

☒ Yes / No	If Yes, for how long:
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We assume that residents will stay in their units and gas-powered equipment will remain operable. In the event of long-term flooding, we anticipate the building and surrounding areas will be evacuated.

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

Because of the site grade change, the building can be accessed from the second level, elevation 33 feet BCB. Essential equipment is located above 19 feet BCB.
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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
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Parking garage will be able to be inundated.

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

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

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

Select appropriate:	Yes / ☒ No	☐ Solar PV	☐ Solar Thermal	☐ Clean Energy / CHP System(s)
		☐ Potable water storage	☐ Wastewater storage	☐ Back up energy systems & fuel

Describe any specific or additional strategies:

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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