Exchange South End

Boston, Massachusetts

Project Notification Form **September 19, 2017**

Submitted to the Boston Planning and Development Agency

Submitted by **The ABBEY Group**

Prepared by **Stantec Consulting Services, Inc.**

in association with
DLA Piper
Howard Stein Hudson
Nitsch Engineering
Haley & Aldrich
Michael Van Valkenburgh Associates, Inc.
WSP Parsons Brinckerhoff
Tremont Preservation Services
Epsilon Associates, Inc.
RWDI Consulting Engineers and Scientists

Exchange South End

Project Notification Form

The Abbey Group
177 Huntington Ave
24th Floor
Boston, MA 02115

Stantec Consulting
226 Causeway St.
6th Floor
Boston, MA 02114

Table of Contents

1.0 INTRODUCTION/ PROJECT DESCRIPTION ... 1-1
1.1 INTRODUCTION ... 1-1
1.2 PROJECT IDENTIFICATION AND TEAM ... 1-2
1.3 PROJECT DESCRIPTION ... 1-6
1.3.1 Project Site ... 1-6
1.3.2 Area Context ... 1-6
1.3.3 Proposed Project ... 1-7
1.3.3.1 Ground Floor Uses ... 1-8
1.3.3.2 Office and Laboratory Uses ... 1-9
1.3.3.3 Parking and Access ... 1-9
1.3.3.4 Open Space and Landscaping ... 1-9
1.4 PUBLIC BENEFITS ... 1-10
1.5 CITY OF BOSTON ZONING ... 1-11
1.6 SUMMARY OF REQUIRED PERMITS AND APPROVALS ... 1-12
1.7 COMMUNITY PROCESS ... 1-14
1.8 SCHEDULE ... 1-15

2.0 TRANSPORTATION ... 2-1
2.1 PROJECT DESCRIPTION ... 2-1
2.1.1 Study Area ... 2-2
2.1.2 Study Methodology ... 2-4
2.2 EXISTING CONDITIONS ... 2-4
2.2.1 Existing Roadway Conditions ... 2-4
2.2.2 Existing Intersection Conditions ... 2-6
2.2.3 Existing Parking ... 2-9
2.2.3.1 On-Street Parking and Curb Usage ... 2-9
2.2.3.2 Off-Street Parking ... 2-11
2.2.3.3 Car Sharing Services ... 2-13
2.2.4 Existing Traffic Data ... 2-13
2.2.4.1 Seasonal Adjustment ... 2-13
2.2.5 Existing Vehicular Traffic Volumes ... 2-14
2.2.6 Existing Bicycle Volumes and Accommodations ... 2-14
2.2.6.1 Bicycle Sharing Services ... 2-14
2.2.7 Existing Pedestrian Volumes and Accommodations ... 2-14
2.2.8 Existing Public Transportation Services ... 2-20
2.2.8.1 Existing Public Transportation Connections ... 2-21
2.2.9 Existing (2017) Condition Traffic Operations Analysis ... 2-24
2.2.9.1 Existing (2017) Condition Traffic Analysis Summary ... 2-30
2.3 NO-BUILD (2024) CONDITION ... 2-31
2.3.1 Background Traffic Growth ... 2-31
2.3.2 Specific Development Traffic Growth ... 2-32

2.3.3 Proposed Infrastructure Improvements 2-33
2.3.4 No-Build Traffic Volumes 2-33
2.3.5 No-Build (2024) Condition Traffic Operations Analysis 2-33
2.3.5.1 No-Build (2024) Condition Traffic Analysis Summary 2-41
2.4 BUILD (2024) CONDITION 2-42
2.4.1 Site Access and Vehicle Circulation 2-42
2.4.2 Project Parking 2-44
2.4.3 Loading and Service Accommodations 2-44
2.4.4 Trip Generation Methodology 2-45
2.4.5 Mode Share 2-46
2.4.6 Project Trip Generation 2-47
2.4.7 Trip Distribution 2-49
2.4.8 Build Traffic Volumes 2-49
2.4.9 Bicycle Accommodations 2-49
2.4.10 Future Public Transportation Connection Capacity 2-49
2.4.11 Build Condition Traffic Operations Analysis 2-62
2.4.11.1 Build (2024) Condition Traffic Analysis Summary 2-69
2.5 TRANSPORTATION DEMAND MANAGEMENT 2-70
2.6 TRANSPORTATION MITIGATION MEASURES 2-71
2.7 EVALUATION OF SHORT-TERM CONSTRUCTION IMPACTS 2-71

3.0 ENVIRONMENTAL REVIEW COMPONENT 3-1
3.1 INTRODUCTION 3-1
3.2 WIND 3-2
3.2.1 Introduction and methodology 3-2
3.2.2 Predicted Wind Conditions 3-2
3.3 SHADOW 3-3
3.3.1 Introduction and Methodology 3-3
3.3.2 Vernal Equinox (March 21) 3-3
3.3.3 Summer Solstice (June 21) 3-4
3.3.4 Autumnal Equinox (September 21) 3-4
3.3.5 Winter Solstice (December 21) 3-4
3.3.6 Shadow Study Conclusions 3-4
3.4 DAYLIGHT ANALYSIS 3-19
3.4.1 Introduction 3-19
3.4.2 Methodology 3-19
3.4.3 Results 3-21
3.4.4 Conclusion 3-22
3.5 SOLAR GLARE 3-24
3.6 AIR QUALITY ANALYSIS 3-24
3.6.1 Background Air Quality and Health Standards 3-24
3.6.1.1 Background Concentrations 3-26
3.6.1.2 Attainment Status 3-27
3.6.2 Mobile Sources 3-28
3.6.2.1 BPDA Air Quality Analysis Requirements 3-28

3.6.2.2 Microscale Analysis Methodology 3-29
3.6.3 Air Quality Results....................3-35
3.6.4 Conclusions 3-35
3.7 NOISE....................3-40
3.7.1 Introduction....................3-40
3.7.2 Noise Terminology 3-40
3.7.3 Noise Regulations and Criteria 3-41
3.7.4 Existing Conditions....................3-42
3.7.4.1 Noise Monitoring Methodology....................3-43
3.7.4.2 Noise Monitoring Locations....................3-43
3.7.4.3 Noise Monitoring Equipment....................3-45
3.7.4.4 Measured Background Noise Levels....................3-45
3.7.5 Future Conditions....................3-47
3.7.5.1 Overview of Potential Project Noise Sources....................3-47
3.7.5.2 Noise Modeling Methodology....................3-50
3.7.5.3 Future Sound Levels - Nighttime 3-50
3.7.5.4 Future Sounds Levels Daytime 3-53
3.7.5.5 Conclusions 3-54
3.8 FLOOD HAZARD ZONES/WETLANDS 3-55
3.9 STORMWATER/ WATER QUALITY 3-55
3.10 WILDLIFE HABITAT 3-56
3.11 TIDELANDS....................3-56
3.11.1 PUBLIC BENEFIT REVIEW AND DETERMINATION....................3-56
3.12 GEOTECHNICAL 3-61
3.12.1 Existing Site Conditions....................3-61
3.12.2 Subsurface Soil and Bedrock Conditions....................3-61
3.12.3 Groundwater....................3-62
3.12.3.1 Groundwater Conservation Overlay District (GCOD)....................3-63
3.12.4 Proposed Foundation Construction....................3-63
3.12.5 Excavation....................3-63
3.12.5.1 Methodology 3-64
3.12.5.2 Excavation Disposal and Soil Management....................3-64
3.12.6 Mitigation Measures and Monitoring....................3-64
3.13 SOLID AND HAZARDOUS WASTE 3-64
3.13.1 Hazardous Waste....................3-64
3.14 CONSTRUCTION IMPACTS....................3-65
3.14.1 Construction Management Plan 3-65
3.14.2 Construction Methodology/ Public Safety 3-65
3.14.3 Construction Schedule 3-66
3.14.4 Construction Staging/Access....................3-67
3.14.5 Construction Mitigation 3-67
3.14.6 Construction Employment and Worker Transportation....................3-68
3.14.7 Construction Truck Routes and Deliveries....................3-68
3.14.8 Construction Air Quality....................3-68
3.14.9 Construction Noise 3-69

3.14.10 Construction Vibration 3-69
3.14.11 Construction Waste 3-69
3.14.12 Protection of Utilities 3-70
3.14.13 Rodent Control 3-70

4.0 SUSTAINABLE DESIGN AND CLIMATE CHANGE PREPAREDNESS 4-1
4.1 SUSTAINABLE DESIGN 4-1

5.0 URBAN DESIGN 5-1
5.1 PROJECT CONTEXT 5-1
5.1.1 Harrison/Albany Corridor Strategic Plan 5-1
5.1.1.1 Sub-Areas: New York Streets, SOWA, Back Streets, Medical Area 5-1
5.1.1.2 Use Corridors & Green Corridors 5-2
5.1.1.3 Design Goals 5-2
5.2 URBAN DESIGN STRATEGY 5-3
5.3 MASSING 5-7
5.4 CHARACTER AND MATERIALS 5-9
5.5 LANDSCAPE AND STREETSCAPE 5-14
5.5.1 ALBANY GREEN 5-14
5.5.2 STREETSCAPES 5-15

6.0 HISTORIC AND ARCHEOLOGICAL RESOURCES 6-1
6.1 HISTORIC RESOURCES ON THE PROJECT SITE 6-1
6.1.1 Existing Conditions 6-1
6.2 HISTORIC RESOURCES WITHIN ½ MILE OF THE PROJECT SITE 6-2
6.3 ARCHEOLOGICAL RESOURCES 6-4
6.4 IMPACTS TO HISTORIC RESOURCES 6-6
6.4.1 Short-Term Impacts 6-6
6.4.2 Long-Term Impacts 6-6
6.4.2.1 Design 6-6
6.4.2.2 Wind 6-6
6.4.2.3 Shadows 6-7
6.4.2.4 Solar Glare 6-7
6.4.2.5 View Corridors 6-7
6.4.3 Project Planning 6-7
6.5 STATUS OF PROJECT REVIEW WITH HISTORICAL AGENCIES 6-7
6.5.1 State Laws 6-9
6.5.2 Local Preservation Laws 6-10

7.0 INFRASTURCTURE 7-1
7.1 INTRODUCTION 7-1
7.2 WASTEWATER 7-1
7.2.1 Existing Sewer System 7-1
7.2.2 Project Generated Sanitary Sewer Flow 7-4
7.2.3 Sanitary Sewer Connection 7-6

7.2.4 Proposed Conditions....7-6
7.2.5 Proposed Impacts....7-7
7.3 WATER SYSTEM....7-7
7.3.1 Existing Water Service....7-7
7.3.2 Anticipated Water Consumption....7-9
7.3.3 Existing Water Capacity....7-9
7.3.4 Proposed Water Service....7-9
7.3.5 Proposed Impacts....7-9
7.4 STORM DRAINAGE SYSTEM....7-10
7.4.1 Existing Storm Drainage System....7-10
7.4.2 Proposed Storm Drainage System....7-12
7.4.3 Water Quality Impacts....7-12
7.4.4 State Stormwater Standards....7-13
7.5 ELECTRICAL SERVICE....7-15
7.6 TELECOMMUNICATION SYSTEMS....7-16
7.7 NATURAL GAS SYSTEMS....7-16
7.8 UTILITY PROTECTION DURING CONSTRUCTION....7-18

List of Tables

Table 1-1 Proposed Project Program....1-8
Table 1-2 Anticipated Project Permits and Approvals....1-13
Table 2-1 Development Program by Building....2-1
Table 2-2 Development Program by Building....2-13
Table 2-3 Existing Public Transportation Service Summary....2-20
Table 2-4 Existing Public Transportation Capacity Summary....2-24
Table 2-5 Vehicle Level of Service Criteria....2-25
Table 2-6 Existing (2017) Condition, Capacity Analysis Summary, a.m. Peak Hour....2-26
Table 2-7 Existing (2017) Condition, Capacity Analysis Summary, p.m. Peak Hour....2-28
Table 2-8 No-Build (2024) Condition, Capacity Analysis Summary, a.m. Peak Hour....2-37
Table 2-9 No-Build (2024) Condition, Capacity Analysis Summary, p.m. Peak Hour....2-39
Table 2-10 Expected Delivery Activity....2-45
Table 2-11 Travel Mode Share....2-46
Table 2-12 Project Trip Generation....2-48
Table 2-13 Build (2024) Condition, Capacity Analysis, a.m. Peak Hour....2-62
Table 2-14 Build (2024) Condition, Capacity Analysis, a.m. Peak Hour....2-65
Table 2-15 One Way Pair Build (2024) Condition, a.m. and p.m. Peak Hours....2-67
Table 2-16 East Canton Build (2024) Condition, a.m. and p.m. Peak hours....2-68
Table 3-1 Shadow Study Dates and Times....3-3
Table 3-2 Daylight Analysis Results....3-21

Table 3-3 National (NAAQS) and Massachusetts (MAAQS) Ambient Air Quality Standards....3-25
Table 3-4 Observed Ambient Air Quality Concentrations and Selected Background Levels....3-27
Table 3-5 Summary of Microscale Modeling Analysis (Existing 2017)....3-36
Table 3-6 Summary of Microscale Modeling Analysis (No-Build 2024)....3-37
Table 3-7 Summary of Microscale Modeling Analysis (“One Way Pair” Build 2024)....3-38
Table 3-8 Summary of Microscale Modeling Analysis (“E. Canton” Build 2024)....3-39
Table 3-9 City Noise Standards, Maximum Allowable Sound Pressure Levels....3-42
Table 3-10 Summary of Measured Background Noise Levels – July 20, 2017 (Daytime) & July 20 and July 21, 2017 (Nighttime)....3-46
Table 3-11 Modeled Noise Sources....3-48
Table 3-12 Modeled Sound Power Levels per Noise Source....3-49
Table 3-13 Attenuation Values Applied to Mitigate Each Noise Source....3-50
Table 3-14 Comparison of Future Predicted Project-Only Nighttime Sound Levels to the City of Boston Limits....3-53
Table 3-15 Comparison of Future Predicted Project-Only Daytime Sound Levels to City Noise Standards....3-54
Table 3-16 Building Program....3-66
Table 6-1 Historic Resources Shown on Figure 6.1....6-4
Table 6-2 Potential Regulatory Reviews....6-8
Table 7-1 Estimated Sewage Flows....7-5
Table 7-2 Sewer Hydraulic Capacity Analysis....7-6
Table 7-3 HVAC Systems....7-17

List of Figures

Figure 1-1 Locus Map....1-16
Figure 1-2 Aerial View of Existing Site....1-17
Figure 1-3 Oblique View of Existing Site....1-18
Figure 1-4 Existing Conditions Survey....1-19
Figure 1-5 Existing Conditions Photographs-Key Plan....1-20
Figure 1-6 Existing Conditions Photographs....1-21
Figure 1-7 Existing Conditions Photographs....1-22
Figure 1-8 Existing Conditions Photographs....1-23
Figure 1-9 Neighborhood Context....1-24
Figure 1-10 Project Site Plan....1-25
Figure 1-11 Ground Floor Plan....1-26
Figure 1-12 Perspective from Albany Street....1-27
Figure 1-13 Perspective from Albany Street Looking North....1-28
Figure 1-14 Perspective from I-93 Looking South....1-29
Figure 1-15 Typical Upper Floor Plan....1-30
Figure 1-16 Preliminary Landscape Plan....1-31

Figure 2-1 Study Area Intersections....2-3
Figure 2-2 On-Street Parking Regulations....2-10
Figure 2-3 Off-Street Parking....2-12
Figure 2-4 Car Sharing Services....2-15
Figure 2-5 Existing (2017) Condition Traffic Volumes, Weekday a.m. Peak Hour....2-16
Figure 2-6 Existing (2017) Condition Traffic Volumes, Weekday p.m. Peak Hour....2-17
Figure 2-7 Existing (2017) Condition Bicycle Volumes, Weekday a.m. and p.m. Peak Hours....2-18
Figure 2-8 Bicycle Sharing Locations....2-19
Figure 2-9 Existing (2017) Condition Pedestrian Volumes, Weekday a.m. and p.m. Peak Hours....2-22
Figure 2-10 Public Transportation....2-23
Figure 2-11 Background Projects....2-34
Figure 2-12 No-Build (2024) Condition Traffic Volumes, Weekday a.m. Peak Hour....2-35
Figure 2-13 No-Build (2024) Condition Traffic Volumes, Weekday p.m. Peak Hour....2-36
Figure 2-14 Site Plan....2-43
Figure 2-15 One-Way Pair Trip Distribution Entering....2-50
Figure 2-16 One-Way Pair Trip Distribution Exiting....2-51
Figure 2-17 E. Canton Trip Distribution Entering....2-52
Figure 2-18 E. Canton Trip Distribution Exiting....2-53
Figure 2-19 One-Way Pair Project Generated Trips, Weekday a.m. Peak Hour....2-54
Figure 2-20 One-Way Pair Project Generated Trips, Weekday p.m. Peak Hour....2-55
Figure 2-21 E. Canton Project Generated Trips, Weekday a.m. Peak Hour....2-56
Figure 2-22 E. Canton Project Generated Trips, Weekday p.m. Peak Hour....2-57
Figure 2-23 One-Way Pair Build (2024) Condition Traffic Volumes, Weekday a.m. Peak Hour....2-58
Figure 2-24 One-Way Pair Build (2024) Condition Traffic Volumes, Weekday p.m. Peak Hour....2-59
Figure 2-25 E. Canton Build (2024) Condition Traffic Volumes, Weekday a.m. Peak Hour....2-60
Figure 2-26 E. Canton Build (2024) Condition Traffic Volumes, Weekday p.m. Peak Hour....2-61
Figure 3-1 Shadow Study, March 21(9:00 AM)....3-5
Figure 3-2 Shadow Study, March 21(12:00 PM)....3-6
Figure 3-3 Shadow Study, March 21(3:00 PM)....3-7
Figure 3-4 Shadow Study, June 21(9:00 AM)....3-8
Figure 3-5 Shadow Study, June 21(12:00 PM)....3-9
Figure 3-6 Shadow Study, June 21(3:00 PM)....3-10
Figure 3-7 Shadow Study, June 21(6:00 PM)....3-11
Figure 3-8 Shadow Study, September 21(9:00 AM)....3-12
Figure 3-9 Shadow Study, September 21(12:00 PM)....3-13
Figure 3-10 Shadow Study, September 21(3:00 PM)....3-14
Figure 3-11 Shadow Study, September 21(6:00 PM)....3-15
Figure 3-12 Shadow Study, December 21(9:00 AM)....3-16
Figure 3-13 Shadow Study, December 21(12:00 PM)....3-17

Figure 3-14 Shadow Study, December 21(3:00 PM) 3-18
Figure 3-15 Daylight Analysis, Viewpoint and Area Context Location 3-20
Figure 3-16 Daylight Analysis, BRADA results 3-23
Figure 3-17 Intersection of Massachusetts Avenue and Albany Street 3-32
Figure 3-18 Intersection of Frontage Road Northbound and the Department of Public Works Yard Driveway 3-33
Figure 3-19 Intersection of Frontage Road Southbound and Albany Street 3-34
Figure 3-20 Noise Measurement Locations 3-44
Figure 3-21 Noise Modeling Locations 3-52
Figure 3-22 Chapter 91 Tidelands Map 3-60
Figure 5-1a Perspective from Albany Street Looking North 5-5
Figure 5-1b Perspective from I-93 Looking South 5-5
Figure 5-2a Perspective from Albany Street Looking East 5-6
Figure 5-2b Massing Build Up 5-6
Figure 5-3 Axonometric View of the Project Site 5-8
Figure 5-4a Proposed Building Materials 5-10
Figure 5-4b Material Palette 5-10
Figure 5-5a East Elevation 5-11
Figure 5-5b North Elevation 5-11
Figure 5-6a South Elevation 5-12
Figure 5-6b Through North Elevation 5-12
Figure 5-7a Through South Elevation 5-13
Figure 5-7b West Elevation 5-13
Figure 5-8 Preliminary Landscape Plan 5-17
Figure 5-9 Planting Plan 5-18
Figure 5-10 Paving and Furnishings Plan 5-19
Figure 5-11 Lighting Plan 5-20
Figure 5-12 Vehicular Zones 5-21
Figure 5-13 Albany Green Section 5-22
Figure 5-14 Albany Green Lawn Plan 5-23
Figure 5-15 Albany Green Lawn – Section and Perspective 5-24
Figure 5-16 Albany Green Plaza Plan 5-25
Figure 5-17 Albany Green Plaza – Section and Perspective 5-26
Figure 5-18 Albany Green Quiet Garden Plan 5-27
Figure 5-19 Albany Green Quiet Garden – Section and Perspective 5-28
Figure 5-20 Albany Street Section 5-29
Figure 5-21a East Canton Extension Section 5-30
Figure 5-21b New Street Section 5-30
Figure 6-1 Historic Resources Within ½ Mile of the Project Site 6-3
Figure 6-2 USGS Map: Boston South, MA 2015 6-5
Figure 7-1 Existing BWSC Sewer System 7-3
Figure 7-2 Existing BWSC Water System 7-8
Figure 7-3 Existing BWSC Storm Drainage System 7-11

List of Appendices

Appendix A Pedestrian Wind Study Preliminary Results A-1
Appendix B Air quality Modeling Assumptions and Back-Up Data B-2
Appendix C Traffic Count (Upon Request) C-3
Appendix D LEED Checklist D-4
Appendix E Climate Change Preparedness/Resiliency Checklist E-5
Appendix F Accessibility Checklist F-6
Appendix G Standards and Criteria South End Harrison/Albany Protection Area G-7
Appendix H FEMA Flood Map H-8

Chapter 1

1.0 INTRODUCTION/ PROJECT DESCRIPTION

1.1 INTRODUCTION

The Abbey Group (the "Proponent") and its affiliates propose 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 west and the Interstate-93 (I-93) Frontage Road to the east. 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 that will attract new businesses and generate 4,000-7,000 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 1+ acres of new publicly accessible open space on Site that will create opportunities for both passive and active recreation. Additional opportunities for community engagement will be provided through active ground floor retail uses that connect to the park, and the development of 30,000 square feet (sf) of flexible civic space for arts, culture, and innovation.

- **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 include multimodal connection improvements through the Site to the Interstate 93 (I-93) corridor, the South Bay Harbor Trail, walkable neighborhood, and nearby transit stops.

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 approximately 1.6 million sf of dynamic public open spaces. 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, other South End developers, City officials and local business owners. Feedback has been positive and the proposed development plan reinforces goals heard from the community and other stakeholder groups.

This Project Notification Form (PNF) is being submitted to the Boston Planning & Development Agency (BPDA) to initiate review of the Project under Article 80B, Large Project Review, of the Boston Zoning Code. The PNF presents details about the Project and provides an analysis of traffic/transportation, potential environmental impacts, infrastructure needs, and other related components to inform state and city agencies and neighborhood residents about the Project, its potential impacts, and the mitigation measures proposed to address those potential impacts. Chapter 1 provides a project overview, presents the project development team, and lists the various approvals and permits anticipated from federal, state and local governmental agencies. A list of ongoing public participation and community outreach efforts is also included.

1.2 PROJECT IDENTIFICATION AND 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)

Proponent	The Abbey Group 177 Huntington Avenue, 24th Floor Boston, MA 02115 Contact: William Keravuori Managing Partner 617.266.8860 info@exchangesouthend.com

Architect	Stantec Architecture 311 Summer Street Boston, MA 02110-1723 Contact: Larry Grossman, AIA Senior Principal 617.234.3139 Larry.Grossman@stantec.com Contact: Jessica Garnitz, RA, AIA 617.234.3113 Jess.Garnitz@stantec.com
Legal	DLA Piper 33 Arch Street, 26th Floor Boston, MA 02110 Contact: John Rattigan Managing Partner, Boston Office 617.406.6057 john.rattigan@dlapiper.com
Transportation	Howard Stein Hudson 11 Beacon Street, 10th Floor, Suite 1010 Boston, MA 02108 Contact: Brian Beisel, PTP Senior Transportation Engineer 617.348.3357 bbeisel@hshassoc.com
Planning and Permitting	Stantec Consulting Services Inc. 226 Causeway Street, 6th Floor Boston, MA 02114 Contact: Christine McVay Senior Project Manager

	617.654.6096 Christine.McVay@stantec.com
Civil Engineering	Nitsch Engineering 2 Center Plaza, Suite 430 Boston MA 02108 Contact: John Schmid, PE Project Manager 617.338.0063 x240 jschmid@nitscheng.com
Geotechnical	Haley & Aldrich, Inc. 465 Medford Street, Suite 2200 Boston MA 02129 Contact: Marya Gorczyca, PE Principal 617.886.7408 mgorczyca@haleyaldrich.com
Landscape Architecture	Michael Van Valkenburgh Associates, Inc. 231 Concord Avenue Cambridge, MA 02138 Contact: Chris Matthews Associate Principal 617.864.2076 cmatthews@mvvainc.com
Sustainability	Stantec Consulting Services, Inc. 311 Summer Street Boston, MA 02110-1723 Contact: Blake Jackson, AIA, LEED 617.234.3194 Blake.Jackson@stantec.com

Mechanical, Electrical, Plumbing, and Fire Protection	WSP Parsons Brinckerhoff 75 Arlington Street Boston, MA 02116 Contact: Scott Robbins, PE Senior Vice President 617.426.7330 scott.robbins@wspgroup.com
Historic Preservation	Tremont Preservation Services 374 Congress Street, Suite 301 Boston, MA 02210 Contact: Leslie Donovan Principal 617.482.0910 leslie@tremontpreservation.com
Greenhouse Gas/Noise/Air Quality/Daylight	Epsilon Associates, Inc. 3 Mill & Main Place, Suite 250 Maynard, MA 01754 Contact: Peggy Briggs Managing Principal 978.897.7100 pbriggs@epsilon.com
Wind	RWDI Consulting Engineers and Scientists 600 Southgate Drive Guelph, Ontario, Canada N1G 4P6 Contact: Bill Smeaton Principal 519.823.1311 x2318 Bill.Smeaton@rwdi.com

1.3 PROJECT DESCRIPTION

1.3.1 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 west and the Interstate-93 (I-93) Frontage Road to the east. I-93, runs east of the 1-93 Frontage Road.

1.3.2 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 the Silver Line with service to Logan International Airport. 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 basic service amenities. The availability of pedestrian-scale distances to bus stops, train stations, a regional bike trail system, and basic service amenities make the Project Site ideal for transit-oriented development, thereby promoting livability and community connectivity.

1.3.3 Proposed Project

The Project, as currently conceived, will include the construction of four buildings with approximately 1,481,350 square feet of mixed-use commercial and life science research space, 42,500 square feet of ground floor retail space, and 30,000 square feet of civic space situated around a new central public park. Below-grade parking garages under each building will provide approximately 1,145 parking spaces, with parking with access provided via driveways off Albany Street and BioSquare Drive. The project is forecasted to provide between 4,000-7,000 jobs and be the catalyst to reconnect the Albany Street corridor into the South End community. See Figure 1-10 Project Site Plan, Figure 1-11 Ground floor plan, Figure 1-12 Perspective from Albany Street Looking East East, Figure 1-13 Perspective from Albany Street Looking North, Figure 1-14 Perspective from I-93 Looking South.

The Project is designed in four main buildings, A through D, each containing mixed uses except for Building C, which will exclusively accommodate laboratory and office space uses. 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	14	20	15	--
Building Height* (ft)	92	200	282	215	--
Floor Area, Gross (sf)	230,000	480,700	502,000	386,725	1,599,425
Laboratory (sf)	192,855	284,030	195,970	167,955	840,810
Office (sf)	0	161,300	298,360	180,880	640,540
Retail (sf)	20,500	22,000	0	0	42,500
Civic (sf)	0	0	0	30,000	30,000
Lobbies (sf)	7,600	5,800	3,500	3,500	20,400
BOH*/Services (sf)	9,045	7,570	4,170	4,390	25,175
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

1.3.3.1 Ground Floor Uses

The ground floors of buildings A and B will contain a lively ensemble of retail shops, restaurants, fitness, and daycare facilities, as well as lobbies to the office/laboratory buildings and the Albany Green central publicly-accessible park. Building D will contain approximately 30,000 square feet of flexible space for arts, culture, community, and innovation. 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.

1.3.3.2 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 four buildings (A, B, C, D) will provide approximately 1,481,350 sf of combined commercial office and laboratory space. See Figure 1-15, Typical Upper Floor Plan.

1.3.3.3 Parking and Access

The parking goals developed by the Boston Transportation Department (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 office or retail space.

The Project is anticipated to provide 1,145 below-grade parking spaces divided between the garages at each of the four buildings. Additionally, 14 at-grade parking spaces are proposed along East Canton Street Extension next to Buildings A and D. The parking ratio based on the 1,159 combined at-grade and below-grade spaces is approximately 0.72 spaces per 1,000 square feet of the total gross square footage.

Vehicular

Vehicular access to the Site is being analyzed under two separate conditions, consisting of the “One-Way Pair Build Condition” and the “East Canton Build Condition". Further details related to these proposed Site access conditions are provided under Transportation Section 2.4.1.

1.3.3.4 Open Space and Landscaping

The Project design includes approximately one acre of new pedestrian-friendly public open space, known as Albany Green. The overall open space plan represents 45% 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 (See Figure 1-16, Preliminary Landscape Plan). The combination of these three types of landscape within Albany Green will allow for a variety of active and passive uses for employees, neighborhood residents and visitors alike. 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 streets and sidewalks will also be upgraded to provide safe pedestrian corridors to surrounding transit locations and the regional South Bay Harbor Trail, enhancing the quality of life in this area of the South End. The Site design incorporates sustainable landscape practices specific to runoff and drainage, planting selections, and materials sourcing.

1.4 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 that will attract new businesses and generate 4,000 – 7,000 permanent commercial and research jobs across a broad spectrum of income levels for the City's residents. Additionally, the Project will create over 2,000 construction jobs, which would represent over $400,000,000 in wages. The Project, which will be an investment of over $1 billion by the Proponent in this neighborhood, will also generate millions of new real estate tax dollars for the City.

- Expanding the vibrancy of the South End neighborhood across Albany Street through transforming the former industrial 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 park.

- Creation of Albany Green, a 1+ acre park with publicly accessible open space, gardens and outdoor seating areas surrounding 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;

- 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.

- Contribution to the Neighborhood Housing Trust, Neighborhood Jobs Trust, and equivalent onsite programs for over $10M of value.

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

1.5 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) review under Article 80C of the Code. As part of the PDA approval process, the Proponent will seek 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 318 feet, which is inclusive of the open and enclosed mechanical penthouse (See Figure 1-17). The project massing took into consideration the existing urban fabric, transportation easements at the east and west sides of the Site, the 50' utility easement, 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 one story. The lost square footage was then shifted onto the rear of the Site, mainly increasing the height of Building C by 80', 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 lot coverage of 80 percent. The Project is anticipated to have an overall FAR of approximately 6.5 and a lot coverage of less than 80%.

The proposed PDA will also address the Project's parking and mix of uses. Notably, the Project will comply with the applicable affordability requirements for non-residential uses for a PDA in the EDA South. Additionally, the Project's Site Plan and design achieve the objectives established under Article 64 (Section 64-1) of the Code.

1.6 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, 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 1-2 Anticipated Project Permits and Approvals

Agency	Permit/Approval
Local	
Boston Planning and Development Agency (BPDA)	• Article 80B Large Project Review • Cooperation Agreement • Certification of Compliance with Article 80B • Certification of Consistency with Article 80C • Development Impact Project Agreement
Boston Civic Design Commission	• Recommendation to the BPDA Board
Boston Zoning Commission	• Planned Development Area Development Plan Approval
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 • Groundwater Conservation Overlay District review/conditional use permit • 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 for a change of use of landlocked tidelands
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

1.7 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
- Impact Advisory Group (IAG) – September 7, 2017

1.8 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 during the Fall of 2018 with completion of buildings A or B by late 2019/early 2020, and will include the park and roads necessary to support the Project. Subsequent buildings will also require approximately 20 months to complete, which depending on demand, could also include multiple buildings per phase.

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

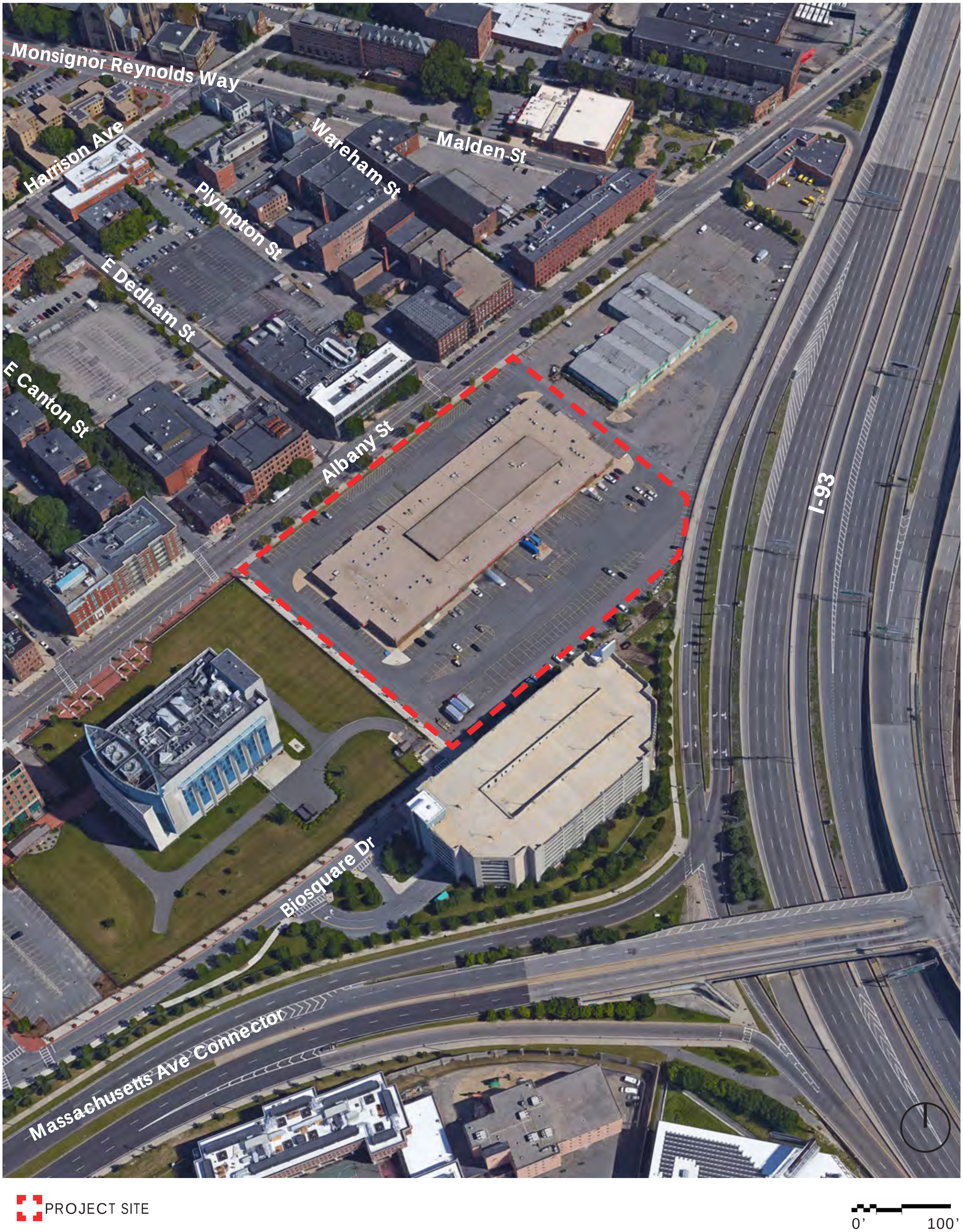
MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 1-2
Aerial View of Existing Site

Basemap Source: Bing



THE ABBEY GROUP

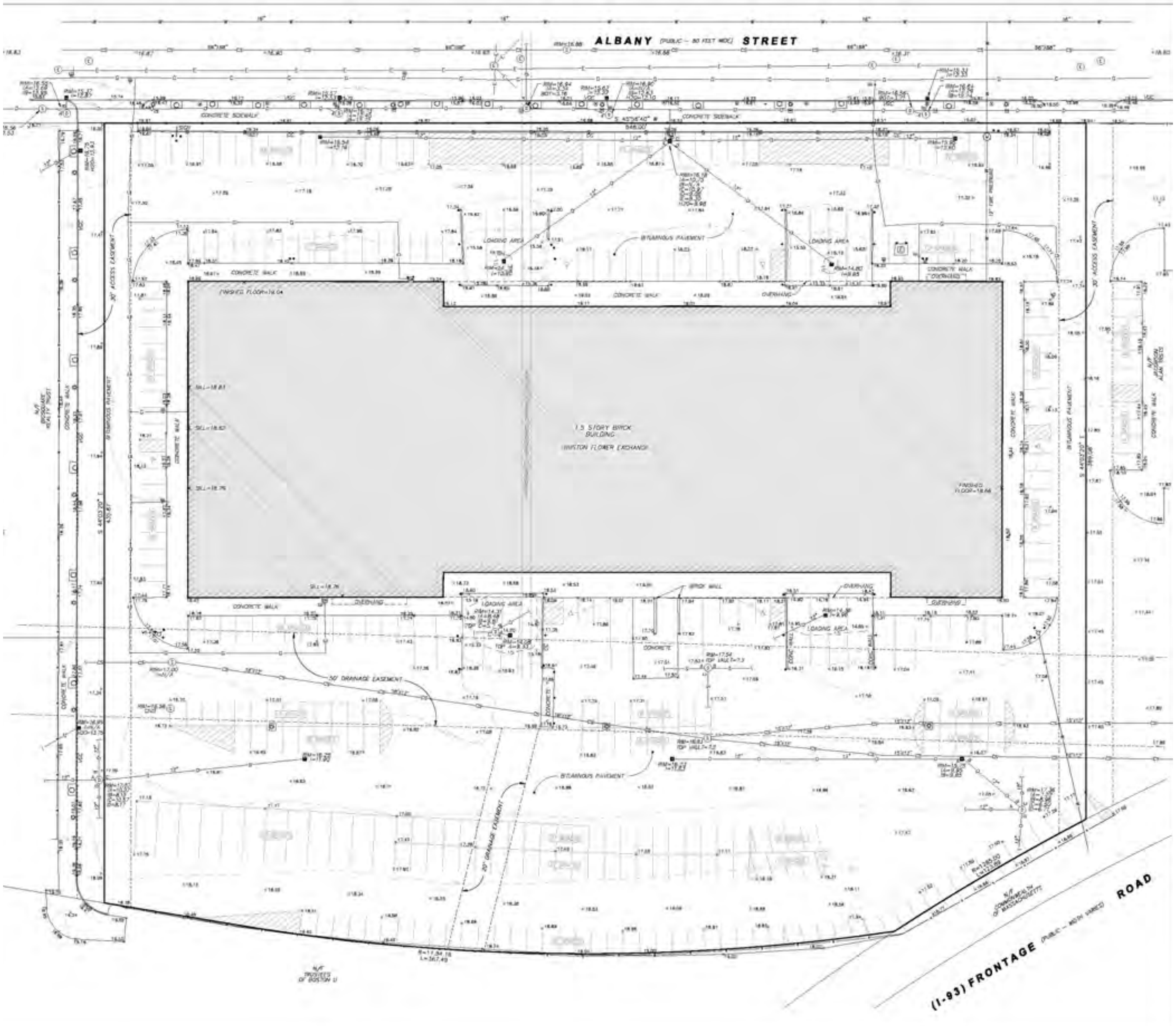
MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 1-3
Oblique View of Existing Site

Basemap Source: Google Earth



THE ABBEY GROUP

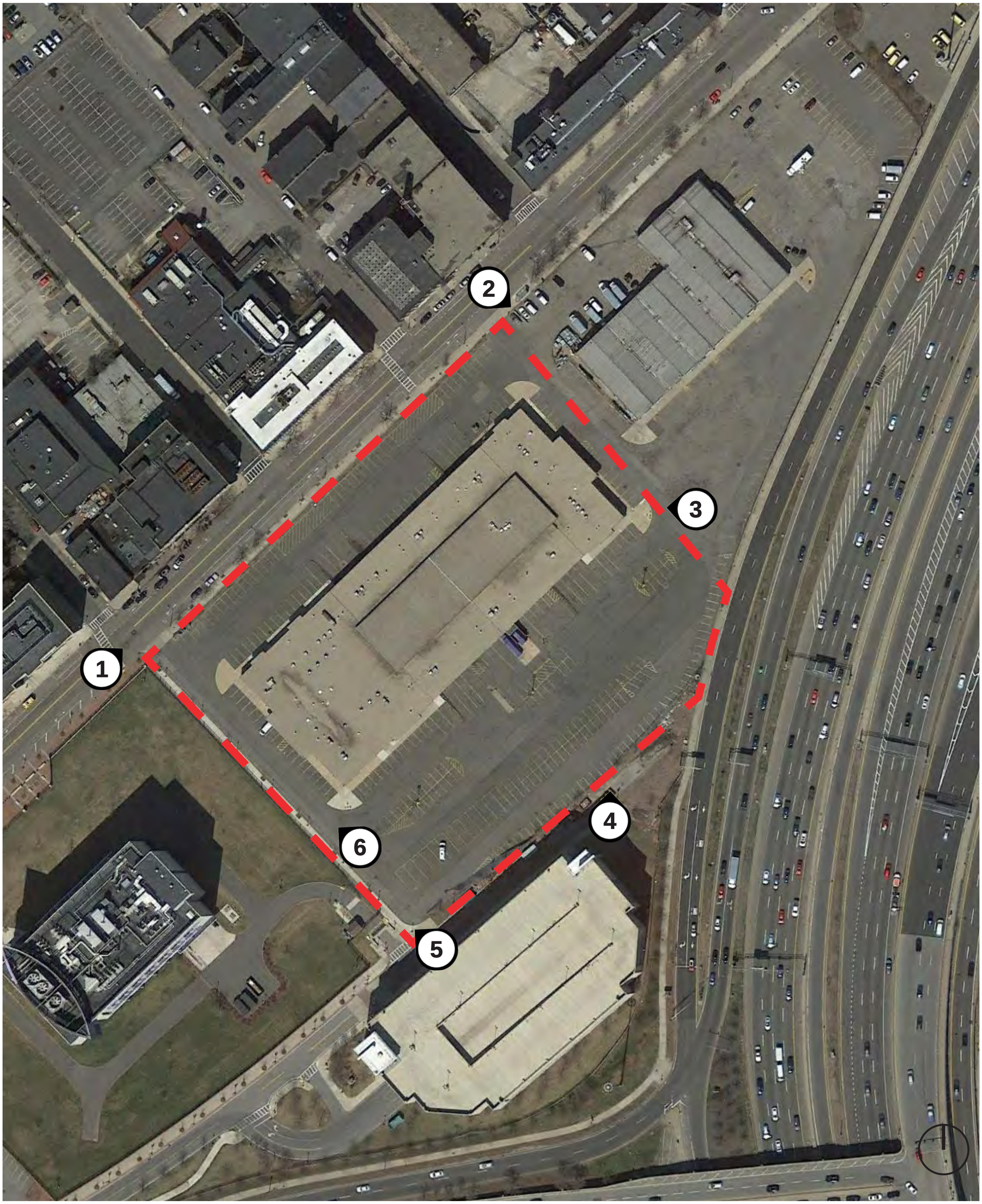
MICHAEL VAN VALKENBURGH ASSOCIATES INC

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

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 1-6
Existing Conditions Photographs

