



Data Sciences Center

Boston University

Volume 1: Draft Project Impact Report

April 30, 2019

submitted to the **Boston Planning & Development Agency**

submitted by **Trustees of Boston University**

prepared by **Fort Point Associates, Inc.**

in association with

KPMB Architects

Richard Burck Associates, Inc.

AECOM

Nitsch Engineering, Inc.

The Green Engineer

RWDI, Inc.

Acentech

Bard, Rao + Athanas Consulting Engineers, LLC

Haley + Aldrich

Entuitive Consulting Engineers

Jensen Huges, Inc.

Transsolar KlimaEngineering

LeMessurier



TABLE OF CONTENTS

VOLUME 1: DRAFT PROJECT IMPACT REPORT

CHAPTER 1: PROJECT SUMMARY

1.1	PROJECT IDENTIFICATION	1-1
1.2	INTRODUCTION.....	1-1
1.3	LEGAL INFORMATION.....	1-1
1.4	PROJECT LOCATION.....	1-2
1.5	PROJECT SUMMARY	1-2
1.6	PROJECT PROGRAM.....	1-3
1.7	CONSISTENCY WITH INSTITUTIONAL MASTER PLAN	1-3
1.8	PUBLIC REVIEW PROCESS	1-4
1.9	MASSACHUSETTS ENVIRONMENTAL POLICY ACT (MEPA).....	1-6
1.10	PUBLIC AND COMMUNITY BENEFITS.....	1-6
1.11	SUMMARY OF REQUIRED PERMITS AND APPROVALS	1-9
1.12	PROJECT TEAM.....	1-10

CHAPTER 2: PROJECT DESCRIPTION

2.1	PROJECT SITE AND PUBLIC REALM	2-1
2.2	PROJECT ALTERNATIVES	2-3
2.3	CHANGES TO THE PROJECT SINCE THE PNF FILING.....	2-7
2.4	PROPOSED PROJECT	2-8
2.5	SITE REQUIREMENTS	2-14
2.6	OPEN SPACE AND LANDSCAPE.....	2-16

CHAPTER 3: URBAN DESIGN

3.1	INTRODUCTION.....	3-1
3.2	PROJECT PURPOSE AND NEED.....	3-1
3.3	NEIGHBORHOOD CONTEXT.....	3-1
3.4	CAMPUS OPEN SPACE NETWORK.....	3-3
3.5	MASSING AND HEIGHT	3-4
3.6	BUILDING CHARACTER AND MATERIALS	3-5
3.7	VIEWS.....	3-6

3.8	OPEN SPACE AND LANDSCAPE MATERIALS	3-7
3.9	PEDESTRIAN ENVIRONMENT	3-9
CHAPTER 4: SUSTAINABILITY		
4.1	SUSTAINABLE DESIGN.....	4-1
4.2	ARTICLE 37/LEED COMPLIANCE.....	4-2
4.3	SUSTAINABLE PRACTICES	4-13
4.4	CLEAN AND RENEWABLE ENERGY PRACTICES.....	4-14
4.5	ENERGY EFFICIENCY ASSISTANCE	4-15
CHAPTER 5: TRANSPORTATION		
5.1	INTRODUCTION.....	5-1
5.2	EXISTING CONDITIONS	5-3
5.3	NO-BUILD (2022) CONDITION	5-12
5.4	BUILD (2022) CONDITION.....	5-15
5.5	GRANBY STREET IMPROVEMENTS.....	5-27
5.6	BAY STATE ROAD BIKE LANE IMPROVEMENTS	5-27
5.7	TRANSPORTATION MITIGATION MEASURES	5-27
5.8	TRANSPORTATION ACCESS PLAN AGREEMENT	5-31
CHAPTER 6: ENVIRONMENTAL		
6.1	INTRODUCTION.....	6-1
6.2	WIND	6-1
6.3	SHADOW	6-3
6.4	COMBINED WIND AND SHADOW	6-4
6.5	DAYLIGHT	6-4
6.6	SOLAR GLARE	6-5
6.7	NIGHTTIME LIGHTING	6-6
6.8	AIR QUALITY	6-7
6.9	NOISE	6-8
6.10	FLOOD ZONES	6-9
6.11	WATER QUALITY	6-9
6.12	GROUNDWATER.....	6-9
6.13	GEOTECHNICAL	6-10
6.14	CONSTRUCTION IMPACTS	6-12

6.15	RODENT CONTROL.....	6-17
6.16	WILDLIFE HABITAT	6-17
6.17	HISTORIC AND ARCHAEOLOGICAL IMPACTS.....	6-17
CHAPTER 7: INFRASTRUCTURE		
7.1	INTRODUCTION.....	7-1
7.2	WASTEWATER.....	7-1
7.3	WATER SYSTEM.....	7-4
7.4	STORM DRAINAGE SYSTEM.....	7-6
7.5	ELECTRICAL SERVICES.....	7-11
7.6	TELECOMMUNICATIONS SYSTEM.....	7-11
7.7	DISTRICT HEATING AND COOLING OR GROUND SOURCE HEAT EXCHANGE SYSTEMS.....	7-12
7.8	NATURAL GAS SYSTEM.....	7-12
7.9	UTILITY PROTECTION DURING CONSTRUCTION	7-13
7.10	FIRE PROTECTION	7-13

LIST OF TABLES

Table 1-1	Anticipated Project Approvals
Table 2-1	Project Alternatives Comparison
Table 2-2	Project Program
Table 5-1	Intersection Level of Service Criteria
Table 5-2	MBTA Service Operations
Table 5-3	Boston University Shuttle (BUS) Operations
Table 5-4	No Build 2022 Trip Generation (Granby Lot/Lot N)
Table 5-5	Unadjusted ITE Vehicle Trips
Table 5-6	Charles River Campus Modal Splits
Table 5-7	Adjusted ITE Vehicle Trips
Table 5-8	Intersection Level of Service Comparison – Weekday AM Peak Hour
Table 5-9	Intersection Level of Service Comparison – Weekday PM Peak Hour
Table 6-1	Shadow Study Dates and Times
Table 6-2	Project Site Soil Profile
Table 6-3	Historic Resources in the Vicinity of the Site
Table 7-1	Projected Wastewater Generation

Table 7-2	Existing Sewer Capacity Evaluation – Commonwealth Avenue
Table 7-3	Existing Sewer Capacity Evaluation – Granby Street
Table 7-4	Project Water Demand
Table 7-5	Existing Storm Sewer Capacity Evaluation – Granby Street

LIST OF FIGURES

Figure 1-1	Locus Map
Figure 1-2	Aerial View
Figure 1-3	Project Site Plan
Figure 2-1	Oblique View of Project Site
Figure 2-2	Existing Conditions Plan
Figure 2-3	Existing Conditions Photographs Key
Figure 2-4	Existing Conditions Photographs
Figure 2-5	Existing Conditions Photographs
Figure 2-6	Alternative A: No-Build
Figure 2-7	Alternative B: Zoning Compliant – Underlying Zoning
Figure 2-8	Alternative C: Zoning Compliant – 2013-2023 Institutional Master Plan
Figure 2-9	Proposed Project
Figure 2-10	Lower Sub-Basement Plan
Figure 2-11	Basement Plan
Figure 2-12	Ground Floor Plan
Figure 2-13	Second Floor Plan
Figure 2-14	Third Floor Plan
Figure 2-15	Fourth Floor Plan
Figure 2-16	Fifth Floor Plan
Figure 2-17	Sixth Floor Plan
Figure 2-18	Seventh Floor Plan
Figure 2-19	Eighth Floor Plan
Figure 2-20	Ninth Floor Plan
Figure 2-21	Tenth Floor Plan
Figure 2-22	Eleventh Floor Plan
Figure 2-23	Twelfth Floor Plan
Figure 2-24	Thirteenth Floor Plan
Figure 2-25	Fourteenth Floor Plan
Figure 2-26	Fifteenth Floor Plan
Figure 2-27	Sixteenth Floor Plan
Figure 2-28	Seventeenth Floor Plan
Figure 2-29	Eighteenth Floor Plan – Mechanical Penthouse
Figure 2-30	Nineteenth Floor Plan – Mechanical Penthouse
Figure 2-31	Roof Plan
Figure 2-32	Circulation and Access Plan

Figure 2-33	Project Site Plan
Figure 2-34	Landscape Plan
Figure 3-1	Neighborhood Context
Figure 3-2	Context of the City
Figure 3-3	Campus Context
Figure 3-4	Access and Connections
Figure 3-5	Sample Massing and Desired Connections
Figure 3-6	Project Site Plan
Figure 3-7	Context Elevations
Figure 3-8	Commonwealth Avenue Figure-Ground Study
Figure 3-9	Perspective Looking North – Daytime
Figure 3-10	Perspective Looking North – Nighttime
Figure 3-11	Perspective Looking East from Essex Street
Figure 3-12	Perspective Looking West from Kenmore Square
Figure 3-13	Perspective Looking Northeast Toward Project Site
Figure 3-14	Perspective Looking Northwest Toward Project Site
Figure 3-15	Phase II Massing Study
Figure 3-16	Public Realm from the Southwest
Figure 3-17	Public Realm from the East
Figure 3-18	Public Realm from the South – Along Granby Street
Figure 3-19	Public Realm from the South – Along Bicycle Parking
Figure 3-20	Interior View of First Floor
Figure 3-21	View of Entrance off of Courtyard
Figure 3-22	View of Laneway Looking West
Figure 3-23	View of Parklet Looking South
Figure 2-24	Perspective View from BU Bridge
Figure 3-25	Building Section
Figure 3-26	North Elevation
Figure 3-27	East Elevation
Figure 3-28	South Elevation
Figure 3-29	West Elevation
Figure 3-30	Landscape Plan
Figure 3-31	Circulation and Access Plan
Figure 4-1	LEED Checklist Part I
Figure 4-2	LEED Checklist Part II
Figure 5-1	Study Area Intersections
Figure 5-2	Existing (2018) Conditions at AM Peak Hour Vehicle Volume
Figure 5-3	Existing (2018) Conditions at PM Peak Hour Vehicle Volume
Figure 5-4	Off-Street Parking Facilities
Figure 5-5	On-Street Parking Facilities

Figure 5-6	Existing (2018) Conditions at AM Peak Hour Pedestrian Volume
Figure 5-7	Existing (2018) Conditions at PM Peak Hour Pedestrian Volume
Figure 5-8	Bike Rack Locations and Capacities
Figure 5-9	Existing (2018) Conditions at AM Peak Hour Bicycle Volume
Figure 5-10	Existing (2018) Conditions at PM Peak Hour Bicycle Volume
Figure 5-11	Public Transportation
Figure 5-12	No-Build (2022) Conditions at AM Peak Hour Vehicle Volume
Figure 5-13	No-Build (2022) Conditions at PM Peak Hour Vehicle Volume
Figure 5-14	Project-Generated Vehicle Trip Distributions (Inbound)
Figure 5-15	Project-Generated Vehicle Trip Distributions (Outbound)
Figure 5-16	Net New Project-Generated Vehicle Trips – AM Peak Hour
Figure 5-17	Net New Project-Generated Vehicle Trips – PM Peak Hour
Figure 5-18	Build (2022) Conditions at AM Peak Hour Vehicle Volume
Figure 5-19	Build (2022) Conditions at PM Peak Hour Vehicle Volume
Figure 6-1	Shadow Studies, March 21 – 9:00 AM
Figure 6-2	Shadow Studies, March 21 – 12:00 PM
Figure 6-3	Shadow Studies, March 21 – 3:00 PM
Figure 6-4	Shadow Studies, March 21 – 6:00 PM
Figure 6-5	Shadow Overlap, March 21
Figure 6-6	Shadow Studies, June 21 – 9:00 AM
Figure 6-7	Shadow Studies, June 21 – 12:00 PM
Figure 6-8	Shadow Studies, June 21 – 3:00 PM
Figure 6-9	Shadow Studies, June 21 – 6:00 PM
Figure 6-10	Shadow Overlap, June 21
Figure 6-11	Shadow Studies, September 21 – 9:00 AM
Figure 6-12	Shadow Studies, September 21 – 12:00 PM
Figure 6-13	Shadow Studies, September 21 – 3:00 PM
Figure 6-14	Shadow Studies, September 21 – 6:00 PM
Figure 6-15	Shadow Overlap, September 21
Figure 6-16	Shadow Studies, December 21 – 9:00 AM
Figure 6-17	Shadow Studies, December 21 – 12:00 PM
Figure 6-18	Shadow Studies, December 21 – 3:00 PM
Figure 6-19	Shadow Studies, December 21 – 6:00 PM
Figure 6-20	Shadow Overlap, December 21
Figure 6-21	Historic Resources in the Vicinity of the Project Site
Figure 6-22	Bay State Road Back Bay West Architectural Conservation District Limits
Figure 6-23	North Elevation with Limits of Bay State Road Back Bay West Architectural Conservation District
Figure 6-24	East Elevation with Limits of Bay State Road Back Bay West Architectural Conservation District
Figure 6-25	West Elevation with Limits of Bay State Road Back Bay West Architectural Conservation District

- Figure 7-1 BWSC Sewer System Map
- Figure 7-2 BWSC Water System Map
- Figure 7-3 BWSC Stormwater System Map

Chapter 1

PROJECT SUMMARY

CHAPTER 1: PROJECT SUMMARY

1.1 PROJECT IDENTIFICATION

Project Name:	Boston University Data Sciences Center
Project Proponent:	Trustees of Boston University
Address/Location:	665 Commonwealth Avenue, Boston Massachusetts 02215
Assessor's Parcels:	0504089001 and 0504100000

1.2 INTRODUCTION

Trustees of Boston University (the "Proponent") proposes to construct the Data Sciences Center (the "Project") at 665 Commonwealth Avenue on land comprised of approximately 47,700 square feet (sf) or 1.1 acres which defines the "Site."

This Draft Project Impact Report (DPIR) is submitted to the Boston Planning and Development Agency (BPDA) by the Proponent in accordance with Article 80B of the Boston Zoning Code.

The Project is located in the Boston University Charles River Campus (CRC) and lies within the boundaries of the Boston University Charles River 2013 - 2023 Institutional Master Plan (IMP). The Project was identified as a Proposed Institutional Project (PIP) located on Site CC in the IMP. Some modifications to the PIP as described in the IMP require the approval of an amendment to the IMP. A Project Notification Form (PNF) was submitted to the BPDA by the Proponent on October 1, 2018. The fifth amendment to the IMP (the "IMP Amendment") was initiated with the submittal by the Proponent of an Institutional Master Plan Notification Form (IMPINF) to the BPDA concurrent with the PNF under the provisions of Article 80D of the Boston Zoning Code. On December 14, 2018 the BPDA issued a Scoping Determination (the "Scoping Determination" or "Scope"), which identified submission requirements for the DPIR as well as for the IMP Amendment. The Scope has been addressed in this DPIR document.

1.3 LEGAL INFORMATION

1.3.1 LEGAL STATUS

History of Tax Arrears

The Proponent does not have a history of tax arrears on any property owned within the City of Boston which is located within the CRC.

Evidence of Site Control

The Site is owned in fee by the Proponent.

Public Easements

There are no public easements within the Site.

Legal Judgements

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

1.3.2 DISCLOSURE OF BENEFICIAL INTERESTS

The Proponent has provided an executed copy of Appendix C Disclosure Statement Concerning Beneficial Interests as Required by Article 80, Section 80B-8 of the Boston Zoning Code under separate cover. See Appendix K, Disclosure Statement Concerning Beneficial Interests.

1.4 PROJECT LOCATION

The Site, located approximately 0.3 miles from Kenmore Square, is in the geographic core of the CRC. Within two blocks is a wide range of the University's programs in allied health, management, earth sciences, humanities, engineering, and communications. To the east and the west, the Site is flanked by academic and research buildings. To the north, a block of multistory brick townhouses serves as residences for students of the University. Across Commonwealth Avenue to the south is a major complex of buildings that supports instruction and research. These buildings include the recently constructed Rajen Kilachand Center for Life Sciences and Engineering. Boston University Grounds South and Warren Towers, an 18-story undergraduate residence hall, complete the block.

Presently the Site is occupied by a paved, at-grade public parking lot, which is accessed via Commonwealth Avenue.

See Figure 1-1, Locus Map; Figure 1-2, Aerial View; and Figure 1-3, Project Site Plan.

1.5 PROJECT SUMMARY

Boston University is globally recognized as a leader in interdisciplinary research and is among the top institutions for education and research in the data sciences.

Data science is the interdisciplinary field that collects large groupings of information and, using scientific methods, processes, algorithms and systems, produces knowledge to drive strategic decision making. The application of data science can be seen throughout our

everyday lives, from the way healthcare is delivered to our strategies for sustaining cities, supply chains, and how we think and learn.

The Data Sciences Center will become a hub of this interdisciplinary activity at Boston University, anchored by the departments of Computer Science and Mathematics & Statistics and the Rafik B. Hariri Institute for Computing and Computational Science & Engineering (the “Hariri Institute”). Collectively, the data sciences permeate all aspects of contemporary academic life, as advances within them open doors to progress in many other disciplines. This new, iconic building will provide a centralized location for existing departments to come together in a truly collaborative and innovative structure.

The departments of Computer Science and Mathematics & Statistics are the ‘home base’ for students’ academic endeavors as they follow the curriculum requirements in their specialized areas of study. Classrooms and computer labs in the lower floors of the building will provide an innovative learning environment that serves their courses. These instruction spaces and the adjacent areas for collaboration will promote innovation in teaching in the most contemporary of settings and access to services. Faculty research will be supported by a floorplan that is designed to provide a maximum of collaborative spaces. The Hariri Institute, which is an incubator supporting a community of scholars, students, and practitioners in the application of data driven techniques, will be located on the building’s top floors.

1.6 PROJECT PROGRAM

Under the umbrella of Data Sciences, two departments and a research institute will be co-located in the new Data Sciences Center. Computer Science and Mathematics & Statistics, as well as the Hariri Institute, will move to the building from five different locations. These programs will be consolidated and thus afforded much needed additional space for expansion and growth. The Project also includes general classrooms and teaching space.

The Data Sciences Center will be comprised of approximately 305,000 sf of Gross Floor Area (GFA). For a detailed description of the Project program, see Chapter 2: Project Description.

1.7 CONSISTENCY WITH INSTITUTIONAL MASTER PLAN

The Project was included in the IMP as a PIP on Site CC. The development of the Site was described as providing new academic space either as a single-phased or multi-phased project. The Project is consistent with the PIP as described in the IMP with the exception that the proposed maximum height (15 stories, 225 feet) will be exceeded. The height of the Data Sciences Center will be 19 stories and 305 feet. Site CC is now comprised of 47,700 sf, which is an addition of 5,700 sf. The development of the Site for academic uses remains unchanged, as does the Proponent’s intention to fully develop Site CC in the future. Parking is no longer being considered for the Site.

The Project as proposed will be the subject of the fifth amendment to the IMP due to its exceedance of the approved stories and height. The Warren Towers Digital Signage work will also be subject to Project Review under Article 80 and is described as a second PIP in the IMP Amendment.

1.8 PUBLIC REVIEW PROCESS

Concurrent with the submission of this DPIR and IMP Amendment to the BPDA, the Proponent will meet with BPDA staff and continue presentations of the Project to the Boston University Charles River Campus Task Force (the “Task Force”). The Proponent looks forward continuing to work with the BPDA, the community, and the City of Boston on this Project.

1.8.1 ARTICLE 80 REVIEW PROCESS

As described in Section 1.2, this document is submitted to the BPDA pursuant to Article 80B, Large Project Review, of the Boston Zoning Code.

Following submission of this DPIR to the BPDA, the Proponent will continue to meet with City agencies and present the Project at a combined community and Task Force meeting. Once a Preliminary Adequacy Determination is issued, the Proponent is anticipating that the DPIR will have addressed the requirements of the Scoping Determination and that the requirement for filing and review of a Final Project Impact Report (FPIR) will be waived pursuant to Section 80B-5.4(c)(iv) of the Code.

1.8.2 BOSTON CIVIC DESIGN COMMISSION

As required by Article 28 of the Boston Zoning Code, the Proponent and the Project Team met with the Boston Civic Design Commission (BCDC) to review and discuss the design of the Project on three occasions. As a result of those meetings, the Proponent has responded to input and incorporated suggestions from the BCDC into the Project design.

The Proponent will seek a recommendation from the BCDC in advance of BPDA Board approval.

1.8.3 BAY STATE ROAD BACK BAY WEST LANDMARK DISTRICT REVIEW

A portion of the Site is located within the Bay State Road Back Bay West Architectural Conservation District (the “District”). The northern footprint of the building is located just within the District (overall one-to-two feet for a length of approximately 95 feet), and 8 floors of the cantilevered tower structure above the podium structure extend 26 feet in depth and 95 feet in length into the District.

Offsite improvements within the District, as described in Chapter 2: Project Description include: modifications to Granby Street, landscape improvements and accessibility upgrades to the private alley behind the Site as well as realignment and re-landscaping of an open space area at the corner of Granby Street and Bay State Road. Except for Granby Street, these offsite areas are owned by the Proponent. Because of the above, the Project is subject to review and approval by the Bay State Road Back Bay West Architectural Conservation District Commission (BSRACDC). The Proponent will consult with the BSRACDC and, following the submittal of a Design Approval Application, will file a request for a Certificate of Appropriateness for review and approval at a public meeting. See Chapter 6: Environmental for a detailed description of work within the District.

1.8.4 BOSTON PUBLIC IMPROVEMENT COMMISSION

The Project will require the review and approval of the Boston Public Improvement Commission (PIC) for proposed public realm improvements. These improvements will include repairs and upgrades to the surrounding sidewalks and installation of stormwater recharge structures on Commonwealth Avenue as well as proposed improvements to Granby Street. At the appropriate stage in the design process the Proponent will submit plans to the PIC to receive approval through a public hearing process for off-site improvements that the Proponent may propose within the public right-of-way. These improvements are further described in Chapter 2: Project Description and Chapter 5: Transportation and Chapter 7: Infrastructure.

1.8.5 BOSTON PARKS AND RECREATION DEPARTMENT

The Project activities will require the removal of 9 street trees located within the public sidewalk adjacent to Commonwealth Avenue. The Proponent will submit a petition to Boston Parks and Recreation Department requesting approval to remove and replace the trees. The Proponent currently has a License, Maintenance and Indemnification Agreement (LMI) with the Massachusetts Department of Transportation (f.k.a. Massachusetts Highway Department) specific to the section of Commonwealth Avenue located between Kenmore Square and the Boston University Bridge. This LMI agreement will be amended as required to include the Project.

1.8.6 ARTICLE 37 GREEN BUILDINGS COMPLIANCE

The Project will address and comply with Article 37 of the Code and will provide a Green Building Report prior to filing an application with the Inspectional Services Department (ISD) as well as a final Green Building Report prior to submittal of a request for a Certificate of Occupancy.

1.8.7 BOSTON UNIVERSITY CHARLES RIVER CAMPUS TASK FORCE

The Task Force is comprised of 14 representatives from areas surrounding the CRC. Since 1986, the Task Force has reviewed all of the University's master plans and development projects. Members of the Task Force include the following individuals:

- Pamela Beale (Chair)
- Paul Berkeley
- Jennifer Carter
- Paul Creighton
- Dan Cuddy
- Anabel Gomes
- James Hynes
- Yvette Lancaster
- Archie Mazmanian
- Terri North
- Richard Ong
- Shlomo Pinkas
- Christopher Strang
- Victor Themo

The University held a pre-filing meeting with the Task Force prior to submitting the PNF on September 26, 2018. A Task Force meeting was also conducted during the comment period on October 24, 2019. Task Force meetings are open to the public. The Proponent will continue to meet with the Task Force during the course of the Article 80 review process. Responses to the comment letter submitted by the Task Force on the PNF are included as Appendix A, Responses to Comments on the PNF.

1.9 MASSACHUSETTS ENVIRONMENTAL POLICY ACT (MEPA)

The Project as defined herein and in previous Article 80 applications is not subject to the jurisdiction of the Massachusetts Environmental Policy Act. The Project does not require any state agency actions or permits and as such is not required to submit an Environmental Notification Form or any other application to the Massachusetts Executive Office of Energy and Environmental Affairs.

1.10 PUBLIC AND COMMUNITY BENEFITS

Since its founding, the University has been committed to, and is an integral part of, the growth and development of the City of Boston. The University continues to make a significant effort to coordinate its goals and objectives with those of the City and is committed to maintaining and improving all property it acquires and to serving the residents of the City by making

educational programs of the highest quality available and accessible. The University is proud to be a steward of many historically significant and important buildings on the CRC. Ongoing and extensive programs to preserve, maintain, and restore these buildings are at the core of the University's commitment to provide excellent facilities to students, faculty, and the public. A detailed description of community benefits is provided in the IMP Amendment.

Through direct and indirect spending of the University, its employees, students, and their visitors, the University's economic impact on the Commonwealth of Massachusetts totaled nearly \$2.8 billion in FY2015, when the most recent Economic Impact Analysis was completed, with \$1.05 billion spent in the City of Boston. From an employment perspective, the University accounted for a total of 17,890 jobs in the Commonwealth, 14,132 of which were in Boston. This total includes 8,724 individuals who were directly employed by the University and an additional 5,408 jobs that resulted from University spending.

The University makes significant annual contributions to local communities through a combination of direct payments and services, which include real estate taxes, payments in lieu of taxes (PILOT), linkage payments, scholarships, fees and permits, police services, rubbish removal and street cleaning, and donated use of athletic and recreation facilities. Between FY2013 and FY2018, the University paid approximately \$30.3 million in real estate property taxes and linkage payments and \$35.8 million to the City of Boston for voluntary payments in lieu of taxes. Combined payments to the City have totaled approximately \$66 million.

The University also contributed more than \$6.6 million between FY2007 and FY2017 to the Commonwealth Avenue Improvement and Beautification Project in collaboration with city, state, and federal agencies.

In addition to direct and indirect economic benefits to the City's economy, the University has long committed to providing opportunity and access to higher education through numerous scholarships that benefit residents of Boston.

The University's signature program, the Thomas M. Menino Scholarship Program, is the longest-running and largest scholarship program of its kind. Each year, 25 exceptional Boston Public High School Seniors are awarded four-year, full-tuition merit scholarships to Boston University. This year the program is expected to enroll 29 new recipients. Since the program's inception in 1973, nearly 2,000 Boston Public School (BPS) students have been awarded more than \$170 million in full-tuition scholarships from Boston University.

In 2009, to further expand scholarship opportunities for local students, the University committed to meeting the full financial need (without loans) of any BPS graduate admitted to Boston University through the creation of the Community Service Scholarship. Since the program's inception in 2009, 466 BPS students have received over \$59 million in Community Service Scholarship funding.

In December 2017, Boston University and Mayor Walsh announced the expansion of the Community Service Scholarship program, which had previously been limited to incoming freshman, to include incoming transfer students who are graduates of BPS. So far, 46 students have received approximately \$2.2 million in funding. This expansion builds on Mayor Walsh's commitment to expanding the educational opportunities for all BPS graduates.

The University also actively seeks ways to reduce demand on city services. Through its own Police Department, the University brings additional security to the entire campus area, 24 hours per day, seven days per week, responding to calls both inside and outside campus boundaries. It also oversees the daily maintenance of the local MBTA stations and City sidewalks and streets around campus, provides snow removal during winter months, plants and repairs street trees, and conducts pest control.

The Project will provide substantial benefits to the City and its residents, including the following:

- Creation of approximately 1,040 direct construction jobs, 554 indirect construction jobs¹, and 414 permanent jobs²;
- Linkage benefits that will include Development Impact Payments (DIP) of \$2,754,150.00 for Housing Linkage and \$542,900.00 for Jobs Linkage;
- The Proponent continues to contribute PILOT payments and other funds and services to the City of Boston as required and agreed upon.
- Generation of approximately \$10 million/year in grant activity;
- Transformation of a surface parking lot into a high-quality state-of-the-art academic center for the study of data sciences;
- Ability to maintain the position of the University and the region on the cutting edge of data sciences teaching and research opportunities;
- Consolidation of three major related University research activities into one building with new facilities for state-of-the-art research activities;
- Creation of a state-of-the-art, energy efficient, and environmentally friendly building;
- Improvement and rejuvenation of the streetscape of Commonwealth Avenue and Granby Street with new landscape features, plantings, and increased gathering spaces

¹ Construction jobs based on Regional Economic Models, Inc. (REMI), PI+ Massachusetts Regions, v1.6.6. Boston Planning & Development Agency (BPDA).

² Bartley, D. (2005). Connection: The Journal of the New England Board of Higher Education; City of Boston Assessing Department, 2009.

- which, will engage pedestrians and occupants of the building with numerous ground-level public realm amenities;
- Enhancement of open space and public amenities that contribute to ground floor activation and improve pedestrian accessibility in the neighborhood; and
 - Substantial improvements to Granby Street including bicycle lanes and street trees.

1.11 SUMMARY OF REQUIRED PERMITS AND APPROVALS

Table 1-1 provides a list of approvals that may be required for the Project.

Table 1-1: Anticipated Project Approvals

Agency	Approval
Local	
Boston Planning and Development Agency (BPDA)	<ul style="list-style-type: none"> • Article 80B Large Project Review • Article 80D Institutional Master Plan Amendment • Schematic Design Approval • Design Development Approval • Construction Document Approval • Boston Residents Construction Employment Plan • Certification of Compliance with Article 80B • Certification of Consistency with Article 80D • Development Impact Project Agreement
Boston Civic Design Commission	<ul style="list-style-type: none"> • Recommendation to the BPDA Board
Bay State Road Back Bay West Architectural Conservation District Commission	<ul style="list-style-type: none"> • Certificate of Design Approval
Boston Zoning Commission	<ul style="list-style-type: none"> • Institutional Master Plan Amendment
Boston Interagency Green Building Committee	<ul style="list-style-type: none"> • Approval of Green Building Reports
Boston Transportation Department	<ul style="list-style-type: none"> • Transportation Access Plan Agreement • Construction Management Plan
Boston Water and Sewer Commission	<ul style="list-style-type: none"> • Site Plan Approval • Groundwater Conservation District Approval
Public Improvement Commission	<ul style="list-style-type: none"> • Specific Repair Plan Approval • License Maintenance Agreement
Boston Public Health Commission	<ul style="list-style-type: none"> • Well Installation Permits
Inspectional Services Department	<ul style="list-style-type: none"> • Building Permit • Certificate of Occupancy

Agency	Approval
State	
Department of Environmental Protection	<ul style="list-style-type: none"> • Notification Prior to Construction or Demolition • Source Registration for Emergency Generator • Elevator Permit • UIC Registration for Geothermal Wells
Massachusetts Architectural Access Board	<ul style="list-style-type: none"> • Variance
Federal	
Environmental Protection Agency	<ul style="list-style-type: none"> • NPDES Construction/Stormwater General Permit • NPDES Remediation General Permit

1.12 PROJECT TEAM

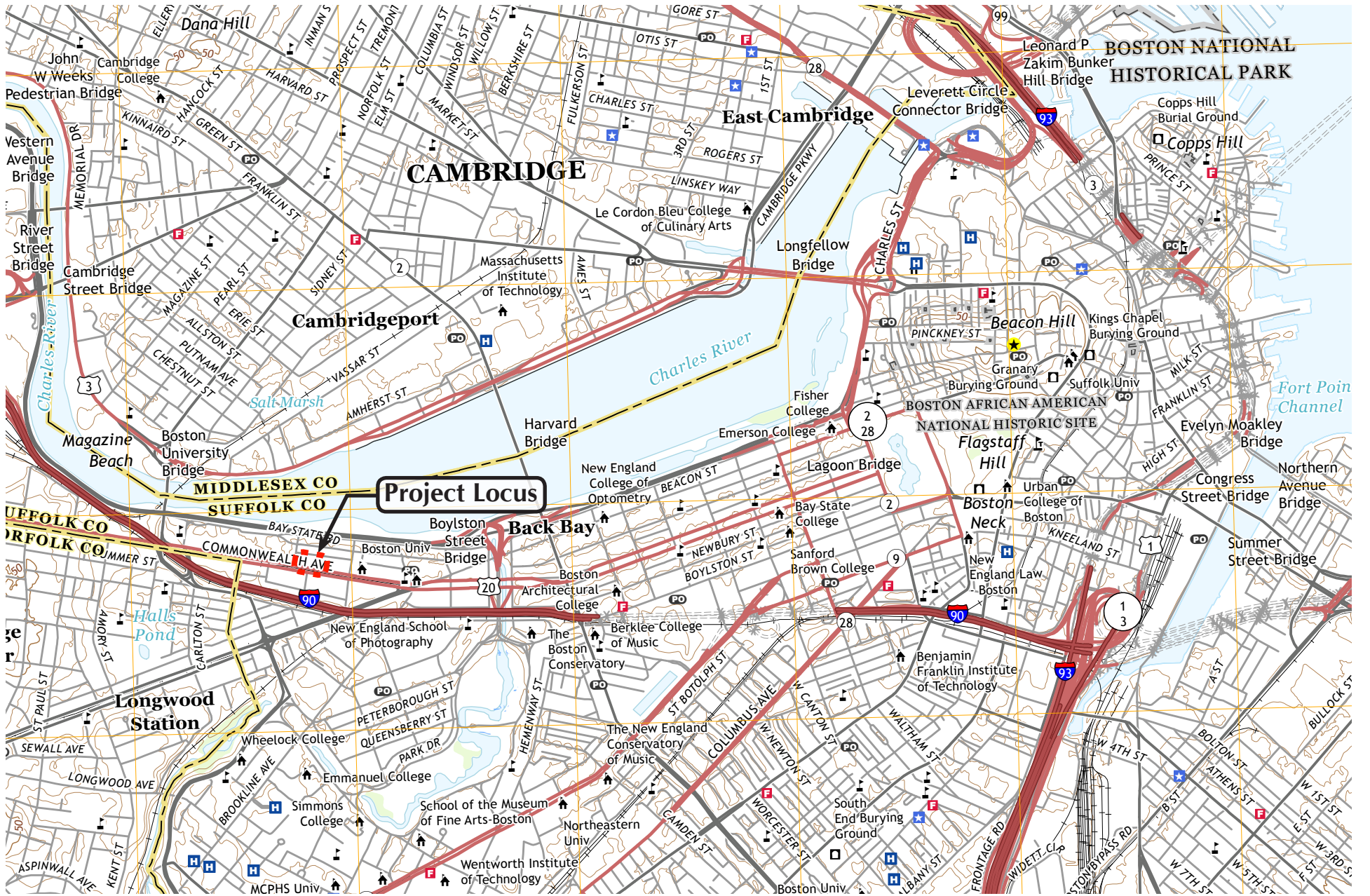
The primary contacts from the Project team can be found below:

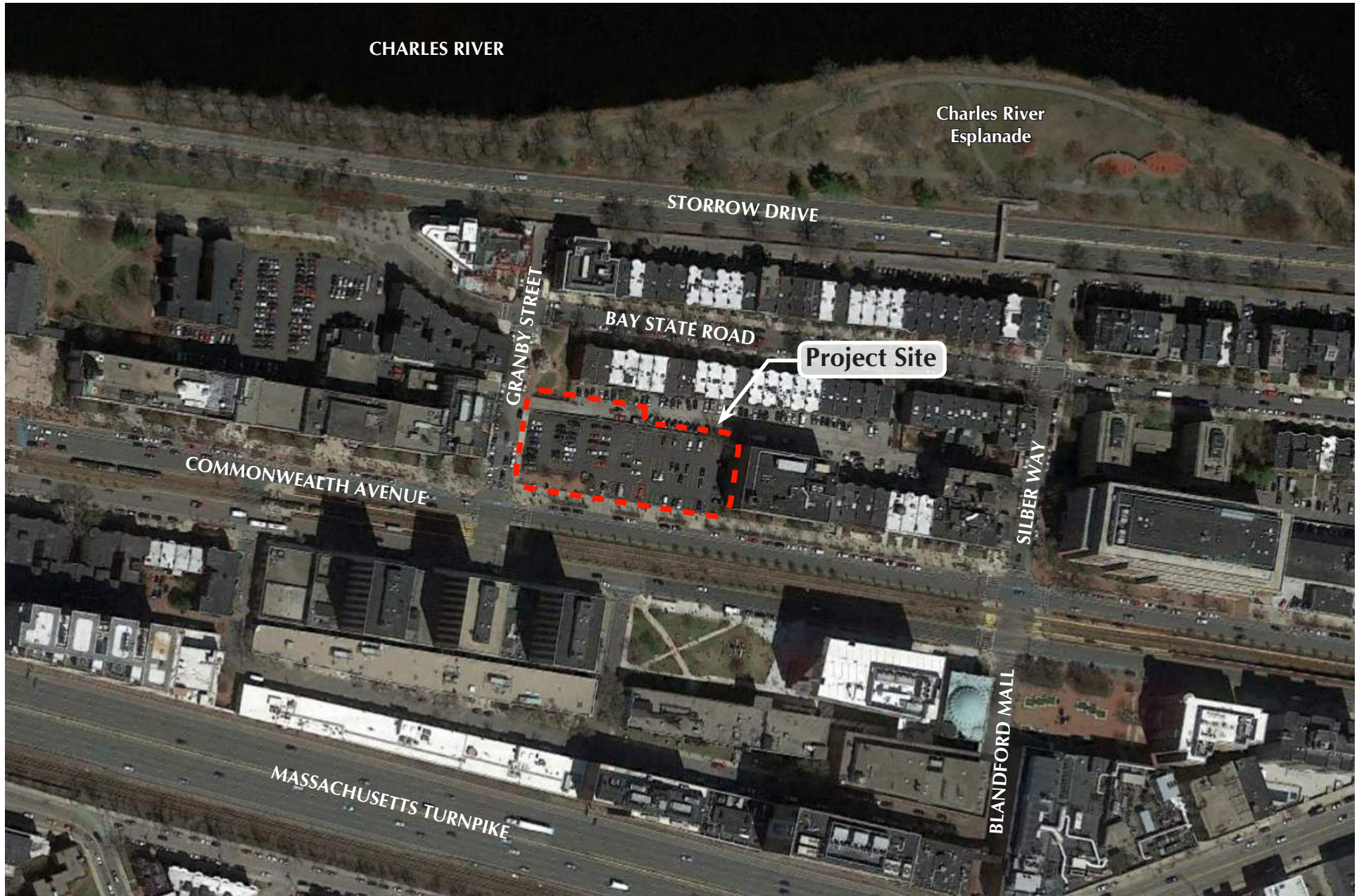
Proponent	<p>Trustees of Boston University One Silber Way Boston, MA 02215</p> <p>Contacts: Gary W. Nicksa, Senior Vice President for Operations nicksa@bu.edu Phone: 617-353-6500</p> <p>Michael Donovan, Vice President for Campus Planning and Operations donovanm@bu.edu Phone: 617-353-4468</p>
Planning and Permitting	<p>Fort Point Associates, Inc. 31 State Street, 3rd Floor Boston, MA 02109</p> <p>Contact: Judith T. Kohn, Vice President jkohn@fpa-inc.com Phone: 617-357-7044 x211</p>

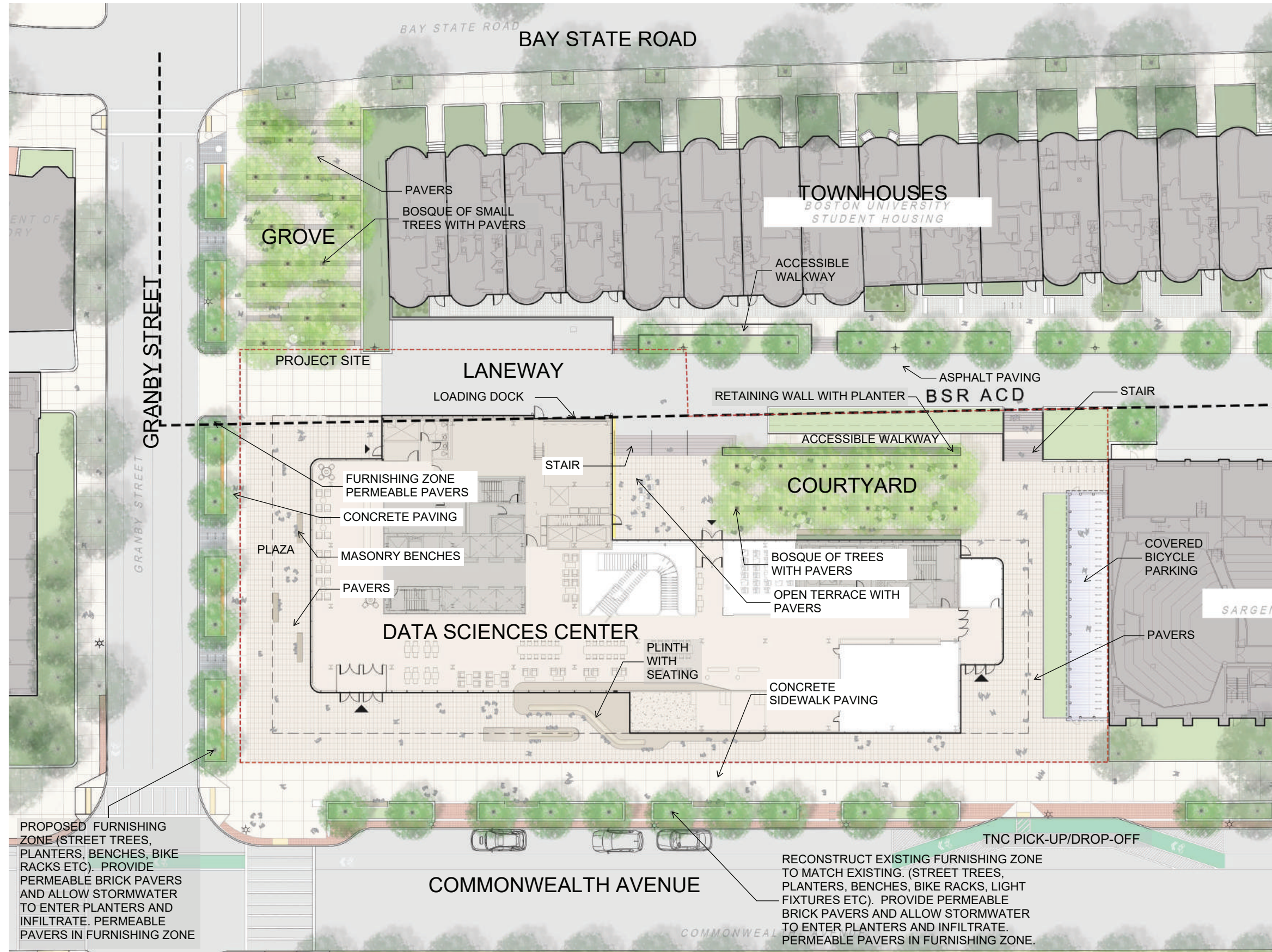
Architect	<p>KPMB Architects 351 King Street East, Suite 1200 Toronto, Ontario M5A 0L6</p> <p>Contact: Luigi LaRocca, Principal llarocca@kpmbarchitects.com Phone: 416-977-5104 x232</p>
Landscape Architect	<p>Richard Burck Associates, Inc. 7 Davis Square Somerville, MA 02144</p> <p>Contact: Richard Burck skip@richardburck.com Phone: 617-623-2300</p>
MEP	<p>Bard, Rao + Athanas Consulting Engineers LLC 10 Guest Street Boston, MA 02135</p> <p>Contact: Cris Copley crc@brplusa.com Phone: 617-925-8316</p>
Sustainability/LEED	<p>The Green Engineer 23 Bradford Street, 1st Floor Concord, MA 01742</p> <p>Chris Schaffner chris@greenengineer.com Phone: 978-369-8978</p>
Legal	<p>Rubin and Rudman, LLP 50 Rowes Wharf Boston, MA 02110</p> <p>Contact: James H. Greene, Partner jgreene@RubinRudman.com Phone: 617-330-7000</p>

Transportation	<p>AECOM 1 Federal Street, 8th Floor Boston, MA 02110</p> <p>Contact: James A Doyle, AICP Jay.doyle@aecom.com Phone: 978-905-2188</p>
Civil Engineering	<p>Nitsch Engineering, Inc. 2 Center Plaza #430 Boston, MA 02108</p> <p>Contact: Chelsea Christenson, Project Manager cchristenson@nitscheng.com Phone: 617-206-8737</p>
Geotechnical and Geothermal	<p>Haley and Aldrich 70 Blanchard Road, Suite 204 Burlington, MA 01803</p> <p>Contact: Bryan Sweeney, Senior Vice President bsweeney@haleyaldrich.com Phone: 617-908-2715</p>
Wind/Daylighting/Glare	<p>RWDI, Inc. 600 Southgate Drive Guelph, ON N1G 4P6</p> <p>Contact: Dan Bacon Dan.bacon@RWDI.com Phone: 519-823-1311</p>
Pre-Construction Services	<p>Suffolk Construction Co., Inc. 65 Allerton Street Boston, MA 02119</p> <p>Contact: Frank Craemer Project Executive fcraemer@suffolk.com Phone: 617-517-5236</p>

	<p>Compass Project Management, Inc. One Edgewater Drive, Suite 204 Norwood, MA 02062</p> <p>Contact: Chris Kenney, Senior Project Manager ckenney@compasspminc.com Phone: 508.589.5061 x 575</p>
Energy and Climate	<p>Transsolar 220 E. 23rd Street. Suite 403 New York, New York 10010</p> <p>Contact: Erik Olsen, Management Partner Olsen@transsolar.com Phone: 212-219-8978</p>







Chapter 2

PROJECT DESCRIPTION

CHAPTER 2: PROJECT DESCRIPTION

2.1 PROJECT SITE AND PUBLIC REALM

2.1.1 PROJECT SITE AND CONTEXT

The Proponent owns and controls most of the buildings along Commonwealth Avenue from Kenmore Square to the Boston University Bridge. To the east of the Site is the Boston University College of Health and Rehabilitation Sciences: Sargent College (Sargent College), while the recently constructed Rajen Kilachand Center for Life Sciences and Engineering and Warren Towers, a student residence hall, are each located to the south. Granby Street and the Department of Earth Sciences and Center for Environmental Studies are to the west of the Site. University-owned multistory brick townhouses face the Site to the north, across a 16-foot-wide paved private passageway that functions as a service alley between the backs of Boston University buildings and the brick townhouses. Together with Warren Towers, the townhouses host over 2,200 Boston University students. These residences front on Bay State Road, which directly abuts Storrow Drive and the Charles River Esplanade. To the south, the MBTA Green Line Boston College Line runs down the centerline of Commonwealth Avenue, with the Blandford Street stop located on the eastern edge of the block.

The Site consists of an existing surface parking lot with 126 parking spaces and a small area of paved open space with benches. Prior to its acquisition by the Proponent, the Site was utilized for commercial uses, including a gas station and a fast food restaurant. The surface parking lot is bordered by three curb cuts on Commonwealth Avenue and two on Granby Street. A significant change in grade occurs at the north property line, where a retaining wall and slopes accommodate a change in elevation that ranges from 2 feet at Granby Street to 8 feet at the eastern property boundary.

Off-Site Improvement Locations

Areas within the vicinity of the Site will be reconstructed or improved as part of the Project development. These areas include University-owned land to the north of the Site and the layout of Granby Street between Commonwealth Avenue and Bay State Road. See Chapter 3, Urban Design for a description of these off-site areas to be improved.

See Figure 2-1 Oblique View of Project Site; Figure 2-2, Existing Conditions Plan; Figure 2-3, Existing Conditions Photographs Key; and Figures 2-4 and 2-5, Existing Conditions Photographs.

2.1.2 LEGAL DESCRIPTION

The metes and bounds description of the Site is included as Appendix B, Legal Description.

2.1.3 SURROUNDING DEVELOPMENT CONTEXT

The Site is located in the heart of the Boston University CRC. As described in detail in the Boston University 2013 – 2023 Institutional Master Plan (IMP) as well as the Urban Design Supplemental Information (UDSI), “The campus of 11.8 million square feet has state-of-the-art academic, research residential and student life facilities extending along a mile and a half of Commonwealth Avenue from Kenmore Square to Packard’s Corner.”¹ Within this 1.5-mile linear corridor, the Boston University CRC is an academic campus extending off the spine of Commonwealth Avenue, which is both a vehicular and transit link between downtown Boston to the east and the neighborhood of Allston/Brighton to the west. Academic buildings and residence halls occupy a diverse combination of repurposed commercial buildings along Commonwealth Avenue, and Boston University-constructed buildings date from 1907 to the recently constructed Rajen Kilachand Center for Life Sciences and Engineering (2017).

To the east, Kenmore Square begins the transition from Boston University owned real estate to existing and planned hotel, retail, residential, commercial and office developments. Fenway Park and its affiliated businesses play a prominent role in the Kenmore Square area. Future planned projects will change the face and activity profile of Kenmore Square and other nearby neighborhoods which are not directly located in downtown Boston. According to the BPDA², projects approved under Article 80 peaked in 2016 at 100, with strong results in 2017 and 2018. The face of the Back Bay is also changing, with significant approved projects. Fenway/Back Bay has permitted over 34.1 million square feet of development since 1996. Many of the projects which have been constructed and those that have been approved are changing the skyline of Boston. Taller buildings will continue to dominate new construction, with heights reaching 600-800 feet downtown. BPDA-approved development projects nearer to the Site are scaled near or below the height and GFA of the Project. Examples of notable and diverse BPDA-reviewed or approved projects within approximately a one-mile radius of the Site include:

¹ Boston University Charles River Campus 2013-2023 Institutional Master Plan: Urban Design Supplemental Information, CBT, 2013.

² Trends in Article 80 Development, Boston Planning and Development Agency Research Division, January 2019

- 1000 Boylston Street: 439,500 sf/up to 484' height – BPDA approved March 15, 2018
- Kenmore Hotels: Two hotels 347,000 sf/up to 280' height – Under review
- Kenmore Square Redevelopment: 280,500 sf/up to 112' height – BPDA approved November 15, 2018
- Landmark Center: 506,000 sf/up to 208' height – BPDA approved November 3, 2017
- One Dalton: 712,500 sf/up to 691' height – BPDA approved September 12, 2013
- Fenway Center Parcel 7: 819,00 sf/up to 305' height – NPC submitted September 14, 2016
- Julie Hall (Emmanuel College): 267,500 sf/up to 205' height – BCDC approved January 5, 16

2.2 PROJECT ALTERNATIVES

As required in the Scoping Determination, the Applicant has evaluated one “no-build” and three “build” alternatives (the “Project Alternatives”). Note that the zoning-compliant alternative, which was included as a Proposed Institutional Project (PIP) in the IMP, is very similar to the currently proposed Project. The Proponent had planned for an academic building on the Site (Site CC) and identified key elements of the Project in the IMP. See Table 2-1: Project Alternative Comparison for a comparison of program, uses, parking provided and impacts.

