Exchange South End

Boston, Massachusetts

Draft Project Impact Report **February 13, 2018**

Submitted to the Boston Planning and Development Agency

Submitted by **The ABBEY Group**

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Exchange South End

Draft Project Impact Report

February 13, 2018

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Chapter 1

1.0 Introduction

1.1 INTRODUCTION

The Abbey Group (the "Proponent") proposes Exchange South End (the "Project"), the redevelopment of an approximate 5.6-acre parcel at 540 Albany Street (the "Site") in the South End neighborhood of Boston, Massachusetts. The Site is bounded by Albany Street to the northwest, Interstate-93 (I-93) Southbound (SB) Frontage Road to the east, and BioSquare Drive to the southeast. The multifaceted nature of the project, which provides a platform for connecting innovative companies, community, culture, and greenspace, is envisioned to meet the following objectives:

- **Improve an underutilized Site and expand the vibrancy of the South End neighborhood across Albany Street.** The development will transform the approximate 5.6-acre parcel consisting of a warehouse facility and accessory parking lot on Albany Street into a vibrant mixed-use commercial, technology, and life science research space with ground floor retail, incubator and civic space surrounding a new central publicly-accessible park.

- **Create a new commercial sector for the city of that will attract new businesses and generate new jobs across a broad spectrum of income levels for the City's residents.** The Project will be an investment of over $1 billion by the Proponent in this neighborhood, and will generate millions of new real estate tax dollars for the City.

- **Create a unique sense of place that engages the local community**. The project design includes approximately 1.1 acres of new publicly accessible open space on Site that will create opportunities for both passive and active recreation. The proposed open space landscape (dubbed Albany Green) at the heart of the Exchange South End will be organized into 3 main areas, consisting of the Lawn, The Plaza, and The Garden. Additional opportunities for community engagement will be provided through active ground floor retail uses that connect to Albany Green, and the development of 30,000 square feet (sf) of flexible cultural center spaces clustered around Albany Green for arts, culture, and other community-based programming.

- **Build upon the goals of the Harrison/Albany Corridor Strategic Plan.** The Project will expand upon the goals of the Harrison/Albany Corridor Strategic Plan through creating commercial and research jobs; producing a sustainable approach to development; and implementing pedestrian-friendly streetscape improvements.

- **Improve on the Site's multimodal transportation features.** Project design features will include multimodal connection improvements through the Site to the Interstate 93 (I-93) corridor, the South Bay Harbor Trail, a walkable neighborhood, and nearby transit stops. Additionally, bicycle share infrastructure will be provided on site to encourage healthier mobility options.

The Project Site, acquired by the Proponent in 2016, is an underutilized Site, consisting of a warehouse facility with an accessory surface parking lot. The existing Site fails to create a sense of place, and does not serve the local community in a meaningful way. The existing Site will be redeveloped into a life science and technology office campus, complemented by local retail, restaurants, bike trails, and dynamic public open spaces for recreation, arts, and cultural activities. The development will build on the district's and the region's momentum in innovation and technology to deliver a vibrant life science center with public realm amenities designed to foster a cohesive neighborhood atmosphere.

The Proponent has placed community feedback and addressing community concerns at the forefront of its efforts to redevelop the Project Site. Beginning in December of 2016, the Proponent has held over 30 meetings with abutters, neighborhood groups, South End developers/property owners, elected City government officials, state and local government agencies, local business owners, and local residents (see Section 1.8 – Community Process). Feedback has been positive, and the proposed development plan reinforces goals heard from the community and other stakeholder groups.

This submission responds to the BPDA's request for a Draft Project Impact Report (DPIR), in conjunction with a Project Notification Form (PNF) filed for the Project on September 19, 2017. This DPIR provides an update of the proposed project since filing of the PNF, as well as supplemental information and analysis requested in the BPDA's Scoping Determination related to transportation/traffic, urban design, infrastructure systems, environmental protection, environmental sustainability, historic resources, community benefits, and construction management. The BPDA's Scoping Determination is provided in Appendix E, and a comment-response table is provided in Appendix F.

1.2 PROJECT IDENTIFICATION AND DEVELOPMENT TEAM

The Proponent has enlisted a team of professional planners, engineers, attorneys, architects, and consultants to assist with the development of the proposed Project. The Project and the Project Team are identified below:

Project Name: Exchange South End

Address/Location: 540 Albany Street, Boston, MA 02118

Assessor's Parcel: The Project Site comprises all of parcel 0801055000 (540 Albany Street)

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1.3 PROJECT CHANGES SINCE FILING THE PNF

The Project design has evolved since the filing of the PNF in response to internal Project team discussion, comments received in the Scoping Determination, from the BPDA, Boston Civic Design Commission, and from the community. These changes include:

In response to comments received specifically from the BCDC and community, the overall massing and scale of Building B was reduced. Two full stories were removed from the upper portion of the building and the massing was modified to better respond to its location on Albany Street, angling the Albany Green facing façade to better open views into and out of the park. The portion of the building that projected towards Albany Green was reduced in mass and is now supported by two large columns flanking the buildings main entry. A screening element made up of terracotta baguettes is located above the entry on the angled wall and both helps to control sunlight and highlights the buildings main entry.

The Albany Street façade was further articulated reducing the overall mass facing the neighborhood, and a regular rhythm of terracotta framed windows extending along the street edge. A portion of the building was setback along the sidewalk to allow additional space for outdoor dining. The upper Albany Street facing portion of the facade was further articulated into unique massing elements to better respond to the Plympton Street axial view.

The area removed from Building B was reallocated into Building C, adding three stories to the overall height, providing a taller center portion to the building. The cantilevered mass projecting over the interior street shifted up to the 4th level, and the previously angled façade was aligned vertically, and the top three floor levels angled back to provide a slender top to the building.

The 30,000-square foot Community/Cultural spaces are now distributed and located proportionally in all the buildings to be implemented in phases as the project progresses. The Cultural/Community space was removed from the second and third floor of Building C into Buildings A and B. It displaces a portion of the retail that was previously planned for the ground floor of Buildings A and B, while still allowing for the reconsolidation of community benefit space during later phases of the development.

Interior bike storage and shower facilities for the use of Project tenants are also distributed into multiple buildings, and outdoor short-term bike parking and Hubway locations have been denoted on the site plan.

Albany Green has been modified to increase the amount of landscaping and lawn area, with benches and seating areas being added. The Proponent also intends to populate this space with public art.

The total FAR square footage has not changed.

1.4 PROJECT DESCRIPTION

1.4.1 Project Site

The proposed redevelopment Site is approximately 5.6-acres located at 540 Albany Street in the South End neighborhood of Boston, Massachusetts (the “Project Site”). See Figure 1-1, Locus Map, Figure 1-2 Aerial View of Existing Site, and Figure 1-3, Oblique View of Existing Site. The Project Site lies in the eastern section of the South End neighborhood of Boston, bordering the Lower Roxbury, Dorchester, and South Boston neighborhoods.

Currently, there is an undistinguished one-story brick warehouse building (approximately 73,000 square-feet) on the Project Site with an accessory paved parking lot area of approximately 171,000 square feet. The warehouse building, built in 1969 and remodeled in 2003, is the former location of a wholesale trade-member only flower market operated by the Boston Flower Exchange LLC. The building is currently vacant and will be demolished as part of the Project. See Figure 1-4, Existing Conditions Survey, Figure 1-5, Existing Conditions Photographs Key Plan, Figures 1-6, 1-7 and 1-8 Existing Conditions Photographs.

Directly south of the Project Site, at 600 Albany Street, is a 7-floor biosciences facility of Boston University known as the National Emerging Infectious Diseases Laboratories (NEIDL) building. Directly north of the Project Site is the Jacobson Floral Supply retail and wholesale facility at 500 Albany Street. Facing the Interstate-93 Frontage Road, east of the Project Site at 610 Albany Street, is a 9-story Boston University Medical Campus parking garage facility. The Project Site is bounded by Albany Street to the northwest, Interstate-93 (I-93) Southbound (SB) Frontage Road to the east, and BioSquare Drive to the southeast.

1.4.2 Area Context

The Project Site is within the Harrison/Albany Corridor in the easternmost portion of Boston's South End neighborhood. The surrounding area includes a combination of commercial and residential buildings. The neighboring context includes Boston Medical Center and the Boston University School of Medicine. Adjacent public open space parcels include Franklin Square and Blackstone Square to the west of the Project Site. Additional open space parcels, north of the Project Site, include Union Park Street Playground and Rotch Playground. See Figure 1-9 Neighborhood Context.

The Project Site is within one-quarter mile of several Massachusetts Bay Transportation Authority (MBTA) bus stops serviced by multiple bus routes, including two Silver Line routes (i.e. SL #4 and #5 that provide access to and from Downtown and Dudley Square (see Section 2.2.8.1 for details specific to existing public transportation connections). The Site is less than one-mile from several train and subway stations, including Massachusetts Avenue Station on the Orange Line, Back Bay Station with connections to the Orange Line, Commuter Rail and Amtrak, and Broadway Station on the Red Line; and walking distance to the South Bay Harbor Trail and other public realm amenities in Boston's South End neighborhood. The availability of pedestrian-scale distances to bus stops, train stations, a regional bike trail system, and various public realm amenities make the Project Site ideal for transit-oriented development, thereby promoting livability and community connectivity.

1.4.3 Public Realm

The Project's proposed public realm improvements will significantly improve the existing condition of the Site and connect the Site to its surroundings. The main public realm on the Site will be along Albany Street, which will extend deep into the site throughout Albany Green. Albany Green is an approximately 1.1-acre public open space at the heart of Exchange South End. The Green will be open and welcoming to everyone, inviting people in from Albany Street to hang out on the Lawn, enjoy an event in the Plaza, spend some quiet time in the Garden, or stop at one of the cafes and restaurants that will enliven the edges of the open space. This spatial arrangement of the plaza, walkway and landscape will allow for multiple potential uses that can provide public and commercial amenities to the neighborhood. Further details about the public realm are discussed in Chapter 5. Additionally, an Open Space Plan is provided in Figure 1-18.

1.4.4 Proposed Project

The Project will include the phased construction of four buildings (Buildings A, B, C, and D) with approximately 1,468,390 square feet of mixed-use office, commercial and/or life science research space, approximately 22,430 square feet of ground floor retail space, and 30,000 square feet of civic space situated around the new 1.1-acre Albany Green central publicly-accessible park. Retail uses will be divided between the ground floors of Buildings A and B, while civic uses will be distributed proportionally in all the buildings. Civic space will include flexible venues for a wide variety of social enterprise/workforce development/arts and cultural organizations. See Figure 1-12, and Figure 1-13.

Below-grade parking garages under each building will provide approximately 1,145 parking spaces with parking access provided via driveways off Albany Street and BioSquare Drive.

Additionally, approximately 10 at-grade parking spaces will be provided along East Canton Street Extension. The project will be designed to integrate various multimodal transportation site access improvements, including direct connections to the I-93 corridor, the South Bay Harbor trail, the walkable South End neighborhood, and nearby transit stops. The proposed implementation of pedestrian friendly streetscapes, Americans with Disabilities Act (ADA)-compliant ramps, designated bike lanes, bike share and storage infrastructure, and traffic signal upgrades will serve to promote safe, accessible, and healthy mobility options.

The Project is expected to be constructed in phases. Buildings A and B will be constructed as part of Phase I, with the associated open space and roads necessary to support the proposed project. Further details, specific to project phasing, are provided in Section 1.11. Table 1-1 below presents a summary of the proposed development program for the project.

Table 1-1 Proposed Project Program

Building	A	B	C	D	Total
# Floors	6	12	23	15	--
Building Height* (ft)	92	173	321	215	--
Floor Area, Gross* (sf)	230,000	427,700	570,000	371,725	1,599,425
Laboratory (sf)	192,855	284,030	195,970	167,955	840,810
Office (sf)	0	106,700	340,000	180,880	627,580
Retail (sf)	14,650	7,780	0	0	22,430
Civic (sf)	4,000	8,000	14,000	4,000	30,000
Lobbies (sf)	5,700	5,670	9,030	2,700	23,100
BOH*/Services (sf)	12,795	15,520	11,000	16,190	55,505
Enclosed MEP*/Penthouse (sf)	19,200	21,600	17,900	17,800	76,500
Garage Area (sf)	145,000	185,000	85,000	75,000	490,000
Garage Spaces	352	505	288		1,145

*Open and Enclosed mechanical penthouse is not included in building height; *BOH = Back of House; *MEP = Mechanical, Electrical, Plumbing

*The Floor Area Gross of 1,599,425 is allowable through the Planned Development Area (PDA)

1.4.5 Ground Floor Uses

The ground floors of buildings A and B will contain a lively ensemble of retail shops, Community/Cultural spaces, and bike facilities, as well as lobbies to the office/laboratory buildings and the Albany Green central publicly-accessible open space. One of the goals of the project is to provide a high-quality pedestrian-oriented experience, where ground floor uses activate streets with sidewalk cafes, signage, canopies, lighting, and a variety of materials, plantings, benches, and trees. See Figure 1-11, Ground Floor Plan.

1.4.6 Office and Laboratory Uses

The Project will leverage its proximity to Boston Medical Center, Boston University Medical School, the burgeoning tech start-up ecosystem in the Harrison/Albany Corridor, and direct connections to nearby public transportation options through the development of a life science and technology office campus. The Project, comprising the phased construction of four buildings (A, B, C, D) will provide approximately 1,468,390 sf of combined commercial office and laboratory space, in addition to space for retail and non-profit jobs. See Figure 1-15, Typical Upper Floor Plan.

1.4.7 Parking and Access

The Project is anticipated to provide 1,145 below-grade parking spaces divided between the garages at each of the four buildings. Additionally, approximately 10 at-grade parking spaces are proposed along East Canton Street Extension. The parking ratio based on the 1,155 combined at-grade and below-grade spaces is approximately 0.72 spaces per 1,000 square feet of the total square footage.

The parking will be shared between uses on site. The parking goals developed by the BTD for this section of the South End are a maximum of 0.75 to 1.00 parking spaces per 1,000 square feet of non-residential development. Therefore, the proposed Project is within the maximum allowed per BTD guidelines.

1.4.7.1 Vehicular Access

The Project site is bordered to the north and south by transportation easements. The North Easement (New Street) is located between the Project Site and the abutting Jacobsen Floral Supply building. The South Easement (East Canton Street Extension) is located between the Project Site and the National Emerging Infectious Diseases Laboratories (NEIDL) building.

Additionally, two internal private roadways will bisect the Site. The Service Drive will run north and south between the two easements, providing access to garage ramps, and loading areas of each building. East Dedham Street Extension will run west to east from Albany Street, through the southern edge of Albany Green, to the Service Driveway. The Site Plan is shown 1- 10.

The access plan assumes a Biosquare Drive connection to the Southbound (SB) Frontage Road will be completed prior to full Project occupancy. A design for the connection of Biosquare Drive to the SB Frontage Road is currently being prepared, with preliminary support from adjacent landowners, the City of Boston, and MassDOT. Once finalized, the plan will be submitted to Federal Highway Administration (FHWA) for approval. Further details related to these proposed Site Access conditions are provided under Transportation Section 2.4.1. A Transportation Site Plan is provided in Figure 2-14.

1.4.7.2 Pedestrian and Cyclist Access

<u>Albany Street</u>

An 8' wide off-street cycle track and a 19' wide sidewalk will be constructed along site frontage on Albany Street. The Proponent will work with the BTD, to ensure the cycle track will integrate with the proposed South Bay Harbor Trail.

The East Dedham Street Extension

East Dedham Street Extension is the main access point for slow moving cars and bicycles coming in to Exchange South End from Albany Street to drop off or pick up at the building lobbies. The 20' wide one-way driveway will be designed as a shared surface for slow speed vehicles, pedestrians and bicycles, integrated within the plaza spaces of Albany Green. The paving of the street will be fully integrated with the plaza design to minimize the visual appearance of a road way. Bollards will delineate the East Dedham Street Extension, and warn and protect the pedestrian from slow moving traffic.

The East Canton Extension and New Street:

The East Canton Extension and New Street are designed to be a pair of two-way streets. East Canton Extension connects Biosquare Drive to Albany Street, and New Street connects Albany Street to the Service Drive. Both streets are 20' wide. East Canton has a parking lane on the east side, adjacent to Buildings A and D. Both Streets are planted with street trees in a 6' wide planting zone on the side adjacent to Exchange South End. Between the street trees and the adjacent buildings, East Canton has a 6' 10" wide concrete sidewalk, and New Street has an 8'6" wide concrete sidewalk.

Service Driveway

The Service Driveway is an internal two-way street connecting the southern end of the Dedham Street Extension to New Street and the East Canton Extension. At the southern end of Albany Green, the plaza paving is continued across the Service Driveway and continues to the face of Buildings C and D, creating a threshold for those buildings and making this part of the Connector seamless with the central landscape of Albany Green. Sidewalk accommodation will be provided along the frontage of all proposed buildings, with access connections from East Canton Extension, New Street, and East Dedham Extension.

A Proposed Landscape, Open Space, and Streetscape of Proposed Project Boundary Plan is provided in Figure 1-21.

1.4.8 Open Space and Landscaping

The Project design includes approximately 1.1 acres of new pedestrian-friendly public open space, known as Albany Green. The overall open space plan represents 39% of the Project Site. In place of existing surface parking, the Project Site will include landscape elements organized into three main areas: The Lawn, The Plaza, and The Garden, which take advantage of the movement of the sun through the day (See Figure 1-16, Preliminary Landscape Plan and Figure 1-18 Open Space Diagram). The combination of these three types of landscape within Albany Green will allow for a variety of experiences, atmospheres, and activities within a relatively compact area, so that Albany Green will truly have something for everyone. Albany Green is intended to be a neighborhood destination amenity, which will contribute to the rich history of community gathering spaces in the South End.

The Project will incorporate streetscape improvements to attract visitors to the Site. Street trees will be planted along Albany Street between the East Canton Extension and New Street to shade the cycle track, sidewalk, and areas in front of the retail. In the central area, a double row of street trees will be planted, and the paving pattern of Albany Green will be extended across the Albany Street sidewalk to announce this major landscape space and to create an inviting threshold. The Site design incorporates sustainable landscape practices specific to runoff and drainage, planting selections, and materials sourcing.

Table 1-2 below provides square footages for sidewalks, shared-use streets, green spaces, and plazas.

Table 1-2 Proposed Landscaped, Open Space & Streetscape Areas/Proposed Streetscape Acreages

Landscaped/Open Space Uses	Approximate Area (sf)
Sidewalks	41,875
Shared-use Streets	13,135
Open Space Paving*	36,055
Plantings*	18,075

*Open Space Paving denotes the hardscaped area in Albany Green
*Plantings denote green space areas in Albany Green and plant beds under street trees

1.5 PUBLIC BENEFITS

The Project will provide a range of public benefits for the South End neighborhood and overall for the City of Boston through job creation, additional tax revenues, new retail options, urban design improvements, streetscape and multimodal transportation enhancements, and provision of new publicly-accessible open space for passive/active recreational uses and cultural exchange. By replacing an underutilized industrial building and parking lot, the Project will substantially contribute to improving pedestrian circulation and retail vitality, as well as the urban design and architectural character of the area. Specific public benefits include:

- Creation of a new commercial sector for the City of Boston that will attract new businesses and generate new jobs. During the development of Exchange South End will create significant job opportunity with construction jobs estimated to earn in excess of $370 million dollars in wages, representing over $4.6 million man-hours, and equating to over $3,000 jobs over the course of construction. Additional, non-construction development jobs will create an additional $40 million dollars in wages during this process. On an ongoing permanent basis, Exchange South End will employ between 4,000 - 7,000 permanent, non-profit, retail, facilities, commercial and research jobs across a broad spectrum of income levels for the City's residents, as follows, by employer category. See Table 1-3.

- Expanding the vibrancy of the South End neighborhood across Albany Street through transforming the former warehouse Site into an active mixed-use commercial, technology, and life science research space with ground floor retail, incubator and civic space surrounding a new central publicly-accessible open space.

- Creation of Albany Green, a 1+ acre park with publicly accessible open space, gardens, and outdoor seating areas internal to the building development. Additionally, the project design incorporates 30,000 sf of flexible space for arts, culture, community, and innovation to contribute to the energy of the neighborhood by hosting events, performances, and other programming.

- The Developer will conduct a Community Benefit Space Needs Study, to include presentations and other outreach, and culminating in a survey of the South End neighborhood population and other stakeholders, to identify community needs and users. This study will be completed over the course of the next year. This study may recur as needed for subsequent phases of the Project.

  - The Developer will constitute a Community Benefit Space Panel for this project, consisting of the Developer, members of the community, members of the city government, and other experts. This group will interpret the survey, develop a strategy for the allocation of space, develop guidelines for selecting solicit users, and choose users based on merit, need and compatibility, adhering generally to the categories of Workforce Development, Arts & Culture, and Social Enterprise.

  - The Developer will create community benefit space within each building roughly equal to its pro rata share of the total commitment of community space for the project. The Developer will provide the space in typical “white shell box” condition with appropriate utility connections to the premises.

- Construction of a sustainable transit-oriented development, through implementation of pedestrian-friendly streetscape improvements through the Project Site to the walkable neighborhood and nearby transit stops. Additionally, the Project will improve the Site’s multimodal transportation features, through providing direct connections to the I-93 corridor and the South Bay Harbor Trail.

- Improvement of the urban design characteristics of the area through introducing innovative and thoughtfully designed architecture that will provide a buffer between Albany Street and I-93.

- Generation of approximately $12,500,000 in housing linkage funds and approximately $2,500,000 in jobs linkage funds to the City of Boston, or equivalent job and/or housing creation programs. Subject to input, review and approval from the appropriate City agencies and overall feasibility, the Proponent anticipates proposing a job creation program within the proposed Project for the benefit of the South End community and hopes to work with affordable housing partners in the South End community to develop potential housing creation programs.

- Development of energy efficient and environmentally-friendly buildings that will aspire to meet the Gold level of the Leadership in Energy and Environmental Design (LEED) rating system, as described in Chapter 4.

Table 1-3 Exchange South End Job Projection

Description	Total employees*
Non-Profit Jobs	100
Retail Jobs	140
Laboratory & Research Jobs	1,000 – 2,500
Office Jobs	2,500 – 4,000
Facilities Jobs	260
Total Permanent Jobs	4,000 – 7,000

*Job projections based on an average number of square feet per employee by job description

1.6 CONSISTENCY WITH CITY OF BOSTON ZONING

The Project is within the South End Neighborhood District, as established by Article 64 of the Boston Zoning Code and, more specifically, the Site is within a designated Economic Development Area of the South End Neighborhood District (the "South End/EDA South"), pursuant to Article 64-14 of the Code. The Restricted Parking Overlay District (RPOD), established by Section 3-1A[c] of the Code, also affects the Site as does the Groundwater Conservation Overlay District (GCOD), established by Article 32 of the Code, as amended.

In accordance with Article 80B of the Code, the Project is subject to the requirements of Large Project Review because it exceeds 50,000 square feet of gross floor area. The Project is also subject to Article 37, Green Buildings, which requires that proposed buildings be LEED-certifiable.

For the Project, the Proponent intends to pursue a Planned Development Area (PDA) approval under Article 80C of the Code. In order to enable the Project, an amendment to the to increase the maximum height allowed on a PDA in the EDA South (Area 3) from its current limit of 200 feet to a maximum of 321 feet will be needed. The Project massing took into consideration the existing urban fabric, transportation easements at the north and south sides of the Site, a 50' Boston Water and Sewer Commission (BWSC) utility easement (i.e. running through the middle of the Site), and the Site's solar orientation. Central to the Project's masterplan, all buildings will front Albany Green, creating an inviting public open space along Albany Street. The massing and height of the buildings have been modified from the underlying PDA zoning heights to provide ample natural sunlight on Albany Green. Principally, the overall height of Building A has been lowered approximately 110 feet from the allowable limit to provide the necessary mid-day sun onto the Green, and the height of the Albany Street facing portion of Building B was also lowered by two stories. The lost square footage was then shifted onto the rear of the Site, mainly increasing the height of Building C by approximately 120', and by also increasing the height of Building D by one floor. The relocated height and mass are pulled further away from the neighborhood, front the highway, create less shadow impact, and provide an acoustical buffer.

Additionally, the lowered heights of the Albany Street buildings provide a comfortable transition from the existing buildings across the street, and create variation in the overall massing and heights of all buildings. A PDA in EDA South (Area 3) is currently eligible for a maximum floor-area-ratio (FAR) of 6.5 and a maximum development footprint of less than 80% of the lot. The Project is anticipated to have an overall FAR of approximately 6.5, and a development footprint of 61%, which includes building footprints, and service driveways. The Project's public realm features (including public open space and roadways open to pedestrian/bicycle access) will constitute 39% of the overall development footprint, which exceeds the 20% PDA requirement. See Figure 1-18, Open Space Diagram.

1.7 SUMMARY OF REQUIRED PERMITS AND APPROVALS

The following table presents a preliminary list of permits and approvals from federal, state and local governmental agencies that are anticipated to be required for the Project to proceed, based on currently available information. It is possible that not all of these permits or actions will be required, or that additional permits or actions may be needed.

Table 1-4 Anticipated Project Permits and Approvals

Agency	Permit/Approval
Local	
Boston Planning and Development Agency (BPDA)	• Article 80B Large Project Review • Planned Development Area Plan Approval • Cooperation Agreement • Certification of Compliance with Article 80B • Certification of Consistency with Article 80C • Development Impact Project Agreement • Boston Residents Construction Employment Plan
Boston Civic Design Commission	• Recommendation to the BPDA Board
Boston Zoning Commission	• Planned Development Area Development Plan Approval • Zoning Amendment
Boston Landmarks Commission (South End Landmark District Commission) – Article 85	• Application for demolition and construction in the South End Landmark District Protection Area • Determination of No Significance
Boston Transportation Department	• Transportation Access Plan Agreement (TAPA) • Construction Management Plan
Boston Water and Sewer Commission	• Site Plan Review • Water and Sewer connection permits
Boston Public Improvement Commission/Department of Public Works	• Specific Repair Plan Approval • Street and Sidewalks Occupancy Permits
Boston Inspectional Services Department	• Demolition Permits • Building permit • Certificate of Occupancy

Agency	Permit/Approval
Boston Public Safety Commission, Committee on Licenses	• Parking Garage License • Flammable Storage Permit
Boston Employment Commission	• Construction Employment Plan
State	
Executive Office of Energy and Environmental Affairs (EEA)	• Certificate Evidencing Completion of MEPA Review • Public Benefit Determination
Massachusetts Department of Environmental Protection	• Notification Prior to Demolition or Construction • Source Registration for Emergency Generator
Massachusetts Historical Commission	• State Register Review in compliance with MGL Chapter 9, sections 26-27C (Chapter 254)
Massachusetts Department of Transportation, Highway Division	• Direct Highway Access Permit
Federal	
U.S. Environmental Protection Agency	• NPDES Construction/Stormwater General Permit for disturbed areas over one acre
Federal Aviation Administration	• Notice of Proposed Construction

1.8 COMMUNITY PROCESS

The Proponent has placed community feedback and addressing community concerns at the forefront of its efforts to redevelop the Project Site. Beginning in December of 2016, the Proponent has held over 30 meetings with abutters, neighborhood groups, other South End developers, City officials and local business owners. Key aspects of community engagement to date include a March 15, 2017 meeting with the South End Forum to introduce initial project thinking, followed by subsequent meetings at individual neighborhood groups to solicit feedback and input. For those constituents who could not make it to one of the association presentations or are not affiliated with any particular group, the Proponent also hosted an open house on April 26, 2017 that was widely advertised in the South End. The Project Team then refined initial plans based on this input and presented refined concepts to the South End Forum on May 2, 2017. The following is a list of meetings held to date:

- Abutter Meeting – December 12, 2016
- Boston Medical Center – December 6, 2016
- Boston University – December 14, 2016
- Boston Planning and Development Agency (BPDA) – January 24, 2017
- Boston Medical Center/Leggatt McCall – March 13, 2017
- South End Forum – March 15, 2017
- Blackstone/Franklin – March 21, 2017
- Abutter meeting – March 27, 2017
- South End developers – March 28, 2017
- New York Streets – April 4, 2017
- Chief of Streets – April 6, 2017
- Abutter meeting – April 7, 2017
- BPDA – April 13, 2017
- Old Dover – April 18, 2017
- Washington Gateway – April 19, 2017
- South End Seniors – April 25, 2017
- Worcester Square – April 25, 2017
- Open House Community Meeting – April 26, 2017
- South End Forum – May 2, 2017
- Chester Square – May 3, 2017
- Councilor Bill Linehan – May 8, 2017
- BPDA Transportation – May 8, 2017
- Councilor Frank Baker – May 9, 2017
- Councilor candidate Michael Kelley – May 15, 2017
- BPDA Transportation – May 19, 2017
- Union Park – May 24, 2017
- Newmarket – May 31
- Harbor Trail Walking tour with abutters/BTD/BPDA – June 1, 2017
- Inquilinos Boricuas an Accion/Villa Victoria – June 6, 2017
- Pre-file meeting with MEPA Office – August 15, 2017
- Impact Advisory Group (IAG) – September 7, 2017
- Scoping Session – October 4, 2017
- Impact Advisory Group (IAG) – October 26, 2017
- Boston Civic Design Commission (BCDC) – November 7, 2017
- Impact Advisory Group (IAG) – November 16, 2017
- Impact Advisory Group (IAG) – November 21, 2017
- Boston Civic Design Sub Commission (BCDC) – November 28, 2017
- Boston Civic Design Sub Commission (BCDC) – January 9, 2018
- Councilor Ed Flynn – January 23, 2018

1.9 LEGAL INFORMATION

1.9.1 Site Control/Public Easements

The Proponent owns fee title to the Site itself. A 216-inch by 120-inch BWSC Roxbury Canal Conduit runs through the middle of the Site and is located in a 50-foot wide BWSC easement. Additionally, the Site is bordered to the north and south by transportation easements. The South Easement (Canton Street Extension) is between the Project site and the BUMC laboratory building site. The North Easement (New Street) is located between the Project site and the Jacobsen Floral Supply. Both easements are 30-feet wide, with shared ownership by the respective abutting properties (Boston University and Jacobson Floral Supply. See Figure 1-17, Easement Diagram.

1.10 PROJECT PHASING AND SCHEDULE

The Construction of the Project will be phased to reflect the demand in the market. Phase I is estimated to take approximately 20 months, commencing as early as Fall of 2018 with completion of Buildings A and B by late 2019/early 2020, and will include the park and roads necessary to support the Project. Subsequent buildings C and D will also require approximately 20 months to complete, which depending on demand, could also include multiple buildings per phase. See Figures 1-19 and 1-20, Phasing Plans.

Chapter 1

Figures

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 1-1
Locus Map

Basemap Source: USGS

PROJECT SITE

0' 200'

THE ABBEY GROUP

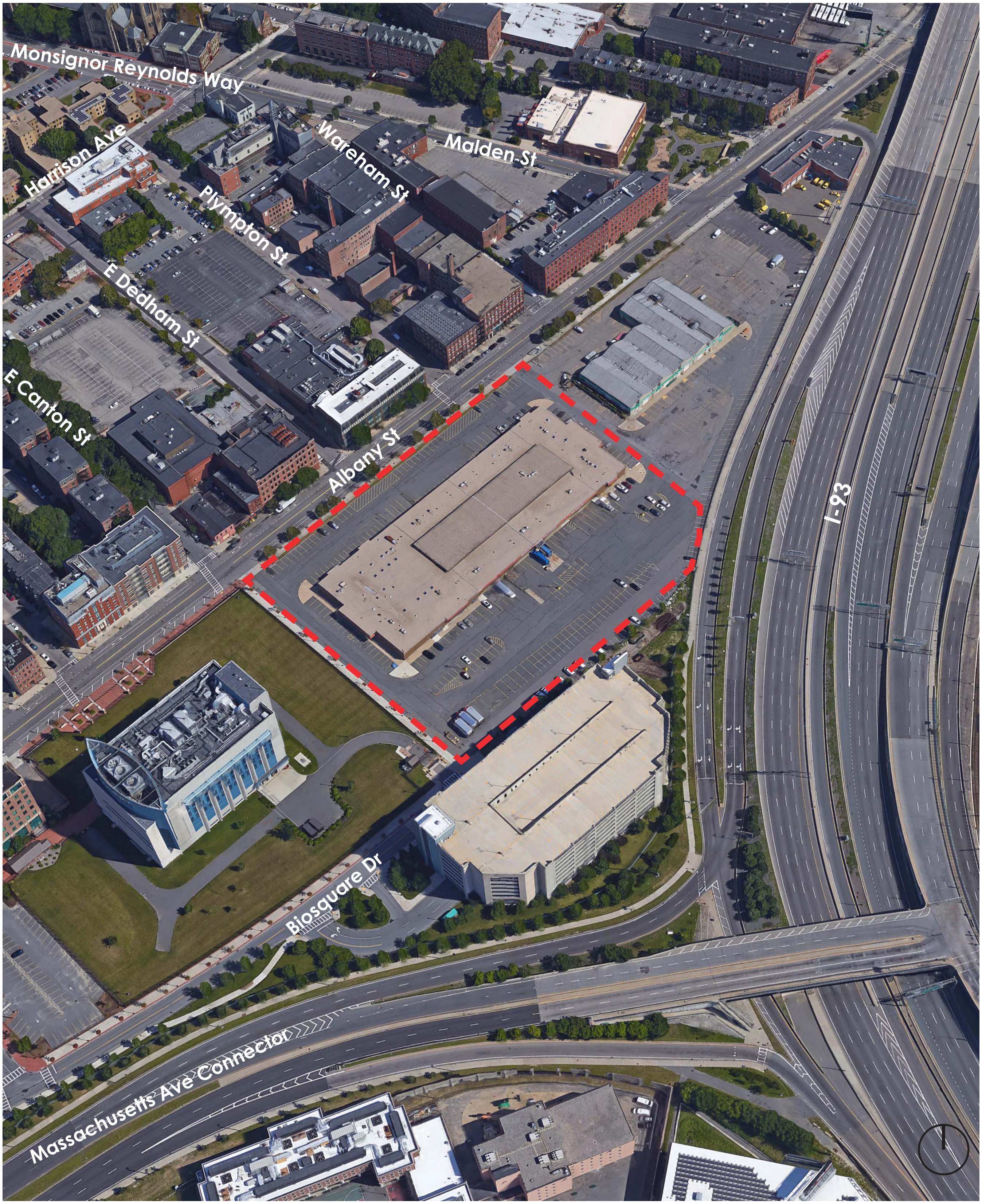
MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 1-2
Aerial View of Existing Site

Basemap Source: Bing



PROJECT SITE

0' 100'

THE ABBEY GROUP

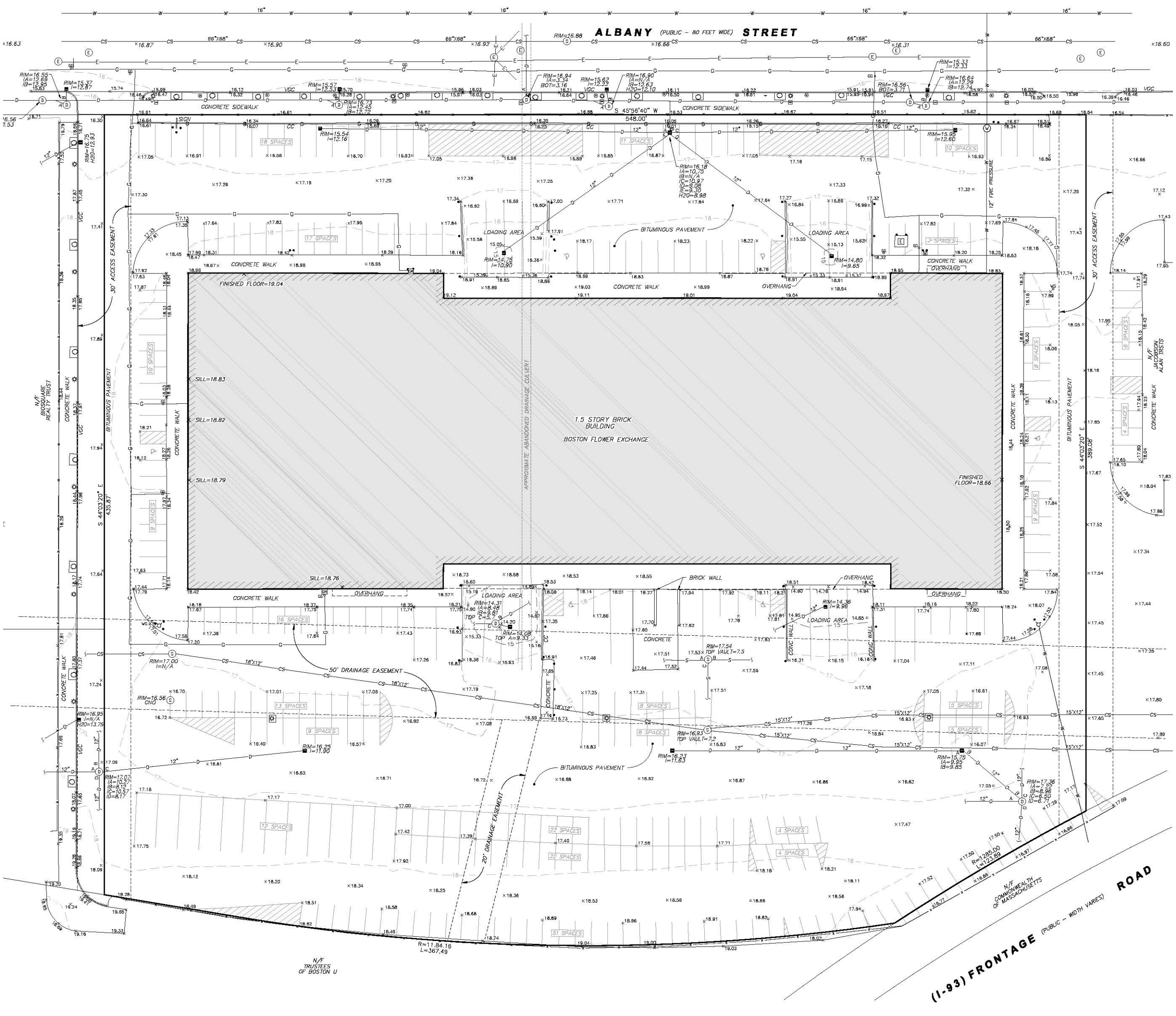
MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 1-3
Oblique View of Existing Site

Basemap Source: Google Earth



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

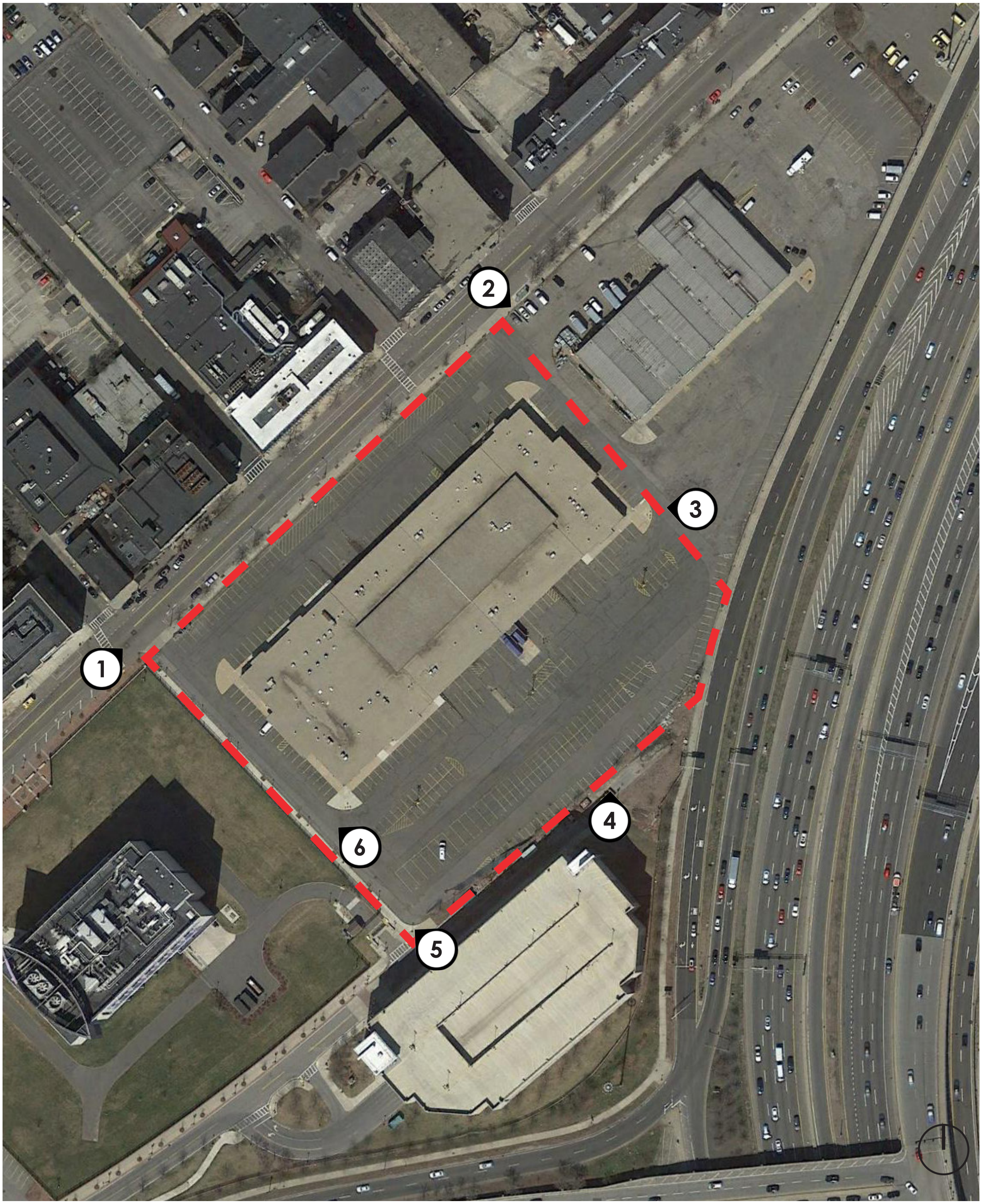
Stantec

EXCHANGE SOUTH END

Figure 1-4

Existing Conditions Survey

Source: Nitsch Engineering



PROJECT SITE

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 1-5
Existing Conditions Photographs-Key Plan
Basemap Source: Google Earth

Photograph 1: View of site looking northeast

Photograph 2: View of the Site and I-93 facing southeast

Photograph 3: View of site looking west

Photograph 4: View of the site looking north

Photograph 5: View of site looking northwest with skyline

Photograph 6: View of site looking northwest

PROJECT SITE

0' 200'

THE ABBEY GROUP

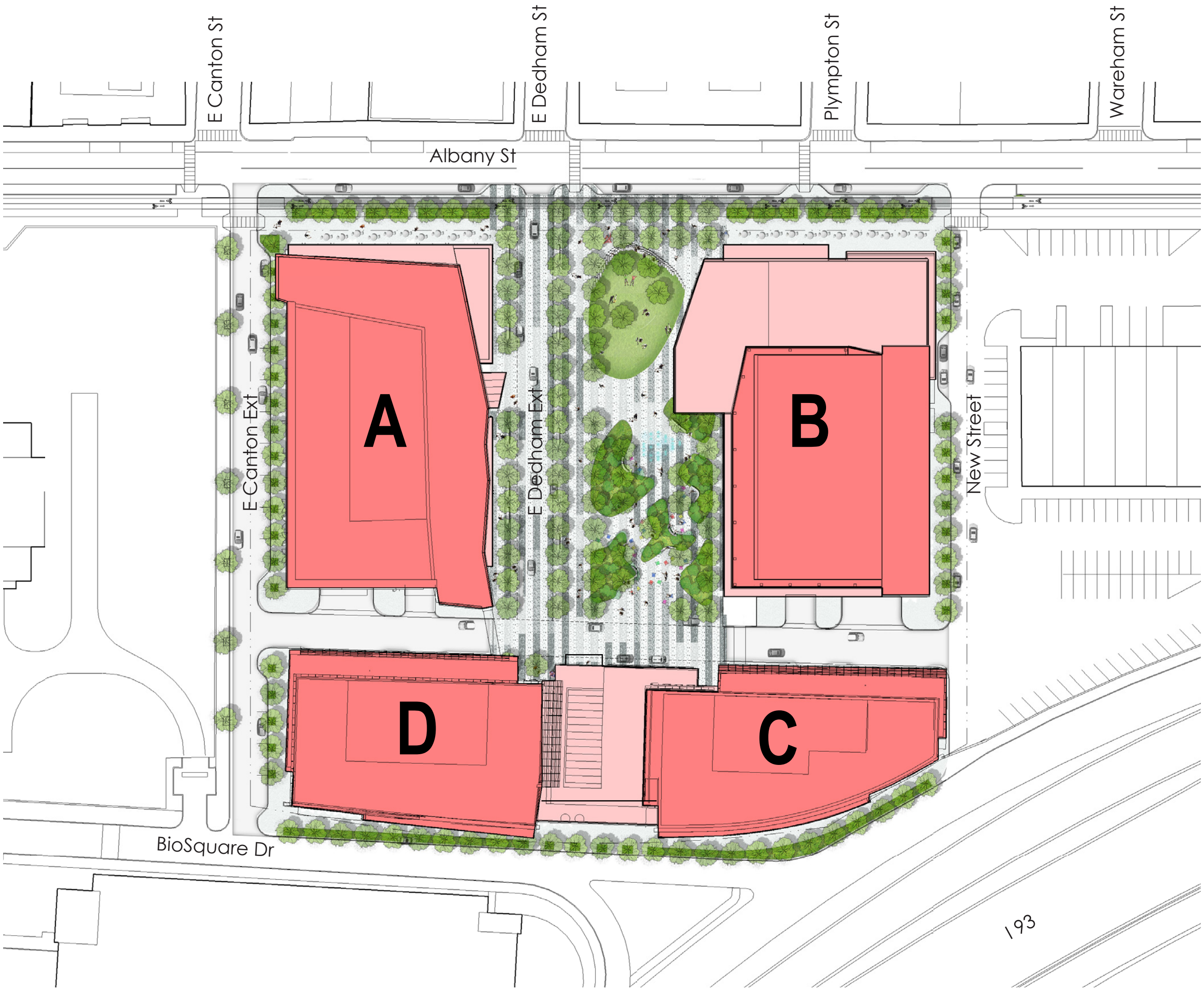
MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 1-9
Neighborhood Context

Basemap Source: Google Earth



PROPOSED BUILDING
LANDSCAPE

0' 100' 200'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 1-10
Project Site Plan

Source: Stantec

BOH CIRCULATION COMMUNITY FIRE DEPT GARAGE LOADING LOBBY RETAIL

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 1-11
Ground Floor Plan

Source: Stantec

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 1-12
Perspective from Albany Street Looking East
Source: Stantec

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 1-13
Perspective from Albany Street Looking North
Source: Stantec

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Figure 1-14
Perspective from I-93
Looking South
Source: Stantec

OFFICE/LAB ROOF TERRACE

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EXCHANGE SOUTH END

Figure 1-15
Typical Upper Floor Plan

Source: Stantec

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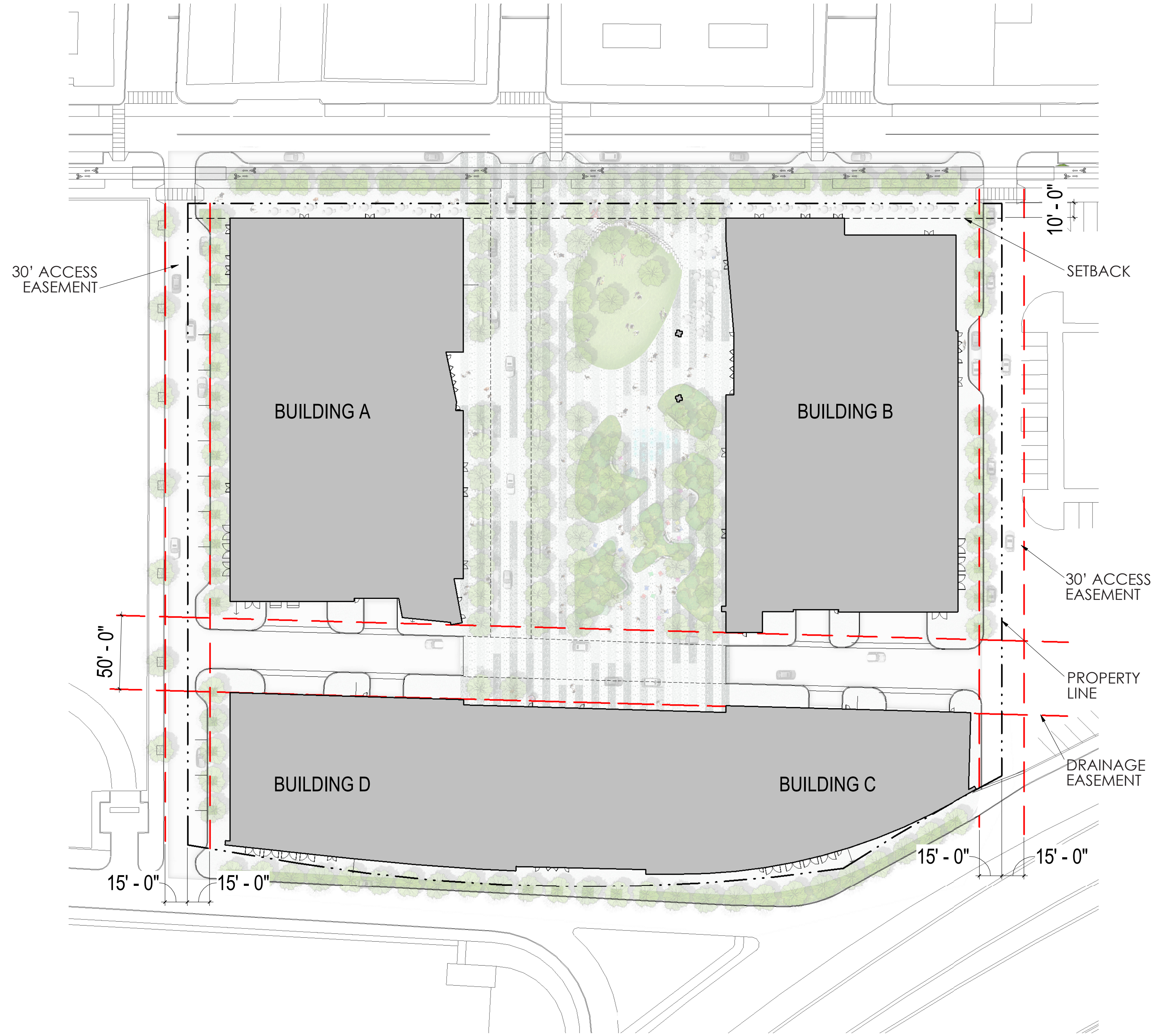
EXCHANGE SOUTH END

Figure 1-16
Preliminary Landscape Plan

Source: MVVA



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EXCHANGE SOUTH END

Figure 1-17
Easement Diagram

Source: Stantec

	TOTAL SITE AREA: 246,145 SF	100%
	PUBLIC OPEN SPACE: 88,238 SF	36%
	ROAD (OPEN SPACE): 7,518 SF	3%
	SERVICE DRIVE: 17,389 SF	7%
	BUILDING FOOTPRINT: 133,000 SF	54%
	TOTAL OPEN SPACE: 95,756 SF	**39%**

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EXCHANGE SOUTH END

Figure 1-18
Open Space Diagram

Source: Stantec

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Figure 1-19

Phasing Plan Phase 1

Source: Stantec

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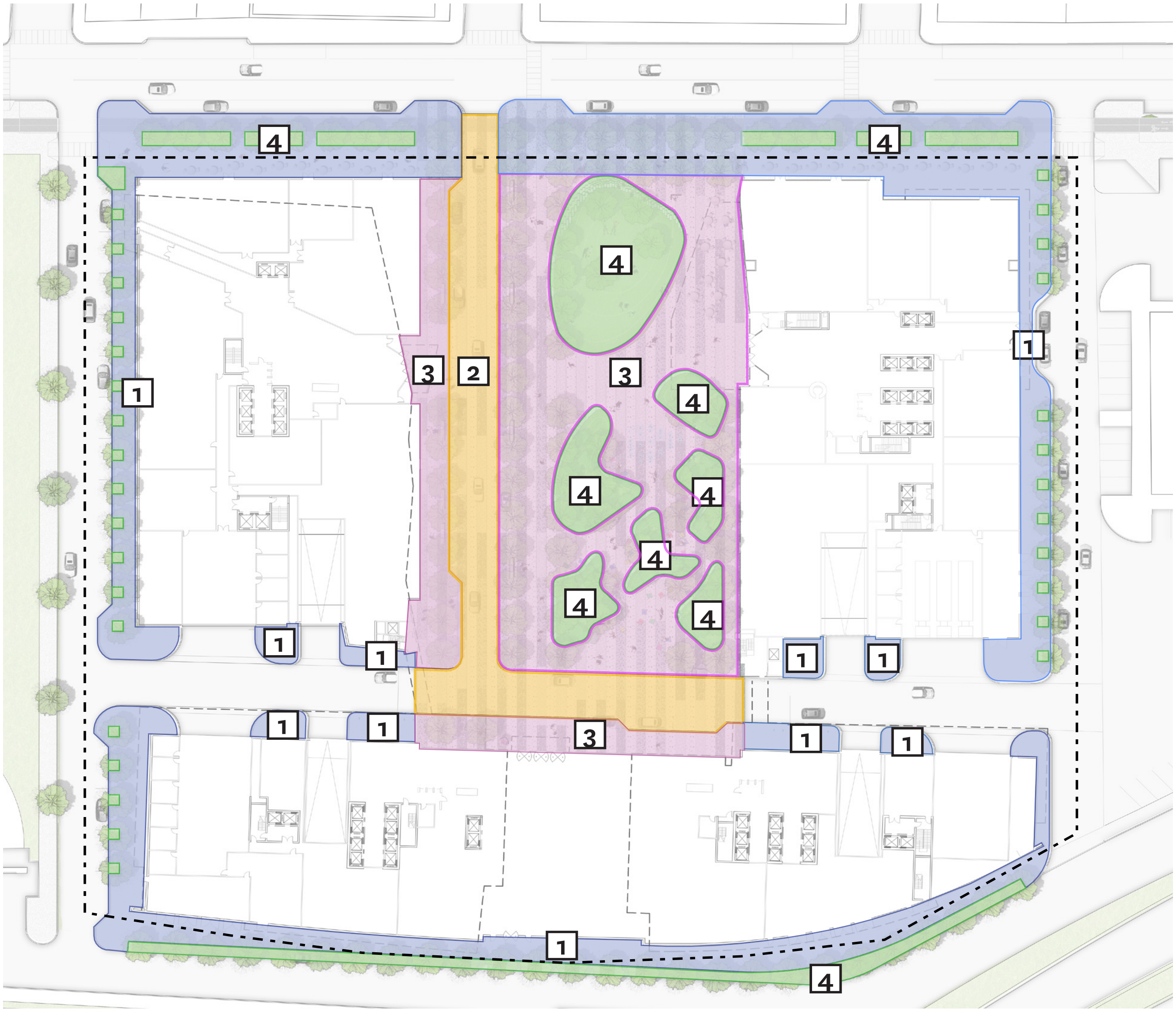
Figure 1-20
Phasing Plan Phase 2
Source: Stantec



1. Sidewalks (41,785 sf)
2. Shared Use Streets (13,135 sf)
3. Open Space Paving (36,055 sf)
4. Open Space Planting (18,075 sf)

Figure 1-21
Proposed Landscape, Open Space, and Streetscape of Proposed Project Boundary
Source: MVVA

Chapter 2

2.0 Transportation

The Proponent engaged Howard Stein Hudson (HSH) to conduct an evaluation of the transportation impacts of the Project in the South End neighborhood of Boston, Massachusetts. This transportation study adheres to the Boston Transportation Department (BTD) Transportation Access Plan Guidelines and BPDA Article 80 Large Project Review process. This study includes an evaluation of existing conditions, future conditions with and without the Project, projected parking demand, loading operations, transit services, and pedestrian activity. This document also serves as a response to the comments received since the submission of the EPNF in September 2017.

2.1 PROJECT DESCRIPTION

The Project Site is an approximately 5.6-acre block at 540 Albany Street bounded by I-93 SB Frontage Road to the east, Albany Street to the northwest, and BioSquare Drive to the southeast. The existing Project Site includes one building, the former Site of the Boston Flower Exchange, and 319 surface parking spaces.

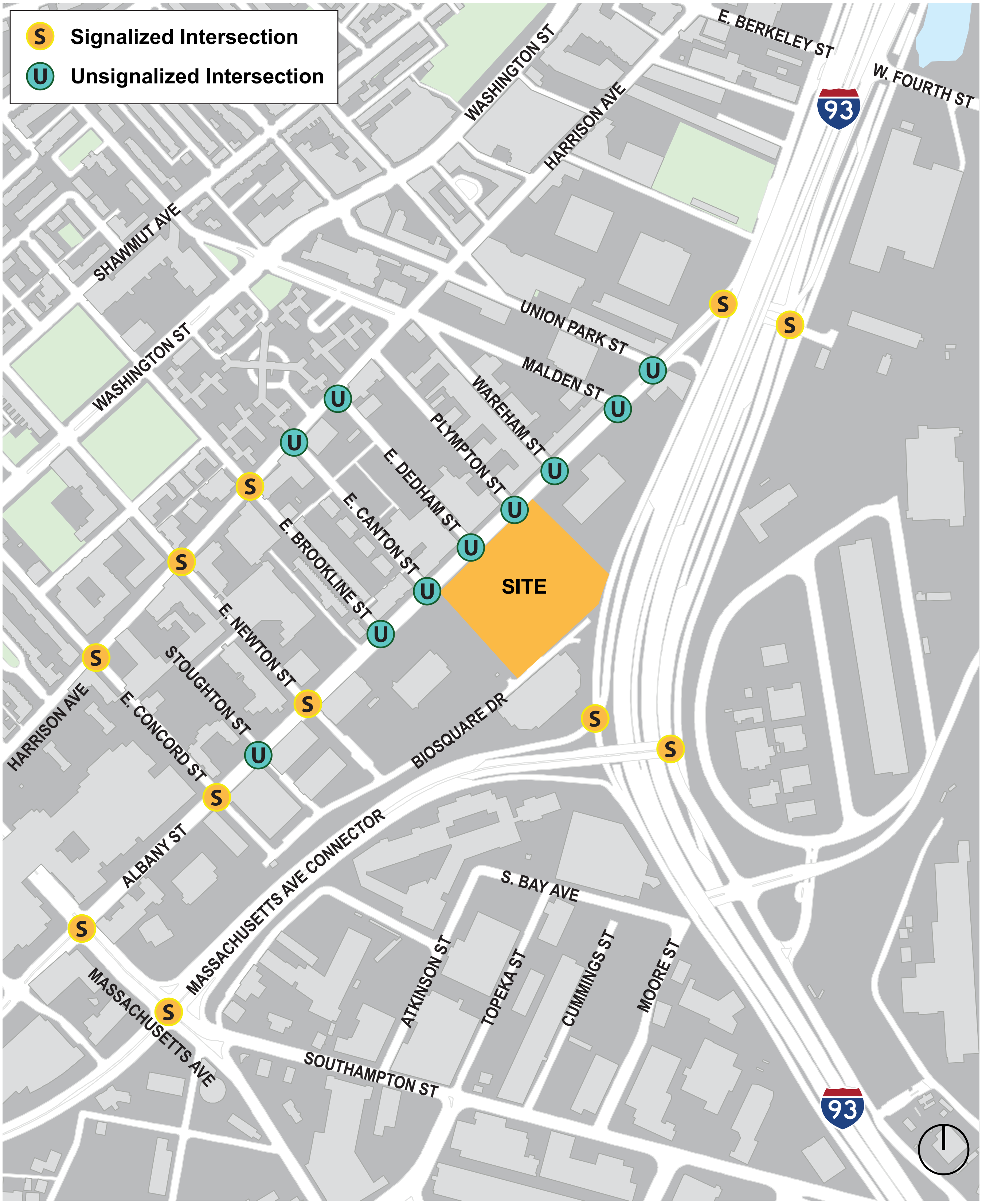
The Project consists of approximately 1.599 million square feet within four buildings that include office/laboratory space, retail space, and combined cultural, community, and innovation space. Below-grade parking will provide approximately 1,145 below-grade garage parking spaces.

2.1.1 Study Area

The transportation study area runs along the Albany Street corridor, bounded by the I-93 Frontage Road Connector to the north, I-93 SB Frontage Road to the east, Harrison Avenue to the west, and Massachusetts Avenue to the south. The EPNF study area consists of the first 13 intersections listed below. In response to comments, eight additional intersections have been added to the study area for a total of 21 intersections, also shown on Figure 2-1:

- I-93 NB Frontage Road/Connector/DPW Driveway (signalized);
- I-93 SB Frontage Road/Connector/Albany Street/MBTA Driveway (signalized);
- Albany Street/Union Park Street (unsignalized);
- Albany Street/Malden Street (unsignalized);
- Albany Street/Wareham Street (unsignalized);
- Albany Street/Plympton Street (unsignalized);
- Albany Street/East Dedham Street (unsignalized);
- Albany Street/East Canton Street/Boston Flower Exchange Driveway (unsignalized);

- Albany Street/East Brookline Street (unsignalized);
- Albany Street/East Newton Street (signalized);
- Albany Street/Stoughton Street (unsignalized);
- Albany Street/East Concord Street (signalized);
- Albany Street/Massachusetts Avenue (signalized);
- Massachusetts Avenue/Melnea Cass Boulevard (signalized);
- Massachusetts Avenue Connector/I-93 SB Frontage Road (signalized);
- Massachusetts Avenue Connector/I-93 NB Frontage Road (signalized);
- Harrison Avenue/East Concord Street (signalized);
- Harrison Avenue/East Newton Street (signalized);
- Harrison Avenue/East Brookline Street (signalized);
- Harrison Avenue/East Canton Street (unsignalized); and
- Harrison Avenue/East Dedham Street (unsignalized).



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EXCHANGE SOUTH END

Figure 2.1
Study Area Intersections

Source: Howard Stein Hudson

2.1.2 Study Methodology

This transportation study and its supporting analyses were conducted in accordance with BTD guidelines. The study methodology is described below.

The Existing (2017) Condition analysis includes an inventory of the existing transportation conditions such as traffic characteristics, parking, curb usage, transit, pedestrian circulation, bicycle facilities, loading, and Site conditions. Existing counts for vehicles, bicycles, and pedestrians were collected at the study area intersections and existing counts for transit ridership were received from the MBTA. A traffic data collection effort forms the basis for the transportation analysis conducted as part of this evaluation.

The future transportation conditions analysis evaluates potential transportation impacts associated with the Project. The long-term transportation impacts are evaluated for the year 2024, based on a seven-year horizon from the year of the filing of this traffic study.

The No-Build (2024) Condition analysis includes general background traffic growth, traffic growth associated with specific developments (not including this Project), and transportation improvements that are planned in the vicinity of the Project Site. Additionally, the transit analysis includes future growth projected by the Central Transportation Planning Staff (CTPS).

The Build (2024) Condition analysis includes a net increase in traffic volume and transit ridership due to the addition of Project-generated trip estimates. The transportation study identified expected roadway, parking, transit, pedestrian, and bicycle accommodations, as well as loading capabilities and deficiencies.

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

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

2.2 EXISTING CONDITIONS

This section includes descriptions of existing study area roadway geometries, intersection traffic control, peak-hour vehicular and pedestrian volumes, average daily traffic volumes, public transportation availability, parking, curb usage, and loading conditions.

2.2.1 Existing Roadway Conditions

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

I-93 Frontage Road **Northbound and Southbound** are a pair of one-way, two lane roadways that run in a predominately north-south direction adjacent to each side of I-93 to the east of the Project site. Both I-93 Frontage Roads are classified as an urban principal arterial under Massachusetts Department of Transportation (MassDOT) jurisdiction. On-street parking is not permitted anywhere along the I-93 Frontage Road. Near the Project Site, the South Bay Harbor Trail runs alongside the I-93 Frontage Road.

Albany Street is a two-way, two lane roadway adjacent to the west of the Project Site that runs in a predominately north-south direction between Kneeland Street to the north and Eustis Street to the south. Albany Street is classified as an urban minor arterial under BTD jurisdiction. Near the Project Site, on-street parking exists along both sides of the roadway. Sidewalks are generally provided on both sides of the roadway; however at the intersection of Albany Street/I-93 SB Frontage Road the eastern side of Albany Street does not have a sidewalk for approximately 300 ft.

Union Park Street east of Harrison Avenue is a one-way eastbound, one lane roadway that runs in a predominately east-west direction between Albany Street to the east and Montgomery Street to the west. Union Park Street is classified as a local road under BTD jurisdiction. In the vicinity of the Project Site, on-street parking exists on both sides of the roadway. Sidewalks are provided on both sides of Union Park Street.

Malden Street is a two-way, two lane roadway north of the Project Site that runs in a predominately east-west direction between Albany Street to the east and Harrison Avenue to the west. Malden Street is classified as an urban minor arterial under BTD jurisdiction. On-street parking exists along the south side of the roadway. Sidewalks are provided on both sides of Malden Street.

Wareham Street is a one-way eastbound, one lane roadway north of the Project Site that runs in a predominately east-west direction between Albany Street to the east and Malden Street to the west. Wareham Street is classified as a local roadway under BTD jurisdiction. On-street parking and loading activity exist along both sides of the roadway. Sidewalks are provided on both sides of Wareham Street.

Plympton Street is a one-way westbound, one lane roadway northwest of the Project Site that runs in a predominately east-west direction between Albany Street to the east and Harrison Avenue to the west. Plympton Street is classified as a local roadway under BTD jurisdiction. On-street parking and loading activity exist along both sides of the roadway. Sidewalks are provided on both sides of Plympton Street.

East Dedham Street is a one-way eastbound, one lane roadway adjacent to the northwest of the Project Site that runs in a predominately east-west direction between Albany Street in the east and Harrison Avenue in the west. East Dedham Street is classified as a local roadway under BTD jurisdiction. In the vicinity of the Site, on-street parking and loading activity exist along both sides of the roadway. Sidewalks are provided on both sides East Dedham Street.

East Canton Street is a one-way westbound, one lane roadway to the west of the Project Site that runs in a predominately east-west direction between Albany Street to the east and Harrison Avenue to the west. East Canton Street is classified as a local roadway under BTD jurisdiction. In the vicinity of the Site, on-street parking exists along both sides of the roadway. Sidewalks are provided on both sides East Canton Street.

East Brookline Street is a one-way eastbound, one lane roadway to the west of the Project Site that runs in a predominately east-west direction between Albany Street to the east and Washington Street to the west. East Brookline Street is classified as an urban minor arterial under BTD jurisdiction. On-street residential parking exists along both sides of the roadway. Sidewalks are provided on both sides of East Brookline Street.

East Newton Street is a one-way westbound, one lane roadway southwest of the Project Site that runs in a predominately east-west direction between BioSquare Drive to the east and Washington Street to the west. East Newton Street is classified as an urban minor arterial under BTD jurisdiction. On-street parking exists along both sides of the roadway. Sidewalks are provided on both sides of East Newton Street.

Stoughton Street is a one-way westbound, one lane roadway between BioSquare Drive to the east and Albany Street to the west. West of Albany Street, Stoughton Street is a two-way, two lane roadway before turning north and terminating at East Newton Street. Stoughton Street is classified as a local roadway under BTD jurisdiction. No on-street parking exists on Stoughton Street; however, there is an off-street surface parking lot that is accessed off of Stoughton Street and the exit from the 710 Albany Street garage is off Stoughton Street. Sidewalks are provided on both sides of Stoughton Street.

East Concord Street is a one-way eastbound, one lane roadway southwest of the Project Site that runs in a predominately east-west direction between BioSquare Drive to the east and Washington Street to the west. East Concord Street is classified as a local roadway under BTD jurisdiction. Additionally, the 710 Albany Street garage is accessed off East Concord Street. Near the Project Site, there is on-street parking and sidewalks provided on both sides of East Concord Street.

Massachusetts Avenue is a two-way, four lane roadway with additional turning lanes at intersections southwest of the Project Site that runs in a predominately north-south direction between Route 2A in Lexington to the north and Edward Everett Square to the south. Massachusetts Avenue is classified as an urban principal arterial under BTD jurisdiction. In the vicinity of the Project Site there is no on-street parking provided along either side of the roadway. Sidewalks are provided on both sides of Massachusetts Avenue.

Melnea Cass Boulevard is a two-way, four lane roadway southwest of the Project Site with additional turning lanes at intersections and a median strip. It runs in a predominately east-west direction between Massachusetts Avenue and Columbus Avenue. Melnea Cass Boulevard is classified as an urban principal arterial under BTD jurisdiction. The South Bay Harbor Trail/Melnea Cass Bike Path provides a biking route separated from the roadway. There is no on-street parking on either side of the roadway. Sidewalks are provided on both sides of the road.

Massachusetts Avenue Connector is a two-way, six lane roadway with additional turning lanes at intersections and a median strip located south of the Project Site. The roadway runs northeast to southwest from I-93 to the intersection of Melnea Cass Boulevard and Massachusetts Avenue. The Massachusetts Avenue Connector is classified as an urban principal arterial under MassDOT jurisdiction. There is no on-street parking provided on either side of the roadway. The South Bay Harbor Trail serves as a bike path and sidewalk on the northern side of the roadway, and a sidewalk is also on the southern side of the roadway.

Harrison Avenue is a two-way, two lane roadway northwest of the Project Site that runs in a predominately north-south direction between Warren Street and Avenue de Lafayette. Harrison Avenue is classified as an urban minor arterial under BTD jurisdiction. On-street parking and sidewalks are provided along both sides of the roadway. Additionally, the D Lot, Yawkey HP Lot, and Menino Valet lot off-street surface parking lots and the Doctors Office Building and 700 Harrison Ave parking garages are accessed off of Harrison Avenue.

BioSquare Drive is a two-way, two lane roadway south of the Project Site that runs in a predominantly north-south direction between East Concord Street and the I-93 Frontage Road. It is classified as a private road owned by Boston University Medical Center. There is no on-street parking on either side of the roadway. There is a sidewalk on the western side of the road and the South Bay Harbor Trail acting as a shared pedestrian and bike space on eastern side.

2.2.2 Existing Intersection Conditions

Existing conditions at the study area intersections are described below.

I-93 NB Frontage Road/Connector/DPW Driveway is a five-leg, signalized intersection with three approaches. The Connector eastbound approach consists of three lanes, a left-turn only lane, a shared left-turn/slight left-turn lane, and a through lane. The DPW Driveway westbound approach consists of one lane, a shared right-turn/hard right-turn lane. The I-93 NB Frontage Road northbound approach consists of two through lanes and a shared through/right-turn lane. There are sidewalks along only the south and east sides of the intersection. There are crosswalks and wheelchair ramps across the I-93 NB Frontage Road northbound approach and the DPW Driveway westbound approach. On-street parking is restricted along all approaches to the intersection.

I-93 SB Frontage Road/Connector/Albany Street/MBTA Driveway is a five-leg, signalized intersection with three approaches. The MBTA Driveway eastbound approach consists of a shared through/right-turn lane. The I-93 SB Frontage Road southbound approach consists of an exclusive left-turn lane, a shared left/through lane, a through lane, and a channelized right-turn only lane. The Albany Street northeast-bound approach consists of two right-turn lanes; additionally, this approach has a channelized right-turn lane approximately 200 feet south of the intersection. There are sidewalks along the south and west sides of the intersection. There are crosswalks with wheelchair ramps provided across the Albany Street eastbound approach and the I-93 SB Frontage Road northbound approach to the intersection. On-street parking is restricted along all approaches to the intersection.

Albany Street/Union Park Street is a three-leg, unsignalized intersection with three approaches. The Union Park Street eastbound approach is one-way eastbound and consists of an exclusive right-turn lane. The Albany Street northbound and southbound approaches are separated by a median and both consist of two through lanes. There is a channelized right-turn lane onto the I-93 SB Frontage Road approximately 75 feet north of the intersection. There is a bike lane at the Albany Street southbound approach and sharrows at the northbound approach. There are sidewalks on both sides of all approaches to the intersection. The only crosswalk and wheelchair ramps at the intersection are across the Union Park Street eastbound approach. On-street parking is only restricted along the northbound approach to the intersection.

Albany Street/Malden Street is a three-leg, unsignalized intersection with three approaches. The Malden Street eastbound approach is stop controlled and consists of a one shared left-turn/right-turn lane. The Albany Street northbound approach consists of two lanes, a shared left-turn/through lane and a through only lane. The Albany Street southbound approach consists of one shared through/right-turn lane and a bike lane. There are sidewalks along all approaches. There are crosswalks with wheelchair ramps across the Malden Street eastbound approach. On-street parking is permitted along all approaches except for the Albany Street northbound approach.

Albany Street/Wareham Street is a three-leg, unsignalized intersection with three approaches. The Wareham Street eastbound approach is one-way eastbound, stop controlled and consists of one shared left-turn/right-turn lane. The Albany Street northbound approaches consist of one through lane and a bike lane. There are sidewalks along all approaches. There is a crosswalk across the Wareham Street eastbound approach; however, the wheelchair ramp at the south side of the approach is substandard. On-street parking is permitted along all approaches except for the northbound approach where there is an MBTA bus stop.

Albany Street/Plympton Street is a three-leg, unsignalized intersection with two approaches. Plympton Street is one-way westbound leaving the intersection. The Albany Street northbound approach consists of a shared left-turn/through lane and a bike lane. The Albany Street southbound approach consists of a shared through/right-turn lane and a bike lane. There are sidewalks along all approaches. There are crosswalks across the Albany Street northbound approach and Plympton Street; however, the wheelchair ramp at the northwest corner of the intersection is substandard. On-street parking is permitted along both sides of all approaches.

Albany Street/East Dedham Street is a three-leg, unsignalized intersection with three approaches. The East Dedham Street eastbound approach is one-way eastbound, stop controlled and consists of one shared left-turn/right-turn lane. The Albany Street northbound and southbound approaches consist of one through lane and a bike lane. There are sidewalks along all approaches. There are crosswalks with wheelchair ramps provided across the East Dedham Street eastbound approach. On-street parking is permitted along the East Dedham Street eastbound approach and the Albany Street southbound approach.

Albany Street/East Canton Street/Boston Flower Exchange Driveway is a four-leg, unsignalized intersection with three approaches. The Boston Flower Exchange Driveway westbound approach consists of a shared left-turn/through/right-turn lane. The Albany Street northbound and southbound approaches consist of a shared left-turn/through/right-turn lane and a bike lane. There are sidewalks are provided along all approaches. There are crosswalks with wheelchair ramps across the East Canton Street eastbound approach and the Albany Street northbound approach. On-street parking is permitted along the Albany Street southbound approach.

Albany Street/East Brookline Street is a three-leg, unsignalized intersection with three approaches. The East Brookline Street eastbound approach is one-way eastbound, stop controlled, and consists of one shared left-turn/right-turn lane. The Albany Street northbound and southbound approaches consist of one through lane and a bike lane. There are sidewalks along all approaches. There are crosswalks with wheelchair ramps across the East Brookline Street eastbound approach and the Albany Street northbound approach. On-street parking is permitted along the East Brookline Street eastbound approach and the Albany Street southbound approach.

Albany Street/East Newton Street is a four-leg, signalized intersection with three approaches. The East Newton Street westbound approach is one-way westbound and consists of a shared left-turn/through lane and an exclusive right-turn lane. The Albany Street northbound approach consists of an exclusive left-turn lane, a through lane, and a bike lane. The Albany Street southbound approach consists of a through lane and a right-turn lane. There are sidewalks, crosswalks, and wheelchair ramps at all approaches. There are MBTA bus stops at the Albany Street northbound and southbound approaches.

Albany Street/Stoughton Street is a four-leg, unsignalized intersection with four approaches. The Stoughton Street eastbound approach is one-way eastbound and consists of an exclusive left-turn lane and an exclusive right-turn lane. The Stoughton Street westbound approach consists of a shared left-turn/right-turn lane. The Albany Street northbound approach consists of a shared left-turn/through lane and a through lane with bicycle lane. The Albany Street southbound approach consists of a shared through/right-turn lane. There are sidewalks along all approaches and crosswalks across all approaches except the Albany Street northbound approach. On-street parking is available on both sides of the Albany Street southbound approach.

Albany Street/East Concord Street is a four-leg, signalized intersection with three approaches. The East Concord Street eastbound approach is one-way eastbound and consists of an exclusive left-turn lane, a through lane, and an exclusive right-turn lane. The Albany Street northbound approach consists of a through lane, a shared through/right-turn lane, and a bike lane. The Albany Street southbound approach consists of a shared left-turn/through lane and a through lane with bicycle sharrows. There are sidewalks, crosswalks, and pedestrian ramps at all approaches to the intersection. On-street parking is prohibited at all approaches to the intersection except the southbound approach.

Albany Street/Massachusetts Avenue is a four-leg, signalized intersection with four approaches. The Massachusetts Avenue eastbound approach consists of an exclusive left-turn lane, two through lanes and a shared through/right-turn lane with bicycle sharrows and a MBTA bus stop. The Massachusetts Avenue westbound approach consists of two through lanes, a bike lane, and an exclusive right-turn lane. The Albany Street northbound approach consists of a shared left/through lane, a through lane with bicycle sharrows, and an exclusive right-turn lane. The Albany Street southbound approach consists of an exclusive left-turn lane, a through lane, and a shared through/right-turn lane with bicycle sharrows. There are sidewalks, crosswalks, and wheelchair ramps at all approaches. On-street parking is not permitted at any approaches to the intersection.

Massachusetts Avenue/Melnea Cass Boulevard is a four-leg, signalized intersection with four approaches. The Massachusetts Avenue eastbound approach consists of two exclusive left-turn lanes, a through lane, and a shared through/right-turn lane with bicycle sharrows. The Southampton Street westbound approach consists of two exclusive left-turn lanes, two through lanes, and a channelized right-turn lane. The Melnea Cass Boulevard northbound approach consists of two exclusive through lanes and an exclusive right turn lane. The Massachusetts Avenue Connector southbound approach consists of two exclusive left turn lanes, two through lanes, and a channelized right-turn lane. There are sidewalks, crosswalks, crossing islands, and wheelchair access ramps at all approaches. On-street parking is not permitted at any approaches to the intersection.

Massachusetts Avenue Connector/I-93 SB Frontage Road is a four-leg, signalized intersection with two approaches. The I-93 SB Frontage Road approach consists of an exclusive through lane and an exclusive right turn lane. The I-93 Exit 18 approach consists of a through/right-turn lane and an exclusive right turn lane. There is a crosswalk across the Massachusetts Avenue Connector departing leg with wheelchair accessible ramps that connects the South Bay Harbor Trail to the sidewalk on the west side of the I-93 Frontage Road. There is no on-street parking on either road.

Massachusetts Avenue Connector/I-93 NB Frontage Road is a three-leg, signalized intersection with two approaches. The Massachusetts Avenue Connector approach consists of two exclusive left-turn lanes. The I-93 NB Frontage Road approach consists of an exclusive left-turn lane, a left-turn/through lane, and an exclusive through lane. There is a crosswalk across the I-93 Frontage Road approach with wheelchair-accessible ramps connecting the sidewalks on the south side of the Massachusetts Avenue Connector and the east side of the I-93 Frontage Road. There is no on-street parking on either road.

Harrison Avenue/East Concord Street is a four-leg, signalized intersection with three approaches. The East Concord Street eastbound approach is one-way eastbound and consists of a shared left-turn/through/right-turn lane. The Harrison Avenue northbound approach consists of a shared through/right-turn lane and the southbound approach consists of a shared left-turn/through lane. There are sidewalks, crosswalks, and pedestrian ramps at all approaches to the intersection. On-street parking is allowed on all approaches.

Harrison Avenue/East Newton Street is a four-leg, signalized intersection with three approaches. The East Newton Street westbound approach is one-way westbound and consists of a shared left-turn/through/right-turn lane. The Harrison Avenue northbound approach consists of a shared left-turn/through lane and a MBTA bus stop. The Harrison Avenue southbound approach consists of a shared through/right-turn lane. There are sidewalks, crosswalks, and pedestrian ramps at all approaches to the intersection. On-street parking is allowed on all approaches.

Harrison Avenue/East Brookline Street is a four-leg, signalized intersection with three approaches. The East Brookline Street eastbound approach is one-way eastbound and consists of a shared left-turn/through/right-turn lane. The Harrison Avenue northbound approach consists of a shared through/right-turn lane. The Harrison Avenue southbound approach consists of a shared left-turn/through lane and a MBTA bus stop. There are sidewalks, crosswalks, and pedestrian ramps at all approaches to the intersection. On-street parking is allowed on all approaches.

Harrison Avenue/East Canton Street is a three-leg, unsignalized intersection with three approaches. The East Canton Street westbound approach is a one-way westbound and consists of a shared left-turn/right-turn lane. The Harrison Avenue northbound and southbound approaches both consist of an exclusive through lane. There are sidewalks on all approaches to the intersection and one crosswalk with pedestrian ramps crossing the westbound East Canton Street approach; however, the wheelchair ramp at the southeastern corner of the intersection is substandard. On-street parking is allowed on all approaches.

Harrison Avenue/East Dedham Street is a three-leg, unsignalized intersection with two approaches. The Harrison Avenue northbound approach consists of a shared through/right-turn lane and the south bound approach consists of a shared left-turn/through lane. There are sidewalks and pedestrian ramps on all approaches to the intersection and one crosswalk across the southbound Harrison Avenue approach. On-street parking is allowed on all approaches.

2.2.3 Existing Parking

An inventory of the existing on-street and off-street parking in the vicinity of the Project was collected. A description of each follows.

2.2.3.1 On-Street Parking and Curb Usage

On-street parking surrounding the Project Site consists of predominately residential parking, metered parking, and commercial parking. The on-street parking regulations within the study area are shown in Figure 2-1.

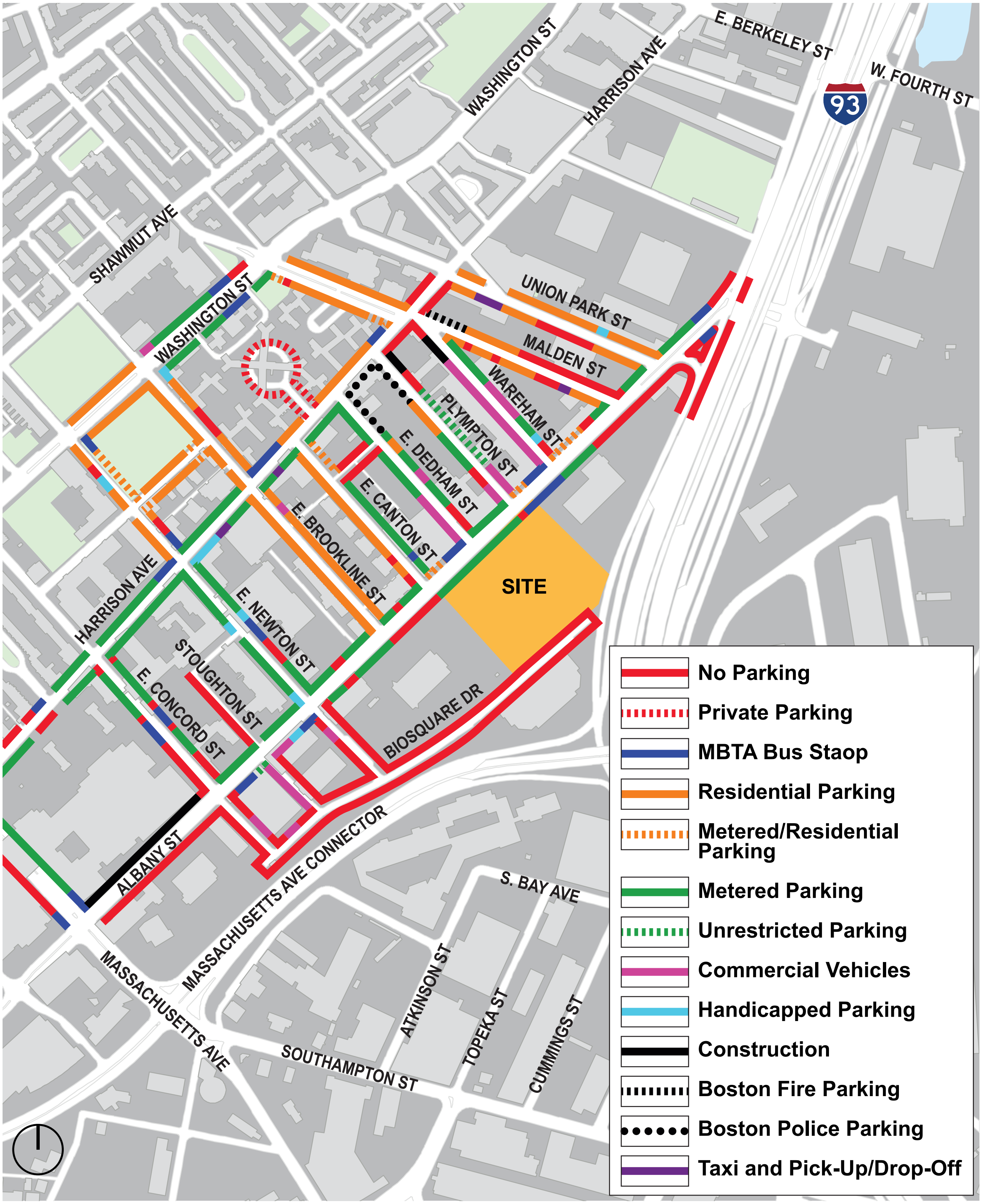

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Figure 2.2
On-Street Parking Regulations

Source: Howard Stein Hudson

2.2.3.2 Off-Street Parking

There are more than 4,669 parking spaces within one-quarter mile, or a five-minute walk, from the Project Site. These parking spaces consist of a mix of public and private parking spaces. A majority of the parking spaces are owned or leased by the nearby medical facilities. Of the parking spaces, approximately 551 are found in parking lots and 4,118 are in parking garages. The surface parking lots and parking garages within a quarter-mile of the Project Site are shown in Figure 2-3. A detailed summary of all parking lots and garages are shown in Table 2-1.

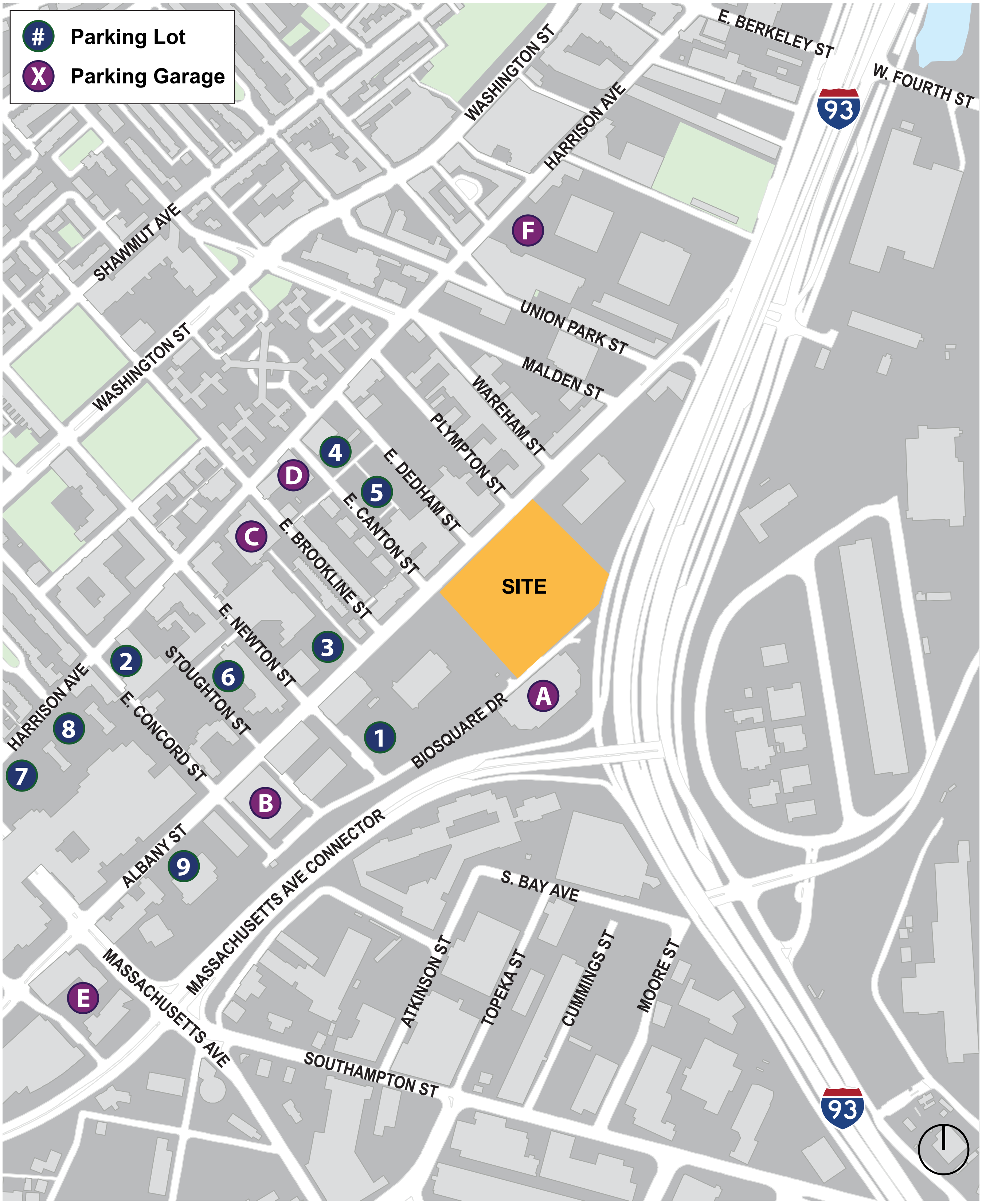

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Figure 2.3
Off-Street Parking

Source: Howard Stein Hudson

Table 2-1 Off-Street Parking Facilities

Map ID	Facility	User	Capacity	Midday Occupancy[1]	% Occupied
Parking Garages					
A	610 Albany Street	Staff	1,400	1,329	95%
B	710 Albany Street	Patients	1,033	859	83%
C	Doctors Office Building	Patients, Staff after 5:30 pm	230	157	68%
D	700 Harrison Avenue	Staff	75	51	68%
E	Crosstown	Staff	1,250	1138	91%
F	GTI Properties	Public	130	No Data Available	
Parking Garages Subtotal			**4,118**	**3,534**	**85%**
Parking Lots					
1	BioSquare	Staff	80	72	90%
2	D Lot	Staff	22	13	59%
3	Naval Blood Lot	Staff	7	5	71%
4	Gambro	Staff	18	15	83%
5	Perkin Elmer	Staff	156	119	76%
6	Stoughton Street Lot	Staff	70	52	74%
7	Yawkey HP Lot	HP	30	25	83%
8	Menino Valet Lot	Patients/ Valet	73	54	74%
9	Power Plant	Staff	95	83	87%
Parking Lots Subtotal			**551**	**438**	**79%**

1. 2013 Boston University Medical Campus (BUMC) IMP Amendment Parking Study Conducted by Howard Stein Hudson

2.2.3.3 Car Sharing Services

Car sharing enables easy access to short-term vehicular transportation. Vehicles are rented on an hourly or daily basis, and all vehicle costs (gas, maintenance, insurance, and parking) are included in the rental fee. Vehicles are checked out for a specific time period and returned to their designated location.

Zipcar is the primary company in the Boston car sharing market. There are currently two Zipcar locations within a half-mile walk of the Project Site. The nearby car sharing locations are shown in Figure 2-4.

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Figure 2.4
Car Sharing Services

Source: Howard Stein Hudson

2.2.4 Existing Traffic Data

Traffic volume data was collected at 9 of the 21 study area intersections on March 1, 2017. Traffic volume data at 10 of the intersections was collected on November 19, 2015. Traffic volume data from the remaining two intersections was received by the BPDA. Turning Movement Counts (TMCs) and vehicle classification counts were conducted during the weekday a.m. and weekday p.m. peak periods (7:00 – 9:00 a.m. and 4:00 – 6:00 p.m., respectively). The traffic classification counts included car, heavy vehicle, pedestrian, and bicycle movements. The detailed traffic counts are provided in Appendix C.

2.2.5 Existing Vehicular Traffic Volumes

To account for seasonal variation in traffic volumes throughout the year, data provided by MassDOT was reviewed. The most recent (2011) MassDOT Weekday Seasonal Factors were used to determine the need for seasonal adjustments to the March 2017 TMCs. The seasonal adjustment factor for roadways similar to the study area (Group 6) is 0.96. This indicates that average monthly traffic volumes are approximately four percent less than the traffic volumes that were collected. Therefore, the traffic counts were not adjusted downward to reflect average month conditions and provide a conservatively high analysis consistent with the peak seasonal traffic volumes. The MassDOT 2011 Weekday Seasonal Factors table is provided in Appendix C.

The existing traffic volumes that were collected in March 2017 and November 2015 were used to develop the Existing (2017) Condition traffic volumes. The 2015 volumes were balanced upwards to the 2017 volumes to represent two years of growth. The Existing (2017) weekday a.m. Peak Hour and weekday p.m. Peak Hour traffic volumes are shown in Figures 2-5 and Figure 2-6, respectively.

2.2.6 Existing Bicycle Volumes and Accommodations

In recent years, bicycle use has increased dramatically throughout the City of Boston. The Project Site is conveniently located in close proximity to several bicycle facilities. The City of Boston's "Bike Routes of Boston" map designates Albany Street and East Newton Street as intermediate routes and designates Massachusetts Avenue as an advanced route. Intermediate routes are suitable for riders with some on-road experience and advanced routes are suitable for experienced and traffic-confident cyclists. Additionally, the South Bay Harbor Trail, is a cycle path that exists north of the Project site and south of the Project site along Melnea Cass Boulevard.

Bicycle counts were conducted concurrent with the vehicular TMCs and are presented in Figure 2-7. As shown in the figure, bicycle volumes are heaviest along Albany Street during the peak periods. Bicycle volumes on the figure may not balance due to the turning movement counts being done on different days for different intersections.

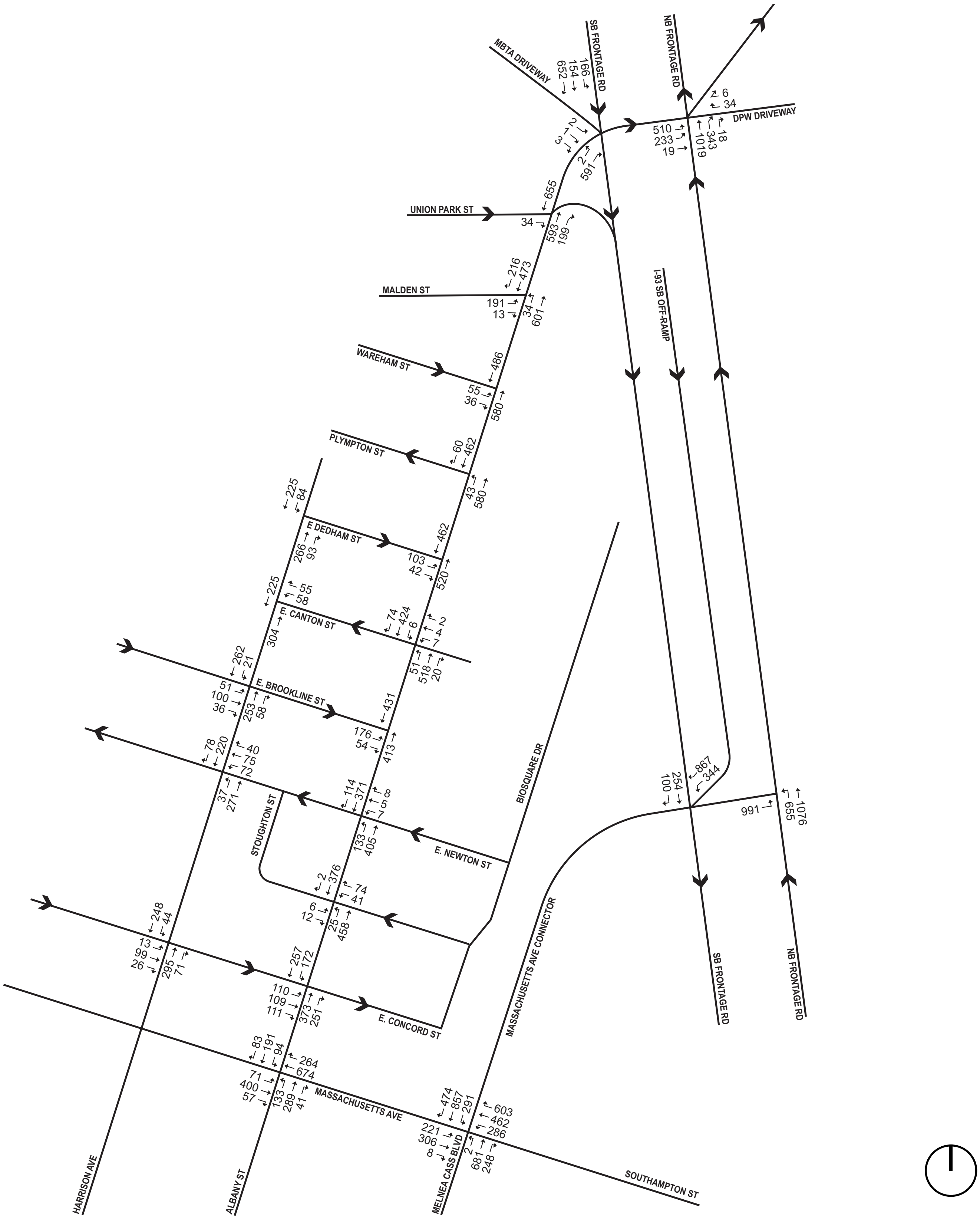

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Figure 2.5

Existing (2017) Condition Traffic Volumes, Weekday a.m. Peak Hour

Source: Howard Stein Hudson

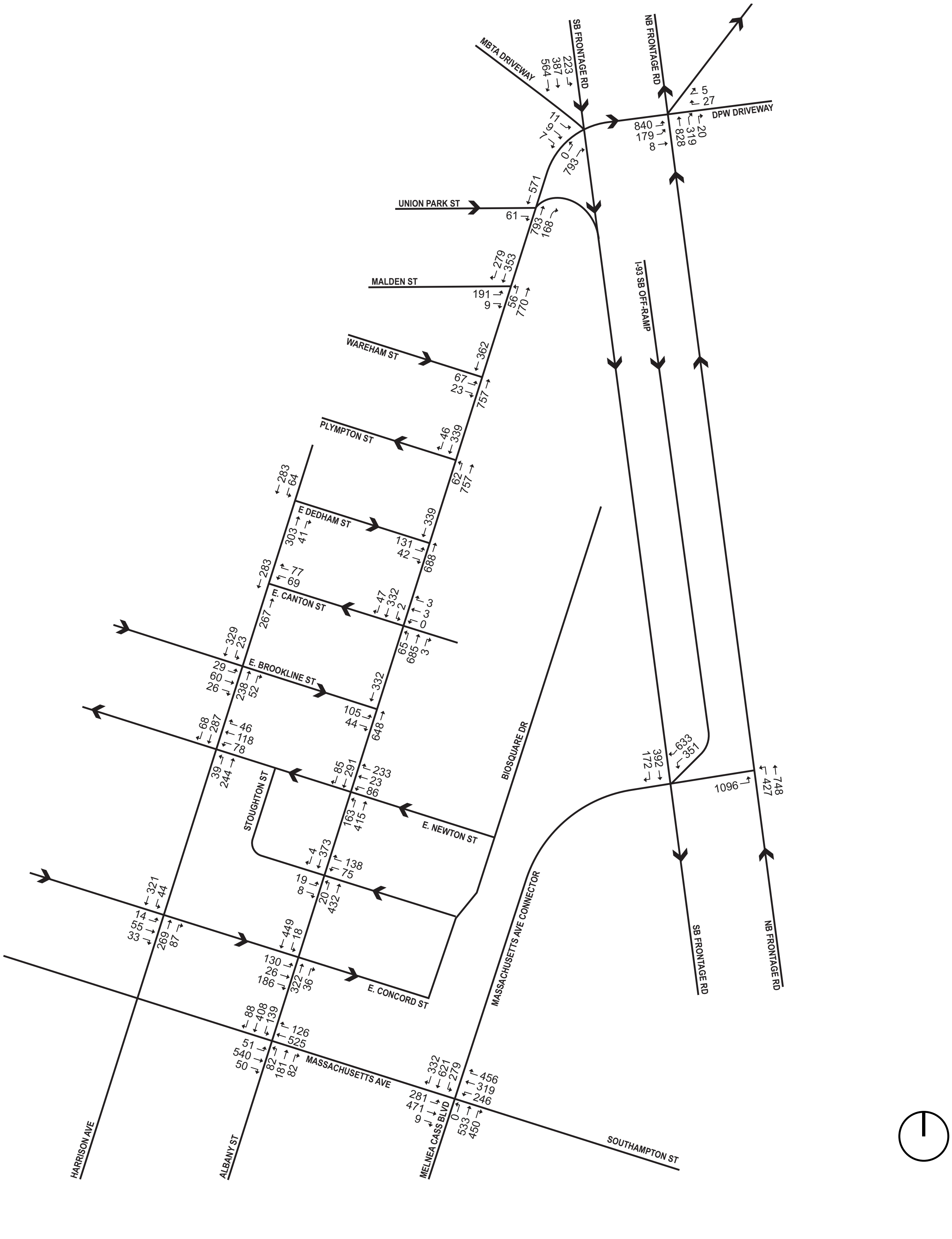

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Figure 2.6

Existing (2017) Condition Traffic Volumes, Weekday p.m. Peak Hour

Source: Howard Stein Hudson

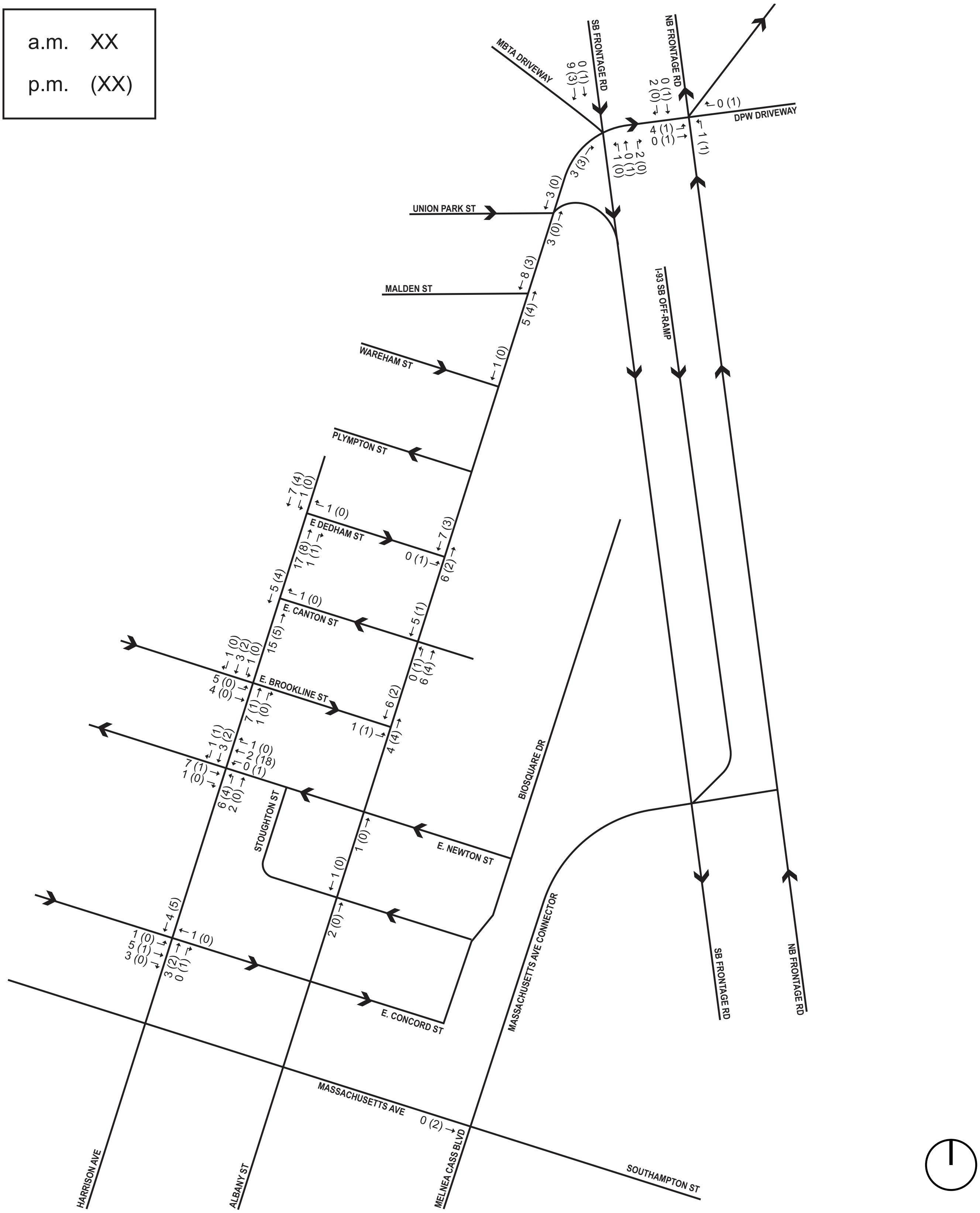

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Figure 2.7

Existing (2017) Condition Bicycle Volumes, Weekday a.m. and p.m. Peak Hours

Source: Howard Stein Hudson

2.2.6.1 Bicycle Sharing Services

The Site is also located in proximity to a bicycle sharing station provided by Hubway, the bicycle sharing system in the Boston area. Hubway launched in 2011 and currently consists of over 140 stations and 1,300 bicycles. There are three Hubway locations within a quarter mile of the Site. Figure 2-8 shows the Hubway stations within one-quarter mile radius.

2.2.7 Existing Pedestrian Volumes and Accommodations Error! Bookmark not defined.

In general, sidewalks are provided along all roadways and are in good condition with the exception of the Albany Street block between Plympton Street and Wareham Street on the west side of Albany Street. At this block, the sidewalks are in poor condition and along Wareham Street pedestrians are often hindered by parked vehicles on the sidewalk. Crosswalks are provided at all study area intersections. Pedestrian signal equipment is provided at all 11 of the signalized study area intersections.

To determine the amount of pedestrian activity within the study area, pedestrian counts were conducted concurrent with the TMCs at the study area intersections and are presented in Figure 2-9. As shown in the figure, pedestrian activity is heavy throughout the study area near the Boston University Medical School.

2.2.8 Existing Public Transportation Services

The Project Site is located in Boston's South End with reliable public transportation opportunities. The Silver Line and several bus lines provide access throughout the city. The closest Silver Line station is approximately one-quarter mile away at the Washington Street at Union Park Street Station.

The MBTA operates five bus routes, as well as two Silver Line routes in close proximity to the Project. Figure 2-10 maps all of the public transportation service located in close proximity of the Project Site, and Table 2-2 provides a brief summary of all routes.

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Figure 2.8
Bicycle Sharing Locations

Source: Howard Stein Hudson

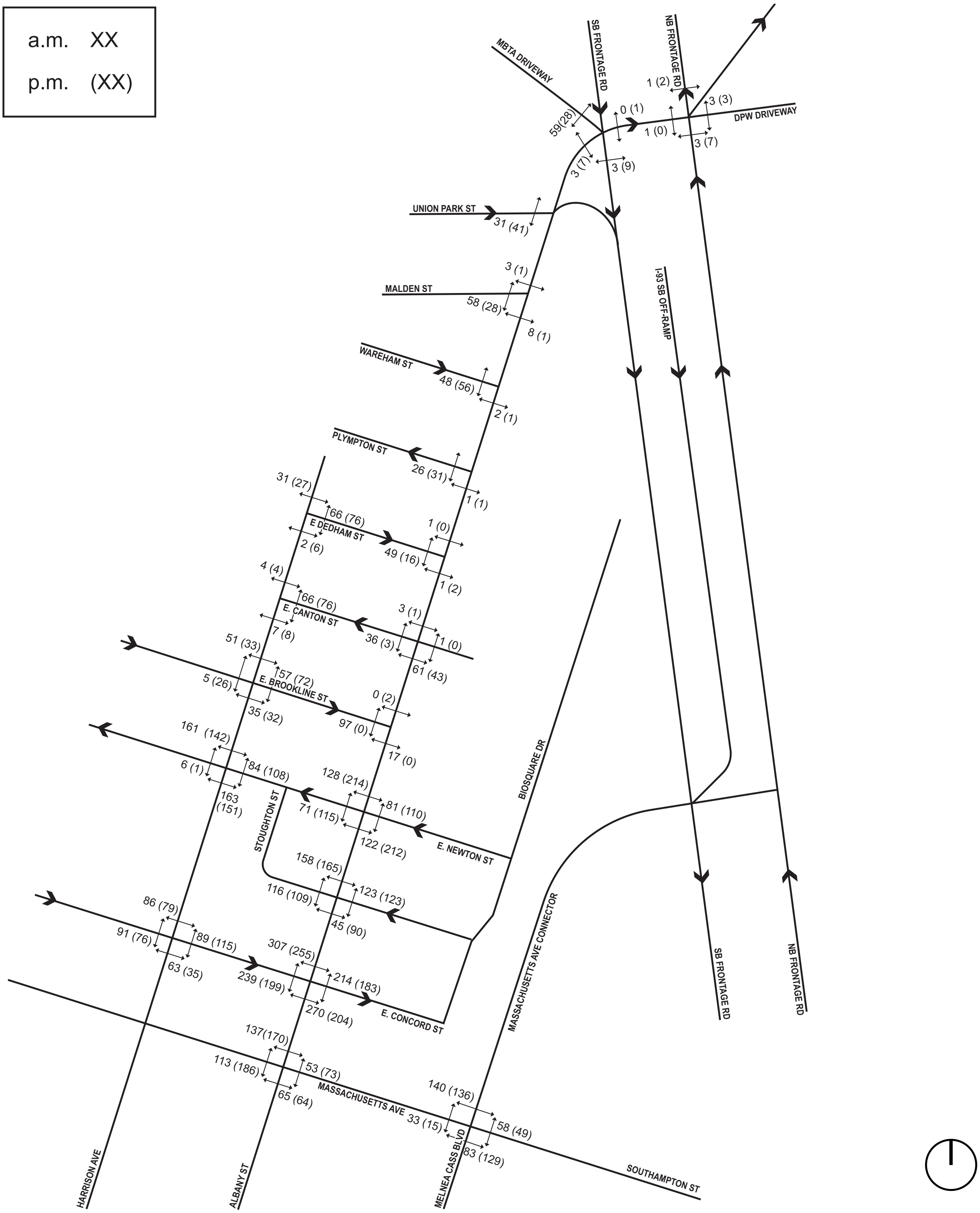

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Figure 2.9

Existing (2017) Condition Pedestrian Volumes, Weekday a.m. and p.m. Peak Hours

Source: Howard Stein Hudson

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Figure 2.10
Public Tansportation

Source: Howard Stein Hudson

Table 2-2 Existing Public Transportation Service Summary

Transit Service	Description	Rush-hour Headway (in minutes)*
Bus Routes		
SL4	Dudley Station – South Station at Essex St via Washington St	8
SL5	Dudley Station – Downtown Crossing at Temple Place via Washington St	8
CT1	Central Sq, Cambridge - B.U. Medical Center/Boston Medical Center via M.I.T.	20
CT3	Beth Israel Deaconess Medical Center - Andrew Station via B.U. Medical Center	20
8	Harbor Point/UMass - Kenmore Station via B.U. Medical Center & Dudley Station	14
10	City Point - Copley Sq via Andrew Station & B.U. Medical Center	15
47	Central Sq., Cambridge - Broadway Station via B.U. Medical Center, Dudley Station & Longwood Medical Area	10

*Headway is the time between buses.

2.2.8.1 Existing Public Transportation Connections

The Project Site is directly served by several bus lines that provide connections to the Red and Orange lines. The #10 bus provides access to the Back Bay Station on the Orange Line for trips to and from downtown as well as for trips to and from the southeast at Andrew Station. The #8 and #47 buses provide access to Ruggles Station on the Orange Line for trips to and from the south. The #47 bus also provides access to the Broadway Station on the Red Line for trips to and from downtown. The Silver Line #4 and #5 buses provide access to and from Downtown and Dudley Square. Graphs of daily transit ridership are included under the Build Condition analysis and transit data used for the analysis is included in Appendix C.

2.2.8.2 Existing Shuttle Services

The Project Site is located adjacent to the BUMC Campus, which operates several private shuttles to transport students, employees, and patients to other modes of transportation such as parking lots or MBTA stops. Table 2-3 shows the existing shuttle service in the study area.

Table 2-3 Existing Shuttle Service

Shuttle	*Riders*	*Description*	*Headway (in minutes)*
Inner Campus	Patients, Staff	East Newton Pavilion – Doctor's Office Building – Emergency Entrance – Menino Pavilion – Devita	20-30
Evening Transit	Staff, Students	Request to nearby MBTA stops, any BUMC parking facility, or residence under a mile away	60
VA Medical Center	Staff, Students	Veteran's Affairs Hospital – B.U. Medical Center	60
HealthNet	Patients	Route No. 3; East Boston Neighborhood Health Center – B.U. Medical Center	30
B.U. Bus	Students	Student Village II – 710 Albany Street	10
LMA	LMA Staff	JFK MBTA Station – Vanderbilt Hall via B.U. Medical Center	15

2.3 NO BUILD (2024) CONDITION

The No-Build (2024) Condition reflects a future scenario that incorporates anticipated traffic volume changes associated with background traffic growth independent of any specific project, traffic associated with other planned specific developments, and planned infrastructure improvements that will affect travel patterns throughout the study area. These infrastructure improvements include roadway, public transportation, pedestrian and bicycle improvements.

2.3.1 Background Traffic Growth

The methodology to account for generic future background traffic growth, independent of this Project, may be affected by changes in demographics, smaller scale development projects, or projects unforeseen at this time. Based on a review of recent and historic traffic data to account for any additional unforeseen traffic growth, a traffic growth rate of one-quarter percent per year, compounded annually, was used.

2.3.2 Specific Development Traffic Growth

Traffic volumes associated with known development projects can affect traffic patterns throughout the study area within the future analysis time horizon. Six such projects were specifically accounted for in the traffic volumes for future scenarios, while others were included in the general background traffic growth (the background projects are mapped on Figure 2-11):

Boston University Medical Center (BUMC) Institutional Master Plan (IMP) – This project consists of the six projects part of the BUMC IMP. The BUMC is located south of the Project Site along Harrison Avenue and Albany Street. In total, these projects consist of approximately 433,100 square feet of medical space, 195,000 square feet of research and development space, and 160,000 square feet of office space. The projects, the building program and the status are listed below:

- Biosquare II NEIDL – 195,000 square foot Research and Development – Construction Complete

- BUMC Administration and Clinical Building – 160,000 square foot Office – BPDA Board Approved
- BUMC Energy Facility – 38,500 square foot Energy Plant – BPDA Board Approved
- BUMC Moakley Cancer Center Addition – 27,800 square foot Hospital – Construction Complete
- BUMC New Inpatient Building (Phase 1) – 82,300 square foot Hospital – BPDA Board Approved
- BUMC New Inpatient Building (Phase 2) – 323,000 square foot Hospital – BPDA Board Approved
- BUMC Dental School – 41,900 square foot Dental School – Under Review

345 Harrison Avenue – This project calls for the construction of 577 rental units, 32,170 square feet of ground floor retail and restaurant space, and 270 parking spaces. This project has been approved.

80 East Berkley Street – This project calls for the construction of a 308,000 square foot, 11-story mixed-use building consisting of 290,000 square feet of office space, 18,000 square feet of ground floor retail space, and 200 parking spaces. This project has been approved.

370-380 Harrison Avenue – This project calls for the construction of a mixed-use building with up to approximately 324 residential units, 180 off-street parking spaces, and 8,500 square feet of commercial space. This project has been approved.

The Factory at 46 Wareham Street – This project calls for the construction of a 64,530 square foot, 6-story mixed-use building consisting of 16 residential units, 45,530 square feet of commercial space, and 97 parking spaces. This project has been approved.

Harrison Albany Block – This project calls for the construction and renovation of approximately 700,000 square feet of building space including 687 residential units, 42,300 square feet of medical office space, and 19,700 square feet of retail space. This project has been approved.

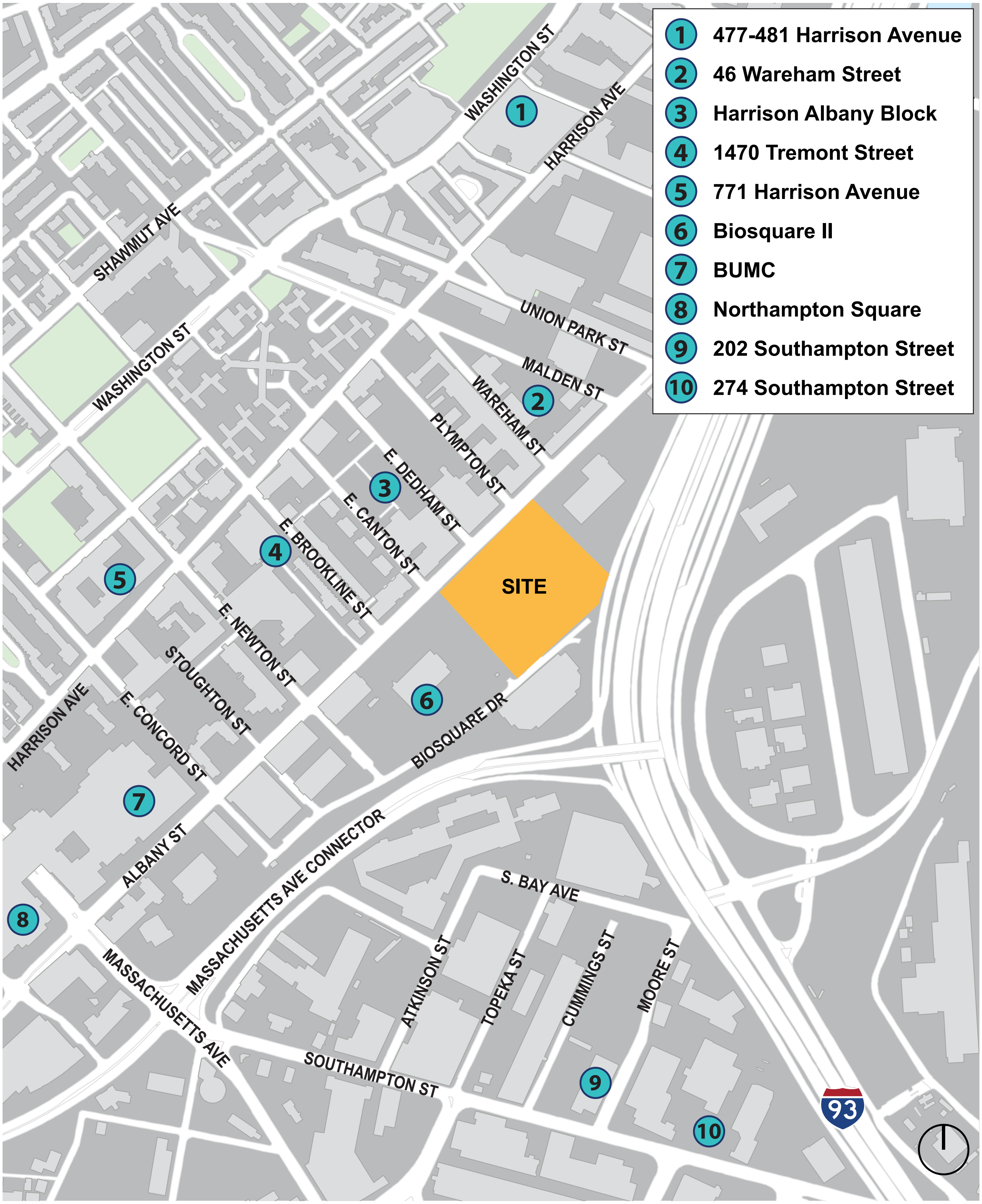

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Figure 2.11
Background Projects

Source: Howard Stein Hudson

2.3.3 Proposed Infrastructure Improvements

A review of planned improvements to roadway, transit, bicycle, and pedestrian facilities was conducted to determine if there are any nearby improvement projects near the study area.