Source: Stantec

Photograph 3: View of site looking west

Photograph 4: View of the site looking north

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

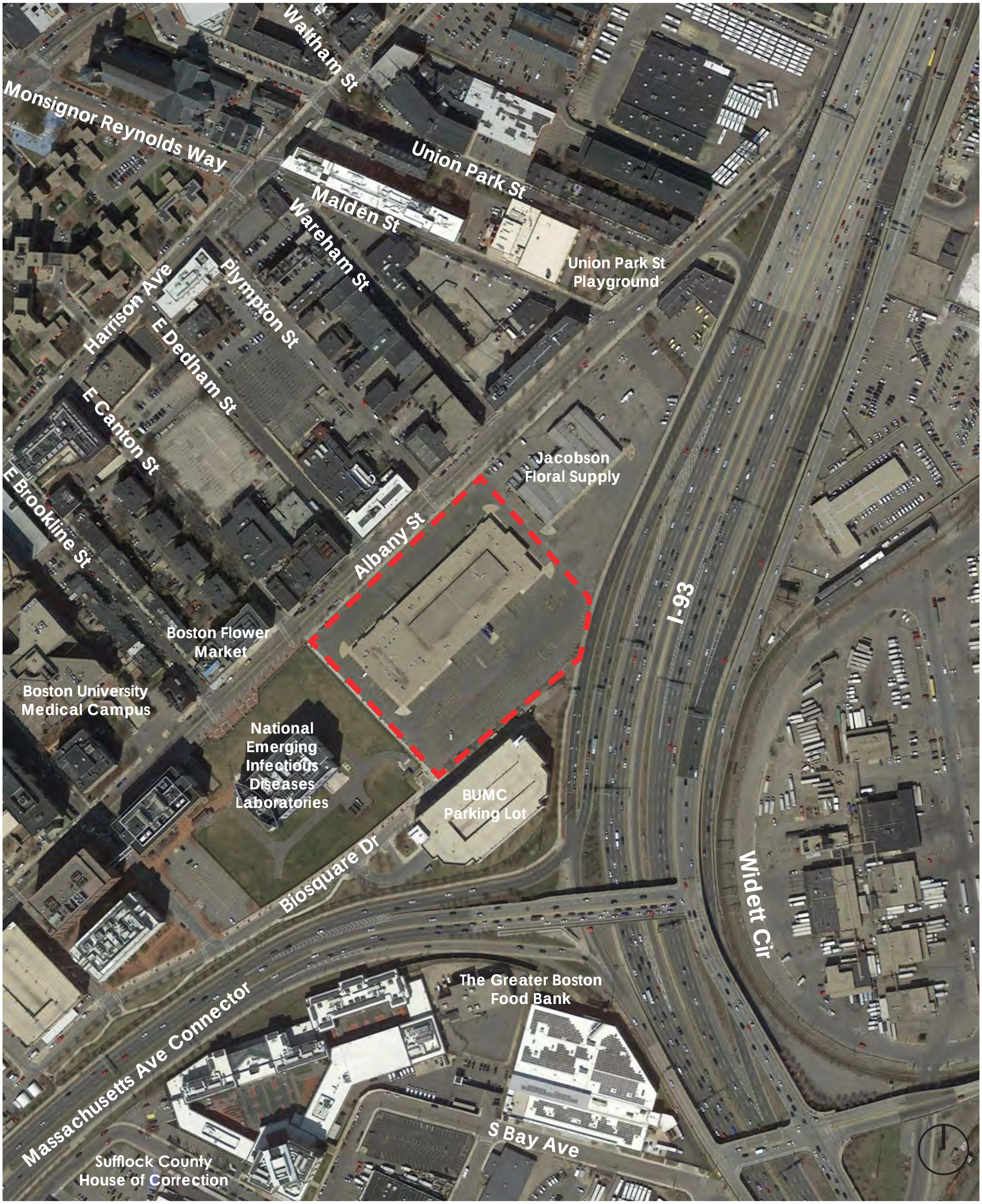
Stantec

EXCHANGE SOUTH END

Figure 1-7
Existing Conditions Photographs
Source: Stantec

Photograph 5: View of site looking northwest with skyline

Photograph 6: View of site looking northwest



PROJECT SITE

0' 200'

THE ABBEY GROUP

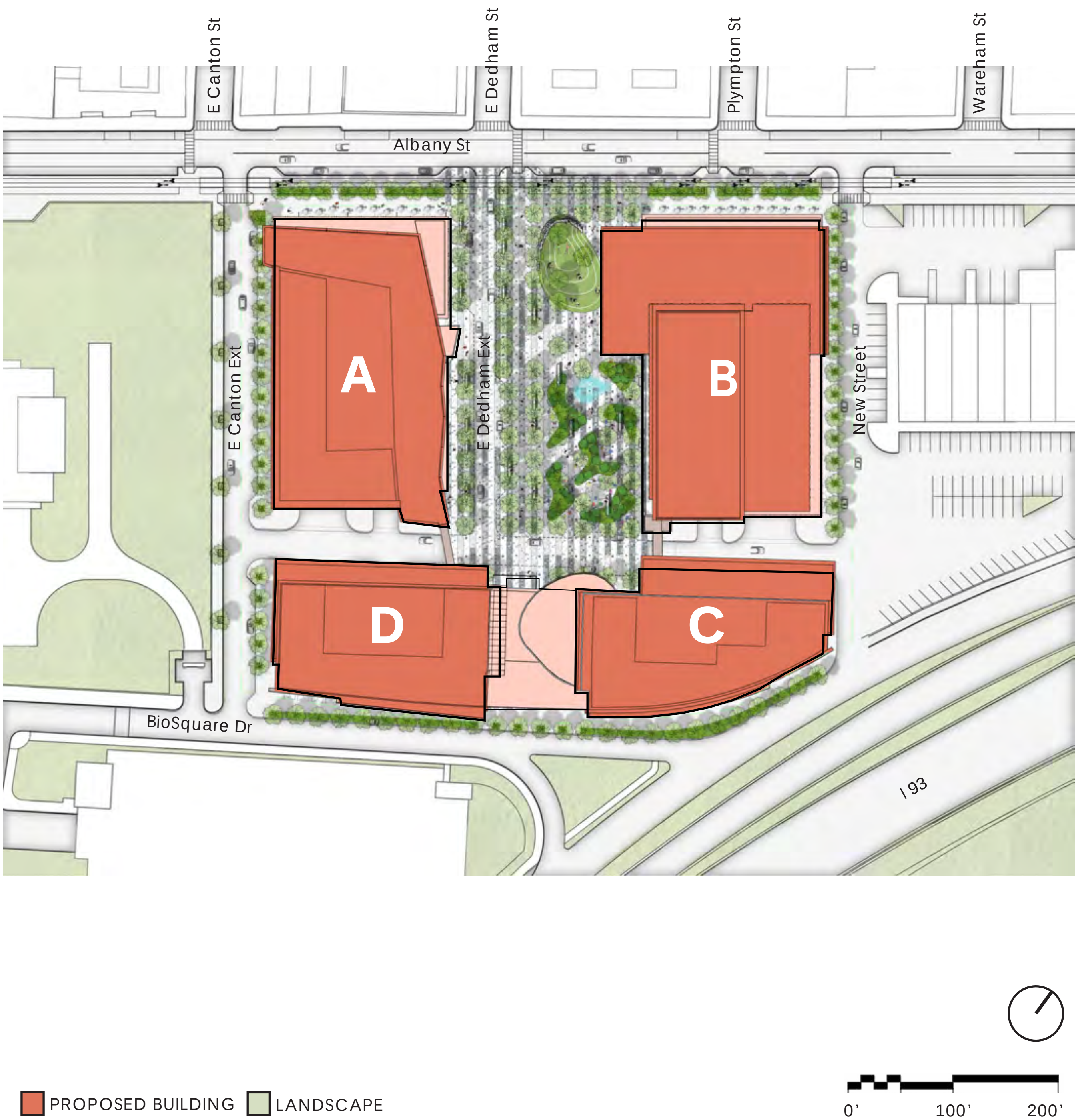
MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 1-9
Neighborhood Context

Basemap Source: Google Earth



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 1-10
Project Site Plan

Source: Stantec

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

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 1-14

Perspective from I-93 Looking South

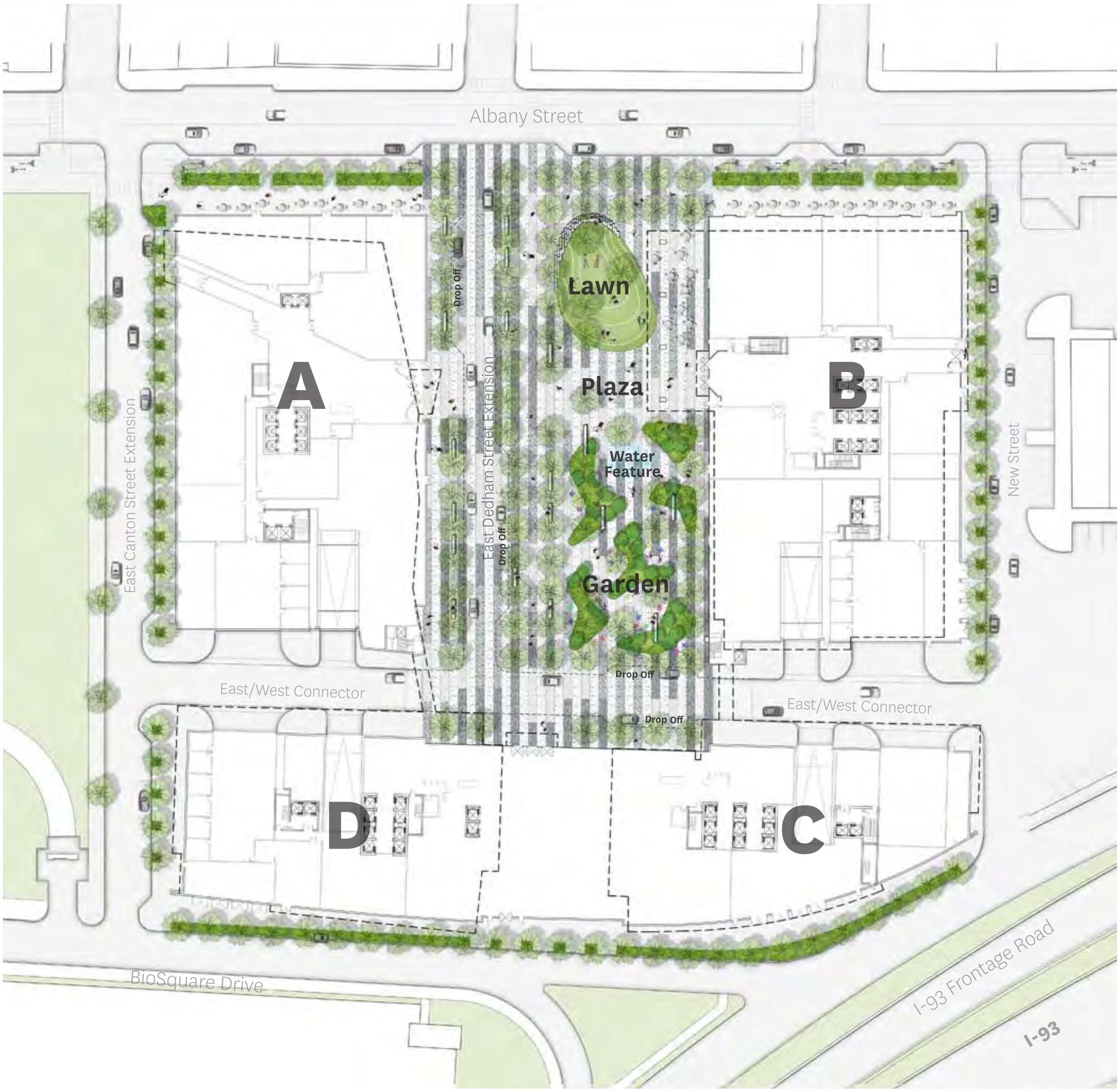
Source: Stantec

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 1-15
Typical Upper Floor Plan

Source: Stantec



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 1-16
Preliminary Landscape Plan

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 BRA 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.

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 four buildings with approximately 1,481,350 square feet of office and laboratory space, approximately 42,500 square feet of retail space, and approximately 30,000 square feet of combined cultural, community, and innovation space. The breakdown of land uses and square footage by building is shown in Table 2-1. Below-grade parking will provide approximately 1,145 parking spaces. The parking will be located below each of the four buildings with access provided via driveways off Albany Street and BioSquare Drive.

Table 2-1 Development Program by Building

Land Use	Building A	Building B	Building C	Building D	Total
Office	-	161,300 sf	298,360 sf	180,880 sf	*640,540 sf*
Laboratory	192,855 sf	284,030 sf	195,970 sf	167,955 sf	*840,810 sf*
Retail	20,500 sf	22,000 sf	-	-	*42,500 sf*
Civic	-	-	-	30,000 sf	*30,000 sf*
BOH	9,045 sf	7,570 sf	4,170 sf	4,390 sf	*25,175 sf*
Lobby	7,600 sf	5,800 sf	3,500 sf	3,500 sf	*20,400 sf*
Total Gross sf	***230,000 sf***	***480,700 sf***	***502,000 sf***	***386,725 sf***	***1,599,425 sf***

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 study area consists of the following thirteen intersections in the vicinity of the Project Site, 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); and
- Albany Street/Massachusetts Avenue (signalized).

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

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. 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.

The Build (2024) Condition analysis includes a net increase in traffic volume due to the addition of Project-generated trip estimates to the traffic volumes developed as part of the No-Build (2024) Condition analysis. 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 is a pair of one-way, two lane roadways adjacent to the east side of the Project Site that runs in a predominately north-south direction along I-93 near the South End. I-93 Frontage Road is 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 provided on both sides of Albany Street.

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, 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, 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.

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 an exclusive left-turn lane and a through lane with bicycle sharrows. 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 bike lane, and an exclusive right-turn lane. The Albany Street southbound approach consists of an exclusive left-turn lane, a through lane, and a bike lane. 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.

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 2-2.

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

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 parking spaces, residential parking spaces, 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 2-2.

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-3
Off-Street Parking

Source: Howard Stein Hudson

Table 2-2 Development Program by Building

Map ID	Facility	Capacity	Map ID	Facility	Capacity
Parking Garages			**Parking Lots**		
A	610 Albany Street	1,400	1	BioSquare	80
B	710 Albany Street	1,033	2	D Lot	22
C	Doctors Office Building	230	3	Naval Blood Lot	7
D	700 Harrison Avenue	75	4	Gambro	18
E	Crosstown	1,250	5	Perkin Elmer	156
F	GTI Properties	130	6	Stoughton Street Lot	70
			7	Yawkey HP Lot	30
			8	Menino Valet Lot	73
			9	Power Plant	95
Parking Garages Subtotal		**4,118**	**Parking Lots Subtotal**		**551**
Total Parking Spaces			**4,669**		

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.

2.2.4 Existing Traffic Data

Traffic volume data was collected at the seven of the thirteen study area intersections on March 1, 2017. Traffic volume data at the remaining six intersections was collected on November 19, 2015. 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.

2.2.4.1 Seasonal Adjustment

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.

2.2.5 Existing Vehicular Traffic Volumes

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, a cycle path that runs along Melnea Cass Boulevard parallels the eastern side of the Project Site.

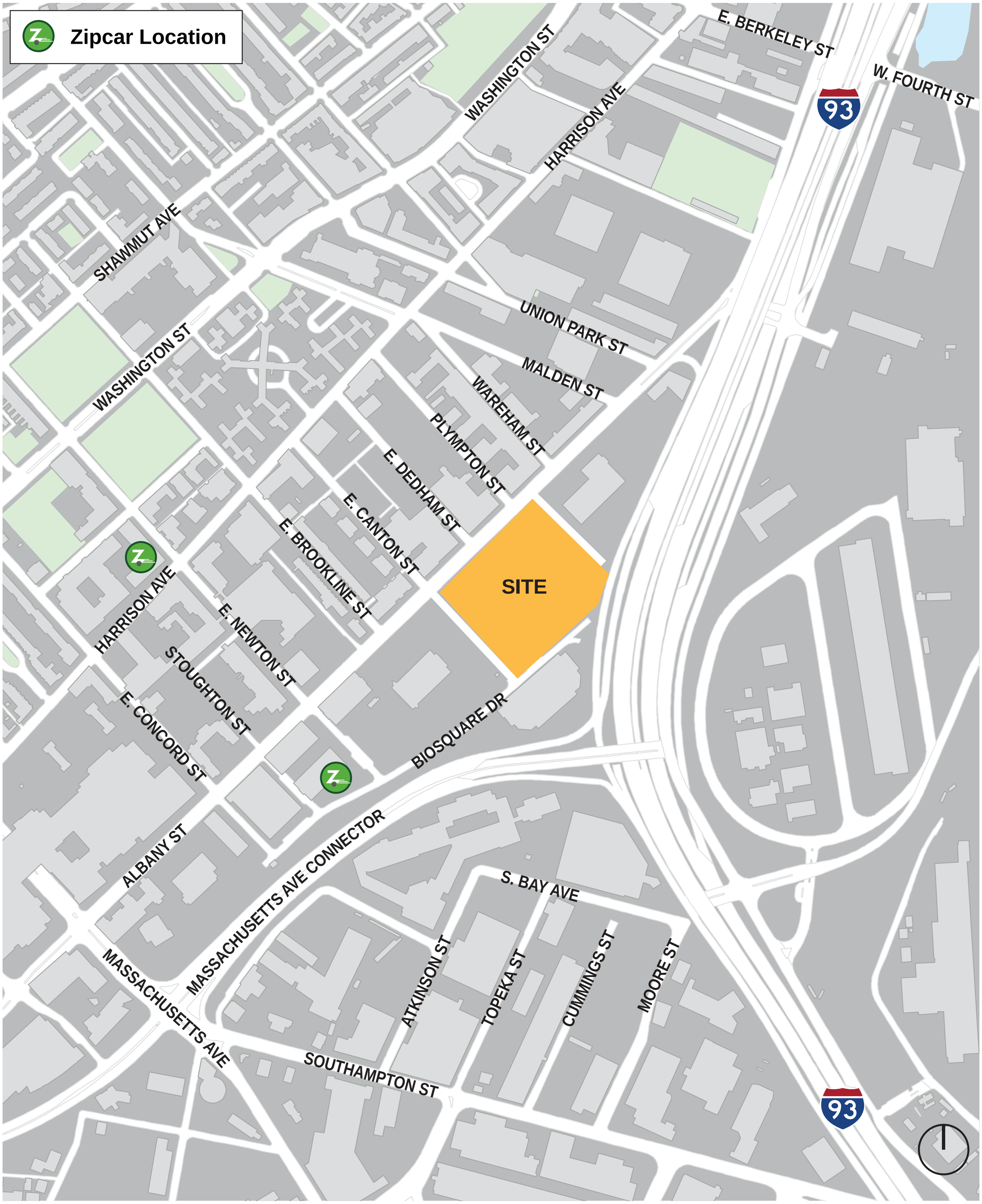
Bicycle counts were conducted concurrent with the vehicular TMCs and are presented in Figure 2-7. As shown in the figure, bicycle volumes are heaviest along Albany Street during the peak periods. Bicycle volumes on the figure may not balance due to the turning movement counts being done on different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

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

In general, sidewalks are provided along all roadways and are in good condition with the exception of the block between Plympton Street and Wareham Street west of Albany Street. Crosswalks are provided at all study area intersections. Pedestrian signal equipment is provided at all five of the signalized study area intersections.

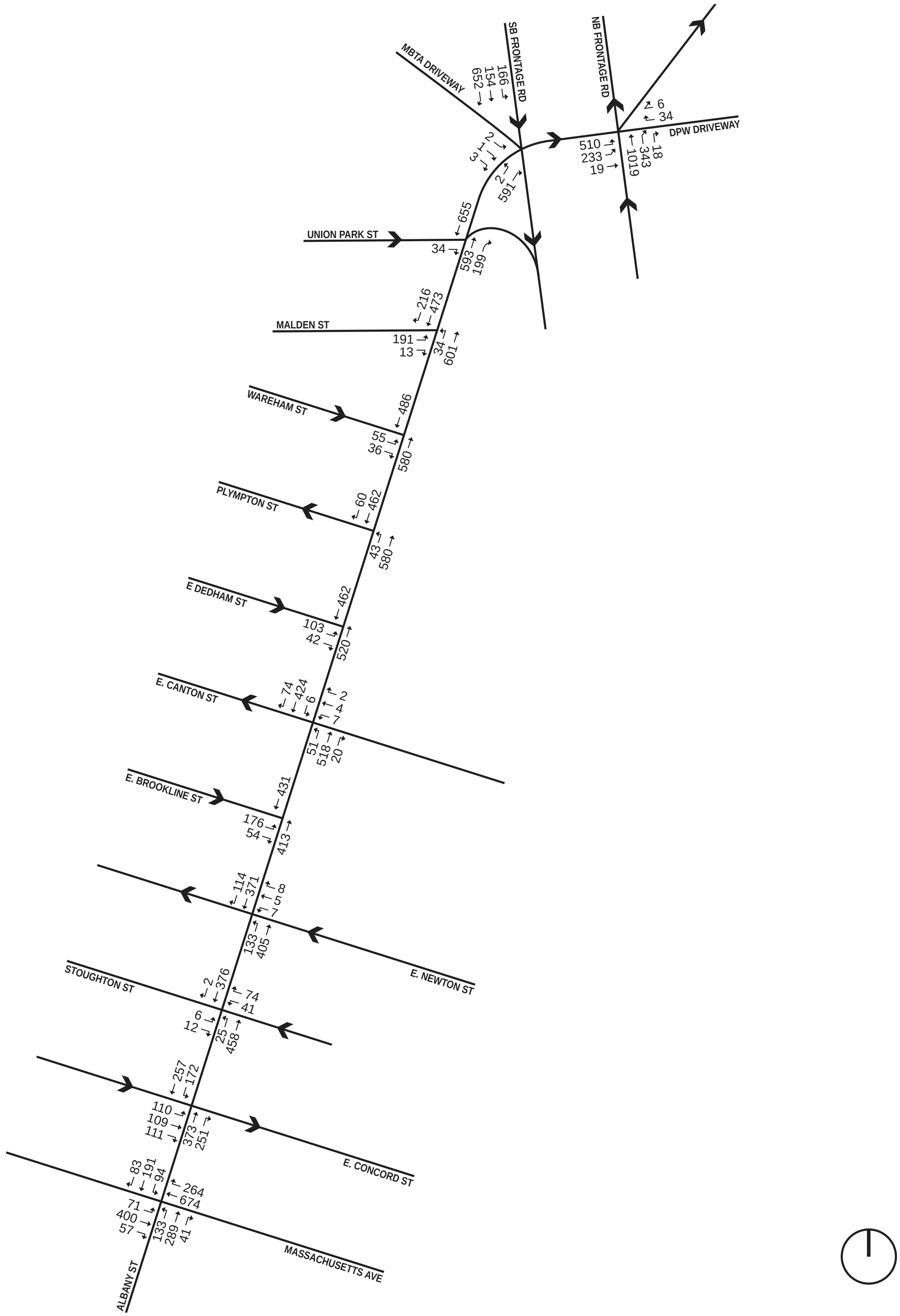


THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-4
Car Sharing Services

Source: Howard Stein Hudson



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

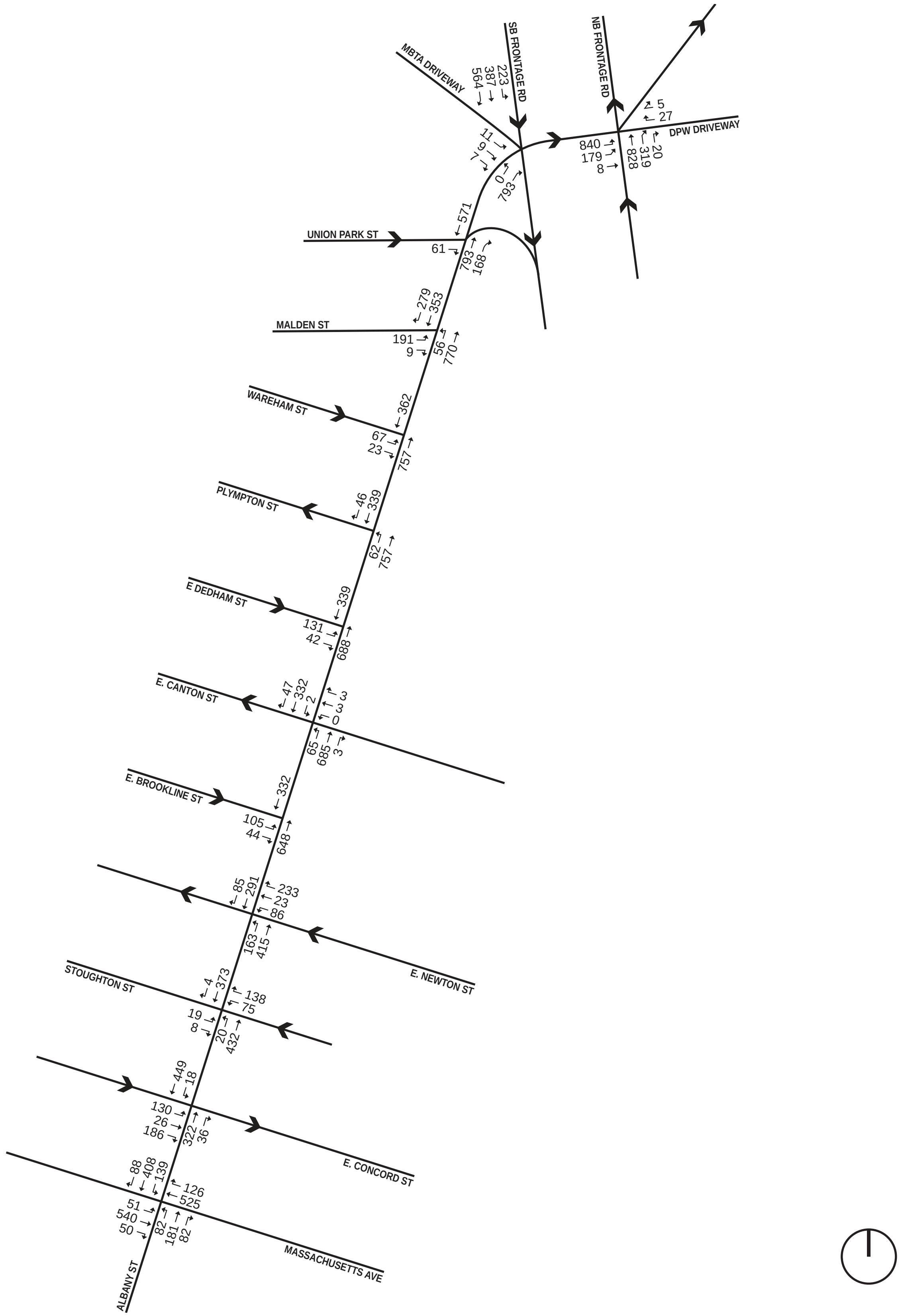
Stantec

EXCHANGE SOUTH END

Figure 2-5

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

Source: Howard Stein Hudson

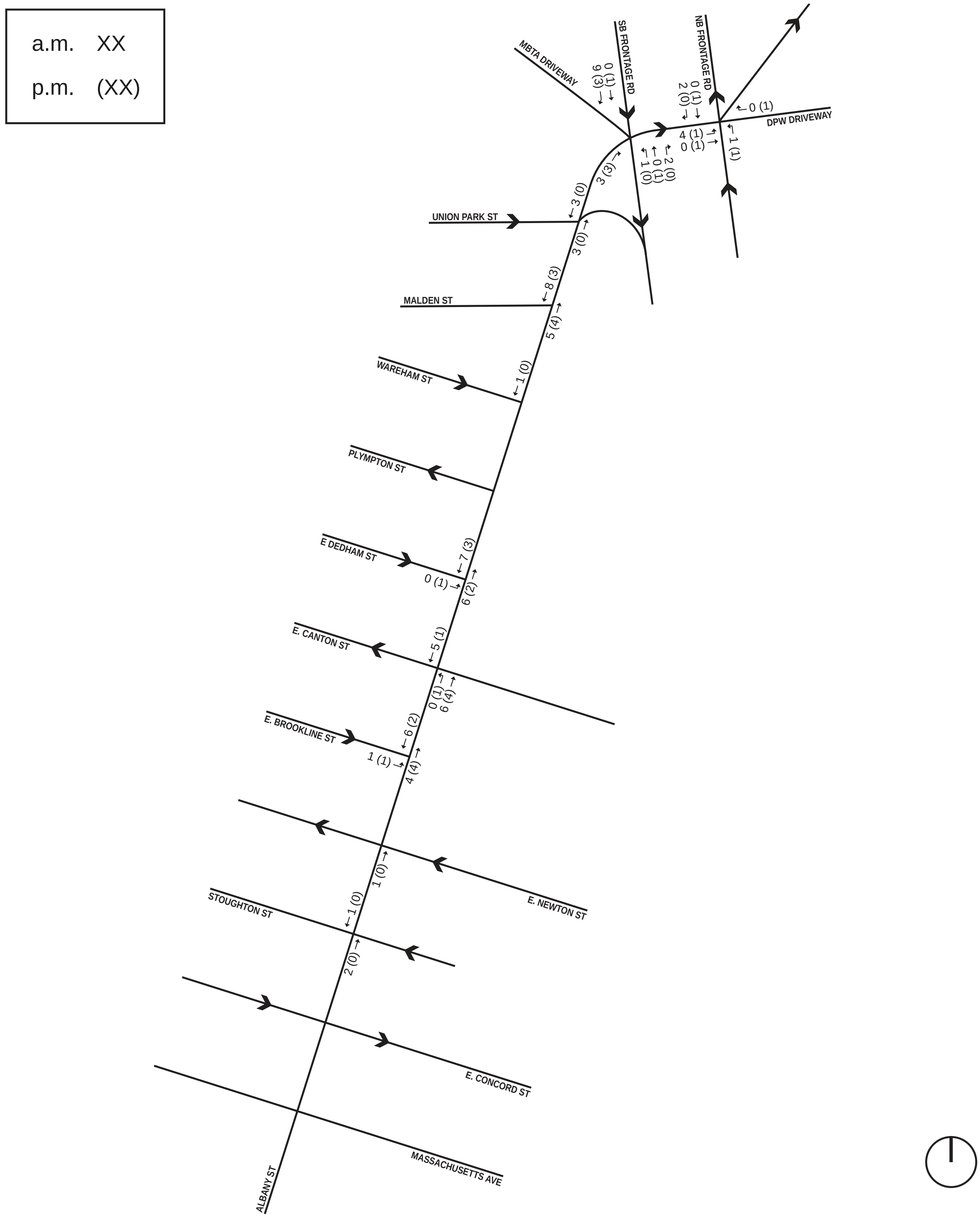


THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-6
Existing (2017) Condition Traffic Volumes, Weekday p.m. Peak Hour

Source: Howard Stein Hudson



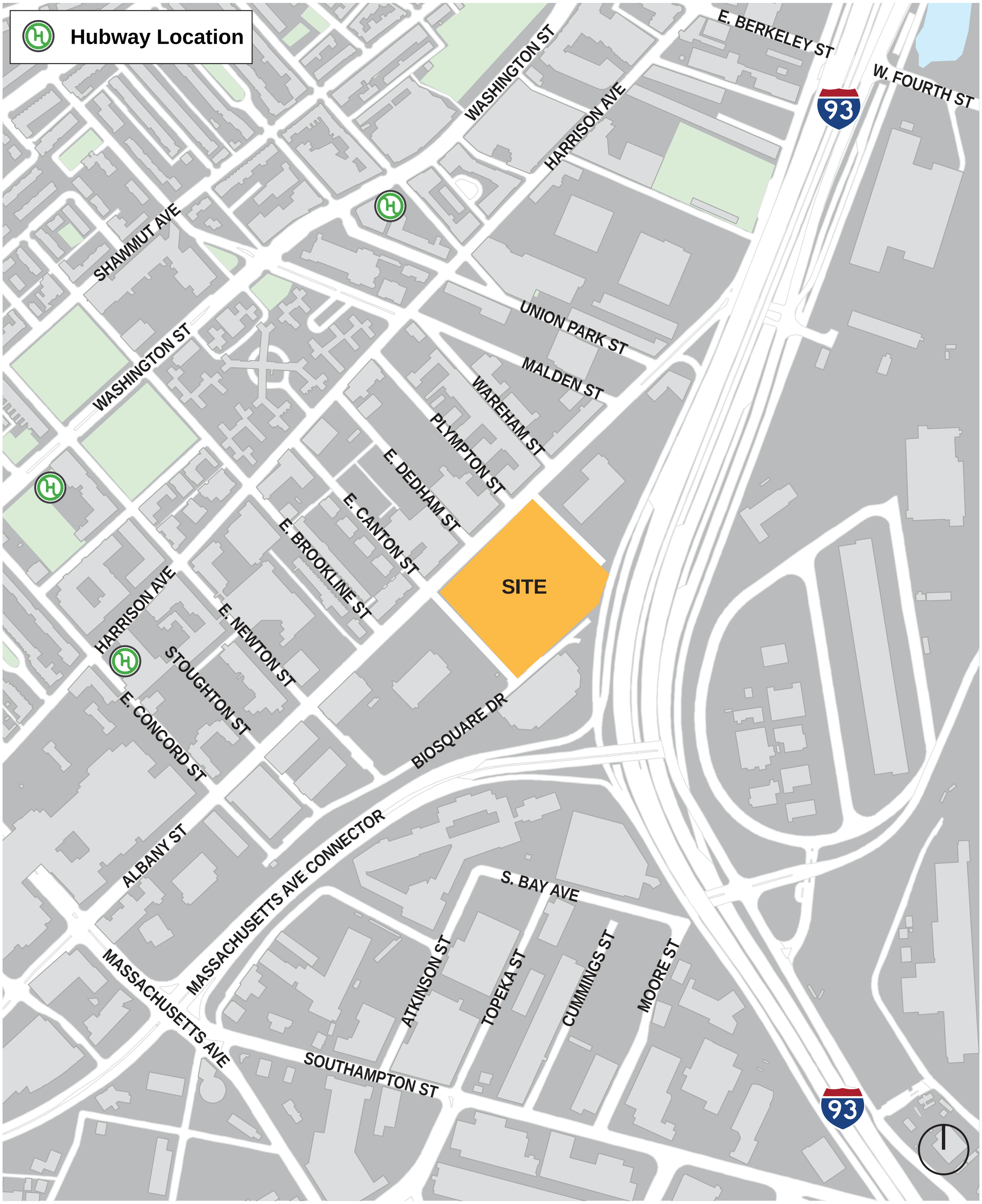
THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-7

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

Source: Howard Stein Hudson



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 2-8
Bicycle Sharing Locations

Source: Howard Stein Hudson

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 2-3 provides a brief summary of all routes.

Table 2-3 Existing Public Transportation Service Summary

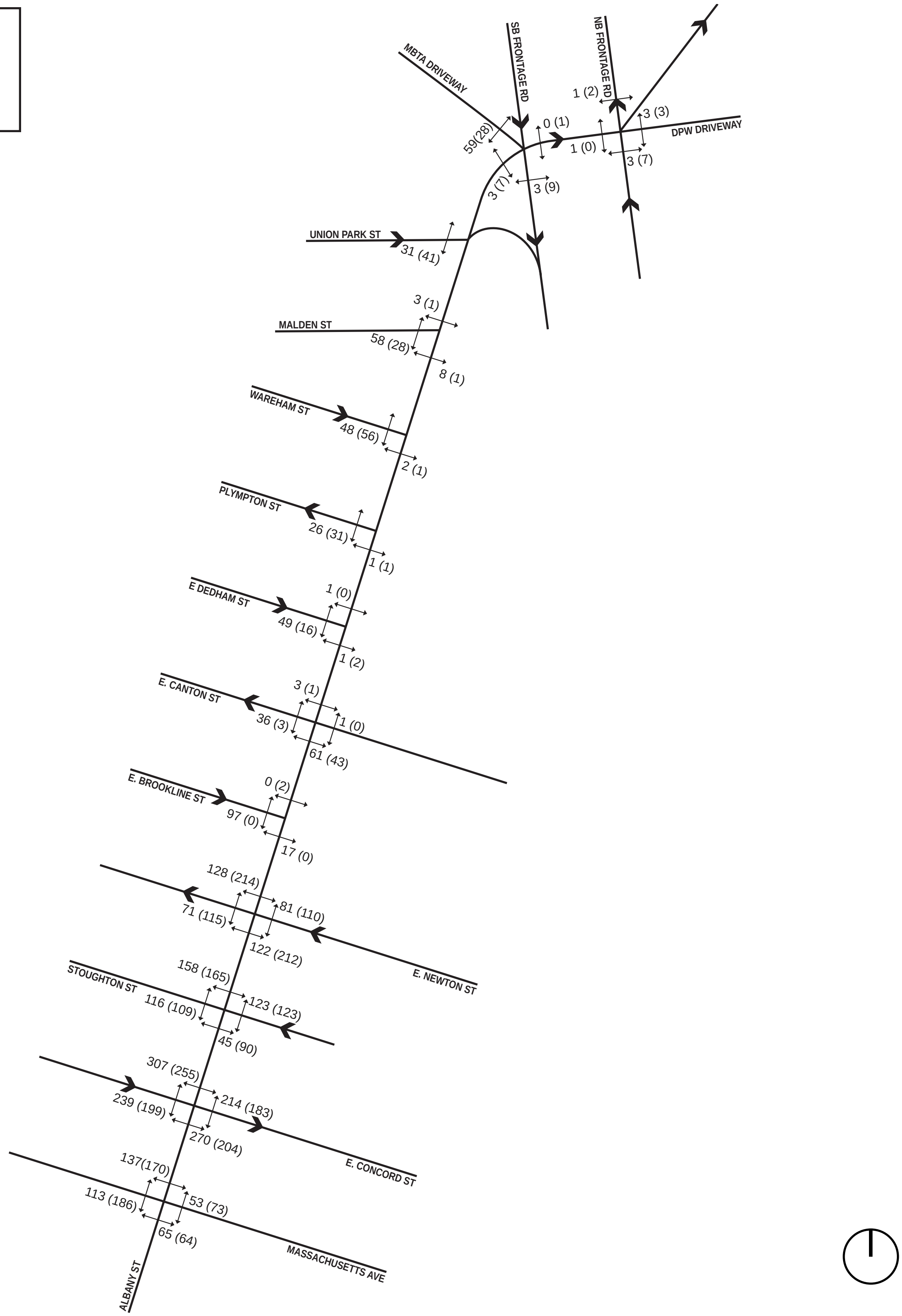
Transit Service	***Description***	***Rush-hour Headway (in minutes)****
Bus Routes		
SL4	Dudley Station – South Station at Essex St via Washington St	8
SL5	Dudley Station – Downtown Crossing at Temple Place via Washington St	8
CT1	Central Sq, Cambridge - B.U. Medical Center/Boston Medical Center via 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 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. Table 2-4 shows the existing bus route connections to the subway lines, along with the capacity of each bus. The data for the transit analysis is included in Appendix C.

a.m. XX
p.m. (XX)



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 2-9

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

Source: Howard Stein Hudson

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-10
Public Tansportation

Source: Howard Stein Hudson

Table 2-4 Existing Public Transportation Capacity Summary

Bus Route	*Description*	*Peak Period*	*Bus Capacity*[1]	Average Available Capacity (Site)[2]	Average Available Capacity (Station)[2]	Average Available Capacity On Route[2]
10	From Back Bay Station	AM	55	45	38	38
10	To Back Bay Station	PM	55	41	37	38
8, 47	From Ruggles Station	AM	110	94	93	88
8, 47	To Ruggles Station	PM	110	89	94	91
47	From Broadway Station	AM	55	41	38	40
47	To Broadway Station	PM	55	34	33	33
10	From Andrew Station	AM	55	44	36	38
10	To Andrew Station	PM	55	43	35	37
SL4, SL5	From Downtown	AM	130	88	107	90
SL4, SL5	To Downtown	PM	130	69	90	75
SL4, SL5	From Dudley Square	AM	130	57	85	73
SL4, SL5	To Dudley Square	PM	130	57	75	56

1. 2014 MBTA Ridership and Service Statistics
2. 2016 MBTA APC Composite Data

As shown in the table above, the buses that connect major transit stations to the Project Site have ample capacity in the peak directions in both the a.m. and p.m. peak hours.

2.2.9 Existing (2017) Condition 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 2-5 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 2-5 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.

Table 2-6 and Table 2-7 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 2-6 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					
I-93 NB Frontage Road / Albany Street Connector / 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	D	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**	**24.3**	-	-	-
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	B	13.1	0.32	177	245
Albany St NB right	C	24.3	0.59	129	300
Albany St SB left	A	4.2	0.23	25	54
Albany St SB thru	A	3.6	0.19	39	80
Massachusetts Avenue / Albany Street	**C**	**30.6**	-	-	-
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	C	23.7	0.46	138	173
Mass. Ave WB right	A	9.0	0.30	54	96
Albany St NB left/thru | thru	E	55.0	0.80	173	218

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
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	39.6	0.29	94	105
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	32.9	0.18	-	16
Stoughton St WB left	E	44.1	0.39	-	42
Stoughton St WB right	C	23.3	0.35	-	38
Albany St NB left	A	8.9	0.03	-	2

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Albany St NB thru	A	0.0	0.29	-	0
Albany St SB thru/right	A	0.0	0.23	-	0

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 2-7 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					
I-93 NB Frontage Road / Albany Street Connector / 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**	**24.4**	-	-	-
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	9.1	0.27	23	106
Albany St NB thru	B	10.1	0.33	63	312
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**	**25.1**	-	-	-
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	B	17.8	0.33	121	266
Albany St NB right	B	19.0	0.10	13	m45

EXCHANGE SOUTH END

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Albany St SB left	A	2.8	0.03	4	m4
Albany St SB thru	A	7.3	0.35	189	162
Massachusetts Avenue / Albany Street	**C**	**30.3**	-	-	-
Mass. Ave EB left	B	19.3	0.14	20	52
Mass. Ave EB thru | thru| thru /right	B	18.2	0.24	94	147
Mass. Ave WB thru | thru	C	34.6	0.42	204	275
Mass. Ave WB right	C	23.1	0.14	62	134
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	38.9	0.48	108	137
Albany St SB thru | thru/right	C	23.1	0.40	171	161
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	2.3	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	-	-	-	-	-

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
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	E	38.7	0.24	-	22
Stoughton St WB left	F	50.7	0.52	-	63
Stoughton St WB right	D	27.7	0.49	-	64
Albany St NB left	A	9.0	0.02	-	2
Albany St NB thru	A	0.0	0.27	-	0
Albany St SB thru/right	A	0.0	0.24	-	0

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.

2.2.9.1 Existing (2017) Condition Traffic Analysis Summary

As shown in Table 2-6 and Table 2-7, 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 Albany Street southbound 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 both the a.m. and p.m. peak hours.

- 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 Albany Street northbound approach during the a.m. peak hour and the Massachusetts Avenue westbound 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** eastbound approach operates at LOS E during the p.m. peak hour. The Stoughton Street westbound left-turn lane operates at LOS E during the a.m. peak hour and LOS F during the p.m. peak hour.

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.

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.

Based on this review, it was determined that an approved project will connect BioSquare Drive to the I-93 Southbound Frontage Road. The Southbound Frontage Road connection will relocate trips off Albany Street and provide better direct access to the Boston University Medical Center as well as the Project Site from the regional highways.

Another proposed project in the area is a connection between BioSquare Drive and the Massachusetts Avenue Connector. This connection will reroute trips coming off I-93 to Albany Street and directly to BioSquare Drive.