The alternatives evaluated by the Proponent include:

2.2.1 NO-BUILD ALTERNATIVE (ALTERNATIVE A)

The No-Build Alternative has been provided to serve as a baseline against which build alternatives may be evaluated. Alternative A assumes that the current use of the Site will continue. As the current use is an at-grade parking lot with 126 spaces, it is expected that the spaces in the existing parking lot will continue to be offered to the public, open 24 hours/7 days a week, year-round. In addition, The No-Build Alternative provides for 35 existing University-owned off-street parking spaces. Alternative A would continue to provide the lowest-value land use from an urban design and planning perspective and is not consistent with the underlying zoning or the IMP PIP proposed for that location.

2.2.2 ZONING COMPLIANT (UNDERLYING ZONING) ALTERNATIVE (ALTERNATIVE B)

The Site is located within the Boston Proper Boston Zoning District as identified on Map 1 of the Zoning Districts City of Boston maps. The Site is also within an Institutional Master Plan Area and in the Groundwater Conservation Overlay District (GCOD). The underlying zoning is H-4, which allows non-university residential uses and a maximum Floor Area Ratio (FAR) of 4.0. While setbacks and FAR constrain the size of a building on the Site, there is no height limitation.

The zoning-compliant residential program evaluated for Alternative B is provided in Table 2-1: Project Alternatives Comparison. Since underlying zoning does not allow University housing, the program advanced in Alternative B is, by necessity, market-rate non-university housing, and therefore not a project that would be undertaken by the University at that location. The purpose of developing an IMP is to determine uses and projects that are best-suited to the University and its mission and objectives, and which are not required to be compliant with underlying zoning.

2.2.3 ZONING COMPLIANT (IMP) ALTERNATIVE (ALTERNATIVE C)

The Site, which is within an Institutional Master Plan Area, was identified as a potential development site for academic uses since the first Institutional Master Plan was approved in 1987. In order to advance this objective, acquisition of the entire Site parcel was completed in 2003. New academic space which could be developed as either a single-or multiple-phase project with a 300-car parking garage was proposed for the Site as Site CC in the IMP. The academic/institutional program identified in the IMP is presented in Table 2-1: Project Alternatives Comparison.

As Alternative C is a PIP, and compliant with the IMP, this development program is generally compatible with the University's mission and goals. Further study of the current needs of the University since the completion of the IMP resulted in the conclusion that the parking program identified in the PIP, which included the addition of 300 parking spaces to the University's parking inventory, was not the optimal project for the University to advance on Site CC. This program does not best serve the University's desire for open space and connectivity and provides unnecessary parking.

2.2.4 PROPOSED PROJECT

The proposed Project is as described further in the DPIR. The proposed Project program and design reflect the current academic and parking needs of the Proponent as they have been developing since the completion of the IMP. The proposed Project is consistent with the use and program developed for inclusion in the IMP, with some critically important refinements to building massing and height and the elimination

of the originally proposed 300 parking spaces. The academic/institutional program for the Proposed Project is presented in Table 2-2: Project Program.

See Figure 2-6, Alternative A: No Build; Figure 2-7, Alternative B: Zoning Compliant – Underlying Zoning; Figure 2-8, Alternative C: Zoning Compliant – 2013-2023 Institutional Master Plan; and Figure 2-9 Proposed Project.

Table 2-1: Project Alternatives Comparison

Program Summary/Impact	Alternative A	Alternative B	Alternative C	Proposed Project
Square footage – Total GFA	0	162,500	350,000	305,000
Square footage – non-GFA parking	0	70,000	120,000	0
Residential Units	0	317	0	0
Project Site Area	42,000 sf	42,000 sf	47,700 sf	47,700 sf
Building Height - feet	0	165	225	305
Building Height - stories	0	15	15	19
Parking Spaces on-site	126	158	300	0
Parking spaces off-site/off-street	35	35	0	0
Parking spaces on-street (Granby Street)	21	21	21	0
Floor Area Ratio	0	4.0	8.4	6.5
Trip Generation (adjusted trips) ADT				
AM Peak Hour Inbound	35	24	53	46
AM Peak Hour Outbound	10	75	17	14
PM Peak Hour Inbound	8	70	25	21
PM Peak Hour Outbound	41	45	49	42
Daily Inbound	120	706	408	355
Daily Outbound	120	706	408	355
Wind Impacts	N/A	Moderate	Moderate	Moderate
Shadow Impacts	N/A	Moderate	Moderate	Moderate
Daylighting	N/A	Moderate	Moderate	Moderate
Solar Glare	N/A	Moderate	Moderate	Moderate
Noise	Average but at times loud consistent with a surface public parking facility	Moderate to loud due to mechanical equipment and parking below grade	Moderate to loud due to mechanical equipment and parking below	Minimal with reduced mechanical equipment and no parking
Construction Duration	0	14.4 months	31 months	27 months
Sustainability/Resilience	none	Silver Certifiable	Gold Certified	Gold Certified
Water Demand (gpd)	none	52,360	15,046	13,112
Wastewater Generation (gpd)	none	57,596	12,955	11,290

Program Summary/Impact	Alternative A	Alternative B	Alternative C	Proposed Project
Groundwater Recharge	None	Required	Required	Required

2.2.5 SUMMARY OF FINDINGS

A comparison of impacts and benefits of the Project Alternatives is provided below:

Environmental Impacts

All Project Alternatives, including the no-Build Alternative (which is currently a surface parking lot), will generate some environmental impacts. While ranging in height and size, all the build alternatives create some moderate increases in wind, shadow, daylighting, water use, and wastewater generation. These impacts are consistent with projects planned and constructed in an urban setting on a site of approximately 1-acre. The three build alternatives range in height from 165 feet to 305 feet. In all cases, the predominant shadows are cast to the northeast and fall on University-owned properties and fall minimally on public streets and open spaces. The primary east-west spine of Commonwealth Avenue is not (or is minimally) in shadow under any of the build conditions. Moderate increases in wind impacts would occur with all three of the build alternatives. While in general the build alternatives require modest water supply and wastewater capacity, the highest water and wastewater impacts are generated by Alternative B.

Environmental Benefits

Alternative A would provide no new contribution to groundwater recharge, water quality improvement, or stormwater management. A comparison of the build alternatives points to an overall environmental benefit in groundwater recharge. In addition to improved groundwater recharge, the proposed Project provides significant environmental benefits by incorporating sustainable measures in its operating systems, energy usage, and operations, as well as adding on-site and off-site landscape improvements, permeable paving, street furniture, and new public and private amenities. The proposed Project provides additional environmental benefits as described in this DPIR.

Transportation Impacts

A comparison of transportation impacts of the four Project Alternatives yields a range of trip generation numbers. Alternative B yields the highest number of unadjusted and adjusted vehicle trips and, as a non-university project, would not be included in the University's Transportation Demand Management (TDM) Plan. Of the Four Project Alternatives evaluated, only the proposed Project eliminates on-site parking with its associated impacts. In addition, of the three build alternatives, the proposed Project generates the fewest new vehicle trips.

Transportation Benefits

Alternative A would provide no transportation benefits. The proposed Project provides additional bicycle parking, as well as the improved circulation and installation of dedicated bicycle lanes on Granby Street. Both Alternative C and the proposed Project would benefit from participation in the University's TDM Plan. None of the other Project Alternatives anticipate improvements to Granby Street or additional bicycle parking. All transportation related factors evaluated in this analysis are most positive for the proposed Project.

Sustainability

Alternative A would provide no sustainability benefits. Understanding that the three build alternatives would be required to undergo Article 80B review, it could be assumed that they would be expected to achieve LEED Certification. In addition, it can be reasonably assumed that both Alternative C and the proposed Project could be expected to achieve LEED Gold Certification, as addressed in Chapter 4, Sustainability. In addition, the proposed Project is exploring the use of geothermal wells as a principal source of energy production.

While it is understood that all the build alternatives will achieve some measure of sustainability, the proposed Project is more advanced and has specific commitments to LEED that will exceed those of the other Project Alternatives, most particularly Alternative A, which will not be required to add any sustainable measures.

Conclusion

After evaluating the compatibility with its institutional mission and goals, as well as overall urban planning and campus design objectives, environmental impacts and benefits, costs, and return on investment, the Proponent has determined that, of the four Project Alternatives studied, the proposed Project best meets the academic needs of the University with similar or fewer impacts, while exceeding the environmental benefits of the alternatives studied. Alternative A provides continued transportation and environmental impacts with no associated benefits. Alternatives B and C cause increased environmental impacts with some counterbalancing benefits. Neither Alternative A, nor B, nor C fulfill the program objectives and mission of the Proponent, and therefore would not be considered as suitable options to pursue, construct, or operate.

The Proponent has an approved IMP which meets the long-term goals and objectives of the University. Undertaking either a no-build option or a project that complies with underlying zoning is contrary to the mission and goals of the University, and inconsistent with the PIP as identified in the IMP for Site CC. As the proposed Project is a refinement of (and a more environmentally sustainable and beneficial change to)

the PIP identified in the IMP, the PIP described in the IMP is also not considered to be the best option of the four Project Alternatives reviewed for this DPIR.

2.3 CHANGES TO THE PROJECT SINCE THE PNF FILING

Since the filing of the PNF on October 1, 2018, the Proponent has met with stakeholders, the Boston University Community Task Force, and City agencies, and has advanced Project planning and design activities to respond to input received. The Proponent is also continuing with design development as required to advance the Project to complete the Article 80 process and obtain permits to construct this significant and much-needed addition to the CRC in accordance with the long-term goals of the University.

The Project program has essentially and materially not changed since the filing of the PNF. Adjustments to the placement of the building on the Site and the Site area have been made to substantially increase the connectivity with the street and spaces allocated to the public realm on Commonwealth Avenue and Granby Street. The building has been set back from Commonwealth Avenue (an additional 10 feet) and Granby Street (an additional 8 feet) with the addition of a plinth/seating area on the Commonwealth Avenue streetscape. The seating area transitions seamlessly inside of the building. Modifications to the off-site areas include the de-formalized grove of ornamental trees in the open space area, and additional permeable pavers concrete pavement and new bituminous concrete paving and curbing.

The Proponent is currently coordinating with Boston Transportation Department on the design of a proposed curbside drop-off and pick-up area along Commonwealth Avenue westbound serving the main eastern entrance of the Project. The drop-off and pick-up spaces are intended to be used by Transportation Network Company (TNC) vehicles or private vehicles for passenger loading and unloading and will not be used for commercial deliveries.

Adjustments to the materiality of the building have been made to improve porosity and increase the transparency on the podium levels facing on Commonwealth Avenue and on the top floors of the tower structure. The Proponent continues to coordinate with the BPDA and BCDC to provide additional refinements to the materiality and color of the building.

2.4 PROPOSED PROJECT

With the initiation of the Project, the Proponent will create a dynamic center for interdisciplinary innovation that will support the first major teaching center on the CRC in a half century, and the most visible building on campus. By bringing the mathematics and statistics and computer science departments under one roof, Boston University furthers its efforts to become one of the country's leading urban interdisciplinary research institutions in the country.

The Project will bring together closely allied disciplines, providing a new platform for collaboration and innovation in the data sciences. The academic, office, and research and training space will serve the College of Arts and Sciences departments of Mathematics & Statistics and Computer Science as well as the Hariri Institute. The Project will allow these academic and research entities to consolidate from five different locations across the campus to one building, which is a critical factor for units that are highly collaborative in their field. The Project will generate some increase in the number of faculty and graduate students who conduct research in these areas as well as providing “hoteling” space for faculty or staff from other departments or institutions needing temporary office space. Key to the design of is the ability to feature opportunities for open, structured, and serendipitous collaboration. Descriptions of the academic and research entities, as well as their interaction in the Data Sciences Center, are found in the sections below.

2.4.1 YEAR-ROUND USES

As a leading research and instructional institution, Boston University maintains year-round operations. The Proponent plans to operate the Project as an academic building and research center twelve months of the year. All areas of the building will be open and operating with little variation in schedules between the academic calendar and summer months, with hundreds of courses and many programs as well as student residences offered during Summer Term.

2.4.2 PROJECT GOALS

Critical goals for the Project have been identified to:

- Provide a learning and research environment that is open, flexible, and collaborative;
- Provide the data sciences disciplines with a visible presence and home in the center of the CRC;
- Reduce the stock of surface parking lots owned by the University and replace the Granby Street lot with a cornerstone urban design feature;
- Continue to expand the number of sustainable and resilient buildings on Boston University’s campus;
- Animate and improve the public realm at the corner of Commonwealth Avenue and Granby Street; and
- Develop and improve pedestrian connections through and around the block to Bay State Road, University properties, and the Riverfront.

2.4.3 PROJECT ON-SITE AND OFF-SITE IMPROVEMENTS

Development of the Project will require removal of the existing parking lot and closing of the curb cuts on Commonwealth Avenue as well as one curb cut on Granby Street. The removal of the curb cuts will create an uninterrupted sidewalk along Commonwealth Avenue between Silber Way and Granby Street.

Proposed off-site improvements to Granby Street will include a change from a two-lane, one-way configuration to a two-way orientation with exclusive bicycle lanes on both sides of the street, and new street trees. The pavement layout from curb to curb is proposed to be reduced from 40 feet to 34 feet for the length of the street. The Boston University-owned open space area at the corner of Granby Street and Bay State Road will be reconstructed and improved with new plantings, paving, and site amenities. The existing curb cut to access the reconstructed 16-foot-wide service alley running from Granby Street will be reconstructed and repaved with a combination of pervious pavers and concrete and bituminous concrete pavement. New trees and plantings will line the laneway passageway behind the building, which will transform it into a pedestrian-friendly space. These features will allow for improved vehicular, pedestrian, and bicycle circulation as well as direct vehicular connections to the Project's service areas. See Figure 2-33, Project Site Plan.

Commonwealth Avenue will be animated by the Project's activities and transparency, its open visible accessible entrances at both the eastern and western limits of the Site, and a new outdoor landscaped pedestrian connection to the laneway between the Sargent College building and the Data Sciences Center. For a more detailed description of Public Realm improvements, see Chapter 3, Urban Design.

2.4.4 PROJECT PROGRAM

The lower floors of the Data Sciences Center will support a major teaching center that will affirm the University's strong commitment to excellence in teaching of both undergraduate and graduate students. These instruction spaces and the adjacent areas for collaboration will promote innovation in teaching in the most contemporary of settings and services. The classrooms and teaching spaces will serve the University community.

The Project will specifically include dedicated computer science and mathematics computing laboratory and workspaces, general classrooms and department teaching spaces, seminar rooms, focused and informal collaboration spaces, faculty and graduate/post-doctoral offices, and administration spaces, as well as seminar rooms, conference and meeting rooms, and typical building support areas including restrooms, utility rooms, mechanical rooms, and common areas.

As described in Table 2-1, the Project is consistent with the proposed IMP Amendment height, massing, and other dimensional controls. The total building footprint is approximately 21,300 sf, covering 45 percent of the Site. The total GFA of the building as calculated under Boston’s zoning code is approximately 305,000 sf, and the Project’s Floor Area Ratio (FAR) is 6.5. The 19-story building has an integrated five-story podium to create an appropriately-scaled street face on Commonwealth Avenue and Granby Street. The 19 stories will be located above grade and include two levels of mechanical penthouse. Two levels will be constructed below grade.

Table 2-2: Project Program

Project Component	Dimensions/Count
Total Project Site	47,700 sf
Building Footprint Area	21,300 sf
Gross Floor Area (Per Zoning)	305,000 sf
Floor Area Ratio (Per Zoning)	6.5
Stories	19 stories with 2 levels below grade
Bicycle Parking	120 bicycle spaces in an exterior covered area on-Site 62 additional secure bicycle spaces provided nearby
Height	305 feet
Building Area³	
Sub-basement	4,244 sf
Basement	17,659 sf
Ground Floor	18,155 sf
Typical Floor – Level 2-5	24,703 sf
Typical Floor – Level 6-17	14,085 sf
Penthouse Level 18	2,569 sf
Penthouse Level 19	1,768 sf

2.4.5 BELOW-GRADE USES

The basement, which is the first level below grade, includes four classroom and teaching spaces, building operations offices, showers and changing rooms for bike users, and mechanical and electrical equipment space. The sub-basement, which is two levels below grade, is a service level with no academic space and includes areas for mechanical and electrical equipment as well as some general building storage space. See Figure 2-10, Lower Sub-Basement Plan; and Figure 2-11, Basement Plan.

³ Gross Floor Area per Zoning

2.4.6 PODIUM LEVELS - GROUND FLOOR AND SECOND FLOOR USES

The ground floor is highly transparent and emphasizes porosity with multiple entrances into the building. The large atrium on the ground floor has a butterfly stair at the center of the plan, which provides for movement to teaching spaces from the basement through the fifth floor. The interconnectivity created by the atrium and atrium stair offers opportunities for collaboration and interaction while providing a view through to the laneway and a true window into the collaborative open spaces on the ground and second floors. Collaboration spaces are profiled along Commonwealth Avenue. A portion of the ground floor will be designated for a small café space.

The first two floors of the building house the more “public” academic program spaces. Twenty-one percent of the floor space is devoted to open informal collaborative spaces for students. These collaboration spaces are for the most part positioned on the glass walls open to Commonwealth Avenue. These floors also house six general classrooms that will provide a flexible environment for teaching in today’s and tomorrow’s environment that values connectivity. Several classrooms will have flexible wall dividers. All classrooms will be equipped with technology for connectivity and flexible movable furniture systems.

The ground floor has four accessible entrances to engage the Project’s open space features. Two entrances are located on the west, one is located on the east, and one is located at mid-block on the north.

See Figure 2-12, Ground Floor Plan; and Figure 2-13, Second Floor Plan.

2.4.7 PODIUM LEVELS - FLOORS THREE TO FIVE – MATHEMATICS & STATISTICS

The upper three floors of the podium of the building contain several general classroom spaces in addition to teaching and computing lab space for the departments of Computer Science and Mathematics & Statistics. The academic spaces, offices, research spaces, and open collaboration spaces for Mathematics & Statistics take up most of the Net Assignable Square Feet (NASF) on these floors.

On the fifth floor, a pavilion located at the east end of the building will provide a common gathering space. This space will serve as an informal lunch area and event space for users of the building.

See Figure 2-14, Third Floor Plan; Figure 2-15, Fourth Floor Plan; and Figure 2-16, Fifth Floor Plan.

2.4.8 BUILDING TOWER

The tower floors are organized as an academic vertical campus community with each department inhabiting a “neighborhood.” Each tower floor provides open and enclosed work spaces that are grouped in flexible configurations to support research clusters in each department. Each research cluster includes space for faculty offices, shared offices for post doctorates and graduate students, open informal and formal collaboration spaces, meeting room spaces, and computing research spaces. The variety of open and closed spaces will encourage collaboration and innovation not only within a research cluster, but also amongst other research clusters in the department and the other departments housed in the Data Sciences Center.

Floors Six Through Ten – Computer Science

Floors six through ten will contain the department academic space for Computer Science, in which students and faculty study and teach the possibilities, limitations, and applications of computing as well as advancement of the field through academic research.

See Figure 2-17, Sixth Floor Plan; Figure 2-18, Seventh Floor Plan; Figure 2-19, Eighth Floor Plan; Figure 2-20, Ninth Floor Plan; and Figure 2-21, Tenth Floor Plan.

Floors Eleven Through Seventeen – Hariri Institute for Computing and Computational Sciences and Engineering

An incubator in a University setting, the Hariri Institute propels collaborative, interdisciplinary research and training initiatives by 1) promoting discovery and innovation through the use of computational and data driven approaches, and 2) advancing computing sciences inspired by challenges in engineering, social, health and management sciences, and the arts. The Hariri Institute includes centers, initiatives, and labs that work in collaboration to support a portfolio of ambitious research projects.

The Hariri Institute closely intersects with both the departments of Computer Science and Mathematics & Statistics. The co-location of these disciplines in one building and the development of the vertical campus enhances the opportunities for the Hariri Institute to develop and grow world class research at Boston University. The seven floors of the Institute include academic and research space similar to the academic departments in the building but with a more flexible and open working environment.

On the top floor, a 100+ seat multipurpose room will serve the Hariri Institute as an everyday colloquium room. The space will also be available to the larger Boston University community for specific events.

See Figure 2-22, Eleventh Floor Plan; Figure 2-23, Twelfth Floor Plan; Figure 2-24, Thirteenth Floor Plan; Figure 2-25, Fourteenth Floor Plan; Figure 2-26, Fifteenth Floor Plan; Figure 2-27, Sixteenth Floor Plan; and Figure 2-28, Seventeenth Floor Plan.

2.4.9 BUILDING ROOF AND MECHANICAL PENTHOUSE

The eighteenth and nineteenth floors will be devoted to mechanical equipment.

A portion of the northeastern corner of the eighteenth and nineteenth floors will be open to both the seventeenth floor and the sky above, creating an open-air terrace below.

See Figure 2-29, Eighteenth Floor Plan – Mechanical Penthouse; Figure 2-30, Nineteenth Floor Plan – Mechanical Penthouse; and Figure 2-31, Roof Plan.

2.5 SITE REQUIREMENTS

2.5.1 SITE CIRCULATION

The podium, which occupies approximately half of the Site area, is designed to provide street frontage on both Commonwealth Avenue and Granby Street. The configuration of the ground floor is such that the width of the pedestrian-accessible areas on Granby Street, and on roughly half of the Commonwealth Avenue building frontage is increased at the street level, with upper floors extending over the ground level at a height of approximately 15 feet. The enhanced pedestrian environment features a significantly wider pedestrian accessible area, much of which has overhead protection from the elements. The building footprint does not extend to the easternmost boundary of the Site, and thus creates a 3,600-sf pedestrian space that will be open to pedestrians and bicycles between the Data Sciences Center and the Sargent College building. This connection will create a new north-south link to a courtyard located on the north side of the building as well as the laneway and University-owned townhouses on Bay State Road. Pedestrians will be able to enter the building from both the corner of Granby Street and Commonwealth Avenue and midblock from the new pedestrian open space connection beside the Sargent College building. See Figure 2-32, Circulation and Access Plan.

2.5.2 VEHICULAR CIRCULATION

As a result of the Project, three curb openings along Commonwealth Avenue will be closed. The Site will provide no new curb cuts for vehicular access along Commonwealth Avenue. One existing curb cut on Granby Street will be removed, and one will be maintained and reconstructed.

In addition to on-site improvements, the privately-owned alley between Commonwealth Avenue and Bay State Road will be reconstructed from Granby Street to the eastern boundary of the Site. Access for loading, deliveries, and trash pick-up will be provided on the north side of the Site via the reconstructed pedestrian-friendly laneway curb cut on Granby Street and by the current access at Silber Way. Granby Street is proposed to be converted to a two-way, two-lane roadway with dedicated bicycle lanes. The Project will provide a designated drop-off area for car sharing services, and metered parking spaces along Commonwealth Avenue will be retained or replaced.

2.5.3 LOADING AND SERVICE

Trucks and deliveries will be accommodated at a loading dock at the north side of the building, which will be accessed from the laneway. Vehicles will access the laneway using routes like the existing truck and delivery routes to University-owned buildings located in the block. The loading dock will provide two ports. One port will receive general deliveries, while the second will house an internal trash compactor. Recycling bins will be housed in the interior of the loading dock for regular pickup. For additional information related to loading and service support, see Chapter 5, Transportation.

2.5.4 PEDESTRIAN/BICYCLE CIRCULATION

Pedestrians will enter the Data Sciences Center from two main accessible entrances provided at the western corners of the building at Granby Street and one at the eastern corner near the Sargent College building. Pedestrians will also access the ground floor mid-building from the north via the new pedestrian courtyard. The ground floor of the Project is set back from the Sargent College building, allowing for a north-south pedestrian connection between Commonwealth Avenue and the laneway. Additionally, the configuration of the ground floor and the second floor provides a wide building frontage and sidewalk plaza area for pedestrians along the length of Granby Street and approximately half of the length along Commonwealth Avenue.

As part of the Project, the Proponent proposes to introduce design changes on Granby Street. These changes include reconfiguring Granby Street from a two-lane, one-way southbound street to a two-way street to reduce traffic on Bay State Road. Dedicated bicycle lanes on both sides of the street will connect to the existing network on Commonwealth Avenue. The Project will provide 120 covered bicycle storage spaces on-site at the eastern end near the Sargent College building. A total of 26 additional bicycle spaces will be provided on University-owned property at the Site. An additional 36 spaces will be provided on Commonwealth Avenue and Granby Street adjacent to sidewalk areas. Bicycle storage areas are also available at several locations on the University Campus near to the Site.

2.5.5 ACCESSIBILITY

All of the Project's main entrances will be located at ground level and will be universally accessible. The Project's interior treatments will facilitate universally accessible connections on every floor.

2.5.6 PARKING AND ACCESS

The Site includes an existing surface parking lot, also known as Lot N or Granby Lot, which contains 126 parking spaces. This parking lot will be removed, as will 35 spaces located in the alley behind the Site. No new parking will be required to accommodate the Project program and uses. Parking and access are described in detail in Chapter 5, Transportation.

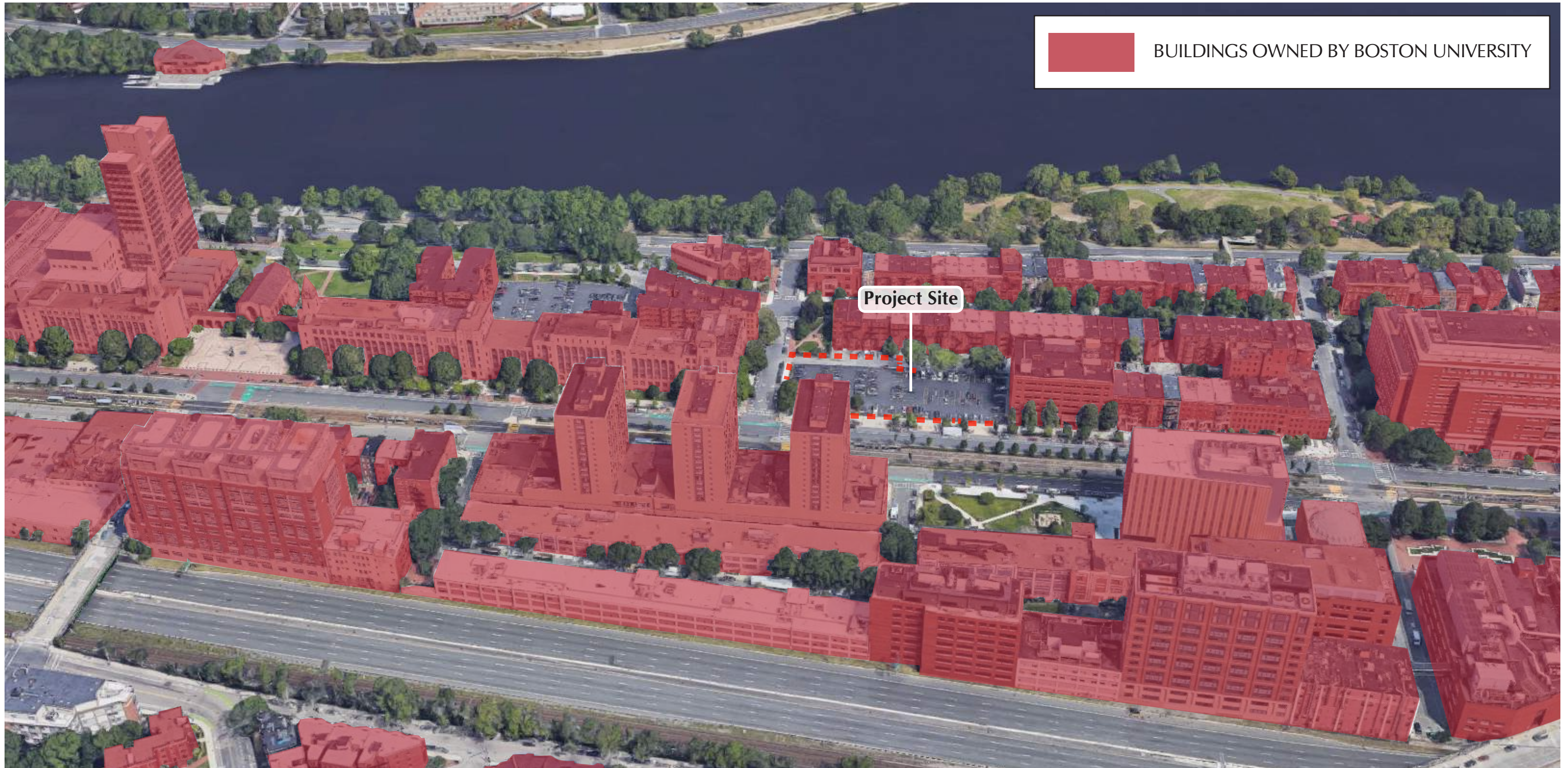
2.6 OPEN SPACE AND LANDSCAPE

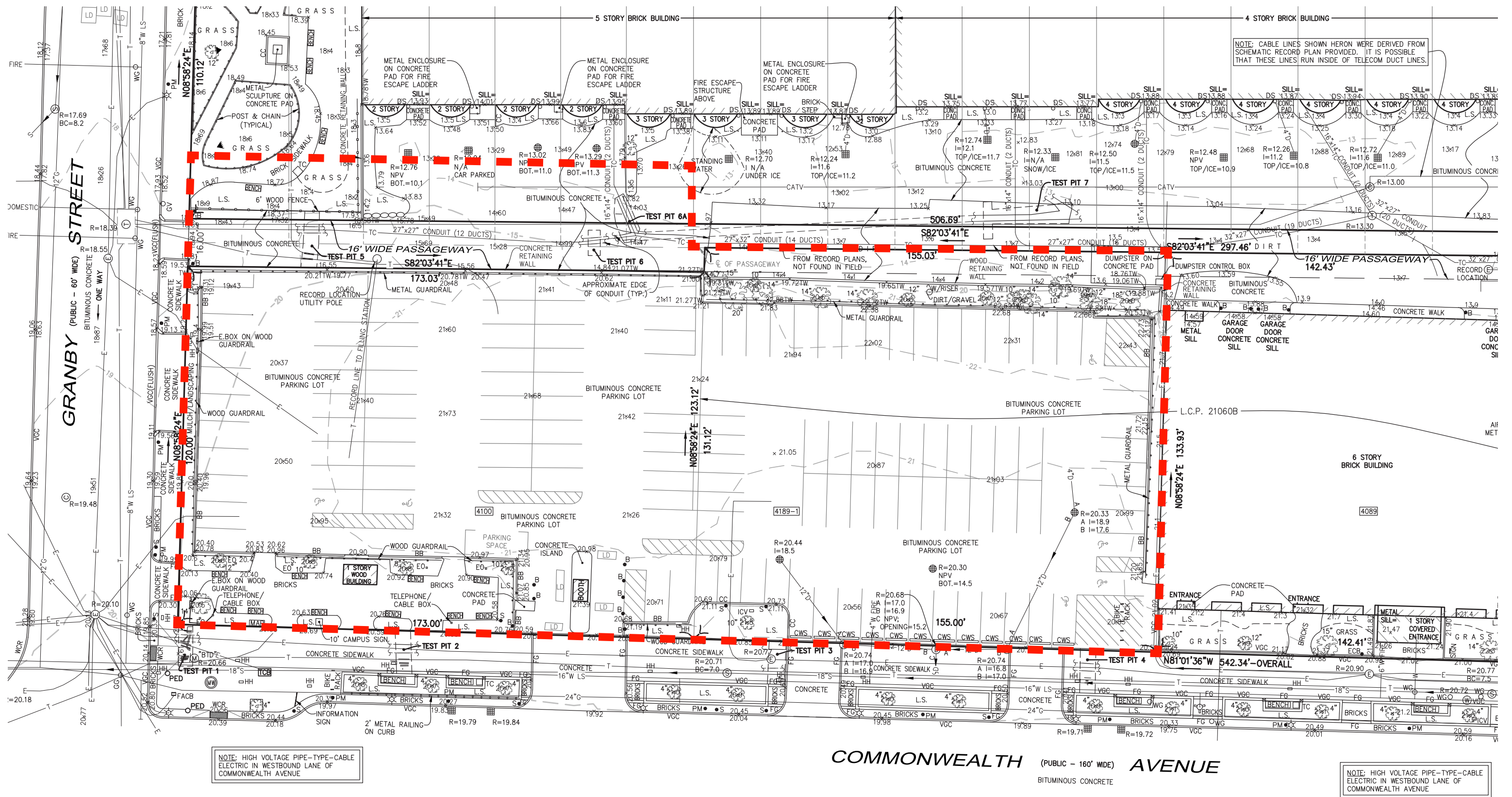
The Proponent proposes to make landscape and open space improvements both within the Site boundaries and to off-site areas abutting the Site. Development of the Project will require removal of parking in the surface lot as well as behind the University-owned townhouses in the abutting alley, which will create a more pedestrian-friendlier landscaped environment while maintaining service and delivery functions on the improved laneway. The improvements to the laneway will include a new Americans with Disabilities Act (ADA) accessible route to the townhouses.

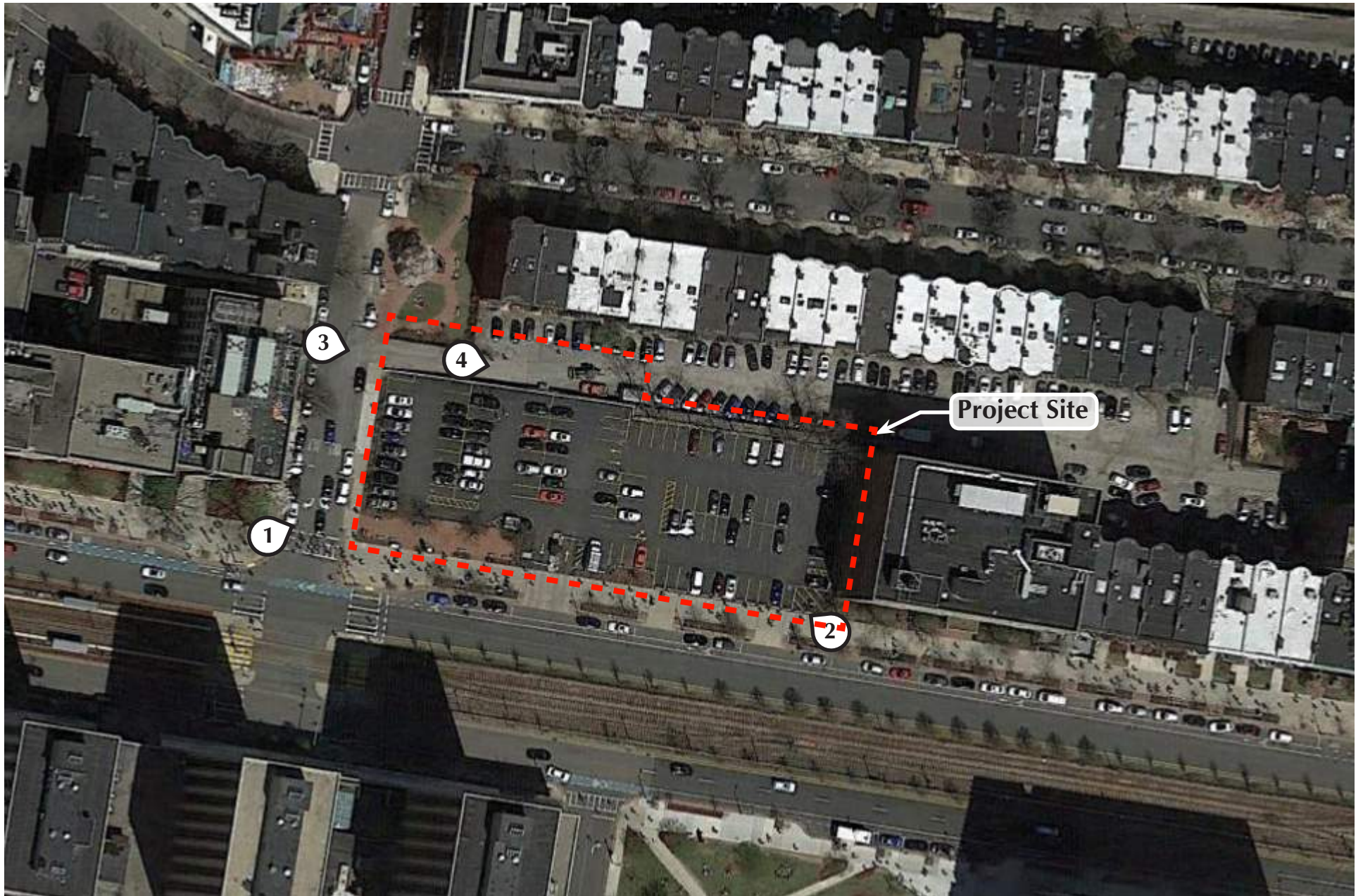
To the north, between the laneway and the Data Sciences Center, there is a new courtyard space and another building entrance that leads to the ground-floor's central atrium and connected spiraling open stair. This large courtyard space will be set at the elevation of the building's ground floor and will be fully accessible directly from the central atrium. Offering outdoor seating for groups and individuals, the space will be planted with trees and paved with large stone or concrete pavers. From the exterior of the building, visitors can access the area via Commonwealth Avenue or the laneway. Because the courtyard is elevated above the laneway, it will provide views of the surrounding architecture and skyline. The ground floor entrances and the laneway will be accessible via a sloped walkway which will connect the courtyard and the laneway.

The Project will provide new street trees along Granby Street and improvements to an open space area at the corner of Granby Street and Bay State Road. Existing street trees and planters along Commonwealth Avenue will be reconstructed to match the existing conditions once construction is completed. A new open space connection to the laneway and Bay State Road area will be created between the building and the six-story Sargent College to the east, which will be softened with a line of canopy trees. For a detailed description of open space and landscape improvements, see Chapter 3, Urban Design.

See Figure 2-33, Project Site Plan; and Figure 2-34, Landscape Plan.









Existing Photograph 1: View Looking Northeast Toward Project Site



Existing Photograph 2: View Looking Northwest Toward Project Site



Existing Photograph 3: View Looking East Toward Alley

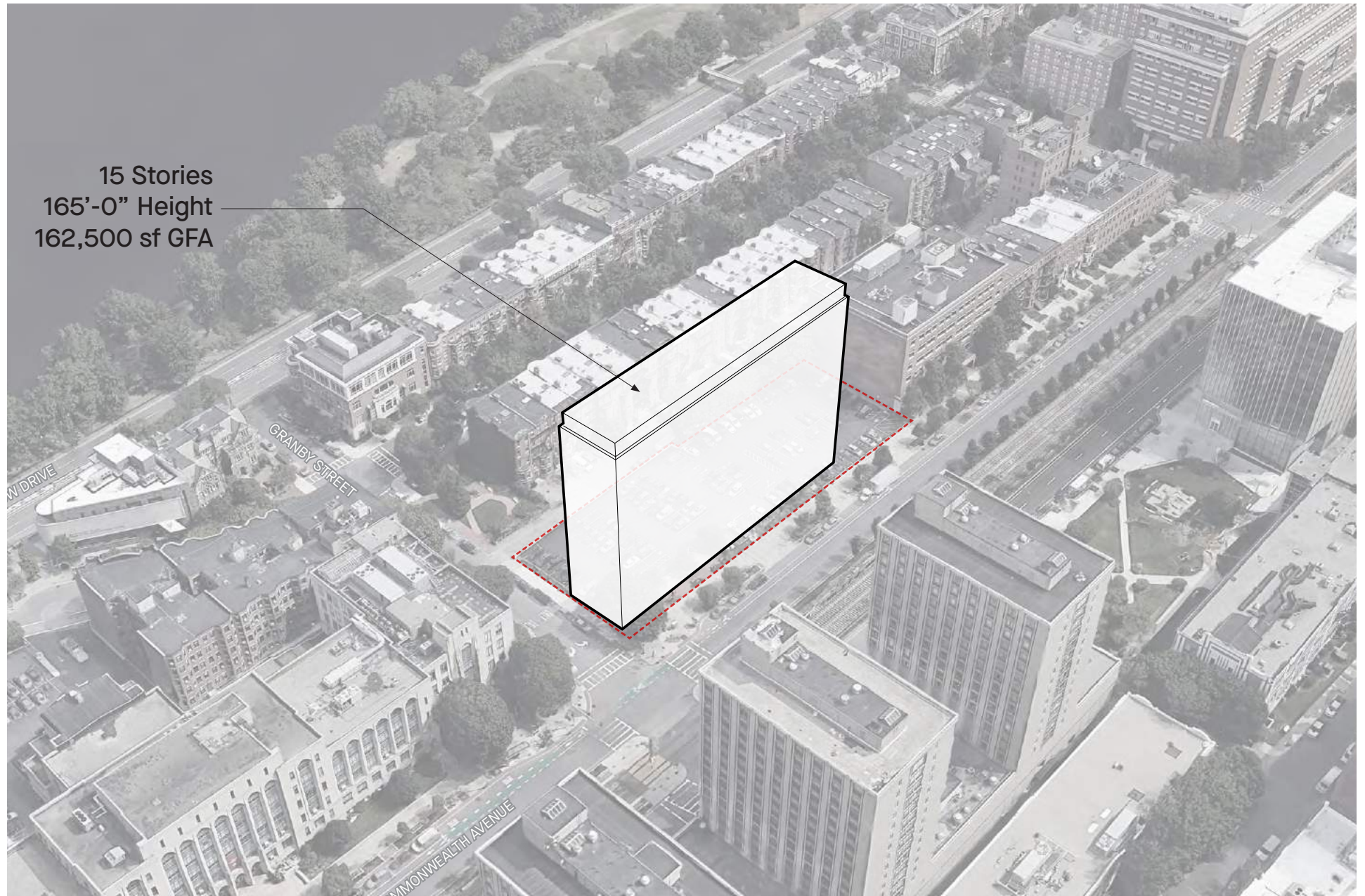


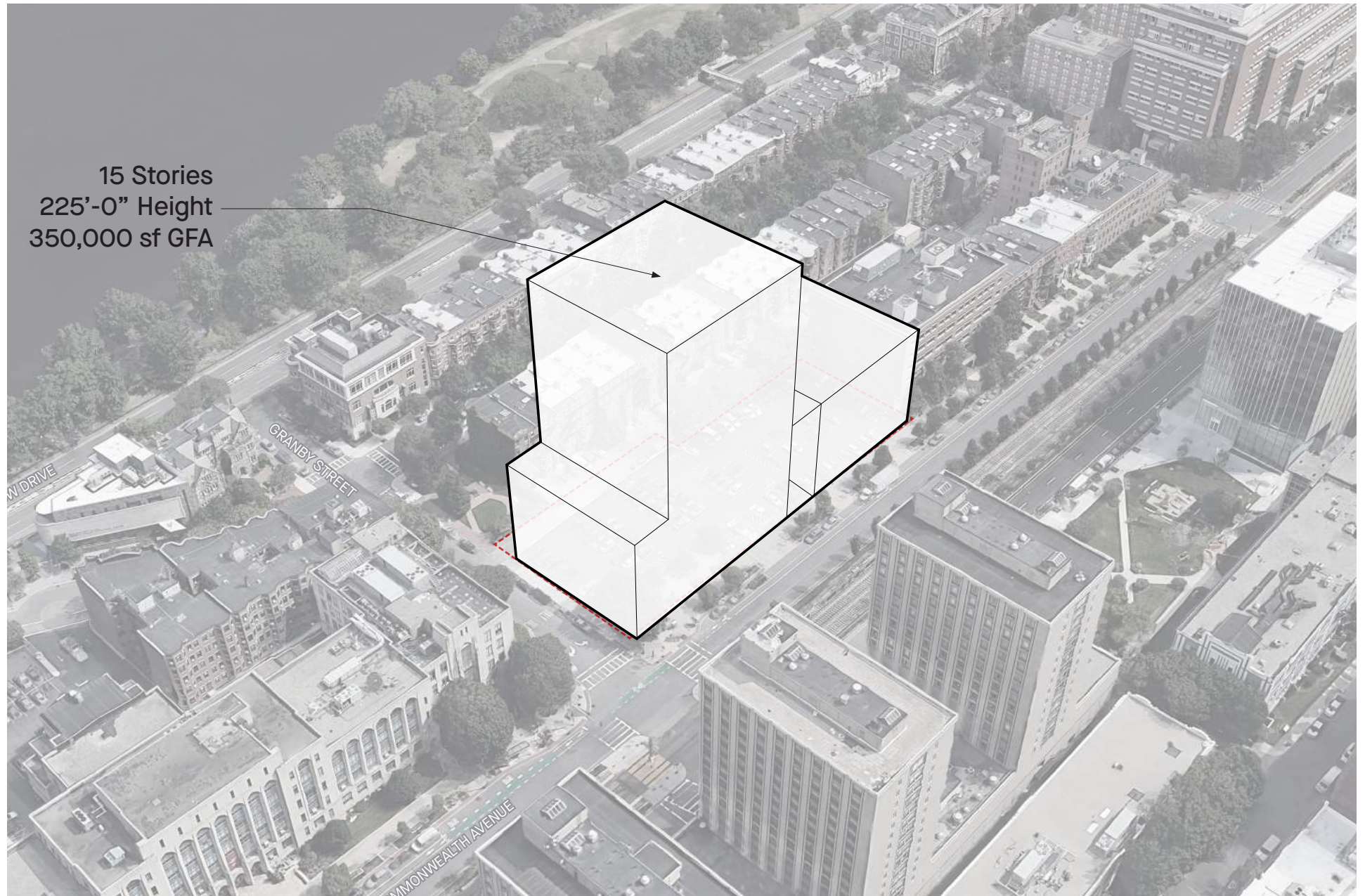
Existing Photograph 4: View Looking East in Alley