The intersection of Albany Street and Malden Street has been signalized by the City as of summer 2017. Since the traffic volume counts were conducted before this intersection was signalized, it has been left as a future improvement for the analysis. Design drawings and signal timings have been obtained from the City and have been incorporated into the future condition analysis.

The City of Boston Harrison-Albany Corridor Study recommended connections between the South End neighborhood and the regional roadways. The study recommended a connection by the Southbound Frontage Road and Biosquare Drive as well as a connection between East Concord Street and the Massachusetts Avenue Connector.

Efforts are currently underway to make the previously envisioned connection between the Southbound Frontage Road and Biosquare Drive. The Southbound Frontage Road connection will relocate trips from Albany Street, Massachusetts Avenue, and Massachusetts Avenue Connector, providing more direct access to the Biosquare area of the Boston University Medical Center, the Project Site, and other destinations in the South End.

The East Concord Street connection to the Massachusetts Avenue Connector is not currently being pursued at this time. However, this remains a recommendation of the Corridor Study to be implemented in the future.

2.3.4 No-Build Traffic Volumes

The one-quarter percent per year annual growth rate, compounded annually, was applied to the Existing (2017) Condition traffic volumes, then the traffic volumes associated with the background development projects listed above were added. The No-Build (2024) weekday morning and evening peak hour traffic volumes are shown on Figures 2-12 and Figure 2-13, respectively.

2.4 BUILD CONDITION

As previously mentioned, the Project will consist of the redevelopment of the Boston Flower Exchange Site at 540 Albany Street. The Project consists of approximately 1.599 million square feet within four buildings that include office/laboratory space, retail space, and combined cultural, community, and innovation space. Below-grade parking will provide approximately 1,145 below-grade garage parking spaces.

2.4.1 Site Access and Circulation

The Project site is bordered to the north and south by transportation easements. The South Easement (Canton Street Extension) is between the Project site and the BUMC laboratory building site. The North Easement (New Street) is located between the Project site and the Jacobsen Floral Supply. Both easements are 30 feet wide, with shared ownership by the respective abutting properties.

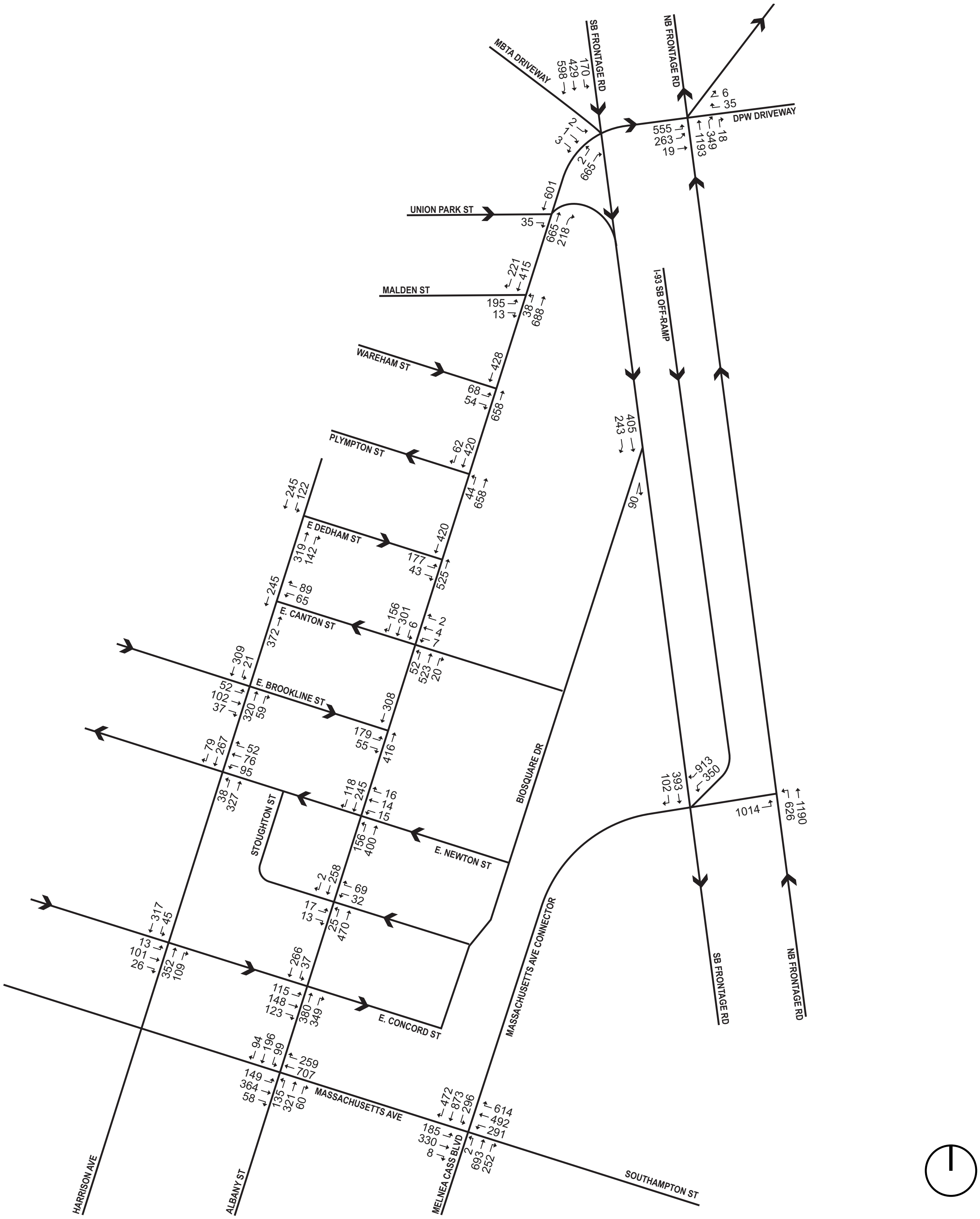

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Figure 2.12

No-Build (2024) Condition Traffic Volumes, Weekday a.m. Peak Hour

Source: Howard Stein Hudson

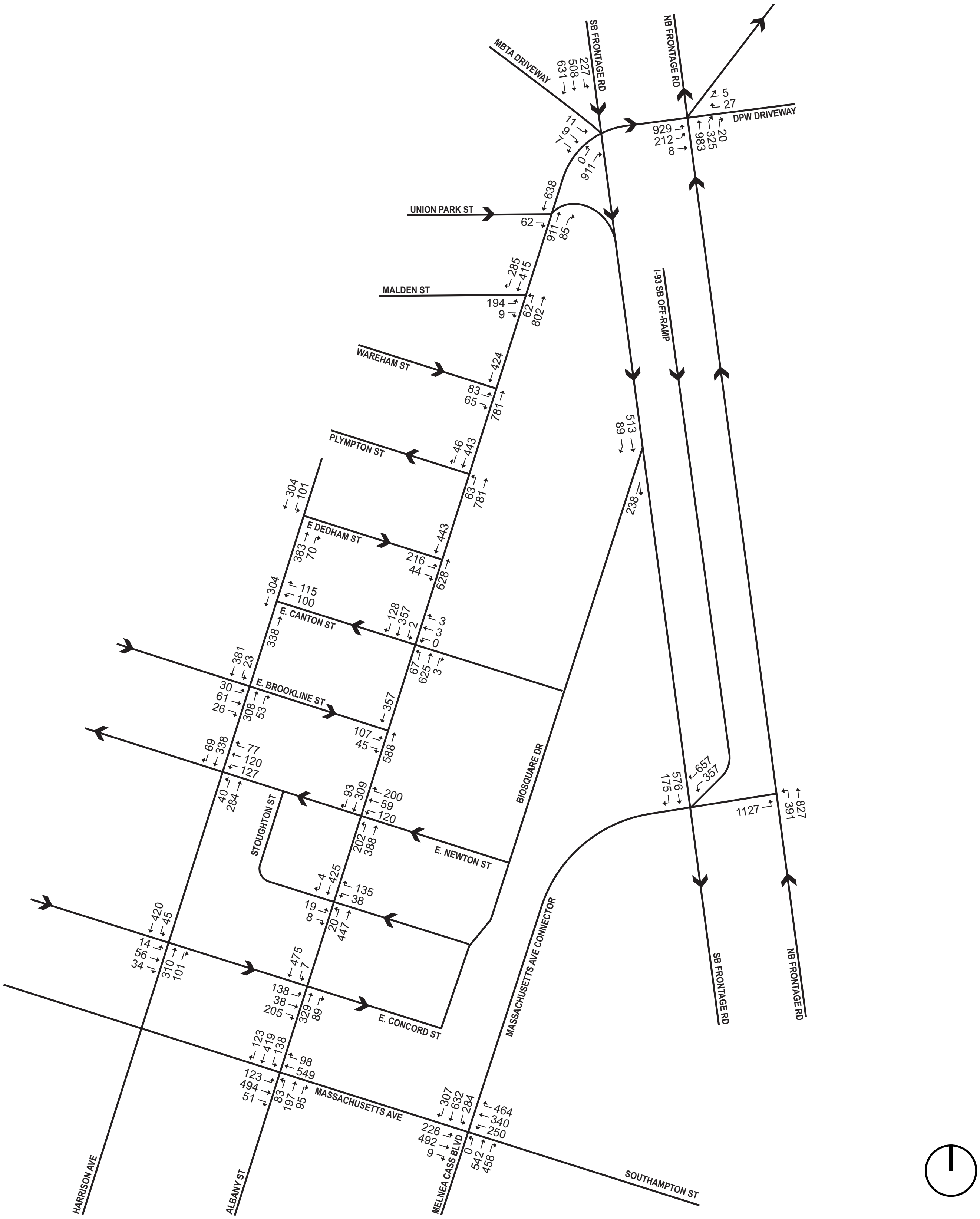

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Figure 2.13

No-Build (2024) Condition Traffic Volumes, Weekday p.m. Peak Hour

Source: Howard Stein Hudson

In addition, two internal roadways will bisect the site. The Service Driveway will run north and south between the two easements providing access to the garage ramps and loading areas of each building. East Dedham Street Extension will run west to east from Albany Street through the southern edge of Albany Green to the Service Driveway. The Site plan is shown in Figure 2-14.

The Project site design and access plan no longer anticipates the East Concord Street connection to the Massachusetts Avenue Connector being in place prior to occupancy since it is not being pursued at this time. The access plan does assume Biosquare Drive connection to the Southbound Frontage Road has been completed prior to full Project occupancy. Since only the full Project is analyzed, the future improvement is included in all future projections and analysis. It should be noted, that based on traffic operations analysis that has been conducted, Building A and Building B can both be occupied prior to this connection being completed. A design for the connection of Biosquare Drive to the Southbound Frontage Road is currently being prepared. This plan has preliminary support from the land owners, the City, and MassDOT. Once finalized, the plan will be submitted to FHWA.

In addition, the Build (2024) Condition includes the signalization of the intersections of Albany Street/East Canton Street/East Canton Street Extension and Albany Street/East Dedham Street/Albany Green. This signalization, installed concurrently, and with the implementation of coordinated timings at the intersections along Albany Street will improve travel times through the Albany Street corridor.

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Figure 2.14
Site Plan

Source: Stantec

2.4.1.1 East Canton Street Extension

The East Canton Street Extension will include two way travel between Albany Street and Biosquare Drive and provide access and egress to and from the garages and service areas of the Project Site.

This roadway will be 20 feet wide plus an on-street parking lane on the east side of the roadway. The Albany Street intersection will be signalized and include complete pedestrian signalization. As part of the Southbound Frontage Road connection, this roadway will need to be designated as a public street.

2.4.1.2 New Street

The New Street will include two way travel between Albany Street and the Service Driveway. This roadway will also be 20 feet wide within the existing easement and provide limited parking/pick-up/drop-off spaces adjacent to the entrance to Building B. This roadway will continue to operate as a shared transportation easement.

2.4.1.3 East Dedham Street Extension

The East Dedham Street Extension will be a shared street (or woonerf) at sidewalk grade. The shared street prioritizes pedestrians over vehicles through the single grade giving motorists the impression they are entering a pedestrian area as they cross over the curb cut from Albany Street. The shared street will act as the main pick-up and drop-off location for taxis and Transportation Network Companies (TNCs). Due to the site design layout, this street will operate as one way eastbound from Albany Street, with vehicles exiting via East Canton Street Extension or New Street. The street will meet Albany Street as the fourth leg of the Albany Street/East Dedham Street intersection. The signalization of this intersection will include full pedestrian signalization. Pedestrians walking along Albany Street will be protected from vehicles traveling into this site through this intersection via the signalization. This roadway will be classified as a private roadway open to public travel. The combined services along this street (TNC, Hubway, and transit information within the buildings, car share within the garages) will operate as a Mobility microHUB for the Project site.

2.4.1.4 Service Driveway

The Service Driveway will run two way between each of the transportation easements. This roadway is also 20 feet wide providing access to the service area for each building as well as the garage ramps. This roadway will be classified as a private roadway open to public travel.

2.4.2 Project Parking

The Project is anticipated to provide 1,145 below-grade parking spaces divided between the garages at each of the four buildings. Additionally, approximately 10 at-grade parking spaces are proposed along East Canton Street Extension New Street. The parking ratio based on the 1,155 combined at-grade and below-grade spaces is approximately 0.72 spaces per 1,000 square feet of the total square footage. Public parking, with the potential exception of South End Resident Parking Permits during certain times, is not allowed on this site per the Boston APCC.

The parking will be shared between uses on site. The parking goals developed by the BTD for this section of the South End are a maximum of 0.75 to 1.00 parking spaces per 1,000 square feet of all non-residential development. Therefore, the proposed Project is within the maximum allowed per BTD guidelines for each of the land uses proposed on site.

As documented in unpublished surveys conducted by HSH in several downtown neighborhoods, based on current Boston parking trends, parking demand has been declining over the last few years. This trend is only expected to exacerbate with the continued use of new mobility options (including TNCs and shuttle services, both public and private) and the advent of autonomous vehicles within a few years.

2.4.3 Loading and Emergency Vehicle Access

There will be four separate loading areas located within the Project Site. Each building will be serviced by its own loading dock that will be accessed from the Service Driveway. Truck trip estimates for the Project were based on two different data sets. Delivery estimates for the retail space were based on data provided in the Truck Trip Generation Rates by Land Use in the Central Artery/Tunnel Project Study (CTPS) Area report[1], and estimates for the office and medical office space was based on a recent survey at the John Hancock Tower[2]. Deliveries to the Project Site will be limited to mostly SU-36 trucks and smaller delivery vehicles.

Retail. Retail truck trips vary depending on the type of retail provided, but a general observation is that larger retail attracts larger trucks but not necessarily more truck deliveries. The storefront retail land use was used to calculate the retail truck trip generation. Based on the CTPS report, retail uses generate approximately 0.15 light truck trips per 1,000 square feet of floor area and 0.02 medium/heavy truck trips per 1,000 square feet of gross floor area.

Office/Lab. Based on the John Hancock report, office uses generate approximately 0.046 light truck trips per 1,000 square feet of floor area and 0.002 medium/heavy truck trips per 1,000 square feet of gross floor area. Based on the CTPS report, the office and lab uses are expected to have similar rates of truck deliveries so the same rates were used for both land uses.

A summary of anticipated loading/service activity by land use is presented in Table 2-4.

Table 2-4 Expected Delivery Activity

Land Use	*Number of Deliveries*	*General Delivery Times*
Retail	12	10% before 7:00 a.m. 70% between 7:00 a.m. and 1:00 p.m. 20% after 1:00 p.m.
Office/Lab	74	
Total	86	

Based on the CTPS data and John Hancock data, the Project is expected to generate approximately 86 deliveries per day, four of which are expected to be medium/heavy trucks. It

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

2 Loading Dock Survey at the John Hancock Tower, Boston, February 8 – 12, 2010. Conducted by Howard Stein Hudson.

is anticipated that the majority of these deliveries will occur between 7:00 a.m. and 1:00 p.m. The delivery totals do not include trash truck trips.

With a minimum of 20 foot cross section for all on site roadways, emergency vehicle access will be accommodated throughout the Project Site.

2.4.4 Trip Generation Methodology

Determining the future trip generation of the Project is a complex, multi-step process that produces an estimate of vehicle trips, transit trips, and walk/bicycle trips associated with a proposed development and a specific land use program. A project's location and proximity to different travel modes determines how people will travel to and from a Site. To estimate the number of trips expected to be generated by the Project, data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual*[3] were used. ITE provides data to estimate the total number of unadjusted vehicular trips associated with the Project. In an urban setting well-served by transit, adjustments are necessary to account for other travel mode shares such as walking, bicycling, and transit.

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

Land Use Code 710 – General Office Building. A general office building houses multiple tenants and is a location where affairs of businesses, commercial, or industrial organizations are conducted. Calculations of the number of trips use ITE's average rate per 1,000 square feet.

Land Use Code 760 – Research and Development (Lab). Research and development centers are facilities or groups of facilities devoted to research and development activities. The range of specific types of businesses contained in this land use varies significantly. Research and development centers may contain offices and light fabrication areas. Calculations of the number of trips use ITE's average rate per 1,000 square feet.

Land Use Code 820 – Shopping Center. The Shopping Center land use code is defined as an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. Shopping center trip generation estimates are based on average vehicle rates per square footage of retail space. Calculations of the number of trips use ITE's average rate per 1,000 square feet.

2.4.5 Mode Share

BTD provides vehicle, transit, and walking mode split rates for different areas of Boston. The Project is located in the westerly portion of designated Area 15 – South End/Roxbury. The unadjusted vehicular trips were converted to person trips by using vehicle occupancy rates published by the Federal Highway Administration (FHWA)[4]. The person trips were then distributed to different modes according to the mode shares shown in Table 2-5.

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

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

Table 2-5 Travel Mode Share

Land Use		*Walk/Bicycle Share*	*Transit Share*	*Auto Share*	*Vehicle Occupancy Rate*
Daily					
Office	In	18%	24%	58%	1.13
	Out	18%	24%	58%	1.13
Lab	In	18%	12%	53%	1.13
	Out	18%	12%	53%	1.13
Retail	In	35%	24%	58%	1.78
	Out	35%	24%	58%	1.78
a.m. Peak					
Office	In	18%	27%	55%	1.13
	Out	17%	40%	43%	1.13
Lab	In	18%	27%	55%	1.13
	Out	17%	40%	43%	1.13
Retail	In	36%	13%	51%	1.78
	Out	37%	21%	42%	1.78
p.m. Peak					
Office	In	17%	40%	43%	1.13
	Out	18%	27%	55%	1.13
Lab	In	17%	40%	43%	1.13
	Out	18%	27%	55%	1.13
Retail	In	37%	21%	43%	1.78
	Out	36%	13%	55%	1.78

2.4.6 Project Trip Generation

The mode share percentages shown in Table 2-5 were applied to the number of person trips to develop walk/bicycle, transit, and vehicle trip generation estimates for the Project. The trip generation for the Project by mode is shown in Table 2-6. The detailed trip generation information is provided in Appendix C.

Table 2-6 Project Trip Generation

Land Use		Walk/Bicycle Trips	Transit Trips	Private Vehicle Trips	Taxi Vehicle Trips
Daily					
Office[1]	In	745	994	1,912	200
	Out	745	994	1,912	200
Lab[2]	In	731	975	1,877	197
	Out	731	975	1,877	197
Retail[3]	In	964	331	738	122
	Out	964	331	738	122
Total Project Generated	In	2,440	2,300	4,527	519
	Out	2,440	2,300	4,527	519
a.m. Peak Hour					
Office	In	186	278	451	53
	Out	24	56	48	53
Lab	In	183	274	444	54
	Out	36	83	71	54
Retail	In	28	10	20	5
	Out	17	10	10	5
Total Project Generated	In	397	562	915	112
	Out	77	149	129	112
p.m. Peak Hour					
Office	In	32	76	65	49
	Out	167	251	407	49
Lab	In	27	64	55	48
	Out	164	246	399	48
Retail	In	85	48	49	18
	Out	90	32	64	18
Total Project Generated	In	144	188	169	115
	Out	421	529	870	115

1. ITE Trip Generation Rate, 9th Edition, LUC 710 (Office), 664,358 square feet.
2. ITE Trip Generation Rate, 9th Edition, LUC 760 (Lab), 886,722 square feet.
3. ITE Trip Generation Rate, 9th Edition, LUC 820 (Shopping Center), 72,500 square feet.

2.4.7 Trip Distribution

The trip distribution identifies the various travel paths for vehicles associated with the Project. Trip distribution patterns for the Project were based on BTD's origin-destination data for Area 15 and trip distribution patterns presented in traffic studies for nearby projects. The trip distribution patterns for entering and exiting vehicles are illustrated in Figure 2-15 and Figure 2-16 respectively.

2.4.8 Build Traffic Volumes

The vehicle trips were distributed through the study area. The Project-generated trips for the a.m. and p.m. peak hours are shown in Figure 2-17 and Figure 2-18.

The trip assignments were added to the No-Build (2024) Condition vehicular traffic volumes to develop the Build (2024) Condition vehicular traffic volumes. The Build (2024) Condition a.m. and p.m. peak hour traffic volumes are shown on Figure 2-19 and Figure 2-20, respectively.
Bicycle Accommodations

BTD has established guidelines requiring projects subject to Transportation Access Plan Agreements to provide secure bicycle parking for residents and short-term bicycle racks for visitors. Based on BTD guidelines, the Project will supply a minimum of 472 secure bicycle parking/storage spaces within the Project Site for employees, public bicycle racks throughout the Project Site for visitors, and a bike share station.

2.4.9 Bicycle Accommodations

The proponent is committed to providing start of the art bicycle accommodations on site. These bicycle accommodations will connect the site to the Albany Street bike infrastructure. The site will include publically accessible bicycle racks for visitors, up to 475 secured/covered bicycle spaces, as well as on-site shower accommodations for employees. It is expected that there will be two Hubway locations on site, one located near Albany Street that would be beneficial to neighbors and visitors, and one located further into the site that would help activate Albany Green and be seen mainly as an amenity for employees of the site. The final location of the bike share stations will be determined by Boston Bikes and Hubway. In addition, the proponent is working with the City to advance the Albany Street redesign that will include a shared bus rapid transit/protected bicycle lane.

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Figure 2.15
Trip Distribution Entering

Source: Howard Stein Hudson

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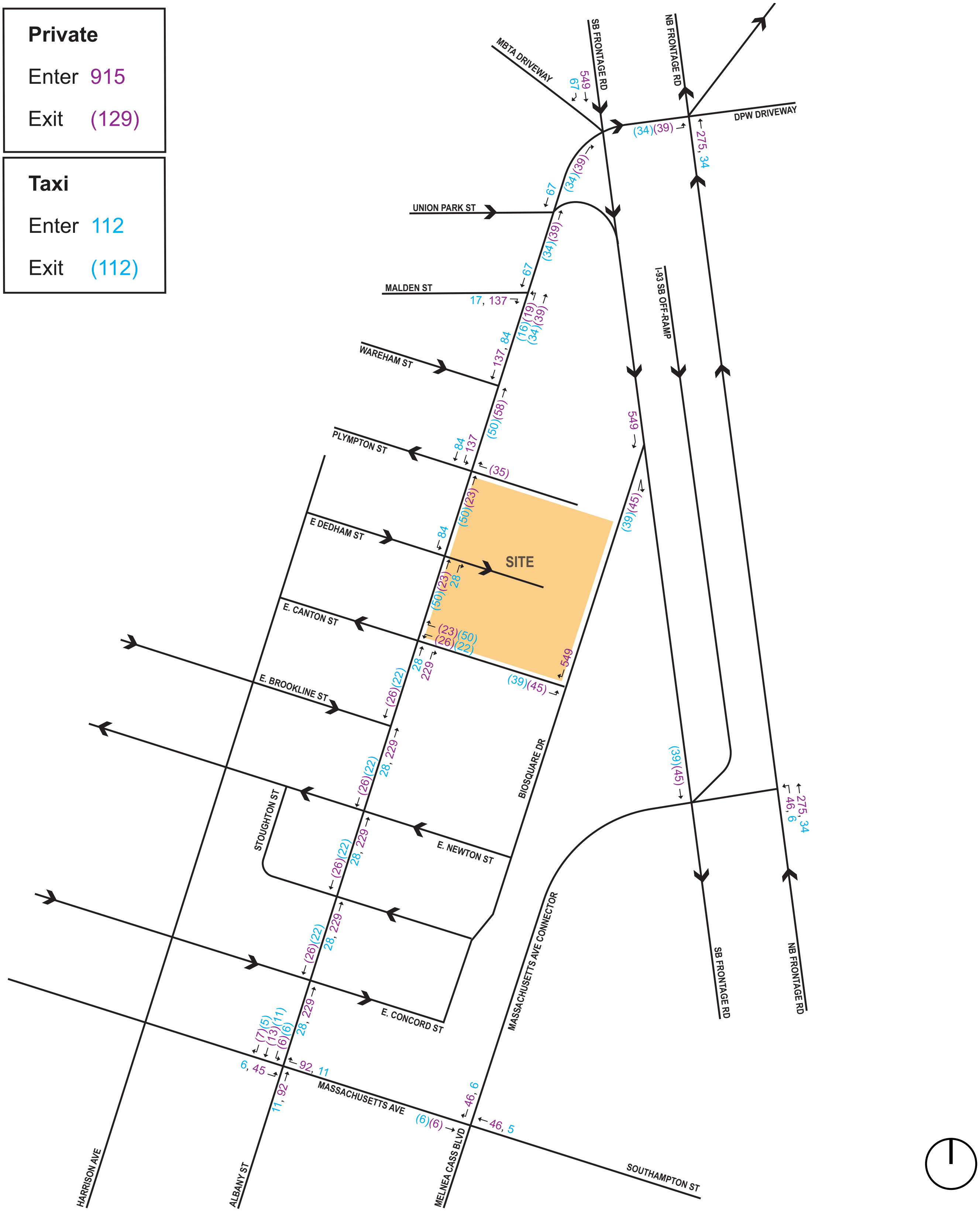
Figure 2.16
Trip Distribution Exiting

Source: Howard Stein Hudson



THE ABBEY GROUP
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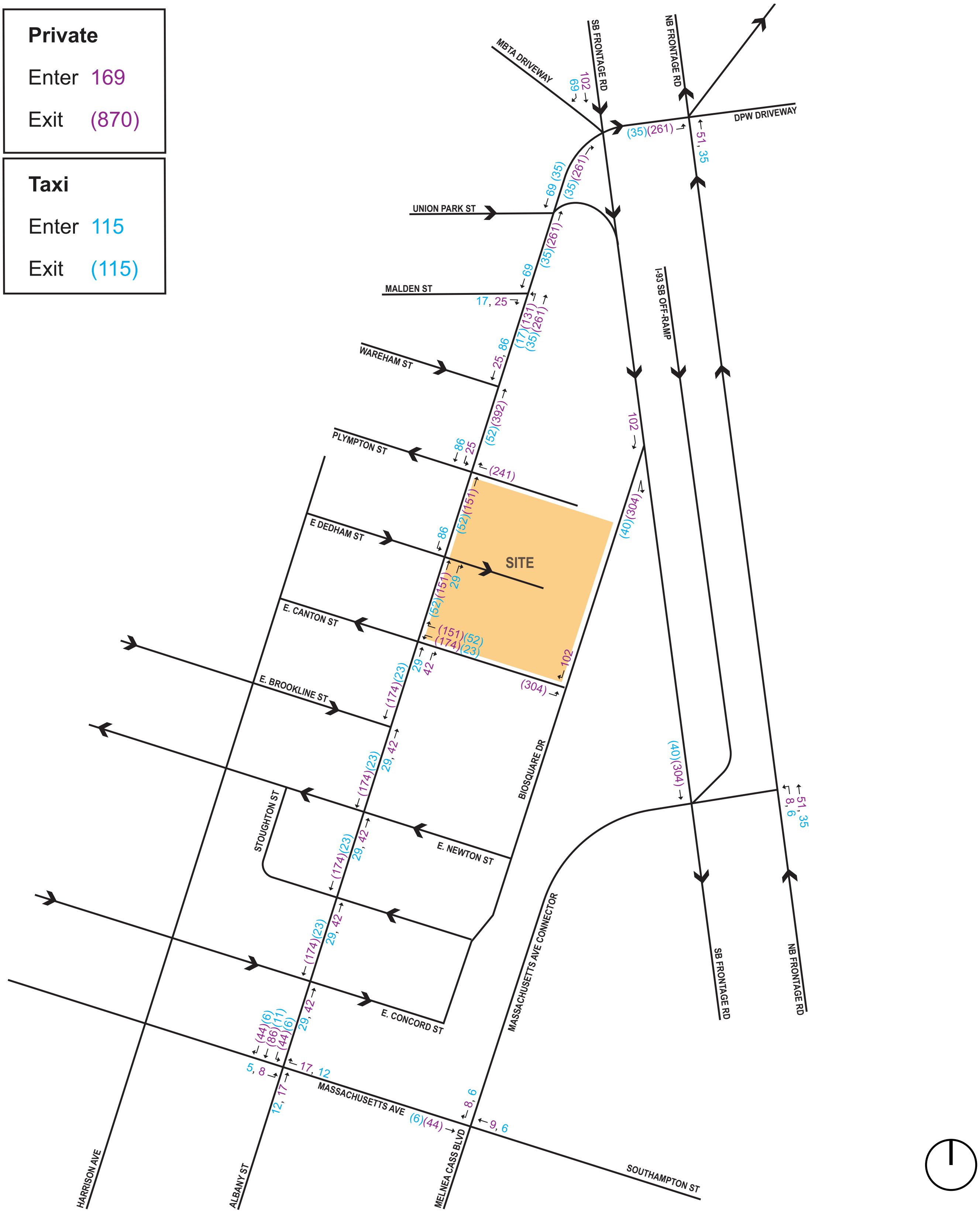
Stantec

EXCHANGE SOUTH END

Figure 2.17
Project Generated Trips, Weekday a.m. Peak Hour
Source: Howard Stein Hudson



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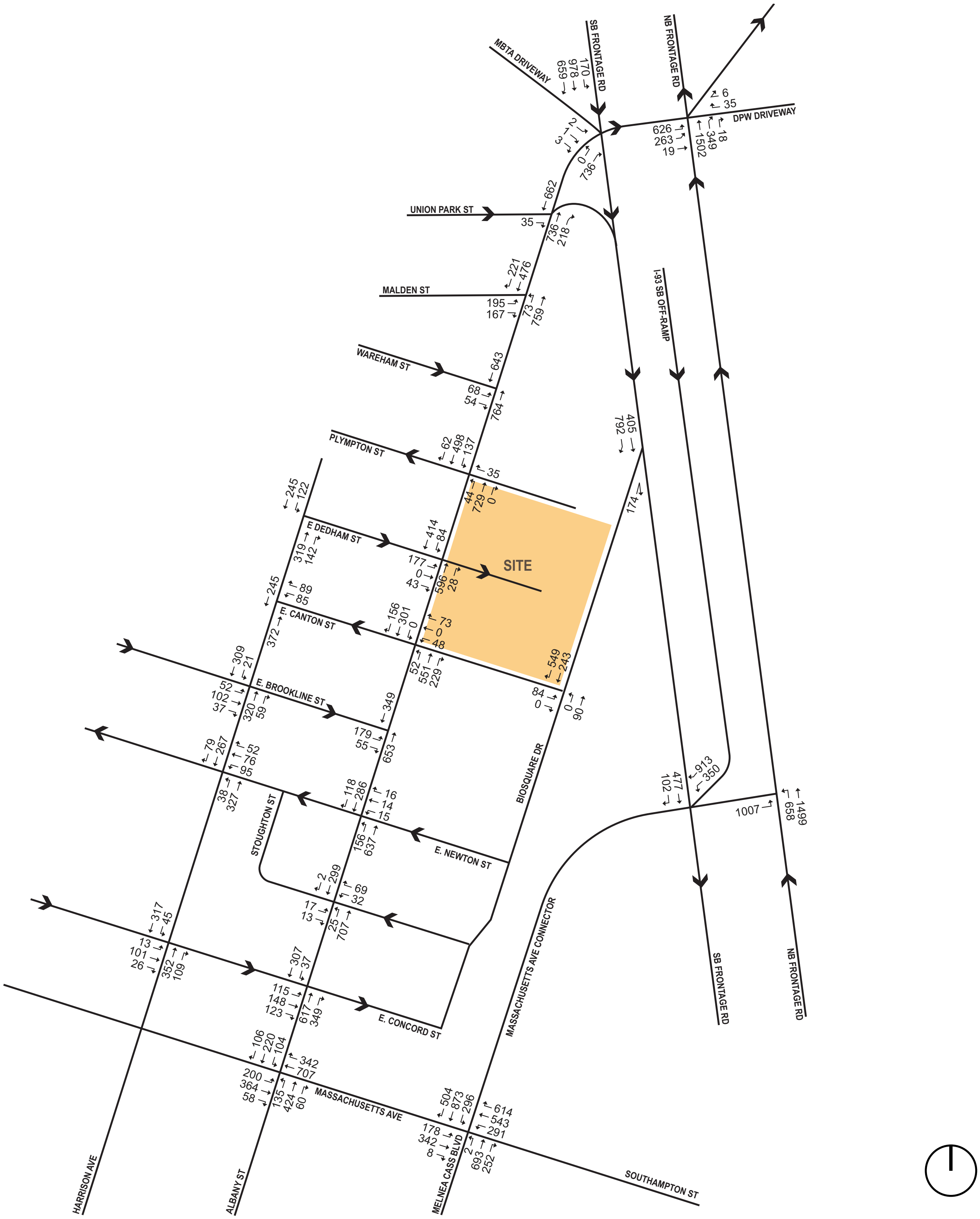
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2.18
Project Generated Trips, Weekday p.m. Peak Hour
Source: Howard Stein Hudson



THE ABBEY GROUP
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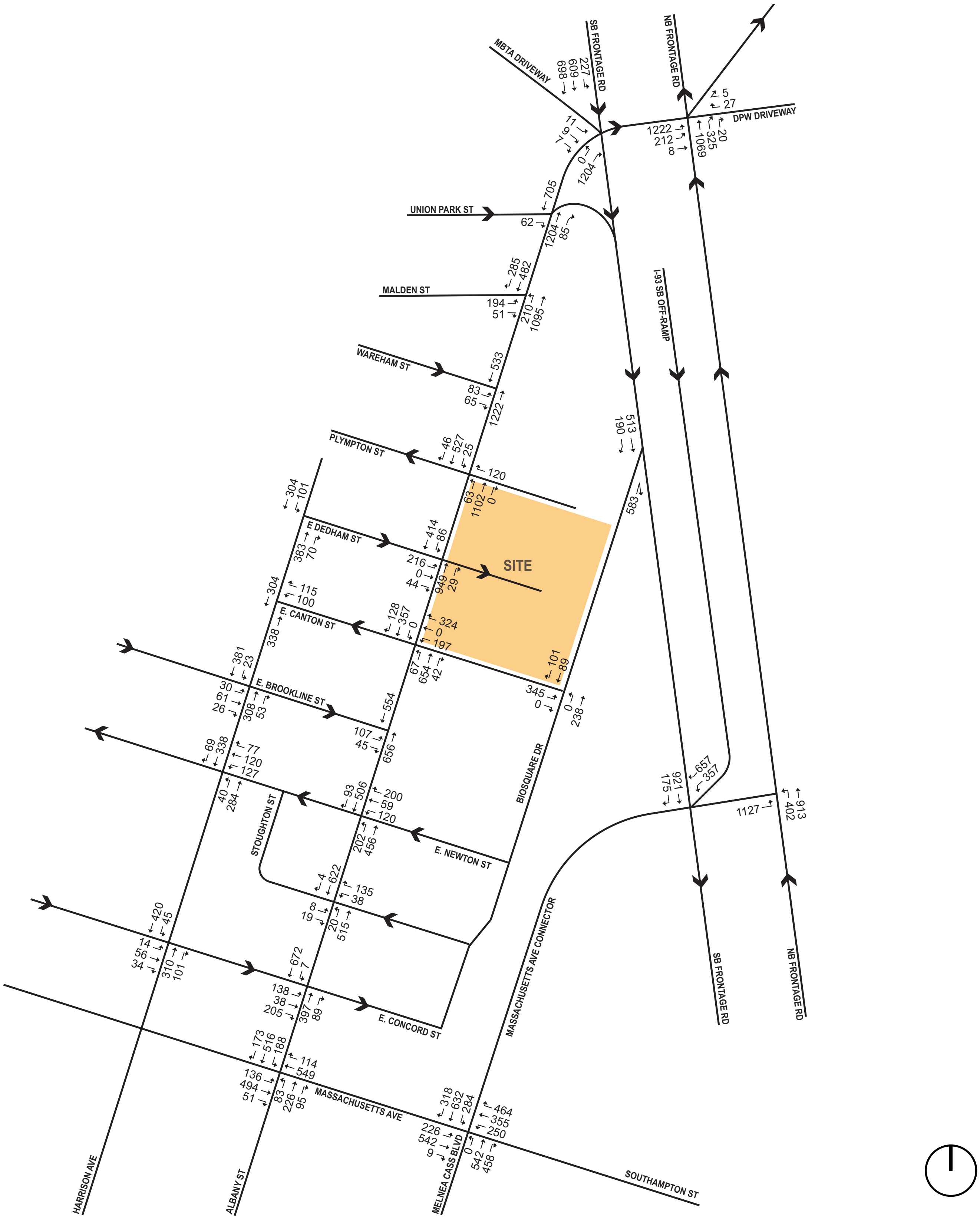
Stantec

EXCHANGE SOUTH END

Figure 2.19
Build (2024) Condition Traffic Volumes, Weekday a.m. Peak Hour
Source: Howard Stein Hudson



THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2.20

Build (2024) Condition Traffic Volumes, Weekday p.m. Peak Hour

Source: Howard Stein Hudson

2.5 TRAFFIC OPERATIONS ANALYSIS

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

LOS designations are based on average delay per vehicle for all vehicles entering an intersection. Table 2-7 displays the intersection LOS criteria. LOS A indicates the most favorable condition, with minimum traffic delay, while LOS F represents the worst condition, with significant traffic delay. LOS D or better is typically considered desirable during the peak hours of traffic in urban and suburban settings.

Table 2-7 Vehicle Level of Service Criteria

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

Source: 2000 Highway Capacity Manual, Transportation Research Board.

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

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

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

2.5.1 Existing (2017) Condition Traffic Operations Analysis

Table 2-8 and Table 2-9 summarize the Existing (2017) Condition capacity analysis for the study area intersection during the a.m. and p.m. peak hours, respectively. The detailed analysis sheets are provided in Appendix C.

Table 2-8 Existing (2017) Condition, Capacity Analysis Summary, a.m. Peak Hour

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Signalized Intersections					
NB Frontage Rd / Albany St / DPW Driveway	**C**	**26.6**	-	-	-
Albany St Connector EB left	C	23.8	0.62	114	m162
Albany St Connector EB left/bear left	C	25.7	0.63	116	m170
Albany St Connector EB thru	B	12.9	0.03	4	m9
DPW Driveway WB right/hard right	A	8.0	0.24	0	13
NB Frontage Rd NB thru | thru | thru/right	C	28.4	0.68	341	398
I-93 SB Frontage Rd / Albany St / MBTA Dr	**C**	**24.3**	-	-	-
MBTA Driveway EB thru/right	D	40.5	0.14	4	12
SB Frontage Rd SB left	A	3.3	0.15	0	30
SB Frontage Rd SB left/thru | thru	B	10.7	0.15	29	67
SB Frontage Rd SB bear right/right	A	2.2	0.45	0	208
Albany St NEB right | right/hard right	D	46.5	0.91	323	385
East Newton Street / Albany Street	**A**	**5.7**	-	-	-
E. Newton St WB left/thru	E	56.1	0.15	13	29
E. Newton St WB right	E	55.0	0.10	8	22
Albany St NB left	A	3.1	0.17	11	66
Albany St NB thru	A	3.9	0.26	44	230
Albany St SB thru	A	5.2	0.26	85	135
Albany St SB right	A	4.7	0.12	23	45
East Concord Street / Albany Street	**C**	**21.8**	-	-	-
E. Concord St EB left	E	61.0	0.58	88	142
E. Concord St EB thru	E	59.2	0.55	87	141
E. Concord St EB right	E	67.5	0.66	90	145
Albany St NB thru | thru/right	B	11.9	0.38	156	194
Albany St SB left/thru | thru	A	4.4	0.29	33	82
Massachusetts Avenue / Albany Street	**C**	**29.5**	-	-	-
Mass. Ave EB left	B	14.9	0.21	25	55
Mass. Ave EB thru | thru| thru /right	B	13.4	0.18	62	94
Mass. Ave WB thru | thru	B	18.9	0.46	204	289
Mass. Ave WB right	B	11.8	0.30	133	208
Albany St NB left/thru | thru	E	55.0	0.80	173	218
Albany St NB right	D	35.5	0.12	27	56
Albany St SB left	F	>80.0	0.74	81	#169
Albany St SB thru | thru/right	D	40.3	0.29	94	113

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Massachusetts Avenue / Mass. Avenue Connector / Melnea Cass Boulevard	**C**	**32.8**	-	-	-
Mass. Ave EB left | left	E	68.9	0.71	90	m137
Mass. Ave EB thru |thru/right	E	60.0	0.51	130	181
Southampton St WB left |left	D	40.2	0.36	100	150
Southampton St WB thru | thru	C	34.3	0.42	157	223
Southampton St WB right	A	0.9	0.42	0	0
Melnea Cass Blvd NB thru |thru	D	51.5	0.83	270	333
Melnea Cass Blvd NB right	A	5.0	0.31	24	47
Mass. Ave Connector SB left | left	E	61.0	0.72	115	159
Mass. Ave Connector SB thru | thru	C	27.3	0.57	262	294
Mass. Ave Connector SB right	B	14.0	0.52	171	224
Harrison Avenue / East Concord Street	**B**	**12.5**	-	-	-
East Concord St EB left	C	32.7	0.07	8	23
East Concord St EB thru/right	D	44.5	0.62	70	118
Harrison Ave NB thru/right	A	6.5	0.37	54	187
Harrison Ave SB left/thru	A	5.2	0.31	40	147
Harrison Avenue / East Newton Street	**B**	**19.1**	-	-	-
East Newton St WB left/thru/right	D	48.5	0.76	107	162
Harrison Ave NB left/thru	B	11.4	0.33	54	166
Harrison Ave SB thru/right	A	7.4	0.30	40	75
Harrison Avenue / East Brookline Street	**B**	**15.0**	-	-	-
East Brookline St EB left/thru/right	D	46.7	0.71	105	166
Harrison Ave NB thru/right	A	4.4	0.33	26	53
Harrison Ave SB left/thru	A	7.5	0.30	47	164
Mass. Avenue Connector / I-93 SB Frontage Road / I-93 SB Off-Ramp	**C**	**27.3**	-	-	-
I-93 SB Frontage Rd SB thru	C	27.3	0.40	131	223
I-93 SB Frontage Rd SB right	C	24.8	0.19	47	97
I-93 SB Off-Ramp SWB left/right	C	25.5	0.77	298	383
I-93 SB Off-Ramp SWB right	C	29.7	0.83	311	416
Mass. Avenue Connector / I-93 NB Frontage Road	**C**	**26.1**	-	-	-
Mass. Ave Connector EB left | left	C	29.8	0.82	271	320
I-93 NB Frontage Road NB left	C	27.3	0.77	297	#563
I-93 NB Frontage Road NB left/thru | thru	C	22.4	0.76	306	445

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Unsignalized Intersections					
Union Park Street / Albany Street	-	-	-	-	-
Union Park St EB right	C	16.9	0.12	-	10
Albany St NB thru | thru	A	0.0	0.25	-	0
Albany St SB thru	A	0.0	0.41	-	0
Malden Street/ Albany Street	-	-	-	-	-
Malden St EB left/right	F	>50.0	>1.00	-	440
Albany St NB left/thru | thru	A	2.1	0.30	-	5
Albany St SB thru/right	A	0.0	0.45	-	0
Wareham Street/ Albany Street	-	-	-	-	-
Wareham St EB left/right	D	28.4	0.41	-	47
Albany St NB thru	A	0.0	0.36	-	0
Albany St SB thru	A	0.0	0.32	-	0
Plympton Street/ Albany Street	-	-	-	-	-
Albany St NB left/thru	A	1.2	0.05	-	4
Albany St SB thru/right	A	0.0	0.33	-	0
East Dedham Street/ Albany Street	-	-	-	-	-
E. Dedham Street EB left/right	E	43.4	0.69	-	114
Albany Street NB thru	A	0.0	0.33	-	0
Albany Street SB thru	A	0.0	0.29	-	0
East Canton Street/ Albany Street/Flower Exchange Driveway	-	-	-	-	-
Driveway WB left/thru/right	D	34.3	0.23	-	21
Albany St NB left/thru/right	A	1.4	0.05	-	4
Albany St SB left/thru/right	A	0.2	0.01	-	0
Albany Street/East Brookline Street	-	-	-	-	-
E. Brookline St EB left/right	F	>50.0	0.95	-	224
Albany St NB thru	A	0.0	0.26	-	0
Albany St SB thru	A	0.0	0.28	-	0
Albany Street / Stoughton Street	-	-	-	-	-
Stoughton St EB left/right	D	29.5	0.16	-	14
Stoughton St WB left	F	>50.0	0.54	-	63
Stoughton St WB right	C	18.6	0.28	-	29
Albany St NB thru | thru/right	A	0.5	0.19	-	2
Albany St SB thru/right	A	0.0	0.23	-	0

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Harrison Avenue / East Canton Street	-	-	-	-	-
East Canton St WB left/right	C	16.1	0.31	-	32
Harrison Ave NB thru	A	0.0	0.21	-	0
Harrison Ave SB thru	A	0.0	0.15	-	0
Harrison Avenue / East Dedham Street	-	-	-	-	-
Harrison Ave NB thru/right	A	0.0	0.22	-	0
Harrison Ave SB left/thru	A	3.0	0.09	-	7

Grey Shading indicates LOS E or F.
~ 50th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.
# 95th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.
m Volumes for 95th percentile queue is metered by upstream signal.

Table 2-9 Existing (2017) Condition, Capacity Analysis Summary, p.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
NB Frontage Rd / Albany St / DPW Driveway	**D**	**50.3**	-	-	-
Albany St Connector EB left	F	>80.0	0.86	364	m441
Albany St Connector EB left/bear left	F	>80.0	0.86	361	m434
Albany St Connector EB thru	A	7.1	0.01	3	m3
DPW Driveway WB right/hard right	A	4.6	0.19	0	0
NB Frontage Rd NB thru | thru | thru/right	C	24.1	0.54	253	304
I-93 SB Frontage Rd / Albany St / MBTA Dr	**D**	**40.5**	-	-	-
MBTA Driveway EB thru/right	E	56.6	0.52	25	35
SB Frontage Rd SB left	D	38.9	0.46	137	224
SB Frontage Rd SB left/thru | thru	C	24.3	0.40	117	162
SB Frontage Rd SB bear right/right	A	4.1	0.44	97	151
Albany St NEB right | right/hard right	E	65.9	0.92	357	#446
East Newton Street / Albany Street	**C**	**23.4**	-	-	-
E. Newton St WB left/thru	D	42.5	0.33	79	124
E. Newton St WB right	E	64.6	0.81	189	261
Albany St NB left	A	7.4	0.27	14	92
Albany St NB thru	A	7.8	0.33	37	245
Albany St SB thru	B	17.0	0.32	134	234
Albany St SB right	B	16.2	0.17	35	80
East Concord Street / Albany Street	**C**	**22.0**	-	-	-
E. Concord St EB left	D	50.6	0.48	96	149
E. Concord St EB thru	D	41.2	0.09	18	43
E. Concord St EB right	E	67.8	0.77	144	212
Albany St NB thru | thru/right	B	10.2	0.19	37	122
Albany St SB left/thru | thru	A	5.5	0.27	94	65
Massachusetts Avenue / Albany Street	**C**	**27.1**	-	-	-
Mass. Ave EB left	B	19.3	0.13	20	52
Mass. Ave EB thru | thru| thru /right	B	18.3	0.24	94	147
Mass. Ave WB thru | thru	C	24.9	0.42	114	155
Mass. Ave WB right	A	7.0	0.14	22	42
Albany St NB left/thru | thru	D	54.3	0.72	125	142
Albany St NB right	D	42.7	0.32	68	99
Albany St SB left	D	40.5	0.47	108	171
Albany St SB thru | thru/right	C	22.0	0.40	165	200

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Massachusetts Avenue / Mass. Avenue Connector / Melnea Cass Boulevard	**C**	**31.6**	-	-	-
Mass. Ave EB left | left	E	60.0	0.73	80	159
Mass. Ave EB thru |thru/right	C	32.8	0.62	120	139
Southampton St WB left |left	D	44.0	0.36	87	137
Southampton St WB thru | thru	C	34.2	0.30	103	157
Southampton St WB right	A	0.5	0.31	0	0
Melnea Cass Blvd NB thru |thru/right	C	49.4	0.83	269	336
Melnea Cass Blvd NB right	A	7.9	0.42	47	93
Mass. Ave Connector SB left | left	E	61.4	0.72	109	153
Mass. Ave Connector SB thru | thru	C	24.7	0.41	172	203
Mass. Ave Connector SB right	A	9.5	0.34	89	119
Harrison Avenue / East Concord Street	**A**	**8.1**	-	-	-
East Concord St EB left	D	36.2	0.09	9	25
East Concord St EB thru/right	D	36.6	0.51	40	82
Harrison Ave NB thru/right	A	4.9	0.33	39	156
Harrison Ave SB left/thru	A	3.2	0.35	40	75
Harrison Avenue / East Newton Street	**C**	**21.3**	-	-	-
East Newton St WB left/thru/right	D	48.0	0.79	150	202
Harrison Ave NB thru/right	A	9.1	0.35	70	109
Harrison Ave SB left/thru	B	12.9	0.37	75	208
Harrison Avenue / East Brookline Street	**B**	**12.0**	-	-	-
East Brookline St EB left/thru/right	D	43.5	0.60	68	108
Harrison Ave NB thru/right	A	5.7	0.27	69	131
Harrison Ave SB left/thru	A	6.0	0.31	44	176
Mass. Avenue Connector / I-93 SB Frontage Road / I-93 SB Off-Ramp	**C**	**25.2**	-	-	-
I-93 SB Frontage Rd SB thru	C	24.4	0.51	190	351
I-93 SB Frontage Rd SB right	A	4.2	0.23	0	47
I-93 SB Off-Ramp SWB left/right	C	30.8	0.78	306	321
I-93 SB Off-Ramp SWB right	C	27.2	0.71	286	300
Mass. Avenue Connector / I-93 NB Frontage Road	**C**	**24.5**	-	-	-
Mass. Ave Connector EB left | left	C	30.6	0.86	300	371
I-93 NB Frontage Road NB left	C	20.2	0.54	175	290
I-93 NB Frontage Road NB thru/left | thru	B	18.1	0.54	184	255

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Unsignalized Intersections					
Union Park Street / Albany Street	-	-	-	-	-
Union Park St EB right	C	16.5	0.20	-	18
Albany St NB thru | thru	A	0.0	0.29	-	0
Albany St SB thru	A	0.0	0.37	-	0
Malden Street/ Albany Street	-	-	-	-	-
Malden St EB left/right	F	>50.0	>1.00	-	290
Albany St NB left/thru | thru	A	0.8	0.31	-	5
Albany St SB thru/right	A	0.0	0.41	-	0
Wareham Street/ Albany Street	-	-	-	-	-
Wareham St EB left/right	D	31.9	0.43	-	51
Albany St NB thru	A	0.0	0.45	-	0
Albany St SB thru	A	0.0	0.23	-	0
Plympton Street/ Albany Street	-	-	-	-	-
Albany St NB left/thru	A	1.4	0.06	-	4
Albany St SB thru/right	A	0.0	0.24	-	0
East Dedham Street/ Albany Street	-	-	-	-	-
E. Dedham Street EB left/right	F	>50.0	>1.00	-	255
Albany Street NB thru	A	0.0	0.43	-	0
Albany Street SB thru	A	0.0	0.25	-	0
East Canton Street/ Albany Street/Flower Exchange Driveway	-	-	-	-	-
Driveway WB left/thru/right	C	23.2	0.06	-	5
Albany St NB left/thru/right	A	1.5	0.06	-	5
Albany St SB left/thru/right	A	0.1	0.00	-	0
Albany Street/East Brookline Street	-	-	-	-	-
E. Brookline St EB left/right	E	40.0	0.67	-	112
Albany St NB thru	A	0.0	0.41	-	0
Albany St SB thru	A	0.0	0.22	-	0
Albany Street / Stoughton Street	-	-	-	-	-
Stoughton St EB left/right	D	30.4	0.19	-	17
Stoughton St WB left	F	>50.0	0.66	-	87
Stoughton St WB right	C	18.8	0.37	-	41
Albany St NB left/thru | thru	A	0.4	0.18	-	2
Albany St SB thru/right	A	0.0	0.24	-	0

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Harrison Avenue / East Canton Street	-	-	-	-	-
East Canton St WB left/right	C	15.5	0.33	-	35
Harrison Ave NB thru	A	0.0	0.17	-	0
Harrison Ave SB thru	A	0.0	0.18	-	0
Harrison Avenue / East Dedham Street	-	-	-	-	-
Harrison Ave NB thru/right	A	0.0	0.24	-	0
Harrison Ave SB left/thru	A	2.1	0.06	-	5

Grey Shading indicates LOS E or F.
~ 50th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.
# 95th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.
m Volumes for 95th percentile queue is metered by upstream signal.

As shown in Table 2-8 and Table 2-9, the majority of intersections and approaches operate well under the Existing (2017) Condition with the following exceptions:

- The signalized intersection of **I-93 NB Frontage Road/Albany Street Connector/DPW Driveway** operates at LOS C during the a.m. peak hour and LOS D during the p.m. peak hour. The Albany Street Connector eastbound approach operates at LOS F during the p.m. peak hour. The longest queues at the intersection occur at the I-93 NB Frontage Road northbound approach during the a.m. peak hour and at the Albany Street Connector eastbound approach during the p.m. peak hour.

- The signalized intersection of **I-93 SB Frontage Road/Albany Street/MBTA Driveway** operates at LOS C during the a.m. peak hour and LOS D during the p.m. peak hour. The MBTA driveway eastbound approach operates at LOS D during the a.m. peak hour and LOS E during the p.m. peak hour. The Albany Street north-eastbound approach operates at LOS E during the p.m. peak hour. The longest queues at the intersection occur at the Albany Street north-eastbound approach during both the a.m. and p.m. peak hours.

- The signalized intersection of **East Newton Street/Albany Street** operates at LOS A during the a.m. peak hour and LOS C during the p.m. peak hour. The East Newton Street westbound left-turn/through lane operates at LOS E during the a.m. peak hour and LOS D during the p.m. peak hour. The East Newton Street westbound right-turn lane operates at LOS D during the a.m. peak hour and LOS E during the p.m. peak hour. The longest queues at the intersection occur at the Albany Street northbound approach during the a.m. peak hour and at the East Newton Street westbound approach during the p.m. peak hour.

- The signalized intersection of **East Concord Street/Albany Street** operates at LOS C during both the a.m. and p.m. peak hours. The East Concord Street eastbound approach operates at LOS E during both the a.m. and p.m. peak hours. The longest queues at the intersection occur at the Albany Street northbound approach during the a.m. peak hour and at the East Concord Street eastbound approach during the p.m. peak hour.

- The signalized intersection of **Massachusetts Avenue/Albany Street** operates at LOS C during both the a.m. and p.m. peak hours. The Albany Street northbound approach operates at LOS E during the a.m. peak hour and LOS D during the p.m. peak hour. The Albany Street southbound left-turn lane operates at LOS F during the a.m. peak hour and LOS D during the p.m. peak hour. The longest queues at the intersection occur at the Massachusetts Avenue westbound approach during the a.m. peak hour and the Albany Street southbound approach during the p.m. peak hours.

In the Existing Condition, all unsignalized intersection approaches operate at LOS D or better during the a.m. and p.m. peak hours with the following exceptions:

- The **Malden Street/Albany Street Malden Street** eastbound approach operates at LOS F during both the a.m. and p.m. peak hours.
- The **East Dedham Street/Albany Street** East Dedham Street eastbound approach operates at LOS E during the a.m. peak hour and LOS F during the p.m. peak hour.
- The **East Brookline Street/Albany Street** East Brookline Street eastbound approach operates at LOS F during the a.m. peak hour and LOS E during the p.m. peak hour.
- The **Stoughton Street/Albany Street** Stoughton Street westbound left-turn lane operates at LOS F during the a.m. and p.m. peak hours.

2.5.2 No Build (2024) Condition Traffic Operations Analysis

The No-Build (2024) Condition analysis uses the same methodology as the Existing (2017) Condition capacity analysis. Tables 2-10 and Table 2-11 present the No-Build (2024) Condition operations analysis for the a.m. and p.m. peak hours, respectively. The shaded cells in the tables indicate a decrease in LOS between the Existing (2017) Condition and the No-Build (2024) Condition to a LOS below LOS D. The detailed analysis sheets are provided in Appendix C.

Table 2-10 No-Build (2024) Condition, Capacity Analysis Summary, a.m. Peak Hour

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Signalized Intersections					
NB Frontage Rd / Albany St / DPW Driveway	**C**	**31.2**	-	-	-
Albany St Connector EB left	C	32.6	0.69	128	m158
Albany St Connector EB left/bear left	C	34.8	0.70	130	m166
Albany St Connector EB thru	B	12.3	0.03	3	m8
DPW Driveway WB right/hard right	A	8.2	0.25	0	15
NB Frontage Rd NB thru | thru | thru/right	C	30.8	0.76	408	472
I-93 SB Frontage Rd / Albany St / MBTA Dr	**C**	**27.6**	-	-	-
MBTA Driveway EB thru/right	D	40.5	0.14	4	12
SB Frontage Rd SB left	A	5.1	0.22	0	56
SB Frontage Rd SB left/thru | thru	B	14.8	0.32	82	154
SB Frontage Rd SB bear right/right	A	2.0	0.42	0	179
Albany St NEB right | right/hard right	D	52.4	0.97	342	#343
Malden Street / Albany Street	**C**	**20.1**	-	-	-
Malden St EB left/right	C	26.9	0.60	72	118
Albany St NB left/thru | thru	B	13.2	0.58	97	184
Albany St SB thru/right	C	25.8	0.85	190	#598
East Newton Street / Albany Street	**A**	**7.8**	-	-	-
E. Newton St WB left/thru	E	60.6	0.34	31	53
E. Newton St WB right	E	56.2	0.20	17	35
Albany St NB left	A	3.7	0.19	26	61
Albany St NB thru	A	4.8	0.26	90	201
Albany St SB thru	A	4.3	0.18	56	m72
Albany St SB right	A	4.1	0.13	25	m34
East Concord Street / Albany Street	**C**	**24.4**	-	-	-
E. Concord St EB left	E	58.6	0.56	92	147
E. Concord St EB thru	E	65.4	0.69	120	183
E. Concord St EB right	E	66.6	0.68	99	158
Albany St NB thru | thru/right	B	12.5	0.48	191	238
Albany St SB left/thru | thru	A	2.3	0.15	13	26
Massachusetts Avenue / Albany Street	**C**	**30.1**	-	-	-
Mass. Ave EB left	B	19.5	0.46	58	104
Mass. Ave EB thru | thru| thru /right	B	19.5	0.46	58	104
Mass. Ave WB thru | thru	B	14.0	0.17	60	87
Mass. Ave WB right	B	12.1	0.30	137	207
Albany St NB left/thru | thru	D	54.9	0.82	186	238

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Albany St NB right	D	35.6	0.17	39	73
Albany St SB left	F	>80.0	0.78	85	#181
Albany St SB thru | thru/right	D	35.9	0.30	87	110
Massachusetts Avenue / Mass. Avenue Connector / Melnea Cass Boulevard	**C**	**32.3**	-	-	-
Mass. Ave EB left | left	E	64.1	0.63	73	m117
Mass. Ave EB thru |thru/right	E	57.3	0.54	134	m186
Southampton St WB left |left	D	41.1	0.38	103	155
Southampton St WB thru | thru	C	34.7	0.44	169	239
Southampton St WB right	A	0.9	0.43	0	0
Melnea Cass Blvd NB thru |thru	D	51.3	0.83	272	339
Melnea Cass Blvd NB right	A	5.2	0.31	25	50
Mass. Ave Connector SB left | left	E	61.0	0.73	117	161
Mass. Ave Connector SB thru | thru	C	27.1	0.58	263	301
Mass. Ave Connector SB right	B	14.0	0.51	169	223
Harrison Avenue / East Concord Street	**B**	**12.3**	-	-	-
East Concord St EB left	C	32.6	0.07	8	23
East Concord St EB thru/right	D	44.9	0.63	72	120
Harrison Ave NB thru/right	A	7.7	0.46	76	257
Harrison Ave SB left/thru	A	5.8	0.39	55	208
Harrison Avenue / East Newton Street	**C**	**21.6**	-	-	-
East Newton St WB left/thru/right	D	49.7	0.80	128	190
Harrison Ave NB left/thru	B	14.1	0.41	76	220
Harrison Ave SB thru/right	B	9.8	0.36	57	126
Harrison Avenue / East Brookline Street	**B**	**14.3**	-	-	-
East Brookline St EB left/thru/right	D	46.6	0.72	107	168
Harrison Ave NB thru/right	A	4.8	0.40	36	61
Harrison Ave SB left/thru	A	8.1	0.35	59	198
Mass. Avenue Connector / I-93 SB Frontage Road / I-93 SB Off-Ramp	**C**	**29.1**	-	-	-
I-93 SB Frontage Rd SB thru	C	34.1	0.64	231	#394
I-93 SB Frontage Rd SB right	C	25.5	0.20	49	98
I-93 SB Off-Ramp SWB left/right	C	25.9	0.79	311	417
I-93 SB Off-Ramp SWB right	C	29.8	0.84	320	446

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Mass. Avenue Connector / I-93 NB Frontage Road	**C**	**27.5**	-	-	-
Mass. Ave Connector EB left | left	C	29.8	0.83	277	330
I-93 NB Frontage Road NB left	C	28.1	0.78	302	#563
I-93 NB Frontage Road NB left/thru | thru	C	25.3	0.82	349	#544
Unsignalized Intersections					
Union Park Street / Albany Street	-	-	-	-	-
Union Park St EB right	C	15.8	0.11	-	9
Albany St NB thru | thru	A	0.0	0.28	-	0
Albany St SB thru	A	0.0	0.38	-	0
Wareham Street/ Albany Street	-	-	-	-	-
Wareham St EB left/right	E	38.8	0.58	-	82
Albany St NB thru	A	0.0	0.41	-	0
Albany St SB thru	A	0.0	0.28	-	0
Plympton Street/ Albany Street	-	-	-	-	-
Albany St NB left/thru	A	1.2	0.05	-	4
Albany St SB thru/right	A	0.0	0.31	-	0
East Dedham Street/ Albany Street	-	-	-	-	-
E. Dedham Street EB left/right	F	>50.0	>1.00	-	278
Albany Street NB thru	A	0.0	0.33	-	0
Albany Street SB thru	A	0.0	0.26	-	0
East Canton Street/ Albany Street/Flower Exchange Driveway	-	-	-	-	-
Driveway WB left/thru/right	D	30.9	0.21	-	19
Albany St NB left/thru/right	A	1.4	0.05	-	4
Albany St SB left/thru/right	A	0.2	0.01	-	0
Albany Street/East Brookline Street	-	-	-	-	-
E. Brookline St EB left/right	E	49.8	0.80	-	165
Albany St NB thru	A	0.0	0.26	-	0
Albany St SB thru	A	0.0	0.20	-	0
Albany Street / Stoughton Street	-	-	-	-	-
Stoughton St EB left/right	E	38.7	0.31	-	30
Stoughton St WB left	E	46.3	0.34	-	35
Stoughton St WB right	C	18.1	0.26	-	26
Albany St NB left/thru | thru	A	0.5	0.03	-	2
Albany St SB thru/right	A	0.0	0.20	-	0

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
BioSquare Drive / I-93 SB Frontage Road	-	-	-	-	-
BioSquare Dr EB right	B	11.1	0.14	-	12
SB Frontage Rd SB thru | thru/right	A	0.0	0.24	-	0
Harrison Avenue / East Canton Street	-	-	-	-	-
East Canton St WB left/right	C	23.2	0.53	-	76
Harrison Ave NB thru	A	0.0	0.26	-	0
Harrison Ave SB thru	A	0.0	0.16	-	0
Harrison Avenue / East Dedham Street	-	-	-	-	-
Harrison Ave NB thru/right	A	0.0	0.28	-	0
Harrison Ave SB left/thru	A	4.1	0.14	-	12

Grey Shading indicates a decrease to LOS E or F.
~ 50th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.
\# 95th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.
m Volumes for 95th percentile queue is metered by upstream signal.

Table 2-11 No-Build (2024) Condition, Capacity Analysis Summary, p.m. Peak Hour

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Signalized Intersections					
NB Frontage Rd / Albany St / DPW Driveway	**D**	**52.5**	-	-	-
Albany St Connector EB left	F	>80.0	0.91	458	m507
Albany St Connector EB left/bear left	F	>80.0	0.94	470	m#534
Albany St Connector EB thru	A	7.0	0.01	2	m3
DPW Driveway WB right/hard right	A	4.6	0.19	0	0
NB Frontage Rd NB thru | thru | thru/right	C	26.7	0.64	302	358
I-93 SB Frontage Rd / Albany St / MBTA Dr	**D**	**49.0**	-	-	-
MBTA Driveway EB thru/right	E	56.6	0.52	25	35
SB Frontage Rd SB left	D	39.8	0.48	143	232
SB Frontage Rd SB left/thru | thru	C	26.1	0.52	156	211
SB Frontage Rd SB bear right/right	A	4.6	0.49	116	182
Albany St NEB right | right/hard right	F	>80.0	0.95	446	m#257
Malden Street/ Albany Street	**B**	**17.9**	-	-	-
Malden St EB left/right	E	60.4	0.77	154	227
Albany St NB left/thru | thru	B	10.7	0.49	157	213
Albany St SB thru/right	B	13.8	0.70	265	333
East Newton Street / Albany Street	**C**	**25.1**	-	-	-
E. Newton St WB left/thru	D	53.1	0.61	141	201
E. Newton St WB right	E	65.2	0.78	163	231
Albany St NB left	A	8.8	0.32	16	130
Albany St NB thru	A	8.7	0.3	31	251
Albany St SB thru	B	17.4	0.34	145	254
Albany St SB right	B	16.5	0.18	39	87
East Concord Street / Albany Street	**C**	**23.7**	-	-	-
E. Concord St EB left	D	48.6	0.47	100	152
E. Concord St EB thru	D	40.3	0.12	26	54
E. Concord St EB right	E	66.5	0.78	158	227
Albany St NB thru | thru/right	B	16.0	0.25	85	177
Albany St SB left/thru | thru	A	5.4	0.22	96	74
Massachusetts Avenue / Albany Street	**C**	**27.8**	-	-	-
Mass. Ave EB left	C	23.0	0.35	55	110
Mass. Ave EB thru | thru| thru /right	C	20.0	0.24	93	141
Mass. Ave WB thru | thru	C	25.2	0.47	116	150
Mass. Ave WB right	A	6.7	0.11	16	31
Albany St NB left/thru | thru	D	52.0	0.72	132	148
Albany St NB right	D	41.7	0.35	78	108

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Albany St SB left	D	39.4	0.44	107	172
Albany St SB thru | thru/right	C	22.4	0.42	179	214
Massachusetts Avenue / Mass. Avenue Connector / Melnea Cass Boulevard	**C**	**32.4**	-	-	-
Mass. Ave EB left | left	E	76.7	0.65	91	143
Mass. Ave EB thru |thru/right	C	32.9	0.64	128	157
Southampton St WB left |left	D	45.1	0.38	89	140
Southampton St WB thru | thru	C	33.6	0.31	109	167
Southampton St WB right	A	0.5	0.31	0	0
Melnea Cass Blvd NB thru |thru	D	49.6	0.83	274	342
Melnea Cass Blvd NB right	A	8.3	0.43	49	98
Mass. Ave Connector SB left | left	E	61.6	0.72	111	155
Mass. Ave Connector SB thru | thru	C	24.5	0.42	174	207
Mass. Ave Connector SB right	A	9.3	0.32	80	107
Harrison Avenue / East Concord Street	**A**	**8.3**	-	-	-
East Concord St EB left	D	36.1	0.09	8	25
East Concord St EB thru/right	D	36.9	0.52	41	84
Harrison Ave NB thru/right	A	5.4	0.38	48	190
Harrison Ave SB left/thru	A	4.5	0.44	67	m120
Harrison Avenue / East Newton Street	**C**	**26.2**	-	-	-
East Newton St WB left/thru/right	D	52.5	0.88	198	#286
Harrison Ave NB left/thru	B	12.2	0.44	96	135
Harrison Ave SB thru/right	B	16.3	0.46	115	262
Harrison Avenue / East Brookline Street	**B**	**11.8**	-	-	-
East Brookline St EB left/thru/right	D	43.7	0.61	70	110
Harrison Ave NB thru/right	A	6.4	0.34	7	224
Harrison Ave SB left/thru	A	6.5	0.36	54	211
Mass. Avenue Connector / I-93 SB Frontage Road / I-93 SB Off-Ramp	**C**	**28.0**	-	-	-
I-93 SB Frontage Rd SB thru	C	34.8	0.78	337	#668
I-93 SB Frontage Rd SB right	A	5.7	0.25	7	58
I-93 SB Off-Ramp SWB left/right	C	29.8	0.78	313	328
I-93 SB Off-Ramp SWB right	C	25.8	0.70	287	298

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Mass. Avenue Connector / I-93 NB Frontage Road	**C**	**25.0**	-	-	-
Mass. Ave Connector EB left | left	C	31.1	0.87	306	388
I-93 NB Frontage Road NB left	B	19.7	0.51	162	261
I-93 NB Frontage Road NB left/thru | thru	B	19.4	0.60	213	286
Unsignalized Intersections					
Union Park Street / Albany Street	-	-	-	-	-
Union Park St EB right	C	18.3	0.22	-	21
Albany St NB thru | thru	A	0.0	0.31	-	0
Albany St SB thru	A	0.0	0.41	-	0
Wareham Street/ Albany Street	-	-	-	-	-
Wareham St EB left/right	F	>50.0	0.78	-	136
Albany St NB thru	A	0.0	0.47	-	0
Albany St SB thru	A	0.0	0.27	-	0
Plympton Street/ Albany Street	-	-	-	-	-
Albany St NB left/thru	A	1.6	0.06	-	5
Albany St SB thru/right	A	0.0	0.31	-	0
East Dedham Street/ Albany Street	-	-	-	-	-
E. Dedham Street EB left/right	F	>50.0	>1.00	-	658
Albany Street NB thru	A	0.0	0.39	-	0
Albany Street SB thru	A	0.0	0.33	-	0
East Canton Street/ Albany Street/Flower Exchange Driveway	-	-	-	-	-
Driveway WB left/thru/right	C	24.1	0.06	-	5
Albany St NB left/thru/right	A	1.8	0.07	-	6
Albany St SB left/thru/right	A	0.1	0	-	0
Albany Street/East Brookline Street	-	-	-	-	-
E. Brookline St EB left/right	E	37.2	0.66	-	107
Albany St NB thru	A	0.0	0.37	-	0
Albany St SB thru	A	0.0	0.24	-	0
Albany Street / Stoughton Street	-	-	-	-	-
Stoughton St EB left/right	D	32.7	0.20	-	18
Stoughton St WB left	F	>50.0	0.37	-	37
Stoughton St WB right	C	17.9	0.34	-	37
Albany St NB left/thru | thru	A	0.4	0.19	-	2
Albany St SB thru/right	A	0.0	0.28	-	0

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
BioSquare Drive / I-93 SB Frontage Road	-	-	-	-	-
BioSquare Dr EB right	B	12.9	0.36	-	41
SB Frontage Rd SB thru | thru/right	A	0.0	0.22	-	0
Harrison Avenue / East Canton Street	-	-	-	-	-
East Canton St WB left/right	C	21.7	0.53	-	77
Harrison Ave NB thru	A	0.0	0.21	-	0
Harrison Ave SB thru	A	0.0	0.19	-	0
Harrison Avenue / East Dedham Street	-	-	-	-	-
Harrison Ave NB thru/right	A	0.0	0.31	-	0
Harrison Ave SB left/thru	A	3.2	0.11	-	9

Grey Shading indicates a decrease to LOS E or F.
~ 50th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.
\# 95th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.
m Volumes for 95th percentile queue is metered by upstream signal.

As shown in Table 2-10 and Table 2-11, the following operational deficiencies are expected under the No-Build (2024) Condition:

- At the signalized intersection of **I-93 Southbound Frontage Road/Albany Street/MBTA Driveway**, the Albany Street north-eastbound approach will decrease to LOS F during the p.m. peak hour. The MBTA Driveway eastbound approach will continue to operate at LOS E during the p.m. peak hour.

- At the signalized intersection of **East Newton Street/Albany Street**, the East Newton Street westbound right-turn lane will decrease to LOS E during the a.m. peak hour and continue to operate at LOS E during the p.m. peak hour. The East Newton Street westbound left-turn/through lane will continue to operate at LOS E during the a.m. peak hour.

- At the unsignalized intersection of **Wareham Street/Albany Street**, the Wareham Street eastbound approach decrease to operate at LOS E during the a.m. peak hour and will decrease to LOS F during the p.m. peak hour.

- At the unsignalized intersection of **East Dedham Street/Albany Street**, the East Dedham Street eastbound approach will decrease from LOS E to LOS F during the a.m. peak hour and will continue to operate at LOS F during the p.m. peak hour.

- At the unsignalized intersection of **Stoughton Street/Albany Street**, the Stoughton Street eastbound approach decreases to LOS E during the a.m. peak hour and continues to operate at LOS F during the p.m. peak hour.

2.5.3 Build (2024) Condition Traffic Operations Analysis

The Build (2024) Condition analysis uses the same methodology as the Existing (2017) Condition and No-Build (2024) Condition analysis. Table 2-12 and Table 2-13 present the Build (2024) Condition capacity analysis for the a.m. and p.m. peak. The shaded cells in the tables indicate a worsening in LOS between the No-Build (2024) Condition and the Build (2024) Condition. The detailed analysis sheets are provided in Appendix C.

Table 2-12 Build (2024) Condition, Capacity Analysis, a.m. Peak Hour

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Signalized Intersections					
NB Frontage Rd / Albany St / DPW Driveway	D	43.0	-	-	-
Albany St Connector EB left	D	52.3	0.74	135	m158
Albany St Connector EB left/bear left	E	58.2	0.76	140	m168
Albany St Connector EB thru	B	11.8	0.03	3	m7
DPW Driveway WB right/hard right	A	8.2	0.25	0	15
NB Frontage Rd NB thru | thru | thru/right	D	38.2	0.91	543	#663
I-93 SB Frontage Rd / Albany St / MBTA Dr	D	41.0	-	-	-
MBTA Driveway EB thru/right	D	40.5	0.14	4	12
SB Frontage Rd SB left	A	7.5	0.22	12	72
SB Frontage Rd SB left/thru | thru	C	25.5	0.72	277	#511
SB Frontage Rd SB bear right/right	A	2.3	0.46	0	213
Albany St NEB right | right/hard right	F	>80.0	>1.00	~480	#449
Malden Street / Albany Street	C	28.0	-	-	-
Malden St EB left/right	E	64.4	0.90	265	#430
Albany St NB left/thru | thru	B	16.8	0.63	205	280
Albany St SB thru/right	C	22.6	0.77	411	601
East Dedham Street / Albany Street	B	14.7	-	-	-
E. Dedham St EB left/thru/right	E	58.5	0.75	168	239
Albany St NB thru/right	A	5.8	0.49	136	194
Albany St SB left/thru	A	6.1	0.49	97	m250
East Canton Street / Albany Street	A	6.4	-		-
Exchange Driveway WB left	E	64.1	0.46	39	79
Exchange Driveway WB right	B	17.0	0.40	0	46
Albany St NB left/thru/right	A	4.4	0.62	49	84
Albany St SB left/thru/right	A	2.1	0.34	27	30
East Newton Street / Albany Street	A	8.7	-	-	-
E. Newton St WB left/thru	E	60.6	0.34	31	53
E. Newton St WB right	E	56.2	0.20	17	35
Albany St NB left/thru/right	A	3.9	0.19	33	60
Albany St NB thru	A	7.7	0.42	242	447
Albany St SB thru	A	4.3	0.21	44	73
Albany St SB right	A	4.3	0.13	18	35

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
East Concord Street / Albany Street	**C**	**23.1**	-	-	-
E. Concord St EB left	E	58.6	0.56	92	147
E. Concord St EB thru	E	65.4	0.69	120	183
E. Concord St EB right	E	66.6	0.68	99	158
Albany St NB thru | thru/right	B	13.1	0.58	236	369
Albany St SB left/thru | thru	A	4.8	0.17	35	75
Massachusetts Avenue / Albany Street	**C**	**32.7**	-	-	-
Mass. Ave EB left	C	29.6	0.67	88	#144
Mass. Ave EB thru | thru| thru /right	B	15.4	0.17	65	87
Mass. Ave WB thru | thru	C	22.0	0.52	232	311
Mass. Ave WB right	B	15.9	0.42	191	274
Albany St NB left/thru | thru	E	57.2	0.88	226	#304
Albany St NB right	C	33.8	0.15	37	73
Albany St SB left	F	>80.0	0.82	89	#193
Albany St SB thru | thru/right	C	32.5	0.31	82	137
Massachusetts Avenue / Mass. Avenue Connector / Melnea Cass Boulevard	**C**	**32.3**	-	-	-
Mass. Ave EB left | left	E	62.5	0.62	71	m112
Mass. Ave EB thru |thru/right	E	56.5	0.55	140	m191
Southampton St WB left |left	D	41.5	0.38	103	155
Southampton St WB thru | thru	D	35.4	0.49	190	265
Southampton St WB right	A	0.9	0.43	0	0
Melnea Cass Blvd NB thru |thru	D	51.3	0.83	272	339
Melnea Cass Blvd NB right	A	5.3	0.31	25	51
Mass. Ave Connector SB left | left	E	61.0	0.73	117	161
Mass. Ave Connector SB thru | thru	C	27.1	0.58	263	301
Mass. Ave Connector SB right	B	15.0	0.55	190	246
Harrison Avenue / East Concord Street	**B**	**12.3**	-	-	-
East Concord St EB left	C	32.6	0.07	8	23
East Concord St EB thru/right	D	44.9	0.63	72	120
Harrison Ave NB thru/right	A	7.7	0.46	76	257
Harrison Ave SB left/thru	A	5.8	0.39	55	208
Harrison Avenue / East Newton Street	**C**	**21.6**	-	-	-
East Newton St WB left/thru/right	D	49.7	0.80	128	190
Harrison Ave NB left/thru	B	14.1	0.41	76	220
Harrison Ave SB thru/right	B	10.0	0.36	57	126

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Harrison Avenue / East Brookline Street	**B**	**14.3**	-	-	-
East Brookline St EB left/thru/right	D	46.6	0.72	107	168
Harrison Ave NB thru/right	A	4.8	0.40	36	61
Harrison Ave SB left/thru	A	8.1	0.35	59	198
Mass. Avenue Connector / I-93 SB Frontage Road / I-93 SB Off-Ramp	**C**	**33.1**	-	-	-
I-93 SB Frontage Rd SB thru	C	34.2	0.72	287	#472
I-93 SB Frontage Rd SB right	C	22.5	0.18	47	91
I-93 SB Off-Ramp SWB left/right	C	29.8	0.82	329	465
I-93 SB Off-Ramp SWB right	D	37.5	0.89	345	#524
Mass. Avenue Connector / I-93 NB Frontage Road	**C**	**33.1**	-	-	-
Mass. Ave Connector EB left | left	D	45.1	0.94	304	#436
I-93 NB Frontage Road NB left	C	21.6	0.74	285	447
I-93 NB Frontage Road NB left/thru | thru	C	29.8	0.93	462	#664
Unsignalized Intersections					
Union Park Street / Albany Street	-	-	-	-	-
Union Park St EB right	C	17.1	0.12		10
Albany St NB thru | thru	A	0.0	0.30		0
Albany St SB thru	A	0.0	0.42		0
Wareham Street/ Albany Street	-	-	-		-
Wareham St EB left/right	E	46.7	0.64		95
Albany St NB thru	A	0.0	0.48		0
Albany St SB thru	A	0.0	0.42		0
Plympton Street/ Albany Street	-	-	-		-
Site Driveway WB right	B	14.9	0.10		8
Albany St NB left/thru/right	A	1.3	0.05		4
Albany St SB left/thru/right	A	4.5	0.19		17
Albany Street/East Brookline Street	-	-	-	-	-
E. Brookline St EB left/right	F	>50.0	>1.00		272
Albany St NB thru	A	0.0	0.41		0
Albany St SB thru	A	0.0	0.23		0
Albany Street / Stoughton Street	-	-	-		-
Stoughton St EB left/right	F	>50.0	0.43		46
Stoughton St WB left	F	>50.0	0.58		64
Stoughton St WB right	C	22.0	0.32		33
Albany St NB left/thru | thru	A	1.1	0.03		2
Albany St SB thru/right	A	0.0	0.18		0

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
BioSquare Drive / I-93 SB Frontage Road					
BioSquare Dr EB right	C	15.7	0.21		20
SB Frontage Rd SB thru | thru/right	A	0.0	0.00		0
BioSquare Drive / E. Canton Street Ext.	A	0.0	0.51		0
E. Canton St Ext EB left/right	-	-	-		-
BioSquare Dr NB left/thru	C	17.7	0.40		48
BioSquare Dr SB thru/right	A	0.0	0.17		0
Harrison Avenue / East Canton Street	-	-	-		-
East Canton St WB left/right	C	23.2	0.53		76
Harrison Ave NB thru	A	0.0	0.26		0
Harrison Ave SB thru	A	0.0	0.16		0
Harrison Avenue / East Dedham Street	-	-	-		-
Harrison Ave NB thru/right	A	0.0	0.28		0
Harrison Ave SB left/thru	A	4.1	0.14		12

Grey Shading indicates a decrease to LOS E or F.
~ 50th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.
# 95th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.
m Volumes for 95th percentile queue is metered by upstream signal.

Table 2-13 Build (2024) Condition, Capacity Analysis, p.m. Peak Hour

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Signalized Intersections					
NB Frontage Rd / Albany St / DPW Driveway	**E**	**60.8**	-	-	-
Albany St Connector EB left	F	>80.0	>1.00	~725	m#544
Albany St Connector EB left/bear left	F	>80.0	>1.00	~721	m#547
Albany St Connector EB thru	A	7.1	0.01	2	m0
DPW Driveway WB right/hard right	A	4.6	0.19	0	0
NB Frontage Rd NB thru | thru | thru/right	C	28.2	0.69	330	389
I-93 SB Frontage Rd / Albany St / MBTA Dr	**E**	**69.4**	-	-	-
MBTA Driveway EB thru/right	E	56.6	0.52	25	35
SB Frontage Rd SB left	D	40.3	0.5	143	232
SB Frontage Rd SB left/thru | thru	C	28.5	0.63	193	256
SB Frontage Rd SB bear right/right	A	5.2	0.54	140	220
Albany St NEB right | right/hard right	F	>80.0	>1.00	~681	m#710
Malden Street/ Albany Street	**D**	**36.8**	-	-	-
Malden St EB left/right	F	>80.0	0.94	190	#342
Albany St NB left/thru | thru	D	41.6	0.99	448	#660
Albany St SB thru/right	B	14.0	0.75	273	337
East Dedham Street/ Albany Street	**C**	**27.5**			
E. Dedham Street EB left/thru/right	E	75.4	0.89	205	#357
Albany Street NB thru/right	A	9.0	0.74	467	398
Albany Street SB left/thru	D	35.8	0.93	379	#540
East Canton Street / Albany Street	**B**	**13.8**	-		-
Exchange Driveway WB left	E	61.6	0.73	159	227
Exchange Driveway WB right	A	0.0	0	0	0
Albany St NB left/thru/right	A	5.1	0.63	45	79
Albany St SB left/thru/right	A	6.1	0.41	48	m83
East Newton Street / Albany Street	**C**	**28.0**	-	-	-
E. Newton St WB left/thru	D	53.1	0.61	141	201
E. Newton St WB right	E	65.2	0.78	163	231
Albany St NB left	B	12.0	0.4	48	143
Albany St NB thru	B	11.5	0.35	85	365
Albany St SB thru	C	27.0	0.55	305	488
Albany St SB right	C	21.5	0.18	44	98

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
East Concord Street / Albany Street	C	23.0	-	-	-
E. Concord St EB left	D	48.6	0.47	100	152
E. Concord St EB thru	D	40.3	0.12	26	54
E. Concord St EB right	E	66.5	0.78	158	227
Albany St NB thru | thru/right	C	20.8	0.3	139	215
Albany St SB left/thru | thru	A	6.4	0.31	170	80
Massachusetts Avenue / Albany Street	**C**	**28.1**	-	-	-
Mass. Ave EB left	C	27.1	0.43	67	121
Mass. Ave EB thru | thru| thru /right	C	22.5	0.26	101	142
Mass. Ave WB thru | thru	C	28.1	0.53	118	150
Mass. Ave WB right	A	7.0	0.14	23	38
Albany St NB left/thru | thru	D	51.4	0.74	143	165
Albany St NB right	D	39.3	0.32	75	108
Albany St SB left	D	38.8	0.54	140	203
Albany St SB thru | thru/right	B	19.1	0.49	232	243
Massachusetts Avenue / Mass. Avenue Connector / Melnea Cass Boulevard	**C**	**32.7**	-	-	-
Mass. Ave EB left | left	F	>80.0	0.65	100	143
Mass. Ave EB thru |thru/right	C	32.6	0.67	144	172
Southampton St WB left |left	D	46.6	0.4	91	142
Southampton St WB thru | thru	C	33.8	0.32	114	174
Southampton St WB right	A	0.5	0.31	0	0
Melnea Cass Blvd NB thru |thru	D	49.6	0.83	274	342
Melnea Cass Blvd NB right	A	8.7	0.44	51	101
Mass. Ave Connector SB left | left	E	61.6	0.72	111	155
Mass. Ave Connector SB thru | thru	C	24.5	0.42	174	207
Mass. Ave Connector SB right	A	9.6	0.33	85	112
Harrison Avenue / East Concord Street	**A**	**8.3**	-	-	-
East Concord St EB left	D	36.1	0.09	8	25
East Concord St EB thru/right	D	36.9	0.52	41	84
Harrison Ave NB thru/right	A	5.4	0.38	48	190
Harrison Ave SB left/thru	A	4.5	0.44	67	m120
Harrison Avenue / East Newton Street	**C**	**26.2**	-	-	-
East Newton St WB left/thru/right	D	52.5	0.88	198	#286
Harrison Ave NB left/thru	B	12.2	0.44	96	135
Harrison Ave SB thru/right	B	16.3	0.46	115	262

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Harrison Avenue / East Brookline Street	B	11.8	-	-	-
East Brookline St EB left/thru/right	D	43.7	0.61	70	110
Harrison Ave NB thru/right	A	6.4	0.34	7	224
Harrison Ave SB left/thru	A	6.5	0.36	54	211
Mass. Avenue Connector / I-93 SB Frontage Road / I-93 SB Off-Ramp	**D**	**51.3**	-	-	-
I-93 SB Frontage Rd SB thru	D	51.1	0.99	602	#906
I-93 SB Frontage Rd SB right	B	12.9	0.22	60	100
I-93 SB Off-Ramp SWB left/right	D	50.0	0.9	342	#547
I-93 SB Off-Ramp SWB right	E	66.8	0.98	345	#574
Mass. Avenue Connector / I-93 NB Frontage Road	**C**	**25.4**	-	-	-
Mass. Ave Connector EB left | left	C	31.1	0.87	306	388
I-93 NB Frontage Road NB left	B	20.0	0.52	169	271
I-93 NB Frontage Road NB left/thru | thru	C	20.7	0.66	243	326
Unsignalized Intersections					
Union Park Street / Albany Street	-	-	-	-	-
Union Park St EB right	C	20.4	0.25		24
Albany St NB thru | thru	A	0.0	0.4		0
Albany St SB thru	A	0.0	0.46		0
Wareham Street/ Albany Street	-	-	-		-
Wareham St EB left/right	F	>50.0	>1.00		411
Albany St NB thru	A	0.0	0.73		0
Albany St SB thru	A	0.0	0.34		0
Plympton Street/ Albany Street	-	-	-		-
Site Driveway WB right	E	45.2	0.61		88
Albany St NB left/thru	A	2.2	0.07		5
Albany St SB thru/right	A	1.6	0.06		4
Albany Street/East Brookline Street	-	-	-	-	-
E. Brookline St EB left/right	F	>50.0	0.76		139
Albany St NB thru	A	0.0	0.41		0
Albany St SB thru	A	0.0	0.37		0
Albany Street / Stoughton Street	-	-	-		-
Stoughton St EB left/right	E	48.6	0.29		27
Stoughton St WB left	F	>50.0	0.58		62
Stoughton St WB right	C	17.7	0.34		37
Albany St NB left/thru | thru	A	1.4	0.03		2
Albany St SB thru/right	A	0.0	0.4		0

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
BioSquare Drive / I-93 SB Frontage Road					
BioSquare Dr EB right	C	20.7	0.63		109
SB Frontage Rd SB thru | thru/right	A	0.0	0		0
BioSquare Drive / E. Canton Street Ext.	A	0.0	0.12		0
E. Canton St Ext EB left/right	-	-	-		-
BioSquare Dr NB left/thru	E	48.9	0.95		339
BioSquare Dr SB thru/right	A	0.0	0.22		0
Harrison Avenue / East Canton Street	-	-	-		-
East Canton St WB left/right	C	21.7	0.53		77
Harrison Ave NB thru	A	0.0	0.21		0
Harrison Ave SB thru	A	0.0	0.19		0
Harrison Avenue / East Dedham Street	-	-	-		-
Harrison Ave NB thru/right	A	0.0	0.31		0
Harrison Ave SB left/thru	A	3.2	0.11		9

Grey Shading indicates a decrease to LOS E or F.
~ 50th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.
\# 95th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.
m Volumes for 95th percentile queue is metered by upstream signal.

As shown in Table 2-12 and Table 2-13, the following operational deficiencies are expected to begin to occur under the Build (2024) Condition:

- The signalized intersection of **I-93 NB Frontage Road/Albany Street Connector/DPW Driveway** degrades to LOS D during the a.m. peak hour and to LOSE during the p.m. peak hour. The Albany Street eastbound left/bare left approach degrades to LOS E during the a.m. peak hour. The Albany Street eastbound left and left/bare left approaches continue to operate at LOS F during the p.m. peak hour.
- The signalized intersection of **I-93 SB Frontage Road/Albany Street/MBTA Driveway** degrades to LOS D during the a.m. peak hour and to LOS E during the p.m. peak hour. The Albany Street northeast bound continues to operate at LOS F during the a.m. and p.m. peak hour.
- The signalized intersection of **Malden Street/Albany Street** continues to operate at LOS C during the a.m. peak hour and degrades to LOS D during the p.m. peak hour. The Malden Street eastbound approach decreases to LOS E during the a.m. peak hour and LOS F during the p.m. peak hour.
- Under the Build condition, the signalized intersection of **East Dedham Street/Albany Street** will operate at LOS B during the a.m. peak hour and LOS C during the p.m. peak hour. The East Dedham Street eastbound approach will operate at LOS E during both the a.m. and p.m. peak hours.

- Under the Build condition, the intersection of **East Canton Street/Albany Street/Exchange Driveway** will need to be signalized to accommodate the new Site traffic. The intersection will operate at LOS A during the a.m. peak hour and LOSB during both the p.m. peak hour. Most of the individual movements will operate at LOS C or better with the Driveway westbound left-turn lane operating at LOS E during both peak hours.
- The signalized intersection of **Massachusetts Avenue/Albany Street** continues to operate at LOS C during both peak hours but the Albany Street northbound approach will degrade to LOS E during the a.m. peak hour.
- The signalized intersection of **Massachusetts Avenue/Melnea Cass Boulevard** continues to operate at LOS C during both peak hours but the Massachusetts Avenue eastbound left-turn lanes degrades to LOS F during the p.m. peak hour.
- The signalized intersection of **Massachusetts Avenue/I-93 SB Frontage Road/I-93 SB Off-Ramp** continues to operate at LOS C during the a.m. peak hour and degrades to LOS D during the p.m. peak hour. The I-93 SB Off-Ramp approach degrades to LOS E during the p.m. peak hour.
- At the unsignalized intersection of **Albany Street/Plympton Street**, the Site Driveway westbound approach operates at LOS E during the p.m. peak hour.
- At the unsignalized intersection of **Albany Street/East Brookline Street**, the East Brookline Street eastbound approach degrades to LOS F during the a.m. and p.m. peak hours.
- At the unsignalized intersection of **Albany Street/Stoughton Street**, the Stoughton Street eastbound approach degrades to LOS F in the a.m. peak hour and LOS E during the p.m. peak hour. The Stoughton Street westbound left-turn lane approach degrades to LOS F during the a.m. peak hour and continues to operate at LOS F during the p.m. peak hour.
- At the unsignalized intersection of **BioSquare Drive/I-93 SB Frontage Road**, the BioSquare Drive eastbound approach operates at LOSE during the p.m. peak hour.

2.6 TRANSIT CAPACITY ANALYSIS

As referenced in Section 2.2.8.1, there are connections to major subway lines in both directions from the Site. The most recent available Automated Passenger Count (APC) data for the year 2016 was received from the MBTA to serve as the basis for capacity analysis. In order to account for future growth outside of this Project a growth rate to the existing 2016 transit data was used. The growth rate was established by the Central Transportation Planning Staff's (CTPS) Long-Range Transportation Plan (LRTP). The LRTP outlines growth trends on all major forms of transportation in the Boston region from 2012 to 2040. The LRTP expects that transit trips overall will increase by 27.3% by 2040 and that bus rapid transit trips will increase by 129.9% by 2040. Based on this, the existing bus transit trips in the analysis were grown at a rate of 1% per year and the bus rapid transit trips were grown at a rate of 3% per year from 2016 to 2024.

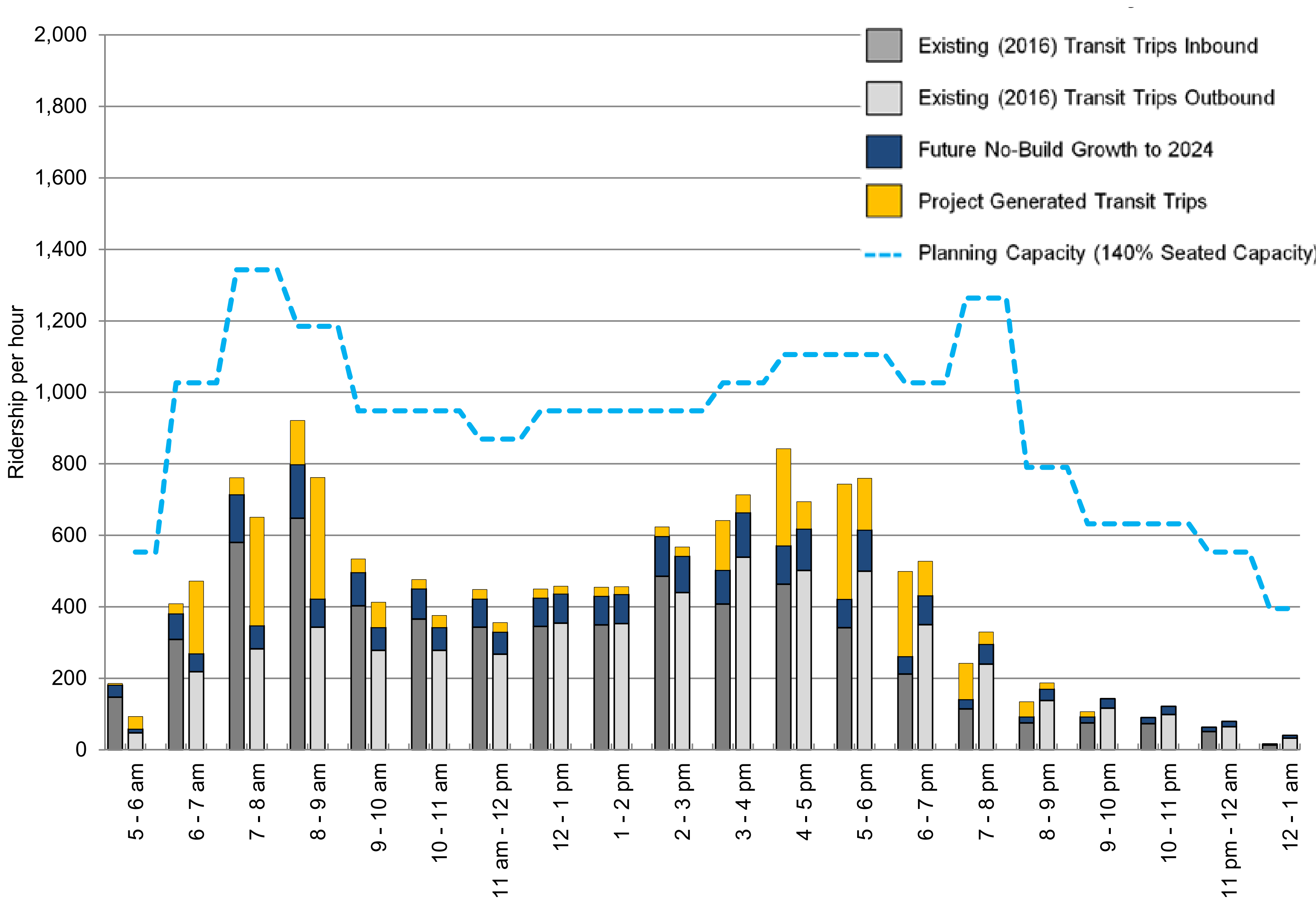
Project generated transit trips were assigned to bus routes that make convenient connections from major transit stations along the Orange and Red lines. Table 2-14 outlines the transit trip distribution and the trips associated with them by time period. Trips were not assigned to the Route 8 bus due to its circuitous routes from stations making it not an attractive commuting option.

Table 2-14 Transit Trip Distribution

Route	Trip Assignment %	Daily		a.m. Peak Hour		p.m. Peak Hour	
		Enter	Exit	Enter	Exit	Enter	Exit
SL4/SL5	65%	1,495	1,495	365	97	122	344
Route 10	15%	345	345	84	22	28	79
Route 47	15%	345	345	84	22	28	79
Route CT3	5%	115	115	29	8	10	27
Total	**100%**	**2,300**	**2,300**	**562**	**149**	**188**	**529**

The project generated trips were distributed across the transit lines and Figure 2-21, Figure 2-22, Figure 2-23, and Figure 2-24 outline the total Build Condition transit trips for the Silver Line 4/5, Route 10, Route 47, and Route CT3 buses respectively. The light and dark grey bars on the figure represent the existing transit ridership outbound and inbound respectively. The dark blue bars represent the future No-Build growth based on the CTPS rates and the yellow bars represent the project generated transit trips. The dotted light blue line on each of the graphs represents the planning capacity of each bus route, a metric outlined in the *MBTA Blue Book* that generally represents 140% of the seated capacity on a bus. For regular bus routes the planning capacity is 54 and for the Silver Line 4/5 bus routes the planning capacity is 79. The dotted blue line represents these values multiplied by the number of buses to determine the hourly capacity.

As shown on the figures, none of the bus routes connecting from major MBTA stations to the Project site will experience over capacity conditions on average with the addition of future No-Build and Build project trips. A major reason for this is that commuters taking the bus routes connecting to and from the Site tend to be traveling in the reverse peak direction so there is additional capacity to accommodate them.



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

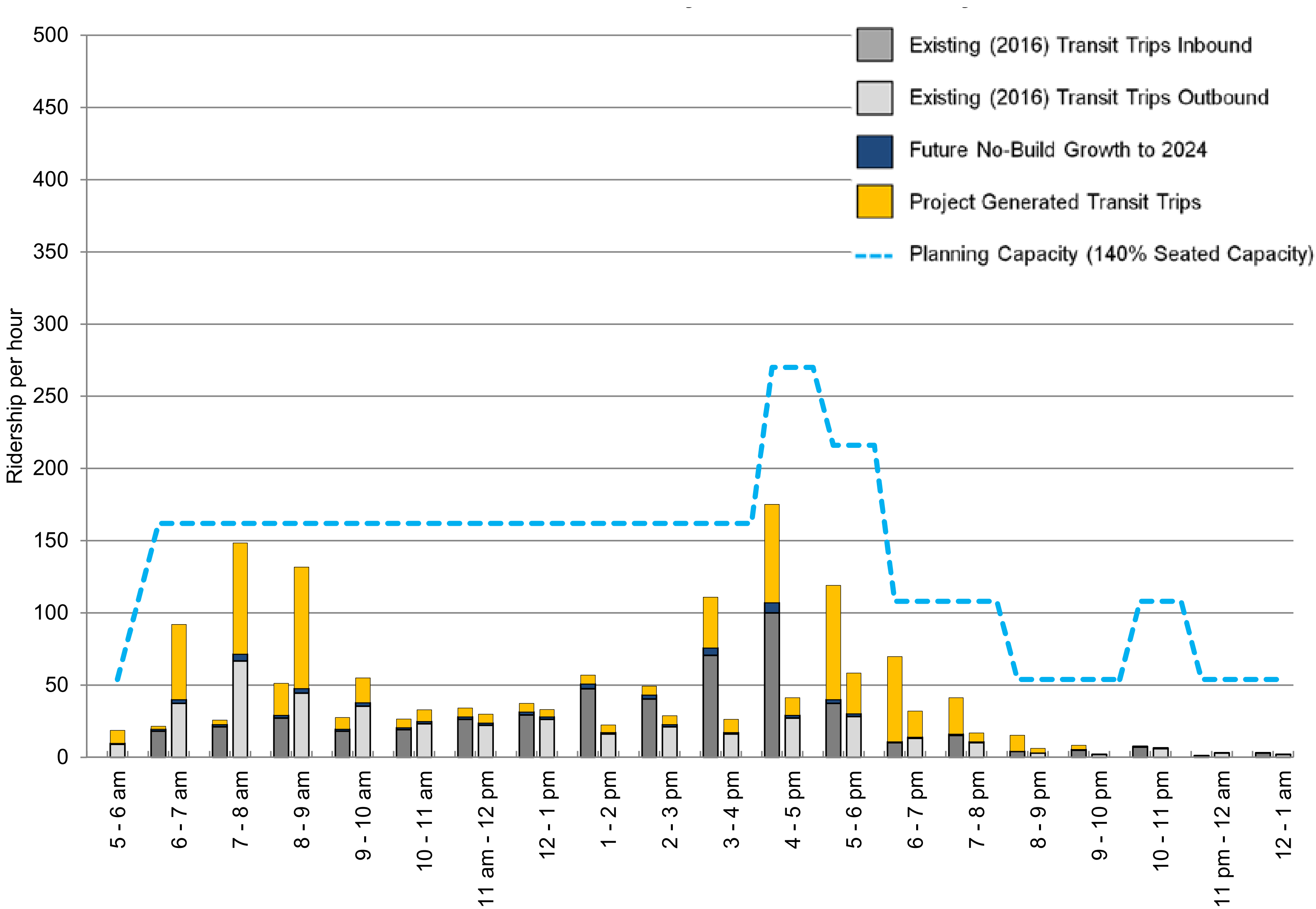
Stantec

EXCHANGE SOUTH END

Figure 2.21

MBTA Silver Line 4 & 5 - Build (2024) Condition
Hourly Ridership, Weekday
Load Point: Between Union Park Street & East Berkeley Street

Source: Howard Stein Hudson



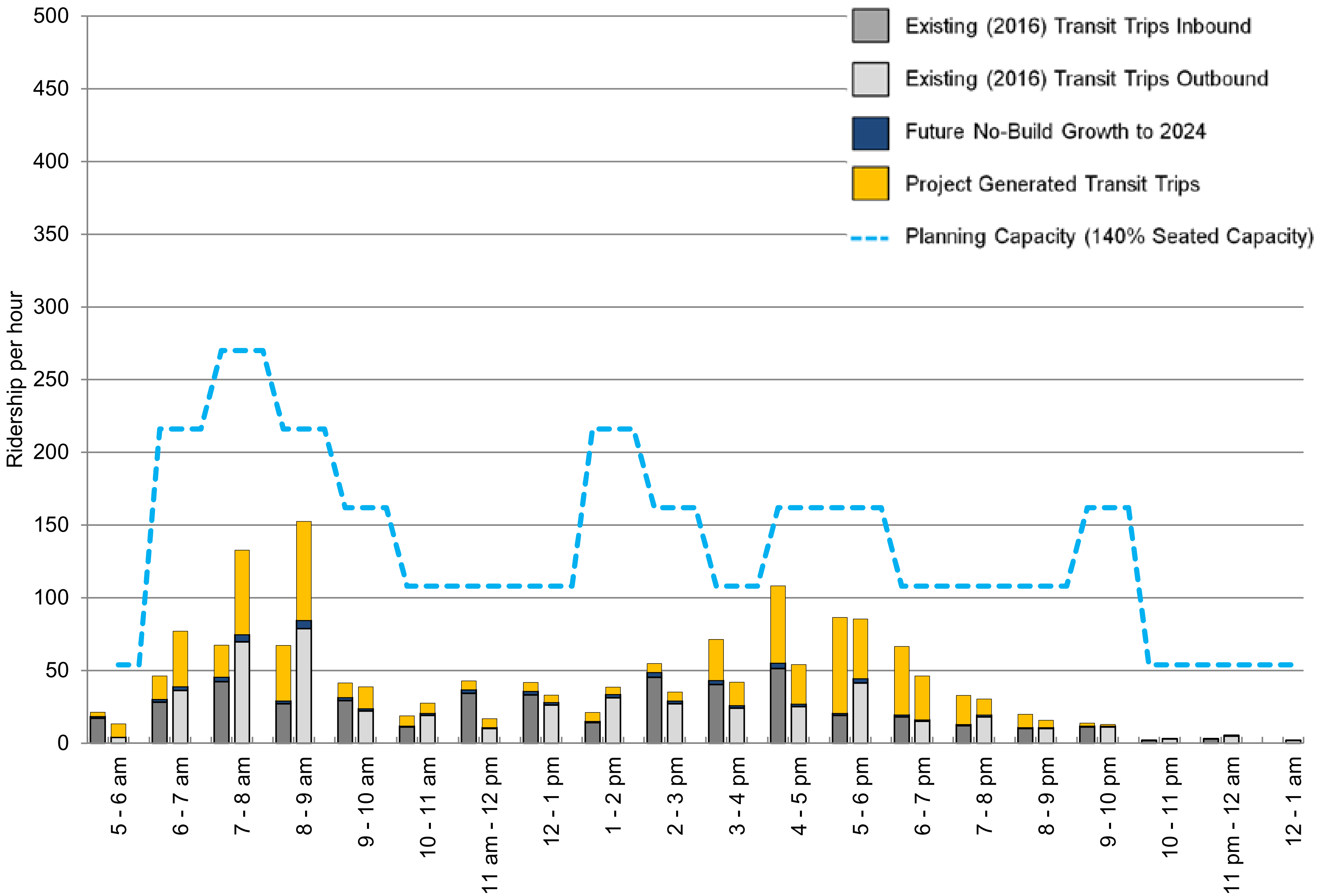
THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2.22

MBTA 47 - Build (2024) Condition Hourly Ridership, Weekday
Load Point: Between Albany Street & Broadway Station

Source: Howard Stein Hudson



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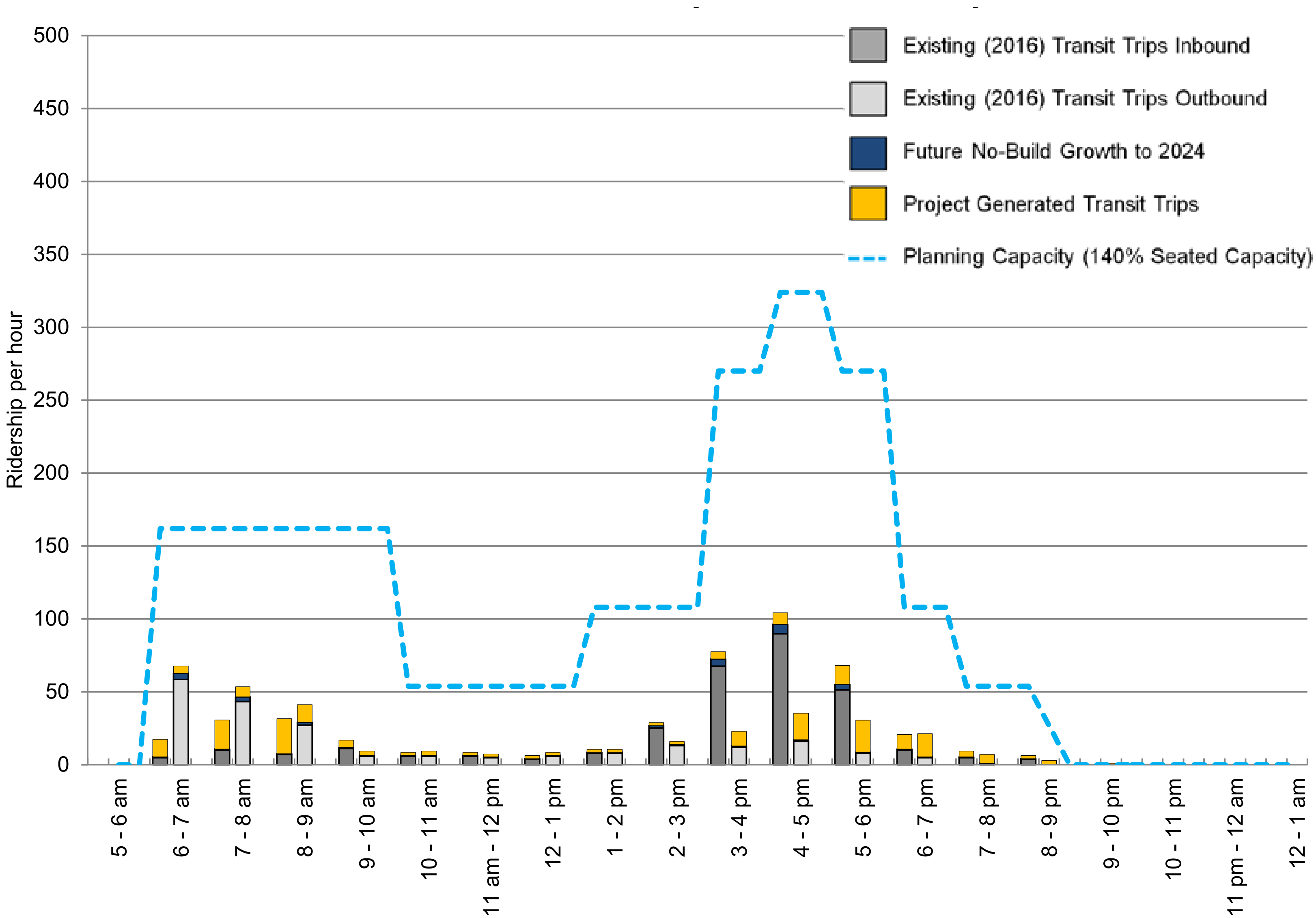
EXCHANGE SOUTH END

Figure 2.23

MBTA 10 - Build (2024) Condition Hourly Ridership, Weekday
Load Point: Between Albany Street & Broadway Station

Source: Howard Stein Hudson



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EXCHANGE SOUTH END

Figure 2.24

MBTA CT3 - Build (2024) Condition
Hourly Ridership, Weekday
Load Point: Between Albany Street & Broadway Station

Source: Howard Stein Hudson

2.7 TRAFFIC DEMAND MANAGEMENT

The Proponent is committed to implementing Transportation Demand Management (TDM) measures to minimize automobile usage and Project-related traffic impacts.
On-Site management will keep a supply of transit information (schedules, maps, and fare information) to be made available to patrons of the Project Site. The Proponent will work with the City to develop a TDM program appropriate to the Project and consistent with its level of impact.

The Proponent is prepared to take advantage of good transit access in marketing the Project Site to future tenants by working with them to implement the following TDM measures to encourage the use of non-vehicular modes of travel.
The TDM measures for the Project may include, but are not limited, to the following:

- The Proponent will designate a transportation coordinator to oversee transportation issues, including parking, service and loading, and deliveries, and will work with tenants as they move in to office space to raise awareness of public transportation, bicycling, and walking opportunities;
- Provide an annual (or more frequent) newsletter or bulletin summarizing transit, ridesharing, bicycling, alternative work schedules, and other travel options;
- Provide real-time transit and mobility information within buildings;
- Promote to commercial tenants that, as employers, they can save on payroll-related taxes and provide employee benefits when they offer transportation benefits such as subsidized public transportation;
- Encourage employers to subsidize on-Site full-time employees' purchase of monthly transit passes;
- Encourage employers to arrange to provide Guaranteed Ride Home during hours in which public transit service is no longer available to employee's home;
- Provide on-line registration for the RideSource ride-matching program through the local TMA membership;
- Provide access to information on area carpool and vanpool participants through the local TMA membership;
- Provide a Mobility MicroHUB to better connect patrons with available travel choices such as bus, bike-share, and car-share;
- Provide enhanced bus stops at or near the Project site to provide shelter make transit a more attractive option to patrons;
- Provide electric vehicle charging stations for 5 percent of the parking capacity in the garage;

- Provide information on travel alternatives for employees and visitors via the Internet and in the building lobby;
- Vehicle Sharing Program: The Proponent will explore the feasibility of providing spaces in the garage for a car sharing service.

2.8 TRANSPORTATION MITIGATION MEASURES

The Proponent is committed to working with the City of Boston so that the Project efficiently serves vehicle trips, improves the pedestrian environment, and encourages transit and bicycle use.

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

The Project expects to contribute to mitigation measures to improve the existing transportation conditions in the area. Potential additional mitigation measures that could be appropriate for a Project with this level of impact include:

- Pedestrian friendly streetscape improvements in the area, as discussed in Section 5.5.2;
- On-site bike share infrastructure;
- Real-time electronic transportation mobility signs within the buildings;
- Transit infrastructure improvements;
- Reconstructing Albany Street from East Brookline Street to Malden Street which will include transit infrastructure improvements and the extension of the South Bay Harbor Trail; and/or
- Traffic signal infrastructure improvements along Albany Street including signalizing the East Canton Street and East Dedham Street intersections and coordinating the signals along the corridor.

Further mitigation measures will be discussed with BTD as the Project moves through the permitting process. All mitigation measures will be detailed in the TAPA, which is a legal binding document.

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

2.9 EVALUATION OF SHORT-TERM CONSTRUCTION IMPACTS

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

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

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

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

Chapter 3

3.0 Environmental Review

3.1 INTRODUCTION

This chapter presents information on the existing environmental conditions within and adjacent to the Project Site, and the potential changes that may occur as a result of the Project. The goal of the Project is to activate the Site for a variety of uses, while avoiding or minimizing potential adverse environmental impacts to the Project area to the greatest extent feasible.
This PNF evaluates the potential for project-related impacts on the following environmental protection components, in accordance with Large Project Review guidelines under Article 80 of the Boston Zoning Code:

- Wind
- Shadow
- Daylight
- Solar Glare
- Air Quality
- Noise
- Flood Hazard Zones/Wetlands
- Stormwater/Water Quality
- Wildlife Habitat
- Tidelands
- Geotechnical Impact
- Solid and Hazardous Waste
- Construction Impacts

As demonstrated in the following sections, all identified impacts have been avoided, minimized, and/or mitigated through design and/or management, as required by local, state, and federal regulations. Temporary construction-period impacts will be managed to minimize disruption to the surrounding neighborhood. Sustainability and climate change resiliency have been addressed in Chapter 4, *Sustainable Design, and Climate Change Preparedness*. Chapter 6, *Historic and Archaeological Resources* describes in detail the historic resources adjacent to the Site. Chapter 7, *Infrastructure* provides detailed descriptions of the infrastructure and utilities required to support the Project.

3.2 WIND

3.2.1 Introduction and methodology

A pedestrian wind study was conducted in September of 2017 by RWDI for the proposed project. The objective of the study was to assess the effect of the proposed development on local conditions in pedestrian areas around the Project Site and provide recommendations for minimizing adverse effects.

The study involved wind simulations on a 1:300 scale model of the proposed building and surroundings. These simulations were conducted in RWDI's boundary-layer wind tunnel in Guelph, Ontario to quantify local wind speed conditions and compare to appropriate criteria for gauging wind comfort in pedestrian areas. The criteria recommended by the Boston Planning and Development Agency (BPDA) was used in this study.

3.2.2 Predicted Wind Conditions

This study involved state-of-the-art measurement and analysis techniques to predict wind conditions at the Project Site. It must be kept in mind that some uncertainty remains in predicting wind comfort. The predicted wind conditions pertaining to the 2 tested configurations (No Build and Build) are graphically depicted on the Site Plan in Figures 1a through 2b of the Pedestrian Wind Study (See Appendix A). These conditions and the associated wind speeds are also present in Table 1 of the Wind Study. The results can be summarized as follows:

- The effective gust criterion was met for the majority of sensor locations around the existing site with the exception of 2 locations to the southwest of the Project site. The construction of the Project is expected to improve wind conditions at these two locations and result in no exceedances of the effective gust criterion on or off site.

- In general, the mean speed wind conditions for the existing site are comfortable for walking, standing, and sitting, with the exception of a few uncomfortable conditions to the southwest. Similar conditions are anticipated with the addition of the proposed Project. However, a greater number of uncomfortable conditions are predicted within the Project site. No dangerous wind conditions are detected at any location on an annual basis.

The full report, which can be found in Appendix A of this PNF, describes the methods and presents the detailed results and data supporting the wind tunnel simulations. If improved wind conditions are desired, wind control measures can be developed with RWDI's design team. Since the completion of wind tunnel testing and submission of the Pedestrian Wind Study report, design changes have led to variants between the wind tunnel model tested and the currently designed project massing. These variants are summarized and discussed in Appendix A(2).

3.3 SHADOW

3.3.1 Introduction and Methodology

A shadow analysis was conducted for the Project to ensure the proposed buildings would not create adverse shadow impacts. Table 3-1, *Shadow Study Dates and Times*, identifies the dates and times for which shadow conditions have been simulated.

Table 3-1 Shadow Study Dates and Times

Date	Time
Vernal Equinox – March 21st	9:00 a.m., 12:00 p.m., 3:00 p.m.
Summer Solstice – June 21st	9:00 a.m., 12:00 p.m., 3:00 p.m., 6:00 p.m.
Autumnal Equinox - September 21st	9:00 a.m., 12:00 p.m., 3:00 p.m., 6:00 p.m.
Winter Solstice – December 21st	9:00 a.m., 12:00 p.m., 3:00 p.m.

The analysis is focused on the impact to the neighboring residential and commercial properties, pedestrian areas, and sidewalks, and how the proposed four buildings of the Project will affect each other on the Project Site. Shadows have been determined using the applicable altitude and azimuth data for the City of Boston.