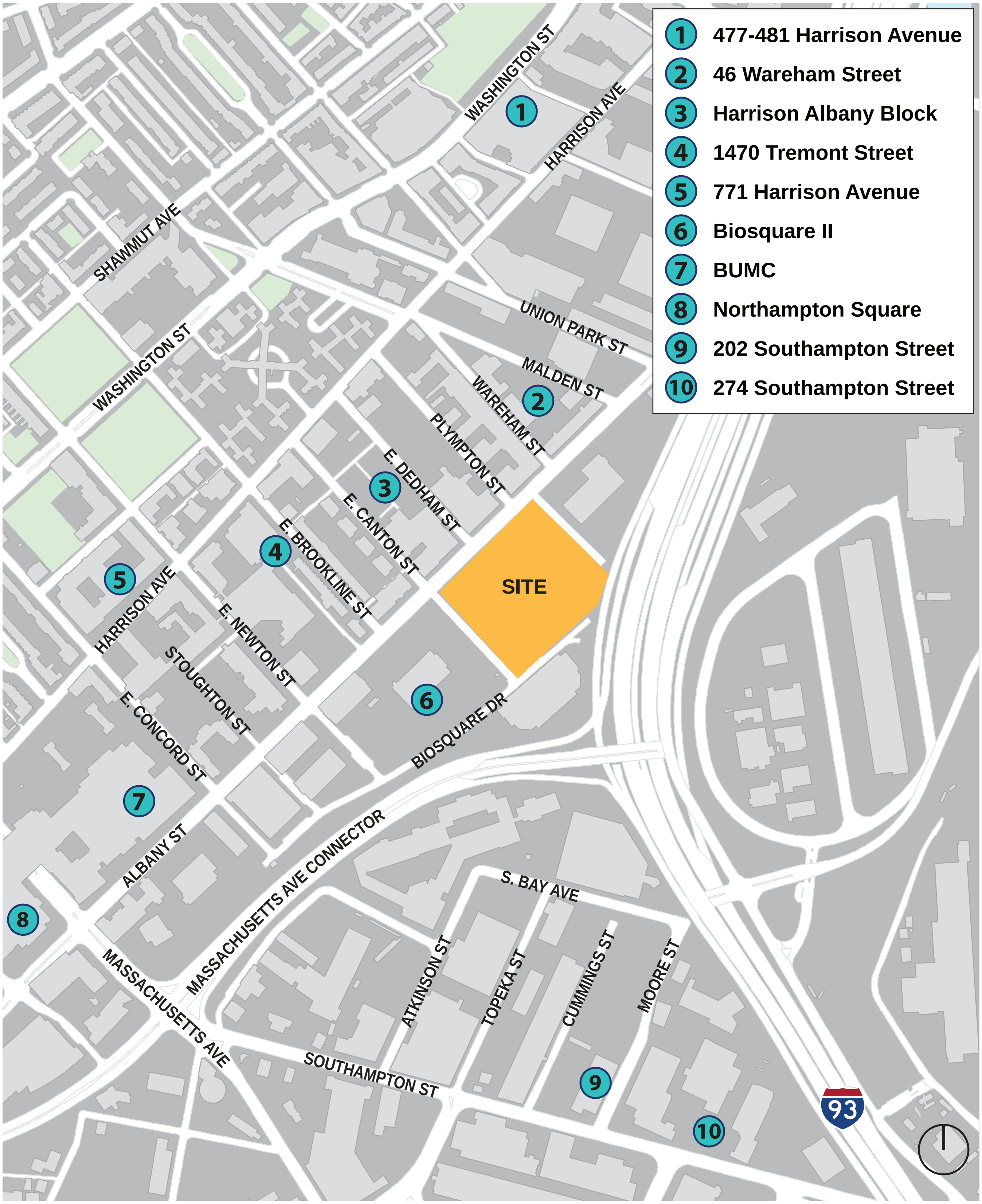
Finally, the intersection of Albany Street and Malden Street is going to be signalized by the City at the end of summer 2017. Design drawings and signal timings have been obtained from the City and have been incorporated into the future condition analysis.

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.

2.3.5 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 2-8 and Table 2-9 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.

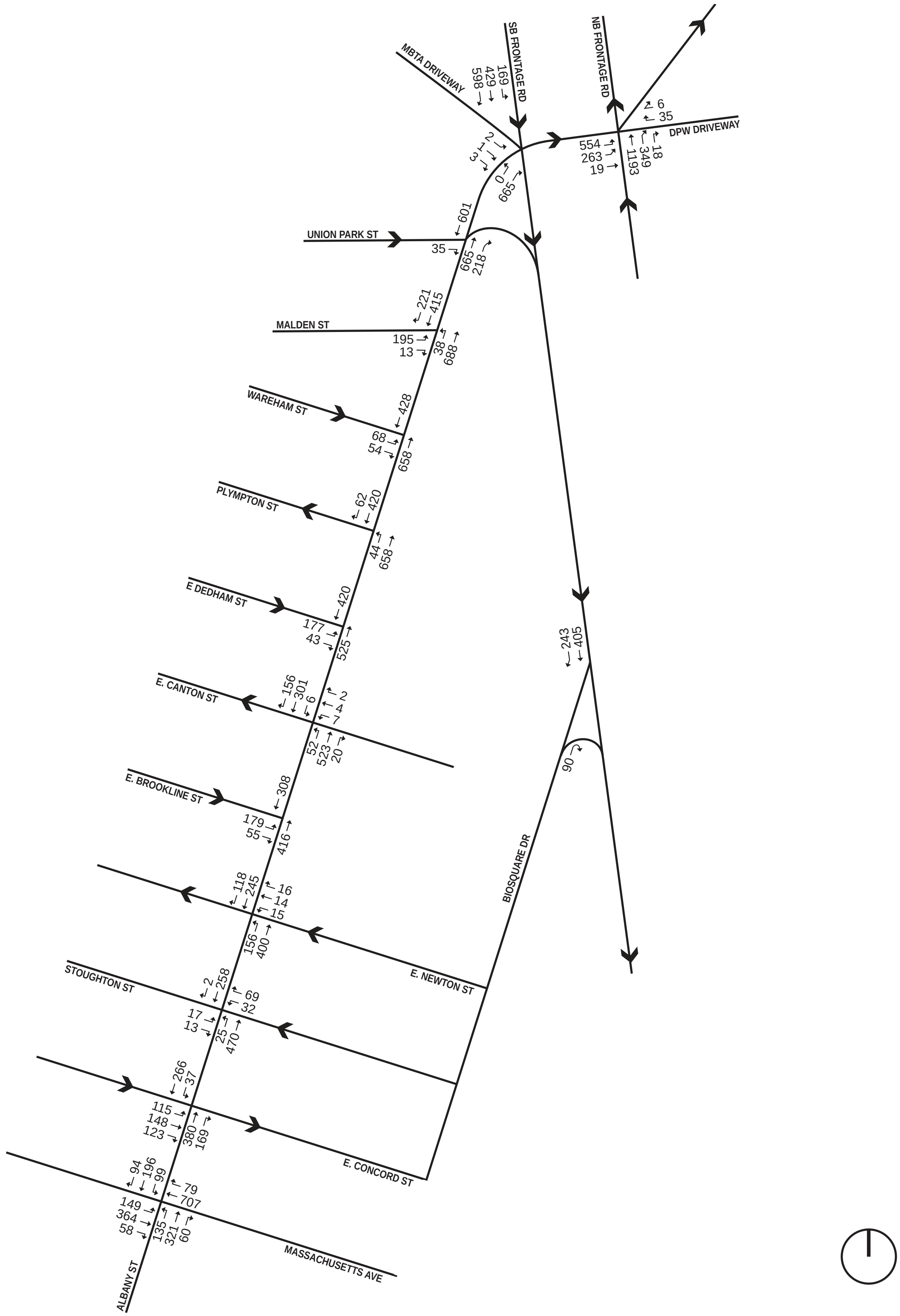


THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-11
Background Projects

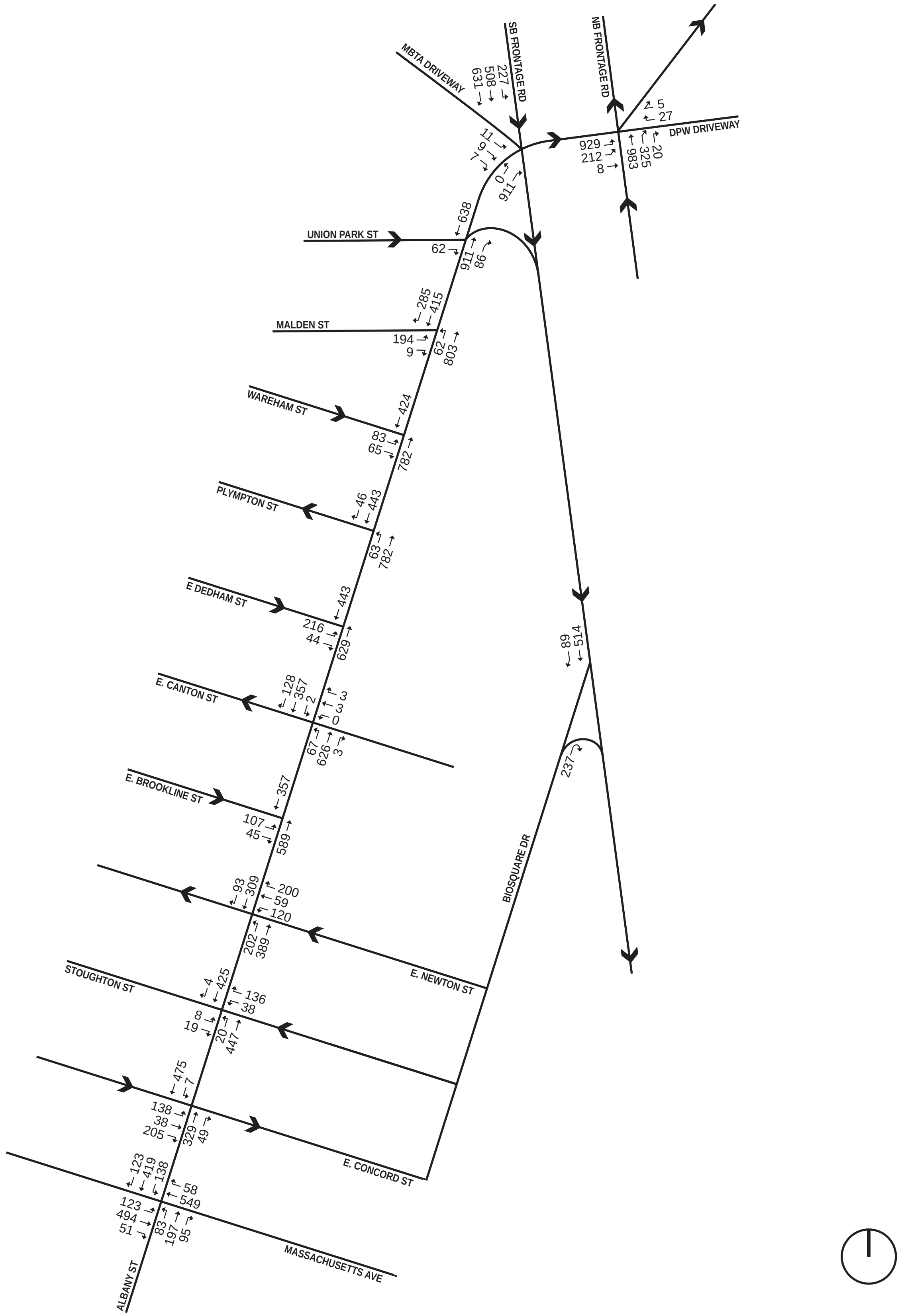
Source: Howard Stein Hudson



THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-12
No-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 2-13
No-Build (2024) Condition Traffic Volumes, Weekday p.m. Peak Hour
Source: Howard Stein Hudson

Table 2-8 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					
I-93 NB Frontage Road / Albany Street Connector / DPW Driveway	**C**	**30.5**	-	-	-
Albany St Connector EB left	C	33.2	0.83	191	m167
Albany St Connector EB left/bear left	D	35.9	0.85	194	m175
Albany St Connector EB thru	B	12.7	0.03	4	m8
DPW Driveway WB right/hard right	A	7.4	0.24	0	16
NB Frontage Rd NB thru | thru | thru/right	C	29.2	0.77	409	506
I-93 SB Frontage Rd / Albany St / MBTA Dr	**C**	**24.0**	-	-	-
MBTA Driveway EB thru/right	D	40.5	0.14	4	12
SB Frontage Rd SB left	A	5.1	0.21	0	56
SB Frontage Rd SB left/thru | thru	B	14.4	0.31	82	154
SB Frontage Rd SB bear right/right	A	2.0	0.42	0	179
Albany St NEB right | right/hard right	D	46.1	0.93	302	#298
Malden Street / Albany Street	**B**	**15.7**	-	-	-
Malden St EB left/right	C	26.8	0.60	72	118
Albany St NB left/thru | thru	B	10.8	0.45	117	166
Albany St SB thru/right	B	17.7	0.74	177	#552
East Newton Street / Albany Street	**A**	**5.4**	-	-	-
E. Newton St WB left/thru	E	58.9	0.27	23	55
E. Newton St WB right	E	55.6	0.15	13	37
Albany St NB left	A	2.2	0.18	5	53
Albany St NB thru	A	2.2	0.25	12	117
Albany St SB thru	A	3.7	0.17	58	m72
Albany St SB right	A	3.6	0.13	26	m33
East Concord Street / Albany Street	**C**	**24.5**	-	-	-
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	A	8.6	0.33	63	171
Albany St NB right	A	9.1	0.26	27	m86
Albany St SB left	A	2.5	0.05	3	9
Albany St SB thru	A	2.5	0.20	23	45
Massachusetts Avenue / Albany Street	**D**	**37.7**	-	-	-
Mass. Ave EB left	B	19.9	0.47	58	104

Intersection/Approach	***LOS***	***Delay (s)***	***V/C Ratio***	***50th Percentile Queue (ft)***	***95th Percentile Queue (ft)***
Mass. Ave EB thru | thru| thru /right	B	14.0	0.17	60	87
Mass. Ave WB thru | thru	D	43.9	0.49	291	357
Mass. Ave WB right	C	27.6	0.09	40	102
Albany St NB left/thru | thru	D	54.9	0.82	186	238
Albany St NB right	D	35.6	0.17	39	73
Albany St SB left	F	80.7	0.78	79	#177
Albany St SB thru | thru/right	C	27.7	0.30	102	137
Unsignalized Intersections					
Union Park Street / Albany Street	-	-	-	-	-
Union Park St EB right	C	15.7	0.10	-	8
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	D	34.9	0.53	-	72
Albany St NB thru	A	0.0	0.41	-	0
Albany St SB thru	A	0.0	0.27	-	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	0.90	-	200
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	27.8	0.08	-	7
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	47.6	0.79	-	160
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	38.9	0.23	-	21
Stoughton St WB left	D	31.9	0.21	-	19
Stoughton St WB right	C	21.2	0.25	-	24
Albany St NB left	A	8.5	0.03	-	2

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Albany St NB thru	A	0.0	0.29	-	0
Albany St SB thru/right	A	0.0	0.16	-	0

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 2-9 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					
I-93 NB Frontage Road / Albany Street Connector / DPW Driveway	**E**	**58.3**	-	-	-
Albany St Connector EB left	F	>80.0	0.96	483	m#624
Albany St Connector EB left/bear left	F	>80.0	0.99	490	m#647
Albany St Connector EB thru	A	9.4	0.01	3	m3
DPW Driveway WB right/hard right	A	1.5	0.16	0	1
NB Frontage Rd NB thru | thru | thru/right	C	29.3	0.72	316	378
I-93 SB Frontage Rd / Albany St / MBTA Dr	**D**	**44.1**	-	-	-
MBTA Driveway EB thru/right	E	56.6	0.52	25	35
SB Frontage Rd SB left	A	6.5	0.35	0	64
SB Frontage Rd SB left/thru | thru	C	21.7	0.48	132	185
SB Frontage Rd SB bear right/right	A	4.6	0.49	116	182
Albany St NEB right | right/hard right	F	>80.0	0.91	389	#257
Malden Street/ Albany Street	**B**	**19.5**	-	-	-
Malden St EB left/right	C	23.8	0.57	63	106
Albany St NB left/thru | thru	B	14.2	0.61	85	#258
Albany St SB thru/right	C	24.6	0.81	278	#899
East Newton Street / Albany Street	**C**	**25.6**	-	-	-
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	9.0	0.31	48	124
Albany St NB thru	A	9.6	0.30	94	234
Albany St SB thru	B	17.3	0.32	132	250
Albany St SB right	B	16.6	0.17	36	87
East Concord Street / Albany Street	**C**	**27.9**	-	-	-
E. Concord St EB left	D	48.6	0.47	100	152

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
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	C	22.6	0.34	132	275
Albany St NB right	C	23.6	0.09	18	61
Albany St SB left	A	5.1	0.01	2	m7
Albany St SB thru	A	9.8	0.37	200	295
Massachusetts Avenue / Albany Street	**C**	**31.0**	-	-	-
Mass. Ave EB left	C	20.8	0.34	51	104
Mass. Ave EB thru | thru| thru /right	B	18.2	0.22	87	134
Mass. Ave WB thru | thru	D	39.3	0.45	218	288
Mass. Ave WB right	C	25.2	0.06	29	75
Albany St NB left/thru | thru	D	54.1	0.70	117	154
Albany St NB right	D	44.2	0.35	70	114
Albany St SB left	D	39.2	0.44	105	133
Albany St SB thru | thru/right	C	21.6	0.43	182	165
Unsignalized Intersections					
Union Park Street / Albany Street	-	-	-	-	-
Union Park St EB right	C	17.6	0.19	-	17
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	E	45.8	0.67	-	106
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	-	350
Albany Street NB thru	A	0.0	0.39	-	0
Albany Street SB thru	A	0.0	0.28	-	0
East Canton Street/ Albany Street/Flower Exchange Driveway	-	-	-	-	-
Driveway WB left/thru/right	C	22.9	0.03	-	2
Albany St NB left/thru/right	A	1.7	0.07	-	5
Albany St SB left/thru/right	A	0.1	0.00	-	0
Albany Street/East Brookline Street	-	-	-	-	-

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
E. Brookline St EB left/right	D	29.3	0.53	-	74
Albany St NB thru	A	0.0	0.37	-	0
Albany St SB thru	A	0.0	0.23	-	0
Albany Street / Stoughton Street	-	-	-	-	-
Stoughton St EB left/right	E	45.8	0.26	-	24
Stoughton St WB left	E	45.4	0.31	-	31
Stoughton St WB right	D	28.6	0.50	-	65
Albany St NB left	A	9.1	0.02	-	2
Albany St NB thru	A	0.0	0.28	-	0
Albany St SB thru/right	A	0.0	0.27	-	0

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.

2.3.5.1 No-Build (2024) Condition Traffic Analysis Summary

As shown in Table 2-8 and Table 2-9, the following operational deficiencies are expected under the No-Build (2024) Condition:

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

- 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 will continue to operate at LOS D during the a.m. peak hour and will decrease to LOS E 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 E during the p.m. peak hour.

2.4 BUILD (2024) CONDITION

As previously mentioned, the Project will consist of the redevelopment of the Boston Flower Exchange Site at 540 Albany Street. The Project will consist of four new buildings totaling approximately 1.623 million square feet. Building A will consist of 192,855 square feet of laboratory space and 20,500 square feet of retail space. Building B will consist of 284,030 square feet of laboratory space, 161,300 square feet of office space, and 22,000 square feet of retail space. Building C will consist of 195,970 square feet of laboratory space and 298,360 square feet of office space. Building D will consist of 167,955 square feet of laboratory space, 180,880 square feet of office space, and 30,000 square feet of civic space.

2.4.1 Site Access and Vehicle Circulation

Vehicular access to the Site is being analyzed under two separate conditions. Both conditions will require signalizations of the intersections of East Canton Street/Albany Street and East Dedham Street/Albany Street.

The first condition consists of a pair of one-way roadways that will be referred to as the **One-Way Pair Build Condition**. One access road will be one-way westbound from Frontage Road via Biosquare Drive along the transportation easement that exists along the southern edge of the Site. This roadway (Canton Street Extension) would meet Albany Street across from the one way westbound Canton Street providing access from Frontage Road into the South End. The other roadway, along the transportation easement that exists along the northern edge of the Site, would run one way eastbound connecting Albany Street to Frontage Road.

The second condition, referred to as **East Canton Build Condition**, concentrates the Site traffic on East Canton Street Extension, creating a two-way street connecting Frontage Road, via BioSquare Drive, and Albany Street.

Garages will be provided at each of the four buildings and access to them will be provided along the two-way roadway off the East Canton Street extension, which connects to the other one-way roadway in the One-Way Pair Build Condition. Pedestrian access to the buildings will be provided via a shared street across from East Dedham Street. The Site plan is shown in Figure 2-14.

RETAIL BACK OF HOUSE LOBBY COMMUNITY FIRE

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 2-14
Site Plan

Source: Stantec

2.4.2 Project Parking

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 office or retail space.

The Project is anticipated to provide 1,145 below-grade parking spaces divided between the garages at each of the four buildings. Additionally, 14 at-grade parking spaces are proposed along East Canton Street Extension next to Buildings A and D. The parking ratio based on the 1,159 combined at-grade and below-grade spaces is approximately 0.72 spaces per 1,000 square feet of the total gross square footage.

2.4.3 Loading and Service Accommodations

There will be four separate loading zones located on the Project Site. Each building will be serviced by its own loading dock that will be accessed from the same internal roadway as the garages. 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. The Office land use was used to calculate both the medical office and the general office space. 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.

[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.

A summary of anticipated loading/service activity by land use is presented in Table 2-10.

Table 2-10 Expected Delivery Activity

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

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

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

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 2-11.

Table 2-11 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

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

2.4.6 Project Trip Generation

The mode share percentages shown in Table 2-11 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 2-12. The detailed trip generation information is provided in Appendix C**.**

Table 2-12 Project Trip Generation

Land Use		Walk/Bicycle Trips	Transit Trips	Vehicle Trips
Daily				
Office[1]	In	745	994	2,125
	Out	745	994	2,125
Lab[2]	In	731	975	2,086
	Out	731	975	2,086
Retail[3]	In	964	331	820
	Out	964	331	820
Total Project Generated	In	2,440	2,300	5,031
	Out	2,440	2,300	5,031
a.m. Peak Hour				
Office	In	186	278	502
	Out	24	56	53
Lab	In	183	274	494
	Out	36	83	79
Retail	In	28	10	22
	Out	17	10	11
Total Project Generated	In	397	562	1,018
	Out	77	149	143
p.m. Peak Hour				
Office	In	32	76	73
	Out	167	251	452
Lab	In	27	64	61
	Out	164	246	443
Retail	In	85	48	54
	Out	90	32	71
Total Project Generated	In	144	188	188
	Out	421	529	966

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.

As shown in Table 2-12, there is expected to be 4,880 new pedestrian/bicycle trips, 4,600 new transit trips, and 10,062 new vehicle trips throughout the day. During the a.m. peak hour, there is expected to be 474 pedestrian trips (397 in and 77 out), 711 transit trips (562 in and 149 out), and 1,161 vehicle trips (1,018 in and 143 out). During the p.m. peak hour, there is expected to be 565 pedestrian trips (144 in and 421 out), 717 transit trips (188 in and 529 out), and 1,154 vehicle trips (188 in and 966 out).

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 the One-Way Pair Build Condition are illustrated in Figure 2-15 and Figure 2-16. The trip distribution patterns for the East Canton Build Condition are illustrated in Figure 2-17 and Figure 2-18.

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 2-19 and Figure 2-20 for the One-Way Pair Build Condition and in Figure 2-21 and Figure 2-22 for the East Canton Build Condition.

The trip assignments were added to the No-Build (2024) Condition vehicular traffic volumes to develop the Build (2024) Condition vehicular traffic volumes. The One-way Pair Build (2024) Condition a.m. and p.m. peak hour traffic volumes are shown on Figure 2-23 and Figure 2-24, respectively. The East Canton Build (2024) Condition a.m. and p.m. peak hour traffic volumes are shown on Figure 2-25 and Figure 2-26, respectively.

2.4.9 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.

2.4.10 Future Public Transportation Connection Capacity

As referenced in Section 2.2.8.1, there are connections to major subway lines in both directions from the Site. Table 2-3 indicates that there is plenty of available capacity on the existing MBTA buses providing access to the subway lines. Employees traveling to the Site from a subway station during the weekday a.m. peak period and employees traveling from the Site to a subway station during the weekday p.m. peak period will not encounter buses that are at capacity. This will provide a two-seat mass transit trip to the entire network (excluding the Blue and Green lines).

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-15
One-way Pair Trip Distribution Entering
Source: Howard Stein Hudson

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-16
One-way Pair Trip Distribution Exiting
Source: Howard Stein Hudson

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-17
E. Canton Trip Distribution Entering
Source: Howard Stein Hudson

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-18
E. Canton Trip Distribution Exiting
Source: Howard Stein Hudson

Enter	1018
Exit	(143)

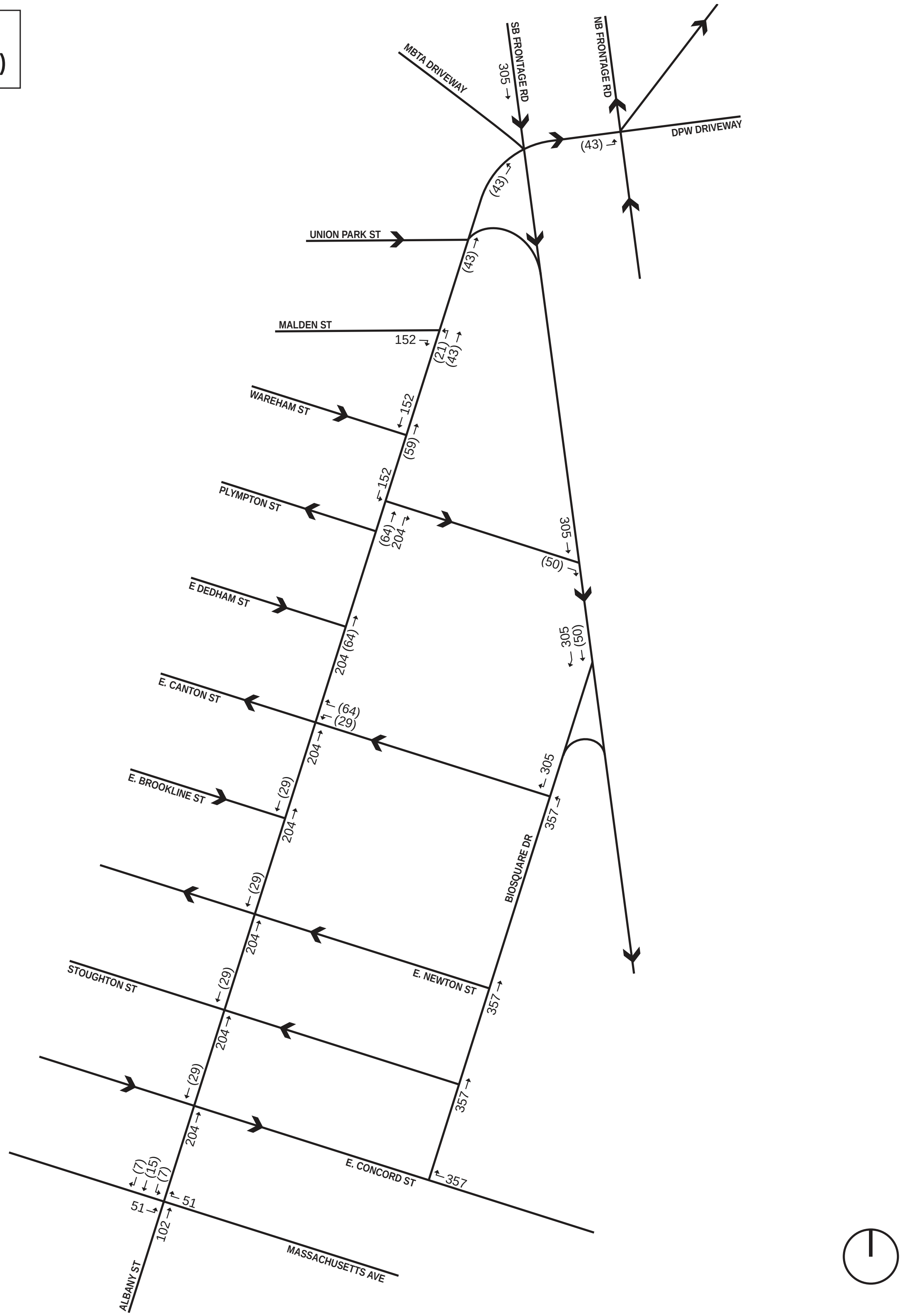
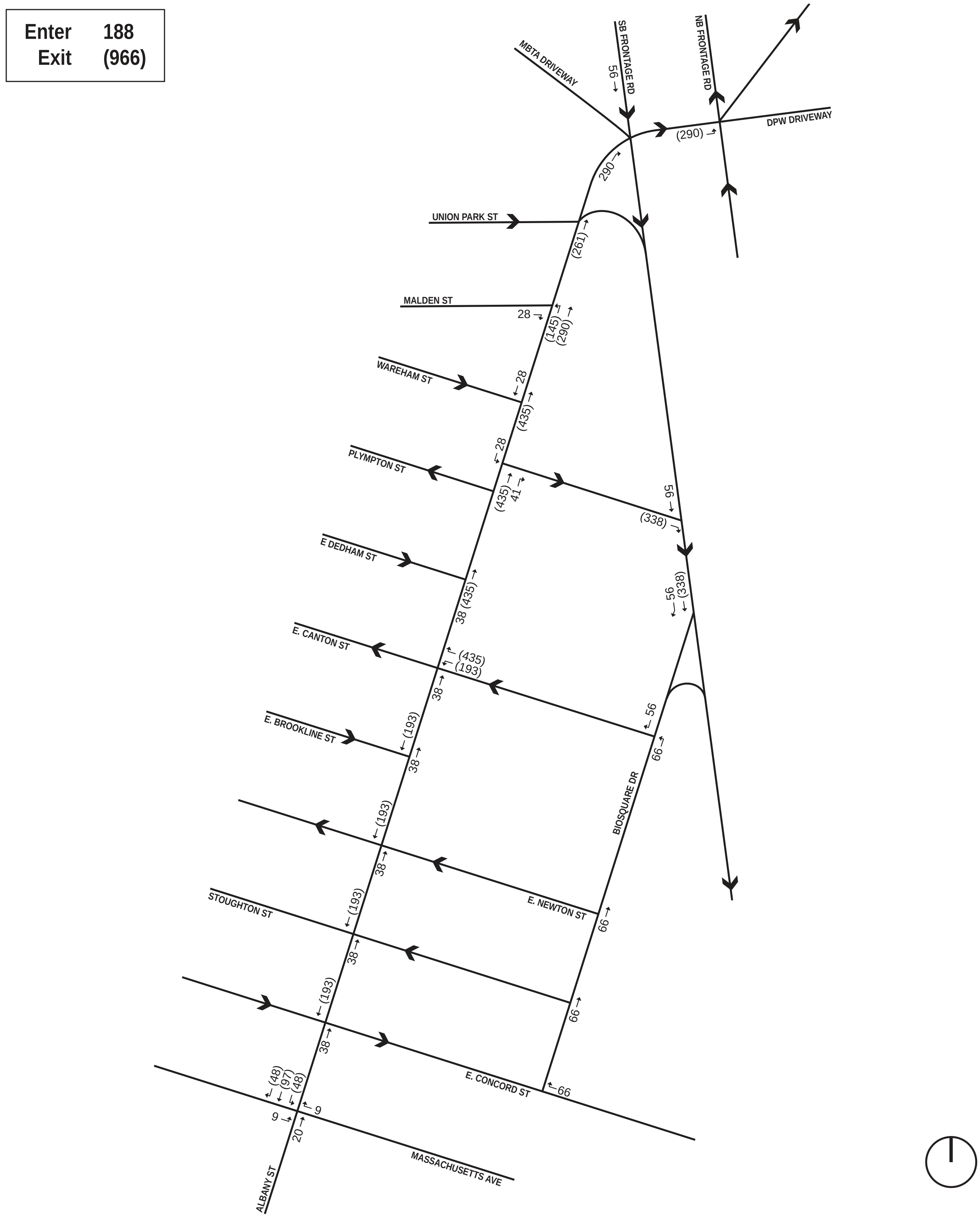


Figure 2-19
One-way Pair Project Generated Trips, Weekday a.m. Peak Hour
Source: Howard Stein Hudson



THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-20
One-way Pair Project Generated Trips, Weekday p.m. Peak Hour
Source: Howard Stein Hudson

Enter	1018
Exit	(143)

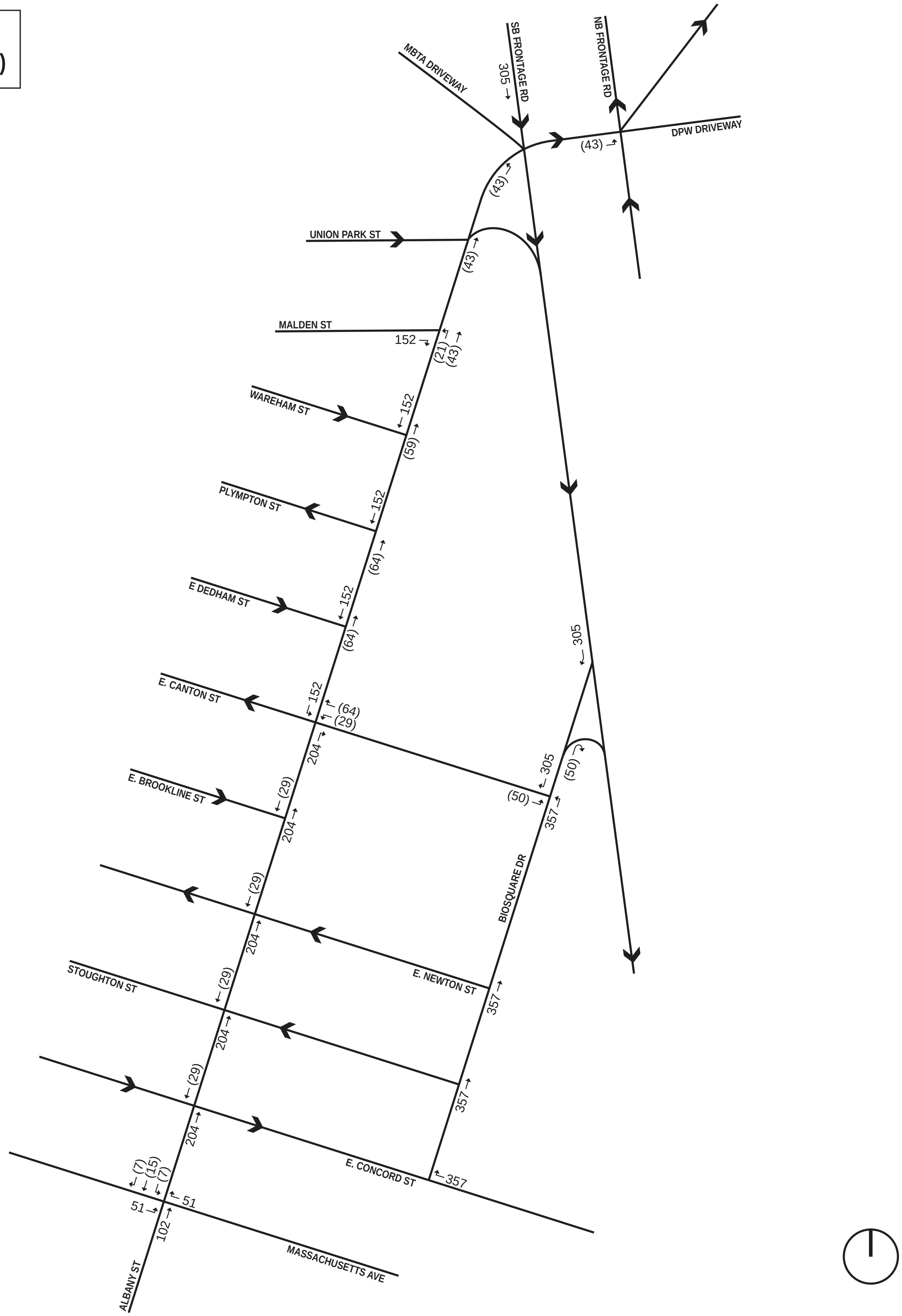
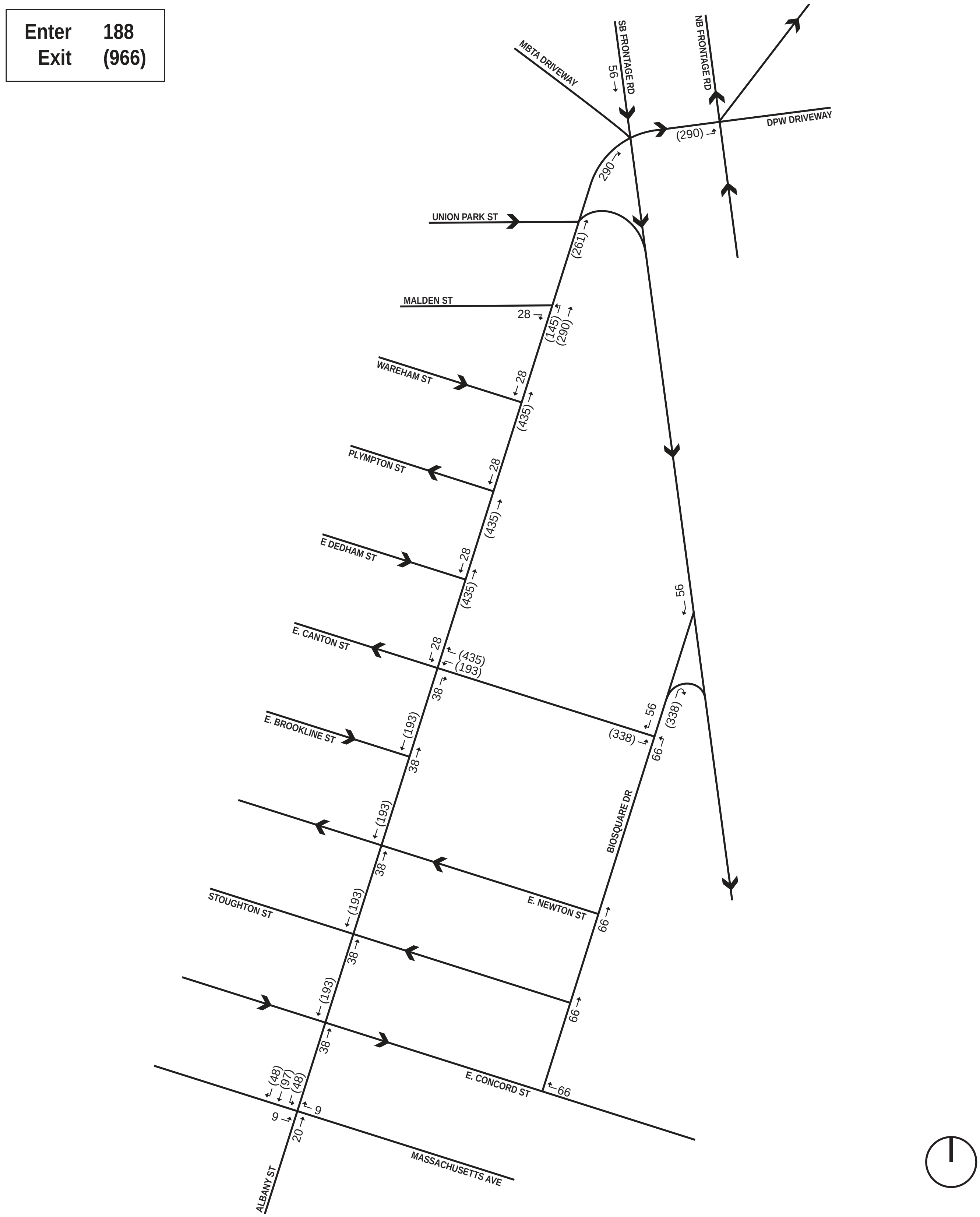


Figure 2-21
E. Canton Project Generated Trips, Weekday a.m. Peak Hour
Source: Howard Stein Hudson



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

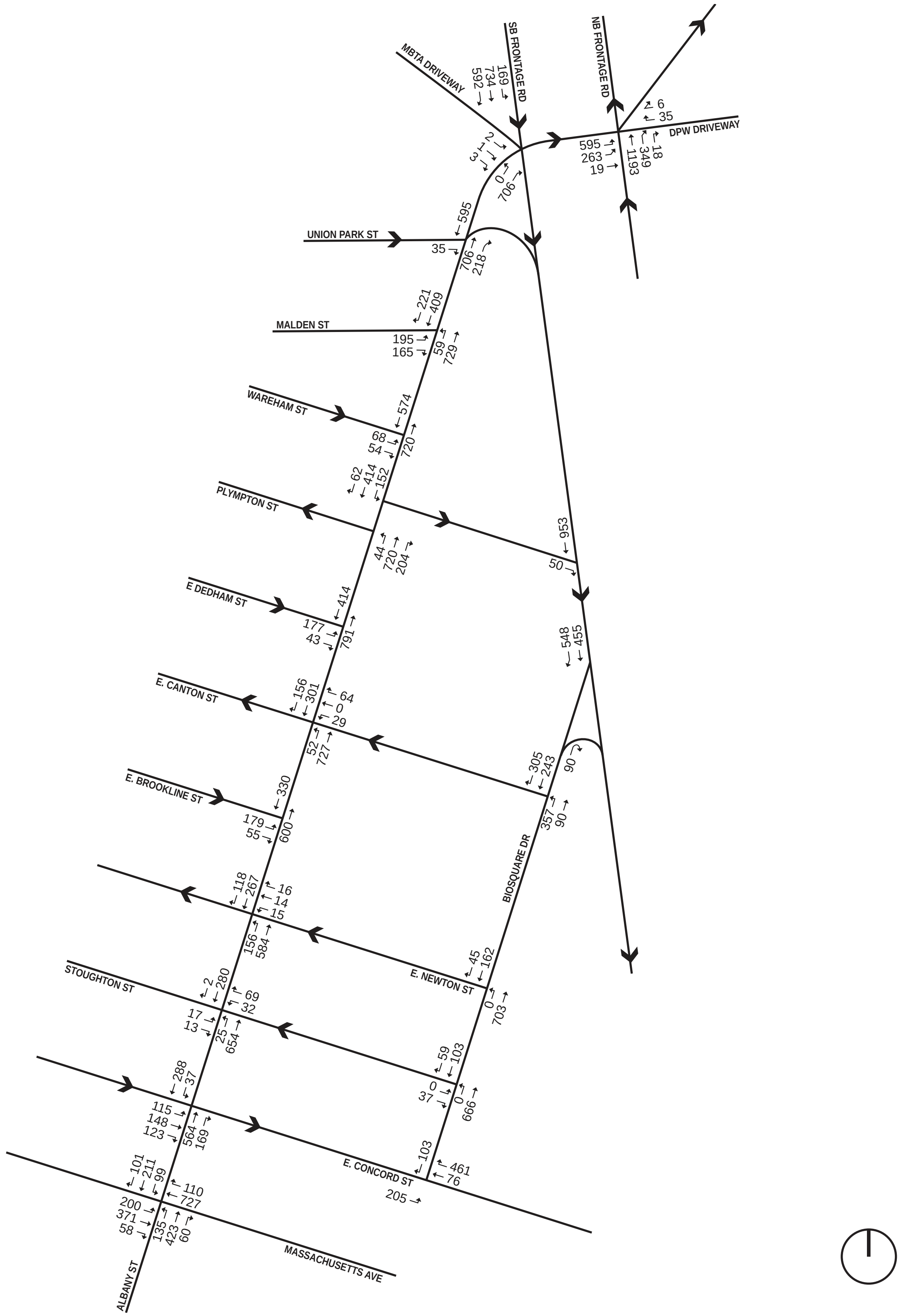
Stantec

EXCHANGE SOUTH END

Figure 2-22

E. Canton Project Generated Trips, Weekday p.m. Peak Hour

Source: Howard Stein Hudson

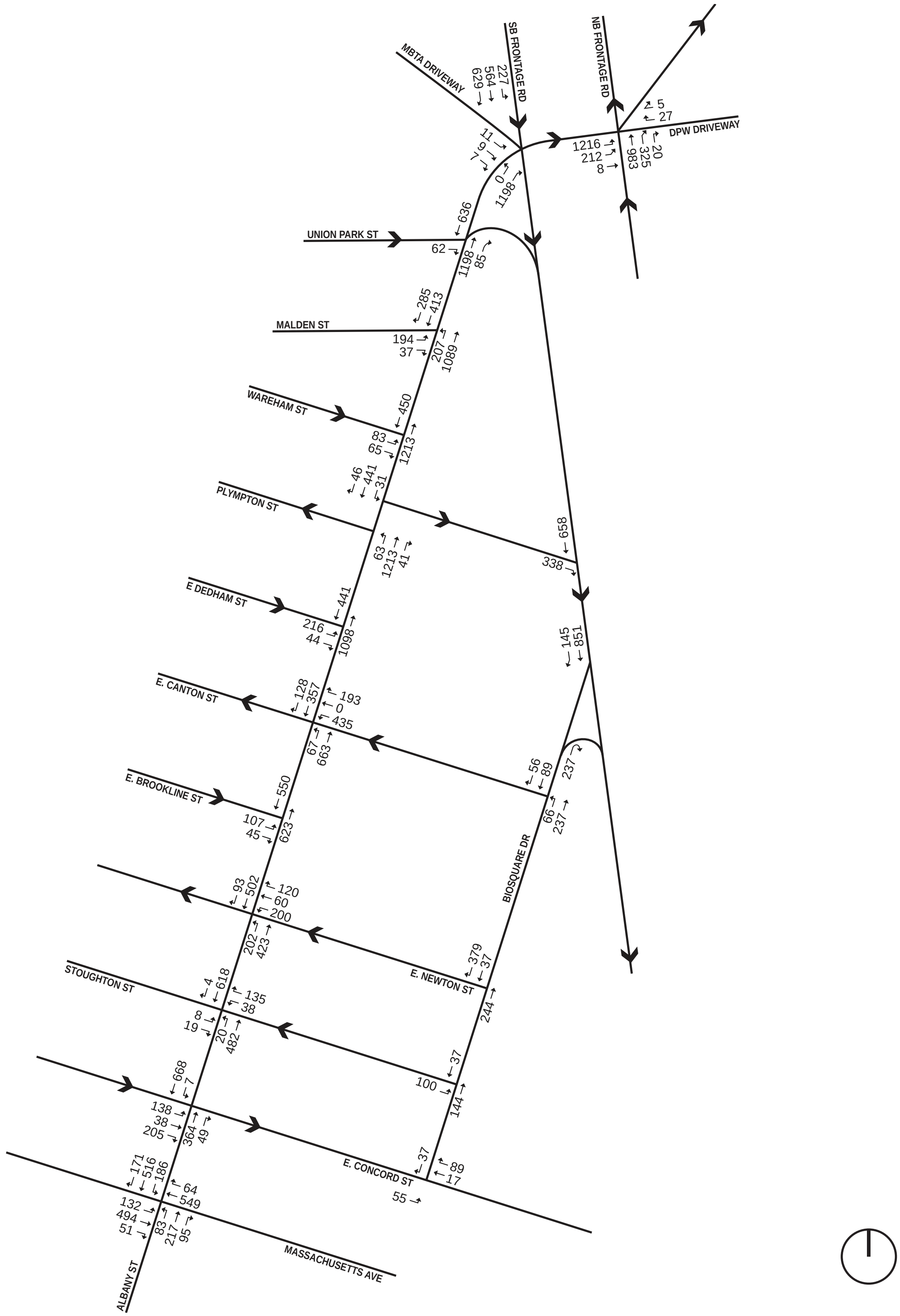


THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-23
One-way Pair Build (2024) Condition Traffic Volumes, Weekday a.m. Peak Hour