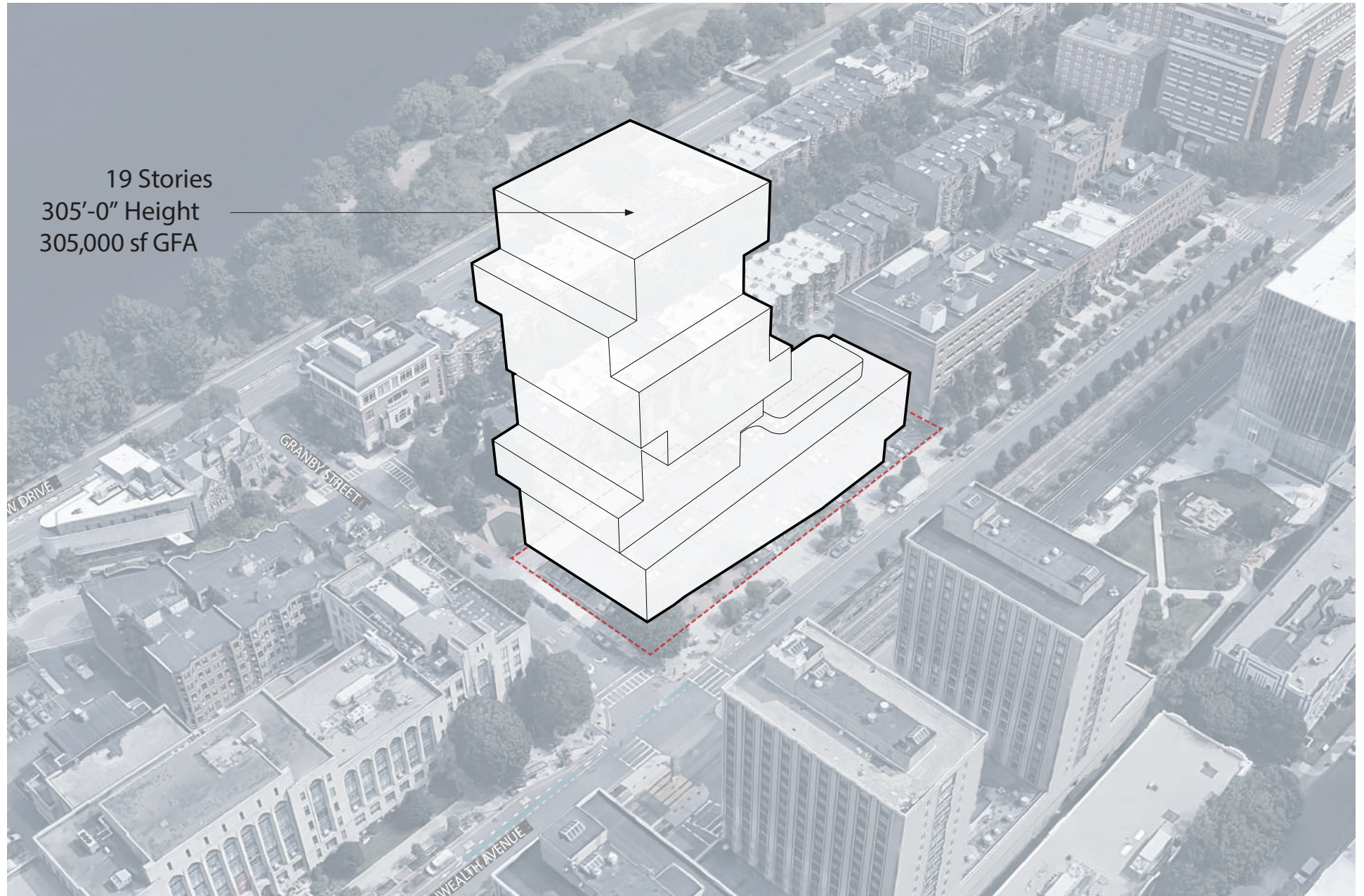
Boston, Massachusetts

Figure 2-6
Alternative A: No-Build
Source: KPMB Architects, 2019

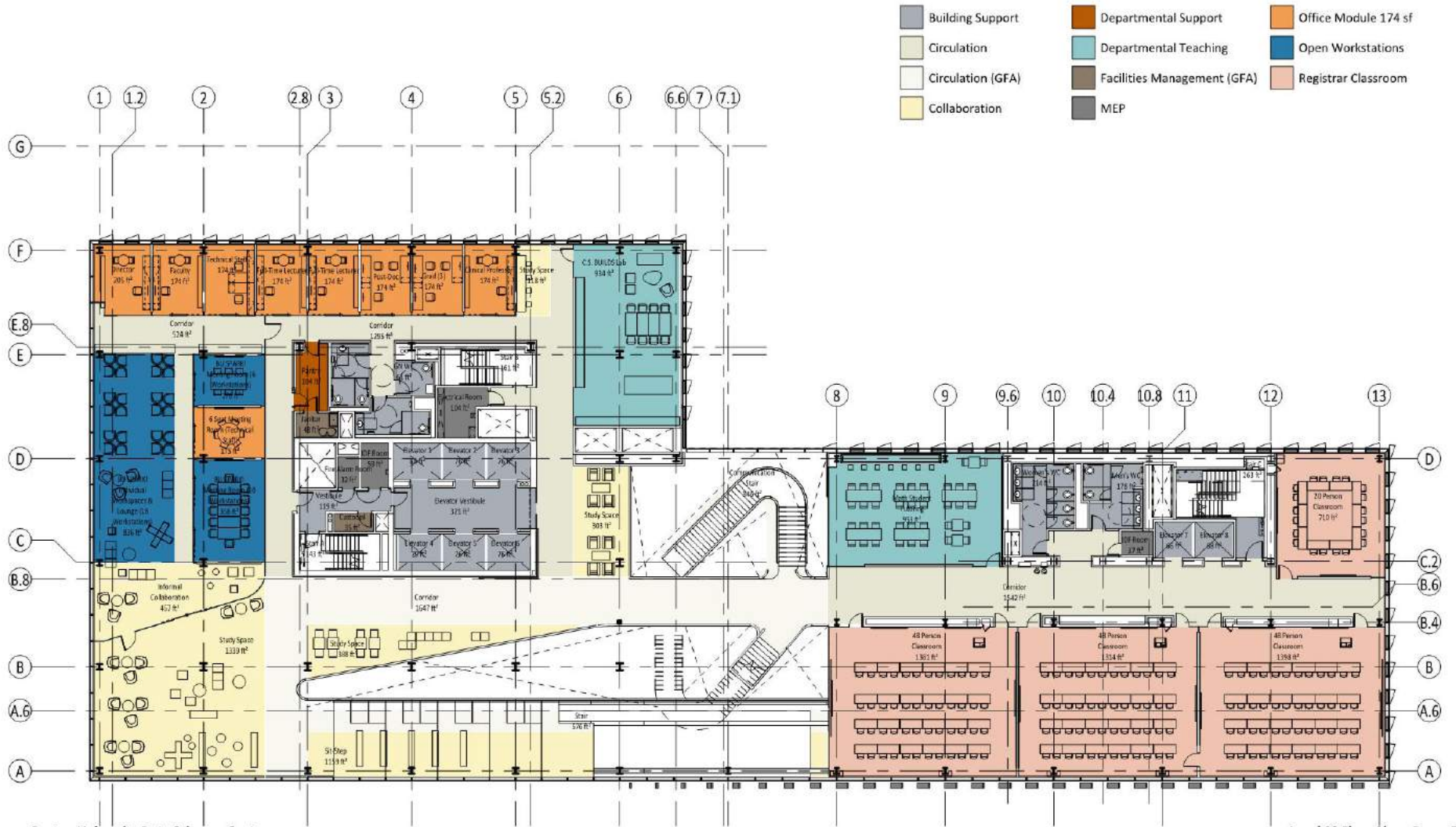




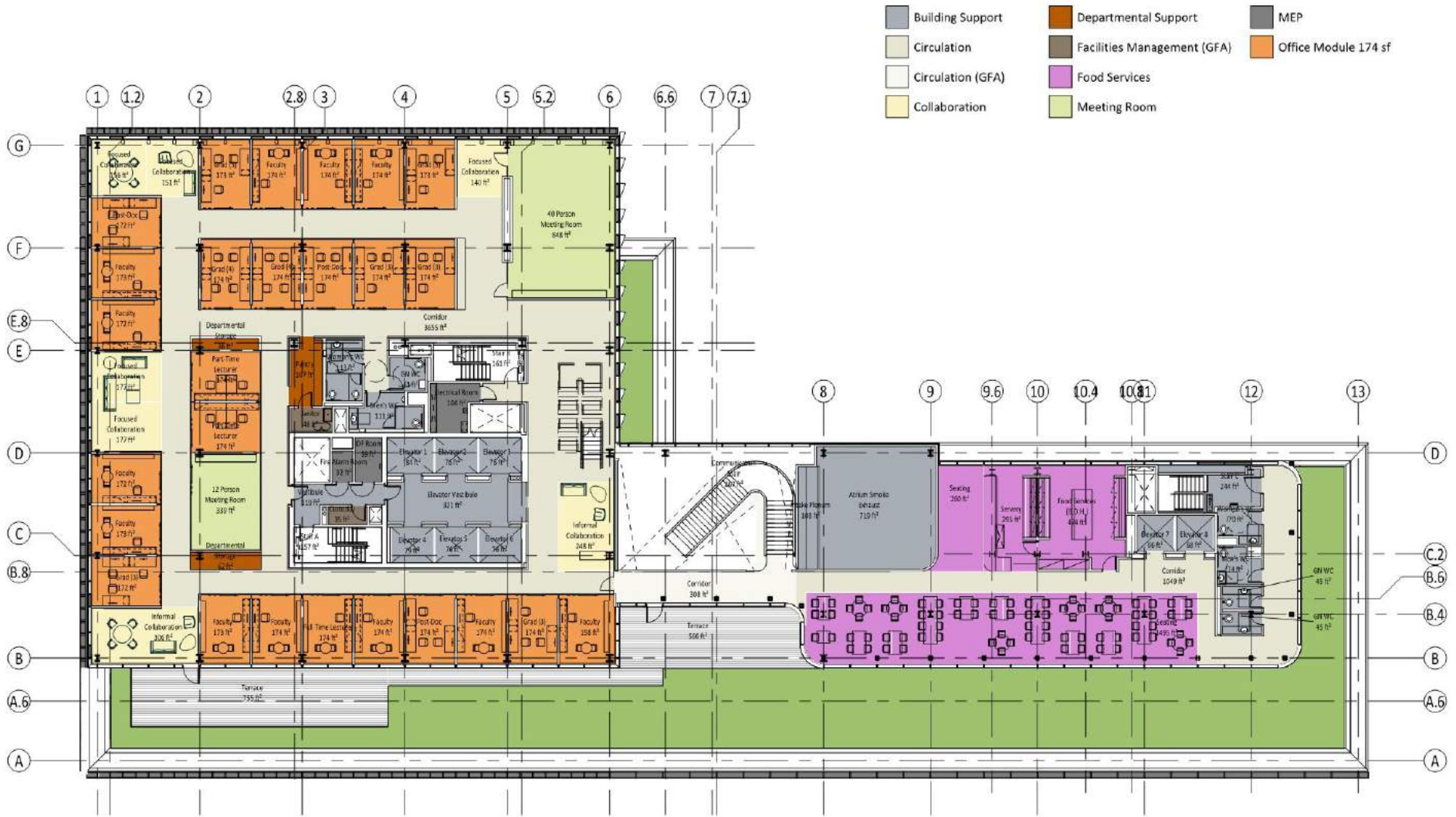
15 Stories
225'-0" Height
350,000 sf GFA

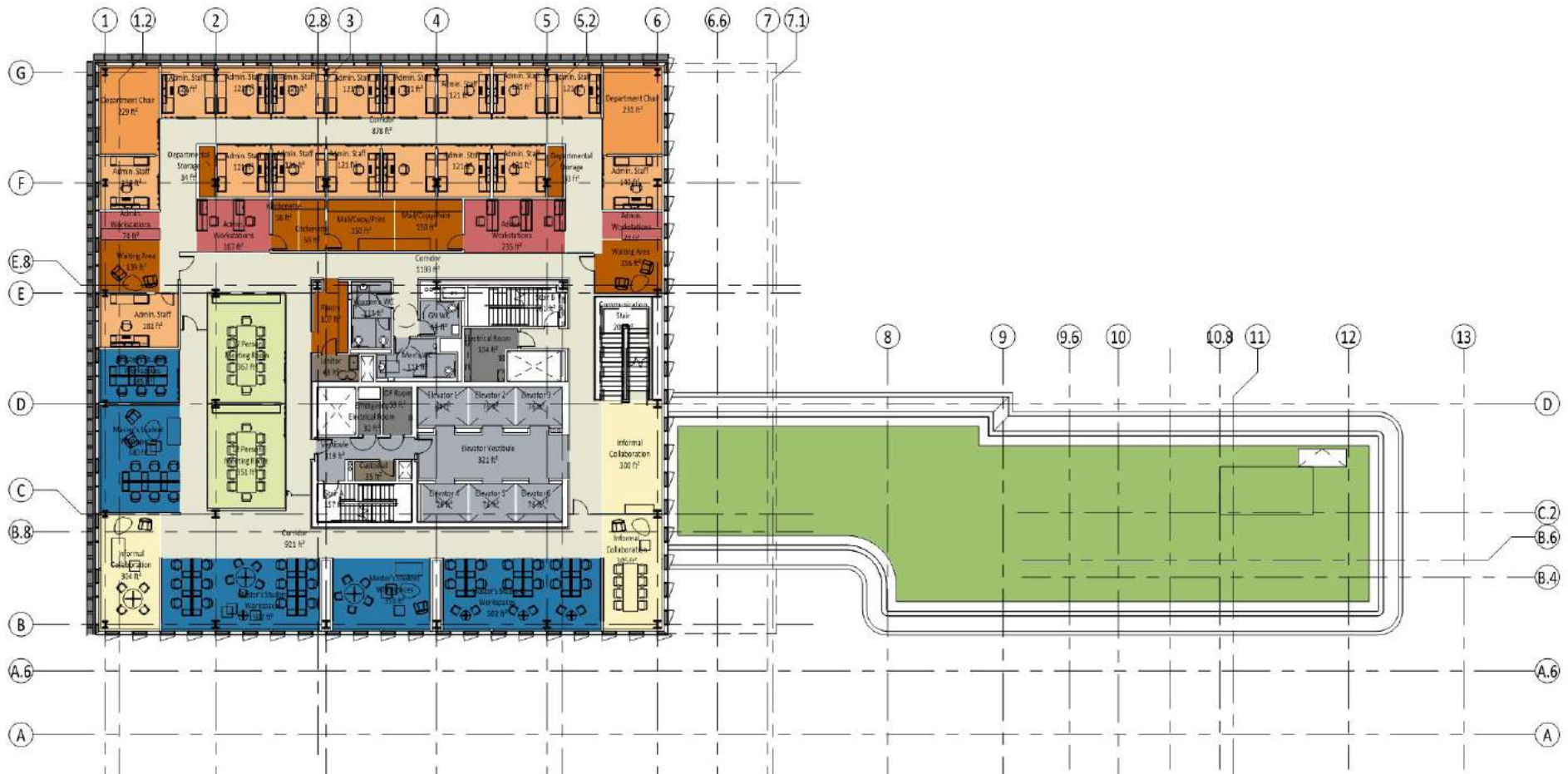






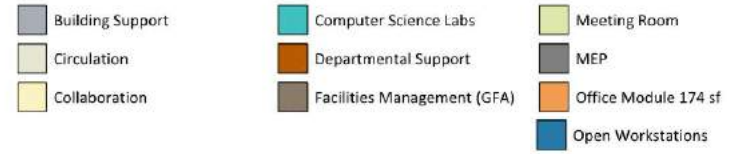














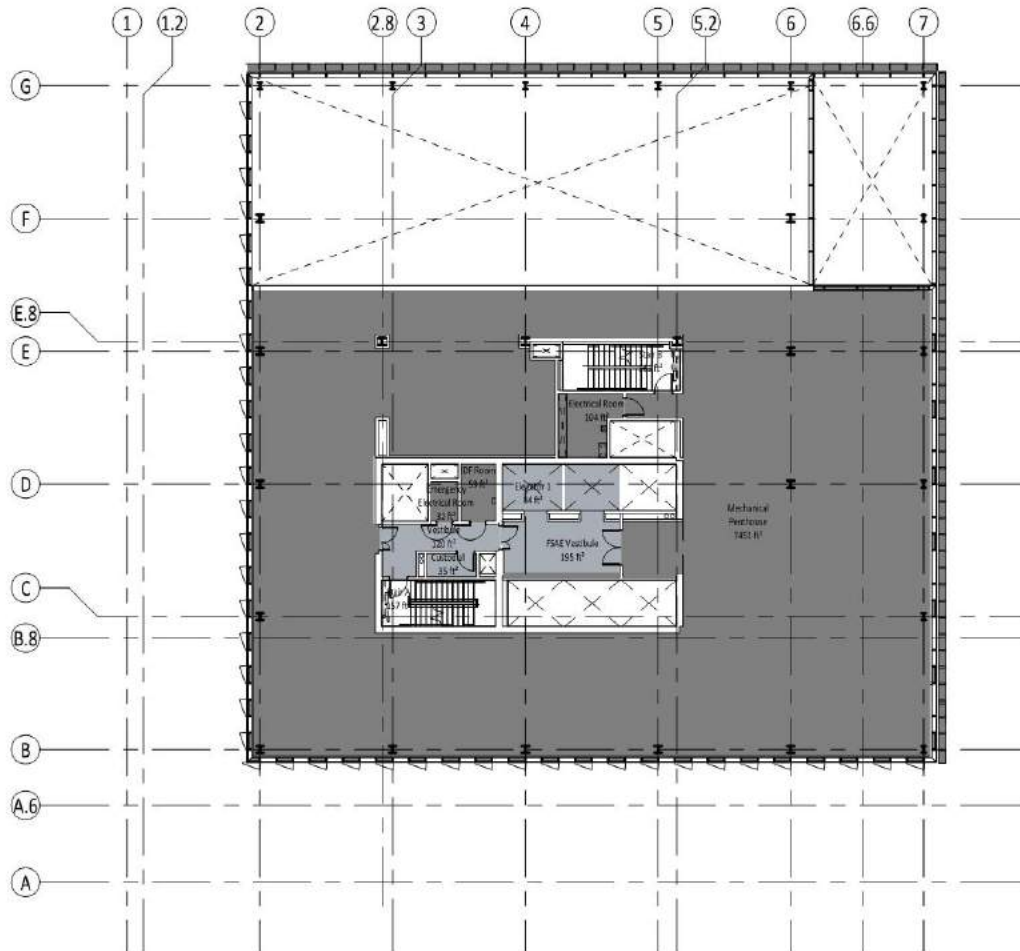








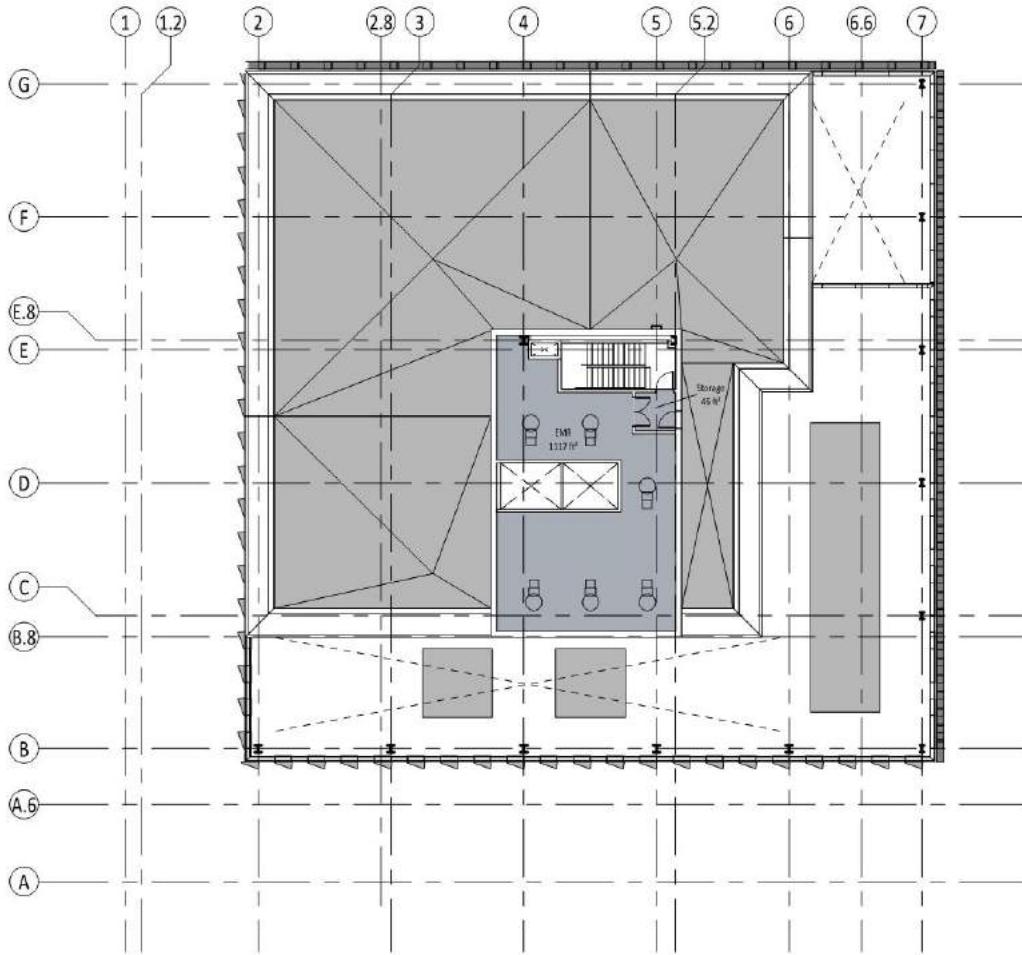


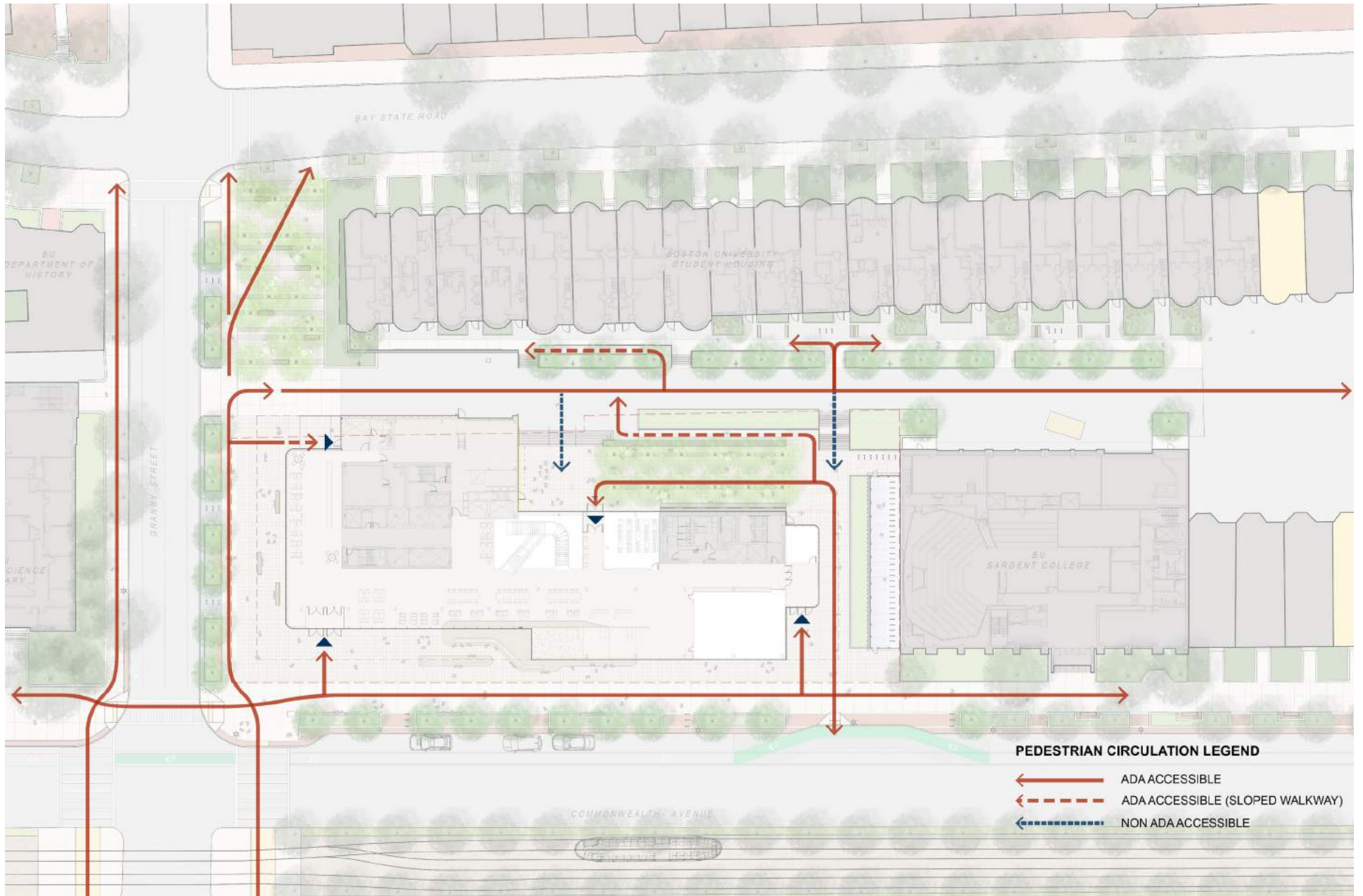


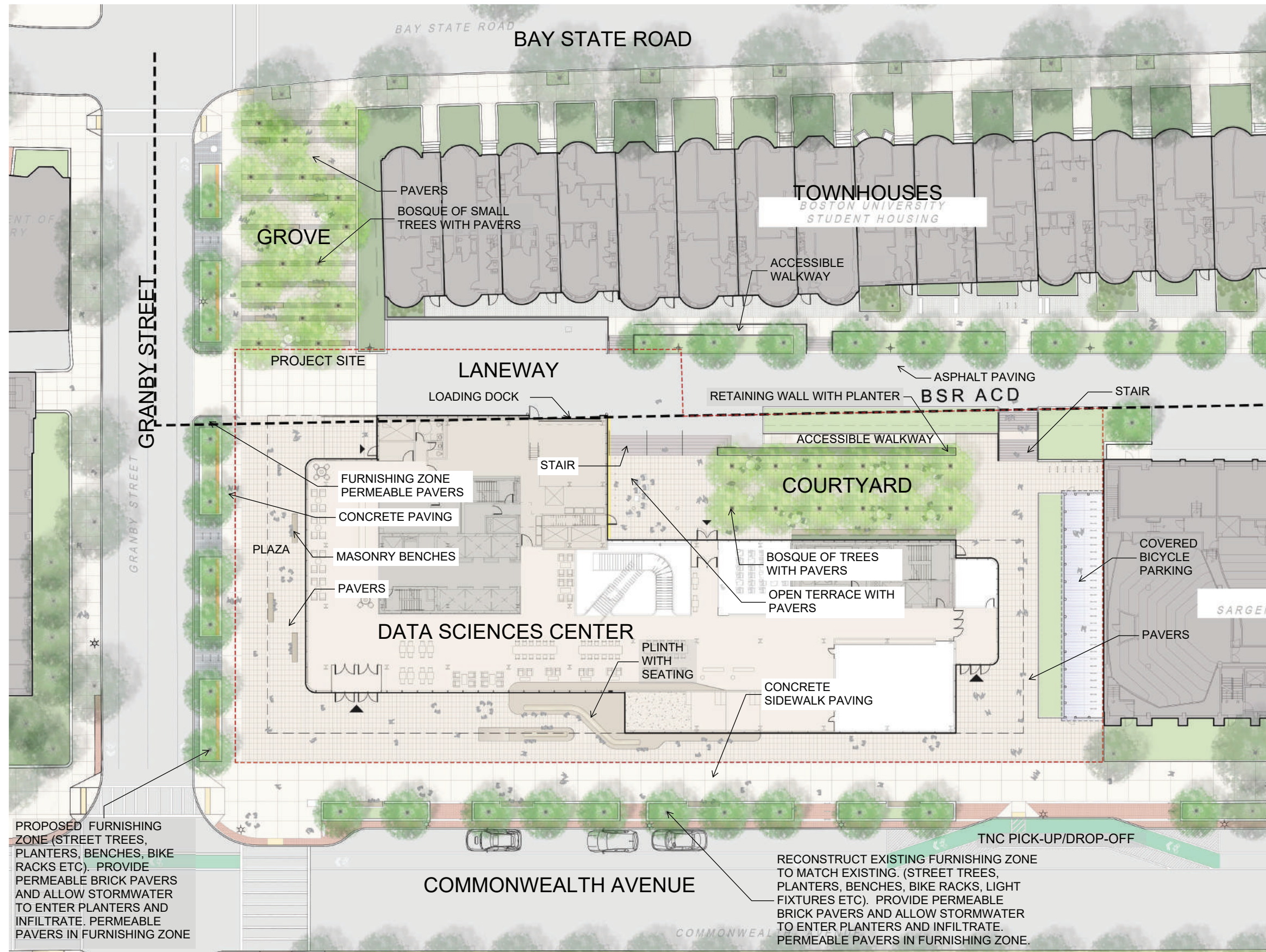
■ Building Support
■ MEP

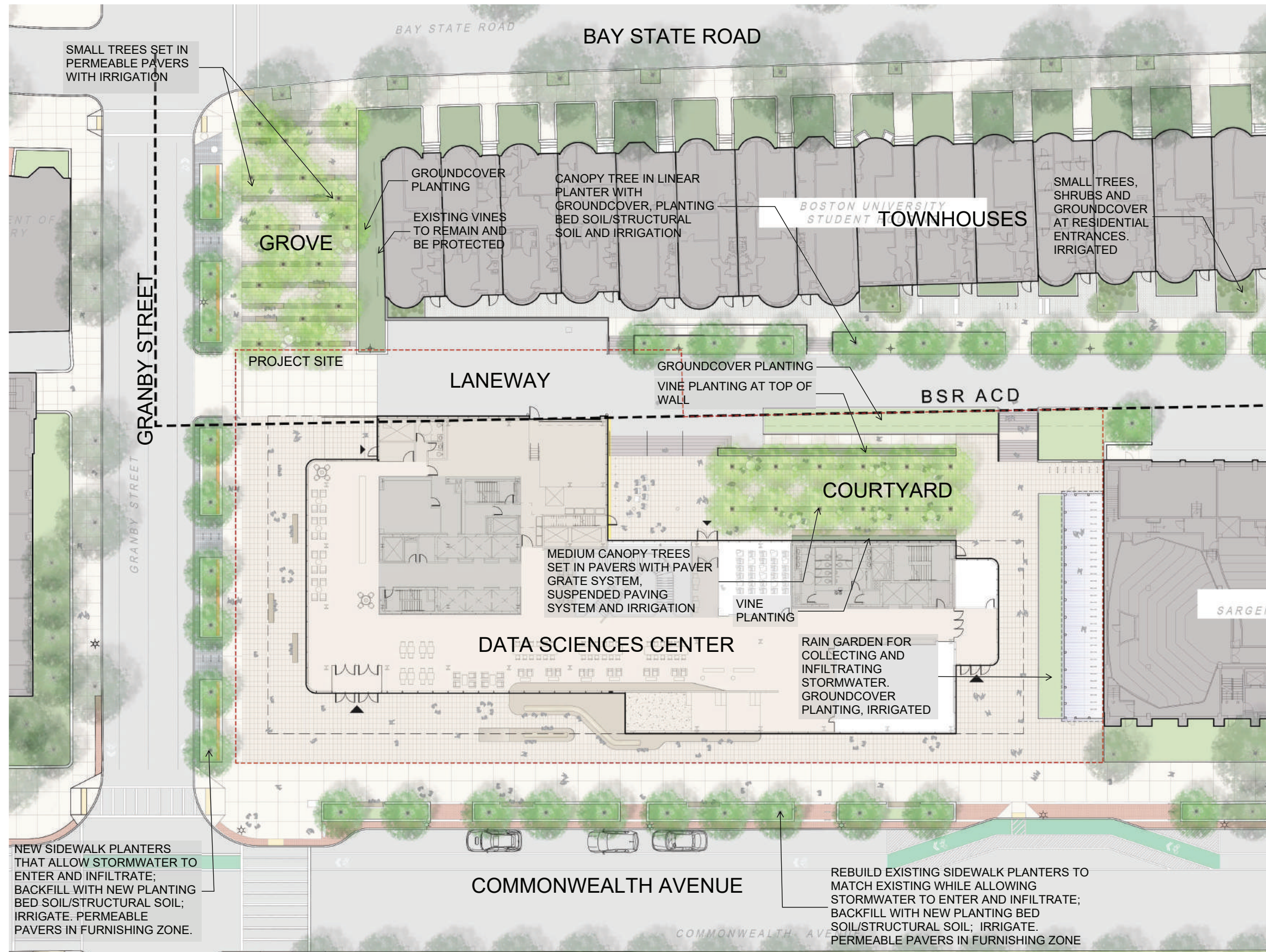


■ Building Support









Chapter 3

URBAN DESIGN

CHAPTER 3: URBAN DESIGN

3.1 INTRODUCTION

This chapter addresses the urban design elements requested in the Scoping Determination. As the Project is also undergoing design review by BPDA and by the BCDC, much of the materials requested are included herein as graphics (figures) and have been or will be presented by the design team at design-focused meetings. Both a physical model and a 3-D virtual/visual presentation were provided at design-focused meetings. In combination, the above referenced materials and the narrative provided in this chapter address the Urban Design Component of the Scoping Determination.

3.2 PROJECT PURPOSE AND NEED

The Project will address an urgent need for the University to construct a visionary building that will allow for the consolidation of academic, office, and research space for the University's Mathematics & Statistics and Computer Science departments and the interdisciplinary Hariri Institute. The Project is consistent with key elements of the Boston University Charles River Campus 2013 – 2023 Institutional Master Plan and the Boston University Charles River Campus 2013 – 2023 Institutional Master Plan Urban Design Supplement (the "Urban Design Supplement").

The Data Sciences Center will be a truly bold architectural statement along the central spine of the CRC, adding another distinctive landmark to Boston University's extensive campus. Combining a pedestrian and precinct -scaled base with a dramatic tower that will reach 19 stories into the sky, the building will be visible and recognizable from both banks of the Charles River. The Data Sciences Center will underscore the University's central place at the heart of – and on the skyline of – a great American City and will celebrate its role as one of the nation's outstanding private research communities.

As described in Chapter 1, Introduction and Chapter 2, Project Description, the Project replaces an existing surface parking lot with a new signature building on the corner of Granby Street and Commonwealth Avenue. When the Project is completed, it will support the Proponent's long-term vision to strengthen the University's Science and Research Campus, improve the public realm, and activate ground floor uses and the streetscape along Commonwealth Avenue.

3.3 NEIGHBORHOOD CONTEXT

Boston University has developed its campus vision in consideration of its mission, riverfront location, proximity to historic neighborhoods, and the inclusion of major transportation

infrastructure within the heart of its campus. This section describes the distinctive character of each area surrounding the Campus. See Figure 3-1, Neighborhood Context and Figure 3-2 Context of the City.

3.3.1 COMMONWEALTH AVENUE

Extending approximately 1.5 miles from Kenmore Square to Packard's Corner, the physical identity of the CRC is strongly influenced by Commonwealth Avenue. This thoroughfare/boulevard serves as both a major transportation spine for both bicycles and vehicular circulation, and the spine of the campus.

The historic Marsh Chapel Plaza anchors Boston University's first constructed buildings on the CRC, which were designed by architects Cram and Ferguson in the mid-1940's. Adjacent and farther west on Commonwealth Avenue is the George Sherman Union (GSU) Plaza, an important public space on the northern edge of Commonwealth Avenue. The Plaza acts as an entry point to Josep Lluís Sert's congregation of mid-century modern structures that comprise the Boston University School of Law and serve the students of the University who utilize the GSU and Mugar Memorial Library. The architectural character and urban form of this section of Commonwealth Avenue is very distinct from the monumental Back Bay section with its uniform building scale and continuous "street wall" with median open space.

Throughout the length of the Boston University Campus, the median of Commonwealth Avenue is occupied by the Green Line trolley, and the urban form is defined by a street wall punctuated by a series of well-scaled and well-used open spaces such as the Marsh Plaza. See Figure 3-3, Campus Context.

The activity of student life along the boulevard makes this section of Commonwealth Avenue unique. In addition to the Green Line trolley, the pedestrian traffic of over 2,000 people/hour during peak hours makes Commonwealth Avenue one of the most vibrant and heavily-travelled streets in the City of Boston. Recognizing the importance of Commonwealth Avenue, a highly successful public-private partnership was initiated by Boston University, the City of Boston's Department of Public Works and Transportation Department, and the state's Executive Office of Transportation that resulted in a significant investment by the University in major safety, aesthetic, and transportation improvements to the portion of Commonwealth Avenue from Kenmore Square to the BU Bridge. These improvements were accomplished through the installation of wider sidewalks, tree plantings on both sides of Commonwealth Avenue and median, period-appropriate streetlights, and articulated crosswalks. The removal of an unnecessary third travel lane allowed for the installation of the first bike lanes in the City of Boston and effectively improved safety conditions for pedestrians and cyclists. Boston University contributed funds toward the design and construction of this phase of improvements and provides ongoing maintenance of the plantings

along this segment of the Commonwealth Avenue corridor. The same planning and treatment is currently being advanced by the University in conjunction with the same stakeholders noted above for the area stretching from the BU Bridge to Packard's Corner.

3.3.2 BAY STATE ROAD

Bay State Road weaves together historic brownstones and a mix of newer institutional buildings. The elegant, attractive, and charming brownstones overlook a tree-lined street and the Charles River; these University-owned as well as privately-owned properties have been restored and upgraded over the years using historically appropriate methods and materials. In 1994, the Boston Preservation Alliance awarded Boston University its preservation award "for the outstanding restoration and stewardship of the many historic properties of Bay State Road." A BPA Preservation Achievement Award in 2015 acknowledged the University's work on The Alan and Sherry Leventhal Center at 225 Bay State Road. The Yawkey Center for Student Services at 100 Bay State Road was constructed in 2005 and was designed to respect the urban design of the street with appropriately scaled setbacks and bay sizes.

3.3.3 CHARLES RIVER

The Charles River, while not a neighborhood, serves as a strong geographic element in the identities of Boston University and the City of Boston. The Charles River is an actively used recreational area, with sailing, rowing, and boating activities underway on an almost year-round basis. The Dr. Paul Dudley White bike path forms an 18.2-mile loop along the length of the Charles River. The Boston and Cambridge shorelines are also popular sightseeing spots. The open space along the southern bank of the Charles River abuts the University's campus, with pedestrian overpasses providing connections to the riverside parkland. The Charles River Basin is listed in the National Register of Historic Places and is managed by the state's Department of Conservation and Recreation (DCR). Dating back to 1892, when Frederick Law Olmsted designed Charlesbank, the Charles River Esplanade was designated as a Boston Landmark by the Bost Landmarks Commission in in 2009.

3.4 CAMPUS OPEN SPACE NETWORK

Following submittal of the IMP to the BPDA in 2013, the Proponent prepared the Urban Design Supplement. Campus planning principles developed in the Urban Design Supplement include: A. Shape the Growth in Integrated Zones; B. Enhance the Public Realm, and C. Develop a Mixed Use, High Density Urban Campus. The Urban Design Supplement also included a number of urban design studies to establish a series of outcomes "all of which will result in a set of public realm and architectural goals set forth by the planning principles." The Urban Design Supplement has been an invaluable tool for the University to further

explore and articulate campus planning principles and design guidelines, specifically as they apply to the Project. The Central Campus, which includes the Site, was studied to develop massing and open space concepts for the blocks between Silber Way and Cummington Street.

The blocks formed on either side of Commonwealth Avenue between Silber Way and Granby Street contain the recently constructed Rajen Kilachand Center for Life Sciences and Engineering, associated “pocket park”, and a network of pedestrian connections. See Figure 3-4, Access and Connections, and Figure 3-5, Sample Massing and Desired Connections.

Utilizing the principles developed in the Urban Design Supplement, the Proponent has carefully planned for improvements to the public realm as well as connections to the Site by providing links through the pocket park and Cummington Mall through Hinsdale Mall, with a key crossing of Commonwealth Avenue at Granby Street and a mid-block pedestrian link between the building and Sargent College.

The planned expanded open spaces at Granby Street and Commonwealth Avenue will lead to the reimagined existing landscaped open space at Granby Street and Bay State Road, with significant landscape and accessibility improvements extending down the repurposed service alley (laneway). See Figure 3-6, Project Site Plan.

3.5 MASSING AND HEIGHT

The Project is located in a part of the University’s CRC characterized by a range of buildings that vary substantially in height, age, and style. See Figure 2-1, Oblique View of Project Site. The area, which was historically built-up by mid-rise townhouses and industrial buildings, has been interspersed over time with punctuating buildings of increasing height and contemporary design. In its history as a landowner in this architecturally diverse neighborhood, Boston University has invested considerable resources in the acquisition, restoration, and protection of historic buildings and, when appropriate, has introduced diversity in massing and scale to the neighborhood that is dominated by the University and its academic buildings.

The height and massing of Boston University’s School of Law, Warren Towers, the Center for Integrated Life Sciences, and the Questrom School for Business each contribute to a visually diverse skyline and streetscape along Commonwealth Avenue. The Data Sciences Center, reaching a height of 305 feet, is approximately 70 feet higher than the School of Law. A number of development projects in the Kenmore Square, Back Bay, and Fenway areas, which are in various stages of permitting or construction, and are being undertaken by other developers, envision similar or taller buildings.

The massing and siting of the Data Sciences Center is intended to enhance the public realm through scale, animation in the program of the ground floor and podium floors, transparency, and accessibility. The height of the five-story podium relates directly to the height and massing of the red brick masonry Sargent College building and Questrom School of Business to the

east and the limestone clad Stone Science building to the west and directly to the south. The tower levels are set back from the podium to mitigate impact on the street, and the massing is carefully developed to establish alignments of height with the buildings along Commonwealth Avenue. The design balances opacity and transparency to simultaneously respond to, and act as a counterpoint to, the solidity of frontages along Commonwealth Avenue. See Figure 3-7, Context Elevations and Figure 3-8, Commonwealth Avenue Figure-Ground Study.

The first floor is set back approximately 11 feet from the Site boundary at its closest point to Commonwealth Avenue. The building setback increases to approximately 27 feet at the intersection of Commonwealth Avenue and Granby Street. The ground floor setback continues at 27 feet down the length of Granby Street, significantly increasing the pedestrian circulation areas and view corridor beyond the public sidewalks extending to the Charles River.

On the fifth floor, where the tower levels become articulated, a glass pavilion is set back from the south and east façades of the podium. The pavilion is surrounded by roof gardens and accessible outdoor terraces. The footprint of the tower levels is relatively small at 120 feet by 120 feet and approximately 14,000 sf. At six different levels, the floor plan is shifted horizontally in one direction to create a dynamic, complex form. This cantilevering of various floor plates creates five outdoor terraces at levels 7, 10, 12, 15, and 17. The terraces will combine green roof space with hard surface space for people, which will further animate the building on the skyline.

See Figure 3-9, Perspective Looking North – Daytime, Figure 10, Perspective Looking North – Nighttime, Figure 3-11, Perspective Looking East from Essex Street, Figure 3-12, Perspective Looking West from Kenmore Square, Figure 3-13, Perspective Looking Northeast Toward Project Site, and Figure 3-14, Perspective Looking Northwest Toward Project Site.

3.5.1 FUTURE BUILDING EXPANSION

As was anticipated in the IMP and is codified in the Fifth Amendment to the IMP, new academic space was planned for Site CC... “allowing the development of a building or building of up to 350,000 square feet of Gross Floor Area developed in one or two phases.” The Proponent’s current needs for academic space will be well served by the Project. Figure 3-15, Phase II Massing Study provides a conceptual massing study which accommodates an additional 45,000 sf of space on the Site if it is determined to be needed by the Proponent in the future.

3.6 BUILDING CHARACTER AND MATERIALS

The podium and tower levels will be unified in the singular use of a unitized glass curtain wall system. Approximately one half of the façades will be screened by steeply sloped vertical

shading fins (louvers) made of prefinished aluminum. The fins will have a terra cotta color that complements the adjacent building materials of red brick and limestone. The spacing of the fins has been expanded on both the podium levels fronting on Commonwealth Avenue, and the three topmost stories facing north on the Charles River where they terminate at and reveal the Sky Court located on the east facing facade.

The remainder of the façades will be clad in an alternating pattern of vertical full-height panels of open vision glass and vertical full-height panels of shaped prefinished metal. The color of the prefinished metal panels will be light in tone to have an affinity to the color and partial reflectivity of the vision glass panels. The overall impression of the glass will be light and transparent with some reflectivity due to the protective coatings on the glass. The use of the sloped louvers and the vertical shading fins realizes the solar shading strategy, which utilizes the sloped louvers in the deep floor plate zones to cut the solar gain and extend daylight into the building. The vertical shading fins are shallow bay floor plates zones where daylight does not need to penetrate as deeply.

The ground floor glazing provides maximum transparency. It consists of a structural glass system with low iron double glazed units with a light heat gain control coating.

The corners of the building have been rounded at the ground level to reflect a welcoming gesture, with transparency allowing views into and through the building to the open interior and courtyard beyond. The wood soffit on the podium is composed of wood planks in a natural finish. The soffits on the tower floors will be comprised of a reflective material that will mirror the activity of the street below. See Figure 3-16, Public Realm from the Southwest; Figure 3-17, Public Realm from the East; Figure 3-18, Public Realm from the South – Along Granby Street; Figure 3-19, Public Realm from the South – Along Bicycle Parking; Figure 3-20, Interior View of First Floor; Figure 3-21, View of Entrance off of Courtyard; Figure 3-22, View of Laneway Looking West; and Figure 3-23, View of Parklet Looking South.

3.7 VIEWS

3.7.1 PODIUM LEVELS

Along Commonwealth Avenue, the southern façade of the Data Sciences Center will serve as the gateway to the building. The five-story podium will have terra cotta-colored shading fins along Commonwealth Avenue and will complement and challenge the existing street wall, giving more traditional, Bostonian architectural forms a striking, contemporary update. The north, east, and west elevations of the podium will be generally screened from distant views by surrounding buildings. The west façade, which fronts on the corner of Granby Street and Commonwealth Avenue, will also be clad in the shading fins. The east and north façade will consist

of glass curtain walls, most visible to residents of the homes on Bay State Road. The adjacent Sargent College does not have windows facing the building.

3.7.2 TOWER LEVELS

The tower, which rises 14 stories above the podium, will be viewed most prominently from Commonwealth Avenue, Bay State Road, and Storrow Drive. Rising above the surrounding neighborhood, the tower will punctuate the skyline and serve as an iconic landmark of the University. The Charles River Esplanade and Charles River will afford some of the stateliest views of the Project from both banks of the River, with the geometric tower levels rising unobstructed above the brownstones situated along Storrow Drive and Bay State Road. The cantilevers and material changes will create a dynamic form that engages with the skyline, integrating the Project into the existing urban fabric. See Figure 3-24, Perspective View from BU Bridge; Figure 3-25, Building Section; Figure 3-26, North Elevation, Figure 3-27, East Elevation; Figure 3-28, South Elevation; and Figure 3-29 West Elevation.

3.8 OPEN SPACE AND LANDSCAPE MATERIALS

The planned open space network which supports the Project and the public realm is designed to surround the building with purposeful open spaces and provide 360° views. The widened public realm, including sidewalk and open private setbacks along Commonwealth Avenue begins with a pedestrian and bicycle connection from Commonwealth Avenue to the laneway which is situated between the Sargent College building and the Data Sciences Center. This connection, which includes covered bicycle storage and plantings, leads to the courtyard and laneway. The courtyard's bosque of trees and open terrace with pavers is an extension of the ground floor which accommodates a transition in elevation to the laneway with wide stairs an accessible walkway on the north side of the building. The newly accessible townhouses (student residences) will be enhanced with plantings along the length of the laneway at the Site. Plantings will include ornamental and street trees, shrubs, vines and groundcovers. Raingardens and pervious pavers will effectuate recharge of rainwater and reduce the need for irrigation. Curbing and sidewalk planters will also be replaced.

Connections and improvements to the Site and surrounding spaces will fulfill urban design and campus improvement objectives expressed in the IMP and Urban Design Supplement. See Figure 3-30, Landscape Plan.

3.8.1 COMMONWEALTH AVENUE STREETScape

The existing Commonwealth Avenue streetscape improvements at the Site were constructed as part of Phase I of the \$13 million of the Commonwealth Avenue Improvement Project, completed in 2010. This project transformed the streetscape from Kenmore Square to the BU Bridge. The University contributed \$3.1 million to

that project, which beautified the campus with new trees, shrubs, plantings, lighting, street furniture, raised planters, and sidewalk pavement treatments. Similar amenities will be part of Phase II, which was initiated in 2016 and is expected to be completed in summer 2019.

The streetscape improvements at the Site consist of a fifteen-foot-wide concrete sidewalk as well as a ten-foot-wide furnishing zone of granite tree planters, flush granite bands, brick paver accents and street lights, benches, and bike racks. Both the sidewalk and the furnishing zone will be demolished during construction. These features will be rebuilt to match the existing design intent, except for the three curb cuts to be closed along Commonwealth Avenue to allow an unbroken continuation of the sidewalk and longer tree planters that will infill these spaces. The signature furnishing zone along the street edge defines a buffer zone between the sidewalk and the street traffic.

3.8.2 PLAZA

The building's deep overhang and broad setback from Granby Street and Commonwealth Avenue will provide considerable protected street-level space for café seating and special events adjacent to the sidewalk. The plaza will be surfaced with durable concrete or granite pavers and will be activated by the high volume of pedestrians that enter the building and travel along Granby Street and Commonwealth Avenue.

3.8.3 COURTYARD

The courtyard on the north side of the building is removed from the active sidewalks on Commonwealth Avenue and provides a quiet outdoor setting for studying and socializing. The courtyard is conceived as an extension of the building atrium's floor material and pattern and will be accessible from the interior of the building by a door at the atrium stair. From outside the Data Sciences Center, the courtyard can be accessed via Commonwealth Avenue or the laneway off Granby Street. An informal grouping of flowering trees will create a ceiling, while seat walls and movable furnishings will create a welcoming outdoor space.

3.8.4 OPEN SPACE CONNECTION/PASSAGEWAY

A new pedestrian connection between the Data Sciences Center and the six-story Sargent College building to the east will be an important mid-block crossing, with covered storage for 120 University-registered bicycle spaces and making a connection to the laneway and the back yards of the brick townhouses which front on Bay State Road. An entry to the building (the first entrance on Commonwealth Avenue) is in this sheltered area.

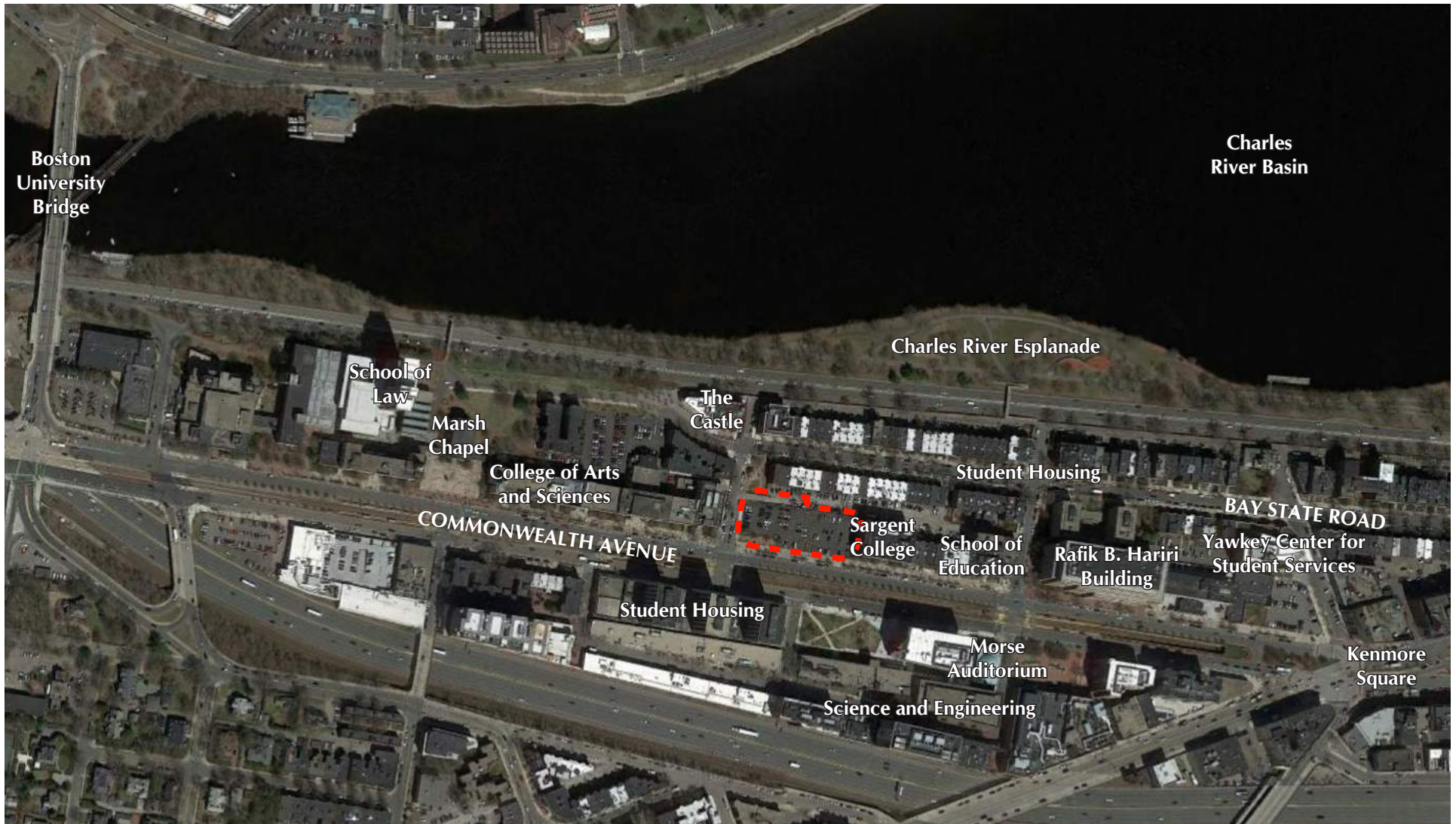
3.8.5 OFF-SITE IMPROVEMENTS

The Project will provide new street trees and a furnishing zone in the sidewalk along Granby Street as well as improvements to an existing open space area at the corner of Granby Street and Bay State Road. A grove of ornamental trees in an informal pattern and new landscape pavers will replace the existing aging group of trees and concrete paving. The Project will also will replace existing street trees, pavement, and planters along Commonwealth Ave. The new laneway, adjacent to the Site on the north, will include shade trees and plantings as well as accessible ramps to the University-owned townhouses. See Figure 3-30, Landscape Plan.

3.9 PEDESTRIAN ENVIRONMENT

The ground floor of the podium is shaped by the interior collaboration spaces and deliberate cutouts that shelter the entrances at both the west end on Granby Street and the east end at the passage between the Project and the Sargent College building. A mid-block pedestrian open space will connect Commonwealth Avenue to the laneway north of the Site where the removal of 35 car spaces will provide a green landscape corridor with fewer vehicular conflicts. The well-placed entrances to the building on all corners will provide clear paths for pedestrians arriving at the building from any direction. Generous plazas and seating areas will encourage pedestrians to move through or stay with ample room for all movements. The open space surrounding the building will improve the movement through and around the Site and strengthening pedestrian connections to the larger campus.