Currently, the Project Site consists of a one-story warehouse space centered in a large parking lot. The Project will therefore result in net new shadow in excess of the existing condition. The Project's shadow impact to the surrounding residential and commercial neighborhood generally restricted to the first block across Albany Street. The Project has been designed so that the tallest buildings are farthest away from the residential neighborhood, in order to minimize the impact to the residential neighborhood. Most of the long afternoon shadow impact will fall on I-93 and the neighboring single-story warehouse. The Project has thoughtfully distributed the building heights so that its public plaza, Albany Green, provides both sun and shade. See Figure 3-1 through Figure 3-14, Shadow Study. Sections 3.3.2 through 3.3.5 provide a summary of the shadow analyses during various seasons of the year.

3.3.2 Vernal Equinox (March 21)

The shadow impact during the Vernal Equinox is limited to the residential neighborhood to the first block across Albany Street during the morning hours. By 12:00 noon, all of the impact falls on the adjacent parking lot and commercial warehouse or on I-93.

3.3.3 Summer Solstice (June 21)

During the Summer Solstice, the majority of the new shadows fall on Albany Street or on the Interstate. There is minimal shadow impact on the residential neighborhood.

3.3.4 Autumnal Equinox (September 21)

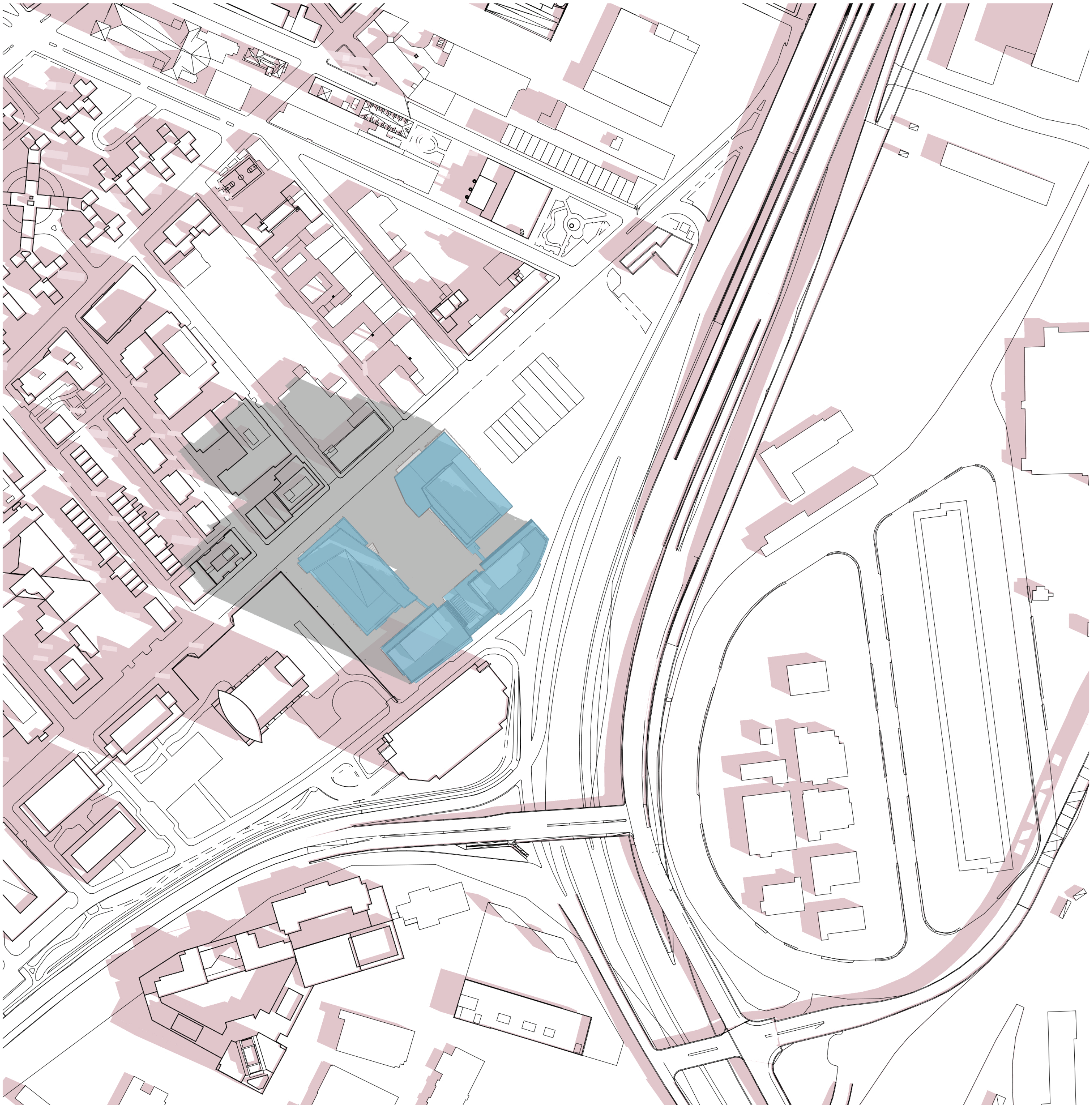
The shadow impact during the Autumnal Equinox is limited to the residential neighborhood during morning hours and only to the first block across Albany Street. The afternoon shadows fall on the neighboring warehouse building and parking lot or on the interstate. It should be noted that at 6:00 p.m. the shadows reach across the Interstate and into portions of the industrial neighborhood.

3.3.5 Winter Solstice (December 21)

The shadow impacts during the Winter Solstice have the greatest effect on the residential neighborhood, however the impacts are still limited to the first block across Albay street. In the afternoon, the shadows parallel Albany Street and reach the Interstate and a minimal portion of the railyards.

3.3.6 Shadow Study Conclusions

During the time periods studied, there is minimal impact on the residential neighborhood across Albany Street. The new shadows in the residential neighborhood fall on the first block across Albany Street in the morning hours only. The longest afternoon shadows are concentrated on the Interstate. The Project's building heights and massing has been carefully studied to provide the most sun in the plaza.



9:00 AM MARCH 21ST

EXISTING SHADOW NEW SHADOW PROPOSED BUILDINGS

0' 200' 400' 800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

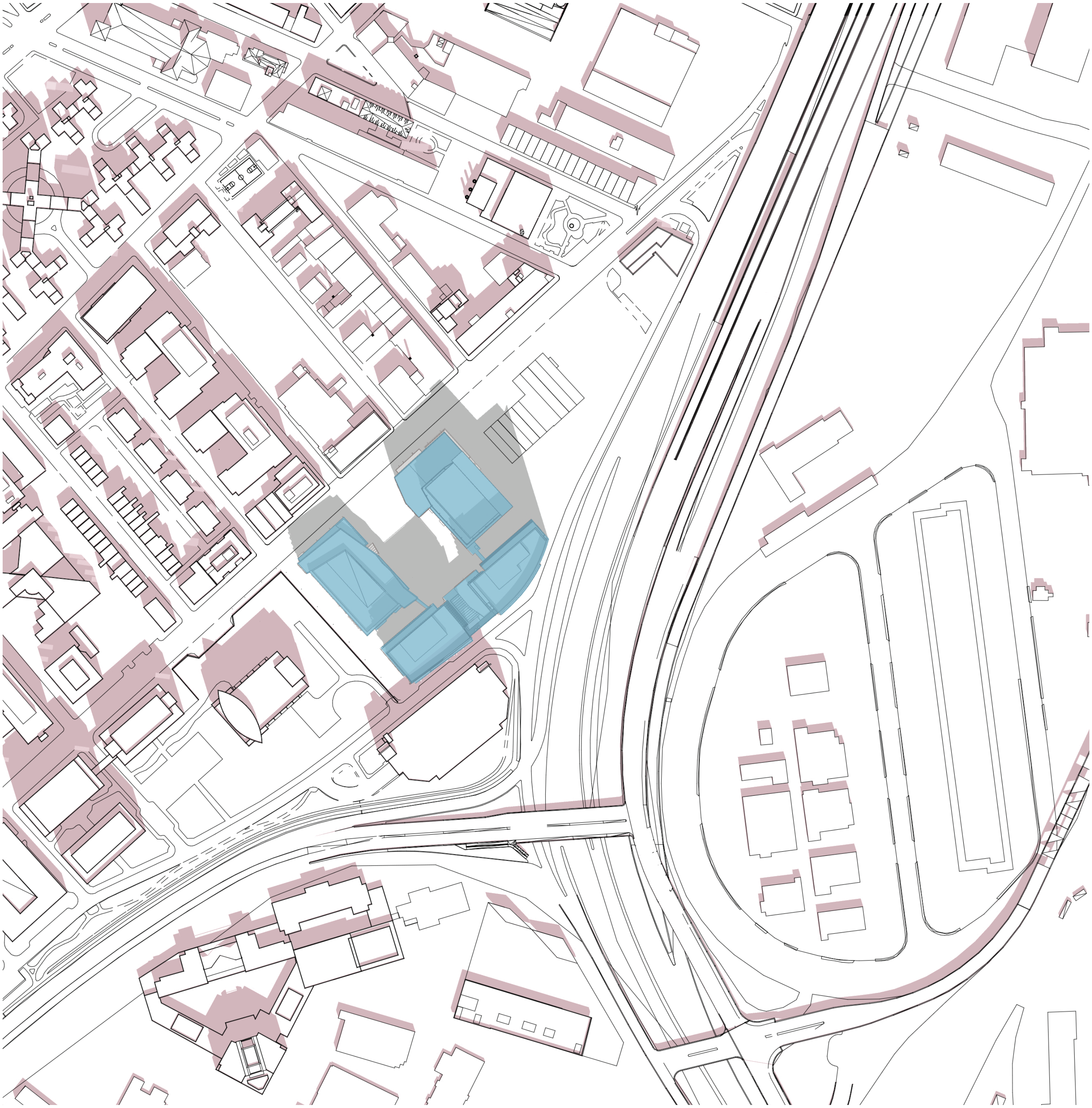
Stantec

EXCHANGE SOUTH END

Figure 3-1

Shadow Study March 21(9:00 AM)

Source: Stantec



12:00 PM   MARCH 21ST

EXISTING SHADOW   NEW SHADOW   PROPOSED BUILDINGS

0'   200'   400'   800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

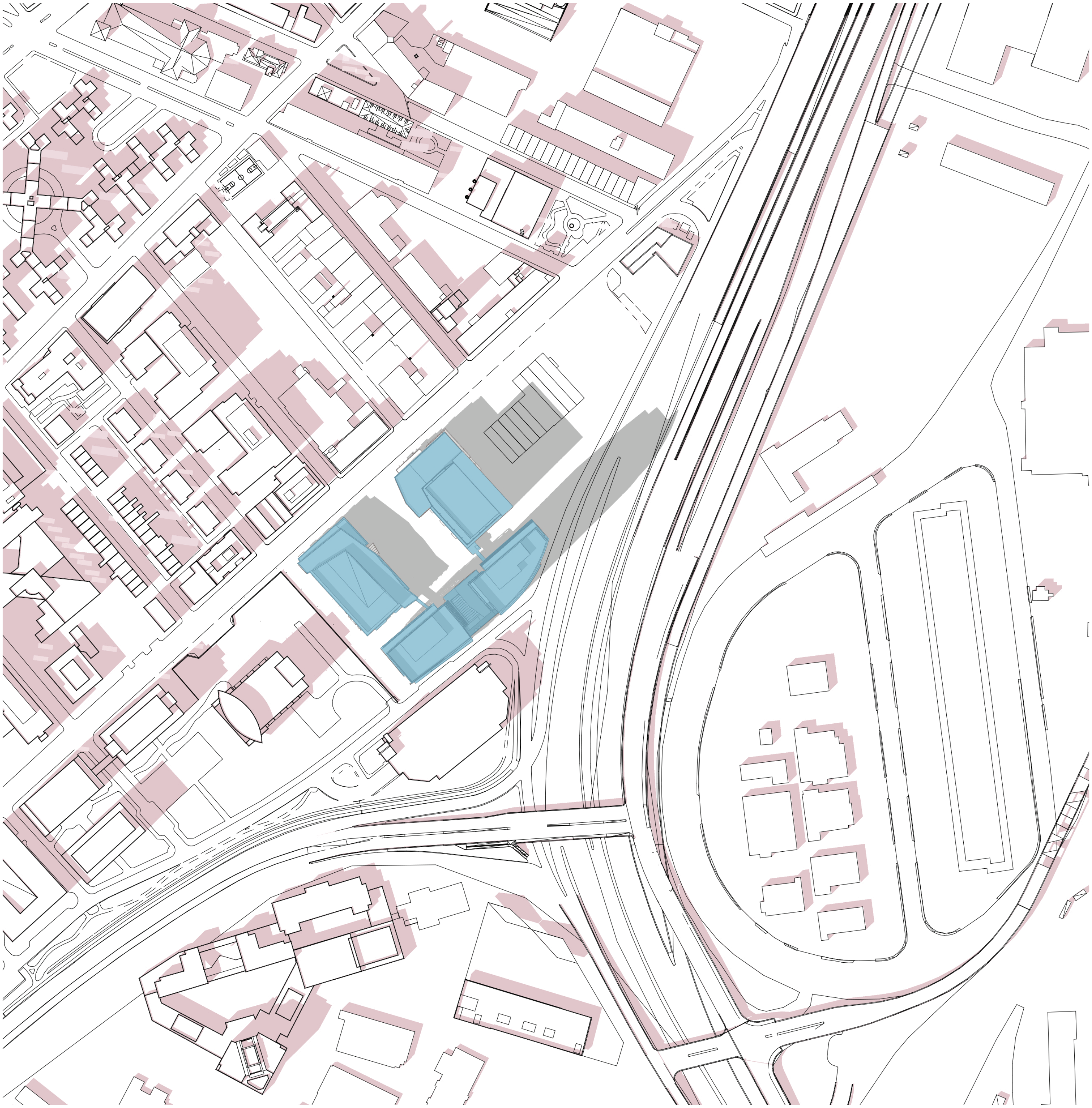
Stantec

EXCHANGE SOUTH END

Figure 3-2

Shadow Study
March 21(12:00 PM)

Source: Stantec



3:00 PM MARCH 21ST

EXISTING SHADOW NEW SHADOW PROPOSED BUILDINGS

0' 200' 400' 800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

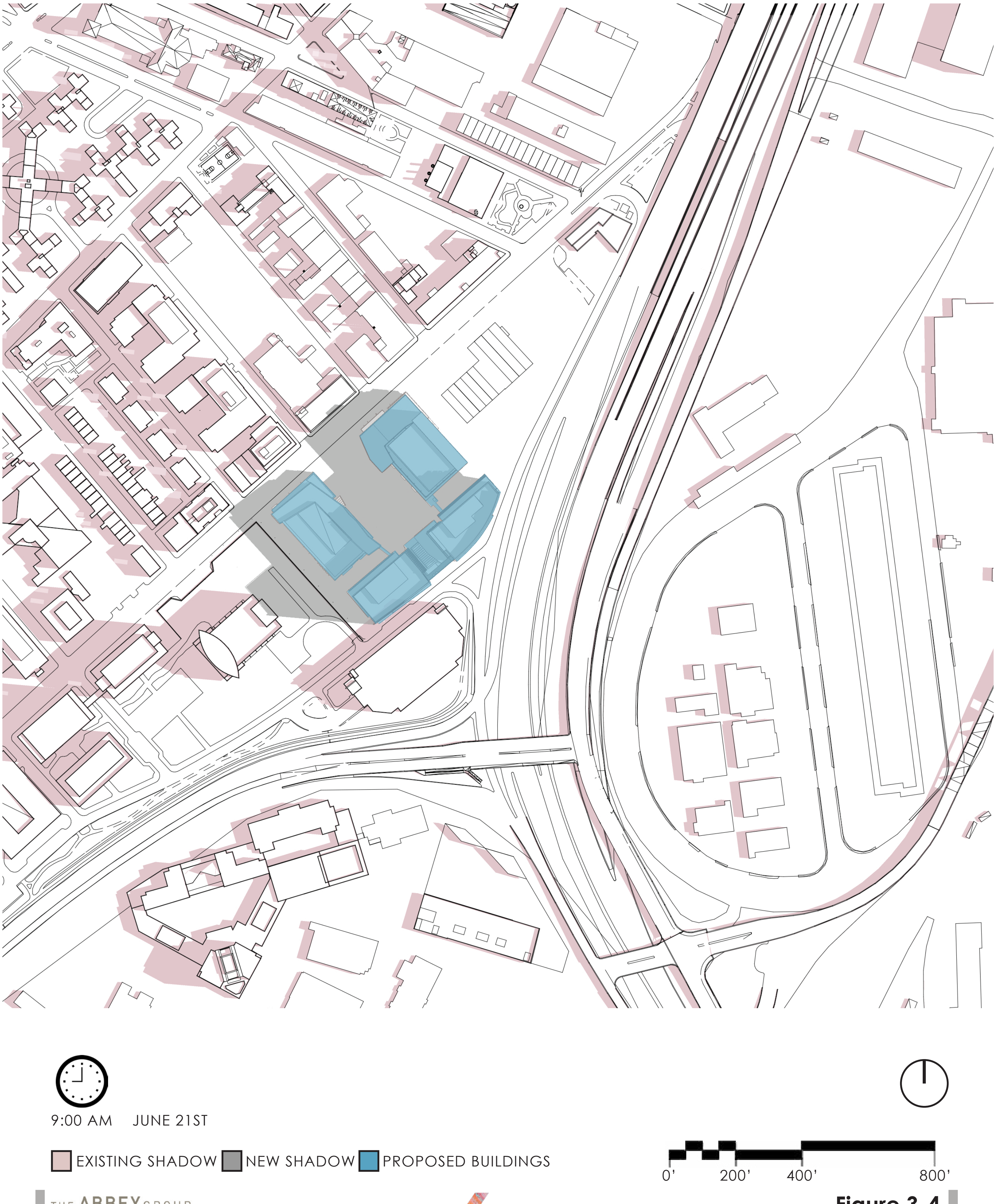
Stantec

EXCHANGE SOUTH END

Figure 3-3

Shadow Study March 21(3:00 PM)

Source: Stantec



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

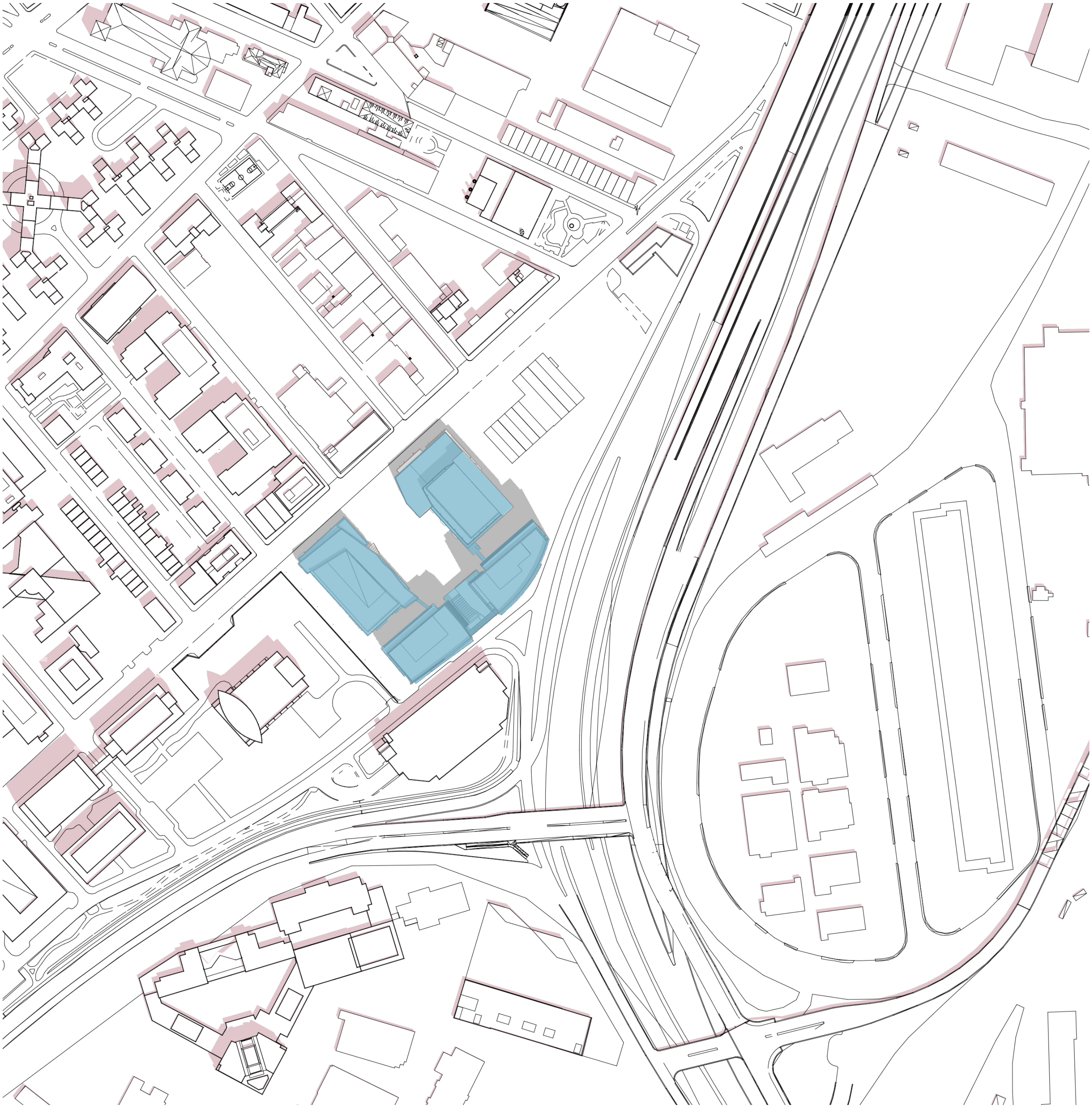
Stantec

EXCHANGE SOUTH END

Figure 3-4

Shadow Study June 21(9:00 AM)

Source: Stantec



12:00 PM JUNE 21ST

EXISTING SHADOW NEW SHADOW PROPOSED BUILDINGS

0' 200' 400' 800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

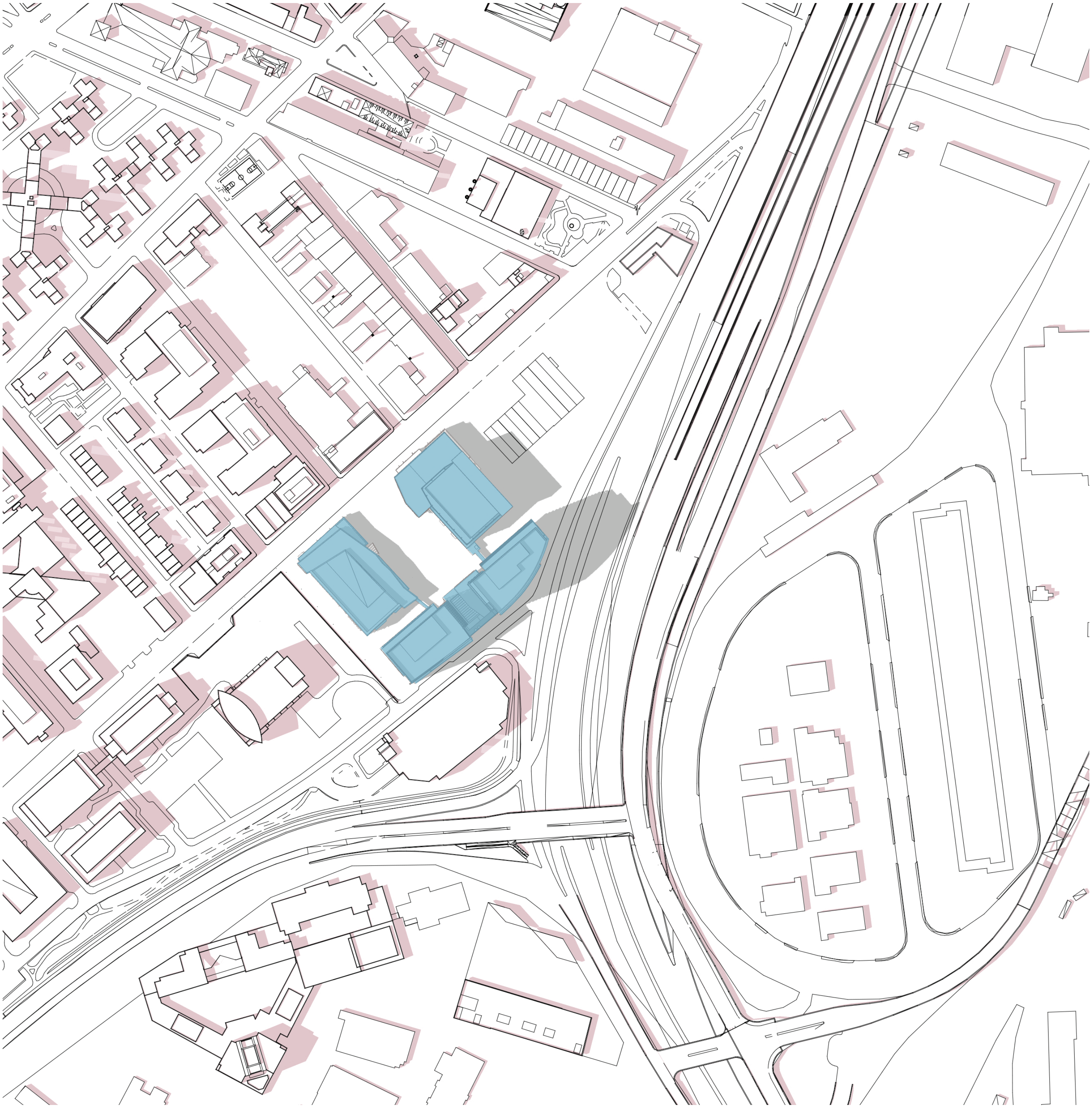
Stantec

EXCHANGE SOUTH END

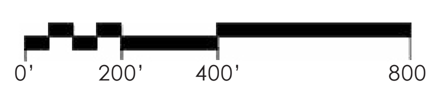
Figure 3-5

Shadow Study
June 21(12:00 PM)

Source: Stantec



EXISTING SHADOW | NEW SHADOW | PROPOSED BUILDINGS



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

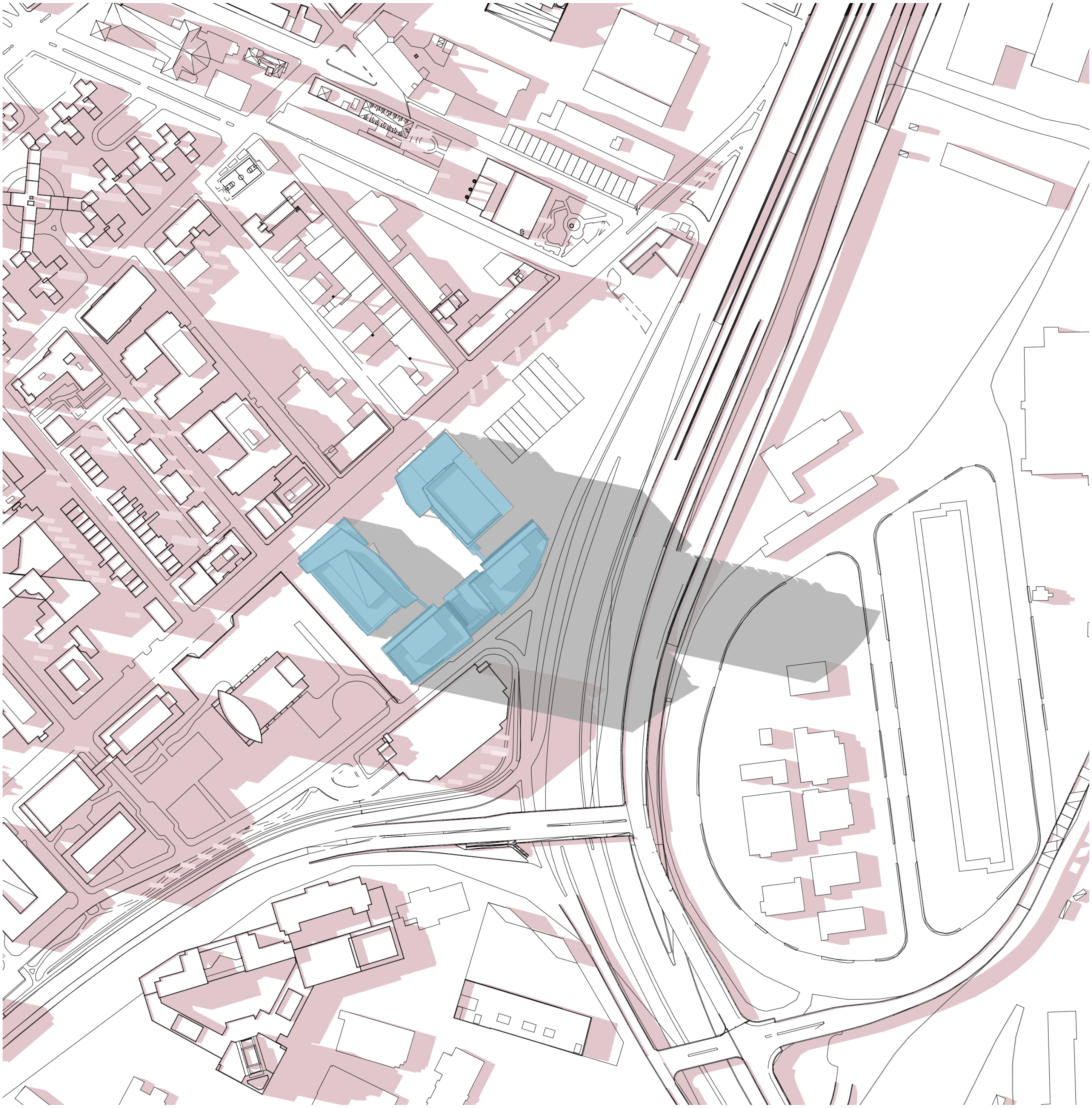
Stantec

EXCHANGE SOUTH END

Figure 3-6

Shadow Study June 21(3:00 PM)

Source: Stantec



6:00 PM JUNE 21ST

EXISTING SHADOW NEW SHADOW PROPOSED BUILDINGS

0' 200' 400' 800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

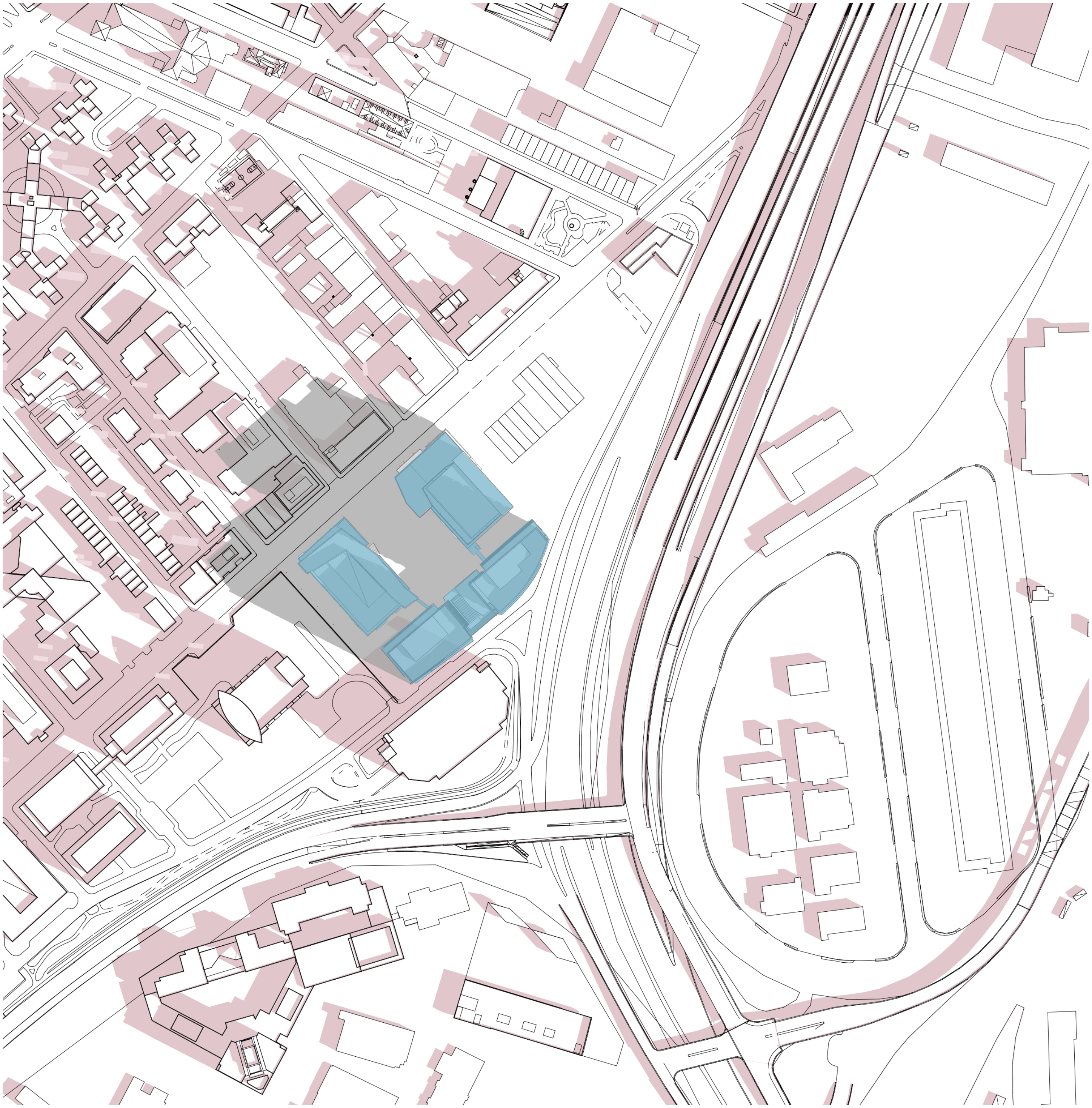
Stantec

EXCHANGE SOUTH END

Figure 3-7

Shadow Study June 21(6:00 PM)

Source: Stantec



9:00 AM SEPTEMBER 21ST

EXISTING SHADOW NEW SHADOW PROPOSED BUILDINGS

0' 200' 400' 800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

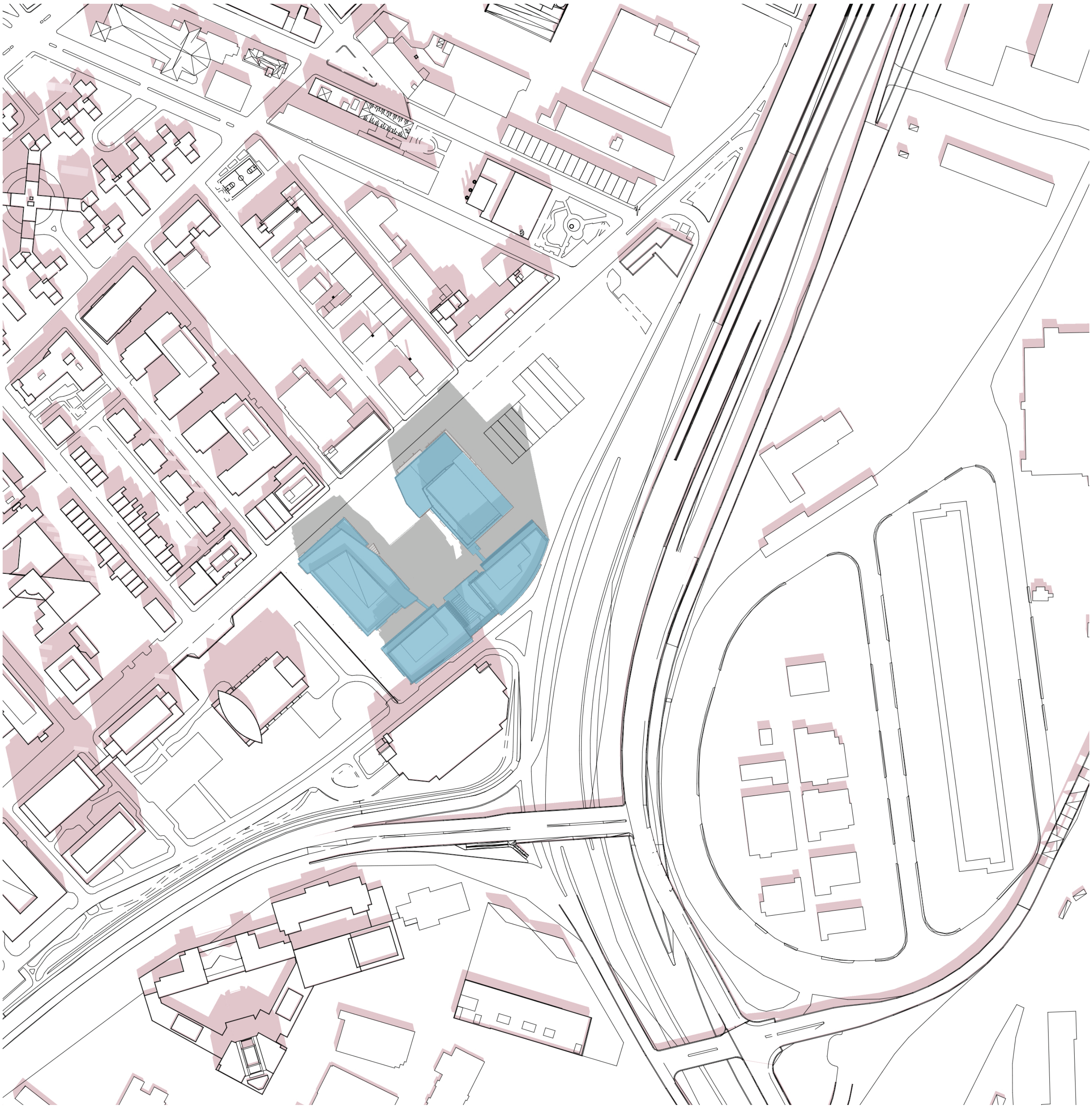
Stantec

EXCHANGE SOUTH END

Figure 3-8

Shadow Study September 21(9:00 AM)

Source: Stantec



12:00 PM SEPTEMBER 21ST

EXISTING SHADOW NEW SHADOW PROPOSED BUILDINGS

0' 200' 400' 800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

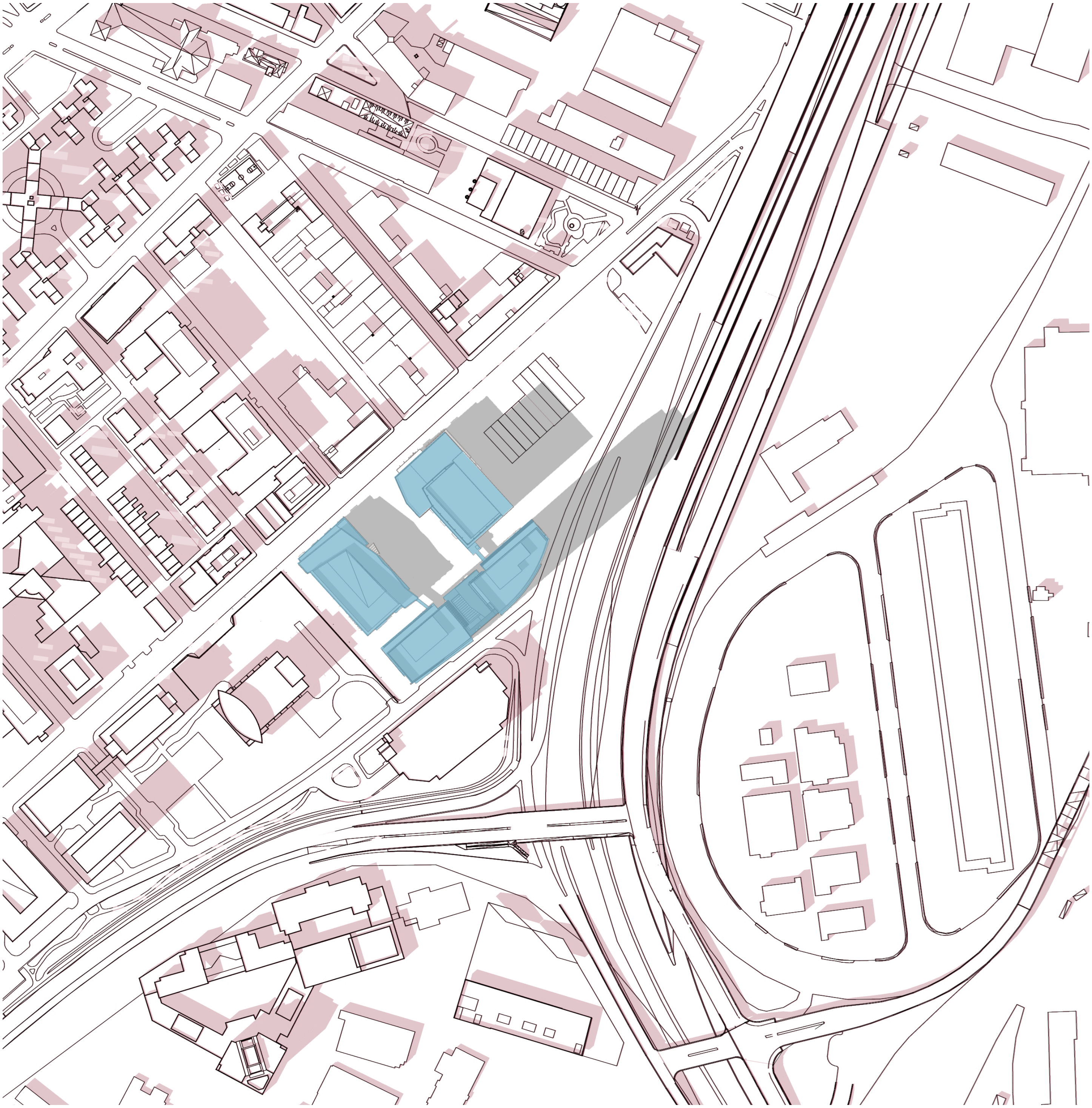
EXCHANGE SOUTH END

Figure 3-9

Shadow Study

September 21(12:00 PM)

Source: Stantec



3:00 PM SEPTEMBER 21ST

EXISTING SHADOW NEW SHADOW PROPOSED BUILDINGS

0' 200' 400' 800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

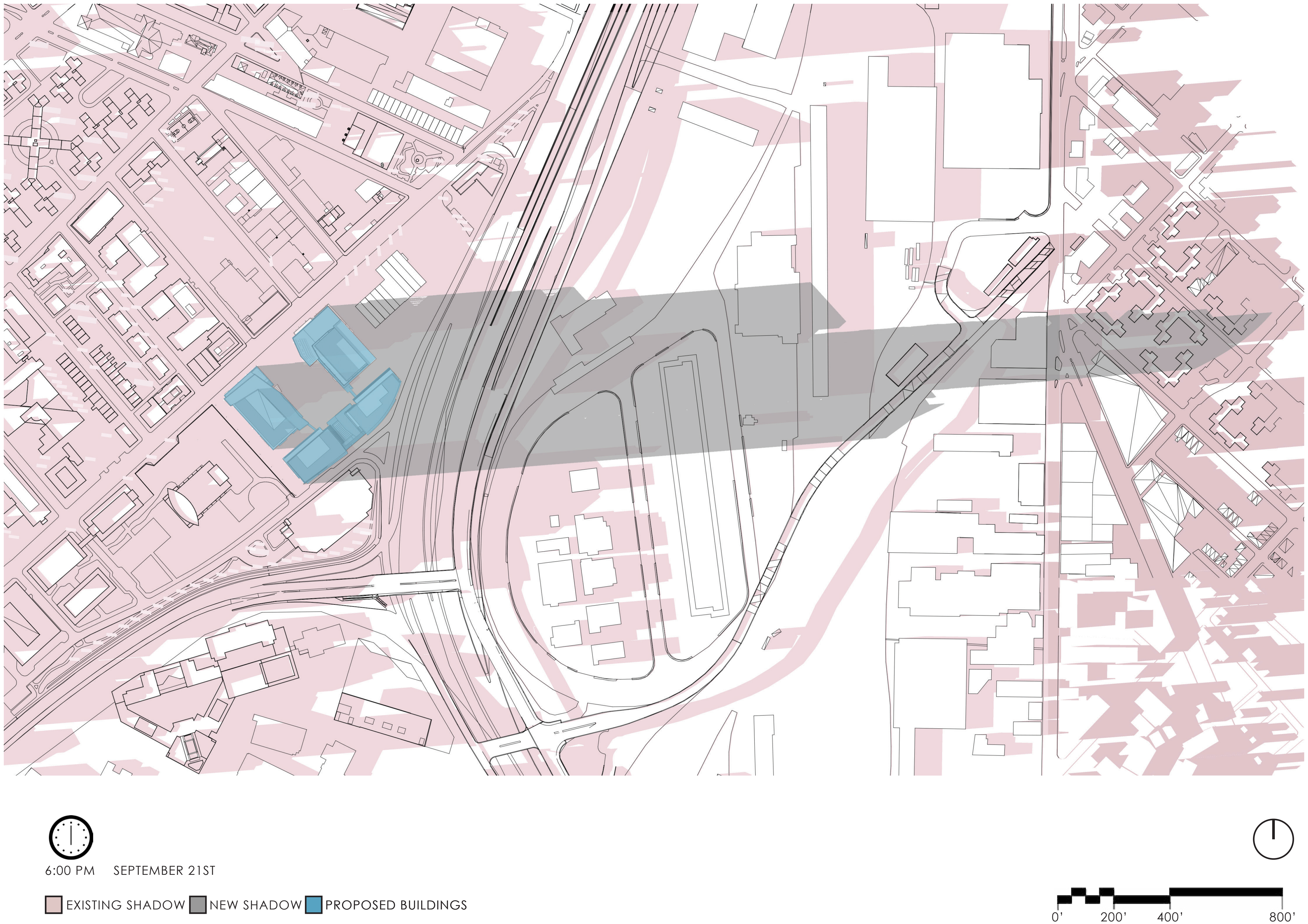
EXCHANGE SOUTH END

Figure 3-10

Shadow Study

September 21(3:00 PM)

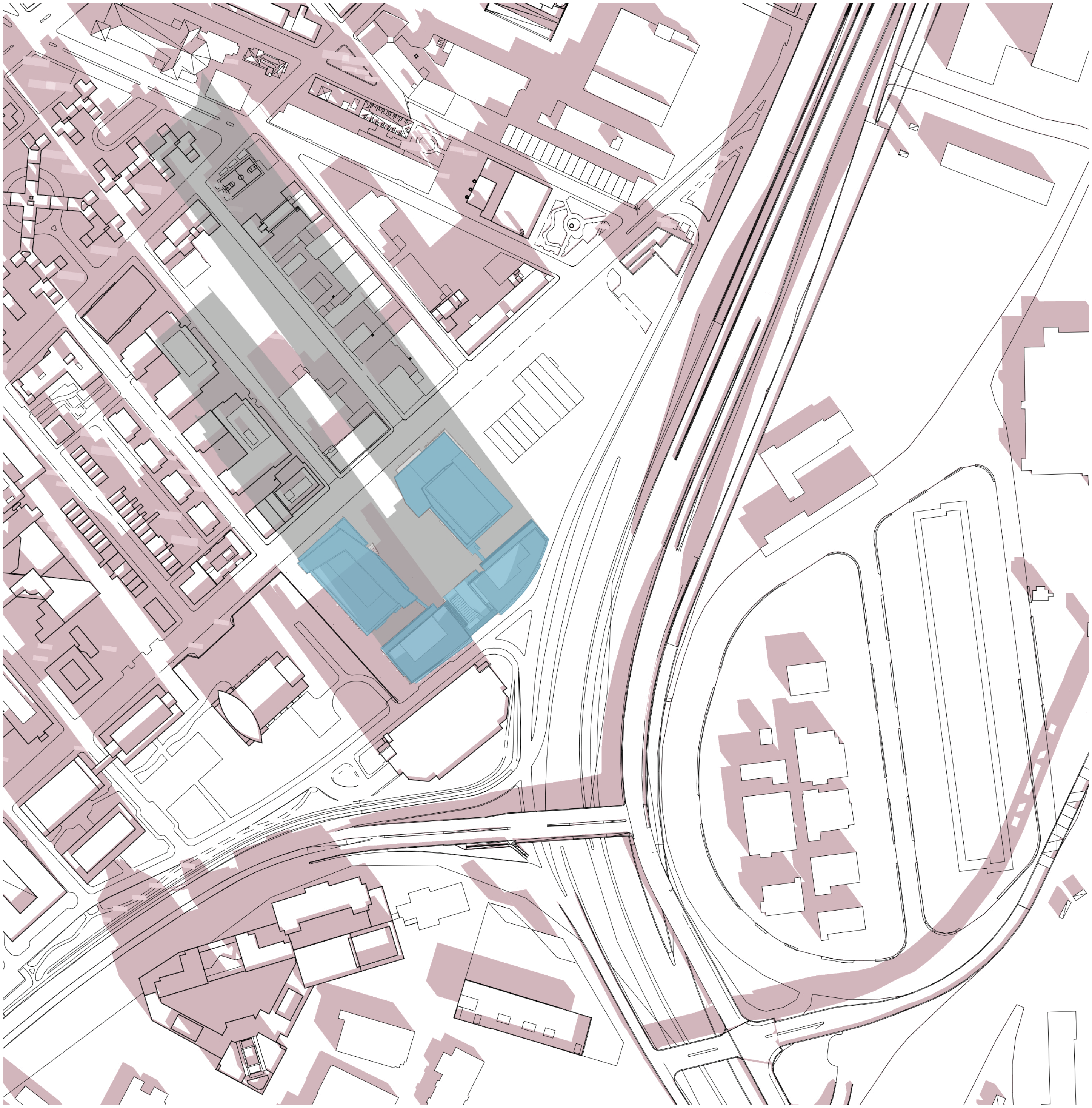
Source: Stantec



THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 3-11
Shadow Study
September 21(6:00 PM)
Source: Stantec



9:00 AM DECEMBER 21ST

EXISTING SHADOW NEW SHADOW PROPOSED BUILDINGS

0' 200' 400' 800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

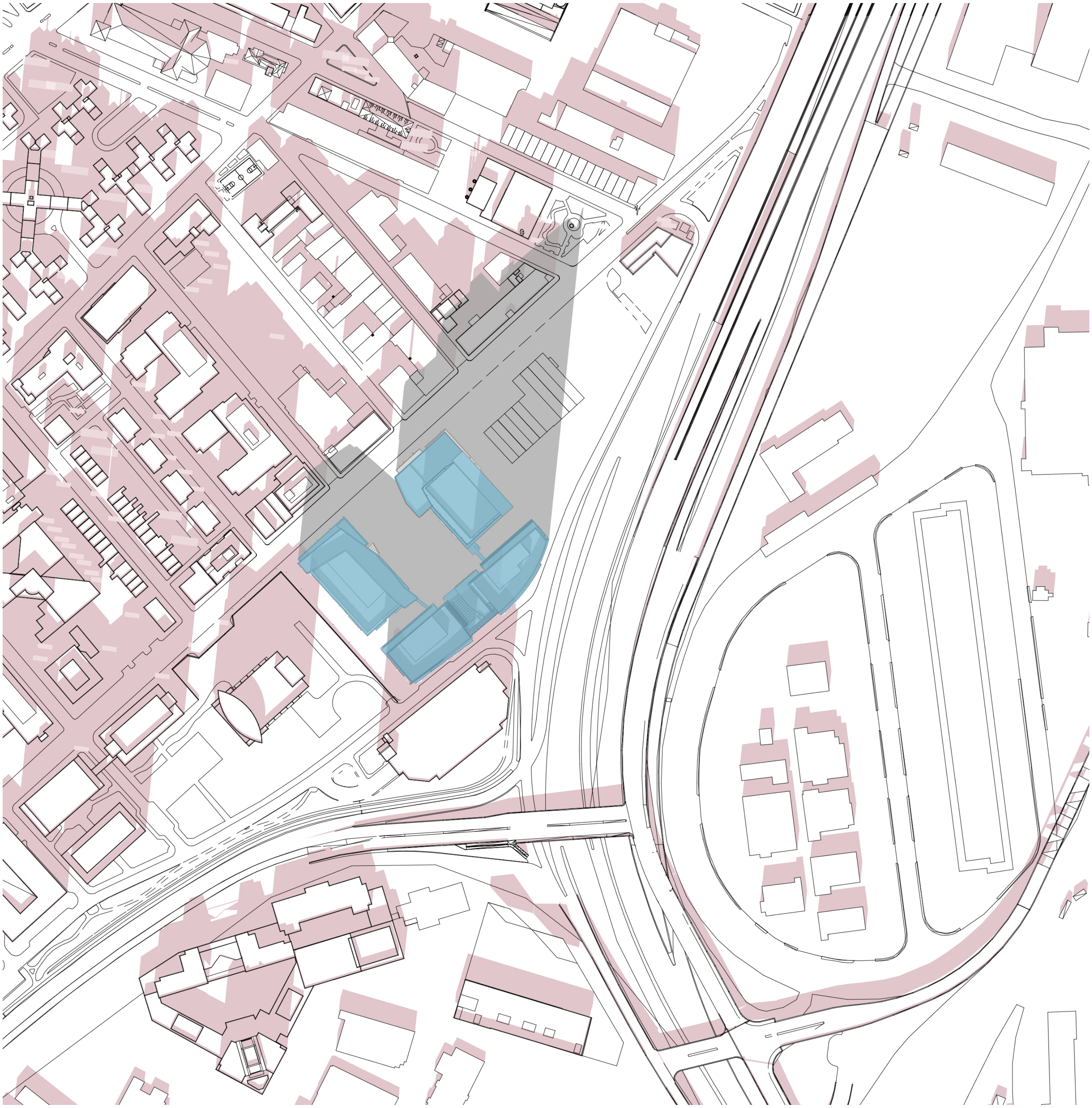
Stantec

EXCHANGE SOUTH END

Figure 3-12

Shadow Study December 21(9:00 AM)

Source: Stantec



12:00 PM DECEMBER 21ST

EXISTING SHADOW NEW SHADOW PROPOSED BUILDINGS

0' 200' 400' 800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

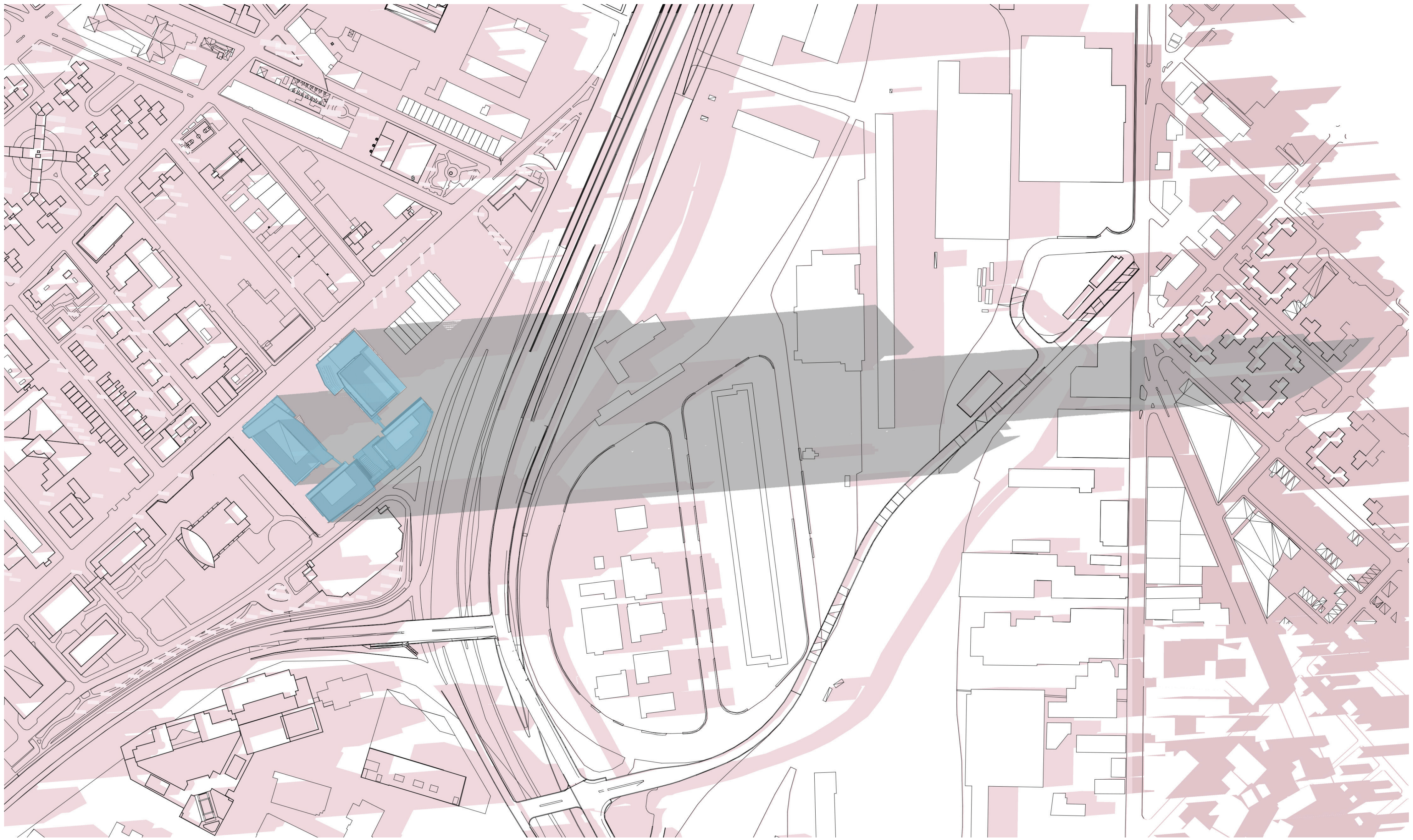
Stantec

EXCHANGE SOUTH END

Figure 3-13

Shadow Study December 21(12:00 PM)

Source: Stantec



3:00 PM DECEMBER 21ST

EXISTING SHADOW NEW SHADOW PROPOSED BUILDINGS

0' 200' 400' 800'

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 3-14
Shadow Study
December 21(3:00 PM)
Source: Stantec

3.4 DAYLIGHT ANALYSIS

3.4.1 Introduction

The purpose of the daylight study analysis is to estimate the extent to which a proposed project will affect the amount of daylight reaching the streets and sidewalks in the immediate vicinity of a project Site. The daylight analysis for the Project considers the existing and proposed conditions, as well as typical daylight obstruction values of the surrounding area.

3.4.2 Methodology

The daylight analysis was performed using the Boston Redevelopment Authority Daylight Analysis (BRADA) computer program.[5] This program measures the percentage of "sky dome" that is obstructed by a project, and is a useful tool in evaluating the net change in obstruction from existing to build conditions at a specific Site.

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

The analysis compares three conditions: Existing Conditions; Proposed Conditions; and the context of the area. Two area context points were considered to provide a basis of comparison to existing conditions in the surrounding area. The viewpoint and area context viewpoints were taken in the following locations and are shown on Figure 3-15.

- **Viewpoint 1:** View from Albany Street facing southeast toward the Project Site.
- **Viewpoint 2:** View from Albany Street facing southeast toward the Project Site.
- **Area Context Viewpoint AC1:** View from Albany Street facing northwest toward 573 Albany Street.
- **Area Context Viewpoint AC2:** View from Albany Street facing southeast toward 650 Albany Street.

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

PROJECT SITE V1 VIEWPOINT LOCATION & DIRECTION AC2 AREA CONTEXT LOCATION & DIRECTION

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Stantec

EXCHANGE SOUTH END

Figure 3-15
Daylight Analysis
Viewpoint and Area Context Location

Source: Epsilon Associates, Inc.

3.4.3 Results

The results for each viewpoint are described in Table 3-2. Figures 3-16 illustrates the BRADA results for each analysis.

Table 3-2 Daylight Analysis Results

Viewpoint Locations		Existing Conditions	Proposed Conditions
Viewpoint 1	View from Albany Street facing southeast toward the Project Site[1]	7.3%	63.9%
Viewpoint 2	View from Albany Street facing southeast toward the Project Site[2]	7.3%	55.3%
Area Context Points			
AC1	View from the center of Albany Street facing northwest toward 573 Albany Street	64.7%	N/A
AC2	View from the center of Albany Street facing southeast toward 650 Albany Street	82.5%	N/A

[1] Viewpoint 1 in the Proposed Conditions faces southeast toward buildings B and C.
[2] Viewpoint 2 in the Proposed Conditions faces southeast toward buildings A and D

Albany Street

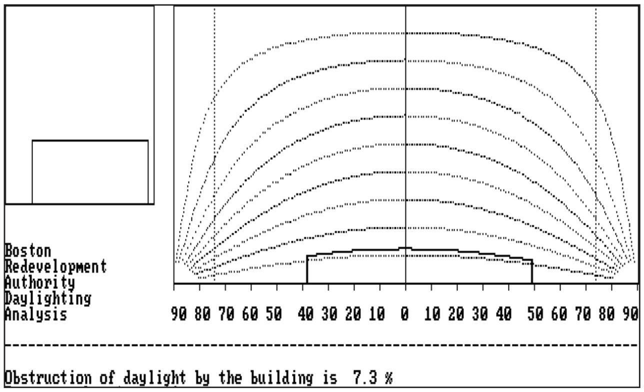
Viewpoints 1 and 2 were taken from Albany Street looking southeast toward the Site. The existing condition includes a surface parking lot and a low-rise, one-story building which is set back from the street. Therefore, the existing daylight obstruction values for Viewpoints 1 and 2, 7.3% and 7.3%, respectively, are modest. In the proposed condition, these viewpoints will look at the taller buildings being proposed. The spaces between buildings, including the proposed open space in the center of the Site, as well as podiums will allow for views of the sky. Since the Site will be mostly developed, the daylight obstruction values are higher than the existing conditions, 63.9% and 55.3%, respectively. The daylight obstruction values will be similar or less than the surrounding area context.

Area Context

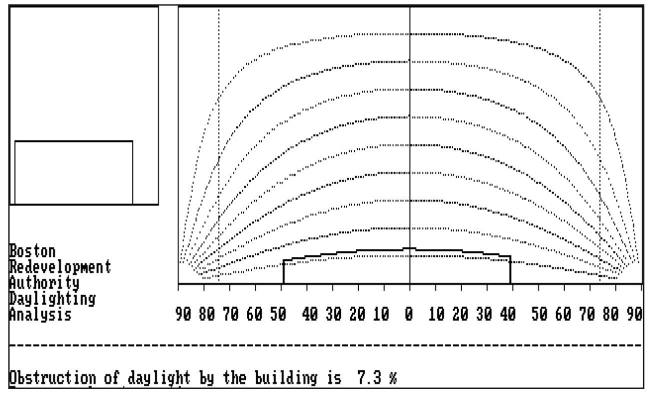
To provide a larger context for comparison of daylight conditions, obstruction values were calculated for two Area Context points described above and shown in Figure 3-15. The daylight obstruction values ranged from 64.7% for AC1 and 82.5% for AC2. Daylight obstruction values for the Project are similar or less than the buildings the Project vicinity, including the Area Context values.

3.4.4 Conclusion

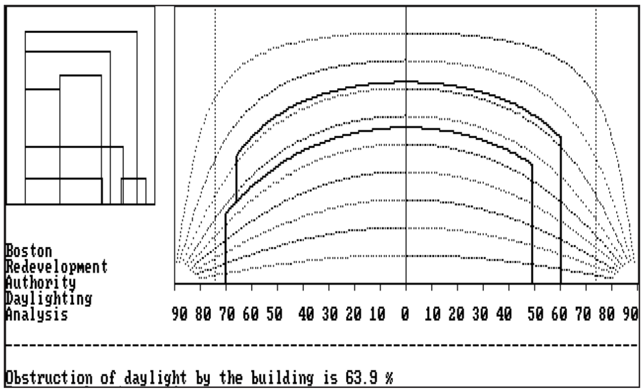
The daylight analysis conducted for the Project describes existing and proposed daylight obstruction conditions at the Project Site and in the surrounding area. The results for the BRADA analysis indicate that although the Project will result in increased daylight obstruction over existing conditions, it will be similar or lower than the daylight obstruction values within the surrounding area. See Figure 3-16.



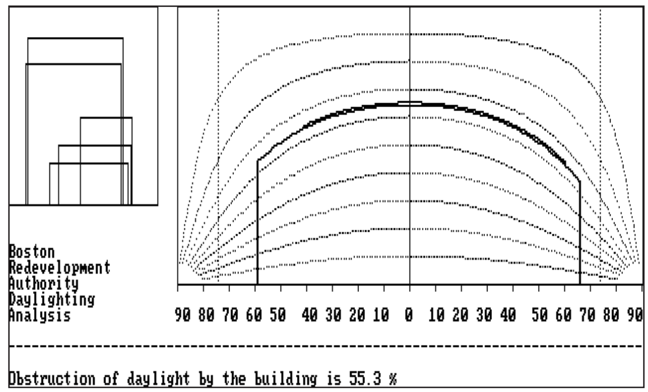
Viewpoint 1 (Existing): View from Albany Street facing southeast toward the Project site



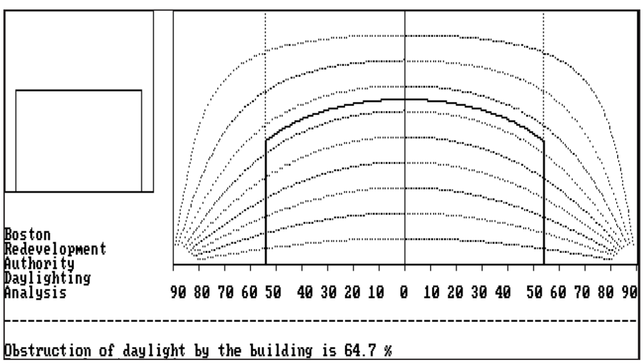
Viewpoint 2 (Existing): View from Albany Street facing southeast toward the Project site



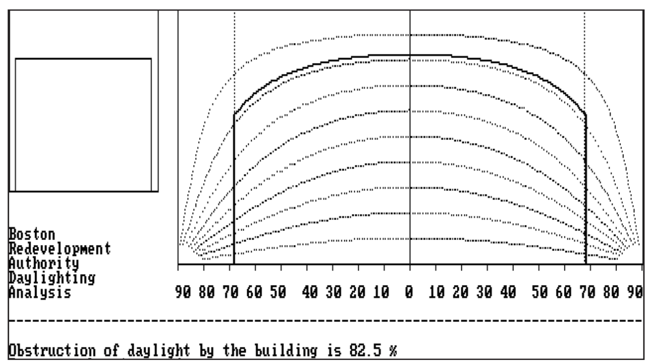
Viewpoint 1 (Proposed): View from Albany Street facing southeast towards the Project site (Buildings B and C)



Viewpoint 2 (Proposed): View from Albany Street facing south toward the Project site (Buildings A and D)



AC1: View from Albany Street facing northwest toward 573 Albany Street



AC2: View from Albany Street facing southwest toward 650 Albany Street

Photograph x
EXISTING SHADOW

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 3-16
Daylight Analysis
BRADA Results

Source: Epsilon Associates, Inc.

3.5 SOLAR GLARE

A solar glare analysis is intended to measure reflective glare from the building onto streets, public open spaces, and sidewalks in order to determine the likelihood of visual impairment or discomfort due to the reflective spot glare. As a result of the design and the use of generally non-reflective materials, it is not anticipated the Project will have adverse solar glare impacts or create solar heat buildup in nearby buildings**.** Site landscaping and street trees will further absorb sunlight to minimize reflection from the buildings onto the street, sidewalk, and neighboring properties.

3.6 AIR QUALITY ANALYSIS

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

3.6.1 Background Air Quality and Health Standards

Background air quality concentrations and federal air quality standards were utilized to conduct the air quality impact analysis, and are described below.

Federal National Ambient Air Quality Standards (NAAQS) were developed by the U.S. Environmental Protection Agency (EPA) to protect the human health against adverse health effects with a margin of safety, in response to the Clean Air Act passed by the U.S. Congress in 1970. One of the basic goals of federal and state air regulations is to ensure that ambient air quality, including the impact of background, existing sources, and new sources, is in compliance with ambient standards. Toward this end, all areas of the country have been classified as in "attainment," "nonattainment", or "unclassified" for a particular contaminant.

As required by the Clean Air Act, EPA promulgated NAAQS for six air contaminants, known as criteria pollutants, for the protection of public health and welfare. These criteria pollutants are Sulfur Dioxide (SO_2); particulate matter having an aerodynamic diameter of 10 micrometers or less (PM10); particulate matter having an aerodynamic diameter of 2.5 micrometers or less (PM2.5); nitrogen dioxide (NO_2); carbon monoxide (CO); ozone (O_3); and lead (Pb). The NAAQS are listed in Table 3-3. Massachusetts Ambient Air Quality Standards (MAAQS) are typically identical to NAAQS (differences are highlighted in **bold** in **Table 3-3**). The Massachusetts air permitting process, among other things, assures new emission sources do not cause or contribute to an exceedance of the NAAQS or MAAQS.

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

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

Table 3-3 National (NAAQS) and Massachusetts (MAAQS) Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS ($\mu g/m^3$)		MAAQS ($\mu g/m^3$)	
		Primary	Secondary	Primary	Secondary
NO_2	Annual (1)	100	Same	100	Same
	1-hour (2)	**188**	None	**None**	None
SO_2	Annual (1)(9)	80	None	80	None
	24-hour (3)(9)	365	None	365	None
	3-hour (3)	None	1300	None	1300
	1-hour (4)	**196**	None	**None**	None
PM2.5	Annual (1)	**12**	**15**	**None**	**None**
	24-hour (5)	**35**	**Same**	**None**	**None**
PM10	Annual (1)(6)	**None**	None	**50**	Same
	24-hour (3)(7)	150	Same	150	Same
CO	8-hour (3)	10,000	None	10,000	Same
	1-hour (3)	40,000	None	40,000	Same
Ozone	8-hour (8)	**147**	Same	**235**	Same
Pb	3-month (1)(10)(11)	**0.15**	Same	**1.5**	Same

Standards for NO_2, SO_2, CO and Ozone are codified in parts per million (ppm) or parts per billion (ppb). Converted to $\mu g/m^3$ for modeling purposes.
(1) Not to be exceeded.
(2) 98th percentile of one-hour daily maximum concentrations, averaged over three years.
(3) Not to be exceeded more than once per year.
(4) 99th percentile of one-hour daily maximum concentrations, averaged over three years.
(5) 98th percentile, averaged over three years.
(6) EPA revoked the annual PM10 NAAQS in 2006.
(7) Not to be exceeded more than once per year on average over three years.
(8) Annual fourth-highest daily maximum eight-hour concentration, averaged over three years.
(9) EPA revoked the annual and 24-hour SO_2 NAAQS in 2010. However they remain in effect until one year after the area's initial attainment designation, unless designated as "nonattainment".
(10) Rolling three-month averaging period for NAAQS, Calendar quarter for MAAQS.
(11) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 $\mu g/m^3$ as a calendar quarter average) also remain in effect.
Source: https://www.epa.gov/criteria-air-pollutants/naaqs-table and 310 CMR 6.04

3.6.1.1 Background Concentrations

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

The Clean Air Act allows for one exceedance per year of the non-probabilistic CO and SO_2 short-term NAAQS per year. The highest second-high accounts for the one exceedance. Annual NAAQS are never to be exceeded. The 24-hour PM10 standard is not to be exceeded more than once per year on average over three years. To attain the 24-hour PM2.5 standard, the three-year average of the 98th percentile of 24-hour concentrations must not exceed 35 $\mu g/m^3$. For annual PM-2.5, the annual mean, averaged over three years is not to be exceeded. To attain the one-hour NO_2 standard, the three-year average of the 98th percentile of the maximum daily one-hour concentrations must not exceed 188 $\mu g/m^3$. Similarly, to attain the one-hour SO_2 standard, the three-year average of the 99th percentile of the maximum daily one-hour concentrations must not exceed 196 µg/m^3. For the remaining annual averages, the annual mean is not to be exceeded.

Background concentrations were determined from the closest available monitoring stations to the Project Site. The closest monitor is at Harrison Avenue in Boston, roughly 1 mile southwest of the Project Site. This Site samples for all pollutants. A summary of the background air quality concentrations is presented in Table 3-4.

Table 3-4 Observed Ambient Air Quality Concentrations and Selected Background Levels

POLL.	Avg. Time	Form	2014	2015	2016	Background Concentration (µg/m³)	NAAQS	Percent of NAAQS
SO_2 (1)(6)	1-Hour (5)	99th %	32.2	24.6	12.3	23.1	196.0	12%
	3-Hour	H2H	56.3	22.8	13.4	56.3	1300.0	4%
	24-Hour	H2H	13.4	11.3	5.0	13.4	365.0	4%
	Annual	H	2.8	2.1	1.2	2.8	80.0	3%
PM10	24-Hour	H2H	61.0	28.0	29.0	61.0	150.0	41%
	Annual	H	14.0	12.4	11.8	14.0	50.0	28%
PM2.5	24-Hour (5)	98th %	17.6	19.0	16.3	17.6	35.0	50%
	Annual (5)	H	8.0	8.8	6.2	7.7	12.0	64%
NO_2 (3)	1-Hour (5)	98th %	95.9	99.6	92.1	95.9	188.0	51%
	Annual	H	29.6	28.1	24.8	29.6	100.0	30%
CO (2)	1-Hour	H2H	1963.1	1560.9	2760.7	2760.7	40000.0	7%
	8-Hour	H2H	1489.8	1031.4	2062.8	2062.8	10000.0	21%
Ozone (4)	8-Hour	H4H	106.0	109.9	113.9	113.9	147.0	77%
Lead	3-Month	H	0.014	0.016	0.017	0.017	0.15	12%

Notes:
From 2014-2016 EPA's AirData Website
(1) SO_2 reported ppb. Converted to µg/m^3 using factor of 1 ppm = 2.62 µg/m^3.
(2) CO reported in ppm. Converted to µg/m^3 using factor of 1 ppm = 1146 µg/m^3.
(3) NO_2 reported in ppb. Converted to µg/m^3 using factor of 1 ppm = 1.88 µg/m^3.
(4) O_3 reported in ppm. Converted to µg/m^3 using factor of 1 ppm = 1963 µg/m^3.
(5) Background level is the average concentration of the three years.
(6) The 24-hour and Annual standards were revoked by EPA on June 22, 2010, Federal Register 75-119, p. 35520.

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

3.6.1.2 Attainment Status

The City of Boston, in Suffolk County, is presently designated as unclassified (treated as attainment) or attainment for NO_2, SO_2, CO, PM10, PM2.5, and Pb. The entire Commonwealth of Massachusetts, including Suffolk County, was formerly classified as moderate nonattainment for Ozone (O_3) (1997 eight-hour standard of 0.08 ppm). This standard was replaced with a standard of 0.075 ppm effective May 28, 2008, and the 1997 standard was officially revoked effective on April 6, 2015. The entire Commonwealth (except for Dukes County on Martha's Vineyard) is classified as being in attainment with the 2008 eight-hour O_3 standard. Effective December 28, 2015, the eight-hour O_3 standard was further reduced to 0.07 ppm. Attainment designations for this standard have not yet been published by EPA.

3.6.2 Mobile Sources

Mobile sources of air pollution include emissions from vehicle traffic associated with the Project.

3.6.2.1 BPDA Air Quality Analysis Requirements

BPDA guidelines[6] state:

> *A mesoscale analysis predicting the change in regional emissions of volatile organic compounds ("VOCs") and nitrogen oxides ("NOx") should be performed for projects that generate more than 10,000 vehicle trips per day. The above analyses shall be conducted in accordance with the modeling protocols established by the Massachusetts Department of Environmental Protection (and the U.S. Environmental Protection Agency.*

For this Project, the vehicle trip threshold is not exceeded. Therefore, a mesoscale analysis was not prepared.

BPDA guidelines also state:

> *A microscale analysis predicting localized carbon monoxide concentrations should be performed, including identification of any locations projected to exceed the National or Massachusetts Ambient Air Quality Standards, for projects in which: 1) project traffic would impact intersections or roadway links currently operating at Level of Service ("LOS") D, E, or F or would cause LOS to decline to D, E, or F; 2) project traffic would increase traffic volumes on nearby roadways by 10% or more (unless the increase in traffic volume is less than 100 vehicles per hour); or, 3) the project will generate 3,000 or more new average daily trips on roadways providing access to a single location.*

For this Project, the transportation analysis shows that Project traffic affects two intersections currently operating at LOS D or worse, or projected to operate at LOS D or worse for future cases. Therefore, a microscale analysis has been completed.

3.6.2.2 Microscale Analysis Methodology

The microscale analysis involves modeling of CO emissions from vehicles idling at and traveling through signaled intersections. Predicted ambient concentrations of CO for the Build and No-Build cases are compared with federal (and state) ambient air quality standards for CO.

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[6] Boston Redevelopment Authority, BRA Development Review Guidelines, 2006.

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

The modeling methodology was developed in accordance with the latest MassDEP modeling policies and Federal modeling guidelines.[7,8] The microscale analysis has been conducted using the latest versions of EPA's MOVES and CAL3QHC programs to estimate CO concentrations at sidewalk receptor locations.

Baseline (2017) and future year (2024) emission factor data calculated from the MOVES model, along with traffic data, were input into the CAL3QHC program to determine CO concentrations due to traffic flowing through the selected intersections.

Existing background values of CO at the nearest monitor location at Harrison Avenue were obtained from MassDEP. CAL3QHC results were then added to background CO values of 2.4 ppm (one-hour) and 1.8 ppm (eight-hour), as provided by MassDEP, to determine total air quality impacts due to the Project. These values were compared to the NAAQS for CO of 35 ppm (one-hour) and 9 ppm (eight-hour).

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

3.6.2.2.1 Intersection Selection

Two signalized intersections included in the traffic study meet the conditions for a microscale analysis as described in Section 3.6.2.1. The traffic volumes and LOS calculations provided in Chapter 2 form the basis of evaluating the traffic data versus the microscale thresholds. The intersections found to meet the criteria are:

The intersection of Massachusetts Avenue and Albany Street, the intersection of Frontage Road Northbound and the Department of Public Works yard driveway; and the intersection of Frontage Road Southbound and Albany Street.

Microscale modeling was performed for the intersections based on the aforementioned methodology. The 2017 Existing Conditions, and the 2024 No-Build and Build conditions were each evaluated for both morning (a.m.) and afternoon (p.m.) peak. Two build cases were evaluated in the transportation study and air quality impacts from both are also evaluated.

3.6.2.2.2 Emissions Calculations (MOVES)

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[8] 40 CFR 51 Appendix B, Guideline on Air Quality Models, 70 FR 68228, Nov. 9, 2005.

The EPA MOVES computer program was used to estimate motor vehicle emission factors on the roadway network. Emission factors calculated by the MOVES model are based on motor vehicle operations typical of daily periods. The Commonwealth's statewide annual Inspection and Maintenance program was included, as well as the county specific vehicle age registration distribution, fleet mix, meteorology, and other inputs. The inputs for MOVES for the Existing (2017) and Build year (2024) were provided by MassDEP.

All link types for the modeled intersections were input into MOVES. Idle emission factors are obtained from factors for a link average speed of 0 miles per hour (mph). Moving emissions are calculated based on speeds at which free-flowing vehicles travel through the intersection as stated in traffic modeling (SYNCHRO) reports. A speed of 25 mph is used for all free-flow traffic. Speeds of 10 and 15 mph were used for right (and U-turns, if necessary) and left turns, respectively. Roadway emissions factors were obtained from MOVES using EPA guidance.[9]

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

3.6.2.2.3 Receptors & Meterology Inputs

Up to 135 receptors were placed in the vicinity of the modeled intersections. Receptors extended approximately 300 feet on the sidewalks along the roadways approaching the intersections. The roadway links and receptor locations of the modeled intersections are presented in Figures 3-17 through 3-19.

For the CAL3QHC model, limited meteorological inputs are required. Following EPA guidance[10], a wind speed of one meter per second, stability class D (4), and a mixing height of 1,000 meters were used. To account for the intersection geometry, wind directions from 0° to 350°, every 10° were selected. A surface roughness length of 321 centimeters was selected.[11]

3.6.2.2.4 Impact Calculations (CAL3QHS)

The CAL3QHC model predicts one-hour concentrations using queue-links at intersections, worst-case meteorological conditions, and traffic input data. The one-hour concentrations were scaled by a factor of 0.9 to estimate eight-hour concentrations.[12] The CAL3QHC methodology was based on EPA CO modeling guidance. Signal timings were provided directly from the traffic modeling outputs.

For use in the microscale analysis, background concentrations of CO in ppm were required. The corresponding maximum background concentrations in ppm were 2.4 ppm (2,761 µg/m^3) for one-hour and 1.8 ppm (2,063 µg/m^3) for eight-hour CO.

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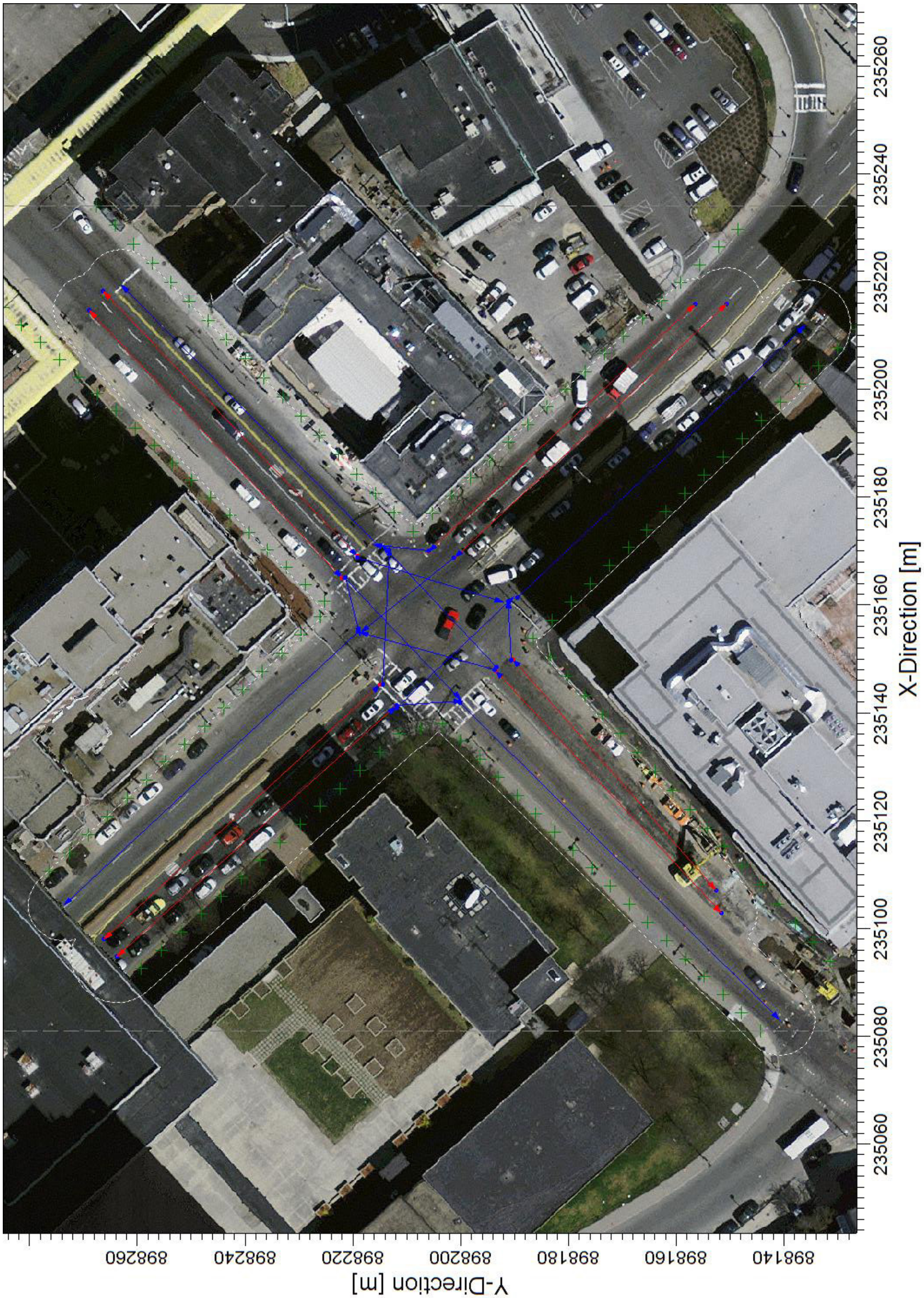
[9] U.S. EPA, 2010. Using MOVES in Project-Level Carbon Monoxide Analyses. EPA-420-B-10-041
[10] U.S. EPA, *Guideline for Modeling Carbon Monoxide from Roadway Intersections.* EPA-454/R-92-005, November 1992.
[11] U.S. EPA, User's Guide for CAL3QHC Version 2: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections. EPA –454/R-92-006 (Revised), September 1995.
[12] U.S. EPA, AERSCREEN User's Guide; EPA-454/B-11-001, March 2011.



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EXCHANGE SOUTH END

Figure 3-17

Intersection of Massachusetts Avenue and Albany Street

Source: Epsilon Associates, Inc.

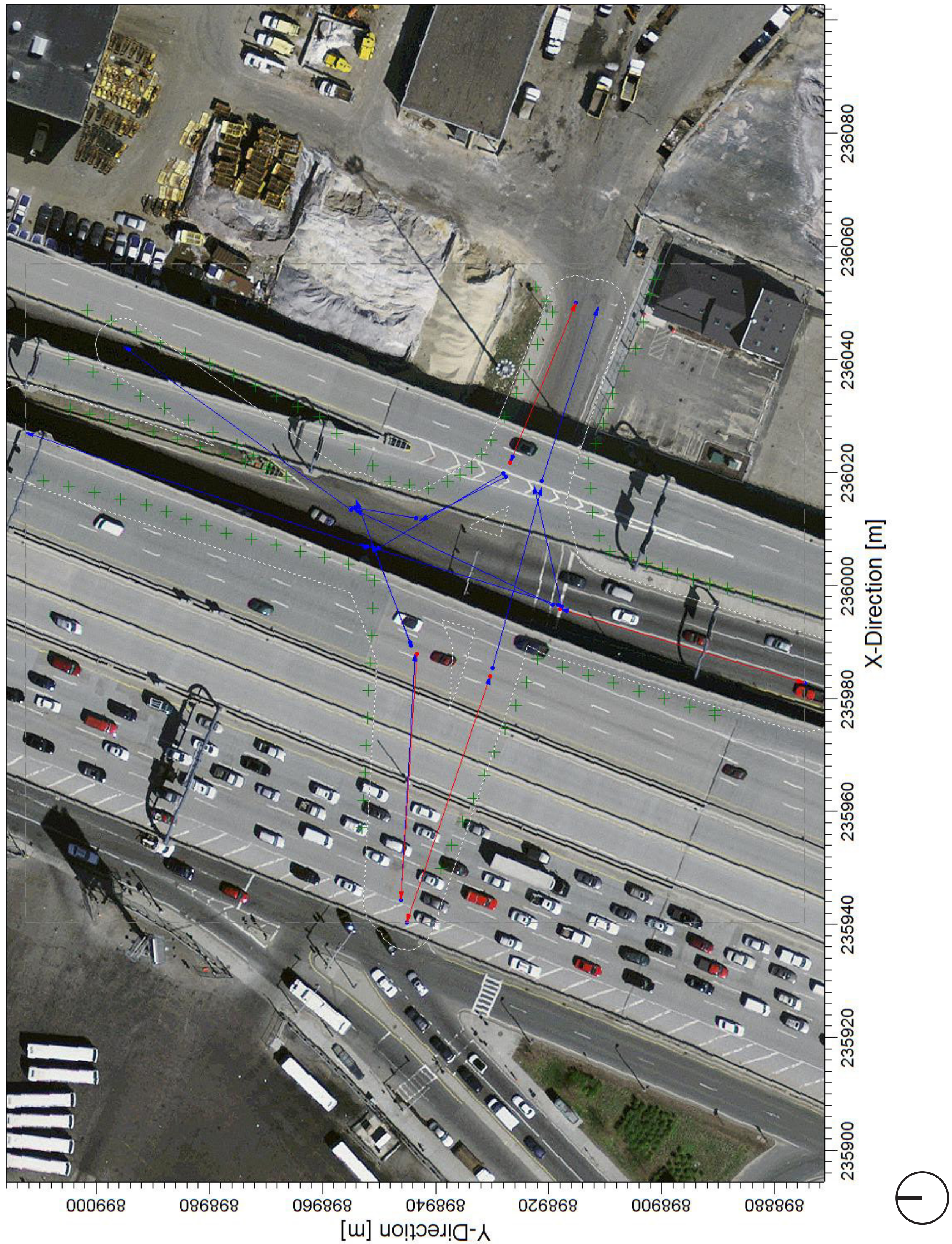

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Figure 3-18

Intersection of Frontage Road Northbound and the Department of Public Works Yard Driveway

Source: Epsilon Associates, Inc.

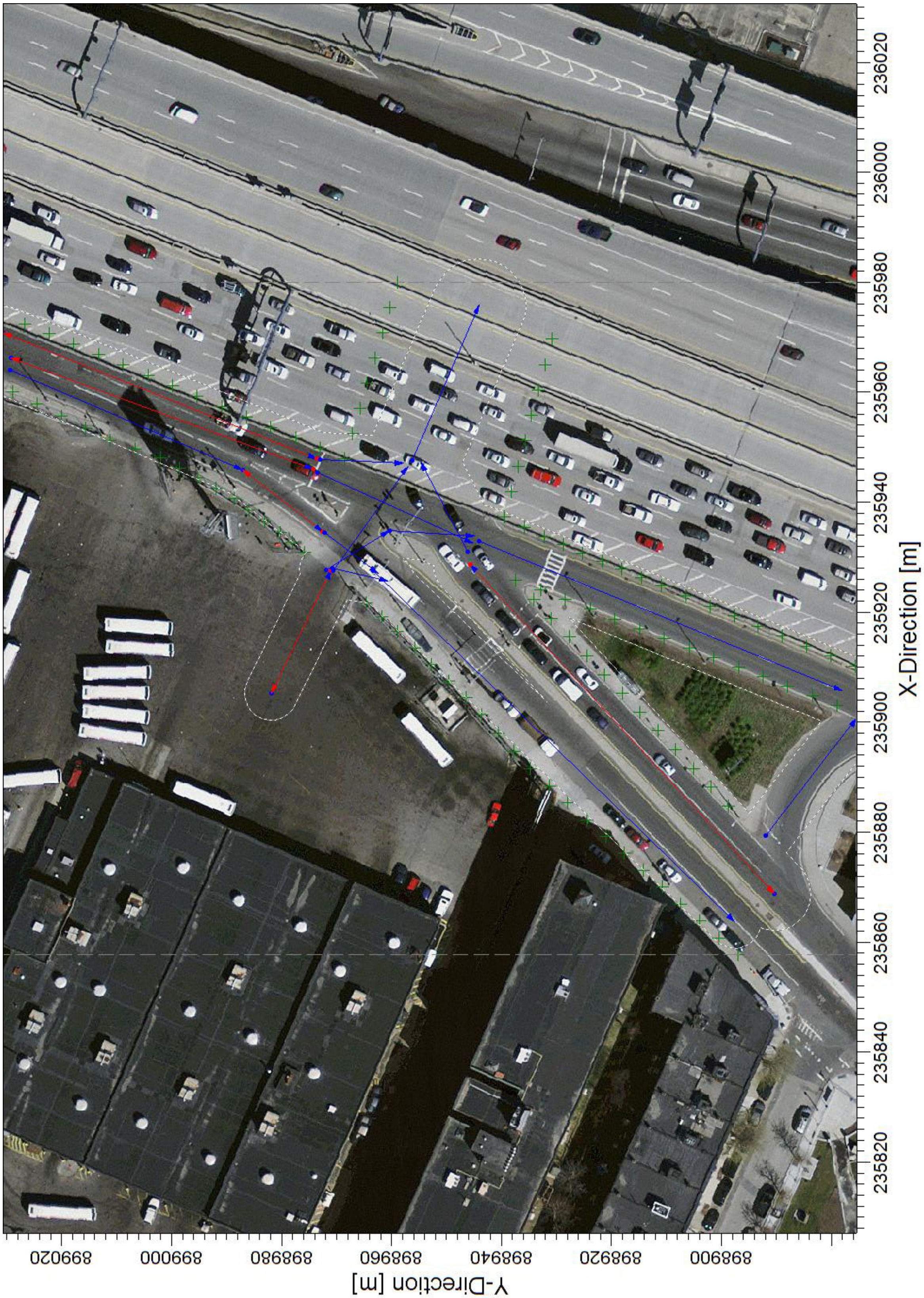

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Figure 3-19

Intersection of Frontage Road Southbound and Albany Street

Source: Epsilon Associates, Inc.

3.6.3 Air Quality Results

The results of the maximum one-hour predicted CO concentrations from CAL3QHC are provided in Tables 3-5 through 3-8 for the 2017 and 2024 scenarios. Eight-hour average concentrations are calculated by multiplying the maximum one-hour concentrations by a factor of 0.9.[13]

The results of the one-hour and eight-hour maximum modeled CO ground-level concentrations from CAL3QHC were added to EPA supplied background levels for comparison to the NAAQS. These values represent the highest potential concentrations at the intersection as they are predicted during the simultaneous occurrence of "defined" worst case meteorology. The highest one-hour traffic-related concentration predicted in the area of the Project for the modeled conditions (0.4 ppm) plus background (2.4 ppm) is 2.8 ppm. The highest eight-hour traffic-related concentration predicted in the area of the Project for the modeled conditions (0.4 ppm) plus background (1.8 ppm) is 2.2 ppm. All concentrations are well below the one-hour NAAQS of 35 ppm and the eight-hour NAAQS of 9 ppm.

3.6.4 Conclusions

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

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

Table 3-5 Summary of Microscale Modeling Analysis (Existing 2017)

Intersection	*Peak*	*CAL3QHC Modeled CO Impacts (ppm)*	*Monitored Background Concentration (ppm)*	*Total CO Impacts (ppm)*	*NAAQS (ppm)*
1-Hour					
Massachusetts Avenue & Albany Street	AM	0.3	2.4	2.7	35
	PM	0.3	2.4	2.7	35
Frontage Road NB and DPW Driveway	AM	0.4	2.4	2.8	35
	PM	0.4	2.4	2.8	35
Frontage Road SB and Albany Street	AM	0.4	2.4	2.8	35
	PM	0.4	2.4	2.8	35
8-Hour					
Massachusetts Avenue & Albany Street	AM	0.3	1.8	2.1	9
	PM	0.3	1.8	2.1	9
Frontage Road NB and DPW Driveway	AM	0.4	1.8	2.2	9
	PM	0.4	1.8	2.2	9
Frontage Road SB and Albany Street	AM	0.4	1.8	2.2	9
	PM	0.4	1.8	2.2	9

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

Table 3-6 Summary of Microscale Modeling Analysis (No-Build 2024)

Intersection	*Peak*	*CAL3QHC Modeled CO Impacts (ppm)*	*Monitored Background Concentration (ppm)*	*Total CO Impacts (ppm)*	*NAAQS (ppm)*
1-Hour					
Massachusetts Avenue & Albany Street	AM	0.2	2.4	2.6	35
	PM	0.2	2.4	2.6	35
Frontage Road NB and DPW Driveway	AM	0.4	2.4	2.8	35
	PM	0.4	2.4	2.8	35
Frontage Road SB and Albany Street	AM	0.2	2.4	2.6	35
	PM	0.2	2.4	2.6	35
8-Hour					
Massachusetts Avenue & Albany Street	AM	0.2	1.8	2.0	9
	PM	0.2	1.8	2.0	9
Frontage Road NB and DPW Driveway	AM	0.4	1.8	2.2	9
	PM	0.4	1.8	2.2	9
Frontage Road SB and Albany Street	AM	0.2	1.8	2.0	9
	PM	0.2	1.8	2.0	9

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

Table 3-7 Summary of Microscale Modeling Analysis ("One Way Pair" Build 2024)

Intersection	Peak	CAL3QHC Modeled CO Impacts (ppm)	Monitored Background Concentration (ppm)	Total CO Impacts (ppm)	NAAQS (ppm)
1-Hour					
Massachusetts Avenue & Albany Street	AM	0.2	2.4	2.6	35
	PM	0.2	2.4	2.6	35
Frontage Road NB and DPW Driveway	AM	0.4	2.4	2.8	35
	PM	0.4	2.4	2.8	35
Frontage Road SB and Albany Street	AM	0.2	2.4	2.6	35
	PM	0.3	2.4	2.7	35
8-Hour					
Massachusetts Avenue & Albany Street	AM	0.2	1.8	2.0	9
	PM	0.2	1.8	2.0	9
Frontage Road NB and DPW Driveway	AM	0.4	1.8	2.2	9
	PM	0.4	1.8	2.2	9
Frontage Road SB and Albany Street	AM	0.2	1.8	2.0	9
	PM	0.3	1.8	2.1	9

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

Table 3-8 Summary of Microscale Modeling Analysis ("E. Canton" Build 2024)

Intersection	*Peak*	*CAL3QHC Modeled CO Impacts (ppm)*	*Monitored Background Concentration (ppm)*	*Total CO Impacts (ppm)*	*NAAQS (ppm)*
1-Hour					
Massachusetts Avenue & Albany Street	AM	0.2	2.4	2.6	35
	PM	0.2	2.4	2.6	35
Frontage Road NB and DPW Driveway	AM	0.4	2.4	2.8	35
	PM	0.4	2.4	2.8	35
Frontage Road SB and Albany Street	AM	0.2	2.4	2.6	35
	PM	0.3	2.4	2.7	35
8-Hour					
Massachusetts Avenue & Albany Street	AM	0.2	1.8	2.0	9
	PM	0.2	1.8	2.0	9
Frontage Road NB and DPW Driveway	AM	0.4	1.8	2.2	9
	PM	0.4	1.8	2.2	9
Frontage Road SB and Albany Street	AM	0.2	1.8	2.0	9
	PM	0.3	1.8	2.1	9

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

3.7 NOISE

3.7.1 Introduction

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

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

3.7.2 Noise Terminology

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

The decibel scale is logarithmic to accommodate the wide range of sound intensities found in the environment. A property of the decibel scale is that the sound pressure levels of two or more separate sounds are not directly additive. For example, if a sound of 50 dB is added to another sound of 50 dB, the total is only a 3-dB increase (53 dB), which is equal to doubling in sound energy but not equal to a doubling in quantity (100 dB). Thus, every 3-dB change in sound level represents a doubling or halving of sound energy. Relative to this characteristic, a change in sound levels of less than 3 dB is imperceptible to the human ear.

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

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

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

- L90 is the sound level in dBA exceeded 90 percent of the time during a measurement period. The L90 is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when there are no obvious nearby intermittent noise sources.

- L50 is the median sound level, the sound level in dBA exceeded 50 percent of the time during the measurement period.

- L10 is the sound level in dBA exceeded only 10 percent of the time. It is close to the maximum level observed during the measurement period. The L10 is sometimes called the intrusive sound level because it is caused by occasional louder noises like those from passing motor vehicles.

- Lmax is the maximum instantaneous sound level observed over a given period.

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

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

3.7.3 Noise Regulations and Criteria

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

Table 3-9 below presents the "Zoning District Noise Standards" contained in Regulation 2.5 of the BAPCC "Regulations for the Control of Noise in the City of Boston," adopted December 17, 1976. These maximum allowable sound pressure levels apply at the property line of the receiving property. The "Residential Zoning District" limits apply to any lot located within a residential zoning district or to any residential use located in another zone except an Industrial Zoning District, according to Regulation 2.2. Similarly, per Regulation 2.3, business limits apply to any lot located within a business zoning district not in residential or institutional use.

Table 3-9 City Noise Standards, Maximum Allowable Sound Pressure Levels

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

Notes:

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

3.7.4 Existing Conditions

A background noise level survey was conducted to characterize the existing "baseline" acoustical environment in the vicinity of the Project. Existing noise sources around the Site include: vehicular traffic along local streets, construction activity, mechanical equipment from surrounding buildings, idling vehicles, pedestrian foot traffic, emergency vehicle sirens, street cleaning, wind, rustling vegetation, birds, overhead planes, and the general city soundscape.

3.7.4.1 Noise Monitoring Methodology

Since noise impacts from the Project on the community will be highest when background noise levels are the lowest, the study was designed to measure community noise levels under conditions typical of a "quiet period" for the area. Therefore, daytime measurements were scheduled to avoid peak traffic conditions. Sound level measurements were made on Thursday, July 20, 2017 during the daytime (12:50 p.m. to 3:00 p.m.) and on Thursday, July 20, 2017 and Friday July 21, 2017 during nighttime hours (11:20 p.m. to 1:15 a.m.). All measurements were 20 minutes in duration.

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

3.7.4.2 Noise Monitoring Locations

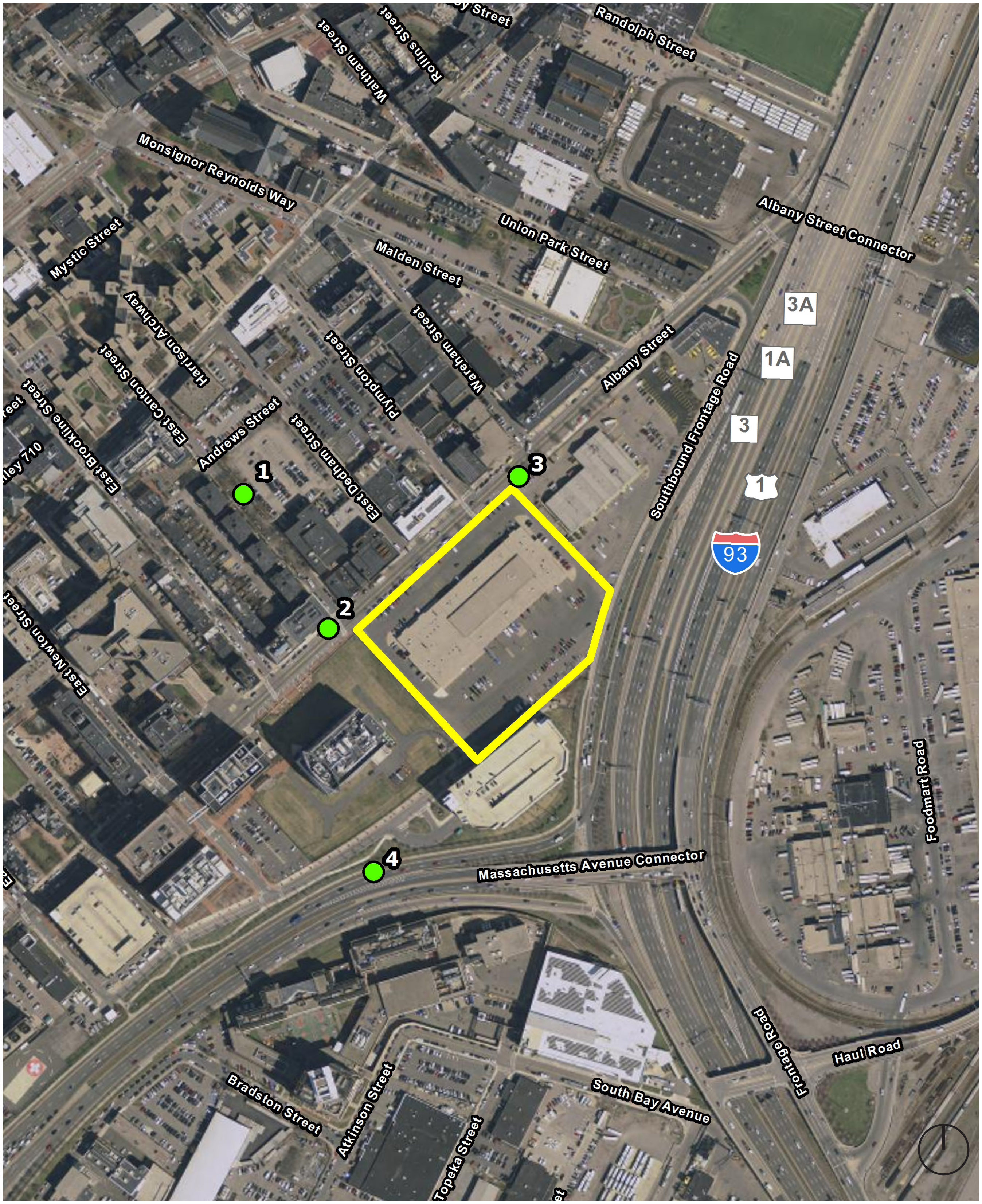
The selection of the noise monitoring locations was based upon a review of zoning and land use in the Project area. Four noise monitoring locations were selected as representative sites to obtain a sampling of the ambient baseline noise environment. These measurement locations are depicted on Figure 3-20 and described below.

- **Location 1** is located on the sidewalk across from the residence at 80 East Canton Street, and adjacent to a parking lot. This location is representative of residential receptors to the northwest of the Project and offset from the traffic on Albany Street.

- **Location 2** is located on the western corner of Albany Street and East Canton Street, outside of the 601 Albany Apartments. This location is representative of the closest residential receptors to the west of the Project.

- **Location 3** is located in front of 500 Albany Street, Jacobson Floral Supply, and across from a commercial and residential building between Wareham and Plympton Streets. This location represents the closest residential and commercial receptors to the east of the Project.

- **Location 4** is located along the northern sidewalk of the Massachusetts Avenue Connector/South Bay Harbor Trail. This location is representative of receptors to the south of the Project.



PROJECT SITE NOISE MEASUREMENT LOCATION

0' 250' 500'

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EXCHANGE SOUTH END

Figure 3-20
Noise Measurement Locations

Source: Epsilon Associates, Inc.

3.7.4.3 Noise Monitoring Equipment

A Larson Davis Model 831 sound level meter equipped with a PCB PRM831 preamplifier, a PCB 377B20 half-inch microphone, and manufacturer-provided windscreen was used to collect background sound pressure level data. This instrumentation meets the "Type 1 - Precision" requirements set forth in ANSI S1.4 for acoustical measuring devices. The measurement equipment was calibrated in the field before and after the surveys with a Larson Davis CAL200 acoustical calibrator which meets the standards of IEC 942 Class 1L and ANSI S1.40-1984. Statistical descriptors (e.g., Leq, L90, etc.) were measured for each 20-minute sampling period, with octave-band sound levels corresponding to the same data set processed for the broadband levels.

3.7.4.4 Measured Background Noise Levels

Baseline noise monitoring results are presented in Table 3-10 and summarized below:

- The daytime residual background (L90) measurements ranged from 55 to 66 dBA;
- The nighttime residual background (L90) measurements ranged from 54 to 58 dBA;
- The daytime equivalent level (Leq) measurements ranged from 61 to 75 dBA;
- The nighttime equivalent level (Leq) measurements ranged from 55 to 71 dBA.

Table 3-10 Summary of Measured Background Noise Levels – July 20, 2017 (Daytime) & July 20 and July 21, 2017 (Nighttime)

Location	Period	Start Time	LA_{eq}	LA_{max}	LA_{10}	LA_{50}	LA_{90}	L_{90} Sound Pressure Level by Octave-Band Center Frequency (Hz)								
								31.5	63	125	250	500	1000	2000	4000	8000
			dBA	dBA	dBA	dBA	dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB
1	Day	12:54 PM	61	80	63	59	55	63	62	59	56	52	50	45	42	31
2	Day	1:22 PM	70	82	73	67	62	66	67	63	61	58	57	52	46	36
3	Day	1:51 PM	75	87	78	71	65	69	68	66	63	60	60	56	49	42
4	Day	2:41 PM	73	83	76	73	66	73	72	69	64	60	62	58	50	43
1	Night	11:21 PM	55	67	55	54	54	60	61	58	55	51	49	44	38	31
2	Night	11:47 PM	69	91	70	59	57	62	64	60	57	54	51	47	39	28
3	Night	12:13 AM	66	85	69	59	58	62	63	61	60	53	53	48	40	32
4	Night	12:48 AM	71	83	75	67	58	67	69	61	57	54	54	50	40	28

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

Weather Conditions:

	Date		Temp	RH	Sky	Wind
Daytime	Thursday, July 20, 2017		102 °F	31%	Partly Cloudy	W @ 1-2 m/s
Nighttime	Friday, July 21, 2017		80 °F	57%	Clear	NE @ 0-1 m/s

Monitoring Equipment Used:

	Manufacturer	Model	S/N
Sound Level Meter	Larson Davis	LD831	4373
Microphone	Larson Davis	377C20	165061
Preamp	Larson Davis	PRM831	46514
Calibrator	Larson Davis	Cal200	13676

3.7.5 Future Conditions

3.7.5.1 Overview of Potential Project Noise Sources

The primary sources of continuous sound exterior to the Project will consist of ventilation, heating, cooling, and emergency power noise sources. Multiple noise sources will be located on the rooftops of the four proposed buildings, loading dock and garage fans will be located on the façades of each building at the first-floor level, and intakes and exhausts for air handling units (AHUs) will be located along the facades of each building below the mechanical penthouses. Other mechanical equipment, including chillers and pumps, are to be located within a dedicated enclosed mechanical room, and have not been considered for this analysis.

Table 3-11 provides an anticipated list of the major sources of exterior sound. Sound power levels used in the acoustical modeling of each piece of equipment are presented in Table 3-12. Sound power level data were provided by the respective manufacturer of each piece of equipment.

The Project includes select noise-control measures that are necessary to achieve compliance with the applicable noise regulations. As the design progresses, specifications for mechanical equipment may change; however, appropriate measures will be taken to ensure compliance with the City Noise Standards. Parking garage fans located within lower level building facades will be attenuated through acoustical louvers and/or duct silencers. Acoustical louvers and duct silencers will be necessary to mitigate the sound levels associated with the AHU intakes and exhausts. Mitigation in the form of quieter fans or a barrier wall will be added to cooling towers on Building D. The sound levels of the emergency generators will be controlled using enclosures and exhaust silencers. To further limit impacts from the standby generators, required periodic, routine testing will be conducted during daytime hours, when background sound levels are highest. A barrier wall 25 feet tall will be constructed along the perimeter of the roof of Building A which will mitigate sound levels associated with rooftop equipment. A summary of the noise mitigation proposed for the Project is presented in Table 3-13.

Table 3-11 Modeled Noise Sources

Noise Source	Quantity	Approximate Location	Size/Capacity
High Plume Dilution Fans	46	Rooftops of Buildings A-D	25,000 CFM
3000 Series Cooling Tower 10N	3	Roof of Building A	1,710 tons
3000 Series Cooling Tower 13S	3	Roof of Building B & C	3,300 tons
3000 Series Cooling Tower 10R	3	Roofs of Buildings D	2,400 tons
Garage 600QMX Exhaust Fan	2	First level Building A	96,075 CFM
Garage 600QMX Supply Fan	2	First level Building A	96,075 CFM
Garage 490QMX Exhaust Fan	2	First level Building B	59,515 CFM
Garage 490QMX Supply Fan	2	First level Building B	59,515 CFM
Garage 270QMX Exhaust Fan	2	First level Buildings C	19,700 CFM
Garage 270QMX Supply Fan	2	First level Buildings C	19,700 CFM
Garage 270QMX Exhaust Fan	2	First level Buildings D	19,700 CFM
Garage 270QMX Supply Fan	2	First level Buildings D	19,700 CFM
Loading Dock SQ-130-A Fan	4	First level Buildings A, B, C & D	1,692 CFM
Ventrol Air Handling Unit	8	AHU Room Building A	-
Ventrol Air Handling Unit	16	AHU Room Building B	-
Ventrol Air Handling Unit	16	AHU Room Building C	-
Ventrol Air Handling Unit	12	AHU Room Building D	-
Cummins 2500DQLE	3	Roof of Buildings A, C & D	2,500 kW
Cummins C3000 D6e	1	Roof of Buildings B	3,000 kW

Table 3-12 Modeled Sound Power Levels per Noise Source

Noise Source	Broad-band (dBA)	Sound Level (dB) per Octave-Band Center Frequency (Hz)								
		31.5	63	125	250	500	1k	2k	4k	8k
High Plume Dilution Fans	81	95[1]	95	91	79	72	72	74	70	62
3000 Series Cooling Tower 10N	86	95[1]	95	93	90	84	78	74	70	65
3000 Series Cooling Tower 13S	90	105[1]	105	97	93	88	82	79	75	68
3000 Series Cooling Tower 10R	91	105[1]	105	97	93	88	84	82	76	69
Garage 600QMX Exhaust Fan	99	98[1]	98	103	100	98	93	89	83	78
Garage 600QMX Supply Fan	94	94[1]	94	97	93	92	89	86	80	73
Garage 490QMX Exhaust Fan	97	94[1]	94	100	98	96	91	86	82	77
Garage 490QMX Supply Fan	92	90[1]	90	94	91	90	86	83	78	72
Garage 270QMX Exhaust Fan	83	87[1]	87	90	95	93	90	86	82	74
Garage 270QMX Supply Fan	78	82[1]	82	86	90	86	85	83	80	72
Loading Dock SQ-130-A Fan	79	74[1]	74	81	83	78	68	68	64	59
Ventral Air Handling Unit Intake / Exhaust	99	89[1]	89	81	84	100	88	88	87	84
Cummins 2500DQLE Engine[2]	102	66	66	83	88	93	97	97	92	89
Cummins 2500DQLE Exhaust	129	92	92	113	118	122	120	124	122	113
Cummins C3000 D6e Engine[2]	103	48	65	88	93	96	97	97	112	95
Cummins C3000 D6e Exhaust	128	69	99	108	123	123	122	121	122	119

Notes: Sound power levels do not include mitigation identified in Table 4.10-5.

1. No data provided by manufacturer. Octave-band sound level assumed to be equal to the 63 Hz band level.

2. Assumes Genset is in standard enclosure that achieves minimum 25 dBA sound level reduction.

Table 3-13 Attenuation Values Applied to Mitigate Each Noise Source

Noise Source	Form of Mitigation	Sound Level (dB) per Octave-Band Center Frequency (Hz)								
		31.5	63	125	250	500	1k	2k	4k	8k
3000 Series Cooling Tower 10R (Building D)	Alternative/ Modified Unit[1]	0[7]	5	10	9	13	20	29	10	5
Building A Garage Fans	Duct Silencer[2]	1[7]	2	5	9	11	13	11	10	8
Building B Garage Supply Fans	Duct Silencer[2]	1[7]	2	5	9	11	13	11	10	8
Garage Fans (All Buildings)	Acoustical Louver[3]	0[7]	5	10	9	13	20	29	10	5
Ventral Air Handling Unit Intake / Exhaust	Duct Silencer[4]	2[7]	5	7	15	21	24	20	14	11
Ventral Air Handling Unit Intake / Exhaust	Acoustical Louver[5]	3[7]	6	6	8	10	14	18	16	15
Generator Exhausts	Silencer[6]	25	25	34	38	34	28	26	27	28

Notes:

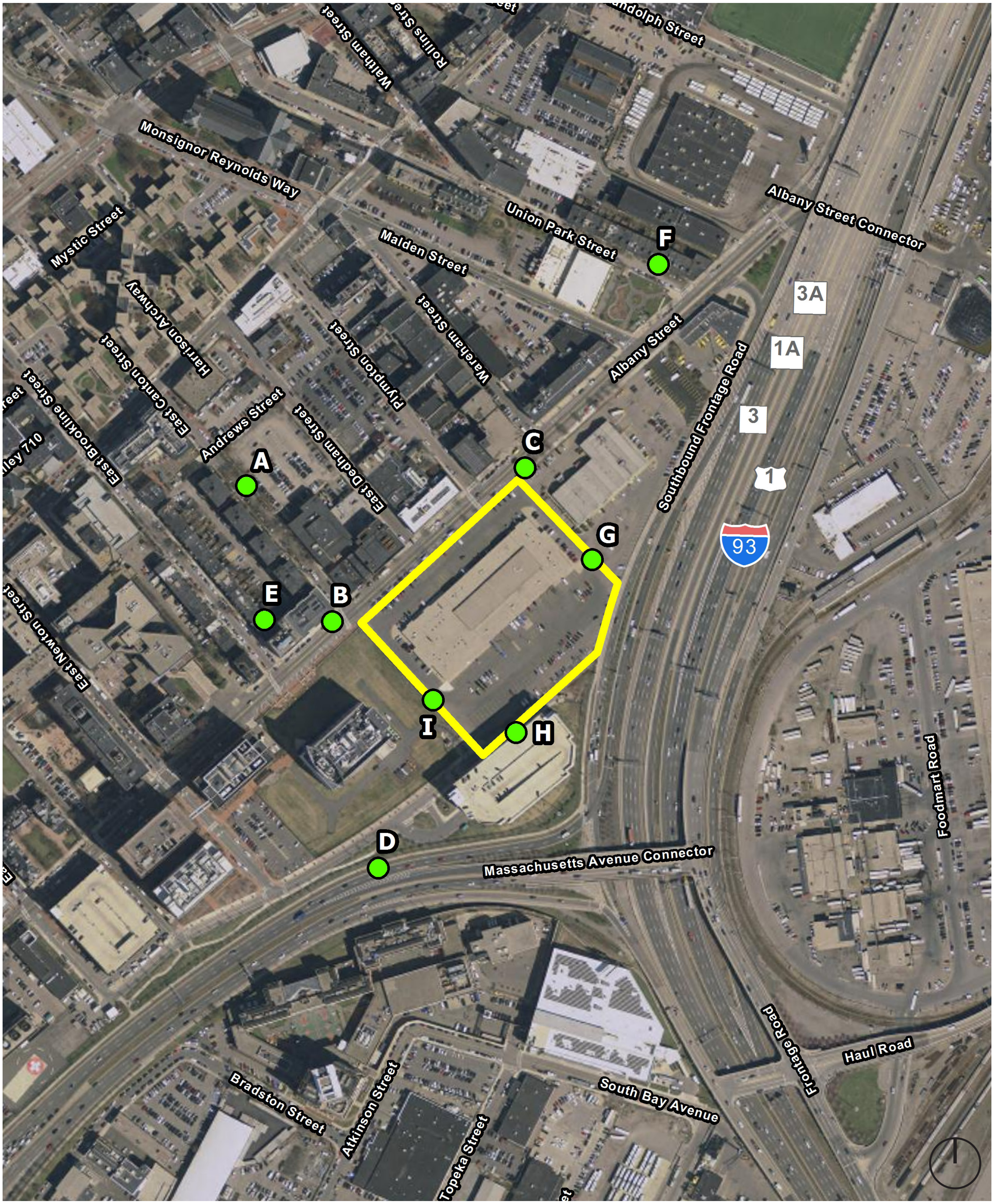
1. The Proponent will consult with the manufacturer to identify mitigation options to achieve the minimum attenuation values presented, or select a unit from an alternate manufacturer meeting the mitigated modeled sound levels.
2. Vibro Acoustics RD-HV-F1 Silencer insertion loss assumed
3. Greenheck model AFJ-120 acoustical louver transmission loss
4. Vibro Acoustics RD-LV-F4 Silencer insertion loss assumed
5. Slimshield Louver Model SL-6 transmission loss
6. GT Exhaust model A201-5100 Critical Grade Silencer
7. No data available. Octave-band attenuation is conservatively assumed.

3.7.5.2 Noise Modeling Methodology

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

3.7.5.3 Future Sound Levels - Nighttime

The analysis of sound levels at night included all the mechanical equipment operating at max loads without the emergency generators running to simulate worst-case nighttime operation conditions at nearby receptors. Nine modeling locations were included in the analysis. Modeling locations A through D are identical to measurement locations 1, 2, 3, and 4, respectively. Five additional modeling locations, E, F G, H, and I, were added for more residential, business, and industrial uses in the vicinity of the Project. The modeling receptors, which correspond to residential, institutional, business, and industrial zoning/uses in the community, are depicted in Figure 3-21. The predicted exterior Project-only sound levels range from 41 to 44 dBA at residential/institutional receptors and from 41 to 61 dBA at all modeled receptors. The City of Boston limits have been applied to the appropriate locations. Predicted sound levels from Project-related equipment are within the broadband and octave-band nighttime limits under the City Noise Standards at the modeling locations. The evaluation is presented in Table 3-14.