Source: Howard Stein Hudson



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

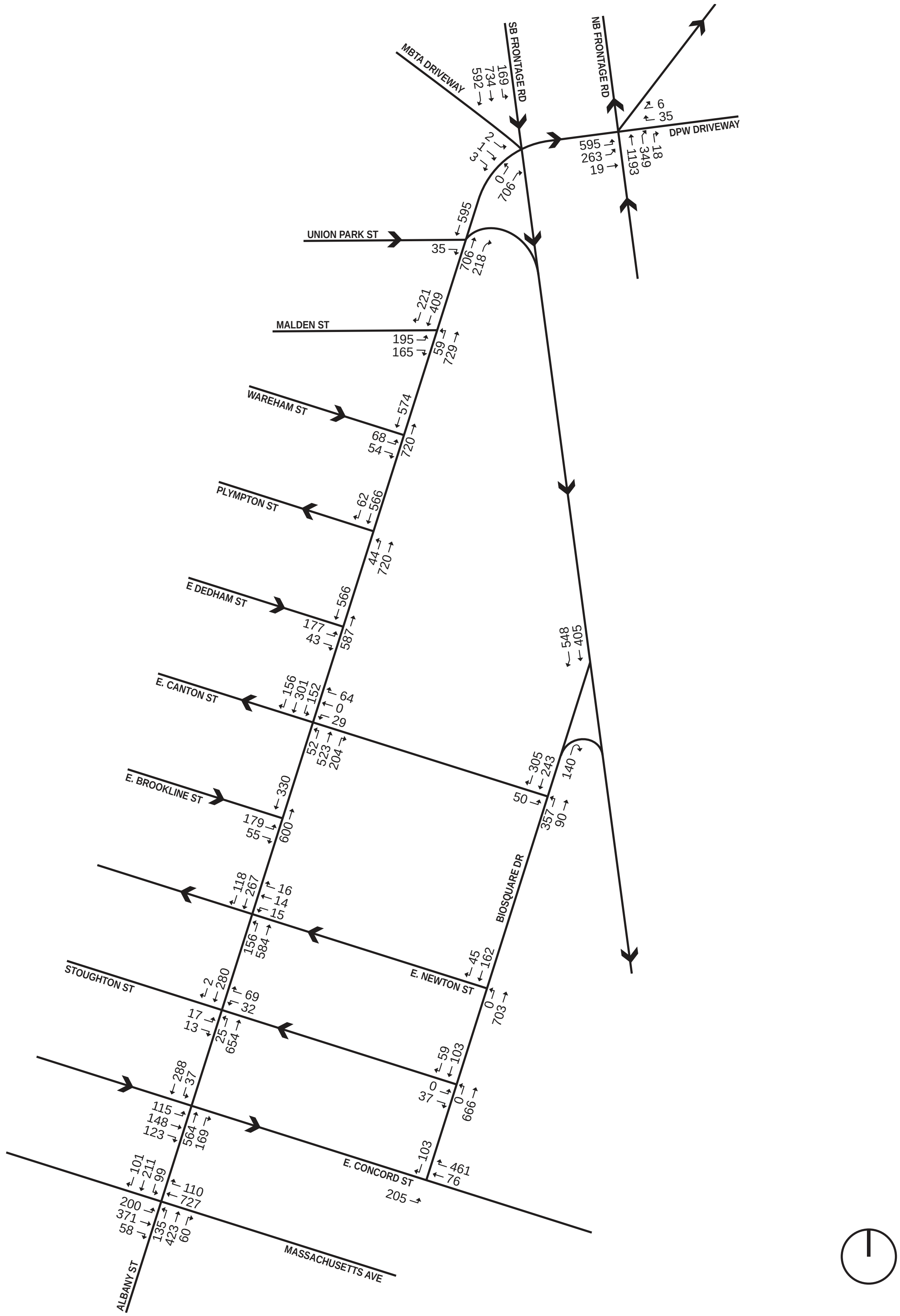
Stantec

EXCHANGE SOUTH END

Figure 2-24

One-way Pair Build (2024) Condition Traffic Volumes, Weekday p.m. Peak Hour

Source: Howard Stein Hudson

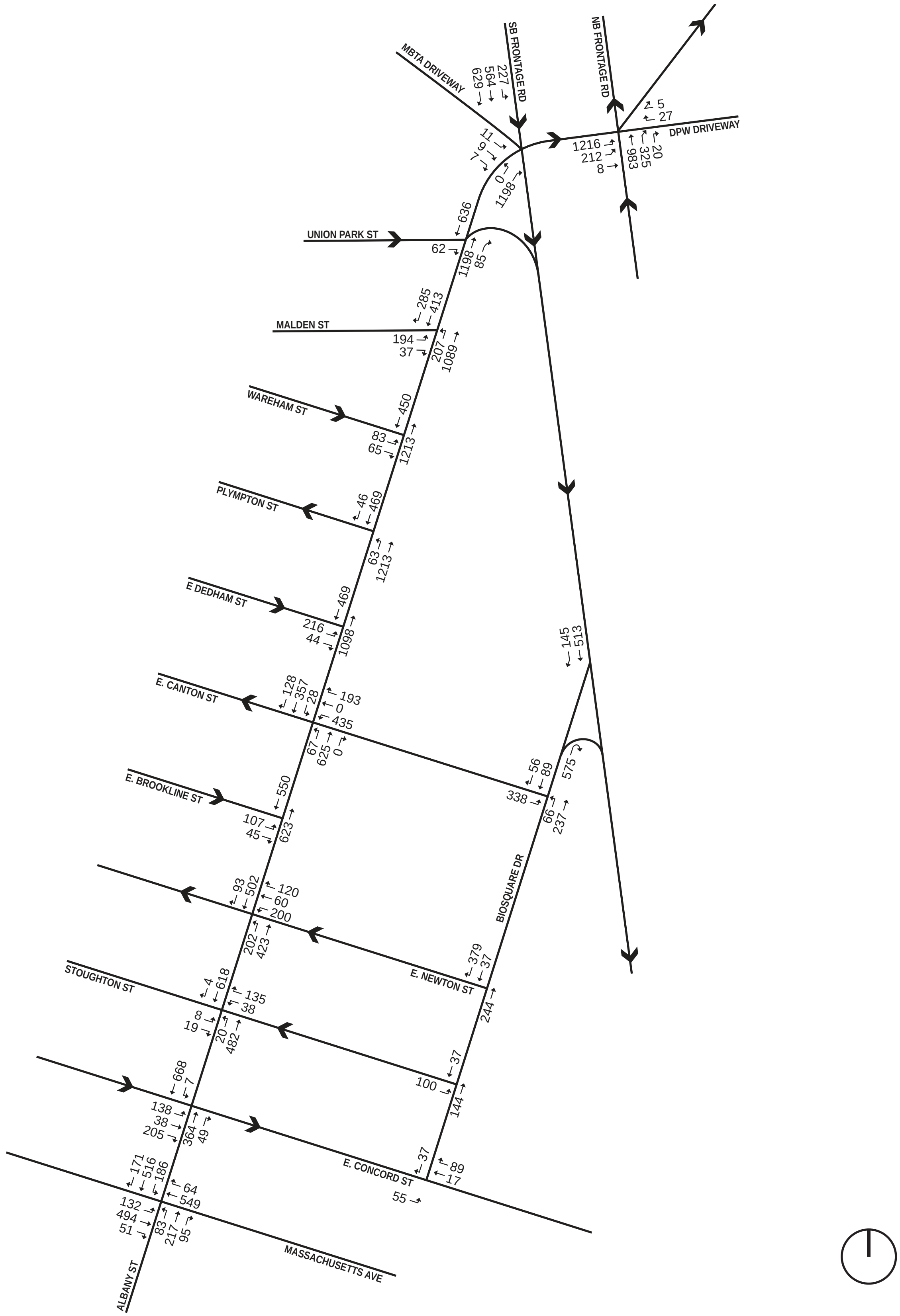


THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 2-25
E. Canton 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 2-26
E. Canton Build (2024) Condition Traffic Volumes, Weekday p.m. Peak Hour

Source: Howard Stein Hudson

2.4.11 Build Condition Traffic Operations Analysis

The Build (2024) Condition analysis uses the same methodology as the Existing (2017) Condition and No-Build (2024) Condition analysis. Aside from the Site driveway changes, the other intersections in the One-Way Pair and East Canton Build Conditions will be the same in both conditions. Table 2-13 and Table 2-14 present the Build (2024) Condition capacity analysis for the a.m. and p.m. peak hours for the intersections that remain the same across both Build Conditions. Table 2-15 presents the intersections specific to the One-Way Pair Build Condition for the a.m. and p.m. peak hours. Table 2-16 presents the intersections specific to the East Canton Build condition for the a.m. and p.m. peak hours. 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 2-13 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					
I-93 NB Frontage Road / Albany Street Connector / DPW Driveway	**D**	**51.1**	-	-	-
Albany St Connector EB left	F	>80.0	0.79	386	m411
Albany St Connector EB left/bear left	F	>80.0	0.81	388	m440
Albany St Connector EB thru	B	10.8	0.03	9	m5
DPW Driveway WB right/hard right	A	7.4	0.24	0	16
NB Frontage Rd NB thru | thru | thru/right	C	33.4	0.83	427	498
I-93 SB Frontage Road / Albany Street / MBTA Driveway	**C**	**24.4**	-	-	-
MBTA Driveway EB thru/right	D	40.5	0.14	4	12
SB Frontage Rd SB left	A	3.9	0.18	0	48
SB Frontage Rd SB left/thru | thru	B	19.3	0.46	181	317
SB Frontage Rd SB bear right/right	A	2.0	0.41	0	176
Albany St NEB right | right/hard right	D	45.5	0.91	261	253
Malden Street / Albany Street	**B**	**19.7**	-	-	-
Malden St EB left/right	C	30.7	0.81	103	#217
Albany St NB left/thru | thru	B	14.0	0.59	171	189
Albany St SB thru/right	C	20.7	0.78	199	#524
East Newton Street / Albany Street	**A**	**6.6**	-	-	-
E. Newton St WB left/thru	E	59.7	0.27	24	m53
E. Newton St WB right	E	56.4	0.15	13	m32
Albany St NB left	A	4.5	0.19	30	64
Albany St NB thru	A	5.7	0.37	132	366
Albany St SB thru	A	2.5	0.19	32	44
Albany St SB right	A	2.6	0.13	14	22
East Concord Street / Albany Street	**C**	**31.0**	-	-	-

Intersection/Approach	***LOS***	***Delay (s)***	***V/C Ratio***	***50th Percentile Queue (ft)***	***95th Percentile Queue (ft)***
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	C	25.9	0.50	396	564
Albany St NB right	C	20.2	0.26	102	m165
Albany St SB left	A	5.6	0.07	6	22
Albany St SB thru	A	5.9	0.21	59	136
Massachusetts Avenue / Albany Street	**C**	**32.1**	-	-	-
Mass. Ave EB left	C	29.0	0.67	92	148
Mass. Ave EB thru | thru| thru /right	B	17.0	0.18	69	95
Mass. Ave WB thru | thru	B	19.9	0.61	111	137
Mass. Ave WB right	A	7.7	0.14	17	35
Albany St NB left/thru | thru	D	54.1	0.85	225	292
Albany St NB right	C	32.8	0.15	37	72
Albany St SB left	E	77.5	0.64	85	#157
Albany St SB thru | thru/right	D	37.3	0.28	102	143
Unsignalized Intersections					
Union Park Street / Albany Street	-	-	-	-	-
Union Park St EB right	C	15.6	0.10	-	8
Albany St NB thru | thru	A	0.0	0.29	-	0
Albany St SB thru	A	0.0	0.38	-	0
Wareham Street / Albany Street	-	-	-	-	-
Wareham St EB left/right	C	23.2	0.41	-	47
Albany St NB thru	A	0.0	0.45	-	0
Albany St SB thru	A	0.0	0.37	-	0
Plympton Street / Albany Street	-	-	-	-	-
Albany St NB left/thru	A	1.3	0.05	-	4
Albany St SB thru/right	A	0.0	0.30	-	0
Albany Street / East Brookline Street	-	-	-	-	-
E. Brookline St EB left/right	F	>50.0	0.94	-	221
Albany St NB thru	A	0.0	0.38	-	0
Albany St SB thru	A	0.0	0.21	-	0
Albany Street / Stoughton Street	-	-	-	-	-
Stoughton St EB left/right	F	>50.0	0.38	-	37
Stoughton St WB left	E	49.1	0.30	-	29
Stoughton St WB right	D	29.7	0.34	-	36
Albany St NB left	A	8.6	0.03	-	2
Albany St NB thru	A	0.0	0.41	-	0
Albany St SB thru/right	A	0.0	0.17	-	0
BioSquare Drive / I-93 SB Frontage Road	-	-	-	-	-

EXCHANGE SOUTH END

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
BioSquare Dr EB right	B	14.4	0.20	-	19
I-93 SB Frontage Rd SB thru | thru/right	A	0.0	0.45	-	0

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 2-14 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					
I-93 NB Frontage Road / Albany Street Connector / DPW Driveway	**D**	**53.5**	-	-	-
Albany St Connector EB left	E	63.1	>1.00	~610	m#617
Albany St Connector EB left/bear left	E	69.6	>1.00	~605	m#610
Albany St Connector EB thru	A	8.6	0.01	1	m2
DPW Driveway WB right/hard right	A	1.5	0.16	0	1
NB Frontage Rd NB thru | thru | thru/right	D	40.8	0.87	357	#469
I-93 SB Frontage Road / Albany Street / MBTA Driveway	**D**	**37.7**	-	-	-
MBTA Driveway EB thru/right	E	58.5	0.52	25	35
SB Frontage Rd SB left	A	4.9	0.30	0	57
SB Frontage Rd SB left/thru | thru	C	26.0	0.48	164	226
SB Frontage Rd SB bear right/right	A	4.6	0.49	116	181
Albany St NEB right | right/hard right	E	62.6	>1.00	~191	#708
Malden Street / Albany Street	**C**	**24.0**	-	-	-
Malden St EB left/right	E	76.8	0.89	169	#310
Albany St NB left/thru | thru	C	21.6	0.87	380	#608
Albany St SB thru/right	B	10.9	0.66	231	289
East Newton Street / Albany Street	**C**	**23.9**	-	-	-
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	8.6	0.37	72	131
Albany St NB thru	A	9.5	0.33	156	297
Albany St SB thru	B	17.0	0.51	225	376
Albany St SB right	B	13.9	0.16	36	82
East Concord Street / Albany Street	**C**	**28.2**	-	-	-
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	C	31.5	0.44	194	315
Albany St NB right	C	31.4	0.10	24	m63
Albany St SB left	A	2.6	0.01	2	m2
Albany St SB thru	B	10.7	0.52	296	529
Massachusetts Avenue / Albany Street	**C**	**30.9**	-	-	-
Mass. Ave EB left	C	24.9	0.41	61	118
Mass. Ave EB thru | thru| thru /right	C	21.0	0.24	96	141
Mass. Ave WB thru | thru	D	43.3	0.50	225	289
Mass. Ave WB right	C	25.0	0.07	31	81

EXCHANGE SOUTH END

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
Albany St NB left/thru | thru	D	51.3	0.70	123	160
Albany St NB right	D	40.8	0.31	68	110
Albany St SB left	D	41.0	0.54	120	190
Albany St SB thru | thru/right	B	17.2	0.50	204	146
Unsignalized Intersections					
Union Park Street / Albany Street	-	-	-	-	-
Union Park St EB right	C	17.5	0.19	-	17
Albany St NB thru | thru	A	0.0	0.39	-	0
Albany St SB thru	A	0.0	0.41	-	0
Wareham Street / Albany Street	-	-	-	-	-
Wareham St EB left/right	F	>50.0	>1.00	-	Err.
Albany St NB thru	A	0.0	0.73	-	0
Albany St SB thru	A	0.0	0.28	-	0
Plympton Street / Albany Street	-	-	-	-	-
Albany St NB left/thru	A	2.5	0.06	-	5
Albany St SB thru/right	A	0.0	0.31	-	0
Albany Street / East Brookline Street	-	-	-	-	-
E. Brookline St EB left/right	D	32.6	0.57	-	82
Albany St NB thru	A	0.0	0.39	-	0
Albany St SB thru	A	0.0	0.35	-	0
Albany Street / Stoughton Street	-	-	-	-	-
Stoughton St EB left/right	F	>50.0	0.33	-	32
Stoughton St WB left	F	>50.0	0.39	-	40
Stoughton St WB right	D	29.7	0.50	-	66
Albany St NB left	B	10.2	0.03	-	2
Albany St NB thru	A	0.0	0.30	-	0
Albany St SB thru/right	A	0.0	0.40	-	0
BioSquare Drive / I-93 SB Frontage Road	-	-	-	-	-
BioSquare Dr EB right	C	20.5	0.53	-	77
I-93 SB Frontage Rd SB thru | thru/right	A	0.0	0.36	-	0

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 2-15 One Way Pair Build (2024) Condition, a.m. and p.m. Peak Hours

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
a.m. Peak Hour					
East Canton Street / Albany Street / Exchange Driveway	**A**	**7.7**	-	-	-
Exchange Driveway WB left	D	45.8	0.13	22	52
Exchange Driveway WB thru/right	B	12.9	0.26	0	42
Albany St NB left/thru	A	8.8	0.60	333	196
Albany St SB thru/right	A	2.6	0.37	23	29
Albany Street/East Dedham Street	**B**	**16.3**	-	-	-
E. Dedham St EB left/thru/right	E	69.2	0.85	167	#275
E. Dedham St WB left/right	A	0.0	0.00	0	0
Albany St NB thru/right	A	5.4	0.64	51	118
Albany St SB left/thru	A	8.7	0.33	118	213
Exchange Driveway/SB Frontage Road	-	-	-	-	-
Exchange Driveway EB right	A	9.8	0.07	-	5
Frontage Road SB thru | thru	A	0.0	0.30	-	0
p.m. Peak Hour					
East Canton Street / Albany Street / Exchange Driveway	**C**	**22.5**	-	-	-
Exchange Driveway WB left	D	48.7	0.58	148	205
Exchange Driveway WB thru/right	D	44.4	0.89	173	286
Albany St NB left/thru/right	B	12.8	0.62	135	221
Albany St SB left/thru/right	A	6.5	0.40	87	m130
Albany Street/East Dedham Street	**C**	**30.6**	-	-	-
E. Dedham St EB left/thru/right	E	76.8	0.91	202	#360
E. Dedham St WB left/right	A	0.0	0.00	0	0
Albany St NB thru/right	C	28.6	0.88	527	#1013
Albany St SB left/thru	A	8.0	0.36	137	191
Exchange Driveway/SB Frontage Road	-	-	-	-	-
Exchange Driveway EB right	B	11.4	0.39	-	48
Frontage Road SB thru | thru	A	0.0	0.21	-	0

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 2-16 East Canton Build (2024) Condition, a.m. and p.m. Peak hours

Intersection/Approach	*LOS*	*Delay (s)*	*V/C Ratio*	*50th Percentile Queue (ft)*	*95th Percentile Queue (ft)*
a.m. Peak Hour					
East Canton Street / Albany Street / Exchange Driveway	**B**	**12.3**	-	-	-
Exchange Driveway WB left	D	45.9	0.14	22	52
Exchange Driveway WB thru/right	B	13.6	0.26	0	42
Albany St NB left/thru/right	A	8.5	0.62	488	97
Albany St SB left/thru/right	B	15.3	0.70	326	631
Albany Street/East Dedham Street	**B**	**16.8**	-	-	-
E. Dedham St EB left/thru/right	E	60.4	0.79	167	238
E. Dedham St WB left/right	A	0.0	0.00	0	0
Albany St NB thru/right	A	8.9	0.48	110	194
Albany St SB left/thru	A	7.7	0.46	107	311
BioSquare Drive/East Canton Extension	-	-	-	-	-
E. Canton St EB left/right	F	>50.0	0.50	-	56
BioSquare Dr NB left/thru	A	9.7	0.39	-	47
BioSquare Dr SB thru/right	A	0.0	0.35	-	0
p.m. Peak Hour					
East Canton Street / Albany Street / Exchange Driveway	**C**	**21.7**	-	-	-
Exchange Driveway WB left	D	49.8	0.60	151	204
Exchange Driveway WB thru/right	D	40.5	0.88	156	264
Albany St NB left/thru/right	B	13.4	0.63	131	218
Albany St SB left/thru/right	A	6.8	0.45	86	m136
Albany Street/East Dedham Street	**C**	**29.8**	-	-	-
E. Dedham St EB left/thru/right	E	75.8	0.90	200	#350
E. Dedham St WB left/right	A	0.0	0.00	0	0
Albany St NB thru/right	C	27.9	0.85	506	963
Albany St SB left/thru	A	8.6	0.39	154	215
BioSquare Drive/East Canton Extension	-	-	-	-	-
E. Canton St EB left/right	D	32.2	0.76	-	163
BioSquare Dr NB left/thru	A	2.0	0.05	-	4
BioSquare Dr SB thru/right	A	0.0	0.09	-	0

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.

2.4.11.1 Build (2024) Condition Traffic Analysis Summary

As shown in Table 2-13, Table 2-14, Table 2-15, and Table 2-16, 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** decreases to LOS D during the a.m. peak hour. The Albany Street eastbound approach decreases to LOS F during the a.m. peak hour and operates at LOS E during the p.m. peak hour.
- The signalized intersection of **I-93 SB Frontage Road/Albany Street/MBTA Driveway** continues to operate at LOS C during the a.m. peak hour and LOS D during the p.m. peak hour. The Albany Street northeastbound approach decreases to LOS E during the a.m. peak hour and operates at LOS E during the p.m. peak hour.
- At the signalized intersection of **Malden Street/Albany Street**, the Malden Street eastbound approach decreases to LOS E during the p.m. peak hour.
- Under both Build conditions, the intersection of **East Canton Street/Albany Street/Exchange Driveway** will need to be signalized to accommodate the new Site traffic. For both Build conditions, the intersection will operate at LOS C or better during both the a.m. and p.m. peak hours and all of the individual movements will operate at LOS D or better during both peak hours.
- Under both Build conditions, the intersection of **East Dedham Street/Albany Street** will need to be signalized due to an increase in through traffic along Albany Street leading to delays for vehicles turning from East Dedham Street. For both Build conditions, the intersection 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 under both Build conditions during both peak hours.
- At the unsignalized intersection of **Wareham Street/Albany Street**, the Wareham Street eastbound approach decreases to LOS F during the p.m. peak hour.
- At the unsignalized intersection of **Albany Street/East Brookline Street**, the East Brookline Street eastbound approach decreases to LOS F during the a.m. peak hour.
- At the unsignalized intersection of **Albany Street/Stoughton Street**, the Stoughton Street eastbound approach decreases to LOS F in both the a.m. and p.m. peak hours. The Stoughton Street westbound left-turn lane decreases to LOS E during the a.m. peak hour and decreases to LOS F during the p.m. peak hour.
- At the unsignalized intersection of **BioSquare Drive/East Canton Extension**, the East Canton St eastbound approach operates at LOS F during the a.m. peak hour and LOS D during the p.m. peak hour.

2.5 TRANSPORTATION DEMAND MANAGEMENT

The Proponent is committed to implementing Transportation Demand Management (TDM) measures to minimize automobile usage and Project-related traffic impacts.

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;
- 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 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.

2.6 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;
- Partial funding of the extension of the South Bay Harbor Trail; and/or
- Traffic signal infrastructure improvements in the area.

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.

2.7 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 COMPONENT

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.

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)

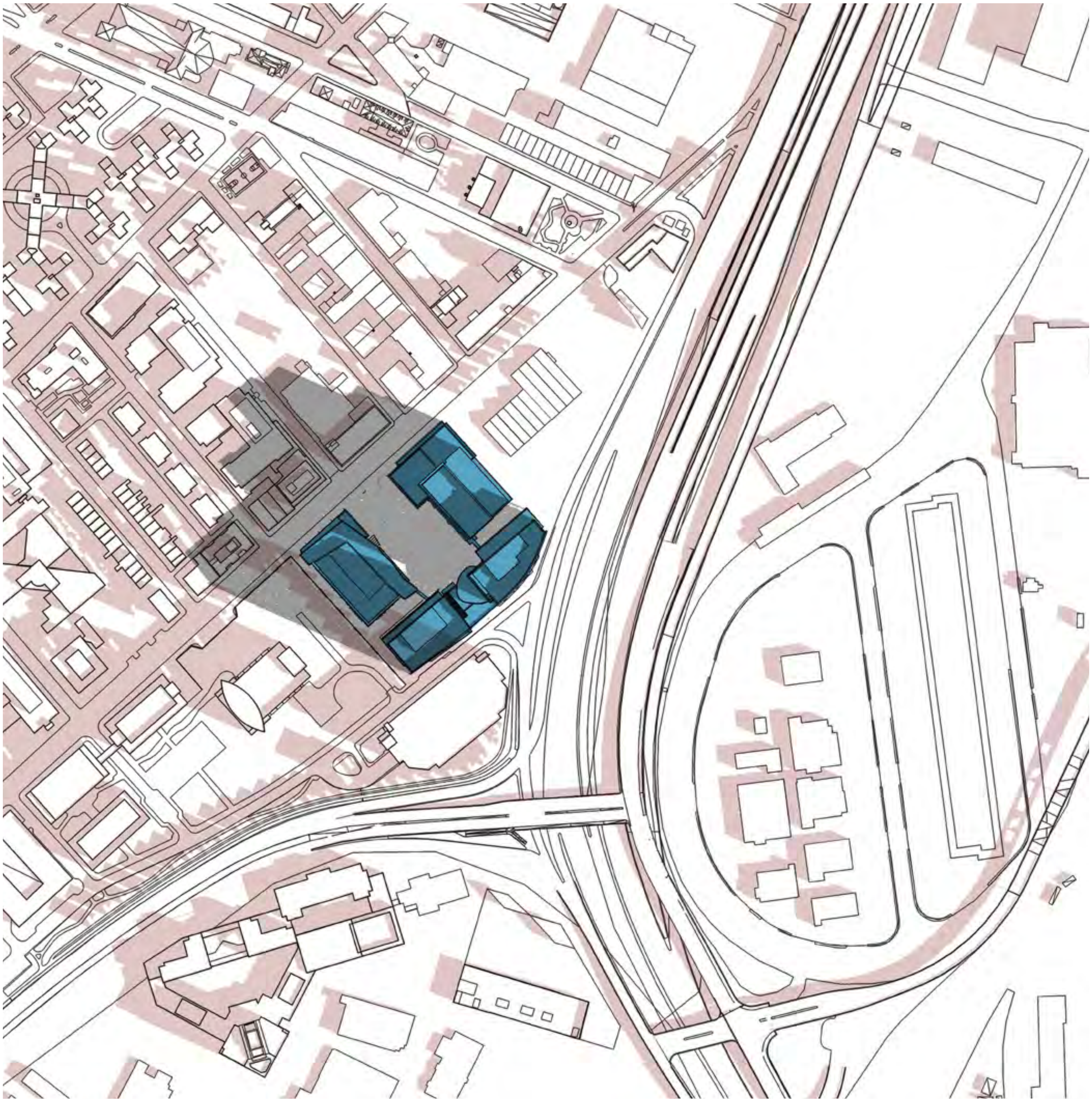
The shadow impact during the Autumnal Equinox is limited to the residential neighborhood during morning hours and only to the first block across Albany Street. The afternoon shadows fall on the neighboring warehouse building and parking lot or on the interstate. It should be noted that at 6:00 p.m. the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

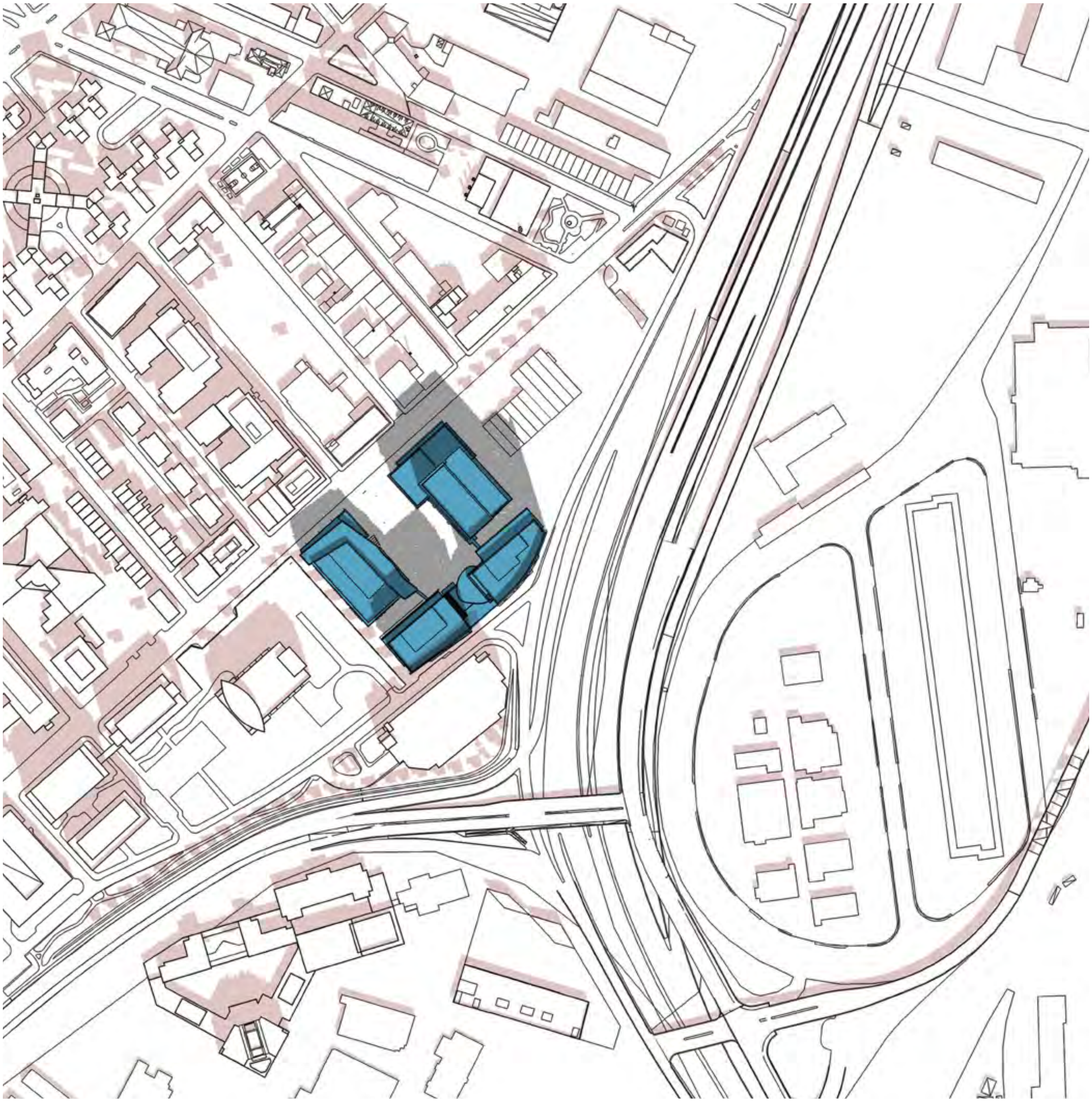
Stantec

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

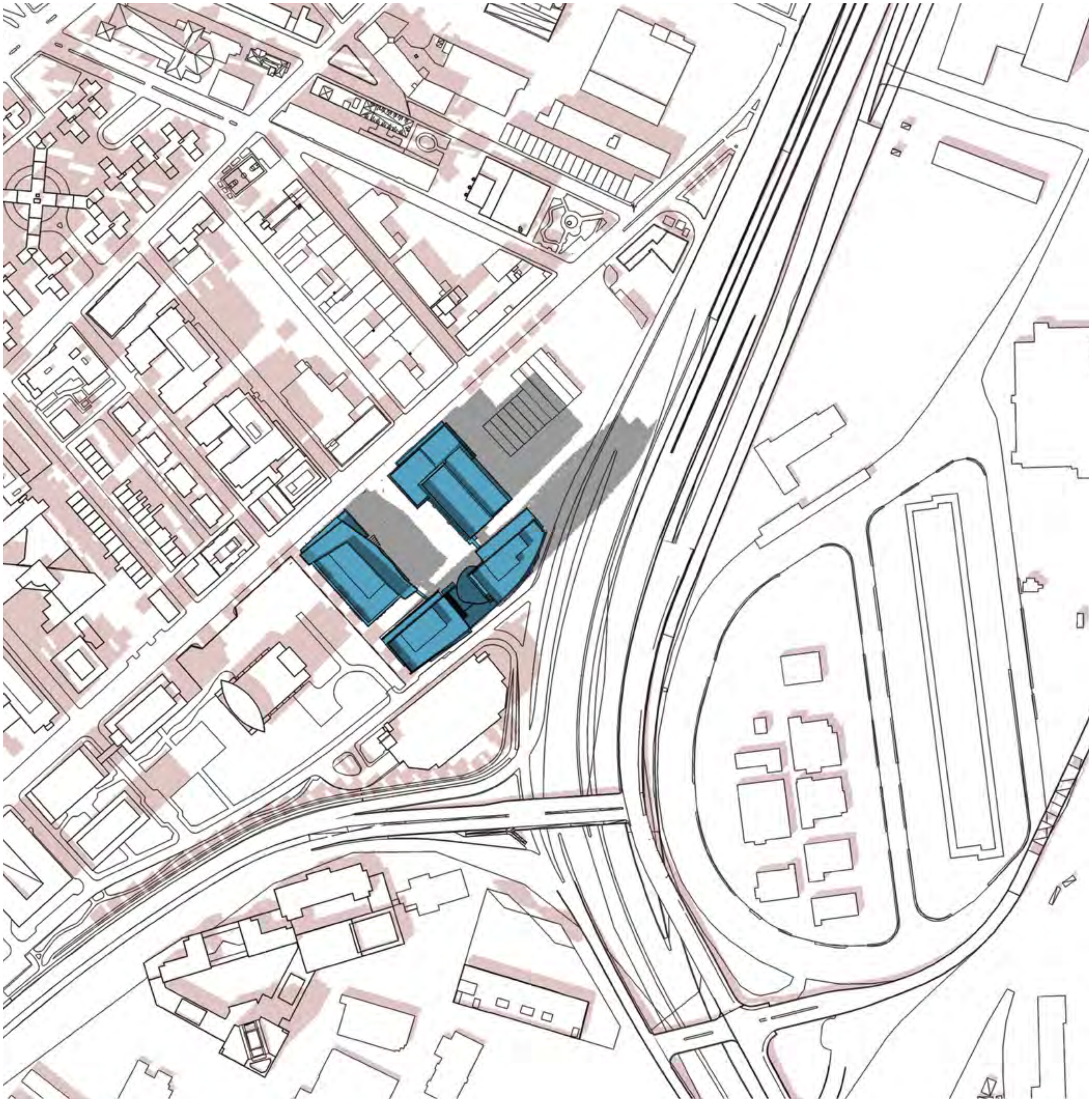
Stantec

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

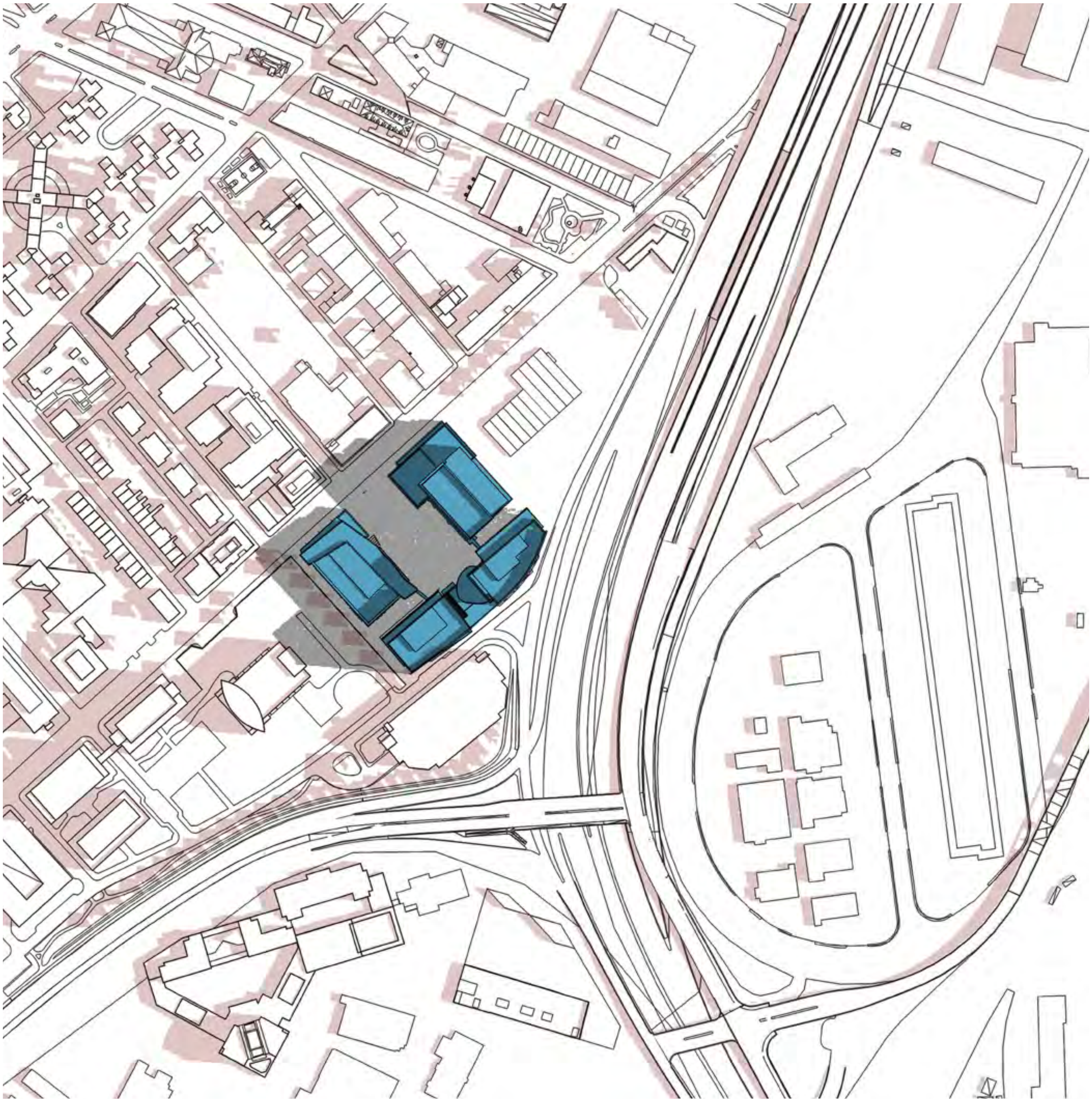
Stantec

EXCHANGE SOUTH END

Figure 3-3

Shadow Study
March 21(3:00 PM)