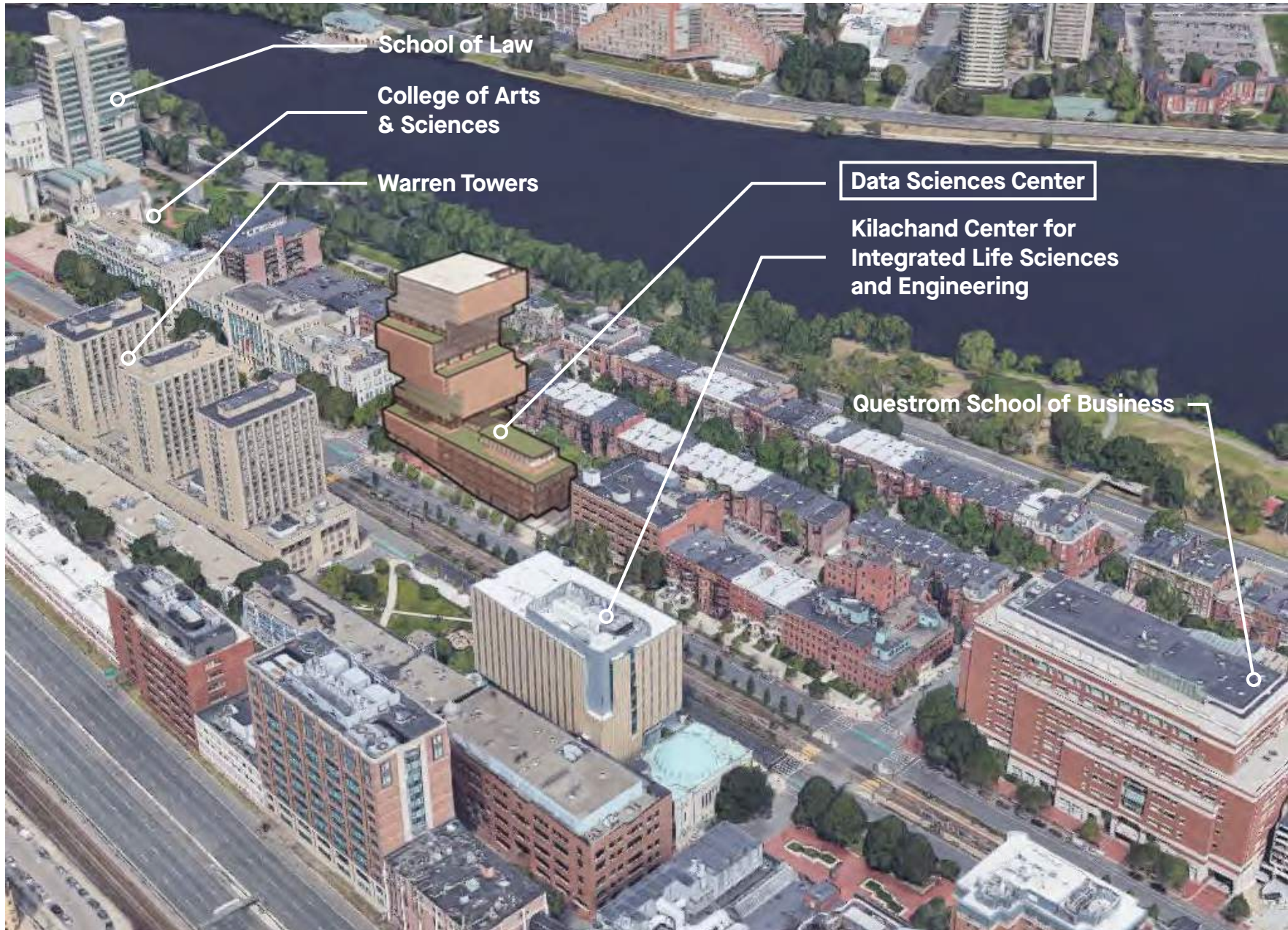
See Figure 3- 31, Circulation and Access Plan.





Boston, Massachusetts

Figure 3-2
Context of the City
Source: Boston University, 2013



School of Law

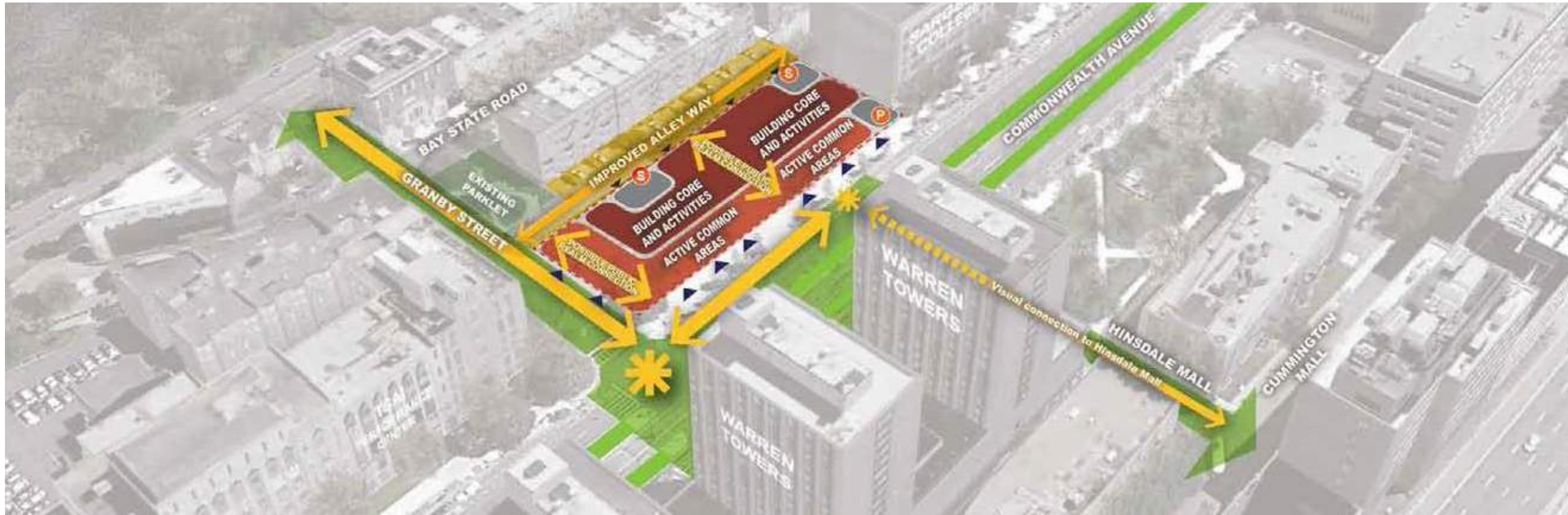
College of Arts & Sciences

Warren Towers

Data Sciences Center

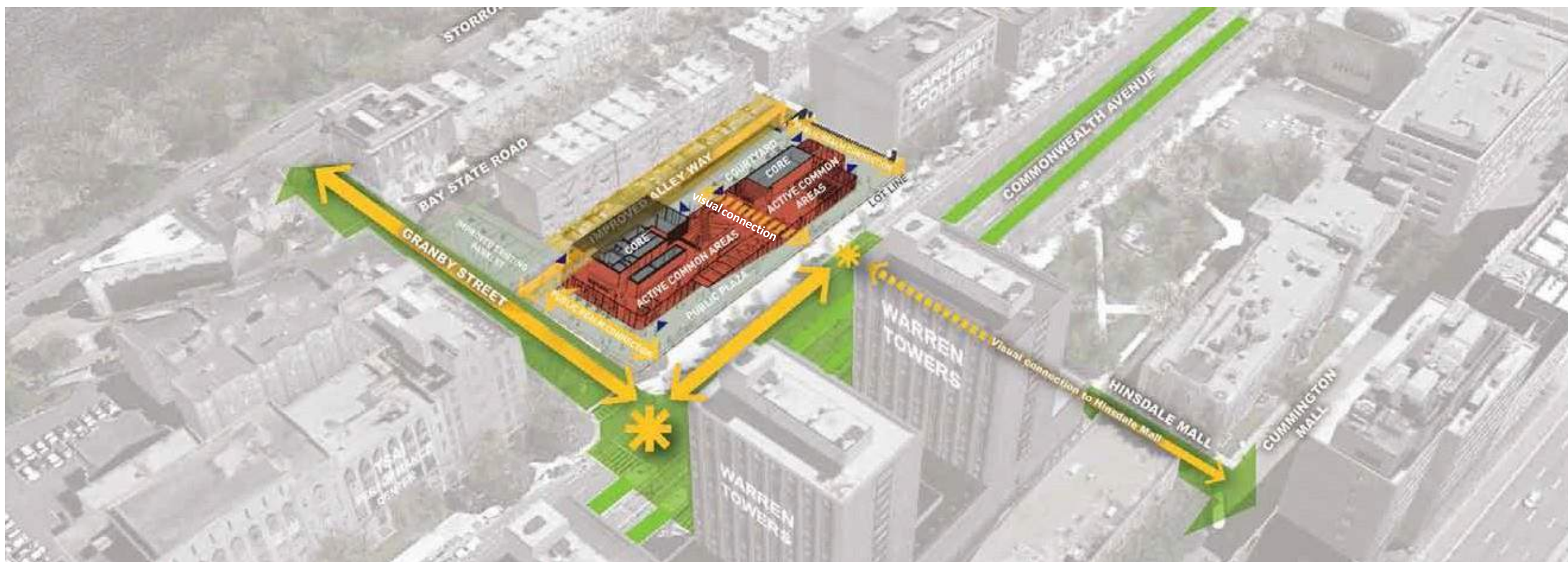
Kilachand Center for Integrated Life Sciences and Engineering

Questrom School of Business

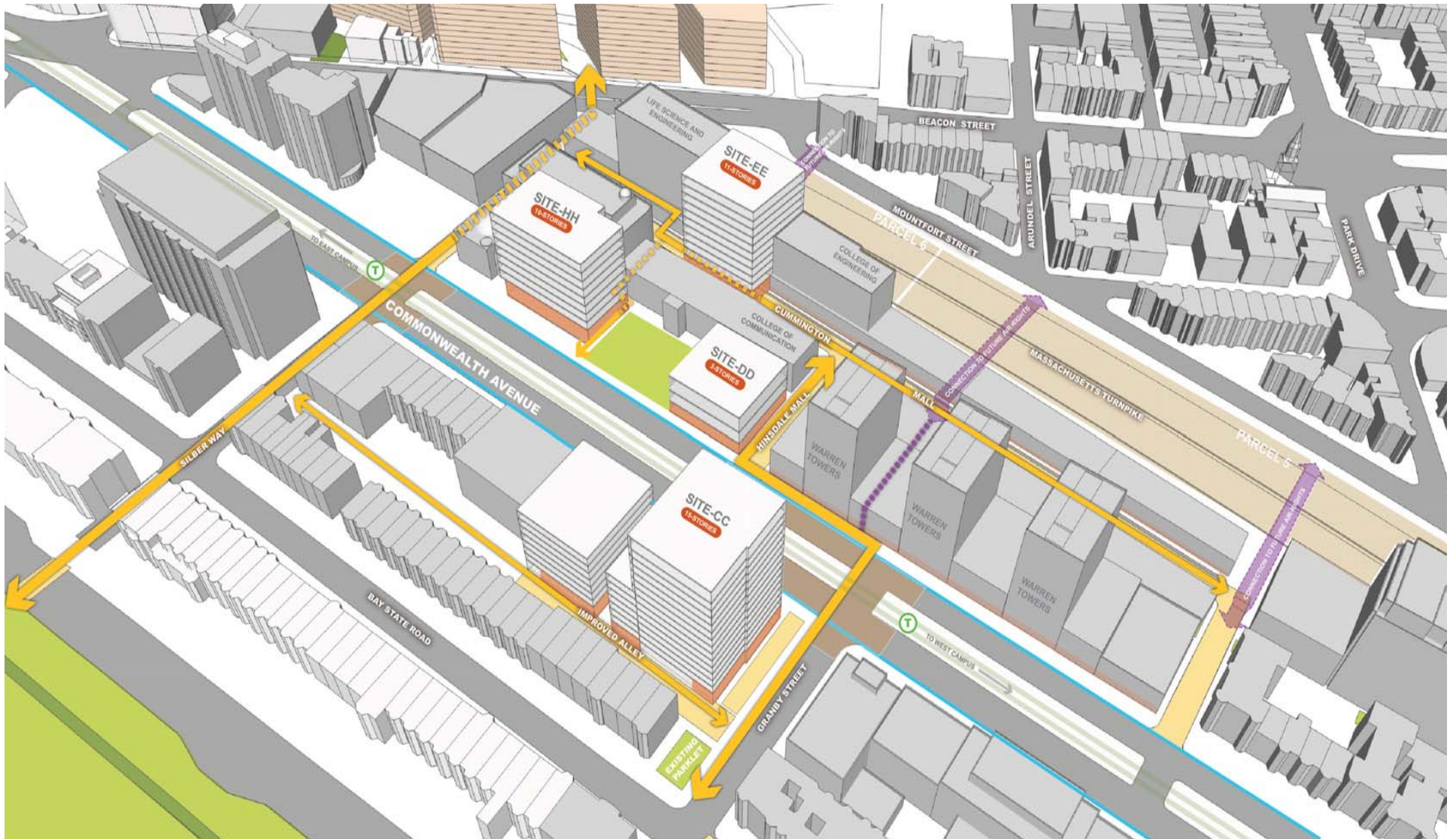


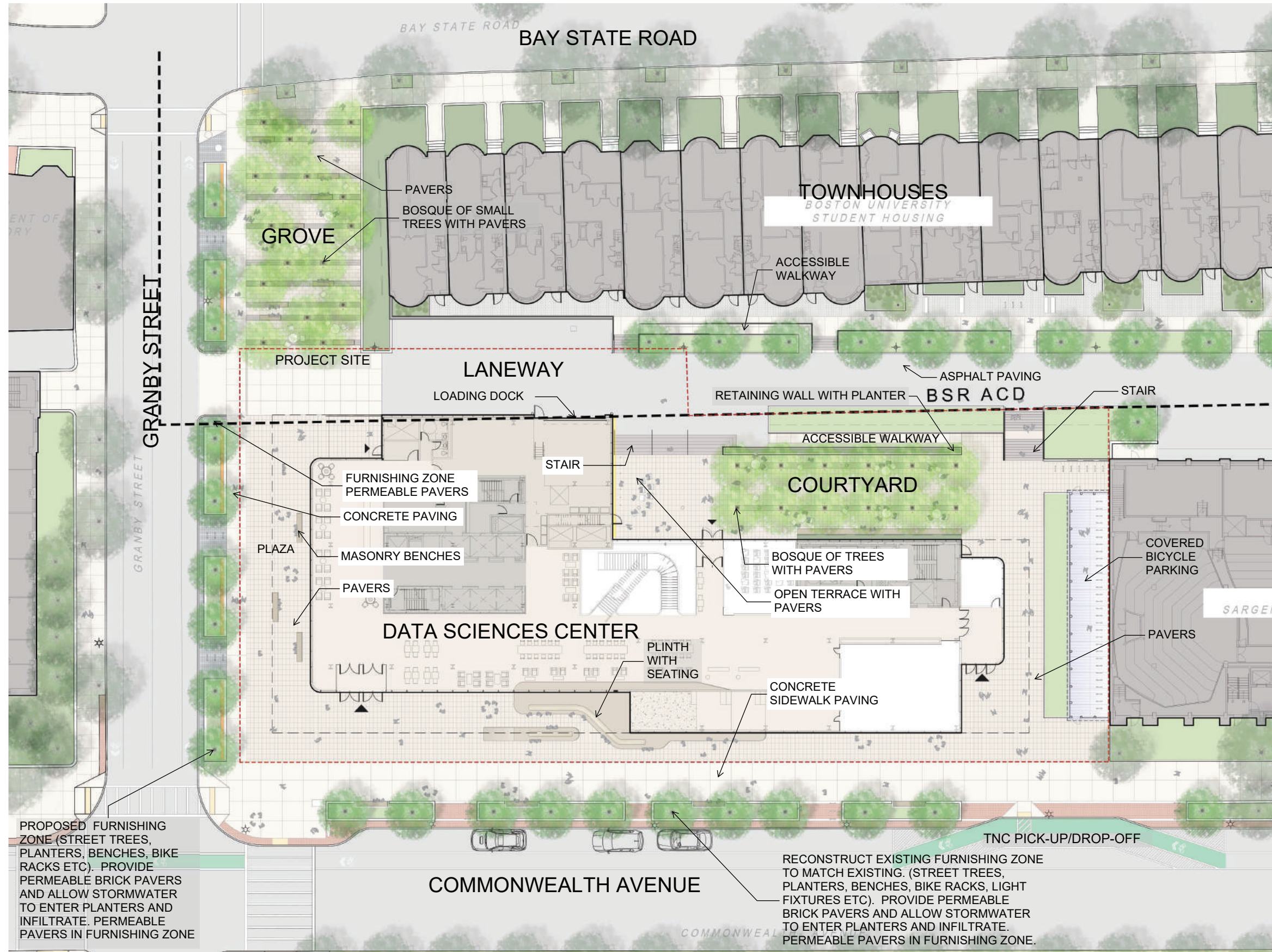
Site CC:645-655 Commonwealth Avenue Access and Desired Connections

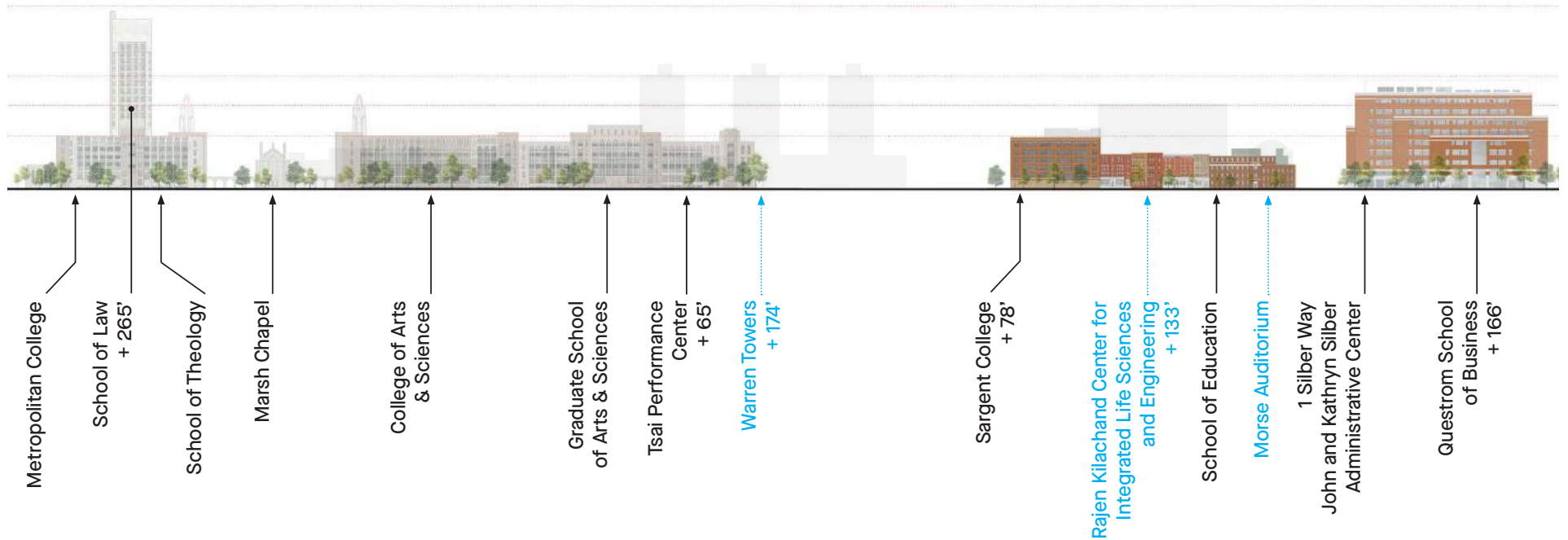
2013-2023 Institutional Master Plan:
Urban Design Supplemental Information



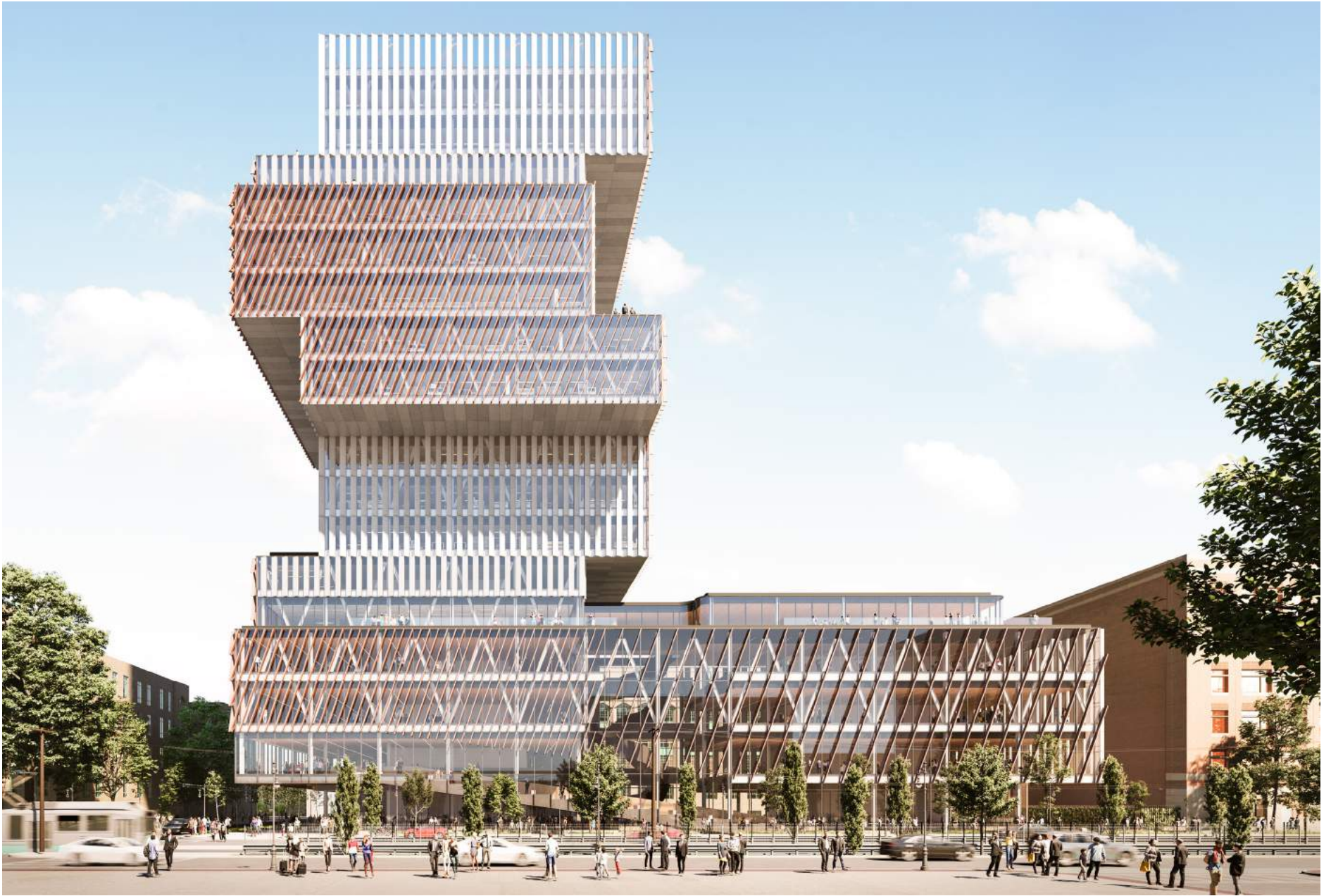
Data Sciences Center Access and Desired Connections











Boston, Massachusetts

Figure 3-9
Perspective Looking North - Daytime
Source: KPMB Architects, 2019



Boston, Massachusetts

Figure 3-10
Perspective Looking North - Nighttime
Source: KPMB Architects, 2019



Boston, Massachusetts

Figure 3-11
Perspective Looking East from Essex Street
Source: KPMB Architects, 2019



Boston, Massachusetts

Figure 3-12
Perspective Looking West from Kenmore Square
Source: KPMB Architects, 2019



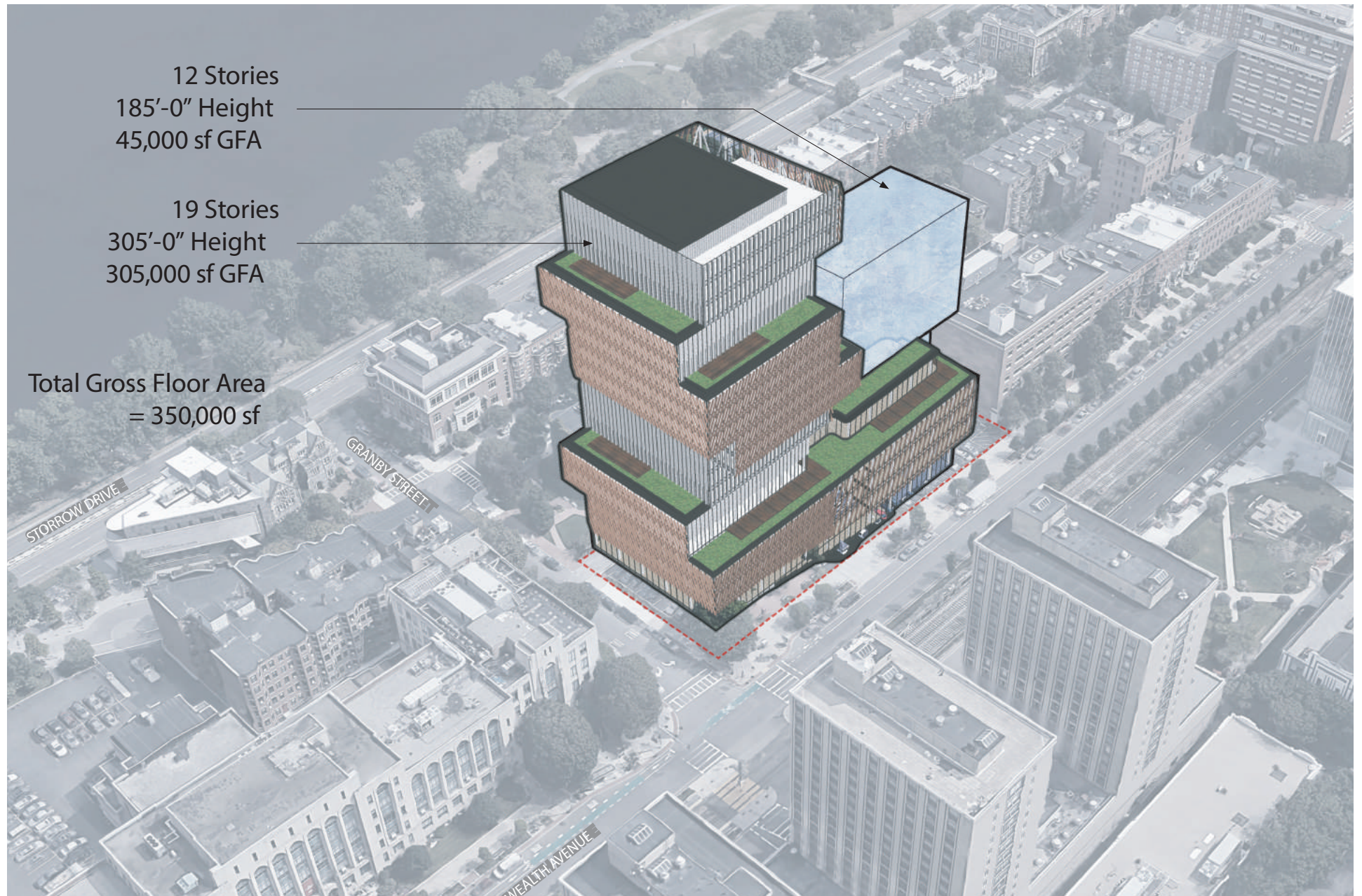
Boston, Massachusetts

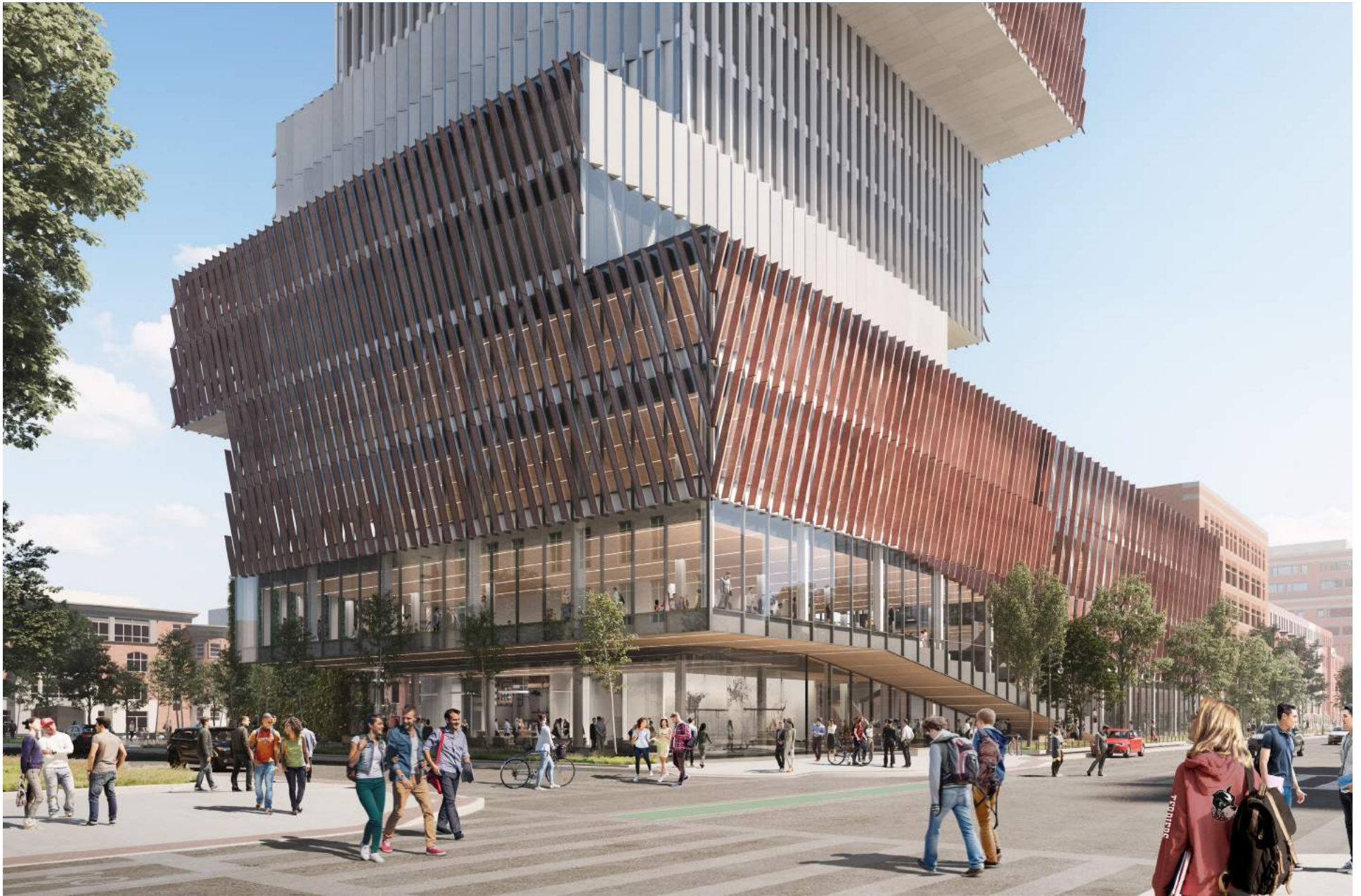
Figure 3-13
Perspective Looking Northeast Toward Project Site
Source: KPMB Architects, 2019



Boston, Massachusetts

Figure 3-14
Perspective Looking Northwest toward Project Site
Source: KPMB Architects, 2019





Boston, Massachusetts

Figure 3-16
Public Realm from the Southwest
Source: KPMB Architects, 2019



Boston, Massachusetts

Figure 3-17
Public Realm from the East
Source: KPMB Architects, 2019



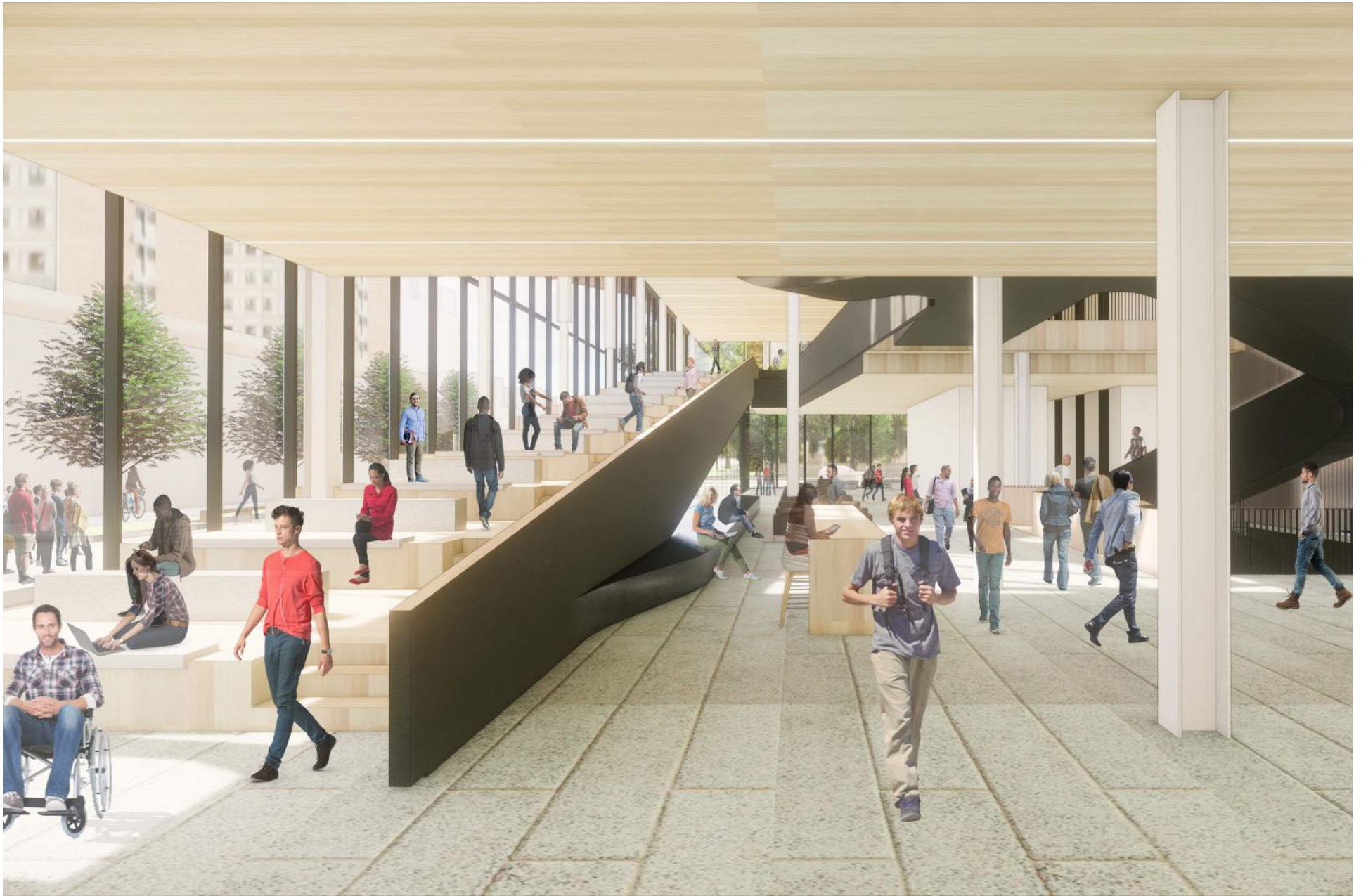
Boston, Massachusetts

Figure 3-18
Public Realm from the South - Along Granby Street
Source: KPMB Architects, 2019



Boston, Massachusetts

Figure 3-19
Public Realm from the South - Along Bicycle Parking
Source: KPMB Architects, 2019



Boston, Massachusetts

Figure 3-20
Interior View of First Floor
Source: KPMB Architects, 2019



Boston, Massachusetts

Figure 3-21
View of Entrance off of Courtyard
Source: KPMB Architects, 2019



Boston, Massachusetts

Figure 3-22
View of Laneway Looking West
Source: KPMB Architects, 2019



Boston, Massachusetts

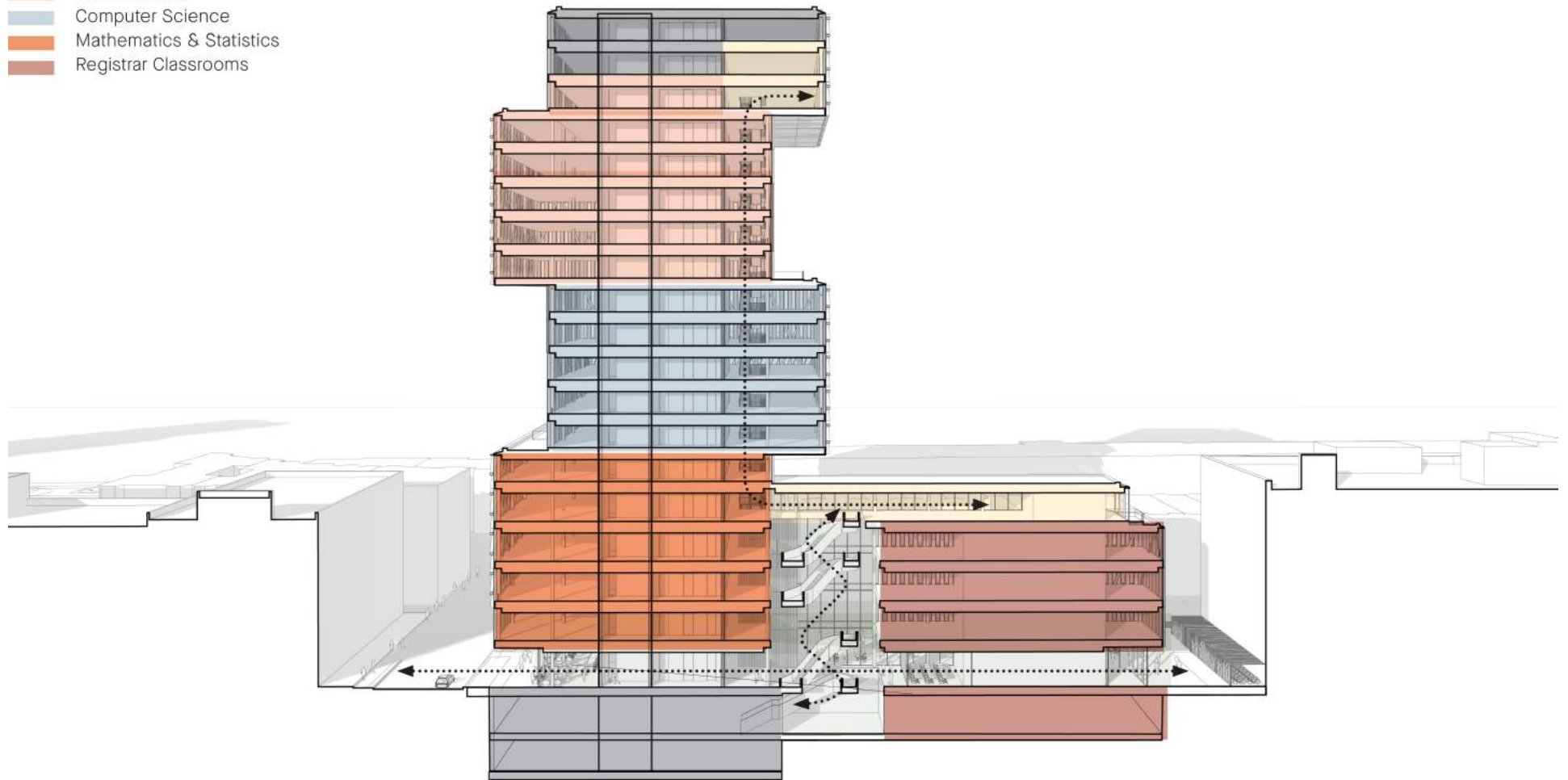
Figure 3-23
View of Parklet Looking South
Source: KPMB Architects, 2019

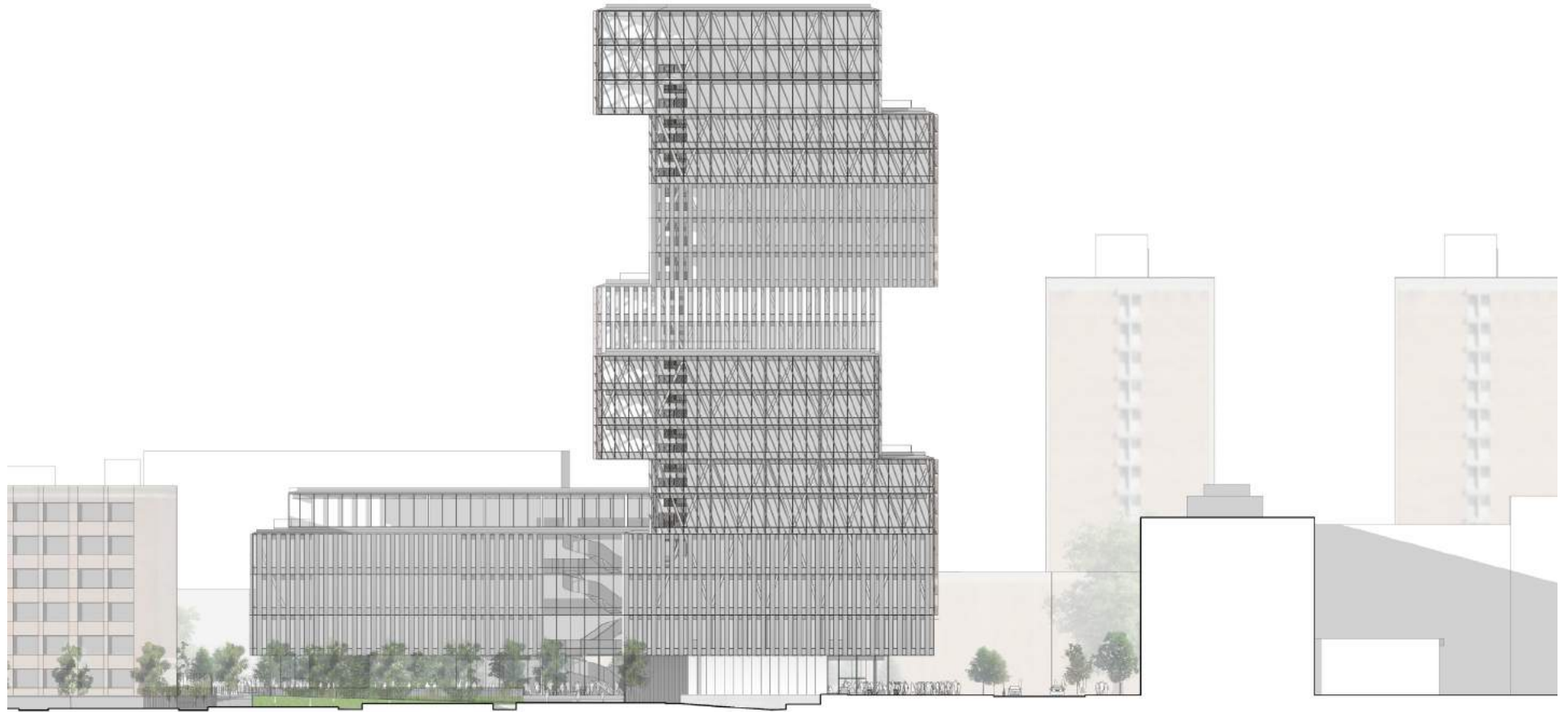


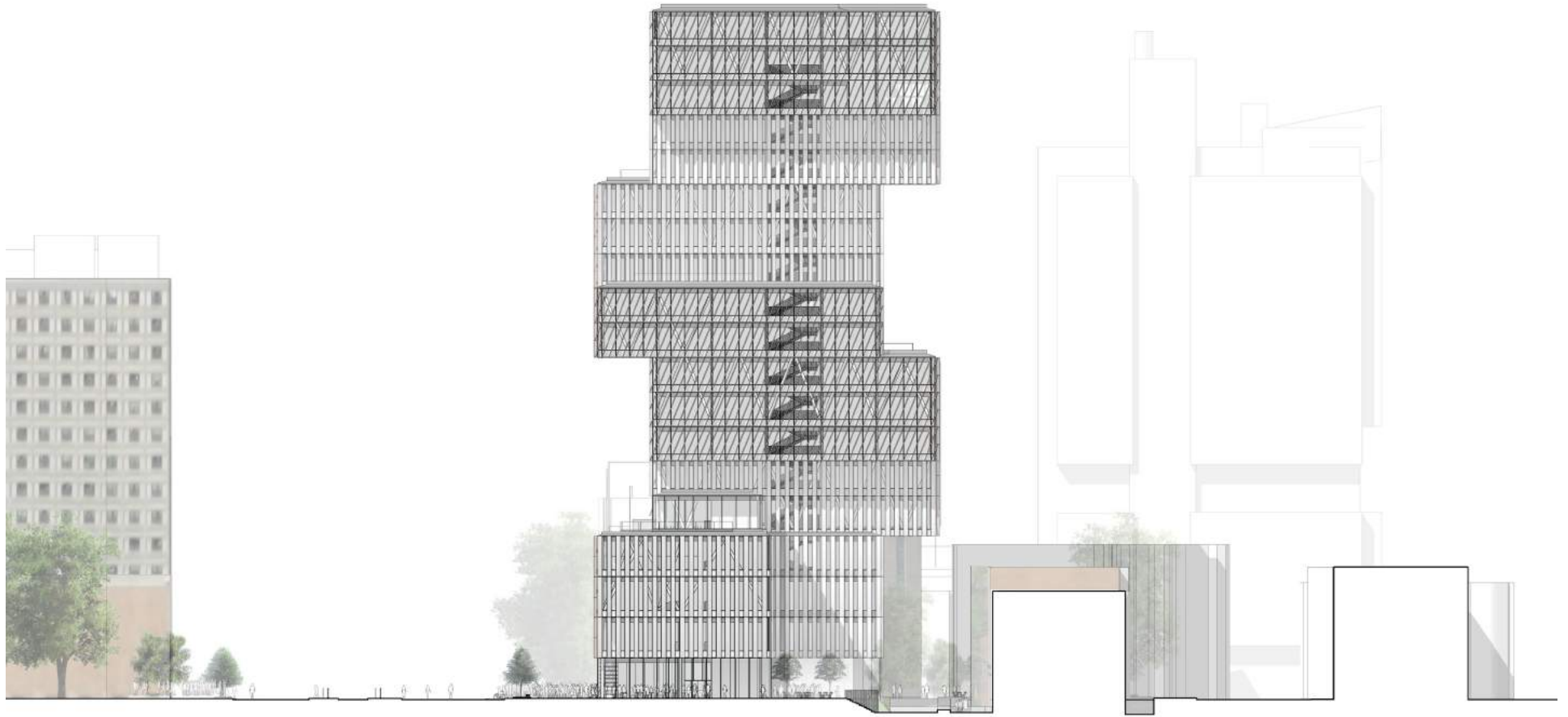
Boston, Massachusetts

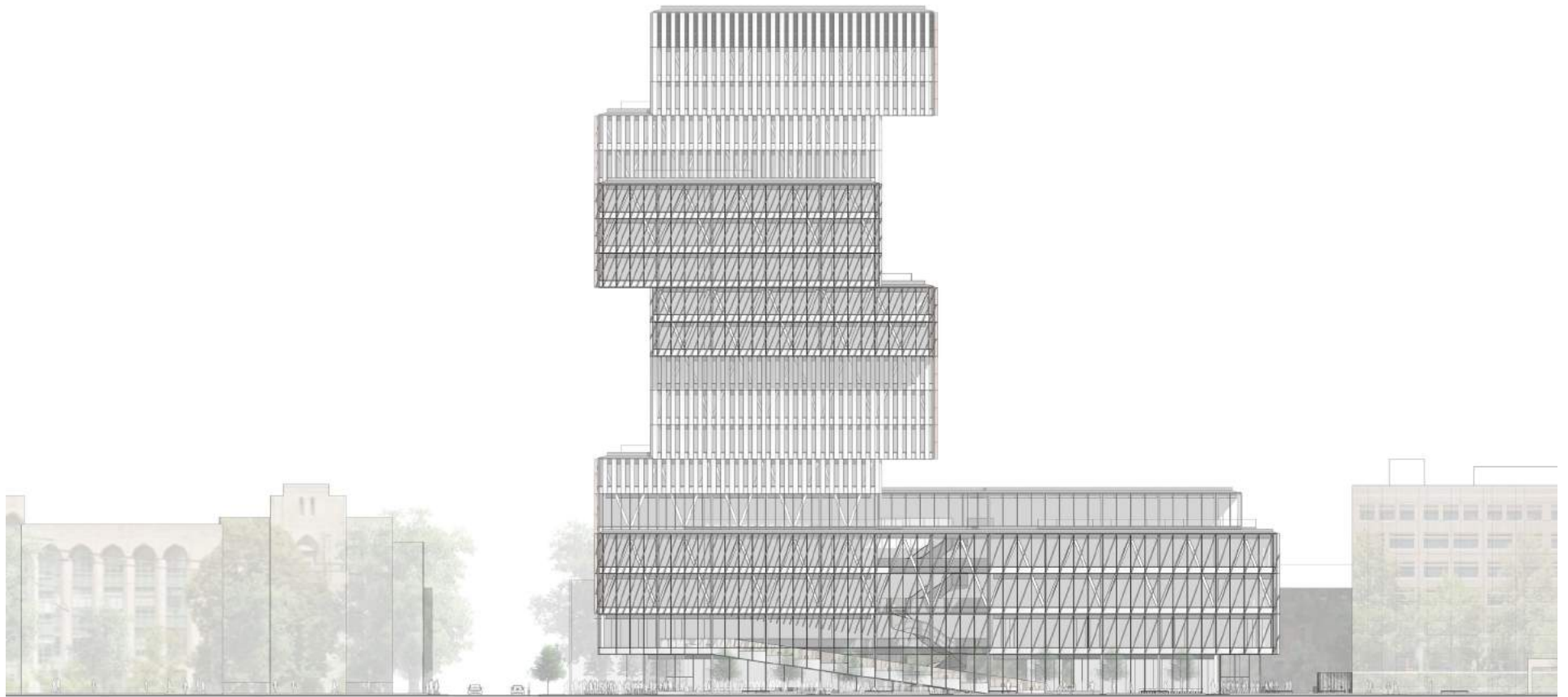
Figure 3-24
Perspective View from BU Bridge
Source: KPMB Architects, 2019

- Program Overview**
- Event Space/Pavilion
 - Public
 - Hariri Institute
 - Computer Science
 - Mathematics & Statistics
 - Registrar Classrooms