PROJECT SITE NOISE MODELING LOCATION

0' 250' 500'

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 3-21
Noise Modeling Locations
Source: Epsilon Associates, Inc.

Table 3-14 Comparison of Future Predicted Project-Only Nighttime Sound Levels to the City of Boston Limits

Modeling Location ID	Zoning / Land Use	Broadband (dBA)	Sound Level (dB) per Octave-Band Center Frequency (Hz)								
			31.5	63	125	250	500	1k	2k	4k	8k
A	Residential	42	59	58	51	44	39	33	31	21	0
B	Residential	43	62	59	51	44	41	31	30	27	21
C	Residential	42	61	59	52	46	39	29	26	26	21
D	Institutional	41	58	55	49	44	39	29	28	25	9
E	Residential	44	61	60	52	47	42	35	33	25	10
F	Residential	41	57	57	50	44	38	32	30	21	0
G	Industrial	61	70	66	66	65	60	48	44	48	46
H	Business	56	63	58	55	61	55	45	32	46	43
I	Business	56	72	66	63	60	54	42	41	42	40
City of Boston Limits	**Residential / Institutional**	**50**	**68**	**67**	**61**	**52**	**46**	**40**	**33**	**28**	**26**
	Business	**65**	**79**	**78**	**73**	**68**	**62**	**56**	**51**	**47**	**44**
	Industrial	**70**	**83**	**82**	**77**	**73**	**67**	**61**	**57**	**53**	**50**

3.7.5.4 Future Sounds Levels Daytime

As previously noted, the emergency generators will only operate during the day for brief, routine testing when the background sound levels are high, or during an interruption of power from the electrical grid. A second analysis combined noise from the Project's mechanical equipment and its emergency generator to reflect worst-case conditions during a period of equipment testing. The sound levels were calculated at the same receptors as in the nighttime analysis and then evaluated against daytime limits.

The predicted exterior Project-only daytime sound levels range from 42 to 46 dBA at residential/institutional receptors and from 42 to 61 dBA at all modeled receptors. Predicted sound levels from Project-related equipment are within the daytime broadband and octave-band limits under the City Noise Standards at each of the modeled locations. This evaluation is presented in Table 3-15.

Table 3-15 Comparison of Future Predicted Project-Only Daytime Sound Levels to City Noise Standards

Modeling Location ID	Zoning / Land Use	Broadband (dBA)	Sound Level (dB) per Octave-Band Center Frequency (Hz)								
			31.5	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
A	Residential	44	59	58	51	45	40	36	34	25	2
B	Residential	44	62	59	51	45	42	36	35	30	22
C	Residential	43	61	59	52	46	40	31	29	26	22
D	Institutional	43	58	55	49	44	41	37	35	28	10
E	Residential	46	61	60	52	47	43	39	37	30	12
F	Residential	42	57	57	50	44	39	33	31	21	0
G	Industrial	61	70	66	66	65	60	48	44	48	46
H	Business	56	63	58	55	61	55	45	35	46	43
I	Business	56	72	66	63	60	54	43	41	42	40
City of Boston Limits	**Residential / Institutional**	**60**	**76**	**75**	**69**	**62**	**56**	**50**	**45**	**40**	**38**
	Business	**65**	**79**	**78**	**73**	**68**	**62**	**56**	**51**	**47**	**44**
	Industrial	**70**	**83**	**82**	**77**	**73**	**67**	**61**	**57**	**53**	**50**

3.7.6 Conclusions

Baseline noise levels were measured in the vicinity of the Project during the day and at night. At these and additional locations, future Project-only sound levels were calculated based on information provided on the expected mechanical equipment. Project-only sound levels were compared to applicable limits. As indicated in Table 3-15, sound levels from the Project with the proposed mitigation will be at or below City of Boston broadband and octave band noise limits.

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

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

3.8 FLOOD HAZARD ZONES/WETLANDS

According to Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the City of Boston (Community Panel 25025C0079J, updated March 16, 2016), the Project is not located within any designated Special Flood Hazard Area (SFHA). A copy of the previously referenced FEMA Flood Map is provided in Appendix H.

There are no wetland resource areas or buffer zones subject to jurisdiction under the Massachusetts Wetlands Protection Act (MA WPA) that exist within or adjacent to the Site. The Project is located within a densely developed urban neighborhood of Boston surrounded by residential, commercial, institutional and transportation uses.

3.9 STORMWATER/ WATER QUALITY

The existing Project Site, which does not provide stormwater treatment or storage, is 100-percent (100%) impervious and is comprised of a building roof, paved parking areas and walkways. The Project will not affect the water quality of nearby water bodies. During construction, erosion and sediment control measures will be implemented to minimize the transport of site sediment to off-site areas and BWSC storm drain systems, which will comply with the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) program for stormwater discharges. These controls will be inspected and maintained throughout the construction phase until all areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover. The Contractor will also adhere to the following best management practice (BMP) measures during construction:

- Comply with all federal, state, and City codes, ordinances, and regulations governing the on-site discharge of construction dewatering effluent
- Use temporary wheel wash areas within the Site
- Use temporary gravel entrance berms at the main exits from the Project Site
- Isolate and protect stockpiled materials
- Monitor the proper use of tarpaulin-covered trucks
- Prevent/control truck spillage
- Clean the adjacent portions of City streets entering and exiting the Project Site

The constructed Project will include a private closed drainage system that will be adequately sized for the Site's expected stormwater flows, and will direct stormwater to an on-site infiltration system for groundwater recharge prior to overflow to the BWSC systems. Additionally, the Proposed Project will create14,875 square feet of new pervious area within the limits of the Project Site, thereby promoting the infiltration of stormwater runoff into the ground and reducing the rate and quantity of stormwater discharged to the BWSC drainage system.

Once construction is complete, the Proposed Project will be in compliance with all local and state stormwater management policies. The stormwater management infrastructure is discussed in more detail in Chapter 7, *Infrastructure Systems*.

3.10 WILDLIFE HABITAT

The Site is fully developed with urban landscape materials and the Project will not impact any important wildlife habitat. According to the latest Natural Heritage and Endangered Species Program (NHESP) maps, no Estimated Habitats of Rare Wildlife, Priority Sites of Rare Species Habitat, or Certified Vernal Pools occur on or near the Site.

According to the U.S. Fish and Wildlife Service's Information for Planning and Consultation (IPaC) data mapping tool, the federally threatened Red Knot shorebird "*Calidris canutus rufa*" may be present within vicinity of the Project Site. The identified bird species is found primarily in intertidal, marine habitats, especially near coastal inlets, estuaries, and bays. As the Project Site features a warehouse facility with an accessory surface parking lot in a densely developed urban neighborhood, potential impacts to the federally threatened Red Knot are not anticipated.

3.11 TIDELANDS

The Project Site is considered landlocked filled tidelands, exempt from Chapter 91 licensing by the Massachusetts Department of Environmental Protection (DEP) pursuant to 310 CMR 9.04(2). See Figure 3-22. As a non-water dependent use, the Project requires the Secretary of Energy and Environmental Affairs to issue a Public Benefit Determination under the provisions of Chapter 91, Section 18(b)(ii) and 301 CMR 13.00. This section provides a summary of the Project's public benefits to assist the Secretary in determining compliance with these requirements.

3.11.1 Public Benefit Review and Determination

The regulations at 301 CMR 13.00 requires the Secretary to consider the following when making a Public Benefit Determination:

- Purpose and effect of the development;
- The impact on abutters and the surrounding community;
- Enhancement of the property;
- Benefits to the public trust rights in tidelands or other associated rights;
- Community activities on the development Site;
- Environmental protection and preservation;
- Public health and safety; and
- General welfare.

The following sections describe how the Project provides appropriate public benefits and is adequately protective of the Public Trust rights inherent in tidelands.

Purpose and Effect of the Development
The purpose of the Project is to redevelop the vacant 5.6-acre Site of the former Boston Flower Exchange, into a vibrant life science and technology workplace campus comprised of active ground floor retail/commercial spaces, publicly accessible open space, and flexible space for hosting of community events.

The anticipated effects of the development include creation of permanent and construction-related job opportunities; increased livability and quality of life for residents; improvement of the urban design characteristics of the area; creation of an activated pedestrian-friendly streetscape with ground floor retail and commercial uses; new publicly accessible open space, as well as flexible space for cultural community events; and increased accessibility.

Impact on Abutters and the Surrounding Community
The Project will result in substantial net benefit to the community by converting a former limited access commercial building and parking lot into a vibrant mixed-use development that will be fully integrated into the surrounding neighborhood.
The Project's planning and design principles reflect a commitment towards creative placemaking and community building. The planned ground floor retail/commercial uses, public space amenities for recreation and community events, and public realm improvements to sidewalks/walkways will provide a strong incentive to attract project abutters and residents of the greater South End community to the underutilized Site.

The potential direct traffic-related impacts will be mitigated through a comprehensive package of transportation improvements described in Chapter 2, Transportation. These improvements will continue to be designed in close consultation with the City of Boston Transportation Department (BTD), and will encourage alternatives to single occupancy vehicle use, and improve vehicular circulation and pedestrian safety.

Enhancement of the Property
The Project will enhance the property by converting a vacant commercial warehouse building and accessory surface parking lot into a vibrant contemporary office building campus with active pedestrian-oriented commercial/retail ground floor uses, and new public space amenities for recreation and community cultural events. The planned improvements will result in a pedestrian-oriented, neighborhood-friendly development that will replace the former industrial nature of the Site.

Benefits to the Public Trust Rights in Tidelands or Other Associated Rights
The Project proposes to activate the Site's public realm component by converting the Site uses from industrial to a vibrant pedestrian-oriented mixed use development consisting of street-level retail, new publicly accessible open space, and flexible civic space for community events.
The traditional public trust rights in tidelands, the right to fish fowl and navigate have long been precluded at the Site by the historic filling and development of the South End. However, the modern expression of these traditional public trust rights on filled land isolated from the existing water sheet will be realized by conversion from its current industrial vacant use to office/retail

mixed uses and the opening of the Site to direct public access, where none existed under the ownership of the Boston Flower Exchange.

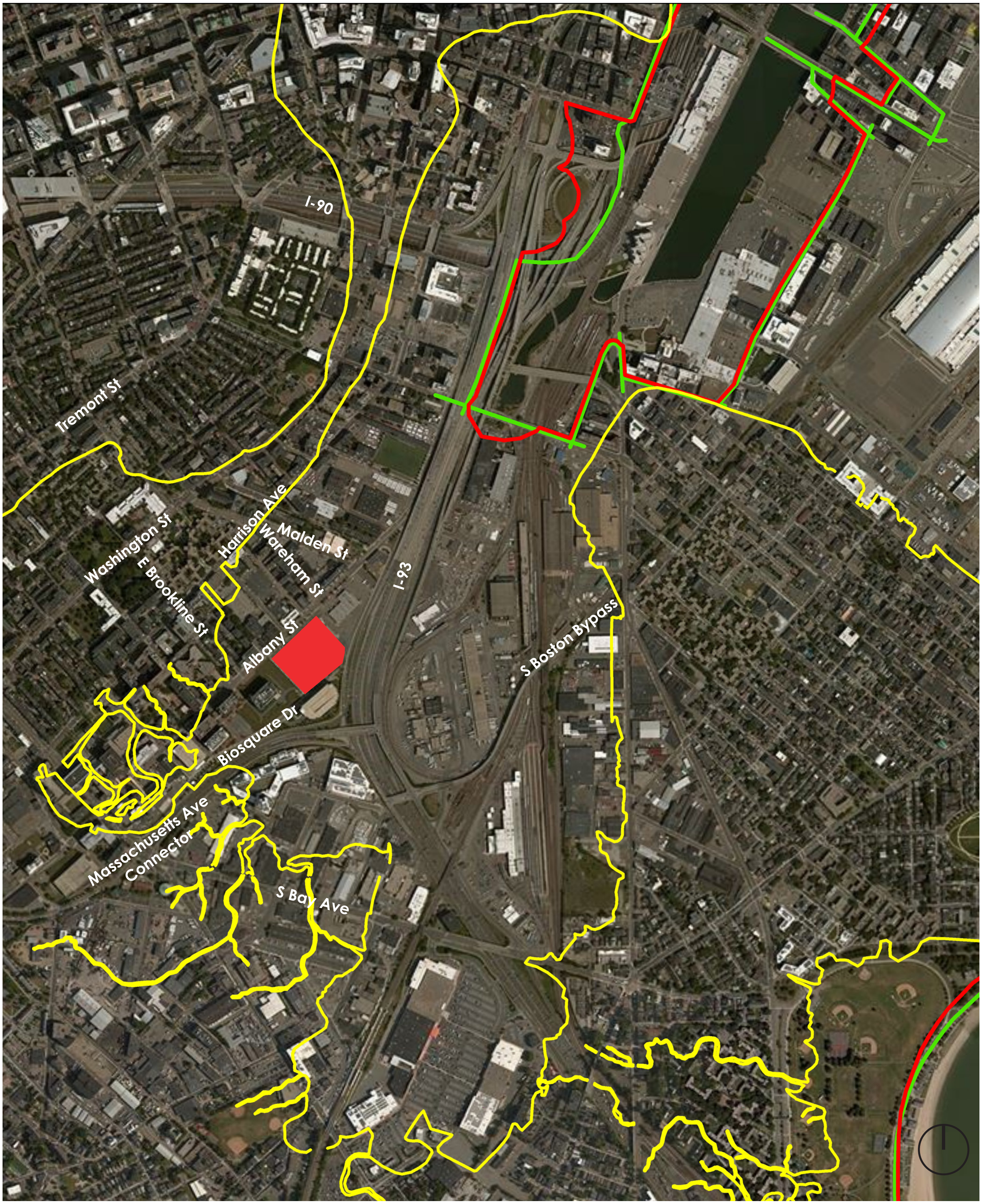
Community Activities on the Site
The Project will result in a substantial net improvement to community activities at the Site by converting the prior access-restricted Flower Exchange Site to a mixed-use development with substantial civic and open space components. The planned one-acre of open space (dubbed Albany Green) will create new opportunities for passive and active community use of the 5.6-acre Site. The proposed ground-floor retail space and approximately 30,000 sf of flexible civic space will serve the surrounding neighborhood, creating new opportunity for community use of the Site, where none previously existed.

Environmental Protection and Preservation
The Proponent is committed to redeveloping the Project Site in accordance with all applicable local, state and federal environmental protection regulations. Table 1-1 in Chapter 1, *Introduction / Project Description*, provides a list of the local, state and federal permits or approvals that are anticipated for the Project.

This Chapter of the PNF, examines the potential for the Project to result in environmental impacts to the project area and provides detailed description of how the project avoids, minimizes, or mitigates potential impacts related to a number of outlined environmental review components. Sustainability and climate change resiliency have been addressed in Chapter 4, *Sustainable Design and Climate Change Preparedness*. Chapter 6, *Historic and Archaeological Resources* describes the existing historic properties and districts adjacent to the Site and demonstrates that the Project will not result in any adverse effect on properties listed on the State and National Register of Historic Places.

Public Health and Safety
The project will promote public health and safety through implementing a Site design, which provides safe and universally accessible facilities from all directions. The design includes on-site and off-site transportation improvements to increase pedestrian and bicyclist safety and accessibility in the neighborhood. Improvements include new open space for active recreation, landscaping, accessible ramps and crosswalks, and appropriate lighting to provide a safe well-lit environment for neighborhood residents, visitors, customers, and employees on a permanent basis.

General Welfare
The Project will protect general welfare by replacing the existing vacant warehouse facility and accessory parking lot with a modern pedestrian-scale mixed use development, designed to serve as a neighborhood destination. The Project will comply with all applicable local, state, and federal environmental protection standards, and will be constructed in accordance with a Construction Management Plan subject to review and approval by the BTD.



PROJECT SITE — HISTORIC HIGH WATER — LAND LOCK — PUBLIC WAY

0' 800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 3-22

Chapter 91 Tidelands Map

Source: ESRI

3.12 GEOTECHNICAL IMPACT/GROUNDWATER

This section describes site subsurface soil and groundwater conditions, planned foundation construction activities, and measures to protect adjacent structures and not impact groundwater levels in the project vicinity.

3.12.1 Existing Site Conditions

The project Site on Albany Street in Boston is partially occupied by an approximately 72,000 square foot, one level warehouse building formerly used as the Boston Flower Exchange. The existing building was constructed in 1969 of concrete block and brick. The 1969 building drawings do not include foundation plans; however, based on verbal reports, subsurface conditions and other considerations foundations are likely enlarged base (belled) concrete caissons bearing in the upper marine clay deposits at depths of 25 to 30 ft. below grade. The building ground level floor is at approximately at El. 19.5' (BCB). The area surrounding the building is paved. Ground surface adjacent to the existing building is relative flat, ranging from about El. 16 to El. 19, Boston City Base Datum (BCB).

Numerous utilities are present below grade. A 50-ft. wide drainage easement is present on the southern portion of the Site which includes the Roxbury Canal Conduit, an extension of the Fort Point Canal. The Roxbury Canal Conduit, consists of a buried reinforced concrete box culvert. According to record drawings, the 18-ft. wide by 10 ft. high (inside dimensions) rectangular culvert is supported by wood piles cutoff at approximately El. -2. The conduit was constructed in the 1960's when the Roxbury Canal was filled. Records indicate that a wood pile supported granite block seawall, which formed the north border of the former Roxbury Canal, extends through the Site. The 1969 Drawings indicate at least some of the previous granite block walls, former bulkheads, piers, and other structures were to remain buried on the Site.

The existing building will be demolished in connection with the proposed development.

3.12.2 Subsurface Soil Conditions

The following section provides a description, evaluation, and analysis of existing subsurface soil and groundwater conditions at the proposed Project site:

The site was formerly part of the Fort Point Channel and was filled in the early 1950s prior to the construction of the existing warehouse. Information on subsurface soil and bedrock conditions at the site is available from test boring data associated with the original building construction. In addition, available subsurface data from nearby project files indicating geologic conditions was reviewed. A comprehensive subsurface investigation is planned during future project design phases and prior to construction. The subsurface conditions are described from ground surface downward:

- Miscellaneous Fill
- Organic Deposits
- Marine Clay
- Glacial Till
- Bedrock

Miscellaneous Fill - The miscellaneous fill was placed over the organic deposits during filling and previous site development. The fill is generally described as loose to very dense, coarse to fine SAND with varying amounts of silt, clay, peat, coarse to fine gravel, wood, cinders, ash, coal, brick, glass, metal, shells, granite blocks, cobblestones, wood piles, concrete and other building rubble. Thickness of the fill ranged from about 20 to 30 ft.

A buried granite block seawall exists within the fill at the site. The granite blocks are likely supported on wood piles driven into the underlying marine soils. Also, remnants of previously existing foundations, slabs, other seawalls, bulkheads, wharves, abandoned and active drainage structures, and other below-grade structures are also present buried below grade throughout the site.

Organic Deposits - The organic deposits are generally described as soft gray to dark brown to black organic silt to fibrous peat, little fine sand, little shells. The thickness of the organics was highly variable and ranged between 2 and 21 ft.

Marine Clay - The marine clay was encountered at depths ranging from about 25 to 30 ft below the ground surface (corresponding to about El. -9 to El. -15 BCB). The thickness of the marine clay encountered in test borings adjacent to the site ranged from 80 to 110 ft. The clay typically consists of hard to very soft olive-gray lean clay and is frequently interlayered with fine sand and silt. The clay generally becomes softer with depth, and is generally very soft below a depth of about 65 ft.

Glacial Till - Glacial till was encountered at depths ranging from about 120 to 135 ft. The glacial till consists of dense to very dense, silty SAND with varying amounts of gravel and boulders.

Bedrock - The bedrock underlying the site is typically described as Cambridge Argillite. At isolated locations, medium hard, fine grained diabase was encountered. Bedrock was encountered at depths ranging from about 125 to 145 ft below the existing ground surface.

3.12.3 Groundwater

Historic groundwater levels measured in nearby observation wells ranged from approximately El. 7 to 10 BCB. In general, groundwater levels at the site are likely affected by tide levels in Boston Harbor due to the site's proximity to the Roxbury Canal Conduit. Mean High Water in Boston Harbor is at El. 10.5 and Mean Low Water is at El. 1.1.

3.12.3.1 Groundwater Conservation Overlay District (GCOD)

The site is located within the limits of the Groundwater Conservation Overlay District as established by Boston Zoning Code Article 32. The new construction will be designed and constructed in a manner to avoid adverse impacts on groundwater levels and include a suitably designed storm water collection and infiltration system to recharge groundwater.

The lowest building floor will be about 25 ft below groundwater levels. Temporary construction dewatering will be required within the limits of a watertight temporary excavation support system to conduct excavation and construction in the dry. Stormwater and groundwater within the excavation will be collected and discharged under appropriate permits.

3.12.4 Excavation and Foundation Construction Methodology

The proposed development is planned to include underground parking. Excavations up to 40 ft below existing site grades will be required for foundation and below grade construction. Excavation will be through the surficial fill and organic soils to the top of stiff marine clay soils to construct the lowest level garage floor slab. Excavations will be completed using conventional earth moving equipment. Odor control measures will be implemented when excavating through the organic soils.

Dewatering will be required during construction of the below grade structure to complete the work in the dry. The temporary excavation support system will be designed as a groundwater cut-off wall to maintain groundwater levels outside the excavation. Dewatering during construction will be conducted within the impervious excavation support system.

Foundation support for new buildings will either consist of footings or a reinforced concrete mat bearing on the underlying stiff marine clay soils, or deep foundation elements (piles or caissons) extending to underlying bedrock. The selected foundation system will depend on final building column loads, and settlement tolerances, and number of below grade parking levels for each of the new buildings.

The building foundation walls will be fully waterproofed and designed to resist hydrostatic pressures. A permanent, perimeter groundwater cut-off wall will be installed around the below grade garages and will extend into the impervious marine clay soils underlying the site. The groundwater cut off wall will serve to both, limit seepage into a subslab pressure relief system, and maintain groundwater levels outside of the below grade garage. This system which is a commonly used design and construction methodology results no impacts to area groundwater levels.

3.12.5 Mitigation Measures to Prevent Potential Impacts on Surrounding Facilities

The project site is located in an area surrounded by existing buildings, utilities, streets and roadways. The construction will be completed using methodology which will not adversely impact adjacent structures. Performance criteria will be established and specified in the contract documents to minimize off site impacts.

The surrounding buildings are either supported on deep foundations extending to bedrock or are located at a distance from the new construction that they are not expected to be impacted by excavation and foundation construction at the site. Adjacent structures include the National Emerging Infectious Disease Laboratory (NEIDL) building and the BU Medical Center Parking Garage, which are both on deep foundations to underlying bedrock. Buildings north west of Albany Street are likely on wood piles founded in the upper clay soils and are at a significant distance from the work. Furthermore, as described above, excavation will be constructed within a stiff excavation support system which will mitigate ground movement and maintain groundwater levels outside the excavation.

Numerous utilities are present below grade at the site. A 50 ft wide drainage easement is present on the southern portion of the site which contains the Roxbury Canal Conduit, a buried reinforced concrete box culvert. According to record drawings, the 18 ft. wide by 10 ft. high (inside dimensions) rectangular culvert is supported on wood piles cutoff at approximately El. -2. The conduit was constructed in the 1960's when the Roxbury Canal was filled. The conduit will be maintained and protected during construction.

The Proponent recognizes the importance for maintaining and monitoring groundwater levels, as well as performance of the construction. A geotechnical instrumentation and monitoring program will be implemented to mitigate impacts. The program will include preconstruction condition surveys, groundwater level, movement and vibration monitoring. Performance criteria developed will be specified in the Contract Documents.

3.12.6 Earthquake/Seismic Evaluation

The Seismic design of new buildings will be in accordance with the provisions of the current edition of the Massachusetts State Building Code. The Seismic Site Classification is based on soil type in the upper 100 ft (30 m) of the soil profile. The applicable seismic design criteria (Article 1613 of the Building Code) are selected for use in analyses to determine the "Seismic Design Category for the design magnitude earthquake specified in the Code for the project location.

Liquefaction of soils refers to the sudden, temporary loss of soil shear strength due to earthquake shaking. The foundation bearing soils are not considered susceptible to liquefaction during the design earthquake in accordance with criteria in the Building Code.

3.13 SOLID AND HAZARDOUS WASTE

3.13.1 Hazardous Waste

A Phase I Environmental Site Assessment was completed for the property in 2000 prior to the sale of the property. The report was reviewed to evaluate potential for encountering Oil and/or Hazardous Material in subsurface soil or groundwater during construction. The Site and surrounding conditions have not changed substantially since the time of the report however a review of environmental records and readily available sources such as MA DEP website was undertaken relative to new information. The property is not a listed Disposal Site under the Massachusetts Contingency Plan (MCP) at 310 CMR 40.000. However, many of the surrounding properties are listed disposal sites due to the presence of urban fill soils containing concentrations of chemical constituents such as metals, Total Petroleum Hydrocarbons (TPH), Polyaromatic Hydrocarbons (PAHs) ubiquitous in fill soils.

A comprehensive characterization program for soil and groundwater will be undertaken during design to define environmental quality of materials to be excavated during construction. The program will include soil and groundwater sampling and chemical analysis for the full suite of chemical constituents required by receiving facilities. Excavated soil will be characterized in groups based on the chemical test results and a soil management plan Any reporting obligations or response actins required under the MCP will be identified early based on the pre-characterization program and timing of regulatory filings identified. Management of all material excavated form the Site will be in accordance with applicable laws and regulations.

A Hazardous Building Materials Survey will be conducted in advance of existing building demolition to assess the presence of asbestos, PCBs, lead and other potentially hazardous materials. Abatement will be undertaken for any materials identified and appropriate permits and approvals obtained prior to any demolition.

3.14 CONSTRUCTION IMPACTS

3.14.1 Construction Management Plan

A Construction Management Plan (CMP), in compliance with the City of Boston's Construction Management Program will be submitted to the Boston Transportation Department. It will include detailed information on construction activities, specific construction mitigation measures and construction material access and staging plans to minimize impacts on the surrounding neighborhood and roadways.

Construction methodologies that ensure public safety and protect nearby residents will be employed. Techniques such as barricades, walkways, signage will be used. Construction management and scheduling will minimize impacts on the surrounding neighborhood and environment. The plan will address construction worker parking, routing plans for trucks and deliveries and control noise and dust.

3.14.2 Construction Methodology/ Public Safety

Impacts associated with the project construction activities are temporary in nature and are typically related to truck traffic, air (dust), noise, stormwater runoff, solid waste, and vibration. The proponent will develop a detailed Construction Management plan ("CMP") for approval by BTD and MassDOT prior to construction. The CMP will address sub-phases and reflect the input of the regulatory authorities having jurisdiction over such plans, including the Boston Fire Department ("BFD") BTD, and MassDOT. The CMP will include detailed information on construction activities, specific construction mitigation measures, and construction materials access and staging area plans to minimize impact on the surrounding neighborhood and the roadways. construction activities, specific construction mitigation measures, and construction materials access and staging area plans to minimize impact on the surrounding neighborhood and the roadways.

Construction methodologies that ensure public safety and protect nearby residents will be employed. Techniques such as barricades, walkways, and signage will be used. Construction management and scheduling will minimize impacts on the surrounding environment and will include plans for construction work commuting and parking, routing plans for trucking and deliveries, and control of noise and dust. The following section generally describes the potential construction-period impacts and proposed CMP elements, which are subject to refinement and modification as the design of the Project progresses.

Public safety is the primary consideration in all of Proponent's construction planning and building processes. Specific pedestrian crosswalks and re-routing measures will be taken to allow for adequate egress around the active construction zones.

The construction area work zone will be confined by fencing and jersey barriers as well as covered pedestrian walkways. Pedestrian foot traffic will be temporarily diverted via temporary signage and crosswalks.

A fenced lay down and work area will be established to separate construction activity from day-to-day pedestrian and vehicular traffic on the Site. Police detail will be provided, as required by the approved CMP.

3.14.3 Construction Schedule

As described in Chapter 1, project description and General Information, the Project includes construction of up to 4 Buildings (seen in Table 3-16):

Table 3-16 Building Program

Building A	Building B	Building C	Building D
230,000 SF	427,700 SF	570,000 SF	371,725 SF

Building A / Building B / Building C / Building D of development consisting of up to approximately 22,430SF of retail located along Albany Street in the neighborhood of Boston. The total construction duration is anticipated to be approximately 20 months for Buildings A and B with abatement activities starting upon completion of the permitting process followed by demolition and structure construction.

The project will be erected with one tower crane for each building and a supplemental assist crane which will periodically be required. The work zone will be confined by fencing and jersey barriers as well as covered pedestrian walkways. A total of 4 construction hoists, 1 on each building, will be utilized for temporary man and material vertical movement and access.

Typical hours of construction are from 7:00 AM to 6:00 PM, Monday through Friday. There may be occasions where work on selected Saturdays is necessary. In addition, the Proponent will be required to coordinate with MassDOT with respect to the timing. Any specific instances requiring work outside of typical hours of construction will be identified and necessary permits will be obtained from the City of Boston.

3.14.4 Construction Staging/Access

Construction Site access will be from Albany Street via 93 to be determined as part of the final CMP. The construction area work zone will be confined by jersey barriers or fencing surrounding the entire Site as well as covered pedestrian walkways along Albany Street.

3.14.5 Construction Mitigation and Best Management Practices

A federal National Pollutant Discharge Elimination System General Construction, or NPDES, Permit is required since the Project is anticipated to disturb over one acre of land. An overall site-specific Stormwater Pollution Prevention Plan will be developed in accordance with local (BWSC) regulatory agency requirements. FRAC tanks with charcoal filters and pumps will be required due to the contamination level of the soil.

During Project construction, Erosion, and Sediment Control ("ESC") measures will be implemented to minimize the transport of Project Site soils to off-site areas and BWSC storm drain systems. The existing catch basins will be protected with filter fabric of silt sacks to provide for sediment removal from runoff. These ESC controls will be inspected and maintained throughout the construction phase until all areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover.

Other sediment controls, which will be implemented as needed during construction, will include the following:

- Stake hay bales and/or silt fence barriers will be installed at the base of stockpiled soils and at erosion-prone areas throughout the construction phase of the Project. The erosion controls will be maintained and replaces as necessary to assure their effectiveness.

- Where necessary, temporary sedimentation basins will be constructed to prevent the transport of sediment off-site.

- Measures to control dust will be implemented during construction. All debris will be properly contained on the Project Site; and

- Erosion controls will be maintained and replaced as necessary until the installation of pavement and the establishment of stabilized vegetation at the Project Site.

3.14.6 Construction Employment and Worker Transportation

In connection with construction of the project, the construction manager shall use commercially reasonable efforts to ensure that the following goals with the city are met.

(a) at least fifteen percent (15%) of the total value of all contracts for construction and/or demolition work are awarded to and performed by construction firms that are certified as WBEs and MBEs;

(b) at least fifty-one percent (51%) of the total employee work hours in each trade shall be by bona fide residents of the City of Boston;

(c) at least forty percent (40%) of the total employee work hours in each trade shall be minorities.

Because the workforce will arrive and depart prior to peak commuter traffic periods, the workforce trips are not expected to have a large impact on the area's transportation system. Construction workers will be strongly encouraged to arrive at the Project Site via public transportation. There will be no construction parking available at the Project Site for workforce.

3.14.7 Construction Truck Routes and Deliveries

Construction truck routes are expected to be Albany Street to Route 93 subject to the approved CMP. Best efforts will be made to schedule major deliveries on non-peak traffic hours. Signage will be prevalent throughout the Project Site and surrounding streets informing vehicular and construction truck traffic alike of detours, as needed. Also, a security detail will be utilized to safely direct and manage construction-related traffic as well as routine traffic. The intent of the construction truck route will be to minimize the impact of construction truck traffic in the Project area and on other nearby roadways.

3.14.8 Construction Air Quality

Short-term air quality impacts from fugitive dust may be expected during the early phases of the Project Site preparation of the Flower Exchange. The construction contract for the Project will require the contractor to reduce potential emissions and minimize air quality impacts. Mitigation measures are expected to include the use of wetting agents where needed on a scheduled basis, covered trucks, minimizing exposed construction debris stored on-site, monitoring construction practices to ensure that unnecessary transfers and mechanical disturbances of loose materials are minimized, locating aggregate storage piles away from areas having the greatest pedestrian activity where and when possible, and periodic cleaning of streets and sidewalks to reduce dust accumulations.

The States anti-idling law will be enforced during construction of the Project with the installation of on-site anti-idling signage at loading and drop-off/pick-up/waiting areas. In addition, the Proponent is committed to meeting the requirements of the DEP State Revolving Fund (SRF) for diesel construction equipment. These require that all non-road diesel equipment rated 50 horsepower or greater will be used on a construction site meet EPA's Tier 4 emission limits or be retrofitted with appropriate emission reduction equipment. Emission reduction equipment includes EPA-verified, CARB-verified or DEP-approved diesel oxidation catalysts or diesel particulate filters.

3.14.9 Construction Noise

Increases in noise level will occur in the short term during the construction of the new buildings. Work will comply with the requirements of the City of Boston Noise Ordinance. Efforts will be made to minimize the noise from the construction activities, including appropriate mufflers on all equipment such as air compressors and welding generators, maintenance of intake and exhaust mufflers, turning off idling equipment, replacing specific operations and techniques with less noise ones, and scheduling equipment operations to synchronize the noisiest operations with the times of highest ambient noise levels. Electric cranes and hoists will be used and are well within allowable noise levels.

3.14.10 Construction Vibration

Sheet piles are being considered for the lateral earth support. The sheets will be vibrated in place rather than hammered. Studies will be performed of the impacts of vibration on abutters. Steps will be taken to mitigate any vibration to acceptable levels. The exact elevation and location of the Roxbury Canal Conduit will be recorded to formulate a protection plan that will be reviewed with our engineers and BWSC.

3.14.11 Construction Waste and Recycling

The Construction Manager ("CM") will take an active role regarding the processing and recycling of construction waste and will implement a Construction Waste Management Plan ("CWMP") for the Project. The CWMP will require the CM to contract with a licensed waste hauler that has off-site sorting capabilities. All construction debris will be taken off-site by the waste hauler, sorted as either recycled debris or waste debris and sent to the proper recycling center or waste facility. Construction debris will be wetted and covered to minimize air born dust particles. Prior to construction, in accordance with the LEED goals established (discussed in Chapter 4, Sustainability/Green Building Design, and Climate Change Preparedness) construction and demolition debris will be diverted away from landfill and incineration facilities, and will be sought to reuse materials. A 90 to 95 percent recycling/diversion rate will be targeted based on recent construction projects.

The proponent does not anticipate any asbestos-containing material or other contaminated material on-site.

3.14.12 Protection of Utilities

Prior to the start of construction, existing utilities will be surveyed and mapped. No excavations will be performed until Dig Safe has been notified, and utilities marked. Existing public and private infrastructure located within the public right-of-way will be protected during construction. The installation of proposed utilities within the public way will be in accordance with the MWRA, Boston Water and Sewer Commission ("BWSC"), Boston Public Works, Dig Safe, and the governing utility company requirements, as applicable. All necessary permits will be obtained before the commencement of the specific utility installation. Specific methods for construction proposed utilities will be reviewed by BWSC as part of its Site Plan Review process.

3.14.13 Rodent Control

The contractor will file a rodent extermination certificate with the building permit application at Inspectional Services Department. Rodent inspection, monitoring and treatment, if needed, will be carried out over the duration of the Project in compliance with City requirements. A fully licensed rodent control contractor will treat both the exterior and interior of the Project prior to commencing the development and periodic service visits will be made to maintain effective rodent controls.

Chapter 4

4.0 Sustainable Design and Climate Change Preparedness

4.1 SUSTAINABLE DESIGN

Preamble: Since BPDA PNF comments, we have revised the original narrative to take into consideration the request to pursue GOLD equivalency (from Silver – 56 points). We have updated the LEED scorecard and credit compliance narratives accordingly and plan to pursue 65 points – comfortably within Gold equivalency. Below is a summary of these updates:

- +2 points for Green Power and Carbon Offsets, (EAc7)
- +1 point for Water Metering (WEc4)
- +1 point for Advanced Energy Metering (EAc3)
- +1 point for Demand response (EAc4)
- +4 points for Enhanced Commissioning (EAc1)

Additionally, the Resiliency Scorecard has also been updated to reflect Gold equivalency, and the ground floor projected has been moved from 18.0 (original PNF) to 19.5' (BCB).

Updated Narrative: This narrative articulates how the *Exchange South End* project intends to comply with Article 37, particularly the requirement that projects meet the US Green Building Council's (USGBC) Leadership for Energy and Environmental Design (LEED) rating system for New and Existing Construction (NC) – version 4 with addenda. *Exchange South End* is a mixed-use development along Albany Street, which is adjacent to the Boston Medical Center campus within Boston's historic South End. It comprises four buildings surrounding a central courtyard with retail at grade, a to-be-determined cultural amenity, and a mixture of office/lab space above. The project will be phased, meaning buildings will come online over time as anchor tenants sign on. This project is committed to promoting environmental stewardship and will utilize the LEED for Campus approach, which is ideal for phased projects within the same development and under the same owner. It takes an approach towards site development which means that shared entities (open space, transit infrastructure, stormwater strategies, etc.) are built into place to comply with LEED, and as projects come onboard, they can tie into the built-in capacity – claiming LEED points for being within the LEED Campus. Each project's goal is to be able to demonstrate equivalency, at minimum, to LEED Gold. This means each individual project must demonstrate compliance with all LEED prerequisites and accrue at least 60 of the 110 possible points within the LEED-NC(v4) rating system. Currently, projects are targeting 65 of 110 possible points – 20 coming by way of the LEED Campus. This narrative illustrates LEED compliance, credit-by-credit.

PROJECT INFORMATION FORMS

Project Information (PI) Forms are a cache of reference information which gives overviews project timeline, statistics, goals, benchmarks, and other data useful for documentation of credits within the rating system. This one form entails all four projects within our LEED Campus in aggregate.

PIf1: Minimum Program Requirements (CAMPUS)

All LEED projects must comply with the following seven requirements:

- Must comply with environmental federal, state, and local laws

- Must be a complete, permanent building or space
- Must use a reasonable site boundary (LEED Boundary)
- Must comply with minimum floor area requirements (>1,000sq.ft.)
- Must comply with minimum occupancy rates (>1FTE)
- Must commit to sharing whole building energy and water usage data
- Must comply with minimum building area-to-site ratio (GSF > 2% gross land area)

This project will meet all applicable laws. These buildings and adjacent grounds will be permanent structures/open space intended for a long useful life. The LEED Boundary will align with current property lines and will also include any additional areas where scope of work is expanded, including (but not limited to) adjacent properties for construction staging, roadways where improvements are being made, etc. Often, the LEED Boundary is flexible in scope until Design Development, and these narratives, in the end, shall be continually updated as the LEED Boundary morphs during the early design process. The project, estimated at 1,574,873 FAR gross square feet, greatly exceeds the minimum floor area requirement. Based on the above GSF, the estimated FTE for this project (4,814) also exceeds the FTE minimum required. Boston's *Building Energy Reporting and Disclosure Ordinance* (BERDO) requires that each project will have to annually disclose such data as required by LEED above. While sub-metering scope is to be fully explored as projects are phased-in, at minimum, we shall commit to collecting this data through Energy Star Portfolio Manager and distributing it as required for LEED and the City of Boston (Option 1). Lastly, our 6.5 FAR greatly exceeds the 0.02FAR minimum.

Project Information (PI) Form 2: Project Summary Details (CAMPUS)

Building Area and Gross Square Footage

Number of Buildings attempting certification	4
Total gross square footage	1,599,425
New construction gross square footage	1,599.425
Existing, renovated gross square footage	0
Existing, unrenovated gross square footage	0
Sum of new and existing gross square footage	1,599,425
Percentage of new construction	100
Percentage of existing, renovated	0
Percentage of existing, unrenovated	0
Square footage of all parking areas	490,000
Gross square footage numbers for new construction	Estimated

Site Characteristics

Total site area within the LEED project Boundary	5.6acres (246,145sf)
Building area ratio	6.5
Footprint of project building	133,000
Area outside footprint comprised of hardscape	113,145
Total number of parking spaces	1,157
Number of stories above grade, excluding parking	6-23
Number of stories below grade excluding parking	0
Total number of stories	9-26
The project building is located on a campus	Yes
Site condition	Brownfield
Context	Urban core

Energy and Water Sources

• Natural gas	Yes
• Electricity	Yes
• Fuel oil	Yes
• Biofuels	No
• District/campus heat (steam or hot water)	No
• District/campus cooling (chilled water)	No
• On-site renewables	TBD
• Municipal potable water	Yes
• Local/surface potable water	No
• Municipal gray/rainwater	No
• On-site gray/rainwater	Yes
• Municipal sewage	Yes
• Local sewage	No

Budget and Historic Project Data

• Project is located in a historic district	No
• Project is on a historic registry	No
• Project budget	$400,000,000

Project Information (PI) Form 3: Occupant and Usage Data

• Occupant type	Office/Lab
• Principle project building activity	Office/Lab
• Total gross square footage	1,599,425
• Total regularly occupied space	1,467,420
• Total leased gross area	1,467,420
• Percentage leased gross area	75%
• Total unconditioned gross area	132,005
• Owner manages the building	Yes
• Owner owns the building	Yes
• Building is speculative	Yes
• Full-time occupants	4,814
• Part-time occupants	0
• Total full-time equivalency occupants (FTE)	4,814
• Transient occupants	645
• Peak occupancy	5,459
• Total residents	0
• Total days of annual operation	365

Space Usage Type	Gross Area(sf)	Owned/Leased	Regularly Occupied(sf)	Unconditioned(sf)
Lab	840,810	Leased	840,810	0
Office	627,580	Leased	627,580	0
Retail	22,430	Leased	22,430	0
Civic	30,000	Leased	30,000	0
Lobbies	23,100	Owned	0	0
Back of House	55,505	Owned	0	55,505
Penthouse	76,500	Owned	0	76,500
Garage	490,000	Owned	0	490,000

Project Information (PI) Form 4: Schedule and Overview Documents (CAMPUS)

Schedule

• Phase in which LEED equivalency was initiated	Schematic Design
• Date estimated for preliminary review	TBD – pending permit
• Project planning/pre-design	January 2017
• Schematic Design	TBD – pending permit
• Design development	TBD – pending tenant
• Construction Documentation	TBD – pending tenant
• Construction kick-off	TBD – pending tenant
• Substantial Completion	TBD – pending tenant

Describe building HVAC, lighting and electrical systems:

HVAC: The HVAC system for each building will consist of a hot water plant, a chilled water plant, air handling units, and exhaust fans. The cooling load of each building, as outlined in the table below, will require (3) high efficiency water sourced chillers and (3) cooling towers, each sized at 1/3 of the total load. The energy recovery air handling units will be 100% outdoor air with fan wall technology and an integral glycol energy recovery loop that will tie into the building exhaust fans. The building exhaust fans will serve the labs, office and general spaces and operate to maintain ventilation and pressure requirements in the building. All ventilation systems are sized as outlined in the table below.

Exhaust fans will be located on the roof along with the cooling towers, generators, and boiler room. A separate penthouse AHU room will contain the AHUs, chillers, condenser water pumps, and chilled water pumps. Based on the building height and floor configuration, air handling rooms for larger story buildings will be located at a mid-level in the building. All systems will operate as variable volume and be controlled through a combination of manufacturer controls and a central building automation system.

Table 4-1 HVAC Data by Buildings

Building	Cooling Load	Chilled Water	Condenser Water	Hot Water	Ventilation (SA)	Ventilation (EA)
Bldg A	1,710 tons	(3) High Efficiency Chillers at 570 tons each Variable Speed Pumps	(3) cooling towers at 570 tons each Variable Speed Pumps	High efficiency condensing boilers Variable Speed Pumps	(8) 100%, 45,000 CFM Energy Recovery Air Handling Units	(12) 27,000 CFM Exhaust Fans Garage Exhaust system
Bldg B	3,300 tons	(3) High Efficiency Chillers at 1,100 tons each Variable Speed Pumps	(3) cooling towers at 1,100 tons each Variable Speed Pumps	High efficiency condensing boilers Variable Speed Pumps	(16) 100% 45,000 CFM stacked Energy Recovery Air Handling Units	(16) 27,000 CFM Exhaust Fans Garage Exhaust system
Bldg C	3,300 tons	(3) High Efficiency Chillers at 1,100 tons each Variable Speed Pumps	(3) cooling towers at 1,100 tons each Variable Speed Pumps	High efficiency condensing boilers Variable Speed Pumps	(16) 100% 45,000 CFM stacked Energy Recovery Air Handling Units	(8) 27,000 CFM Exhaust Fans Garage Exhaust system
Bldg D	2,400 tons	(3) High Efficiency Chillers at 800 tons each Variable Speed Pumps	(3) cooling towers at 800 tons each Variable Speed Pumps	High efficiency condensing boilers Variable Speed Pumps	(12) 100% 45,000 CFM stacked Energy Recovery Air Handling Units	(10) 27,000 CFM Exhaust Fans Garage Exhaust system

In addition to the systems described above, the retail and service spaces (i.e. loading docks, etc.) on the ground floor of the building will be served by separate air handling units ducted to exterior louvers. The programs within these spaces will further detail the design parameters when they are established. The parking garages below grade will also require intake and exhaust louvers for the garage exhaust and supply fans.

Lighting: Site lighting, lighting in public areas and in common areas will be controlled by a relay base time computer programmable controller. System will include daylight and occupancy sensors. Lighting in utility, storage, mechanical and electrical spaces will be locally switched fluorescent industrial type fixtures. Emergency lighting will be provided by normal lighting fixtures connected to the emergency life safety generator system. Emergency lighting will be provided in all public and common areas, elevator machine room, electric rooms, stairwells and at exterior exits. An allowance of 0.25w/sf is included in the emergency life safety generator system for tenant emergency lighting. The tenant will install an emergency lighting transfer relay to access emergency power on failure of the tenant normal service.

Electrical: Each building's electric service will be comprised of (4) 4000 ampere, 480/277 volt circuit breaker switchboards along with dedicated 1000 ampere switchboard for the fire pump. Electric service entrance switchgears will be served via feeder bus ducts. Electronic metering will be provided at electric service switchboards and all panels including distribution boards, power and lighting panel boards throughout the building. Meters shall report to BMS and they will be utilized to meet LEED measurement and verification point requirements. Each building will be equipped with a dedicated metering system. Power distribution systems throughout the buildings will be at 480/277 volt, 3 phase, 4 wire bus duct and local transformation 480-208/120 volt for 120/208 volt loads. Additional distribution will be provided to serve building standby and emergency loads. Normal power electrical room will be provided on each floor. Each floor's electrical room will contain (2) 480/277 volt, 60 hz, 3, phase, 4 wire, 4000 ampere plug in bus ducts for tenant normal power and (2) 480/277 volt, 60 hz, 3 phase, 4 wire, 4000 ampere feeder bus ducts for mechanical loads at the penthouse. Tenant will be responsible for all tenant electrical installation from point of service at floor bus ducts. In addition to the tenant floor bus duct service, electric services will be available in the main electrical room for tenant use, metering will be required for each individual tenant.

Brief project description:
Exchange South End is a phased mixed-use development occupying the old Flower Exchange site within the historic South End. The new development comprises four buildings of various sizes enclosing a central public open space with retail and a civic feature at grade. The main function of the development is speculative labs/offices. The project seeks to respect the context and scale of Albany Street while reaching vertically towards the highway as a beacon for a new life sciences complex in this part of the city.

INTEGRATIVE PROCESS (1 point "YES"/0 points "MAYBE"/0 points "NO")
This credit encourages early project "discovery", through exploring strategies with key stakeholders to improve upon baseline requirements for site, transportation, resources, etc.

IPc1: Integrative Process (CAMPUS): (1 Point "YES")

Energy Systems: Describe baseline assumptions for the following systems, how they impacted Owner's Project Requirements (OPR) and Basis of Design (BOD), and how research in each area will influence the final project. Give reasons where topics were not addressed.

Site: The site is a 5.6-acre grayfield located in Boston's historic South End. It is currently serviced by electricity and natural gas and houses a 1-level warehouse, which will be demolished, and surface parking. The site is flat and bounded by similar neighbors to each side, Albany Street frontage, and I-93 to the rear. When developed, these buildings will be the tallest around (C and D).

Massing and Orientation: The core concept of this development hinges upon 4 phased buildings growing around a central, public open space. Variances are being requested so that the taller building will be located to the rear of the site to block noise from the highway, and the massing of the buildings was designed to allow a minimum of 6 hours of sunshine into the public open space for its health.

Envelope: The team will be exploring options for high performance glazing, insulation, and air-tight assemblies to exceed code minimum performance. Note: our goal is to be >10% better than code from an energy cost perspective (better than MA Stretch Code).

Lighting: This development shall feature long-life LED lighting indoors and outdoors to provide efficiency and safety.

Thermal Comfort: All projects shall be designed to meet and exceed performance requirements of ASHRAE 55 for mechanically ventilated spaces.

Plug and Process Loads: The HVAC system will be designed to accommodate 5 W/SF of plug load in lab areas, and 1 W/SF of plug load in office areas. Since the tenant is not yet known, the system will be designed under this worst-case scenario.

Programmatic and Operational Parameters: All HVAC equipment will be fully integrated into a front-end building automation system capable of enhanced system operation and control. The BAS will allow for full system monitoring and trending. Major systems and operation will be metered and totaled at the BAS for full building consumption analysis and breakdowns for all end uses. Through the BAS, the front-end user will be able to adjust system parameters and points, monitor operation on a day to day basis, create scheduling and receive remote alarms for incidences and troubleshooting scenarios.

Energy modeling – envelope: The maximum window-to-wall ratio for each building will be as follows: Building A – 45%; Building B – 50%; Building C – 55%; Building D - 55%. The exterior wall and roof performance will exceed code.

Energy modeling – lighting levels: Lighting levels will be set for the base buildings, and tenant guidelines shall require the same prescriptive performance within future fit-outs.

Water Systems: Describe baseline assumptions for the following systems, how they impacted Owner's Project Requirements (OPR) and Basis of Design (BOD), and how research in each area influenced the final project. Give reasons where topics were not addressed.

Indoor Water Demand: As required by LEED, all indoor fixtures shall be Water Sense. Tenant guidelines shall be written to require a minimum level of prescriptive performance for fixtures and flow rates to meet the intent of this development to be efficient and for all projects to potentially be LEED certified. The following guidelines are promoted:

Fixture	Baseline	Proposed	Enhanced
Toilets (water closet)	1.6gpf	01.25gpf	0.9gpf
Urinal	1.0gpf	0.8gpf	0.125gpf
Public lavatory (restroom) faucet	0.5gpm	0.5gpm	n/a
Private lavatory faucet	2.2gpm	1.5gpm	1.0gpm
Kitchen faucet	2.2gpm	2.0gpm	1.0gpm
Showerhead	2.5gpm	2.0gpm	1.25gpm
Prerinse spray valves	1.3gpm	1.0gpm	0.7gpm

Appliances	Requirement
Clothes washers	ENERGY STAR
Ice Machines	ENERGY STAR + air-cooled/closed-loop cooling
Dishwashers	ENERGY STAR

Outdoor Water Demand: The project proposes to reduce outdoor potable water demand by 100% through use of rainwater harvesting. Rooftop leaders will channel water into below-grade cisterns (sizing to be determined) for collection and used to meet site irrigation demand.

Process Water Demand: No potable water should be used for once-through cooling for heat rejection and cooling equipment. Cooling towers and evaporative condensers shall be equipped with makeup water meters, conductivity controllers, overflow alarms, and efficient drift eliminators that reduce drift to a maximum of 0.002% of recirculated water volume for counterflow towers and 0.005% of recirculated water flow for cross-flow towers. Discharge water shall be cooled via a thermal recovery heat exchanger to cool it to code-compliant temperatures while simultaneously preheating inlet makeup water. Steam condensate will be returned to boilers. Venturi-type flow-through vacuum generators or aspirators shall be forbidden. Additional recommendations specific for labs shall be made in the tenant guidelines.

Supply Sources: Potable water shall be supplied via a municipal system. Additionally, the project is considering utilizing rainwater harvesting from rooftops for collection in below grade cisterns, sized to meet irrigation demand. Condensate water additionally shall provide an option for graywater onsite.

LOCATION AND TRANSPORTATION (15 points “YES”/1 point “MAYBE”/0 points “NO”)

This section essentially removes location-specific parameters from Sustainable Sites into its own standalone section focusing on access, transit, reduced parking, reduced commuter emissions, and encouraging smart growth principles.

LTc1: LEED for Neighborhood Development Location: (16 points “N/A”)

The project is not located within a LEED-ND development; thus, it will not comply with this option and will instead chose to pursue credits within the LT section one-by-one to accrue LT points.

LTc2: Sensitive Land Protection: (1 point “YES”)

This project claims 1 point for Option 1, which awards projects locating their development on previously developed land. The current site is an extensive greyfield development with an existing warehouse building to be demolished and paving over the entire surface outside the building footprint, which meets the definition of “previously developed” sites within LEED.

LTc3: High Priority Site* (CAMPUS): (1 point “YES”/1 point “MAYBE”)**

The project site is suspected to be a brownfield, which the Owner will have to remediate upon development – to be determined by the Site Assessment (SSc1); thus, the project will comply under Option 3 when the brownfield site is remediated. Note: if the project is discovered not to be a brownfield, it will still comply for 1 point under Option 2 – placement of a project within a Federal Empowerment Zone (to be determined).

LTc4: Surrounding Density and Diverse Uses: (5 points “YES”)

LEED awards points to projects which develop within dense urban environments to promote walkability, health, smart land use, etc. Part 1 of this credit offers up to 3 points for developing in densities that within .25-miles of the site boundaries meet the following conditions:

	Requirement	Minimum Threshold	Site Actual
1.	Buildable land	35,000sf/acre	242,288sf/acre*
2.	Residential Density	12 units/acre	80-100units/acre**
3.	Nonresidential FAR	0.8	6.5

Note: It is currently impractical to calculate all these metrics at this stage of the process; however, some baseline assumptions can be made. First* with a radius of 1,320 feet, the area within this parameter equals 5,471,136sf. Divided by acres, this gives us an estimated buildable area at 125.6sf/acre – hence the FAR quota of 0.8, minimum. The density of this area is sufficiently more than this without having to calculate the number, especially given that the majority of non-buildable land in this scenario is I-93, other roadways, and some parkland. Second, there are several urban neighborhoods within this area which greatly exceed the minimum requirement for 12 units/acre**. One such example is the Boston Housing Authority complex at Franklin Square.

Additionally, it offers up to 2 points for projects demonstrating that within 0.5-miles of a main entry the ability of pedestrians to walk to eight or more existing, publicly available diverse uses.

Category	Walkable Amenity	Distance from Site (mi.)
1. Food Retail	Foodie's Markets	0.04
2. Community Retail	Jacobson Wholesale	0.08
3. Community Retail	Boston Flower Market	0.04
4. Service – Restaurant	Stella	0.40
5. Service – Restaurant	Estragon	0.30
6. Civic/Community Facility	Fedex	0.20
7. Community Anchor – Office	Boston Medical Center	0.40

LTc5: Access to Quality Transit: (5 points "YES")

LEED awards points based on the number of daily trips offered as a metric for "quality" – increased likelihood of use through greater convenience/coverage. Currently, within the 0.5-mile walkable limit of the site, the following buses (daily and weekend trips) accrue:

Line	Weekday Daily Trips	Weekend Daily Trips	Distance(mi)
• Bus 8	40	24	<0.25
• Bus 10	42	35	<0.25
• Bus 47	49	38	<0.25
• CT1	32	0	<0.25
• SL4	90	72	<0.50
• SL5	140	144	<0.50
• CT3	27	0	<0.25
	420 (5 of 5 points)	**313 (5 of 5 points)**	

LTc6: Bicycle Facilities (CAMPUS): (1 point "YES")

This credit awards 1 point for projects locating a functional entry within allowable distances of a bike network connecting either 10 diverse uses, and/or a school/employment center, and or a multi-modal transit station. In this site's case, all three are connected by what will be the re-designed South Bay Harbor Trail – to be replaced along Albany Street (all within the 3-mile compliance radius). Additionally, the following requirements must be met:

• Short term bike storage	2.5% peak visitors	100 feet of an entry
• Long-term bike storage	5.0% of FTE occupants	100 feet of an entry
• Onsite showers	1/100FTE + 1/additional 150 FTE)	200 yards of an entry

Based on the speculative area for this building type, we can estimate from the LEED appendix how many FTE and peak occupants we can plan for based on the following metrics. See Appendix D, Climate Resiliency Checklist & LEED Project Checklist

Typology	Area(sf)	FTE	Visitors	Peak	Bikes	Showers
• Retail/civic	72,500	148	665	813	-	-
• Office	640,540	2,563	0	2,563	-	-
• Lab	840,810	2,103	0	2,103	-	-
	1,553,850	**4,814**	**645**	**6,479**	**137 short-term**	**-**
					241 long-term	**-**
					378 total	**33 total**

LTc7: Reduced Parking Footprint (CAMPUS): (1 Point "Yes")

Total site parking in three below-grade garages equals 1,150 spaces. We are not allowed to exceed current code requirements for parking, based on the ITE Transportation Planning Handbook – representing a 40% reduction (1 point) and a 60% reduction (1points) in parking. The ITE Handbook does not specify a number based on labs; thus, all lab area shall be treated as office space:

Max. 2.58 spaces/1,000sf (office/lab) = 1,481,350sf/1,000 = 1,481.35 X 2.58 ~ 3,822 spaces
Max. 5.55 spaces/1,000sf (retail) = 72,500sf/1,000 = 72.5 X 5.55 = 403 spaces
Total Allowable: 4,225 spaces
Total Proposed 1,150 spaces
% Reduction = 72.78% (exemplary performance)

This project uses Case 2 for its earning of LT credits 4 and 5. Preferred parking for carpools shall meet the required 5% threshold (58 spaces) and shall be proportionately distributed between the three garages. Shuttles be considered, pending an additional Silver Line stop is not placed adjacent to the site to accommodate the increased volume.

LTc8: Green Vehicles (CAMPUS): (1 Point "YES")

5% of parking (58 spaces) must additionally be designated as preferred for vehicles achieving a minimum green score of 45 on the ACEEE annual vehicle rating guide. Additionally, we shall consider Option 1 for electric vehicle charging by installing electric vehicle charging equipment (EVSE) in an additional 2% of the parking spaces (24). EVSE must be at least Level-2, comply with regional standards for electrical connectors, and be networked to be able to participate in demand response programs or time-of-use pricing (encourage off-peak charging.

SUSTAINABLE SITES (8 points "YES"/2 points "MAYBE"/0 points "NO")

This section focuses on site-specific strategies regarding open/green space, habitat, rainwater, surface reflectivity and absorptivity, porosity, and light pollution.

SSp1: Construction Activity Pollution Prevention: (REQUIRED)

This prerequisite requires that the contractor implement an erosion and sedimentation control plan for all construction activities conforming to the requirements within the 2012 US EPA Construction General Permit, or local equivalent (whichever is most stringent).

SSc1: Environmental Site Assessment (CAMPUS): (1 Point "YES")

The purpose of this credit is to assess site conditions prior to design to inform related issues about the site design. Such an assessment must include the following:

1. Contour map denoting unique features and risks
2. Hydrology map denoting bodies of water and storage/reuse opportunities
3. Climate analysis including wind, precipitation, temperature ranges, sun angles, etc.

4. Vegetation analysis illustrating types, species, habitat, etc.
5. Soils report illustrating previous development, disturbed soils, etc.
6. Access map showing views, transit, adjacent properties, and materials reuse options.
7. Health map showing proximity of vulnerable populations, physical activity opportunities, and proximity to major sources of air pollution.

The below assessment addresses each of the above parameters, according to number:

1. The current site is a previously developed, non-porous warehouse development and is currently flat to accommodate grade parking and vehicular maneuvering. There are no topographical risks associated with the site; however, our 0.5-mile proximity to the Bass River means that the site is at risk from sea level rise/storm surge, as the site elevation varies from 16'-5" to18'-6" (approximately 11'-0" to 13'-0" above mean sea level). In the event of flooding, due by its relative flatness, the site would quickly be inundated with water.

2. The Bass River is within 0.5-mile of the site to the northeast. There is also an easement which bisects the site, which houses an old stormwater conveyance line, an extension of this river. The site otherwise is completely impervious and compacted; thus, we'll plan to infiltrate stormwater to replenish the below grade aquifer in this area to attempt to restore previous hydrology. We are currently required to capture the first 1" of stormwater falling on the site, and the system will be sized to exceed this minimum requirement.

3. We have looked closely at the climate as a means of shaping space to illuminate the central square around annual solar angles and available natural light. Prevailing winds are deadened by the neighborhood in the winter (from northwest), while less exposure from the southwest means that summer winds can help establish breezes within the courtyard, funneled by the towers in the rear and lower buildings along Albany Street. Prevailing spring winds will be blocked by the towers; however, the towers will also help keep air quality within courtyard better due to creating a physical barrier for wind and noise between the courtyard and I-93. Boston has steady monthly precipitation, varying from just above 3" (July) to 4" (November); thus, the projects shall consider utilizing this to reduce potable water use within the building and grounds via harvesting.

4. Currently, there is very little planting on the site, only some deciduous trees along Albany Street with a narrow strip of grass between the sidewalk and the parking lot. There is also a small strip of grass with some deciduous trees to the rear of the site along BioSquare Drive. It is currently unknown if any species live on the site, i.e. rooftop birds; however, the proposed development will increase the porosity of the site, as well as the amount of greenery – types and square footage – making for a place to increase biodiversity of plants and wildlife onsite.

5. Soils reports shall be conducted as necessary per each project's initiation.

6. Access maps have been created to illustrate current transit options, vehicular traffic, pedestrian access, and adjacent neighborhoods (scale, character, connectivity, etc.). While the existing facility is not being incorporated into the new development, a plan so that it avoids landfilling and is recycled shall be instated aligning with construction and demolition best practices associated with LEEDv4.

7. Regarding health, the main source of air pollution and noise is the proximity of I-93 to the site. The buildings are amassed in such a way as to protect the courtyard and building-

integrated green spaces. Albany Street is also a busy corridor. This will be reimagined, with a health-focus, by way of the relocation of the South Bay Harbor Trail along this corridor. This will increase the use and aesthetics of both corridors, providing an additional buffer between Albany Street and the courtyard. Regarding proximity to vulnerable populations, the site is nearby public housing (Boston Public Housing Authority), Boston Medical Center, and several shelters, including the Pine Street Inn.

SSc2: Site Development – Protect or Restore Habitat (CAMPUS): (1 Point "YES"/1 Point "MAYBE")

This credit asks that 40% (min.) of greenfield area onsite be protected if they exist, which is not the case for our site, which is a 100% grayfield development. Option 1 allows restoration 30% of the site, including the building footprint, to habitat. We may incorporate green rooftops since our FAR > 1.5. The site features 45% open space (including the open public space/sidewalks and excluding any green roofs). We must also restore disturbed or compacted soils appropriate for previous functions (i.e. sport and leisure), while meeting stringent requirements set forth in LEED regarding material makeup – to be determined. Note: imported top soil cannot be used from greenfield sites unless it is a byproduct of that site's construction processes.

SSc3: Open Space (CAMPUS): (1 Point "YES")

LEED requires that projects provide a minimum of 30% of the development footprint as open space, a minimum of 25% of such space must be vegetated. Such space must accommodate social activities, recreation, gardening, food production, etc. Intensive and extensive green roofs may aid compliance because of our density. This project creates public, open space approximately 45% of the site footprint (including sidewalks). The main public open space features an "active" and "passive" zone, one for relaxation and the other for socialization and recreation.

SSc4: Rainwater Management (CAMPUS): (2 Points "YES"/1 Point "MAYBE")

This project will use Option 1; Path 3 for zero lot line projects (for urban projects with FAR > 1.5). In a manner best replicating natural site hydrology, runoff quotas shall meet/exceed the 85th percentile of regional/local (most stringent) rainfall events using LID and green infrastructure. The open space and green roofs play a critical role in this, as well as site porosity. We shall manage the first inch of runoff by recharging the aquifer. There is also room onsite to store underground tanks to reduce potable water for irrigation purposes – to be explored at a campus level.

SSc5: Heat Island Reduction (CAMPUS): (2 Points "YES")

This credit combines rooftop and site albedo into a single LEED credit. All Rooftops will be low-slope and will feature vegetative roofs (optional) or reflective membranes with a minimum initial SRI of 82 and minimum 3-year aged SRI of 64. All parking will be below grade, meaning it shall be covered and shaded. This and site plant covering will meet the tenets of LEED, including shade by adjacent structures, open grid paving systems (50% unbound as appropriate), and/or paving materials with a minimum 0.33 initial SRI and minimum 3-year SRI of 0.28 for all site cover, including sidewalks, asphalt, roofs, etc., within the LEED Project Boundary.

SSc6: Light Pollution Reduction (CAMPUS): (1 Point "YES")

Light pollution is a major problem in urban areas. For this credit, these projects will use the backlight-uplight-glare (BUG) method (Option1) for all exterior luminaires within the LEED Boundary (minus "exemptions") based on photometric characteristics when mounted and the property's IES/IDA Model Lighting Ordinance User Guide lighting zone. Additionally, project internally illuminated signage requirements must be met.

Being an urban, campus project, the IES Lighting Zone for this project is LZ4: High ambient lighting. This designation is appropriate where lighting is necessary for safety/convenience and is generally uniform/continuous. After curfew, lighting may be extinguished and/or dimmed as activity levels decline. For LZ4, the maximum uplight ratings for luminaires is U4, and the maximum back light and glare ratings are as follows:

Mounting Condition	Backlight Rating (max.)
> 2 mounting heights from lighting boundary	B5
1-2 mounting heights from boundary and properly oriented	B4
0.5-1 mounting heights from boundary and properly oriented	B3
< 1.5 mounting heights from boundary and properly oriented	B2

Mounting Condition	Glare Rating (max.)
Building mounted > 2 mounting heights from lighting boundary	G4
Building mounted 1-2 mounting heights from lighting boundary	G3
Building mounted 0.5-1 mounting heights from lighting boundary	G2
Building mounted < 0.5 mounting heights from lighting boundary	G1
All other luminaries	G4

Note: the lighting boundary follows the LEED Boundary in all conditions except the following:

- When property lines are adjacent to public paths (move boundary outward 5'-0")
- When property lines are adjacent to public ways (move boundary to centerline of way)
- When multiple properties owned by same owner are contiguous and some properties have the same or higher MLO designation, the lighting boundary may be expanded to include those projects.

All luminaries are to be oriented less than two mounting heights from the lighting boundary such that the backlight points toward the nearest lighting boundary. Building-mounted luminaires with the backlight oriented toward the building are exempt from the backlight rating requirement. Internally illuminated exterior signage shall not exceed a luminance of 200 cd/m² (nits) during nighttime hours and 2000 cd/m² (nits) during daytime hours.

Additional uplight and light trespass exemptions (requires separate controls):

- Specialized signals for transportation
- Theatrical lighting
- Roadway lighting (government mandated)
- Internally illuminated signage
- Façade/landscape accent lighting (requires automatic turnoff 12:00-6:00am; note: lighting for national flags is exempt)

WATER EFFICIENCY (7 points "YES"/4 points "MAYBE"/0 points "NO")

This section focuses on reducing potable water us onsite, relying on a combination of alternate sources, efficient fixtures and equipment, and metering to encourage on-going responsibility.

WEp1/c1: Outdoor Water Use Reduction (CAMPUS): (2 Points "Yes")

This requires a minimum potable water reduction for irrigation. Non-vegetative surfaces are to be excluded from landscaping calculations. Because of the gardens and tree-lined streets the project has planned, there will be a requirement for irrigation, meaning that we will pursue Option 2: Reduced Irrigation. LEED requires landscaping potable water reduction of at least 30% from a calculated peak based on the site's peak watering month (July, which also happens to be the lowest month for rainfall). Reductions can be made via a plant species and irrigation system efficiency (calculated from EPA WaterSense Budget Tool). We anticipate utilizing only non-potable sources for irrigation demand, primarily through rooftop stormwater harvesting and condensate. Projects will explore these and other options to meet this demand.

WEp2/c2: Indoor Water Use Reduction: (2 Points "YES"/4 Points "MAYBE")

LEED projects are required to reduce indoor potable water use by a minimum of 20%. Our project intends to reduce all potable water use in the buildings, at minimum 30% through efficient fixtures (See IPc1). All water use appliances shall be Energy Star rated, and all fixtures within the scope of LEED shall be EPA Water Sense labeled: toilets, urinals, faucets, showers, clothes washers, dishwashers, pre-rinse spray valves, ice machines, heat rejection and cooling, cooling tower evaporative sensors, food steamers, and combination ovens. Additionally, for process water, venture-type flow-through vacuum generators/aspirators shall not be used, and discharge water shall be tempered by a means deemed appropriate by the MEP Engineer prior to being released to drain. Additional points may be available on a project by project basis.

WEp3/c4: Building Level Water Metering: (1 Point "YES")

The City of Boston Building Energy Use Disclosure Ordinance (BERDO) requires commercial properties >50,000sf to share annual energy and water use data. LEED requires this data for 5 years. At minimum, the project shall collect and share this data via Energy Star Portfolio Manager. LEED only requires, at minimum, one meter to measure potable water use at a monthly or annual basis. Additionally, a point will be earned for measuring at least two of the following water "flows": irrigation, indoor plumbing fixtures, domestic hot water, boiler, and/or reclaimed water. Such metering shall be addressed project by project.

WEc3: Cooling Tower Water Use (CAMPUS): (2 Points "YES")

LEED requires a one-time potable water analysis to measure 5 control parameters for cooling towers and evaporative condenser units. Additionally, it awards points for achievement of a minimum number of cycles and at least 20% of make-up water pulling from non-potable sources.

ENERGY AND ATMOSPHERE (14 points "YES"/16 points "MAYBE"/3 points "NO")

This section focuses on reducing carbon emissions by energy use reduction. It promotes responsible energy management best practices through efficiency, passive and active systems, tracking and reporting, sub-metering, renewables, and offsetting. The majority of LEED points fall within this section, as it has the greatest global warming reduction potential.

EAp1/c1: Fundamental/Enhanced Commissioning&Verification(CAMPUS): (6pts "YES")

The integrative project team will develop OPR and BOD documents and deliver them at 50% DD to a LEED-compliant Commissioning Authority (CxA) who will review the documents, develop and implement a Cx Plan, confirm Cx requirements in construction documents, develop construction checklists, develop testing procedures, maintain a Cx log, author a final Cx report, who will document and pose recommendations throughout the design and construction process, and who will review the exterior enclosure design with members of the design and construction team. The Cx will be brought on at 50% DD and may not be an employee of any firms associated with the integrative design team. They will also develop a baseline Facilities O+M Plan to include for each building/all days of the week: sequence of operations, building occupancy schedules, equipment run-time schedules, HVAC set points, lighting levels, min. outdoor air requirements, systems narratives (mechanical/electrical), and a commissioning program with all requirements, tasks, etc.

Additionally, each building will undergo Enhanced Commissioning (Path 2). This includes review of contractor submittals, inclusion of a systems manual in CD's, inclusion of occupant/operator training in CD's, systems manuals updates/delivery, seasonal testing, measure of training effectiveness, development of an on-going Cx Plan, and review of full building operations 10 months post-substantial completion. All such tasks are to be included within the OPR and BOD. Lastly, each building will utilize Envelope Commissioning (Option 2).

EAp2/c2: Minimum + Optimize Energy Performance: (3 Points "YES"/15 Points "MAYBE")

All project buildings are required to demonstrate at minimum a 5% better cost performance than an ASHRAE 90.1-2010, Appendix G (with errata) compliant baseline through energy modeling. Additionally, these buildings are committing to performing 10% better to earn a minimum of 3 LEED points (and to exceed MA Stretch Energy Code). Energy conservation measures shall be determined project but project; however, the integrative design team shall investigate combinations of architectural and engineering systems to reduce energy cost through iterative energy modeling and simultaneous cost analysis. Certain known energy conservation measures shall include green roofs, reflective roofs, efficient lighting and HVAC systems, heat recovery systems, and enhanced glazing and insulation.

EAp3/c3: Building Level + Advanced Energy Metering: (1 Point "YES")

The City of Boston Building Energy Use Disclosure Ordinance (BERDO) requires that commercial properties >50,000sf share their annual energy and water use data – also a 5-year requirement for LEED certification. At minimum, the project shall collect and share this data via Energy Star Portfolio Manager. LEED only requires, at minimum, one meter to measure total building-level energy use data at a monthly or annual basis. Additionally, a point will be earned for measuring individual energy "flows" >10% of total annual consumption. Meters must have the following characteristics: permanent, record at hourly intervals (max.), remote transmittal of data, records consumption and demand, records Power Factor, and 36-month minimum storage.

EAp4/c6: Fundamental + Enhanced Refrigerant Management: (1 Point "YES")

No systems can use CFC-based refrigerants in HVAC&R equipment. Small units (<0.5lbs of refrigerant) are exempt. Additionally, the project shall only use refrigerants with an ozone depletion potential (ODP) equal to "0" and a global warming potential (GWP) <50 (Option 1).

EAc4: Demand Response: (1 Points "YES"/1 Point "NO")

Projects will be designed to be "demand response ready" (Case2), meaning they will provide infrastructure to enable future tenants to join DR programs at their discretion. Such systems must interface with building automated systems, enable load shedding (10% min.), include DR scope within the Cx Plan, and requires input from local utilities.

EAc5: Renewable Energy Production: (1 Point "MAYBE"/2 Points "NO")

This credit awards points for onsite renewable energy production. The most efficient means to do this is via rooftop PV, which shall be explored project by project.

EAc7: Green Power & Carbon Offsets (2 Points "YES")

Renewable energy credits (REC's) shall be purchased to exemplary performance levels.

MATERIALS AND RESOURCES (2 points "YES"/6 points "MAYBE"/5 points "NO")

New materials procurement practices promote manufacturing processes which are transparent in their supply chain management from extraction through point of sale and impacts upon human health. This section awards practices which reduce the need for virgin resource extraction, as well as construction management practices which reduce onsite landfill waste. Lastly, it requires infrastructure to support long-term waste and hazardous materials deferral from landfilling.

MRp1: Storage and Collection of Recyclables: (REQUIRED): (CAMPUS):

All buildings will have their own centralized handling and storage of recycling streams handled by Owner. Waste will be comingled and the following streams shall be collected: paper, cardboard, metals, glass, plastics, e-waste, batteries, and mercury-containing lamps. Additionally, projects will gauge the applicability of composting programs.

MRp2: Construction and Demolition Waste Management Planning: (REQUIRED): (CAMPUS):

Such a plan is required to establish waste diversion goals by identifying 5 diversion-targeted materials and approximating a percentage of overall waste these shall represent. Materials will be required to be site-separated, and narratives explaining the facilities receiving them shall be included. A final report detailing all major waste streams generated with disposal/diversion rates will be included. All calculations shall exclude land-clearing debris.

MRc1: Building Life-cycle Impact Reduction*: (5 points “NO”)**

Because this project is a new construction and no materials from the existing structure will be salvaged, Options 1-3 are not applicable. Option 4 allows new construction projects up to 3 points for demonstrating through LCA a 10% reduction compared to a reference building (ISO 14044 data sets/60-year operating life). Projects may investigate this individually as appropriate.

MRc2: Building Product Disclosure and Optimization – EPD’s: (2 points “MAYBE”)

Option 1 awards points for specifying 20 products from 5 manufacturers who promote Environmental Product Declarations (EPD’s) - to be addressed project by project.

MRc3: Building Product Disclosure and Optimization – Sourcing: (2 points “MAYBE”)

Option 2 awards products for meeting responsible extraction practices equivalent to 25% of the project cost, including manufacturer take-back programs, bio-based materials, FSC-wood products, reused and recycled content materials – to be addressed project by project.

MRc4: Building Product Disclosure and Optimization – Ingredients: (2 points “MAYBE”)

Option 1 awards points for specifying 20 products from 5 manufacturers promoting Health Product Declarations (HPD’s) and/or UL Product Lens products and/or Cradle-to-Cradle (v2 Basic/v3 Bronze and up) products, and/or Declare labelled products - to be addressed project by project.

MRc5: Construction and Demolition Waste Management: (2 points “YES”)

Projects shall endeavor to divert a minimum of 75% of total construction and demolition waste from landfill (at minimum 4 materials streams) as per the Waste Management Plan (Path 2).

INDOOR ENVIRONMENTAL QUALITY (11 points “YES”/5 point “MAYBE”/0 points “NO”)

This section focuses on the qualities which make an indoor environment successful: thermal and visual comfort, quality ventilation and air, natural and artificial light, outdoor views, acoustics, and elimination of toxins from entering regularly occupied spaces.

EQp1: Minimum Air Quality Performance: (REQUIRED)

All project will determine their minimum outdoor air intake flow rates for ventilation systems utilizing ASHRAE 62.1-2010, Sections 4-7 (with errata).

EQp2: Environmental Tobacco Smoke (ETS) Control: (REQUIRED): (CAMPUS):

Smoking shall be banned on-campus (indoors an on grounds within 25 feet of building perimeters) Signage reinforcing such policies will be posted within 10 feet of all main entries.

EQc1: Enhanced Indoor Air Quality Strategies: (2 Points “YES”)

All projects will mechanically ventilate entry vestibules to limit cross-contamination, as well as install permanent entry systems at least 10 feet in the path of travel to remove particulate matter from feet. These grates, mats, or combination shall be maintained weekly basis (max.). Additionally, spaces where air quality hazards might be stored (janitor's closets, print rooms, etc.) shall have separate exhaust, negative pressurization, provide self-closing doors, and either floor-to-deck partitions or a hard-lid ceiling. Outdoor air ventilation systems shall use MERV 13 or higher filtration media. All filters shall be replaced after construction completion and prior to occupancy. While not receiving LEED points, CO2 monitoring of densely occupied spaces 3'-6' feet above finished floor and with an audible and/or visible indicator when thresholds exceed 10% outside acceptable set points shall be employed as a best practice. Additionally, office tenants may seek to utilize enhanced ventilation (30% above ASHRAE) to increase cognitive function as seen appropriate, project by project.

EQc2: Low-emitting Materials: (3 points "YES")

Projects will specify low-emitting materials for assembly groups, the "Option" to be deemed appropriate by the Contractor, project by project.

EQc3: Construction Indoor Air Quality Management Plan: (1 point "YES")

This IAQ management is designated for construction and pre-occupancy phases, meeting all SMACNA IAQ Guidelines for Occupied Buildings under Construction (2nd Ed., 2007 Chapter 3) by protecting absorptive materials absorbed onsite. It shall also require MERV 8 filtration media installed in all ductwork operated during construction, which must be changed prior to occupancy. Onsite smoking will be prohibited during construction.

EQc4: Indoor Air Quality assessment: (2 points "YES")

Projects will perform building flush-outs per LEED (Option 1) either prior to occupancy or during occupancy, totaling an end rate of 14,000 cubic feet of outdoor air of gross floor area (60-80˚F, max. 60% RH). After the flush, projects will test indoor air quality (Option 2) for an additional LEED point per ASTM or ISO protocols as deemed appropriate. Corrective actions will be taken where each sampling point does not pass.

EQc5: Thermal Comfort: (1 point "YES")

All HVAC systems will be designed in compliance with ASHRAE 55-2010 (with errata). Thermal comfort controls will be provided for a minimum of 50% of individual occupant spaces with group thermal comfort controls for all shared multi-occupant spaces. All controls must adjust at least one of the following: air temperature, radiant temperature, air speed, and/or humidity.

EQc6: Interior Lighting: (2 points "YES")

All project buildings shall provide lighting controls (Option 1) for at least 90% of individual occupant spaces, allowing adjustment at three levels (on, 30-70% illumination, off). All shared spaces must place multizone controls with three-level adjustability. They must be controlled separately from presentation/projection systems, and switching must be located in the same space as the controlled luminaires with a direct line of sight. Additionally, projects shall apply quality aspects (Option 2), which includes the following:

- Regularly occupied space fixture luminance <2,500 cd/m² between 45-90˚ nadir (with exceptions)
- All fixture min. CRI 80 (with exceptions)
- 75% of connected load sources rated life/L70 min. 24,000 hours (at 3-hour/start, if applicable)

- 25% max. direct-only overhead lighting for total connected lighting load of regularly occupied spaces
- Area weighted average reflectance for 90% regularly occupied spaces: 85% for ceilings, 60% for walls, 25% for floors, 45% for work surfaces, and 50% for moveable partitions
- Min. 75% regularly occupied spaces wall surface-to-work plane illuminance max. 1:10 and ceiling-to work plane illuminance max. 1:10.

EQc7: Daylight: (3 points "MAYBE")

All buildings will provide manual glare control devices for perimeter zoned spaces. Buildings will be assessed individually to gauge compliance for LEED daylighting.

EQc8: Quality Views: (1 point "MAYBE")

This credit requires a direct line of sight outdoors for 75% of regularly occupied spaces. This will be assessed building by building once the interiors are laid out, as this is based on a percentage of regularly occupied space (not GSF).

EQc9: Acoustic Performance: (1 point "MAYBE")

This will be assessed building by building, and has scope for HVAC noise, sound isolation, reverberation time, and masking. HVAC background noise and STC ratings must not exceed levels published within 2011 ASHRAE Handbook, HVAC Applications, Ch. 48, Table 1, while meeting maximum reverberation times from Table 2. Where gathered seating exceeds 50 persons, sound masking will be considered per LEED criteria.

INNOVATION IN DESIGN (6 Points "YES"/0 Points "MAYBE"/0 Points "NO")

This section awards points for going above and beyond existing credit benchmarks, projects attempting novel strategies, projects pulling from Boston-specific Article 37 credits, projects attempting LEED pilot credits, and those which reference other systems, including WELL.

IDc1 (CAMPUS): (5 Points "YES")

These 5 ID points will be assessed project by project and will use a combination of Campus and individual credits to achieve compliance. Options for these also include LEED Pilot Credits (PC's), exemplary performance, and Article 37 Boston-specific LEED credits, as well as unique ideas which emerge not covered within the LEED rating system. Options under consideration for these include:

- Exemplary performance for MRc5: Construction & Demolition Waste Management
- Exemplary performance for EAc7" Green Power & Carbon Offsets
- EQpc57: Enhanced Acoustical Performance – Exterior Noise Control
- SSpc75: Clean Construction
- SSpc121: Solar Access to Green Space

IDc2: LEED Accredited Professional: (1 Point "YES")

Blake Jackson of Stantec is serving as the LEED consultant for the campus project. He brings 11+ years' experience with multiple versions of LEED rating systems, as well as is a WELL AP and a LEED and WELL Faculty member. As a Faculty member, his good-standing and contributions to the project from permitting onward serves to demonstrate compliance for this credit.

REGIONAL PRIORITY* (1 Point "YES"/3 Points "MAYBE"/0 points "NO")**

To encourage teams to focus on strategies which are most regionally-pertinent, LEED offers 6 existing credits which are regionally critical, offering up to 4 points for pursuing these strategies (based on the project location). Note: RP credits are designated in the list above by a triple asterisk (***). Note: two additional options for credits are available: Renewable Energy Reduction (minimum 3% offset) and Building Life-cycle Impact Reduction. These both were not included, as LCA is not an option since there is no building to salvage, and renewables were not considered because the high-energy lab use will likely require more renewables than the on-site capacity can hold. The below four were deemed the most likely to be successful.

- RPc1.1: High Priority Site (Brownfield remediation option only) (CAMPUS): (1 point "MAYBE")
- RPc1.2: Rainwater management (2-point threshold) (CAMPUS): (1 point "YES")
- RPc1.3: Indoor water use reduction (40% minimum) (CAMPUS): (1 point "MAYBE")
- RPc1.4: Optimize Energy Reduction (20% min)

Chapter 5

5.0 Urban Design

5.1 PROJECT CONTEXT

5.1.1 Harrison/Albany Corridor Strategic Plan

The Harrison/Albany Corridor Strategic Plan (the Plan) was released in June of 2012 to provide a vision and guidelines for the zoning and redevelopment of the southern portion of the South End. This neighborhood, once a thriving industrial area, is currently in transition to new uses. One of the major goals of the Plan was to guide the future and identity of the area. The Plan divides the area into four sub-neighborhoods based upon the character of each area, and its potential for growth in the future. The sub-neighborhoods include the New York Streets, SOWA, the Back Streets, and the Medical Area. The Project is located on the boarder of the Back Streets neighborhood and the Medical Area, and is consistent with and builds upon the goals and vision of the Plan.

5.1.2 Sub-Areas: New York Streets, SOWA, Back Streets, Medical Area

The first area described in the Plan is the New York Streets sub-area, which is located southwest of the intersection of Interstate 90 and 93. This area has recently seen substantial residential and commercial development including Ink Block, Troy, 345 Harrison Avenue, and 80 East Berkeley Street. The New York Streets sub-area is positioned to become an economic link between the city's downtown, Chinatown and the South End.

The second area is SOWA, or South of Washington, which is located just south of New York Streets. SOWA is a vibrant mixed-use neighborhood with galleries, artist space, housing, commercial space, and strategically-located retail. Many of the industrial buildings have been renovated for new uses, including lofts and artist space. SOWA will continue to be a lively, cultural destination in the South End and remain a driving factor in defining the Harrison Avenue Creative Use Corridor.

The third sub-area is the Back Streets, which is located just south of SOWA. The Back Streets area has the most potential for development, as there are currently gaps in the urban fabric. The area is characterized by light industrial uses and small businesses. In the Plan, the vision for this area is to encourage the creation of new jobs. In addition to the existing light industrial and medical uses, complementary commercial and research uses will build upon the neighborhoods foundation. The Plan welcomes new streetscapes, green technology, and contemporary design.

The last sub-area is the Medical Area, which is located just south of Back Streets. As the name indicates, the medical area is home to Boston Medical Center, Boston University Medical Campus, and many hospital related uses including biomedical research facilities. This area is characterized by larger buildings and internal courtyards.

5.1.3 Use Corridors & Green Corridors

The Plan outlines specific goals for the public realm: use corridors, green corridors, placemaking opportunities and streetscape guidelines. There are three (3) main use corridors motioned in the

Plan. The **Retail Corridor** on Washington Street has active ground floor retail uses and a lively mixed-use character. The corridor is populated with trendy restaurants, boutique shops and neighborhood amenities. The **Creative Corridor** on Harrison Avenue is home to many art galleries, artist works pace, and architecture studios which define the eclectic character of the corridor. The **Medical Corridor** on Albany street is reinforced by Boston Medical Center and Boston University Medical Campus and is a strong presence on the southern portion of Albany Street. The Project is situated one block north of the well-defined medical corridor and is perfectly situated to expand upon the corridor.

The Existing urban fabric of the South End includes green corridors connecting open space. There are four primary east-west green corridors and one north-south green corridor: Travelers Street, Perry Street, Union Park Street and East Newton Street and the extension of the South Bay Harbor Trail. The project is located along the Harbor Trail extension and is providing a sizeable open space to add to the existing green corridor.

5.1.4 Design Goals

The Project goals and aspirational vision directly align with those of the Plan. The team has outlined several goals as follows:

- Create an integrated and collaborative facility for idea generational and intellectual exchange
- Build upon the neighboring medical Institution and expertise with a premiere life science and research development
- Create a destination for neighbors, visitors and tenants, and continue the deep-rooted tradition of vibrant arts, culture and creativity in the South End.
- Provide a programmable urban plaza capable of small and large scale events
- Improve the streetscape, not only visually, but also addressing safety concerns

The Project is located between the vibrant creative community of SOWA and the prestigious institutions of the Medical Area. The Project goal is to foster cross collaboration between the creative and medical communities. Leveraging the adjacent BioSquare development, the Boston University Medical Campus and Boston Medical Center, the Project will develop the Albany Street Corridor into a premiere life science business address, attracting many new jobs to the neighborhood. Through implementation of pedestrian friendly streetscape improvements, retail uses, and other public amenities, the Project will extend the core character of the South End to Albany Street. The Project strives to integrate both by design and function into the South End's authentic social and cultural life. The Project will embrace the South End community known for its vibrant tree lined streets, urban squares, worldly dining, art galleries and studios, and markets.

Albany Green is at the heart of Exchange South End, with approximately 1.1-acre of publicly accessible open space. The Green will be open and welcoming to everyone, inviting people in from Albany Street to picnic on the Lawn, enjoy an event in the Plaza, or spend some quiet time in the Garden. Albany Green is the common space for the four buildings at Exchange South End, encouraging people to come out of their buildings and have lunch in the open air, or spend some time after work, meeting each other and building a sense of community in this new part of the South End

The Proponent also acknowledges the importance of the Albany Streetscape as a crucial piece to attract visitors to the Site. An in-depth community process to source ideas of the best uses of the building edges has helped inform the design of the spaces. The space is being designed for possible restaurants, local boutiques, cafés, and other retailers, in addition to daycare and fitness facilities. The Project has strategically located the Community/Cultural spaces in multiple locations to activate the Plaza and draw visitors from the streets' edge into the Site. This will create an 18-hour active plaza perfect for cross collaboration. The plan shows the Community/Cultural spaces in each building to allow for activity in each phase. Connecting companies and community, connecting commerce and culture, connecting workspace and greenspace, where business and the neighborhood work together.

5.2 URBAN DESIGN STRATEGY

The project's inviting mixed-use campus with activities and design animate Albany Street itself while a signature public space—lined with arts and cultural uses, shops, and restaurants—sets the tone at the heart of the development. The project is an important step towards reinventing the Albany Street corridor, once a symbol of Boston's 18th- and 19th-century maritime economy, to become a symbol of Boston's innovation economy in the 21st century. To achieve this vision, the urban design strategy was founded at the nexus of collaboration, community, companies, culture, and connection.

The urban design provides new connections. The project integrates multi-modal transportation access, including direct connections to the I-93 corridor, a regional bike trail, a walkable neighborhood, and nearby transit stops. At the interface between the block and the corridor, retail, cultural, commercial, and research uses are arranged along 500 feet of the Site's frontage along Albany Street, as shown in Figure 5-1a, Perspective from Albany Street Looking North.

Collaboration is part of the strategy. The approach was tailored to reflect key priorities expressed by the community. The urban plan and architectural design reinforce goals heard from the community during over 30 meetings held with abutters, neighborhood groups, city officials, and local business owners. Examples of collaborative outcomes in the project are a mix of building heights, a barrier against I-93 (see Figure 5-1b, Perspective from I-93 Looking South), multiple pedestrian connections to the surrounding neighborhood, and a vibrant and welcoming ground floor.

The strategy creates a place for today's top talent to be attractive for companies. The project is the heart of a major life-science cluster and a knowledge workforce community. The design will create a bustling corridor lined with the types of retail and activity that attract knowledge workforce, provide diverse job opportunities, and invite the community at large.

The urban design is community-focused. As depicted in Figure 5-2a, Perspective from Albany Street Looking East, a signature park is lined with shops, restaurants, and cultural space will provide workers, neighbors, and visitors a place to gather and share in the culture and activities that make the South End special. Careful organization of the surrounding buildings will assure that ample afternoon sunlight reaches the park and encourages its use as a lunchtime destination. The South End is one of Boston's most desirable neighborhoods, known for tree-lined residential streets, restaurants, and its arts scene. The amenities for a new workforce are here. The urban design extends that energy in a manner that is authentic, diverse, and culturally rich by tying into the character of the existing fabric and building on the true spirit of the district.

Finally, the strategy has a strong cultural component. The plan features 30,000-square-foot of community space that will contribute to the energy of South End and SoWa by introducing flexible venues for a wide variety of social enterprise / workforce development / arts and cultural organizations. It will be a hub for arts, culture, and gathering as well as other community programming. The cultural center spaces are clustered around Albany Green and each has the opportunity to take advantage of the outdoor plaza space for larger events. This can be seen in Figure 5-2a, Perspective from Albany Street Looking East.

The urban design addresses each element with six major moves to create value and build community. The following design decisions result in the Project's spatial strategy, see figure 5-2b massing build-up:

1. Circulation and access: Restore historic, fine-grained block structure to improve the pedestrian experience and streamline traffic flow.

2. New publicly-accessible park: Push building sites to the edge of the property to create the Albany Green, a signature public park.

3. Fit into the context: Guided by underlying zoning, the buildings along Albany Street are lower to create a comfortable edge.

4. Sun in the park: Vary building heights by pushing up against I-93 and down along the historic Albany Street edge to allow daylight onto the Albany Green.

5. Active Albany Street: Design a commercially active and culturally vibrant corridor with exciting retail and programming.

6. Arts and culture space: Create arts, cultural, community, and innovation spaces to anchor the public space and draw people in.

Taken together, this strategy results in a community of four buildings centering around an active European-style public plaza named Albany Green. The buildings have been located along the edges of the Site, leaving 39% of the Site as open space. The approach is consistent with the ideas in the Harrison Albany Corridor Strategic Plan for creating place making opportunities at the intersection of north-south Use Corridors with east-west Corridors. Some of the South End streets have been extended into the Site to blend the Site with the existing neighborhood and restore fine-grained block structure to improve pedestrian experience and streamline traffic flow. The streets are laid out in a modified grid pattern and feature landscape, sidewalks, separate bike lanes (extension of the South Bay Harbor Trail), and vehicular lanes in accordance with Boston's Complete Streets guidelines.

5.2.1 Alternative Scenarios for Shared Street

The shared street is currently designed to be one way into Albany Green at a signaled intersection. See Figures 1-19, and 1-20, Phasing Plan: Phases 1 and 2, for drop off locations. Alternative designs would be right in only, right out only, right in and out, and eliminating the shared street completely. If the shared street were to be eliminated completely, drop off for A would be located off of East Canton Extension and drop off for B would be located off of New

Street. Drop off for C & D would remain the same at the east side of the Service Drive. In this scenario, drop off for A and B would not be located at the buildings main entry. The proponent feels that allowing slow car activity will help to provided activity in Albany Green that will help support the retail uses.

(a) Perspective from Albany Street looking North

(b) Perspective from I-93 looking South

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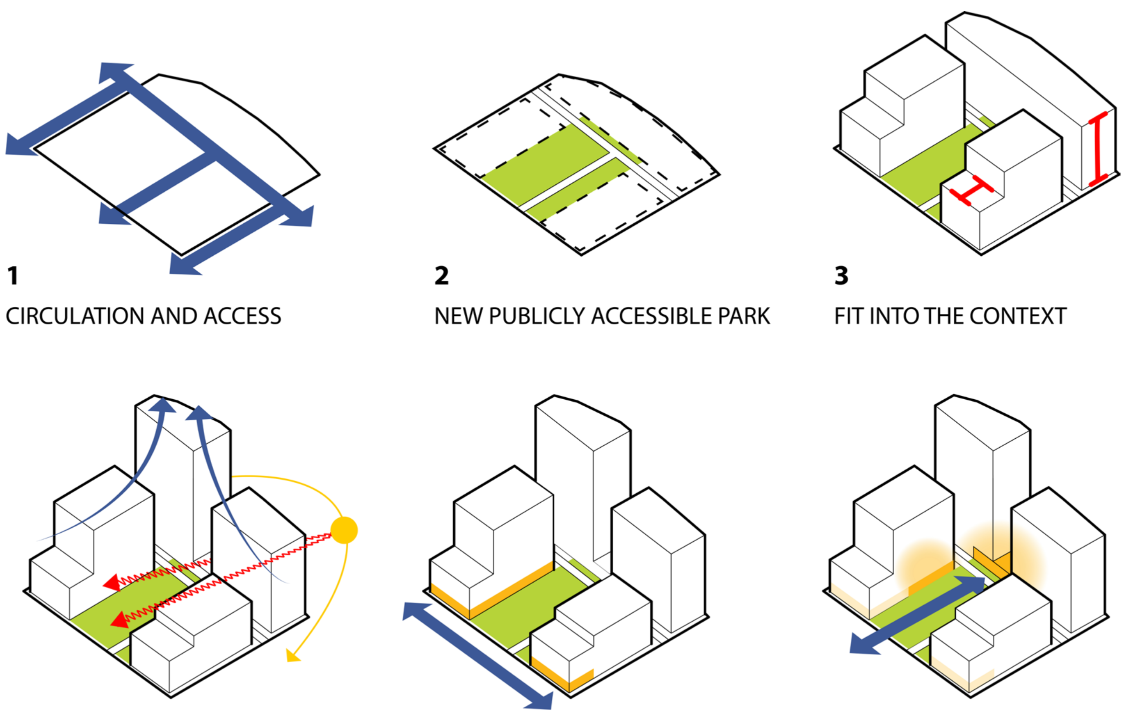
EXCHANGE SOUTH END

Figure 5-1
Perspectives

Source: Stantec

(a) Perspective from Albany Street looking East



(b) Massing Build-up

5.3 MASSING

The massing of the four buildings has been carefully crafted to provide context and connection to the adjacent residential neighborhood, as well as, allow maximum sunlight into the publicly accessible Albany Green plaza. The strategy places the lowest buildings along Albany Street and the buildings gradually increase in height as they are placed closer to the Interstate, where they act as buffers for the residential buildings. See Figures 5-36 – 5-40 for views of the project from various locations in the South End.

- Building A– A 6-story office and lab building with retail at the ground floor. The street wall of the building is set to remain consistent with many of the buildings across Albany Street at 4 floors. That height wraps the building and begins to break down the volume into a lower and upper portion. Building A begins to define the commercially active and vibrant corridor along Albany Street with a café, boutique retail and restaurant. Retail and amenity spaces also wrap the building edge along the plaza and a portion of the building edge along the new streets. Since Building A is located on the southeast portion of the Site, the building has been designed to be the lowest in height to allow the maximum sunlight into Albany Green.

- Building B– A 12-story office and lab building with retail at the ground floor. A portion of the building projects towards Albany Green and is supported by two large columns flanking the buildings main entry. A screening element of terracotta baguettes is located above the entry on a canted wall and both helps to control sunlight and highlights the buildings main entry. The Albany Street façade is articulated into multiple massing forms facing the neighborhood, and introduces a regular rhythm of terracotta framed windows extending along the street edge. A portion of the building is setback along the sidewalk to allow additional space for outdoor dining. The upper Albany Street facing portion of the facade is articulated into unique massing elements to respond to the Plympton Street axial view. Retail and amenity spaces wrap the building along the plaza and Albany Street. A through building lobby will allow for future connections to the adjacent Jacobson parcel.

- Building C – A 23-story office and lab building. Building C is the tallest building on the Site, located closest to the highway and farthest away from the residential neighborhood. The facade of the building which faces the highway is curved to reflect movement and speed, and to create an iconic gateway image seen from the greatest distance. The building gracefully slopes in at the top three levels creating a slender top to the building. See figure 5-3 Aerial Looking North

- Building D – A 15-story office and lab building. Building D is also located at the back of the Site, but it is separated from and lower than building C to allow the maximum amount of sun light into Albany Green.

To create an interesting pedestrian rhythm, many of the buildings have been designed with various projections (bays or building masses that push in and out toward the sidewalk) along their lengths. See Figure 5-4, Perspective from Albany Street into Courtyard.

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EXCHANGE SOUTH END

Figure 5-3
Aerial Looking North

Source: Stantec

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EXCHANGE SOUTH END

Figure 5-4
Perspective from Albany Street into Courtyard
Source: Stantec

5.3.1 Phasing

The project is expected to be completed in phases. Building A & B will be constructed as part of phase 1 in addition to Albany Green. The remaining portion of the site will be left paved to accommodate flexible programming space. See Figure 1-19. The full build out of the project will be completed with the addition of Buildings C & D. See Figure 1-20.

5.3.2 Bicycle Accommodations

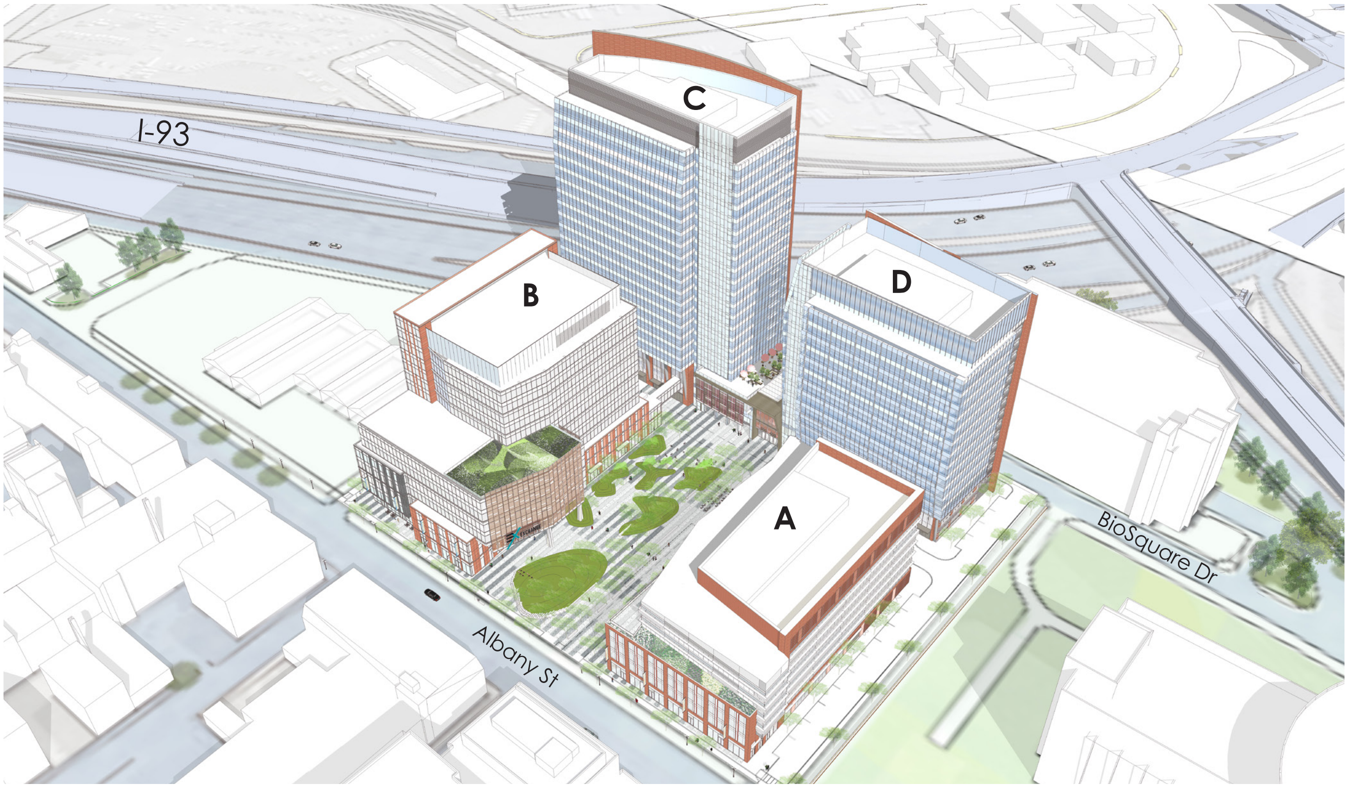
The planning of the project accommodates a variety of ways in which the user will arrive on site. The site accommodates for 138 bicycle parking spaces outside for short term bike parking. There are also hubway bicycle spots along Albany Street. Building A includes indoor bicycle parking for 217 bicycles and the required shower facilities for occupants of Buildings A & B. Building D accommodates for 255 bicycle parking spaces and the required shower facilities for occupants of building C & D.

5.4 CHARACTER AND MATERIALS

The character of the Project will be carefully composed with the understanding that there are two main ways in which people view the Site, from the neighborhood and from the highway.

Buildings A and B on the Albany Street edge respond to the neighborhood context with the use of repetitive patterns, rich textures, and warm materiality. Buildings C and D along the interstate are designed for long-distance views with expressive forms and movement. In the middle, Albany Green strives to create a unique sense of place, attractive to tenants, neighbors, and visitors alike. The buildings will be designed with variations of textures, colors, and materials. See Figure 5-4a, Proposed Building Materials, and Figure 5-4b, Material Palette.

Materials and their interface are critical, and the Proponent has experience creating attractive places through careful attention to streetscape and storefront material integration. Building materials will include terracotta, multiple variations of tinted glass, spandrel glass with varying depths of window mullions, and metal panel.



(a) Proposed building materials

(b) Material Palette

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EXCHANGE SOUTH END

Figure 5-5
Proposed Building Materials

Source: Stantec

(a) East Elevation

(b) North Elevation

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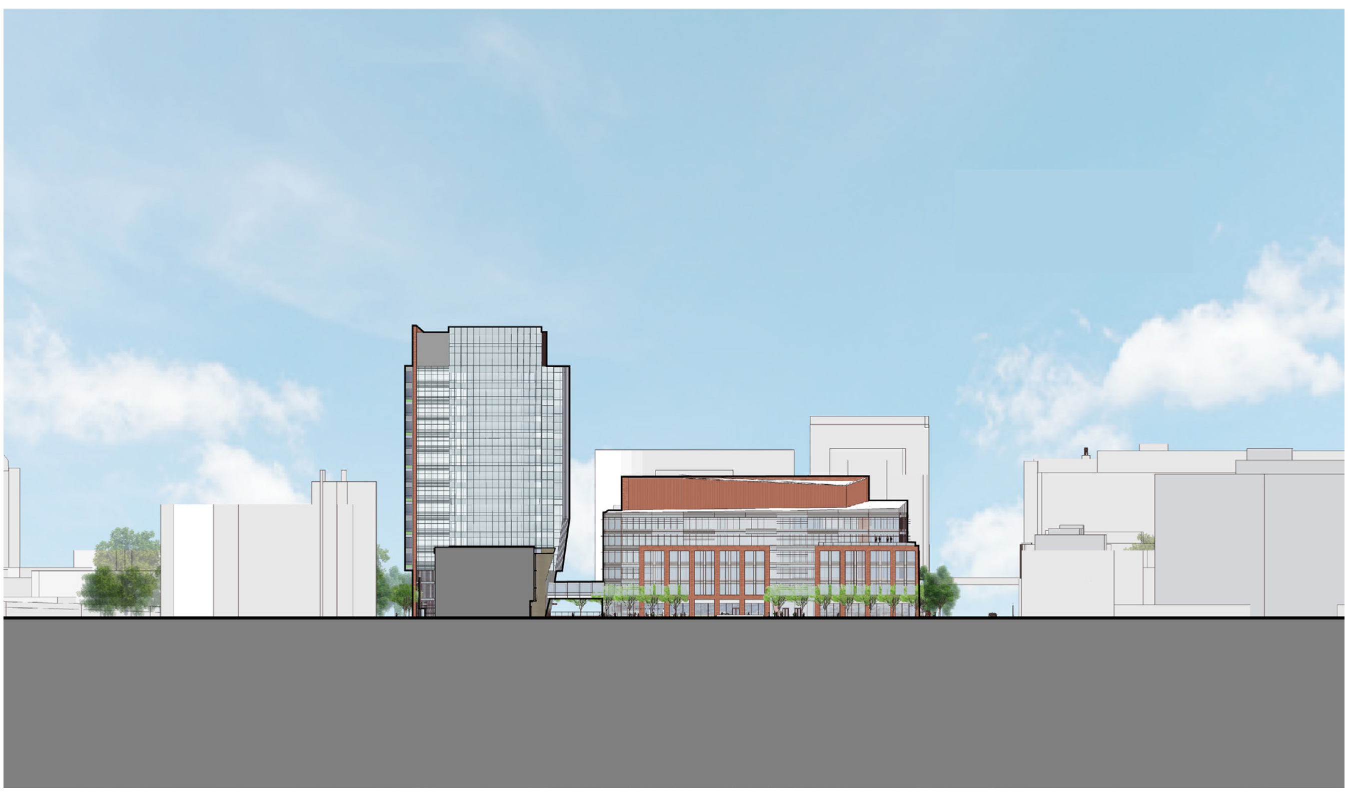
EXCHANGE SOUTH END

Figure 5-6
Elevations

Source: Stantec

(a) South Elevation



(b) Through North Elevation

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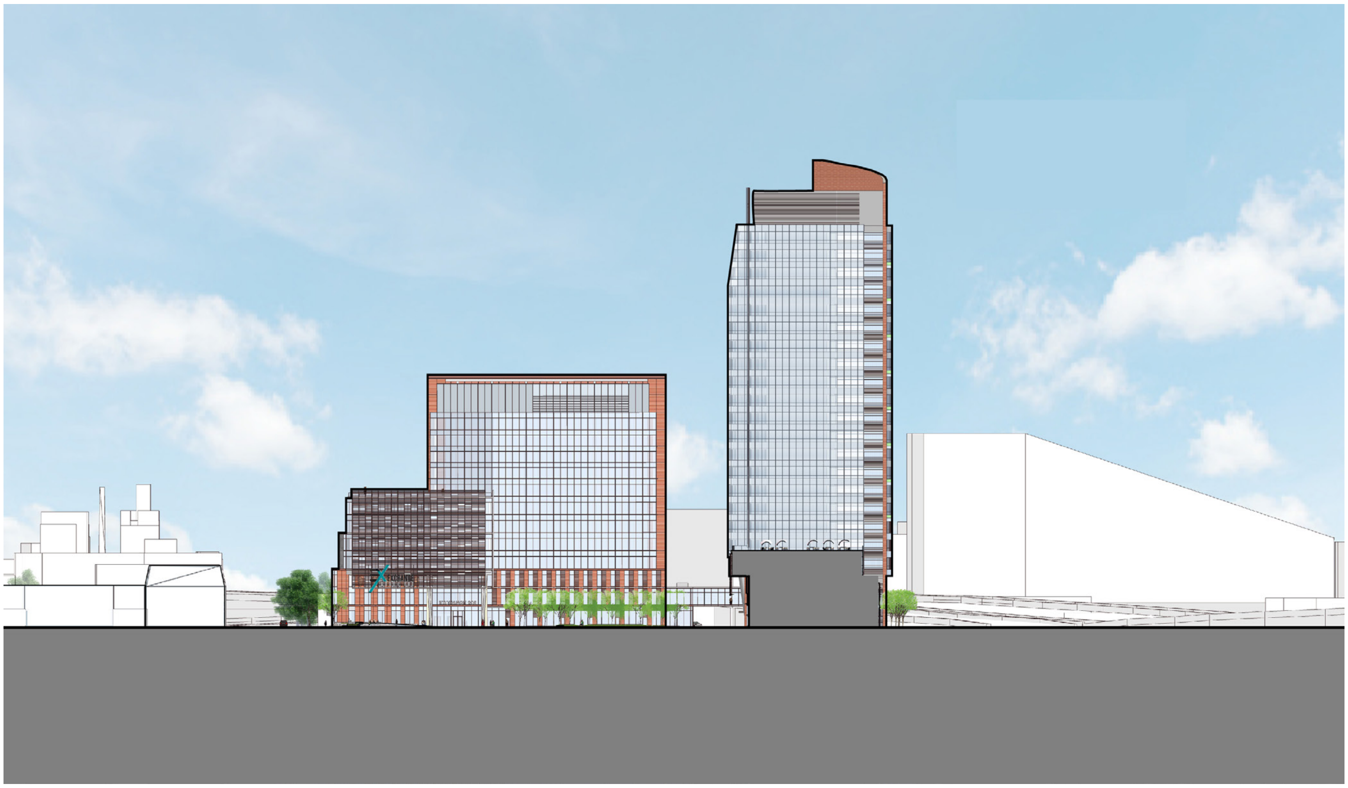
EXCHANGE SOUTH END

Figure 5-7
Elevations

Source: Stantec



(a) Through South Elevation

(b) West Elevation

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EXCHANGE SOUTH END

Figure 5-8
Elevations

Source: Stantec

5.5 LANDSCAPE AND STREETSCAPE

The proposed landscape and streetscape elements are divided into the following areas:

- Albany Green
- Streetscapes

The following subsections provide overviews for each of these elements:

5.5.1 Albany Green

Albany Green is an approximately 1.1-acre public open space at the heart of Exchange South End. The Green will be open and welcoming to everyone, inviting people in from Albany Street to hang out on the Lawn, enjoy an event in the Plaza, spend some quiet time in the Garden, or stop at one of the cafes and restaurants that will enliven the edges of the open space. Albany Green is the common space for the four buildings at Exchange South End, encouraging people to come out of their buildings and have lunch in the open air, or spend some time after work, meeting each other and building a sense of community in this new part of the South End. The landscape will have a strong sense of identity, with a graphic north-south paving pattern and parallel rows of canopy trees drawing people into the space from Albany Street and emphasizing the sense of welcome. The buildings around Albany Green have been scaled to allow for good solar exposure, and the landscape is organized into three main areas, The Lawn, The Plaza and The Garden, which take advantage of the movement of the sun through the day. The combination of three types of landscape within Albany Green is designed to give people a variety of experiences, atmospheres and activities within a relatively compact area, so that Albany Green will truly have something for everyone. See Figure 5-9, Preliminary Landscape Plan, Figure 5-10, Planting Plan, Figure 5-11, Paving and Furnishings Plan, Figure 5-12, Lighting Plan, Figure 5-13, Vehicular Zones, and Figure 5-14, Albany Green Section, Figure 23, Bicycle Parking, and Figures 5-24 - 5 –35 Albany Green Program and Activities.

The Lawn
The Lawn is located in the sunniest part of Albany Green and tilted to the south to further increase sun exposure. The granite seating edge on the Albany Street sidewalk gives passers-by a place to stop and hang out for a few minutes, it might be a place where street performers gather, creating a highly visible and active edge on Albany Street. The Lawn slopes down towards the central plaza, providing a place to enjoy the sun, or maybe watch an event, with up to 200 people on the lawn and a further 100 in the plaza. The eastern edge of the lawn opens onto the restaurant and café terrace of Building B, creating further activation of the landscape. Lighting for The Lawn will be discretely located in the high soffit on the west side of Building B, and will combine lighting for regular evenings and special event lighting. See Figure 5-14, Albany Green Lawn Plan, Figure 5-15, Albany Green Lawn – Section and Perspective, and Figures 5-26 and 5-27, Albany Green Program Movie Lawn and Large Event.

The Plaza
The Plaza is at the center of Albany Green, and provides a place for events, gatherings, or a farmer's market at the heart of Exchange South End. The Plaza will be a place for the community of Exchange South End to meet with the wider South End Community and could host seasonal programs, for example a 2,000sf skating rink in the winter, lunch-time concerts in the summer, or an event tent for up to 250 people. On the south side a water feature in the paving creates a place for children to play, and the threshold to The Garden beyond. Lighting for The Plaza will be with The Lawn lighting in the high soffit on the west side of Building B, and will

combine lighting for regular evenings and special event lighting. See Figure 5-16, Albany Green Plaza Plan, Figure 5-17, Albany Green Plaza – Section and Perspective, and Figures 5-25, 5-28, 5-29, and 5-30, Albany Green Event Plaza, Ice Rink and Event Tent.

The Garden

The Garden is at the southern end of Albany Green, away from the relative noise and activity of Albany Street, and in an area that is more shaded and secluded. The Garden gives people a place of peace and quiet, and a place for more intimate low-key activities like yoga, exercise or an outdoor classroom, with rich plantings of flowering trees, shrubs and groundcover, and a combination of fixed and moveable furniture. The Plaza paving will continue through the garden and sightlines will be maintained to Buildings C and D to the south so that Albany Green will be experienced as a single landscape with a variety of character areas within it. Lighting in The Garden will be from low bollards to emphasize the intimacy of the space. See Figure 5-19, Albany Green Quiet Garden Plan, Figure 5-20, Albany Green Quiet Garden – Section and Perspective, and Figures 5-31, and 5-35 Large Cultural Event, and Small and Quiet Activities.

5.5.2 Streetscapes

Albany Street

Albany Street is the front door of Exchange South End, connecting to the South End neighborhood, transit access, the Boston Medical Center, and the wider city. The streetscape at this front door has been designed to be as welcoming and open as possible to pedestrians, cyclists and those arriving by transit or car. The proposed streetscape will improve the experience of all users of Albany Street, and will continue the transformation of this important thoroughfare into a "Complete Street". Street trees will be planted along Albany between the East Canton Extension and New Street to shade the cycle track, sidewalk, and areas in front of the retail. In the central area a double row of street trees will be planted and the paving pattern of Albany Green will be extended across the Albany Street sidewalk to announce this major landscape space and to create an inviting threshold. Parallel parking spaces and an 8' wide off-street cycle track will be provided. The sidewalk between the street trees and the retail frontage of Buildings A and B will be 19' wide to provide ample space for short-term bicycle parking, a Hubway, and retail activities including café furniture to spill out onto the sidewalk and enliven the public realm. See Figure 5-21, Albany Street Section.

East Dedham Street Extension

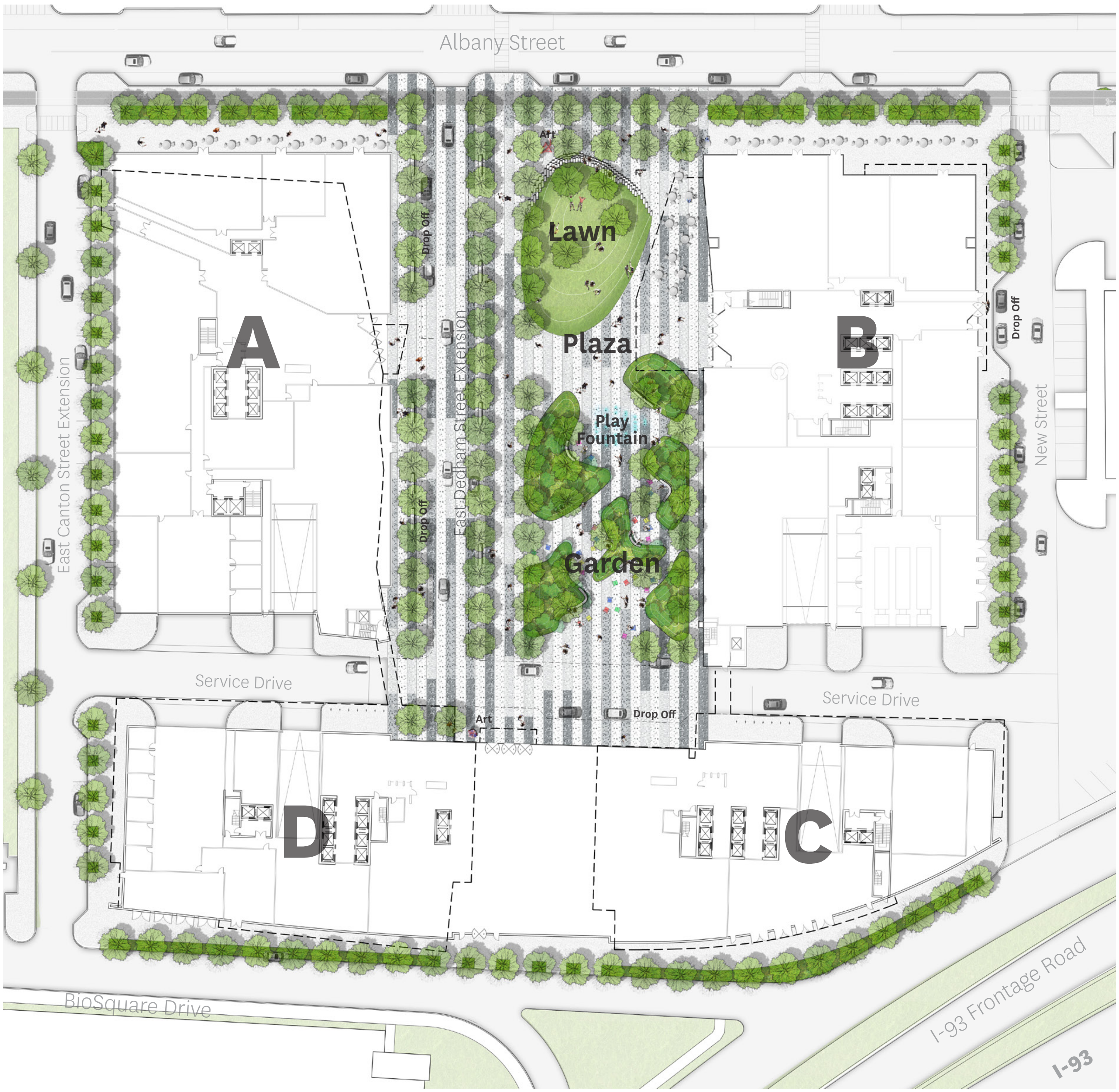
The East Dedham Street Extension is the main access point for cars and bicycles coming in to Exchange South End to drop off or pick up at the building lobbies. The 20' wide one-way driveway will be designed as a shared surface for slow speed vehicles, pedestrians, and bicycles, integrated with the plaza spaces of Albany Green. The lobbies of the four buildings are clearly visible from this street, giving good orientation and legibility for those arriving for the first time at Exchange South End. Ten drop-off spaces on the driveway allow for convenient access to the buildings. The linear rows of canopy trees shading Albany Green continue on either side of the East Dedham Extension, creating a comfortable microclimate, protecting pedestrians and making the driveway a seamless part of the wider Albany Green. The driveway will be flush with the adjacent plaza, and defined by a shift in paving scale, a flush curb, street furniture, and the further protection of bollards at the Building A lobby. Lighting will be from 20' high poles on either side of the driveway, see Figure 5-12 Lighting Plan.