Source: Stantec



9:00 AM JUNE 21ST

EXISTING SHADOW NEW SHADOW PROPOSED BUILDINGS

0' 200' 400' 800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

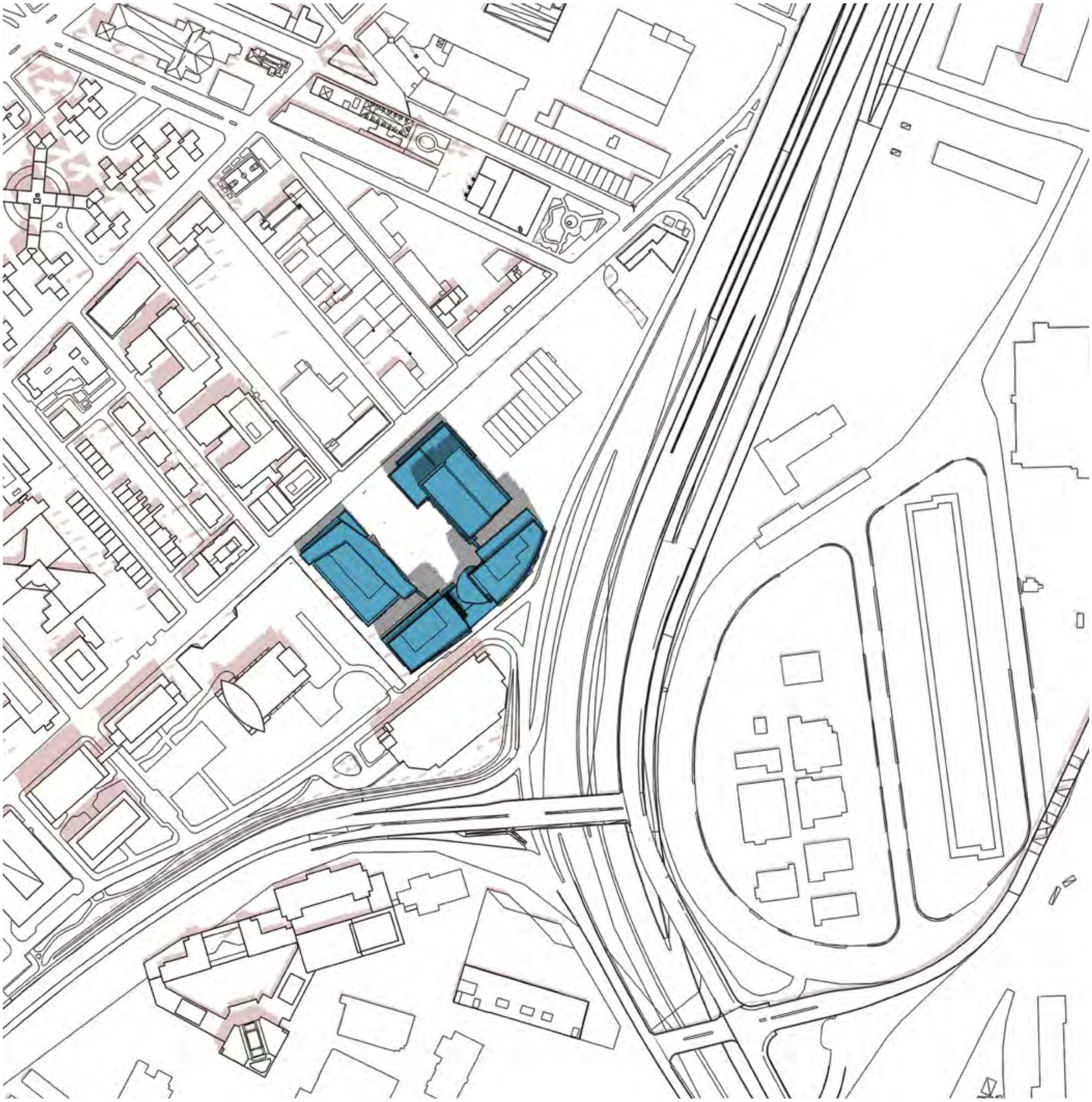
Stantec

EXCHANGE SOUTH END

Figure 3-4

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

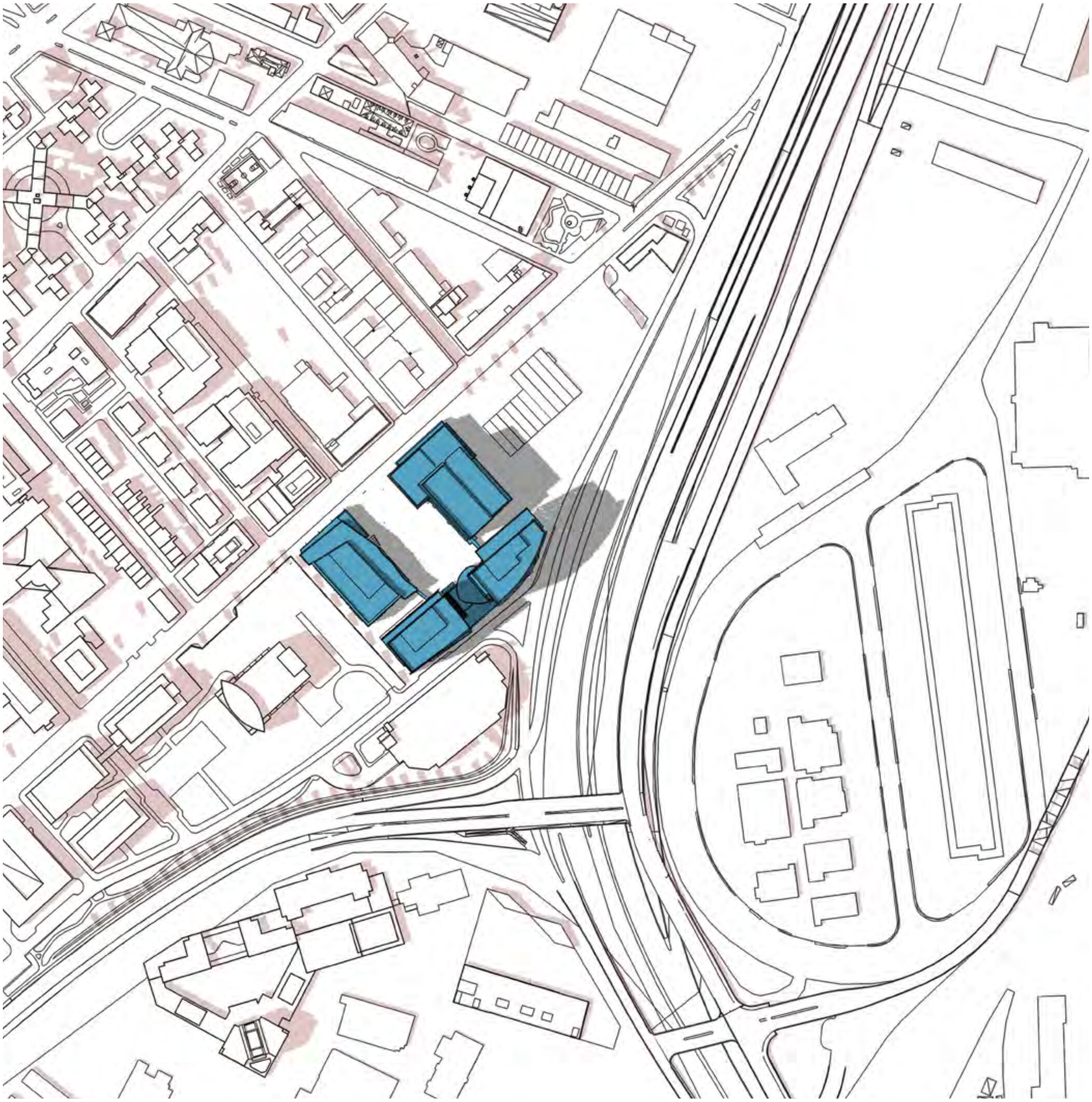
Stantec

EXCHANGE SOUTH END

Figure 3-5

Shadow Study June 21(12:00 PM)

Source: Stantec



3:00 PM JUNE 21ST

EXISTING SHADOW | NEW SHADOW | PROPOSED BUILDINGS

0' 200' 400' 800'

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

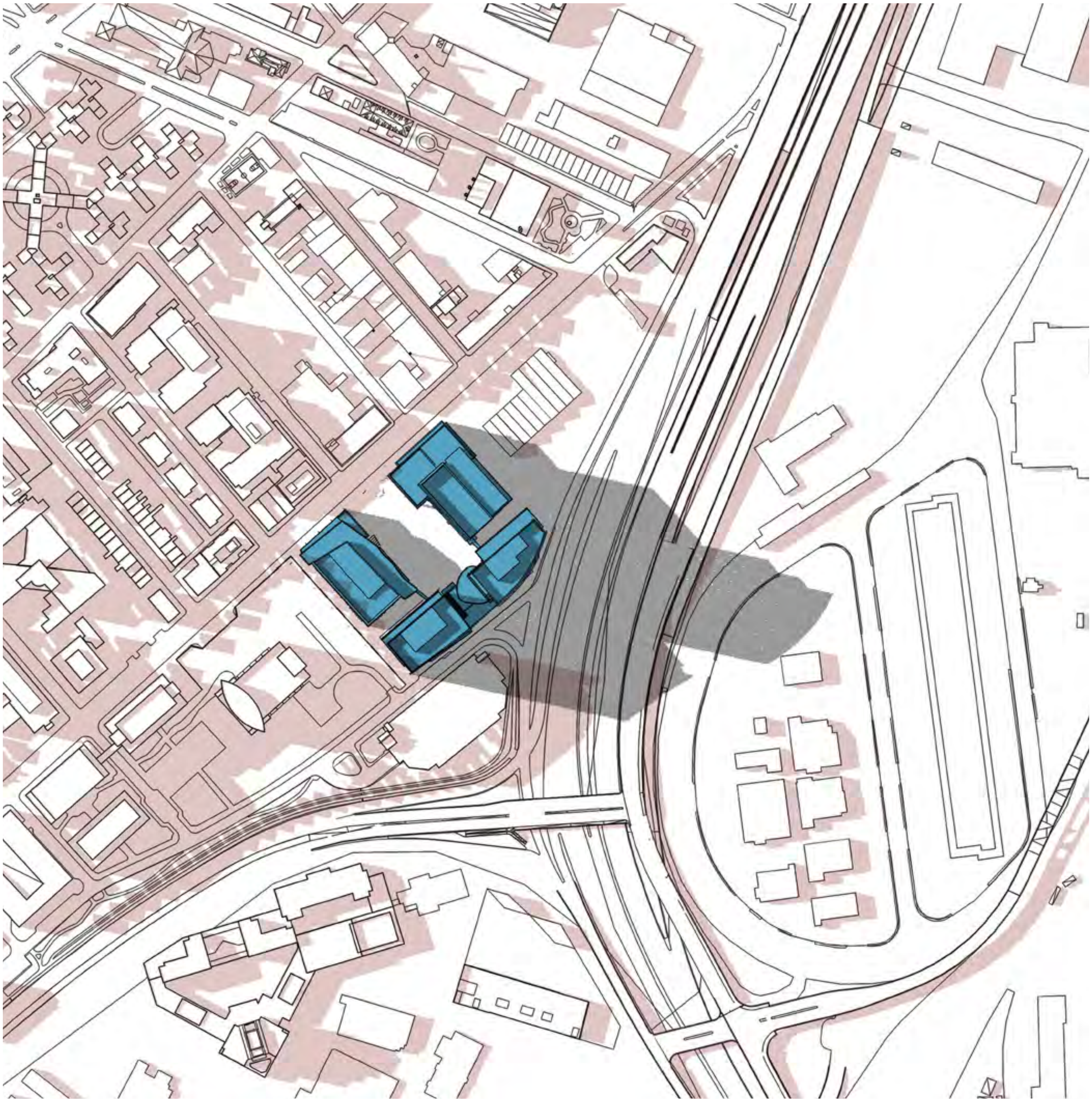
Stantec

EXCHANGE SOUTH END

Figure 3-6

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

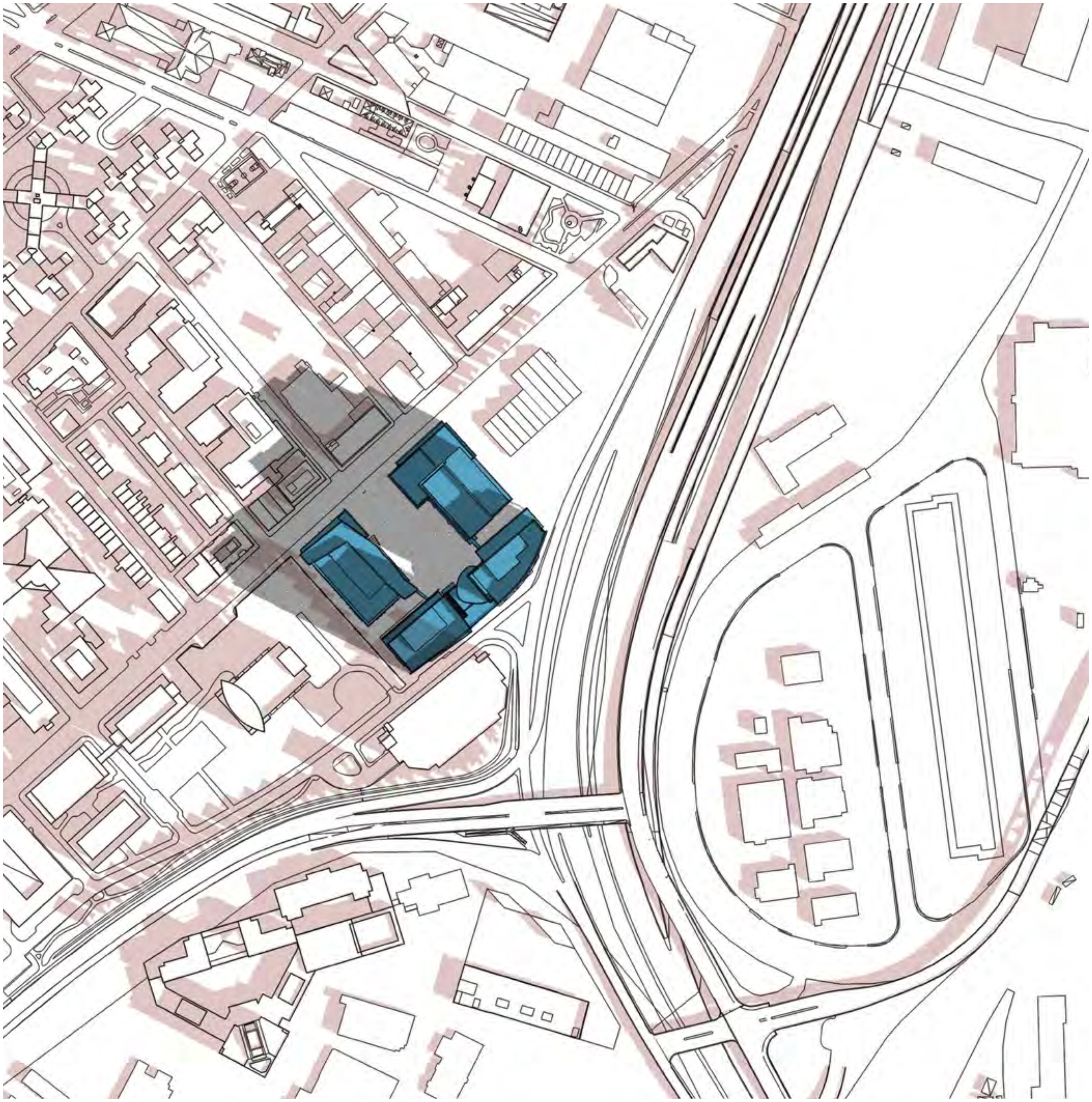
Stantec

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

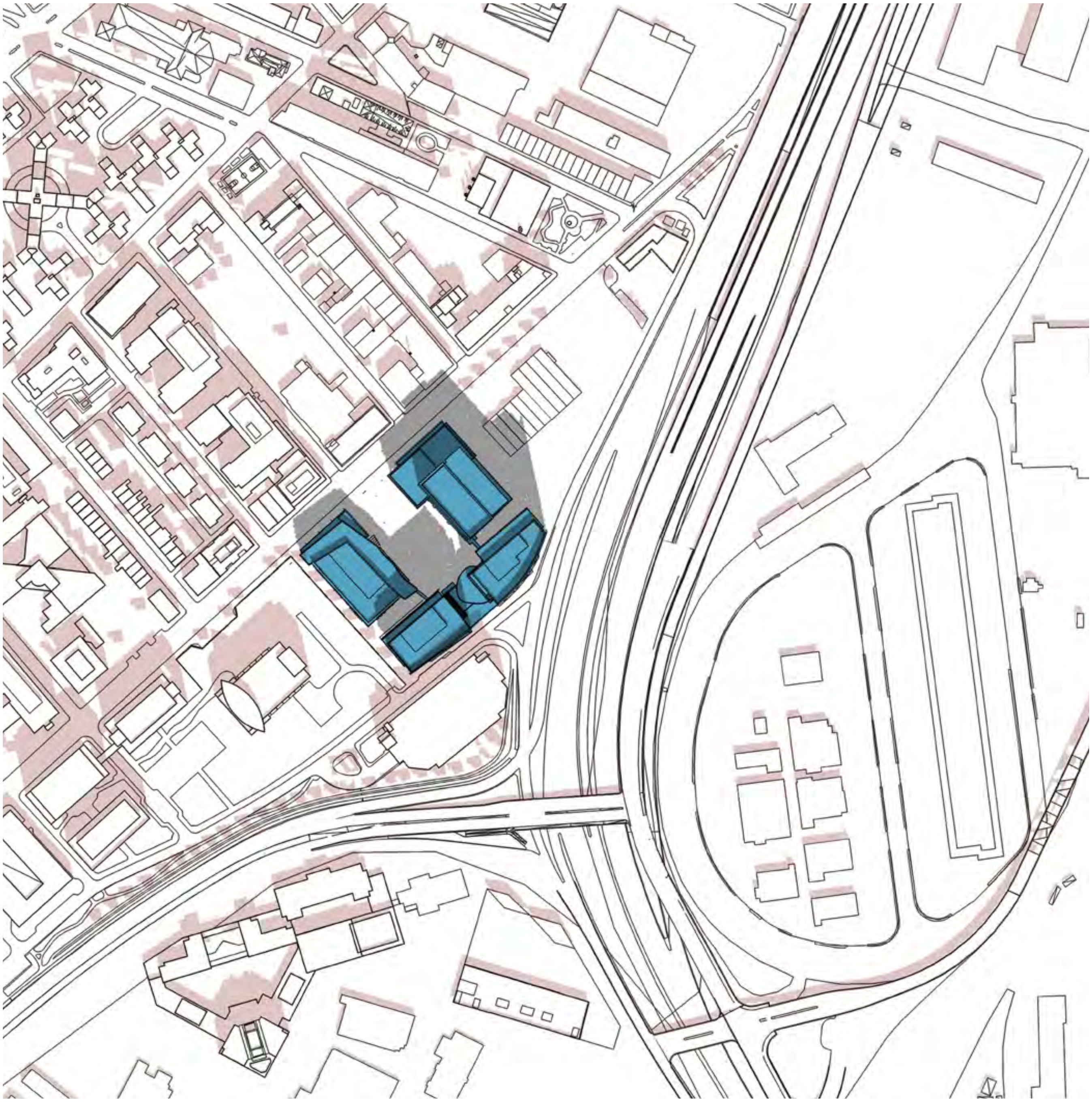
EXCHANGE SOUTH END

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

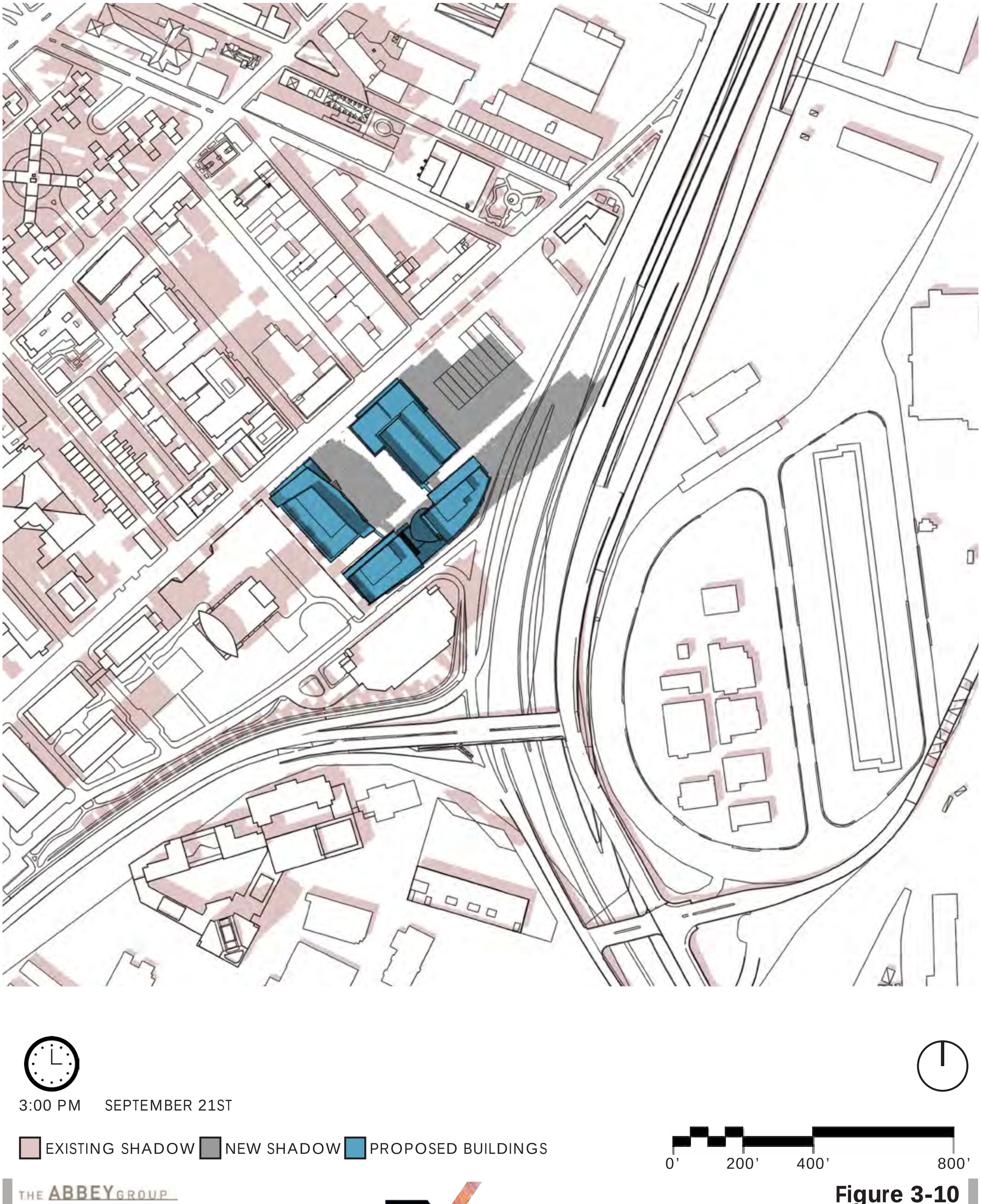
EXCHANGE SOUTH END

Figure 3-9

Shadow Study

September 21(12:00 PM)

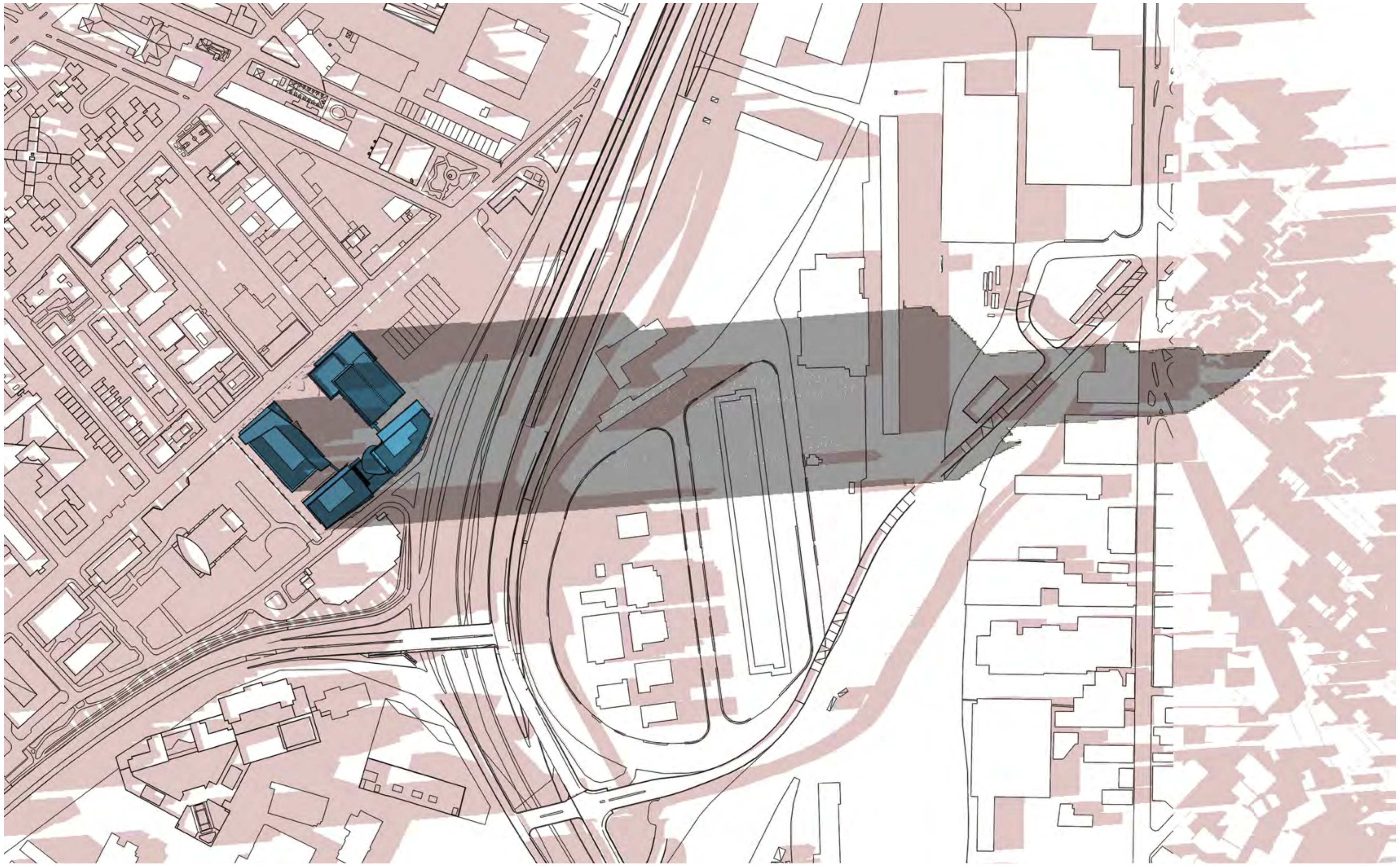
Source: Stantec



THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 3-10
Shadow Study
September 21(3:00 PM)
Source: Stantec



6:00 PM SEPTEMBER 21ST

EXISTING SHADOW NEW SHADOW PROPOSED BUILDINGS

0' 200' 400' 800'

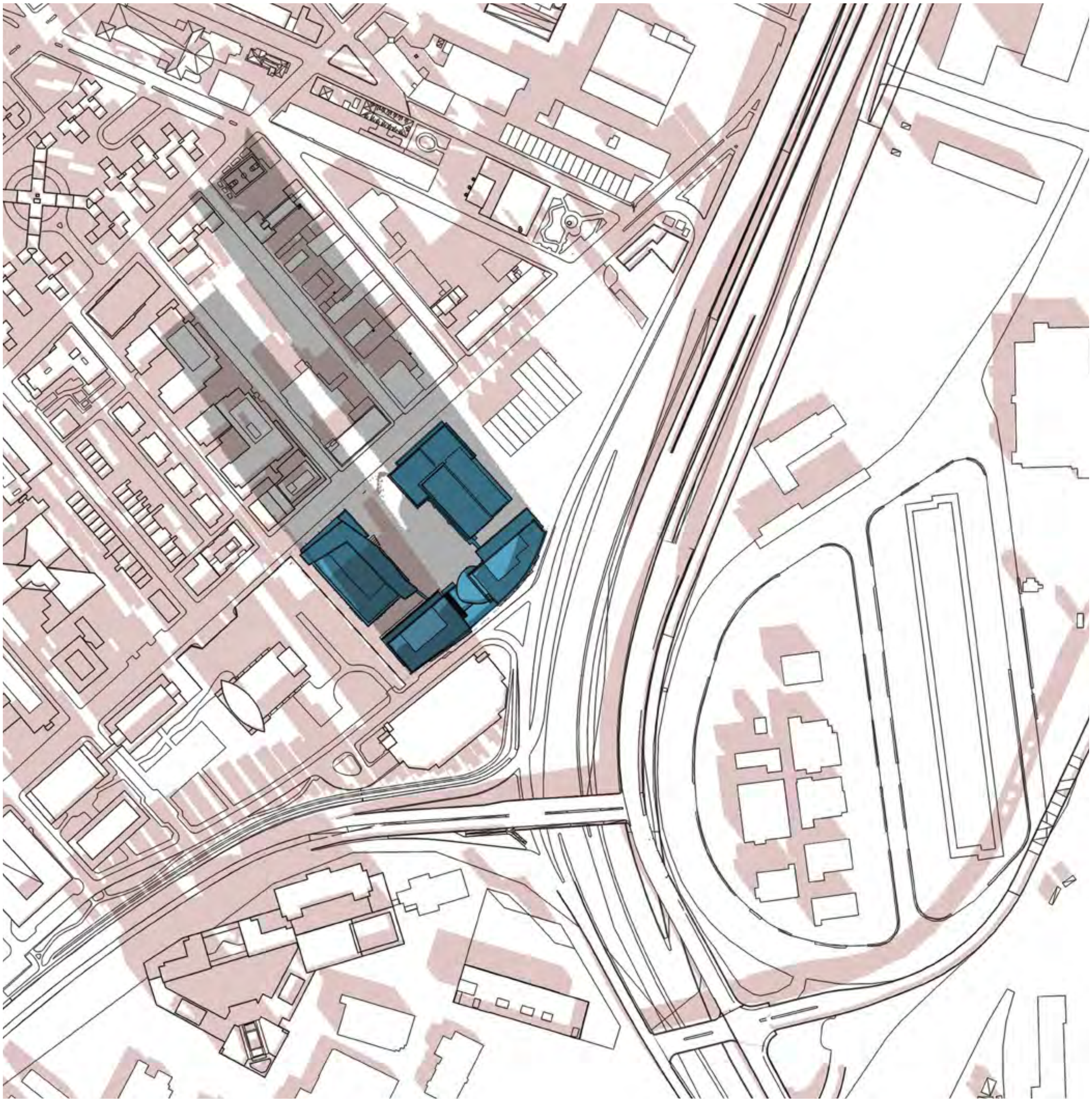
THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 3-11
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

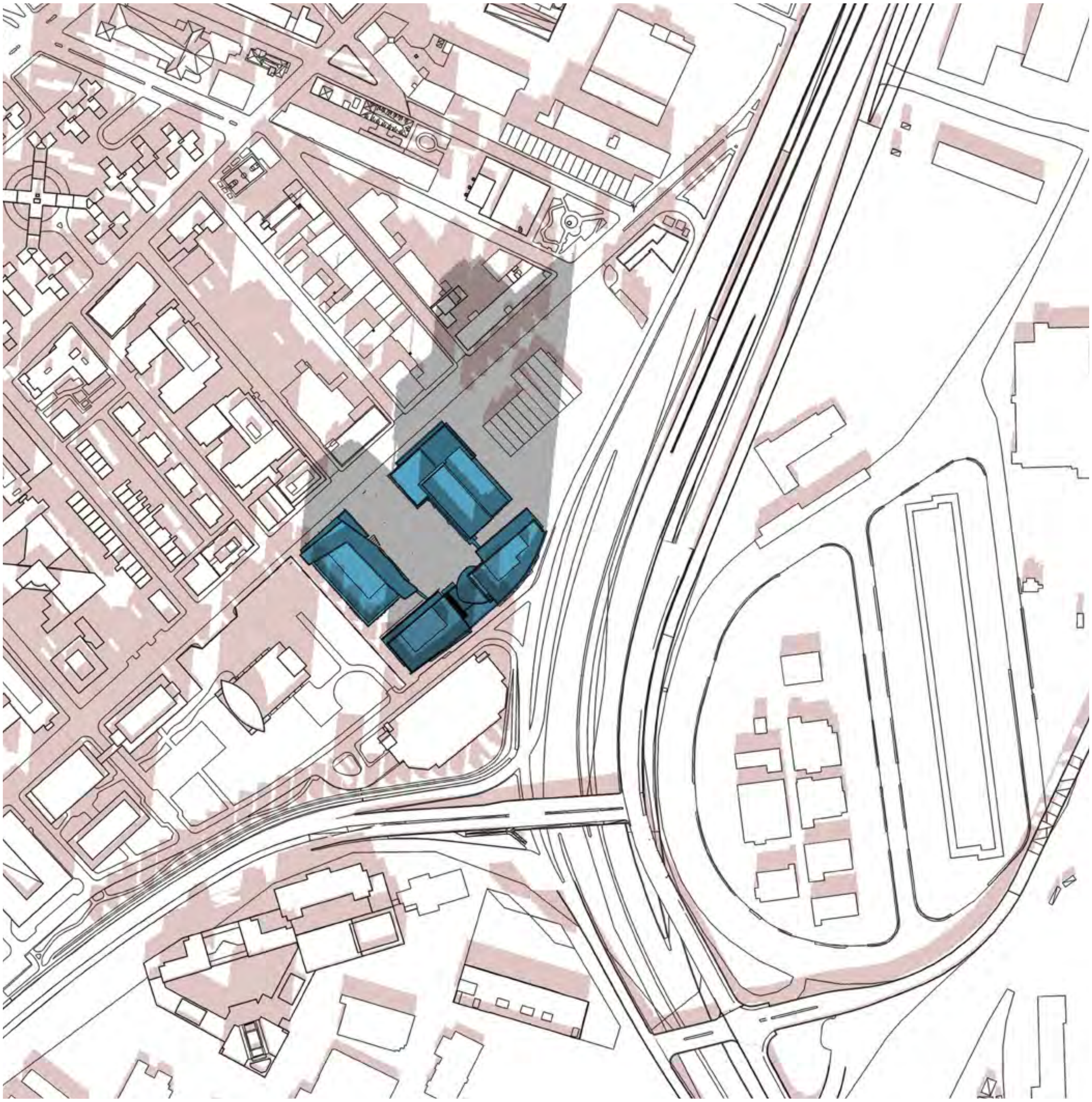
EXCHANGE SOUTH END

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

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.

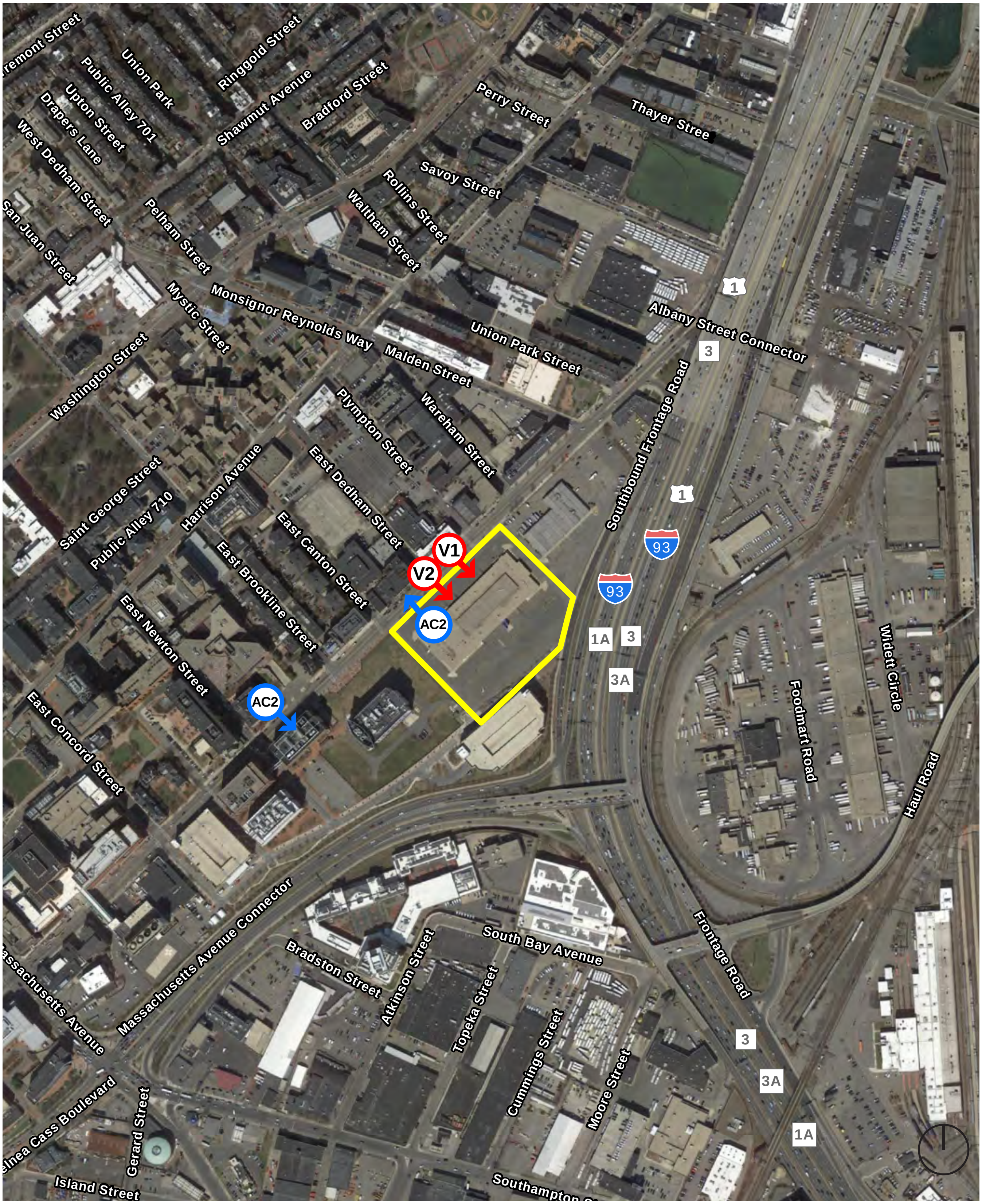
Using BRADA, a silhouette view of the building is taken at ground level from the middle of the adjacent city streets or pedestrian ways centered on the proposed building. The façade of the building facing the viewpoint, including heights, setbacks, corners, and other features, is plotted onto a base 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

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

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

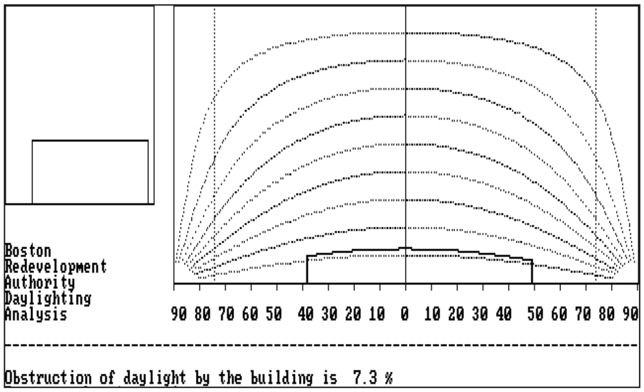
Viewpoints 1 and 2 were taken from Albany Street looking southeast toward the Site. The existing condition includes a surface parking lot and a low-rise, one-story building which is set back from the street. Therefore, the existing daylight obstruction values for Viewpoints 1 and 2, 7.3% and 7.3%, respectively, 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

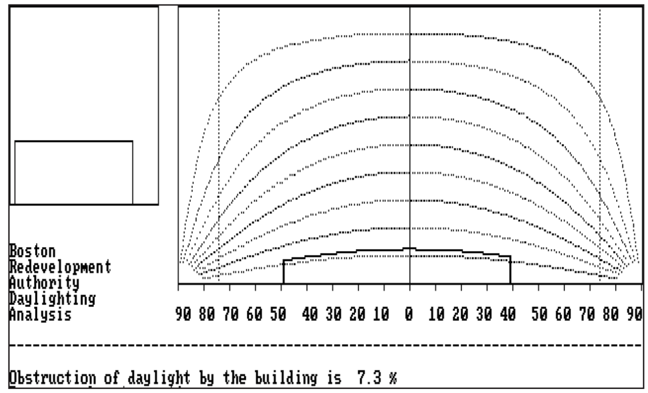
To provide a larger context for comparison of daylight conditions, obstruction values were calculated for two Area Context points described above and shown in Figure 3.4-1. The daylight obstruction values ranged from 64.7% for AC1 and 82.5% for AC2. Daylight obstruction values for the Project are similar or less than the buildings the Project vicinity, including the Area Context values.

3.4.4 Conclusion

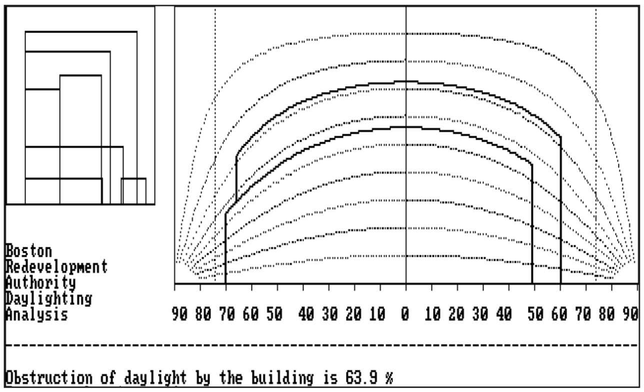
The daylight analysis conducted for the Project describes existing and proposed daylight obstruction conditions at the Project Site and in the surrounding area. The results for the BRADA analysis indicate that although the Project will result in increased daylight obstruction over existing conditions,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



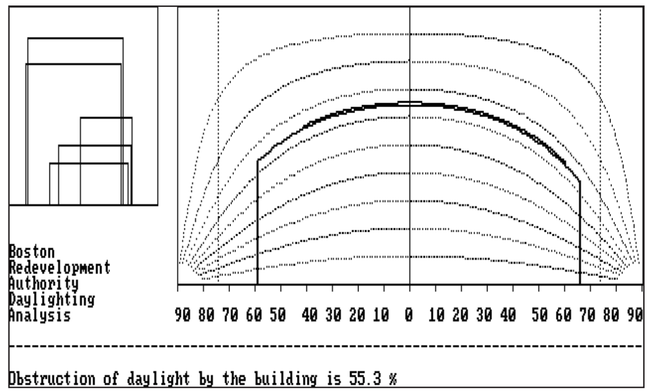
Viewpoint 1: View from Albany Street facing southeast toward the Project site



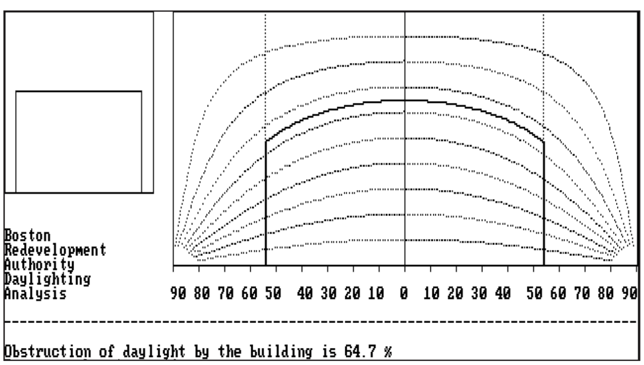
Viewpoint 2: View from Albany Street facing southeast toward the Project s



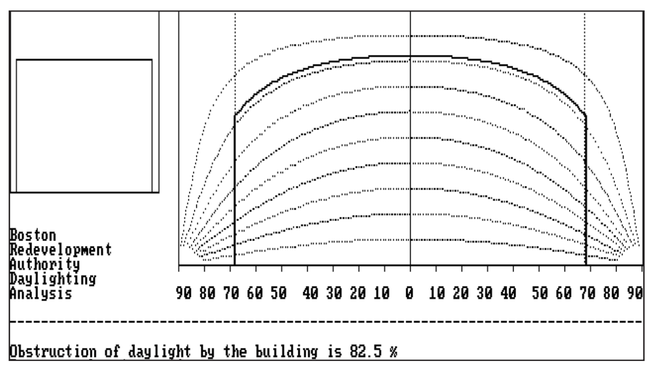
Viewpoint 1: View from Albany Street facing southeast towards the Project site (Buildings B and C)



Viewpoint 2: 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 (μg/m³)		MAAQS (μg/m³)	
		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 μg/m³ 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 μg/m³ 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 $\mu g/m^3$. 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/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.

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.

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

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.

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:

---

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

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)

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 & Meteorology 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

---

[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.

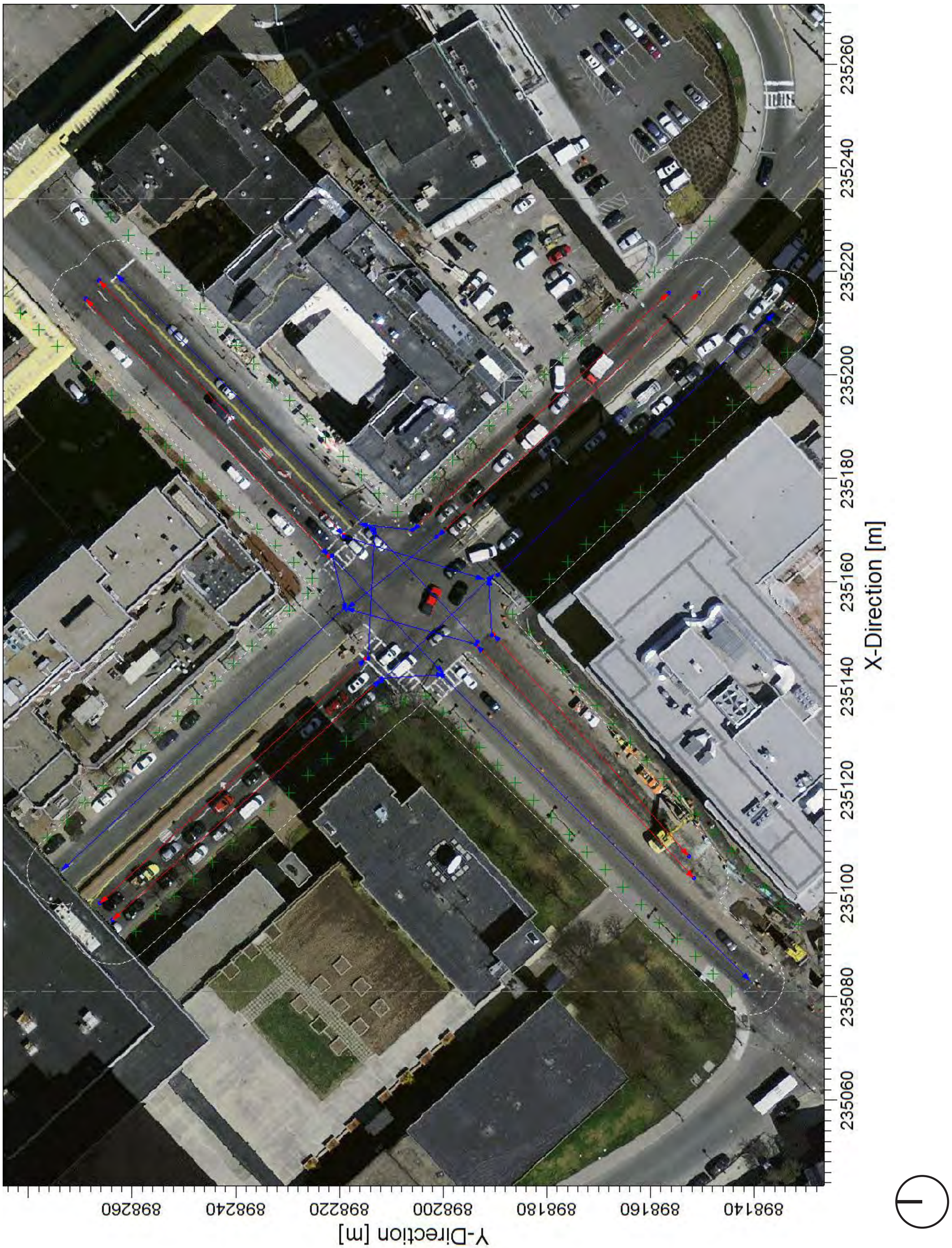
used. To account for the intersection geometry, wind directions from 0° to 350°, every 10° were selected. A surface roughness length of 321 centimeters was selected.[11]

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.