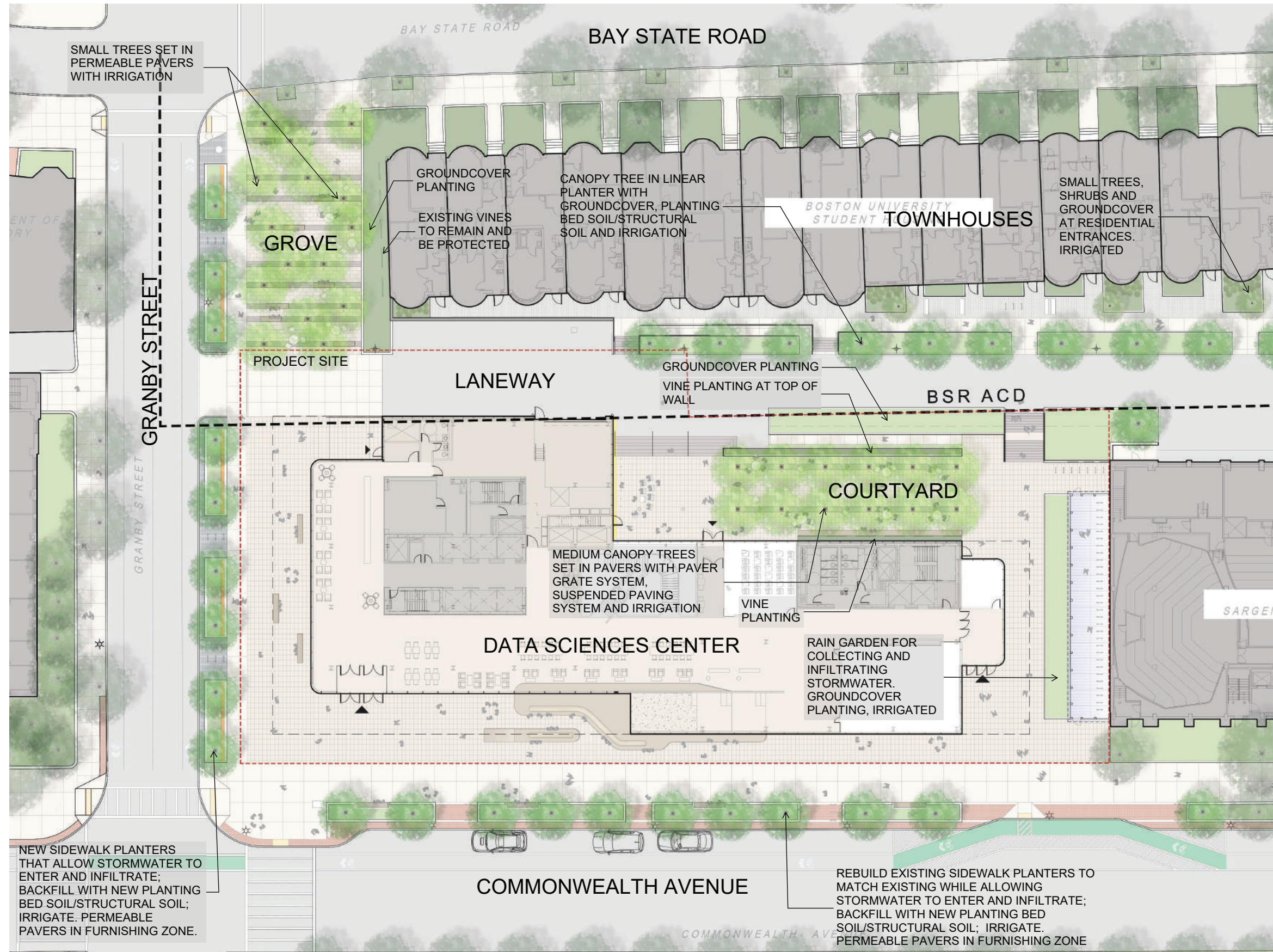


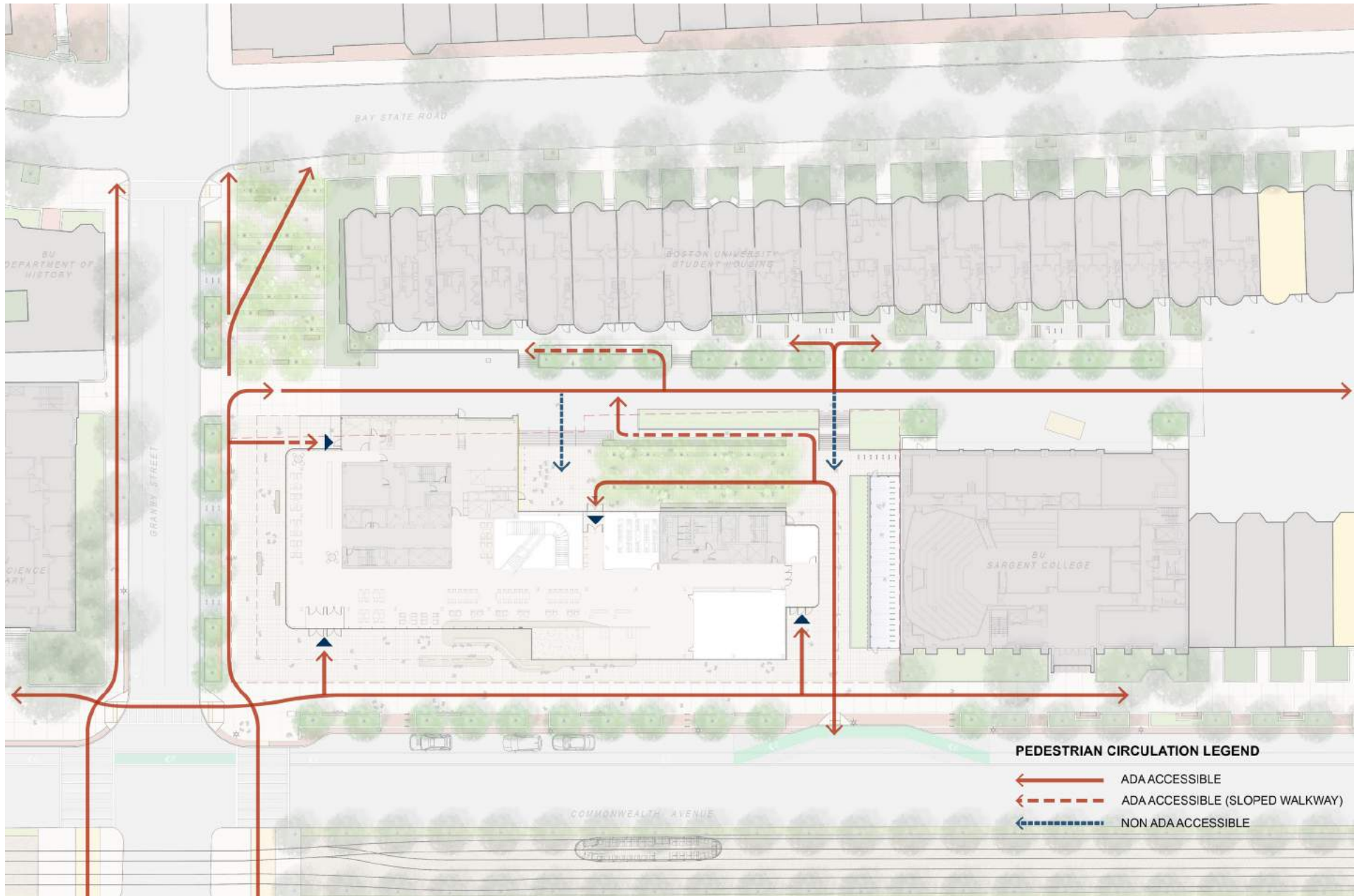












Chapter 4

SUSTAINABILITY

CHAPTER 4: SUSTAINABILITY

4.1 SUSTAINABLE DESIGN

The University is implementing a bold Climate Action Plan (CAP) approved by the Board of Trustees in 2017. The Plan has five major points:

1. Prepare the campuses for the effects from climate change, including:
 - a. Flooding from sea level rise and more intense storms
 - b. Rising temperatures
2. Net zero emissions from operations by 2040, including:
 - a. 31% GHG reduction from building energy efficiency by 2032
 - b. 100% renewable energy
 - c. Shift to fossil fuel free heating and cooling
 - d. LEED Gold certification
3. Act on indirect emissions from transportation, purchasing, and waste.
4. Integrate climate change into undergraduate education and support for research.
5. Integrate the Climate Action Plan into the University's Strategic Plan.

The Project is a prime example of what implementation of the Climate Action Plan looks like for new building design. It addresses: 1) preparing for the effects from climate change by locating the first floor of the Project above the Elevation of Resilience (20' BCB) established in the CAP, while lower levels are being protected against flooding; and 2) continuing to target a site Energy Use Intensity of 36, below the EUI of 40 kBtus/sf established in the CAP. As identified in Appendix C, Climate Change Questionnaire, energy modelling continues to be refined, and the current EUI is 41.5.

The Project is striving for a fossil-fuel free building operation with ground source heat pumps to accommodate 90% of the heating and cooling load. Electric, rather than gas-fired boilers, will be utilized to cover peak periods. The Project will use 100% renewable energy to power the building. To match 100% of Boston University's electricity needs, the University signed a 15-year Power Purchase Agreement (PPA) with ENGIE to buy wind power beginning in 2020, a major step in the University's CAP to curb greenhouse gas emissions. Boston University will buy the power from a South Dakota wind farm that will begin construction this summer. By purchasing the power, the University will earn Green-e Certified Renewable Energy Certificates against its own carbon emissions in Boston. Purchasing these credits, along with increasing energy efficiency and solar power on campus, as well as shifting to fossil fuel free heating and cooling, will position the Project to address these three key strategies in the CAP.

In addition, the University has engaged solar energy and structural engineers to complete a campus wide solar feasibility study in June 2019. A portion of the resulting solar project is intended to be allocated to the Data Sciences Center.

The Project will use the Leadership in Energy and Environmental Design (LEED) rating system as a framework to measure the various sustainable features of the Project. This system is divided into the following categories: Integrative Process, Location and Transportation, Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation, and Regional Priority Credits. A variety of sustainable design strategies in each category will be pursued to target a minimum of Gold Certification, as provided in the University's Climate Action Plan for new buildings of this size.

The Project will comply with the requirements of the City of Boston to address the current LEED Version 4 (v4). The Proponent has used a LEED v4 Building Design + Construction: New Construction Checklist to illustrate that the Project is currently tracking 68 LEED points. See Figure 4-1 and Figure 4-2, LEED Checklist.

The Project will comply with Article 37 of the Boston Zoning Code, Boston's Green Building Regulations. The purpose of Article 37 is to ensure that major building projects are planned, designed, constructed, and managed to minimize adverse environmental impacts, conserve natural resources, prepare for climate change, promote a more sustainable city, and enhance the quality of life in Boston. The narrative below demonstrates that the Project is planned to be in compliance with Article 37. A completed Climate Change Preparedness and Resiliency Questionnaire can be found in Appendix B. As the Project is in the early stages of the design process, some of these strategies are expected to evolve with the design of the building.

4.2 ARTICLE 37/LEED COMPLIANCE

As requested in the Scoping Determination, the Project has considered numerous opportunities and options to incorporate sustainable design measures. In addition to the campus-wide initiatives described in Section 4.1, the Project will incorporate advanced energy conservation features, passive performance measures, and other innovative measures to optimize building performance and achieve greater than 30% reduction in energy use in order to achieve LEED Gold Certification. As the Proponent proceeds through design development, the Project will be evaluated and adjusted to strive to reach LEED Platinum level if this is feasible. Specific measures currently identified to reach LEED Gold Certification are listed in this section.

4.2.1 INTEGRATIVE PROCESS

IP Credit 1 Integrative Process

1 point

The Project team meets regularly to ensure team members from the various disciplines involved are all known to each other and collectively communicating. Sustainable design-focused workshops were held early in the design process to assist the team in establishing shared sustainable design and energy efficiency goals for the Project. This includes evaluations of both energy and water-related systems, load reduction strategies, potential system downsizing opportunities, opportunities for non-potable water use, and any influenced adjustments to the Owner's Project Requirements and/or the Basis of Design for the Project.

As the Project progresses, there will be regular design meetings to ensure the entire team is engaged throughout the design and construction processes.

4.2.2 LOCATION AND TRANSPORTATION

The Project is located in the Fenway/Kenmore neighborhood of Boston, where it has ample access to public transportation, including the MBTA Green Line via the B branch at the Boston University East station, MBTA Bus route 54, Boston University Bus operating on the Charles River Campus and connecting the Charles River Campus to the medical campus, and the MBTA Commuter Rail via the Framingham line at Lansdowne Station. Exterior long and short-term bicycle storage is planned to encourage occupants to bike to the Project. The local neighborhood provides a variety of services with pedestrian and cyclist access.

The Project earns points for Sensitive Land Protection, High Priority Site, Surrounding Density and Diverse Uses, Access to Quality Transit, Bicycle Facilities, and Reduced Parking Footprint.

LT Credit 2 Sensitive Land Protection

1 point

The Project is located on a previously developed/graded site at the corner of Commonwealth Avenue and Granby Street on Boston University's campus.

LT Credit 3 High Priority Site

1 point

The Project is located within a U.S. Department of Housing and Urban Development Qualified Census Tract (QCT). A QCT is an area in which 50 percent of households have incomes below 60 percent of the Area Median Gross Income and/or there is a poverty rate of 25 percent or more.

LT Credit 4 Surrounding Density and Diverse Uses **5 points**

The Site is located on a dense urban college campus, with a surrounding community that includes many local amenities within a .5-mile walking distance.

LT Credit 5 Access to Quality Transit **5 points**

There is direct access within a .25-mile walking distance to the MBTA Green Line light rail via the Boston University East station (B branch of the Green Line), MBTA Bus route 54, and within .5-miles of the MBTA Framingham line of the Commuter Rail at Lansdowne Station.

LT Credit 6 Bicycle Facilities **1 point**

The Project will provide long and short-term bicycle storage on-site as well as showers for regular building occupants. The Project is located on a bike network in Boston where all streets have ≤ 25 MPH speed limits, many with designated bike lanes.

LT Credit 7 Reduced Parking Footprint **1 point**

The Project is located on the site of an existing campus parking lot (Lot N) and will not be replacing the off-street spaces that were previously existing. By removing these spaces, the University intends to reduce its overall parking capacity by up to 6%. The remaining on-street parking capacity meets the LEED requirements for providing at least 40% less parking than baseline values as recommended by the Institute of Transportation Engineers' Transportation Planning Handbook.

4.2.3 SUSTAINABLE SITES

The Site is a previously developed parcel located at the corner of Commonwealth Avenue and Granby Street. It is currently being used as a parking lot.

Prior to its design and ongoing throughout the application process, the Project has carefully considered the features of the Site and the surrounding context to create a building that is sustainable and environmentally sensitive. At this stage in the Project development, the Proponent is committed to reducing the heat island effect through light colored surfaces and ample vegetation. Light pollution will also be mitigated by installing exterior light features that comply with LEED requirements regarding uplighting and trespass. Additional measures to protect and improve habitat, open space, and rainwater management are still being considered.

SS Prerequisite 1 Construction Activity Pollution Prevention **REQUIRED**

The Project construction manager will submit and implement an Erosion and Sedimentation Control (ESC) Plan for construction activities related to the demolition of existing conditions and the construction of the new building specific

to this project. The ESC Plan shall conform to the erosion and sedimentation requirements of the 2012 EPA Construction General Permit in order to comply with this LEED prerequisite.

SS Credit 1 Site Assessment **1 point**

The Project will complete a Site survey that includes the Site topography and soil conditions, human use, and hydrology.

SS Credit 2 Site Development – Protect or Restore Habitat **2 points**

The Project landscape design will restore at least 30% of the previously developed site area, using native or adapted vegetation and green roof areas. Additionally, all disturbed or compacted soils being revegetated will meet the applicable soil requirements.

SS Credit 3 Open Space **1 point**

The Project's site design includes ample pedestrian-oriented hardscape areas as well as ground level vegetation and trees, providing a large amount of accessible and usable open space for building occupants.

SS Credit 4 Rainwater Management **2 points**

The Project will retain on site runoff from the developed site for, at minimum, the 85th percentile (per the new LEED v4.1 credit threshold update) of local rainfall events using low impact and green infrastructure practices. The project will include two 35,000-gallon recharge tanks which will be designed to recharge 1.25 inches within 72 hours following a rainfall event.

SS Credit 5 Heat Island Reduction **2 points**

The Project's hardscape and roofing materials will be selected with compliant SRI values in order to lower the Project's impact on the heat island effect.

SS Credit 6 Light Pollution Reduction **1 point**

Exterior light fixtures will comply with LEED requirements to reduce uplighting and trespass, thereby lowering the Project's light pollution.

4.2.4 WATER EFFICIENCY

In order to improve on-site water efficiency and reduce the burden on municipal water supply and wastewater systems, the Project will reduce potable water use for both sewage conveyance and irrigation needs. Both whole-building and end-use water metering will be installed in the Project, and low flow and high efficiency plumbing fixtures will be used to reduce the amount of potable water used

throughout the building. Exterior vegetation will be comprised of regionally appropriate, drought tolerant, indigenous plants.

The Project earns points for Outdoor Water Use Reduction, Indoor Water Use Reduction, and Water Metering.

WE Prerequisite 1 / Credit 1: Outdoor Water Use Reduction REQUIRED / 1 point

The Project landscape design will include native and adaptive vegetation and an efficient irrigation system that will reduce potable water use by at least 50% over baseline, using a combination of planting and efficient irrigation strategies.

WE Prerequisite 2 / Credit 2: Indoor Water Use Reduction REQUIRED / 2 points

Through the specification of low flow and high efficiency plumbing fixtures, the Project shall implement water use reduction strategies that use, at a minimum, 20 percent less potable water than the water use baseline calculated for the building after meeting Energy Policy Act of 1992 fixture performance requirements. The Project shall target an overall potable water use savings of 30 percent from the calculated baseline use. A higher goal of 40 percent will be considered depending on the final fixture selection for Water Use Reduction by the Project.

WE Prerequisite 3 / Credit 4 Water Metering REQUIRED / 1 point

The Project will include building-level water meters, the data from which will be shared with the U. S. Green Building Council (USGBC) for a minimum of five years. Additionally, water meters will be installed for at least two subsystems in the Project. These may include meters for the boiler, indoor plumbing fixtures and fittings, or domestic hot water.

4.2.5 ENERGY AND ATMOSPHERE

The building systems shall be designed to optimize energy performance and reduce energy consumption through high efficiency building systems. The Project team will engage a building commissioning agent to ensure the proper installation and operation of systems. No chlorofluorocarbon (CFC) based refrigerants will be used in order to avoid ozone depletion in the atmosphere. The Project team will explore the feasibility of onsite alternative energy technologies, including geothermal wells for ground source heat pumps.

The Project has established a preliminary Site EUI target of 36. Methods under study to achieve this target include: triple glazing coupled with a high-performing building envelope, a hybrid geothermal system for heating and cooling, and a highly-efficient LED lighting system with occupancy and daylight controls. The Project is striving for a fossil-fuel free building operation.

The HVAC design options include air handling units, heat recovery chillers, air-cooled chillers, condensing boilers, pumps, chilled beams, terminal units, and other miscellaneous systems.

Ventilation will be provided by dual wheel dedicated outdoor air units serving minimum ventilation to fan powered boxes, fan coil units, and active chilled beams. Perimeter heat will be provided in spaces with greater than 15 feet of glass height.

The Proponent shall engage a Commissioning Agent during the design phase to review the proposed design and ultimately confirm the building systems are installed and function as intended and desired.

The Project earns points for Enhanced Commissioning, Optimize Energy Performance, Advanced Energy Metering, and Green Power and Carbon Offsets.

EA Prerequisite 1 / Credit 1

REQUIRED / 6 points

Fundamental/Enhanced Commissioning and Verification

A Commissioning Agent (CxA) will be engaged by the Proponent for purposes of providing full commissioning services for the building energy related systems including building envelope, HVAC&R, lighting, and domestic hot water systems. The CxA will verify that the building systems are installed, calibrated, and perform to the Project requirements and basis of design. Additionally, the CxA will perform Commissioning activities for mechanical, electrical, plumbing, and renewable energy systems. The Project will be designed to support monitoring-based commissioning efforts after occupancy of the building, to be performed by the CxA.

EA Prerequisite 2 / Credit 2 Energy Performance

REQUIRED / 10 points

The Project's energy performance shall meet the minimum requirements of EA_p2. For EA_c2, project teams may use a pilot alternative compliance path (EA_pc95) for documenting savings under the EA Optimize Energy Performance Credit. The intent of this ACP is to allow project teams to use performance metrics other than cost for documenting performance improvement. The ACP requires project teams to calculate and report a metric from each of the required categories: Site Energy Cost, Source Energy, Greenhouse Gas Emissions, and Time Dependent Valuation (TDV) Energy (if available).

The average percent savings of the two highest-performing metrics, using equal weighting, is then used to determine percentage energy savings for the Project. Source energy reduction and greenhouse gas emission reduction metrics will be used to document savings under LEED.

Based on the Design Development phase draft energy model (Appendix F), the average percent savings for energy use reduction is 25 percent, which equates to 10

LEED points. The Proponent will continue to refine the building energy model through the end of the Construction Document phase to demonstrate the expected performance rating of the designed building systems.

EA Prerequisite 3 Building-Level Energy Metering **REQUIRED**

The Project will include building-level energy meters, the data from which will be shared with the USGBC for a minimum of five years.

EA Prerequisite 4 Fundamental Refrigerant Management **REQUIRED**

The specifications for refrigerants used in the Project HVAC & R systems shall NOT permit the use of CFC based refrigerants. The proposed design of the HVAC systems will achieve the prerequisite.

EA Credit 3 Advanced Energy Metering **1 point**

The Project will include meters for all end uses that represent 10 percent or more of the total building energy use.

EA Credit 7 Green Power and Carbon Offsets **2 points**

The University has negotiated a contract to purchase 100% of the electricity used on all campuses from a planned wind farm scheduled to come online in early 2020. The electricity demand for the Project will be included within this contracted amount. The contract is for a minimum of 15 years, and all RECs attained through this process will be Green-e Certified, as required.

4.2.6 MATERIALS AND RESOURCES

A demolition and construction waste management plan will be implemented during the construction of the Project to divert at least 75 percent of waste material from at least four separate waste streams from entering landfills. Building materials will be selected that contain recycled and regional content to reduce use of virgin materials and energy use associated with transportation while supporting local economies. Additionally, materials that disclose environmental and health information will be specified. Building-occupant waste recycling will be supported throughout the building and managed through the University's recycling program.

The Project earns points for Construction and Demolition Waste Management and Building Product Disclosure and Optimization Environmental Product Declarations, Sourcing of Raw Materials, and Material Ingredients.

MR Prerequisite 1 Storage and Collection of Recyclables **REQUIRED**

The storage of collected recyclables shall be accommodated within the Project design, including options for hazardous material disposal (i.e. batteries and

electronic waste). Occupants shall have dedicated areas located on each floor to bring their recyclables for storage and collection. The University's contracted waste management company shall collect recyclables on a regular basis.

MR Prerequisite 2 / Credit 5**REQUIRED / 2 points****Construction and Demolition Waste Management (Planning)**

The specification shall require that prior to the start of construction, the Construction Management team shall prepare and submit a Construction Waste Management plan that shall be implemented on the Site. The Project construction manager shall endeavor to divert as much demolition debris and construction waste from area landfills as possible with a goal to achieve at minimum 75 percent diversion of four waste streams.

MR Credit 1 Building Life-Cycle Impact Reduction**1 point**

The Project will develop a Whole Building Life Cycle Assessment evaluating the impacts of the structural and enclosure materials. Using the newly released LEED-BD+C v4.1 language, this strategy will achieve 1 point for this credit. The Whole Building LCA will be used to assess the material selections and evaluate the environmental impacts of up to six categories for the structural and enclosure materials.

MR Credit 2 BPDO Environmental Product Declarations**1 point**

The Architect will work with the specifications writer and the construction manager to specify 20 products from five manufacturers with compliant Environmental Product Declarations.

MR Credit 3 BPDO Sourcing of Raw Materials**1 point**

The architect will work with the specifications writer and the construction manager to specify products worth 25 percent of the total materials cost with positive Leadership and Extraction Practices. These include regional, recycled, FSC wood, and rapidly renewable materials.

MR Credit 4 BPDO Material Ingredients**1 point**

The architect will work with the specifications writer and the construction manager to specify 20 products from five manufacturers with compliant Health Product Declarations or similar.

4.2.7 INDOOR ENVIRONMENTAL QUALITY

The comfort and well-being of the building occupants will be paramount in regard to air quality, access to light, and thermal comfort. An indoor air quality management plan will be implemented during construction to enhance the well-

being of construction workers and to promote a better indoor environment for building occupants. Low-emitting materials will be employed throughout the building to reduce the quantity of indoor air contaminants and promote the comfort and well-being of installers and building occupants.

The Project earns points for Enhanced Indoor Air Quality Strategies, Low Emitting Materials, Construction Indoor Air Quality Management Plan, Thermal Comfort, and Interior Lighting.

IEQ Prerequisite 1 Minimum IAQ Performance **REQUIRED**

The building mechanical systems shall be designed to meet or exceed the requirements of ASHRAE Standard 62.1-2010 sections 4 through 7. Any naturally ventilated spaces shall comply with the applicable portions of ASHRAE 62.1.

IEQ Prerequisite 2 Environmental Tobacco Smoke (ETS) Control **REQUIRED**

The Project shall be non-smoking. Additionally, smoking shall be prohibited within 25 feet of all building openings and air intakes. Signage will be located within 10 feet of all entrances to inform building occupants.

IEQ Credit 1 Enhanced Indoor Air Quality Strategies **2 points**

The Project will pursue both options for this credit. The following considerations will be made: Entryway Systems, Interior Cross-Contamination Prevention, Filtration, and Carbon Dioxide Monitoring.

IEQ Credit 2 Low-Emitting Materials **1 point**

The specifications shall include requirements for at least two of the following categories to meet low emitting and VOC criteria: adhesives and sealants, paints and coatings, flooring, furniture, and composite wood. The Project construction manager will be required to track all products used to ensure compliance.

IEQ Credit 3 Construction IAQ Management Plan **1 point**

The specifications shall require the Project construction manager to develop an Indoor Air Quality Management Plan for the construction and pre-occupancy phases of the Project to meet/exceed the recommended Control Measures of the SMACNA IAQ Guidelines for Occupied Buildings Under Construction 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3).

IEQ Credit 5 Thermal Comfort **1 point**

The Project will meet ASHRAE 55-2010 standards for thermal comfort and will be designed to provide thermal controls to occupants within all multi-occupant

common spaces, as well as individual controls to comfortably surpass the minimum of 50 percent of occupants with control access.

IEQ Credit 6 Interior Lighting **1 point**

The Project will be designed to provide three-level lighting controls to occupants within all multi-occupant common spaces, as well as provide individual, multi-level lighting controls to a minimum of 90 percent of occupants within individually occupied spaces.

IEQ Credit 8 Quality Views **1 point**

The Project will provide ample access to quality views for building occupants, for at least 75% of the regularly occupied spaces.

4.2.8 INNOVATION

ID Credit 1 O+M Starter Kit **1 point**
Green Cleaning and Integrated Pest Management Plan

The Proponent shall implement a campus standard Green Cleaning Policy that covers green cleaning procedures, materials, and services that are within the building and site management's control and includes the organization responsible for cleaning the building and building site. Additionally, the Proponent will institute an Integrated Pest Management Program that includes measures for investigation, evaluation, and low-risk, alternative methods for pest management before moving to consider higher risk methods. If high-risk methods of pest control are necessary, the Program will ensure notification of all building occupants prior to utilization.

ID Credit 2 Green Building Education **1 point**

The Project shall develop and implement educational programs and resources for building occupants and the University community as a whole to learn about the sustainable features of the building. This will be done using brochures for occupants and a web-based information portal displayed on a building dashboard to be installed in the main lobby as well as within the University's sustainability website. Tours of the building that include sustainability as a focus of the presentations will also be provided.

ID Credit 3 Sustainable Purchasing, Lamps **1 point**

The Project shall design the lighting to reduce the average mercury content of purchased lamps below 35 picograms per lumen hour or eliminate the use of mercury-containing lamps altogether. The credit requires that the Project demonstrate a reduction of mercury content in mercury-containing lamps to 35 picograms per lumen hour or less.

ID Credit 4 PBT Source Reduction 1 point

The Project shall specify substitutes for building materials manufactured with lead, cadmium, and copper per requirements of this credit, with the intent to reduce the release of PBTs (Persistent Bio accumulative and Toxic) chemicals into the environment and exposure to occupants and facilities and maintenance staff.

ID Credit 5 Pilot Credit Integrative Analysis of Building Materials 1 point

The Project shall specify and install at least three permanently installed products within the building that have a documented qualitative analysis of the potential health, safety, and environmental impacts of the product in five stages of the product's life cycle. Qualitative analysis will meet requirements of this Pilot Credit.

ID Credit 6 LEED Accredited Professional 1 point

A LEED AP shall provide administrative services to oversee the LEED credit documentation process.

4.2.9 REGIONAL PRIORITY

Regional Priority Credits (RPCs) are established LEED credits designated by the USGBC to have priority for a particular area of the country. When a project team achieves one of the designated RPCs, an additional credit is awarded to the project for up to four total points. RPCs applicable to the Project's location include: LTc3 High Priority Site (2 point threshold), SSc4 Rainwater Management (85% threshold), WEc2 Indoor Water Use Reduction (40% threshold), EAc2 Optimize Energy Performance (20% threshold), and EAc5 Renewable Energy Production (5% threshold). This Project currently holds two RPCs as "Yes," as described in the sections above.

SS Credit 4 Rainwater Management 1 point**EA Credit 2 Optimize Energy Performance 1 point****4.2.10 BOSTON GREEN BUILDING CREDITS**

The Boston Green Building Credits were established in Appendix A to Article 37 as Boston-specific credits that can contribute a point toward a project's LEED "Certifiable" point total. One point may be awarded for each of the following four categories: Modern Grid, Historic Preservation, Groundwater Recharge, and Modern Mobility. The Project will meet the three required prerequisites and is exploring pursuit of the following credits:

Historic Preservation

The Project is not eligible for this credit since it is a new construction project.

Groundwater Recharge

The Proponent will explore whether or not the Project can provide 50 percent greater recharge than required under Article 32-6.

Modern Mobility

The Project team will explore Transportation Demand Management options available and appropriate for the Project.

4.3 SUSTAINABLE PRACTICES

A number of innovative measures have been incorporated into the Project to address sea-level rise and climate change.

4.3.1 SEA LEVEL RISE

The Project team has established a design flood elevation of 20 feet, consistent with Boston University guidelines (20 feet) and exceeding the City of Boston guidelines (16.1 feet). Measures will be implemented on the Project to prevent flood water from entering the building and subsequently minimize damage should water enter the building during a flood event. These measures may include:

- Locate the ground floor elevation at 21.25, which is above the design flood elevation;
- Design the foundation of the Project to resist additional hydrostatic pressure;
- Provide temporary flood barriers at ground floor doors; and
- Waterproof and dam around the lower elevation loading dock area.

If water should enter the building:

- Manage drainage of below-grade openings; and
- Provide waterproof electrical vault and electrical rooms.

4.3.2 CLIMATE CHANGE

Additional measures will be implemented on the Project to address various conditions brought on by climate change. These include bolstering the stormwater retention and management system to account for increased precipitation and

flooding; designing a triple-glazed, high-performance envelope to mitigate solar heat gain and optimize heating and cooling load conditions; and using passive and alternative energy building system strategies to reduce the overall energy consumption of the Project.

4.4 CLEAN AND RENEWABLE ENERGY PRACTICES

The Proponent and Project team have evaluated multiple potential clean and/or renewable strategies for the Project, as described in the sections below.

4.4.1 COMBINED HEAT AND POWER

Combined Heat and Power (CHP) has received increased interest and application. Given that the University's goal outlined in the Climate Action Plan is to be net carbon neutral for its operations by 2040, the Project is striving for a fossil-fuel free building, and the fact that the anticipated thermal demand for domestic hot water within this Project does not support it, CHP is not considered an appropriate or economical option to implement in the Project.

4.4.2 SOLAR PHOTOVOLTAIC PANELS

The University has engaged solar energy and structural engineers to conduct a campus-wide solar feasibility study. The study, which is expected to be completed in June 2019, is exploring a total of 29 buildings and sites across all the University's three campuses. With, a maximum installed generation capacity of approximately 2.3 MW, it is the University's intention to aggregate these projects into a Power Purchase Agreement, and to allocate a portion of the solar project to the Data Sciences Center.

4.4.3 DISTRICT HEATING AND COOLING OR GROUND SOURCE HEAT EXCHANGE SYSTEMS

The heating/cooling infrastructure serving the Project will exclusively serve the Project. The goal of the Project to provide a very low energy consumption heating, cooling, and lighting system that is leading-edge in its design and annual efficiency. These systems are designed in collaboration with highly effective building envelope systems and shading systems to minimize external environmental cooling and heating loads and maximize daylight. There will be no connection to existing Boston University campus chilled water and steam systems.

The Proponent is exploring the installation of a stand-alone heating/cooling system that relies upon ground source heat exchange for heating and cooling for approximately 90% of the annual loads, with supplemental electric boilers and water-cooled chillers to manage the remainder of the loads. If this option proves to

be feasible, a key component of the strategy is to no longer use fossil fuels and to rely on electricity, generated by renewable sources for primary heating and cooling.

The innovative systems within the Project could include a combination of high efficiency air handling systems consisting of dedicated dual-wheel outdoor air handling units, ground source heat recovery chillers, closed-loop wells, load-peaking electric boilers (for partial heating), pumps, and fan-powered boxes driving chilled beams and fan coils.

4.5 ENERGY EFFICIENCY ASSISTANCE

The University has Memoranda of Understanding (MOA) with National Grid and Eversource (the “Utility Companies”) outlining their initiative to reduce natural gas and electricity consumption over three years. As part of this initiative, the Utility Companies have been engaged and were partnered early in the Design Development phase to review the Project design and offer further energy conservation opportunities. As part of the technical assistance provided, the Utility Companies are evaluating the Project design’s effectiveness over code compliance, and screening incentive opportunities to help offset the costs associated with the measures that contribute to the overall improvement of the energy efficiency of the building.



LEED v4 for New Construction Project Scorecard

Project Name: **BU Data Sciences Center**
 Address: Commonwealth Ave, Boston MA
 Date of Issue: 3/11/2019

Yes	Maybe	No			
1	0	0		Integrative Process	1
1			Credit 1	Integrative Process	1
14	1	1		Location and Transportation	16
		N	Credit 1	LEED for Neighborhood Development Location	16
1			Credit 2	Sensitive Land Protection	1
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
1			Credit 6	Bicycle Facilities	1
1			Credit 7	Reduced Parking Footprint	1
	1		Credit 8	Green Vehicles	1
9	1	0		Sustainable Sites	11
Y			Prereq 1	Construction Activity Pollution Prevention	Required
1			Credit 1	Site Assessment	1
2			Credit 2	Site Development; Protect or Restore Habitat	2
1			Credit 3	Open Space	1
2	1		Credit 4	Rainwater Management	3
2			Credit 5	Heat Island Reduction	2
1			Credit 6	Light Pollution Reduction	1
4	3	4		Water Efficiency	11
Y			Prereq 1	Outdoor Water Use Reduction	Required
Y			Prereq 2	Indoor Water Use Reduction	Required
Y			Prereq 3	Building-level Water Metering	Required
1	1		Credit 1	Outdoor Water Use Reduction	2
2	2	2	Credit 2	Indoor Water Use Reduction	6
		2	Credit 3	Cooling Tower Water Use	2
1			Credit 4	Water Metering	1
19	8	6		Energy and Atmosphere	33
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
6			Credit 1	Enhanced Commissioning	6
10	2	6	Credit 2	Optimize Energy Performance	18
1			Credit 3	Advanced Energy Metering	1
	2		Credit 4	Demand Response	2
	3		Credit 5	Renewable Energy Production	3

	1		Credit 6	Enhanced Refrigerant Management	1
2			Credit 7	Green Power and Carbon Offsets	2

Yes	Maybe	No				
6	2	5	Materials and Resources			13
Y			Prereq 1	Storage & Collection of Recyclables	Required	
Y			Prereq 2	Construction and Demolition Waste Management Planning	Required	
1	2	2	Credit 1	<u>Building Life-Cycle Impact Reduction</u>	5	
1		1	Credit 2	Building Product Disclosure and Optimization-Environmental Product Declarations	2	
1		1	Credit 3	Building Product Disclosure and Optimization-Sourcing of Raw Materials	2	
1		1	Credit 4	Building Product Disclosure and Optimization-Material Ingredients	2	
2			Credit 5	Construction and Demolition Waste Management	2	

Yes	Maybe	No				
7	5	4	Indoor Environmental Quality			15
Y			Prereq 1	Minimum IAQ Performance	Required	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required	
2			Credit 1	Enhanced IAQ Strategies	2	
1	1	1	Credit 2	Low-Emitting Materials	3	
1			Credit 3	Construction IAQ Management Plan	1	
	2		Credit 4	IAQ Assessment	2	
1			Credit 5	Thermal Comfort	1	
1	1		Credit 6	Interior Lighting	2	
		3	Credit 7	Daylight	3	
1			Credit 8	Quality Views	1	
	1		Credit 9	Acoustical Performance	1	

Yes	Maybe	No				
6	0	0	Innovation			6
1			Credit 1	Innovation: O+M Starter Kit: Green Cleaning +Integrated Pest Mgmt	1	
1			Credit 2	Innovation: Green Building Education	1	
1			Credit 3	Innovation: Sustainable Purchasing, Lamps	1	
1			Credit 4	Innovation: PBT Source Reduction	1	
1			Credit 5	Pilot Credit: Integrative Analysis of Materials	1	
1			Credit 6	LEED Accredited Professional	1	

Yes	Maybe	No				
2	2	0	Regional Priority			4
	1		Credit 1	Renewable Energy Production (2 pts)	1	
1			Credit 2	Optimize Energy Performance (8 pts)	1	
1			Credit 3	Rainwater Management (2 pts)	1	
	1		Credit 4	Indoor Water Use Reduction (4 pts)	1	

Yes	Maybe	No				
68	22	20				110

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

Chapter 5

TRANSPORTATION

CHAPTER 5: TRANSPORTATION

5.1 INTRODUCTION

Potential transportation impacts resulting from the Project were evaluated. This chapter summarizes the existing and proposed transportation conditions, analyzes transportation operations, and identifies potential Project impacts, transportation demand management (TDM) strategies, and transportation mitigation measures. The study was developed in conformance with the Boston Transportation Department's (BTD) Transportation Access Plan Guidelines and the Boston Planning and Development Agency's Article 80 Large Project Review process.

5.1.1 SUMMARY OF FINDINGS

The net new vehicle trips generated by the Project represent a small portion of existing traffic along the Study Area roadway network. As shown in the analyses to follow, the additional traffic generated by the Project is not expected to result in significant impacts to the surrounding transportation network. Parking impacts resulting from the loss of on-street and off-street parking spaces are expected to be mitigated by available parking capacities at adjacent University-owned facilities and through reductions in campus-wide parking demand currently being achieved through the University's comprehensive Transportation Demand Management Program. The Project is well served by public transit via the MBTA Green Line B Branch and bus routes, the Commuter Rail at Lansdowne Station (formerly known as Yawkey Station), and the extensive Boston University Shuttle operations, which together will foster a reduction in the share of trips by automobile and reduce impacts on surrounding streets. The Project is not expected to result in any significant changes to peak hour operating conditions at study area intersections.

5.1.2 PROJECT DESCRIPTION

The Project will be located at the corner of Commonwealth Avenue and Granby Street at 665 Commonwealth Avenue within the Boston University Charles River Campus. The Site is currently used as a public surface parking lot containing 126 parking spaces. There are 35 Boston University permitted off-street parking spaces along the 16-foot-wide paved private alley at the northern boundary of the Site. Three existing curb cuts are located along Commonwealth Avenue, one of which is currently used for accessing the surface parking lot. Granby Street has three existing curb cuts, one of which is utilized to access the alley.

The Data Sciences Center will be home to three departments and institutions focused on computational or data sciences. Computer Sciences, Mathematics &

Statistics, and the Hariri Institute will move from several different locations and will be co-located in the Data Sciences Center. The Project also includes classrooms and other types of teaching spaces.

The Project will be comprised of approximately 305,000 sf of GFA and will include 19 stories above grade, including two stories of mechanical penthouse.

The Project will replace the existing University-owned, public surface parking lot and the Boston University permit parking spaces on the south side of the alley. On-site parking will be eliminated. Pedestrian access will be provided via Granby Street, Commonwealth Avenue, as well as the reconstructed alley. The landscape improvements to the portion of the alley adjacent to the Project will provide a pedestrian friendly laneway that will also allow access to service the adjacent buildings. No changes are planned for the portion of the alley located east of the Project. Vehicles can access the laneway using routes similar to the existing truck and delivery routes.

As an associated public realm improvement, the Project proposes to convert Granby Street from a one-way southbound roadway to a two-way, two-lane roadway. The existing on-street parking spaces on both sides of Granby Street between Commonwealth Avenue and Bay State Road will be replaced by a dedicated bicycle lane in each direction. The Proponent is currently working with the BTB in the development of this associated public realm improvement.

5.1.3 STUDY AREA

The Study Area is bounded by Commonwealth Avenue to the south, Granby Street to the West, Bay State Road to the north, and Silber Way to the east. The Study Area also includes the existing private alley between Granby Street and Silber Way adjacent to the north side of the Site. The Study Area includes the following four signalized and three unsignalized intersections (See Figure 5-1, Study Area Intersections):

- Commonwealth Avenue/St. Mary's Street (signalized);
- Commonwealth Avenue/Cumington Mall (signalized);
- Commonwealth Avenue/Granby Street (signalized);
- Commonwealth Avenue/Hinsdale Mall (unsignalized);
- Commonwealth Avenue/Silber Way/Blandford Mall (signalized);
- Granby Street/Bay State Road (unsignalized); and

- Silber Way/Bay State Road (unsignalized).

5.1.4 STUDY METHODOLOGY

Boston University's current Institutional Master Plan and Charles River Campus Transportation Master Plan (TMP) 2013-2023 were reviewed as background to existing transportation conditions along the Commonwealth Avenue corridor and in the vicinity of the Site. The existing conditions traffic analysis was based on new traffic counts conducted on April 12, 2018.

Additionally, University Parking & Transportation Planning Transportation Demand Management Updates, dated January 6, 2017 and February 15, 2018 and provided by Boston University's Parking and Transportation Service Office, were used to evaluate parking space utilization and TDM measures. The analysis year for the Project is 2022, consistent with the expected opening year for the Project as well as the analysis year for the TMP.

5.2 EXISTING CONDITIONS

5.2.1 EXISTING ROADWAY NETWORK

Commonwealth Avenue is a two-way, four-lane roadway located to the south of the Site. Commonwealth Avenue is classified as an urban principal arterial roadway under BTJ jurisdiction and runs primarily in an east-west direction from Route 95 in Weston to the west and Arlington Street in Boston to the east. In the Study Area, the MBTA Green Line B Branch runs within the median of Commonwealth Avenue and separates the roadway directions of travel. Sidewalks are provided along the northern edge of Commonwealth Avenue westbound and along the southern edge of Commonwealth Avenue eastbound. Dedicated bike lanes and on-street parking are provided along both sides of Commonwealth Avenue.

Granby Street is located on the west side of the Site. It is classified as a local roadway under BTJ jurisdiction and runs in a north-south direction between Back Street to the north and Commonwealth Avenue to the south. Granby Street is a one-way southbound, two-lane roadway south of Bay State Road and is a short two-way, two-lane roadway on the north side of Bay State Road. There are sidewalks and on-street parking along both sides of Granby Street.

Silber Way is a two-way, two-lane roadway located to the east of the Site. Silber Way is classified as a local roadway under BTJ jurisdiction and runs in a north-south direction between Back Street to the north and Commonwealth Avenue to the south. There are sidewalks and on-street parking along both sides of Silber Way.

Bay State Road is a one-way westbound, one lane roadway located to the north of the Site. It becomes a two-way roadway for a short-distance west of Granby Street. Bay State Road runs in an east-west direction between University Road to the west and Charlesgate West to the east. Bay State Road is owned by the City of Boston east of Granby Street and is classified as a local roadway under BTD jurisdiction. Bay State Road west of Granby Street from Granby Street to University Road is owned by the University. Sidewalks and on-street parking are provided along both sides of Bay State Road.

5.2.2 EXISTING INTERSECTION CONDITIONS

Existing conditions of the Study Area intersections are summarized below.

Commonwealth Avenue/St. Mary's Street is a three-legged, signalized intersection with two approaches and a median that separates the eastbound and westbound directions of travel on Commonwealth Avenue. The MBTA Green Line B Branch runs within the median of Commonwealth Avenue and crosses the intersection at grade. The Commonwealth Avenue eastbound approach consists of one through lane and one shared through/right turn lane. Left turn and U-turns are prohibited on Commonwealth Avenue eastbound approach. The Commonwealth Avenue westbound approach consists of two through lanes and one dedicated left turn lane. U-turns are permitted on Commonwealth Avenue westbound approach. Crosswalks, curb cut ramps, and pedestrian signals for crossing are provided on each leg of the intersection.

Commonwealth Avenue/Cummington Mall is a three-legged, signalized intersection with three approaches and a median that separates the eastbound and westbound directions of travel on Commonwealth Avenue. The MBTA Green Line B Branch runs within the median of Commonwealth Avenue and crosses the intersection at grade. The Commonwealth Avenue eastbound approach consists of two through lanes and one dedicated lane for making left-turn and U-turn. The Commonwealth Avenue westbound lane consists of two through lanes. Cummington Mall northbound approach consists of two dedicated left and right turn only lanes. Crosswalks, curb cut ramps, and pedestrian crossing signals are provided along Commonwealth Avenue westbound approach leg, Commonwealth Avenue eastbound departure leg, and on Cummington Mall approach leg. Cummington Mall is a Boston University owned roadway.

Commonwealth Avenue/Granby Street is a three-legged, signalized intersection with three approaches and a median that separates the eastbound and westbound directions of travel on Commonwealth Avenue. The MBTA Green Line B Branch runs within the median of Commonwealth Avenue and crosses the intersection at grade. The Commonwealth Avenue eastbound and westbound approaches each

consist of two through lanes. The Granby Street approach consists of two dedicated left and right turn only lanes. Crossings, curb cut ramps, and pedestrian crossing signals are provided along all approach and departure legs at the intersection.

Commonwealth Avenue/Hinsdale Mall is a two-legged, unsignalized T-intersection with two approaches. The Commonwealth Avenue eastbound approach has one through lane and one shared through/right turn lane. Hinsdale Mall roadway approach has one right-turn-only lane and is controlled by a STOP sign. Crossing and curb cut ramps are provided on Hinsdale Mall roadway. There are no pedestrian crossing signals. Hinsdale Mall is a Boston University owned roadway.

Commonwealth Avenue/Silber Way/Blandford Mall is a four-legged, signalized intersection with four approaches, with a median that separates the eastbound and westbound directions of travel on Commonwealth Avenue. The MBTA Green Line B Branch runs within the median of Commonwealth Avenue and crosses the intersection at grade. The Commonwealth Avenue eastbound and westbound approaches both have one through lane and one shared through/right turn lane. Left turns are prohibited from both Commonwealth Avenue eastbound and westbound approaches. The Silber Way and Blandford Mall approaches both have one shared left turn/through/right turn lane. Crossings, curb cut ramps, and pedestrian crossing signals are provided on each leg of the intersection. Blandford Mall is a Boston University owned roadway.

Granby Street/Bay State Road is a four-legged, unsignalized intersection with three approaches. The Bay State Road eastbound and westbound approaches are controlled by STOP signs. The Granby Street southbound approach has one shared through/right turn lane, the Bay State Road eastbound approach has one shared left turn/right turn lane, and the Bay State Road westbound approach has one shared left turn/through/right turn lane. Bay State Road is owned by the City east of Granby Street and west by the University.

Silber Way/Bay State Road is a four-legged, unsignalized intersection with three approaches controlled by an all-way STOP sign. Silber Way northbound approach has one shared left turn/through lane, Silber Way southbound approach has one shared through/right turn lane, and Bay State Road westbound approach has one shared left turn/through/right turn lane. Crossings and curb cut ramps are provided on each leg of the intersection. Bay State Road is owned by the City east of Granby Street and west by the University.

5.2.3 EXISTING (2018) TRAFFIC VOLUME

Intersection turning movement counts (TMCs) and vehicle classification counts were conducted at the seven study intersections on Thursday, April 12, 2018. The TMCs were collected during the weekday morning peak period between 7:00 and 9:00

AM, and afternoon peak period between 4:00 and 6:00 PM. The vehicle classification counts were collected for autos, heavy vehicles (trucks and buses), bicycles, and pedestrians. The traffic count volumes were summarized in 15-minute increments.

Based on the TMCs, the AM peak hour at the study intersections occurred from 8:00 to 9:00 AM and the PM peak hour occurred from 5:00 to 6:00 PM.

See Figure 5-2, Existing (2018) Conditions at AM Peak Hour Vehicle Volume; and Figure 5-3, Existing (2018) Conditions at PM Peak Hour Vehicle Volume.

5.2.4 EXISTING (2018) TRAFFIC OPERATIONS ANALYSIS

The latest SYNCHRO 9.2 software was used for analyzing the peak hour traffic operations using Highway Capacity Manual (HCM) methodology. The results of the analysis are summarized in Tables 5-8 and 5-9, which provide overall level of service (LOS), delay, queue lengths, and volume-to-capacity ratio results for the Study Area intersections. The delay-based level of service thresholds provided in the 2000 Highway Capacity Manual are summarized for signalized and unsignalized intersections in Table 5-1.

Table 5-1: Intersection Level of Service Criteria

Level of Service	Average Delay per Vehicle (seconds)	
	Signalized	Unsignalized
A	≤ 10.0	≤ 10.0
B	10.1 to 20.0	10.1 to 15.0
C	20.1 to 35.0	15.1 to 25.0
D	35.1 to 55.0	25.1 to 35.0
E	55.1 to 80.0	35.1 to 50.0
F	> 80.0	> 50.0

Source: Highway Capacity Manual, Special Report 209, Transportation Research Board, National Research Council, Washington, DC, 2000.

In general, all study intersections operate at acceptable overall levels of service (LOS C or better). Some minor-street turning movements experience higher levels of delay at signalized intersections, but do not exceed LOS E. Additionally, left turns from Commonwealth Avenue are generally LOS D and LOS E. There is one movement operating marginally above LOS F thresholds at the stop-controlled approach of Hinsdale Mall at Commonwealth Avenue.

5.2.5 CRASH ANALYSIS

A crash analysis at the Study Area intersections was conducted to identify potential vehicle accident trends by obtaining the most recent three years of crash records from MassDOT between 2013 and 2015. The MassDOT database is comprised of crash data from the Massachusetts Registry of Motor Vehicles (RMV) Division. The crash data files are compiled by year for an entire city or town. Review of the crash data showed that none of the Study Area intersections had reported crashes from 2013 to 2015.