East Canton Street Extension and New Street

The East Canton Extension and New Street are designed to be a pair of one-way streets. East Canton is a northbound street connecting Biosquare Drive to Albany Street, and New Street is a southbound street connecting to Albany Street. Both streets are 20' wide, which will allow them to be converted to two-way if required. East Canton has a parking lane on the east side, adjacent to Buildings A and D. Both Streets are planted with street trees in a 6' wide planting zone on the side adjacent to Exchange South End. Between the street trees and the adjacent buildings East Canton has a 6' 10" wide concrete sidewalk, and New Street has an 8'6" wide concrete sidewalk. Lighting will be from poles to match the adjacent streets. See Figure 5-22a, East Canton Extension Section, and Figure 5-22b, New Street Section.

Service Drive

The Service Drive is an internal two-way street connecting the southern end of the Dedham Street Extension to New Street and the East Canton Extension. The Connector provides access to the underground parking and all four buildings' loading docks, which are efficiently located in pairs opposite each other to minimize their visual presence.
At the southern end of Albany Green the plaza paving is continued across the East/ West Connector and continues to the face of Buildings C and D, creating a threshold for those buildings and making this part of the Connector seamless with the central landscape of Albany Green. Two drop-off spaces on either side of the Connector allow for convenient access to the lobby of Building C and D. As it crosses Albany Green the Connector will be flush with the adjacent plaza, and defined by a shift in paving scale, a flush curb, street furniture, and the further protection of bollards at the Building C and D lobby. Lighting will be from 20' high poles on either side of the driveway, see Figure 5-12 Lighting Plan.



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EXCHANGE SOUTH END

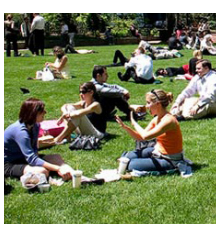
Figure 5-9
Preliminary Landscape Plan

Source: MVVA

1. High Canopy Deciduous Tree

2. High Canopy Street Tree

3. Flowering Trees, Shrubs & Groundcover



4. Lawn

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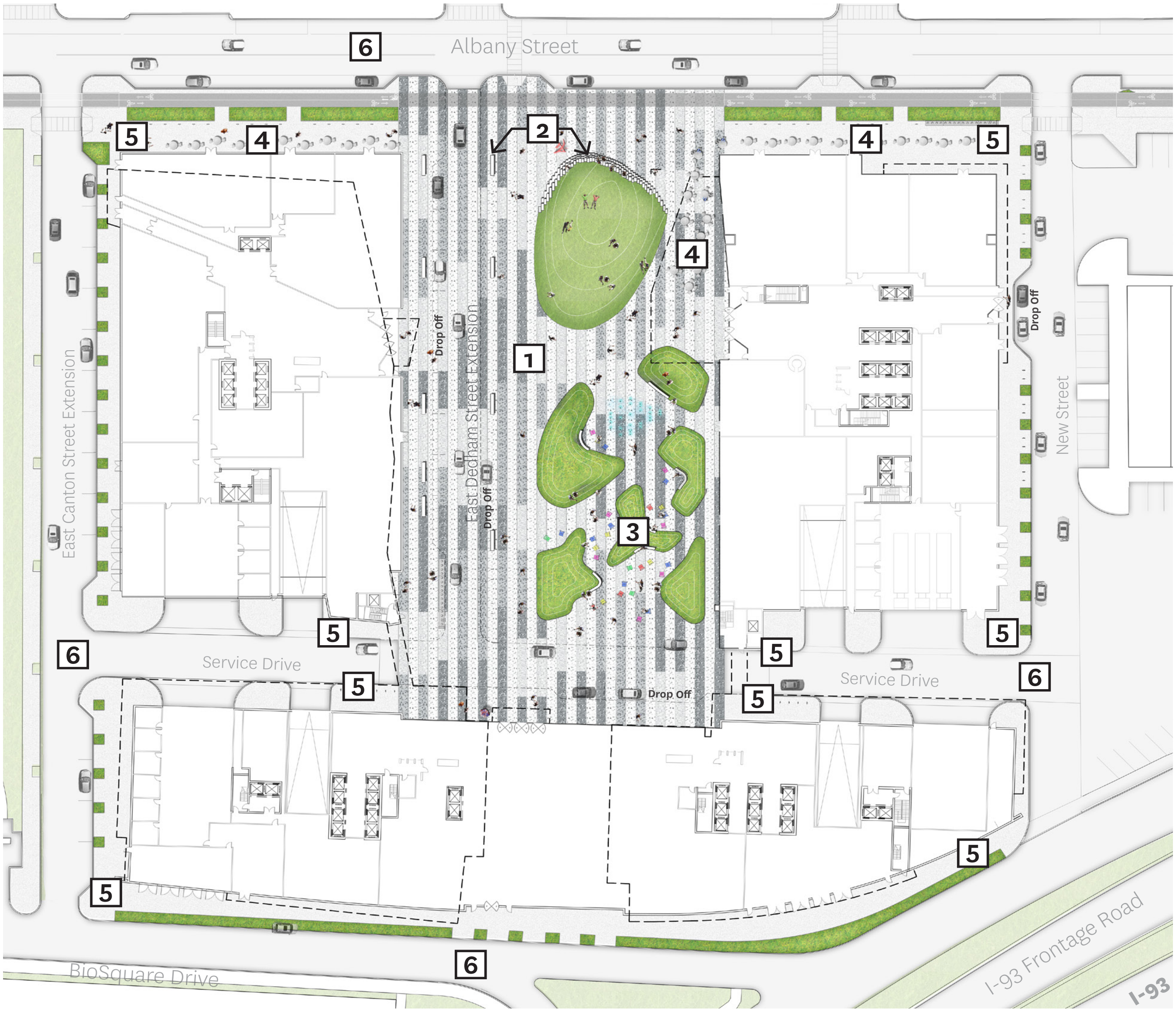
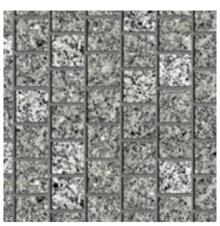
EXCHANGE SOUTH END

Figure 5-10
Planting Plan

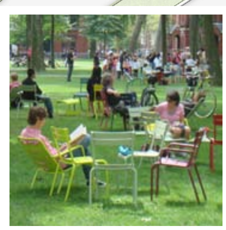
Source: MVVA





1. Granite & Precast Concrete Pavers (Light & Dark Gray mix)

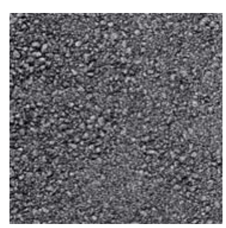
2. Slavaged Granite Blocks



3. Moveable Garden Chairs

4. Cafe Tables & Chairs

5. Cast-in-Place Concrete Pavement



6. Asphalt

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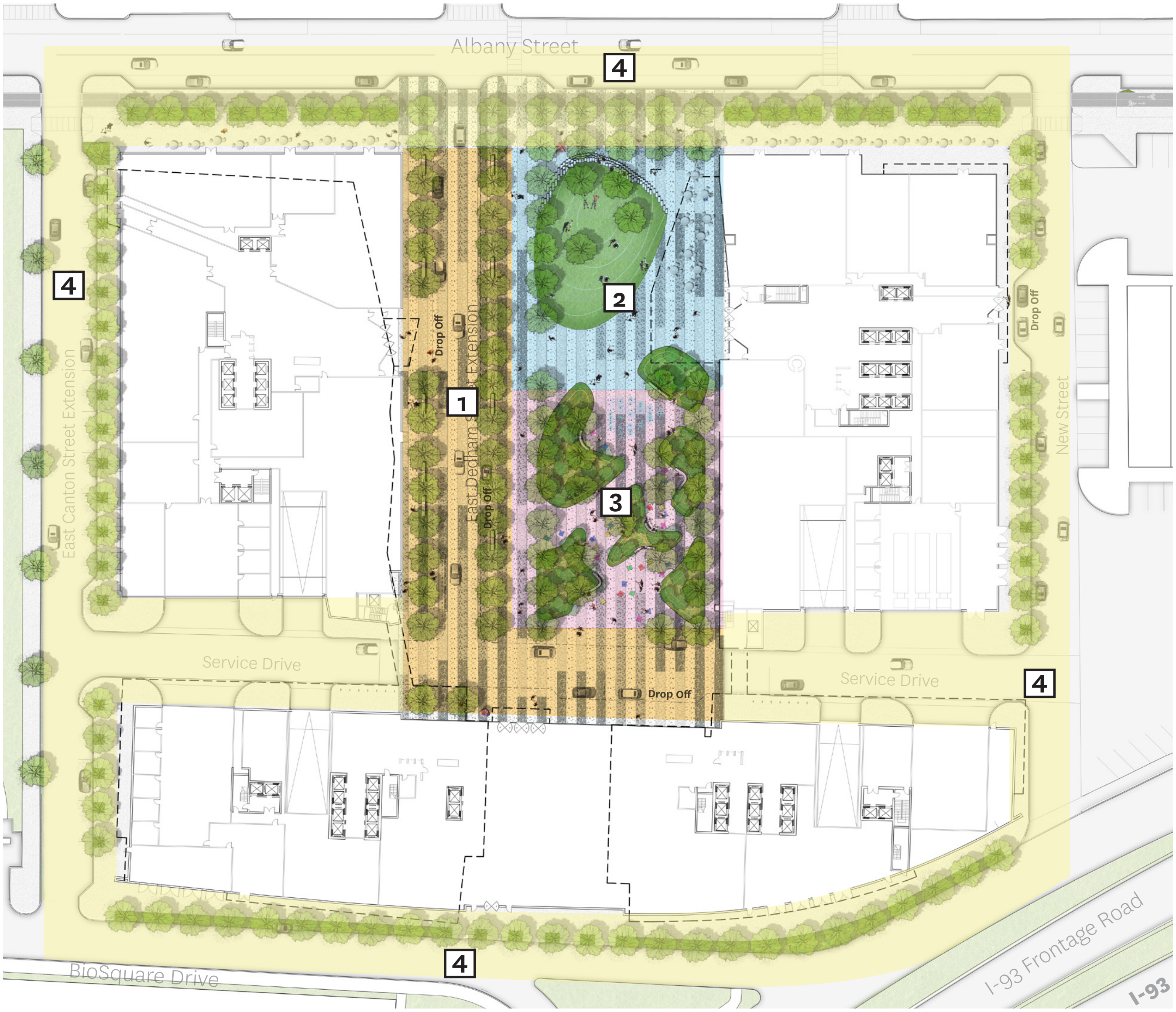
Figure 5-11
Paving and Furnishings Plan

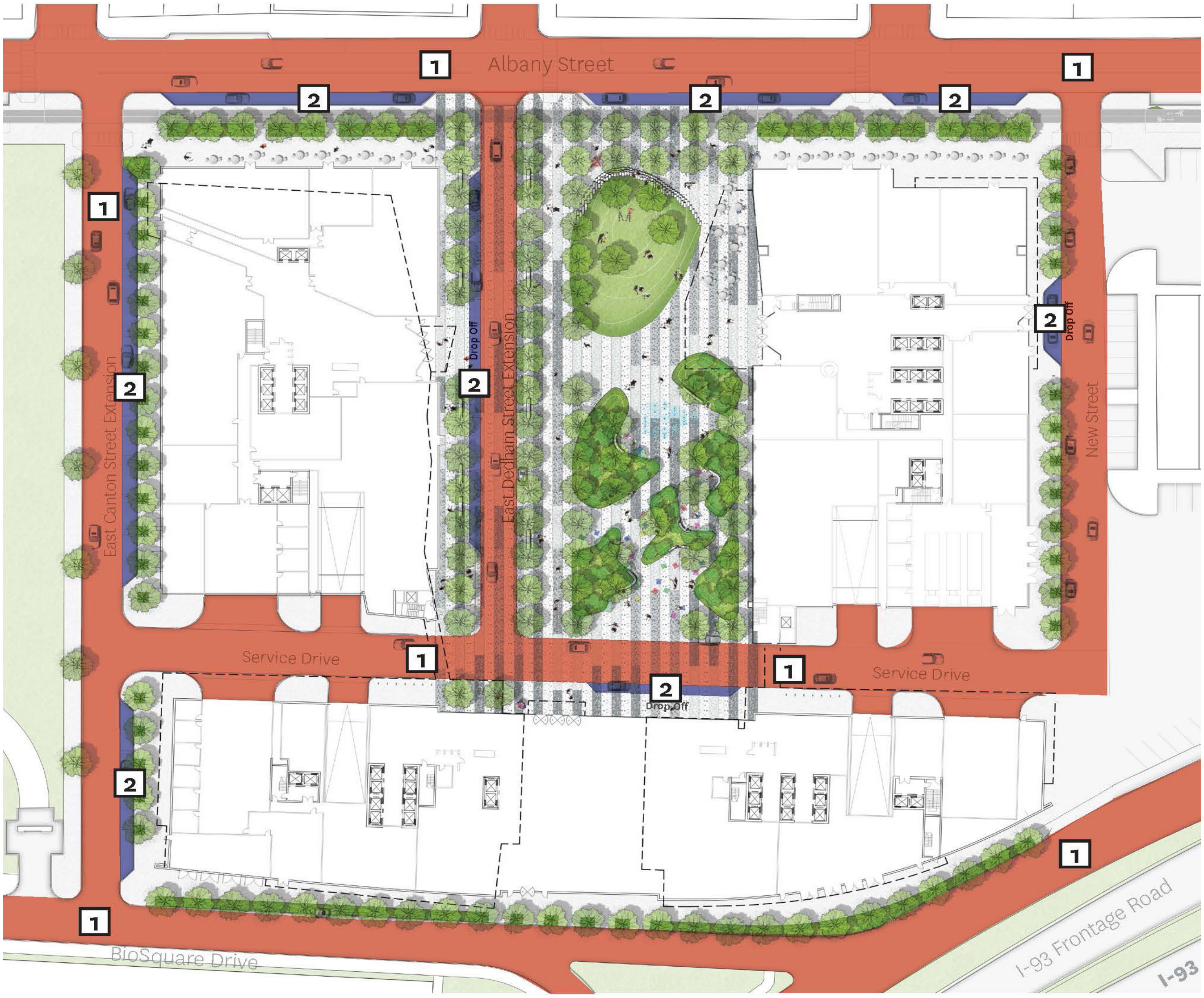
Source: MVVA



1. 20' Pole Lights
2. Building Mounted Moonlighting + Event Lights
3. Building Mounted Moonlighting + Bollard Lights
4. City of Boston Standard Street Lights

Figure 5-12
Lighting Plan

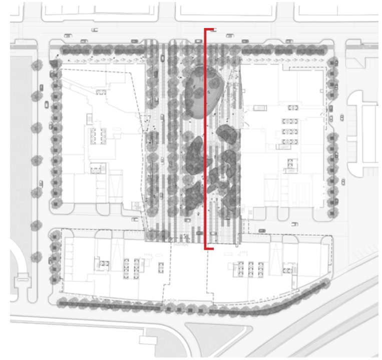
Source: MVVA



1. Vehicular Circulation
2. Parking/Drop-Off

Figure 5-13
Vehicular Zones

Source: MVVA



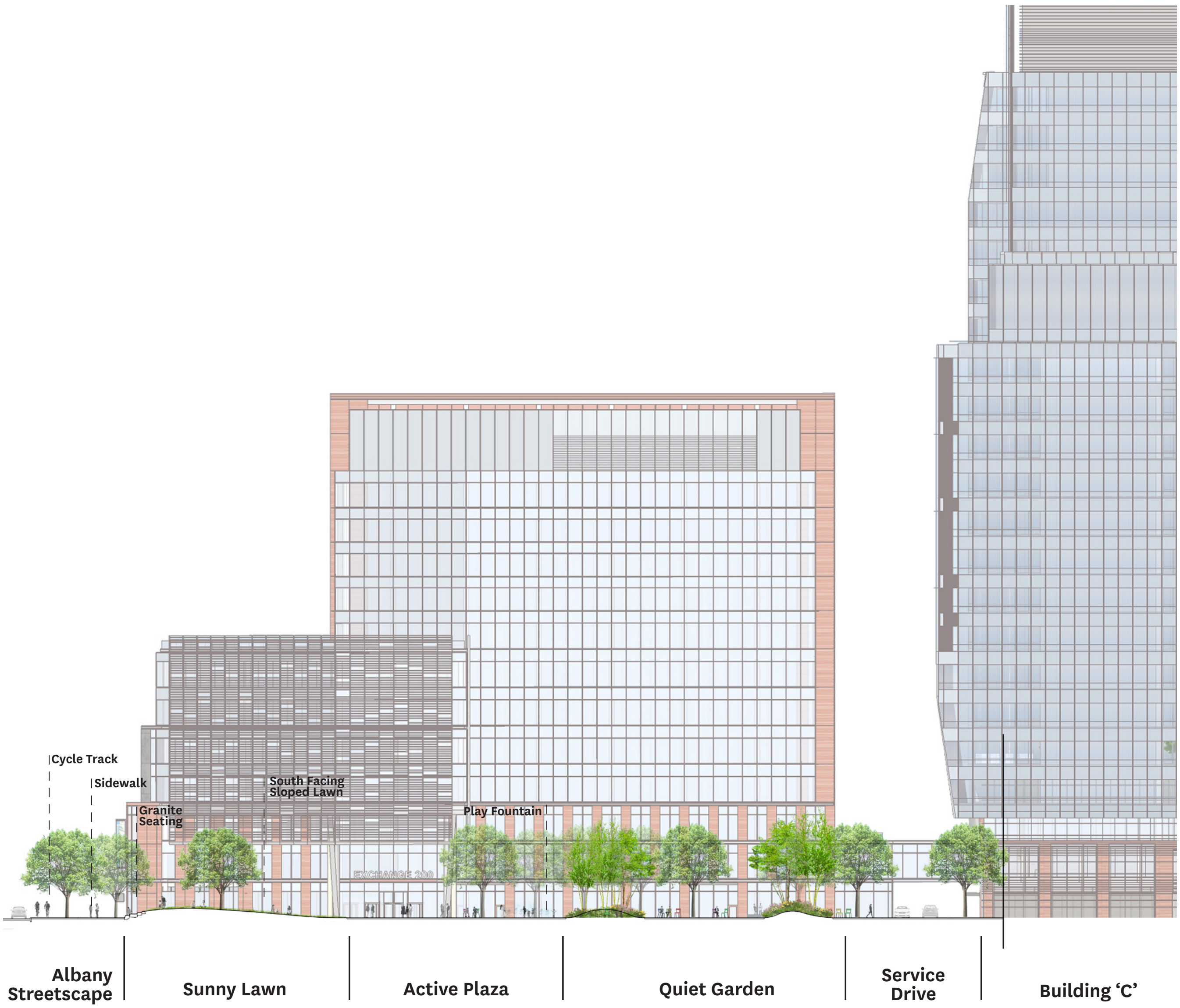
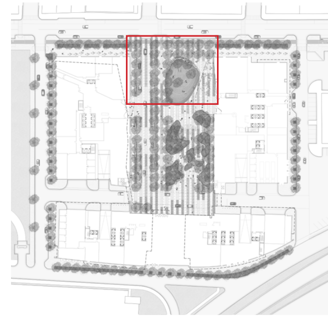


Figure 5-14
Albany Green Section
Source: MVVA



0' 30' 60'

Figure 5-15
Albany Green Lawn Plan
Source: MVVA

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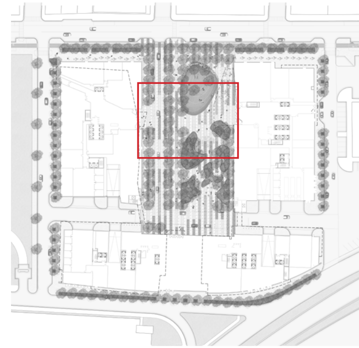
Figure 5-16
Albany Green Lawn Section and Perspective
Source: MVVA



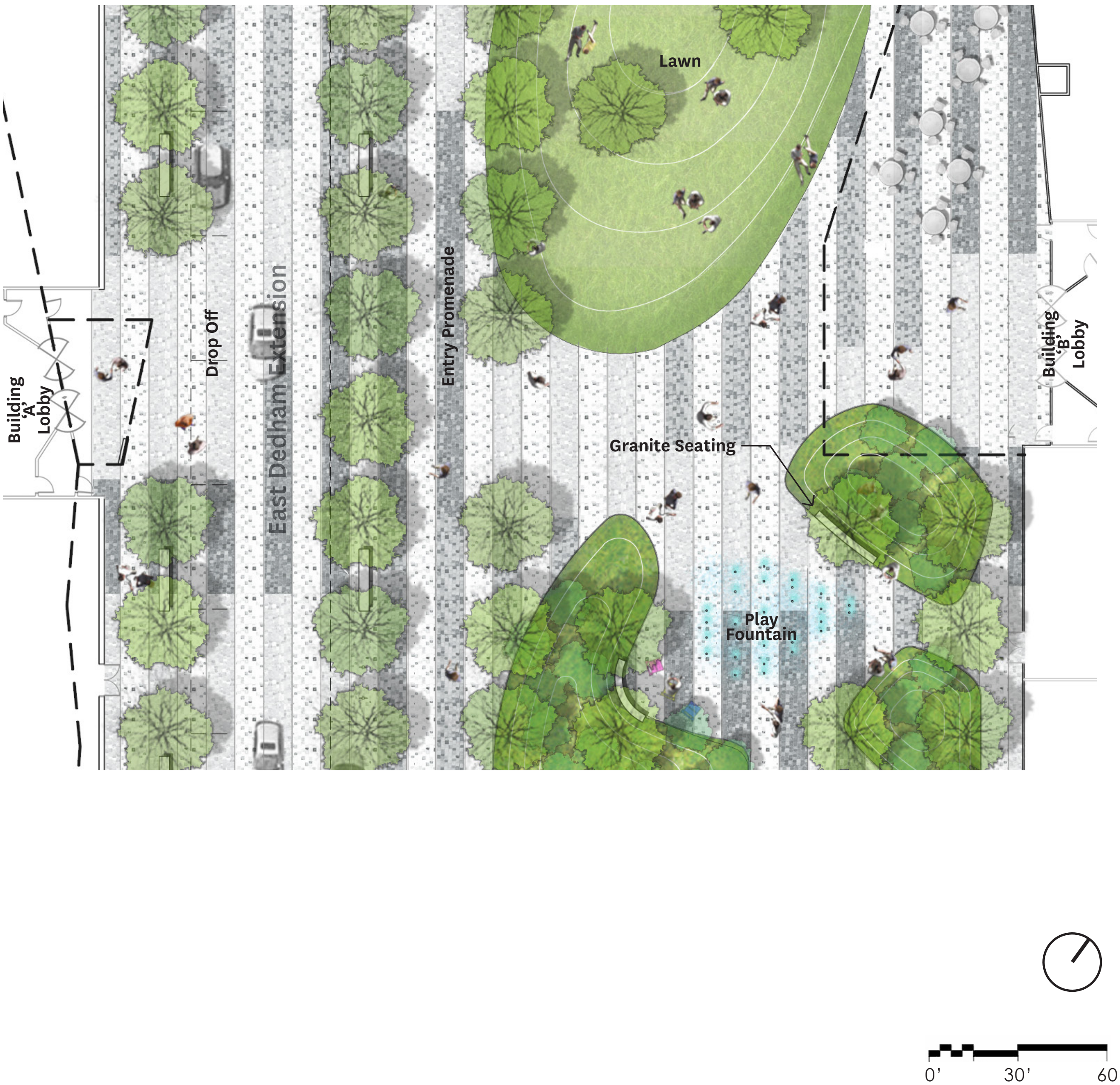


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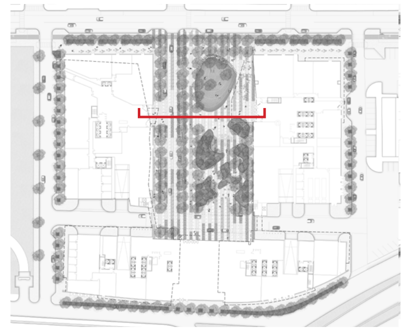
Figure 5-17
Albany Green Plaza Plan
Source: MVVA



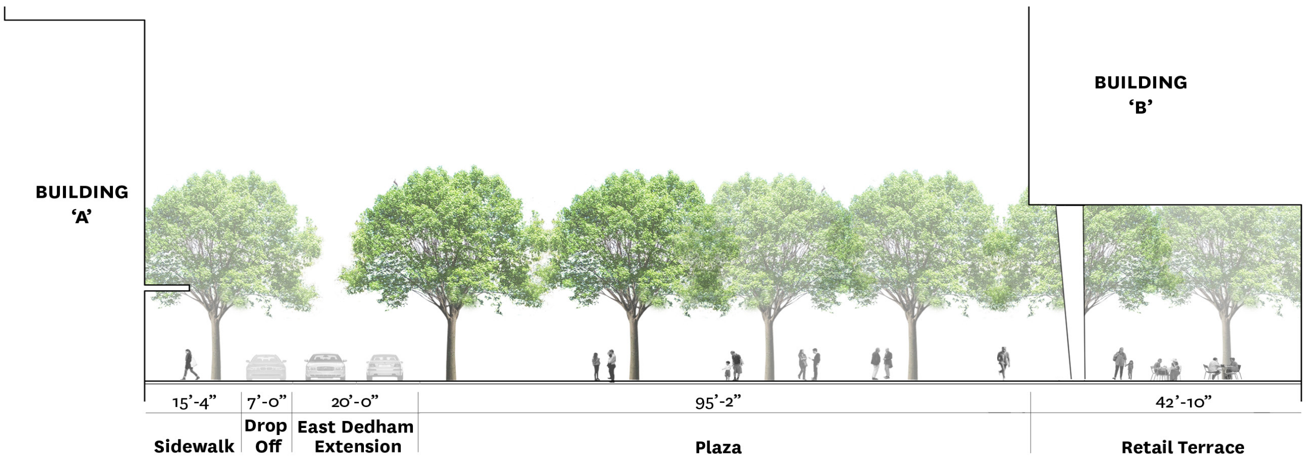


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Figure 5-18
Albany Green Plaza Section and Perspective
Source: MVVA

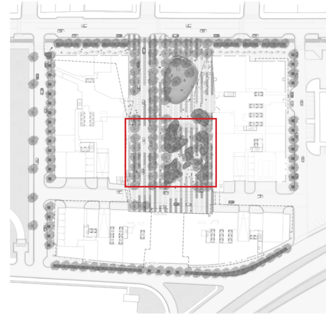

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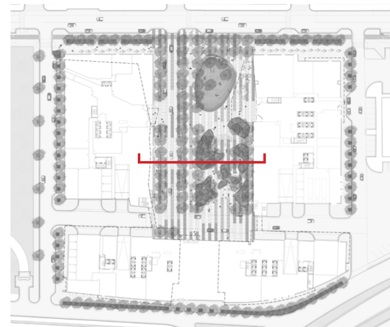
Figure 5-19
Albany Green Quiet Garden Plan
Source: MVVA



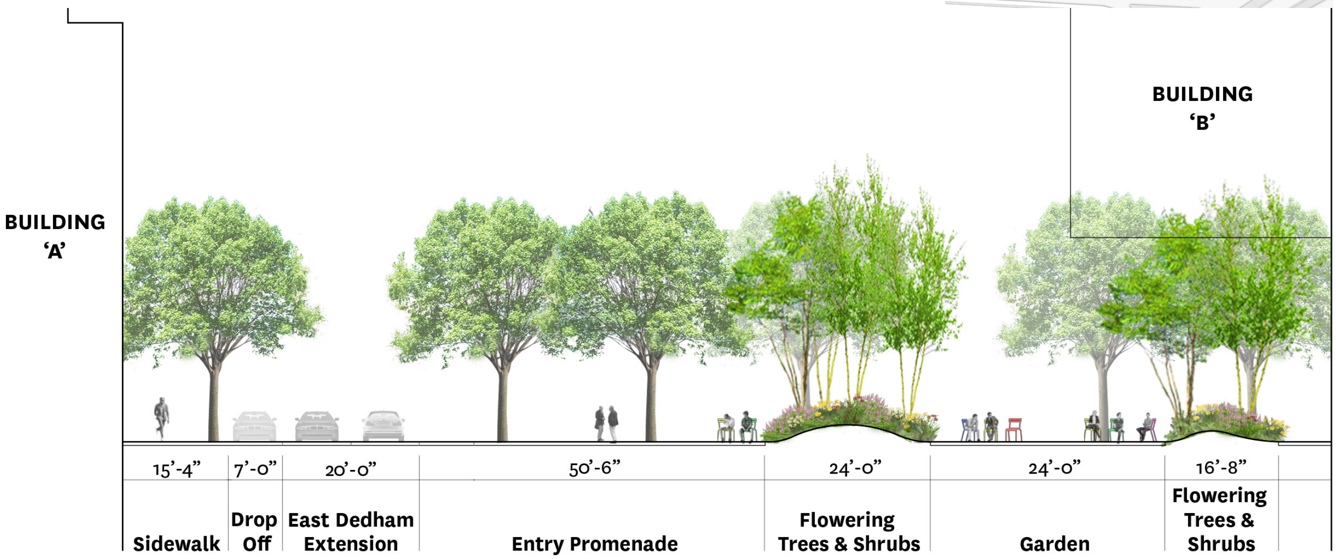
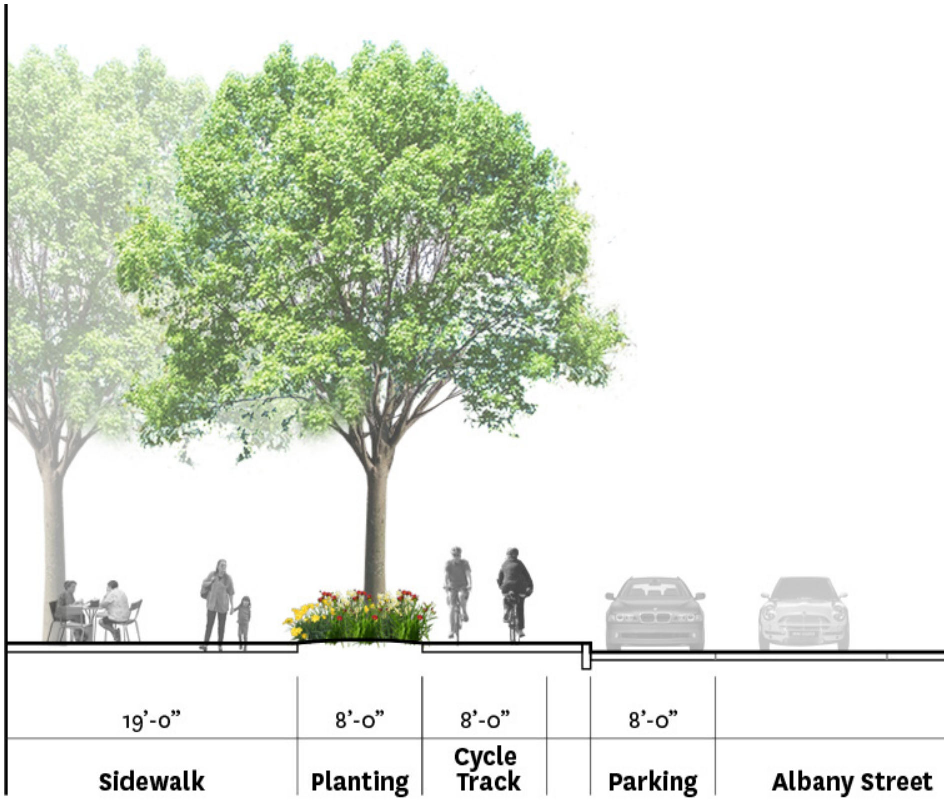


Figure 5-20
Albany Green Quiet Garden Section and Perspective
Source: MVVA



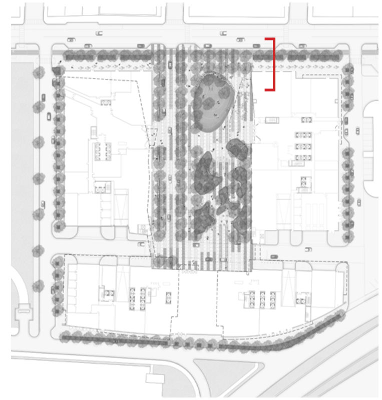
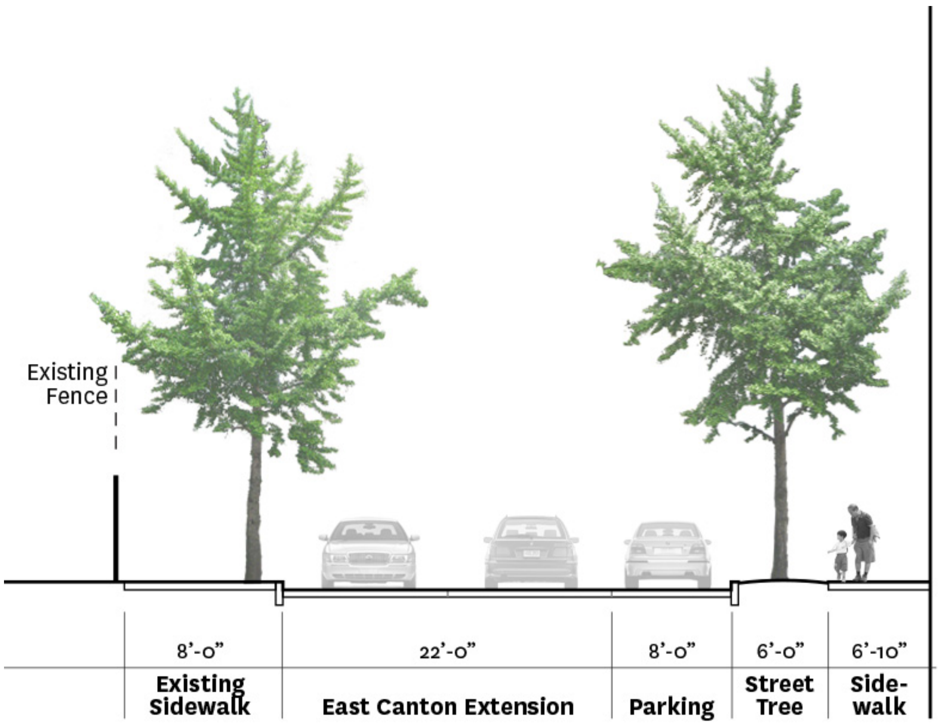
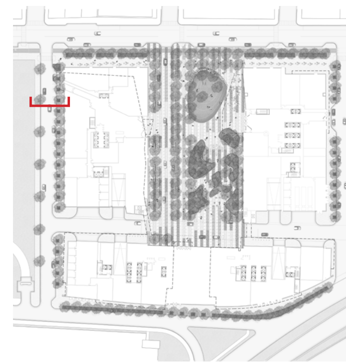
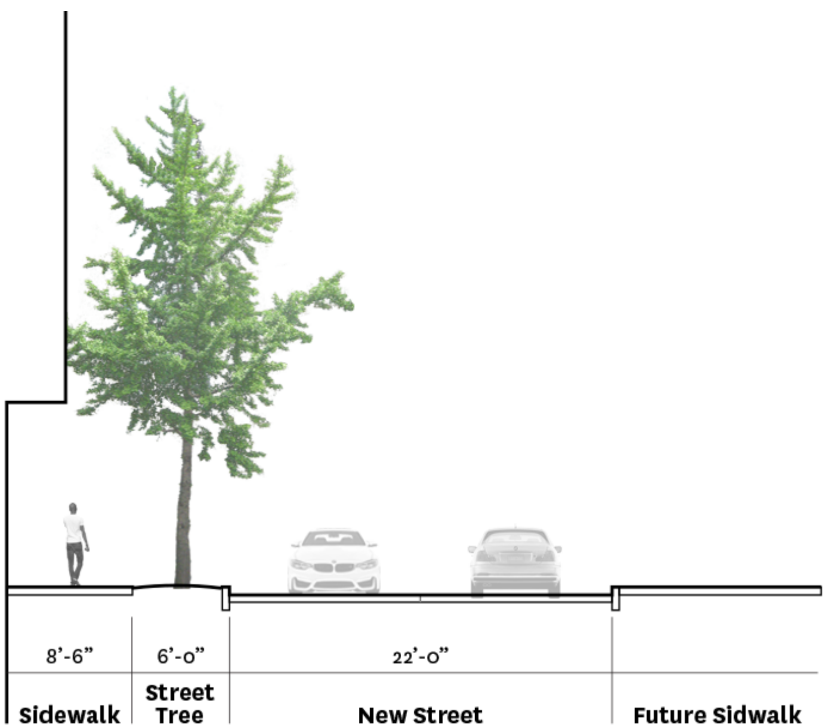


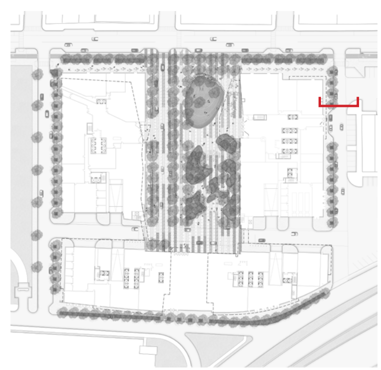
Figure 5-21
Albany Street Section
Source: MVVA





(a) East Canton Extension Section





(b) New Street Section

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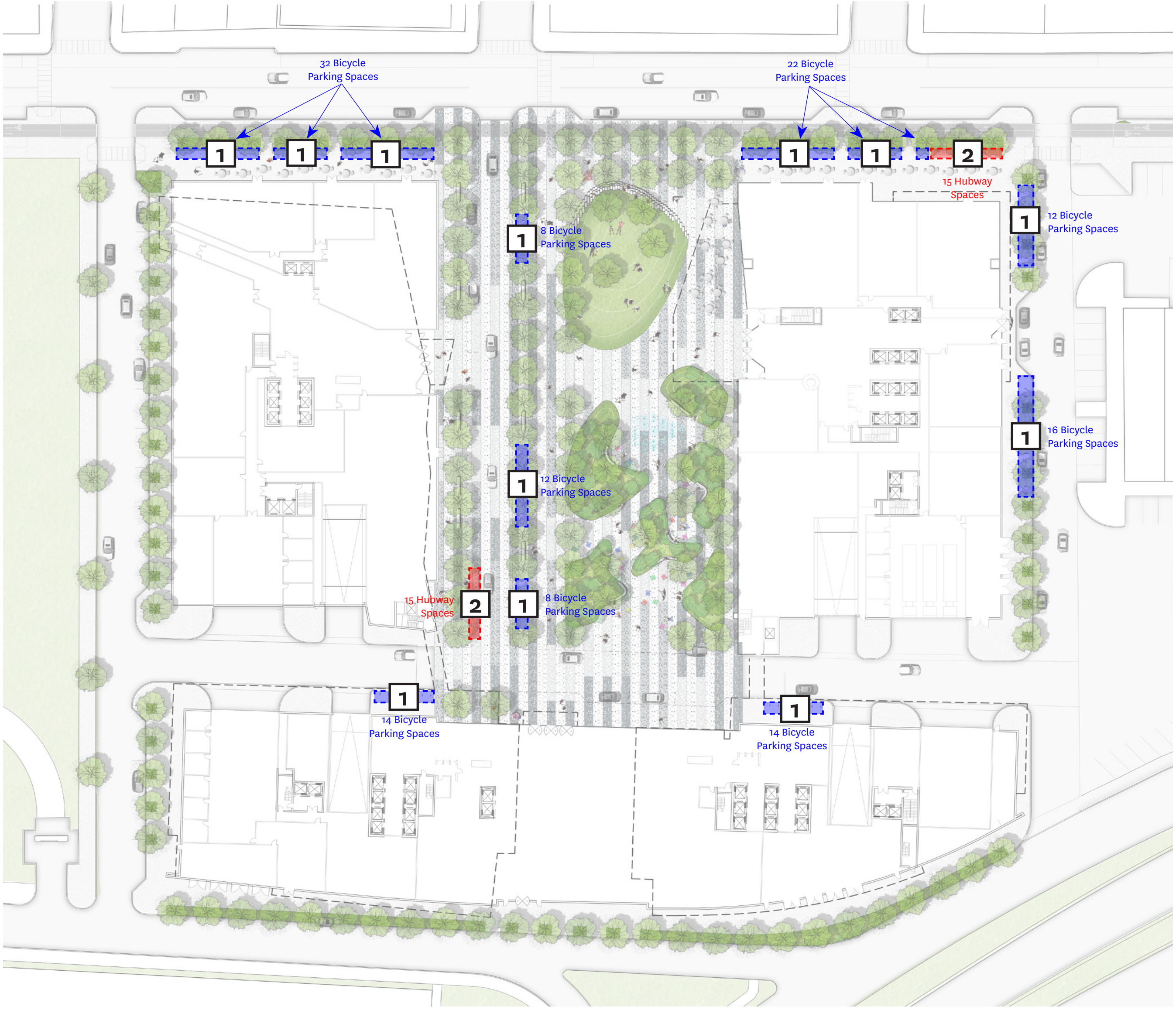
Figure 5-22
East Canton Extension and New Street Sections
Source: MVVA



1. Bicycle Parking (138 Parking Spaces)
2. Bicycle Hubway (30 Spaces)

Figure 5-23
Bicycle Parking

Source: MVVA

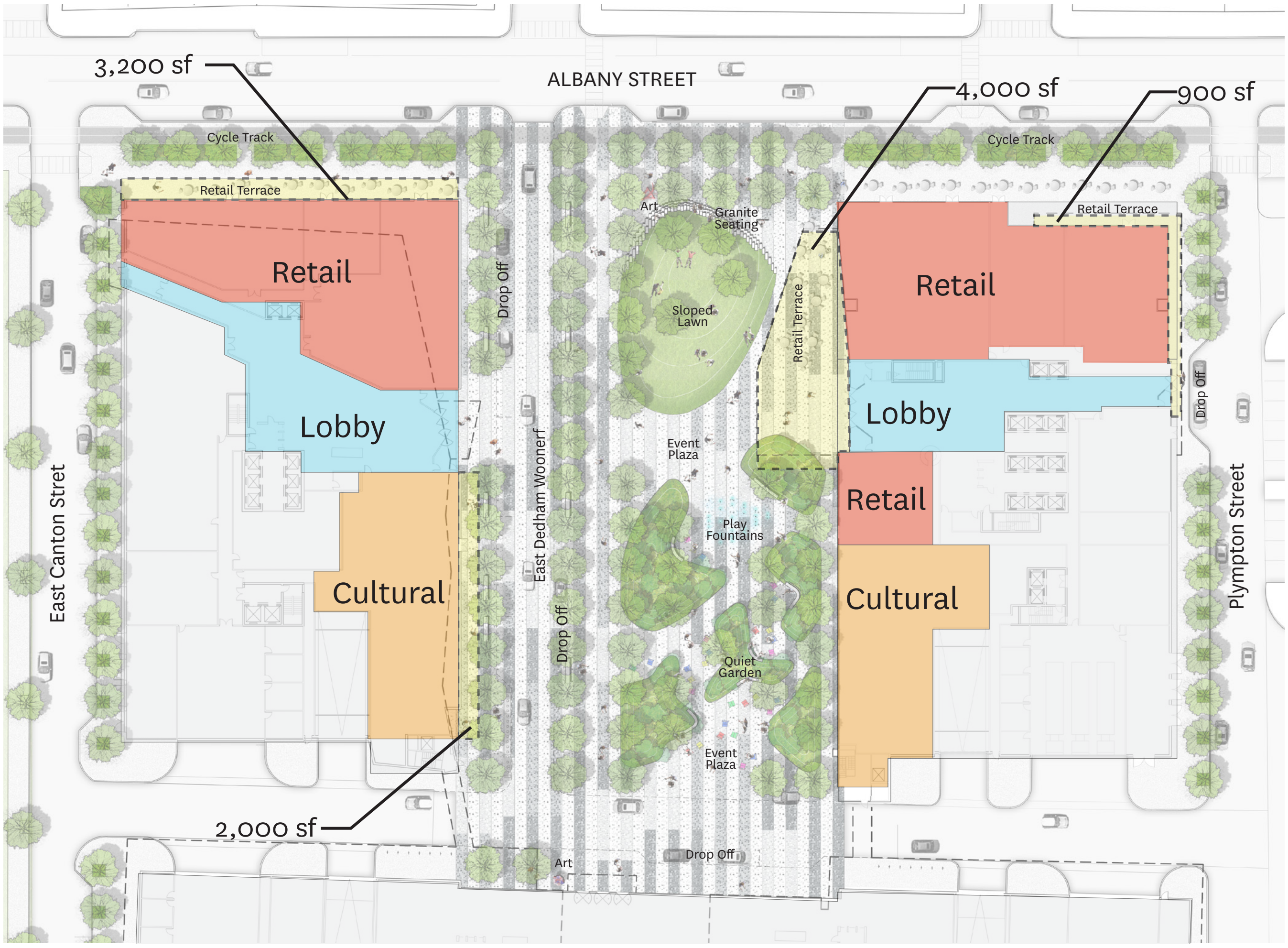


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Figure 5-24

Retail/Cultural Outdoor Space

Source: MVVA

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Figure 5-25
Event Plaza

Source: MVVA

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Figure 5-26
Movie Lawn

Source: MVVA

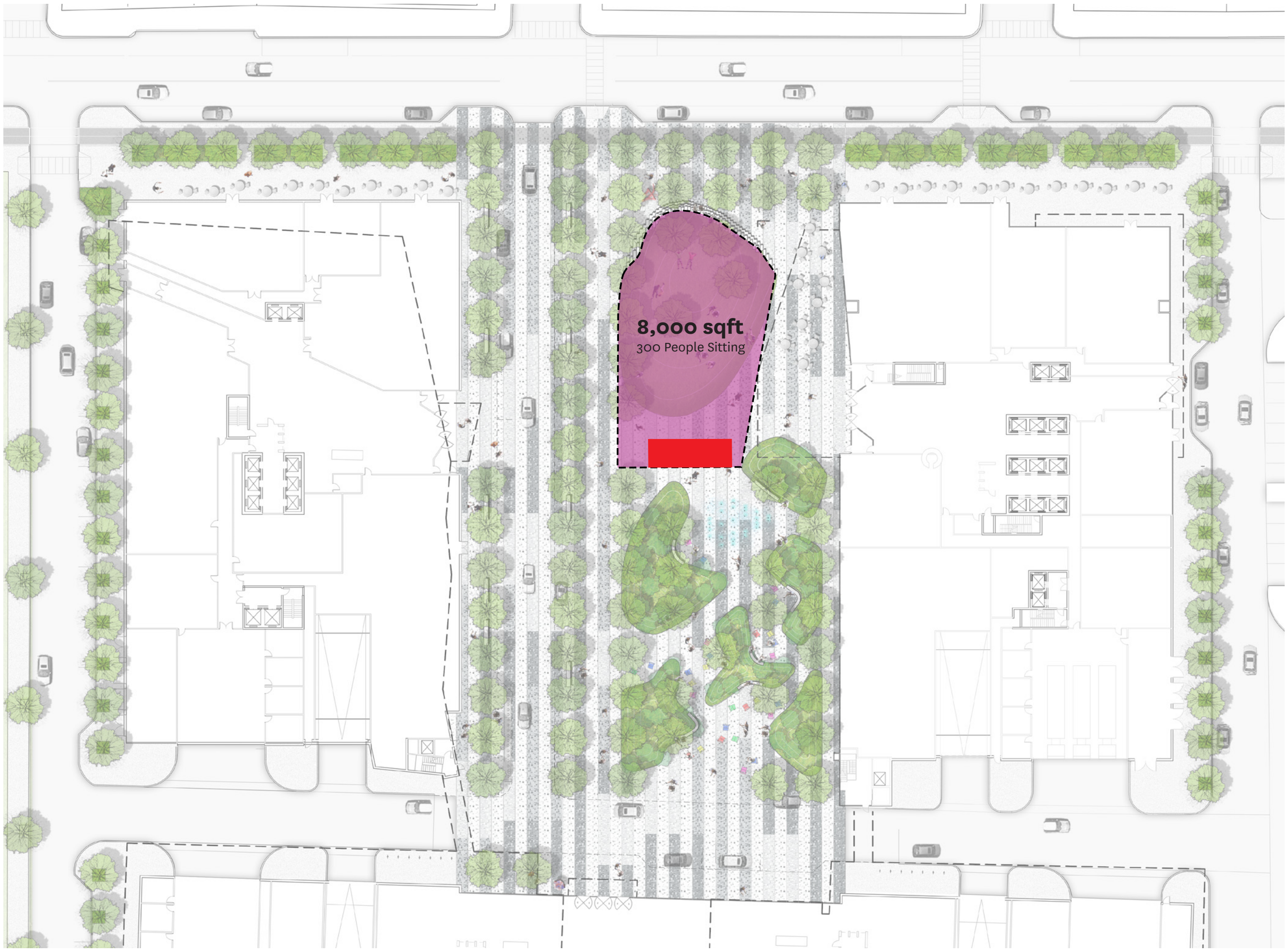

Figure 5-27
Large Event

Source: MVVA

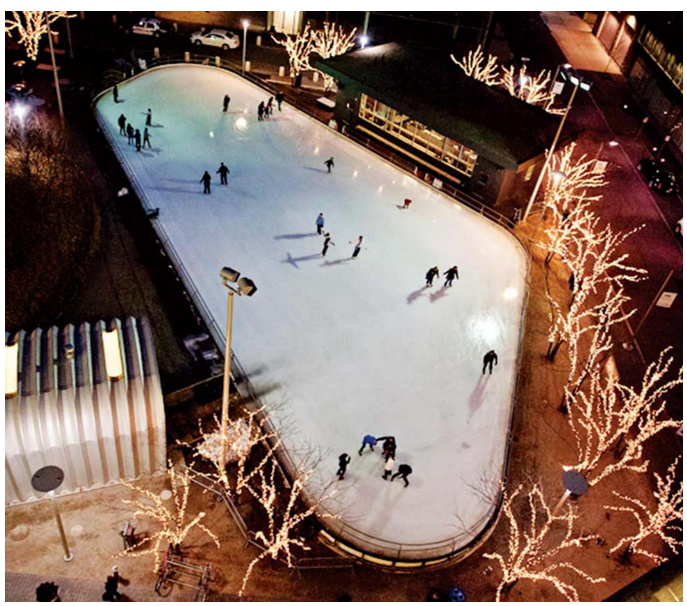

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Figure 5-28
Ice Rink

Source: MVVA

Figure 5-29
Event Tent 30ft x 50ft

Source: MVVA

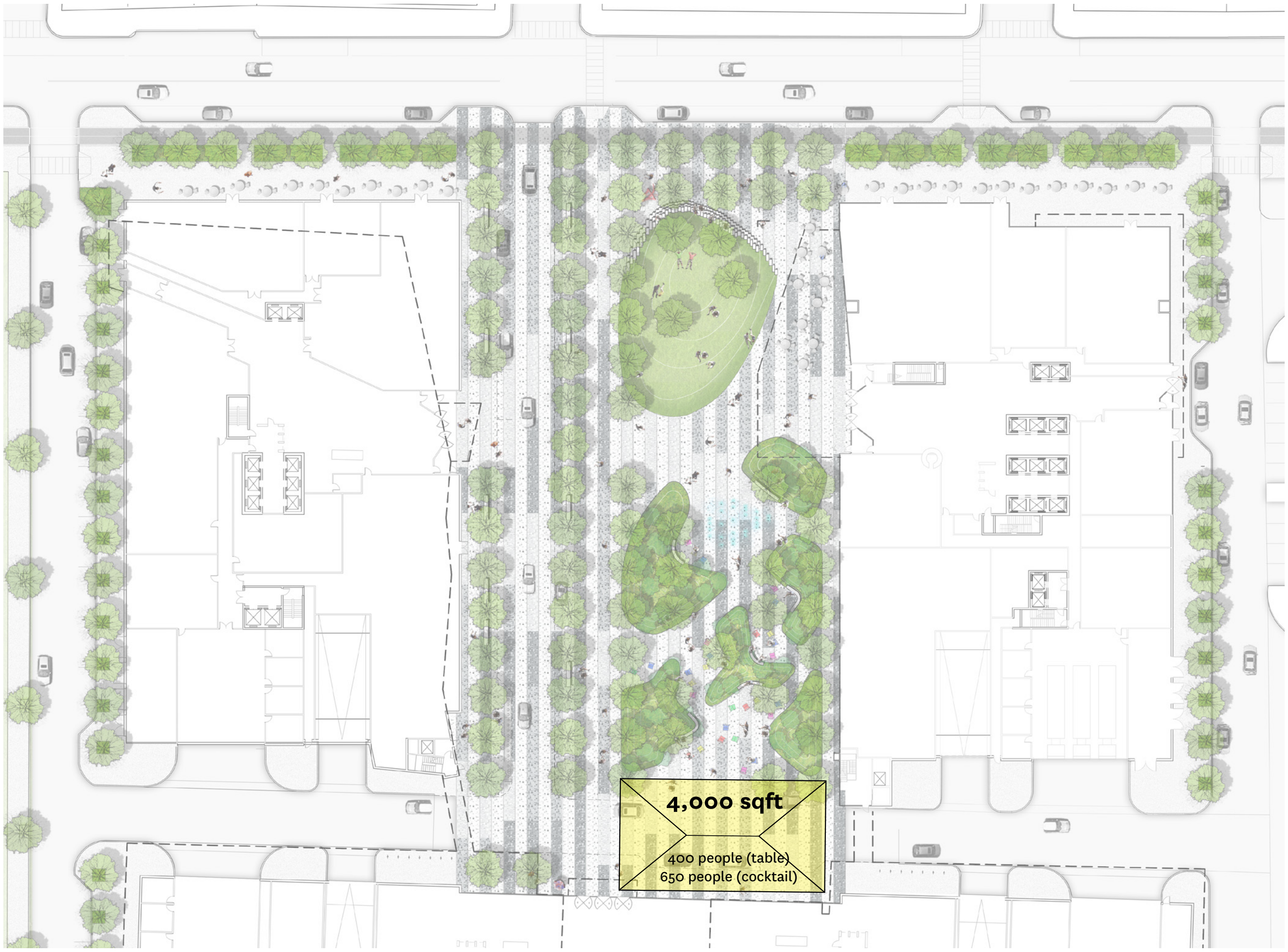

Figure 5-30
Event Tent 50ft x 80ft

Source: MVVA

Figure 5-31
Large Cultural Tent

Source: MVVA

Figure 5-32
Farmer's Market

Source: MVVA

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Figure 5-33
Street Market

Source: MVVA

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Figure 5-34
Street Festival

Source: MVVA

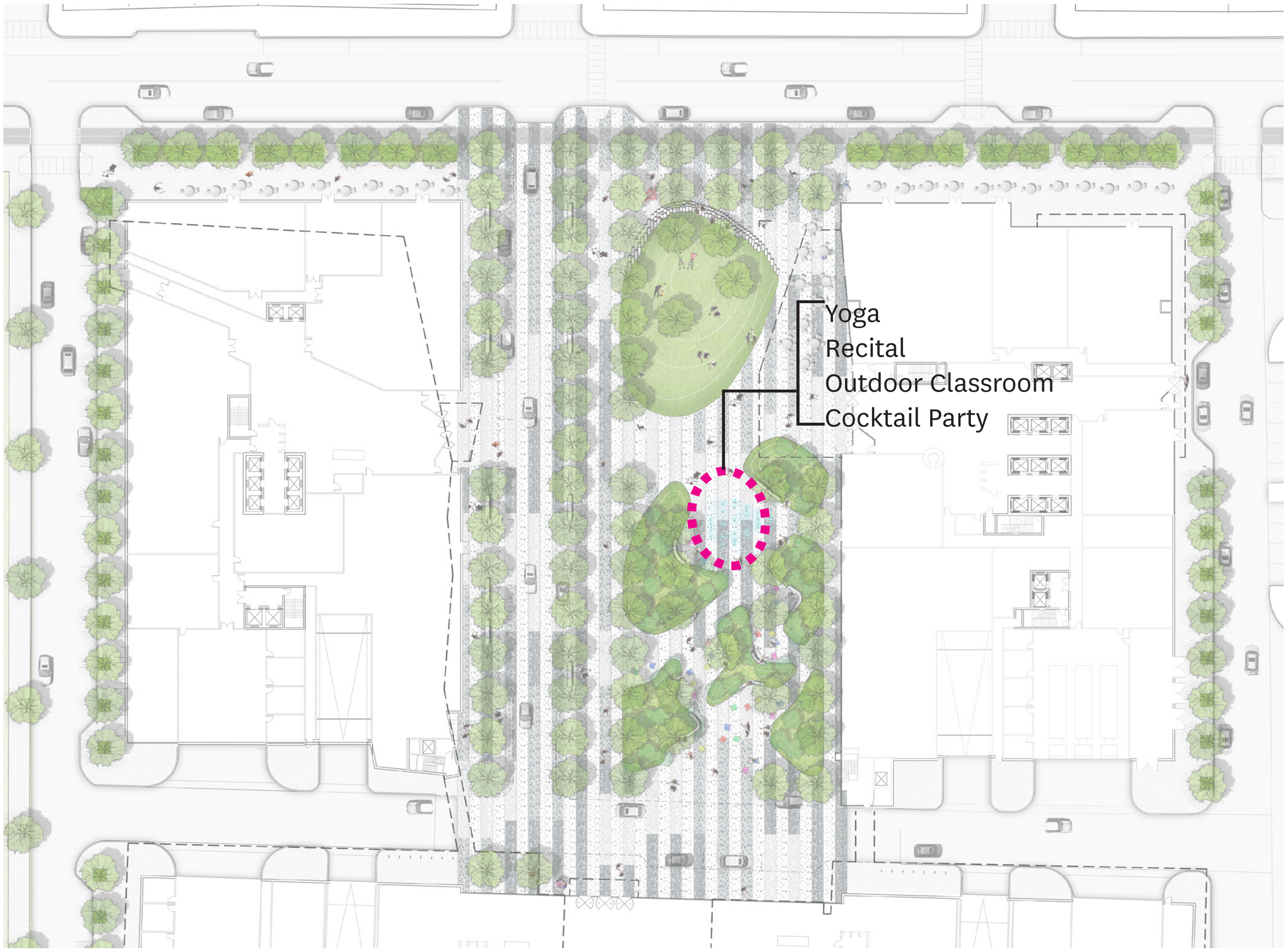
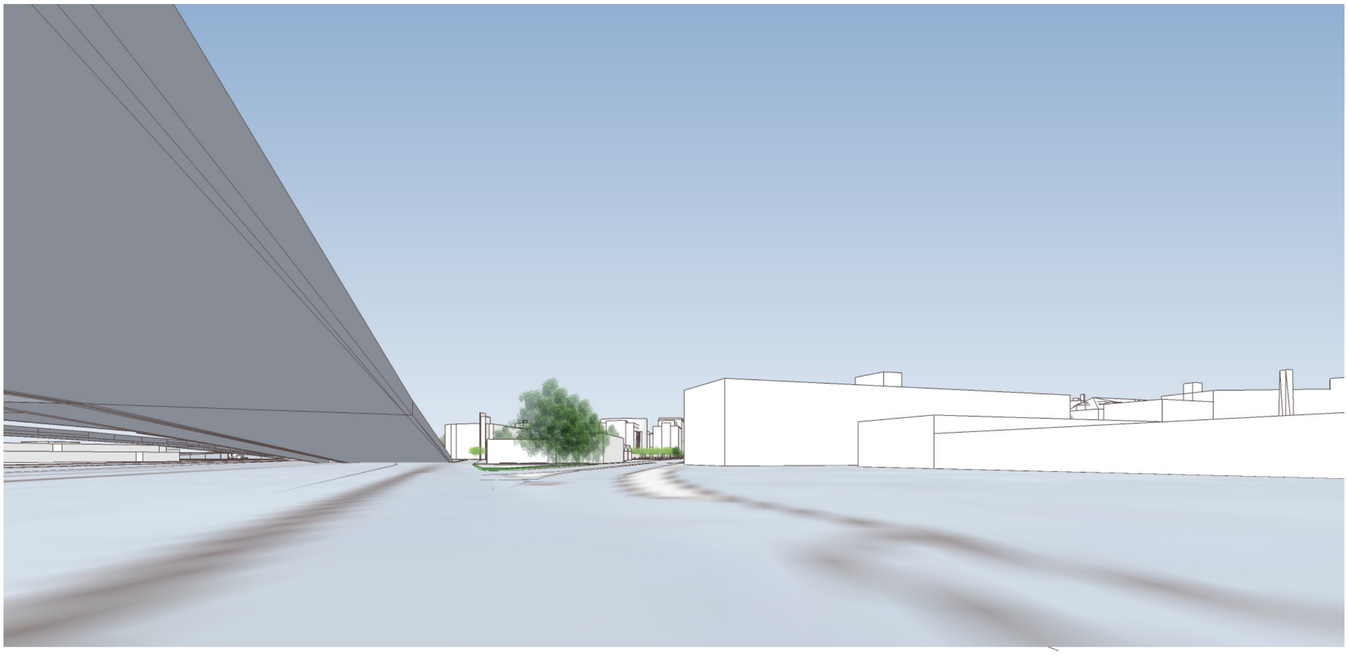


Figure 5-35
Small & Quiet Activities

Source: MVVA

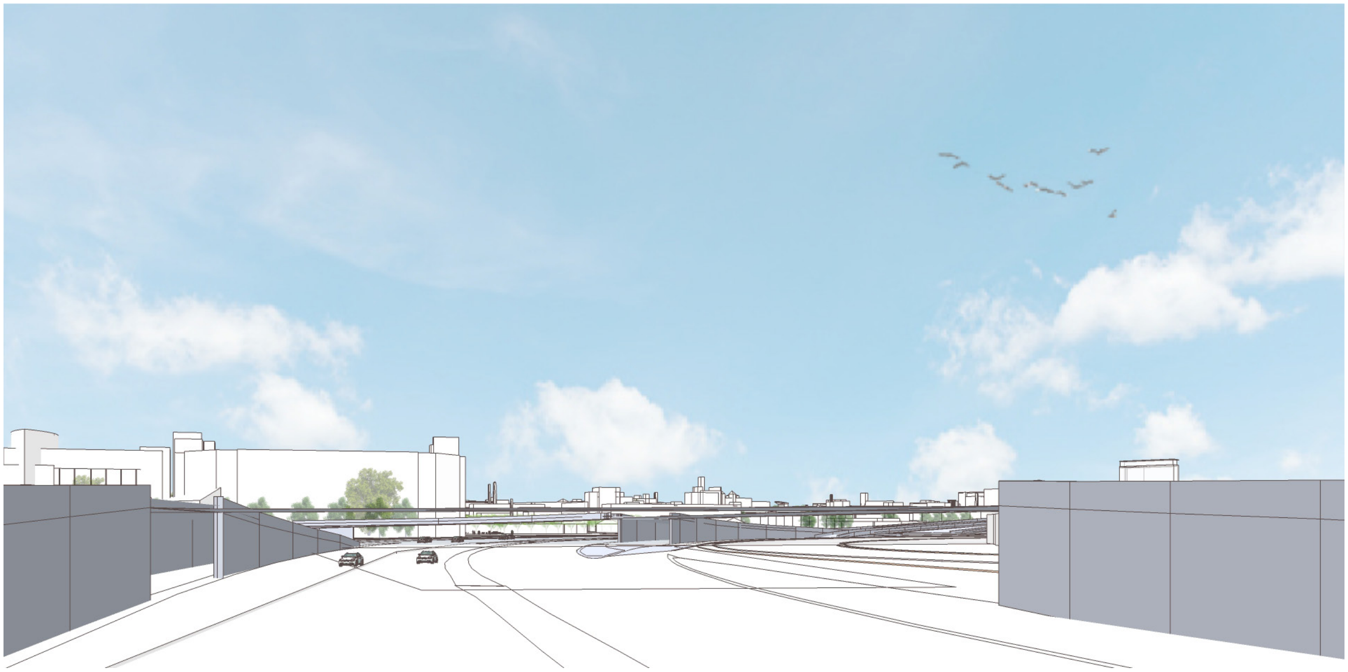


(a) Existing Conditions

(b) Post Development

Figure 5-36
Albany at Frontage Road

Source: Stantec



(a) Existing Conditions

(b) Post Development

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Figure 5-37
93 North

Source: Stantec

(a) Existing Conditions

(b) Post Development

Figure 5-38
Biosquare Drive

Source: Stantec

(a) Existing Conditions

(b) Post Development

Figure 5-39
Albany Street at Concord

Source: Stantec

(a) Existing Conditions

(b) Post Development

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Figure 5-40
Dedham Street at Washington

Source: Stantec

Chapter 6

6.0 Historic and Archeological Resources

6.1 HISTORIC RESOURCES ON THE PROJECT SITE

The Project Site is located within an area of man-made land, created by filling the former South Bay during the 19th and 20th centuries. A granite seawall was built in 1852 parallel to and east of Albany Street; by the second half of the 19th century, the east side of Albany Street between East Canton and Malden Streets was lined with a continuous and regular series of wharves. The indented docks lined up with each of the cross streets along Albany Street. Typically, stables and wood frame sheds were built on the wharves, which most commonly served as coal and lumber yards and in the 20th century they held cement, coal and stone yards. In the 1950s, the wharves and the South Bay, including a portion of the Project Site, were filled for construction of the Southeast Expressway.

6.1.1 Existing Conditions

The Project Site of approximately 5.6 acres is relatively level, approximately rectangular in plan with a canted corner at the northeast corner of the lot. It is set at the middle of the block, and is bounded to the northeast and northwest by the property line for 500 Albany Street and by Albany Street, to the southeast and south by Biosquare Drive and to the south and southwest by the property line to 600 Albany Street. See Figures 1-1, Locus Plan and Figure 1-2, Aerial View of the Existing Site.

The Site currently contains one building surrounded by a paved parking area. The tall, one-story building is rectangular in plan, 454 feet by 176 feet, with a flat roof and a central raised monitor, which brings light to the center of the building's interior. The concrete slab and steel structure is set on caisson foundations and is enclosed with walls of concrete block and brick veneer. Views of the building and the Project Site are shown in the Existing Conditions Photographs, Figures 1-6, 1-7 and 1-8.

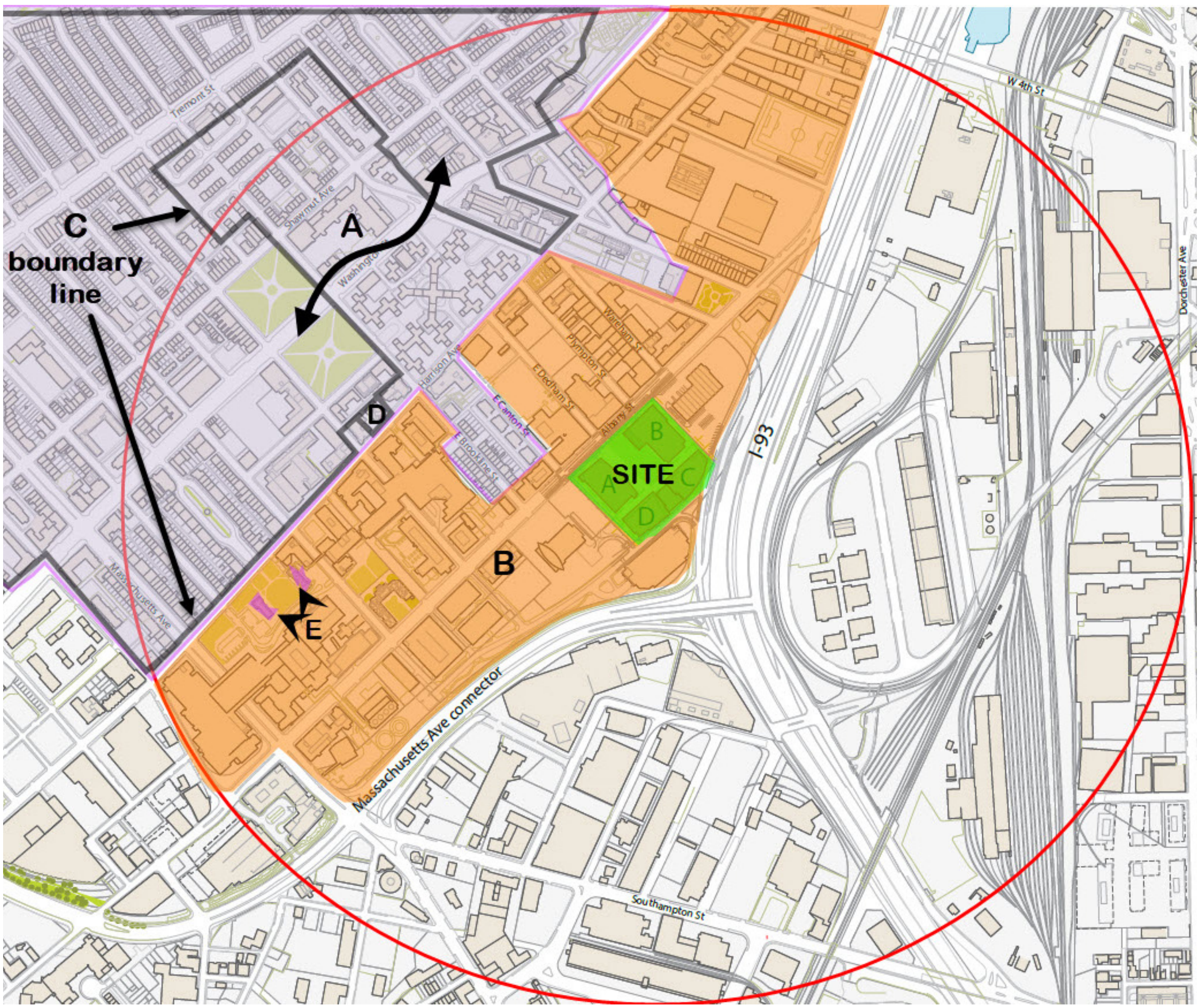
The Boston Redevelopment Authority (BRA), now called the Boston Planning & Development Agency "BPDA", transferred ownership of the parcel by a deed dated July 1969, with the commitment that the BRA would remove the existing buildings on the lot. The current building was constructed in 1969.

The Project Site is set within the boundaries of the South End Harrison/Albany Protection Area which was designated by the Boston Landmarks Commission. The SEH/A Protection Area is irregular in plan; it extends southeast from Harrison Avenue to the Massachusetts Avenue Connector and north from Northampton Street to the Mass Turnpike connector. No historic resources inventory form or MHC survey form was located on MACRIS (MHC database of cultural resources) for this property, which indicates that the property is not part of the Inventory of the Historic and Archaeological Resources of the Commonwealth.

6.2 HISTORIC RESOURCES WITHIN ½ MILE OF THE PROJECT SITE

The Project Site is one block south east of the boundary of the South End Landmark District (SELD), which generally runs along Harrison Avenue. However, the SELD boundary projects south east from Harrison Ave along East Canton and East Brookline streets to Thorn Street, bringing the boundary to within approximately 250 feet of the Project Site. Nearby historic districts are shown below on Figure 6-1 and are listed in Table 6-1.

Two individual historic resources appear on Fig. 6-1 and in Table 6-1: The Joshua Bates School is listed individually in the National Register of Historic Places and the Boston City Hospital Pavilions were determined eligible for listing in the National Register in 1990 as part of the Central Artery Project.



SOUTH END LANDMARK DISTRICT   SOUTH END LANDMARK PROTECTION AREA

SOUTH END NATIONAL REGISTER DISTRICT BOUNDARY

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Figure 6-1

Historic Resources within 1/2 Mile of the Project Site

Source: Tremont Preservation Services & MACRIS

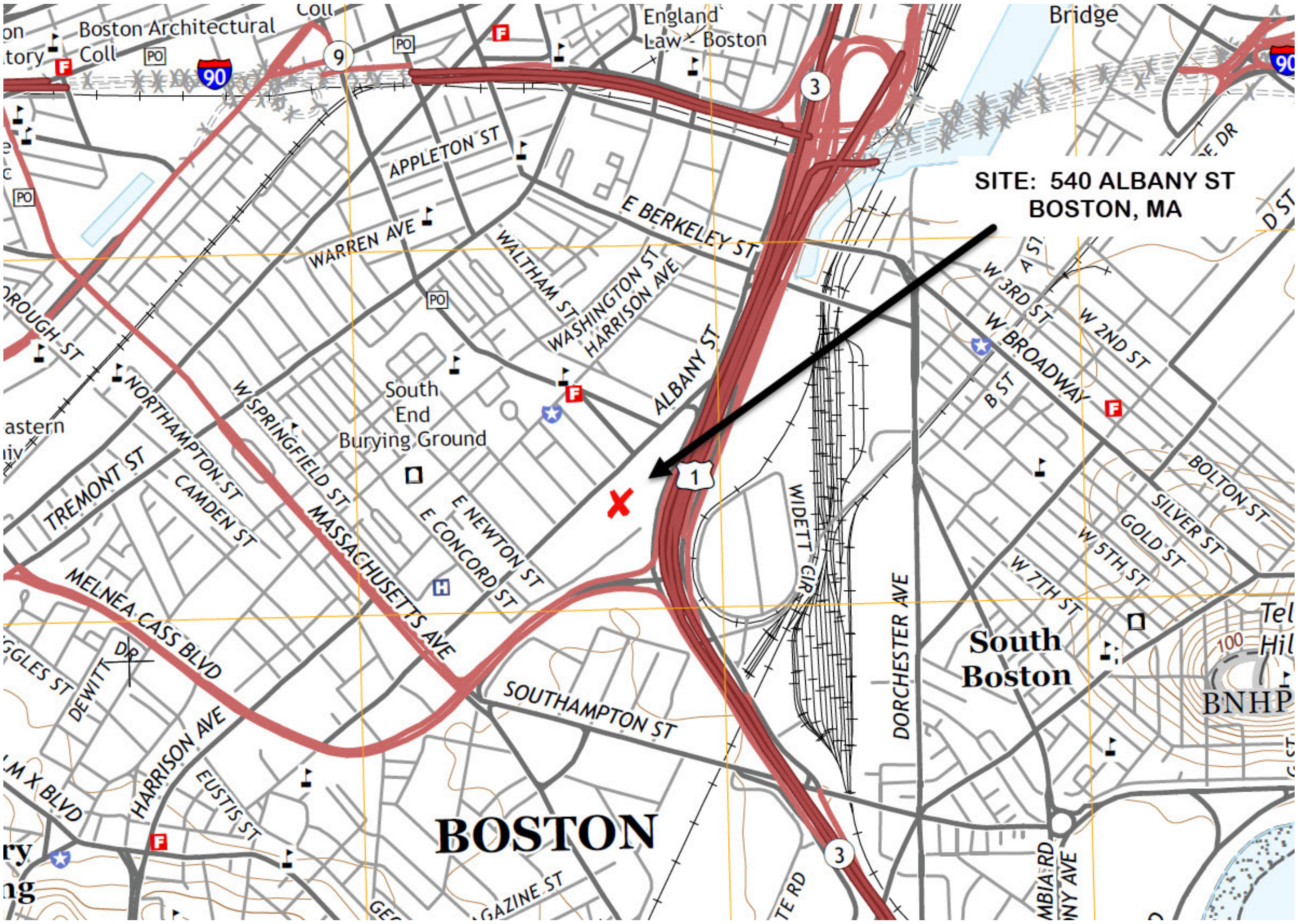
Table 6-1 Historic Resources Shown on Figure 6.1

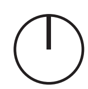
Identified on Figure	Building/District Name	Address	Designation
A	South End Landmark District	Roughly bounded by Penn Central RR [Amtrak], Camden St., Harrison Ave., and East Berkeley & Tremont streets	LHD BOS.AB
B	South End Harrison/Albany Protection Area	Roughly bounded by Harrison Ave. Frontage Road, Albany Street, Washington Street & Northampton Street	LPA BOS.AD
C	South End District, National Register District	Roughly bounded by Penn Central RR [Amtrak], Massachusetts & Harrison Aves, East and West Brookline, Tremont, Upton, Malden and Union Park Sts, Shawmut Ave, Dwight and Berkeley Sts	NRDIS
D	Joshua Bates School	731 Harrison Avenue	NRIND BOS.646
E	Boston City Hospital Gridley Bryant Pavilions B,C,D & F,G,H	Harrison Avenue	NRDOE 4/18/1990, LPA BOS.1479

LHD – Local Historic District
LPA – Local Protection Area
NRDIS – National Register District
NRDOE – Determined Eligible for National Register Listing
BOS.XXX – MHC Inventory Number

6.3 ARCHEOLOGICAL RESOURCES

The Project Site is located in an area of fill which had been tidal flats prior to the mid-19th century. The Site was partially filled west of a seawall constructed in1852 and filling of the parcel was completed in the 1950s during construction of the Southeast Expressway. There are no known archaeological sites listed in the State Register of Historic Places on the Project Site. Refer to Figure 6.2, USGS Map, and to **Section 3.12.2.**





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EXCHANGE SOUTH END

Figure 6-2
USGS Map: Boston South, MA 2015

Source: Tremont Preservation Services & MACRIS

6.4 IMPACTS TO HISTORIC RESOURCES

Impacts to historic resources include short-term impacts, typically those associated with demolition and construction, and long-term impacts, typically related to impacts after construction. Review by the South End Landmarks District Commission (SELDC) will center on two phases of the project. First, SELDC will consider demolition of the existing building and will make a determination whether the building contributes to the architectural or historical significance of the Protection Area. Second, SELDC will consider the existing conditions of the building. The Standards and Criteria with respect to demolition in the South End Harrison/Albany Protection Ares are included in Appendix H.

The existing building is not compatible with the South End Landmark District in terms of fenestration, materials, massing, siting, and setbacks. In general, the current building and Site development conflict with the character-defining features of the SELD which are its urban-residential scale, high architectural quality and the neighborhood plan, which encourages and enhances pedestrian traffic and uses.

6.4.1 Short-Term Impacts

Potential geotechnical impacts during construction are related to vibration, dewatering and settlement. These are discussed in Sections 3.10 and 3.12.

Existing subsurface conditions and geotechnical impacts of the Project are discussed in **Section 3.12.** The Project's geotechnical consultant will provide design recommendations with respect to foundation design, will prepare geotechnical specifications, and will review the Construction Contractor's proposed procedures. Project design criteria will be established to avoid negative impacts that could be caused by lowering area groundwater levels.

Based on the design and construction methodology to be developed for the project, potential impacts to nearby buildings from foundation construction, such as ground movement, vibration, and groundwater lowering are anticipated to be negligible.

6.4.2 Long-Term Impacts

Potential long-term impacts are related to wind, shadows, solar glare, landscape and view corridors between the South End Landmark District and the Project Site.

6.4.2.1 Design

Review of the design will consider the architectural compatibility of the project with the nearby South End Landmark District, and will be evaluated to protect light and air circulation within the district.

The South End Harrison/Albany Protection Area Standards and Guidelines are included in Appendix G.

6.4.2.2 Wind

The discussion of potential wind impacts is found in Section 3.2.

6.4.2.3 Shadows

The discussion of potential shadow impacts is found in **Section 3.3**. No shadow impacts are anticipated to occur to historic buildings within the South End Landmark District. There will be no shadow impacts inside the South End Landmark District. There will be increased shadows in the South End Harrison/Albany Protection Area.

6.4.2.4 Solar Glare

The discussion of potential impacts resulting from Solar Glare is found in **Section 3.5**. No impacts are anticipated from solar glare.

6.4.2.5 View Corridors

Views from the Project Site into the SELD are limited due to the distance to the SELD boundary. Views are also blocked by the Ruth Barkley Apartments between Harrison Ave and Washington Street, which are shown in Figure 1.7, Photo 3, and Figure 1.8, Photo 6. The view from SELD to the Project Site will be open along East Dedham Street into a public green space at the center of the Project. Views along East Canton Street toward the Project Site will remain open.

6.4.3 Project Planning

Measures will be proposed as needed to address potential impacts to historic resources from the Project. Construction impacts with respect to lowering of groundwater, vibration, or ground movement due to excavation are expected to be minimal. A geotechnical instrumentation and monitoring program with performance criteria will be implemented as needed. Refer to **Section 3.12.5.**
As the design moves forward, mitigation measures to protect historic buildings and to avoid, minimize or mitigate potential impacts to such buildings during construction will be incorporated as needed into project planning and design.

6.5 STATUS OF PROJECT REVIEW WITH HISTORICAL AGENCIES

State laws protecting historic and archeological resources are typically triggered when a proposed project is to be undertaken, funded, licensed or permitted by a state agency. Depending upon the status of the resource and the nature of the impact, the extent of the regulatory process will vary. The City of Boston has regulations and guidelines for work conducted within a Local Protection Area. The South End Landmarks Commission reviews projects within the South End Harrison/Albany Protection Area. Possible state or city preservation reviews are outlined in Table 6-2 below and are discussed in this section.
In order to comply with preservation regulations, the project proponent will begin the review process early in the planning phase of the project. This will help to avoid delays and unexpected costs once the project has begun. Some of the laws that are most likely to apply to are discussed in this section.

As no federal agency action/approval is required, the Project is not subject to the requirements for federal review under Sec. 106 of the National Historic Preservation Act of 1966, as amended. The Exchange Project is subject to review by the South End District Landmarks Commission.

Table 6-2 Potential Regulatory Reviews

HISTORIC PRESERVATION - RELATED REVIEWS AND AGENCIES

	Trigger	Review Agencies	First Submission	Review Period
Local				
Article 85: Review by BLC	Proposed demolition within a local historic district	Separate review by BLC required		
State				
M.G.L., Chap 9, Section 26 – 27C (aka Chap. 254)	Use of state funds or permits or involvement by a state agency (such as tenant)	MHC; (consultation with BLC required, also consultation with state agency involved and interested parties)	Project Notification Form (PNF) or MEPA Environmental Notification Form (ENF)	30 days upon first complete submission
MEPA	Demolition of Property located in any Historic District listed in the State Register of Historic Places or in the MHC Inventory of the Historic and Archeological Assets of the Commonwealth	MHC; MEPA	ENF (consultation with MHC required)	ENF - 30 days for first submission

BLC Boston Landmarks Commission
MHC Massachusetts Historical Commission
ENF Environmental Notification Form
PNF Project Notification Form
SELDC South End Landmark District Commission
MEPA Massachusetts Environmental Protection Agency

6.5.1 State Laws

Chapter 254 – Massachusetts Historical Commission

Compliance with laws and regulations protecting historic and archeological properties listed in the State Register of Historic Places is required for projects undertaken, funded, licensed, permitted or approved by a state body (M.G.L. c. 9 ss. 26 – 27C as amended by ST 1988, c. 254). The Massachusetts Historical Commission (MHC) must be given an opportunity to review and comment on proposed projects to be undertaken, funded, licensed or permitted by state agencies. The intent of the law is “to eliminate, minimize, or mitigate adverse effects to properties listed in the State Register of Historic Places.” (950 CMR 71.02 (1))

The State Register of Historic Places is the official list of the state’s cultural resources deserving preservation consideration. Properties and districts that have at least one of eight types of local, state, and federal designations are Included in the State Register. This includes properties and districts listed in the National Register of Historic Places, those listed as Boston Landmarks and Landmark Districts as well as properties specifically designated State Register properties.

MHC will determine whether or not the project will affect any State Register listed properties and, as appropriate, will consult with the project proponent, interested parties and the state agency to discuss measures to avoid or mitigate adverse impacts.

Although the Project Site is not listed in the State Register of Historic Places, MHC Review under Chap. 254 will evaluate associated impacts to adjacent historical properties.

A permit must be obtained from the State Archeologist before conducting any field investigation of sensitive archeological sites.

Massachusetts Environmental Policy Act (MEPA)
The Massachusetts Environmental Policy Act (MEPA) (M.G.L. c. 30 ss. 61 – 62H) and its regulations (301 CMR 11.00), apply to projects where a state agency is the project proponent or where a state agency provides financing, licensing or permits to the project, and where review thresholds are exceeded. MEPA requires review of such projects to identify impacts and to determine all feasible alternatives to minimize damage to the environment. The review of environmental impacts under MEPA must include a discussion of impacts and mitigation measures for significant historic and archeological properties. It also requires that all feasible means and measures be used to avoid or minimize damage to the environment.

The MEPA process, administered by the Executive Office of Energy and Environmental Affairs, also facilitates review and comment by the Massachusetts Historical Commission (MHC) regarding demolition or destruction of and impacts of new projects on historic properties and archaeological sites listed in the State Register of Historic Places or in the Inventory of Historic and Archaeological Assets of the Commonwealth.

6.5.2 Local Preservation Laws

Boston Landmarks Commission/South End Landmark District Commission
Boston is a Certified Local Government (CLG) as defined in Sec 101 (d) (1) of the National Historic Preservation Act of 1966, as amended. As a CLG, BLC participates as an interested party during Chap 254 (state) reviews.

The Boston Landmarks Commission also designates historic resources such as, structures, sites, or objects, man-made or natural, as local landmarks and landmark districts. Design changes to individual landmarks and to properties within local landmark districts are reviewed and administered by the BLC staff and Commission and by the local historic district commissions.

The South End Landmark District Commission is responsible for design review of all properties in the South End Harrison/Albany Protection Area and also in the adjacent South End Landmark District. In compliance with the design review criteria included in Appendix G, private and public projects must be submitted for review to the SELD Commission. The demolition of the existing structure and parking lot and the design of the new construction will be submitted to SELDC.

6.6 SUMMARY

There are no known historic resources on the project site. Sections 6.1 and 6.2 identify historic resources near the project site.

The regulatory processes related to historic resources are covered in Section 6.5; the responsible agencies and their reviews are discussed. Reviews by both the Boston Landmarks Commission [South End Landmarks District Commission] and by the Massachusetts Historical Commission are part of the review and permitting phases of the project and are listed in Table 1-3. Comments have not yet been requested with respect to the regulatory processes from either agency. Throughout the advancement of the Project, the Proponent will coordinate with MHC and BLC to assess impacts on historical and archaeological resources. Mitigation measures will be established if adverse impacts to said resources are unavoidable.

Chapter 7

7.0 Infrastructure

7.1 INTRODUCTION

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

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

The Project site is approximately 5.60-acres and is bounded by 500 Albany Street to the north, Frontage Road (I-93) and a private roadway called Biosquare Drive (owned by Boston University) to the east, 600 Albany Street to the south, and Albany Street to the west. The existing Site is comprised of an existing warehouse building surrounded by a paved parking lot. The proposed Project includes the demolition of the existing building and the construction of four (4) new multi-use buildings with underground parking and a plaza between the buildings.

7.2 WASTEWATER

7.2.1 Existing Sewer System

The Boston Water and Sewer Commission (BWSC) owns and maintains the sewer system that services the City of Boston. The BWSC sewer system connects to the Massachusetts Water Resources Authority (MWRA) interceptors for conveyance, treatment, and disposal through the MWRA Deer Island Wastewater Treatment Plant. There are existing Boston Water and Sewer Commission (BWSC) sanitary sewer mains near the Project Site.

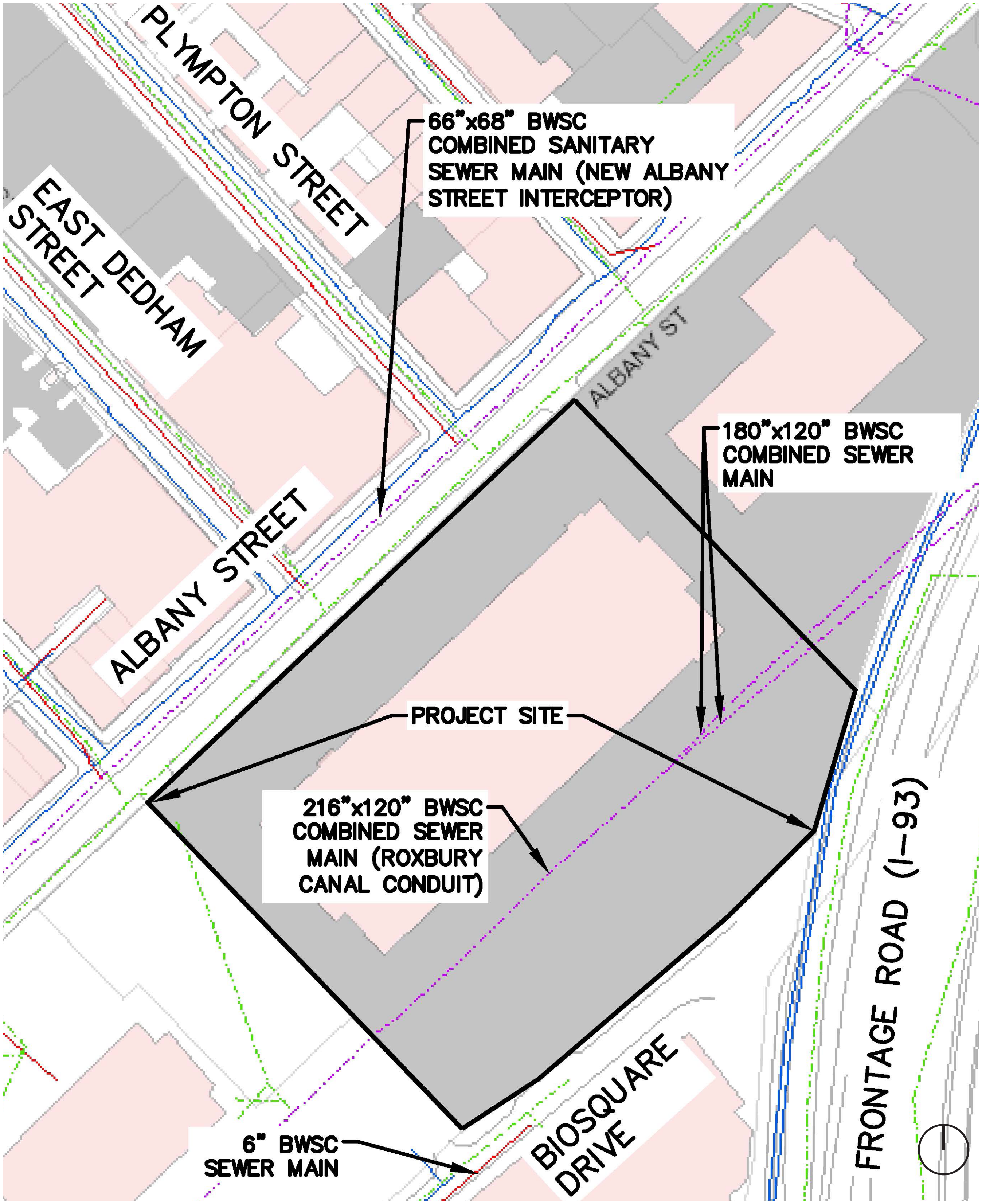
There is an existing 66-inch by 68-inch BWSC combined sewer main (also called the New Albany Street Interceptor) in Albany Street. The New Albany Street Interceptor flows northerly and connects to the New Boston Main. BWSC records indicate that overflow from the New Albany Street Interceptor is sent to the Union Park Pump Station in Malden Street. There is also an existing 6-inch BWSC sewer main in Biosquare Drive behind the existing building. The 6-inch BWSC sewer main in Biosquare Drive flows southerly before connecting to the New Boston Main. The New Boston Main is ultimately directed to the Deer Island Wastewater Treatment Plant for treatment and disposal. The existing BWSC sewer system is shown in Figure 7-1.

Additionally, there is a 216-inch by 120-inch BWSC combined sewer main (also called the Roxbury Canal Conduit) which runs through the Site. In the middle of the Site, the Roxbury Canal conduit splits and increases to two 180-inch by 120-inch BWSC combined sewer mains. BWSC record plans indicate that the BWSC sewer mains in this area do not connect to the Roxbury Canal Conduit. The Roxbury Canal Conduit flows northerly to the Fort Point Channel via the BWSC Combined Sewer Outfalls 070 and 071.

Record plans do not indicate where existing building sewer services connect to the existing BWSC sewer mains adjacent to the Project Site.

The Project's existing sanitary flows were estimated using 310 CMR 15.203 for office uses. 310 CMR 15.203 lists typical sewage generation values by the building use and are conservative values for estimating the sewage flows from buildings. The 310 CMR 15.203 values were used to evaluate the new sewage flows, to estimate existing sewer flows, and to determine the approximate increase in sewer flows due to the Project.

The existing building on Site is approximately 73,000 square feet (s.f.). The existing average daily sewage generation is estimated to be approximately 5,475 gallons per day (gpd) assuming the existing building is used as office space. The existing building program is summarized in Table 7-1.



PROJECT SITE　EXISTING BUILDINGS　NOT TO SCALE

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Figure 7-1
Existing BWSC Sewer System
Source: BWSC

7.2.2 Project Generated Sanitary Sewer Flow

The Project will consist of four (4) new multi-use buildings with a mix of office and lab space, with civic, retail and restaurant spaces, and underground parking garages.

Estimated sewage flows calculated with 310 CMR 15.203 values and the proposed development program are summarized by building in Table 7-1. The total estimated proposed sewage flow for the Project is approximately 123,012 gallons per day (gpd), or an increase of approximately 117,537 gpd compared to the existing condition.

Table 7-1 Estimated Sewage Flows

Proposed Use – Building A	Units/Size	Design Flow Rate (GPD/unit)	Proposed Sanitary Flows (GPD)
Lab	192,855 s.f.	75/1,000 s.f.	14,464
Retail	8,790 s.f.	50/1,000 s.f.	440
Restaurant[1]	167 seats	35/seat	5,845
Daycare	100 occupants	10/occupant	1,000
Civic	4,000 s.f.	75/1,000 s.f.	300
PROPOSED SANITARY FLOW			22,049
Proposed Use – Building B	**Units/Size**	**Design Flow Rate (GPD/unit)**	**Proposed Sanitary Flows (GPD)**
Lab	284,030 s.f.	75/1,000 s.f.	21,302
Office	106,700 s.f.	75/1,000 s.f.	8,003
Retail	4,668 s.f.	50/1,000 s.f.	233
Restaurant[1]	89 seats	35/seat	3,115
Civic	8,000 s.f.	75/1000 s.f.	600
PROPOSED SANITARY FLOW			33,253
Proposed Use – Building C	**Units/Size**	**Design Flow Rate (GPD/unit)**	**Proposed Sanitary Flows (GPD)**
Lab	195,970 s.f.	75/1,000 s.f.	14,698
Office	340,000 s.f.	75/1,000 s.f.	25,500
PROPOSED SANITARY FLOW			41,248
Proposed Use – Building D	**Units/Size**	**Design Flow Rate (GPD/unit)**	**Proposed Sanitary Flows (GPD)**
Lab	167,955 s.f.	75/1,000 s.f.	12,597
Office	180,880 s.f.	75/1,000 s.f.	13,566
Civic	4,000 s.f.	75/1,000 s.f.	300
PROPOSED SANITARY FLOW			26,463
TOTAL PROPOSED SANITARY FLOW			123,012
Existing Use	**Units/Size**	**Design Flow Rate (GPD/unit)**	**Existing Sanitary Flows (GPD)**
Office	73,000 s.f.	75/1000 s.f.	5,475
TOTAL EXISTING SANITARY FLOW			5,475
TOTAL INCREASE IN SEWER FLOWS			117,537

[1] Total restaurant seat number is approximately 256 seats, and is approximately 40% of the total retail space (Building A: 14,650 sf retail x 40% = 5,860 sf or 167 seats; Building B: 7,780 sf retail x 40% = 3,112 sf or 89 seats. Retail square footages in this table do not include restaurants.

7.2.3 Sanitary Sewer Connection

The Project's impact on the existing BWSC systems in Albany Street and Biosquare Drive were analyzed. The existing sewer system capacity calculations are presented in Table 7-2.

Table 7-2 Sewer Hydraulic Capacity Analysis

BWSC Sewer Manhole[2]	Slope (%)[1]	Dia. (inches)	Manning's Number	Flow Capacity (cfs)[3]	Flow Capacity (MGD)
Albany Street (New Albany Street Interceptor)					
195 to 445	0.4%	66 x 68	0.013	209.6	135.5
445 to 201	0.1%	66 x 68	0.013	90.2	58.3
201 to 211	0.1%	6 x 68	0.013	104.8	67.8
Minimum Flow Analyzed:				90.2	58.3
Biosquare Drive					
645 to 524	1.0%	6	0.013	0.57	0.37
Minimum Flow Analyzed:				0.57	0.37

1. Slopes was calculated with inverts from BWSC GIS Sewer Maps.
2. BWSC sewer manhole numbers are from BWSC GIS Sewer Maps.
3. Flow calculations based on Manning's Equation.

7.2.4 Proposed Conditions

The proposed buildings will require new building sewer services. The new sewer services for the Project may connect to the New Albany Street Interceptor and/or the sewer main in Biosquare Drive.

The proposed buildings will require new sanitary sewer connections to the BWSC sewer systems. Improvements to and connections to BWSC infrastructure will be reviewed as part of the BWSC's Site Plan Review process for the Project. This process will include a comprehensive design review of the proposed service connections, an assessment of Project demands and system capacity, and the establishment of service accounts. Coordination with BWSC will include review and approval of the design, capacity, connections, and flow increase resulting from the proposed discharges to the sanitary sewer system. In total, the complete Project sewer generation is expected to increase wastewater flows by approximately 117,537 gpd. Approval for the increase in sanitary flow will come from BWSC.

7.2.5 Proposed Impacts

Table 7-2 indicates the flow (hydraulic) capacity of the New Albany Street Interceptor and the 6-inch main in Biosquare Drive. The minimum flow capacity is 58.3 million gallons per day (MGD) or 90.2 cubic feet per second (cfs) for the New Albany Street Interceptor and 0.37 million gallons per day (MGD) or 0.57 cubic feet per second for the BWSC sewer main in Biosquare Drive.

As previously stated, the approximate proposed increase in sewage flow is 117,537 gpd or 0.118 MGD. Based on an increase in average daily flow of 0.118 MGD; and with a factor of safety of 10 (total estimate = 0.118 MGD x 10 = 1.18 MGD), no capacity problems are expected for the

New Albany Street Interceptor. The option to connect to the 6-inch BWSC sewer main in Biosquare Drive based on the available capacity will be evaluated throughout the design process.

7.3 WATER SYSTEM

7.3.1 Existing Water Service

Water for the Project will be provided by BWSC. BWSC is supplied water by the MWRA system.

There are five water systems within the City of Boston, and these provide service to portions of the City based on ground surface elevation. The five systems are the southern low (SL), southern high (SH), southern extra high (SEH), northern low (NL), and northern high (NH). Water mains are labeled by their system, pipe size, year installed, pipe material, and year cement lined (CL), if applicable.

There is an existing SL 16 PCI 1912 (1974) BWSC water main in Albany Street adjacent to the Project Site. Record drawings indicate that the building has one 12-inch water service connecting to the 16-inch water main. Record plans do not indicate the location of existing fire protection services. Record plans indicate one private site hydrant at the back of the existing building connects to an existing water main in Frontage Road (Interstate 93). The existing BWSC water system is shown in Figure 7-2.

The Project's approximate existing water usage for domestic water service is based on the Project's estimated existing sewage generation, described in the previous section. A conservative factor of 1.1 (10%) is applied to the estimated existing average daily sewage flows to account for consumption, system losses and other usages to estimate an average daily water demand. The estimate is used to compare the proposed average daily water demand to the existing conditions. The existing building's estimated water usage is estimated to be approximately 6,023 gallons per day (gpd).

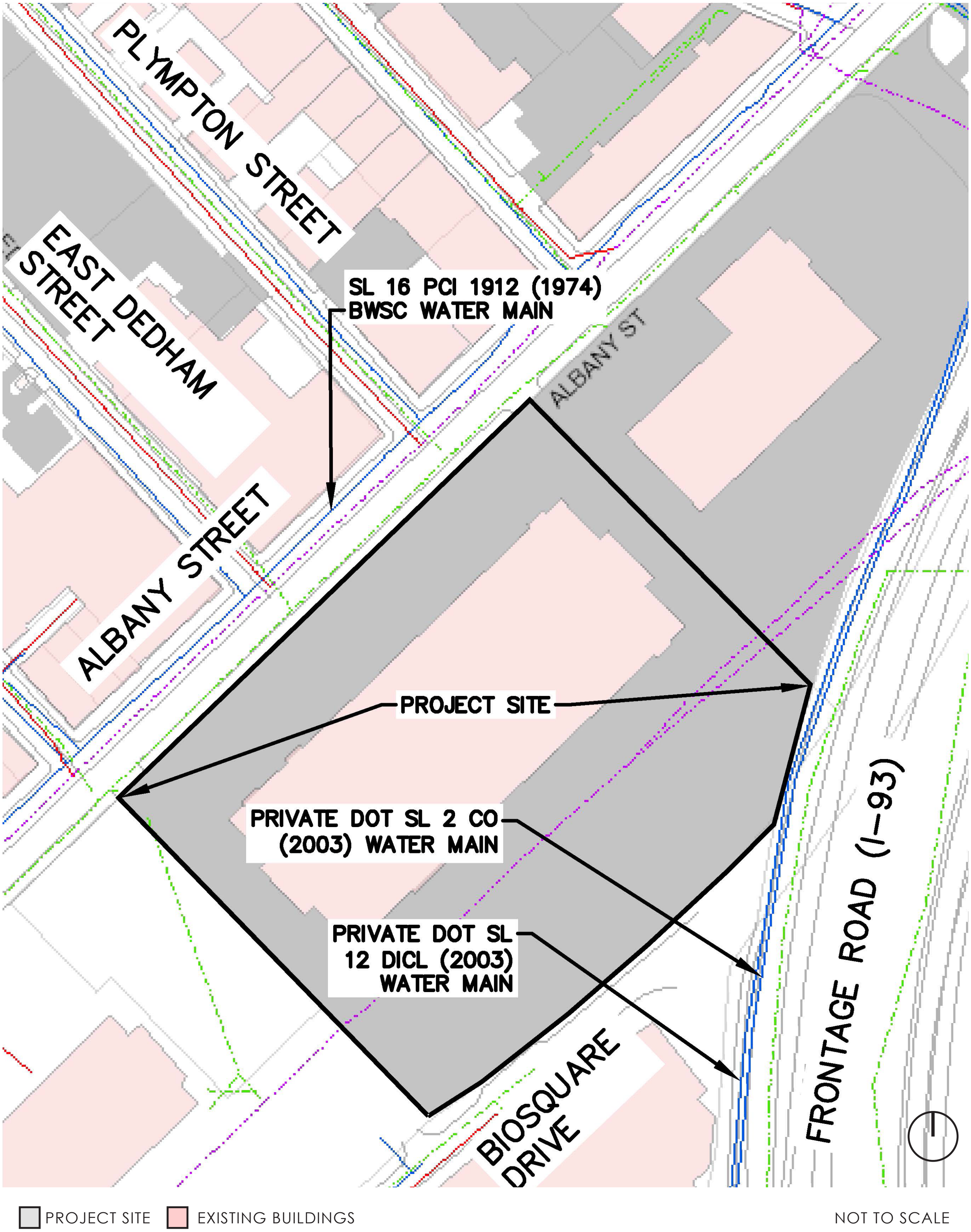

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Figure 7-2
Existing BWSC Water System
Source: BWSC

7.3.2 Anticipated Water Consumption

The Project's water demand estimate for the domestic services is based on the Project's estimated sewage generation, described in the previous section. A conservative factor of 1.1 (10%) is applied to the estimated daily sewage flows, calculated in Table 7-1 to account for consumption system losses, and other usages to estimate an average daily water demand. The estimated proposed domestic water demand is approximately 135,313 gallons per day, or an increase of approximately 129,290 gpd compared to the existing condition.

This number will be updated once the filing process is complete and the program finalized. The water for the Project will be supplied by the BWSC system. Peak water demand will be determined during the design phase based on the final plumbing fixture count and the make-up water needs of the mechanical systems in the building, and will be submitted to BWSC as part of the site plan approval process.

7.3.3 Existing Water Capacity

BWSC record flow test data containing actual flow and pressure for hydrants within the vicinity of the Project Site was requested by the Proponent. Hydrant flow data was not available near the Project Site. As the design progresses, the Proponent will request hydrant flows be conducted by BWSC adjacent to the Project, as hydrant flow test data must be less than one-year old when used for design.

7.3.4 Proposed Water Service

The proposed Project will require new domestic water services and fire protection services. The domestic water and fire protection services for the Project will connect to the existing BWSC water main in Albany Street. Due to the multiple proposed buildings, the Proponent will coordinate with the BWSC to design private water services that will meet BWSC requirements.

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

7.3.5 Green Infrastructure and Rainwater Reuse

We are looking at a series of intensive and extensive vegetative and/or occupied roofs (all buildings), which reduce runoff, reduce heat island, and serve as space amenities to enhance indoor/outdoor connection. Additionally, rooftops where this is not plausible will filter rainwater into below-plaza cisterns for reuse in irrigation and potentially indoor potable water replacements (i.e. toilet flushing). All roofs will work in an integrated manner to reduce runoff, keeping storm water onsite.

The Project intends to further analyze the collection rooftop rainwater run-off for re-use in toilet flushing in the lower levels of the commercial portions of the building. The rainwater would be collected, treated, stored, and distributed to the public bathrooms in the commercial occupancy. Individual tenant domestic water metering is not being provided to the commercial or residential tenants, based on the vertical water distribution. If a significant water demand is required by a commercial tenant, tenant water metering may be implemented at that time. Individual tenant HVAC hot and chilled water metering will be provided for commercial tenants from the heating/cooling system.

The plaza will function in the same manner, directing water to a district infiltration pit to maintain local groundwater levels, as well as to keep rainwater onsite. A series of greened sidewalks will function as a barrier to runoff, utilizing the central plaza as the major onsite rainwater collection mechanism. Additionally, green spaces will be enhanced and expanded per the comments herein. These strategies are also reflected in the projects submitted (Chapter 4.1) LEED Scorecard.

7.3.6 Proposed Impacts

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

The State Building Code requires the use of water-conserving plumbing fixtures, and all efforts to reduce water consumption will be made. Water conservation measures such as low-flow toilets and restricted-flow faucets will help reduce the domestic water demand on the existing distribution system. The installation of sensor-operated sinks with water-conserving aerators and sensor-operated toilets in all the commercial area restrooms will be incorporated into the design plans for the Project. Exterior landscaping will consist of native and drought tolerant plants and a high-efficiency irrigation system. Rainwater will also be collected for reuse within the office and public restrooms.

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

7.4 STORM DRAINAGE SYSTEM

7.4.1 Existing Storm Drainage System

The existing Site is comprised of building roof, paved parking areas and walkways. The existing Site is approximately 100-percent (100%) impervious.

There are existing BWSC storm drain mains in Albany Street, Biosquare Drive, and within the Project Site. There is a 42-inch BWSC storm drain main in Albany Street and an 18-inch BWSC storm drain main in Biosquare Drive. The 42-inch storm drain main in Albany Street adjacent to the Project Site flows southerly before turning east and through the adjacent Boston University National Emerging Infectious Diseases Laboratories (NEIDL) property. The storm drain main continues flowing easterly and connects to the Roxbury Canal Conduit. The 18-inch storm drain main in Biosquare Drive flows southerly before turning at the NEIDL, flows westerly, and then connects to the Roxbury Canal Conduit.

The 216-inch by 120-inch BWSC Roxbury Canal Conduit runs through the Project Site and is located in a 50-foot wide BWSC easement. In the middle of the Site, the Roxbury Canal conduit splits and increases to two 180-inch by 120-inch mains. The Roxbury Canal Conduit flows northerly to the Fort Point Channel via the BWSC Combined Sewer Outfalls 070 and 071. The existing BWSC Storm Drainage System is shown in Figure 7-3.

BWSC records do not indicate where the existing building drains connect to, however they may connect to the storm drain main in Albany Street or to the Roxbury Canal Conduit. Stormwater from the building roof may also sheet flow to existing catch basins in the paved parking lot throughout the Site. Stormwater runoff from the paved parking lot around the existing building sheet flows and is collected by catch basins. Record plans do not indicate where these catch basins connect to, but it appears that they may connect to the storm drain main in Albany Street or the Roxbury Canal Conduit.

In addition to the Roxbury Canal Conduit easement, there is also a 20-foot drainage easement and an abandoned drainage culvert extending from the Roxbury Canal Conduit to Albany street. The proponent will work with BWSC to determine what is located within the existing drainage easements and what BWSC will allow to be built within the easements and in close proximity to the existing BWSC infrastructure.

The proposed design will be nearly 96-percent (96%) impervious, or a decrease of approximately 4-percent (4%) compared to the existing condition. The proposed impervious area will consist mostly of building roof and paved pedestrian sidewalks. The added pervious areas will be landscaped spaces. The Project will be designed to meet or reduce stormwater runoff peak rates and volumes, and to minimize the loss of annual stormwater recharge to groundwater using on-site infiltration measures to the greatest extent practicable.

The Project is located within the Groundwater Conservation Overlay District, and as a result, the Project will be designed to capture and recharge one-inch stormwater from the impervious site areas. The Project's design will include a private closed drainage system that will be adequately sized for the Site's expected stormwater flows, and will direct stormwater to the on-site infiltration system for groundwater recharge prior to overflow to the BWSC systems. Overflow connections to the BWSC storm drain mains will be provided for greater stormwater flows. The on-site infiltration systems will strive to infiltrate one-inch of stormwater runoff from impervious areas to the greatest extent practicable, in order to meet the BWSC stormwater quality and stormwater recharge requirements.

Improvements to the BWSC Infrastructure and the existing private storm drain systems will be evaluated as part of the BWSC Site Plan Review Process.

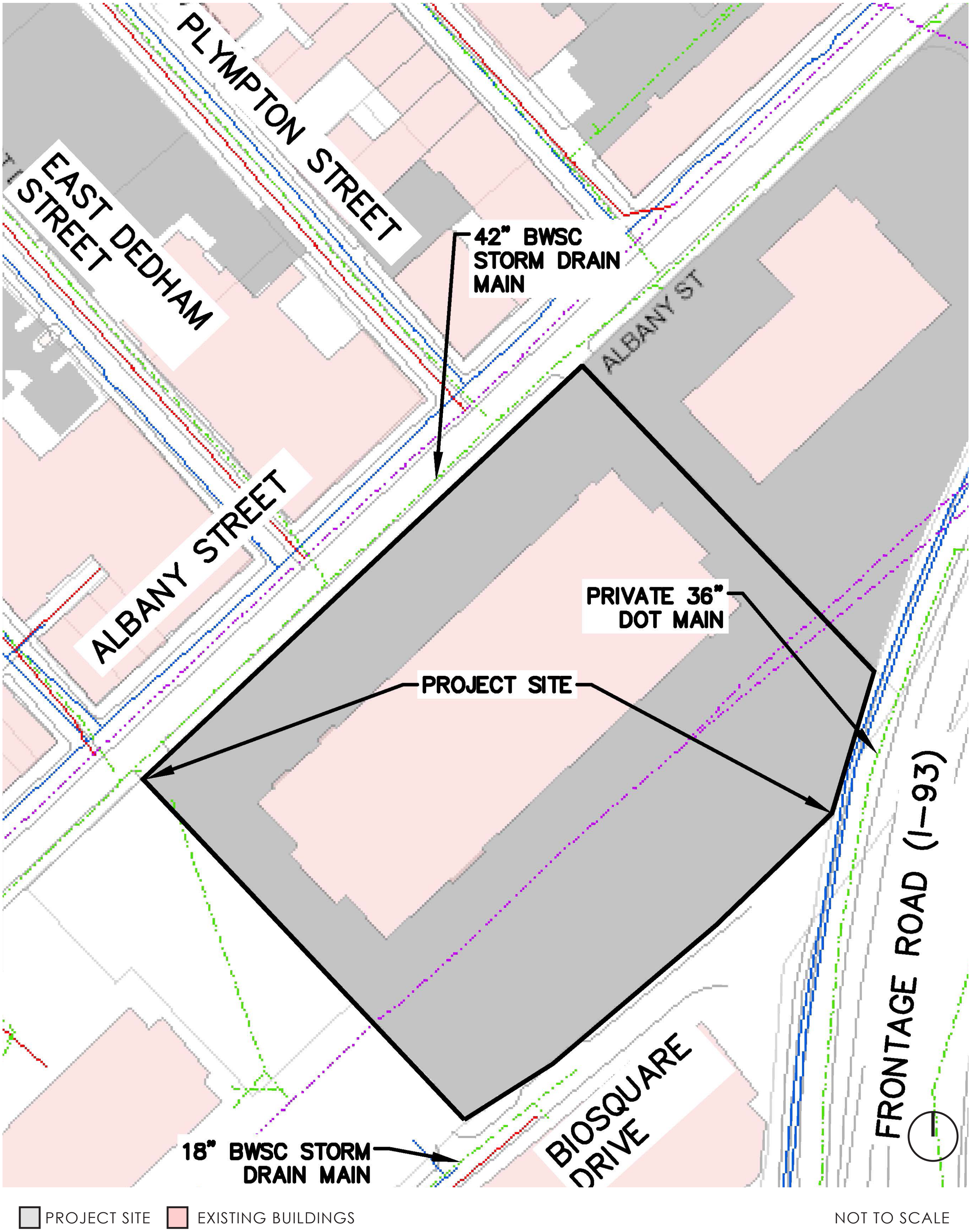

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Figure 7-3
Existing BWSC Storm Drainage System
Source: BWSC

7.4.2 Water Quality Impacts

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

The constructed Project will improve the quality of stormwater leaving the Site. The existing Site does not provide stormwater treatment or storage. The Site will be designed to at minimum meet the rates and volumes of stormwater from the existing Site. The proposed design will treat stormwater by collecting it at the building roof and directing it to underground recharge systems for storage prior to overflowing to BWSC infrastructure. Stormwater from the paved vehicular areas will be collected by deep sump and hooded catch basins, directed to proprietary water quality structures, and then to the underground recharge systems.

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

7.4.3 State Stormwater Standards

In March 1997, Massachusetts Department of Environmental Protection (MassDEP) adopted a new Stormwater Management Policy to address non-point source pollution. In 1997, MassDEP published the Massachusetts Stormwater Handbook as guidance on the Stormwater Policy, which was revised in February 2008. The Policy prescribes specific stormwater management standards for development projects, including urban pollutant removal criteria for Projects that may impact environmental resource areas. Compliance is achieved through the implementation of Best Management Practices (BMPs) in the stormwater management design. The Policy is administered locally pursuant to MGL Ch. 131, s. 40.

A description of the Project’s anticipated compliance with the Standards is outlined below:

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

Compliance: The proposed design will comply with this Standard. The design does not propose new stormwater conveyances and no new untreated stormwater will be directly discharged to, nor will erosion be caused to wetlands or waters of the Commonwealth as a result of stormwater discharges related to the Project.

Standard #2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

Compliance: The proposed design will comply with this Standard to the maximum extent practicable. The existing peak discharge rate will be met or will be decreased as a result of the improvements associated with the Project.

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

Compliance: The Project will comply with this standard. The Project is located within Boston's Groundwater Conservation Overlay District, and the stormwater system shall be designed to capture and infiltrate 1-inch of stormwater from the impervious Site's areas.

Standard #4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:
a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and
c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

Compliance: The proposed design will comply with this standard. Within the Project Site, there will be mostly roof, and paved sidewalks. Runoff from paved areas that would contribute unwanted sediments or pollutants to the existing storm drain system will be collected by deep sump, hooded catch basins and treated with proprietary water quality structures before discharging into the BWSC system.

Standard #5: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Compliance: The proposed design will comply with this standard. The proposed design will include source control, pollution prevention and pretreatment practices, as necessary.
Standard #6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater

discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

Compliance: Not Applicable. The proposed Project is not within an outstanding resource area.

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

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

Compliance: The proposed design will comply with this standard. A plan to control temporary construction-related impacts including erosion, sedimentation, and other pollutant sources during construction and land disturbing activities will be developed and implemented.

Standard #9: A long-term operation and maintenance (O&M) plan shall be developed and implemented to ensure that stormwater management systems function as designed.

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

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

Compliance: The Project will comply with this standard. There will be no illicit connections associated with the Proposed Project. Temporary construction dewatering will be conducted in accordance with applicable BWSC and Massachusetts Water Resource Authority (MWRA) requirements, as necessary.

7.5 ANTICIPATED ENERGY NEEDS

7.5.1 Electrical Service

There is an existing electrical system owned by Eversource in Albany Street. Eversource will determine the point of service to minimize the impact on the current area network. The electric infrastructure in the Project area is adequate for the proposed development, which will access existing electrical conduits. The Proponent has been coordinated with Eversource, and the utility is currently evaluating projected loads for the Project to determine how best to serve the Project with minimum impact to the surrounding area. Electrical utility metering will be provided for both commercial tenants and individual residential units to meter electric power consumption.
In the future event, the grid will be capable of accommodating smart technology, the electrical infrastructure will be designed to support such a system. By planning for future two way smart grids, the development site will be

The peak electrical demand associated with the Project is estimated at 11,935 kW. The Proponent will work with Eversource to confirm adequate system capacity as the design is finalized.

Annual Electric	36,541,524 kWh
Peak electric	11,935 kW
Annual Heating	54,926 MMbtu
Peak Heating	34,811 kbtu/hr
Annual Cooling	6,413,463 Ton-hrs (76,961 MMbtu)
Peak Cooling	10,710 Tons

We used GIS maps from the City's Climate Ready website to prioritize placement and location of critical systems and connections, based on long-term projects for climate change relative to the specific site. All vaults and transformers will be located within buildings so as not to disrupt the pedestrian realm in any way. They all are located off the exterior perimeter, maintaining the context of the central square, adjacent to exterior walls in each case so as to be easily identifiable and serviceable during all periods of the year. They will be guarded by metal decorative grills to match the exterior aesthetic concept of the building, are in the lofted ground floors which can accommodate their height, and will be elevated for their protection from flooding (nothing critical within the 500-year floodplain). All are close as reasonable to the "service end" of the building, far away as practical from Albany Street.

Additionally, ventilation from below grade garages have all been placed strategically to blend in with the exterior aesthetic concept of each building and will exhaust air well above the occupied zones of the plaza, as well as will not coincide within 25' of any entryways, air intakes, operable windows, or occupied rooftops so as to maintain air quality standards in these important areas. The placement of these will be guided as the design progresses based on this principle.

7.5.2 District Microgrid/Smart Utility Technology

Regarding the integration of Smart Utility Technology (SUT's) into new developments, the proposed case has several elements of a microgrid: options for renewables (varying opportunities per building), electric vehicle charging stations (each garage), efficient buildings/HVAC systems, options for demand response (all buildings), and options for co/trigen (Appendix report) to reduce carbon, save energy, and promote resiliency. The design team will follow Smart Utility Standards to integrate smart technology with existing infrastructure for future connections to anticipated smart grids for all utilities.

Options for increasing this could be expanded in optional building-integrated renewables, energy storage systems, and expanded electric vehicle parking stations. While these components combine to create a microgrid system, it is currently unknown if the development will always be owned by one single entity. We will explore options regarding microgrid and other systems' feasibility regarding long-term flexibility and ownership models. We have already done an extensive energy modeling effort for each building to piece together strategies for energy cost savings, carbon reduction, etc. These strategies are reflected in the project's submitted (Chapter 4.1) LEED Scorecard and energy model report.