[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.

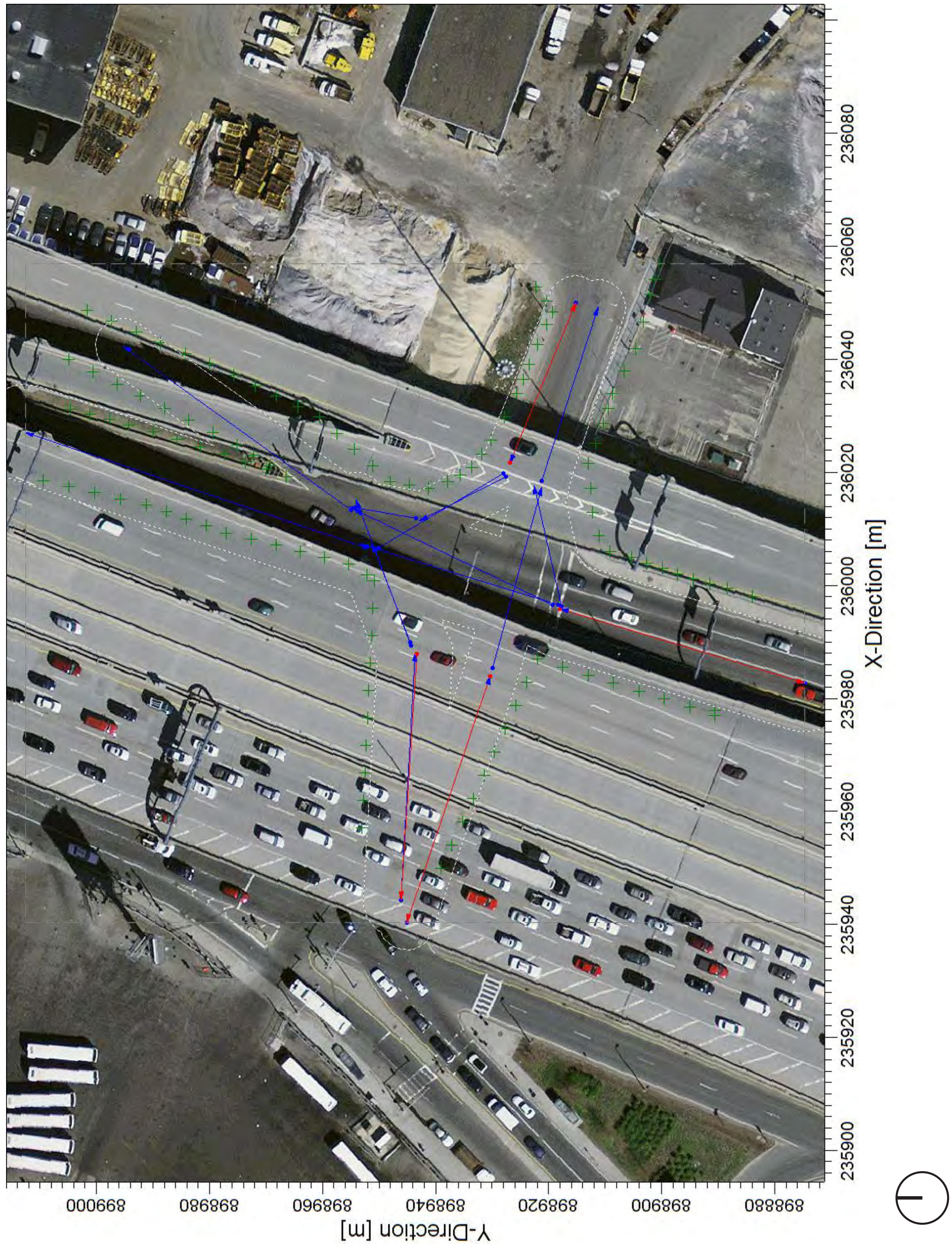


THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 3-17
Intersection of Massachusetts Avenue and Albany Street

Source: Epsilon Associates, Inc.



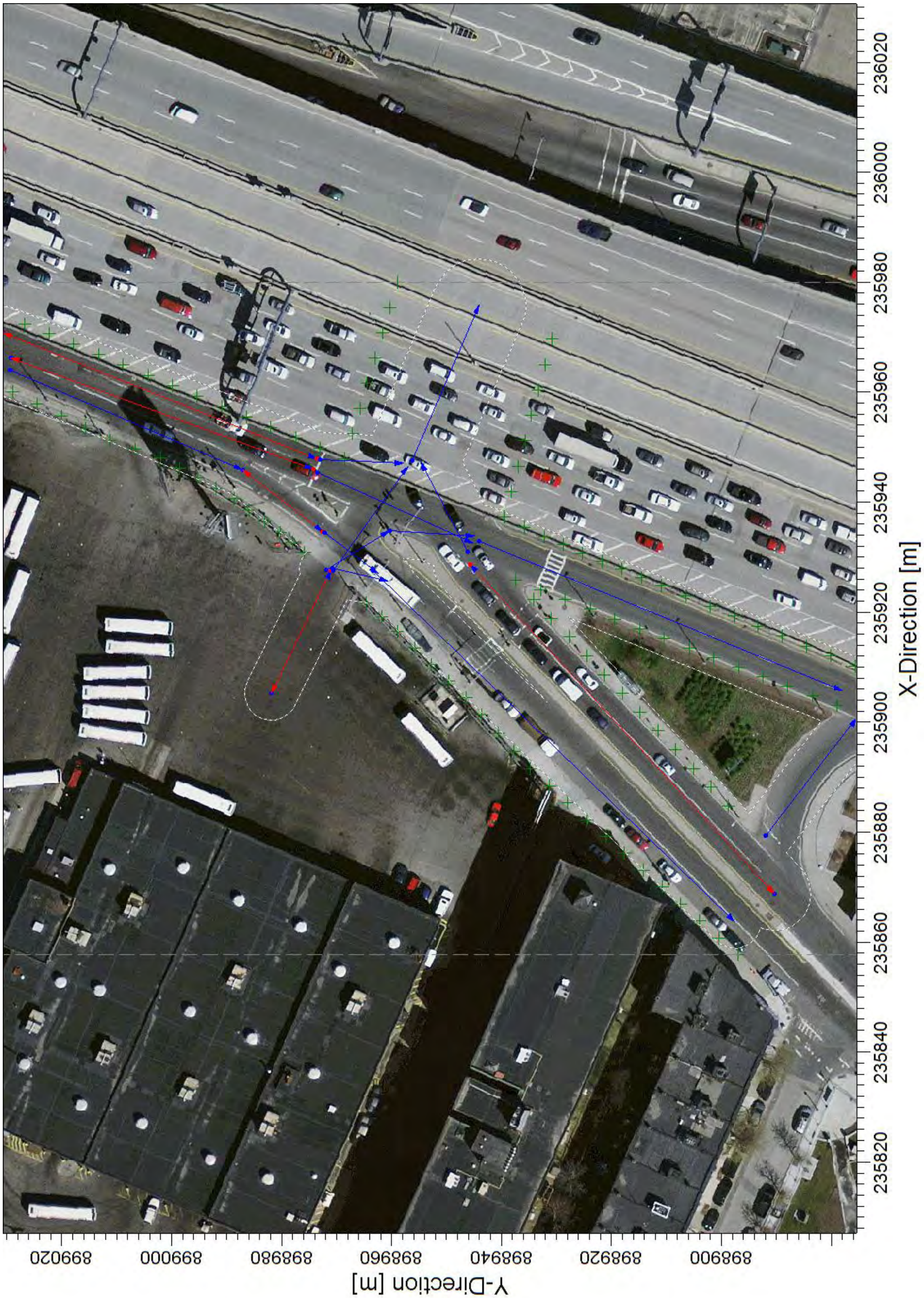
THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 3-18

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

Source: Epsilon Associates, Inc.



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

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.

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

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.

EXCHANGE SOUTH END

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:

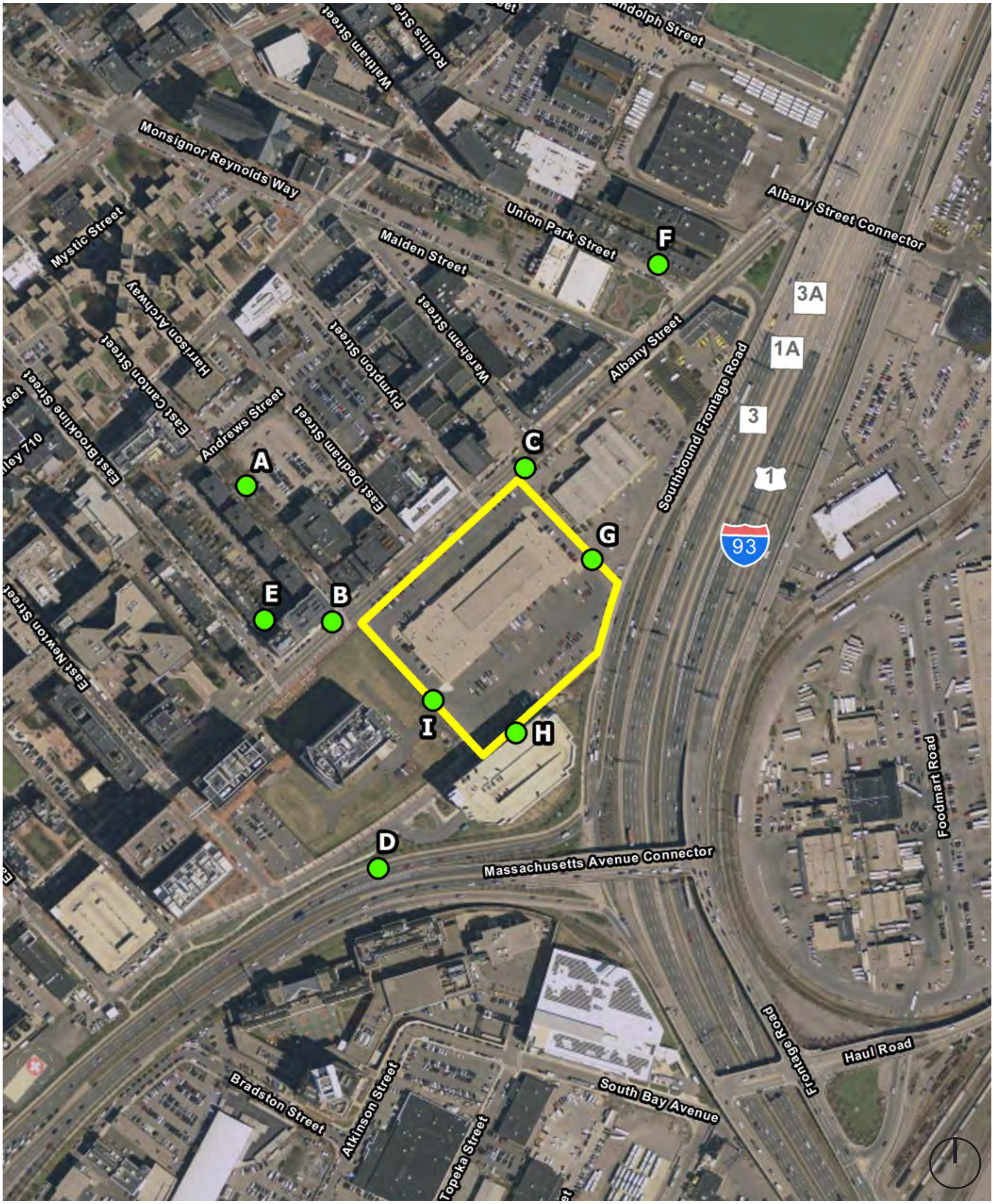
1. The Proponent will consult with the manufacturer to identify mitigation options to achieve the minimum attenuation values presented, or select a unit from an alternate manufacturer meeting the mitigated modeled sound levels.
2. Vibro Acoustics RD-HV-F1 Silencer insertion loss assumed
3. Greenheck 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**

3.7.5.5 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.

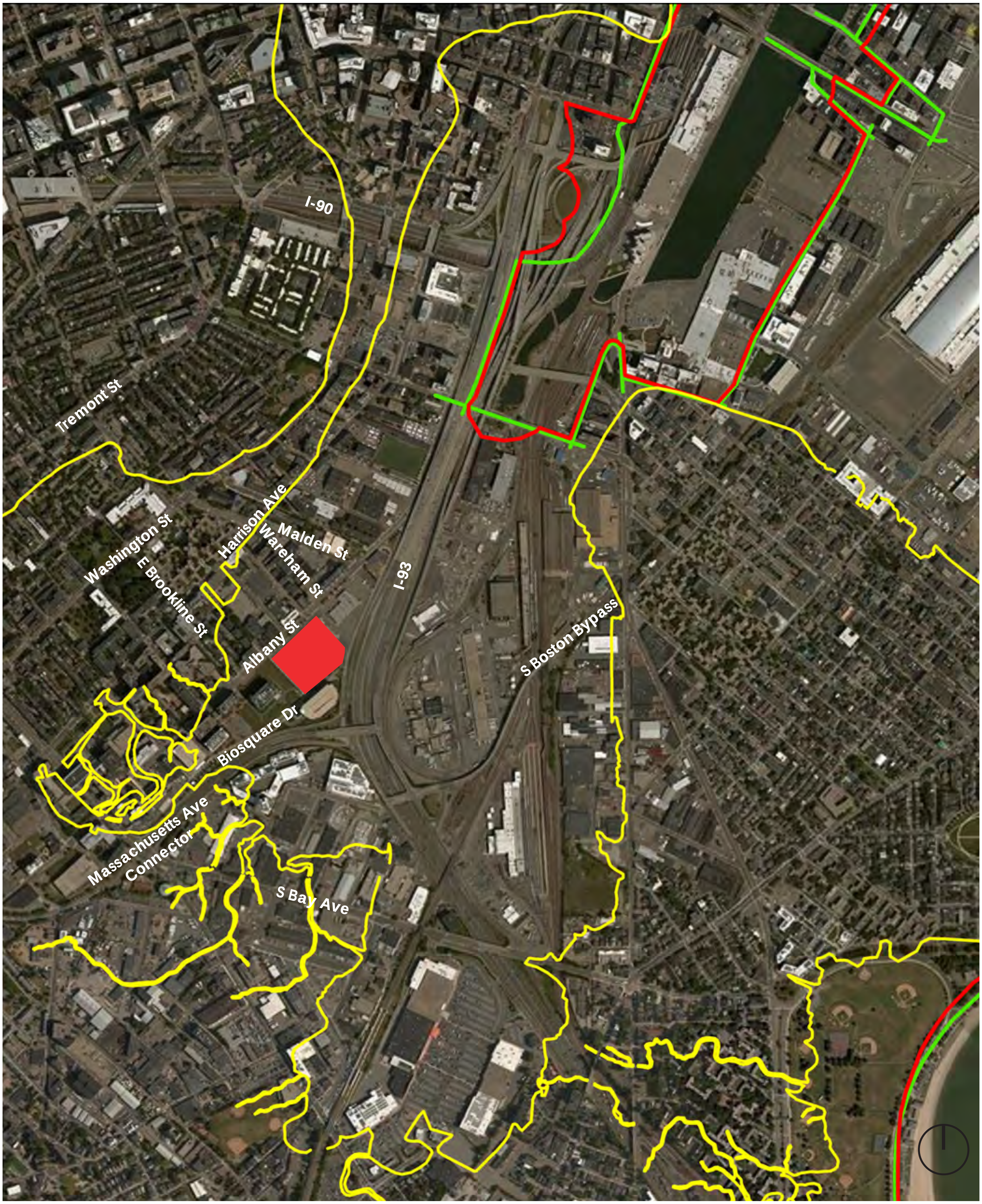
This Chapter of the PNF, examines the potential for the Project to result in environmental impacts to the project area and provides detailed description of how the project avoids, minimizes, or mitigates potential impacts related to a number of outlined environmental review components. Sustainability 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

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. 18.5 (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 and Bedrock Conditions

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 including test borings, exploratory test pits, and soil and groundwater testing for the presence of O&HM will be performed at the Site during subsequent project design phases and prior to construction.

Generalized subsurface conditions are described below, 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 Site previous 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 granite block seawall exists along within the Site. The granite blocks are likely supported on wood piles driven into the underlying marine soils. Also, remnants of previously existing foundations, buried slabs, other buried seawalls, buried wharves, abandoned and active drainage structures, and other below-grade structures are also expected to be present 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 ranged between 2 ft. and 21 ft., and was highly variable.

Marine Clay - The marine clay was encountered at depths ranging from about 25 to 30 ft. below 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 argillite. At isolated locations, medium hard, fine grained diabase was encountered. Bedrock was encountered at depths ranging from about 125 to 145 ft. below 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.

The Site is located within an area defined by FEMA as an "Area of Minimal Flood Hazard, Zone X," according to FEMA Map 25025C0079J, dated 3/15/2016.

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 any groundwater into the excavation will be collected and discharged under appropriate permits.

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 sub slab 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 in no impacts to groundwater levels.

Groundwater level monitoring with a system of observation wells will be used to demonstrate no impact to area groundwater levels. The wells will be installed prior to construction and monitored throughout below grade garage construction.

3.12.4 Proposed Foundation Construction

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

3.12.5 Excavation

The proposed building development is planned to include underground parking. Excavations up to 40 ft. below ground surface will be required for foundation and below grade construction. Excavation will be conducted within a stiff watertight excavation support system designed and constructed to minimize off-site impacts. Performance criteria will be established to mitigate impact and specified in the contract documents. Excavation will remove the surficial fill and organic soils.

3.12.5.1 Methodology

Excavation is expected to utilize conventional earth excavation equipment. 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. Odor control measures will need to be implemented when excavating through the organic soils. Dewatering will be required to conduct the work in the dry. Refer to separate sections for a discussion of the temporary earth support and groundwater methodology.

3.12.5.2 Excavation Disposal and Soil Management

As noted above, the Site contains man-placed fills that are anticipated to contain low levels of contaminants ubiquitous to the area. Excavated soils to be removed from the Site will be characterized and for off-site disposal or recycling in accordance with applicable regulations including the Massachusetts Contingency plan. Additional details are included in Section 3.11.1. A soil management plan will be developed and included in the Contract Document defining requirements for execution of work.

3.12.6 Mitigation Measures and Monitoring

The proposed construction is not expected to impact foundations of adjacent or nearby structures. Adjacent structures include the New Emerging Infectious Disease Laboratory 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. Also, adjacent to the Site is US Route 93. These structures will be protected against movement by a rigid lateral earth support system. The construction will be conducted in a manner that will not adversely impact adjacent structures.

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.

A geotechnical engineer or technician will be on Site during the foundation and subsurface construction to confirm compliance of the work with the project plans and specifications, as well as monitor geotechnical instrumentation.

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.

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	480,700 SF	502,000 SF	386,725 SF
3 levels below grade 8 levels above grade	3 levels below grade 16 levels above grade	3 levels below grade 23 levels above grade	3 levels below grade 17 levels above grade

Building A / Building B / Building C / Building D of development consisting of up to approximately 42,500SF of retail located along Albany Street in the neighborhood of Boston. The total construction duration is anticipated to be approximately 24 months for Building A 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

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

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

This narrative articulates how the Project intends to comply with Article 37 of the Boston Zoning Code, 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. The Project 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, 30,000 sf of cultural, community and innovation space, and a mixture of office/lab space above. 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. 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 certify, at minimum, LEED Silver. This means each individual project must demonstrate compliance with all LEED prerequisites and accrue at least 50 of the 110 possible points within the LEED-NC(v4) rating system. Currently, projects are targeting 56 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 1,599,425 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	130,730
• Area outside footprint comprised of hardscape	115,415
• Total number of parking spaces	1,159
• Number of stories above grade, excluding parking	6-20
• Number of stories below grade excluding parking	0
• Total number of stories	9-23
• 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

<u>Budget and Historic Project Data</u>

- Project is located in a historic district — Yes
- Project is on a historic registry — No
- Project budget — $600,000,000

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 — 1,199,569
- Total leased gross area — 1,199,569
- Percentage leased gross area — 75%
- Total unconditioned gross area — 467,930
- 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)
MEP Penthouse	76,500	Owned	N/A	Yes
Office/Lab	1,481,350	Leased	Yes	No
Civic	30,000	Leased	Yes	No
Retail	42,500	Leased	Yes	No
Lobbies	20,400	Owned	No	No
Services	25,175	Owned	No	Yes
Parking	490,000	Owned	No	Yes

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

<u>Schedule</u>

- Phase in which LEED certification was initiated — Schematic Design
- Date estimated for preliminary review — TBD – pending initiation
- 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.

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.

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. – encourage teams to ask the right questions to enhance LEED as a mechanism for positive impact.
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

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 1,159 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 1,159 spaces
% Reduction = 72.56% (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, the proposed Project will infiltrate stormwater to replenish the below grade aquifer in this area 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 comply with this minimum requirement.

3. The Project design takes into consideration climate conditions 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. The Project 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). The Project 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. The Project will be designed to 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, the Project 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 (6 points "YES"/5 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). The Project anticipates utilizing only non-potable sources for irrigation demand, primarily through rooftop stormwater harvesting and condensate. The Project 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%. The 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 "MAYBE")

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 may be earned for projects which measure 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 (6 points "YES"/15 points "MAYBE"/5 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): (2pts "YES"/4 "MAYBE")

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 shall consider Enhanced Commissioning (Path 1, at minimum). 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. Individual projects will explore additional monitoring-based procedures for energy and water systems, as well as Envelope Commissioning.

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 E (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 "MAYBE")

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 may be earned for projects which measure 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: (2 Points "MAYBE")

Projects will consider being designed to be "demand response ready" (Case2), meaning they will consider providing 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 it 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 "MAYBE")

Renewable energy credits (REC's) shall be explored on a project by project basis as needed to maintain 55 points/push individual projects from one certification threshold to the next higher level.

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 combined and the following streams shall be collected: paper, cardboard, metals, glass, plastics, e-waste, batteries, and mercury-containing lamps. Additionally, the Project 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 projects 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.

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% minimum) (CAMPUS): (1 point "MAYBE)

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.

5.1.1.1 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.

5.1.1.2 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 1 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.

5.1.1.3 Design Goals

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

The Proponent 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 a possible restaurants, local boutiques, cafés, and other retailers, in addition to daycare and fitness facilities. The Project has strategically located the Community space inside the Plaza to draw visitors from the streets' edge into the Site. This will create an 18-hour active plaza perfect for cross collaboration. 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 550 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 from 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 a 30,000-square-foot destination arts and culture hub that will contribute to the energy of South End and SoWa by introducing a flexible venue for a wide variety of events, performances, shows, and other community programming. It will be a hub for arts, culture, and gathering. The cultural center is visible at the end of the Albany Green on the bottom stories of the building 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 45% 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.

(a) Perspective from Albany Street looking North

(b) Perspective from I-93 looking South

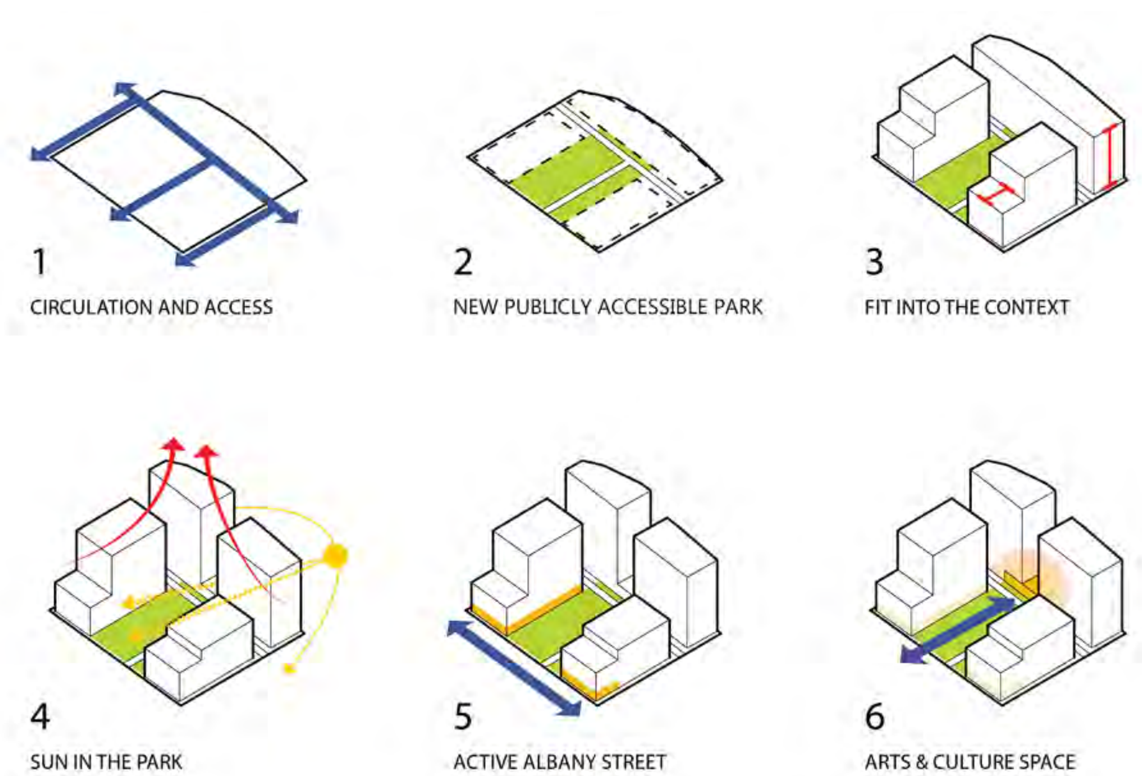
THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 5-1
Perspectives

Source: Stantec

(a) Perspective from Albany Street looking East



(b) Massing Build-up

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 5-2
Perspectives

Source: Stantec

5.3 MASSING

The massing of the four buildings has been carefully thought out to provide context and connection to the adjacent residential neighborhood, as well as, allow maximum sunlight into the public 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.

• 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 14-story office and lab building with retail at the ground floor. Building B can be broken down into three pieces: a base, a front massing and a back massing. Similar to building A, the street wall of the building is set to remain consistent with many of the buildings across Albany Street. The 3-story base is consistent around the whole building. As the building steps back, a 4-story rectangle cantilevers over the plaza to create a defined entry and a covered patio. The back portion of the building extends from the base to 14 stories high. The building will continue to define the commercially active street edge along Albany Street with more restaurants and local boutiques. Retail and amenity spaces also wrap the building edge along the plaza and a portion of the building edge along the new streets. A through building lobby will allow for future connections to the adjacent Jacobson parcel.

• Building C – A 20-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.

- 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.

- The jewel of the Site is located between buildings C & D and houses the community space. It is designed as a special feature destination to draw people from the street, through the plaza, and into the back of the Site. It is visible from both Albany Street and the Interstate.

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 5-3, Axonometric View of the Project Site.

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 5-3
Axonometric View of the Project Site
Source: Stantec

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

Figure 5-4
Proposed Building Materials

Source: Stantec

(a) East Elevation

(b) North Elevation

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 5-5
Elevations

Source: Stantec

(a) South Elevation

(b) Through North Elevation

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 5-6
Elevations

Source: Stantec

(a) Through South Elevation

(b) West Elevation

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 5-7
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 5-8, Preliminary Landscape Plan, Figure 5-9, Planting Plan, Figure 5-10, Paving and Furnishings Plan, Figure 5-11, Lighting Plan, Figure 5-12, Vehicular Zones, and Figure 5-13, Albany Green Section,

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. 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, and Figure 5-15, Albany Green Lawn – Section and Perspective.

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 skating rink in the winter, or lunch-time concerts in the summer. On the south side a water feature in the paving creates a place for 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, and Figure 5-17, Albany Green Plaza – Section and Perspective.

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, 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 5-18, Albany Green Quiet Garden Plan, and Figure 5-19, Albany Green Quiet Garden – Section and Perspective.

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 retail activities including café furniture to spill out onto the sidewalk and enliven the public realm. See Figure 5-20, 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 two-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. Three drop-off spaces on either side of 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.

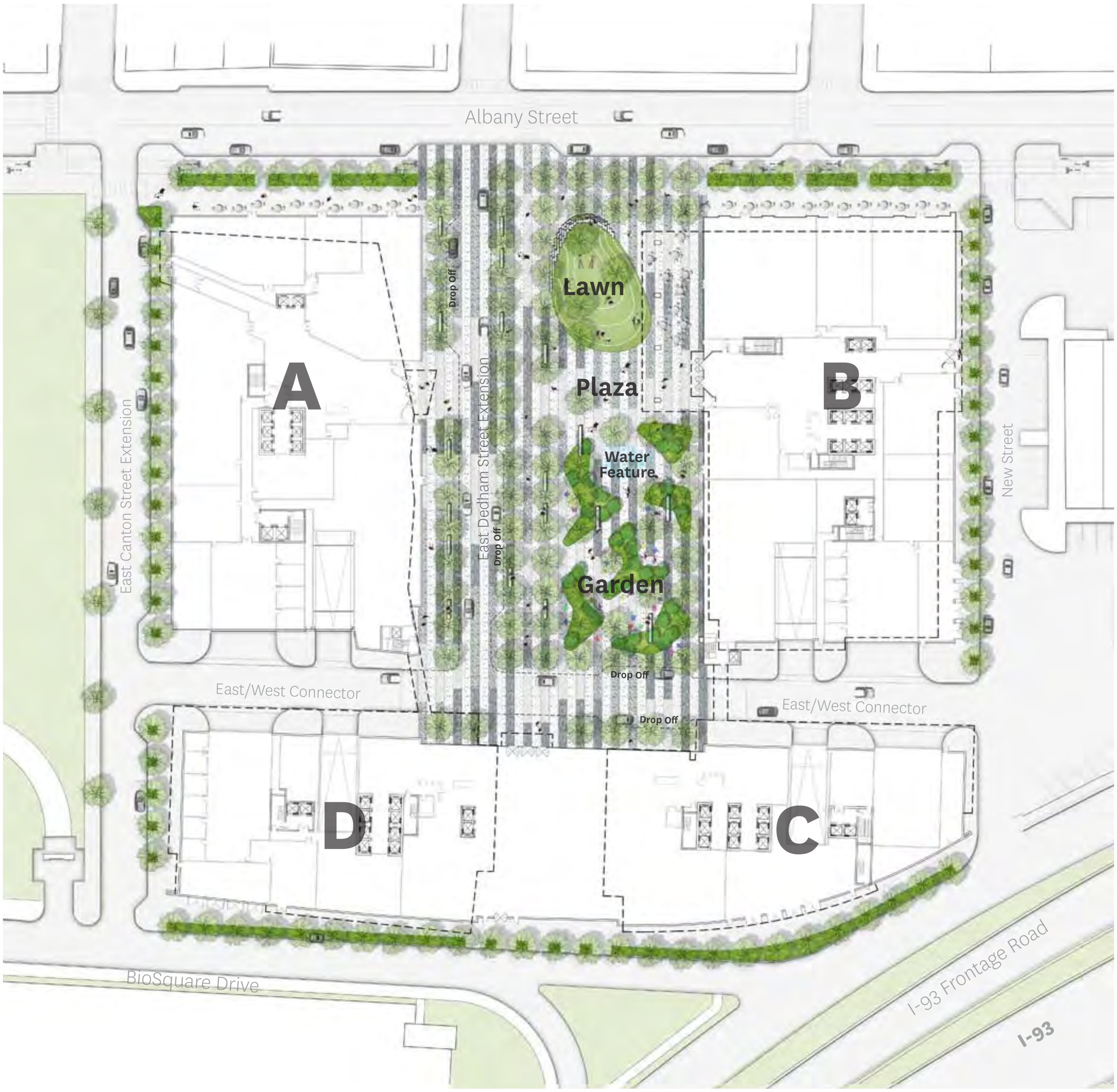
East Canton Street Extension and New Street

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 Albany to the I93 Frontage Road. 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 5-21a, East Canton Extension Section, and Figure 5-21b, New Street Section.

East/West Connector

The East/West Connector 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.



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 5-8
Preliminary Landscape Plan

Source: MVVA

1. High Canopy Deciduous Tree

2. High Canopy Street Tree

3. Flowering Trees, Shrubs & Groundcover

4. Lawn

THE ABBEY GROUP

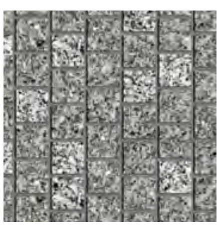
MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

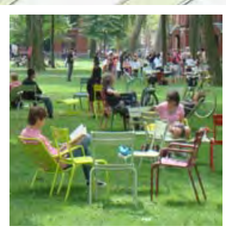
Figure 5-9
Planting Plan

Source: MVVA



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

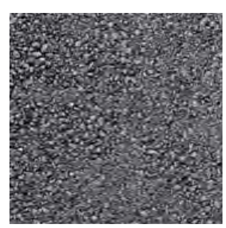
2. Slavaged Granite Blocks



3. Moveable Garden Chairs

4. Cafe Tables & Chairs

5. Cast-in-Place Concrete Pavement



6. Asphalt

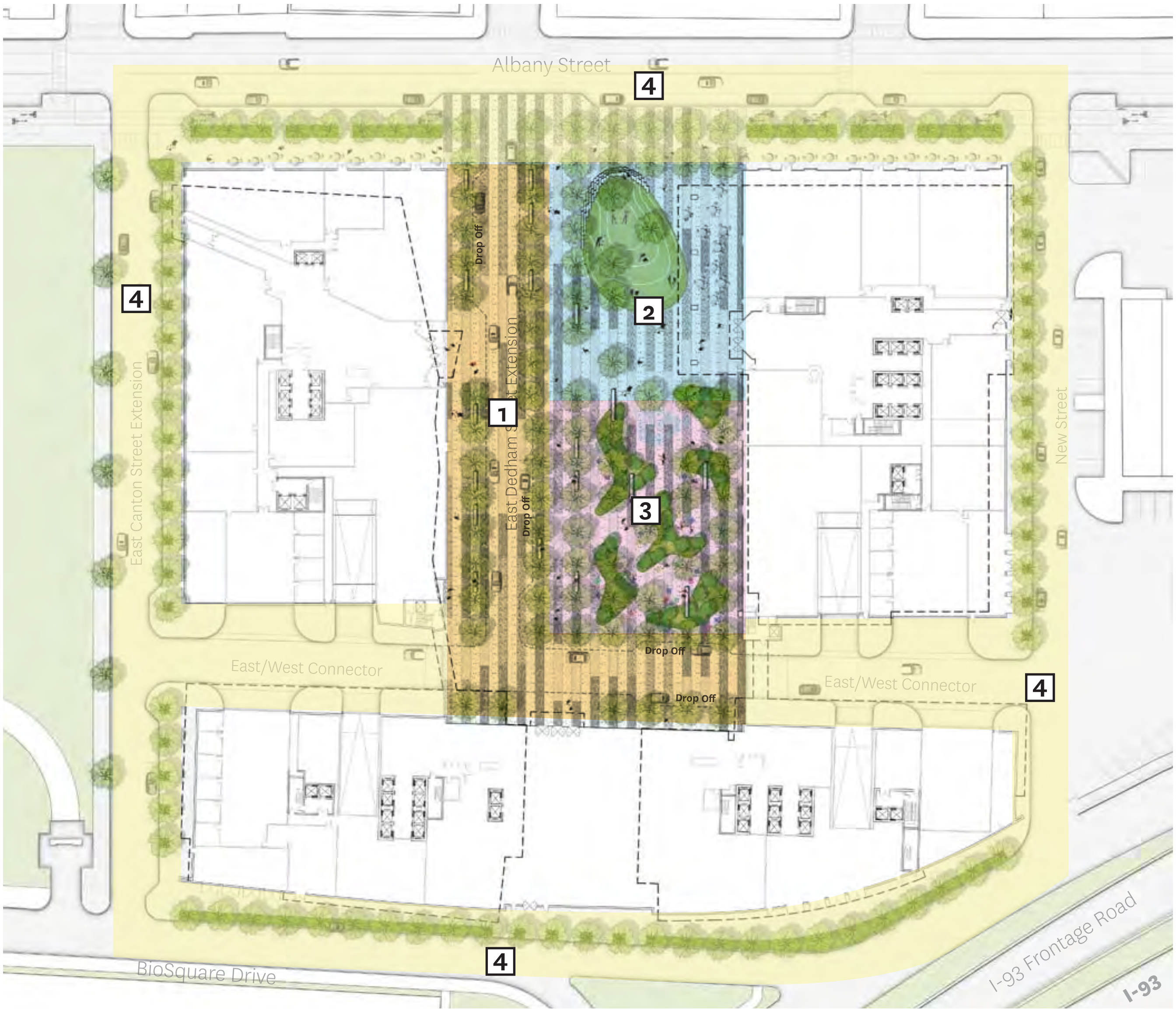
THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

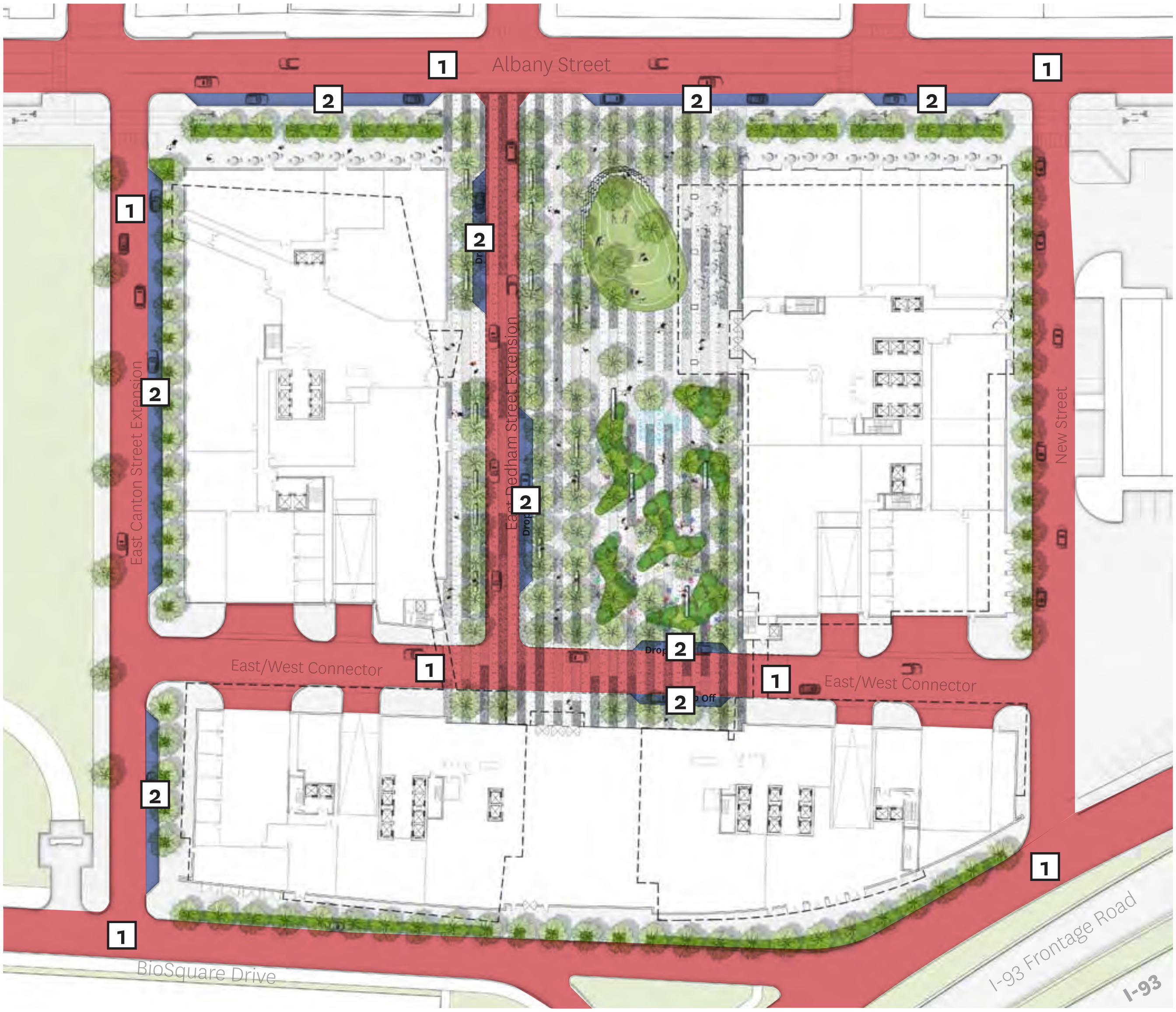
Figure 5-10
Paving and Furnishings Plan
Source: MVVA