The Highway Safety Improvement Plan (HSIP) map of the top crash locations was also reviewed using MassDOT's online interactive map. None of the intersections or roadway segments within the Study Area are classified within an HSIP crash cluster in recent years.

5.2.6 PARKING

Boston University owns and operates nine major off-street surface parking lots and nine parking garages within the Charles River Campus. Additionally, the University regulates parking along several private roadways and various small off-street parking areas located throughout the campus. According to the University's Parking and Transportation Services Office, as of February 2018, the University managed a total of 3,280 parking spaces (not including handicap and reserved spaces).

Off-Street Parking

The Site includes an existing surface parking lot, also known as Lot N or the Granby Lot. The Granby Lot is open to the public and does not accept University parking permits. The parking lot is typically used by visitors to Boston University during the day. It is also available to the public for Red Sox home games and select campus events. There are three existing curb cuts along Commonwealth Avenue, only one of which is used for parking lot ingress/egress.

Other University-owned parking facilities within a quarter-mile radius from the Site are listed below. See Figure 5-4, Off-Street Parking Facilities.

- Garage K, Warren Towers at 700 Commonwealth Avenue (481 spaces);
- Garage L at 575 Commonwealth Avenue (117 spaces);
- Garage M at 595 Commonwealth Avenue (269 spaces);
- Garage Q at 730-750 Commonwealth Avenue (138 spaces); and

- Lot J at College of Arts & Sciences (CAS Lot) at 240 Bay State Road (150 spaces).

In addition, the following lots are located marginally beyond the quarter-mile radius:

- Lot O (Kenmore Lot) at 549 Commonwealth Avenue (116 spaces); and
- Lot R at 766 Commonwealth Avenue (106 spaces).

The area surrounding the Site also includes residential permit parking and University reserved parking on private roadways owned or shared by the University. There are 75 spaces within the alley at the north of the Site between Silber Way and Granby Street, most of which are Green (faculty, staff) permit spaces. The remainder of the parking spaces are for rental property tenants.

On-Street Parking

The on-street parking regulations within the Study Area are mostly comprised of no parking, two-hour parking, three-hour parking, and four-hour parking. The on-street parking on Commonwealth Avenue westbound adjacent to the Site, Granby Street, Silber Way, and Bay State Road are regulated with four-hour parking restrictions. Parking meters along Blandford Mall, Cummington Mall, and Hinsdale Mall were removed when these streets became private ways owned by the University and were consequently converted from vehicle to pedestrian use (except for authorized vehicles). Granby Street between Commonwealth Avenue and Bay State Road consists of a total of 21 metered parking spaces, with 9 spaces along the east side adjacent to the Site and 12 spaces along west side. There are 24 metered parking spaces along Commonwealth Avenue westbound between Silber Way and Granby Street. See Figure 5-5, On-Street Parking Facilities.

5.2.7 CAR SHARING SERVICES

Car sharing services provide an alternative means of short-term private vehicular transportation without the hassle of car ownership and maintenance costs. Vehicles are available for renting on an hourly or daily basis for a specific time period. They can be parked on dedicated parking spots or returned to their designated drop-off parking locations specified in the reservation. Rental fee for car sharing service covers gas, insurance, parking, and maintenance costs.

Zipcar is a major car sharing service in the Boston area. Zipcar locations at or near the Site include:

- University surface lot at Granby Street/Commonwealth Avenue – Boston University (4 vehicles, to be relocated as described in Section 5.4.3);

- 854 Beacon Street – Brookline (2 vehicles); and
- University surface lot at 766 Commonwealth Avenue (Lot R) – Boston University (2 vehicles).

See Figure 5-11, Public Transportation.

5.2.8 EXISTING PEDESTRIAN ACCOMMODATIONS

Sidewalks are available along both sides of the roadways in the Study Area and are of sufficient width to accommodate the pedestrian demands in most areas. Sidewalks vary in width from six feet along Granby Street southbound south of Bay State Road to 25 feet along Commonwealth Avenue westbound. The rest of the sidewalks along Granby Street and Silber Way are ten feet wide. Sidewalks along Bay State Road vary from eight to 14 feet.

The physical conditions of the sidewalks are generally good throughout the Study Area. Crosswalks and handicap accessible ramps are provided at all study intersections. Pedestrian crossing signals are provided at the signalized intersections.

Pedestrian counts were conducted along with the vehicular TMCs on April 12, 2018. See Figure 5-6, Existing (2018) Conditions at AM Peak Hour Pedestrian Volume; and Figure 5-7, Existing (2018) Conditions at PM Peak Hour Pedestrian Volume.

5.2.9 EXISTING BICYCLES ACCOMMODATIONS

Bicycle facilities located in the vicinity of the Site include painted bike lanes along the northern edge of Commonwealth Avenue westbound and the southern edge of Commonwealth Avenue eastbound, outdoor bicycle racks, and bike storage rooms. There are several on-street bicycle racks within a 500-foot radius of the Site, which provide a total storage capacity of approximately 330 bikes. See Figure 5-8, Bike Rack Locations and Capacities.

Bicycle counts were conducted along with the vehicular TMCs on April 12, 2018. Bicycle volumes are highest along Commonwealth Avenue. See Figure 5-9, Existing (2018) Conditions at AM Peak Hour Bicycle Volume; and Figure 5-10, Existing (2018) Conditions at PM Peak Hour Bicycle Volume.

5.2.10 PUBLIC TRANSPORTATION

MBTA Services

The Site is served by six MBTA services. The MBTA Green Line B Branch runs along the median on Commonwealth Avenue, providing train service from Boston College

to Park Street in Boston. The MBTA Green Line C and D Branches also run within the quarter-mile radius of the Site, however they do not have stops at a quarter-mile distance.

The major MBTA bus routes operating near the Site are Routes 57 and 57A, which run along Commonwealth Avenue from Watertown Yard to Kenmore Station and from Oak Square to Kenmore Station, respectively. Other MBTA bus routes within the quarter-mile distance of the Site include Routes CT2 and 47, which provide crosstown services.

The Site is also served by the Framingham/Worcester Line of the MBTA Commuter Rail service, with the nearest stop at the Lansdowne Station.

See Table 5-2 MBTA Service Operations; and Figure 5-11, Public Transportation.

Table 5-2: MBTA Service Operations

Route	Origin– Destination	Weekday Peak Hour Frequency (min)	Hours of Service
Green Line B Branch	Boston College – Park Street	6	Weekdays: 5:01 AM - 12:53 AM Saturday: 4:45 AM - 12:52 AM Sunday: 5:20 AM - 12:52 AM
Bus Route 57	Watertown Yard – Kenmore Station	10-14	Weekdays: 4:33 AM - 1:30 AM Saturday: 4:33 AM - 1:21 AM Sunday: 6:00 AM - 1:32 AM
Bus Route 57A	Oak Square – Kenmore Station	10-16	Weekdays: 7:05 AM - 7:06 PM No weekend service
Bus Route CT2	Sullivan Square - Ruggles	20-26	Weekdays: 6:35 AM - 7:26 PM No weekend service
Bus Route 47	Central Square, Cambridge – Broadway Station	10-24	Weekdays: 5:15 AM - 1:31 AM Saturday: 5:00 AM - 1:40 AM Sunday: 7:30 AM - 1:04 AM
Framingham /Worcester Line	Worcester – South Station	9 – 60	Weekdays: 4:45 AM - 1:51 AM Weekend: 6:40 AM – 12:30 AM

Source: Subway and Bus: MBTA Summer 2018 Schedule, Commuter Rail: MBTA Schedule for Framingham/Worcester Line effective May 21, 2018.

Boston University Shuttle (BUS) Service

Boston University operates a free shuttle service (BUS) that connects the Charles River Campus to the Boston University Medical Campus and provides service for the students and faculties of both campuses (see Figure 5-11, Public Transportation). The live view BUS tracking system on the BUS website and BUS mobile app provides real-time information of bus locations traveling along the route.

The BUS provides weekday and Saturday service throughout the year and late-night service seven days a week during Fall and Spring seasons only. The University uses larger articulated buses as well as standard city bus-type vehicles to accommodate increased demand during the weekday peak periods. The weekday and Saturday bus routes serve the Charles River Campus and Medical Campus and operate on a loop between 33 Harry Agganis Way and 710 Albany Street. The late-night service operates on a loop along the Charles River Campus only. Table 5-3 summarizes the BUS service operations.

Table 5-3: Boston University Shuttle (BUS) Operations

Boston University Shuttle (BUS) Route	Origin–Destination	Weekday Peak Hour Frequency (min)	Hours of Service
BUS Fall/Spring Route	Weekday & Saturday: Student Village II (33 Harry Agganis) – 710 Albany Street – Student Village II (33 Harry Agganis)	10	Weekdays: 7:00 AM – 11:55 AM Saturday: 6:30 AM – 5:25 PM
	Late-Night: Agganis & Commonwealth Avenue – Student Village (Buick Street)	15	Late-Night: 7:05 PM – 2:00 AM
BUS Summer Schedule	Student Village II (33 Harry Agganis) – 710 Albany Street – Student Village II (33 Harry Agganis)	30	Weekdays: 7:00 AM – 11:25 AM Saturday: 6:30 AM – 5:25 PM

Source: Boston University Parking & Transportation Services. The BUS Schedules. <http://www.bu.edu/thebus/about-the-bus/>

5.2.11 BICYCLE SHARING SERVICES

The Site is located in close proximity to bicycle sharing locations. BLUEbikes, formerly known as Hubway, is Metro Boston’s public bike share program. Hubway was launched in 2011, and the name was changed to BLUEbikes in the Spring of 2018. BLUEbikes now consists of more than 1,800 bikes at over 200 stations across Boston, Brookline, Cambridge, and Somerville.

Four BLUEbike stations are located within a quarter-mile of the Project. The location of the BLUEbikes stations are listed below and shown in Figure 5-11, Public Transportation.

- Park Drive at Buswell Street (14 bicycle docks);
- Silber Way at Commonwealth Avenue (19 docks);
- Kenmore Square (13 bicycle docks); and
- Boston University Central – 725 Commonwealth Avenue (11 bicycle docks).

5.3 NO-BUILD (2022) CONDITION

The 2022 No-Build Condition analyzes the future transportation conditions within the Project Study Area without the proposed Project. Traffic volume changes based on annual growth rate and growth associated with specific developments near the Project are included in the No-Build (2022) traffic analysis.

5.3.1 BACKGROUND TRAFFIC GROWTH

A background traffic growth rate was applied to the Existing Condition peak hour traffic volumes to account for general future traffic growth in the Project Study Area. Based on BTD guidance, an annual growth rate of one-half percent per year for four years was applied to the 2018 Existing Condition vehicle volumes for the No-Build (2022) condition.

5.3.2 SPECIFIC DEVELOPMENT TRAFFIC GROWTH

Traffic growth from current or future development projects proposed in the vicinity of the Charles River Campus was also included to estimate No-Build (2022) traffic volumes. The Boston Planning and Development Agency and Town of Brookline's websites were reviewed to identify current and planned projects. The following projects in the City of Boston are located near the Project Study Area and were reviewed for relevance to the Project Study Area:

- **Kenmore Square Hotels, Boston, MA (560-574 Commonwealth Avenue/645-665 Beacon Street)** – Involves the construction of a 24-story hotel building containing approximately 382 rooms at 560-574 Commonwealth Avenue and a 19-story hotel building containing approximately 295 rooms at 645-665 Beacon Street with underground parking. As of the writing of this PNF, the Kenmore Square Hotels PNF filing (March 12th, 2018) did not identify a project vehicle trip distribution or provide a detailed traffic analysis. Lacking this information, it was not possible to assess how many project trips (if any) are expected to affect the Project Study Area. When this information is made available, the relevancy of this project to the No-Build (2022) traffic volumes will be reassessed.

- **Kenmore Square Redevelopment Project (541 Commonwealth Avenue and 650-600 Beacon Street, Boston MA)** – Involves redevelopment of seven parcels known as 533-541 Commonwealth Avenue and 650-660 Beacon Street. Six of the existing buildings will be demolished, and one will be renovated and expanded to construct two new, mixed-use buildings. Includes approximately 282,500 square feet of newly constructed and renovated office and retail space, and approximately 60 parking spaces. This project is under review by the BPDA and will generate additional vehicle trips within the Project Study Area. The relevant trips associated with this project have been included in the No-Build (2022) conditions.
- **Boston Children’s Hospital (819 Beacon Street, Boston)** – Involves the construction of an office building supporting Boston Children's Hospital uses with ground-floor retail and 432 parking spaces. This project is under review by the BPDA. This project does not generate vehicle trips within the Project Study Area.
- **Fenway Center - Phase 1 (0 Brookline Avenue)** – Phase 1 of the Fenway Center project includes building 1 and building 2 of the Fenway Center proposal, which consists of 346,000 square feet and approximately 312 residential units. This project is under construction. This project does not generate vehicle trips within the Project Study Area.
- **Fenway Center (Parcel 7 Air Rights)** – Involves a four building, mixed-use development with a parking garage to be built over the Mass Pike. The development will range from 7 to 22 stories and total approximately 819,000 gross square feet, approximately 552 residential units, and approximately 1,340 parking spaces. This project is under construction and will generate additional vehicle trips within the Project Study Area. The relevant trips associated with this project have been included in the No-Build (2022) conditions.
- **839 Beacon Street** – Involves the construction of a five-story mixed-use building containing 45 residential units, 4,500 square feet of ground floor commercial space, and 30 parking spaces. The total size of the building is 46,850 square feet. This project is under construction. This project does not generate vehicle trips within the Project Study Area.
- **Landmark Center Redevelopment (201 Brookline Avenue)** – Involves the expansion of the existing Landmark Center with the construction of a 506,000 square-foot, 14-story office/laboratory building on the southwest corner of Brookline Avenue and Fullerton Street. The project has been approved by the

BPDA with a request for a Development Impact Report. This project does not generate vehicle trips within the Project Study Area.

- **Boston University Charles River Campus Transportation Master Plan (2013-2023)** Boston University's TMP identified multiple planned institutional projects through 2022. The TMP assumed year 2022 as the future year for traffic analysis, as it represented the 10-year horizon from the existing conditions analysis year of 2012. In addition, the TMP assumed a 2.5 percent growth in University employment through 2022, equating to approximately 150 new employees. These trip generators were quantified and assigned to the roadway network as part of the 2022 traffic analysis. To be conservative, the institutional trip generation identified by the TMP has been included in the No-Build (2022) analysis in its entirety.

5.3.3 NO-BUILD (2022) CONDITION TRAFFIC VOLUMES

Morning and afternoon peak hour traffic volumes for the future No-Build (2022) condition are illustrated in Figures 5-12 and 5-13, respectively. The future No-Build (2022) traffic volumes include the background traffic growth and specific development traffic growth.

The No-Build (2022) condition retains the current operations of the existing surface parking lot on the Site, known as Lot N or the Granby Lot. As the parking lot was fully operational when traffic counts were performed for this study, the trips generated by Granby Lot operations are already accounted for in the traffic count data and thereby are included in the No-Build (2022) traffic volumes. While it was not required for traffic operations analysis, an understanding of the Granby Lot trip generation is helpful in the comparison of alternative uses of the Site and is provided in Table 5-4.

Table 5-4: No-Build 2022 Trip Generation (Granby Lot / Lot N)

Period	Inbound Trips (veh)	Outbound Trips (veh)	Total Trips (veh)
Morning Peak Hour	35	10	45
Evening Peak Hour	8	41	49
Daily	120	120	240

Source: Traffic counts conducted on April 12, 2018. Daily parking usage data was provided by Boston University Parking and Transportation Services and represents average mid-week daily usage while Boston University is in session.

5.3.4 NO-BUILD (2022) CONDITION TRAFFIC OPERATIONS ANALYSIS

Tables 5-8 and 5-9 provide a summary of the future No-Build (2022) traffic operations analysis at the Study Area intersections. In general, no significant

changes are observed from the Existing (2018) Conditions to the No-Build (2022) Condition. All study intersections operate at acceptable overall levels of service (LOS C or better). Consistent with the Existing (2018) Condition, some minor-street turning movements experience higher levels of delay at signalized intersections, but do not exceed LOS E. Additionally, left turns from Commonwealth Avenue are generally LOS D and LOS E. There is one movement operating above LOS F thresholds at the stop-controlled approach of Hinsdale Mall at Commonwealth Avenue, which also occurs in the Existing (2018) Condition.

5.4 BUILD (2022) CONDITION

The Project will replace the existing surface parking lot and will be home to three departments and institutions focused on computational or data sciences. Computer Sciences, Mathematics & Statistics, and the Hariri Institute will move from several different locations to be co-located in the Data Sciences Center. The Project also includes general classrooms and teaching space. The Data Sciences Center will be comprised of approximately 305,000 sf of GFA.

Associated public realm improvements for the Project will include reconstruction of the alley on the north side of the Site and the conversion of Granby Street to a two-way, two-lane roadway. The existing on-street parking spaces on both sides of Granby Street will be replaced by dedicated bike lanes in each direction.

5.4.1 SITE ACCESS AND CIRCULATION

The Site will have no added curb cuts for vehicular access along Granby Street and Commonwealth Avenue. As part of the Project, the alley along the northern side of the Site will be reconstructed from Granby Street to the eastern boundary of the Site. Access for loading, deliveries, and trash pick-up will be provided on the north side of the Site via the new, pedestrian-friendly laneway. Vehicles can access the laneway using routes similar to the existing truck and deliveries routes.

Pedestrian access to the Data Sciences Center will be provided via two main building entrances: one provided at the western end near the corner of Granby Street and Commonwealth Avenue and the other at the eastern end near the Sargent College building, which is also accessible via Commonwealth Avenue. Pedestrians can also access the building midblock from the north through a landscaped courtyard space. The first floor of the Data Sciences Center does not extend the entire length of the Site near the Sargent building, allowing a north-south pedestrian connection between Commonwealth Avenue and the laneway. See Figure 2-32, Circulation and Access Plan.

5.4.2 PARKING

The Project will remove 126 spaces provided at the University-owned Granby Lot. The widening and reconstruction of the private laneway will also remove 35 University reserved off-street permit spaces. The Project does not include a replacement for the University-owned spaces. The proposed reconfiguration of Granby Street will replace 21 on-street metered parking spaces with dedicated bicycle lanes on either side of Granby Street between Commonwealth Avenue and Bay State Road.

The Granby Lot currently contains five handicap-accessible parking spaces, three of which are located on the eastern side of the parking lot adjacent to the Sargent College building. The Project will provide two handicap-accessible pick-up/drop-off spaces along Commonwealth Avenue in close proximity to the Project's eastern accessible entrance and Sargent College.

Off-Street Parking

Visitors may park at the University owned pay-on-entry Kenmore Parking Lot (Lot O) located at the corner of Commonwealth Avenue and Deerfield Street. Boston University visitors can also park in the Agganis Arena Lot/Garage and Langsam Garage located west of the Boston University Bridge and can walk, bike, or take public transportation (MBTA bus, Green Line trains, or BUS) to the Site.

Several Boston University owned parking facilities, including the Kenmore Lot (Lot O), Warren Towers Garage (Lot K), 575 Commonwealth Avenue Garage (Lot L), Rafik B. Hariri Building Garage (Lot M), and 766 Commonwealth Avenue Garage (Lot R) are available to the public during Red Sox events.

The University has implemented several measures to reduce the number of vehicles on campus and increase the use of sustainable modes for commuters at the Campus. The University's TDM program is described in Section 5.7.1 and includes elements such as subsidized MBTA transit passes for faculty, staff, and students; parking management strategies; carpooling benefits; and bicycle commuter benefits. In Year 2017, the University experienced reduction in daily parking demand on Campus as a result of its TDM initiatives, with more spaces being available during weekday peak periods in garages, including Warren Towers (Lot K), 730-750 Commonwealth Avenue Garage (Lot Q), and 766 Commonwealth Avenue (Lot R). The Proponent charges fees for parking permits for faculty, staff, and students to discourage vehicle trips to the University; limits student parking permits; and actively restricts the number of parking permits issued to undergraduate students. The University is considering a number of additional benefits and measures to further strengthen the TDM program to achieve its goal of reducing drive-alone vehicle demand, as described in Section 5.7.1.

On-Street Parking

Visitors can utilize existing metered parking located along the north and south sides of Commonwealth Avenue and Bay State Road, and along the east and west sides of Silber Way. The on-street parking on Commonwealth Avenue westbound adjacent to the Site, Silber Way, and Bay State Road are regulated with four-hour parking restrictions.

There are 24 metered parking spaces along Commonwealth Avenue westbound between Silber Way and Granby Street. Granby Street between Commonwealth Avenue and Bay State Road consists of a total of 21 on-street metered parking spaces, which will be replaced with bike lanes as part of the proposed reconfiguration of Granby Street.

Drop-off/Pick-up, Short-Term Parking, Loading and Queuing

The Proponent is currently coordinating with the BTD in the design of a proposed curbside drop-off and pick-up area along Commonwealth Avenue westbound serving the main eastern entrance of the Project. The drop-off and pick-up spaces are intended to be used by Transportation Network Company (TNC) vehicles or private vehicles for passenger loading and unloading, and will not be used for commercial deliveries. The TNC drop-off and pick-up area will be accessible for people with disabilities. The curb ramp for the proposed TNC curb area aligns with the primary eastern entrance of the proposed Data Sciences Center, to orient both pedestrians and bicyclists who want to move northward to the building entrance, bike shelter or all the way to the laneway.

The existing metered parking spaces on Commonwealth Avenue (24 spaces) are not expected to be reduced as a result of the proposed TNC curb. The parking to be directly displaced by the TNC curb design is expected to be offset by parking gains attributed to the Project's removal of driveways associated with the existing Granby Lot. As a result, it is expected that the TNC curb will result in a net gain of two unmetered drop-off/pick-up spaces. The Proponent will continue to work with the BTD to develop a dedicated TNC curb area to serve the Project.

Parking Supply Analysis

Boston University owns and operates nine major off-street surface parking lots and nine parking garages on the Charles River Campus. Additionally, the University regulates parking along several private roadways and various small off-street parking areas located throughout the campus. According to the University's Parking and Transportation Services Office, as of February 2018, the University managed a total of 3,280 parking spaces (not including handicap and reserved spaces). For the supply of 3,280 spaces, the University recorded a campus-wide average peak parking occupancy of 79 percent, with an average of 693 spaces remaining

unoccupied during peak weekday activity. The net loss of on-street and off-street parking spaces as a result of the Project is expected to be offset by available campus-wide parking capacities and through reductions in campus-wide parking demand currently being achieved through the University's comprehensive Transportation Demand Management Program.

Figure 5-4 provides a complete summary of all University-owned off-street parking facilities. University-owned parking facilities provide 1,155 off-street parking spaces within a quarter-mile radius from the Site, as follows:

- Garage K Warren Towers at 700 Commonwealth Avenue (481 spaces);
- Garage L at 575 Commonwealth Avenue (117 spaces);
- Garage M at 595 Commonwealth Avenue (269 spaces);
- Garage Q at 730-750 Commonwealth Avenue (138 spaces); and
- Lot J at College of Arts & Sciences (CAS Lot) at 240 Bay State Road (150 spaces).

In addition, the following University-owned lots (222 total parking spaces) are located marginally beyond the quarter-mile radius:

- Lot O (Kenmore Lot) at 549 Commonwealth Avenue (116 spaces); and
- Lot R at 766 Commonwealth Avenue (106 spaces).

The following additional University-owned parking facilities are accessible to the Site by way of public transportation, including the Green Line, MBTA bus and BU shuttles and comprise 1,639 spaces in total:

- Lot H (Upper Bridge) at 1 University Road (67 spaces);
- Lot G (Lower Bridge) at 3 University Road (42 spaces);
- Lot F (Essex Garage) at 148 Essex Street (263 spaces);
- Lot E (CFA Lot) at 855 Commonwealth Avenue (41 spaces);
- Lot D (Buick Street Lot) at 25 Buick Street (144 spaces);
- Agganis Arena Lot / Garage (Lot A/C-2) at 925 Commonwealth Avenue (742 spaces); and
- Langsam Garage (Lot B/New Balance Field) at 142 Gardner Street (340 spaces).

5.4.3 CAR SHARING SERVICES

The Granby Street Lot currently consists of four parking spaces assigned for Zipcars. The Project will displace these four spaces, which will be relocated to two University-owned parking facilities, as follows:

- Lot R at 766 Commonwealth Avenue (2 spaces); and

- Lot E at 855 Commonwealth Avenue (2 spaces).

5.4.4 LOADING AND SERVICE

Loading and service areas will be located on the north side of the Site behind the Data Sciences Center. Loading docks will be provided in two enclosed bays on the north elevation of the building. Vehicles for loading, deliveries, and trash pick-up will access the service bays from the reconstructed private service drive on the north side of the Site. The laneway will continue to be accessed by vehicles via Granby Street and Silber Way. The laneway will be reconstructed with adequate width to allow service trucks and vehicles to maneuver to and from the service bays in the building. In addition, the existing trash compactor will be relocated to a new location in the area. The Project does not provide a designated area for truck queuing, however trucks can queue for a short period of time on the laneway without blocking the laneway for other vehicles.

Emergency Vehicle Access

Emergency vehicle access to the Site will be provided via Commonwealth Avenue, Granby Street, and the laneway on the north side of the site.

Truck Network

Trucks can access the laneway using routes similar to the existing truck and deliveries routes. Regionally, trucks will use the Massachusetts Turnpike (I-90), Exit 18; and I-93, Exit 18 to access the project Site. Local trucks will use Commonwealth Avenue, Massachusetts Avenue and Cambridge Street.

Daily Deliveries

The loading and delivery activities, as well as trash and recycling pick-up will be made during off-peak periods as much as possible, so the local streets will not be impacted highly by truck traffic.

5.4.5 PEDESTRIAN ACCOMMODATIONS

Pedestrians can enter the Data Sciences Center from two main accessible entrances provided at the southwestern corner of the Site at Granby Street and Commonwealth Avenue, and at the southeastern corner of the site near Sargent College. Pedestrians can also access the building midblock from the north via the new pedestrian courtyard space. The first floor of the Data Sciences Center does not extend the entire length of the Site near the Sargent College building, allowing a north-south pedestrian connection between Commonwealth Avenue and the laneway. Additionally, the configuration of the ground floor and the second floor provides a wide building frontage and sidewalk for pedestrians along the entire

length of Granby Street and approximately half of the length along Commonwealth Avenue. See Figure 2-32, Circulation and Access Plan.

The Project will provide universal Americans with Disabilities Act (ADA) accessibility improvements at both edges of the Site, including the laneway, and will also improve access to and across the laneway. Main entrances to the Data Sciences Center will be located at ground level and will be universally accessible. The Project will preserve the sidewalks and pedestrian ramps where possible and will reconstruct where necessary to meet ADA and Massachusetts Architectural Access Board (MAAB) requirements. Additionally, the Project will provide handicap access to the rear of the adjacent University-owned townhouses on Bay State Road along the north side of the laneway.

5.4.6 BICYCLE ACCOMMODATIONS

In line with Boston University's current TDM program, the Project will encourage bicycle use and reduce parking demand. As part of the Project, Granby Street will be redesigned to provide dedicated bike lanes on both sides of the street, connecting to the existing bike lanes network on Commonwealth Avenue.

The Project will remove the bicycle racks located in the existing surface lot and will provide bicycle storage on site at the eastern end near the Sargent College building. In addition, there are several bicycle racks available within the 500-foot radius of the Site, as shown in Figure 5-8, Bike Rack Locations and Capacities. The proposed locations, quantities and types of bicycle parking for the Project are currently in development and are expected to comprise of:

<u>Location</u>	<u>No. of Bikes</u>
Storage Enclosure East Side of Site	120 (for registered bikes at BU)
North of Storage Enclosure	14 (for public use)
Commonwealth Avenue Furnishing Zone	18
Granby Street Furnishing Zone	18
<u>Laneway Back of Brownstones</u>	<u>12</u>
Total Spaces	182

The Boston University Charles River Campus Bicycle Plan was adopted by the University's Board of Trustees in Spring of 2018. The Bicycle Plan guides future investment by the University to support the continued growth of bicycling as a major component of the University's transportation system. It presents recommendations for improving bicycling in the Charles River Campus through a combination of new bike parking installation, redistribution, maintenance, and modernization. The University has already implemented several key initiatives from the Bicycle Plan, including a new bikeshare subsidy to make biking accessible for all students. A key recommendation of the Plan is to increase the supply of bike

parking on campus to meet the recommended BTM standard of one bike parking space per 10 people. The Proponent will continue to work with the BTM to develop the proposed on-site bicycle parking supply.

5.4.7 PROJECT TRIP GENERATION

The Proponent anticipates that approximately 501 faculty and staff will be employed at the Project. Of these employees, the University estimates that 209 (42 percent) will be relocated from existing facilities on the Campus. The approximate 292 remaining positions will be filled by new employees. Only the 292 new employee positions are used to determine trip generation for the Project, as the existing employees who drive to the Campus have already been accounted for in the traffic counts collected on April 12, 2018.

Project-generated vehicle trips were estimated by using vehicle trip generation rates published in the most current Institute of Transportation Engineers (ITE) Trip General Manual (10th Edition). The initial ITE trip generation was adjusted to reflect the urban location of the Project using the process described in the sections to follow, as the ITE rates were derived from data collected at suburban or rural campuses. Specifically, the average rates per employee for ITE Land Use Code 550 “University/College” were used to estimate the unadjusted ITE vehicle trips. Unadjusted vehicle trips are calculated by multiplying the ITE rate by the expected number of new employees. Table 5-5 summarizes the ITE rates and the resulting unadjusted vehicle trips and their directional distributions.

Table 5-5: Unadjusted ITE Vehicle Trips

Period	ITE Rate	Unadjusted Vehicle Trips (Total)	Directional Distribution	
			Inbound	Outbound
Morning Peak Hour	0.75	219	76%	24%
Evening Peak Hour	0.79	231	33%	67%
Daily	8.89	2,596	50%	50%

Source: ITE 10th Edition, 2017

The unadjusted vehicle trips were converted into person trips by applying the national average vehicle occupancy of 1.14 for Massachusetts work trips (statewide) as presented in the 2017 National Household Travel Survey. Person trips were then distributed to transportation modes using the modal split data documented from the 2018 Boston University Charles River Campus DEP Rideshare Program Update, shown in Table 5-6. The final adjusted vehicle trips are summarized in Table 5-7.

Table 5-6: Charles River Campus Modal Splits

Mode of Travel	AM Peak
Single Occupancy Vehicles	24%
Public Transportation	46%
Walk	12%
Bicycle	9%
Car/Van Pools	7%
Other	2%
Total	100%

Source: 2018 Boston University Charles River Campus DEP Rideshare Program Update

Table 5-7: Adjusted ITE Vehicle Trips

Period	Inbound Trips	Outbound Trips	Total Trips
Morning Peak Hour	46	14	60
Evening Peak Hour	21	42	63
Daily	355	355	710

5.4.8 PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

The net new Project-generated vehicle trips were assigned to the roadway network based on the BTD Area 4 trip distribution rates. As the Project provides no on-site parking, the net new vehicles trips were then distributed to Project-Site-adjacent parking structures based on proximity and expected utilization. See Figure 5-14, Project-Generated Vehicle Trips (Inbound); Figure 5-15, Project-Generated Vehicle Trip Distributions (Outbound); Figure 5-16, Net New Project-Generated Vehicle Trips - AM Peak Hour; and Figure 5-17, Net New Project-Generated Vehicle Trips - PM Peak Hour. The following is a summary of the assumed distribution of new project trips to nearby parking facilities:

- 60 percent - Garage K, Warren Towers at 700 Commonwealth Avenue (481 spaces);
- 10 percent - Garage L at 575 Commonwealth Avenue (117 spaces);
- 15 percent - Garage Q at 730-750 Commonwealth Avenue (138 spaces); and
- 15 percent - Lot R at 766 Commonwealth Avenue (106 spaces).

In addition to the quantification and distribution of net new vehicle trips generated by the Project, the Build Condition traffic analysis also accounts for the Project-related traffic re-distributions described below.

Redistribution of Existing Granby Lot (Lot N) Vehicular Traffic

The existing vehicular traffic associated with the Granby Lot to be displaced by the Project was assumed to redistribute to other University-owned public parking facilities to the west and east of the Study Area. As a conservative assumption, the existing Granby Lot traffic remains within the Study Area roadway network and is thereby included in the Build (2022) traffic volumes to be analyzed. The Granby Street Lot is a daily pay-on-entry parking lot open to the public and does not accept University parking permits. It is typically used by Boston University visitors during the day and is also available during Red Sox events. The University can utilize its parking website to provide directions to visitors to use another lot, such as the Kenmore Lot near Deerfield Street.

Redistribution of Traffic Related to the Granby Street Two-way Conversion

As described previously, Granby Street is proposed to be converted to a two-way street as an associated public realm improvement with the Project. A redistribution of traffic was assumed to occur as a result of this improvement, which is anticipated to affect the distribution of traffic using two adjacent parallel roadways (Silber Way and Granby Street) to travel between Bay State Road and Commonwealth Avenue. It should be noted that left turns will be prohibited at all times from Commonwealth Avenue eastbound to the proposed Granby Street northbound travel lane and therefore no traffic will be distributed to this prohibited movement.

Future traffic unrelated to the Project was assumed to shift from Silber Way northbound to Granby Street northbound. Specifically, 50 percent of the northbound left-turn volume at Silber Way and Bay State Road was assumed to be rerouted to Granby Street northbound via Commonwealth Avenue westbound. Given the one-way westbound configuration of Bay State Road and limited potential destinations along Granby Street to the north of Bay State Road, the latent traffic demand for the proposed northbound Granby Street is expected to be low.

The proposed reduction of travel lanes on Granby Street southbound from two turning lanes to a single shared lane is expected to shift southbound traffic from Granby Street to Silber Way, where there is under-utilized traffic signal capacity. To account for this expected change in travel patterns, 30 percent of future southbound traffic on Granby Street is assumed to redistribute to Silber Way southbound (15 percent), and Commonwealth Avenue westbound (15 percent). The justification for this redistribution is two-fold:

- 1) Existing PM peak hour traffic data indicates that a large portion of traffic on Granby Street is originating from the east along Bay State Road (219 vehicles/hour) rather than from the west (56 vehicles/hour). Given the surrounding roadway network and limited sources for this relatively large portion of traffic, it follows that

the majority of this traffic is cut-through traffic bypassing Commonwealth Avenue westbound coming from the intersection of Bay State/Charlesgate West/Beacon Street. The recent elimination of the slip lane onto Bay State Road from Charlesgate West discourages this cut-through behavior and thereby is expected to result in a redistribution of traffic from Bay State Road westbound and Granby Street southbound to Commonwealth Avenue westbound.

2) Southbound traffic on Granby Street originating from the east has the opportunity to easily shift to Silber Way, where there is under-utilized signal capacity. Currently, the appeal of using Granby Street over Silber Way is due to the extra turn lane provided at Granby Street, which is particularly advantageous for the aforementioned cut-through traffic seeking to return to Commonwealth Avenue westbound. Since the proposed design of Granby Street eliminates this, it is reasonable to assume that traffic will seek the shortest/quickest route, and traffic volumes and delays are expected to be more evenly distributed between the two roads.

5.4.9 BUILD (2022) CONDITION TRAFFIC VOLUMES

The Build (2022) traffic volumes were developed by estimating Project-generated traffic volumes, distributing these volumes, and assigning them to the Study Area roadways. The Build (2022) traffic volume networks were developed by adding the No-Build (2022) traffic volumes, the net new traffic volumes expected to be generated by the Project, and the other Project-related traffic redistributions described in Section 5.4.8.

See Figure 5-18, Build (2022) Conditions at AM Peak Hour Vehicle Volume; and Figure 5-19, Build (2022) Conditions at PM Peak Hour Vehicle Volume.

5.4.10 BUILD (2022) CONDITION TRAFFIC OPERATIONS ANALYSIS

Tables 5-8 and 5-9 provide a summary of the future Build (2022) traffic operations analysis at the Study Area intersections. No significant changes are observed for overall intersection operations from the No-Build (2022) Condition to the Build (2022) Condition, and all study intersections remain at acceptable overall levels of service (LOS C or better). Consistent with the Existing (2018) Condition and No-Build (2022) Condition, some minor-street turning movements experience higher levels of delay at signalized intersections, but do not exceed LOS E. Additionally, left turns from Commonwealth Avenue remain LOS D and LOS E. The single LOS F movement at the stop-controlled approach of Hinsdale Mall at Commonwealth Avenue also occurs in the Existing (2018) Condition.

Table 5-8: Intersection Level of Service Comparison – Weekday AM Peak Hour

Intersection	Existing (2018) AM Peak Hour					No-Build (2022) AM Peak Hour					Build (2022) AM Peak Hour				
	LOS	Delay (s)	V/C	50% Queue Length (ft)	95% Queue Length (ft)	LOS	Delay (s)	V/C	50% Queue Length (ft)	95% Queue Length (ft)	LOS	Delay (s)	V/C	50% Queue Length (ft)	95% Queue Length (ft)
<i>Signalized Intersections</i>															
St Mary's St @ Commonwealth Ave	B	11.9	0.51			B	12.0	0.52			B	14.1	0.60		
Commonwealth Ave EB Thru	A	3.5	0.31	62	97	A	3.7	0.33	68	107	A	4.7	0.36	80	124
Commonwealth Ave WB Left	D	50.0	0.51	64	86	D	50.0	0.52	65	88	D	51.5	0.60	85	109
Commonwealth Ave WB Thru	B	16.9	0.31	115	202	B	17.4	0.32	124	207	B	19.5	0.34	138	216
Cummington Mall* @ Commonwealth Ave	B	17.4	0.66			B	17.8	0.66			B	18.7	0.67		
Commonwealth Ave EB Left	E	55.0	0.66	98	159	D	54.4	0.66	101	163	D	54.0	0.67	102	167
Commonwealth Ave EB Thru	B	13.6	0.27	89	194	B	14.7	0.29	105	216	B	16.6	0.31	130	234
Commonwealth Ave WB Thru	A	9.1	0.25	77	115	A	9.3	0.25	80	117	A	9.5	0.27	86	124
Cummington Mall* NB Left	E	55.8	0.26	17	34	E	55.8	0.26	17	34	E	56.8	0.31	21	39
Cummington Mall* NB Right	A	0.6	0.05	0	0	A	0.6	0.05	0	0	A	0.6	0.05	0	0
Granby St @ Commonwealth Ave	A	5.9	0.36			A	6.3	0.40			A	5.2	0.48		
Commonwealth Ave EB Thru	A	3.1	0.21	36	60	A	3.3	0.22	41	69	A	3.3	0.24	41	74
Commonwealth Ave WB Thru	A	2.7	0.17	27	46	A	2.9	0.18	28	49	A	2.9	0.22	32	58
Granby St SB Left [Left/Right]	D	49.1	0.36	32	51	D	49.7	0.40	37	57	C	32.5	0.48	28	49
Granby St SB Right [Removed]	B	15.8	0.36	0	23	B	15.3	0.35	0	23	-	-	-	-	-
Silber Way @ Commonwealth Ave	A	1.9	0.26			A	1.9	0.26			A	3.9	0.43		
Commonwealth Ave EB Thru	A	1.8	0.19	34	45	A	1.9	0.20	36	49	A	2.6	0.21	36	63
Commonwealth Ave WB Thru	A	1.9	0.26	36	45	A	2.0	0.26	38	47	A	2.9	0.28	43	67
Silber Way SB Left/Thru/Right	A	1.2	0.14	0	0	A	1.3	0.14	0	0	C	31.0	0.43	8	46
<i>Unsignalized Intersections</i>															
Hinsdale Mall* @ Commonwealth Ave	A	0.1				A	0.1				A	0.1			
Hinsdale Mall* NB Right	B	14.7	0.02	N/A	0	C	15.1	0.02	N/A	0	C	15.5	0.03	N/A	3
Granby St/Back St @ Bay State Rd*	B	10.3				B	10.6				A	7.9			
[Granby St NB]	-	-	-	-	-	-	-	-	-	-	A	7.7	0.04	N/A	3
Bay State Rd EB*	A	9.2	0.02	N/A	2	A	9.2	0.02	N/A	3	A	6.6	0.02	N/A	0
[Granby St SB]	-	-	-	-	-	-	-	-	-	-	A	7.2	0.01	N/A	0
Bay State Rd WB	B	10.6	0.26	N/A	25	B	10.9	0.29	N/A	30	A	8.1	0.19	N/A	18
Silber Way @ Bay State Rd	A	8.4				A	8.6				A	8.4			
Silber Way NB Left/Thru/Right	A	8.2	0.12	N/A	10	A	8.3	0.13	N/A	13	A	8.0	0.09	N/A	8
Silber Way SB Left/Thru/Right	A	7.5	0.02	N/A	3	A	7.6	0.02	N/A	3	A	7.5	0.02	N/A	3
Bay State Rd WB Left/Thru	A	8.6	0.25	N/A	25	A	8.8	0.27	N/A	28	A	8.6	0.25	N/A	25

Notes:

1. Synchro version 9.2.914.6 was used to calculate results.
2. Signalized intersection results are based on the Lanes, Volumes, and Timings report from Synchro.
3. Unsignalized intersection results are based on the HCM 2010 reports.
4. Queue lengths for unsignalized intersections are based on a 25' vehicle length.

Symbols:

- N/A - Results not reported or available.
- [XXXX] - Movement is only available in the build condition.
- * denotes Boston University owned roadway. Bay State is Boston University owned west of Granby Street.
- # - 95th percentile volume exceeds capacity, queue may be longer.
- m - Volume for the 95th percentile queue is metered by upstream signal.

Table 5-9: Intersection Level of Service Comparison – Weekday PM Peak Hour

Intersection	Existing (2018) PM Peak Hour					No-Build (2022) PM Peak Hour					Build (2022) PM Peak Hour				
	LOS	Delay (s)	V/C	50% Queue Length (ft)	95% Queue Length (ft)	LOS	Delay (s)	V/C	50% Queue Length (ft)	95% Queue Length (ft)	LOS	Delay (s)	V/C	50% Queue Length (ft)	95% Queue Length (ft)
<i>Signalized Intersections</i>															
St Mary's St @ Commonwealth Ave	B	18.3	0.75			B	18.8	0.76			C	20.0	0.78		
Commonwealth Ave EB Thru	A	7.7	0.44	125	164	A	8	0.45	132	171	A	8.4	0.46	141	176
Commonwealth Ave WB Left	D	48.6	0.75	99	147	D	49.6	0.76	105	160	E	58.9	0.78	135	255
Commonwealth Ave WB Thru	C	21.5	0.54	262	335	C	22	0.56	275	352	C	21.8	0.59	298	368
Cummington Mall* @ Commonwealth Ave	B	13.8	0.68			B	14.6	0.71			B	15.6	0.74		
Commonwealth Ave EB Left	E	63.3	0.68	78	#150	E	65	0.71	80	#159	E	68.6	0.74	84	m#167
Commonwealth Ave EB Thru	B	10.6	0.45	139	165	B	11.1	0.46	145	171	B	12.4	0.51	160	180
Commonwealth Ave WB Thru	A	7.1	0.43	67	98	A	7.3	0.45	71	102	A	6.4	0.48	89	93
Cummington Mall* NB Left	E	61.7	0.54	52	83	E	63.8	0.6	62	96	E	66.2	0.66	73	110
Cummington Mall* NB Right	A	1	0.09	0	0	A	0.9	0.09	0	0	A	0.8	0.08	0	0
Granby St @ Commonwealth Ave	A	6.8	0.61			A	7	0.63			A	9.7	0.80		
Commonwealth Ave EB Thru	A	0.6	0.34	1	1	A	0.6	0.35	1	1	A	0.6	0.39	1	2
Commonwealth Ave WB Thru	A	4.2	0.3	94	107	A	4.5	0.3	101	114	A	7.6	0.42	176	261
Granby St SB Left [Left/Right]	E	58.5	0.61	79	131	E	58.5	0.63	85	141	D	54.0	0.80	131	202
Granby St SB Right [Removed]	B	12.9	0.57	0	61	B	12.5	0.58	0	62	-	-	-	-	-
Silber Way @ Commonwealth Ave	A	5.5	0.61			A	5.8	0.63			B	11.9	0.81		
Commonwealth Ave EB Thru	A	3.2	0.31	69	142	A	3.3	0.33	79	162	A	7.3	0.37	146	172
Commonwealth Ave WB Thru	A	4.3	0.35	64	130	A	4.5	0.36	68	137	A	8.2	0.41	113	201
Silber Way SB Left/Thru/Right	D	38.6	0.61	22	71	D	40.7	0.63	26	76	E	60.2	0.81	76	139
<i>Unsignalized Intersections</i>															
Hinsdale Mall* @ Commonwealth Ave	A	2.5				A	2.6				A	3.7			
Hinsdale Mall* NB Right	F	57.5	0.54	N/A	68	F	60	0.56	N/A	70	F	74.6	0.69	N/A	98
Granby St/Back St @ Bay State Rd*	C	15				C	15.8				A	8.1			
[Granby St NB]	-	-	-	-	-	-	-	-	-	-	A	8.2	0.08	N/A	8
Bay State Rd EB*	B	11.2	0.12	N/A	10	B	11.3	0.12	N/A	10	A	7.1	0.08	N/A	8
[Granby St SB]	-	-	-	-	-	-	-	-	-	-	A	7.7	0.02	N/A	3
Bay State Rd WB	C	16.7	0.53	N/A	78	C	17.6	0.56	N/A	88	A	8.5	0.24	N/A	23
Silber Way @ Bay State Rd	B	10.1				B	10.4				A	9.6			
Silber Way NB Left/Thru/Right	A	9.1	0.19	N/A	18	A	9.3	0.21	N/A	20	A	8.6	0.13	N/A	13
Silber Way SB Left/Thru/Right	B	10.7	0.43	N/A	55	B	11.1	0.46	N/A	60	A	7.8	0.05	N/A	5
Bay State Rd WB Left/Thru	A	7.9	0.05	N/A	5	A	8	0.05	N/A	5	B	10.1	0.39	N/A	48

Notes:

1. Synchro version 9.2.914.6 was used to calculate results.
2. Signalized intersection results are based on the Lanes, Volumes, and Timings report from Synchro.
3. Unsignalized intersection results are based on the HCM 2010 reports.
4. Queue lengths for unsignalized intersections are based on a 25' vehicle length.

Symbols:

- N/A - Results not reported or available.
- [XXXX] - Movement is only available in the build condition.
- * denotes Boston University owned roadway. Bay State is Boston University owned west of Granby Street.
- # - 95th percentile volume exceeds capacity, queue may be longer.
- m - Volume for the 95th percentile queue is metered by upstream signal.

5.5 GRANBY STREET IMPROVEMENTS

As an associated public realm improvement, Granby Street is proposed to be reconfigured to accommodate a two-way, two-lane roadway with bike lanes in both directions. The proposed reconfiguration will remove 21 on-street metered parking spaces along Granby Street between Commonwealth Avenue and Bay State Road. As part of this reconfiguration, Granby Street is proposed to be narrowed from the existing 40-foot roadway width to 34 feet curb-to-curb, in conjunction with a widening of the eastern sidewalk of Granby Street. Vehicular travel lanes are proposed to be narrowed from 12 feet to 11 feet. The existing 8-foot parking lanes on either side of Granby Street will be replaced by 6-foot curbside-running bike lanes with no on-street parking provided. A new northbound travel lane will be provided and will be accessible via westbound right turn from Commonwealth Avenue. The eastbound left turn from Commonwealth Avenue will remain prohibited at all times with the proposed reconfiguration of Granby Street. As a result, no changes to the traffic signal operations are required for the signalized intersection of Granby Street and Commonwealth Avenue to accommodate the new northbound access.

The existing two lanes of southbound traffic on Granby Street (one left-turn lane, one right-turn lane) will be reduced to a single shared left/right-turn lane. A redistribution of traffic is expected to occur as a result of this improvement and is described in detail under Section 5.4.8. As described previously, the normalization of traffic patterns is anticipated to result in the shift of southbound traffic from Granby Street to Silber Way, where there is currently under-utilized traffic signal capacity.

The Proponent will continue to work closely with the BTM to develop this associated public realm improvement.

5.6 BAY STATE ROAD BIKE LANE IMPROVEMENTS

Bay State Road is proposed by the City of Boston to be reconfigured to provide two-way bike operations through creation of an eastbound contra-flow bike lane, while maintaining the existing one-way westbound vehicular operations. The Proponent is currently coordinating with the BTM to develop this project, which will improve bicycle safety and connectivity throughout this area of the campus. The proposed two-way Granby Street with curbside bike lanes will connect with and complement the planned bicycle improvements on Bay State Road.

5.7 TRANSPORTATION MITIGATION MEASURES

As described in Section 5.4 Build (2022) Condition, no traffic-related impacts are associated with the Project. The Project will displace approximately 35 existing University parking spaces reserved for University Parking Permit holders located in the laneway north of the Site. In addition, 126 off-street public spaces in the Granby Lot and 21 on-street metered

parking spaces along Granby Street between Commonwealth Avenue and Bay State Road will be removed. Granby Street is proposed to be reconfigured to accommodate a two-way, two-lane roadway with bike lanes in both directions. This would grant direct access to Boston University faculty, staff, students, and visitors bound to the Boston University Admissions Office from Commonwealth Avenue via Granby Street rather than Silber Way and Bay State Road. This would reduce the traffic volume on Bay Street Road between Silber Way and Granby Street.

To accommodate the reduction in parking supply, Boston University has a proven and robust TDM program that has effectively reduced parking demand on campus. From November 2015 to February 2018 alone, Boston University documented a 10 percent reduction in occupancy rates for parking facilities campus-wide. As of 2018, an average of 693 spaces remain unoccupied during peak weekday activity and is sufficient to offset the parking supply displaced by the Project. As the University continues to expand its TDM program, parking demand on campus is expected to continue to fall. The following section describes the current and planned TDM program elements.

5.7.1 TRANSPORTATION DEMAND MANAGEMENT

Boston University's Parking and Transportation Services office has established a set of initiatives with the goal of reducing the number of vehicles on campus and increasing the use of sustainable modes of travel. Reducing drive-alone vehicle demand is an essential component of the University's TDM program, and faculty, students, and staff are encouraged to pursue alternatives to driving alone. The University's TDM program includes the following components:

Commuter Choices

The University's TDM program includes a wide variety of commuter options as summarized below:

- **Ride Matching Program:** The University partners with Bay State Commute to assist employees seeking a carpool partner.
- **Carpool Parking Permit:** Employees who must drive are offered a number of incentives to carpool: discounted parking, dedicated parking spaces, discounted daily parking passes, gas cards, and eligibility for the guaranteed ride home program. Carpool parking permits must be purchased at the Parking & Transportation Services office and all members of the carpool are required to be present at the time of purchase.
- **MBTA Pass Program:** University employees can purchase MBTA monthly passes through payroll deduction on a pre-tax basis. All regular faculty and staff can purchase subsidized MBTA passes (35 percent subsidy for bus, subway and

commuter rail zone 1A and 50 percent subsidy for boat and commuter rail zones 1-10). Up to \$265 per month is tax exempt.