Lastly, a study of using tandem absorptive electric and natural gas chillers as an energy cost savings strategy will be added to our list of strategies to further explore. This would allow end users to monitor utility rates and use one over the other to provide energy using the medium posing the best real-time rates.

7.5.3 Telephone

Verizon owns and operates the telephone facilities and services in the vicinity of the Project Site. Verizon record plans will be reviewed for lateral serving the site extending from a manhole in Albany Street. Given the existing infrastructure, telephone for the Project Site is anticipated to be provided from Albany Street. The configuration of the proposed service will be developed with Verizon as the project design progresses.

7.5.4 Telecommunication Systems

The Proponent will select private telecommunications companies to provide telephone, cable, and data services. There are several potential candidates with substantial Boston networks capable of providing service. Upon selection of a provider or providers, the Proponent will coordinate service connection locations and obtain appropriate approvals. As the development progresses, the team will evaluate the feasibility of consolidating the telecommunication systems for each building into a single unified service entrance to the site.

7.5.5 Natural Gas Systems

Record plans indicate the existing building has a gas service connecting to a gas main in Albany Street. The Proponent will work with National Grid or Eversource to confirm adequate system capacity as design is finalized. See Above breakdown.

7.5.6 Schematic Systems Design

The goals of the design are to reduce the overall source energy consumption of each building, ensure occupant comfort by limiting cold spots and drafts, and eliminate thermal bridging in the façade to increase durability. The key design elements that will guide this Project towards our design principles to include an air-tight building envelope, optimized mechanical systems, a highly insulated façade, and advanced lighting controls. Together, these design features will reduce the whole building energy demand.

Heating, cooling, and domestic hot water are provided via high efficiency equipment such as four-pipe chilled beams, Fan Coil units, heat recovery, and high-efficiency condensing boilers. As the highly insulated building envelope drops the space conditioning loads, fans, pumps, and lighting constitute an increasingly higher percentage of building energy use. High-efficiency auxiliary equipment such as pumps and fans with Electronically Commutated Motors (ECM) or Variable Frequency Drives (VFD) are also typical and help reduce the overall energy demand.

One of the integral components is a balanced heat or energy recovery ventilation system that provides fresh air to all habitable spaces and removes stale air from kitchens, baths, and trash rooms. A minimum efficiency of 75% is specified by the codes and standards, minimizing energy use and resulting in fresh, tempered air delivered to the occupants. To ensure the necessary levels of ventilation to each space, ductwork will have to be tightly sealed and the supply and return air streams balanced to provide the specific requirements.

Any device that uses electricity will be evaluated to minimize energy use. Electrical systems will include bi-level lighting, daylight, and occupancy sensors as well as ENERGY STAR® lighting and LED fixtures.

7.5.6.1 HVAC

The HVAC system for each building on-site will consist of a hot water plant, a chilled water plant, air handling units, and exhaust fans. The cooling load of each Building, as outlined in the table below, will require (3) high efficiency water sourced chillers and (3) cooling towers, each sized at 1/3 of the total load. The energy recovery air handling units will be 100% outdoor air with fan wall technology and an integral glycol energy recovery loop that will tie into the building exhaust fans. The building exhaust fans will serve the labs, office and general spaces and operate to maintain ventilation and pressure requirements in the building. All ventilation systems are sized as outlined in the table below.

Exhaust fans will be located on the roof along with the cooling towers, generators, and boiler room. A separate penthouse AHU room will contain the AHUs, chillers, condenser water pumps, and chilled water pumps. Based on the building height and floor configuration, air handling rooms for larger story buildings will be located at a mid-level in the building. All systems will operate as variable volume and be controlled through a combination of manufacturer controls and a central building automation system.

Table 7-3 HVAC Systems

Building	Cooling Load	Chilled Water	Condenser Water	Hot Water	Ventilation (SA)	Ventilation (EA)
Bldg A	1,710 tons	(3) High Efficiency Chillers at 570 tons each Variable Speed Pumps	(3) cooling towers at 570 tons each Variable Speed Pumps	High efficiency condensing boilers Variable Speed Pumps	(8) 100%, 45,000 CFM Energy Recovery Air Handling Units	(12) 27,000 CFM Exhaust Fans Garage Exhaust system
Bldg B	3,300 tons	(3) High Efficiency Chillers at 1,100 tons each Variable Speed Pumps	(3) cooling towers at 1,100 tons each Variable Speed Pumps	High efficiency condensing boilers Variable Speed Pumps	(16) 100% 45,000 CFM stacked Energy Recovery Air Handling Units	(16) 27,000 CFM Exhaust Fans Garage Exhaust system
Bldg C	3,300 tons	(3) High Efficiency Chillers at 1,100 tons each Variable Speed Pumps	(3) cooling towers at 1,100 tons each Variable Speed Pumps	High efficiency condensing boilers Variable Speed Pumps	(16) 100% 45,000 CFM stacked Energy Recovery Air Handling Units	(8) 27,000 CFM Exhaust Fans Garage Exhaust system
Bldg D	2,400 tons	(3) High Efficiency Chillers at 800 tons each Variable Speed Pumps	(3) cooling towers at 800 tons each Variable Speed Pumps	High efficiency condensing boilers Variable Speed Pumps	(12) 100% 45,000 CFM stacked Energy Recovery Air Handling Units	(10) 27,000 CFM Exhaust Fans Garage Exhaust system

In addition to the systems described above, the retail and service spaces (i.e. loading docks, etc.) on the ground floor of the building will be served by separate air handling units ducted to exterior louvers. The programs within these spaces will further detail the design parameters when they are established. The parking garages below grade will also require intake and exhaust louvers for the garage exhaust and supply fans.

7.5.6.2 Lighting

Site lighting, lighting in public areas and in common areas will be controlled by a relay base time computer programmable controller. System will include daylight and occupancy sensors. Lighting in utility, storage, mechanical and electrical spaces will be locally switched fluorescent industrial type fixtures.

Emergency lighting will be provided by normal lighting fixtures connected to the emergency life safety generator system. Emergency lighting will be provided in all public and common areas, elevator machine room, electric rooms, stairwells and at exterior exits.

An allowance of 0.25w/sf is included in the emergency life safety generator system for tenant emergency lighting. The tenant will install an emergency lighting transfer relay to access emergency power on failure of the tenant normal service.

7.5.6.3 Electrical

Each building electric service will comprise of (4) 4000 ampere, 480/277 volt circuit breaker switchboards along with dedicated 1000 ampere switchboard for the fire pump. Electric service entrance switchgears will be served via feeder bus ducts.

Electronic metering will be provided at electric service switchboards and all panels including distribution boards, power and lighting panel boards throughout the building. Meters shall report to BMS and they will be utilized to meet LEED measurement and verification point requirements. Each building will be equipped with a dedicated metering system.

Power distribution system throughout the buildings will be at 480/277 volt, 3 phase, 4 wire bus duct and local transformation 480-208/120 volt for 120/208 volt loads. Additional distribution will be provided to serve building standby and emergency loads.

Normal power electrical room will be provided on each floor. Each floor’s electrical room will contain (2) 480/277 volt, 60 hz, 3, phase, 4 wire, 4000 ampere plug in bus ducts for tenant normal power and (2) 480/277 volt, 60 hz, 3 phase, 4 wire, 4000 ampere feeder bus ducts for mechanical loads at the penthouse.

Tenant will be responsible for all tenant electrical installation from point of service at floor bus ducts. In addition to the tenant floor bus duct service, electric services will be available in the main electrical room for tenant use, metering will be required for each individual tenant.

Regarding emergency systems, we provided a narrative in the Resiliency Scorecard (Chapter 4.2) which addresses proposed emergency systems. We used GIS maps from the City’s Climate Ready website to prioritize placement and location of critical systems and connections, based on long-term projects for climate change relative to the specific site. All vaults and transformers will be located within buildings so as not to disrupt the pedestrian realm in any way. They all are located off the exterior perimeter, maintaining the context of the central square, adjacent to exterior walls in each case so as to be easily identifiable and serviceable during all periods of the year. They will be guarded by metal decorative grills to match the exterior aesthetic concept of the building, are in the lofted ground floors which can accommodate their height, and will be elevated for their protection from flooding (nothing critical within the 500-year floodplain). All are close as reasonable to the “service end” of the building, far away as practical from Albany Street.

Additionally, ventilation from below grade garages have all been placed strategically to blend in with the exterior aesthetic concept of each building and will exhaust air well above the occupied zones of the plaza, as well as will not coincide within 25’ of any entryways, air intakes, operable windows, or occupied rooftops so as to maintain air quality standards in these important areas. The placement of these will be guided as the design progresses based on this principle.

7.6 UTILITY PROTECTION DURING CONSTRUCTION

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

Appendix A

Pedestrian Wind Study Preliminary Results

PRELIMINARY RESULTS

EXCHANGE SOUTH END

BOSTON, MA

PEDESTRIAN WIND STUDY

RWDI #1702588

September 19, 2017

SUBMITTED TO

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EXECUTIVE SUMMARY

The wind conditions around the proposed Exchange South End development are discussed in detail within the content of this report and are summarized as follows:

- The effective gust criterion was met for the majority of sensor locations around the existing site with the exception of 2 locations to the southwest of the Project site. The construction of the Project is expected to improve wind conditions at these two locations and result in no exceedances of the effective gust criterion on or off site.

- In general, the mean speed wind conditions for the existing site are comfortable for walking or better with the exception of a few uncomfortable conditions to the southwest. Similar conditions are anticipated with the addition of the proposed Project. However, a greater number of uncomfortable conditions are predicted within the Project site. No dangerous wind conditions are detected at any location on an annual basis.

- If improved wind conditions are desired, wind control measures can be developed with RWDI's design team.

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Figure 2a: Pedestrian Wind Conditions – Effective Gust Speed – No Build Configuration – Annual
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Table 1: Mean Speed and Effective Gust Categories – Multiple Seasons

1 INTRODUCTION

A pedestrian wind study was conducted for the proposed Exchange South End development ("Project") 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 project site, as shown in Image 1, is bound between Albany Street to the northwest and the I93 Expressway to the east. The Project involves the demolition of the old Flower Exchange Property to construct a new mixed-use development. The Boston Logan International Airport is located approximately 3 miles northwest of the Project site.

The study involved wind simulations on a 1:300 scale model of the proposed building and surroundings. These simulations were conducted in RWDI's boundary-layer wind tunnel at Guelph, Ontario, for the purpose of quantifying local wind speed conditions and comparing to appropriate criteria for gauging wind comfort in pedestrian areas. The criteria recommended by the Boston Planning and Development Agency (BPDA) were used in this study. The present report describes the methods and presents the results of the wind tunnel simulations.

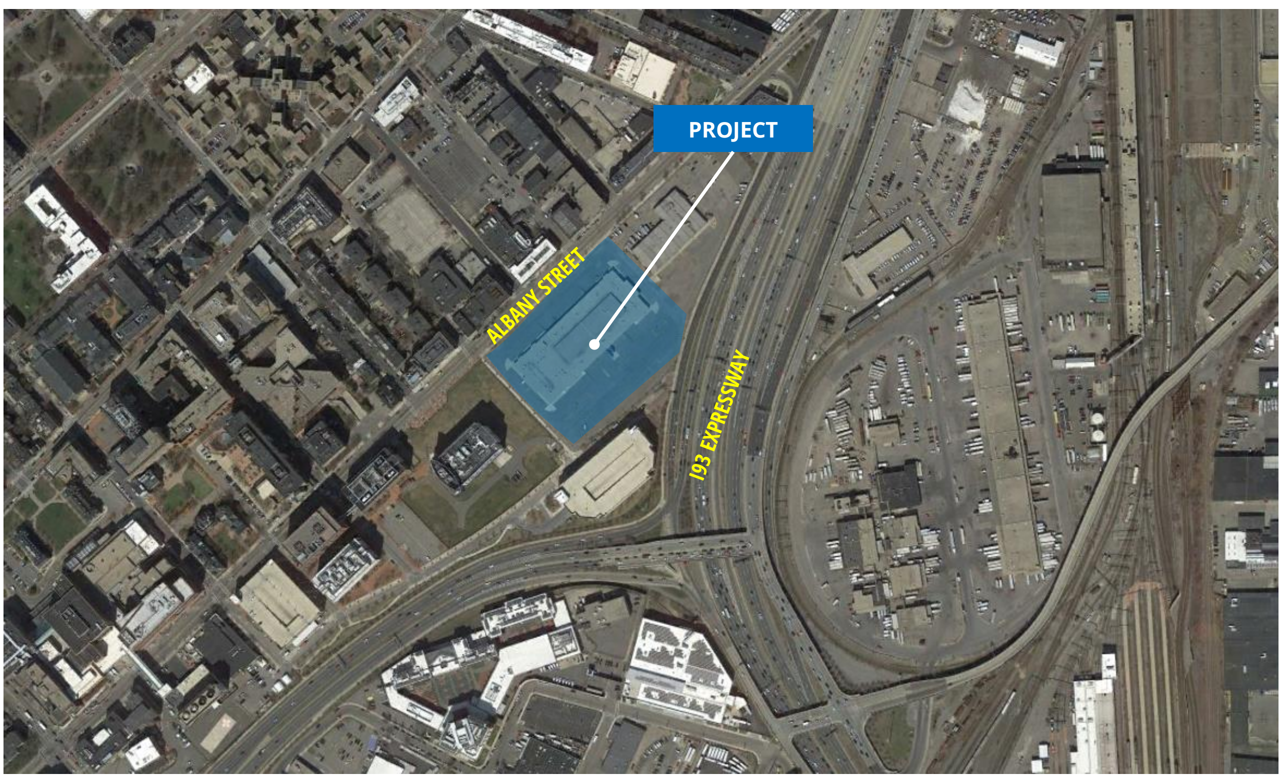


Image 1: Site Plan – Aerial View of Site and Surroundings (Courtesy of Google™ Earth)

2 METHODOLOGY

2.1 Wind Tunnel Study Model

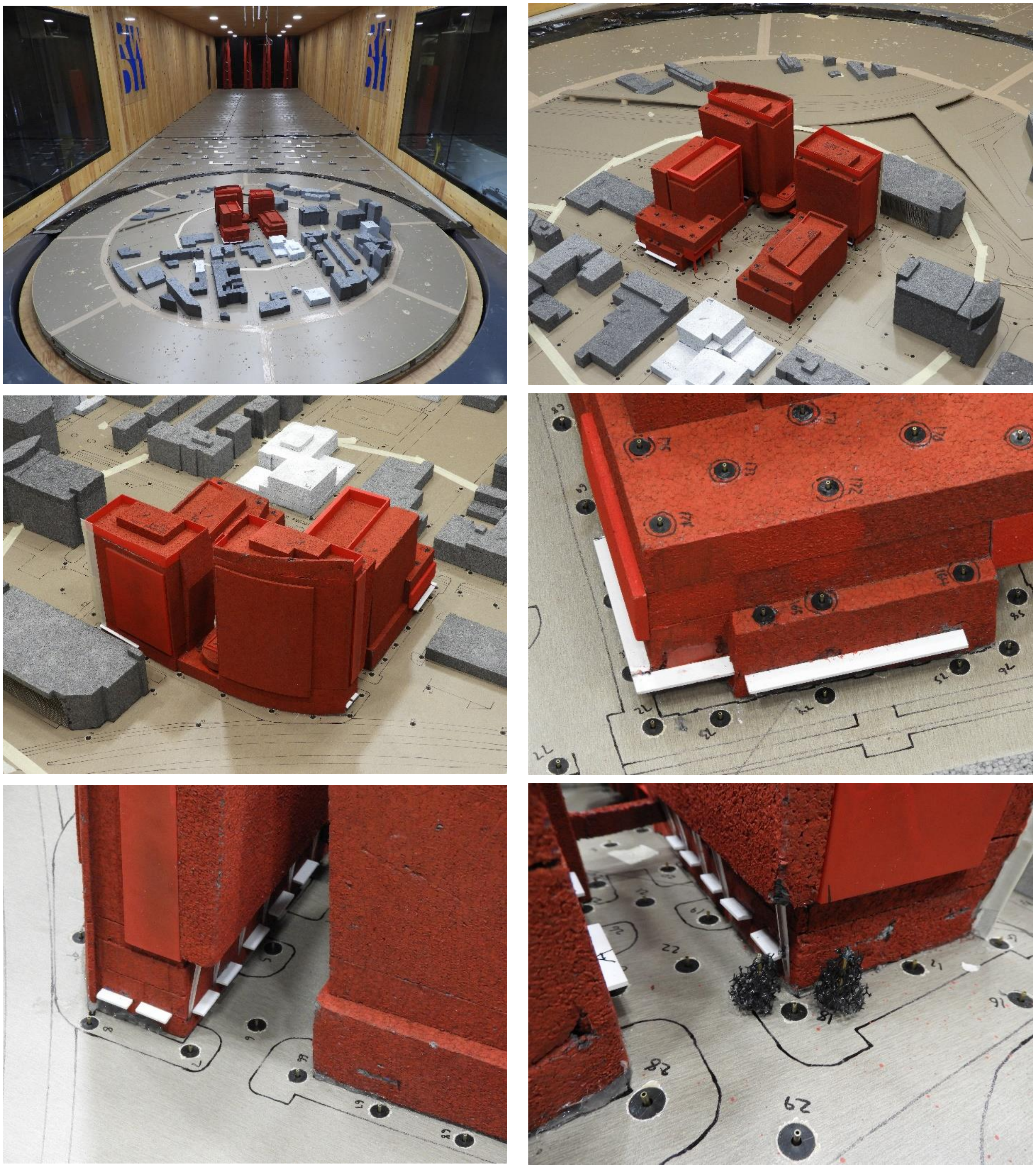
To assess the wind environment around the proposed Project, a 1:300 scale model of the project site and surroundings was constructed for the wind tunnel tests with two configurations tested;

A) No Build - the existing site with existing surroundings (Image 2a); and,

B) Build - the proposed Project with existing surroundings (Image 2b).

The scale model of the proposed Project was constructed using the design information and drawings listed at the back of this report. The wind tunnel model included all relevant surrounding buildings and topography within an approximately 1200 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 153 sensors specially designed wind speed sensors that were connected to the wind tunnel's data acquisition system to record the mean and fluctuating components of wind speed at a full-scale height of 5 feet above grade in pedestrian areas throughout the study site. Wind speeds were measured for 36 wind directions, in 10 degree increments, starting from true north. The measurements at each sensor location were recorded in the form of ratios of local mean and gust speeds to the reference wind speed in the free stream above the model.

A) No Build Configuration



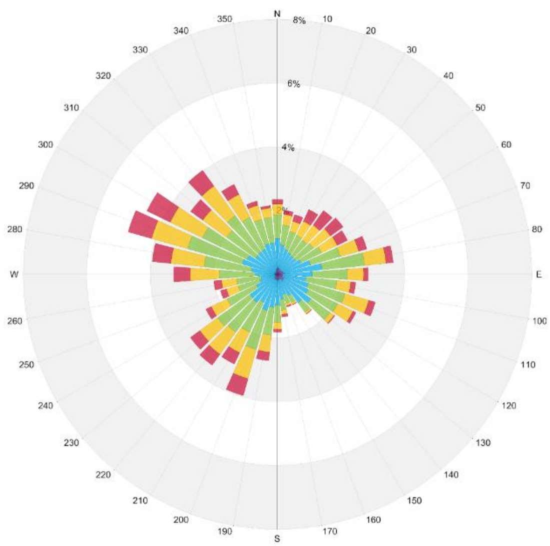
B) Build Configuration

Image 2: Wind Tunnel Study Model

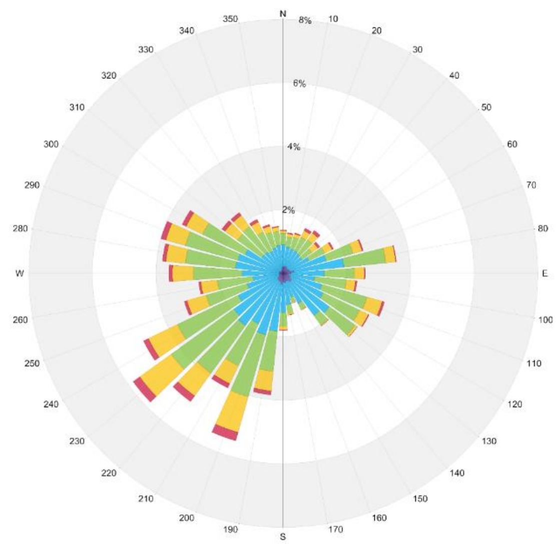
2.2 Meteorological Data

The results were then combined with long-term meteorological data, recorded during the years 1986 through 2016 at Boston's Logan International Airport to predict full scale wind conditions. The analysis was performed separately for each of the four seasons and for the entire year. Images 3 and 4 present "wind roses", summarizing the seasonal and annual wind climates in the Boston area respectively, based on the data from Logan Airport.

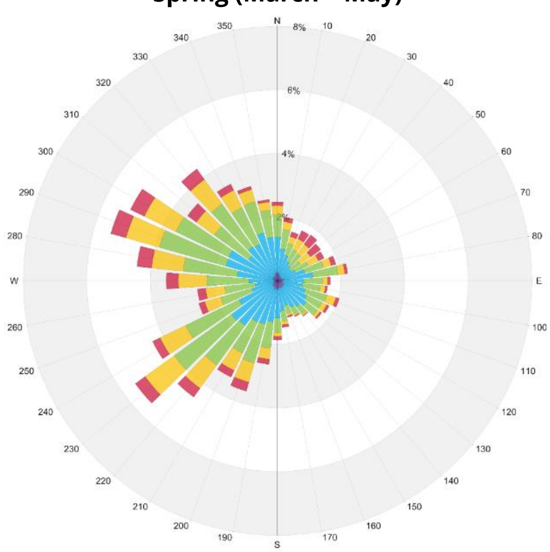
For example, the first wind rose in Image 3, summarizes the spring (March, April, and May) wind data which in general, indicate prevailing winds occurring from the northwest to south-southwest and northeast to east-southeast and strong winds (red bands), primarily occurring from the west-northwest, northwest,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



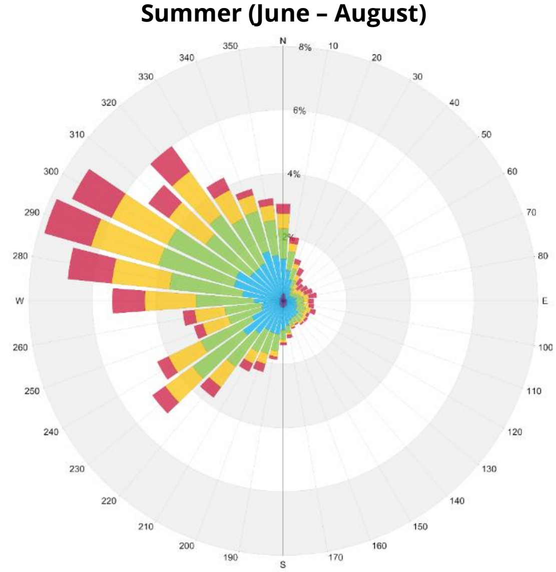
Spring (March – May)



Summer (June – August)



Fall (September – November)

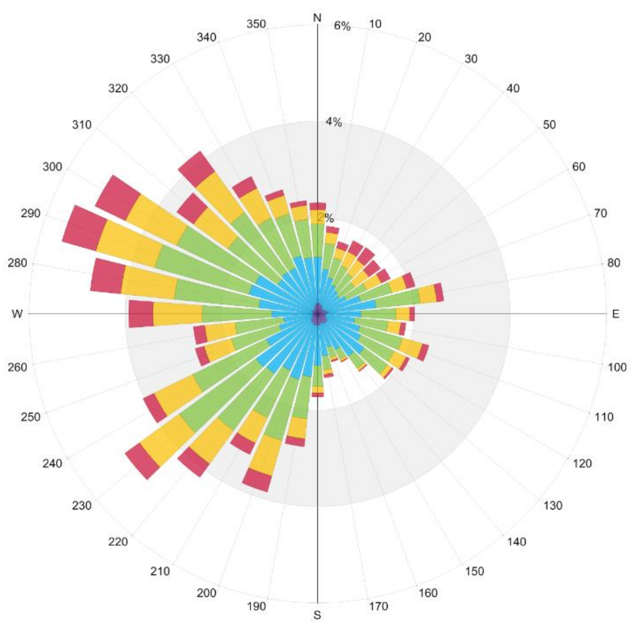


Winter (December – February)

Wind Speed (mph)	Probability (%) Spring	Summer	Fall	Winter
Calm	2.2	2.3	2.5	2.0
1-5	5.6	7.5	6.9	5.3
6-10	28.0	37.1	33.1	26.4
11-15	33.2	35.8	33.3	31.5
16-20	20.5	14.3	16.5	21.4
>20	10.6	3.0	7.6	13.4

Image 3: Seasonal Directional Distribution of Winds Approaching Boston Logan International Airport From 1986 Through 2016

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



Wind Speed (mph)	Probability (%) Annual
Calm	2.2
1-5	6.3
6-10	31.2
11-15	33.5
16-20	18.2
>20	8.6

Image 4: Annual Directional Distribution of Winds Approaching Boston Logan International Airport From 1986 Through 2016

2.3 Wind Criteria

The BPDA has adopted two standards for assessing the relative wind comfort of pedestrians. First, the BPDA wind design guidance criterion states that an effective gust velocity (hourly mean wind speed +1.5 times the root-mean-square wind speed) of 31 mph should not be exceeded more than one percent of the time. The second set of criteria used by the BPDA to determine the acceptability of specific locations is based on the work of Melbourne[1]. This set of criteria is used to determine the relative level of pedestrian wind comfort for activities such as sitting, standing, or walking. The criteria are expressed in terms of benchmarks for the 1-hour mean wind speed exceeded 1% of the time (i.e., the 99-percentile mean wind speed). They are as follows:

BPDA Mean Wind Criteria*

Comfort Category	Mean Wind Speed (mph)
Dangerous	> 27
Uncomfortable for Walking	> 19 and ≤ 27
Comfortable for Walking	> 15 and ≤ 19
Comfortable for Standing	> 12 and ≤ 15
Comfortable for Sitting	< 12

* Applicable to the hourly mean wind speed exceeded 1% of the time.

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

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

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

3 PREDICTED WIND CONDITIONS

The predicted wind comfort and safety conditions pertaining to the two tested configurations assessed are graphically depicted on a site plan in Figures 1a through 2b located in the "Figures" section of this report. These conditions and the associated wind speeds are also presented in Table 1, located in the "Tables" section of this report. Typically, the summer and fall winds tend to be more comfortable than the annual winds while the winter and spring winds are less comfortable than the annual winds. The following summary of pedestrian wind comfort is based on the annual winds for each configuration tested.

The following is a detailed discussion of the suitability of the predicted wind comfort conditions for the anticipated pedestrian use of each area of interest. Wind conditions comfortable for walking are appropriate for sidewalks and walkways as pedestrians will be active and less likely to remain in one area for prolonged periods of time. Lower wind speeds conducive to standing are preferred at main entrances where pedestrians are apt to linger. Wind speeds comfortable for sitting are ideal for areas intended for passive activities, such as plaza spaces or outdoor dining areas.

3.1 No Build Configuration

In general, the mean speed winds for the existing site are comfortable for walking or better with the exception of a few uncomfortable conditions to the southwest (Figure 1a).

The effective gust criterion was met for the majority of sensor locations around the existing site with the exception of 2 locations to the southwest of the Project site (Locations 103 and 105 in Figure 2a).

3.2 Build Configuration

In general, similar mean speed wind conditions are anticipated with the addition of the proposed Project except for a greater number of uncomfortable conditions predicted at the north, south and southeast corners of Building B and southeast of Building D near the Parking Garage (Figure 1b). No dangerous wind speeds are detected at any location on an annual basis.

All locations are predicted to meet the effective gust criterion on an annual basis with the addition of the proposed Project (Figure 2b). Dangerous mean wind speeds are recorded at Location 72 during the spring and winter (Table 1), and unacceptable gusts are also detected seasonally at several locations. If improved conditions are desired for these areas by the design team, wind control measures can be developed with RWDI's design team.

4 APPLICABILITY

This study involved state-of-the-art measurement and analysis techniques to predict wind conditions at the Project site. Nevertheless, some uncertainty remains in predicting wind comfort, and this must be kept in mind. For example, the sensation of comfort among individuals can be quite variable. Variations in age, individual health, clothing, and other human factors can change a particular response of an individual. The comfort limits used in this report represent an average for the total population. Also, unforeseen changes in the project area, such as the construction or removal of buildings, can affect the conditions experienced at the site. Finally, the prediction of wind speeds is necessarily a statistical procedure. The wind speeds reported are for the frequency of occurrence stated (1% of the time). Higher wind speeds will occur but on a less frequent basis.

The wind conditions presented in this report pertain to the proposed Exchange South End development as detailed in the architectural design drawings listed at the back of this report. Should there be any design changes that deviate from this list of drawings, the wind condition predictions 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.

5 REFERENCES

1) ASCE Task Committee on Outdoor Human Comfort (2004). *Outdoor Human Comfort and Its Assessment*, 68 pages, American Society of Civil Engineers, Reston, Virginia, USA.

2) Williams, C.J., Hunter, M.A. and Waechter, W.F. (1990). "Criteria for Assessing the Pedestrian Wind Environment," *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.36, pp.811-815.

3) Williams, C.J., Soligo M.J. and Cote, J. (1992). "A Discussion of the Components for a Comprehensive Pedestrian Level Comfort Criteria," *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.41-44, pp.2389-2390.

4) Soligo, M.J., Irwin, P.A., and Williams, C.J. (1993). "Pedestrian Comfort Including Wind and Thermal Effects," *Third Asia-Pacific Symposium on Wind Engineering*, Hong Kong.

5) Soligo, M.J., Irwin, P.A., Williams, C.J. and Schuyler, G.D. (1998). "A Comprehensive Assessment of Pedestrian Comfort Including Thermal Effects," *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.77&78, pp.753-766.

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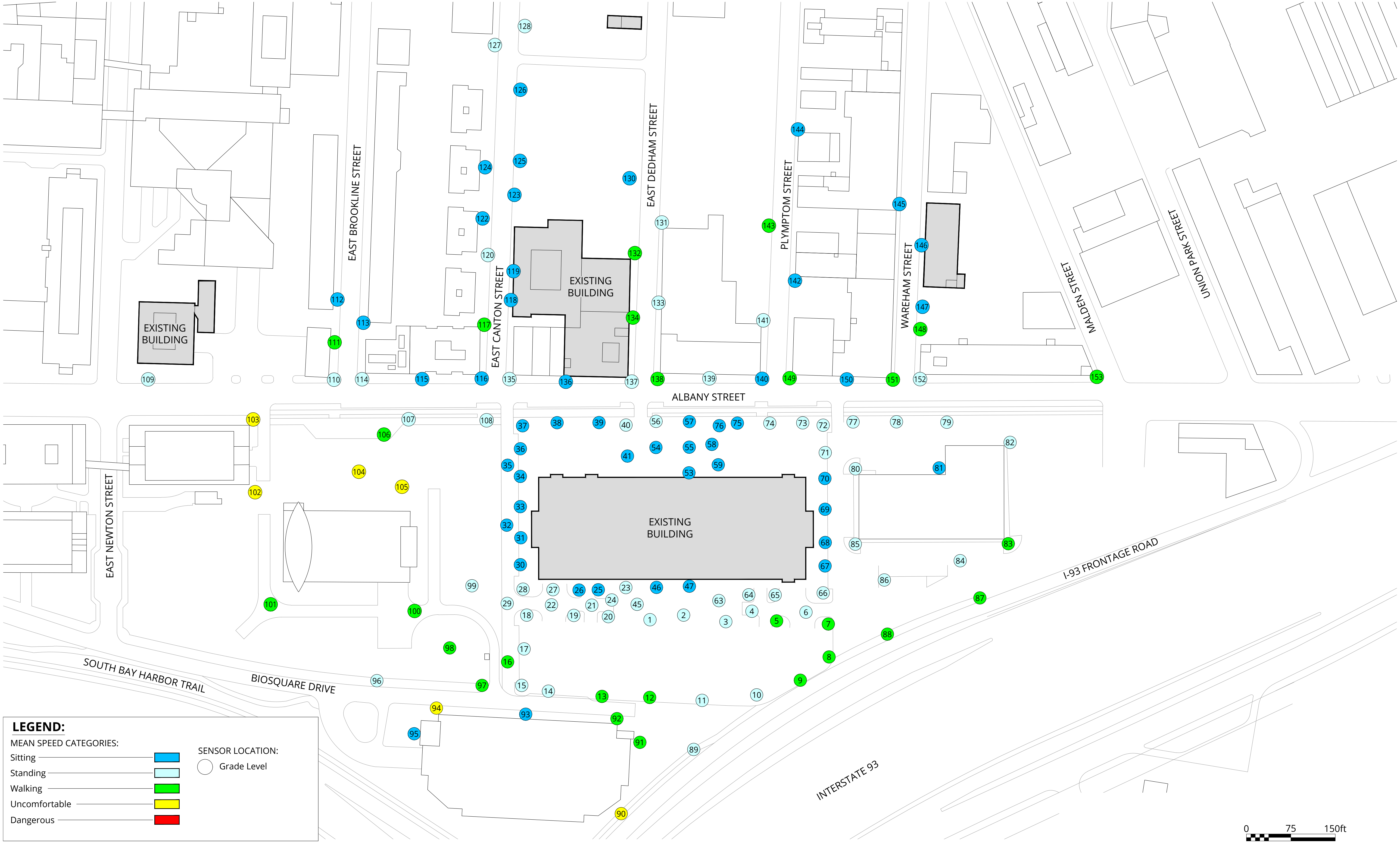
11) Williams, C.J., Wu, H., Waechter, W.F. and Baker, H.A. (1999). "Experiences with Remedial Solutions to Control Pedestrian Wind Problems," *Tenth International Conference on Wind Engineering*, Copenhagen, Denmark.

FIGURES



Pedestrian Wind Conditions - Mean Speed

No Build

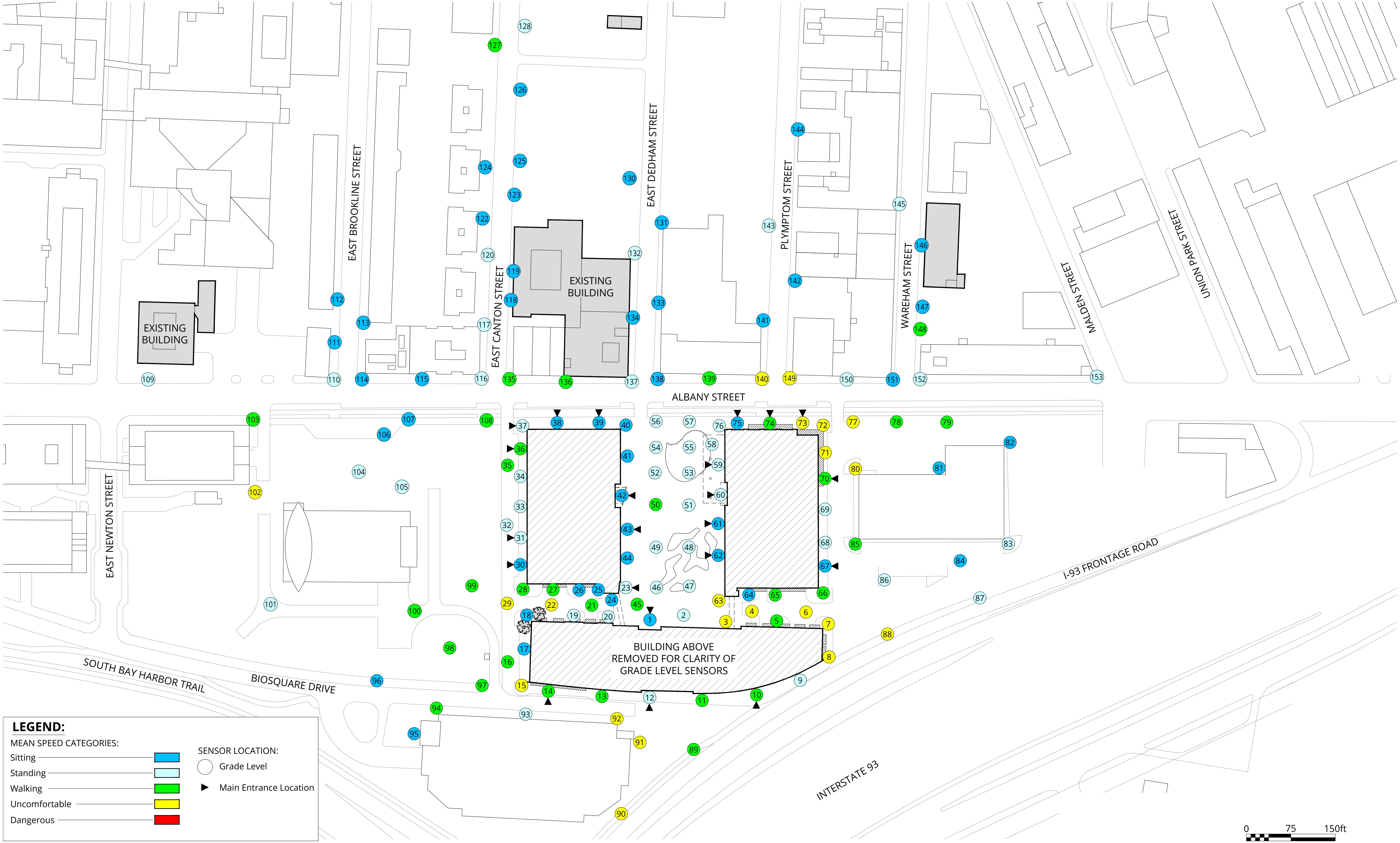
Annual

Exchange South End - Boston, MA

True North

Project #1702588

Drawn by: DBB	Figure: 1a
Approx. Scale:	1"=150'
Date Revised:	Sept. 19, 2017



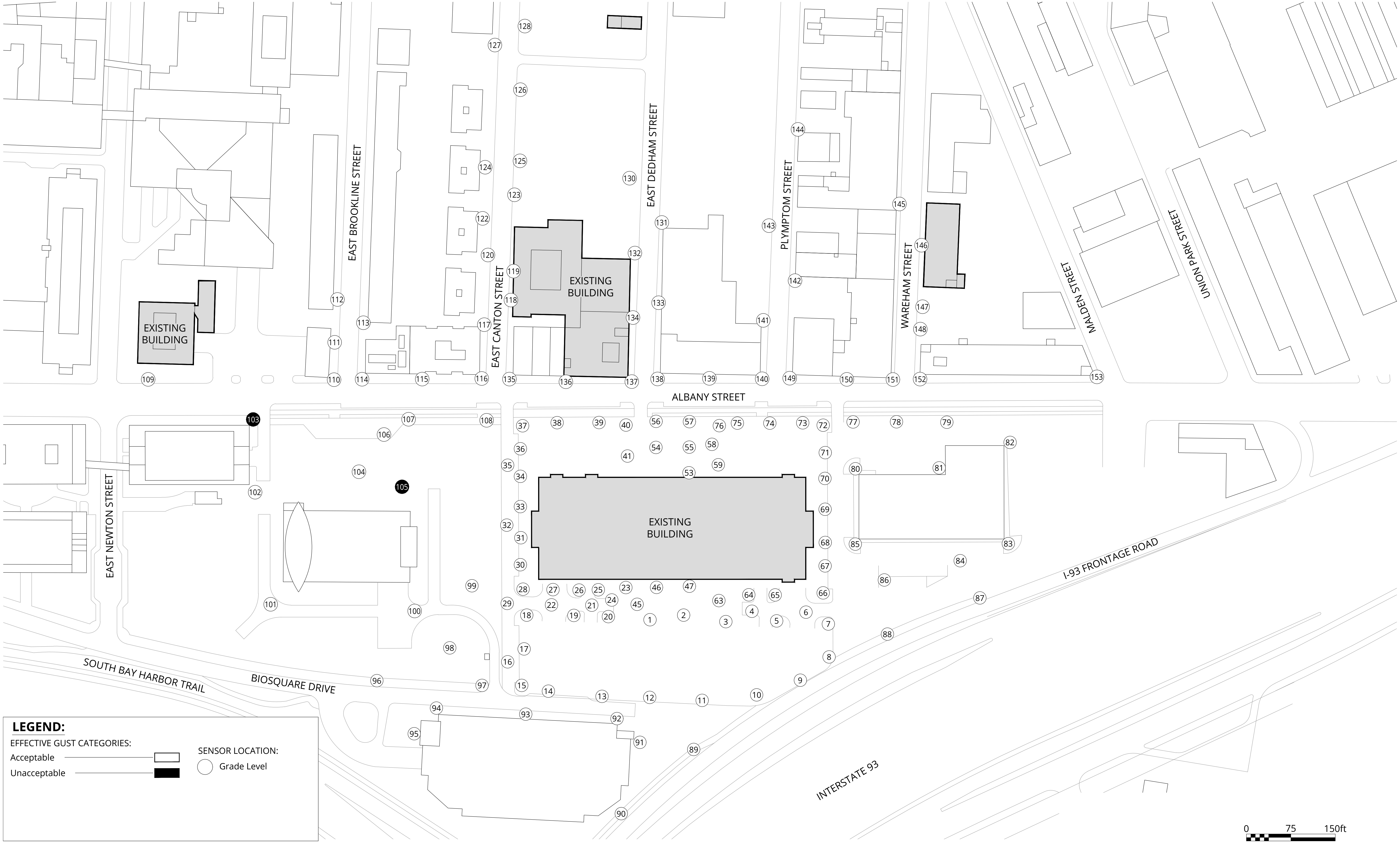
Pedestrian Wind Conditions - Mean Speed
Build
Annual

Exchange South End - Boston, MA

True North

Drawn by: DBB | Figure: 1b
Approx. Scale: 1"=150'

Project #1702588
Date Revised: Sept. 19, 2017



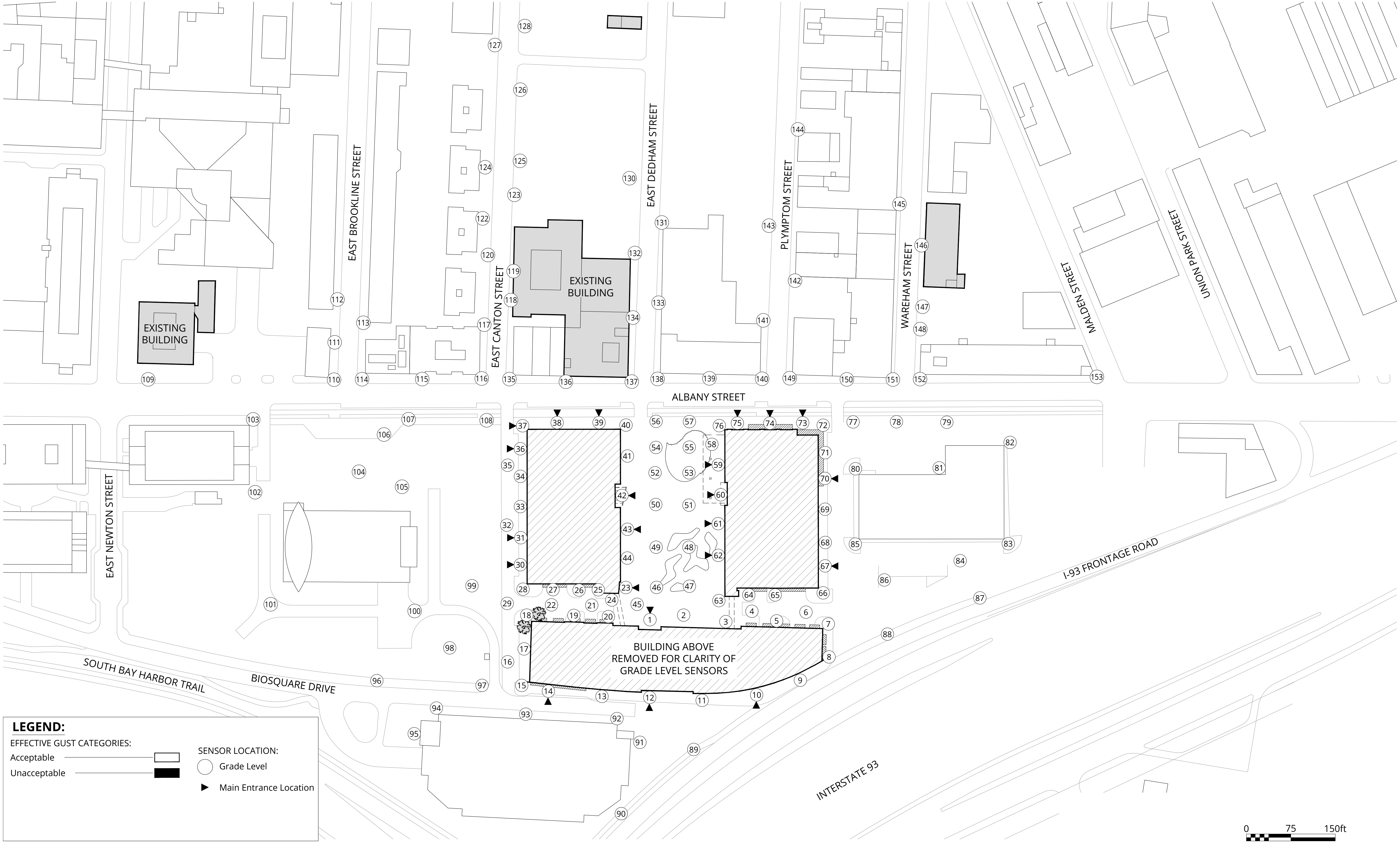
Pedestrian Wind Conditions - Effective Gust Speed
No Build
Annual

Exchange South End - Boston, MA

True North

Project #1702588

Drawn by: DBB	Figure: 2a
Approx. Scale: 1"=150'	
Date Revised: Sept. 19, 2017	



Pedestrian Wind Conditions - Effective Gust Speed
Build
Annual

Exchange South End - Boston, MA

True North

Project #1702588

Drawn by: DBB	Figure: 2b
Approx. Scale:	1"=150'
Date Revised:	Sept. 19, 2017

TABLES

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
1	A	Spring	17		Walking	22		Acceptable
		Summer	13		Standing	17		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	7	-59%	Sitting	12	-45%	Acceptable
		Summer	6	-54%	Sitting	10	-41%	Acceptable
		Fall	7	-53%	Sitting	11	-48%	Acceptable
		Winter	8	-50%	Sitting	12	-45%	Acceptable
		Annual	7	-53%	Sitting	11	-48%	Acceptable
2	A	Spring	16		Walking	22		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	15		Standing	21		Acceptable
		Summer	11	-15%	Sitting	16	-11%	Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
3	A	Spring	16		Walking	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15		Standing	20		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	15		Standing	20		Acceptable
	B	Spring	24	50%	Uncomfortable	31	41%	Acceptable
		Summer	18	50%	Walking	23	35%	Acceptable
		Fall	22	47%	Uncomfortable	28	40%	Acceptable
		Winter	23	44%	Uncomfortable	30	36%	Acceptable
		Annual	22	47%	Uncomfortable	28	40%	Acceptable
4	A	Spring	16		Walking	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15		Standing	20		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	15		Standing	20		Acceptable
	B	Spring	24	50%	Uncomfortable	31	41%	Acceptable
		Summer	18	50%	Walking	24	41%	Acceptable
		Fall	23	53%	Uncomfortable	30	50%	Acceptable
		Winter	26	62%	Uncomfortable	34	55%	Unacceptable
		Annual	24	60%	Uncomfortable	31	55%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
5	A	Spring	17		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	21		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	16		Walking	21		Acceptable
	B	Spring	19	12%	Walking	26	13%	Acceptable
		Summer	15	15%	Standing	20	11%	Acceptable
		Fall	18	12%	Walking	25	19%	Acceptable
		Winter	20	25%	Uncomfortable	28	27%	Acceptable
		Annual	18	12%	Walking	25	19%	Acceptable
6	A	Spring	16		Walking	22		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	23	44%	Uncomfortable	29	32%	Acceptable
		Summer	18	38%	Walking	24	33%	Acceptable
		Fall	20	33%	Uncomfortable	27	29%	Acceptable
		Winter	23	44%	Uncomfortable	31	41%	Acceptable
		Annual	21	40%	Uncomfortable	28	33%	Acceptable
7	A	Spring	17		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	21		Acceptable
		Winter	17		Walking	23		Acceptable
		Annual	16		Walking	21		Acceptable
	B	Spring	21	24%	Uncomfortable	29	26%	Acceptable
		Summer	18	38%	Walking	24	33%	Acceptable
		Fall	19	19%	Walking	26	24%	Acceptable
		Winter	22	29%	Uncomfortable	30	30%	Acceptable
		Annual	20	25%	Uncomfortable	28	33%	Acceptable
8	A	Spring	17		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	23		Acceptable
		Annual	16		Walking	22		Acceptable
	B	Spring	24	41%	Uncomfortable	31	35%	Acceptable
		Summer	20	54%	Uncomfortable	26	44%	Acceptable
		Fall	21	31%	Uncomfortable	29	32%	Acceptable
		Winter	23	35%	Uncomfortable	31	35%	Acceptable
		Annual	22	38%	Uncomfortable	29	32%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
9	A	Spring	17		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	22		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	15	-12%	Standing	22		Acceptable
		Annual	15		Standing	21		Acceptable
10	A	Spring	16		Walking	22		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	20	25%	Uncomfortable	28	27%	Acceptable
		Summer	15	15%	Standing	21	17%	Acceptable
		Fall	18	20%	Walking	25	19%	Acceptable
		Winter	18	12%	Walking	26	13%	Acceptable
		Annual	18	20%	Walking	25	14%	Acceptable
11	A	Spring	16		Walking	22		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	20	25%	Uncomfortable	26	18%	Acceptable
		Summer	16	33%	Walking	21	17%	Acceptable
		Fall	17	13%	Walking	24	14%	Acceptable
		Winter	20	25%	Uncomfortable	27	17%	Acceptable
		Annual	18	20%	Walking	25	14%	Acceptable
12	A	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	24		Acceptable
	B	Spring	14	-22%	Standing	20	-20%	Acceptable
		Summer	11	-21%	Sitting	16	-16%	Acceptable
		Fall	13	-19%	Standing	18	-22%	Acceptable
		Winter	14	-22%	Standing	21	-19%	Acceptable
		Annual	13	-24%	Standing	19	-21%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
13	A	Spring	18		Walking	26		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	17		Walking	25		Acceptable
	B	Spring	19		Walking	25		Acceptable
		Summer	15		Standing	19		Acceptable
		Fall	17		Walking	23		Acceptable
		Winter	19		Walking	25		Acceptable
		Annual	18		Walking	23		Acceptable
14	A	Spring	16		Walking	24		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	18	12%	Walking	25		Acceptable
		Summer	15	25%	Standing	20		Acceptable
		Fall	17	13%	Walking	23		Acceptable
		Winter	19	19%	Walking	26		Acceptable
		Annual	17	13%	Walking	24		Acceptable
15	A	Spring	16		Walking	24		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable
	B	Spring	24	50%	Uncomfortable	32	33%	Unacceptable
		Summer	20	67%	Uncomfortable	27	42%	Acceptable
		Fall	23	53%	Uncomfortable	31	35%	Acceptable
		Winter	25	56%	Uncomfortable	34	36%	Unacceptable
		Annual	23	53%	Uncomfortable	31	35%	Acceptable
16	A	Spring	17		Walking	24		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
	B	Spring	18		Walking	26		Acceptable
		Summer	16	14%	Walking	23	15%	Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17		Walking	25		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
17	A	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	10	-38%	Sitting	16	-30%	Acceptable
		Summer	8	-38%	Sitting	13	-28%	Acceptable
		Fall	9	-40%	Sitting	15	-29%	Acceptable
		Winter	10	-38%	Sitting	17	-26%	Acceptable
		Annual	10	-33%	Sitting	16	-27%	Acceptable
18	A	Spring	16		Walking	22		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	11	-31%	Sitting	16	-27%	Acceptable
		Summer	8	-38%	Sitting	13	-28%	Acceptable
		Fall	10	-33%	Sitting	15	-29%	Acceptable
		Winter	11	-31%	Sitting	17	-23%	Acceptable
		Annual	10	-33%	Sitting	16	-24%	Acceptable
19	A	Spring	16		Walking	22		Acceptable
		Summer	13		Standing	17		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	13	-19%	Standing	20		Acceptable
		Summer	11	-15%	Sitting	16		Acceptable
		Fall	12	-20%	Sitting	19		Acceptable
		Winter	14	-12%	Standing	21		Acceptable
		Annual	13	-13%	Standing	19		Acceptable
20	A	Spring	16		Walking	22		Acceptable
		Summer	13		Standing	17		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	13	-19%	Standing	20		Acceptable
		Summer	10	-23%	Sitting	16		Acceptable
		Fall	13	-13%	Standing	19		Acceptable
		Winter	14	-12%	Standing	21		Acceptable
		Annual	13	-13%	Standing	20		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
21	A	Spring	16		Walking	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15		Standing	20		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	15		Standing	20		Acceptable
	B	Spring	18	12%	Walking	25	19%	Acceptable
		Summer	15	25%	Standing	21	24%	Acceptable
		Fall	17	13%	Walking	23	15%	Acceptable
		Winter	17	13%	Walking	24	14%	Acceptable
		Annual	17	13%	Walking	23	15%	Acceptable
22	A	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	25	67%	Uncomfortable	33	57%	Unacceptable
		Summer	21	75%	Uncomfortable	29	71%	Acceptable
		Fall	23	64%	Uncomfortable	31	55%	Acceptable
		Winter	23	53%	Uncomfortable	31	48%	Acceptable
		Annual	23	64%	Uncomfortable	31	55%	Acceptable
23	A	Spring	14		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	13		Standing	18		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	13		Standing	18		Acceptable
	B	Spring	13		Standing	22	16%	Acceptable
		Summer	10		Sitting	17	13%	Acceptable
		Fall	12		Sitting	21	17%	Acceptable
		Winter	14		Standing	24	26%	Acceptable
		Annual	13		Standing	22	22%	Acceptable
24	A	Spring	15		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	19		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	14		Standing	19		Acceptable
	B	Spring	10	-33%	Sitting	16	-20%	Acceptable
		Summer	9	-18%	Sitting	14	-12%	Acceptable
		Fall	10	-29%	Sitting	16	-16%	Acceptable
		Winter	10	-29%	Sitting	16	-20%	Acceptable
		Annual	10	-29%	Sitting	16	-16%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
25	A	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	9	-31%	Sitting	12	-37%	Acceptable
		Summer	8	-20%	Sitting	9	-36%	Acceptable
		Fall	9	-25%	Sitting	11	-35%	Acceptable
		Winter	9	-31%	Sitting	12	-37%	Acceptable
		Annual	9	-25%	Sitting	11	-35%	Acceptable
26	A	Spring	13		Standing	18		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	12		Sitting	17		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	11		Sitting	17		Acceptable
27	A	Spring	13		Standing	19		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	13		Standing	18		Acceptable
	B	Spring	20	54%	Uncomfortable	26	37%	Acceptable
		Summer	17	55%	Walking	23	44%	Acceptable
		Fall	18	50%	Walking	25	39%	Acceptable
		Winter	19	46%	Walking	26	37%	Acceptable
		Annual	19	46%	Walking	25	39%	Acceptable
28	A	Spring	13		Standing	19		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	18	38%	Walking	27	42%	Acceptable
		Summer	14	27%	Standing	21	31%	Acceptable
		Fall	17	42%	Walking	26	44%	Acceptable
		Winter	19	46%	Walking	29	45%	Acceptable
		Annual	18	38%	Walking	27	42%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
29	A	Spring	15		Standing	21		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	23	53%	Uncomfortable	31	48%	Acceptable
		Summer	18	38%	Walking	25	39%	Acceptable
		Fall	22	57%	Uncomfortable	30	50%	Acceptable
		Winter	25	67%	Uncomfortable	34	62%	Unacceptable
		Annual	23	64%	Uncomfortable	31	55%	Acceptable
30	A	Spring	10		Sitting	17		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	17		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	10	11%	Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
31	A	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	10		Sitting	16		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	14	27%	Standing	21	24%	Acceptable
		Summer	12	33%	Sitting	18	29%	Acceptable
		Fall	14	40%	Standing	20	25%	Acceptable
		Winter	14	40%	Standing	21	31%	Acceptable
		Annual	14	40%	Standing	20	25%	Acceptable
32	A	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	11		Sitting	16		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	14	27%	Standing	20	18%	Acceptable
		Summer	11	22%	Sitting	17	31%	Acceptable
		Fall	13	18%	Standing	19	19%	Acceptable
		Winter	14	17%	Standing	20	11%	Acceptable
		Annual	13	18%	Standing	19	12%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed Speed (mph)	Mean Wind Speed % Change	Mean Wind Speed Rating	Effective Gust Wind Speed Speed (mph)	Effective Gust Wind Speed % Change	Effective Gust Wind Speed Rating
33	A	Spring	10		Sitting	16		Acceptable
		Summer	8		Sitting	13		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	10		Sitting	16		Acceptable
		Annual	10		Sitting	15		Acceptable
	B	Spring	15	50%	Standing	22	38%	Acceptable
		Summer	12	50%	Sitting	19	46%	Acceptable
		Fall	14	40%	Standing	20	33%	Acceptable
		Winter	14	40%	Standing	21	31%	Acceptable
		Annual	14	40%	Standing	20	33%	Acceptable
34	A	Spring	11		Sitting	17		Acceptable
		Summer	8		Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	17		Acceptable
	B	Spring	15	36%	Standing	23	35%	Acceptable
		Summer	13	62%	Standing	20	43%	Acceptable
		Fall	15	50%	Standing	22	29%	Acceptable
		Winter	15	36%	Standing	23	28%	Acceptable
		Annual	15	50%	Standing	22	29%	Acceptable
35	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	21		Acceptable
		Annual	11		Sitting	19		Acceptable
	B	Spring	20	67%	Uncomfortable	28	47%	Acceptable
		Summer	17	89%	Walking	23	53%	Acceptable
		Fall	19	73%	Walking	27	50%	Acceptable
		Winter	19	58%	Walking	28	33%	Acceptable
		Annual	19	73%	Walking	27	42%	Acceptable
36	A	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	18	50%	Walking	26	44%	Acceptable
		Summer	16	78%	Walking	22	57%	Acceptable
		Fall	17	55%	Walking	24	41%	Acceptable
		Winter	17	42%	Walking	25	32%	Acceptable
		Annual	17	55%	Walking	25	47%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
37	A	Spring	10		Sitting	16		Acceptable
		Summer	8		Sitting	12		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	11		Sitting	16		Acceptable
		Annual	10		Sitting	15		Acceptable
	B	Spring	15	50%	Standing	24	50%	Acceptable
		Summer	13	62%	Standing	20	67%	Acceptable
		Fall	15	50%	Standing	22	47%	Acceptable
		Winter	15	36%	Standing	24	50%	Acceptable
		Annual	15	50%	Standing	23	53%	Acceptable
38	A	Spring	12		Sitting	18		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	8	-20%	Sitting	13		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	11	-15%	Sitting	17	-11%	Acceptable
		Annual	10	-17%	Sitting	17		Acceptable
39	A	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	13		Standing	20		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	12		Sitting	18		Acceptable
40	A	Spring	14		Standing	20		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	12	-14%	Sitting	20		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11	-15%	Sitting	18		Acceptable
		Winter	12	-14%	Sitting	20		Acceptable
		Annual	11	-15%	Sitting	19		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
41	A	Spring	13		Standing	18		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	13		Standing	18		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	12		Sitting	20	11%	Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	10	-23%	Sitting	17		Acceptable
		Annual	11		Sitting	18		Acceptable
42	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	11	-	Sitting	15	-	Acceptable
		Summer	8	-	Sitting	11	-	Acceptable
		Fall	10	-	Sitting	14	-	Acceptable
		Winter	11	-	Sitting	15	-	Acceptable
		Annual	10	-	Sitting	14	-	Acceptable
43	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	13	-	Standing	20	-	Acceptable
		Summer	10	-	Sitting	15	-	Acceptable
		Fall	11	-	Sitting	18	-	Acceptable
		Winter	13	-	Standing	20	-	Acceptable
		Annual	12	-	Sitting	18	-	Acceptable
44	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	11	-	Sitting	17	-	Acceptable
		Summer	8	-	Sitting	12	-	Acceptable
		Fall	10	-	Sitting	16	-	Acceptable
		Winter	11	-	Sitting	17	-	Acceptable
		Annual	10	-	Sitting	16	-	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed Speed (mph)	% Change	Rating	Effective Gust Wind Speed Speed (mph)	% Change	Rating
45	A	Spring	16		Walking	21		Acceptable
		Summer	12		Sitting	16		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	15		Standing	20		Acceptable
	B	Spring	17		Walking	24	14%	Acceptable
		Summer	14	17%	Standing	20	25%	Acceptable
		Fall	16	14%	Walking	23	15%	Acceptable
		Winter	17	13%	Walking	24	14%	Acceptable
		Annual	16		Walking	23	15%	Acceptable
46	A	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	13		Standing	18		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	14		Standing	22	16%	Acceptable
		Summer	13	30%	Standing	20	43%	Acceptable
		Fall	14	17%	Standing	22	29%	Acceptable
		Winter	15	15%	Standing	23	28%	Acceptable
		Annual	14	17%	Standing	22	29%	Acceptable
47	A	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	14	17%	Standing	22	22%	Acceptable
		Summer	13	44%	Standing	20	43%	Acceptable
		Fall	14	27%	Standing	21	24%	Acceptable
		Winter	15	25%	Standing	23	28%	Acceptable
		Annual	14	17%	Standing	21	24%	Acceptable
48	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	15	-	Standing	23	-	Acceptable
		Summer	14	-	Standing	20	-	Acceptable
		Fall	15	-	Standing	22	-	Acceptable
		Winter	16	-	Walking	23	-	Acceptable
		Annual	15	-	Standing	22	-	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
49	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	16	-	Walking	24	-	Acceptable
		Summer	14	-	Standing	20	-	Acceptable
		Fall	15	-	Standing	23	-	Acceptable
		Winter	16	-	Walking	24	-	Acceptable
		Annual	15	-	Standing	23	-	Acceptable
50	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	17	-	Walking	25	-	Acceptable
		Summer	14	-	Standing	21	-	Acceptable
		Fall	17	-	Walking	24	-	Acceptable
		Winter	18	-	Walking	25	-	Acceptable
		Annual	17	-	Walking	24	-	Acceptable
51	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	13	-	Standing	21	-	Acceptable
		Summer	12	-	Sitting	18	-	Acceptable
		Fall	13	-	Standing	20	-	Acceptable
		Winter	14	-	Standing	22	-	Acceptable
		Annual	13	-	Standing	21	-	Acceptable
52	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	16	-	Walking	23	-	Acceptable
		Summer	13	-	Standing	19	-	Acceptable
		Fall	15	-	Standing	22	-	Acceptable
		Winter	16	-	Walking	24	-	Acceptable
		Annual	15	-	Standing	23	-	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
53	A	Spring	8		Sitting	13		Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	8		Sitting	13		Acceptable
		Winter	8		Sitting	14		Acceptable
		Annual	8		Sitting	13		Acceptable
	B	Spring	14	75%	Standing	22	69%	Acceptable
		Summer	12	71%	Sitting	18	64%	Acceptable
		Fall	14	75%	Standing	21	62%	Acceptable
		Winter	16	100%	Walking	24	71%	Acceptable
		Annual	14	75%	Standing	22	69%	Acceptable
54	A	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	14		Standing	22	16%	Acceptable
		Summer	12	20%	Sitting	18	29%	Acceptable
		Fall	14	17%	Standing	21	17%	Acceptable
		Winter	14		Standing	22	16%	Acceptable
		Annual	14	17%	Standing	21	17%	Acceptable
55	A	Spring	13		Standing	18		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	15	15%	Standing	22	22%	Acceptable
		Summer	12	20%	Sitting	18	29%	Acceptable
		Fall	15	25%	Standing	21	24%	Acceptable
		Winter	16	33%	Walking	24	33%	Acceptable
		Annual	15	25%	Standing	22	29%	Acceptable
56	A	Spring	14		Standing	22		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	13	-19%	Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
57	A	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	15	25%	Standing	23	28%	Acceptable
		Summer	12	33%	Sitting	18	29%	Acceptable
		Fall	14	27%	Standing	22	29%	Acceptable
		Winter	15	25%	Standing	24	33%	Acceptable
		Annual	14	27%	Standing	23	35%	Acceptable
58	A	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	14	17%	Standing	21	17%	Acceptable
		Summer	11	22%	Sitting	18	29%	Acceptable
		Fall	13	18%	Standing	21	24%	Acceptable
		Winter	15	25%	Standing	23	21%	Acceptable
		Annual	14	17%	Standing	21	24%	Acceptable
59	A	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	13	18%	Standing	21	24%	Acceptable
		Summer	11	22%	Sitting	17	31%	Acceptable
		Fall	12	20%	Sitting	20	25%	Acceptable
		Winter	14	27%	Standing	23	35%	Acceptable
		Annual	13	30%	Standing	21	31%	Acceptable
60	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	14	-	Standing	22	-	Acceptable
		Summer	12	-	Sitting	20	-	Acceptable
		Fall	14	-	Standing	22	-	Acceptable
		Winter	14	-	Standing	23	-	Acceptable
		Annual	14	-	Standing	22	-	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
61	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	11	-	Sitting	18	-	Acceptable
		Summer	9	-	Sitting	15	-	Acceptable
		Fall	11	-	Sitting	17	-	Acceptable
		Winter	12	-	Sitting	19	-	Acceptable
		Annual	11	-	Sitting	17	-	Acceptable
62	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	12	-	Sitting	18	-	Acceptable
		Summer	10	-	Sitting	16	-	Acceptable
		Fall	11	-	Sitting	17	-	Acceptable
		Winter	12	-	Sitting	18	-	Acceptable
		Annual	11	-	Sitting	18	-	Acceptable
63	A	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	16		Acceptable
		Fall	14		Standing	19		Acceptable
		Winter	15		Standing	20		Acceptable
		Annual	14		Standing	19		Acceptable
	B	Spring	21	40%	Uncomfortable	29	38%	Acceptable
		Summer	17	42%	Walking	23	44%	Acceptable
		Fall	20	43%	Uncomfortable	27	42%	Acceptable
		Winter	22	47%	Uncomfortable	30	50%	Acceptable
		Annual	21	50%	Uncomfortable	28	47%	Acceptable
64	A	Spring	14		Standing	19		Acceptable
		Summer	11		Sitting	15		Acceptable
		Fall	13		Standing	18		Acceptable
		Winter	14		Standing	19		Acceptable
		Annual	13		Standing	18		Acceptable
	B	Spring	11	-21%	Sitting	16	-16%	Acceptable
		Summer	9	-18%	Sitting	13	-13%	Acceptable
		Fall	10	-23%	Sitting	14	-22%	Acceptable
		Winter	11	-21%	Sitting	16	-16%	Acceptable
		Annual	10	-23%	Sitting	15	-17%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
65	A	Spring	14		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	18		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	21	50%	Uncomfortable	28	40%	Acceptable
		Summer	18	64%	Walking	24	50%	Acceptable
		Fall	18	38%	Walking	24	33%	Acceptable
		Winter	20	43%	Uncomfortable	27	35%	Acceptable
		Annual	19	46%	Walking	26	37%	Acceptable
66	A	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	19	27%	Walking	28	33%	Acceptable
		Summer	14	17%	Standing	20	18%	Acceptable
		Fall	18	29%	Walking	26	30%	Acceptable
		Winter	18	20%	Walking	27	29%	Acceptable
		Annual	17	21%	Walking	25	25%	Acceptable
67	A	Spring	11		Sitting	16		Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	10		Sitting	16		Acceptable
	B	Spring	12		Sitting	19	19%	Acceptable
		Summer	11	22%	Sitting	16	23%	Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	11		Sitting	18	12%	Acceptable
68	A	Spring	12		Sitting	17		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	14	17%	Standing	20	18%	Acceptable
		Summer	12	20%	Sitting	17	21%	Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	13		Standing	19	12%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
69	A	Spring	13		Standing	18		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	15	15%	Standing	21	17%	Acceptable
		Summer	13	30%	Standing	17	21%	Acceptable
		Fall	13		Standing	19	12%	Acceptable
		Winter	15	15%	Standing	21	11%	Acceptable
		Annual	14	17%	Standing	20	18%	Acceptable
70	A	Spring	12		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	20	67%	Uncomfortable	26	44%	Acceptable
		Summer	15	67%	Standing	20	43%	Acceptable
		Fall	17	55%	Walking	23	28%	Acceptable
		Winter	20	54%	Uncomfortable	26	30%	Acceptable
		Annual	18	50%	Walking	24	33%	Acceptable
71	A	Spring	14		Standing	20		Acceptable
		Summer	11		Sitting	15		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	25	79%	Uncomfortable	31	55%	Acceptable
		Summer	19	73%	Walking	23	53%	Acceptable
		Fall	23	77%	Uncomfortable	28	47%	Acceptable
		Winter	24	71%	Uncomfortable	30	50%	Acceptable
		Annual	23	77%	Uncomfortable	28	47%	Acceptable
72	A	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	19		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	29	93%	Dangerous	33	36%	Unacceptable
		Summer	22	100%	Uncomfortable	24	33%	Acceptable
		Fall	27	93%	Uncomfortable	31	39%	Acceptable
		Winter	28	87%	Dangerous	33	36%	Unacceptable
		Annual	27	93%	Uncomfortable	31	35%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
73	A	Spring	16		Walking	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	20	25%	Uncomfortable	28	27%	Acceptable
		Summer	16	33%	Walking	22	29%	Acceptable
		Fall	19	36%	Walking	26	30%	Acceptable
		Winter	23	44%	Uncomfortable	31	41%	Acceptable
		Annual	20	33%	Uncomfortable	28	33%	Acceptable
74	A	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	16	14%	Walking	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15	15%	Standing	21	11%	Acceptable
		Winter	18	29%	Walking	24	14%	Acceptable
		Annual	16	14%	Walking	22		Acceptable
75	A	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
76	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	15	25%	Standing	23	21%	Acceptable
		Summer	12	33%	Sitting	19	36%	Acceptable
		Fall	15	25%	Standing	22	29%	Acceptable
		Winter	16	33%	Walking	24	26%	Acceptable
		Annual	15	25%	Standing	22	22%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
77	A	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	16		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	23	53%	Uncomfortable	31	48%	Acceptable
		Summer	17	42%	Walking	24	50%	Acceptable
		Fall	21	50%	Uncomfortable	29	45%	Acceptable
		Winter	24	60%	Uncomfortable	33	57%	Unacceptable
		Annual	22	57%	Uncomfortable	30	50%	Acceptable
78	A	Spring	16		Walking	21		Acceptable
		Summer	12		Sitting	16		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	19	19%	Walking	27	29%	Acceptable
		Summer	15	25%	Standing	21	31%	Acceptable
		Fall	18	29%	Walking	26	30%	Acceptable
		Winter	21	40%	Uncomfortable	30	36%	Acceptable
		Annual	19	36%	Walking	27	35%	Acceptable
79	A	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	18	12%	Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	18	20%	Walking	25	14%	Acceptable
		Annual	16	14%	Walking	23	15%	Acceptable
80	A	Spring	14		Standing	21		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	13		Standing	21		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	21	50%	Uncomfortable	28	33%	Acceptable
		Summer	16	33%	Walking	21	17%	Acceptable
		Fall	20	54%	Uncomfortable	27	35%	Acceptable
		Winter	23	77%	Uncomfortable	31	48%	Acceptable
		Annual	21	62%	Uncomfortable	28	40%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
81	A	Spring	8		Sitting	12		Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	8		Sitting	12		Acceptable
		Winter	8		Sitting	13		Acceptable
		Annual	8		Sitting	12		Acceptable
	B	Spring	8		Sitting	13		Acceptable
		Summer	7		Sitting	11		Acceptable
		Fall	8		Sitting	13		Acceptable
		Winter	9	12%	Sitting	14		Acceptable
		Annual	8		Sitting	13		Acceptable
82	A	Spring	14		Standing	20		Acceptable
		Summer	11		Sitting	15		Acceptable
		Fall	13		Standing	18		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	12	-14%	Sitting	18		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11	-15%	Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
83	A	Spring	17		Walking	23		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	23		Acceptable
		Annual	16		Walking	22		Acceptable
	B	Spring	13	-24%	Standing	20	-13%	Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13	-19%	Standing	19	-14%	Acceptable
		Winter	14	-18%	Standing	22		Acceptable
		Annual	13	-19%	Standing	20		Acceptable
84	A	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	19		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	14		Standing	19		Acceptable
	B	Spring	11	-27%	Sitting	18	-14%	Acceptable
		Summer	9	-25%	Sitting	14	-18%	Acceptable
		Fall	11	-21%	Sitting	17	-11%	Acceptable
		Winter	12	-14%	Sitting	19		Acceptable
		Annual	11	-21%	Sitting	17	-11%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
85	A	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	16		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	19	27%	Walking	27	29%	Acceptable
		Summer	15	25%	Standing	22	38%	Acceptable
		Fall	18	29%	Walking	26	30%	Acceptable
		Winter	20	25%	Uncomfortable	29	32%	Acceptable
		Annual	18	20%	Walking	26	24%	Acceptable
86	A	Spring	15		Standing	21		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	16		Walking	24	14%	Acceptable
		Summer	13		Standing	19	12%	Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24	14%	Acceptable
		Annual	15		Standing	22		Acceptable
87	A	Spring	17		Walking	22		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	16		Walking	21		Acceptable
	B	Spring	16		Walking	24		Acceptable
		Summer	14		Standing	20	11%	Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	23		Acceptable
88	A	Spring	17		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	22		Acceptable
	B	Spring	20	18%	Uncomfortable	28	22%	Acceptable
		Summer	16	23%	Walking	23	28%	Acceptable
		Fall	20	25%	Uncomfortable	27	23%	Acceptable
		Winter	21	24%	Uncomfortable	29	21%	Acceptable
		Annual	20	25%	Uncomfortable	27	23%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
89	A	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	19	27%	Walking	27	23%	Acceptable
		Summer	14	17%	Standing	21	17%	Acceptable
		Fall	18	20%	Walking	25	14%	Acceptable
		Winter	19	19%	Walking	27	12%	Acceptable
		Annual	18	20%	Walking	25	14%	Acceptable
90	A	Spring	23		Uncomfortable	31		Acceptable
		Summer	16		Walking	23		Acceptable
		Fall	21		Uncomfortable	29		Acceptable
		Winter	22		Uncomfortable	30		Acceptable
		Annual	21		Uncomfortable	29		Acceptable
	B	Spring	23		Uncomfortable	30		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	20		Uncomfortable	28		Acceptable
		Winter	21		Uncomfortable	28		Acceptable
		Annual	20		Uncomfortable	28		Acceptable
91	A	Spring	19		Walking	28		Acceptable
		Summer	15		Standing	22		Acceptable
		Fall	17		Walking	26		Acceptable
		Winter	19		Walking	29		Acceptable
		Annual	18		Walking	27		Acceptable
	B	Spring	22	16%	Uncomfortable	29		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	20	18%	Uncomfortable	27		Acceptable
		Winter	21	11%	Uncomfortable	28		Acceptable
		Annual	20	11%	Uncomfortable	27		Acceptable
92	A	Spring	17		Walking	25		Acceptable
		Summer	13		Standing	20		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	16		Walking	24		Acceptable
	B	Spring	25	47%	Uncomfortable	33	32%	Unacceptable
		Summer	19	46%	Walking	25	25%	Acceptable
		Fall	23	44%	Uncomfortable	30	25%	Acceptable
		Winter	24	50%	Uncomfortable	33	32%	Unacceptable
		Annual	23	44%	Uncomfortable	31	29%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
93	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	11		Sitting	20		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	15	25%	Standing	23	21%	Acceptable
		Summer	13	44%	Standing	20	33%	Acceptable
		Fall	15	36%	Standing	23	28%	Acceptable
		Winter	16	45%	Walking	24	20%	Acceptable
		Annual	15	36%	Standing	23	28%	Acceptable
94	A	Spring	21		Uncomfortable	30		Acceptable
		Summer	17		Walking	26		Acceptable
		Fall	19		Walking	29		Acceptable
		Winter	21		Uncomfortable	31		Acceptable
		Annual	20		Uncomfortable	29		Acceptable
	B	Spring	17	-19%	Walking	26	-13%	Acceptable
		Summer	14	-18%	Standing	22	-15%	Acceptable
		Fall	15	-21%	Standing	25	-14%	Acceptable
		Winter	16	-24%	Walking	26	-16%	Acceptable
		Annual	16	-20%	Walking	25	-14%	Acceptable
95	A	Spring	12		Sitting	21		Acceptable
		Summer	10		Sitting	17		Acceptable
		Fall	12		Sitting	20		Acceptable
		Winter	12		Sitting	22		Acceptable
		Annual	11		Sitting	20		Acceptable
	B	Spring	11		Sitting	18	-14%	Acceptable
		Summer	8	-20%	Sitting	15	-12%	Acceptable
		Fall	10	-17%	Sitting	18		Acceptable
		Winter	11		Sitting	20		Acceptable
		Annual	11		Sitting	18		Acceptable
96	A	Spring	15		Standing	21		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	14		Standing	19		Acceptable
		Winter	15		Standing	21		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	12	-20%	Sitting	18	-14%	Acceptable
		Summer	9	-18%	Sitting	14	-12%	Acceptable
		Fall	11	-21%	Sitting	17	-11%	Acceptable
		Winter	12	-20%	Sitting	19		Acceptable
		Annual	11	-21%	Sitting	17	-15%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
97	A	Spring	18		Walking	26		Acceptable
		Summer	15		Standing	22		Acceptable
		Fall	17		Walking	25		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	17		Walking	26		Acceptable
	B	Spring	19		Walking	27		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	18		Walking	26		Acceptable
		Winter	20	11%	Uncomfortable	28		Acceptable
		Annual	18		Walking	26		Acceptable
98	A	Spring	19		Walking	25		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	17		Walking	23		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	17		Walking	23		Acceptable
	B	Spring	19		Walking	27		Acceptable
		Summer	16		Walking	22		Acceptable
		Fall	18		Walking	26	13%	Acceptable
		Winter	21	17%	Uncomfortable	30	20%	Acceptable
		Annual	19	12%	Walking	27	17%	Acceptable
99	A	Spring	16		Walking	23		Acceptable
		Summer	14		Standing	20		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	18	12%	Walking	26	13%	Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	17	13%	Walking	25	14%	Acceptable
		Winter	19	19%	Walking	27	12%	Acceptable
		Annual	17	13%	Walking	25	14%	Acceptable
100	A	Spring	21		Uncomfortable	28		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	19		Walking	27		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	19		Walking	26		Acceptable
	B	Spring	17	-19%	Walking	25	-11%	Acceptable
		Summer	13	-13%	Standing	19		Acceptable
		Fall	16	-16%	Walking	24	-11%	Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	17	-11%	Walking	24		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
101	A	Spring	17		Walking	26		Acceptable
		Summer	14		Standing	21		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	27		Acceptable
		Annual	16		Walking	25		Acceptable
	B	Spring	15	-12%	Standing	21	-19%	Acceptable
		Summer	13		Standing	18	-14%	Acceptable
		Fall	13	-19%	Standing	20	-17%	Acceptable
		Winter	15	-17%	Standing	23	-15%	Acceptable
		Annual	14	-12%	Standing	21	-16%	Acceptable
102	A	Spring	23		Uncomfortable	31		Acceptable
		Summer	18		Walking	24		Acceptable
		Fall	22		Uncomfortable	30		Acceptable
		Winter	24		Uncomfortable	32		Unacceptable
		Annual	22		Uncomfortable	30		Acceptable
	B	Spring	22		Uncomfortable	29		Acceptable
		Summer	18		Walking	24		Acceptable
		Fall	21		Uncomfortable	28		Acceptable
		Winter	23		Uncomfortable	31		Acceptable
		Annual	22		Uncomfortable	29		Acceptable
103	A	Spring	22		Uncomfortable	33		Unacceptable
		Summer	16		Walking	25		Acceptable
		Fall	20		Uncomfortable	31		Acceptable
		Winter	24		Uncomfortable	36		Unacceptable
		Annual	21		Uncomfortable	33		Unacceptable
	B	Spring	18	-18%	Walking	29	-12%	Acceptable
		Summer	13	-19%	Standing	22	-12%	Acceptable
		Fall	16	-20%	Walking	27	-13%	Acceptable
		Winter	20	-17%	Uncomfortable	32	-11%	Unacceptable
		Annual	18	-14%	Walking	29	-12%	Acceptable
104	A	Spring	21		Uncomfortable	30		Acceptable
		Summer	16		Walking	23		Acceptable
		Fall	19		Walking	29		Acceptable
		Winter	21		Uncomfortable	32		Unacceptable
		Annual	20		Uncomfortable	29		Acceptable
	B	Spring	14	-33%	Standing	23	-23%	Acceptable
		Summer	11	-31%	Sitting	19	-17%	Acceptable
		Fall	14	-26%	Standing	22	-24%	Acceptable
		Winter	15	-29%	Standing	25	-22%	Acceptable
		Annual	14	-30%	Standing	23	-21%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
105	A	Spring	24		Uncomfortable	32		Unacceptable
		Summer	18		Walking	25		Acceptable
		Fall	22		Uncomfortable	31		Acceptable
		Winter	24		Uncomfortable	34		Unacceptable
		Annual	23		Uncomfortable	32		Unacceptable
	B	Spring	14	-42%	Standing	23	-28%	Acceptable
		Summer	11	-39%	Sitting	19	-24%	Acceptable
		Fall	13	-41%	Standing	22	-29%	Acceptable
		Winter	15	-38%	Standing	25	-26%	Acceptable
		Annual	14	-39%	Standing	23	-28%	Acceptable
106	A	Spring	17		Walking	25		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	24		Acceptable
		Winter	18		Walking	26		Acceptable
		Annual	16		Walking	24		Acceptable
	B	Spring	11	-35%	Sitting	19	-24%	Acceptable
		Summer	9	-31%	Sitting	15	-21%	Acceptable
		Fall	11	-31%	Sitting	18	-25%	Acceptable
		Winter	12	-33%	Sitting	20	-23%	Acceptable
		Annual	11	-31%	Sitting	19	-21%	Acceptable
107	A	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	10	-33%	Sitting	17	-23%	Acceptable
		Summer	8	-33%	Sitting	14	-18%	Acceptable
		Fall	10	-29%	Sitting	16	-24%	Acceptable
		Winter	11	-31%	Sitting	18	-22%	Acceptable
		Annual	10	-33%	Sitting	17	-19%	Acceptable
108	A	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	13		Standing	18		Acceptable
	B	Spring	19	46%	Walking	27	42%	Acceptable
		Summer	15	50%	Standing	22	47%	Acceptable
		Fall	17	42%	Walking	25	39%	Acceptable
		Winter	19	36%	Walking	28	40%	Acceptable
		Annual	18	38%	Walking	26	44%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
109	A	Spring	16		Walking	26		Acceptable
		Summer	13		Standing	21		Acceptable
		Fall	15		Standing	24		Acceptable
		Winter	16		Walking	27		Acceptable
		Annual	15		Standing	25		Acceptable
	B	Spring	15		Standing	24		Acceptable
		Summer	13		Standing	21		Acceptable
		Fall	14		Standing	23		Acceptable
		Winter	15		Standing	25		Acceptable
		Annual	15		Standing	23		Acceptable
110	A	Spring	14		Standing	21		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	13		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	14		Standing	21		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
111	A	Spring	17		Walking	23		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	18		Walking	24		Acceptable
		Annual	16		Walking	22		Acceptable
	B	Spring	11	-35%	Sitting	16	-30%	Acceptable
		Summer	9	-36%	Sitting	13	-32%	Acceptable
		Fall	11	-31%	Sitting	16	-27%	Acceptable
		Winter	12	-33%	Sitting	18	-25%	Acceptable
		Annual	11	-31%	Sitting	16	-27%	Acceptable
112	A	Spring	13		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	10	-23%	Sitting	16	-20%	Acceptable
		Summer	9	-18%	Sitting	14	-12%	Acceptable
		Fall	10	-17%	Sitting	15	-17%	Acceptable
		Winter	11	-21%	Sitting	17	-15%	Acceptable
		Annual	10	-17%	Sitting	16	-16%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
113	A	Spring	9		Sitting	16		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	10		Sitting	16		Acceptable
		Annual	9		Sitting	15		Acceptable
	B	Spring	10	11%	Sitting	16		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10	11%	Sitting	16		Acceptable
		Winter	10		Sitting	17		Acceptable
		Annual	10	11%	Sitting	16		Acceptable
114	A	Spring	14		Standing	19		Acceptable
		Summer	11		Sitting	15		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	13		Standing	18		Acceptable
	B	Spring	10	-29%	Sitting	17	-11%	Acceptable
		Summer	8	-27%	Sitting	14		Acceptable
		Fall	10	-17%	Sitting	16	-11%	Acceptable
		Winter	10	-29%	Sitting	17	-15%	Acceptable
		Annual	10	-23%	Sitting	16	-11%	Acceptable
115	A	Spring	12		Sitting	18		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	16		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	9	-25%	Sitting	16	-11%	Acceptable
		Summer	8	-20%	Sitting	13	-13%	Acceptable
		Fall	9	-18%	Sitting	15		Acceptable
		Winter	9	-25%	Sitting	16	-11%	Acceptable
		Annual	9	-18%	Sitting	15	-12%	Acceptable
116	A	Spring	13		Standing	19		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	15	15%	Standing	21	11%	Acceptable
		Summer	13	18%	Standing	18	12%	Acceptable
		Fall	14	17%	Standing	20	11%	Acceptable
		Winter	15	15%	Standing	21	11%	Acceptable
		Annual	14	17%	Standing	20	11%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
117	A	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	22		Acceptable
	B	Spring	15		Standing	22		Acceptable
		Summer	11	-15%	Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	14	-18%	Standing	22		Acceptable
		Annual	14	-12%	Standing	21		Acceptable
118	A	Spring	12		Sitting	18		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	13		Standing	19		Acceptable
		Summer	10		Sitting	14		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	13		Standing	18		Acceptable
		Annual	12		Sitting	17		Acceptable
119	A	Spring	9		Sitting	15		Acceptable
		Summer	8		Sitting	12		Acceptable
		Fall	9		Sitting	14		Acceptable
		Winter	9		Sitting	15		Acceptable
		Annual	9		Sitting	14		Acceptable
	B	Spring	9		Sitting	15		Acceptable
		Summer	7	-12%	Sitting	11		Acceptable
		Fall	9		Sitting	14		Acceptable
		Winter	9		Sitting	14		Acceptable
		Annual	9		Sitting	13		Acceptable
120	A	Spring	15		Standing	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	14		Standing	20		Acceptable
		Summer	11		Sitting	15	-12%	Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	14	-12%	Standing	20	-13%	Acceptable
		Annual	13	-13%	Standing	19		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
121	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
122	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
123	A	Spring	11		Sitting	17		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	12		Sitting	18		Acceptable
		Summer	10	11%	Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	12		Sitting	17		Acceptable
124	A	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	11		Sitting	17		Acceptable
		Summer	8	-11%	Sitting	13		Acceptable
		Fall	10		Sitting	16		Acceptable
		Winter	11		Sitting	18		Acceptable
		Annual	10		Sitting	16		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
125	A	Spring	9		Sitting	15		Acceptable
		Summer	7		Sitting	12		Acceptable
		Fall	9		Sitting	15		Acceptable
		Winter	10		Sitting	16		Acceptable
		Annual	9		Sitting	15		Acceptable
	B	Spring	10	11%	Sitting	16		Acceptable
		Summer	8	14%	Sitting	13		Acceptable
		Fall	10	11%	Sitting	15		Acceptable
		Winter	10		Sitting	16		Acceptable
		Annual	10	11%	Sitting	15		Acceptable
126	A	Spring	11		Sitting	19		Acceptable
		Summer	9		Sitting	16		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	20		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
127	A	Spring	16		Walking	23		Acceptable
		Summer	12		Sitting	18		Acceptable
		Fall	15		Standing	22		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	16		Walking	24		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	16		Walking	23		Acceptable
		Winter	17		Walking	25		Acceptable
		Annual	16		Walking	23		Acceptable
128	A	Spring	16		Walking	25		Acceptable
		Summer	12		Sitting	19		Acceptable
		Fall	15		Standing	24		Acceptable
		Winter	17		Walking	26		Acceptable
		Annual	15		Standing	24		Acceptable
	B	Spring	15		Standing	24		Acceptable
		Summer	11		Sitting	18		Acceptable
		Fall	15		Standing	23		Acceptable
		Winter	16		Walking	25		Acceptable
		Annual	15		Standing	23		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
129	A	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
	B	Spring	-		-	-		-
		Summer	-		-	-		-
		Fall	-		-	-		-
		Winter	-		-	-		-
		Annual	-		-	-		-
130	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	18		Acceptable
	B	Spring	11		Sitting	17	-11%	Acceptable
		Summer	9		Sitting	13		Acceptable
		Fall	10		Sitting	16	-11%	Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
131	A	Spring	14		Standing	21		Acceptable
		Summer	11		Sitting	17		Acceptable
		Fall	14		Standing	20		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	21		Acceptable
	B	Spring	12	-14%	Sitting	19		Acceptable
		Summer	9	-18%	Sitting	15	-12%	Acceptable
		Fall	11	-21%	Sitting	18		Acceptable
		Winter	13	-13%	Standing	20	-13%	Acceptable
		Annual	12	-14%	Sitting	19		Acceptable
132	A	Spring	17		Walking	23		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	16		Walking	22		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	17		Walking	23		Acceptable
	B	Spring	13	-24%	Standing	19	-17%	Acceptable
		Summer	10	-23%	Sitting	15	-17%	Acceptable
		Fall	12	-25%	Sitting	18	-18%	Acceptable
		Winter	14	-22%	Standing	21	-16%	Acceptable
		Annual	13	-24%	Standing	19	-17%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
133	A	Spring	16		Walking	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable
	B	Spring	10	-38%	Sitting	17	-23%	Acceptable
		Summer	8	-33%	Sitting	13	-24%	Acceptable
		Fall	10	-33%	Sitting	16	-24%	Acceptable
		Winter	11	-35%	Sitting	18	-25%	Acceptable
		Annual	10	-33%	Sitting	16	-27%	Acceptable
134	A	Spring	18		Walking	24		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	17		Walking	23		Acceptable
		Winter	19		Walking	26		Acceptable
		Annual	17		Walking	24		Acceptable
	B	Spring	10	-44%	Sitting	16	-33%	Acceptable
		Summer	8	-43%	Sitting	12	-37%	Acceptable
		Fall	9	-47%	Sitting	15	-35%	Acceptable
		Winter	11	-42%	Sitting	17	-35%	Acceptable
		Annual	10	-41%	Sitting	16	-33%	Acceptable
135	A	Spring	15		Standing	22		Acceptable
		Summer	13		Standing	18		Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	16		Walking	23		Acceptable
		Annual	15		Standing	21		Acceptable
	B	Spring	17	13%	Walking	25	14%	Acceptable
		Summer	15	15%	Standing	21	17%	Acceptable
		Fall	16	14%	Walking	23		Acceptable
		Winter	16		Walking	24		Acceptable
		Annual	16		Walking	23		Acceptable
136	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	11		Sitting	16		Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	18	50%	Walking	26	37%	Acceptable
		Summer	16	60%	Walking	23	53%	Acceptable
		Fall	17	55%	Walking	24	50%	Acceptable
		Winter	17	31%	Walking	25	32%	Acceptable
		Annual	17	55%	Walking	25	47%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
137	A	Spring	13		Standing	20		Acceptable
		Summer	10		Sitting	16		Acceptable
		Fall	13		Standing	20		Acceptable
		Winter	14		Standing	22		Acceptable
		Annual	13		Standing	20		Acceptable
	B	Spring	15	15%	Standing	23	15%	Acceptable
		Summer	12	20%	Sitting	18	12%	Acceptable
		Fall	14		Standing	21		Acceptable
		Winter	15		Standing	23		Acceptable
		Annual	14		Standing	22		Acceptable
138	A	Spring	18		Walking	24		Acceptable
		Summer	15		Standing	20		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	20		Uncomfortable	27		Acceptable
		Annual	18		Walking	24		Acceptable
	B	Spring	12	-33%	Sitting	19	-21%	Acceptable
		Summer	10	-33%	Sitting	15	-25%	Acceptable
		Fall	11	-35%	Sitting	17	-29%	Acceptable
		Winter	12	-40%	Sitting	19	-30%	Acceptable
		Annual	11	-39%	Sitting	18	-25%	Acceptable
139	A	Spring	14		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	12		Sitting	18		Acceptable
		Winter	14		Standing	20		Acceptable
		Annual	13		Standing	19		Acceptable
	B	Spring	19	36%	Walking	26	30%	Acceptable
		Summer	15	36%	Standing	20	25%	Acceptable
		Fall	17	42%	Walking	23	28%	Acceptable
		Winter	19	36%	Walking	26	30%	Acceptable
		Annual	17	31%	Walking	24	26%	Acceptable
140	A	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	17		Acceptable
		Winter	12		Sitting	18		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	22	100%	Uncomfortable	29	61%	Acceptable
		Summer	17	89%	Walking	23	53%	Acceptable
		Fall	20	82%	Uncomfortable	26	53%	Acceptable
		Winter	22	83%	Uncomfortable	29	61%	Acceptable
		Annual	20	82%	Uncomfortable	27	59%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
141	A	Spring	14		Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13		Standing	19		Acceptable
		Winter	15		Standing	22		Acceptable
		Annual	14		Standing	20		Acceptable
	B	Spring	11	-21%	Sitting	18		Acceptable
		Summer	8	-27%	Sitting	14	-12%	Acceptable
		Fall	10	-23%	Sitting	16	-16%	Acceptable
		Winter	11	-27%	Sitting	18	-18%	Acceptable
		Annual	10	-29%	Sitting	17	-15%	Acceptable
142	A	Spring	12		Sitting	19		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	19		Acceptable
		Winter	14		Standing	21		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	17	-11%	Acceptable
		Winter	13		Standing	19		Acceptable
		Annual	12		Sitting	18		Acceptable
143	A	Spring	16		Walking	22		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	15		Standing	21		Acceptable
		Winter	17		Walking	24		Acceptable
		Annual	16		Walking	22		Acceptable
	B	Spring	14	-12%	Standing	20		Acceptable
		Summer	11		Sitting	16		Acceptable
		Fall	13	-13%	Standing	19		Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	14	-12%	Standing	20		Acceptable
144	A	Spring	12		Sitting	19		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	13		Standing	20		Acceptable
		Annual	12		Sitting	19		Acceptable
	B	Spring	11		Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
145	A	Spring	12		Sitting	20		Acceptable
		Summer	9		Sitting	15		Acceptable
		Fall	11		Sitting	18		Acceptable
		Winter	11		Sitting	19		Acceptable
		Annual	11		Sitting	18		Acceptable
	B	Spring	14	17%	Standing	22		Acceptable
		Summer	10	11%	Sitting	16		Acceptable
		Fall	13	18%	Standing	20	11%	Acceptable
		Winter	13	18%	Standing	21	11%	Acceptable
		Annual	13	18%	Standing	20	11%	Acceptable
146	A	Spring	11		Sitting	16		Acceptable
		Summer	8		Sitting	12		Acceptable
		Fall	10		Sitting	15		Acceptable
		Winter	10		Sitting	16		Acceptable
		Annual	10		Sitting	15		Acceptable
	B	Spring	12		Sitting	17		Acceptable
		Summer	9	12%	Sitting	13		Acceptable
		Fall	11		Sitting	16		Acceptable
		Winter	11		Sitting	17		Acceptable
		Annual	11		Sitting	16		Acceptable
147	A	Spring	13		Standing	18		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	12		Sitting	17		Acceptable
		Winter	14		Standing	18		Acceptable
		Annual	12		Sitting	17		Acceptable
	B	Spring	11	-15%	Sitting	18		Acceptable
		Summer	9		Sitting	14		Acceptable
		Fall	10	-17%	Sitting	17		Acceptable
		Winter	12	-14%	Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
148	A	Spring	18		Walking	26		Acceptable
		Summer	15		Standing	21		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	18		Walking	26		Acceptable
	B	Spring	16	-11%	Walking	23	-12%	Acceptable
		Summer	13	-13%	Standing	18	-14%	Acceptable
		Fall	15	-17%	Standing	22	-12%	Acceptable
		Winter	17	-15%	Walking	25	-11%	Acceptable
		Annual	16	-11%	Walking	22	-15%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
149	A	Spring	19		Walking	26		Acceptable
		Summer	16		Walking	21		Acceptable
		Fall	18		Walking	25		Acceptable
		Winter	20		Uncomfortable	28		Acceptable
		Annual	19		Walking	26		Acceptable
	B	Spring	25	32%	Uncomfortable	31	19%	Acceptable
		Summer	20	25%	Uncomfortable	24	14%	Acceptable
		Fall	23	28%	Uncomfortable	28	12%	Acceptable
		Winter	25	25%	Uncomfortable	31	11%	Acceptable
		Annual	23	21%	Uncomfortable	29	12%	Acceptable
150	A	Spring	12		Sitting	18		Acceptable
		Summer	10		Sitting	15		Acceptable
		Fall	10		Sitting	17		Acceptable
		Winter	12		Sitting	19		Acceptable
		Annual	11		Sitting	17		Acceptable
	B	Spring	16	33%	Walking	22	22%	Acceptable
		Summer	12	20%	Sitting	17	13%	Acceptable
		Fall	15	50%	Standing	21	24%	Acceptable
		Winter	17	42%	Walking	24	26%	Acceptable
		Annual	15	36%	Standing	22	29%	Acceptable
151	A	Spring	18		Walking	25		Acceptable
		Summer	14		Standing	19		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	17		Walking	24		Acceptable
	B	Spring	12	-33%	Sitting	19	-24%	Acceptable
		Summer	9	-36%	Sitting	15	-21%	Acceptable
		Fall	11	-35%	Sitting	18	-25%	Acceptable
		Winter	12	-33%	Sitting	19	-24%	Acceptable
		Annual	11	-35%	Sitting	18	-25%	Acceptable
152	A	Spring	15		Standing	20		Acceptable
		Summer	12		Sitting	17		Acceptable
		Fall	13		Standing	18		Acceptable
		Winter	15		Standing	20		Acceptable
		Annual	14		Standing	19		Acceptable
	B	Spring	16		Walking	21		Acceptable
		Summer	14	17%	Standing	18		Acceptable
		Fall	14		Standing	20	11%	Acceptable
		Winter	16		Walking	22		Acceptable
		Annual	15		Standing	20		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Multiple Seasons

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
153	A	Spring	17		Walking	25		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	17		Walking	24		Acceptable
		Winter	18		Walking	25		Acceptable
		Annual	16		Walking	24		Acceptable
	B	Spring	16		Walking	23		Acceptable
		Summer	13		Standing	19		Acceptable
		Fall	15	-12%	Standing	22		Acceptable
		Winter	16	-11%	Walking	24		Acceptable
		Annual	15		Standing	22		Acceptable

Configurations		Mean Wind Criteria Speed (mph)		Effective Gust Criteria (mph)	
A	No Build	≤ 12	Comfortable for Sitting	≤ 31	Acceptable
B	Build	13 - 15	Comfortable for Standing	> 31	Unacceptable
		16 - 19	Comfortable for Walking		
		20 - 27	Uncomfortable for Walking		
		> 27	Dangerous Conditions		

1) Wind Speeds are for a 1% probability of exceedance; and,

2) % Change is based on comaprison with Configuration A and only those that are greater than 10% are listed

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MEMORANDUM

DATE:	2018-01-24	**RWDI REFERENCE #:** 1702588
TO:	Christine McVay	**EMAIL:** Christine.McVay@stantec.com
FROM:	Bill Smeaton	**Email:** Bill.Smeaton@rwdi.com
	Kevin Bauman	**Email:** Kevin.Bauman@rwdi.com
RE:	**Pedestrian Wind Study - Commentary Regarding Massing Changes** **Exchange South End** **Boston, MA**	

Wind tunnel testing was conducted in September, 2017 to assess the pedestrian wind conditions for the proposed Exchange South End development (Project) in Boston, MA. This assessment included wind tunnel testing of a 1:300 scale model of the proposed development. The detailed results of this study, photos of the wind tunnel study model, an in-depth discussion of the methodology of wind tunnel studies for pedestrian wind conditions and the description of local climate were provided in a report submitted on September 19, 2017.

The results of the study can be summarized as follows;

- The effective gust criterion was met for the majority of sensor locations around the existing site with the exception of two locations to the southwest of the Project site. The construction of the Project is expected to improve wind conditions at these two locations and results in no exceedances of the effective gust criterion on or off site.

- In general, the mean speed wind conditions for the existing site are comfortable for walking or better with the exception of a few uncomfortable conditions to the southwest. Similar conditions are anticipated with the addition of the proposed Project. However, an increased number of uncomfortable conditions is predicted within the Project site. No dangerous wind conditions are detected at any location on an annual basis.

Since the completion of wind tunnel testing and submission of the Pedestrian Wind Study report, design changes have led to variants between the wind tunnel model tested and the currently designed Project massing. These variants are summarized and discussed below and can be referred to the site plan shown in **Image 1.**

1. Building B has been lowered by 2 floors
2. The north corner of Building B along Albany St is pushed back at the ground floor level, and pushed forward at the upper floors
3. Building B along Albany street has new massing protrusions
4. 3 additional floors have been added to Building C
5. Building C cantilevers out over the easement at level 4 instead of level 3
6. There are no changes to Building A and Building D

Image 1: Annotated Site Plan

These variants have been reviewed and analyzed by RWDI and are not expected to have a significant impact on the pedestrian wind conditions previously presented in the Pedestrian Wind Study report. On Building C, the three additional floors and the cantilevers over the easement at Level 4 being moved to Level 3 instead are expected to have little to no impact on the predicted wind conditions. The largest variance occurs at the northeast corner of the Block B building. For the wind tunnel test results previously presented, canopies were included along the north and east facades to reduce the effects of winds that intercepted the façade at a higher elevation, down-washed to grade and subsequently accelerated around the corner. However, in the revised design, these canopies have been removed which could result in increased wind speeds to those presented in the previously submitted Pedestrian Wind Study report. Additionally, alterations to the protrusions along the north façade have been made which could also result in an increase to wind speeds, but the proposed banners on the north façade may reduce the wind activity slightly. These changes are identified in **Image 2** below.

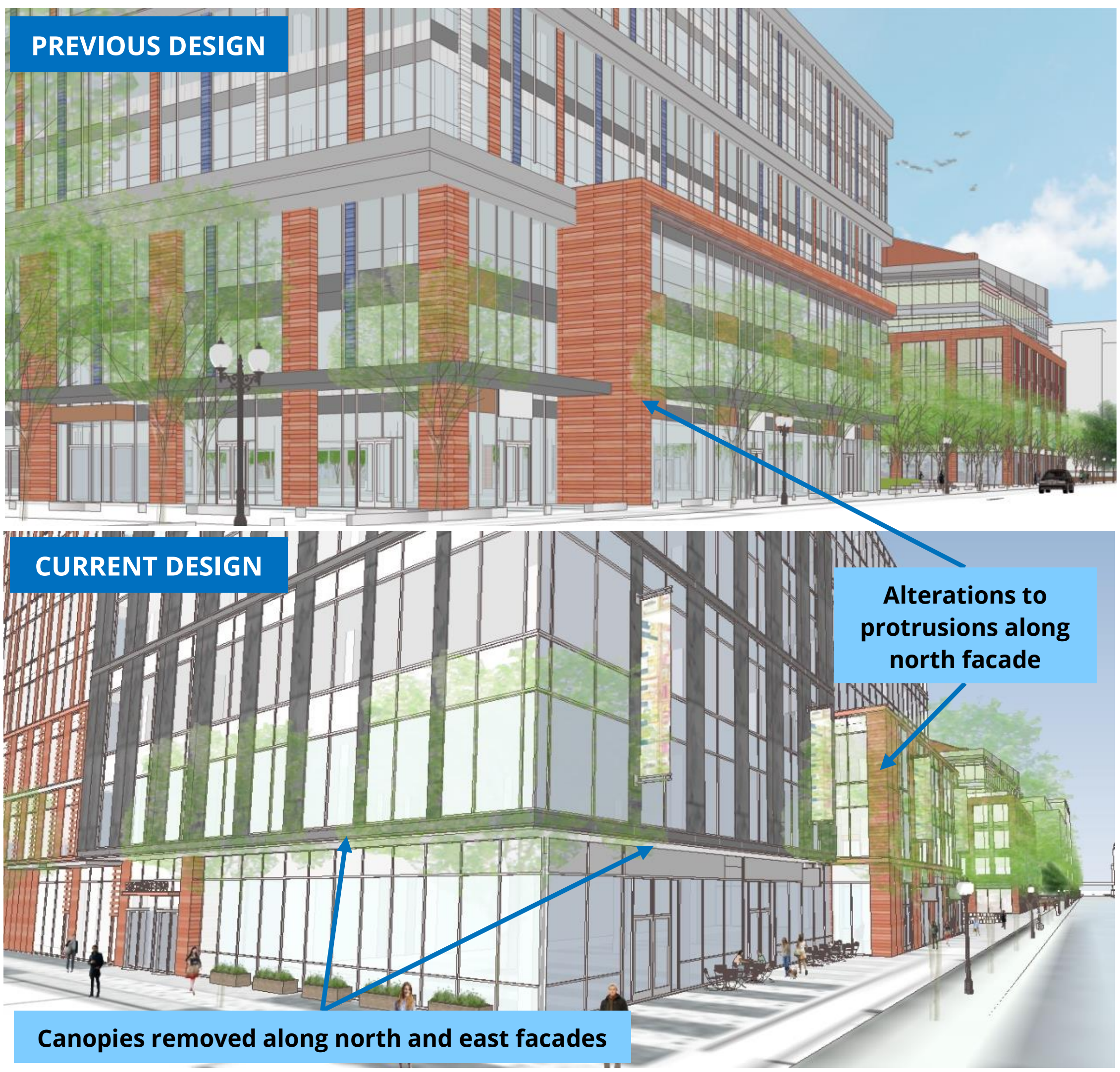

Image 2: Comparison of Previous and Current designs – Northeast Corner

It should be noted that existing landscaping along adjacent streets was not modeled in the wind tunnel testing. Typically, landscaping is not modeled to provide a worst-case exposure baseline. Landscaping does provide localized wind protection, especially during the summer, therefore the results presented in the previous Pedestrian Wind Study report are conservative.

The proposed landscaping identified in the site plan in **Image 1** in combination with existing landscaping in the surrounding area is expected to provide improvement to the wind conditions previously presented in the Pedestrian Wind Study report issued on September 19, 2017. However, as increased wind speeds occur primarily during the winter, it is advised that any landscaping that is selected be a coniferous or marcescent species. These species retain their foliage during the winter and therefore provide sheltering affects throughout the year. Additionally, landscaping should be complimented with dense underplantings in raised planters. This will help to provide protection from higher vertical winds as well as lower horizontal winds. Hardscaping elements such as screens and trellises can also be considered for wind control throughout the year.

We hope the enclosed meets your present requirements. Please contact us if you have any questions or comments regarding the presented material.

Appendix B

Air Quality Modeling Assumptions and Back-Up Data

AIR QUALITY APPENDIX

Introduction

This Air Quality Appendix provides modeling assumptions and backup for results presented in Section 3.6 of the report. Included within this documentation is a brief description of the methodology employed along with pertinent calculations and data used in the emissions and dispersion calculations supporting the microscale air quality analysis.

Motor Vehicle Emissions

The EPA MOVES computer program generated motor vehicle emissions used in the garage stationary source analysis along with the mobile source CAL3QHC modeling and mesoscale analysis. The model input parameters were provided by MassDEP. Emission rates were derived for 2017 and 2024 for speed limits of idle, 10, 15, and 25mph for use in the microscale analyses.

MOVES CO Emission Factor Summary

Carbon Monoxide Only

		2017	2024
Free Flow	25 mph	2.611	1.758
Right Turns	10 mph	4.058	2.693
Left Turns	15 mph	3.508	2.369
Queues	Idle	8.013	3.216

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

CAL3QHC

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

Raw Air Quality Monitor Background Concentrations

POLLUTANT	AVERAGING TIME	Form	2014	2015	2016	Units	ppm/ppb to µg/m³ Conversion Factor	2014-2016 Background Concentration (µg/m³)	Location
SO_2 (1)(6)	1-Hour (5)	99th %	12.3	9.4	4.7	ppb	2.62	23.1	Harrison Ave., Boston
	3-Hour	H2H	21.5	8.7	5.1	ppb	2.62	56.3	Harrison Ave., Boston
	24-Hour	H2H	5.1	4.3	1.9	ppb	2.62	13.4	Harrison Ave., Boston
	Annual	H	1.057204	0.795953	0.458538	ppb	2.62	2.8	Harrison Ave., Boston
PM-10	24-Hour	H2H	61	28	29	µg/m³	1	61	Harrison Ave., Boston
	Annual	H	13.97479	12.361345	11.826531	µg/m³	1	14.0	Harrison Ave., Boston
PM-2.5	24-Hour (5)	98th %	17.6	19	16.3	µg/m³	1	17.6	Harrison Ave., Boston
	Annual (5)	H	8.0405539	8.811331	6.231933	µg/m³	1	7.7	Harrison Ave., Boston
NO_2 (3)	1-Hour (5)	98th %	51	53	49	ppb	1.88	95.9	Harrison Ave., Boston
	Annual	H	15.759425	14.970182	13.198638	ppb	1.88	29.6	Harrison Ave., Boston
CO (2)	1-Hour	H2H	1.713	1.362	2.409	ppm	1146	2760.7	Harrison Ave., Boston
	8-Hour	H2H	1.3	0.9	1.8	ppm	1146	2062.8	Harrison Ave., Boston
Ozone (4)	8-Hour	H4H	0.054	0.056	0.058	ppm	1963	113.9	Harrison Ave., Boston
Lead	3-Month	H	0.0142	0.0157	0.0174	µg/m³	1	0.017	Harrison Ave., Boston

Notes:
From 2014-2016 EPA's AirData Website
[1] SO_2 reported ppb. Converted to µg/m³ using factor of 1 ppm = 2.62 µg/m³.
[2] CO reported in ppm. Converted to µg/m³ using factor of 1 ppm = 1146 µg/m³.
[3] NO_2 reported in ppb. Converted to µg/m³ using factor of 1 ppm = 1.88 µg/m³.
[4] O_3 reported in ppm. Converted to µg/m³ using factor of 1 ppm = 1963 µg/m³.
[5] Background level is the average concentration of the three years.
[6] The 24-hour and Annual standards were revoked by EPA on June 22, 2010, Federal Register 75-119, p. 35520.

Model Input/Output Files

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

Appendix C

Transportation (Available Upon Request)

Appendix D

Climate Resiliency Checklist & LEED Project Checklist

Climate Resiliency Checklist

boston planning & development agency

NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

A.1 - Project Information

Project Name:	Exchange South End			
Project Address:	540 Albany Street Boston MA, 02118			
Project Address Additional:	n/a			
Filing Type (*select*)	*Initial (PNF, **EPNF**, NPC or other substantial filing)* *Design / Building Permit (prior to final design approval), or* *Construction / Certificate of Occupancy (post construction completion)*			
Filing Contact	*Christine McVay*	*Stantec*	*Christine.McVay@Stantec.com*	*617-654-6096*
Is MEPA approval required	***Yes**/no*		*1/23/2018*	

A.3 - Project Team

Owner / Developer:	The Abbey Group
Architect:	Stantec
Engineer:	WSP
Sustainability / LEED:	Stantec
Permitting:	Stantec
Construction Management:	Suffolk

A.3 - Project Description and Design Conditions

List the principal Building Uses:	Lab/Office
List the First Floor Uses:	Retail/Lobby/Community Space/Service
List any Critical Site Infrastructure and or Building Uses:	Research (level 2, up), Switchgear (pad-mounted, elevation 24'-0", backup diesel storage above top level of garage

Site and Building:

Site Area:	246,145 *SF*	Building Area:	1,599,425 *SF*
Building Height:	130'-0" to 318'-0" *Ft*	Building Height:	6-23 Floors
Existing Site Elevation – Low:	*16.5 Ft BCB*	Existing Site Elevation – High:	*18.5 Ft BCB*
Proposed Site Elevation – Low:	*18.5 Ft BCB*	Proposed Site Elevation – High:	*19.5 Ft BCB*
Proposed First Floor Elevation:	*19.5 Ft BCB*	Below grade levels:	*3 Stories*

Article 37 Green Building:

LEED Version - Rating System :	LEED-NCv4	LEED Certification:	*Equivalency*
Proposed LEED rating:	*Certified/Silver/ **Gold**/Platinum*	Proposed LEED point score:	*65 Pts.*

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined	*Energy loads were determined by the MEP engineer utilizing eQuest software for energy modeling.*		
Annual Electric:	36,541,524 *(kWh)*	Peak Electric:	11,935 *(kW)*
Annual Heating:	54,926 *(MMbtu/hr)*	Peak Heating:	34,811 kbtu/hr
Annual Cooling:	6,413,463 Ton-hrs (76,961 MMbtu)	Peak Cooling:	10,710 *(Tons)*
Energy Use - Below ASHRAE 90.1 - 2013:	*12.1 %*	Have the local utilities reviewed the building energy performance?:	*Yes / **no***
Energy Use - Below Mass. Code:	*12.1 %*	Energy Use Intensity:	*115.5 (kBtu/SF)*

Back-up / Emergency Power System

Electrical Generation Output:	*10,500 (kW)*	Number of Power Units:	4
System Type:	*10,500 (kW)*	Fuel Source:	diesel

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

Electric:	*10,500 (kW)*	Heating:	*0 (MMbtu/hr)*
		Cooling:	*0 (Tons/hr)*

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

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

B.1 – GHG Emissions - Design Conditions

For this Filing - Annual Building GHG Emissions:	*19,072 (Tons)*

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

Energy has been a priority since the beginning. We have been dynamically modeling energy uses of the buildings since their inception with our MEP engineer and have looked at multiple strategies for increasing efficiencies above the minimum goals above baseline moving forward, including: enhance envelope/glazing, enhanced systems (heat recovery, chiller heat recovery, and CHP), reduced SHGC, reduced window-wall ratios, 30% LPD reduction, energy star appliance policy, and inclusion of PV. These results have been shared iteratively between the design team and the owner since concept design.

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

The masses of the buildings were selected due to maximizing daylight onto the plaza and thus will also benefit from daylighting themselves. We may explore natural ventilation as an option for parts of the buildings, but given their size/program/location, this may not yield much benefit. Building systems will consider these options as the design progresses, including LPD reductions from daylight, and glare/energy reduction from potential glazing improvements, including the exploration of dynamic glass.

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

We will explore DR, PV-ready, and CHP. Additionally, we are looking at use of air-air systems and potentially chilled beams – to be decided later by the client. Controls for lighting and occupancy will be tied to regularly occupied spaces, and lighting will feature efficient all-LED systems.

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

We will incorporate BAS to help regulate building loads, as well as are considering full M&V per LEEDv4 for energy and water using systems to control and monitor consumption. Each building will seek to reduce its loads while maintaining long-term flexibility between office and lab tenanting. We will explore renewables and design the buildings to be PV-ready, as well as DR-ready. Currently, our EV stations can be used as an energy storage facility, which can expand over time. We will explore further options for this, as well as potential areas for onsite storage, as this trend develops for future adaptation.

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

We are exploring DR, PV options, and CHP options currently. Additionally, we will utilize smart controls in the buildings, as well as EV stations to meet BTD requirements. Additionally, we will look at energy storage options and how to roll them out over time. Currently, we are not considering central plants so as to allow flexibility later in case the Owner wishes to sell one or more of the buildings. We are planning to promote active transportation, as well as providing a plan for renewables (rooftop PV) should the uses change from lab to office in buildings A and B.

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

We plan to engage the utility provider once the permitting phase is complete to take advantage of their incentives programs.

B.2 - GHG Reduction - Adaptation Strategies

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

The building/systems may evolve to further reduce GHG over time through inclusion of metering, tenant guidelines, energy conservation measures, opportunities for renewables, and exploring energy storage options as they emerge and as systems get upgraded. The project team will continue to evaluate energy conservation strategies during the design phase of the project. Several additional strategies have been identified for further investigation:

- Reduce overall glass percentage to less than 40% of wall
- Optimize wall and roof U-value
- Optimize glass SHGC
- Reduce lighting power density by 30%, or more
- Increase heat recovery effectiveness
- Implement chiller heat recovery
- Combined Heat and Power (CHP)
- Photovoltaic array (PV)

It is intended that these buildings will be designed with the infrastructure in place for a CHP or PV System. An economic analysis will be conducted during the design phase of each project. With involvement and input from the utility, including the utility's approval to connect back into the grid, such a system can be further evaluated.

It is important to note that full build-out of each building is many years out. Given this timeframe, it is anticipated that energy conservation technologies will advance providing additional, potentially more viable options than a CHP or PV system. Therefore, the Proponent is committed to continuing to evaluate the feasibility and benefits of each system as well as other technologies for comparative purposes.

C - Extreme Heat Events

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

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low:	*22-36 Deg.*	Temperature Range - High:	*66-82 Deg.*
Annual Heating Degree Days:	295.9	Annual Cooling Degree Days	1,783.1

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

Days - Above 90°:	*10*	Days – Above 100°:	*1*
Number of Heatwaves / Year:	*1*	Average Duration of Heatwave (Days):	*7 days*

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

Buildings will feature a mixture of hi-albedo rooftops with some integrated intensive/extensive rooftops, where appropriate. Additionally, the site will feature a large open plaza with hi-albedo reflective materials, green space, and many shade trees. Additionally, there are many canopies and awnings designed for shade, protections from elements, and to reduce negative wind impacts.

C.2 - Extreme Heat – Adaptation Strategies

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

As part of the energy modeling process, climate files that reflect the predicted increase in temperature have been used to better understand how the buildings and their systems would perform under different climate conditions. (This understanding can then be taken into account when designing major plant and overall HVAC systems.)

100% of the rooftops will feature LEEDv4-compliant hi-albedo rooftops, and some lower-level roofs will feature greened terraces to reduce building-related heat island effects. The site will additionally feature light colored paving, green space, and shade from trees and buildings to cool the microclimate within the park – all LEEDv4-compliant. Increased building insulation will also help mitigate increasing external pressures over time. MEP systems will be designed to accommodate for change, as well as for flexibility when the time comes to replace the systems with newer models as time progresses. Lastly, the BAS in each building will be able to adjust to real-time monitoring data to provide IAQ quality despite external conditions.

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

Building rooftops can be used as an area of refuge in case of long-term disrupt (i.e. prolonged flooding). Ground floors will be wet flood-proofed so as to recover quickly from an event. Ground floor MEP will be elevated above the 500-year flood plain on platforms that can rise over time with flexible connections. We will explore opportunities for natural ventilated spaces within each building so that long-term power outage won't result in stagnant air and also extensive daylighting so that visual tasks can be achieved during daylight hours during power outages.

During power outages, building emergency and life safety systems (i.e., fire-pump pressurizing sprinkler and standpipe systems, egress lighting, smoke evacuation systems, heat and smoke detection and alarm systems, emergency communications and first-responder's elevator systems) will all be powered by diesel emergency generators in each building and the Garage. Emergency generators will be sized to operate long enough to safely fight a fire or to evacuate the building (i.e., 8-10 hours), as required by code. Generally, the emergency generators will be roof-mounted and air-cooled. All fuel supplies will be protected from the effects of extreme weather and potential flooding, and could be enhanced to provide running time greater than required by current codes in order to provide continued safety features for extended periods to account for the possibility that fuel supply to fill the tanks could be interrupted. To run for longer periods, emergency generators require bigger fuel tanks, which add expense and take up valuable building space making them cost- prohibitive as they would stand idle most of the time. As design progresses, the Proponent is committed to exploring expanding the size of emergency generators to allow for select common areas and other emergency and life safety systems to remain operational for a period of time beyond the code requirement, specifically in residential buildings. Additionally, on-site renewable energy systems, if applicable, could be utilized to power and, therefore, extend the operations of emergency and life safety systems.