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

Figure 5-11
Lighting Plan

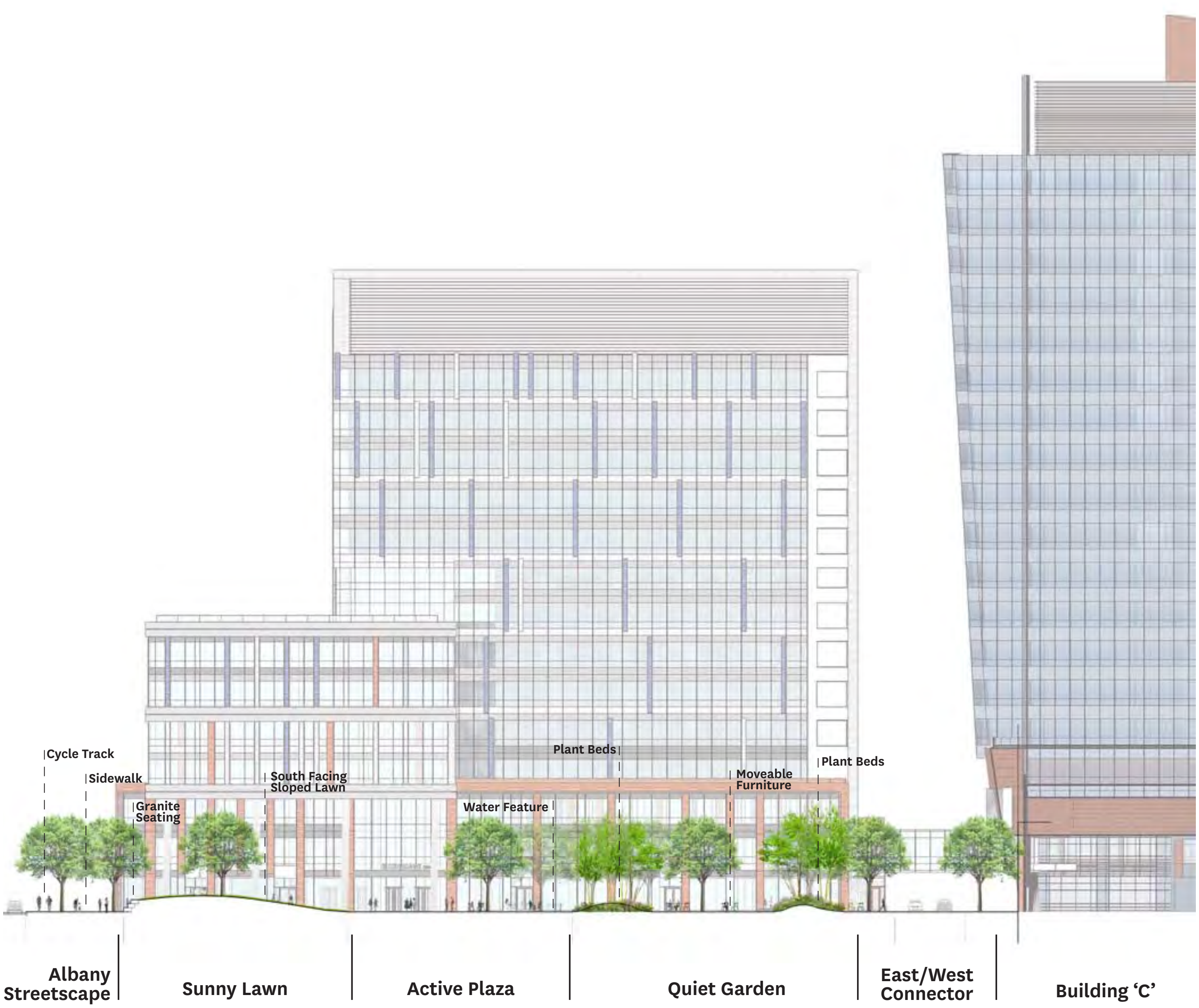
Source: MVVA



1. Vehicular Circulation
2. Parking/Drop-Off

Figure 5-12
Vehicular Zones

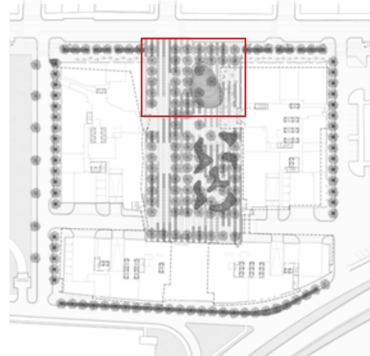
Source: MVVA

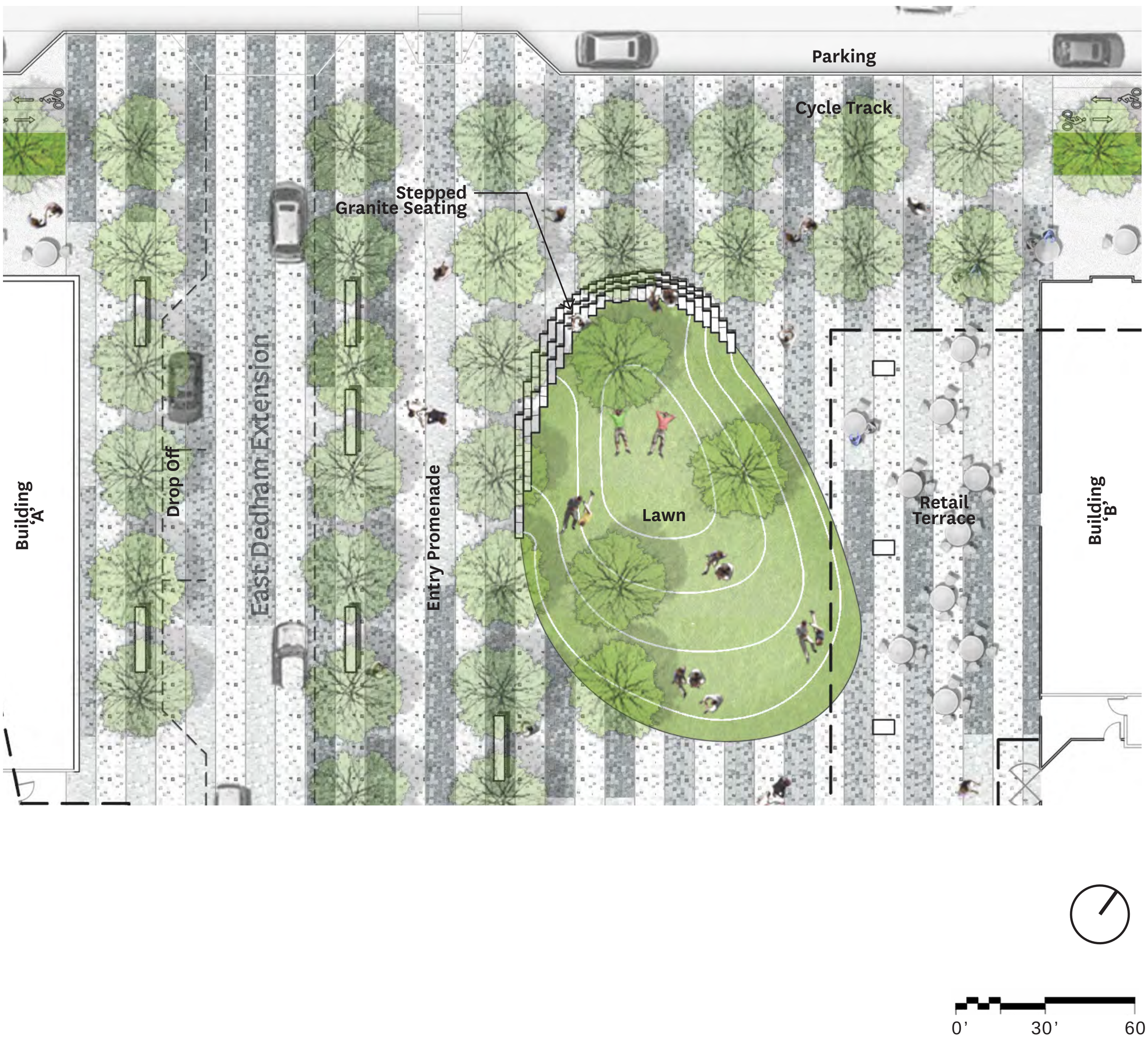


THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 5-13
Albany Green Section
Source: MVVA



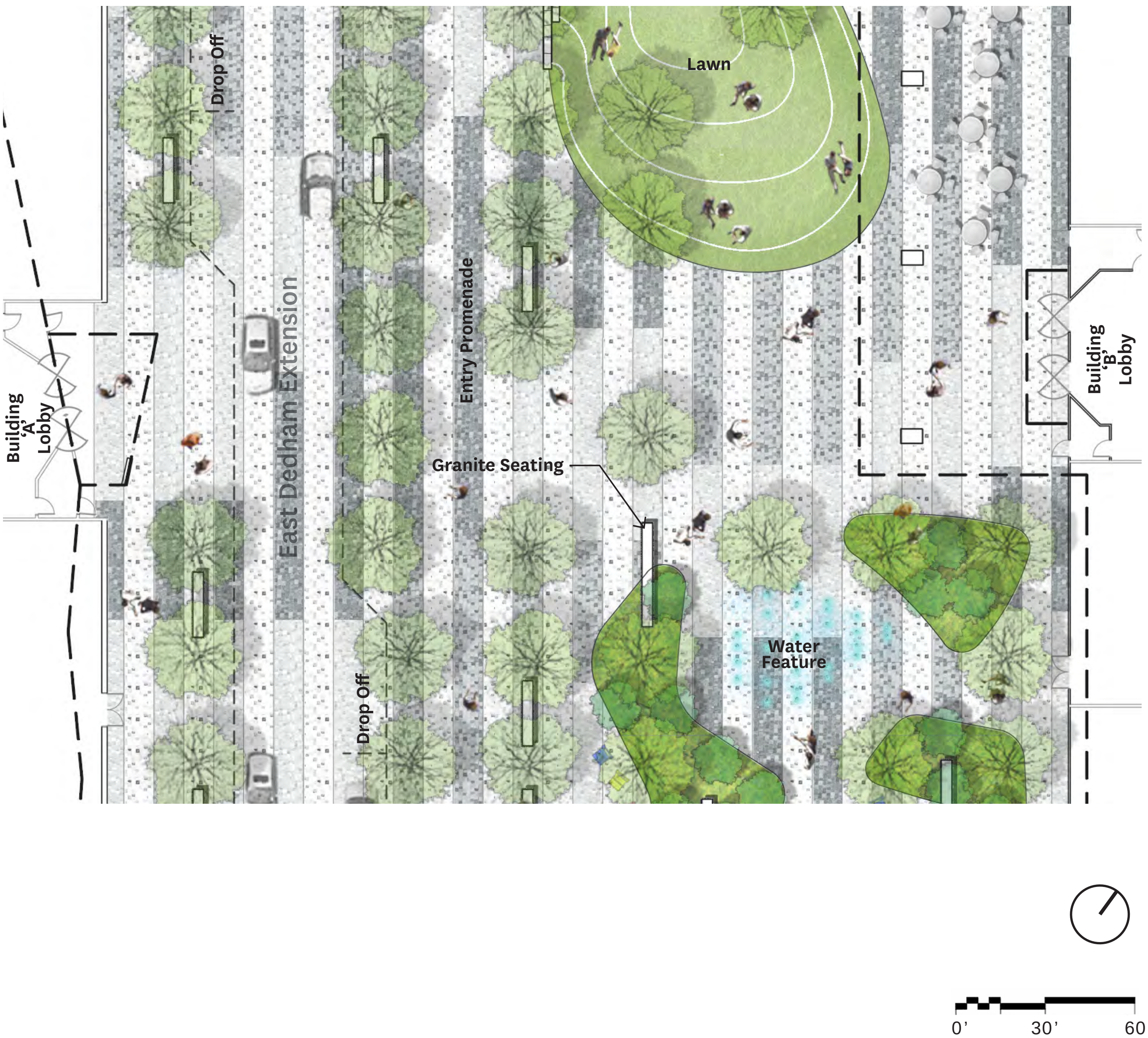


THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 5-14
Albany Green Lawn Plan
Source: MVVA

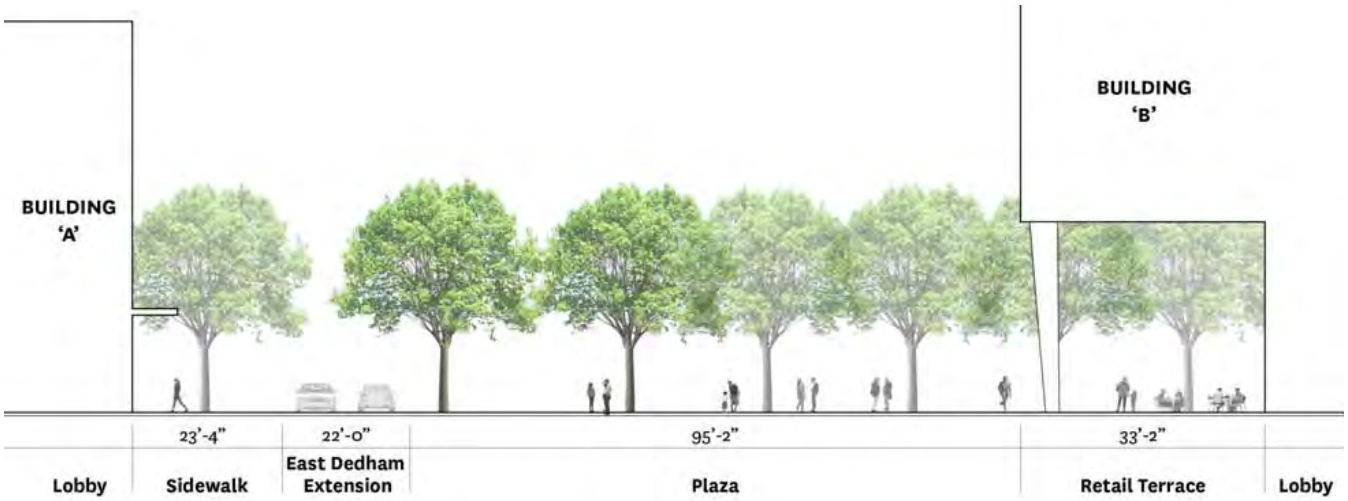
Figure 5-15
Albany Green Lawn Section and Perspective
Source: MVVA



THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 5-16
Albany Green Plaza Plan
Source: MVVA



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

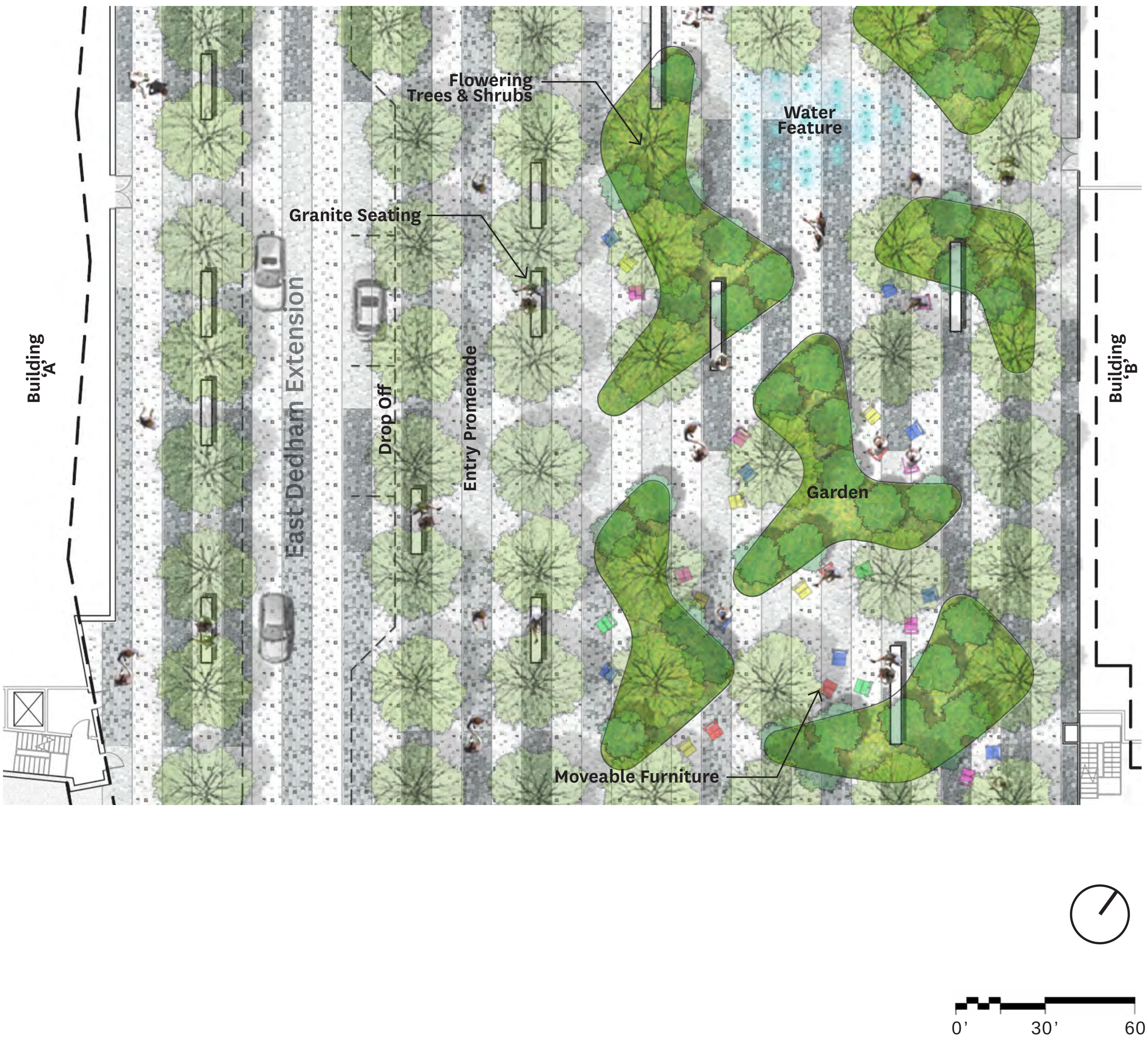
Stantec

EXCHANGE SOUTH END

Figure 5-17

Albany Green Plaza Section and Perspective

Source: MVVA



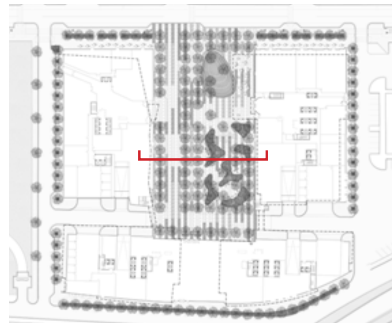
THE ABBEY GROUP

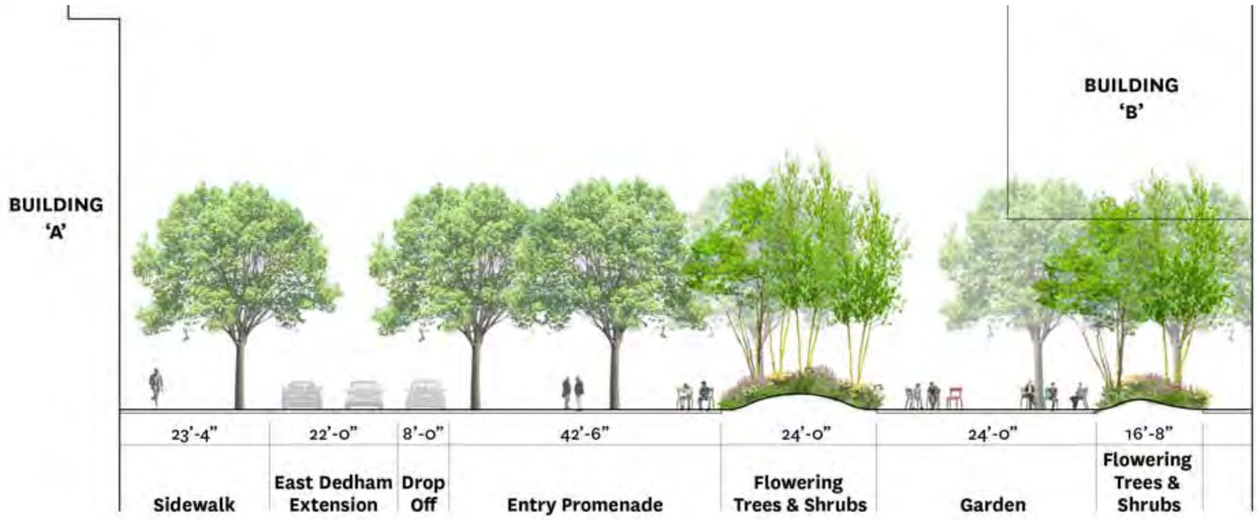
MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 5-18
Albany Green Quiet Garden Plan
Source: MVVA





THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 5-19
Albany Green Quiet Garden Section and Perspective
Source: MVVA

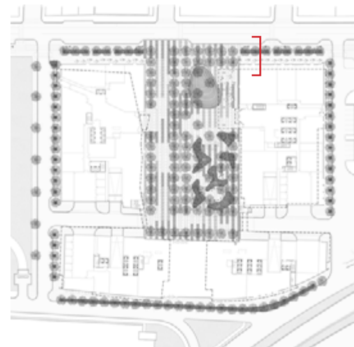
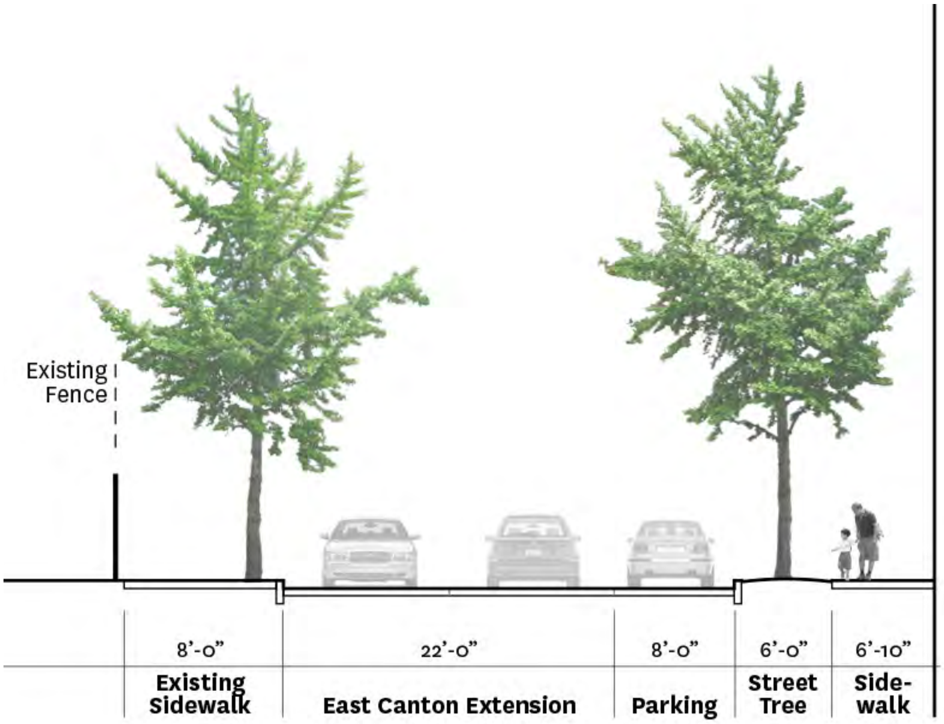
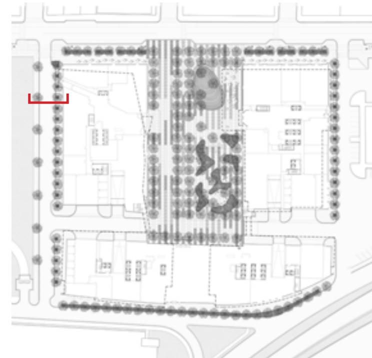
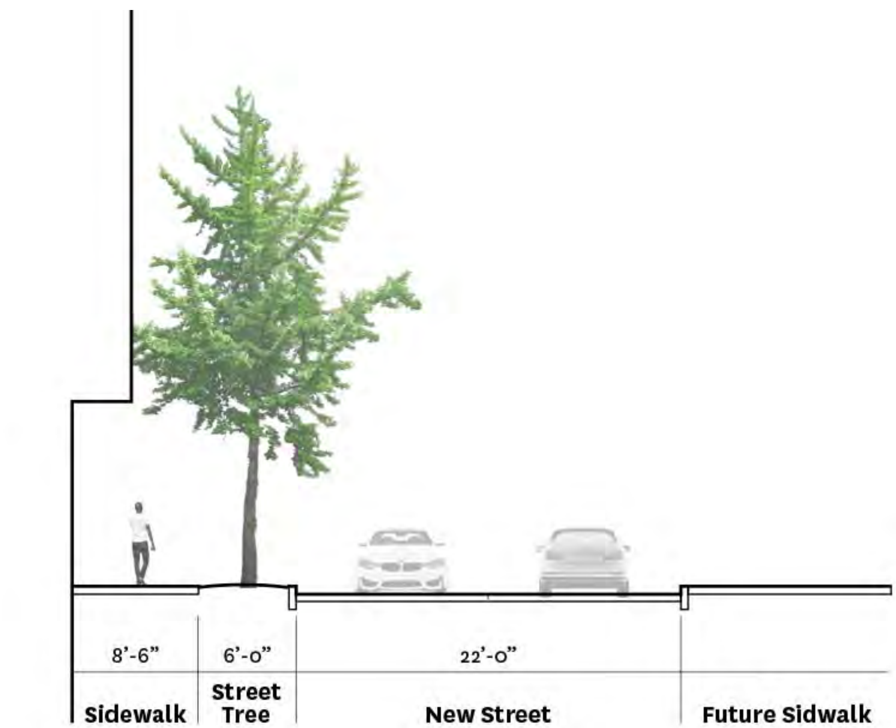


Figure 5-20
Albany Street Section
Source: MVVA





(a) East Canton Extension Section



(b) New Street Section

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 5-21

East Canton Extension and New Street Sections

Source: MVVA

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.

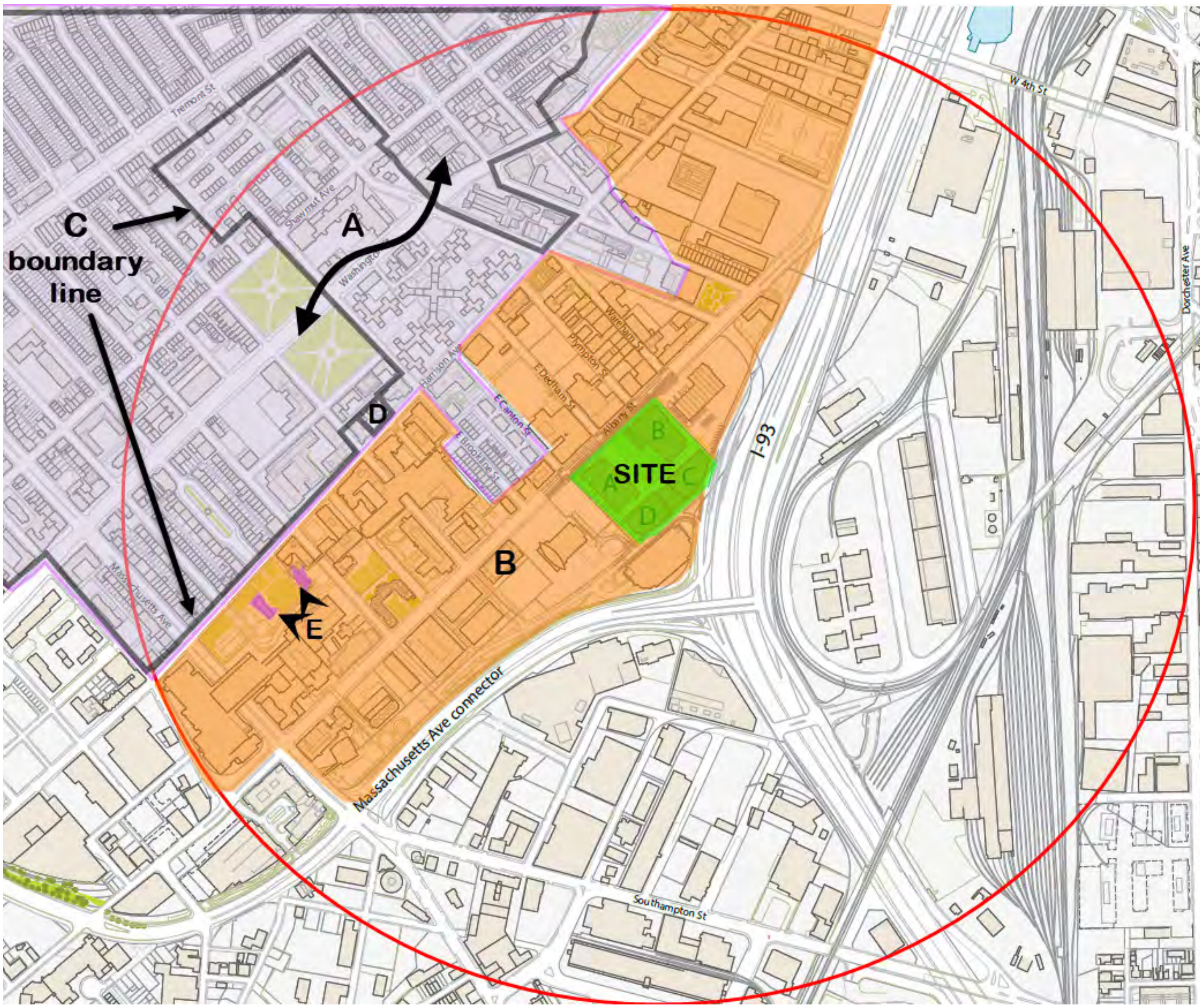
The Boston Redevelopment Authority (BRA), now called the Boston Planning & Development Agency "BPDA", transferred ownership of the parcel by a deed dated July 1969, with the commitment that the BRA would remove the existing buildings on the lot. The current building was constructed in 1969.

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

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

Figure 6-1

Historic Resources within 1/2 mile of the Project Site

Source: Tremont Preservation Services & MACRIS

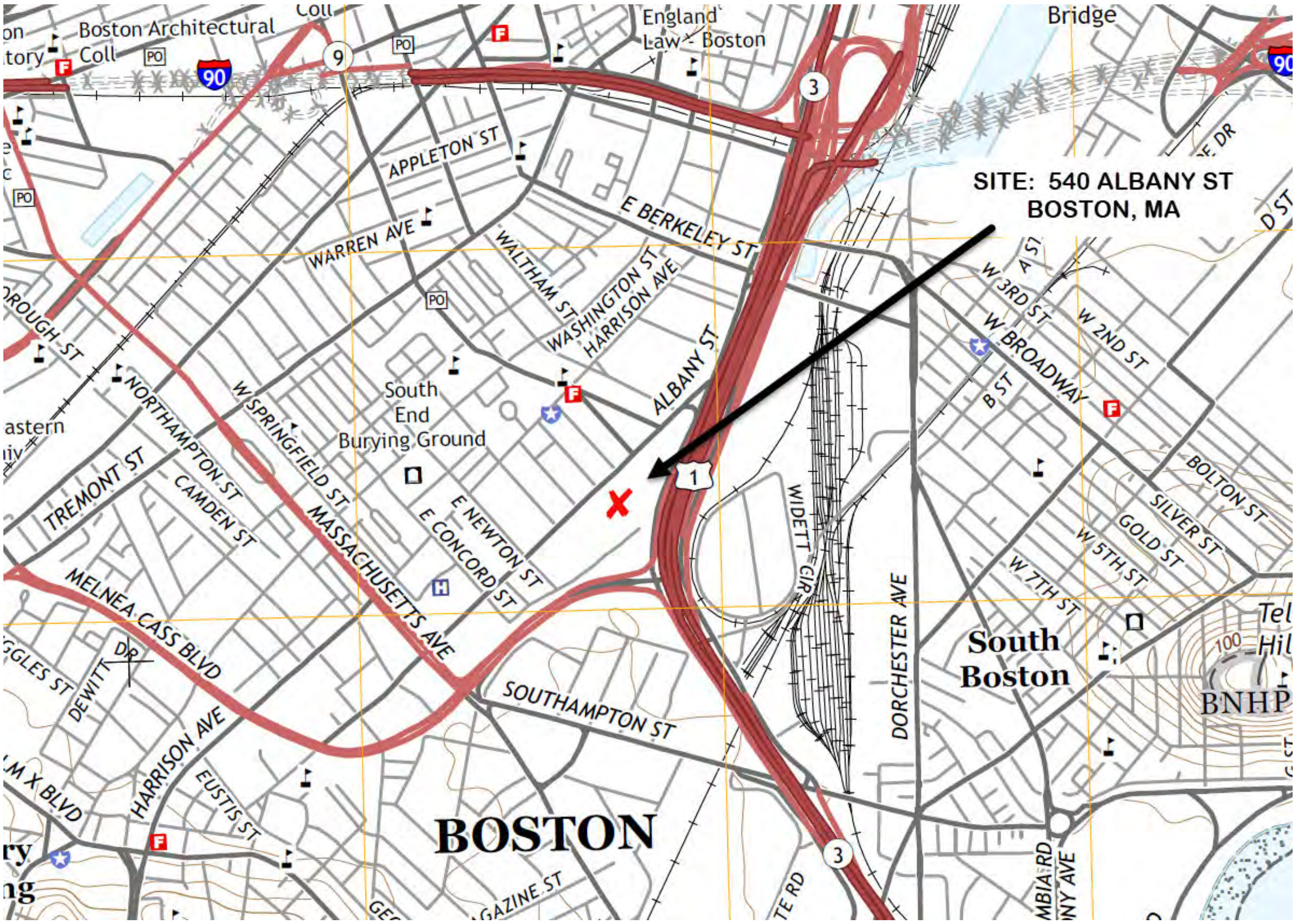
Table 6-1 Historic Resources Shown on Figure 6.1

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.**



THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

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 G.

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.

Chapter 7

7.0 INFRASTURCTURE

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

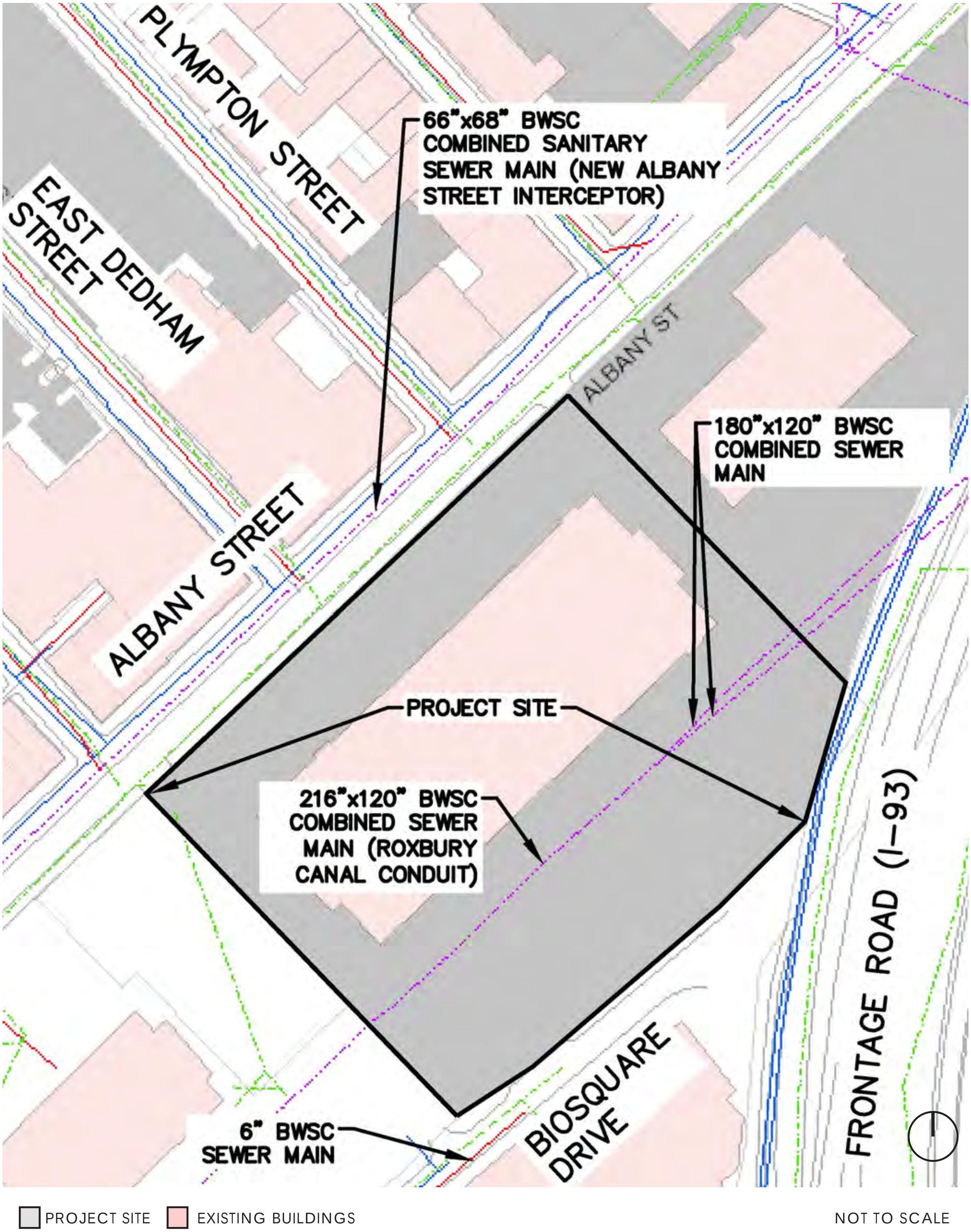
BWSC sewer main in Biosquare Drive behind the existing building. The 6-inch BWSC sewer main in Biosquare Drive flows southerly before connecting to the New Boston Main. The New Boston Main is ultimately directed to the Deer Island Wastewater Treatment Plant for treatment and disposal. The existing BWSC 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.



THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

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 133,127 gallons per day (gpd), or an increase of approximately 127,652 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	12,300 s.f.	50/1,000 s.f.	615
Restaurant[1]	241 seats	35/seat	8,435
Daycare	100 occupants	10/occupant	1,000
PROPOSED SANITARY FLOW			24,514
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	161,300 s.f.	75/1,000 s.f.	12,098
Retail	13,200 s.f.	50/1,000 s.f.	660
Restaurant[1]	259 seats	35/seat	9,065
PROPOSED SANITARY FLOW			43,125
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	298,360 s.f.	75/1,000 s.f.	22,377
PROPOSED SANITARY FLOW			37,075
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	30,000 s.f.	75/1,000 s.f.	2,250
PROPOSED SANITARY FLOW			28,413
TOTAL PROPOSED SANITARY FLOW			133,127
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			127,652

[1] Total restaurant seat number is 500 seats, and is approximately 40% of the total retail space (Building A: 20,500 sf retail x 40% = 8,200 sf or 241 seats; Building B: 22,000 sf retail x 40% = 8,800 sf or 259 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 127,652 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 127,652 gpd or 0.128 MGD. Based on an increase in average daily flow of 0.128 MGD; and with a factor of safety of 10 (total estimate = 0.128 MGD x 10 = 1.28 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

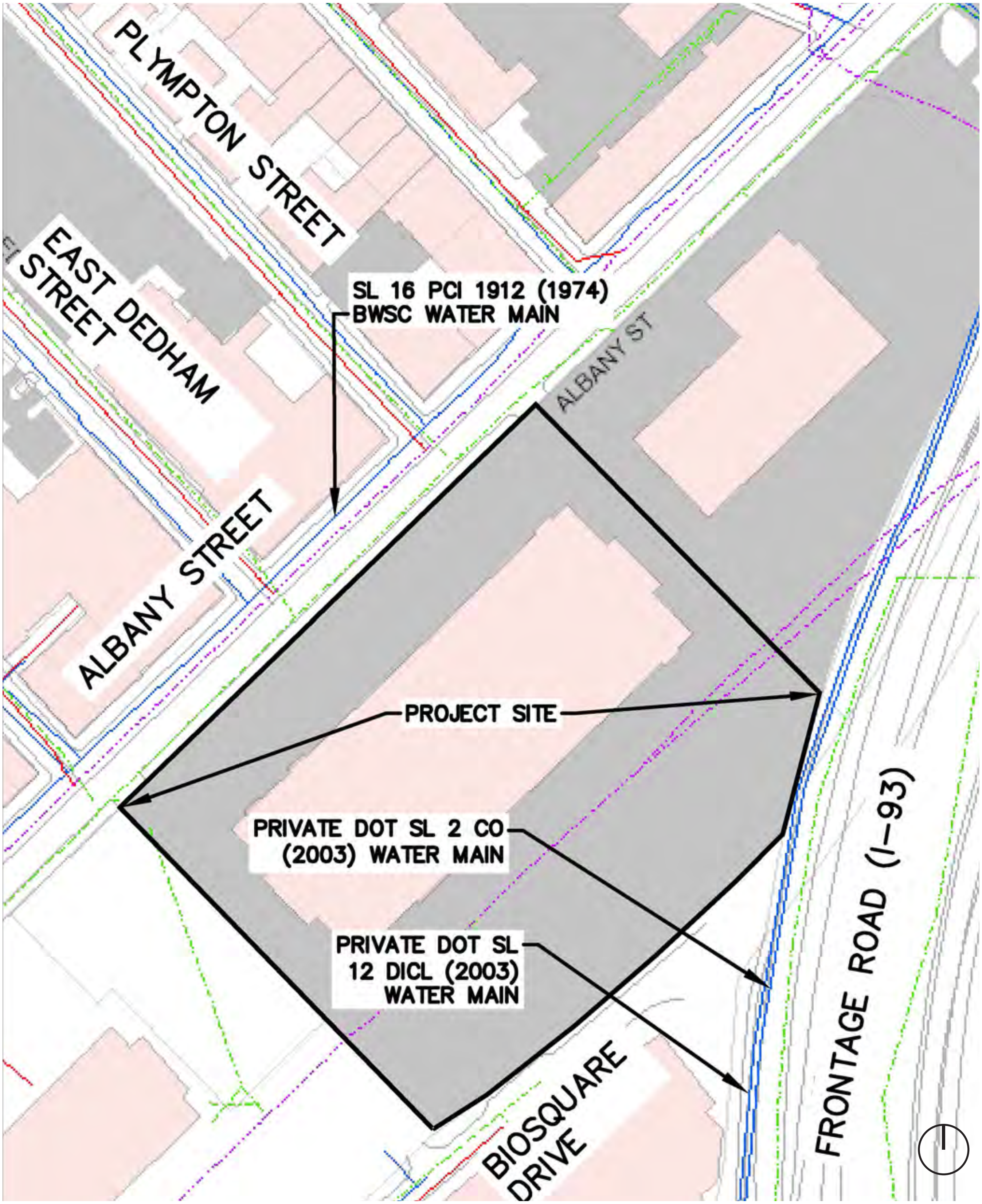
7.3.1 Existing Water Service

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).



PROJECT SITE EXISTING BUILDINGS

NOT TO SCALE

THE ABBEY GROUP

MICHAEL VAN VALKENBURGH ASSOCIATES INC

Stantec

EXCHANGE SOUTH END

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 146,440 gallons per day, or an increase of approximately 140,417 gpd compared to the existing condition.

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 Proposed Impacts

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

Efforts to reduce water consumption will be made. Aeration fixtures and appliances will be chosen for water conservation qualities. In public areas, sensor operated faucets and toilets will be installed.

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

7.4 STORM DRAINAGE SYSTEM

7.4.1 Existing Storm Drainage System

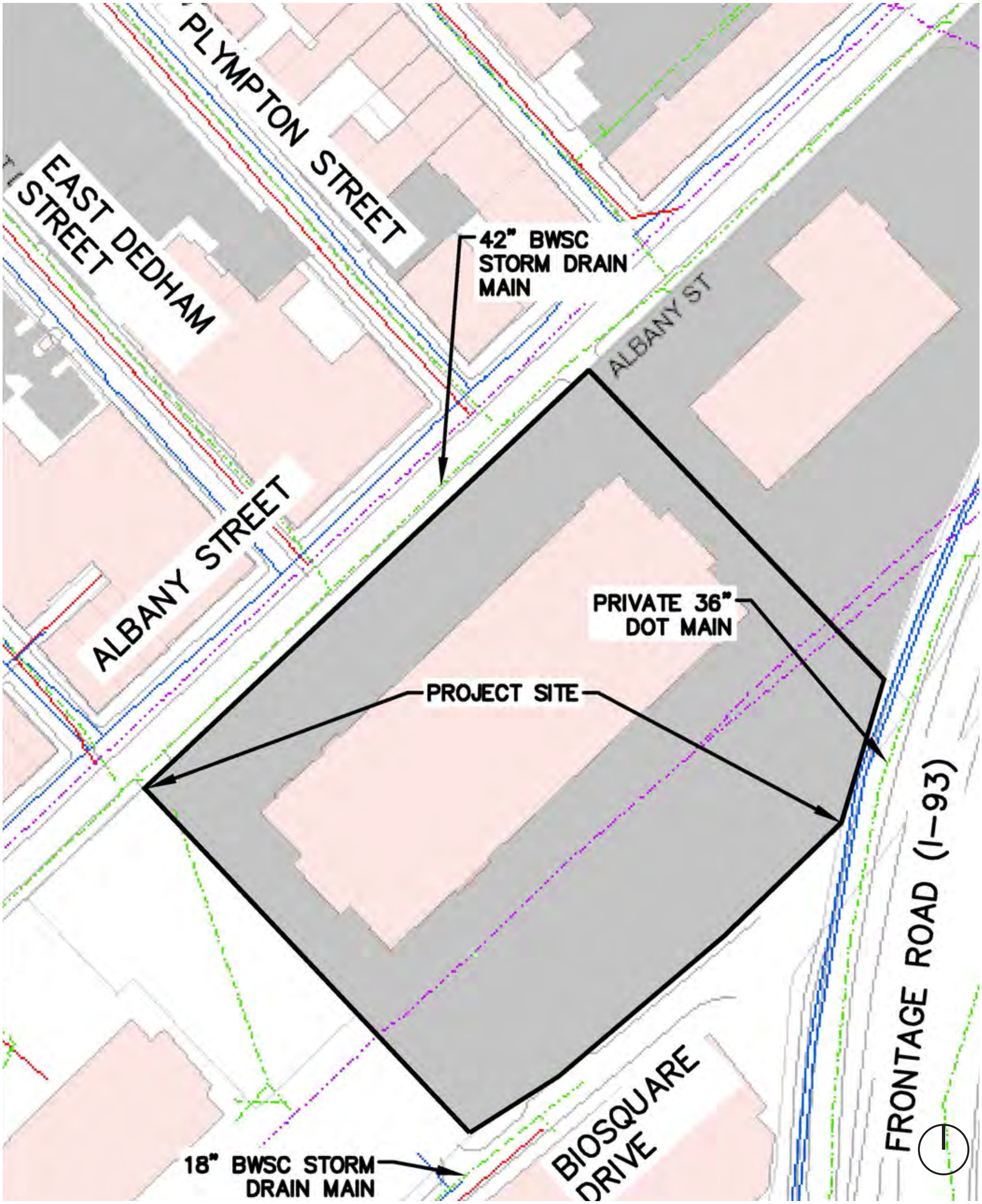
The existing Site is comprised of building roof, paved parking areas and walkways. The existing Site is approximately 100-percent (100%) impervious.