- **Student MBTA Semester Pass:** University students can purchase Semester MBTA Passes during the fall and spring semesters through the Parking & Transportation Services Office via the University website. The semester pass is good for four months and provides an 11 percent discount.
- **Boston University Shuttle (BUS):** The University provides a free shuttle bus service for faculty, staff, and students that connects the Charles River Campus with the BU Medical Campus. It operates at high frequency during weekday peak hours and provides late-night service 7 days a week.
- **Bicycle Facilities:** The University has installed a significant number of bicycle storage racks or bicycle rooms throughout the Campus to make bicycle travel convenient for users. All institutional projects will provide an appropriate amount of bicycle storage. The location of bike racks on campus can be found using the online Boston University Maps.
- **Bike Commuter Reimbursement Benefit:** The University rewards those who commute by bike with reimbursement for bike-related expenses. Employees whose commute involve a bicycle are eligible for \$25 reimbursement for each month in which they held neither a BU parking permit nor subsidized transit pass.
- **Bicycle Safety:** The University's Parking & Transportation Services Office oversees the Bike Safety programs including helmet and light distribution, bicycle registration, bike parking management, education initiatives, and encouragement events as well as enforcement of:
 - **Cycling rules and regulations on campus:** Students are encouraged to register their bicycles with the Office.
- **Discounted BLUEbikes Memberships:** The University provides BLUEbikes memberships to faculty, staff and students in the Charles River Campus at a discounted annual rate of \$52.50 compared to the regular annual rate of \$99.
- **Guaranteed Ride Home:** The Guaranteed Ride Home (GRH) program sponsored by Boston University and provided by the Allston Brighton Transportation Management Association is available to Boston University employees. The GRH program provides six free taxi rides, Lyft or Uber home per year for unexpected situations.

- **Workout to Work:** The University has also implemented Workout to Work program for employees who incorporate walking and running into their commute. Commuters can earn rewards from Allston Brighton TMS by participating in Workout to Work and are also eligible to use the GRH program.
- **Zipcar:** Zipcar's University program provides discounted Zipcar membership to Boston University students, faculties, staff, and alumni. There are multiple Zipcar locations in the Charles River Campus and surrounding areas.
- **Electric Vehicle Charging Stations:** The University has electric vehicle charging stations located across the Charles River Campus. The cost of charging a vehicle is \$0.25 per hour for up to four hours, after which the cost increases to \$0.50 per hour.

Parking Management

The University has various parking management measures to discourage vehicle trips to the University as described below.

- **Parking Fees:** The University charges fees for all parking permits issued to faculty, staff, and students. Campus parking rates reflect the true cost of parking and are nearly market-rate for all users (including faculty, staff, and students). Accurate pricing discourages unnecessary vehicle trips.
- **Limit Student Parking:** The University strongly discourages students from bringing their cars onto campus. Freshmen as well as students residing in Allston, Brighton, Brookline, Fenway/Kenmore, Bay Village and Back Bay (nearby neighborhoods with robust public transit options) are not eligible to purchase a parking permit. Additionally, Overnight parking permits are restricted only to students who reside in on campus housing. The University issues a very limited number of student parking permits.
- **Pre-Tax Transit Station Parking:** The University's regular employees who purchase MBTA passes through Boston University are eligible to set aside pre-tax money from their paycheck to pay for their work-related parking costs at MBTA transit stations.
- **Limiting Construction of New Parking Spaces:** Over the course of the last two Master Plans, the University has limited the number of new spaces provided at institutional projects and has constructed new buildings with no parking. The Project will not include new parking spaces and will result in a net loss of 126 spaces at the Charles River Campus and 35 spaces at the private laneway.

Enhanced Strategies

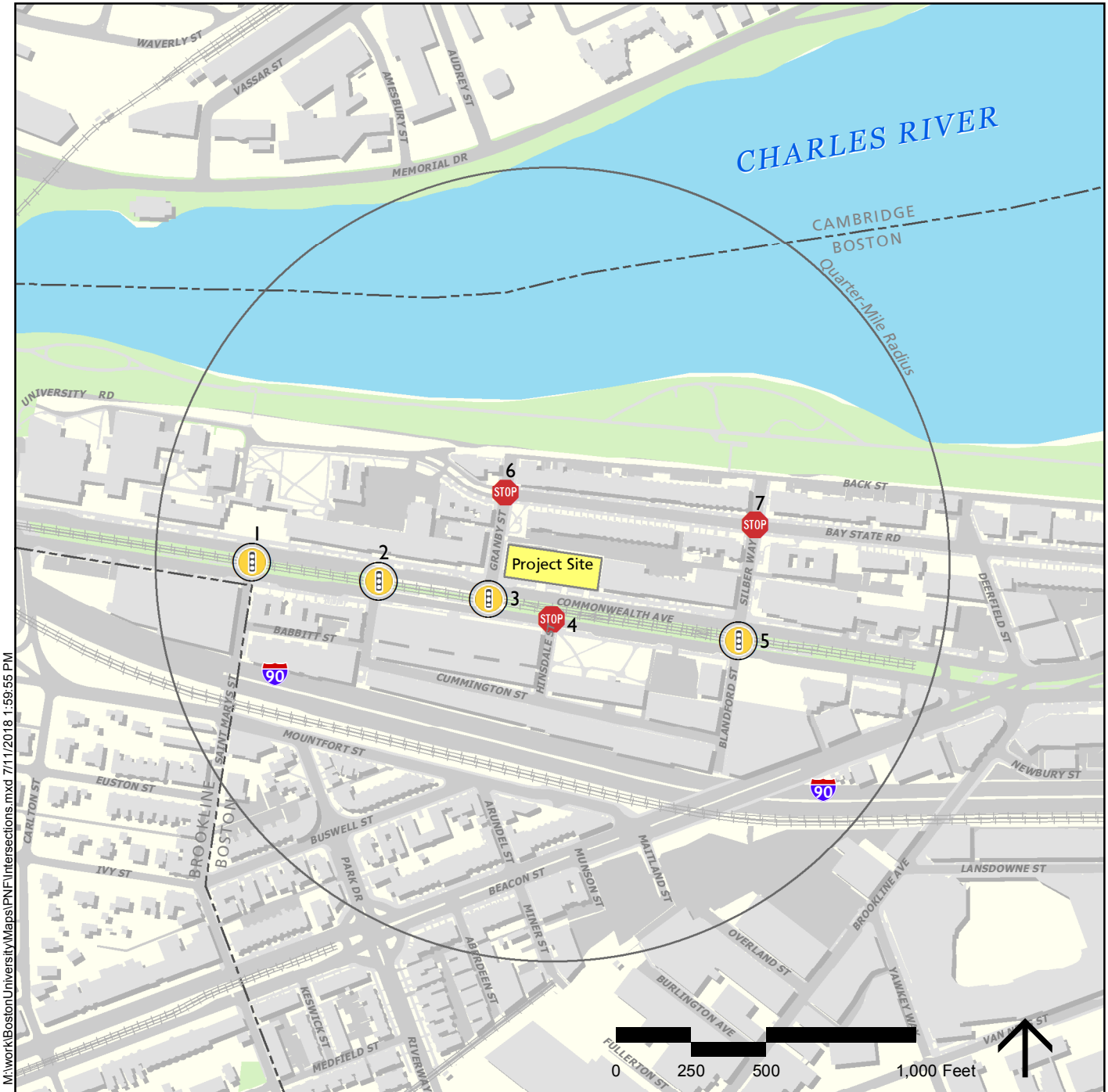
Boston University intends to take the following steps to further improve its TDM program:

- Continue to monitor rates of peer institutions in order to keep Charles River Campus parking permit rate in line with market levels.
- Replace the decades old legacy-based parking technology with a comprehensive, fully integrated Permit Management System and Parking Access and Revenue Control System with zone and dynamic pricing capabilities.
- Continue to study Charles River Campus and Boston University Medical Campus shuttle bus routes and passenger counts to assess potential route and schedule changes.
- Continue the on-going efforts to evaluate and implement the recommendations identified in the recently adopted Boston University Charles River Campus Bicycle Plan.
 - Continue to assess current bike parking inventory, bike parking placement, bike rack styles, end-of-trip facilities and wayfinding (both on and off-campus routes);
 - Continue to evaluate areas of growth in demand for bike parking and potential mode shift expectations, particularly after installation of protected cycle tracks on Commonwealth Avenue;
 - Continue to evaluate short, medium, and long-term bike parking facilities improvements, including areas to install sheltered bike parking and opportunities to expand capacity; and
 - Continue to evaluate potential for BLUEbikes (formerly Hubway) bike share system to serve as part of the solution to the increasing demand on available bike parking.
- Raise awareness of current faculty and staff benefits and continue to introduce new programs



5.8 TRANSPORTATION ACCESS PLAN AGREEMENT

The Proponent is responsible for preparation of the Transportation Access Plan Agreement (TAPA), which is a formal legal agreement between the Proponent and the BTM. The TAPA formalizes the findings of the transportation study, mitigation commitments, elements of access and physical design, transportation demand management measures, traffic impact model, and any other responsibilities that are agreed to by both the Proponent and the BTM.

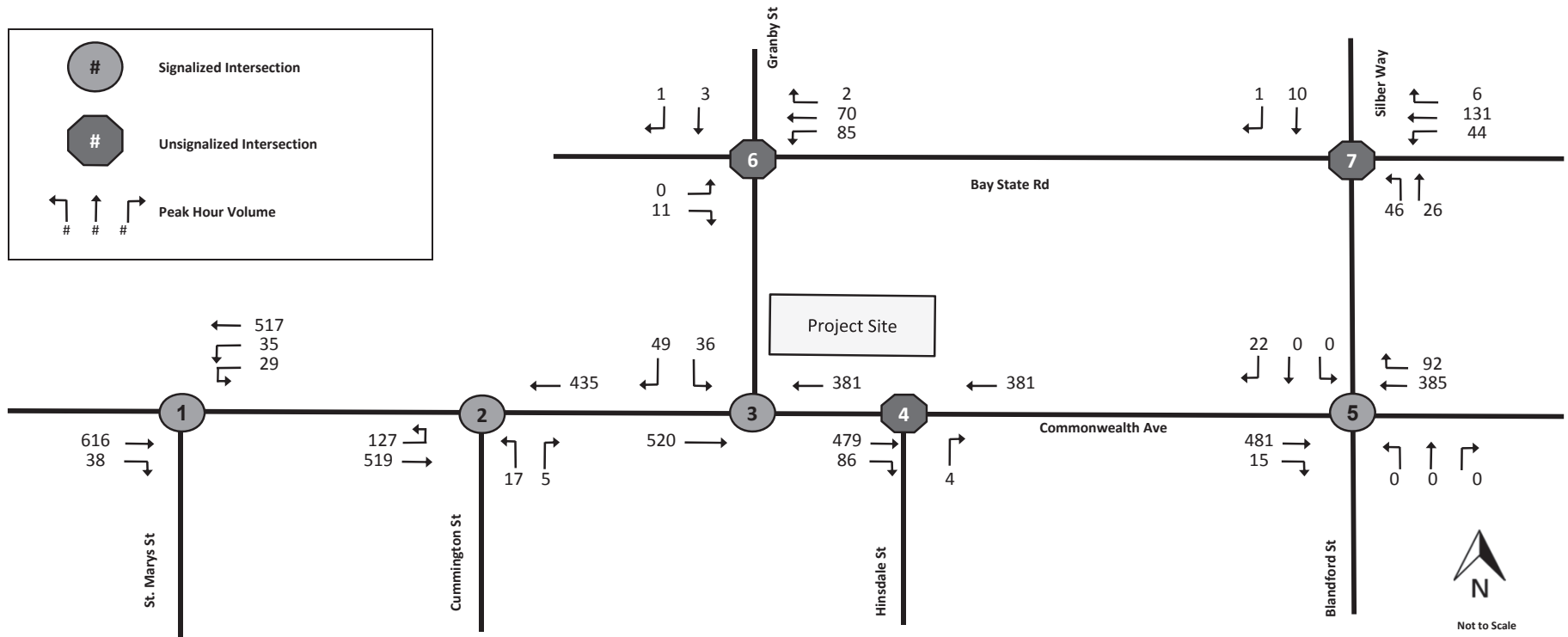
Specific mitigation measures have not been discussed with the City at this time. Upon the City's review of this transportation analysis and assessment of Project impacts, mitigation commitments will be discussed and agreed upon for the Project. A TAPA will be executed for the Project in advance of its building permit issuance.

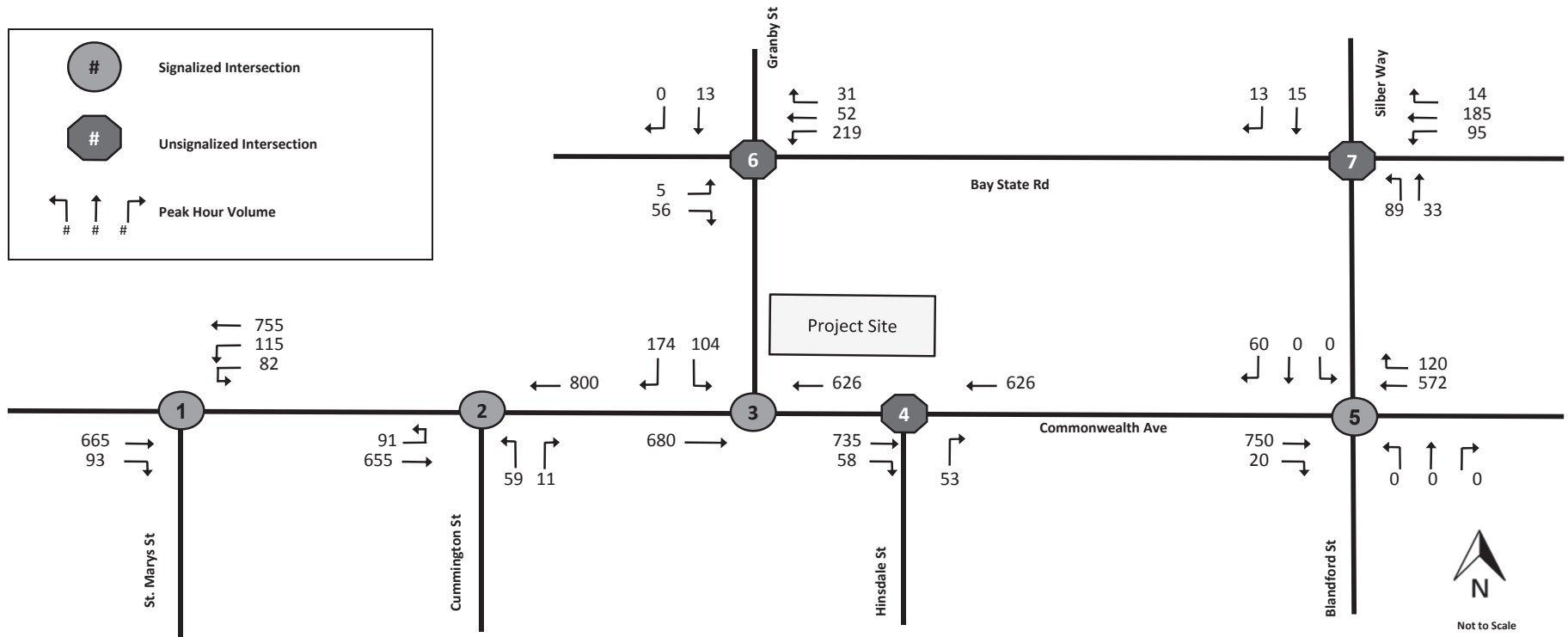


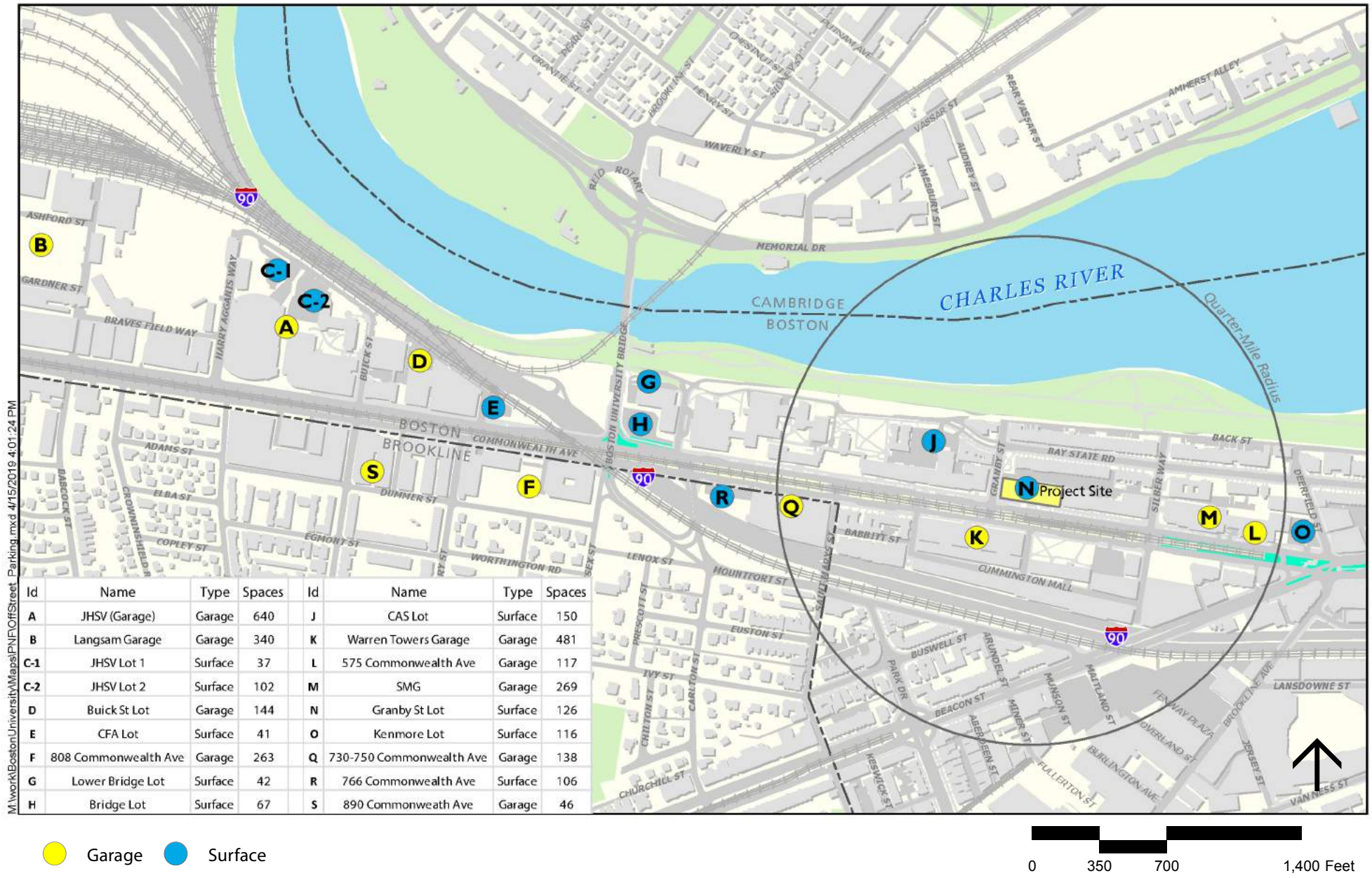
M:\work\Boston\University\Maps\PNFI\Intersections.mxd 7/11/2018 1:59:55 PM

-  Signalized Intersection
-  Unsignalized Intersection

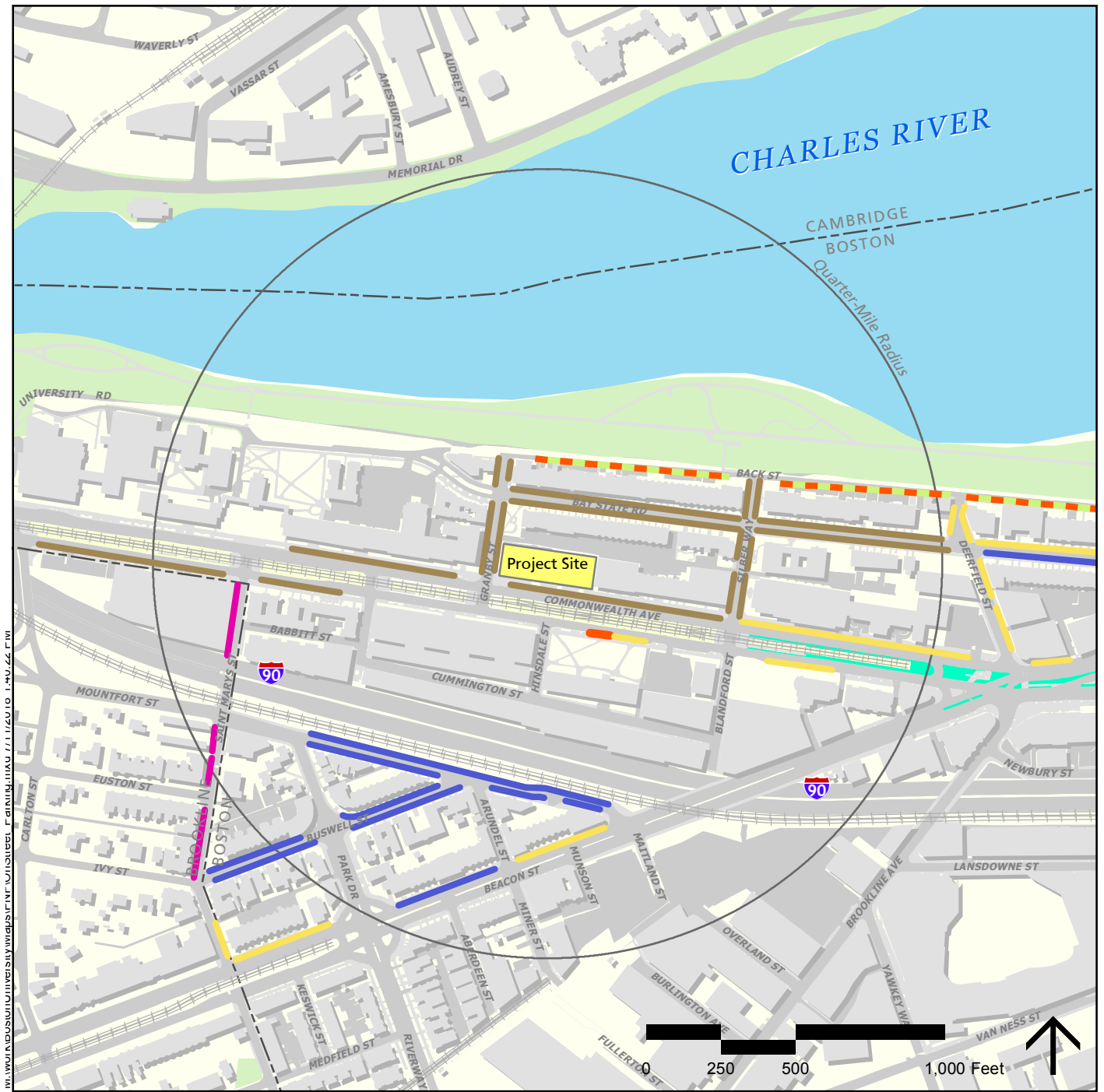
- 1 Commonwealth Ave/St Marys St
- 2 Commonwealth Ave/Cummington Mall
- 3 Commonwealth Ave/Granby St
- 4 Commonwealth Ave/Hinsdale Mall
- 5 Commonwealth Ave/Silber Way/Blandford Mall
- 6 Granby St/Bay State Rd
- 7 Silber Way/Bay State Rd



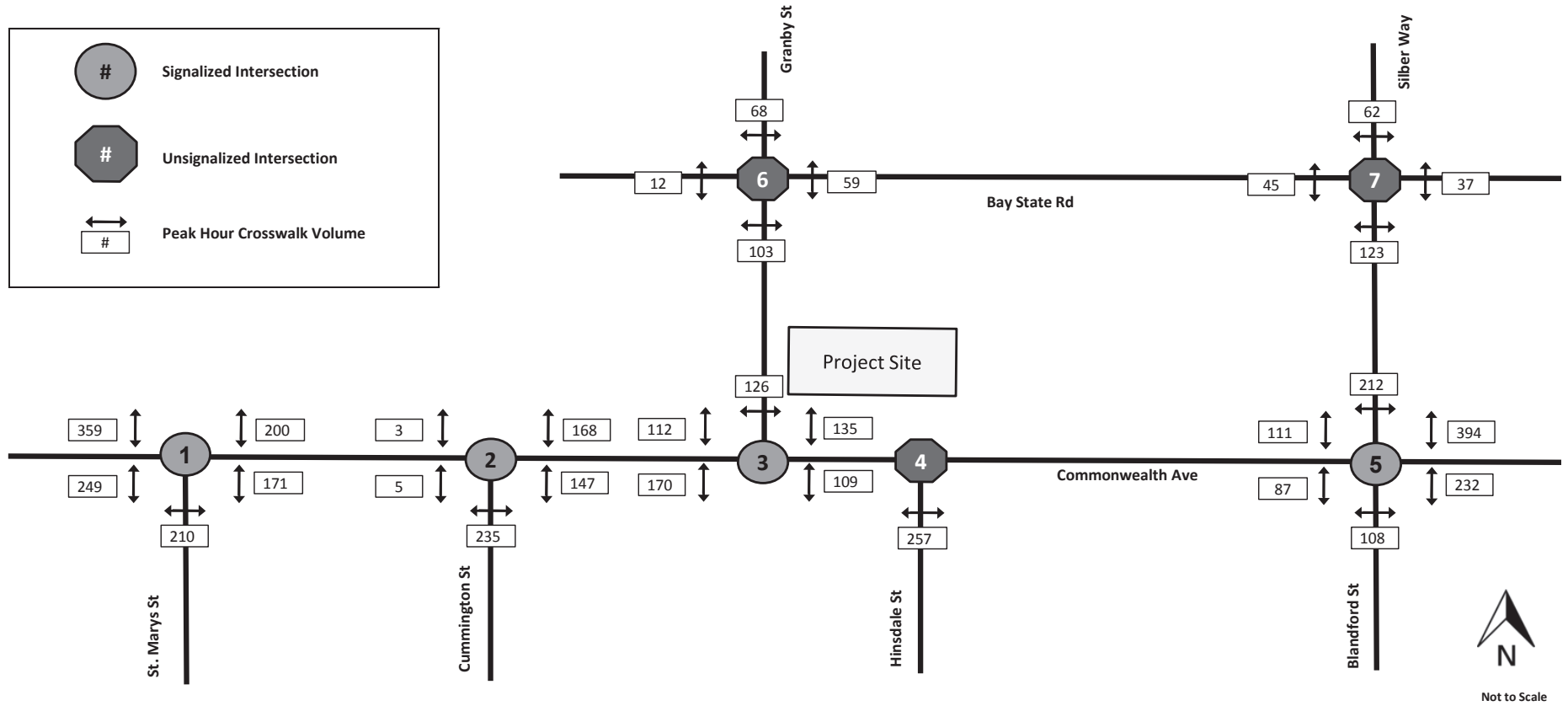


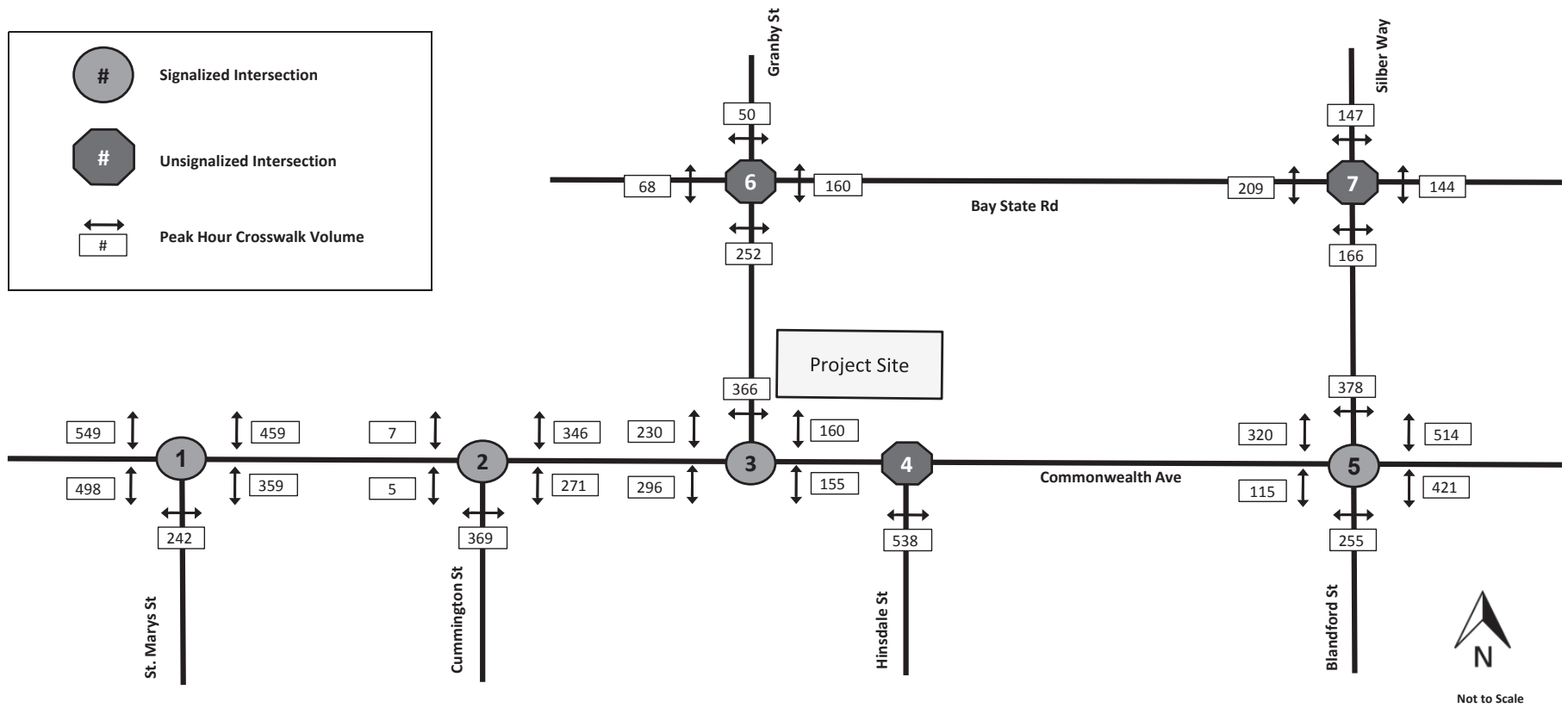


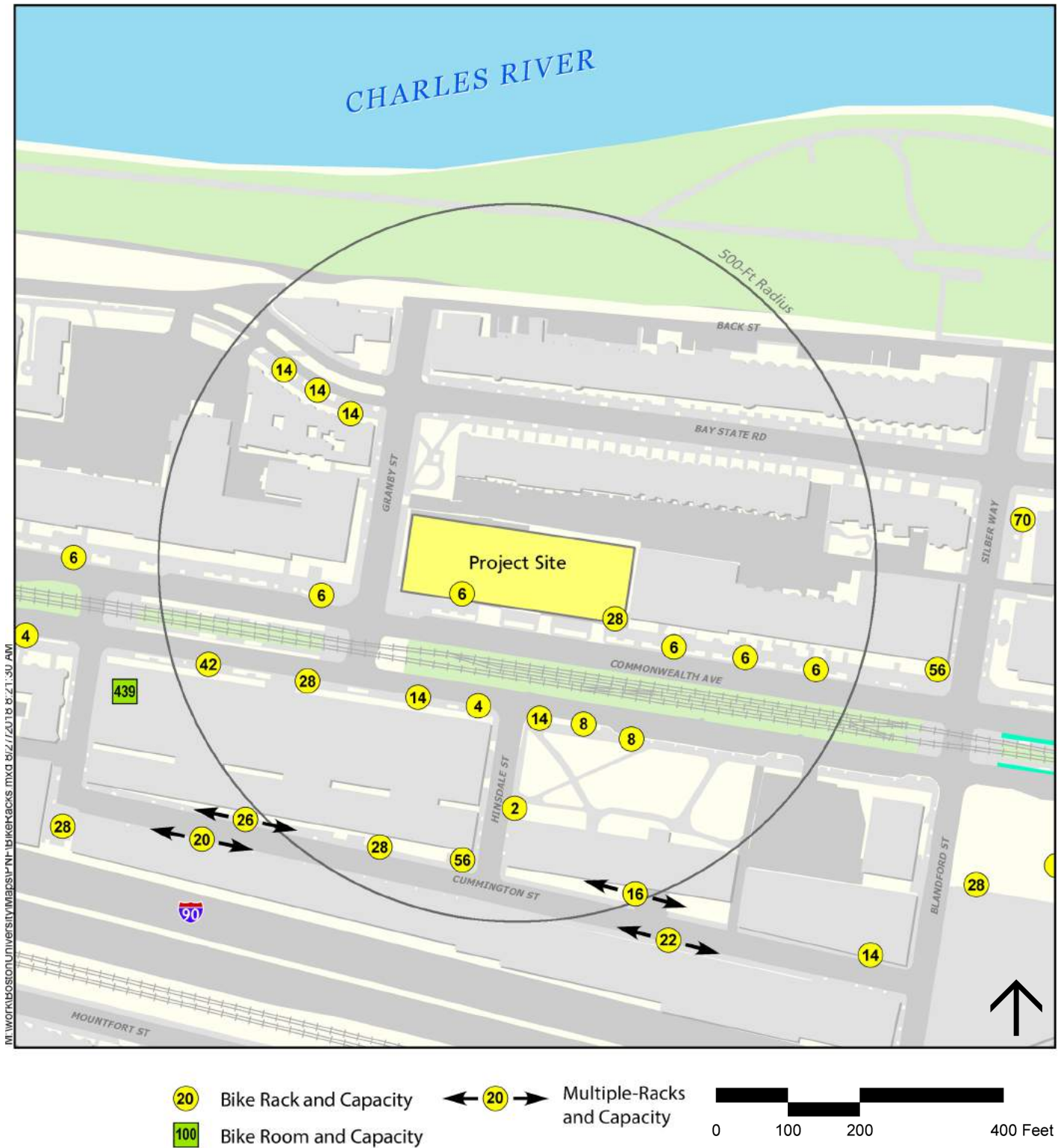
M:\work\Boston\University\Maps\PNF\OffStreet_Parking.mxd 4/15/2019 4:01:24 PM

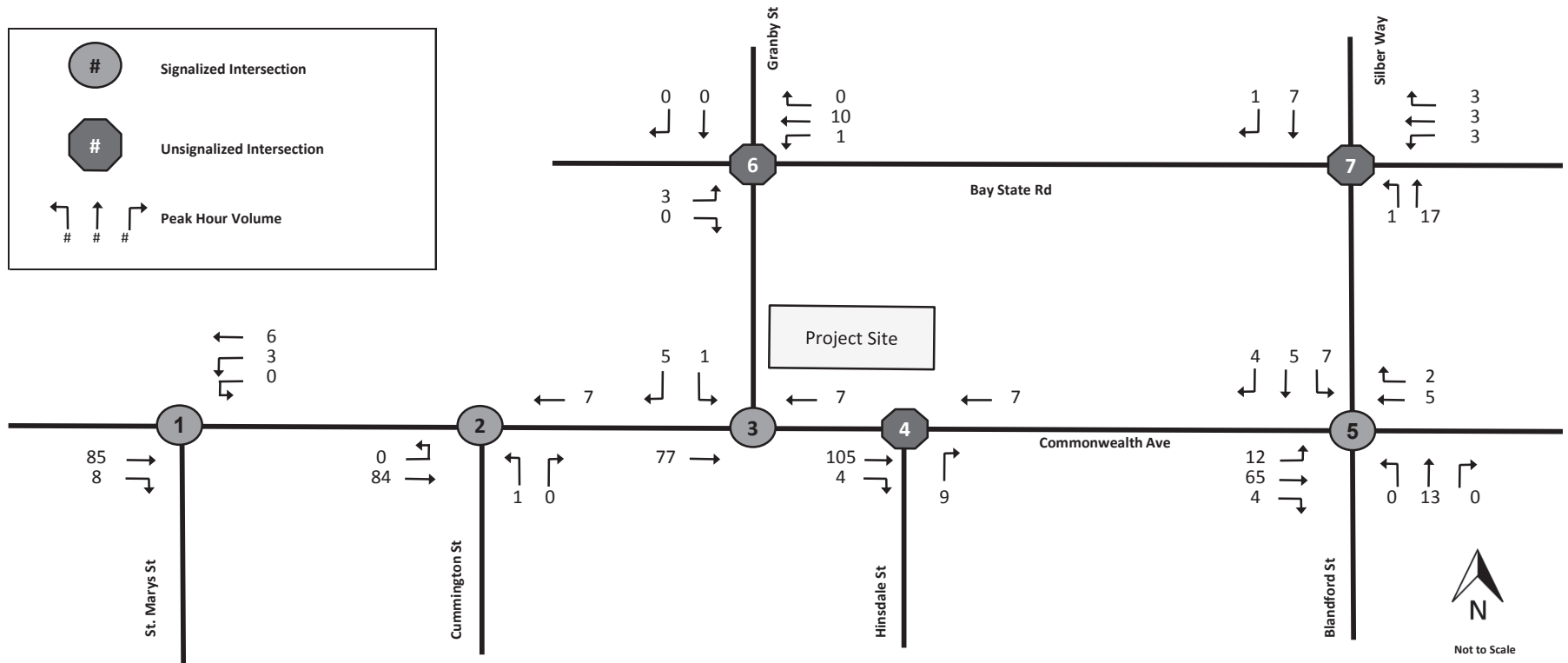


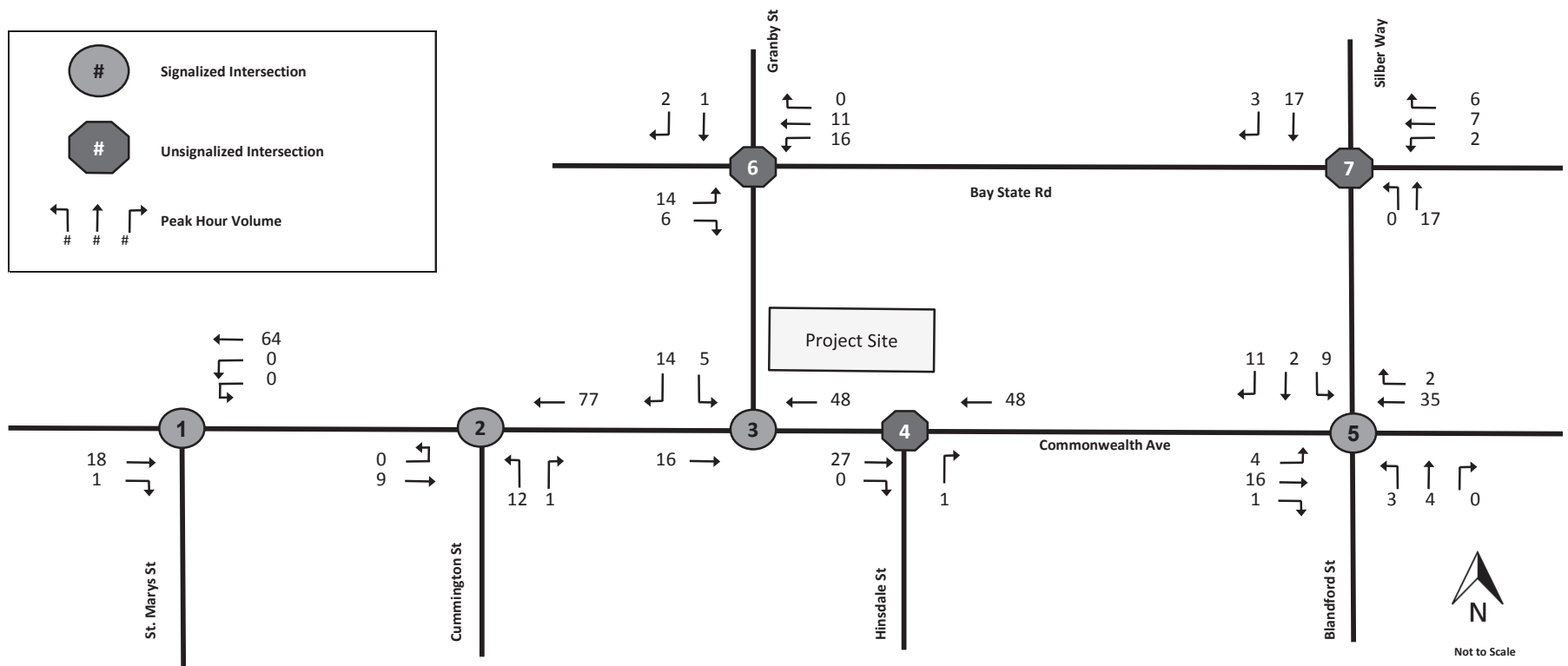
- 2 Hour Meters (8AM - 6 PM M-Sat)
- 3 Hour Meters (3AM- 6PM M-Sat)
- 4 Hour Meters (8AM-6PM M-Sat)
- BU Reserved Parking
- Fenway/Kenmore Resident Parking
- Food Truck Parking
















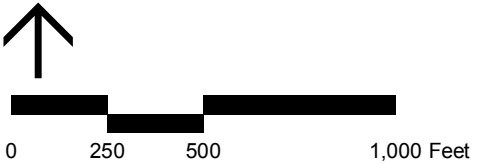


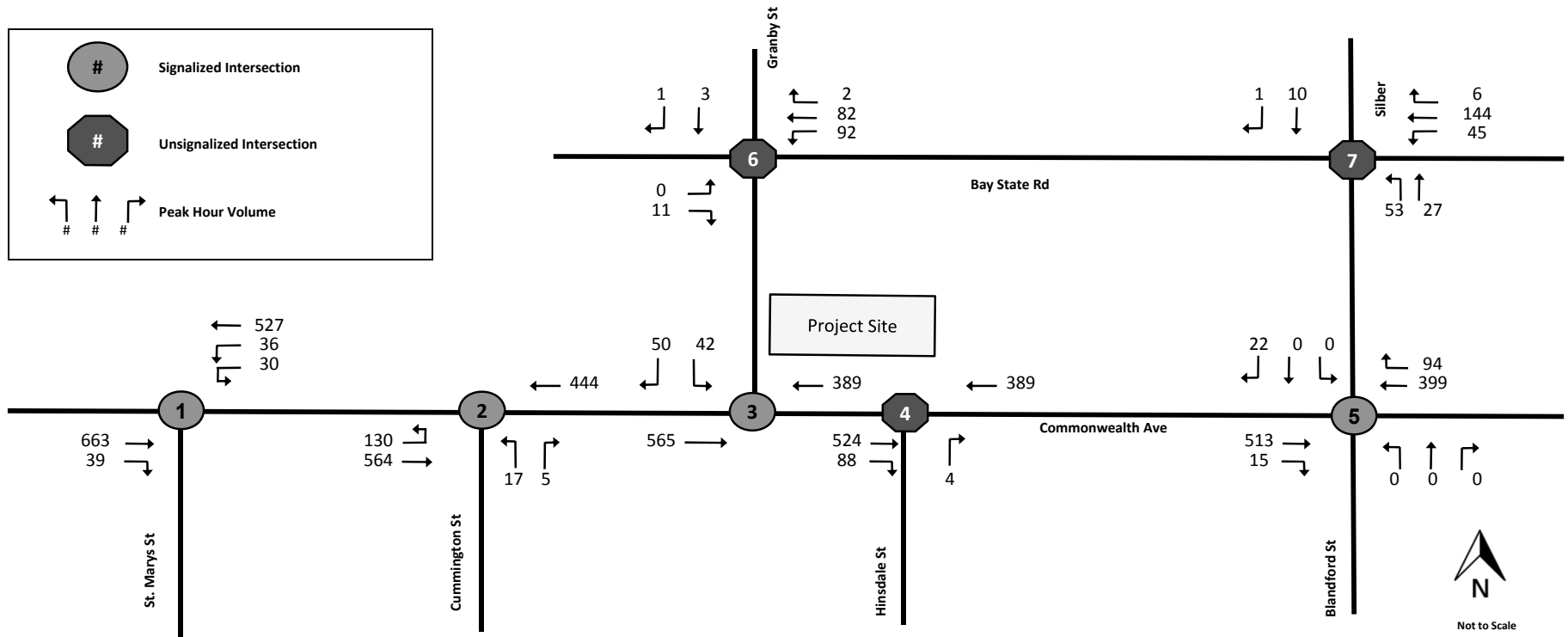


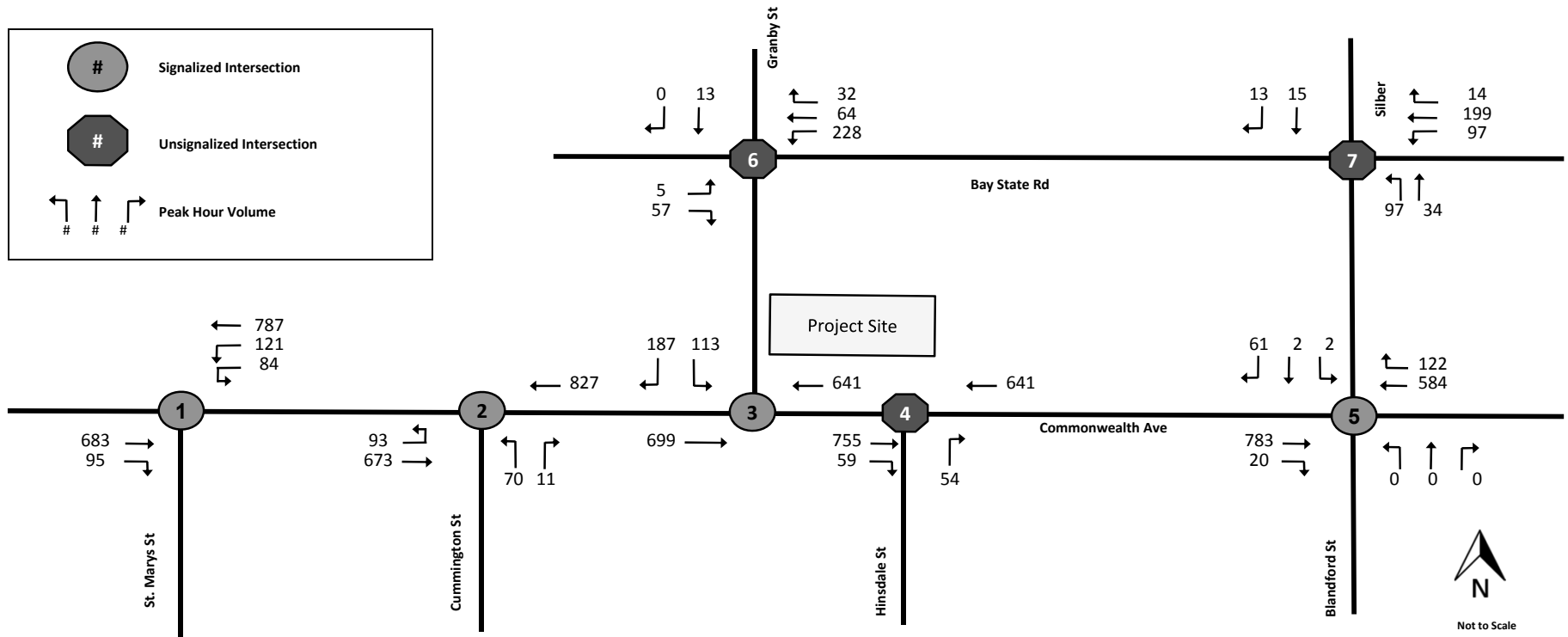


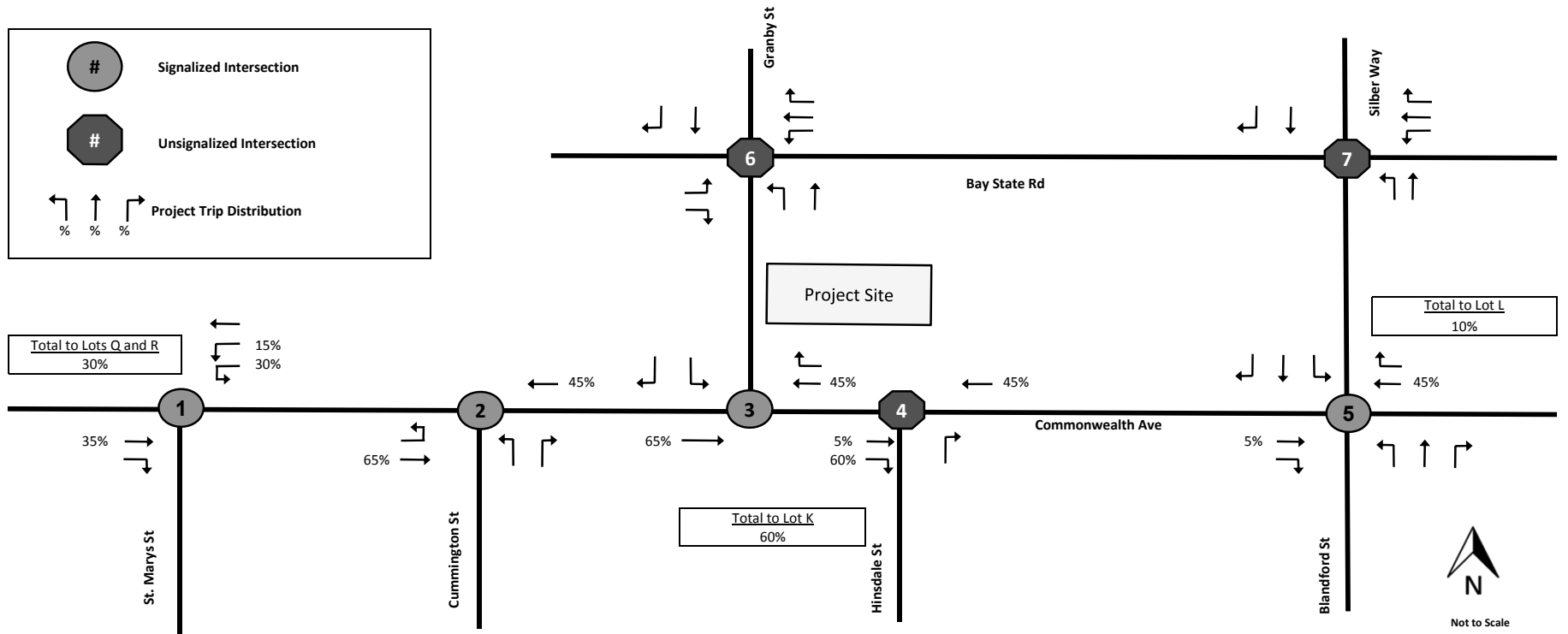
M:\work\Boston\University\Maps\PNF-11_ransit_v2.mxd 9/24/2018 11:12:11 AM