D - Extreme Precipitation Events

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

D.1 – Extreme Precipitation - Design Conditions

10 Year, 24 Hour Design Storm: *4 In.*

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

The site will capture the first inch of rainfall and store it onsite. Rooftops will harvest water for irrigation and potentially toilet flushing. Additional rain will go into an onsite infiltration pit to recharge the aquifer, beneath the plaza. Site absorptivity will be encouraged through the main green space, plants, trees, green strips, and green roofs (where appropriate).

D.2 - Extreme Precipitation - Adaptation Strategies

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

The site can accommodate additional green roof in the future as needed, as well as contains additional capacity to store and reuse rainwater within the site (additional below-grade cisterns in the park). Infiltration pits will be sized to accommodate potential for increased precipitation.
Note: we are meeting the 3-points/Regional Priority credit for “Rainwater Management” within LEEDv4.

E – Sea Level Rise and Storms

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

Is any portion of the site in a FEMA SFHA?	*Yes / **No***	What Zone:	n/a
		Current FEMA SFHA Zone Base Flood Elevation:	*18.5Ft BCB*

Is any portion of the site in a BPDA Sea Level Rise - Flood Hazard Area? Use the online [BPDA SLR-FHA Mapping Tool]() to assess the susceptibility of the project site.	*Yes / **No***

If you answered YES to either of the above questions, please complete the following questions.
Otherwise you have completed the questionnaire; thank you!

E.1 – Sea Level Rise and Storms – Design Conditions

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented on the BPDA Sea Level Rise - Flood Hazard Area (SLR-FHA) map, which depicts a modeled 1% annual chance coastal flood event with 40 inches of sea level rise (SLR). Use the online BPDA SLR-FHA Mapping Tool to identify the highest Sea Level Rise - Base Flood Elevation for the site. The Sea Level Rise - Design Flood Elevation is determined by adding either 24" of freeboard for critical facilities and infrastructure and any ground floor residential units OR 12" of freeboard for other buildings and uses.

Sea Level Rise - Base Flood Elevation:	*18.5 Ft BCB*		
Sea Level Rise - Design Flood Elevation:	*18.5 Ft BCB*	First Floor Elevation:	*19.5 Ft BCB*
Site Elevations at Building:	*16.6-18.5 Ft BCB*	Accessible Route Elevation:	*19.5 Ft BCB*

Describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, wave / velocity breaks, storm water systems, utility services, etc.:

We will consider moving flood gates into critical entries in the event of flooding, as well as shall elevate all critical infrastructure and program above elevation 24'(or above Level 1). Soft barriers include landscaping, green roofs, and retention pits. Given our location, we are not worried about velocity from storm surge. Additionally, we will make sure that backup power supply and fuel sources are located above the garage, rather than in the lowest level. Lobbies and retail spaces at grade will be designed to be wet-flood-proofed in the event of flooding with the potential for operable windows for retail/restaurant where appropriate to ease cleaning and maintenance post-event. Storage within the building can accommodate protective deployable barriers, if they are seen fit by the owner/operator. Backflow prevention will be designed into the space to protect drains and waste conveyance systems, and utility access routes will be protected and easily accessible for routine maintenance. Absorptivity onsite will be promoted through building and site-integrated landscaping.

Describe how the proposed Building Design Flood Elevation will be achieved including dry / wet flood proofing, critical systems protection, utility service protection, temporary flood barriers, waste and drain water back flow prevention, etc.:

We will elevate the building to the proposed 18.5’ and will create a base flashing detail to protect the building to an additional 19.5’ per the top of water projected by the City. The whole first floor will be wet flood proofed. Critical systems at grade will be further elevated on gangways, which can be elevated overtime to adjust to changes in BCB. Utility hook-ups will feature black flow prevention and be placed in areas of least danger and where they can be safely accessed during disruption. Additionally, the owner will explore onsite barrier deployable devices.

Describe how occupants might shelter in place during a flooding event including any emergency power, water, and waste water provisions and the expected availability of any such measures:

We have built in adaptive survivability into the program by allowing sheltering in place at level 2 and above within the various structures. The green rooftops – integrated within all buildings - are all areas where each building has ease of access in the event of an emergency or prolonged event. Emergency power generation will be supplied onsite for emergency use to maintain power – particularly critical in research spaces for emergency power, water and waste. Additionally, every level of the buildings will likely have kitchenettes to aid in food and water storage. Grade retail can be rummaged in emergency events – accessing from within the protected lobbies without having to go outdoors during an extreme event. Should elevation 24’ become more vulnerable to sea level rise and increased flooding, critical systems can be elevated within the building to Level 2 over the life of the building.

Describe any strategies that would support rapid recovery after a weather event:

Protected emergency backup would be located safely from flooding. Wet flood-proofing techniques would allow level one to quickly recover to occupied use after an event without harboring long-term IAQ issues, such as mold.

E.2 – Sea Level Rise and Storms – Adaptation Strategies

Describe future site design and or infrastructure adaptation strategies for responding to sea level rise including future elevating of site areas and access routes, barriers, wave / velocity breaks, storm water systems, utility services, etc.:

We have looked at the city’s GIS maps and are not in danger of storm surge. Again, we are exploring deployable barriers, flexible connection for critical systems on liftable platforms, and are placing utility services in locations where they can be accessed during an event.

Describe future building adaptation strategies for raising the Sea Level Rise Design Flood Elevation and further protecting critical systems, including permanent and temporary measures:

The first floor will be able to accommodate long-term flooding per the City’s GIS maps. Should critical infrastructure need to move into L2, that can be accommodated over time, and options for encapsulation at grade (“bath-tubbing”) can also be explored over time.

A pdf and word version of the Climate Resiliency Checklist is provided for informational use and off-line preparation of a project submission. NOTE: Project filings should be prepared and submitted using the online Climate Resiliency Checklist.

For questions or comments about this checklist or Climate Change best practices, please contact: John.Dalzell@boston.gov

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Exchange South End

1/25/2018

MS	Y	?	N			
0	1			Credi 1	Integrative Process	1

MS	Y	?	N			
5	15	1	0	**Location and Transportation**	Possible Points:	16
			16	Credit 1	LEED for Neighborhood Development Location	16
	1			Credit 2	Sensitive Land Protection	1
X	1	1		Credit 3	High Priority Site***	2
	5			Credit 4	Surrounding Density and Diverse Uses	5
	5			Credit 5	Access to Quality Transit	5
X	1			Credit 6	Bicycle Facilities	1
X	1			Credit 7	Reduced Parking Footprint	1
X	1			Credit 8	Green Vehicles	1

MS	Y	?	N			
10	8	2	0	**Sustainable Sites**	Possible Points:	10
	Y			Prereq 1	Construction Activity Pollution Prevention	Required
X	1			Credit 1	Site Assessment	1
X	1	1		Credit 2	Site Development--Protect or Restore Habitat	2
X	1			Credit 3	Open Space	1
X	2	1		Credit 4	Rainwater Management***	3
X	2			Credit 5	Heat Island Reduction	2
X	1			Credit 6	Light Pollution Reduction	1

MS	Y	?	N			
4	7	4	0	**Water Efficiency**	Possible Points:	11
X	Y			Prereq 1	Outdoor Water Use Reduction	Required
	Y			Prereq 2	Indoor Water Use Reduction***	Required
	Y			Prereq 3	Building-Level Water Metering	Required
X	2			Credit 1	Outdoor Water Use Reduction	2
	2	4		Credit 2	Indoor Water Use Reduction	6
X	2			Credit 3	Cooling Tower Water Use	2
	1			Credit 4	Water Metering	1

MS	Y	?	N			
6	14	16	3	**Energy and Atmosphere**	Possible Points:	33
X	Y			Prereq 1	Fundamental Commissioning and Verification	Required
	Y			Prereq 2	Minimum Energy Performance	Required
	Y			Prereq 3	Building-Level Energy Metering	Required
	Y			Prereq 4	Fundamental Refrigerant Management	Required
X	6			Credit 1	Enhanced Commissioning	6
	3	15		Credit 2	Optimize Energy Performance***	18
	1			Credit 3	Advanced Energy Metering	1
	1		1	Credit 4	Demand Response	2
		1	2	Credit 5	Renewable Energy Production***	3
	1			Credit 6	Enhanced Refrigerant Management	1
	2			Credit 7	Green Power and Carbon Offsets	2

0	2	6	5	**Materials and Resources**		Possible Points: 13
X	Y			Prereq 1	Storage and Collection of Recyclables	Required
X	Y			Prereq 2	Construction and Demolition Waste Management Planning	Required
			5	Credit 1	Building Life-Cycle Impact Reduction	5
		2		Credit 2	Building Product Disclosure and Optimization - Environmental Product Declarations	2
		2		Credit 3	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
		2		Credit 4	Building Product Disclosure and Optimization - Material Ingredients	2
	2			Credit 5	Construction and Demolition Waste Management	2

0	11	5	0	**Indoor Environmental Quality**		Possible Points: 16
	Y			Prereq 1	Minimum Indoor Air Quality Performance	Required
X	Y			Prereq 2	Environmental Tobacco Smoke Control	Required
	2			Credit 1	Enhanced Indoor Air Quality Strategies	2
	3			Credit 2	Low-Emitting Materials	3
	1			Credit 3	Construction Indoor Air Quality Management Plan	1
	2			Credit 4	Indoor Air Quality Assessment	2
	1			Credit 5	Thermal Comfort	1
	2			Credit 6	Interior Lighting	2
		3		Credit 7	Daylight	3
		1		Credit 8	Quality Views	1
		1		Credit 9	Acoustic Performance	1

5	6	0	0	**Innovation**		Possible Points: 6
X	1			Credit 1.1	Utilization of Boston Green Building Credits, Pilot Credits, Exemplary Performance, etc.	1
X	1			Credit 1.2	Utilization of Boston Green Building Credits, Pilot Credits, Exemplary Performance, etc.	1
X	1			Credit 1.3	Utilization of Boston Green Building Credits, Pilot Credits, Exemplary Performance, etc.	1
X	1			Credit 1.4	Utilization of Boston Green Building Credits, Pilot Credits, Exemplary Performance, etc.	1
X	1			Credit 1.5	Utilization of Boston Green Building Credits, Pilot Credits, Exemplary Performance, etc.	1
	1			Credit 2	LEED Accredited Professional	1

2	1	3	0	**Regional Priority*** **		Possible Points: 4
		1		Credit 1	WEc2: 4pts min. for indoor water use reduction (40%)	1
x	1			Credit 2	SSc4: 2pts min. for rainwater management	1
X		1		Credit 3	LTc3: 2pts min. for high priority site (brownfield remediation)	1
		1		Credit 4	EAc2: 8pts min. for optimize energy performance (20%)(EAc5: 2pts min. onsite renewables)	1

32	65	37	8	**Total**	Possible Points: 110

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

Appendix E

Scoping Determination

January 18, 2018

William Keravuori
The Abbey Group
177 Huntington Avenue, 24th Floor
Boston, MA 02115

Re: **<u>Exchange South End Scoping Determination</u>**

Dear Mr. Keravuori:

Please find enclosed the Scoping Determination for the proposed Exchange South End project. The Scoping Determination describes information required by the Boston Planning and Development Agency in response to the Project Notification Form. Additional information may be required during the course of the review of the proposals.

If you have any questions regarding the Scoping Determination or the review process, please contact me at (617) 918-4438.

Sincerely,

Gerald Autler
Senior Project Manager/Planner

CC: Jonathan Greeley, BPDA
William Conroy, BTD
Faisa Sharif, Mayor's Office of Neighborhood Services

BOSTON PLANNING AND DEVELOPMENT AGENCY

SCOPING DETERMINATION

FOR

EXCHANGE SOUTH END

PREAMBLE

In September, 2017 The Abbey Group ("Proponent") submitted to the Boston Redevelopment Authority d/b/a Boston Planning and Development Agency ("BPDA") a Project Notification Form ("PNF") seeking approval of the Exchange South End ("Proposed Project") pursuant to Article 80B of the Code.

On October 4, 2017 a Scoping Session was held with public agencies and a series of public meetings and Impact Advisory Group (IAG) meetings was held over the course of the fall of 2017. Based on review of the PNF and related comments, as well as the scoping session and public meetings, the BPDA hereby issues its written Scoping Determination ("Scope") pursuant to Section 80B-5.3 of the Code. The Abbey Group is requested to respond to the specific elements outlined in this Scope. Comments, included in Appendix 1, are incorporated as a part of this Scope. Written comments constitute an integral part of the Scope and should be responded to in the Draft Project Impact Report ("DPIR") or in another appropriate manner over the course of the review process.

It should be understood that at any point during the public review of the Proposed Project, the BPDA and other City agencies may require additional information to assist with that review.

SUBMISSION REQUIREMENTS

FOR

EXCHANGE SOUTH END

The Scope requests information required by the BPDA for its review of the Proposed Project in connection with the Certification of Compliance and approval of the Proposed Project pursuant to Article 80, Section 80B of the Code.

Subsequent to the end of the ninety (90) day public comment period on the DPIR, the BPDA will issue a Preliminary Adequacy Determination ("PAD") that indicates the additional steps necessary for Harvard to satisfy the requirements of the Scoping Determination and all applicable sections of Article 80 of the Code. If the BPDA finds that the DPIR adequately describes the Proposed Project's impacts and, if appropriate, proposes satisfactory measures to mitigate, limit or minimize such impacts, the PAD will announce such a determination and that the requirements for the filing and review of a Final Project Impact Report ("FPIR") are waived pursuant to Section 80B-5.4(c)(iv) of the Code. Before reaching said findings, the BPDA shall hold a public hearing pursuant to Article 80 of the Code. Section 80B-6 requires the Director of the BPDA to issue a Certification of Compliance before the Commissioner of Inspectional Services can issue any building permit for the Proposed Project.

Ten (10) hard copies of the full bound report should be submitted to the BPDA, in addition to an electronic version in .pdf format. Hard copies of the document shall also be made available for distribution to the IAG other interested parties in support of the public review process. The report should contain all submission materials reduced to size 8-1/2"x11", except where otherwise specified, and should be printed on both sides of the page. A copy of this Scoping Determination must be included in the report submitted for review.

<u>Because the Proponent submitted a detailed Project Notification Form ("PNF"), this Scope focuses on the new information that should be included in the DPIR, or elements that should be updated. The DPIR should contain all the information submitted in the PNF, except where that has changed.</u>

1. GENERAL INFORMATION AND PROJECT DESCRIPTION

- **Applicant/Proponent Information.** The contains much of the following information, which should also be included in the DPIR along with the other items requested:

    - Development Team.
    - Summary of Required Permits and Approvals.
    - Nature and extent of any and all easements into, through, or surrounding the site.

- **Disclosure of Beneficial Interests.** Disclosure of Beneficial Interests in the Proposed Project pursuant to Section 80B-8 of the Boston Zoning Code.
- **Project Site.**
- **Project Description.**

2. TRANSPORTATION COMPONENT

Comments by BPDA staff and the Boston Transportation Department are included in Appendix 1 and are incorporated herein by reference and made a part hereof. The DPIR should respond to all comments from those public agencies; this Scope only highlights the most significant transportation issues.

Significant new development in the South End will not be viable, at least not without undue impact on the local roadway network, without both an established vehicular connection to Frontage Road and I-93 (as called for in the Harrison-Albany Corridor Strategic Plan) AND significant improvements to alternative transportation options, combined with aggressive transportation demand management efforts. The Proponent has been an active partner in helping to advance a number of key improvements, notably the connection to Frontage Road.

Continued efforts by the Proponent, in conjunction with the City of Boston, Boston University, Massachusetts Department of Transportation, and other stakeholders, will be necessary to ensure that the full array of transportation improvements needed in this area can be implemented.

The DPIR should provide the following:

G1
- **Traffic Management Element.** The DPIR should include updated transportation modeling that conforms to the recommendations in the BPDA/BTD comments referenced above.

G2
- **Multimodal Access.** Both pedestrian and cyclist access to the Project Site must be included explicitly in the document; the importance of these modes of transportation must not be understated. For example, this could be added to Section 1.3.3.3 or be called out in a separate section.

G3
- **Transportation Demand Management.** A robust Transportation Demand Management (TDM) will be critical to ensuring that the Project is able to function well without overburdening the local roadway network. The PNF outlines some potential TDM measures and states that the Proponent will work with the City of Boston to develop more detailed TDM measures. Although the Proponent's transportation commitments will continue to evolve through and beyond any BPDA approval, the DPIR should include additional detail about potential TDM measures, including:

    - Detail on potential future expansion of bicycle parking, both secure/internal and short-term/external, beyond the minimum commitment in the PNF
    - Detail on shower/changing facilities for commuters
    - Proposed real-time transit and mobility information within buildings
    - Proposed Neighborhood Mobility microHUBs, as described in Go Boston 2030[1]. Specifically, the DPIR should analyze alternative locations for the array of services that should be

[1] Neighborhood Mobility microHUBs are designed to provide and identify a range of connected travel choices. Using clearly-branded kiosks or nodes with real-time interactive information displays about transit schedules and shared vehicle availability, people can connect quickly between bus and train service, a Hubway station, secure bike parking, carshare vehicles, ridehailing pick-up spots, and electric vehicle charging stations at every microHUB. Coupled with free Wi-Fi and intuitive wayfinding, these nodes become reliable ways to start, continue, or complete a multimodal journey. Placemaking strategies including plazas or parklets, sidewalk

facilitated on the Project site. Of particular importance is a realistic approach to pick-up and drop-off, particularly by taxis and ridesharing services, that avoids impacts on the primary roadways surrounding the site and the transit services, buses, and private vehicles that use those roadways. The City of Boston is currently piloting efforts with ridesharing services that would limit users' ability to set pickup and dropoff points to specific locations in the vicinity of major origins and destinations (e.g. transit stations, mobility hubs, major projects).

G4
- **Bicycle Sharing.** Given the number of projected employees and residents in the Project and the vicinity, the Project should be designed to adequately accommodate at least 30 Hubway bicycles in a highly visible and accessible location along the Albany Street frontage.

G5
- **Parking Management Element.**
    - The parking ratios presented in this document and specifically page 1-9 are not clear. Parking ratios should be based on office, lab, civic, and retail space, but instead the document claims are calculated based on gross floor area.
    - There should be further definition of the uses of parking between office/lab, retail, and cultural uses. Additionally, the proponent should note if there will be public parking available on the site.
    - When discussing "off-street parking" the proponent should include information about remaining parking capacity.
    - Provisions for constructing parking garages should include that any above grade parking levels and at minimum the first below grade parking level should be constructed with enough height and other physical considerations to allow for the conversion to better/more desirable uses. This approach also provides flexibility for the parking program to include "stackers."
    - The DPIR should present more detail on the potential for shared parking, both with existing and future complementary uses in the area (e.g. residential) and as a service to local residents during snow emergencies.
    - The DPIR should analyze the potential for future "smart parking" features, e.g. displays of availability and pricing, design that can accommodate autonomous vehicles that park and retrieve themselves (e.g. waiting area for patrons, smaller space requirements for parking spots).

G6
- **Albany Street Multimodal Improvements.** City of Boston agencies have developed preliminary concepts for the South Bay/Harbor Trail protected bicycle facility and dedicated bus lanes with enhanced bus stops on Albany Street. In addition, the addition of new traffic signals on Albany Street, and the synchronization/coordination of all signals, will require ongoing involvement and funding from a variety of stakeholders. The Proponent is expected to continue to work closely with relevant agencies to ensure that the Albany Street frontage of the Project is consistent with the evolving thinking about Albany Street, as well as to coordinate implementation. As stated in the PNF, the Proponent will make a financial contribution towards implementation of this infrastructure on Albany Street.

G7
- **Pedestrian Analysis.** Address the adequacy of sidewalks and other pedestrian infrastructure in the area of the Proposed Project and potential safety issues at pedestrian crossings. Propose improvements to facilitate pedestrian circulation to and around the Proposed Project and ways that development can improve the overall pedestrian circulation

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amenities, information signs, shelters, and works of art at each of these hubs will make them places that are worth stopping in when you have the time or if you have to wait.

system of the area, including working with BTD to propose a suitable signalized pedestrian crossing at East Dedham Street.

G8
- **Transit Improvements.** The City of Boston is engaged in ongoing discussions with the MBTA about potential improvements to transit service to this area. The Proponent should expect to be an active partner in such conversations.
    - The Existing Conditions section needs to include analysis for transit needs such as ridership, remaining capacity, and stop boarding/alighting information. This analysis is crucial to determining the effect of such a development on transit conditions.
    - The proponent claims that future new transit riders "will not encounter buses that are at capacity." While this could be true, it needs to be articulated and proven by assigning trips to services by time of day and showing the remaining capacity. This is necessary for both "build" and "no build" trips.
    - Shuttle buses can be a critical element of transportation to the Exchange South End development. The DPIR should include an overview of existing private shuttles in the area such as the Boston University Medical Campus (BUMC) shuttle.

G9
- **Loading and emergency vehicle access**
- Review provisions for emergency vehicle access to the Proposed Project.
- Lab and office space differ in terms of projected rates for deliveries. Therefore, they should be separated in the loading and service accommodations to allow for a higher lab space delivery rate.

3. URBAN DESIGN COMPONENT

The Project is proposing to shift height and massing from the buildings along Albany Street to the buildings at the rear of the site. This strategy allows the Project to stay within the FAR limits, provide better light to the public space, and provide a better transition to the existing neighborhood on the other side of Albany Street while doubling the required public realm piece.

G10 While the height and massing ideas are sound the design of the open space and the design of Building B still need further work. BPDA staff are concerned that the plaza contains too much paved area and not enough planted areas. The staff has expressed concerns over the orientation of the mound and placement within the plaza. Another concern is the overall depth of the plaza especially when it comes to the location of any type of community space.

The design of Building B needs some additional review. Building A does a good job finding a balance between modern design and the traditional South End design. Building B needs this balance in terms of its aesthetic but also the scale of the street-level elements.

Finally, the design approach for both of the buildings (C + D) at the rear of the site should be unrelated to the buildings at the front of the site (A + B). C + D should be fully expressive of their use type and building type. A bolder, clean modern expression would be appropriate. The design approach should result in something that resembles a collection of buildings designed and built over time.

These comments align with the comments from the IAG, which has largely embraced the approach to height and massing and the relationship to the street edge but has also requested a bolder approach to the design of buildings C and D.

Likewise, the IAG has expressed concern about the scale of the green element of the public space and the ability of the plaza design to incorporate the range of activities that would make it viable and desirable to the larger public, e.g. interesting and safe play areas for children, active uses such as yoga, spinning classes, etc., performances, and passive seating areas.

Finally, BPDA staff have concerns about the impact of a curb cut at the intersection of Albany Street and the East Dedham Extension. Although a shared street as part of the plaza, particularly one that can be closed to traffic, does not seem problematic in and of itself if it is properly designed and managed, an additional intersection on Albany Street threatens to further complicate an already complex multimodal street. The roadway would mean traffic is crossing a busy pedestrian zone, a protected bicycle facility, and a dedicated bus right-of-way, in addition to creating an additional source of friction with through-traffic on Albany Street.

G11 The DPIR should present the following:

- **Additional Precedents and Analysis of Plaza Design.** Whenever possible, precedents should be local in order to maximize the familiarity of the public. They should be of similar scale and context, with a range of hardscape/green ratios and a comparable range of activities.
- **Alternative Scenarios for Shared Street.** The DPIR should present additional analysis of traffic movements in and out of the proposed East Dedham Street Extension shared street under various scenarios: right in only, right out only, right in and out (i.e. two-way traffic). This should be based on estimated volume at peak times and combined with estimated pedestrian and bicycle volumes at full buildout. The DPIR should also present alternative scenarios in which the shared street does not connect to Albany Street, and show how proposed activities (e.g., drop-off) could be accommodated by the Project. Finally, the DPIR should present more detailed design proposals that would minimize the conflicts between cars, bicycles, and pedestrians at this mid-block location, as well as proposals for how access could be controlled in order limit the volumes of vehicles and/or the times of day that the street is open.
- **Views.** The DPIR shall present views of the Proposed Project from locations to be determined through consultation with the BPDA's Urban Design Department.
- **Design Submission Requirements.** The materials required for submission should be determined through consultation with the BPDA's Urban Design Department.

4. INFRASTRUCTURE SYSTEMS COMPONENT

G12 The BPDA has worked in close collaboration with numerous internal and external stakeholders to develop a new model for integrated planning among energy, transit, water, and communications utilities. The resulting Boston Smart Utilities Vision ("Boston Vision") aims to make utility services in urban neighborhoods more affordable, resilient, equitable, and sustainable.

BPDA will expect to see Smart Utility Technologies ("SUTs") incorporated into new developments. The SUTs include Adaptive Signal Technology, District Energy Microgrid, Green Infrastructure, Rainwater Reuse, a Telecommunications Utilidor, and, electrical connections and data services access for street lights.

For any projects at or above 1.5 million square feet of floor area, the BPDA recommends incorporation of a District Energy Microgrid, to the extent that the project includes buildings located on contiguous properties or clustered close together. If a District Energy Microgrid is not incorporated into the project plan, the BPDA and Public Improvement Commission ("PIC") shall require documentation explaining how other technologies to be incorporated into the project will offer comparable or superior benefits in terms of climate resiliency, reduced energy use, reduced greenhouse gas emissions, and cost reductions to end users.

The written comments of the Boston Water and Sewer Commission (BWSC) are included in Appendix 1 and are incorporated herein by reference and made a part hereof. Responses to the BWSC comments shall be included in the DPIR.

The DPIR should also discuss emergency systems, gas, steam, optic fiber, cable, and any other systems impacted by the Proposed Project. The location of transformer and other vaults required for electrical distribution or ventilation must be chosen to minimize disruption to pedestrian paths and public improvements both when operating normally and when being serviced, and must be described.

5. ENVIRONMENTAL PROTECTION COMPONENT

G13
- **Nighttime Lighting.** The impact of both interior and exterior lighting on the residents of nearby buildings is a concern. The DPIR should explain, in text or graphics as appropriate:
  - The type of exterior lighting to be used on each façade or other portion of the building and the elements of the design that mitigate nighttime lighting impacts of the building on surrounding areas.
  - Measures being taken to minimize any negative impacts of interior lighting on the surrounding areas.

G14
- **Geotechnical Impact/Groundwater.** A description and evaluation analysis of existing sub-soil conditions at the Proposed Project site, groundwater levels, potential for ground movement and settlement during excavation and foundation construction, and potential impact on adjacent buildings, utility lines, and the roadways shall be required. This analysis shall also include a description of the foundation construction methodology, the amount and method of excavation, and measures to prevent any adverse effects on adjacent buildings, utility lines, and roadways. Measures to ensure that groundwater levels will be maintained and will not be lowered during or after construction also shall be described. In addition, the geotechnical analysis shall evaluate the earthquake potential in the Proposed Project area and shall describe measures to be implemented to mitigate any adverse impacts from an earthquake event.

G15
6. ENVIRONMENTAL SUSTAINABILITY

- **Clarification of LEED Level.** The DPIR should clarify the goal for LEED Certification, with Gold being the recommended target.

7. HISTORIC RESOURCES COMPONENT

G16 The DPIR should summarize any historic resources that will be affected by the Proposed Project, the position of public agencies on those resources (including any necessary regulatory process), and present a plan to minimize the adverse impact of the Proposed Project.

8. COMMUNITY BENEFITS

G17 In addition to other benefits and mitigation, the Project will provide affordable cultural and/or commercial space pursuant to Article 64 of the Boston Zoning Code. The exact nature of this space, as well as the process by which decisions will be made, is still being determined, and will be agreed to by the Proponent and the BPDA, with public input, and memorialized in the Cooperation Agreement for the Project.

The DPIR should present the following:

- A proposed approach to a needs assessment that can provide more detail on the most valuable benefits that the project could provide in the following areas: cultural space (for education, performance, creation of cultural products), affordable retail space, affordable commercial space for neighborhood-serving start-up businesses and local entrepreneurs. The needs assessment should include public opinion, analysis of existing supply of similar spaces, and an analysis of the local real estate market showing prevailing rates for equivalent spaces.
- A retail strategy that includes the potential for retail component serving a broad spectrum of incomes. Affordable retail space could be a component of the overall provision of affordable commercial space.
- A proposed approach to memorializing a commitment that is flexible and adaptable to changing circumstances, e.g. project phasing, changing needs, changing real estate values.

The IAG has requested a commitment from the developer to spend an agreed-upon percentage of pre-construction/construction costs (or an agreed upon equivalent) with local, minority and women-owned businesses located within a predetermined radius (or other defined municipal boundary) of the Project, with emphasis on South End and Newmarket businesses (specific percentage and boundary to be finalized by BPDA, IAG and Developer and approved by all entities). The Proponent should work with the BPDA and relevant City of Boston agencies to formulate an appropriate commitment for the DPIR.

9. CONSTRUCTION MANAGEMENT

G18
- **Article 80 Construction Management Element.** The Construction Management Element shall, at a minimum:
  - Identify the impact from the timing and routes of truck movement and construction deliveries for the Proposed Project; proposed street closings; and the need for employee parking.
  - Identify, and provide a plan for implementing, mitigation measures that are intended to mitigate, limit, or minimize, to the extent economically feasible, the construction impact of the Proposed Project by limiting the number of construction vehicle trips generated by the Proposed Project, the demand for construction-related parking (both on-site and off-site),

and the interference of building construction with the safe and orderly operation of the Transportation Network, such measures to include the use of alternative modes of transport for employees and materials to and from the site; appropriate construction equipment, including use of a climbing crane; staggered hours for vehicular movement; traffic controllers to facilitate equipment and trucks entering and exiting the site; covered pedestrian walkways; alternative construction networks and construction planning; and restrictions of vehicular movement

- Designate a liaison between the Proposed Project, public agencies, and the surrounding residential and business communities.

G19

- **Construction Impacts.** A construction impact analysis shall include a description and evaluation of the following:

  - Measures to protect the public safety.
  - Potential dust and pollutant emissions and mitigation measures to control these emissions.
  - Potential noise generation and mitigation measures to minimize increase in noise levels.
  - Location of construction staging areas and construction worker parking; measures to encourage carpooling and/or public transportation use by construction workers.
  - Any impacts of intended drilling, digging, or blasting.
  - Construction schedule, including hours of construction activity.
  - Access routes for construction trucks and anticipated volume of construction truck traffic.
  - Construction methodology (including foundation construction), amount and method of excavation required, storage and disposal of the excavated material, description of foundation support, maintenance of groundwater levels, and measures to prevent any adverse effects or damage to adjacent structures and infrastructure.
  - Schedule and method of demolition of the existing buildings on the Proposed Project site and intended method of disposal of the demolition debris.
  - Potential for the recycling of construction and demolition debris, including asphalt from the existing parking lots.
  - Measures to make construction fencing as attractive as possible to ensure the visual character of the streetscape.
  - Identification of best management practices to control erosion and to prevent the discharge of sediments and contaminated groundwater or stormwater runoff into the City's drainage system during the construction period.
  - Impact of Proposed Project construction on rodent populations and description of the proposed rodent control program, including frequency of application and compliance with applicable City and State regulatory requirements.
  - Plan for handling demolition debris and construction waste. The DPIR should discuss how recycling, reuse and reprocessing will be conducted. Building demolition may offer an opportunity for recycling, reprocessing or donation of construction and building materials (e.g., glass, brick, stone, interior furnishing) to the Building Materials Resource Center ("BMRC"). Harvard is encouraged to contact the BMRC at the following address regarding disposal and/or acquisition of materials that may be appropriate for use:

    Building Materials Resource Center
    100 Terrace Street
    Roxbury, MA 02120

617-442-8917

For the recycling, reuse and reprocessing of demolition waste and construction debris not suitable for use by the BMRC, we recommend speaking with The Institutional Recycling Network (IRN) at 1-866-229-1962. IRN can divert up to 95 percent of waste from a job site. End markets have been identified for a wide variety of materials.

The Exchange South End
Impact Advisory Group

December 5, 2017

Boston Planning and Redevelopment Authority
One City Hall Square
Boston, MA 02201-1007

Re: Comments on The Exchange South End Project
540 Albany Street, Boston, MA
<u>Development Proposal:: The Abbey Group</u>

Dear Director Golden,

The Impact Advisory Group, "IAG" for the proposed Exchange South End, "the Project" has met with the developer, BPDA & BTD staff and members of the public over the past few months. Our goal was to fact find and discuss various aspects of this massive proposed project and to determine what areas of the proposal create areas of impact and concern for the surrounding community.

The majority of the IAG thus far views the concept of this Project favorably. The proposed uses, the connection between building and street, and the synergy with the area have not been major touch points, thus far, for our Group.

We are, however, gravely concerned with a few key areas in the current proposal as submitted to the BPDA in the Project Notification Form," PNF". Additionally, we hereby request a commitment from the BPDA that would require a DPIR from the developer, so the community at large can review such changes especially as they relate to traffic or design.

Perhaps no topic has garnered as much concern from the IAG as the traffic and transportation plan. While we recognize that this IAG is focused solely on the Exchange Place project, we wish to echo the concerns of South Enders in general about the cumulative impact of construction in this area of the South End including large and high-traffic impact residential projects completed, under construction, and in the pipeline. The cumulative effect of all these projects and the project-by-project evaluation of traffic and transportation impacts is a grave concern for this IAG and South Enders in general. It would be wise for the BPDA, in conjunction with IAG representatives from several current or recently completed projects to create a "Working Group" specifically and independently to look at the overall transportation and traffic management environment within this locus of rapid and significant development. We are generally uneasy about the assurances and projections provided on a project by project basis (albeit with an effort to look at the larger cumulative picture). An independent transportation consultant working with this an independent "Working Group" would be an exceptionally wise investment in the long-term South End traffic picture and avoid new development approvals that fail to consider incremental as well as cumulative impact.

The specific items of concern are categorized as follows:

IAG 1

<u>Traffic / Safety</u>

1. There are significant concerns with traffic flow on Albany Street. It is imperative that a synchronized traffic signal system be put into service on Albany Street (from Mass. Ave. to Methuen) which incorporates technology that will allow continuous and uninterrupted flow from signal to signal on the corridor preventing back-ups and block locks.

IAG 2 2. We are not convinced that Albany Street, Massachusetts Ave., the Mass. Ave. Connector and all the connecting cross streets to the South End can handle the increased volume of traffic. We feel strongly that a new roadway connection to the Mass. Ave. Connector from Biosquare Drive must be opened and a new roadway connection from I-93/Frontage Road should also be created.

We strongly believe that without at least one of these new connections, and ideally both, this Project should not move forward.

The IAG requests routine communication from the Developer and City agencies on all efforts to work with state and local authorities and private stakeholders to obtain approval to construct connections from BioSquare Drive to I-93/Frontage Road and BioSquare Drive to Mass Ave Connector.

The developer has suggested that one impediment to construction of these connections is a MassDOT view that these changes will not benefit South End residents directly. Our view is that while local South End residents are unlikely to be the direct majority users of these connections, residents will nevertheless see essential and indirect benefit from their construction because they will serve to relieve congestion from commuters to/from the Project on local roads, particularly, Mass. Ave. and Albany Street, as well as connecting streets (e.g., West Newton St., Dartmouth St.) between I-90 and the Project.

The developer projects between 4,000 to 7,000 employees at the Project site. This is comparable to the 8,000 employees at neighboring Boston University Medical Campus, which includes Boston Medical Center.

[See https://www.bumc.bu.edu/files/2017/04/BUMC-Fast-Facts.pdf.]

Thus, this Project will nearly double the number of employees commuting to the Albany Street corridor on a daily basis. Improved traffic management and reliable and frequent public transportation options are imperative.

The Harrison-Albany Corridor suffers from poor connections to public transportation due to reliance on the Silver Line. While the IAG does not believe that Silver Line capacity issues are currently a concern for the Project (due to reverse commute direction), inconsistent bus schedules and bus bunching are a deterrent to reliable Silver Line use.

The addition or rerouting of certain MBTA bus lines to better serve the Project's connections to the T, including the 49 bus, should be considered.

To compensate for the poor connections to the T, the IAG recommends that the Project initially provide private shuttle connections to the Red and Orange Line, while working with the MBTA to implement route changes/additions to take over these routes once proof of demand is shown.

IAG 3 3. It is imperative that the developers reach an agreement for the continued, unencumbered use of Biosquare Drive for access and egress in order for the Project to move forward.

IAG 4 4. There is no consensus agreement within the IAG in support of the proposed roadway through the plaza from Albany Street to the rear of the open space (in front of the designated "cultural center"). However, if a roadway is to be included within the open space area, it is our general agreement that one-way traffic flow on the internal roadway adjacent to the outdoor plaza space should be considered. Our concern is a large amount of traffic flow moving in both directions creates a less pleasing plaza area. The vehicles that enter here from Albany Street could exit from the crossroads in front of building C & D and out the exterior sides of the site.

IAG 5

5. There has been discussion around creating a street cut in the front of the Project along Albany Street to allow for pick-ups and drop-offs out of the flow of traffic. The IAG has proposed this change as a potential increase to pedestrian safety.

IAG 6

6. We request a revised traffic management plan for the area. Even before this project and other upcoming projects in the area, traffic along Albany Street and Massachusetts Avenue is strangled at best during many parts of the day. Harrison Avenue also experiences significant delays. It is imperative that the City and State Transportation Departments work together with the neighbors/stakeholders in the area form a working group to create a viable traffic management plan. This working group should meet regularly.

IAG 7

7. It was discussed that the BPDA conduct an additional traffic study to review the street light timing throughout the neighboring communities with a particular focus on Harrison Ave. and the crossroads and the intersection of Melnea Cass and Mass. Ave. We would like an independent recommendation on how the timing of lights and movement of traffic can be best mitigated with the increased traffic count as outlined in the PNF along with the potential impacts of other major developments in the area (Leggatt McCall, etc.)

IAG 8

8. To increase safety of all and to reduce car volume we would encourage a commitment from the developer to engage in local business improvement district creation discussions that would provide area-wide security and provide shuttle services to the surrounding subway stations.

IAG 9

9. An agreement with all surrounding communities to have access to the garage during snow emergencies at reduced cost to area residents. Potential discussion to include possible discounted night/weekend/holiday parking for neighbors

IAG 10

10. Dedicated Zipcar, hubway, and possibly pedicab areas to encourage less vehicle traffic. We would like to see even further increased support for alternative modes of transportation as well as exploration of new ways to incentivize businesses to have their employees take advantage of biking, walking and other public transit options. The minimal bike infrastructure proposed on site is not adequate to deal with the projected number of employees on site.

IAG 11

11. The commitment of the City and related transportation departments that the Harbor Trail / bike path will be completed with the progress of this project, thus addressing additional transportation options in an effort to decrease traffic and environmental impacts on neighborhood.

IAG 12

12. Proponent to outline and confirm plan for subsidized public transport, Guaranteed Ride Home, Ridesource and TMA membership as outlined in section 2.5 of the Project Notification Form dated September 19, 2017.

<u>Open Space/ Plaza Area Design</u>

IAG 13

13. There have been several questions raised over the proposed “open space “or plaza type area. Some of the concerns are:

   A. Need for some youth recreational space – i.e., sculptures that children can climb on or play around

B. Need for space for active use – yoga; spinning; exercise etc.
C. Need for a stage area.
D. Benches etc. for relaxation; eating a snack; talking with friends;
E. Need for green areas.

IAG 14

14. A number of members of the IAG continue to be concerned that the Albany Green component is of insufficient size to encourage use by the South End community. Leventhan Park at Post Office Square is an example of a green space of critical mass to attract usage. The IAG requests metrics to determine the true person-capacity of Albany Green as designed. The IAG is also unpersuaded that shadows from the Project prevent constructions of a larger grassy space. Leventhan Park, for example, is a thriving green space surrounded by tall building. We requests a more detailed explanation as to why a larger green space is constrained by the environment.

Community/Cultural Space

IAG 15

15. The definition and use of the committed 30,000 sq.ft. of Cultural/Community Space is of great importance to the IAG. This is an area that was deliberately deferred due to the need for further review by the IAG membership with the developer and the BPDA as part of the process moving forward.

A needs assessment of the community must be an important part of this process.

Following this assessment, it is essential that general guidelines for both determination processes and use be agreed upon by the developer and the IAG and that the BPDA work with both parties to craft criteria by which to monitor and manage those guidelines.

IAG 16

Design

The IAG applauds the engaging design of the Project with respect to the interaction between the buildings' lower levels and the street. The variation in height is also well received although there are concerns about massing with regards to shadowing the neighboring properties.

The IAG sees room for improvement with respect to the upper levels of the buildings. Buildings B and D are uninspiring rectangular boxes. Only Building C contains an interesting design element, with its gentle curve along the side facing I-93. The IAG recommends that the developer incorporate additional interesting design elements in Buildings B and D and expand on the design of Building C.

Mayor Walsh has specifically addressed the need for bold design in Boston's neighborhoods. In a 2014 speech to the Greater Boston Chamber of Commerce, Walsh said, "Too often, in recent decades, new buildings have been ***merely functional***. I believe Boston can do better. We should aim for ***world-class design.*** Our historic buildings reflect our unique past. New buildings should project the values and aspirations of our growing city. We can balance the old and new. And we can do it with imagination. Let's make sure ***bold design*** is part of the conversation – for every building, in every neighborhood….***So I challenge every developer working in our city to take design to a new level. Reach beyond your comfort zone.*** Boston's design community is a driving force in our creative economy. Invite these innovators to dream up new images and new icons. Let's build inspiration in our landscape."

[See http://www.wbur.org/news/2014/12/10/walsh-boston-chamber-remarks.]

Developers have responded, with bold designs, such as the dramatic open mid-section at 88 Seaport Boulevard, and elliptical 121 Seaport Boulevard, which developer Skansa said “represents the type of a design that Mayor Walsh challenged the real estate community with early on in his administration.”

[Seehttps://www.necn.com/news/business/Building-Boldly-in-Boston-Ground-Breaks-for-121-Seaport-313027291.html.]

After the developer did its initial listening tour but before filing the PNF, it gave a presentation to the community which incorporated quoted comments from various neighborhood groups. One of the quotes--which the developer selected to highlight--urged the developer to “be bold” with its design.

We urge the developer to take Mayor Walsh’s and the neighborhood’s words to heart and take the design of Exchange South “to a new level” of “bold design” as well. We urge the developer to look beyond the “merely functional” rectangular spaces that benefit only a tenant’s conveniences--but offer little awe and inspiration to the skyline that residents of the South End and the City will look upon each day.

Additionally the IAG requests an explanation as to why the PNF states that the developer will seeks Silver LEED status for the Project in the PNF, but has stated at all subsequent presentations to the public that it will seek only Gold LEED status. The IAG recommends that the Project seek SilverGold LEED status absent a reasonable explanation that it is now unfeasible.

IAG 17

Construction Considerations

1. Commitment from the developer to comply with the Boston Residence Jobs Policy (which requires that on private development projects over 100,000 square feet, 50 percent of workers are Boston residents, 25 percent are minorities, and 10 percent are women) It is, of course, suggested for the developer to exceed these requirements if at all possible.

2. Insofar as possible and consistent with the City of Boston's own contractor preference goals, the IAG requests a commitment from the developer to spend an agreed upon percentage of pre-construction/construction costs (or an agreed upon equivalent) with local, minority and women-owned businesses located within a predetermined radius (or other defined municipal boundary) of the Project, with emphasis on South End and Newmarket businesses (specific percentage and boundary to be finalized by BPDA, IAG and Developer and approved by all entities).

3. Rodent abatement throughout the whole process.

4. A community relations office to be located on-site so that concerns can be addressed throughout the development project. Routine communications should be provided to the neighborhood using various media tools to advise of project updates, special activities, and disruptive events. In addition, no weekend work will be scheduled on the project unless the work is considered a clear health and safety emergency and in the personal determination of the ISD Commissioner work essential to optimal traffic and safety considerations for the South End neighborhood.

5. No construction vehicles staged on Albany Street or any residential streets off of Albany St. during any phase of construction

6. Linkages – the project claimed an allocation of 14 million for job growth and affordable housing (assuming it is an 8 yrs project build by phases). How is this allocation to be distributed and who will determine the amount per project phase?

IAG 18 **Retail Considerations**

1. We are very concerned about the type of ground floor retail the project will permit. We would like to see a commitment to proving retail that is accessible to South End residents at all income levels. Additionally, the project should include a commitment to providing affordable smaller retail spaces for small business owners.

IAG 19 **Mitigation**

1. It is necessary that The Article 80 process over the next few months result in the signing of a contractual agreement by the proponents to a mitigation package agreed upon by The Abbey Group and the Exchange South End IAG.

Thank you for your attention to these concerns.

Very truly yours,

Mary Bertin
Jonathan Berk
Valeda Britton
Caroline Foscato
Christina Farrell
Stephen Fox
Mark Haley
Eric Huang
Bill Jacobson
Vadim Kuksin
Rafael Medina
The Very Reverend Kevin O'Leary
Kristin Phelan
Sue Sullivan

cc: City Council President Michelle Wu
City Councilor Frank Baker
City Councilor Annissa Essaibi George
City Councilor Ed Flynn
Representative Nick Collins
Representative Byron Rushing
Representative Aaron Michlewitz
Senator Linda Dorcena-Forry
Senator Sonia Chang-Diaz

Scoping Determination Comments – Exchange South End DPIR

MF1 **Stakeholder: Maria Finkelmeier**

I am a musician, composer, producer, and arts organizer. My music and projection mapping collective produces innovation, large scale public art performance pieces, and is need of new studio space. I am supportive of this project if the civic/cultural space is offered to Boston-based performing arts groups. There is a shortage of support for artists that have dedicated their time, craft, and energy to creating in Boston, and access to affordable space would be a great step in establishing a foundation for this work. Please communicate with the performing arts community when establishing your "arts and cultural space." There are specific needs that we can outline that will help you build a space that truly serves the arts and the public.

Stakeholder: Deborah Hall

DH1 In the proposal for the Exchange, I like that the highest buildings abut the highway. I like the huge plaza – an outside fountain or waterfall would be an asset also. Wish there was a little more drama in the architectural design of the buildings. It is my hope that local artists will be considered when art is purchased for the walls.

DH2 Developer Abbey Group's intentions are unclear regarding the proposed 30,000 square feet of community/cultural space. What is their understanding of the community they are trying to placate? Is this a nod to the future residents of the Harrison Albany Block project and the new buildings on Wareham Street or does it include the current diverse population that currently exists on the borders of the proposed Exchange? It is hard to envision the actual physical space(s) being offered. Abbey Group suggested screened movies, performances, ice skating and activities, through proposed partnerships with cultural institutions in the city. How would the programming be funded and managed? A quality art gallery with a real curator would be an asset as well, with some show slots for local artists and some from outside New England.

DH3 Do not approve this project until the proposed expanded transportation and traffic components are solid. It will be a major disaster and deadlock otherwise. This particularly relates to discussion of a connector to and from highway 93 and the flow of traffic onto Albany Street from small streets like East Dedham, East Canton, and East Brookline, as well as Harrison Avenue. If public transportation in the vicinity is improved future tenants must be encouraged to offer subsidized T-passes to their employees or some kind of bike benefit to control the density and air pollution of automobile traffic.

In the meetings it would be beneficial to hear the comments and questions of the IAG members before the floor is open to the public. As the IAG members were chosen as voices of the community it has been my disappointment to not hear what they have to say.

Stakeholder: Jesse Irons

JI1 This looks like an ambitious and wonderful development for the city. As a creative professional in the performing arts, I read with great interest about the 30,000 square foot civic / cultural space. In addition to seeking new and better performance spaces, cultural organizations in Boston are in need of rehearsal space. Many end up rehearsing in out-of-the-way (read: cheap) locations, which misses opportunities for innovation through interaction with professionals in other fields. I encourage you to consider the viability of highly visible, visitable rehearsal spaces as a component of the cultural facilities. These would be actively used during daytime (when many performance-only spaces are dormant) and would serve to draw in visitors and increase opportunities for cultural exchange.

SL1 **Stakeholder: Sheldon Lloyd**

In regards to the community space at the Exchange Project, please consider and direct me and other community members in the consideration of creating "Active Space", a recreation sports center in the the 32K Sq.ft civic space allocated for this project. The Southend is exploding with development & population growth and active park space is declining for community residents, especially with the increased restrictions at Rotch Field and Carter Park. First hand, consistently families have to travel to other communities to play sports. All Southend (3) city recreational southend parks are busy, tennis and fields have waits and tight schedules. To improve the quality of life for all residents, this project needs to consider "Active Recreational Space" indoor or outdoor. Health and recreation saves lives, it keeps children and adults safe and healthy. This is a quality of life issue as the Boston inner city builds and becomes more exclusive. I look forward to helping and gaining the advice of the city to work with my local community constituents to communicate their needs in civic community space opportunities.

Stakeholder: Rafael Medina

RM1 Transportation: Transportation continues to be a topic challenging to overcome at satisfactory levels for all parties. There is not an easy solution for Boston, and unfortunately the rate of densification in the area (take Ink Block for example) doesn't help the cause of the Exchange South End project. Besides what the developer is proposing; I will like to see short to long terms commitments, sustainable plans and buy-in from MBTA and MassDOT in sync with the developer's proposal. Acknowledging the transportation/traffic is a bigger challenge in the area in addition to what this project could trigger; its crucial to see cross collaboration and endorsements from both agencies in mitigation. Another concern that I have is the structure safety around the garages proposed to build. It's not clear to me if the geology and water table in South End is supportive of the proposed engineering for such big garages. In conclusion; I'm afraid that undesired outcomes from lack of public and affordable transportation increases hard to manage traffic give us consequences that will end up being absorbed by the community.

RM2 Project scale and phases: All things consider overall is an ambitious project. The scale for the project in the space triggers an overcrowding feeling in the neighborhood. The total sf (four buildings) is 1,599,425. Considering the amount of new development in the area (Ink Block) and the infrastructure capacity of the neighborhood (roads, train and buses stops, parking etc), I will recommend to reduce the scale of this project. For example this project is proposing 840,810 sf as lab. The parcel is next to the NEIDL (another big lab this one run my BU). Do we have such demand for labs in the area? If the developers are able to maneuver a reduction of at least of 40% of the scope of the project, I can see a more appealing and welcoming project to the area. A smaller scale might also alleviate the concerns around traffic and capacity.

RM3 Community development / spaces: How this project could help social mobility to low and mid incomes families in the neighborhood? I will like to see a process of input from community development organizations in the South End for the "RFP" that will determine the types of 501c3 this project will host. The South End possess plenty of K1 (preschools) options and arts spaces as well. Between 3 to 6 of both already in a radius less than a mile. I can offer as an example that thanks to a grant of tBf IBA will be providing "free space art "for artists, SOHA is down the street

RM4 (with plenty of options) and next to this project. The same apply for preschools. Pine Street in Harrison, IBA's Preschool in 85 West Newton St, The Cathedral also have a preschool. In addition the city of Boston will start soon with BPS universal Pre K. Can the developer reconsider adding other type of use to the spaces considered for more K1 and Art spaces? A need assessment of the community will be very beneficial to identify space use with purpose, and workforce development programs that could be driven from the community spaces within this project.

RM5 Other: - Linkages - Allocation time and amount of the 14 million between Job grow and affordable housing by project (assuming is a 8 yrs project build by phases). Construction of the project: I recommend the developers to commit and contract during construction MWBE enterprises http://www.mwbe-enterprises.com/wbe/ as well to offer affordable commercial spaces post construction to similar enterprises. Mid to low income communities will benefit from this type of partnership as well as promoting affordable services (café, rest etc in the building).

Stakeholder: Elizabeth Mezias

EM1 I am writing with regards to the mixed-use permitting of the project at the Flower Exchange. The public open space that is part of the plan is great! If you want to be sure that space does not sit empty on the weekends, please do what you can to get some housing in the development.

EM2 There is a tremendous demand for housing in the city of Boston, especially in the South End. Make housing a requirement for the project so that the people who work at the Exchange have an opportunity to live near their work. Traffic in and around town is tough. There's not much public transit on Albany. People want to live in the city. Do what you can to make it possible.

Thanks in advance for your consideration.

Stakeholder: Sam Potrykus

SP1 Love to see some of this space go towards the performing arts! We need affordable, all ages and otherwise accessible space. We desperately need it.

Stakeholder: Ann Teixeira

AT1 The New England Philharmonic supports the development of 30,000 square feet of civic and cultural space in the redevelopment of the Flower Exchange. The particular need of the New England Philharmonic -- which can be met by a multi-purpose space with the characteristics I will list below -- is for rehearsal space that accommodates a full-size symphony orchestra of around 75 people. The space needs to meet the following characteristics/criteria: Dimensions of at least 40' X 40' Excellent (i.e., bright) lighting so musicians can read their scores easily Acoustics that are NOT too reverberant Rentable LOCKED storage space for percussion instruments; 100 - 125 square foot space will suffice Sound containment to ensure surrounding spaces/functions are not disturbed by music rehearsal. Thank you for this opportunity to put forth out support and our definition of a need we have that could be accommodated through this redevelopment. I am a member of the Board of the New England Philharmonic and it's immediate Past President (2013-17).

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November 27, 2017

Mr. Timothy Burke, Chairman
Boston Planning & Development Authority
Boston City Hall
Boston, MA 02201

Attention: Gerald Autler, Project Manager

Re: Exchange South End Project at 540 Albany Street (the "Project")

Dear Chairman and Board Members,

First, we would like to thank the Boston Planning & Development Authority ("BPDA", formerly known as the Boston Redevelopment Agency) for the public meetings held on September 27, 2017, November 16, 2017 and November 21, 2017 to discuss the proposal for the Project. While we appreciate those discussions and the other meetings held by The Abbey Group (the "Proponent") regarding the proposed Project, we are deeply concerned with the current Project proposal, particularly on issues concerning (i) density and massing, (ii) traffic and transportation mitigation, and (iii) over-burdening easements.

As a direct abutter to the Project at 500 Albany Street and long-standing business owner in the community, we strongly believe that these issues are vital to the well-being of the neighborhood and require immediate attention before the Project moves forward.

The comments below are based on the (1) Project Notification Form dated September 19, 2017 (the "PNF"), (2) Parcel Plan approved by the Boston Redevelopment Agency for the South End Renewal Area for Parcels 48A, 48B, and 48C recorded on January 1, 1980 in Book 8267, Page 155 in the Suffolk Registry of Deeds (the "Plan"), (3) Land Disposition Agreement dated November 12, 1968 between the Boston Redevelopment Agency and The Boston Flower Exchange, Inc. recorded in Book 8300, Page 419 in the Suffolk Registry of Deeds (the "LDA"),

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and (4) Deed between The Boston Flower Exchange, Inc. and Boston Redevelopment Authority dated July 29, 1969, recorded in Book 8300, Page 419 in the Suffolk Registry of Deeds (the "Deed").

(i) <u>Density and Massing</u>

J1 The Project proposes to demolish the existing warehouse building onsite and construct four (4) buildings with a 1-acre open space. The Proponent is taking advantage of the site and our neighborhood by clustering four (4) buildings on one site. We urge that the Proponent revise the Project such that the proposed construction is a reasonable middle ground to mitigate density.

J2 The Project massing was modified to provide additional natural sunlight on Albany Green, a proposed 1-acre open space between four (4) proposed buildings (Buildings A, B, C, and D, respectively). The massing modification resulted in decreasing Building A by 110 feet, decreasing Building B by only 1 story, increasing Building C by 80 feet, and increasing Building D by 1 floor (see page 1-11 of the PNF). Both Building B and Building C directly abut our property (see Figure 1-10 Project Site Plan in PNF). Although the proposed massing modifications to the buildings provide for the mid-day sun to hit Albany Green, the buildings rob our property of such sunlight and instead cast an overarching shadow darkening our premises. We propose adjusting the massing of the buildings such that the mid-day sun is not only accessible to the Proponent's Project site but also to our property. We request the Proponent to add more height to Building A and Building D, and decrease the height of Building B and Building C such that the mid-day sun is still able to amply reach the Albany Street public realm and our property.

(ii) <u>Traffic and Transportation Mitigation</u>

J3 The proposed Project provides approximately 1,145 parking spaces in below-grade parking garages with parking access from driveways off Albany Street with additional spaces at grade. The access provided from Albany Street will increase the overall vehicular traffic on Albany Street, the main access road to our property. Moreover, there is no plan for the inevitable queuing that will occur with that many vehicles entering and exiting the Project garages during morning and evening rush hours as well as the impacts of drop offs and pickups associated with the increased use of Uber, Lyft and other car services. The Proponent should explore alternative access avenues for the parking garages in order to alleviate the traffic pressure on Albany Street, including discussions involving Boston University and city, state and federal transportation officials. We request the Proponent to conduct an alternatives analysis to showcase the varying access points available to the proposed parking garages.

J4

The Proponent has expressed commitment to working with the City of Boston on improving the pedestrian environment and encouraging transit use as associated with the Project. Although the Proponent proposes to takes responsibility by preparing a detailed Transportation Access Plan Agreement (“TAPA”) with BTD to formalize its transportation mitigation measures, it is important for community members to understand now with a holistic view of exactly how the Proponent will (1) improve traffic signal infrastructure in the area, (2) fund the extension of the South Bay Harbor Trail, and (3) utilize shuttle buses to connect Project occupants and visitors as well as community residents to Red and Orange lines.

(iii) <u>Overburdening of Easements</u>

J5

The site of the proposed Project (540 Albany Street, the “Property”) contains easements for shared access by all of the three property owners (Jacobson, Abbey Group and Boston University) on each end of the Property. The easements are identified as *traffic circulation easements* on the Plan and are described to be used for access and egress for the present and future owners of Parcel 48A, Parcel 48B, and Parcel 48C as shown in the Plan and described in Exhibit A of the Deed. The respective present owners of Parcel 48A, Parcel 48B, and Parcel 48C are Boston University, Abbey Group, and Jacobson Floral Supply. The Project’s proposed usage of the *traffic circulation easements* for access and egress to the below-grade parking garages stipulates a high volume of traffic that overburdens the easements. The Proponent must not be allowed to overburden the *traffic circulation easements* on the Property to the extent that this affects usage by the remaining easement holders. We specifically request that the Proponent provide a site plan showing proposed site improvements overlaid on a plan with the surveyed property and easement boundaries shown.

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J6 We request that the BPDA require the Proponent to prepare a Draft Project Impact Report which responds to the issues and concerns raised in this letter. Our comments and recommendations are not exhaustive and we reserve the right to provide further comments in the future as the Project progresses. We applaud the Proponent for engaging with the community and hearing the public's concerns and attempting to address them. We are confident that the Project will be able to fully integrate into the neighborhood with the refinement of the above issues. Please do not hesitate to contact us with any questions or additional information required.

Very truly yours,

JACOBSON FLORAL SUPPLY, INC.

William Jacobson, President

cc: Brian P. Golden, Director, Boston Planning & Development Agency
William Keravuori, The Abbey Group
Martin J. Walsh, Mayor, City of Boston
Michelle Wu, Michael Flaherty, Annissa Essaibi George, and Ayanna Pressley, Boston City Councilors
Gina Fiandaca, Commissioner, Boston Transportation Department

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Transportation and Infrastructure Review

Transportation access to the Exchange South End development and broader South End neighborhood were evaluated by BPDA and BTD staff (City) as a part of the overall Project Notification Form (PNF) process. The following sections delineate by mode the transportation and access issues that the Exchange South End PNF, including comments and questions regarding the Modeling and Methodology, Transportation Demand Management (TDM) Overview, Transit Network and Accommodations, Roadway Network, Parking and Loading Access, Pedestrian Network, and Bicycle Network and Accommodations. Additionally, an appendix is attached with specific corrections for grammatical errors and unclear syntax as well as clarification of figures and tables.

This following section builds on this commitment with specific mitigation concepts and questions that will seek to ameliorate transportation burden identified in the the PNF proposal.

Modeling & Methodology

The proponent utilized Howard Stein Hudson (HSH) for transportation modeling. The analysis requires additional detail and clarifications to ensure the City is able to conduct a complete analysis of the transportation modeling assumptions.

B1

- The analysis notes that the PNF project is the basis for the transportation modeling. The City understands this to mean that the PNF buildings are the only basis for transportation impact analysis and other elements of the Exchange South End development are considered as "existing conditions." The proponent should confirm one way or another whether the City's understanding is correct;

B2

- The proponent designates a study area which runs along the Albany Street corridor with bounds of the I-93 Frontage Road, Harrison Avenue, the I-93 Frontage Road Connector, and Massachusetts Avenue. While these intersections are important to the project site, the City believes it necessary to include the following intersections:
    - Massachusetts Ave Connector/Melnea Cass @ Massachusetts Ave
    - Massachusetts Ave Connector @ Frontage Road
    - Harrison Ave @ East Canton
    - Harrison Ave @ East Dedham
    - Harrison Ave @ Malden Street
    - Harrison Ave @ East Concord
    - Harrison Ave @ East Brookline
    - BioSquare Drive @ Frontage Road (Future Condition only)

- It should be noted that with an addition of these intersections, several results will need to be revised as well including a revision of the prioritized intersections for air quality analysis.

B3
- In order to accurately represent future conditions, the City thinks it necessary to include the future transit capacity analysis under "Study Methodology" (section 2.1.2).

B4
- The build condition analysis include the assumption that East Concord will connect to the Mass Ave Connector; this assumption can not be made because there is not a commitment on the part of government or area stakeholders to build this connection. Therefore, ***analysis needs to be re-run without this connection*** and traffic redistributed to existing roads/intersections.

B5
- ***All transportation analysis should be re-run with changes indicated in this document.*** This transportation network analysis and re-run should be comprehensive and the Proponent should provide results to the City in an expedited manner to ensure a proper review can take place.

B6 In addition to transportation modeling and methodology, the PNF includes a framework for construction planning. The section of the document is accurate in scope and detail except for two notable instances:

- There is not an established completion **timeframe for Albany Green or road improvements**. The scheduling section that includes the buildings must include these elements as well.
- The construction timelines for buildings A, B, C, and D are not consistently communicated. The proponent lists that "...duration is anticipated to be approximately 24 months for Building A…" but fails to mention a **timeline for buildings B, C, and D.**

Transportation Demand Management

B7 The City applauds the proponent's commitment to creating a TDM program for the Exchange South End development. The proponent outlined several steps to improving the transportation network through a TDM system, including ride-sharing resources, transportation bulletins, access to a TMA membership, electric vehicle charging stations, and vehicle sharing programs. In addition to these elements, the proponent should consider the following options:

- Mobility MicroHUBs (Go Boston 2030)
- Enhanced bus stops
- Real-time transit and mobility information within buildings

These elements will ensure the Exchange South End community has a comprehensive set of transportation options and will help to ease the burden on surrounding transportation networks.

Transit Network & Accommodations

Transit is a crucial element to the workings of the Exchange South End neighborhood. The proponent recognizes significant transit relationships to its site and in many cases includes the correct analysis of current and future impacts of building and ridership. However, there are a few amendments to be made regarding the inclusion of transit in this PNF.

B8
- The **Silver Line** has an important role in the neighborhood, but not to the extent alluded to by the proponent. The PNF states that "The Project Site is within one-quarter mile of several Massachusetts Bay Transportation Authority (MBTA) bus stops serviced by multiple bus routes, including the Silver Line with service to Logan International Airport." The Silver Lines nearby- 4 and 5- do not service Logan Airport, but connect to lines that do.

B9
- The **Existing Conditions** section needs to include analysis for transit needs such as ridership, remaining capacity, and stop boarding/alighting information. This analysis is crucial to determining the effect of such a development on transit conditions.

B10
- The proponent claims that future new transit riders "will not encounter buses that are at capacity." While this could be true, it needs to be articulated and proven by **assigning trips to services** by time of day and showing the remaining capacity. This is necessary for both "build" and "no build" trips.

B11
- **Shuttle buses** can be a critical element of transportation to the Exchange South End development. The proponent should include an overview of existing private shuttles in the area such as the Boston University Medical Campus (BUMC) shuttle.

B12
- The proponent would benefit from adding a section on **TMC activity in the area** from available data sources i.e. Lyft. This would be added in section 2.2.4.

Roadway Network

B13 In the PNF, the proponent provides an analysis of anticipated traffic impacts that will result from the changes of use and area in the Exchange South End development. The City finds the majority of these proposed elements and analyses to be acceptable. However, there are distinct roadway network changes that must be addressed or clarified:

- The nature of the **new streets** "East Canton Street Extension," "New Street," "East-West Connector," and "East Dedham Street Extension" need to be established more clearly. The City would like designation of driveways, private vs. public ways, City streets, or some combination of the aforementioned. The City recommends for these streets the following:
  - **East Canton Street Extension** should be designed and built as a public street (or a private way open to public travel) with two way traffic between Albany Street and BioSquare Drive.
  - **New Street** and **East-West Connector** should be designed as a private way open to public travel.
  - **East Dedham Street Extension** should be designed as a pedestrian priority street with a right-in/right-out condition ***if*** it is to be open to vehicles. Further, there should not be a

signal at Albany Street for East Dedham Street due to significant impacts on Albany Street through moves.

  - For consistency in design as well as technical comprehension, the proponent should provide **dimensional and operational clarification** of all the proposed roadway and site drives. This would be best included in section 2.4.1 Site Access and Vehicle Circulation.

B14

- To provide for future transit, pedestrian, and bike accommodation, **reconstruct Albany Street** from East Brookline Street to Malden Street according to standards set by the City.

B15

- In order to communicate changes made to the roadway network, the proponent should clarify the **easement rights along both edges of the site**. This clarification should include if all abutters have equal rights to the easement as well as what city or other public entities have rights.

Parking & Loading Access

In the PNF, the proponent includes several important loading and parking sites. Parking and loading sites are necessary elements for buildings and structures of this scale. However, the proponent should improve the presentation of parking analysis in this PNF as well as modify some of the methodology for loading and parking calculations.

B16

The City recommends the following for improving this component of the PNF:

- Lab and office space differ in terms of projected rates for deliveries. Therefore, they should be separated in the loading and service accommodations to allow for a higher **lab space delivery** rate.

- The **parking ratios** presented in this document and specifically page 1-9 are not clear. Parking ratios should be based on office, lab, civic, and retail space, but instead the document claims are calculated based on gross floor area.

- There should be further definition of the **uses of parking** between office/lab, retail, and cultural uses. Additionally, the proponent should note if there will be public parking available on the site.

- When discussing “off-street parking” the proponent should include information about **remaining parking capacity.**

- **Provisions for constructing parking garages** should include that any above grade parking levels and at minimum the first below grade parking level should be constructed with enough height and other physical considerations to allow for the conversion to better/more desirable uses. This approach also provides flexibility for the parking program to include “stackers.”

Pedestrian and Bike Network

B17

The City recognizes how essential the pedestrian and bike network is to this development. Interconnectivity to the surrounding neighborhood is of utmost importance to the project for successful integration and integrity to the pedestrian and bike experience. The proponent provides for pedestrians by including the Boston Complete Streets Design Guidelines. However, there are several other items that must be specified in the proposal:

- The following must be revised to provide for pedestrian-specific elements:
    - The proponent states that "sidewalks are provided on both sides of Albany Street," although segments of Albany Street do not have sidewalks on both sides of the street. For example, near the intersection of Frontage Road. These **sidewalks must be better defined**.
    - The pedestrian experience is hindered by sidewalks on the west side of Wareham Street past #63. These are often impeded by parked vehicles and this should be noted in the description.

B18
- The following must be revised to provide for bike-specific elements:
    - The location of the bike share mentioned in the proposal is not specified. This is a significant design element that provides clarification of access and mobility at the site. The proponent must **specify where the bike share will be located** to bolster multimodal transportation options.
    - When discussing access to the south bay harbor trail, the proponent states that "the South Bay Harbor Trail runs alongside the I-93 Frontage Road." The proponent should also **describe the condition of the Harbor Trail** in this segment to accurately communicate multimodal accessibility to the development.
    - As discussed, the proponent will work with the City to determine the design of details of the South Bay Harbor Trail along the Albany Street edge of the site, and potentially a connection between Albany and Frontage Road.

B19
- Both **pedestrian and cyclist access** to the Project Site must be **included explicitly** in the document; the importance of these means of transportation must not be understated. For example, this could be added to Section 1.3.3.3 or be called out in a separate section.

Open Space

B20
Open space is an integral part of the design for any development and the City of Boston appreciates efforts made by the proponent to provide for this. This development has a central focus on the green space constructed between four buildings. There are only a couple of recommendations to amend elements of open space in this PNF:

- The size of the new "Central Park" as defined on page 1-7 must be **designated with acres or square footage**. Further, the square footage for sidewalks, shared streets, green spaces, and plazas must be specified, perhaps in Table 1-1.
- A clarification about the percentage of the open space landscaping must be made according to conflicting statements on pages 1-9 and 1-11. The proponent writes on page 1-11 that "the

Project is anticipated to have an overall FAR of approximately 6.5 and a lot coverage of less than 80%." Then on page 1-9 the proponent writes that open space and landscaping is defined as 45% of the overall site. This **conflicting statement must be corrected** for clarification.

- Proponent mentions active and passes uses for Albany Green. Provide some examples of what active uses might incorporated (park vs. plaza). In addition, there is some criticism by residents of the South End who suggest that the more active recreational places are needed (or existing ones are over-capacity) in order to keep up with the density and influx of new residents to the area.

Off-site Transportation Mitigation

B21 Working with the City and community, an appropriate package of off site transportation mitigation package will be developed. Potential elements include:

- Improvements to the Albany Street corridor
- Transit infrastructure improvements
- Traffic operational improvements such as signal enhancements and upgrades
- Pedestrian and bicycle network improvements
- Bike share infrastructure

Design Elements

B22 Some of the design elements listed by the proponent require clarification to improve the readability and effectiveness of the PNF. Design is intrinsically one of the most significant aspects to accessibility of a development and therefore requires needed attention. Suggestions from the City include:

- The "pop up" space located on "New Street" is included in a 30K square foot reference, written as: "Additionally, the project design incorporates 30,000 sf of flexible space for arts, culture, community, and innovation to contribute to the energy of the neighborhood by hosting events, performances, and other programming." To improve effectiveness of this statement, the proponent **must define what "pop up" is**.

- The plaza designed for small and large scale events is mentioned vaguely in section 5.5.1. However, this **feature should be elaborated upon** in the Introduction section if it is going to be a significant component of the cultural space.

- The proponent should place more emphasis on "The jewel of the Site" as mention on page 5-7 if this aspect is truly a significant part of the development. This arts and culture space hasn't had much stress and it should it it's considered to be so important. Perhaps an amendment should be made to **remove "jewel" and replace it with "Arts and Cultural Space."**

Resilient Development

B23 To promote resiliency and limit potential adverse impacts due to climate change the BPDA has recently updated its Climate Resiliency Checklist to have project proponents address the likely impacts and risks outlined in the City's Climate Ready Boston Report including, greenhouse gas emissions, extreme heat events, more intense precipitation, and sea level rise.

Please note that the updated Boston Climate Resiliency Checklist is available and should be completed online. Please provide a Resiliency Checklist utilizing the online format.

The Checklist requires proponents to review mitigation measures to contend with 40-inches of sea level rise during a 1% chance storm event as modeled on the BPDA Sea Level Rise - Flood Hazard Area Map and to calculate the Sea Level Rise Design Flood Elevation by adding at minimum 24" of freeboard for ground floor residential, critical uses and infrastructure OR at minimum 12" of freeboard for all other structures. The Base Flood Elevation (top of water) for such an event at the project site would be approximately 18.5' Boston City Base (BCB). The resulting minimum Design Flood Elevation would be 19.5' or 20.5' BCB. Please confirm, the PNF indicates a finish floor elevation of 18-feet BCB? The proponent should explore raising the site elevations to be above those minimums and include strategies for future adaptation to potential sea level rise.

Article 37 Green Buildings

B24 The PNF indicates that the project will use the LEED v4 BD&C New Construction rating system and commits the project to achieving a LEED Silver rating with 56 points and utilizing the LEED Campus approach. The rating system and approach are acceptable. Given the location and impacts of the project the development team should commitment to a minimum green building outcome of LEED Gold for all buildings.

B25 The PNF indicates building performance will be 10% better than Mass Stretch Code and the project teams awareness of utility and state-funded energy efficiency and clean/renewable energy programs. Please engage the utilities as soon as possible and provide information on any energy efficiency assistance and support that might be afforded to the project.

B26 In support of Boston's Carbon Neutral 2050 GHG goal, the project team should further reduce building sourced GHG emissions, strategies should include the following:

1. Prioritize passive building strategies such as improved building envelope performance, increasing building envelope air tightness and insulation levels, high efficient glazings, and exterior shading.
2. Ensure active building systems are appropriately sized for improved passive performance and cost savings are fully captured.
3. The PNF indicates on site CHP is feasible and will be included. Please provide system information. Additionally the project team should analyze opportunities for on-site battery energy storage systems for reducing peak electrical loads and providing secure energy services for occupants.
4. The PNF indicates solar PV is a cost effective clean renewable energy source for reducing adverse project impacts. The project team should commit to installing solar PV should on the new buildings. Please provide system(s) location, size, and output information along with any related analysis.

Economic Development

B27

The proponent mentions in a couple of places that there are economically beneficial aspects of this project. These need to be specified more clearly if they are to have an important role in the PNF. Changes to the document should include:

- In the introduction, the proponent states that there will be 4,000-7,000 jobs created by this development. The **source of these jobs should be stated** as well as the methodology for projecting these numbers i.e. square footage assessment or some other attribute.

- A case is made for the economic benefit of construction jobs associate with this project. The proponent suggests that the project will create construction jobs with over $400,000,000 in wages. It is necessary to **clarify the source and breakdown of the numbers** with information on timelines and assumed wages.

Smart Utility Technologies

The Boston Planning & Development Agency ("BPDA") has worked in close collaboration with numerous internal and external stakeholders--the Mayor's Office of Streets, Transportation and Sanitation, the Mayor's Office of New Urban Mechanics, the Mayor's Office of Environment Energy and Open Space, the City of Boston Department of Information Technology, the City of Boston Public Works Department, the Boston Water and Sewer Commission, the City of Boston Transportation Department, and Boston's utility companies--to develop a new model for integrated planning among energy, transit, water, and communications utilities. The resulting Boston Smart Utilities Vision ("Boston Vision") aims to make utility services in urban neighborhoods more affordable, resilient, equitable, and sustainable.

The fundamental mission of Boston Smart Utilities is to transform the business-as-usual model of utility design, planning and coordination into an approach that results in greater efficiency, equity, resiliency and sustainability. . Boston Smart Utilities addresses the lack of adequate utility planning and coordination that results in unnecessary street disruptions and increased costs. By improving the planning for and coordination of utilities (telecommunications, water/sewer, gas, electrical, roadways), utility service can be made more affordable, equitable and sustainable.

Four key products of the year-long study leading up to the Smart Utilities Vision include a Baseline Report, an Assessment of Costs and Benefits, the Smart Utility Standards, and a new policy calling for the incorporation of SUT's into new development. The first three of these work products can be found at http://www.bostonplans.org/planning/planning-initiatives/boston-smart-utilities-project. The fourth work product, the Smart Utility Policy for Article 80 Development Review, is contained herein.

The *Baseline Report* analyzes the cost of doing "business-as-usual"--namely, planning and constructing utilities for the pilot project area using conventional approaches.

The Boston Smart Utilities *Cost Benefit Analysis* evaluates the financial feasibility of multiple Smart Utility Technologies and concludes that, depending upon the scale, many technologies were deemed financially feasible and cost effective at various scales of real estate development under current market conditions.

In addition to the Cost Benefit Analysis, several prominent local developers were consulted for their opinions about the feasibility of a variety of Smart Utility Technologies.

B28 The *Smart Utilities Standards* set forth guidelines for planning and integration of smart utility technologies with existing utility infrastructure in existing or new streets, defining 10 Smart Utility Technologies and a cross section of an ideal layout for underground pipes in 40' and 60' right of ways. The Smart Utilities Standards are intended to serve as guidelines for developers, architects, engineers, and utility providers for planning, designing and locating utilities. [NS2] [NS3]

The forthcoming *Smart Utilities Policy for Article 80 Developmen*t *Review* will describe which SUT's will be required in new development of certain size thresholds.

Applicable Smart Utility Technologies

B29 Pending adoption by the BPDA Board, it will be BPDA's objective that all projects comply with the Smart Utility Standards. In addition, depending on the project size, BPDA will expect to see Smart Utility Technologies (SUT's) incorporated into new developments. The SUT's include Adaptive Signal Technology, District Energy Microgrid, Green Infrastructure, Rainwater Reuse, a Telecommunications Utilidor, and, electrical connections and data services access for street lights. Definitions of these technologies are provided below for reference*.

B30 Applicable Smart Utility Technologies for each project will depend on (a) the floor area of the Project and/or (b) the Project's required mitigation of traffic, street lighting, and surface water runoff.

1- **For any projects at or above 1.5 million square feet of floor area**, the BPDA shall, as part of their project review, recommend incorporation of a District Energy Microgrid, to the extent that the project includes buildings located on contiguous properties or clustered close together. For projects that are primarily residential, complying with this requirement may entail cooperation with a district energy provider that can sub-meter individual residential units. If a District Energy Microgrid is not incorporated into the project plan, the BPDA and Public Improvement Commission (PIC) shall require documentation explaining how other technologies to be incorporated into the project will offer comparable or superior benefits in terms of climate resiliency, reduced energy use, reduced greenhouse gas (GHG) emissions, and cost reductions to end users.
2- **For projects at or above 1.5 million square feet of floor area, and/or adding or altering road surface in excess of .5 miles of roadway,** the BPDA shall, as part of its project review, recommend the incorporation of a Telecommunications Utilidor. If a Telecommunications Utilidor is not incorporated into the project plan, BPDA and Public Improvement Commission shall require documentation explaining how other technologies to be incorporated into the project will provide comparable or superior benefits in terms of mitigating and/or reducing surface street disruptions, yielding more efficient use of underground space, and promoting more equitable access to telecom infrastructure for both system providers and end users than conventionally associated with telecom utility upgrades/changes.

For all Projects at or above 100,000 square feet of floor area:

3- BPDA shall recommend incorporation of in-building **rainwater capture and reuse** through on site retention for irrigation or other reuse.

For Projects satisfying other threshold criteria, as specified below:

B31 4 - **For all projects that are subject to Boston Water and Sewer Commission (BWSC) stormwater mitigation requirements,** the BPDA shall recommend the installation of Green Infrastructure installation.

B32 5- **For all projects where the Boston Transportation Department requires that traffic signals be installed, or where traffic signal phasing and timing changes are required to due to traffic mitigatio**n, the BPDA shall recommend the incorporation of Adaptive Signal Technology into the traffic signal system.

B33 6- **For all projects making right-of-way improvements which are responsible for Street Light installation or a contribution toward the same**, and in anticipation of forthcoming PIC standards for street lights, BPDA shall recommend all street lights to have additional electrical connection and data service access.

Timing in the Article 80 Process

A. **With the Project Notification Form (PNF), Notice of Project Change (NPC), or other initial filing,** provide documentation of the integration of applicable technologies into the design and planning of the project via diagrams, plans, analyses and descriptions deemed necessary by the Director of the BPDA. Describe all immediate and long-term planning, design, and construction strategies that will be employed to avoid, eliminate, or mitigate the adverse impacts of utility construction. Consideration of SUTs should not be limited to those described in the Smart Utility Standards handbook.

B. Incorporate Smart Utility Standards into all relevant components of the project including building, site, infrastructure, transportation, environmental protection, urban design, landscape, sustainable development, historic resources, and tidelands.

C. With the Design / Building Permit filing, the Project Proponent must submit updated documentation of the integration of applicable technologies along with supporting analysis and document the strategies that will be employed to integrate SUTs .

D. **With the Construction / Certificate of Occupancy filing,** the Project Proponent must submit documentation of the integration of applicable technologies along with supporting analysis and document the strategies that will be employed to integrate SUTs.

Given that the South End Exchange Project exceeds all of these thresholds, the BPDA looks forward to working with the proponent to explore how the project can address each of these Smart Utility Technologies.

Smart Utilities Definitions

To be clear about what each of the Smart Utility Technologies involves, the following definitions are provided. More detailed standards and specifications will be developed for certain technologies by other City Departments--for example, the Department of Public Works will develop standards for the Telecommunications Utilidor.

District Energy - District energy systems produce steam, hot water or chilled water ("thermal services") at a central plant. The steam or water is then piped underground to individual buildings for space heating, hot water heating and air conditioning. Buildings served by district energy do not need their own boilers, furnaces, chillers, and/or air conditioners and thus have lower capital costs and more usable floor area. District energy provides opportunities to reduce energy use, energy cost, and greenhouse gas (GHG) emissions.

Microgrid - A microgrid is an electricity generation and distribution system generally serving multiple buildings that can be operated in a controlled, coordinated way with the main power grid or, as needed, when disconnected from the main power grid and functioning independently (in "island mode") as the need arises. Microgrids include: 1) a power source, 2) a power management system, 3) an energy storage system, 4) electricity consuming devices, and 5) a utility connection. Microgrids provide resilience in the face of weather or other emergencies that affect the main power grid. They also improve power quality, flexibility and reliability by integrating and optimizing various sources of energy, including renewable energy and battery storage.

District Energy Microgrid - An energy generation and distribution system which combines the thermal services of District Energy with the electrical generation and distribution services of Microgrids using combined heat and power (CHP). CHP is on-site electricity generation that captures the excess heat that would otherwise be wasted to provide useful thermal energy—such as steam or hot water—that can be used for space heating, cooling, domestic hot water and industrial processes.

Adaptive Signal Technology - Smart traffic management utilizes intelligent signals and traffic cameras to manage traffic flow in real-time. These technologies are used to facilitate vehicle progression and reduce wait time which improves fuel efficiency and reduces GHG emissions. Smart traffic management can be coupled with autonomous vehicles, vehicles equipped with the capabilities to sense the surrounding environment and navigate without human input. Combined, such a traffic system provides advantages of improved pedestrian safety and fewer associated traffic crashes.

Green Infrastructure - Green infrastructure is an approach to water management that includes policies, planning activities and infrastructure implementation that assist in absorbing, delaying, detaining, and treating stormwater in order to reduce flood risk and pollution downstream. The Boston Complete Street Guidelines 2013 provide additional information on various green vegetated stormwater management systems (stormwater/bioretention planters, rain gardens, etc.), as well as information on permeable paving materials. Green Infrastructure considered in the Smart Utilities Vision includes: bioretention basins and planters, infiltration chambers, tree pits/trenches, dry wells, and permeable paving.

Rainwater re-use - Rainwater and greywater can be directed and collected using a drainage/plumbing system that is separate from the building wastewater plumbing system and the storm drainage system. The re-use process consists of two steps: the diversion system and the filtration/purification system. Rainwater use is the accumulation of rainwater from roofs. Greywater is gently-used water from bathroom sinks, showers, tubs, and washing machines. Greywater does not contain any fecal contamination. Although greywater may contain traces of food and grease, it is still considered "clean" and is a beneficial source of water for irrigation and toilet use. Re-using rainwater and greywater for these purposes reduces water main demands, particularly in growing urban communities. By re-using this water, it is kept out of the sewer and storm drainage systems, ultimately reducing the chance of polluting local water bodies as well.

Telecommunications Utilidor - The Telecommunications or “Telecom” Utilidor is an underground passageway that will contain all telecommunication utility assets. By unifying all the telecom assets in one “Utilidor”, surface street disruptions will be decreased when telecom utility upgrades/changes are required, as well as when subsequent providers want to add assets. . Additionally, by providing opportunity for utility coordination, initial construction costs, as well as future operation and maintenance costs will be reduced.

Appendix

The following table outlines mistakes or clarifications that must be made to figures/tables and grammar/formatting. They are listed by the figure/table numbers or page numbers.

Figure 1-16	The East Dedham Street Extension is on this diagram, but the way it is visualized makes it seem not very prevalent. Is this intentional and accurate for the design of the street or will it have more of a visual impact on the ground? Change the diagrams to show the confines of the shared street.
Figure 2-2	There are roads shown abutting the Site on the Northeast and Southwest sides. This is misleading because there aren't existing roads and are instead part of the parking lot.
Figures 2-15 - 2-22	The proponent must show the unacceptable use of a Concord/Mass Ave Connector connection and the distribution of 35% of project trips (350+) to this location.
Figures 2-23 - 2-26	The analysis shows through trips from the E. Concord connector beyond Biosquare Drive, but this is an opposing one-way.
Figure 3-15	AC2 is listed twice on the map. The legend would make more sense to say "V#" and "AC#" to indicate the categories of viewpoint and area context instead of

	referencing specific points.
Figure 3-16	The proponent must make it more clear that the top two pictures are the existing condition and the middle two pictures are the build condition.
Figures 5-2 / 5-10	The rendering on 5-2 is inconsistent in regards to parking/bike accommodations on Albany Street compared with later figures.
Figure 5-14	The actual design for the cycle track seems ambiguous when it crosses the plaza. There isn't a marking or design element established and this is inconsistent through several figures.
Table 2-2	The proponent should include what type of use each of the parking lots are allocated.
1-6	The proponent writes that "I-93, runs east of the 1-93 Frontage Road." The comma in this sentence is incorrect and the proponent writes a "1" instead of "I". This sentence should read "I-93 runs east of the I-93 Frontage Road."
3-21	There is a reference "...Area Context points described above and shown in Figure 3.4-1." It is not clear what "Figure 3.4-1" is. Is it meant to be "Figure 3-15"?
3-56	The proponent writes about a bird species called "Calidris canutus rufa" when the convention for citing scientific genus and species names is to italicize as *Calidris canutus rufa*.
5-3	The proponent writes "The space is being designed for a possible restaurants..." The "a" in the sentence should be removed so that it instead reads "The space is being designed for possible restaurants…"
5-16	The proponent writes "The 20' wide two-way driveway will be designed as a shared surface for slow speed vehicles pedestrians and bicycles, integrated..." The proponents needs to add a comma after "vehicles". Also, amend the statement to abide with previous comments on "driveway" and public/private road designation.
5-16	In the last paragraph, "East/ West Connector" should instead read "East/West Connector".

November 6, 2017

Mr. Gerald Autler
Boston Planning & Development Agency
One City Hall Square
Boston, MA 02201

Re: Exchange South End, PNF

Dear Mr. Autler:

The Boston Water and Sewer Commission (the "Commission") has reviewed the Project Notification Form ("PNF") for the proposed Exchange South End Project (the "Project"). The Project site is located at 540 Albany Street in Boston's South End neighborhood. The Project includes the construction of four buildings with approximately 1,481,350 square feet (sf) of mixed-use commercial and life science research space, 42,500 square feet of ground floor retail space, and 30,000 sf of civic space situated around a new central public park. Below-grade parking garages under each building will provide approximately 1,245 parking spaces.

Water, sewer, and storm drain service for the site is provided by the Boston Water and Sewer Commission. For water service the Project is served by a 16-inch water main on Albany Street. Water demand for the Project is estimated at 146,440 gpd.

For sanitary sewer service the Project site is served by an existing 66-inch by 68-inch combined sewer main (the New Albany Street Interceptor) on Albany Street. Also, there is an existing 6-inch sanitary sewer in Biosquare Drive behind the existing building. Wastewater flow from the Project is estimated at 133,127 gpd.

Additionally, there is a 216-inch by 120-inch combined sewer (the Roxbury Canal Conduit (RCC)) which transects the site and is located in a 50-foot BWSC easement. In the middle of the site, the RCC splits and increases to two 180-inch by 120-inch combined sewer mains. The RCC flows in a northerly direction and then discharges to the Fort Point Channel via the Commission owned outfall CSO-070.

Record plans do not indicate where existing building sewer services connect to the existing Commission sewer mains adjacent to the site. But the record plans indicate that the Commission's sewers in this area do not connect to the RCC. Total estimated sewage flow for the Project is estimated at 133,127 gallons per day (gpd). The proposed buildings will require new building sewer services.

The existing Project site is comprised of building roof, paved parking areas and walkways. The existing site is approximately 100-percent impervious. For drainage the Project site is currently served by a 42-inch storm drain on Albany Street and an 18-inch storm drain on Biosquare Drive. The 42-inch storm drain on Albany Street flows southerly before turning east and through the adjacent Boston University National Emerging Infectious Diseases Laboratories (NEIDL) property. The storm drain continues flowing easterly and connects to the RCC. The 18-inch storm drain on Biosquare Drive flows southerly before turning at the NEIDL, flows westerly, and then connects to the RCC.

Commission records do not indicate where the existing building drains connect; however, they may connect to the storm drain on Albany Street or to the RCC. Stormwater from the building roof may also sheet flow to the existing catch basins in the paved parking lot throughout the site. Stormwater runoff from the paved parking lot around the existing building sheet flows and is collected by catch basins. Record plans do not indicate where these catch basins connect, but it appears that they may connect to the storm drain on Albany Street or the RCC.

In addition to the RCC easement, there is also a 20-foot drainage easement and an abandoned drainage culvert extending from the RCC to Albany Street. The PNF states that the proponent will work with the Commission to determine what is located within the existing drainage easements and what the Commission will allow to be built within the easements and in close proximity to the existing Commission infrastructure.

The Commission has the following comments regarding the proposed Project:

General

BW1

1. The Proponent must submit a site plan and General Service Application to the Commission for the proposed Project. The site plan must show the location of the water mains, sewers and drains serving the Project site, as well as the locations of existing and proposed service connections. To assure compliance with the Commission's requirements, the Proponent should submit the site plan and General Service Application to the Commission's Engineering Customer Service Department for review when the design for the Project is at 50 percent complete.

BW2

2. Any new or relocated water mains, sewers and storm drains must be designed and constructed at the Proponent's expense. They must be designed and constructed in conformance with the Commission's design standards, Water Distribution System and Sewer Use Regulations, and Requirements for Site Plans.

BW3

3. With the site plan the Proponent must provide detailed estimates for water demand (including water required for landscaping), wastewater generation, and stormwater runoff for the Project.

BW4

4. It is the Proponent's responsibility to evaluate the capacity of the water and sewer system serving the Project site to determine if the systems are adequate to meet future Project demands. With the site plan, the Proponent must include a detailed capacity analysis for the water and sewer systems serving the Project site, as well as an analysis of the impact the Project will have on the Commission's systems and the MWRA's systems overall. The analysis should identify specific measures that will be implemented to offset the impacts of the anticipated flows on the Commission and MWRA sewer systems.

BW5

5. Developers of projects involving disturbances of land of one acre or more are required to obtain an NPDES General Permit for Construction from the Environmental Protection Agency. The Proponent is responsible for determining if such a permit is required and for obtaining the permit. If such a permit is required for the proposed Project, a copy of the Notice of Intent and any pollution prevention plan submitted to EPA pursuant to the permit must be provided to the Commission's Engineering Services Department prior to the commencement of construction.

BW6 6. Before the Proponent demolishes the existing structures existing water and drain connections that won't be re-used must be cut and capped in accordance with Commission standards. The Proponent must complete a Termination Verification Approval Form for a Demolition Permit, available from the Commission. The completed form must be submitted to the City of Boston's Inspectional Services Department before a Demolition Permit will be issued.

Sewage/Drainage

BW7 7. As noted in the PNF, the Project site is transected by the Commission's Roxbury Canal Conduit. The proponent is responsible for ensuring that the construction does not negatively impact the RCC. Prior to commencing the project, the proponent must submit to the Commission plans indicating the location of the RCC relative to the proposed construction. The plans must also identify specific measures that will be implemented to prevent damage or obstruction of the RCC during construction. The Project must be designed so that access, including vehicular access, to the Commission's RCC for the purpose of operation and maintenance is not inhibited.

BW8 8. The Proponent should note Article V of the Commission's Sewer Use Regulations as it pertains to medical and laboratory facilities.

BW9 9. Oil traps are required on drainage systems discharging from enclosed parking garages. Discharges from the oil traps must be directed to a building sewer and must not be mixed with roof or other surface runoff. The requirements for oil traps are provided in the Commission's Requirements for Site Plans.

BW10 10. Grease traps will be required in any food service facility in the new facility in accordance with the Commission's Sewer Use Regulations. The proponent is advised to consult with the Commission before preparing plans for food service facilities.

BW11 11. The Department of Environmental Protection (DEP), in cooperation with the Massachusetts Water Resources Authority (MWRA) and its member communities are implementing a coordinated approach to flow control in the MWRA regional wastewater system, particularly the removal of extraneous clean water (e.g., infiltration/ inflow ("I/I")) in the system. Pursuant to the policy new developments with design flow exceeding 15,000 gpd of wastewater are subject to the Department of Environmental Protection's regulation 314 CMR 12.00, section 12.04(2)(d). This regulation requires all new sewer connections with design flows exceeding 15,000 gpd to mitigate the impacts of the development by removing four gallons of infiltration and inflow (I/I) for each new gallon of wastewater flow added. The Commission will require the Proponent to develop an inflow reduction plan consistent with the regulation. The 4:1 reduction should be addressed at least 90 days prior to activation of water service, and will be based on the estimated sewage generation provided with the Project site plan.

BW12 12. The discharge of dewatering drainage to a sanitary sewer is prohibited by the Commission and the MWRA. The discharge of any dewatering drainage to the storm drainage system requires a Drainage Discharge Permit from the Commission. If the dewatering drainage is contaminated with petroleum products for example, the Proponent will be required to obtain a Remediation General Permit from the EPA for the discharge.

BW13 13. The site plan must show in detail how drainage from the building's roof top and from other impervious areas will be managed. Roof runoff and other stormwater runoff must be conveyed separately from sanitary waste at all times.

BW14 14. The Project is located within Boston's Goundwater Conservation Overlay District (GCOD). The district is intended to promote the restoration of groundwater levels and reduce the impact of surface runoff. Projects constructed within the GCOD are required to include provisions for retaining stormwater and directing the stormwater towards the groundwater table for recharge. The Proponent must fully investigate methods for infiltrating stormwater on-site before the Commission will consider a request to discharge stormwater to the Commission's system. A feasibility assessment for infiltrating stormwater on-site must be submitted with the site plan for the Project.

BW15 15. The Massachusetts Department of Environmental Protection (MassDEP) has established Performance Standards for Stormwater Management. The Standards address stormwater quality, quantity and recharge. In addition to Commission standards, the proposed Project will be required to meet MassDEP's Stormwater Management Standards.

BW16 16. In conjunction with the site plan and General Service Application the Proponent will be required to submit a Stormwater Pollution Prevention Plan. The plan must:

- Specifically identify how the Project will comply with the Department of Environmental Protection's Performance Standards for Stormwater Management both during construction and after construction is complete.

- Identify specific best management measures for controlling erosion and preventing the discharge of sediment, contaminated stormwater or construction debris to the Commission's drainage system when construction is underway.

- Include a site map which shows, at a minimum, existing drainage patterns and areas used for storage or treatment of contaminated soils, groundwater or stormwater, and the location of major control or treatment structures to be utilized during construction.

BW17 17. The Commission requests that the Proponent install a permanent casting stating: "Don't Dump: Drains to Boston Harbor" next to any new catch basin installed as part of the Project. The Proponent may contact the Commission's Operations Division for information regarding the purchase of the castings.

BW18 18. The Commission encourages the Proponent to explore additional opportunities for protecting stormwater quality by minimizing sanding and the use of deicing chemicals, pesticides and fertilizers.

Water

BW19 19. The Proponent is required to obtain a Hydrant Permit for use of any hydrant during construction of the Project. The water used from the hydrant must be metered. The Proponent should contact the Commission's Operations Department for information on obtaining a Hydrant Permit.

BW20 20. The Commission utilizes a Fixed Radio Meter Reading System to obtain water meter readings. Where a new water meter is needed, the Commission will provide a Meter Transmitter Unit (MTU) and connect the device to the meter. For information regarding the installation of MTUs, the Proponent should contact the Commission's Meter Installation Department.

BW21 21. The Proponent should explore opportunities for implementing water conservation measures in addition to those required by the State Plumbing Code. In particular the Proponent should consider indoor and outdoor landscaping which requires minimal use of water to maintain. If the Proponent plans to install in-ground sprinkler systems, the Commission recommends that timers, soil moisture indicators and rainfall sensors be installed. The use of sensor-operated faucets and toilets in common areas of buildings should also be considered.

Thank you for the opportunity to comment on this Project.

Yours truly,

John P. Sullivan, P.E.
Chief Engineer and Operations Officer

JPS/as
cc: William Keravuori, The Abbey Group
Marianne Connolly, Mass. Water Resources Authority
Maura Zlody, Boston Environment Department
Phil Larocque, Boston Water and Sewer Commission

Smart Utility Technologies

The Boston Planning & Development Agency (“BPDA”) has worked in close collaboration with numerous internal and external stakeholders--the Mayor’s Office of Streets, Transportation and Sanitation, the Mayor’s Office of New Urban Mechanics, the Mayor’s Office of Environment Energy and Open Space, the City of Boston Department of Information Technology, the City of Boston Public Works Department, the Boston Water and Sewer Commission, the City of Boston Transportation Department, and Boston’s utility companies--to develop a new model for integrated planning among energy, transit, water, and communications utilities. The resulting Boston Smart Utilities Vision (“Boston Vision”) aims to make utility services in urban neighborhoods more affordable, resilient, equitable, and sustainable.

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The forthcoming *Smart Utilities Policy for Article 80 Developmen*t *Review* will describe which SUT’s will be required in new development of certain size thresholds.

Applicable Smart Utility Technologies

Pending adoption by the BPDA Board, it will be BPDA's objective that all projects comply with the Smart Utility Standards. In addition, depending on the project size, BPDA will expect to see Smart Utility Technologies (SUT's) incorporated into new developments. The SUT's include Adaptive Signal Technology, District Energy Microgrid, Green Infrastructure, Rainwater Reuse, a Telecommunications Utilidor, and, electrical connections and data services access for street lights. Definitions of these technologies are provided below for reference*.

Applicable Smart Utility Technologies for each project will depend on (a) the floor area of the Project and/or (b) the Project's required mitigation of traffic, street lighting, and surface water runoff.

1- **For any projects at or above 1.5 million square feet of floor area**, the BPDA shall, as part of their project review, recommend incorporation of a District Energy Microgrid, to the extent that the project includes buildings located on contiguous properties or clustered close together. For projects that are primarily residential, complying with this requirement may entail cooperation with a district energy provider that can sub-meter individual residential units. If a District Energy Microgrid is not incorporated into the project plan, the BPDA and Public Improvement Commission (PIC) shall require documentation explaining how other technologies to be incorporated into the project will offer comparable or superior benefits in terms of climate resiliency, reduced energy use, reduced greenhouse gas (GHG) emissions, and cost reductions to end users.

2- **For projects at or above 1.5 million square feet of floor area, and/or adding or altering road surface in excess of .5 miles of roadway,** the BPDA shall, as part of its project review, recommend the incorporation of a Telecommunications Utilidor. If a Telecommunications Utilidor is not incorporated into the project plan, BPDA and Public Improvement Commission shall require documentation explaining how other technologies to be incorporated into the project will provide comparable or superior benefits in terms of mitigating and/or reducing surface street disruptions, yielding more efficient use of underground space, and promoting more equitable access to telecom infrastructure for both system providers and end users than conventionally associated with telecom utility upgrades/changes.

For all Projects at or above 100,000 square feet of floor area:

3- BPDA shall recommend incorporation of in-building **rainwater capture and reuse** through on site retention for irrigation or other reuse.

For Projects satisfying other threshold criteria, as specified below:

4 - **For all projects that are subject to Boston Water and Sewer Commission (BWSC) stormwater mitigation requirements,** the BPDA shall recommend the installation of Green Infrastructure installation.

5- **For all projects where the Boston Transportation Department requires that traffic signals be installed, or where traffic signal phasing and timing changes are required to due to traffic mitigatio**n, the BPDA shall recommend the incorporation of Adaptive Signal Technology into the traffic signal system.

6- **For all projects making right-of-way improvements which are responsible for Street Light installation or a contribution toward the same**, and in anticipation of forthcoming PIC standards for street lights, BPDA shall recommend all street lights to have additional electrical connection and data service access.

Timing in the Article 80 Process

A. **With the Project Notification Form (PNF), Notice of Project Change (NPC), or other initial filing,** provide documentation of the integration of applicable technologies into the design and planning of the project via diagrams, plans, analyses and descriptions deemed necessary by the Director of the BPDA. Describe all immediate and long-term planning, design, and construction strategies that will be employed to avoid, eliminate, or mitigate the adverse impacts of utility construction. Consideration of SUTs should not be limited to those described in the Smart Utility Standards handbook.

B. Incorporate Smart Utility Standards into all relevant components of the project including building, site, infrastructure, transportation, environmental protection, urban design, landscape, sustainable development, historic resources, and tidelands.

C. With the Design / Building Permit filing, the Project Proponent must submit updated documentation of the integration of applicable technologies along with supporting analysis and document the strategies that will be employed to integrate SUTs .

D. **With the Construction / Certificate of Occupancy filing,** the Project Proponent must submit documentation of the integration of applicable technologies along with supporting analysis and document the strategies that will be employed to integrate SUTs.

Given that the South End Exchange Project exceeds all of these thresholds, the BPDA looks forward to working with the proponent to explore how the project can address each of these Smart Utility Technologies.

Definitions

To be clear about what each of the Smart Utility Technologies involves, the following definitions are provided. More detailed standards and specifications will be developed for certain technologies by other City Departments--for example, the Department of Public Works will develop standards for the Telecommunications Utilidor.

District Energy - District energy systems produce steam, hot water or chilled water ("thermal services") at a central plant. The steam or water is then piped underground to individual buildings for space heating, hot water heating and air conditioning. Buildings served by district energy do not need their own boilers, furnaces, chillers, and/or air conditioners and thus have lower capital costs and more usable floor area. District energy provides opportunities to reduce energy use, energy cost, and greenhouse gas (GHG) emissions.

Microgrid - A microgrid is an electricity generation and distribution system generally serving multiple buildings that can be operated in a controlled, coordinated way with the main power grid or, as needed, when disconnected from the main power grid and functioning independently (in "island mode") as the need arises. Microgrids include: 1) a power source, 2) a power management system, 3) an energy storage system, 4) electricity consuming devices, and 5) a utility connection. Microgrids provide resilience in the face of weather or other emergencies that affect the main power grid. They also improve power quality, flexibility and reliability by integrating and optimizing various sources of energy, including renewable energy and battery storage.

District Energy Microgrid - An energy generation and distribution system which combines the thermal services of District Energy with the electrical generation and distribution services of Microgrids using combined heat and power (CHP). CHP is on-site electricity generation that captures the excess heat that would otherwise be wasted to provide useful thermal energy—such as steam or hot water—that can be used for space heating, cooling, domestic hot water and industrial processes.

Adaptive Signal Technology - Smart traffic management utilizes intelligent signals and traffic cameras to manage traffic flow in real-time. These technologies are used to facilitate vehicle progression and reduce wait time which improves fuel efficiency and reduces GHG emissions. Smart traffic management can be coupled with autonomous vehicles, vehicles equipped with the capabilities to sense the surrounding environment and navigate without human input. Combined, such a traffic system provides advantages of improved pedestrian safety and fewer associated traffic crashes.

Green Infrastructure - Green infrastructure is an approach to water management that includes policies, planning activities and infrastructure implementation that assist in absorbing, delaying, detaining, and treating stormwater in order to reduce flood risk and pollution downstream. The Boston Complete Street Guidelines 2013 provide additional information on various green vegetated stormwater management systems (stormwater/bioretention planters, rain gardens, etc.), as well as information on permeable paving materials. Green Infrastructure considered in the Smart Utilities Vision includes: bioretention basins and planters, infiltration chambers, tree pits/trenches, dry wells, and permeable paving.

Rainwater re-use - Rainwater and greywater can be directed and collected using a drainage/plumbing system that is separate from the building wastewater plumbing system and the storm drainage system. The re-use process consists of two steps: the diversion system and the filtration/purification system. Rainwater use is the accumulation of rainwater from roofs. Greywater is gently-used water from bathroom sinks, showers, tubs, and washing machines. Greywater does not contain any fecal contamination. Although greywater may contain traces of food and grease, it is still considered “clean” and is a beneficial source of water for irrigation and toilet use. Re-using rainwater and greywater for these purposes reduces water main demands, particularly in growing urban communities. By re-using this water, it is kept out of the sewer and storm drainage systems, ultimately reducing the chance of polluting local water bodies as well.

Telecommunications Utilidor - The Telecommunications or “Telecom” Utilidor is an underground passageway that will contain all telecommunication utility assets. By unifying all the telecom assets in one “Utilidor”, surface street disruptions will be decreased when telecom utility upgrades/changes are required, as well as when subsequent providers want to add assets. . Additionally, by providing opportunity for utility coordination, initial construction costs, as well as future operation and maintenance costs will be reduced.

Appendix F

Comments Response Table

Comments Responses Table

Exchange South End

BPDA General Scoping Determination Comments Summary

Comment No.	Comment Summary	Comment Responses
Transportation Component		
Traffic Management Element		
G1	The DPIR should include updated transportation modeling that conforms to the recommendations in the BPDA/BTD comments outlined below: a) Additional intersections to be included in the study area with several results to be revised, including a revision of the prioritized intersections for air quality analysis. b) Inclusion of the future transit capacity analysis under "Study Methodology" (section 2.1.2). c) Removing the East Concord/Mass. Ave Connector from The Build Condition Analysis presented in the PNF.	**Please see Section 2. The study area has been expanded, the study includes transit capacity analysis, and the East Concord connection is not being pursued at this time.**
Multimodal Access		
G2	Both pedestrian and cyclist access to the Project Site must be included explicitly in the document, as the importance of these modes of transportation must not be understated.	**Please see Section 2.4.1 and 2.4.9**
Transportation Demand Management		
G3	The DPIR should include additional detail about potential TDM measures, including: a) Detail on potential future expansion of bicycle parking, both secure/internal and short- term/external, beyond the minimum commitment in the PNF b) Detail on shower/changing facilities for commuters c) Proposed real-time transit and mobility information within buildings d) Proposed Neighborhood Mobility microHUBs, as described in Go Boston 2030. Specifically, the DPIR should	**Please see Section 2.4.9. The project intends to meet the BTD bicycle guidelines or LEED requirements (whichever is more stringent for each component) for bicycle and shower facilities.** **Please see Section 2.8 for mitigation commitments including real-time transportation mobility commitments. Please see Section 2.4.1 for Site Access and Circulation discussion.** **See section 5.3.2 Bicycle Accommmodations**

Comment No.	Comment Summary	Comment Responses
	analyze alternative locations for the array of services that should be facilitated on the Project site. Of particular importance is a realistic approach to pick-up and drop-off, particularly by taxis and ridesharing services, that avoids impacts on the primary roadways surrounding the site and the transit services, buses, and private vehicles that use those roadways. The City of Boston is currently piloting efforts with ridesharing services that would limit users' ability to set pickup and dropoff points to specific locations near major origins and destinations (e.g. transit stations, mobility hubs, major projects).	
Bicycle Sharing		
G4	Given the number of projected employees and residents in the Project and the vicinity, the Project should be designed to adequately accommodate at least 30 Hubway bicycles in a highly visible and accessible location along the Albany Street frontage.	**Please see Section 2.4.9** **See figure 5-23 for location of 30 Hubway stations**
Parking Management Element		
G5	The parking ratios presented in this document and specifically page 1-9 are not clear. Parking ratios should be based on office, lab, civic, and retail space, but instead the document claims are calculated based on gross floor area.	**Please see Section 2.4.2. The maximum allowed parking ratio for each of the land uses are the same (0.75 to 1.0 per 1,000 SF).**
	There should be further definition of the uses of parking between office/lab, retail, and cultural uses. Additionally, the proponent should note if there will be public parking available on the site.	**Please see Section 2.4.2. As per the APCC, public parking is not permitted on this site.**
	When discussing "off-street parking" the proponent should include information about remaining parking capacity.	**Please see Section 2.4.2.**
	Provisions for constructing parking garages should include that any above grade parking levels and at minimum the first below grade parking level should be constructed with enough height and other physical considerations to allow for the conversion to better/more desirable uses. This approach also provides flexibility for the parking program to include "stackers."	**The garages in Phase 1 will be designed to allow for the removal of all or a portion of the first below grade parking level for conversion to other uses. Also, the project will be constructed in phases, so parking requirements can be evaluated prior to construction of future garage structures, and eliminated if appropriate.**
	The DPIR should present more detail on the potential for shared parking, both with existing and future complementary uses in the area (e.g.	**The shared use of parking with South End Resident Permit Parkers will be codified in the TAPA.**

Comment No.	Comment Summary	Comment Responses
	residential) and as a service to local residents during snow emergencies.	
	The DPIR should analyze the potential for future "smart parking" features, e.g. displays of availability and pricing, design that can accommodate autonomous vehicles that park and retrieve themselves (e.g. waiting area for patrons, smaller space requirements for parking spots).	**Noted.**
Albany Street Multimodal Improvements		
G6	City of Boston agencies have developed preliminary concepts for the South Bay/Harbor Trail protected bicycle facility and dedicated bus lanes with enhanced bus stops on Albany Street. In addition, the addition of new traffic signals on Albany Street, and the synchronization/coordination of all signals, will require ongoing involvement and funding from a variety of stakeholders. The Proponent is expected to continue to work closely with relevant agencies to ensure that the Albany Street frontage of the Project is consistent with the evolving thinking about Albany Street, as well as to coordinate implementation. As stated in the PNF, the Proponent will make a financial contribution towards implementation of this infrastructure on Albany Street.	**The Proponent has been and will continue to work closely with all relevant agencies to ensure Site frontage will be consistent with evolving street designs along Albany Street.**
Pedestrian Analysis		
G7	The DPIR should: a) Address the adequacy of sidewalks and other pedestrian infrastructure in the area of the Proposed Project and potential safety issues at pedestrian crossings. b) Propose improvements to facilitate pedestrian circulation to and around the Proposed Project and ways that development can improve the overall pedestrian circulation system of the area, including working with BTD to propose a suitable signalized pedestrian crossing at East Dedham Street.	**Please see Section 2.2.1 and 2.2.2 for existing sidewalk and pedestrian infrastructure. Please see Section 2.4.1 for on-site pedestrian accommodations. The Project proposes to fully signalize the East Dedham Street intersection.** **Note on architectural planning: multiple and distributed entry points are provided into all the buildings**
Transit Improvements		
G8	The Existing Conditions section needs to include analysis for transit needs such as ridership, remaining capacity, and stop boarding/alighting information. This analysis is crucial to determining the effect of such a development on transit conditions.	**Please see Section 2.6**
	The proponent claims that future new transit riders "will not encounter buses that are at	**Please see Section 2.6**

Comment No.	Comment Summary	Comment Responses
	capacity." While this could be true, it needs to be articulated and proven by assigning trips to services by time of day and showing the remaining capacity. This is necessary for both "build" and "no build" trips.	
	Shuttle buses can be a critical element of transportation to the Exchange South End development. The DPIR should include an overview of existing private shuttles in the area such as the Boston University Medical Campus (BUMC) shuttle.	**Please see Section 2.2.8.2**
Loading and emergency vehicle access		
G9	Review provisions for emergency vehicle access to the Proposed Project. Lab and office space differ in terms of projected rates for deliveries. Therefore, they should be separated in the loading and service accommodations to allow for a higher lab space delivery rate.	**Please see Section 2.4.3** **In our architectural experience, the loading areas can be shared.**
Urban Design Component		
G10	While the height and massing ideas are sound the design of the open space and the design of Building B still need further work. BPDA staff are concerned that the plaza contains too much paved area and not enough planted areas. The staff has expressed concerns over the orientation of the mound and placement within the plaza. Another concern is the overall depth of the plaza especially when it comes to the location of any type of community space.	**The amount of planted and lawn area were increased. Community space was distributed into all buildings. See section 1.3, Section 5.5.1, and Figure 5-15 Albany Green Lawn**
	The design of Building B needs some additional review. Building A does a good job finding a balance between modern design and the traditional South End design. Building B needs this balance in terms of its aesthetic but also the scale of the street-level elements.	**Building B was redesigned, reduced in height and mass, and follows many of the design elements found in Building A.** **See section 1.3 and Figure 5-4 Perspective from Albany Street**
	The design approach for both of the buildings (C + D) at the rear of the site should be unrelated to the buildings at the front of the site (A + B). C + D should be fully expressive of their use type and	**Building C's height was increased, including the area removed from Building B. The massing of both the base and**

Comment No.	Comment Summary	Comment Responses
	building type. A bolder, clean modern expression would be appropriate. The design approach should result in something that resembles a collection of buildings designed and built over time.	**top of 'C' were modified providing better proportions, and share a similar vocabulary with Building D. See section 1.3 and Figure 5-4 Perspective from Albany Street**
	BPDA staff have concerns about the impact of a curb cut at the intersection of Albany Street and the East Dedham Extension. Although a shared street as part of the plaza, particularly one that can be closed to traffic, does not seem problematic in and of itself if it is properly designed and managed, an additional intersection on Albany Street threatens to further complicate an already complex multimodal street. The roadway would mean traffic is crossing a busy pedestrian zone, a protected bicycle facility, and a dedicated bus right-of-way, in addition to creating an additional source of friction with through-traffic on Albany Street.	**The Albany Street corridor will be constructed following the City preferred cross section.**
G11	The DPIR should present the following:	
	- **Additional Precedents and Analysis of Plaza Design:** Whenever possible, precedents should be local in order to maximize the familiarity of the public. They should be of similar scale and context, with a range of hardscape/green ratios and a comparable range of activities.	**See Figures 5-24 to 5-35**
	- **Alternative Scenarios for Shared Street:** a) The DPIR should present additional analysis of traffic movements in and out of the proposed East Dedham Street Extension shared street under various scenarios: right in only, right out only, right in and out (i.e. two-way traffic). This should be based on estimated volume at peak times and combined with estimated pedestrian and bicycle volumes at full buildout.	**See 5.2.1 Alternative Scenarios for Shared Street**
	b) The DPIR should also present alternative scenarios in which the shared street does not connect to Albany Street, and show how proposed activities (e.g., drop-off) could be accommodated by the Project.	**See Section 5.2.1**

Comment No.	Comment Summary	Comment Responses
	c) the DPIR should present more detailed design proposals that would minimize the conflicts between cars, bicycles, and pedestrians at this mid-block location, as well as proposals for how access could be controlled in order limit the volumes of vehicles and/or the times of day that the street is open.	**See Figures 5-36 to 5-40 (Existing and Post development Images)**
	Views: i. The DPIR shall present views of the Proposed Project from locations to be determined through consultation with the BPDA's Urban Design Department.	**See Figures 5-36 to 5-40 (Existing and Post development Images)**
	Design Submission Requirements: I. The materials required for submission should be determined through consultation with the BPDA's Urban Design Department.	**Stantec has been in coordination with BCDC in regards to the Project's Urban Design component**
Infrastructure Systems Component		
G12	The BPDA has worked in close collaboration with numerous internal and external stakeholders to develop a new model for integrated planning among energy, transit, water, and communications utilities. The resulting Boston Smart Utilities Vision ("Boston Vision") aims to make utility services in urban neighborhoods more affordable, resilient, equitable, and sustainable. BPDA will expect to see Smart Utility Technologies ("SUTs") incorporated into new developments. The SUTs include Adaptive Signal Technology, District Energy Microgrid, Green Infrastructure, Rainwater Reuse, a Telecommunications Utilidor, and, electrical connections and data services access for street lights. For any projects at or above 1.5 million square feet of floor area, the BPDA recommends incorporation of a District Energy Microgrid, to the extent that the project includes buildings located on contiguous properties or clustered close together. If a District Energy Microgrid is not incorporated into the project plan, the BPDA and Public Improvement Commission ("PIC") shall require documentation explaining how	**See Chapter 7**

Comment No.	Comment Summary	Comment Responses
	other technologies to be incorporated into the project will offer comparable or superior benefits in terms of climate resiliency, reduced energy use, reduced greenhouse gas emissions, and cost reductions to end users. The written comments of the Boston Water and Sewer Commission (BWSC) are included in Appendix 1 and are incorporated herein by reference and made a part hereof. Responses to the BWSC comments shall be included in the DPIR. The DPIR should also discuss emergency systems, gas, steam, optic fiber, cable, and any other systems impacted by the Proposed Project. The location of transformer and other vaults required for electrical distribution or ventilation must be chosen to minimize disruption to pedestrian paths and public improvements both when operating normally and when being serviced, and must be described.	 **Responses are provided in the Stakeholder Comments Summary Table** **See Section 7.5.6.3**
Environmental Protection Component		
Nighttime Lighting		
G13	The impact of both interior and exterior lighting on the residents of nearby buildings is a concern. The DPIR should explain, in text or graphics as appropriate: a) The type of exterior lighting to be used on each façade or other portion of the building and the elements of the design that mitigate nighttime lighting impacts of the building on surrounding areas. b) Measures being taken to minimize any negative impacts of interior lighting on the surrounding areas.	**Other than lighting of the pedestrian realm, retail arcades, and building entries, the design does not include the lighting of the building facades.** **The interior lighting will be on occupancy sensors (other than required emergency lighting). Interior shading devices will be incorporated on all windows.**
Geotechnical Impact/Groundwater		
G14	A description and evaluation analysis of existing sub-soil conditions at the Proposed Project site, groundwater levels, potential for ground movement and settlement during excavation and foundation construction, and potential impact on adjacent buildings, utility lines, and the roadways shall be required. This analysis shall also include a description of the foundation construction methodology, the amount and method of excavation, and measures to prevent	**See Section 3.12**

Comment No.	Comment Summary	Comment Responses
	any adverse effects on adjacent buildings, utility lines, and roadways. Measures to ensure that groundwater levels will be maintained and will not be lowered during or after construction also shall be described. In addition, the geotechnical analysis shall evaluate the earthquake potential in the Proposed Project area and shall describe measures to be implemented to mitigate any adverse impacts from an earthquake event.	
Environmental Sustainability		
G15	The DPIR should clarify the goal for LEED Certification, with Gold being the recommended target.	**See section 4.1 Sustainable Design. The project will pursue Gold equivalency.**
Historic Resources Component		
G16	The DPIR should summarize any historic resources that will be affected by the Proposed Project, the position of public agencies on those resources (including any necessary regulatory process), and present a plan to minimize the adverse impact of the Proposed Project.	**See Section 6.6**
Community Benefits		
G17	The DPIR should present the following: a) A proposed approach to a needs assessment that can provide more detail on the most valuable benefits that the project could provide in the following areas: cultural space (for education, performance, creation of cultural products), affordable retail space, affordable commercial space for neighborhood-serving start-up businesses and local entrepreneurs. The needs assessment should include public opinion, analysis of existing supply of similar spaces, and an analysis of the local real estate market showing prevailing rates for equivalent spaces. b) A retail strategy that includes the potential for retail component serving a broad spectrum of incomes. Affordable retail space could be a component of the overall provision of affordable commercial space. c) A proposed approach to memorializing a commitment that is flexible and adaptable to changing circumstances, e.g. project phasing, changing needs, changing real estate values.	**The Developer will conduct a Community Benefit Space Needs Study, to include presentations and other outreach, and culminating in a survey of the South End neighborhood population and other stakeholders, to identify community needs and users. This study will be completed over the course of the next year. This study may recur as needed for subsequent phases of the project.** **The Developer will constitute a Community Benefit Space Panel for this project, consisting of the Developer, members of the community, members of the city government, and other experts. This group will interpret the survey, develop a strategy for the allocation of**

Comment No.	Comment Summary	Comment Responses
	The IAG has requested a commitment from the developer to spend an agreed-upon percentage of pre-construction/construction costs (or an agreed upon equivalent) with local, minority and women-owned businesses located within a predetermined radius (or other defined municipal boundary) of the Project, with emphasis on South End and Newmarket businesses (specific percentage and boundary to be finalized by BPDA, IAG and Developer and approved by all entities). The Proponent should work with the BPDA and relevant City of Boston agencies to formulate an appropriate commitment for the DPIR.	**space, develop guidelines for selecting solicit users, and choose users based on merit, need and compatibility, adhering generally to the categories of Workforce Development, Arts & Culture, and Social Enterprise. The Panel shall determine the terms of occupancy, including the level of subsidy and consequently the rent level, the term of occupancy and extensions, on a tenant by tenant basis. This panel will be established within the year.** **The Developer will create community benefit space within each building roughly equal to its pro rata share of the total commitment of community space for the project. The Developer will provide the space in typical “white shell box” condition with appropriate utility connections to the premises.**

<table>
<tr><th colspan="3">Construction Management</th></tr>
<tr><td>G18</td><td><u>Article 80 Construction Management Element</u>

The Construction Management Element shall, at a minimum:

a) Identify the impact from the timing and routes of truck movement and construction deliveries for the Proposed Project; proposed street closings; and the need for employee parking.

b) Identify, and provide a plan for implementing, mitigation measures that are intended to mitigate, limit, or minimize, to the extent economically feasible, the construction impact of the Proposed Project by limiting the number of construction vehicle trips generated by the Proposed Project, the demand for construction-related parking (both on-site and off-site), and the interference of building construction with the safe and orderly operation of the Transportation Network, such measures to include the use of alternative modes of transport for employees and materials to and from the site; appropriate construction equipment, including use of a climbing crane; staggered hours for vehicular movement; traffic controllers to facilitate equipment and trucks entering and exiting the site; covered pedestrian walkways; alternative construction networks and construction planning; and restrictions of vehicular movement.

c) Designate a liaison between the Proposed Project, public agencies, and the surrounding residential and business communities.</td><td>See Section 3.14</td></tr>
<tr><td>G19</td><td><u>Construction Impacts</u>

A construction impacts analysis shall include a description and evaluation of the following:

a) Measures to protect the public safety

b) Potential dust and pollutant emissions and mitigation measures to control these emissions. Potential noise generation and mitigation measures to minimize increase in noise levels.</td><td>See Section 3.14</td></tr>
</table>

	c) Location of construction staging areas and construction worker parking; measures to encourage carpooling and/or public transportation use by construction workers. d) Any impacts of intended drilling, digging, or blasting. e) Construction schedule, including hours of construction activity. f) Access routes for construction trucks and anticipated volume of construction truck traffic. g) Construction methodology (including foundation construction), amount and method of excavation required, storage and disposal of the excavated material, description of foundation support, maintenance of groundwater levels, and measures to prevent any adverse effects or damage to adjacent structures and infrastructure. h) Schedule and method of demolition of the existing buildings on the Proposed Project site and intended method of disposal of the demolition debris. i) Potential for the recycling of construction and demolition debris, including asphalt from the existing parking lots. j) Measures to make construction fencing as attractive as possible to ensure the visual character of the streetscape. k) Identification of best management practices to control erosion and to prevent the discharge of sediments and contaminated groundwater or stormwater runoff into the City's drainage system during the construction period. l) Impact of Proposed Project construction on rodent populations and description of the proposed rodent control program, including frequency of application and	

	compliance with applicable City and State regulatory requirements. m) Plan for handling demolition debris and construction waste. The DPIR should discuss how recycling, reuse and reprocessing will be conducted. Building demolition may offer an opportunity for recycling, reprocessing or donation of construction and building materials (e.g., glass, brick, stone, interior furnishing) to the Building Materials Resource Center (“BMRC”).	