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.



PROJECT SITE   EXISTING BUILDINGS   NOT TO SCALE

THE ABBEY GROUP
MICHAEL VAN VALKENBURGH ASSOCIATES INC
Stantec

EXCHANGE SOUTH END

Figure 7-3
Existing BWSC Storm Drainage System
Source: BWSC

7.4.2 Proposed Storm Drainage System

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.

7.4.3 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.

7.4.4 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 ELECTRICAL SERVICE

There is an existing electrical system owned by Eversource in Albany Street. It is expected that adequate service is available in the existing electrical system to serve the Project. 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

7.6 TELECOMMUNICATION SYSTEMS

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

7.7 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.

More detailed “schematic level” systems per trade:

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.

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 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.

7.8 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.

This document entitled Exchange South End was prepared by Stantec for the account of The Abbey Group. Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by ______________________
(signature)

Reviewed by ______________________
(signature)

Approved by ______________________
(signature)

Appendix A

Pedestrian Wind Study Preliminary Results

PRELIMINARY RESULTS

EXCHANGE SOUTH END

BOSTON, MA

PEDESTRIAN WIND STUDY

RWDI #1702588

September 19, 2017

SUBMITTED TO

Christine McVay
Senior Project Manager
Christine.McVay@stantec.com

Stantec
226 Causeway Street 6th Floor,
Boston MA 02114-2155
T: (617) 654-6096

SUBMITTED BY

Kevin Bauman, B.Eng., EIT.
Technical Coordinator
Kevin.Bauman@rwdi.com

Bill Smeaton, P.Eng.
Principal / Senior Project Manager
Bill.Smeaton@rwdi.com

Rowan Williams Davies & Irwin Inc.
600 Southgate Drive,
Guelph, Canada, N1G 4P6
T: 519.823.1311 x 2318
F: 519.823.1316

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.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1 INTRODUCTION 2

2 METHODOLOGY 3

2.1 Wind Tunnel Study Model 3

2.2 Meteorological Data 5

2.3 Wind Criteria 7

3 PREDICTED WIND CONDITIONS 8

3.1 No Build Configuration 8

3.2 Build Configuration 8

4 APPLICABILITY 9

5 REFERENCES 10

LIST OF IMAGES

Image 1: Site Plan – Aerial View of Site and Surroundings (Courtesy of Google™ Earth)........................ 2
Image 2: Wind Tunnel Study Model.. 4
Image 3: Seasonal Directional Distribution of Winds Approaching Boston Logan International Airport From 1986 Through 2016 6
Image 4: Annual Directional Distribution of Winds Approaching Boston Logan International Airport From 1986 Through 2016 6

LIST OF FIGURES

Figure 1a: Pedestrian Wind Conditions – Mean Speed – No Build Configuration - Annual
Figure 1b: Pedestrian Wind Conditions – Mean Speed – Build Configuration - Annual

Figure 2a: Pedestrian Wind Conditions – Effective Gust Speed – No Build Configuration – Annual
Figure 2b: Pedestrian Wind Conditions – Effective Gust Speed – Build Configuration – Annual

LIST OF TABLES

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.

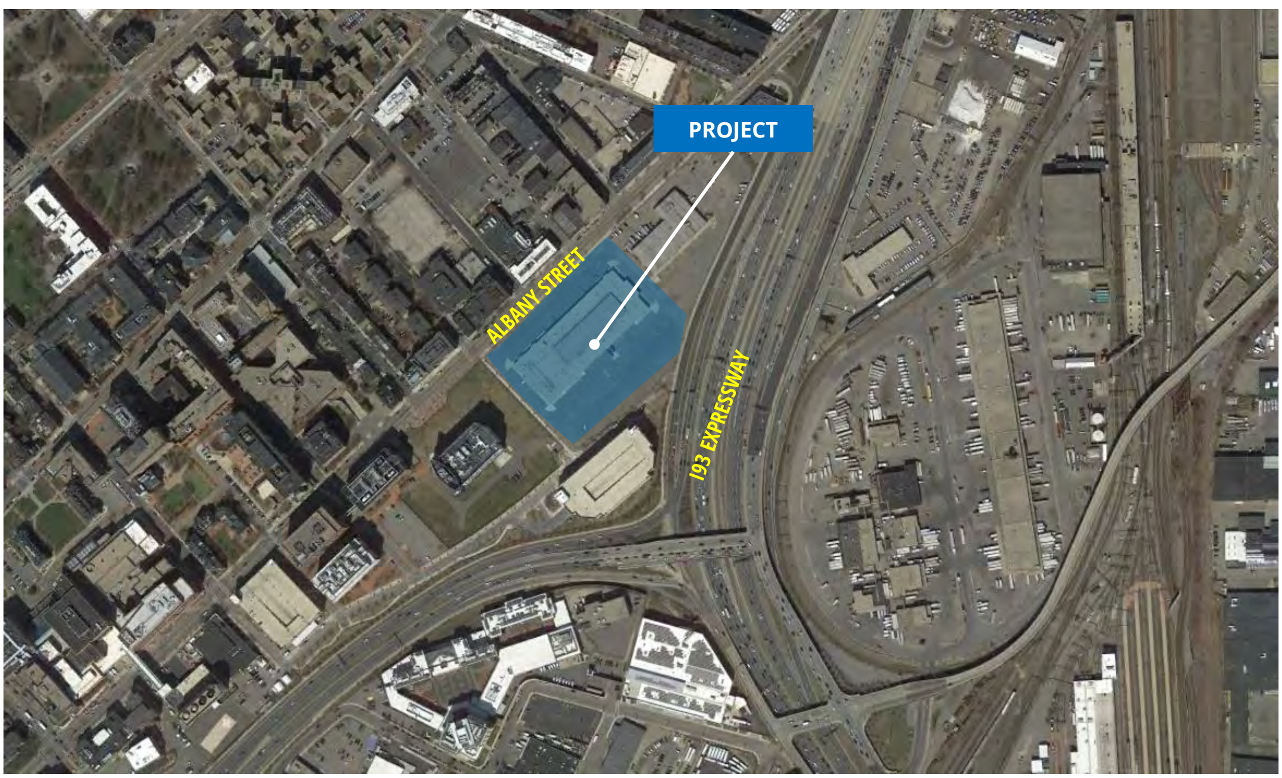


Image 1: Site Plan – Aerial View of Site and Surroundings (Courtesy of Google™ Earth)

2 METHODOLOGY

2.1 Wind Tunnel Study Model

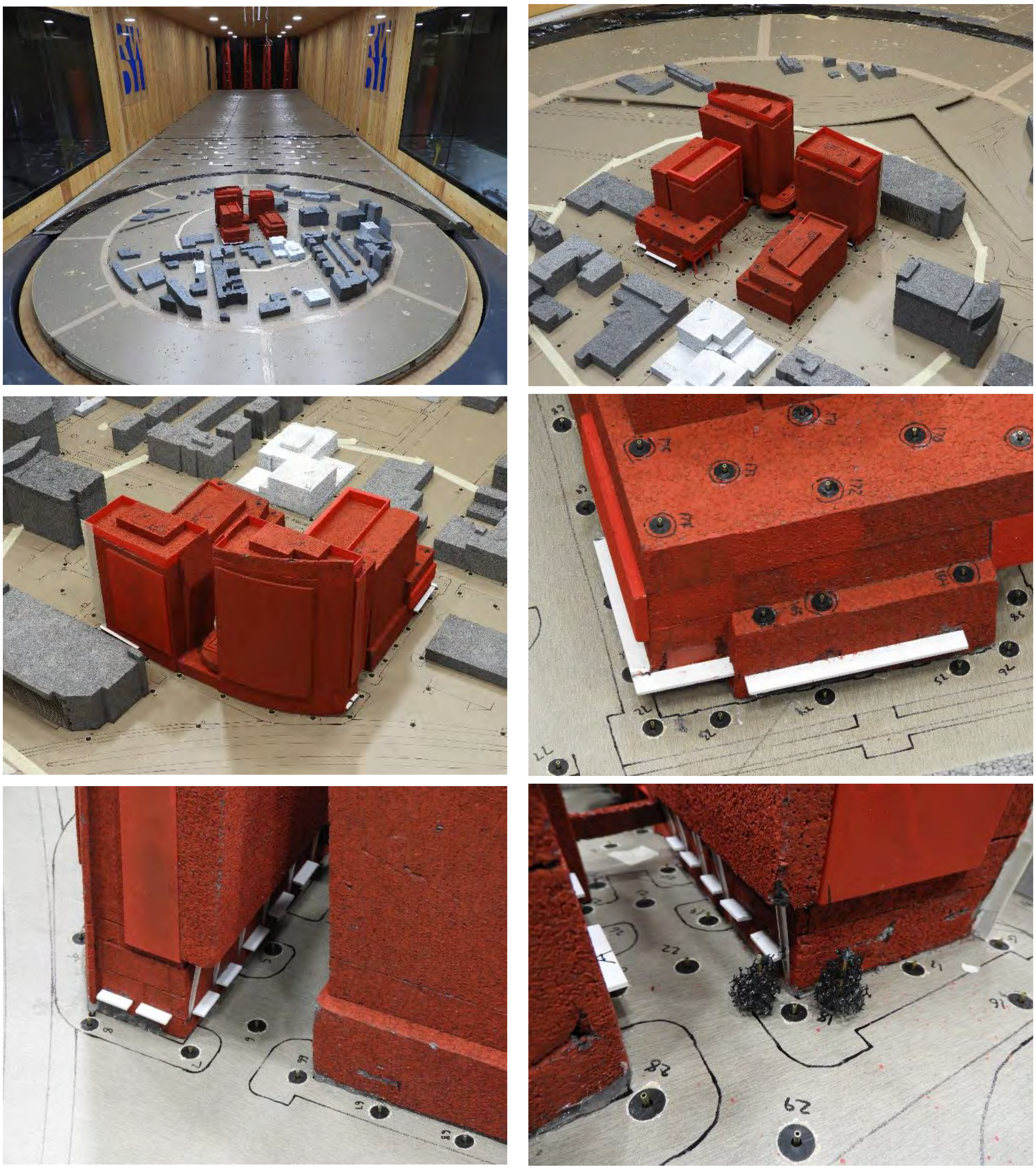
To assess the wind environment around the proposed Project, a 1:300 scale model of the project site and surroundings was constructed for the wind tunnel tests with two configurations tested;

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



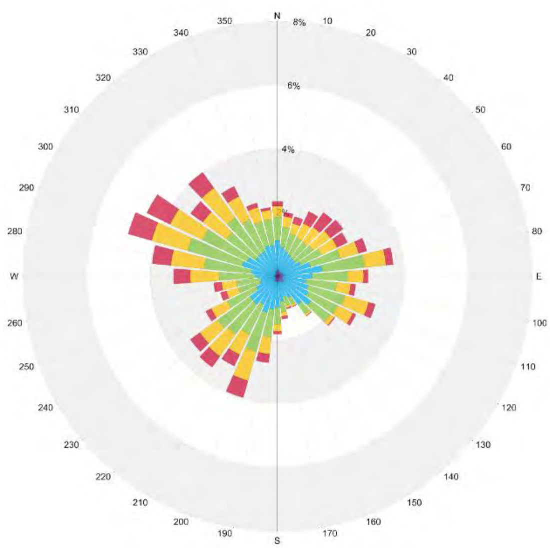
B) Build Configuration

Image 2: Wind Tunnel Study Model

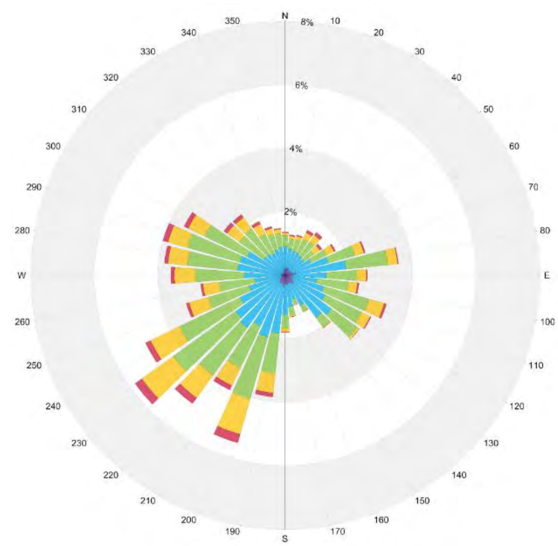
2.2 Meteorological Data

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.

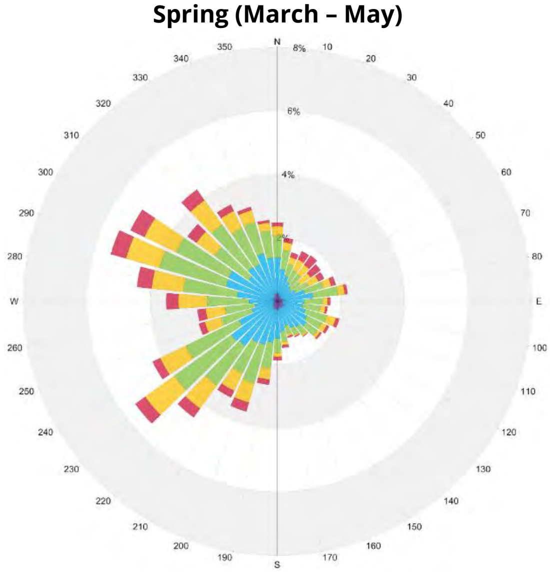
For example, the first wind rose in Image 3, summarizes the spring (March, April, and May) wind data which in general, indicate prevailing winds occurring from the northwest to south-southwest and northeast to east-southeast and strong winds (red bands), primarily occurring from the west-northwest, northwest, south-southwest and west directions.



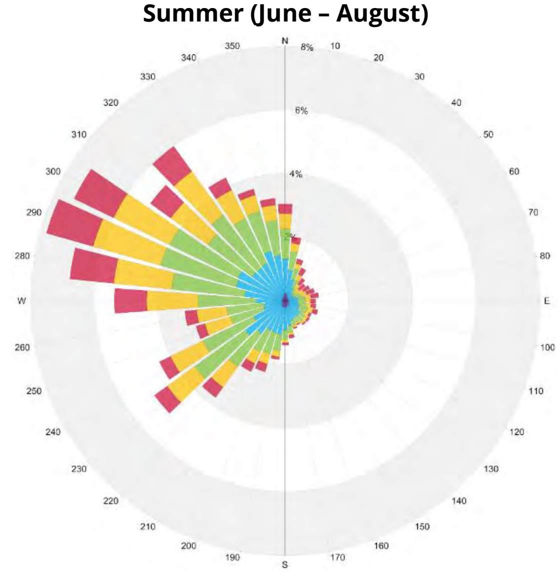
Spring (March – May)



Summer (June – August)



Fall (September – November)

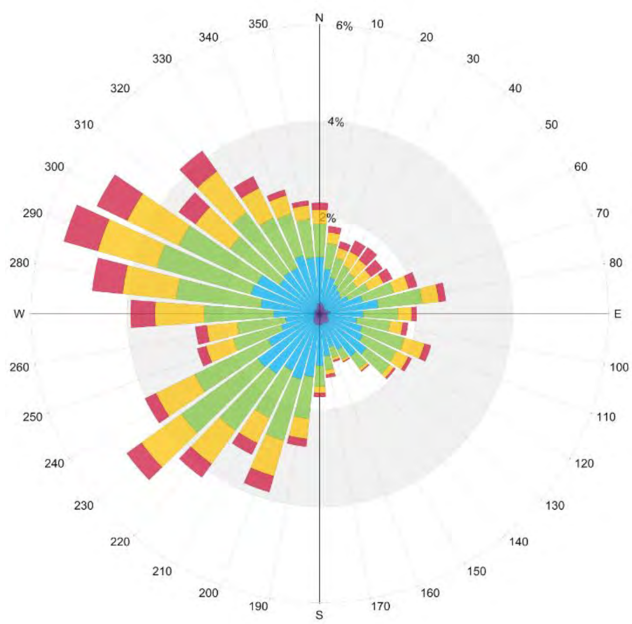


Winter (December – February)

Wind Speed (mph)	Spring	Summer	Fall	Winter
	Probability (%)			
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.

6) 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.

7) Lawson, T.V. (1973). "Wind Environment of Buildings: A Logical Approach to the Establishment of Criteria", *Report No. TVL 7321*, Department of Aeronautic Engineering, University of Bristol, Bristol, England.

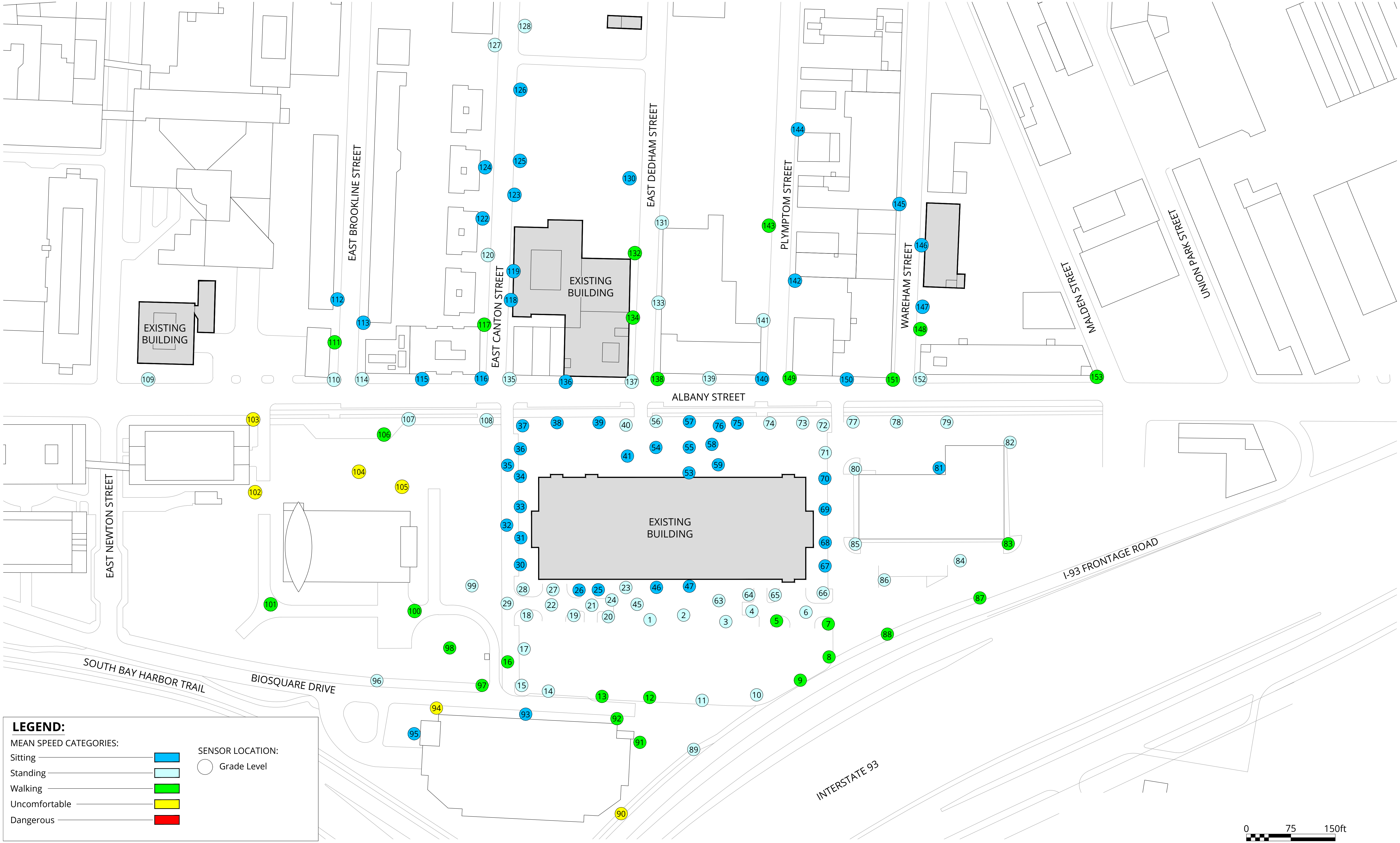
8) Durgin, F. H. (1997). "Pedestrian Level Wind Criteria Using the Equivalent average", *Journal of Wind Engineering and Industrial Aerodynamics*, Vol. 66, pp. 215-226.

9) Wu, H. and Kriksic, F. (2012). “Designing for Pedestrian Comfort in Response to Local Climate”, *Journal of Wind Engineering and Industrial Aerodynamics*, Vol.104-106, pp.397-407.

10) Wu, H., Williams, C.J., Baker, H.A. and Waechter, W.F. (2004), “Knowledge-based Desk-Top Analysis of Pedestrian Wind Conditions”, *ASCE Structure Congress 2004,* Nashville, Tennessee.

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



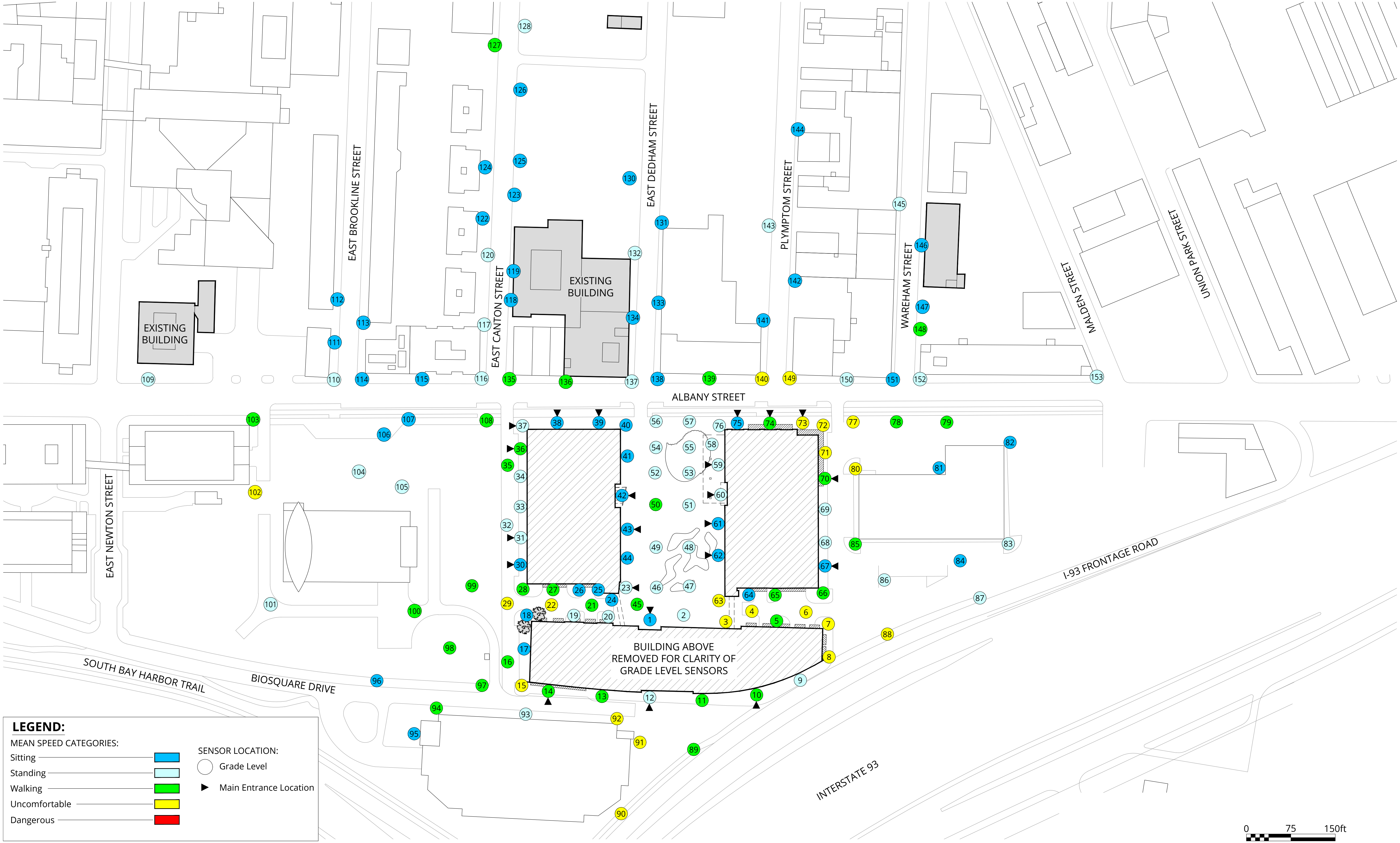
Pedestrian Wind Conditions - Mean Speed
No Build
Annual

Exchange South End - Boston, MA

True North

Project #1702588

Drawn by: DBB	Figure: 1a
Approx. Scale:	1"=150'
Date Revised:	Sept. 19, 2017



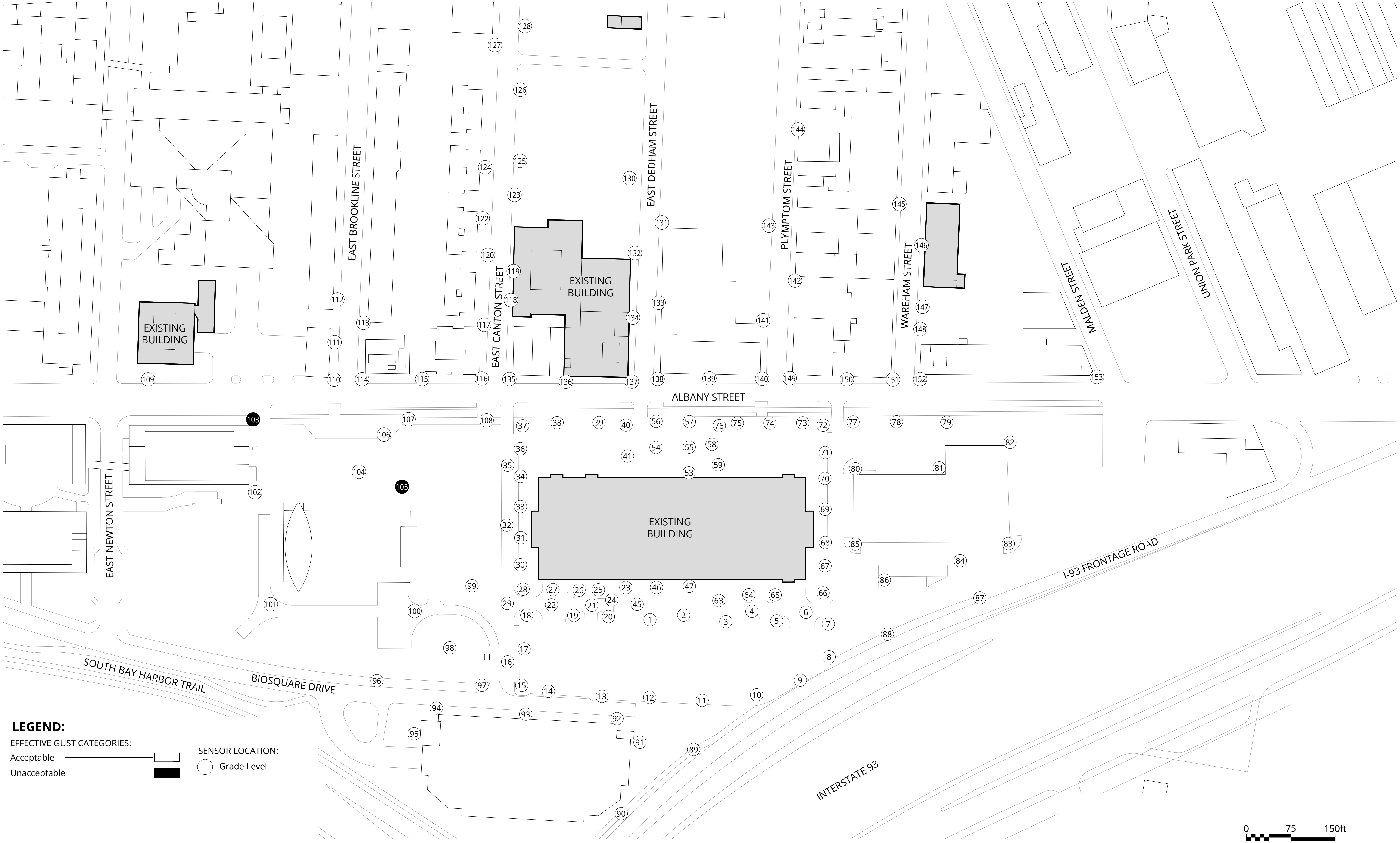
Pedestrian Wind Conditions - Mean Speed
Build
Annual

Exchange South End - Boston, MA

True North

Project #1702588

Drawn by: DBB	Figure: 1b
Approx. Scale: 1"=150'	
Date Revised: Sept. 19, 2017	



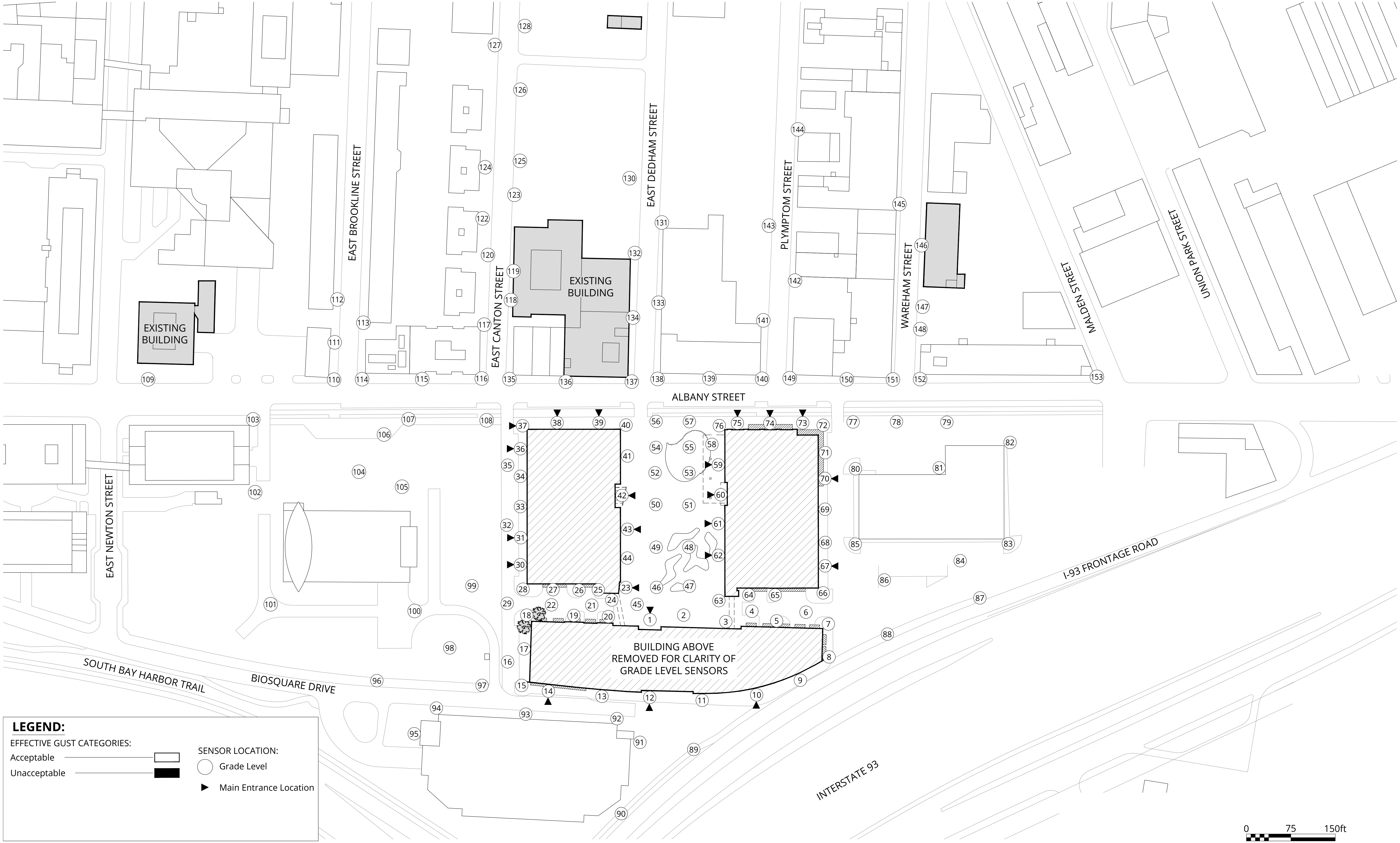
Pedestrian Wind Conditions - Effective Gust Speed
No Build
Annual

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			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	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			Effective Gust Wind Speed		
			Speed (mph)	% Change	Rating	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

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 $\mu g/m^3$ using factor of 1 ppm = 2.62 $\mu g/m^3$.
[2] CO reported in ppm. Converted to $\mu g/m^3$ using factor of 1 ppm = 1146 $\mu g/m^3$.
[3] NO_2 reported in ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 1.88 $\mu g/m^3$.
[4] O_3 reported in ppm. Converted to $\mu g/m^3$ using factor of 1 ppm = 1963 $\mu g/m^3$.
[5] Background level is the average concentration of the three years.
[6] The 24-hour and Annual standards were revoked by EPA on June 22, 2010, Federal Register 75-119, p. 35520.

Model Input/Output Files

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

Appendix C

Traffic Counts (Upon Request)

Appendix D

LEED Checklist

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Exchange South End

6/22/2017

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	6	5	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	6	25	2	**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	2	4		Credit 1	Enhanced Commissioning	6
	3	15		Credit 2	Optimize Energy Performance***	18
		1		Credit 3	Advanced Energy Metering	1
		2		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

MS	Y	?	N			
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	56	47	7	**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

Climate Change Preparedness/ Resiliency Checklist

4.2 CLIMATE CHANGE PREPAREDNESS

BPDA CLIMATE CHANGE CHECKLIST

A.1 Project Information	
Project Name	Exchange South End
Project Address	540 Albany Street
Date & Filing	08-07-2017
Filing Contact	Christine McVay
MEPA approval required	Yes

A.2 Project Team	
Owner/Developer	Abbey Group
Architect	Stantec
Engineer	WSP
Sustainability/LEED	Stantec
Permitting	Stantec
Construction Management	Suffolk

A.3 Project Description & Design Conditions	
Principal Building Uses	Office/lab
First floor uses	Retail, service, circulation/lobby/community space
Critical site infrastructure/uses	Research (level 2, up), Switchgear (pad-mounted, elevation 24’-0”, backup diesel storage above top level of garage (variance)
Site & Building	
Site Area	246,145 SF
Building Area	1,599,425 SF
Building Height – Feet	92’-0” to 282’-0” FT
Building Height – Levels	6-20 Floors (+ 3 levels of below-grade parking)
Existing Site Elevation – Low	16’-5”
Existing Site Elevation – Hi	18’-6”
Proposed Site Elevation – Low	16’-0”
Proposed Ste Elevation – Hi	18’-0”
Below Grade spaces/Levels	Garage & Storage/3 Levels
Proposed First Floor Elevation	18’-0”
Building Proximity to Water	0.43 miles from north Albany Street corner of site (Bass River)
Energy Performance	
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
Energy use < ASHRAE 90.1-2013	12.1 %
Utilities reviewed energy model	Design team intends to engage Utilities to investigate available utility incentives
Energy use < MA Code	12.1 %
EUI	115.5 kBTU/SF

Critical Systems Loads (in the event of a service interruption)

Electric	10,500 kW
Heating	0 MMbtu/hr
Cooling	0 Tons

Back-up/Emergency Power System

Electrical Generation	10,500 kW (Combined from all buildings)
Fuel Source	Diesel
System Type	Combustion Engine
Number of Power Units	Four (4)

B.1 – GHG Emissions – Design Conditions

Annual Building GHG Emissions	(To be determined by October 2017)

B.2 – GHG Reduction – Mitigation Strategies

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 building. 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 the Project 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.1 – Extreme Heat Design Conditions

Temperature Range – Low	22-36˚F
Temperature Range – Hi	66-82˚F
Annual HDD	295.9
Annual CDD	1783.1
Days > 90˚F	10
Days > 100˚F	1
Heatwaves/Year	1
Avg. Duration of Heatwaves	7 Days

C.2 – Extreme Heat – Adaptation Strategies

As part of the energy modeling process, climate files that reflect the predicted increase in temperature can be 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.

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 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. Additionally, on-site renewable energy systems, if applicable, could be utilized to power and, therefore, extend the operations of emergency and life safety 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.

D.1 – Extreme Precipitation – Design Conditions

10-year, 24-hour design storm	4 Inches

D.2 – Extreme Precipitation – Adaptation Strategies

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.

E – Sea Level Rise & Storms

FEMA SFHA Zone	No
Zone, if applicable	n/a
1% Annual Flood Area Zone	No

E.1 – Sea Level Rise & Storms – Design Conditions

Building Design Flood Elevation	12.35 Ft BCB (Boston City Base = 5.65 feet)
First Floor Elevation	12.35 Ft BCB
Site Elevations at Building	12.35 Ft BCB
Accessible Route Elevation	12.35 Ft BCB

E.2 – Sea Level Rise & Storms – Adaptation Strategies

Flood gates will be moved into critical entries in the event of flooding, and all critical infrastructure and program will be raised 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 in each building, 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.

We have built in adaptive survivability into the program by allowing sheltering in place at level 2 within the various structures. The community component and green rooftops 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. 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 lobby without having to go outdoors. 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.

Appendix F

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.

1. Project Information: *If this is a multi-phased or multi-building project, fill out a separate Checklist for each phase/building.*			
Project Name:	Exchange South End		
Primary Project Address:	540 Albany Street		
Total Number of Phases/Buildings:	4 Buildings		
Primary Contact (Name / Title / Company / Email / Phone):	William Keravuori / The Abbey Group / wkeravuori@theabbeygroup.com		
Owner / Developer:	The Abbey Group		
Architect:	Stantec Architecture		
Civil Engineer:	Nitsch Engineering		
Landscape Architect:	Michael Van Valkenburgh Associates		
Permitting:	Stantec Consulting Ltd.		
Construction Management:	Suffolk		
At what stage is the project at time of this questionnaire? Select below:			
	PNF / **PNF Submitted**	Draft / Final Project Impact Report Submitted	BPDA Board Approved
	BPDA Design Approved	Under Construction	Construction Completed:
Do you anticipate filing for any variances with the Massachusetts Architectural Access Board (MAAB)? ***If yes,*** identify and explain.	No		
2. Building Classification and Description: *This section identifies preliminary construction information about the project including size and uses.*			
What are the dimensions of the project?			
Site Area:	*246,145SF*	Building Area:	*1,599,425 SF*
Building Height:	*92-282 ft.*	Number of Stories:	*6-20Flrs.*
First Floor Elevation:	16 to 18 ft	Is there below grade space:	***Yes*** */ No*

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:	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:	Yes. 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 yet 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?	1150 garage spaces and 14 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 Garages. Refer to Garage Accessibility Plan Figure.
Has a drop-off area been identified? ***If yes,*** will it be accessible?	Yes it will be accessible. It is adjacent to the all of 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" -New community space for cultural exchange
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.

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

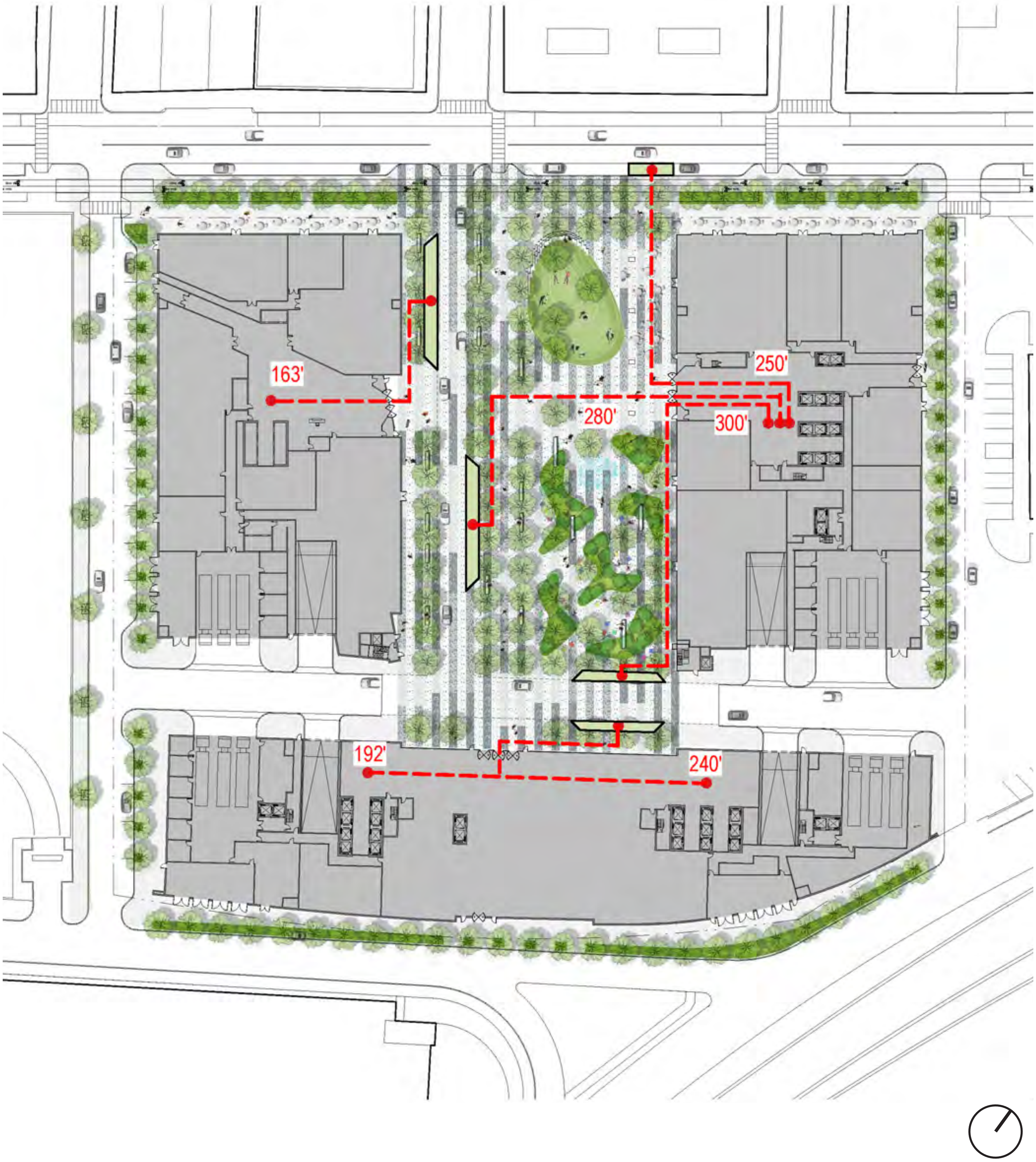
MICHAEL VAN VALKENBURGH ASSOCIATES INC

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 G

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.

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

$^{49}89^{000m}$ 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.

MAP NUMBER
25025C0079J

MAP REVISED
MARCH 16, 2016

Federal Emergency Management Agency