Comments Responses Table

Exchange South End

Stakeholder Comments Summary

Comment No.	Comment Summary	Comment Responses
Impact Advisory Group (IAG)		
Traffic/Safety		
IAG 1	There are significant concerns with traffic flow on Albany Street. It is imperative that a synchronized traffic signal system be put into service on Albany Street (from Mass. Ave. to Methuen) which incorporates technology that will allow continuous and uninterrupted flow from signal to signal on the corridor preventing back-ups and block locks.	**Please see Section 2.4.1**
IAG 2	We feel strongly that a new roadway connection to the Mass. Ave. Connector from Biosquare Drive must be opened and a new roadway connection from I-93/Frontage Road should also be created. We strongly believe that without at least one of these new connections, and ideally both, this Project should not move forward. The IAG requests routine communication from the Developer and City agencies on all efforts to work with state and local authorities and private stakeholders to obtain approval to construct connections from BioSquare Drive to I-93/Frontage Road and BioSquare Drive to Mass Ave Connector.	**Please see Section 2.4.1**
	Given the projected increase in the number of employees commuting to the Albany Street corridor daily, improved traffic management and reliable and frequent public transportation options are imperative. The Harrison-Albany Corridor suffers from poor connections to public transportation due to reliance on the Silver Line. While the IAG does not believe that Silver Line capacity issues are currently a concern for the Project (due to reverse commute direction), inconsistent bus schedules and bus bunching are a deterrent to reliable Silver Line use. The addition or rerouting of certain MBTA bus lines to better serve the Project's connections to the T, including the 49 bus, should be considered. To compensate for the poor connections to the T, the IAG recommends that the Project initially provide private shuttle connections to the Red and Orange Line, while working with the MBTA to implement route changes/additions to take over these routes once proof of demand is shown.	**The proponent is working with the City and MBTA in order to provide more mass transit options in the area. These improvements will be codified in the TAPA.**

Comment No.	Comment Summary	Comment Responses
IAG 3	It is imperative that the developers reach an agreement for the continued, unencumbered use of Biosquare Drive for access and egress in order for the Project to move forward.	**Please see Section 2.4.1.**
IAG 4	There is no consensus agreement within the IAG in support of the proposed roadway through the plaza from Albany Street to the rear of the open space (in front of the designated "cultural center"). However, if a roadway is to be included within the open space area, it is our general agreement that one-way traffic flow on the internal roadway adjacent to the outdoor plaza space should be considered. Our concern is a large amount of traffic flow moving in both directions creates a less pleasing plaza area. The vehicles that enter here from Albany Street could exit from the crossroads in front of building C & D and out the exterior sides of the site.	**Please see Section 2.4.1.3.**
IAG 5	There has been discussion around creating a street cut in the front of the Project along Albany Street to allow for pick-ups and drop-offs out of the flow of traffic. The IAG has proposed this change as a potential increase to pedestrian safety.	**The Albany Street corridor will be constructed following the City preferred cross section.**
IAG 6	We request a revised traffic management plan for the area. Even before this project and other upcoming projects in the area, traffic along Albany Street and Massachusetts Avenue is strangled at best during many parts of the day. Harrison Avenue also experiences significant delays. It is imperative that the City and State Transportation Departments work together with the neighbors/stakeholders in the area form a working group to create a viable traffic management plan. This working group should meet regularly.	**A transportation update to the Harrison Albany Corridor Study is currently being conducted by the City.**
IAG 7	It was discussed that the BPDA conduct an additional traffic study to review the street light timing throughout the neighboring communities with a particular focus on Harrison Ave. and the crossroads and the intersection of Melnea Cass and Mass. Ave. We would like an independent recommendation on how the timing of lights and movement of traffic can be best mitigated with the increased traffic count as outlined in the PNF along with the potential impacts of other major developments in the area (Leggatt McCall, etc.)	**In addition to the signal improvements along Albany Street associated with this project, the Harrison/Albany Block development includes mitigation along Harrison Avenue and The Melnea Cass redesign project includes completely updated traffic signals.**
IAG 8	To increase safety for all and to reduce car volume, we would encourage a commitment from the developer to engage in local business improvement district creation discussions that would provide area-wide security and provide shuttle services to the surrounding subway stations.	**The Proponent has and continues to pursue establishing associations with other local businesses and institutions to achieve improvements to transportation, cleanliness and safety, including possibly establishing a BID.**
IAG 9	We request an agreement with all surrounding communities to have access to the garage during snow emergencies at reduced cost to area residents. The developer should also entertain potential discussion to include possible discounted night/weekend/holiday parking for neighbors.	**The Proponent agrees to allow access to the garage during snow emergencies to the extent possible while still honoring its tenant parking**

Comment No.	Comment Summary	Comment Responses
		agreements. Additionally, overnight and weekend rates will be priced to attract residential parking during those off-hour time periods.
IAG 10	We request dedicated Zipcar, hubway, and possibly pedicab areas to encourage less vehicle traffic. We would like to see even further increased support for alternative modes of transportation as well as exploration of new ways to incentivize businesses to have their employees take advantage of biking, walking and other public transit options. The minimal bike infrastructure proposed on site is not adequate to deal with the projected number of employees on site.	**Please see Section 2.4.9, 2.7, and 2.8.**
IAG 11	We request a commitment from the City and related transportation departments that the Harbor Trail / bike path will be completed with the progress of this project, thus addressing additional transportation options in an effort to decrease traffic and environmental impacts on neighborhood.	**Please see Section 2.4.9.**
IAG 12	The Proponent to outline and confirm plan for subsidized public transport, Guaranteed Ride Home, Ridesource and TMA membership as outlined in section 2.5 of the Project Notification Form dated September 19, 2017.	**Please see Section 2.8.**
Open Space / Plaza Area Design		
IAG 13	There have been several questions raised over the proposed "open space "or plaza type area. Some of the concerns are: A. Need for some youth recreational space – i.e., sculptures that children can climb on or play around. B. Need for space for active use – yoga; spinning; exercise etc. C. Need for a stage area. C. Need for a stage area. D. Benches etc. for relaxation; eating a snack; talking with friends; E. Need for green areas.	**The play fountain in the Plaza will be designed to attract children.** **Public art will be selected for Albany Green to encourage children to play around. The Quiet Garden has spaces for yoga, exercise etc.** **The Plaza and Sloped Lawn are designed to accommodate a stage.** **Albany Green will have a variety of seating elements from natural rocks to fixed benches to moveable tables and chairs.** **The green areas in the project total 18,075sf.**
IAG 14	A number of members of the IAG continue to be concerned that the Albany Green component is of insufficient size to encourage use by the South End community.	**Albany Green is approximately 1.1 acres, compared to the 1.7 acre Norman B. Leventhal Park.**

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	Leventhan Park at Post Office Square is an example of a green space of critical mass to attract usage. The IAG requests metrics to determine the true person-capacity of Albany Green as designed. The IAG is also unpersuaded that shadows from the Project prevent constructions of a larger grassy space. Leventhan Park, for example, is a thriving green space surrounded by tall building. We request a more detailed explanation as to why a larger green space is constrained by the environment.	**The lawn at Albany Green can accommodate up to 200 people sitting on the grass, and can be augmented with the use of surrounding plaza spaces, accommodating a further 100 people. The building on the south side of Albany Green is only 50 feet from the lawn, making the shadows persistent in spring, the critical season for healthy lawn growth.**
Community / Cultural Space		
IAG 15	The definition and use of the committed 30,000 sq.ft. of Cultural/Community Space is of great importance to the IAG. This is an area that was deliberately deferred due to the need for further review by the IAG membership with the developer and the BPDA as part of the process moving forward. A needs assessment of the community must be an important part of this process. Following this assessment, it is essential that general guidelines for both determination processes and use be agreed upon by the developer and the IAG and that the BPDA work with both parties to craft criteria by which to monitor and manage those guidelines.	**See Response to Comment Number G17**
Design		
IAG 16	The IAG sees room for improvement with respect to the upper levels of the buildings. Buildings B and D are uninspiring rectangular boxes. Only Building C contains an interesting design element, with its gentle curve along the side facing I-93. The IAG recommends that the developer incorporate additional interesting design elements in Buildings B and D and expand on the design of Building C. After the developer did its initial listening tour but before filing the PNF, it gave a presentation to the community which incorporated quoted comments from various neighborhood groups. One of the quotes--which the developer selected to highlight--urged the developer to “be bold” with its design. We urge the developer to take Mayor Walsh’s and the neighborhood’s words to heart and take the design of Exchange South “to a new level” of “bold design” as well. We urge the developer to look beyond the “merely functional” rectangular spaces that benefit only a tenant’s conveniences- -but offer little awe and inspiration to the skyline that residents of the South End and the City will look upon each day.	**See Figures 5-3, 5-4, and 5-5**

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	Additionally, the IAG requests an explanation as to why the PNF states that the developer will seeks Silver LEED status for the Project in the PNF, but has stated at all subsequent presentations to the public that it will seek only Gold LEED status. The IAG recommends that the Project seek SilverGold LEED status absent a reasonable explanation that it is now unfeasible.	**Development of energy efficient and environmentally-friendly buildings will aspire to meet the Gold level of the Leadership in Energy and Environmental Design (LEED) rating system, as described in Chapter 4.**
Construction Considerations		
IAG 17	A commitment from the developer to comply with the Boston Residence Jobs Policy (which requires that on private development projects over 100,000 square feet, 50 percent of workers are Boston residents, 25 percent are minorities, and 10 percent are women). It is, of course, suggested for the developer to exceed these requirements if possible.	**The Proponent commits to complying with the Boston Residence Jobs Policy.**
	Insofar as possible and consistent with the City of Boston's own contractor preference goals, the IAG requests a commitment from the developer to spend an agreed upon percentage of pre-construction/construction costs (or an agreed upon equivalent) with local, minority and women-owned businesses located within a predetermined radius (or other defined municipal boundary) of the Project, with emphasis on South End and Newmarket businesses (specific percentage and boundary to be finalized by BPDA, IAG and Developer and approved by all entities).	**See Comment G17 Response.**
	Rodent abatement throughout the whole process.	**The Construction Management Plan submitted/approved by BTD will address rodent abatement commitments**
	A community relations office to be located on-site so that concerns can be addressed throughout the development project. Routine communications should be provided to the neighborhood using various media tools to advise of project updates, special activities, and disruptive events. In addition, no weekend work will be scheduled on the project unless the work is considered a clear health and safety emergency and in the personal determination of the ISD Commissioner work essential to optimal traffic and safety considerations for the South End neighborhood.	**Prior to commencement of construction the Proponent intends to establish an on-line community website, email list and telephone hotline to communicate current project information and to receive and act on complaints. The Proponent does not intend to work on weekends generally but cannot commit to scheduling no activity as requested.**
	No construction vehicles staged on Albany Street or any residential streets off Albany St. during any phase of construction.	**The Construction Management Plan submitted/approved by BTD will address construction staging commitments.**

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	Linkages – the project claimed an allocation of 14 million for job growth and affordable housing (assuming it is an 8-year project build by phases). How is this allocation to be distributed and who will determine the amount per project phase?	**The project will generate approximately $12,500,000 in housing linkage funds and approximately $2,500,000 in jobs linkage funds to the City of Boston, or equivalent job and/or housing creation programs.**
Retail Considerations		
IAG 18	We are very concerned about the type of ground floor retail the project will permit. We would like to see a commitment to proving retail that is accessible to South End residents at all income levels. Additionally, the project should include a commitment to providing affordable smaller retail spaces for small business owners.	**The Proponent intends to select retail that compliments the integrated public realm concept of Albany Green and the ground floors of the buildings, which is designed to attract neighborhood use and tenant use. the shapes and sizes of the retail spaces are relatively small and will be appropriate for small business owners.**
Mitigation		
IAG 19	It is necessary that the Article 80 process over the next few months result in the signing of a contractual agreement by the proponents to a mitigation package agreed upon by The Abbey Group and the Exchange South End IAG.	**As a result of the Article 80 process the Proponent shall enter into a Development Plan, a Cooperation Agreement, and a Transportation Access Plan Agreement with the City of Boston that will include all the mitigation, community benefits and entitlements of the project.**
Jacobson William Jacobson		
Density and Massing		
J1	We urge that the Proponent revise the Project such that the proposed construction is a reasonable middle ground to mitigate density.	**After review and consideration of all design alternatives the Proponent believes that this current design and program best meet the underlying zoning, the goals of the city and neighborhood and the constraints of the site.**
J2	Both Building B and Building C directly abut our property (see Figure 1-10 Project Site Plan in PNF). Although the proposed massing modifications to the buildings provide for the mid-day sun to hit Albany Green, the buildings rob our property of such sunlight and instead cast an overarching shadow darkening our premises. We propose adjusting the massing of	**The Proponent acknowledges this comment and has reduced the size of Building B by removing two stories from its height, making it two**

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	the buildings such that the mid-day sun is not only accessible to the Proponent's Project site but also to our property. We request the Proponent to add more height to Building A and Building D, and decrease the height of Building B and Building C such that the mid-day sun is still able to amply reach the Albany Street public realm and our property.	**stories below the zoning allowed height.**
Traffic and Transportation Mitigation		
J3	The access provided from Albany Street will increase the overall vehicular traffic on Albany Street, the main access road to our property. Moreover, there is no plan for the inevitable queuing that will occur with that many vehicles entering and exiting the Project garages during morning and evening rush hours as well as the impacts of drop offs and pickups associated with the increased use of Uber, Lyft and other car services. The Proponent should explore alternative access avenues for the parking garages in order to alleviate the traffic pressure on Albany Street, including discussions involving Boston University and city, state and federal transportation officials. We request the Proponent to conduct an alternatives analysis to showcase the varying access points available to the proposed parking garages.	**As recommended in the comment, the main access location for the Project will be from the new Southbound Frontage Road connection. All pick-up/drop-off activity is proposed to occur on site.**
J4	It is important for community members to understand now with a holistic view of exactly how the Proponent will (1) improve traffic signal infrastructure in the area, (2) fund the extension of the South Bay Harbor Trail, and (3) utilize shuttle buses to connect Project occupants and visitors as well as community residents to Red and Orange lines.	**Please see Section 2.4.1, 2.4.9, and 2.8.**
Overburdening of Easements		
J5	The Project's proposed usage of the traffic circulation easements for access and egress to the below-grade parking garages stipulates a high volume of traffic that overburdens the easements. The Proponent must not be allowed to overburden the traffic circulation easements on the Property to the extent that this affects usage by the remaining easement holders. We specifically request that the Proponent provide a site plan showing proposed site improvements overlaid on a plan with the surveyed property and easement boundaries shown.	**Please see Figure 2-14.**
J6	We request that the BPDA require the Proponent to prepare a Draft Project Impact Report which responds to the issues and concerns raised in this letter.	**Noted.**
	BPDA and BTD Staff	
Transportation Modeling & Methodology		
B1	The analysis notes that the PNF project is the basis for the transportation modeling. The City understands this to mean that the PNF buildings are the only basis for transportation impact analysis and other elements of the Exchange South End development are considered as "existing conditions." The proponent should confirm one way or another whether the City's understanding is correct.	**The PNF and this filing follow (BTD) Transportation Access Plan Guidelines. Projects existing during traffic volume counts are included in the Existing Condition. Projects planned but not occupied during the counts are**

<table>
<tr><th>Comment No.</th><th>Comment Summary</th><th>Comment Responses</th></tr>
<tr><td></td><td></td><td>included in the No-Build Condition. The Project impacts are calculated in the Build Condition.</td></tr>
<tr><td>B2</td><td>The proponent designates a study area which runs along the Albany Street corridor with bounds of the I-93 Frontage Road, Harrison Avenue, the I-93 Frontage Road Connector, and Massachusetts Avenue. While these intersections are important to the project site, the City believes it necessary to include the following intersections:

• Massachusetts Ave Connector/Melnea Cass @ Massachusetts Ave
• Massachusetts Ave Connector @ Frontage Road
• Harrison Ave @ East Canton
• Harrison Ave @ East Dedham
• Harrison Ave @ Malden Street
• Harrison Ave @ East Concord
• Harrison Ave @ East Brookline
• BioSquare Drive @ Frontage Road (Future Condition only)

It should be noted that with an addition of these intersections, several results will need to be revised as well including a revision of the prioritized intersections for air quality analysis.</td><td>The Study area has been expanded as requested. Please see Section 2.</td></tr>
<tr><td>B3</td><td>In order to accurately represent future conditions, the City thinks it necessary to include the future transit capacity analysis under “Study Methodology” (section 2.1.2).</td><td>Please see Section 2.6.</td></tr>
<tr><td>B4</td><td>The build condition analysis includes the assumption that East Concord will connect to the Mass Ave Connector; this assumption cannot be made because there is not a commitment on the part of government or area stakeholders to build this connection. Therefore, analysis needs to be re-run without this connection and traffic redistributed to existing roads/intersections.</td><td>This connection is no longer being pursued at this time. The analysis includes a redistribution of the traffic as suggested.</td></tr>
<tr><td>B5</td><td>All transportation analysis should be re-run with changes indicated in this document. This transportation network analysis and re-run should be comprehensive and the Proponent should provide results to the City in an expedited manner to ensure a proper review can take place.</td><td>Please see Section 2.</td></tr>
<tr><td>B6</td><td>In addition to transportation modeling and methodology, the PNF includes a framework for <u>construction planning</u>. The section of the document is accurate in scope and detail except for two notable instances:

• There is not an established completion timeframe for Albany Green or road improvements. The scheduling section that includes the buildings must include these elements as well.
• The construction timelines for buildings A, B, C, and D are not consistently communicated. The proponent</td><td>Albany Green and roadway improvements will be implemented with Building A and Building B completion. Buildings C and D will be completed as tenants for those buildings are obtained.</td></tr>
</table>

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	lists that "...duration is anticipated to be approximately 24 months for Building A..." but fails to mention a timeline for buildings B, C, and D.	
Transportation Demand Management		
B7	The City applauds the proponent's commitment to creating a TDM program for the Exchange South End development. The proponent outlined several steps to improving the transportation network through a TDM system, including ride-sharing resources, transportation bulletins, access to a TMA membership, electric vehicle charging stations, and vehicle sharing programs. In addition to these elements, the proponent should consider the following options: - Mobility MicroHUBs (Go Boston 2030) - Enhanced bus stops - Real-time transit and mobility information within buildings These elements will ensure the Exchange South End community has a comprehensive set of transportation options and will help to ease the burden on surrounding transportation networks.	**The proponent agrees with the benefit of the implementation of these measures. Exact mitigation measures will be codified in the TAPA.**
Transit Network & Accommodations		
B8	The Silver Line has an important role in the neighborhood, but not to the extent alluded to by the proponent. The PNF states that "The Project Site is within one-quarter mile of several Massachusetts Bay Transportation Authority (MBTA) bus stops serviced by multiple bus routes, including the Silver Line with service to Logan International Airport." The Silver Lines nearby-4 and 5- do not service Logan Airport, but connect to lines that do.	**The text within Section 2.2.8 has been corrected.**
B9	The **Existing Conditions** section needs to include analysis for transit needs such as ridership, remaining capacity, and stop boarding/alighting information. This analysis is crucial to determining the effect of such a development on transit conditions.	**Please see Section 2.6 for a detailed Transit Capacity Analysis for all three conditions.**
B10	The proponent claims that future new transit riders "will not encounter buses that are at capacity." While this could be true, it needs to be articulated and proven by **assigning trips to services** by time of day and showing the remaining capacity. This is necessary for both "build" and "no build" trips.	**Please see Section 2.6 and the Capacity Figures within that section.**
B11	**Shuttle buses** can be a critical element of transportation to the Exchange South End development. The proponent should include an overview of existing private shuttles in the area such as the Boston University Medical Campus (BUMC) shuttle.	**Please see Section 2.2.8.2.**
B12	The proponent would benefit from adding a section on **TMC activity in the area** from available data sources i.e. Lyft. This would be added in section 2.2.4.	**Unfortunately, this data is not publicly available and the proponent was not able to obtain TNC data.**

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Roadway Network		
B13	In the PNF, the proponent provides an analysis of anticipated traffic impacts that will result from the changes of use and area in the Exchange South End development. The City finds most these proposed elements and analyses to be acceptable. However, there are distinct roadway network changes that must be addressed or clarified: • The nature of the **new streets** "East Canton Street Extension," "New Street," "East-West Connector," and "East Dedham Street Extension" need to be established more clearly. The City would like designation of driveways, private vs. public ways, City streets, or some combination of the aforementioned. The City recommends for these streets the following: o **East Canton Street Extension** should be designed and built as a public street (or a private way open to public travel) with two-way traffic between Albany Street and BioSquare Drive. o **New Street** and **East-West Connector** should be designed as a private way open to public travel. o **East Dedham Street Extension** should be designed as a pedestrian priority street with a right-in/right-out condition ***if*** it is to be open to vehicles. Further, there should not be a signal at Albany Street for East Dedham Street due to significant impacts on Albany Street through moves. o For consistency in design as well as technical comprehension, the Proponent should provide **dimensional and operational clarification** of all the proposed roadway and site drives. This would be best included in section 2.4.1 Site Access and Vehicle Circulation.	**Please see Section 2.4.1.**
B14	To provide for future transit, pedestrian, and bike accommodation, **reconstruct Albany Street** from East Brookline Street to Malden Street according to standards set by the City.	**The proponent will continue to work with the City on the reconstruction of Albany Street.**
B15	In order to communicate changes made to the roadway network, the proponent should clarify the **easement rights along both edges of the site**. This clarification should include if all abutters have equal rights to the easement as well as what city or other public entities have rights.	**Please see Section 2.4.1.**
Parking & Loading Access		
B16	In the PNF, the proponent includes several important loading and parking sites. Parking and loading sites are necessary	**Please see Section 2.4.2**

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	elements for buildings and structures of this scale. However, the proponent should improve the presentation of parking analysis in this PNF as well as modify some of the methodology for loading and parking calculations. The City recommends the following for improving this component of the PNF: - Lab and office space differ in terms of projected rates for deliveries. Therefore, they should be separated in the loading and service accommodations to allow for a higher **lab space delivery** rate. - The **parking ratios** presented in this document and specifically page 1-9 are not clear. Parking ratios should be based on office, lab, civic, and retail space, but instead the document claims are calculated based on gross floor area. - There should be further definition of the **uses of parking** between office/lab, retail, and cultural uses. Additionally, the proponent should note if there will be public parking available on the site. - When discussing "off-street parking" the proponent should include information about **remaining parking capacity**. - **Provisions for constructing parking garages** should include that any above grade parking levels and at minimum the first below grade parking level should be constructed with enough height and other physical considerations to allow for the conversion to better/more desirable uses. This approach also provides flexibility for the parking program to include "stackers."	
Pedestrian and Bike Network		
B17	The City recognizes how essential the pedestrian and bike network is to this development. Interconnectivity to the surrounding neighborhood is of utmost importance to the project for successful integration and integrity to the pedestrian and bike experience. The proponent provides for pedestrians by including the Boston Complete Streets Design Guidelines. However, there are several other items that must be specified in the proposal: • The following must be revised to provide for pedestrian-specific elements:	**Please see Section 2.2.1 and 2.2.2.**

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	o The proponent states that "sidewalks are provided on both sides of Albany Street," although segments of Albany Street do not have sidewalks on both sides of the street. For example, near the intersection of Frontage Road. These **sidewalks must be better defined.** o The pedestrian experience is hindered by sidewalks on the west side of Wareham Street past #63. These are often impeded by parked vehicles and this should be noted in the description.	
B18	The following must be revised to provide for bike-specific elements: - The location of the bike share mentioned in the proposal is not specified. This is a significant design element that provides clarification of access and mobility at the site. The proponent must **specify where the bike share will be located** to bolster multimodal transportation options. - When discussing access to the south bay harbor trail, the proponent states that "the South Bay Harbor Trail runs alongside the I-93 Frontage Road." The proponent should also **describe the condition of the Harbor Trail** in this segment to accurately communicate multimodal accessibility to the development. - As discussed, the proponent will work with the City to determine the design of details of the South Bay Harbor Trail along the Albany Street edge of the site, and potentially a connection between Albany and Frontage Road.	**Please see Section 2.2.6 and 2.4.9.**
B19	Both **pedestrian and cyclist access** to the Project Site must be included explicitly in the document; the importance of these means of transportation must not be understated. For example, this could be added to Section 1.3.3.3 or be called out in a separate section.	**Please see Section 2.4.1 and 2.4.9.**
Open Space		
B20	Open space is an integral part of the design for any development and the City of Boston appreciates efforts made by the proponent to provide for this. This development has a central focus on the green space constructed between four buildings. There are only a couple of recommendations to amend elements of open space in this PNF: - The size of the new "Central Park" as defined on page 1-7 must be **designated with acres or square footage.** Further, the square footage for sidewalks, shared	**Diagrams and images of the range of active and passive uses for the different parts of Albany Green have been provided. The size of the Albany Green has been updated to 1.1 acres. See Figures 1-21, and 5-34.**

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	streets, green spaces, and plazas must be specified, perhaps in Table 1-1. • A clarification about the percentage of the open space landscaping must be made according to conflicting statements on pages 1-9 and 1-11. The proponent writes on page 1-11 that "the Project is anticipated to have an overall FAR of approximately 6.5 and a lot coverage of less than 80%." Then on page 1-9 the proponent writes that open space and landscaping is defined as 45% of the overall site. This **conflicting statement must be corrected** for clarification. • Proponent mentions active and passes uses for Albany Green. Provide some examples of what active uses might incorporated (park vs. plaza). In addition, there is some criticism by residents of the South End who suggest that the more active recreational places are needed (or existing ones are over-capacity) in order to keep up with the density and influx of new residents to the area.	**See Section 1.6** **See Figures 5-24 to 5-35.**
Off-site Transportation Mitigation		
B21	Working with the City and community, an appropriate package of off-site transportation mitigation package will be developed. Potential elements include: • Improvements to the Albany Street corridor • Transit infrastructure improvements • Traffic operational improvements such as signal enhancements and upgrades • Pedestrian and bicycle network improvements • Bike share infrastructure	**The Proponent will continue to work with the City to determine and implement appropriate transportation mitigation.**
Design Elements		
B22	Some of the design elements listed by the proponent require clarification to improve the readability and effectiveness of the PNF. Design is intrinsically one of the most significant aspects to accessibility of a development and therefore requires needed attention. Suggestions from the City include: • The "pop up" space located on "New Street" is included in a 30K square foot reference, written as: "Additionally, the project design incorporates 30,000 sf of flexible space for arts, culture, community, and innovation to contribute to the energy of the neighborhood by hosting events, performances, and other programming." To improve effectiveness of this statement, the proponent **must define what "pop up" is**.	**Comment no longer applicable** **See Section 1.4.3**

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	• The plaza designed for small and large scale events is mentioned vaguely in section 5.5.1. However, this **feature should be elaborated upon** in the Introduction section if it is going to be a significant component of the cultural space. • The proponent should place more emphasis on "The jewel of the Site" as mention on page 5-7 if this aspect is truly a significant part of the development. This arts and culture space hasn't had much stress and it should it it's considered to be so important. Perhaps an amendment should be made to **remove "jewel" and replace it with "Arts and Cultural Space."**	**See Section 5.2**
Resilient Development		
B23	To promote resiliency and limit potential adverse impacts due to climate change the BPDA has recently updated its Climate Resiliency Checklist to have project proponents address the likely impacts and risks outlined in the City's Climate Ready Boston Report including, greenhouse gas emissions, extreme heat events, more intense precipitation, and sea level rise. The Checklist requires proponents to review mitigation measures to contend with 40-inches of sea level rise during a 1% chance storm event as modeled on the **BPDA Sea Level Rise - Flood Hazard Area Map** and to calculate the Sea Level Rise Design Flood Elevation by adding at minimum 24" of freeboard for ground floor residential, critical uses and infrastructure OR at minimum 12" of freeboard for all other structures. The Base Flood Elevation (top of water) for such an event at the project site would be approximately 18.5' Boston City Base (BCB). The resulting minimum Design Flood Elevation would be 19.5' or 20.5' BCB. Please confirm, the PNF indicates a finish floor elevation of 18-feet BCB? The proponent should explore raising the site elevations to be above those minimums and include strategies for future adaptation to potential sea level rise.	**Regarding this recommendation, the team has coordinating moving the first floor elevation from 18.5' BCB to 19.5' BCB. We referenced the BPDA Sea Level Rise – Flood Hazard Area Map tool and were able to establish that based on our location and building type that elevating the ground floor 12" would sufficiently meet long-term resiliency for the site and minimize potential climate change impacts to our site. For more information, see The Resiliencey Scorecard (Chapter 4.2) E.1 – Sea Level Rise and Storms – Design Conditions.**
Article 37 Green Buildings		
B24	The PNF indicates that the project will use the LEED v4 BD&C New Construction rating system and commits the project to achieving a LEED Silver rating with 56 points and utilizing the LEED Campus approach. The rating system and approach are acceptable. Given the location and impacts of the project the development team should commitment to a minimum green building outcome of LEED Gold for all buildings.	**We have discussed with the client and have agreed to target Gold equivalency. A preamble to Chapter 4.1 has been provided summarizing our new pursuit of 65 points to achieve this within LEED.**
B25	The PNF indicates building performance will be 10% better than Mass Stretch Code and the project team's awareness of utility and state-funded energy efficiency and clean/renewable energy programs. Please engage the utilities as soon as possible and provide information on any	**This is on our agenda moving forward. We are aware of the energy charrette they will fund, in conjunction with on-going engagement and eventual incentives after**

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	energy efficiency assistance and support that might be afforded to the project.	**construction, and plan to factor this into the project schedule.**
B26	In support of Boston's Carbon Neutral 2050 GHG goal, the project team should further reduce building sourced GHG emissions, strategies should include the following: - Prioritize passive building strategies such as improved building envelope performance, increasing building envelope air tightness and insulation levels, high efficient glazings, and exterior shading. - Ensure active building systems are appropriately sized for improved passive performance and cost savings are fully captured. - The PNF indicates on site CHP is feasible and will be included. Please provide system information. Additionally, the project team should analyze opportunities for on-site battery energy storage systems for reducing peak electrical loads and providing secure energy services for occupants. - The PNF indicates solar PV is a cost effective clean renewable energy source for reducing adverse project impacts. The project team should commit to installing solar PV should on the new buildings. Please provide system(s) location, size, and output information along with any related analysis.	**Based on these comments:** **1) Envelope improvements beyond code have been explored and will continue to be explored in design development, in conjunction with the energy modeling report, provided by WSP (Appendix G). Additionally, BECx has been added to the scope of work.** **2) Active systems are included within the scope of work and explorations above by WSP(Appendix G).** **3) Additionally, WSP has provided a narrative on CHP feasibility (Appendix G). We have expanded the scope of work to make the projects DR-ready, as well as will explore energy storage systems/placement moving forward. We have also incorporated enhanced EV numbers and future capacity on site per BTD requirements.** **4) Solar PV will be explored once the building has a tenant through PPA. The reason for this is because the amount**

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		of space on the rooftops will be diminished if the tenants are labs versus offices. Structural loads will be calculated to take additional weight of PV array in each building. While addressed in Chapter 4.1, we did not explicitly state the above approach, as this will be determined in the future.
Economic Development		
B27	The proponent mentions in a couple of places that there are economically beneficial aspects of this project. These economic benefits need to be specified more clearly if they are to have an important role in the PNF. Changes to the document should include: - In the introduction, the proponent states that there will be 4,000-7,000 jobs created by this development. The **source of these jobs should be stated**, as well as the methodology for projecting these numbers i.e. square footage assessment or some other attribute. - A case is made for the economic benefit of construction jobs associate with this project. The proponent suggests that the project will create construction jobs with over $400,000,000 in wages. It is necessary to clarify the source and breakdown of the numbers with information on timelines and assumed wages.	**See Table 1.3 for the source of jobs to be created by the development. The methodology for projecting job numbers is based on an average number of square feet per employee by building use.**
Smart Utility Technologies		
B28	The Smart Utilities Standards set forth guidelines for planning and integration of smart utility technologies with existing utility infrastructure in existing or new streets, defining 10 Smart Utility Technologies and a cross section of an ideal layout for underground pipes in 40' and 60' right of ways. The Smart Utilities Standards are intended to serve as guidelines for developers, architects, engineers, and utility providers for planning, designing and locating utilities. [NS2] [NS3] The forthcoming Smart Utilities Policy for Article 80 Development Review will describe which SUT's will be required in new development of certain size thresholds.	**See Section 7.5.2**

Comment No.	Comment Summary	Comment Responses
B29	Pending adoption by the BPDA Board, it will be BPDA's objective that all projects comply with the Smart Utility Standards. In addition, depending on the project size, BPDA will expect to see Smart Utility Technologies (SUT's) incorporated into new developments. The SUT's include Adaptive Signal Technology, District Energy Microgrid, Green Infrastructure, Rainwater Reuse, a Telecommunications Utilidor, and, electrical connections and data services access for street lights. Definitions of these technologies are provided below for reference*.	**See Section 7.5.2**
B30	Applicable Smart Utility Technologies for each project will depend on (a) the floor area of the Project and/or (b) the Project's required mitigation of traffic, street lighting, and surface water runoff. 1. **For any projects at or above 1.5 million square feet of floor area**, the BPDA shall, as part of their project review, recommend incorporation of a District Energy Microgrid, to the extent that the project includes buildings located on contiguous properties or clustered close together. I f a District Energy Microgrid is not incorporated into the project plan, the BPDA and Public Improvement Commission (PIC) shall require documentation explaining how other technologies to be incorporated into the project will offer comparable or superior benefits in terms of climate resiliency, reduced energy use, reduced greenhouse gas (GHG) emissions, and cost reductions to end users. 2. **For projects at or above 1.5 million square feet of floor area, and/or adding or altering road surface in excess of .5 miles of roadway**, the BPDA shall, as part of its project review, recommend the incorporation of a Telecommunications Utilidor. If a Telecommunications Utilidor is not incorporated into the project plan, BPDA and Public Improvement Commission shall require documentation explaining how other technologies to be incorporated into the project will provide comparable or superior benefits in terms of mitigating and/or reducing surface street disruptions, yielding more efficient use of underground space, and promoting more equitable access to telecom infrastructure for both system providers and end users than conventionally associated with telecom utility upgrades/changes. 3. **For all Projects at or above 100,000 square feet of floor area**, the BPDA shall recommend incorporation of in-	**Noted. See Chapter 7**

Comment No.	Comment Summary	Comment Responses
	building rainwater capture and reuse through on site retention for irrigation or other reuse.	
B31	**For all projects that are subject to Boston Water and Sewer Commission (BWSC) stormwater mitigation requirements**, the BPDA shall recommend the installation of Green Infrastructure installation.	**See Section 7.3.5**
B32	**For all projects where the Boston Transportation Department requires that traffic signals be installed, or where traffic signal phasing and timing changes are required to due to traffic mitigation**, the BPDA shall recommend the incorporation of Adaptive Signal Technology into the traffic signal system.	**Noted**
B33	**For all projects making right-of-way improvements which are responsible for Street Light installation or a contribution toward the same,** and in anticipation of forthcoming PIC standards for street lights, BPDA shall recommend all street lights to have additional electrical connection and data service access.	**Noted**
Boston Water and Sewer Commission (BWSC)		
General		
BW1	The Proponent must submit a site plan and General Service Application to the Commission for the proposed Project. The site plan must show the location of the water mains, sewers and drains serving the Project site, as well as the locations of existing and proposed service connections. To assure compliance with the Commission's requirements, the Proponent should submit the site plan and General Service Application to the Commission's Engineering Customer Service Department for review when the design for the Project is at 50 percent complete.	**The Project will be submitted for site plan review as part of the design process.**
BW2	Any new or relocated water mains, sewers and storm drains must be designed and constructed at the Proponent's expense. They must be designed and constructed in conformance with the Commission's design standards, Water Distribution System and Sewer Use Regulations, and Requirements for Site Plans.	**New or relocated water, sewer, or storm drain mains will be designed and constructed in conformance with the applicable standards at the Owner's expense.**
BW3	With the site plan the Proponent must provide detailed estimates for water demand (including water required for landscaping), wastewater generation, and stormwater runoff for the Project.	**Noted. The Proponent will provide the water demand, wastewater, and stormwater runoff estimates with the site plan review application.**
BW4	It is the Proponent's responsibility to evaluate the capacity of the water and sewer system serving the Project site to determine if the systems are adequate to meet future Project demands. With the site plan, the Proponent must include a detailed capacity analysis for the water and sewer systems serving the Project site, as well as an analysis of the impact	**The Proponent will include a capacity analysis of the existing water and sewer systems serving the Project site and an analysis of the impact the Project will have**

Comment No.	Comment Summary	Comment Responses
	the Project will have on the Commission's systems and the MWRA's systems overall. The analysis should identify specific measures that will be implemented to offset the impacts of the anticipated flows on the Commission and MWRA sewer systems.	**on the Commission's and MWRA's systems.**
BW5	Developers of projects involving disturbances of land of one acre or more are required to obtain an NPDES General Permit for Construction from the Environmental Protection Agency. The Proponent is responsible for determining if such a permit is required and for obtaining the permit. If such a permit is required for the proposed Project, a copy of the Notice of Intent and any pollution prevention plan submitted to EPA pursuant to the permit must be provided to the Commission's Engineering Services Department prior to the commencement of construction.	**The Site is larger than one-acre. The Proponent will obtain a NPDES eNOI and will provide a copy of the eNOI and stormwater pollution prevention plan (SWPPP) to the Commission during the Site Plan Review process.**
BW6	Before the Proponent demolishes the existing structures, existing water and drain connections that won't be re-used must be cut and capped in accordance with Commission standards. The Proponent must complete a Termination Verification Approval Form for a Demolition Permit, available from the Commission. The completed form must be submitted to the City of Boston's Inspectional Services Department before a Demolition Permit will be issued.	**The Proponent will submit a plan identifying locations for cutting and capping existing building services during the Site Plan Review Process.**
Sewer/Drainage		
BW7	As noted in the PNF, the Project site is transected by the Commission's Roxbury Canal Conduit. The proponent is responsible for ensuring that the construction does not negatively impact the RCC. Prior to commencing the project, the proponent must submit to the Commission plans indicating the location of the RCC relative to the proposed construction. The plans must also identify specific measures that will be implemented to prevent damage or obstruction of the RCC during construction. The Project must be designed so that access, including vehicular access, to the Commission's RCC for the purpose of operation and maintenance is not inhibited.	**The Roxbury Canal Conduit location, proximity of the RCC to the proposed construction, measures to protect and prevent damage or obstruction, and locations for vehicular access will be included during the Site Plan Review process.**
BW8	The Proponent should note Article V of the Commission's Sewer Use Regulations as it pertains to medical and laboratory facilities.	**The sewer flows were estimated using office space since a majority of the proposed buildings may be dry-lab space. The Proponent will update the proposed sewer flows once a tenant has been identified for the proposed buildings which will be provided to the Commission during the Site Plan Review process.**
BW9	Oil traps are required on drainage systems discharging from enclosed parking garages. Discharges from the oil traps must be directed to a building sewer and must not be mixed with	**The Proponent will work with the plumbing engineer to provide a design that**

Comment No.	Comment Summary	Comment Responses
	roof or other surface runoff. The requirements for oil traps are provided in the Commission's Requirements for Site Plans.	**includes oil trap(s) for drainage systems from enclosed parking garages, which will be directed to the building's sewer services. The oil trap(s) will be designed and submitted to the Commission during the Site Plan Review process.**
BW10	Grease traps will be required in any food service facility in the new facility in accordance with the Commission's Sewer Use Regulations. The proponent is advised to consult with the Commission before preparing plans for food service facilities.	**The number of grease traps and sizing will be designed and submitted to the Commission during the Site Plan Review process.**
BW11	The Department of Environmental Protection (DEP), in cooperation with the Massachusetts Water Resources Authority (MWRA) and its member communities are implementing a coordinated approach to flow control in the MWRA regional wastewater system, particularly the removal of extraneous clean water (e.g., infiltration/ inflow ("I/I")) in the system. Pursuant to the policy new developments with design flow exceeding 15,000 gpd of wastewater are subject to the Department of Environmental Protection's regulation 314 CMR 12.00, section 12.04(2)(d). This regulation requires all new sewer connections with design flows exceeding 15,000 gpd to mitigate the impacts of the development by removing four gallons of infiltration and inflow (I/I) for each new gallon of wastewater flow added. The Commission will require the Proponent to develop an inflow reduction plan consistent with the regulation. The 4:1 reduction should be addressed at least 90 days prior to activation of water service, and will be based on the estimated sewage generation provided with the Project site plan.	**The Proponent will work with the Owner to provide a 4:1 Infiltration/Inflow reduction strategy.**
BW12	The discharge of dewatering drainage to a sanitary sewer is prohibited by the Commission and the MWRA. The discharge of any dewatering drainage to the storm drainage system requires a Drainage Discharge Permit from the Commission. If the dewatering drainage is contaminated with petroleum products for example, the Proponent will be required to obtain a Remediation General Permit from the EPA for the discharge.	**The Proponent will work with the design team to determine dewatering requirements for the Project and will work with the geotechnical engineer to obtain a Drainage Discharge Permit and a Remediation General Permit (if required).**
BW13	The site plan must show in detail how drainage from the building's roof top and from other impervious areas will be managed. Roof runoff and other stormwater runoff must be conveyed separately from sanitary waste at all times.	**Roof runoff calculations and stormwater management systems will be designed and provided to the commission during the Site Plan Review process.**
BW14	The Project is located within Boston's Goundwater Conservation Overlay District (GCOD). The district is intended to promote the restoration of groundwater levels and reduce the impact of surface runoff. Projects constructed within the	**The Proponent will evaluate the feasibility of infiltrating stormwater on-site and will work with the Commission to**

Comment No.	Comment Summary	Comment Responses
	GCOD are required to include provisions for retaining stormwater and directing the stormwater towards the groundwater table for recharge. The Proponent must fully investigate methods for infiltrating stormwater on-site before the Commission will consider a request to discharge stormwater to the Commission's system. A feasibility assessment for infiltrating stormwater on-site must be submitted with the site plan for the Project.	**provide a stormwater management system which complies with the GCOD requirements to the greatest extent practicable.**
BW15	The Massachusetts Department of Environmental Protection (MassDEP) has established Performance Standards for Stormwater Management. The Standards address stormwater quality, quantity and recharge. In addition to Commission standards, the proposed Project will be required to meet MassDEP's Stormwater Management Standards.	**The proposed Site's stormwater management systems will be designed to meet the Commission's and MassDEP's Stormwater Management Standards.**
BW16	In conjunction with the site plan and General Service Application the Proponent will be required to submit a Stormwater Pollution Prevention Plan. The plan must: Specifically identify how the Project will comply with the Department of Environmental Protection's Performance Standards for Stormwater Management both during construction and after construction is complete.	**The Proponent will provide a Stormwater Pollution Prevent Plan during the Site Plan Review Process.**
	In conjunction with the site plan and General Service Application the Proponent will be required to submit a Stormwater Pollution Prevention Plan. The plan must: Identify specific best management measures for controlling erosion and preventing the discharge of sediment, contaminated stormwater or construction debris to the Commission's drainage system when construction is underway.	**The Proponent will provide a Stormwater Pollution Prevent Plan during the Site Plan Review Process.**
	In conjunction with the site plan and General Service Application the Proponent will be required to submit a Stormwater Pollution Prevention Plan. The plan must: Include a site map which shows, at a minimum, existing drainage patterns and areas used for storage or treatment of contaminated soils, groundwater or stormwater, and the location of major control or treatment structures to be utilized during construction.	**The Proponent will provide a Stormwater Pollution Prevent Plan during the Site Plan Review Process.**
BW17	The Commission requests that the Proponent install a permanent casting stating: "Don't Dump: Drains to Boston Harbor" next to any new catch basin installed as part of the Project. The Proponent may contact the Commission's Operations Division for information regarding the purchase of the castings.	**The "Don't Dump" plaques will be included in the design submitted to the Commission during the Site Plan Review process.**
BW18	The Commission encourages the Proponent to explore additional opportunities for protecting stormwater quality by minimizing sanding and the use of deicing chemicals, pesticides and fertilizers.	**The Site's operation and maintenance strategy will be included in the Long-Term Pollution Prevention Plan as part of the Stormwater Pollution Prevention Plan, which will be submitted to the Commission during the Site Plan Review process.**

Comment No.	Comment Summary	Comment Responses
Water		
BW19	The Proponent is required to obtain a Hydrant Permit for use of any hydrant during construction of the Project. The water used from the hydrant must be metered. The Proponent should contact the Commission's Operations Department for information on obtaining a Hydrant Permit.	**The Proponent will work with the project team to obtain a Hydrant Permit as necessary during construction.**
BW20	The Commission utilizes a Fixed Radio Meter Reading System to obtain water meter readings. Where a new water meter is needed, the Commission will provide a Meter Transmitter Unit (MTU) and connect the device to the meter. For information regarding the installation of MTUs, the Proponent should contact the Commission's Meter Installation Department.	**The Project will be designed for the buildings' meters to meet the Commission's requirements.**
BW21	The Proponent should explore opportunities for implementing water conservation measures in addition to those required by the State Plumbing Code. In particular, the Proponent should consider indoor and outdoor landscaping which requires minimal use of water to maintain. If the Proponent plans to install in-ground sprinkler systems, the Commission recommends that timers, soil moisture indicators and rainfall sensors be installed. The use of sensor-operated faucets and toilets in common areas of buildings should also be considered.	**The design team will evaluate water conservation methods as recommended by the Commission.**
	Other Stakeholders	
Maria Finkelmeier		
MF1	Please communicate with the performing arts community when establishing your "arts and cultural space." There are specific needs that we can outline that will help you build a space that truly serves the arts and the public.	**Please see the proposed Community Benefit Space selection process.**
Deborah Hall		
DH1	In the proposal for the Exchange, I like that the highest buildings abut the highway. I like the huge plaza – an outside fountain or waterfall would be an asset also. Wish there was a little more drama in the architectural design of the buildings. It is my hope that local artists will be considered when art is purchased for the walls.	**Please see the improved designs of the buildings and site. the Proponent intends to populate the project with public art, both within the buildings and within Albany Green and looks forward to including the Boston artist community within that search.**
DH2	What is their understanding of the community they are trying to placate? Is this a nod to the future residents of the Harrison Albany Block project and the new buildings on Wareham Street or does it include the current diverse population that currently exists on the borders of the proposed Exchange? It is hard to envision the actual physical space(s) being offered. Abbey Group suggested screened movies, performances, ice skating and activities, through proposed partnerships with cultural institutions in the city. How would the programming be funded and managed? A quality art gallery with a real curator would be an asset as well, with some show slots for local artists and some from outside New England.	**Please see the proposed Community Benefit Space selection process.**

Comment No.	Comment Summary	Comment Responses
DH3	Do not approve this project until the proposed expanded transportation and traffic components are solid. It will be a major disaster and deadlock otherwise. This particularly relates to discussion of a connector to and from highway 93 and the flow of traffic onto Albany Street from small streets like East Dedham, East Canton, and East Brookline, as well as Harrison Avenue. If public transportation in the vicinity is improved future tenants must be encouraged to offer subsidized T-passes to their employees or some kind of bike benefit to control the density and air pollution of automobile traffic.	**Please see the transportation mitigation measures outlined in this document.**
Jesse Irons		
JI1	I encourage you to consider the viability of highly visible, visitable rehearsal spaces as a component of the cultural facilities. These would be actively used during daytime (when many performance-only spaces are dormant) and would serve to draw in visitors and increase opportunities for cultural exchange.	**Please see the proposed Community Benefit Space selection process.**
Sheldon Lloyd		
SL1	In regards to the community space at the Exchange Project, please consider and direct me and other community members in the consideration of creating "Active Space", a recreation sports center in the the 32K Sq.ft civic space allocated for this project. The Southend is exploding with development & population growth and active park space is declining for community residents, especially with the increased restrictions at Rotch Field and Carter Park. o improve the quality of life for all residents, this project needs to consider "Active Recreational Space" indoor or outdoor.	**Please see the proposed Community Benefit Space selection process.**
Rafael Medina		
Transportation		
RM1	I will like to see short to long terms commitments, sustainable plans and buy-in from MBTA and MassDOT in sync with the developer's proposal. Acknowledging the transportation/traffic is a bigger challenge in the area in addition to what this project could trigger; its crucial to see cross collaboration and endorsements from both agencies in mitigation. Another concern that I have is the structure safety around the garages proposed to build. It's not clear to me if the geology and water table in South End is supportive of the proposed engineering for such big garages. In conclusion; I'm afraid that undesired outcomes from lack of public and affordable transportation increases hard to manage traffic give us consequences that will end up being absorbed by the community.	**The Proponent is working diligently with the city and state agencies to achieve the transportation mitigation measures proposed in this document. Geotechnical baseline studies support the current conceptual design and program for the structures, and further study, planning and design work will have been conducted to validate the plan. Please see the transportation mitigation measures outlined in this document.**
Project Scale and Phases		

Comment No.	Comment Summary	Comment Responses
RM2	Considering the amount of new development in the area (Ink Block) and the infrastructure capacity of the neighborhood (roads, train and buses stops, parking etc), I will recommend to reduce the scale of this project. For example this project is proposing 840,810 sf as lab. The parcel is next to the NEIDL (another big lab this one run my BU). Do we have such demand for labs in the area? If the developers are able to maneuver a reduction of at least of 40% of the scope of the project, I can see a more appealing and welcoming project to the area. A smaller scale might also alleviate the concerns around traffic and capacity.	**After review and consideration of all design alternatives the Proponent believes that this current design and program best meet the underlying zoning, the goals of the city and neighborhood and the constraints of the site.**
Community Development/Spaces		
RM3	How this project could help social mobility to low and mid incomes families in the neighborhood? I will like to see a process of input from community development organizations in the South End for the “RFP” that will determine the types of 501c3 this project will host.	**The Developer will conduct a Community Benefit Space Needs Study, to include presentations and other outreach, and culminating in a survey of the South End neighborhood population and other stakeholders, to identify community needs and users.** **See Comment G17 Response.**
RM4	Can the developer reconsider adding other type of use to the spaces considered for more K1 and Art spaces? A need assessment of the community will be very beneficial to identify space use with purpose, and workforce development programs that could be driven from the community spaces within this project.	**Please see the proposed Community Benefit Space selection process.**
Other		
RM5	Construction of the project: I recommend the developers to commit and contract during construction MWBE enterprises http://www.mwbe-enterprises.com/wbe/ as well to offer affordable commercial spaces post construction to similar enterprises. Mid to low income communities will benefit from this type of partnership as well as promoting affordable services (café, rest etc in the building).	**The Proponent commits to complying with the Boston Residence Jobs Policy.** **Please see the proposed Community Benefit Space selection process.**
Elizabeth Mezias		
EM1	The public open space that is part of the plan is great! If you want to be sure that space does not sit empty on the weekends, please do what you can to get some housing in the development.	**After review and consideration of all design alternatives the Proponent believes that this current design and program best meet the underlying zoning, the goals of the city and neighborhood and the constraints of the site.**
EM2	There is a tremendous demand for housing in the city of Boston, especially in the South End. Make housing a requirement for the project so that the people who work at	**After review and consideration of all design alternatives the Proponent**

Comment No.	Comment Summary	Comment Responses
	the Exchange have an opportunity to live near their work. Traffic in and around town is tough. There's not much public transit on Albany. People want to live in the city. Do what you can to make it possible.	**believes that this current design and program best meet the underlying zoning, the goals of the city and neighborhood and the constraints of the site.**
Sam Potrykus		
SP1	Love to see some of this space go towards the performing arts! We need affordable, all ages and otherwise accessible space. We desperately need it.	**Please see the proposed Community Benefit Space selection process.**
Ann Teixeria		
AT1	The New England Philharmonic supports the development of 30,000 square feet of civic and cultural space in the redevelopment of the Flower Exchange. The particular need of the New England Philharmonic -- which can be met by a multi-purpose space with the characteristics I will list below -- is for rehearsal space that accommodates a full-size symphony orchestra of around 75 people. The space needs to meet the following characteristics/criteria: Dimensions of at least 40' X 40' Excellent (i.e., bright) lighting so musicians can read their scores easily Acoustics that are NOT too reverberant Rentable LOCKED storage space for percussion instruments; 100 - 125 square foot space will suffice Sound containment to ensure surrounding spaces/functions are not disturbed by music rehearsal.	**Please see the proposed Community Benefit Space selection process.**

Comments Responses Table

Exchange South End

Figures and Tables Comments

The following table outlines mistakes or clarifications that must be made to figures/tables and grammar/formatting. They are listed by the figure/table numbers or page numbers.

Comment No.	Comment Summary	Comment Responses
BPDA/BTD Scoping Determination		
Figure 1-16	The East Dedham Street Extension is on this diagram, but the way it is visualized makes it seem not very prevalent. Is this intentional and accurate for the design of the street or will it have more of a visual impact on the ground? Change the diagrams to show the confines of the shared street.	**See Figure 1-21**
Figure 2-2	There are roads shown abutting the Site on the Northeast and Southwest sides. This is misleading because there aren't existing roads and are instead part of the parking lot.	**See Figure 2-2**
Figures 2-15 - 2-22	The proponent must show the unacceptable use of a Concord/Mass Ave Connector connection and the distribution of 35% of project trips (350+) to this location.	**This connection is no longer being pursued at this time. The analysis includes a redistribution of the traffic as suggested.**
Figures 2-23 - 2-26	The analysis shows through trips from the E. Concord connector beyond Biosquare Drive, but this is an opposing one-way.	**Not applicable to proposed design.**
Figure 3-15	AC2 is listed twice on the map. The legend would make more sense to say "V#" and "AC#" to indicate the categories of viewpoint and area context instead of referencing certain points.	**See Figure 3-15**
Figure 3-16	The proponent must make it more clear that the top two pictures are the existing condition and the middle two pictures are the build condition.	**See Figure 3-16**
Figures 5-2 / 5-10	The rendering on 5-2 is inconsistent in regards to parking/bike accommodations on Albany Street compared with later figures.	**See Figures 5-2 and 5-21**
Figure 5-14	The actual design for the cycle track seems ambiguous when it crosses the plaza. There isn't a marking or design element established and this is inconsistent through several figures.	**See Figure 5-21**
Table 2-2	The proponent should include what	**See Table 2-1**

	type of use each of the parking lots are allocated.	
Page 1-6	The proponent writes that "I-93, runs east of the 1-93 Frontage Road." The comma in this sentence is incorrect and the proponent writes a "1" instead of "I". This sentence should read "I-93 runs east of the I-93 Frontage Road."	**See Section 1.4.1**
Page 3-21	There is a reference "...Area Context points described above and shown in Figure 3.4-1." It is not clear what "Figure 3.4-1" is. Is it meant to be "Figure 3-15"?	**See Section 3.4.3**
Page 3-56	The proponent writes about a bird species called "Calidris canutus rufa" when the convention for citing scientific genus and species names is to italicize as *Calidris canutus rufa*.	**See Section 3.10**
Page 5-3	The proponent writes "The space is being designed for a possible restaurants..." The "a" in the sentence should be removed so that it instead reads "The space is being designed for possible restaurants…"	**See Section 5.1.4**
Page 5-16	The proponent writes "The 20' wide two-way driveway will be designed as a shared surface for slow speed vehicles pedestrians and bicycles, integrated..." The proponents needs to add a comma after "vehicles". Also, amend the statement to abide with previous comments on "driveway" and public/private road designation.	**See Section 5.5.2**
Page 5-16	In the last paragraph, "East/ West Connector" should instead read "East/West Connector".	**Not applicable due to roadway name change to "Service Drive"**

Appendix G

Energy Modeling

ENERGY MODELING ANALYSIS

TO: Stantec

FROM: WSP

SUBJECT: **Boston Flower Exchange – Energy Model Results**

DATE: **November 10, 2017**

EXECUTIVE SUMMARY:

The purpose of this memo is to present the modeled energy performance of the Boston Flower Exchange Development with respect to the Massachusetts Stretch Energy Code. Energy modeling has been performed using eQUEST v3.65 energy simulation software.

The project will consist of the redevelopment of the Boston Flower Exchange site, which will include construction of (4) new buildings with a total floor area of approximate 1.6 million gross square feet. Each building will include core and shell office, laboratory, and retail space. There will also be three (3) levels of underground parking for each building.

To comply with the minimum energy requirements of the Massachusetts Stretch Energy code, the design must achieve at least 10% energy savings relative to ASHRAE 90.1-2013 Appendix G. The design has been modeled based on the most current available design documentation as of 10/31/2017.

The results of the modeling indicate all four buildings achieve at least a 10% site energy reduction relative to ASHRAE 90.1-2013 Appendix G and meet the MA Stretch Code. The results are summarized in the table below.

Table 1: Annual Energy and Cost Savings

	Annual Energy Consumption			**Site Energy Use Intensity (EUI)**	
	Electricity (kWh)	Natural Gas (therm)	Site Energy (MMBTU)	**EUI (kBtu/sf/year)**	**Site Energy Savings (%)**
Building A:					
ASHRAE 90.1-2013 Baseline	7,041,901	168,306	40,864	175	-
Proposed Design	6,776,666	126,435	35,772	153	**12.5%**
Building B:					
ASHRAE 90.1-2013 Baseline	11,906,182	270,484	67,684	139	-
Proposed Design	11,658,009	206,383	60,427	124	**10.7%**
Building C:					
ASHRAE 90.1-2013 Baseline	9,686,911	207,880	53,849	106	-
Proposed Design	9,458,230	161,225	48,403	95	**10.1%**
Building D:					
ASHRAE 90.1-2013 Baseline	8,742,746	212,262	51,065	130	-
Proposed Design	8,354,762	170,396	45,554	116	**10.8%**

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MODELING METHODOLOGY

The annual energy savings presented in this report was analyzed by generating an hourly simulation of building energy consumption using eQUEST software (v.3.65). eQUEST uses the latest DOE 2.2 building energy analysis software as its calculation engine. The program permits the modeling of complex building geometry, HVAC systems, electrical systems, and central plant equipment. The program relies on a well-tested and validated DOE 2.2 simulation engine, which incorporates a state-of-the-art graphic user interface and features. It allows for the creation of detailed thermal energy definitions of key building characteristics, along with customized operating strategies and schedules. The interactions between the different building loads, systems, and HVAC plants are then simulated in hourly time intervals using typical or long-term average weather data for the location. This results in a detailed account of energy consumption and demand.

The purpose of the model is to estimate the energy use that accounts for weather, solar impact, building geometry, orientation, material properties, and electrical/mechanical systems. It also considers variables including fresh air ventilation, schedules of operations, and interactive effects. For each of the 8,760 hours during the course of a year, the program will account for these factors to calculate the building energy consumption.

MODELING LIMITATIONS

There are limitations inherent to the modeling program and the models it generates. The main purpose of the model is to compare a code compliant building and a proposed design case under the same conditions. ASHRAE 90.1-2013 states:

"Neither the proposed building performance nor the baseline building performance models are predictions of actual energy consumption or costs for the proposed design after construction." (ASHRAE 90.1-2013, Appendix G, p. 255)

The assumptions made about several factors affecting energy usage such as the occupancy; building operation and maintenance; weather; changes in energy rates; etc., will result in differences from the model to actual experience. Although models are meant to approximate the actual operation of the systems, it is difficult to predict unusual events. The program assumes that the conditioning equipment works under ideal conditions for the entire year. Also, when certain systems are beyond the capabilities of the modeling software, assumptions must be made in order to approximate the effect of that system.

DESIGN ALTERNATIVES

Several design alternatives were evaluated for each building to determine the energy savings associated with enhancing components such as the exterior wall and glass, lighting, and HVAC system beyond the selected proposed design. Eight (8) additional iterations were modeled for each building. A description of each iteration, as well as the associated energy consumption and energy cost savings are included in the tables below.

Table 2: Building A – Summary of Annual Energy Savings

Flower Exchange - Building A	Annual Energy Consumption		Annual Site EUI *		Annual Energy Cost	
	Electricity (kWh)	Natural Gas (therm)	EUI (kBtu/sf/year)	Site Energy Savings (%)	Energy Cost ($)	Energy Cost Savings (%)
ASHRAE 90.1-2013 Baseline	7,041,901	168,306	175.0	-	$1,320,256	-
Selected Proposed Design *Includes U-0.055 Wall, Glass (U-0.38 & SHGC 0.35), 55% Glass, 50% ERU Effectiveness, VAV System*	6,776,666	126,435	153.2	12.5%	$1,229,667	6.9%
Additional Design Options:						
1. Proposed Design + U-0.045 Wall	6,775,247	125,891	153.0	12.6%	$1,228,814	6.9%
2. Proposed Design + U-0.035 Wall	6,773,838	125,354	152.7	12.7%	$1,227,971	7.0%
3. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25)	6,683,976	123,284	150.5	14.0%	$1,211,213	8.3%
4. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 50% Glass	6,674,229	122,318	150.0	14.3%	$1,208,542	8.5%
5. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass	6,665,757	121,478	149.5	14.6%	$1,206,221	8.6%
6. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass, 30% LPD Reduction	6,261,271	132,937	148.5	15.2%	$1,154,681	12.5%
7. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass, 30% LPD Reduction, 70% ERU Effectiveness	6,245,739	111,714	139.2	20.5%	$1,127,789	14.6%
8. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass, 30% LPD Reduction, 70% ERU Effectiveness, Chilled Beams	6,182,491	104,573	135.2	22.8%	$1,109,458	16.0%
** Minimum 10% site EUI savings required to meet MA Stretch Energy Code*						

Table 3: Building B – Summary of Annual Energy Savings

Flower Exchange - Building B	Annual Energy Consumption		Annual Site EUI *		Annual Energy Cost	
	Electricity (kWh)	Natural Gas (therm)	EUI (kBtu/sf/year)	Site Energy Savings (%)	Energy Cost ($)	Energy Cost Savings (%)
ASHRAE 90.1-2013 Baseline	11,906,182	270,484	138.7	-	$2,216,046	-
Selected Proposed Design *Includes U-0.055 Wall, Glass (U-0.38 & SHGC 0.35), 55% Glass, 50% ERU Effectiveness, VAV System*	11,658,009	206,383	123.8	10.7%	$2,102,622	5.1%
Additional Design Options:						
1. Proposed Design + U-0.045 Wall	11,654,204	205,350	123.6	10.9%	$2,100,825	5.2%
2. Proposed Design + U-0.035 Wall	11,650,855	204,358	123.4	11.1%	$2,099,149	5.3%
3. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25)	11,534,163	196,580	121.0	12.8%	$2,071,533	6.5%
4. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 50% Glass	11,510,694	194,122	120.3	13.3%	$2,064,951	6.8%
5. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass	11,486,108	191,788	119.6	13.7%	$2,058,333	7.1%
6. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass, 30% LPD Reduction	10,657,835	210,408	117.7	15.2%	$1,947,223	12.1%
7. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass, 30% LPD Reduction, 70% ERU Effectiveness	10,649,063	178,440	111.1	19.9%	$1,909,056	13.9%
8. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass, 30% LPD Reduction, 70% ERU Effectiveness, Chilled Beams	10,404,698	161,307	105.8	23.7%	$1,850,255	16.5%
** Minimum 10% site EUI savings required to meet MA Stretch Energy Code*						

Table 4: Building C – Summary of Annual Energy Savings

Flower Exchange - Building C	Annual Energy Consumption		Annual Site EUI *		Annual Energy Cost	
	Electricity (kWh)	Natural Gas (therm)	EUI (kBtu/sf/year)	Site Energy Savings (%)	Energy Cost ($)	Energy Cost Savings (%)
ASHRAE 90.1-2013 Baseline	9,686,911	207,880	105.7	-	$1,788,968	-
Selected Proposed Design *Includes U-0.055 Wall, Glass (U-0.38 & SHGC 0.35), 55% Glass, 50% ERU Effectiveness, VAV System*	9,458,230	161,225	95.0	10.1%	$1,698,726	5.0%
Additional Design Options:						
1. Proposed Design + U-0.045 Wall	9,454,118	159,977	94.7	10.4%	$1,696,632	5.2%
2. Proposed Design + U-0.035 Wall	9,449,863	158,710	94.4	10.6%	$1,694,495	5.3%
3. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25)	9,259,497	151,144	91.7	13.2%	$1,655,335	7.5%
4. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 50% Glass	9,222,884	148,286	90.9	14.0%	$1,646,190	8.0%
5. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass	9,131,200	145,424	89.7	15.1%	$1,628,230	9.0%
6. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass, 30% LPD Reduction	8,455,998	159,924	88.0	16.7%	$1,536,872	14.1%
7. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass, 30% LPD Reduction, 70% ERU Effectiveness	8,454,464	138,297	83.8	20.7%	$1,511,756	15.5%
8. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass, 30% LPD Reduction, 70% ERU Effectiveness, Chilled Beams	8,013,174	117,463	76.7	27.4%	$1,417,190	20.8%
** Minimum 10% site EUI savings required to meet MA Stretch Energy Code*						

Table 5: Building D – Summary of Annual Energy Savings

Flower Exchange - Building C	Annual Energy Consumption Electricity (kWh)	Natural Gas (therm)	Annual Site EUI * EUI (kBtu/sf/year)	Site Energy Savings (%)	Annual Energy Cost Energy Cost ($)	Energy Cost Savings (%)
ASHRAE 90.1-2013 Baseline	9,686,911	207,880	**105.7**	**-**	$1,788,968	-
Selected Proposed Design *Includes U-0.055 Wall, Glass (U-0.38 & SHGC 0.35), 55% Glass, 50% ERU Effectiveness, VAV System*	9,458,230	161,225	**95.0**	**10.1%**	$1,698,726	5.0%
Additional Design Options:						
1. Proposed Design + U-0.045 Wall	9,454,118	159,977	**94.7**	**10.4%**	$1,696,632	5.2%
2. Proposed Design + U-0.035 Wall	9,449,863	158,710	**94.4**	**10.6%**	$1,694,495	5.3%
3. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25)	9,259,497	151,144	**91.7**	**13.2%**	$1,655,335	7.5%
4. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 50% Glass	9,222,884	148,286	**90.9**	**14.0%**	$1,646,190	8.0%
5. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass	9,131,200	145,424	**89.7**	**15.1%**	$1,628,230	9.0%
6. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass, 30% LPD Reduction	8,455,998	159,924	**88.0**	**16.7%**	$1,536,872	14.1%
7. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass, 30% LPD Reduction, 70% ERU Effectiveness	8,454,464	138,297	**83.8**	**20.7%**	$1,511,756	15.5%
8. Proposed Design + U-0.035 Wall, Glass (U-0.30 & SHGC 0.25), 45% Glass, 30% LPD Reduction, 70% ERU Effectiveness, Chilled Beams	8,013,174	117,463	**76.7**	**27.4%**	$1,417,190	20.8%
** Minimum 10% site EUI savings required to meet MA Stretch Energy Code*						

FACILITY DESCRIPTION

GENERAL

The proposed development is located on Albany Street within the South End District in Boston, MA. As per ASHRAE 90.1-2007, Appendix B, this is located in Climate Zone 5A. The weather file used for the energy analysis is Boston, MA in Typical Meteorological Year (TMY2) format. The weather data was obtained from the website: www.doe2.com.

The location of the building also determines the utility rate, which is presented in Table 6. A blended utility rate is utilized to determine the energy costs for the project. The rates presented below are provided Eversource (electric utility) and National Grid (gas utility).

Table 6: Utility Rate Structure

	Unit	Rate Per Unit
Electricity	kWh	$0.16
Natural Gas	Therm	$1.15

HVAC

- High efficiency Air Handling Units with enthalpy wheel energy recovery on the roof to provide 0.4 cfm/sf of ventilation and return air required to serve chilled beam fit out and variable air volume fit out in large community spaces. Supply and return risers installed with branch extensions onto each floor for fit out.
- Water cooled chiller plant generates 42°F chilled water to condition the ventilation air at the air handling units.
- Condensing Boiler system provides 130°F hot water at 93% efficiency for tenant fit out space heating and reheat.
- Toilet, janitor and other miscellaneous exhaust risers and fans for base building areas.
- HVAC fit out for base building areas.
- Garage exhaust system and controls
- Stair and elevator pressurization systems for high rise buildings.

ELECTRICAL

- Electrical utility service to switchgear in main electrical room.
- 480/277V bus risers for base building systems
- 480/277 V bus risers for tenant fit out
- Diesel generator for base building life safety and code-required emergency power systems
- Lighting and power distribution for base building areas
- Lighting fit out to accommodate code required emergency lighting for core and shell

PLUMBING

- Domestic water service from utility with distribution for base building areas
- Domestic hot water generation with distribution for base building areas
- Restroom plumbing fixtures included in base building areas
- Sanitary waste and vent service for base building areas
- Wall hydrants within base building areas
- Storm drainage system
- Natural gas service to base building and distribution to boilers

FIRE PROTECTION

- Fire service entrance including fire department connection, pump, alarm valve and back flow prevention
- Base building distribution piping and upturned heads for core and shell code minimum
- Standpipes, distribution and hose connections
- Base building fire alarm system with devices to base building areas
- Fire alarm sub panels for tenant fit out

SUMMARY OF MODELING INPUTS

The table below includes the assumptions for the Selected Proposed Design and the ASHRAE 90.1-2013 Baseline Design.

Summary of Assumptions for Energy Model	**ASHRAE 90.1-2013 Appendix G Baseline**	**Proposed Design**
General Building Information		
Space use type	Office/Lab	Same as baseline
Conditioned Square Feet	Building A: 233,455 SF Conditioned Area (100% Lab); 145,000 SF Garage Building B: 473,292 SF Conditioned Area (64% Lab, 36% office); 185,000 SF Garage Building C: 494,370 SF Conditioned Area (40% Lab, 60% office); 85,000 SF Garage Building D: 380,759 SF Conditioned Area (48% Lab, 52% office); 75,000 SF Garage	Same as baseline
Operating Schedule (HVAC Fans)	Lab: 24/7/365 Office: M-F: 7am-6pm; Sat: None; Sun: None	Same as baseline
Temperature Setpoints	Cooling - Occupied : 75°F, Unoccupied : 80°F Heating - Occupied : 70°F, Unoccupied : 65°F	Same as baseline
Building Envelope (Construction Assemblies)		
Roofs	R30ci Insulation Entirely Above Deck (U-0.032)	R30ci Insulation Entirely Above Deck (U-0.032)
Walls	Steel Framed R-18 (U-0.055)	R-18 (U-0.055) – Opaque Wall (terracotta rain screen) and Spandrel Panel
Fenestration and Shading		
Vertical fenestration area (of Wall area)	40% maximum	55%
Vertical Glazing U-factor	Fixed = U-0.42	Curtainwall = U-0.38
Vertical Glazing SHGC	SHGC = 0.4	SHGC = 0.3
HVAC (Air-side)		
HVAC System Type	Office/Lab Areas = System #7: VAV Rooftop Unit With HW Reheat - System per Floor Heated only Storage = System #9:	CHW/HW VAV Rooftop Unit With HW Reheat with sensible energy recovery
Fan System Operation	Lab: 24/7/365 On continuously Office: M-F: 7am-6pm; Sat: None; Sun: None Cycled to meet load during unoccupied hours.	Same as baseline
Outdoor Air Design Min. Ventilation	Lab: Assumes 2 CFM/SF max OA and 1 CFM/SF min OA Office: Assumes 20 CFM/person of OA ASHRAE 62.1-2013 Compliant	Same as baseline
Economizer High-Limit Shutoff	System #7: Outdoor Air Temperature with 70°F shutoff limit	Enthalpy Economizer
Design Airflow Rates (Conditioned Spaces)	Auto sized based on 20F supply air to room air delta-T	Auto sized based on 20F supply air to room air delta-T
Minimum Supply Flow	Per ASHRAE 90.1-2013 Section G3.1.3.13 Office VAV - 30% Turndown Ratio Lab VAV - 50% Turndown Ratio	Per ASHRAE 90.1-2013 Section G3.1.3.13 Office VAV - 30% Turndown Ratio Lab VAV - 50% Turndown Ratio
Total System Fan Power (Conditioned)	Per ASHRAE 90.1-2013 G3.1.2.9 System #7 Office VAV - 0.0013 kW/cfm System #7 Lab VAV - 0.0017 kW/cfm	System #7 Office VAV - 0.0013 kW/cfm System #7 Lab VAV - 0.0017 kW/cfm
Pressure Drop Adjustments	-Particulate filtration Credit MERV 13 -Sound Attenuation -ERV in applicable systems	-Particulate filtration Credit MERV 13 -Sound Attenuation -ERV in applicable systems
Exhaust Air Energy Recovery	50% effective sensible HX on lab system	50% effective sensible HX on lab system
Demand Control Ventilation	None	None
Supply Air Temperature Reset Parameters	Supply Air Temperature reset on VAV systems from 55F-60F	Supply Air Temperature reset on VAV systems from 55F-60F
HVAC (Water-side)		
Number of Chillers	2	2
Chiller Part-Load Controls	No VSD	Yes - VSD
Chiller Capacity (Per Chiller)	≥400 and <600 Tons	≥400 and <600 Tons
Chiller Efficiency	0.56 kW/ton (full load) 0.50 IPLV	0.56 kW/ton (full load) 0.38 IPLV
Chilled Water Loop Supply Temperature	44	42
Chilled Water (CHW) Loop Delta-T	12	12
CHW Loop Temp Reset Parameters	54F @ 60F OA, 44F @ 80F OA	48F @ 60F OA, 42F @ 80F OA
CHW Loop Configuration	Primary/Secondary	Variable Primary
Number of Primary CHW Pumps	1 per chiller	2 (Primary/Standby)
Primary CHW Pump Power	11 W/GPM	22 W/GPM
Primary CHW Pump Speed Control	One Speed	Variable Speed
Secondary CHW Pump Power	11 W/GPM	N/A
Secondary CHW Pump Speed Control	Variable Speed	N/A
Number of Cooling Towers / Fluid Coolers	1	3
Cooling Tower Fan Control	Variable Speed	Variable Speed
Condenser Water Leaving Temperature	85	85
Condenser Water (CW) Loop Delta-T	10	10
CW Loop Temp Reset Parameters	Maintain 70°F when weather permits, floating up to leaving water temperature at design conditions (85°F)	Maintain 70°F when weather permits, floating up to leaving water temperature at design conditions (85°F)
CW Loop Configuration	Primary Only	Primary Only
Number of CW Pumps	1 per chiller	1
CW Pump Power	19 W/GPM	19 W/GPM
CW Pump Speed Control	One Speed	Variable Speed
Water-side Economizer for Free Cooling	No	No
Number of Boilers	2	3
Boiler Part-Load Controls	Staged	Staged
Boiler Capacity (Per Boiler)	N/A	N/A
Boiler Efficiency	82% Natural Draft	93% Condensing
Boiler Water Loop Supply Temperature	180°F	130°F
Hot Water or Steam (HW) Loop Delta-T	50°F	20°F
HW Loop Reset Parameters	150°F @ 50°F OA, 180°F @ 20°F OA	110°F @ 50°F OA, 130 @ 20°F OA
Number of Primary HW Pumps	2	2
Primary HW Pump Power	19W/GPM	19W/GPM
Primary HW Pump Speed Control	Variable Speed	Variable Speed

Summary of Assumptions for Energy Model General Building Information	ASHRAE 90.1-2013 Appendix G Baseline	Proposed Design
DHW Equipment Type	Gas Storage Water Heater	Gas Storage Water Heater
Equipment Efficiency	80% Efficient	93% Efficient
Temperature Controls	120°F Constant	120°F Constant
DHW Flow	Standard Flow Fixtures	Standard Flow Fixtures
Lighting		
Automatic Lighting Shutoff Method	Timeclock to schedule off lighting during unoccupied hours. Occupancy sensors where required by code.	Timeclock to schedule off lighting during unoccupied hours. Occupancy sensors where required by code.
Gross Lighted Floor Area	Varies per building (see above)	Varies per building (see above)
Interior Lighting Power Calc Method	Space-by-space Area	Space-by-space Area 10% Reduction in LPD
Interior LPD by Building Area (W/SF)	Office = 0.98 W/sf	Office = 0.88 W/sf
	Lab = 1.81 W/sf	Lab = 1.63 W/sf
	Mechanical = 0.95 W/sf	Mechanical = 0.85 W/sf
	Corridor = 0.66 W/sf	Corridor = 0.59 W/sf
	Lobby = 0.9 W/sf	Lobby = 0.81 W/sf
	Retail Area = 1.68 W/sf	Retail Area = 1.68 W/sf
	Parking Garage = 0.19 W/sf	Parking Garage = 0.17 W/sf
Miscellaneous		
Receptacle Equipment	Office = 1.00 W/sf Lab = 4.00 W/sf (with diversity)	Office = 1.00 W/sf Lab = 4.00 W/sf (with diversity)
Escalators and Elevators	Average load = 75 HP per building	Average load = 75 HP per building
Utility Rates		
Electricity	$0.16/kWh	$0.16/kWh
Natural Gas	$1.15/therm	$1.15/therm

PRELIMINARY COGENERATION / TRIGENERATION ENERGY STUDY

TO: Stantec

FROM: WSP USA

SUBJECT: **Cogeneration and Trigeneration Investigation Study**

DATE: **November 10, 2017**

OVERVIEW

The intent of this analysis is to investigate the feasibility of including cogeneration and / or trigeneration systems as part of the Boston Flower Exchange project.

The project consists of four (4) buildings – A, B, C, and D. Hourly energy modeling output data was used to develop this analysis along with assumptions on utility costs and equipment performance.

Cogeneration is the simultaneous production of electricity with the recovery and utilization of heat (commonly referred to as CHP – Combined Heat and Power). Fuel (natural gas) is used to generate electricity at a facility and a portion of the waste heat from the power generation is then used to provide useful thermal energy.

A trigeneration system operates much like a cogeneration system except with an additional energy output, where the heat produced by the plant is also used for air conditioning or refrigeration. An absorption chiller is linked to the CHP system to provide this functionality. Absorption chillers are thermally driven chillers that use a refrigerant and heat source (i.e. waste heat from cogeneration) to provide cooling. For this analysis, trigeneration was ruled out due to a lack of year-round chilled water load. It is expected that chilled water would primarily be required during the summer months (June through August) and that free-cooling (waterside or airside economizer) would be utilized in the shoulder seasons.

The following utility rates were assumed in the study:

Electric: $0.16 / kWh
Natural Gas: $1.15 / therm

The following aspects should be considered when investigating cogeneration and trigeneration as a means to supply energy for a project:

1. **The technology should only be considered once other priority energy efficiency measures are implemented to reduce the projected energy demand for the site.**

2. **Volatility in energy prices can cause discrepancies in long term savings versus short term savings.**
3. **Connection requirements with the utility providers should be determined.**
4. **Variations in a building's operation and energy demand will impact system efficiency (i.e. if demand for waste heat reduces, using natural gas to generate electricity for power only is far less efficient than importing from the grid.)**

PRELIMINARY SYSTEM SIZING

To maximize return on investment a cogeneration system should be sized such that:

1. The cogeneration system operates 24/7/365 with some downtime due to planned maintenance.
    a. When the system is operating, the heat output from the generator(s) will always be displaced to other end use(s) such as space heat, domestic hot water, and/or process loads (i.e. laboratory equipment).

To conduct preliminary sizing of the cogeneration system, monthly average thermal load (per energy modeling output data) was populated. See *Table 1* below.

Table 1 - Average Thermal Load per Building

Month	Average Thermal Load* (therms / hr)				
	Building A	Building B	Building C	Building D	Total
January	24.6	40.1	33.5	34.2	132.4
February	22.0	35.8	29.6	30.5	117.9
March	17.2	27.8	22.8	23.9	91.7
April	11.1	17.8	13.1	14.9	56.9
May	8.1	12.2	8.1	9.6	38.0
June	7.2	10.7	6.8	7.9	32.6
July	6.3	9.4	5.8	6.6	28.1
August	6.9	10.4	6.5	7.5	31.3
September	7.1	10.6	6.7	8.1	32.5
October	9.0	14.1	9.9	11.6	44.6
November	14.1	23.5	19.4	20.4	77.5
December	20.8	33.9	28.1	29.1	111.9
*Based on hourly energy modeling data					

July (see highlighted row above) represents the month with the minimum average thermal load. Thermal load during this month serves as the limiting factor for sizing the cogeneration plant(s).

As such, the following is suggested:

➢ Install one (1) **75 kW cogeneration module** at **Building A, C,** and **D**. Each of these buildings has a theoretical minimum thermal load of 5.8 to 6.6 therms / hr. A 75 kW cogeneration module has a thermal output of 4.86 therms /hr.

- Install one (1) **125 kW cogeneration module** at **Building B**. This building has a theoretical minimum thermal load of 9.4 therms / hr. A 125 kW module has a thermal output of 8.76 therms / hr.

ENERGY CONSUMPTION AND SAVINGS SUMMARY

The table below summaries energy consumption, energy savings, energy cost savings, and maintenance costs associated with cogeneration systems at Buildings A, C, and D. The numbers represented on this table represent each building individually, not the sum of all three (3) buildings.

Table 2 - Buildings A, C, and D Energy Consumption and Cost Savings (each)

Month	Electric Output (kWh)	Electric Cost Avoided ($)	Thermal Input (therms)	Thermal Input Natural Gas Cost	Thermal Output (therms)	Boiler Therms Saved	Net Natural Gas Consumption (therms)	Net Natural Gas Cost	Maintenance Cost	Net Cost Savings
Jan	55,800	$ 8,928	6,517	$ 7,495	3,616	3,888	2,629	$ 3,024	$ 1,042	$ 4,863
Feb	50,400	$ 8,064	5,887	$ 6,770	3,266	3,512	2,375	$ 2,731	$ 941	$ 4,392
Mar	55,800	$ 8,928	6,517	$ 7,495	3,616	3,888	2,629	$ 3,024	$ 1,042	$ 4,863
Apr	54,000	$ 8,640	6,307	$ 7,253	3,499	3,763	2,545	$ 2,926	$ 1,008	$ 4,706
May	55,800	$ 8,928	6,517	$ 7,495	3,616	3,888	2,629	$ 3,024	$ 1,042	$ 4,863
June	54,000	$ 8,640	6,307	$ 7,253	3,499	3,763	2,545	$ 2,926	$ 1,008	$ 4,706
July	55,800	$ 8,928	6,517	$ 7,495	3,616	3,888	2,629	$ 3,024	$ 1,042	$ 4,863
Aug	55,800	$ 8,928	6,517	$ 7,495	3,616	3,888	2,629	$ 3,024	$ 1,042	$ 4,863
Sept	54,000	$ 8,640	6,307	$ 7,253	3,499	3,763	2,545	$ 2,926	$ 1,008	$ 4,706
Oct	55,800	$ 8,928	6,517	$ 7,495	3,616	3,888	2,629	$ 3,024	$ 1,042	$ 4,863
Nov	54,000	$ 8,640	6,307	$ 7,253	3,499	3,763	2,545	$ 2,926	$ 1,008	$ 4,706
Dec	55,800	$ 8,928	6,517	$ 7,495	3,616	3,888	2,629	$ 3,024	$ 1,042	$ 4,863
Summary:	**657,000**	**$ 105,120**	**76,738**	**$ 88,248**	**42,574**	**45,778**	**30,960**	**$ 35,603**	**$ 12,264**	**$ 57,253**

Table 3 - Buildings B Energy Consumption and Cost Savings

Month	Electric Output (kWh)	Electric Cost Avoided ($)	Thermal Input (therms)	Thermal Input Natural Gas Cost	Thermal Output (therms)	Boiler Therms Saved	Net Natural Gas Consumption	Net Natural Gas Cost	Maintenance Cost	Net Cost Savings
Jan	93,000	$ 14,880	10,825	$ 12,449	6,034	6,488	4,337	$ 4,988	$ 1,190	$ 8,702
Feb	84,000	$ 13,440	9,778	$ 11,244	5,450	5,860	3,917	$ 4,505	$ 3,226	$ 5,709
Mar	93,000	$ 14,880	10,825	$ 12,449	6,034	6,488	4,337	$ 4,988	$ 3,571	$ 6,321
Apr	90,000	$ 14,400	10,476	$ 12,047	5,839	6,279	4,197	$ 4,827	$ 3,456	$ 6,117
May	93,000	$ 14,880	10,825	$ 12,449	6,034	6,488	4,337	$ 4,988	$ 3,571	$ 6,321
June	90,000	$ 14,400	10,476	$ 12,047	5,839	6,279	4,197	$ 4,827	$ 3,456	$ 6,117
July	93,000	$ 14,880	10,825	$ 12,449	6,034	6,488	4,337	$ 4,988	$ 3,571	$ 6,321
Aug	93,000	$ 14,880	10,825	$ 12,449	6,034	6,488	4,337	$ 4,988	$ 3,571	$ 6,321
Sept	90,000	$ 14,400	10,476	$ 12,047	5,839	6,279	4,197	$ 4,827	$ 3,456	$ 6,117
Oct	93,000	$ 14,880	10,825	$ 12,449	6,034	6,488	4,337	$ 4,988	$ 3,571	$ 6,321
Nov	90,000	$ 14,400	10,476	$ 12,047	5,839	6,279	4,197	$ 4,827	$ 3,456	$ 6,117
Dec	93,000	$ 14,880	10,825	$ 12,449	6,034	6,488	4,337	$ 4,988	$ 3,571	$ 6,321
Summary:	**1,095,000**	**$ 175,200**	**127,458**	**$ 146,577**	**71,044**	**76,391**	**51,067**	**$ 58,727**	**$ 39,667**	**$ 76,806**

Table 4 - Whole Campus Energy Consumption and Cost Savings Summary

Month	Electric Output (kWh)	Electric Cost Avoided ($)	Thermal Input (therms)	Thermal Input Natural Gas Cost	Thermal Output (therms)	Boiler Therms Saved	Net Natural Gas Consumption	Net Natural Gas Cost	Maintenance Cost	Net Cost Savings
Jan	260,400	$ 41,664	30,378	$ 34,934	16,881	18,152	12,226	$ 14,059	$ 4,315	$ 23,289
Feb	235,200	$ 37,632	27,438	$ 31,553	15,248	16,395	11,042	$ 12,699	$ 6,048	$ 18,885
Mar	260,400	$ 41,664	30,378	$ 34,934	16,881	18,152	12,226	$ 14,059	$ 6,696	$ 20,909
Apr	252,000	$ 40,320	29,398	$ 33,807	16,337	17,566	11,831	$ 13,606	$ 6,480	$ 20,234
May	260,400	$ 41,664	30,378	$ 34,934	16,881	18,152	12,226	$ 14,059	$ 6,696	$ 20,909
June	252,000	$ 40,320	29,398	$ 33,807	16,337	17,566	11,831	$ 13,606	$ 6,480	$ 20,234
July	260,400	$ 41,664	30,378	$ 34,934	16,881	18,152	12,226	$ 14,059	$ 6,696	$ 20,909
Aug	260,400	$ 41,664	30,378	$ 34,934	16,881	18,152	12,226	$ 14,059	$ 6,696	$ 20,909
Sept	252,000	$ 40,320	29,398	$ 33,807	16,337	17,566	11,831	$ 13,606	$ 6,480	$ 20,234
Oct	260,400	$ 41,664	30,378	$ 34,934	16,881	18,152	12,226	$ 14,059	$ 6,696	$ 20,909
Nov	252,000	$ 40,320	29,398	$ 33,807	16,337	17,566	11,831	$ 13,606	$ 6,480	$ 20,234
Dec	260,400	$ 41,664	30,378	$ 34,934	16,881	18,152	12,226	$ 14,059	$ 6,696	$ 20,909
Summary:	**3,066,000**	**$ 490,560**	**357,671**	**$ 411,321**	**198,764**	**213,725**	**143,946**	**$ 165,537**	**$ 76,459**	**$ 248,563**

ECONOMICS SUMMARY

Table 5 – Implementation Costs and Annual Cost Savings

Building	System Size	Implementation Cost	Incentives / Grants	Net Implementation Cost	Energy Cost Savings	Maintenance Costs	Net Annual Costs	Simple Payback (years)
Building A	75 kW	$ 260,000	$ 80,000	$ 180,000	$ 69,517	$ 12,264	$ 57,253	3.1
Building B	125 kW	$ 425,000	$ 135,000	$ 290,000	$ 116,473	$ 39,667	$ 76,806	3.8
Building C	75 kW	$ 260,000	$ 80,000	$ 180,000	$ 69,517	$ 12,264	$ 57,253	3.1
Building D	75 kW	$ 260,000	$ 80,000	$ 180,000	$ 69,517	$ 12,264	$ 57,253	3.1
Summary	**350 kW**	**$ 1,205,000**	**$ 375,000**	**$ 830,000**	**$ 325,023**	**$ 76,459**	**$ 248,563**	**3.3**

ENVIRONMENTAL SUMMARY

Table 6 - GHG Savings Summary

GHG Emissions (see note)	Baseline tons/yr	Proposed tons/yr	Savings
Direct Gas Burning	-	842	(842)
Indirect Imported Electricity	1,389	-	1,389
Total	**1,389**	**842**	**547**

<u>Notes</u>
CO2 Emission Factors:
Electricity = 906 Lb/MWh (ISO-NE-2007 Marginal Emissions Rate Analysis, Table 5.12)
Gas = 117 lb/MMBtu (EIA Fuel Emissions Factors, Weighted National Average)

Appendix H

FEMA Flood Map
Map Number: 25025C0079J

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

The AE Zone category has been divided by a **Limit of Moderate Wave Action (LiMWA)**. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Massachusetts State Plane Mainland Zone (FIPS zone 2001). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM is derived from Massachusetts Geographic Information System (MassGIS) digital ortho-photography produced at 45 centimeter (2005) and 30 centimeter (2008) resolution. Aerial photography is dated Spring 2005 and Spring 2008.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data Tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map,** how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

Only coastal structures that are certified to provide protection from the 1-percent-annual chance flood are shown on this panel. However, all structures taken into consideration for the purpose of coastal flood hazard analysis and mapping are present in the DFIRM database in S_Gen_Struct.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary
0.2% Annual Chance Floodplain Boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

Limit of Moderate Wave Action

Limit of Moderate Wave Action coincident with Zone Break

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 - - - - 23	Transect line
	Culvert
	Bridge
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
4989000 M	1000-meter grid: Massachusetts State Plane Mainland Zone (FIPS Zone 2001), Lambert Conformal Conic projection
4989000m N	1000-meter Universal Transverse Mercator tick values, zone 19N
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 25, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

March 16, 2016 - to change Base Flood Elevations and Special Flood Hazard Areas, to change zone designations, to update the effects of wave action, to update corporate limits, to add roads and road names, to incorporate previously issued Letters of Map Revision and to modify Coastal Barrier Resource System units.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0079J

FIRM

FLOOD INSURANCE RATE MAP

SUFFOLK COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)

PANEL 79 OF 176

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOSTON, CITY OF	250286	0079	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

U.S. DEPARTMENT OF HOMELAND SECURITY

MAP NUMBER 25025C0079J

MAP REVISED MARCH 16, 2016

Federal Emergency Management Agency

Appendix I

Accessibility Checklist

Article 80 – Accessibility Checklist

A requirement of the Boston Planning & Development Agency (BPDA) Article 80 Development Review Process

The Mayor's Commission for Persons with Disabilities strives to reduce architectural, procedural, attitudinal, and communication barriers that affect persons with disabilities in the City of Boston. In 2009, a Disability Advisory Board was appointed by the Mayor to work alongside the Commission in creating universal access throughout the city's built environment. The Disability Advisory Board is made up of 13 volunteer Boston residents with disabilities who have been tasked with representing the accessibility needs of their neighborhoods and increasing inclusion of people with disabilities.

In conformance with this directive, the BDPA has instituted this Accessibility Checklist as a tool to encourage developers to begin thinking about access and inclusion at the beginning of development projects, and strive to go beyond meeting only minimum MAAB / ADAAG compliance requirements. Instead, our goal is for developers to create ideal design for accessibility which will ensure that the built environment provides equitable experiences for all people, regardless of their abilities. As such, any project subject to Boston Zoning Article 80 Small or Large Project Review, including Institutional Master Plan modifications and updates, must complete this Accessibility Checklist thoroughly to provide specific detail about accessibility and inclusion, including descriptions, diagrams, and data.

For more information on compliance requirements, advancing best practices, and learning about progressive approaches to expand accessibility throughout Boston's built environment. Proponents are highly encouraged to meet with Commission staff, prior to filing.

Accessibility Analysis Information Sources:

1. Americans with Disabilities Act – 2010 ADA Standards for Accessible Design
   http://www.ada.gov/2010ADAstandards_index.htm
2. Massachusetts Architectural Access Board 521 CMR
   http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/aab/aab-rules-and-regulations-pdf.html
3. Massachusetts State Building Code 780 CMR
   http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/csl/building-codebbrs.html
4. Massachusetts Office of Disability – Disabled Parking Regulations
   http://www.mass.gov/anf/docs/mod/hp-parking-regulations-summary-mod.pdf
5. MBTA Fixed Route Accessible Transit Stations
   http://www.mbta.com/riding_the_t/accessible_services/
6. City of Boston – Complete Street Guidelines
   http://bostoncompletestreets.org/
7. City of Boston – Mayor's Commission for Persons with Disabilities Advisory Board
   www.boston.gov/disability
8. City of Boston – Public Works Sidewalk Reconstruction Policy
   http://www.cityofboston.gov/images_documents/sidewalk%20policy%200114_tcm3-41668.pdf
9. City of Boston – Public Improvement Commission Sidewalk Café Policy
   http://www.cityofboston.gov/images_documents/Sidewalk_cafes_tcm3-1845.pdf

Glossary of Terms:

1. *Accessible Route* – A continuous and unobstructed path of travel that meets or exceeds the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 20
2. *Accessible Group 2 Units* – Residential units with additional floor space that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 9.4
3. *Accessible Guestrooms* – Guestrooms with additional floor space, that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 8.4
4. *Inclusionary Development Policy (IDP)* – Program run by the BPDA that preserves access to affordable housing opportunities, in the City. For more information visit: http://www.bostonplans.org/housing/overview
5. *Public Improvement Commission (PIC)* – The regulatory body in charge of managing the public right of way. For more information visit: https://www.boston.gov/pic
6. *Visitability* – A place's ability to be accessed and visited by persons with disabilities that cause functional limitations; where architectural barriers do not inhibit access to entrances/doors and bathrooms.

Article 80 | ACCESSIBILTY CHECKLIST

<table>
<tr><td colspan="5">1. Project Information:
If this is a multi-phased or multi-building project, fill out a separate Checklist for each phase/building.</td></tr>
<tr><td>Project Name:</td><td colspan="4">Exchange South End</td></tr>
<tr><td>Primary Project Address:</td><td colspan="4">540 Albany Street</td></tr>
<tr><td>Total Number of Phases/Buildings:</td><td colspan="4">4 Buildings</td></tr>
<tr><td>Primary Contact
(Name / Title / Company / Email / Phone):</td><td colspan="4">William Keravuori / The Abbey Group / wkeravuori@theabbeygroup.com</td></tr>
<tr><td>Owner / Developer:</td><td colspan="4">The Abbey Group</td></tr>
<tr><td>Architect:</td><td colspan="4">Stantec Architecture</td></tr>
<tr><td>Civil Engineer:</td><td colspan="4">Nitsch Engineering</td></tr>
<tr><td>Landscape Architect:</td><td colspan="4">Michael Van Valkenburgh Associates</td></tr>
<tr><td>Permitting:</td><td colspan="4">Stantec Consulting Ltd.</td></tr>
<tr><td>Construction Management:</td><td colspan="4">Suffolk</td></tr>
<tr><td colspan="5">At what stage is the project at time of this questionnaire? Select below:</td></tr>
<tr><td rowspan="2"></td><td>PNF / Expanded PNF Submitted</td><td colspan="2">Draft / Final Project Impact Report Submitted</td><td>BPDA Board Approved</td></tr>
<tr><td>BPDA Design Approved</td><td colspan="2">Under Construction</td><td>Construction Completed:</td></tr>
<tr><td>Do you anticipate filing for any variances with the Massachusetts Architectural Access Board (MAAB)? If yes, identify and explain.</td><td colspan="4">No</td></tr>
<tr><td colspan="5">2. Building Classification and Description:
This section identifies preliminary construction information about the project including size and uses.</td></tr>
<tr><td colspan="5">What are the dimensions of the project?</td></tr>
<tr><td>Site Area:</td><td>246,145SF</td><td colspan="2">Building Area:</td><td>1,599,425 SF</td></tr>
<tr><td>Building Height:</td><td>92-282 ft.</td><td colspan="2">Number of Stories:</td><td>6-23Flrs.</td></tr>
<tr><td>First Floor Elevation:</td><td>19.5</td><td colspan="2">Is there below grade space:</td><td>Yes / No</td></tr>
</table>

What is the Construction Type? (Select most appropriate type)				
	Wood Frame	Masonry	Steel Frame	Concrete
What are the principal building uses? (IBC definitions are below – select all appropriate that apply)				
	Residential – One - Three Unit	Residential - Multi-unit, Four +	Institutional	Educational
	Business	Mercantile	Factory	Hospitality
	Laboratory / Medical	Storage, Utility and Other		
List street-level uses of the building:	*Retail, Office Lobby*			

3. Assessment of Existing Infrastructure for Accessibility:

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

Provide a description of the neighborhood where this development is located and its identifying topographical characteristics:	The proposed project site is located in the Harrison Albany Corridor located in the southernmost portion of Boston's South End neighborhood. The site is bounded by Albany Street and BioSquare Drive. It is next to the Jacobson Parcel and the NEIDL building.
List the surrounding accessible MBTA transit lines and their proximity to development site: commuter rail / subway stations, bus stops:	#47 Central Square accessible bus across the street on Albany St – 1 min walk Accessible Silver Line stops along Washington St at East Newton St and Union Park St about - 10 min walk CT1 Express – 11 min walk Broadway Subway– 15 min walk
List the surrounding institutions: hospitals, public housing, elderly and disabled housing developments, educational facilities, others:	Boston Medical Center, South End Community Health Center, Boston University School of Medicine, Pine Village Preschool, Media and Technology Charter School, Cathedral Grammar School, Public Housing: Cathedral, Washington Manor, Torre Unidad, Rutland/East Springfield, Frederick Douglass Soloman Carter Fuller Mental Health Wood Mullen Shelter, Blackstone School
List the surrounding government buildings: libraries, community centers,	

recreational facilities, and other related facilities:	No. Boston Police District D-4, South End Branch Library, JHCC, Boston Sports Club, Union Park Street Playground, Franklin Square, Blackstone Square.
4. Surrounding Site Conditions – Existing: *This section identifies current condition of the sidewalks and pedestrian ramps at the development site.*	
Is the development site within a historic district? *If yes,* identify which district:	No, South End Protection Area
Are there sidewalks and pedestrian ramps existing at the development site? *If yes*, list the existing sidewalk and pedestrian ramp dimensions, slopes, materials, and physical condition at the development site:	Sidewalks. Concrete sidewalks, some asphalt. Mostly in poor condition.
Are the sidewalks and pedestrian ramps existing-to-remain? *If yes,* have they been verified as ADA / MAAB compliant (with yellow composite detectable warning surfaces, cast in concrete)? *If yes,* provide description and photos:	New sidewalks will be provided and will be ADA/MAAB compliant. Sidewalks have not been designed to that level of detail.
5. Surrounding Site Conditions – Proposed *This section identifies the proposed condition of the walkways and pedestrian ramps around the development site. Sidewalk width contributes to the degree of comfort walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Wider sidewalks allow people to walk side by side and pass each other comfortably walking alone, walking in pairs, or using a wheelchair.*	
Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? *If yes*, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, or Boulevard.	Yes, they will be. Albany Street is an Industrial Street, The East Canton Extension and the New Street will be Neighborhood Residential. East Dedham Extension will be a Shared Street

What are the total dimensions and slopes of the proposed sidewalks? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone:	Albany Street Sidewalk: The design of Albany Street sidewalk is still in progress and will depend on how the cycle track is resolved. Currently 10' for Frontage zone, 9' for Pedestrian zone, 19' for Furnishing zone (planting, cycle track, and buffer). Total = 38' New Street: 2' for Frontage, 6'6" for Pedestrian, 5'6" Greenspace, Total = 14' East Canton Extension: 1'10" Frontage, 5' Pedestrian, 5'6" Greenspace, Total = 12'4" East Dedham Extension: 2' Frontage, 21'4" Pedestrian, 22' Shared Space, Total = 45' 4"
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?	Albany Street Sidewalk: Granite & precast pavers for Frontage zone, granite & precast pavers for Pedestrian zone, granite & precast pavers and mix of plants for Furnishing zone. Private Property and City of Boston pedestrian right of way. See plan. New Street: Cast-in-place concrete pavement for Frontage zone, cast-in-place concrete pavement for Pedestrian zone, and plantings and concrete pavement for Greenspace zone. Private Property. East Canton Extension: Cast-in-place concrete pavement for Frontage zone, cast-in-place concrete pavement for Pedestrian zone, and plantings and concrete pavement for Greenspace zone. Private Property. East Dedham Extension: Granite & precast pavers for Frontage zone, granite & precast pavers for Pedestrian zone, granite & precast pavers and mix of plants for Furnishing zone. Private Property.
Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way? *If yes,* what are the proposed dimensions of the sidewalk café or furnishings and what will the remaining right-of-way clearance be?	Sidewalk café will be inside the property line, not in the pedestrian right of way.

If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the Public Improvement Commission (PIC)?	
Will any portion of the Project be going through the PIC? *If yes,* identify PIC actions and provide details.	New public sidewalk
6. Accessible Parking: *See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirement counts and the Massachusetts Office of Disability – Disabled Parking Regulations.*	
What is the total number of parking spaces provided at the development site? Will these be in a parking lot or garage?	1145 garage spaces and 10 on grade
What is the total number of accessible spaces provided at the development site? How many of these are "Van Accessible" spaces with an 8 foot access aisle?	26 accessible spaces including 4 van spaces.
Will any on-street accessible parking spaces be required? *If yes,* has the proponent contacted the Commission for Persons with Disabilities regarding this need?	1 on grade space we have not yet contacted Commission for Persons with Disabilities.
Where is the accessible visitor parking located?	Parking Garage
Has a drop-off area been identified? *If yes,* will it be accessible?	Yes it will be accessible. It is adjacent to the lobbies.
7. Circulation and Accessible Routes: *The primary objective in designing smooth and continuous paths of travel is to create universal access to entryways and common spaces, which accommodates persons of all abilities and allows for visitability-with neighbors.*	

Describe accessibility at each entryway: Example: Flush Condition, Stairs, Ramp, Lift or Elevator:	Main lobby entries will be flush with the sidewalk entrances.
Are the accessible entrances and standard entrance integrated? *If yes, describe. If no,* what is the reason?	Yes
If project is subject to Large Project Review/Institutional Master Plan, describe the accessible routes way-finding / signage package.	Wayfinding will be provided but has not yet been designed.
8. Accessible Units (Group 2) and Guestrooms: (If applicable) *In order to facilitate access to housing and hospitality, this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing and hotel rooms.*	
What is the total number of proposed housing units or hotel rooms for the development?	n/a
If a residential development, how many units are for sale? How many are for rent? What is the breakdown of market value units vs. IDP (Inclusionary Development Policy) units?	n/a
If a residential development, how many accessible Group 2 units are being proposed?	n/a
If a residential development, how many accessible Group 2 units will also be IDP units? *If none*, describe reason.	n/a
If a hospitality development, how many accessible units will feature a wheel-in shower? Will accessible equipment be provided as well? *If yes,* provide amount and location of equipment.	n/a

Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs / thresholds at entry, step to balcony, others. *If yes*, provide reason.	n/a
Are there interior elevators, ramps or lifts located in the development for access around architectural barriers and/or to separate floors? *If yes*, describe:	n/a
9. Community Impact: *Accessibility and inclusion extend past required compliance with building codes. Providing an overall scheme that allows full and equal participation of persons with disabilities makes the development an asset to the surrounding community*.	
Is this project providing any funding or improvements to the surrounding neighborhood? Examples: adding extra street trees, building or refurbishing a local park, or supporting other community-based initiatives?	-New sidewalk on Albany St -New protected bike path on Albany Street -New publically accessible park "Albany Green"
What inclusion elements does this development provide for persons with disabilities in common social and open spaces? Example: Indoor seating and TVs in common rooms; outdoor seating and barbeque grills in yard. Will all of these spaces and features provide accessibility?	All space will be accessible
Are any restrooms planned in common public spaces? *If yes,* will any be single-stall, ADA compliant and designated as "Family"/ "Companion" restrooms? *If no*, explain why not.	Yes
Has the proponent reviewed the proposed plan with the City of Boston	The plan has not yet been designed for that level of detail.

Disability Commissioner or with their Architectural Access staff? *If yes,* did they approve? *If no,* what were their comments?	
Has the proponent presented the proposed plan to the Disability Advisory Board at one of their monthly meetings? Did the Advisory Board vote to support this project? *If no,* what recommendations did the Advisory Board give to make this project more accessible?	The plan has not yet been designed for that level of detail.

10. Attachments *Include a list of all documents you are submitting with this Checklist. This may include drawings, diagrams, photos, or any other material that describes the accessible and inclusive elements of this project.*
Provide a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations, including route distances.
Provide a diagram of the accessible route connections through the site, including distances.
Provide a diagram the accessible route to any roof decks or outdoor courtyard space? (if applicable)
Provide a plan and diagram of the accessible Group 2 units, including locations and route from accessible entry.
Provide any additional drawings, diagrams, photos, or any other material that describes the inclusive and accessible elements of this project. • • • •

This completes the Article 80 Accessibility Checklist required for your project. Prior to and during the review process, Commission staff are able to provide technical assistance and design review, in order to help achieve ideal accessibility and to ensure that all buildings, sidewalks, parks, and open spaces are usable and welcoming to Boston's diverse residents and visitors, including those with physical, sensory, and other disabilities.

Article 80 | ACCESSIBILTY CHECKLIST

For questions or comments about this checklist, or for more information on best practices for improving accessibility and inclusion, visit www.boston.gov/disability, or our office:

The Mayor's Commission for Persons with Disabilities
1 City Hall Square, Room 967,
Boston MA 02201.
Architectural Access staff can be reached at: accessibility@boston.gov | patricia.mendez@boston.gov | sarah.leung@boston.gov | 617-635-3682

FLUSH CURB
ACCESSIBLE ROUTE
ACCESSIBLE ENTRY

THE ABBEY GROUP

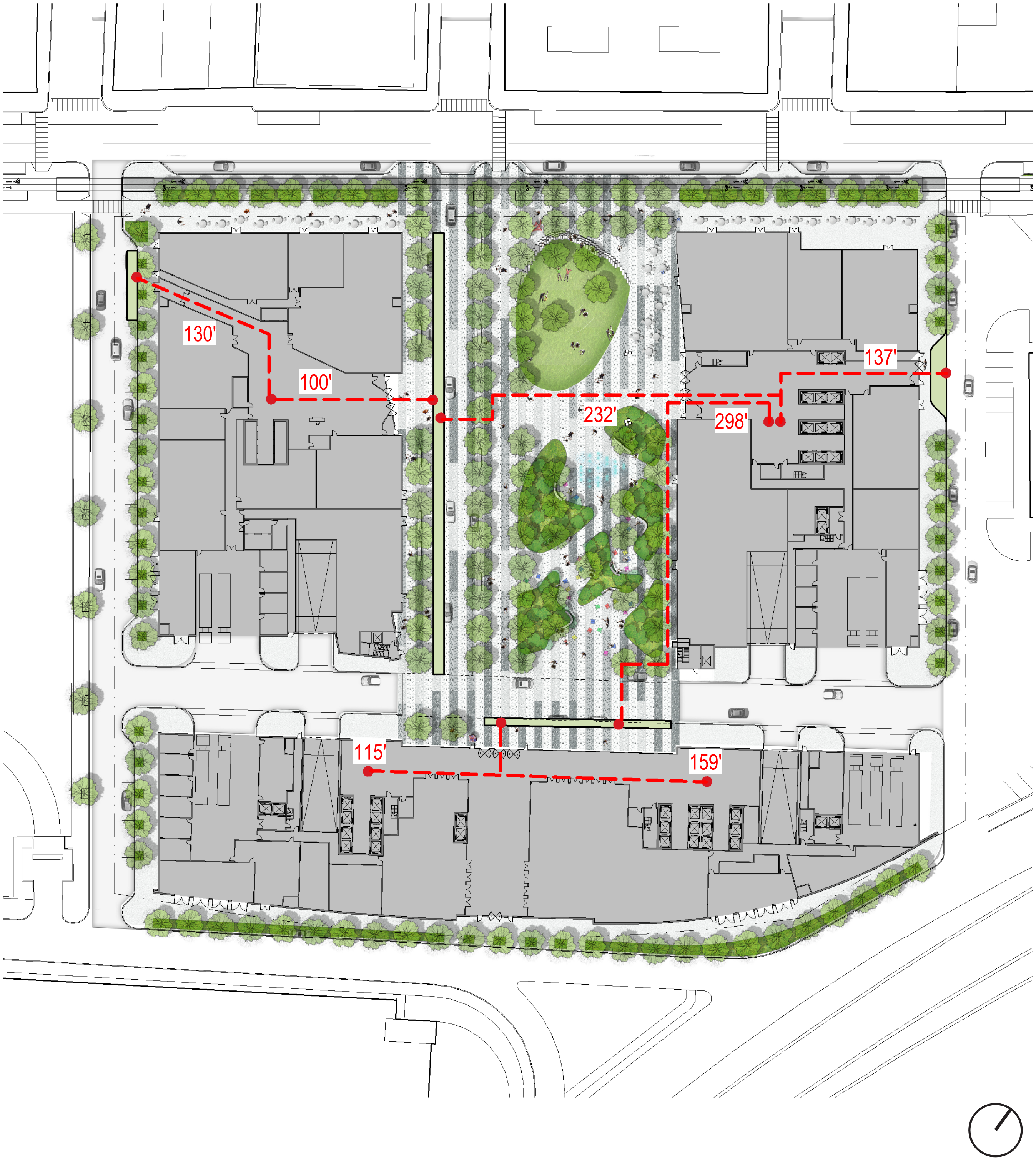
MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Appendix F
Accessible Route

Source: Stantec



DROP OFF
ACCESSIBLE ROUTE

THE ABBEY GROUP

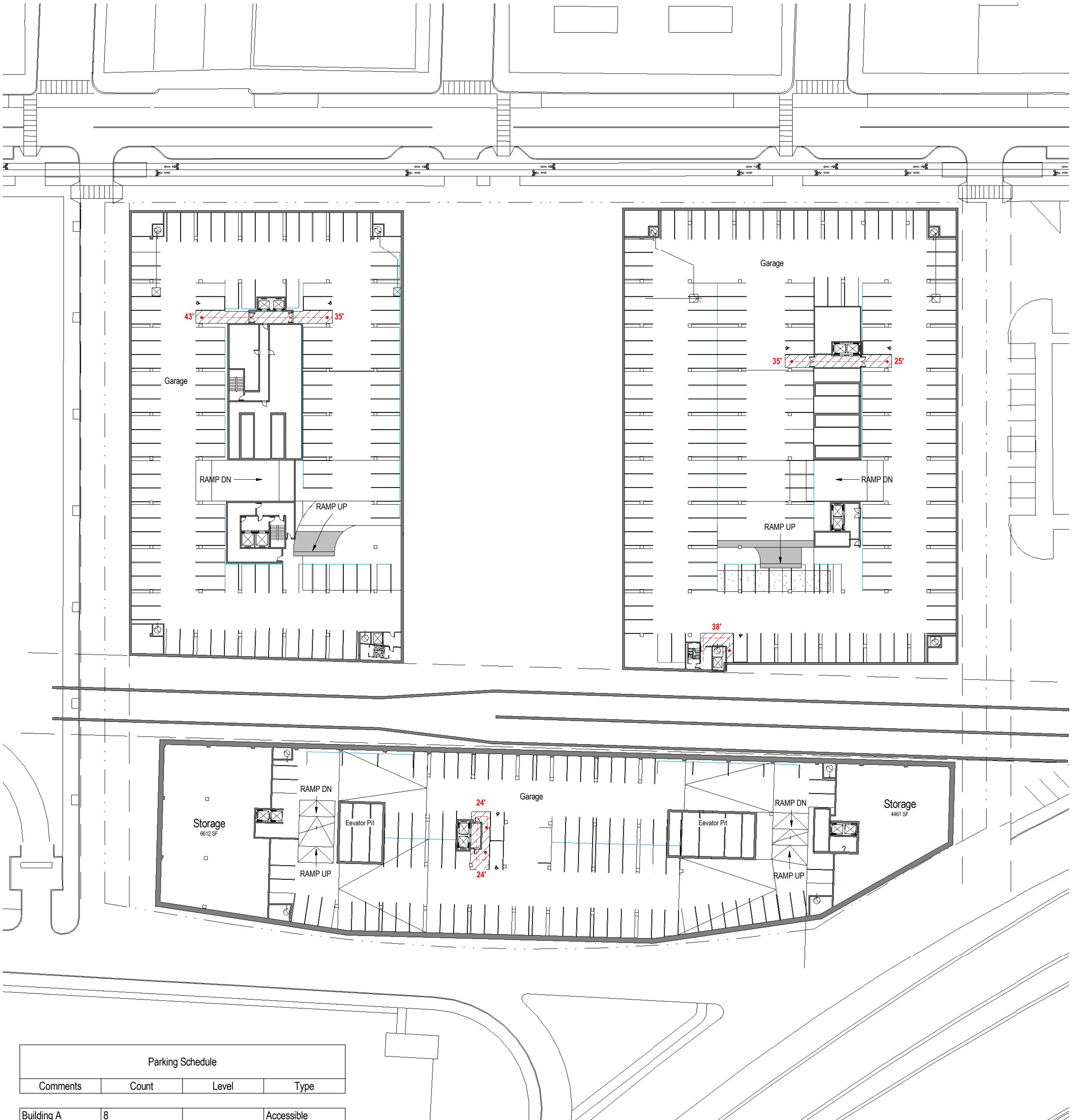
MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Appendix F
Accessibility Diagram
Drop Off

Source: Stantec



Parking Schedule			
Comments	Count	Level	Type
Building A	8		Accessible
Building A	18		COMPACT
Building A	326		Standard
352			
Building B	9		Accessible
Building B	496		Standard
505			
Building C&D	24		8' x 22' - parallel
Building C&D	6		Accessible
Building C&D	138		COMPACT
Building C&D	120		Standard
288			

ACCESSIBLE ROUTE

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Appendix F
Parking Accessibility Diagram
Source: Stantec

Appendix J

Standards and Criteria for South End Harrison/Albany Protection Area

STANDARDS AND CRITERIA
SOUTH END HARRISON/ALBANY PROTECTION AREA
Revised July 2013

General Standards

As provided in Section 4, St. 1975, C.772, as amended, the only items subject to design review in the Protection Area Are:

Demolition;
Land Coverage:
Height of Structures:
Landscape; and
Topography.

The goals of the Protection Area are to protect views of the proposed adjacent Landmark District, to ensure that new development of major alterations adjacent to the District is architecturally compatible in massing, setback and height and to protect light and air circulation within the District.

Specific Standards and Criteria

1. Demolition: In general, demolition of structures in the Protection Area may be allowed subject to prior approval by the Commission.

2. Land Coverage: Setbacks may not exceed ten (10) feet from the back of the sidewalk line unless otherwise approved by the Commission except that a setback of greater than ten (10) feet may be allowed of the setback is consistent with adjacent setbacks or if the site is adequately landscaped.

3. Height of Structures: Please see maps for Protection Area Sub-districts: http://www.cityofboston.gov/images_documents/Article%2064%20Maps_tcm3-39595.pdf.
For additional information on allowable heights, please see Article 64, South End Neighborhood District: http://www.bostonredevelopmentauthority.org/pdf/ZoningCode/Article64.pdf.

4. Topography No major changes in topography are allowed within the Protection Area,

5. Landscape In general, landscape changes within the Protection Area must not obstruct views of the elements of the adjacent Landmark District from any public ways in the Protection Area.

If surface parking adjacent to streets is proposed, then a visual barrier of landscaping is encouraged.

DEMOLITION POLICY IN THE PROTECTION AREA

The Standards and Criteria for the South End Harrison/Albany Protection Area state:

In general, the demolition of structures in the Protection Area may be allowed subject to prior approval by the Commission.

The following policy clarifies the Commission's position on how it will evaluate demolition proposals:

If the Commission determines that the subject building contributes to the architectural or historic character of the District or the Protection Area then the following criteria shall be used to evaluate an application for demolition:

1. Physical Condition
   Evidence of current and on-going deterioration and/or that the building is in immediate danger of collapse must be provided.

2. Cost of Reuse is Prohibitive
   The cost of restoration must be shown to be beyond the means of any reuse (not just the goals of the developer). The Commission would require that costs be quantified by a consultant.

3. Demolition of the building will allow for a project that will make a higher contribution to the Protection Area than currently possible.

   The Commission can consider plans for reuse of the property and the effects such plans would have on the architectural, social, aesthetic, historic and urban design character of the district. If demolition is approved, the Commission could review new construction using the same criteria that applies within the District.