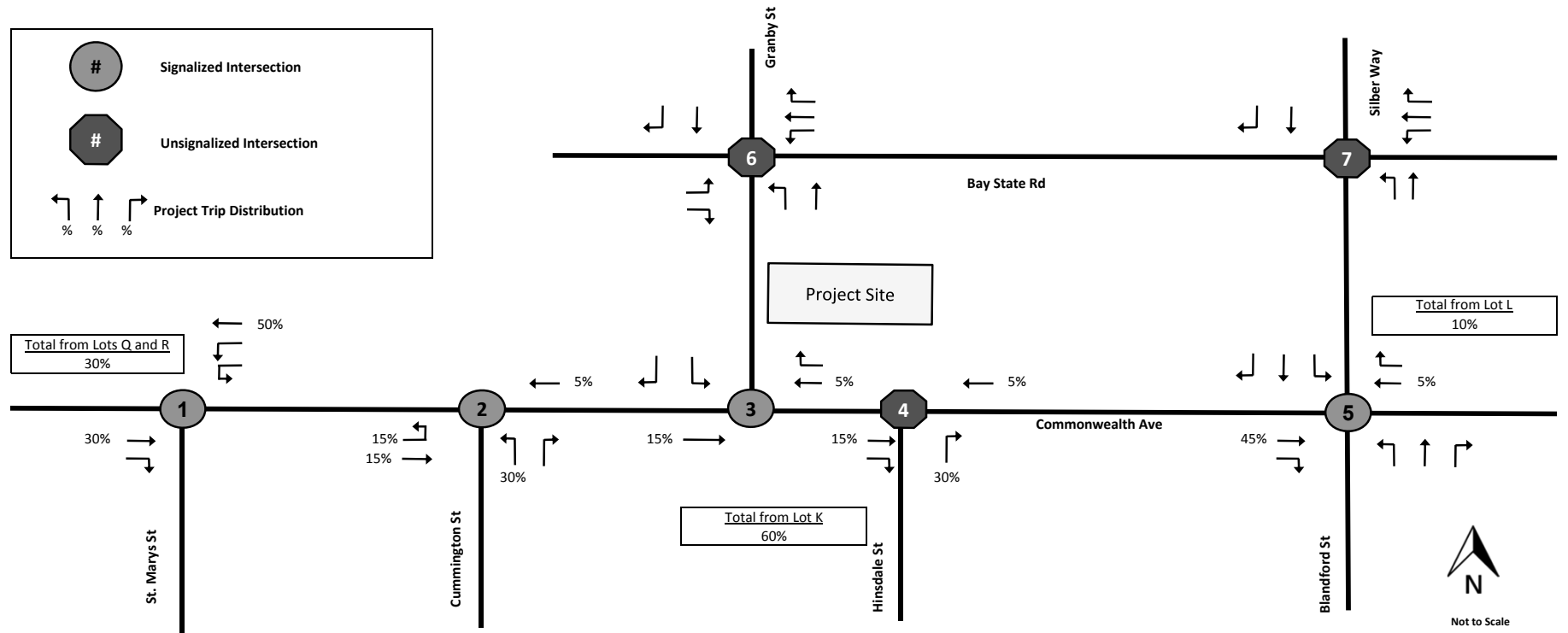
-  Bus Stop
-  BU Shuttle Stop
-  Green Line Stop
-  Commuter Rail Station
-  Zipcar Location
-  BLUEBikes Locations
-  Green Line
-  MBTA Bus Route
-  BU Shuttle Route

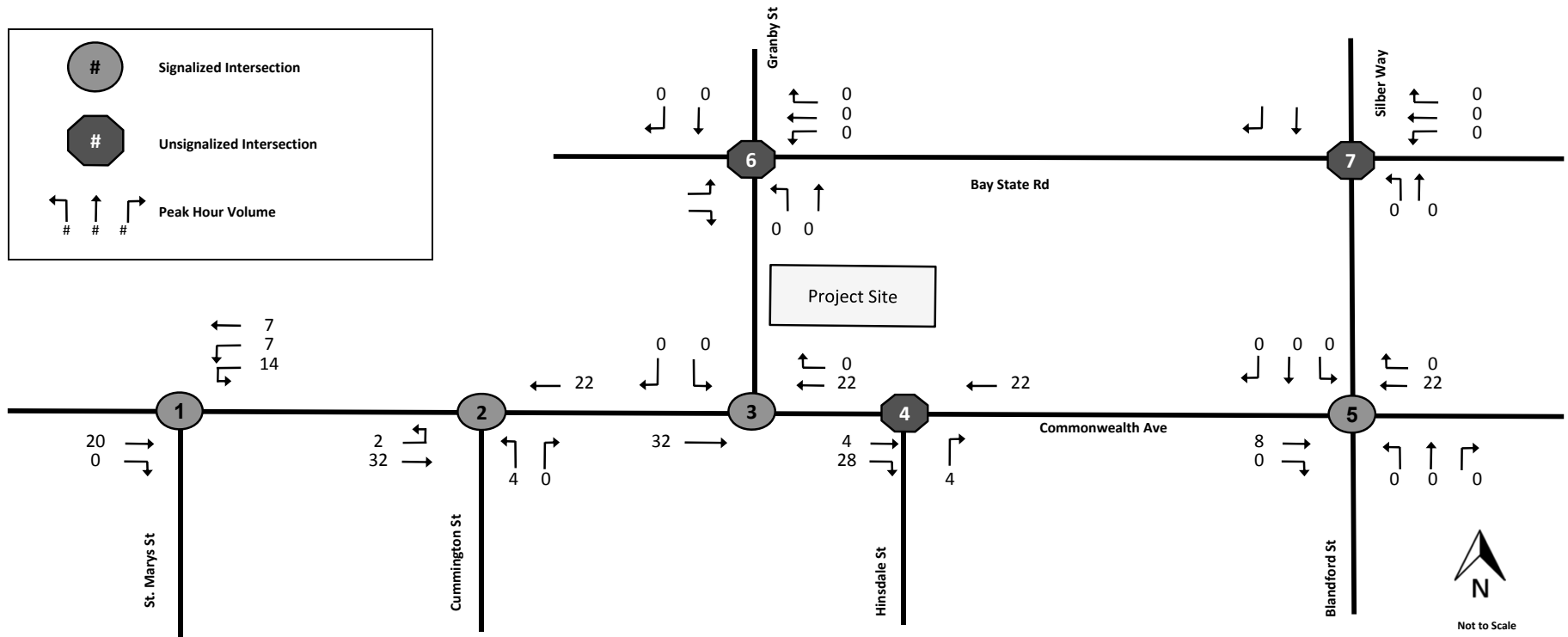


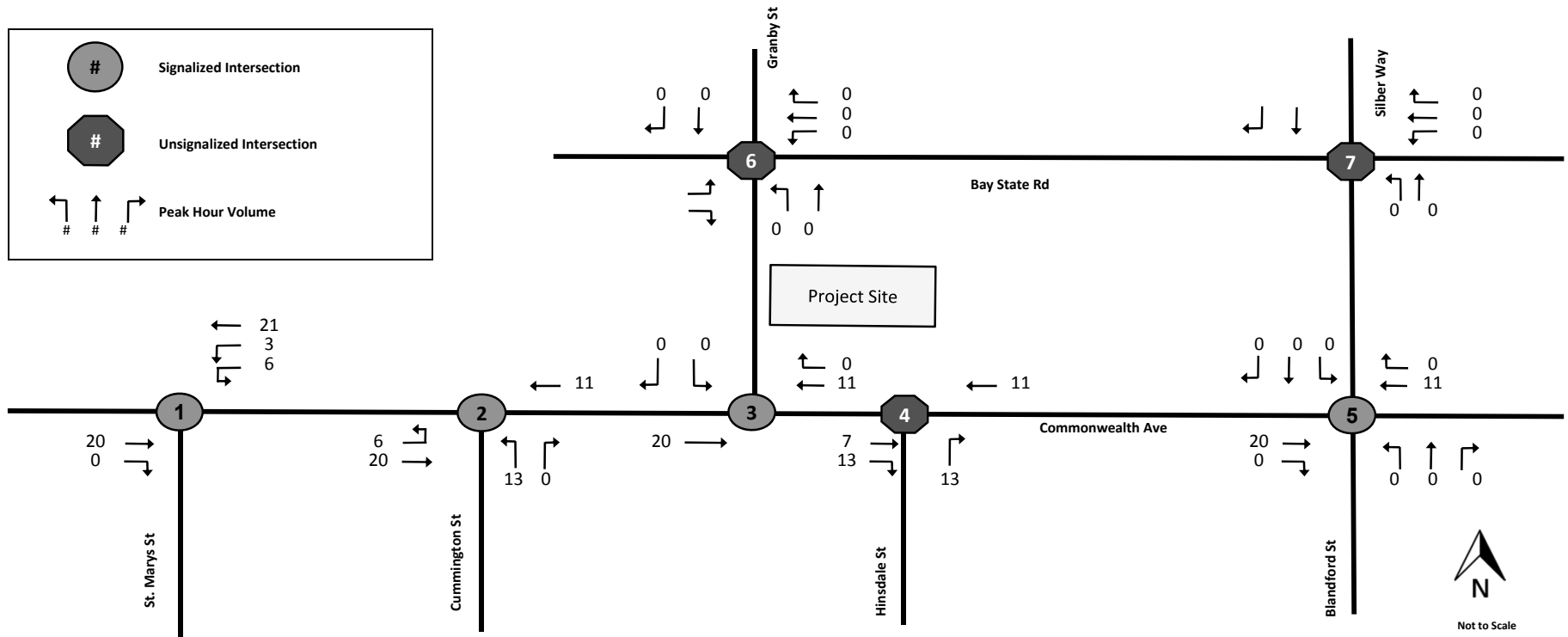


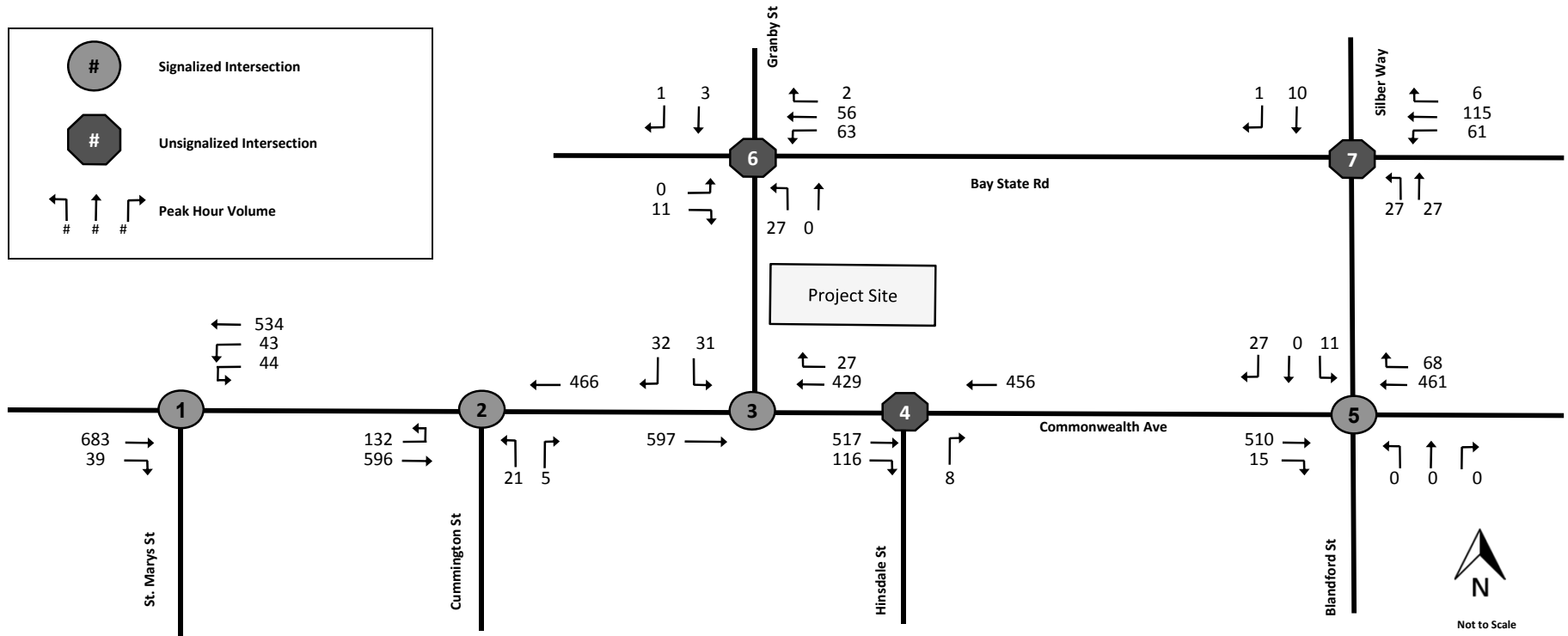


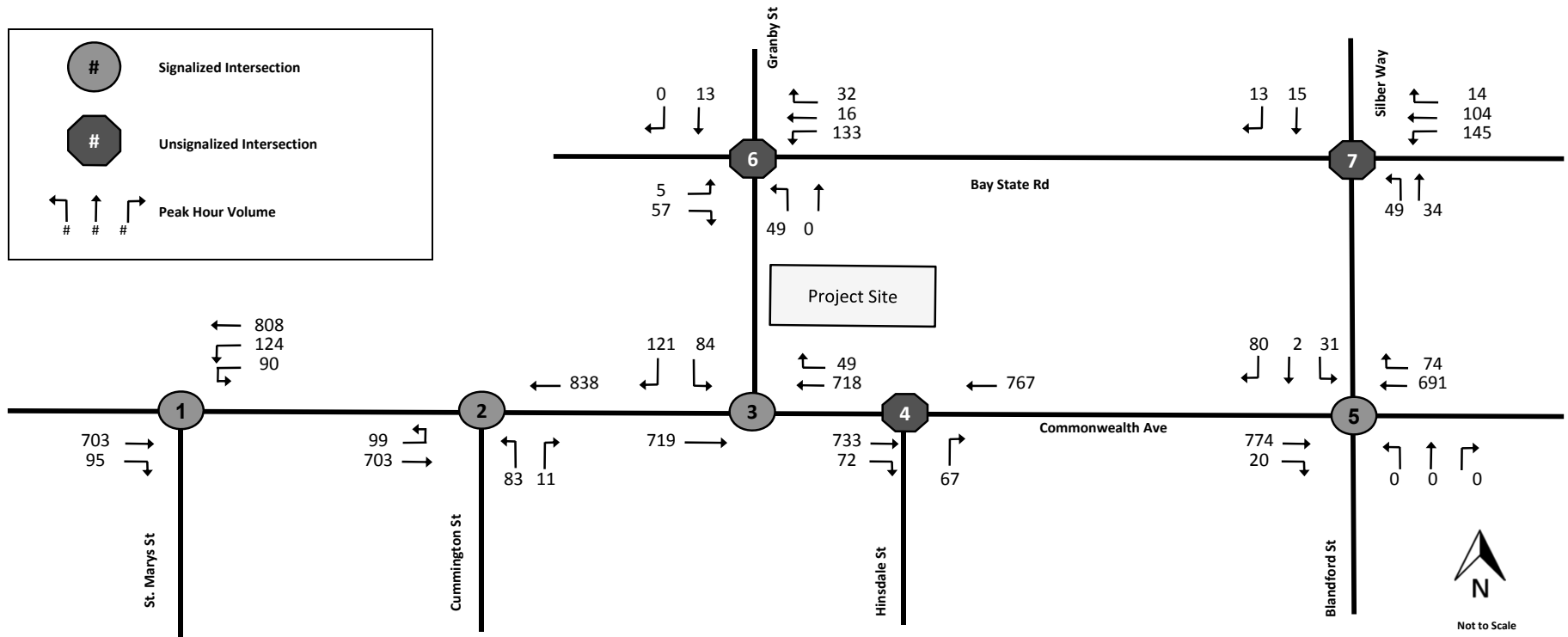












Chapter 6

ENVIRONMENTAL

CHAPTER 6: ENVIRONMENTAL

6.1 INTRODUCTION

The Project has been thoughtfully designed to consider and improve the environmental conditions of the Site. The building will be constructed and operated in full compliance with local, state, and federal environmental regulations and will not create undue wind, shadow, noise, solar glare, or air quality impacts in the surrounding areas. An appropriate Construction Management Plan (CMP) will be prepared and approved by the City prior to commencement of construction to avoid and mitigate construction period impacts.

6.2 WIND

The Site is comprised of an existing surface parking lot situated along Commonwealth Avenue, which serves as the spine of the University's CRC. This portion of the campus is characterized by a wide variety of low to high-rise institutional and academic buildings as well as open spaces. The properties immediately abutting the Site contain landscaped open space and buildings five to six stories in height.

The proposed building will have a maximum height of 305 feet, with main entrances located along the east and west facades.

Computer modeling has been used to generate a qualitative assessment of the pedestrian environment near the Site to evaluate existing and future conditions. The analysis is in compliance with the Scoping Determination and the requirements of the BPDA and is based on a review of regional long-term meteorological data for the Boston area, advanced design drawings of the proposed building, engineering discretion, and the results of computer-generated computation. The results of these analyses have been measured against the Boston Redevelopment Authority (BRA dba BPDA) standards for acceptable wind conditions and are summarized in this section.

6.2.1 RESULTS SUMMARY

Rowan Williams Davies & Irwin Inc. (RWDI) prepared a pedestrian wind study in conjunction with a wind tunnel study to assess the pedestrian wind conditions for the Project. The results and conclusions of the study found that appropriate wind conditions are expected at all entrances on Commonwealth Avenue, and most areas on sidewalks around the building. Accelerated wind speeds and potentially uncomfortable conditions are expected at the sidewalks close to the northwest and southwest corners of the building. Project features including stepped facades, recessed facades, and the presence of the building overhang do provide mitigation.

The study, which was based on wind tunnel testing of the proposed Project including proposed and existing landscaping showed higher mean speeds, uncomfortable or comfortable for walking are expected close to the north, west and southwest building perimeters. Mean speeds farther from the Project site are expected to remain similar to that in the No Build scenario. Wind speeds that meet the effective gust criterion are anticipated at all test locations in both the No Build and Build scenarios on an annual basis. During the winter months, wind speeds that do not meet the gust criterion are predicted off site to the southwest and west in both the No Build and Build scenarios, and they are not caused by the proposed development. No dangerous wind speeds are predicted annually or for any season for both No Build and Build configurations.

The results of the wind tunnel study corroborate the results of the wind assessment as it was found that the BPDA criteria are anticipated to be met at most areas on and around the Project site. The wind tunnel study was conducted under the guidelines of the BPDA and met all aspects of the BPDA Scope for Wind. There are two exceptions to the statement that reads: "All buildings taller than 25 stories and within 2,400 feet of the project site should be placed at the appropriate location upstream of the project site during the test."

The first exception is the Kenmore Square project, a future development that is not fully determined to date, which is taller than 25 stories and would have been included in the wind tunnel study in a "Full Build" (i.e., future) scenario. However, Kenmore Square is the only future development within the study area, and it was therefore deemed unnecessary to conduct an additional tunnel test configuration solely for the purposes of including this one future development. Kenmore Square is also located to the east-southeast of the Project site, which is not a main wind direction for Boston, and its impact on wind conditions on and around the Project site would be negligible.

The second exception is related to the extent of the disc used to model the surrounding area around the Project. The physical maximum extent of the disc allows for modeling of all surrounding buildings within a 1,600-foot radius of the Project site, and as such, any developments beyond that extent would not fit in the wind tunnel.

Furthermore, the results of the wind tunnel study show that the Project is not expected to significantly impact surrounding wind conditions outside a radius of roughly 500 feet, whereas Kenmore Square is located roughly 1,300 feet to the east-southeast of the Project, and therefore the impacts of any developments farther away would also be negligible.

As such, RWDI is confident that the results of the wind tunnel testing would be identical with or without the exclusion of the aforementioned buildings and that the data presented in the wind tunnel study is accurate.

The assessment prepared by RWDI is included as Appendix G, Wind Impact Assessment.

6.3 SHADOW

A shadow study was prepared to evaluate the potential shadow impact of the Project for existing and build conditions. Specific times during the year were evaluated and include the spring (March 21), summer (June 21), fall (September 21), and winter (December 21) months during the morning (9:00 AM), midday (12:00 Noon), and afternoon (3:00 PM) periods. Early evening (6:00 PM) shadow impacts were evaluated for the spring, summer and fall.

The dates and times during which shadow conditions were simulated are identified in Table 6-1, Shadow Study Dates and Times. The results of the shadow analysis are illustrated in Figures 6-1 through 6-20, Shadow Studies. The existing shadow is shown in grey, and new shadow is depicted in red.

Table 6-1: Shadow Study Dates and Times

Date	Time
Vernal Equinox – March 21 st	9:00 AM, 12:00 PM, 3:00 PM, 6:00 PM
Summer Solstice – June 21 st	9:00 AM, 12:00 PM, 3:00 PM, 6:00 PM
Autumnal Equinox – September 21 st , EDT	9:00 AM, 12:00 PM, 3:00 PM, 6:00 PM
Winter Solstice – December 21 st , EDT	9:00 AM, 12:00 PM, 3:00 PM, 6:00 PM

6.3.1 VERNAL EQUINOX – MARCH 21ST

New shadows in the morning (9:00 AM) fall on the existing Boston University Arts & Sciences buildings on the west side of the proposed building and do not reach Bay State Road. At noon, the shadows shift toward the north and extend over the Boston University owned townhouses on Bay State Road but do not reach beyond the shadows that the townhouses cast over a small portion of Storrow Drive. By mid-afternoon (3:00 PM), the new shadow falls along a small portion of Storrow Drive. No new shadow falls onto the Charles River Esplanade during these times, although at 6:00 PM shadow will partially obscure a portion of the Esplanade covered by tree canopy.

6.3.2 SUMMER SOLSTICE – JUNE 21ST

During the summer months (June 21), there is little impact of shadow except to immediately adjacent Boston University owned buildings. In the morning, some

shadow falls on the Arts & Sciences building on the west side of Granby Street. At noon, the shadow is confined to a small number of the townhouses on the south side of Bay State Road, which is similar to the effects at 3:00 PM. In the early evening (6:00 PM), the shadow falls along Commonwealth Avenue and is confined to Boston University owned buildings. No shadow falls on the Charles River Esplanade during these times.

6.3.3 AUTUMNAL EQUINOX – SEPTEMBER 21ST, EDT

During the fall (September 21), the shadows are essentially the same as those described above for the spring, except they are shifted by one hour due to the difference in daylight savings time. During the early evening in the fall, there is no appreciable net impact on shadow.

6.3.4 WINTER SOLSTICE – DECEMBER 21ST, EDT

During the winter (December 21) when the sun is low in the sky, the shadow impacts extend farther from the building. In the morning, the only new shadow is a relatively thin section cast over the open space of the Charles River Esplanade and extending into the Charles River. At noon, shadow is cast across Storrow Drive onto the Charles River Esplanade. In the mid-afternoon, a relatively narrow shadow is cast on the Charles River Esplanade and onto a portion of the Charles River.

6.3.5 CONCLUSIONS

Excepting for the Winter Solstice, net new shadow is minimal. The shadows cast during the Winter Solstice are limited in duration and do not significantly exceed similar impacts of surrounding buildings into the Charles River Esplanade or the Charles River.

6.4 COMBINED WIND AND SHADOW

Figures depicting no-build and build wind monitoring locations have been compared at an orientation and scale consistent with that used for shadow diagrams in order that the cumulative effect of wind and shadow can be determined. Although not specific known criteria have been established to accurately evaluate a combined impact of wind and shadow, no extraordinary conditions are expected on the Site because of wind impacts on areas in shadow.

6.5 DAYLIGHT

At a maximum height of 305 feet, the Data Sciences Center is appropriately scaled to respond to neighboring structures and the width of Commonwealth Avenue and Granby Street. Adjacent buildings are owned and occupied by the University. A daylight study utilizing the

Boston Redevelopment Authority Daylight Analysis Computer Program (BRADA) is included as Appendix I, Daylighting Analysis.

6.6 SOLAR GLARE

6.6.1 SOLAR SPOT GLARE

RWDI was retained to investigate the impact that solar reflections emanating from the proposed Boston University Math and Data Science Building will have on the surrounding urban realm.

The planar nature of the facades of the proposed building ensure that reflected sunlight will not focus (multiply) in any particular area. Therefore, RWDI does not expect any significant thermal impacts (i.e. risks to human safety or property damage) to occur in the surrounding neighborhood.

6.6.2 THERMAL IMPACTS ON FACADES

At all studied facade areas, reflections are of low intensity. Hence, these reflections are not expected to lead to a significant additional cooling load for a building. Should an individual choose to expose themselves to the reflected energy through a window, they may feel warm, however this would be a temporary experience and one which would easily be remedied by closing window treatments.

6.6.3 VISUAL GLARE IMPACT ON DRIVERS

As with the addition of any glazed building, drivers travelling in the vicinity of the building are expected to experience an increased level of visual glare impact. Car drivers along Commonwealth Avenue and train drivers along the parallel tracks in the median are predicted to experience reflections from the building which can cause a high level of impact. However, the potential for high impacts at these locations is possible in less than 0.1% of the daytime.

6.6.4 VISUAL GLARE IMPACT ON PEDESTRIANS AND FACADES

Typical levels of visual glare are possible for pedestrians and building occupants in the vicinity of the Project. Some of these reflections are frequent and relatively long in duration particularly on the residences immediately south of the building. These types of reflections represent at worst a visual nuisance, as viewers can look away or close blinds. This condition is common in many urban centers and is unlikely to present a safety risk.

6.6.5 SOLAR HEAT BUILDUP

The Project design includes deep overhangs on the tower levels, as well as vertical fins to be installed on the facades to aid in reducing solar gains and glare on the building envelope. Preliminary facade design studies included, among others, optimizing shading device orientation and size, estimating the solar heat gain through the facade glazing, and critical time of day when shade is required. These studies were performed during early conceptual design.

As the design of the building progresses, detailed analysis of the exterior materials will be performed for different glazing options and shading strategies, including options such as motorized shades, ceramic frit on glass, dynamic glazing, and roll-on shades.

6.7 NIGHTTIME LIGHTING

6.7.1 EXTERIOR LIGHTING

The exterior site lighting is designed to minimize light pollution, light trespass, and glare while creating a welcoming, safe, nighttime environment. The exterior area adjacent to street level storefront is illuminated with low wattage, LED downlights recessed into the overhead soffit. The fixtures are well shielded to prevent glare to pedestrians and motorists. On the north side of the podium where there is no overhang, the feature bosque of trees is uplit with low wattage, LED well lights which provide a soft indirect light in the plaza. LED step lights supplement the light levels at stairs and ramps. The tree uplights will be turned off from midnight to sunrise to reduce sky glow and comply with the LEED Light Pollution Reduction Credit. The laneway is illuminated with full cut-off LED pole lights to provide safe light levels for pedestrians crossing the drive while minimizing spill light. The streets bounding the Site are illuminated with city standard pole lights using the DOT spacing guidelines.

The lighting for the building terraces is provided by very low wattage step lights that provide minimum egress light level requirements and do not obstruct the views out from the building. The integral shielding and downward orientation of the light source further reduces any possibility of light pollution from the fixtures.

6.7.2 INTERIOR LIGHTING

All of the interior lights will be recessed, LED fixtures. At the podium level, 55 degree cut-off, recessed LED downlights are located in the ceilings to efficiently illuminate the floor and task surfaces. These lights will be controlled by a series of daylight sensors in conjunction with an astronomical time clock. During the day, the lights automatically dim in response to the available daylight. At night the lights dim in response to the buildings occupancy to reduce energy consumption and light trespass

from the building. At the corner lounges and circulation spaces of the Tower, recessed LED downlights will be used in combination with lensed wall washers to light the whiteboard work walls. Recessed, lensed, LED troffers in the offices are set 5' back from the curtain wall to reduce light trespass through the façade. In addition, all of the lights within the rooms are controlled by occupancy sensors to automatically shut off the lights when spaces are unoccupied.

6.8 AIR QUALITY

This section provides a qualitative review of potential air quality sources and impacts from the Project. Air quality impacts from construction operations are addressed in Section 6.12.5, Construction Air Quality.

6.8.1 EXISTING AIR QUALITY

Existing air quality at the Site is consistent with urban conditions. The presence of the Charles River and other open space provides some amelioration of impacts from stationary and mobile sources in the vicinity of the Site.

6.8.2 PARKING SOURCES

The Site is currently covered with a paved surface parking lot containing 126 public spaces. The Project will eliminate these parking spaces and thus result in a net reduction of air quality impacts from parking sources. In addition, 35 spaces will be removed from the alley to the north of the building.

The Project also aims to encourage bicycle use and further reduce parking demand. The Proponent's robust Transportation Demand Management (TDM) program, combined with the Project's proximity to the MBTA Green line and bus lines, indicates that air pollution from vehicle sources will be minimized.

6.8.3 TRAFFIC SOURCES

During a typical day, there is not expected to be a significant change in the level of service of surrounding intersections after the Project is open. Given the Project's proximity to public transit and bicycle orientation, the Project will redistribute the 126 existing parking spaces on the Site to University-owned parking facilities within the vicinity of the Project. Faculty and staff will be encouraged to park at the nearby Boston University owned lots and garages. Visitors to the Site can utilize existing metered parking located along the north and south sides of Commonwealth Avenue, or they can park at the University owned pay-on-entry parking facility located at the corner of Commonwealth Avenue and Deerfield Street. See Chapter 5, Transportation, for a full description of existing and proposed transportation conditions.

TDM strategies are a significant component of the Project and are anticipated to assist in minimizing adverse air quality impacts. As described in Section 5.5, Transportation Mitigation Measures, the Project will utilize the following TDM initiatives to encourage employees and visitors to access the Site via alternative means of transportation that have lesser impacts on overall air quality for the Project:

- Promote public transit and dissemination of transit information;
- Provide a ride-matching service for car and van pools;
- Provide secure, indoor bicycle storage for employees and students; and
- Provide publicly accessible outdoor bicycle storage for the Project's visitors.

6.8.4 BUILDING OPERATION SOURCES

Building operations are not expected to affect air quality in the surrounding area. Mechanical and venting equipment will be selected to meet all state and federal standards for emissions.

6.9 NOISE

The Proponent does not anticipate an increase in noise impacts associated with the academic, administrative, or research uses at the Site. The Boston Air Pollution Control Commission regulates noise in the City of Boston based on zoning and land use classification. The regulations define fixed noise limits for the use of equipment serving the building, which is limited to a maximum level of 60 decibels (dBA) for daytime use and 50 dBA for nighttime use in institutional areas. These levels are sound limits for equipment assessed at the boundaries of the Project. The limits apply to equipment that operates on a significant basis to serve the building, such as air conditioning equipment and fans. In addition to the overall sound level requirements, the regulations list specific octave band frequency limits for daytime and nighttime periods. The design team performed a site noise survey between 2/22/2019 and 2/27/2019 and confirmed that the quietest sound levels at the site are about 50dBA, in agreement with the local noise ordinance.

Most of the Project's mechanicals will be located within the interior on the basement floors, with a minimal number of condensing and venting units located on the roof. Based on general equipment design, the rooftop equipment is not expected to produce significant sound levels at the building property line, though noise control measures will be provided if required. Rooftop screens will conceal vents and condensing units and will provide some acoustical dampening. See Appendix H, Noise Impact Analysis for a more detailed discussion of the existing and proposed noise conditions.

6.10 FLOOD ZONES

Climate change adaptation has gained national attention as a critical environmental factor that must be addressed in new development projects. In Boston, sea level rise has become a particularly serious concern. Recent weather patterns and future modeling demonstrate that the impact of storms on the City are likely to continue to intensify, necessitating careful consideration of a project's location and flood-resiliency features.

According to the BPDA Sea Level Rise Flood Hazard Mapping Tool, the nearest future flood impact area (along the Charles River) is at Elevation 14.1' Boston City Base (BCB). The limits of this flood area are approximately 200 feet north of the Site. As the Finished Floor Elevation of the ground floor is proposed at Elevation 21.25', and basement levels will be designed to minimize or avoid impacts during flood events, the Project is well positioned to respond to future flood conditions.

6.11 WATER QUALITY

Domestic water service will be provided to the building by Boston Water and Sewer Commission (BWSC). No aquifers or drinking water wells are located near the Site.

6.12 GROUNDWATER

Several groundwater monitoring wells exist at and in the vicinity of the Site. Data obtained from the on-site monitoring well and Boston Groundwater Trust (BGwT) wells indicate that groundwater levels range from El. 8.5 to El. 10.5 BCB.

The Project is located within the Groundwater Conservation Overlay District (GCOD). Therefore, the Project design will comply with GCOD and City standards by establishing design and construction methodology that protects groundwater. An engineer's certification report will be submitted to demonstrate that the standards have been met and that the Project will have no negative impacts to groundwater levels. Methods include use of fully waterproofed basement (walls and mat slab) for the portion of the structure that extends below groundwater levels. The Project will have no long-term groundwater pumping.

The Proponent will coordinate with the Boston Groundwater Trust (BGwT) regarding groundwater monitoring prior to and during construction. Several existing wells in the area are shown on the BGwT website. One groundwater monitoring well may be installed to document existing groundwater levels and hydrogeologic conditions. If required, the new well will be installed prior to the start of construction and will be installed in accordance with City and BGwT standards for permanent monitoring wells. The well will be installed at a location where it will be accessible for long term monitoring.

6.13 GEOTECHNICAL

6.13.1 SUBSURFACE SOIL CONDITIONS

Based on available test boring information obtained at the Site, subsurface soil conditions underlying the proposed building are characterized by the general soil profile in the Table 6-2.

Table 6-2: Project Site Soil Profile

Generalized Description	Approximate Elevation of Top of Layer (ft, BCB)
Fill	Ground Surface
Organic Deposits	El. 7 to El. 9
Glaciofluvial Deposits	El. 1 to El. -1
Marine Deposits	El. -8 to El. -15
Glacial Till	El. -160
Bedrock (Cambridge Argillite)	El. -200

Note that in general, ground surface elevations at the proposed building Site range between approximately El. 20 and 22.

6.13.2 FOUNDATION DESIGN AND CONSTRUCTION

The proposed building has a 2-level deep basement on the west side of the Site and a 1-level deep basement on the east side of the site. The excavation depths vary from approximately 45 ft on the west side of the Site to approximately 22 ft on the east side. There will be locally deeper excavations for pits, such as elevators.

The 5-story building podium on the east side of the site has one basement level below grade. The foundation below the building will consist of a reinforced concrete mat foundation that is fully waterproofed. The mat foundation will be soil bearing in the naturally deposited sand unit.

The proposed tower on the west side of the Site has 2 basement levels and this structure will also be supported on a continuous reinforced concrete, soil bearing, mat foundation. This deeper mat foundation will bear in the marine clay deposit.

All basement walls that extend below the groundwater level, and also the mat slab, will be fully waterproofed. The structure will not cause the groundwater to raise, pond, or be lowered in the surrounding area.

The building foundation will be designed in accordance with the Mass Building Code (MBC). For seismic design purposes, this site is classified as a Site Class D in accordance with the MBC, based on the soil profile at this site.

A temporary lateral earth support system will be required to complete the excavation for the below grade space. The earth support system will be a relatively impermeable wall such as continuous interlocking steel sheet piles. The excavation support wall will be laterally braced with 1 to 2 or 3 levels of bracing during construction. The proposed approximately 45 ft deep excavation on the west side of the site will result in surrounding soil movements. Street surface settlements of typically 1 inch are anticipated within approximately 30 feet of the excavation support wall. The excavation performance and street settlements will be monitored during construction with a geotechnical instrumentation program to evaluate if the performance coincides with the design assumptions. Corrective actions such as limited excavation areas or additional bracing will be implemented if measured movements exceed design phase estimated movements.

The excavation support wall will extend into the underlying marine deposits (clay) to create a groundwater barrier around the perimeter of the Site. Temporary construction dewatering will be required inside the limits of the excavation support wall. Groundwater drawdown outside the limits of the excavation will be controlled by the continuous interlocking steel sheeting that will be used for temporary excavation support. Any leaks or holes in the sheeting that are revealed during excavation will be plugged or grouted in the field or prior to excavation, if known. The excavation inside the limits of the excavation support walls will be accomplished with conventional earth moving equipment such as backhoes.

A National Pollutant Discharge Elimination System permit for temporary construction dewatering will be obtained for discharge of dewatering effluent during construction.

A geotechnical monitoring program will be implemented prior to and during construction and will likely consist of settlement monitoring of adjacent buildings. A program of monitoring existing observation wells located on and in the vicinity of the Site will also be conducted prior to and during construction.

6.13.3 SOLID AND HAZARDOUS WASTE

Haley & Aldrich, Inc. is chemically testing the excavated soils (e.g., in building basement excavation areas) that require disposal in accordance with disposal facility requirements. This chemical testing will be conducted in Winter and Spring 2019 and the results will be summarized in a report to be dated, May 2019. The chemical test results will be evaluated with respect to the permissible limits in the Massachusetts Contingency Plan. All of the excavation and soil disposal work will be conducted in accordance with Mass DEP regulations. The mass excavation for basement construction is planned to begin in 2020.

The excavated soils requiring offsite disposal are planned to be dug and hauled real time, without stockpiling soils on site unless anomalies are encountered in the field during excavation.

All soil leaving the Site will be required to be legally transported in accordance with local, state, and federal requirements. In addition, any regulated soil and/or groundwater conditions related to oil and hazardous materials will be managed in accordance with appropriate Massachusetts Department of Environmental Protection regulatory requirements.

6.14 CONSTRUCTION IMPACTS

The following section describes the impacts likely to result from the Project's construction and the steps that will be taken to avoid or minimize environmental and transportation-related impacts. The Proponent has designated a construction manager who is responsible for developing a construction phasing plan and coordinating construction activities with all appropriate regulatory agencies. The Project's geotechnical consultant is providing consulting services associated with foundation design recommendations, preparing geotechnical specifications, and reviewing the construction contractor's proposed procedure. The approved Construction Management Plan will address potential construction impacts in detail.

6.14.1 CONSTRUCTION METHODOLOGY

The basic sequence of construction will be: foundations, superstructure, façade & roof, interior mechanical, electrical and finishes, and landscaping. The initial phase of the project is the lower level foundations including support of excavation. The project currently plans to install a braced steel sheet pile system for earth support and ground water control. A dewatering system will be employed to keep excavations dry without adversely impacting existing pile supported structures nearby. Soils removed from the excavation will be transported and legally disposed of offsite. Foundation construction will be followed by the erection of the structural steel with a concrete core.

6.14.2 RECYCLING OF CONSTRUCTION WASTE

The Proponent will take an active role to address the reprocessing and recycling of construction waste. The disposal contract will include specific requirements that will ensure that construction procedures allow for the necessary segregation, reprocessing, reuse and recycling of material when possible. For those materials that cannot be recycled, solid waste will be transported in covered trucks to an approved solid waste facility, per Mass DEP Regulation for Solid Waste Facility, 310 CMR 16.00. This requirement will be specified in the disposal contract. Construction will be conducted

so that material that may be recycled are segregated from those materials not recyclable to enable disposal at an approved solid waste facility.

6.14.3 CONSTRUCTION MANAGEMENT PLAN

The Proponent will comply with applicable state and local regulations governing construction of the Project. The Proponent will require that the construction manager comply with the CMP developed in consultation with and approved by the Boston Transportation Department (BTD) prior to the commencement of construction. Discussions have been initiated with BTD regarding the CMP. The construction manager will be bound by the CMP, which will include detailed information about construction activities, specific construction mitigation measures, construction materials, and access and staging area plans to minimize the impact on the surrounding neighborhood and pedestrian environment. The Proponent understands the challenges of managing construction activities in this urban/academic context and has extensive experience with the necessary precautions.

Construction methodologies that ensure public safety and protect nearby residents will be employed. Techniques such as temporary barricaded walkways and signage will be used. Construction management and scheduling will minimize impacts on the surrounding environment and will include plans for construction worker commuting, routing plans for trucking and deliveries, and control of noise and dust. The University will establish a Project website which will be accessible to the public at large as well as the University community.

6.14.4 CONSTRUCTION ACTIVITY SCHEDULE

The construction period for this Project is expected to last approximately 27 months in duration. It is anticipated that construction will be completed in one phase and will start .

Typical construction activities will be scheduled from Monday through Friday. Weekend or off-hour activity may occasionally be necessary to minimize impact on vehicular and pedestrian traffic during delivery of large construction equipment (i.e. cranes, excavation equipment, etc.).

6.14.5 CONSTRUCTION TRAFFIC IMPACTS

Truck traffic will vary throughout the construction period, depending on the activity. Construction truck routes to and from the site for contractor personnel, supplies, materials, and removal of excavations required for the project will be coordinated with BTD. Truck traffic will be heaviest during the excavation and concrete foundation work where truck volumes will be in the range of 20 to 40 per day.

Thereafter, truck traffic will spread evenly throughout the day. “No Idling” signs will be included at the loading, delivery, pick-up and drop-off areas.

Construction contracts will include clauses restricting truck travel per BTB requirements. Primary access to and egress from the Site will be restricted to gates approved by BTB.

6.14.6 CONSTRUCTION WORKER PARKING AND STAGING

The number of workers required for the construction of the Project will vary depending upon the stage of construction. The general contractor will be responsible for educating all construction workers about public transit options and encouraging the use of High Occupancy Vehicles (HOVs). As part of the program to promote public transportation, the following mitigation measures will be implemented:

- Prohibit personnel from parking at the Site during construction;
- Encourage construction personnel to utilize public transportation (due to the proximity of the MBTA Green Line and Kenmore Station in Kenmore, a substantial level of public transportation use is anticipated by workers);
- Post transit schedules and maps at the jobsite;
- Provide lock-up facilities for work tools to make public transportation more convenient and desirable for workers; and
- Write terms and conditions related to workforce parking and public transportation into each subcontract.

These measures will be incorporated into the CMP for the Project, which will be reviewed by the BTB prior to commencement of construction activities.

Should some of the workers choose to drive to the Site, parking will be available at off-street commercial parking lots owned by the University. The lots are pay-on-entry facilities and are not currently fully utilized during the week. Because the majority of the construction workforce will arrive prior to the AM peak traffic period and depart prior to the PM peak period, these trips are not expected to have an appreciable impact on the local transportation system.

6.14.7 CONSTRUCTION FENCING

Throughout Project construction, a secure perimeter fence will be maintained to protect the public from construction activities. As the design of the Project progresses, the Proponent will be with BTB to discuss the specific location of barricades, the need for land closures, pedestrian walkways, and truck queuing areas. Secure fencing

with scrim, signage and covered walkways will be employed to ensure the safety and efficiency of all pedestrian and vehicular traffic flows. In addition, sidewalk areas and walkways near construction activities will be well marked and lighted to protect pedestrians and ensure their safety.

6.14.8 CONSTRUCTION AIR QUALITY

Construction activities may generate fugitive dust, which will result in a localized increase of airborne particle levels. Fugitive dust emission from construction activities will depend on such factors as the properties of the emitting surface (e.g. moisture content), meteorological variables, and construction practices employed.

To reduce emission of fugitive dust and minimize impact on the local environment, the construction contractor will adhere to a number of strictly enforceable mitigation measures, which may include:

- Use wetting agents to control and suppress dust from construction debris;
- Ensure that all trucks traveling to and from the Site will be fully covered;
- Remove construction debris regularly;
- Monitor construction practices closely to ensure any emissions of dust are negligible;
- Clean streets and sidewalks to minimize dust and dirt accumulation; and
- Wheel-wash trucks before they leave the Site during the excavation phase.

6.14.9 CONSTRUCTION NOISE IMPACTS

Intermittent increases in noise levels will occur in the short-term during construction, however, construction work will comply with the requirements of the City of Boston noise ordinance. Although there are no residential buildings proximate to the Site, this issue will be carefully addressed to ensure that any construction related noise will not impact the surrounding academic and research buildings.

The proposed construction processes for the Project will be designed around the constraints at the Site. Construction will occur during the daytime hours as defined by Boston Noise Regulations (7:00 AM to 6:00 pm except Sundays). In some instances, second shifts may be required. When these events arise, all required permits will be in place and the Department of Neighborhood Services will be notified.

Every reasonable effort will be made to minimize the noise impact of construction activities. Mitigation measures will include:

- Schedule work during daytime hours;
- Schedule construction activities to avoid the simultaneous operation of the noisiest construction activities and reduce impacts during potential second shift operations;
- Use appropriate mufflers on all equipment and provide ongoing maintenance of intake and exhaust mufflers;
- Maintain muffler enclosures on continuously operating equipment, such as air compressors and welding generators;
- Turn off idling equipment;
- Select the quietest practical items of equipment (electric instead of diesel powered equipment); and
- Replace specific construction operations with less noisy ones where feasible and practical.

6.14.10 SEDIMENT CONTROL MEASURES

During excavation and construction, erosion and sediment control measures will be implemented to minimize the transport of Site soils to off-site areas and the BWSC storm drain system. The existing catch basins will be protected with filter fabric or silt sacks to remove sediment from runoff. 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.

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

- Stacked hay bales and/or silt fence barriers will be installed at the base of the stockpiled soils and at erosion-prone areas throughout the construction phase of the Project;
- Erosion controls will be maintained and replaced as necessary to ensure their effectiveness;
- Where necessary, temporary sedimentation basins will be constructed to prevent the transport of sediment off-site; and

- Measures to control dust will be implemented during excavation – all debris will be properly contained on the Site.

6.15 RODENT CONTROL

Construction and demolition activities can disturb rodent habitat, eliminating food, shelter, and movement routes. Since the existing Site is currently used as a parking lot and there are no structures on-site, the proposed construction activity is not expected to increase rodent activity in the vicinity. The contractor will file a rodent extermination certificate along with the building permit application to the City. Rodent inspection, monitoring, and treatment in compliance with the City's requirements will be carried out before, during, and at the completion of all construction work for the Project.

6.16 WILDLIFE HABITAT

No federal, state, or local wildlife habitat has been identified on the Site.

6.17 HISTORIC AND ARCHAEOLOGICAL IMPACTS

Consistent with the Boston University Charles River Campus 2013 – 2023 Institutional Master Plan, Boston University is committed to maintaining and enhancing the value of historic resources on and around the CRC. The Proponent has invested significant resources in rehabilitating and preserving the historic brownstones along Bay State Road and has carefully introduced contemporary designs in new construction where appropriate. The proposed building will be a groundbreaking contemporary style building that showcases the innovation and forward thinking academic environment pursued at the University.

The Project has been designed to respect the historic nature of the Bay State Road – Back Bay West neighborhood. In addition to identifying any historic resources located on the Site, an Area of Potential Effect ("APE") of one-quarter mile has been analyzed for the purpose of identifying historic resources in the vicinity of the Site. The potential project-related impacts on historic resources on and within the vicinity of the Site are discussed in the sections below. See Figure 6-21, Historic Resources in the Vicinity of the Project Site.

6.17.1 HISTORIC AND ARCHAEOLOGICAL RESOURCES ON THE PROJECT SITE

No historic resources are located on the Site, and no archeological resources are known to exist on the Site.

6.17.2 CHARLES RIVER BASIN HISTORIC DISTRICT

The Charles River Basin Historic District (the "Basin"), which is located in both Cambridge and Boston, was designated in 1978 as a National Register District and is a significant feature of the University's CRC and Boston as a whole. Though the Basin

has undergone significant changes in the past, it has been preserved as an attractive promenade from which spectacular views of the Boston and Cambridge skylines are visible. The Basin includes the vibrant and well-utilized Charles River Esplanade, which was listed on the National Register as a District in 1978 and was designated as a Local Landmark in 2009. The Basin also includes portions of the Charles River Reservation Parkway, which includes over 17 miles of parkland extending from Boston to Weston. Separated from the Project by several major roadways, including Storrow Drive and Bay State Road, the Project is not located within and will have no adverse effect on the Basin.

6.17.3 BAY STATE ROAD/BACK BAY WEST ARCHITECTURAL CONSERVATION DISTRICT

Designated as a Local Historic District in 1979, the Bay State Road/Back Bay West Architectural Conservation District (“BSRACD” or the “District”) includes approximately 200 properties located along Bay State Road. See Figure 6-21, Historic Properties in the Vicinity of the Project Site. Most buildings in the District, many of which are owned and maintained by the University, were constructed in the late 19th century in a variety of revival styles. These buildings have been well maintained and improved by both the University and private owners, including the recently restored and renovated Myles Standish Hall and Dahod Family Alumni Center.

A portion of the Site is not located within the BSRACD, and off-site Project activities will occur in the District. The building’s ground floor, and upper floors will, on some levels, extend over the District boundary on the north elevation. The Project will be located adjacent to the block of University-owned brick townhouses fronting on Bay State Road, west of Granby Street. These buildings will not be affected by the Project, but improvements will be made to the landscape, accessibility, and back entry features of these buildings and to the alley between the townhouses and the Site.

Granby Street will be reconstructed, with a reduced travel way and additional sidewalk furnishing area, curbing, and dedicated bicycle travel lanes. An existing University-owned 3,600 square-foot landscaped open space area at the eastern corner of Granby Street and Bay State Road will be reconstructed with new ornamental trees, pavers and curbing.

As described in Chapter 1: Introduction, features of the Project will be the subject of review by the Bay State Road/Back Bay West Architectural Conservation District Commission.

For Improvements to the Site and off-site areas see Figure 6-22 Bay State Road Back Bay West Architectural Conservation District Limits. Views of the building elevations that are visible from within the District are shown in Figure 6-23, North Elevation, Figure 6-24, East Elevation, and Figure 6-25, West Elevation.

6.17.4 HISTORIC RESOURCES IN THE VICINITY OF THE PROJECT SITE

A review of the Massachusetts Historical Commission (MHC) Inventory revealed 122 extant inventoried historic individual properties and all or portions of 6 MHC inventoried districts within the Area of Potential Effects (APE). Of the individually inventoried resources, 8 fall within the BSRACDC. An additional 55 inventoried resources fall within the Audubon Circle area. One inventoried resource is located in both the Charles River Basin Historic District – Boston and the Commonwealth Avenue Area. The remaining 57 resources are not located within a district area.

Although the Site is not located within a historical district, it immediately abuts the Bay State Road/Back Bay West Architectural Conservation District. The Site is additionally located directly adjacent to a number of inventoried properties. These resources are described in Table 6-3 and shown on Figure 6-21, Historic Resources in the Vicinity of the Site.

Table 6-3: Historic Resources in the Vicinity of the Site

Location / Name	Description / Historic Name	Impact of Project on Resource
District		
Commonwealth Avenue Area	<i>Inventoried Area</i>	Streetscape improvements to frontage along the Site
Charles River Basin Historic District - Boston	<i>National Register of Historic Places</i>	Very minor shadow during winter days
Charles River Basin Historic District - Cambridge	<i>National Register of Historic Places</i>	None
Bay State Road/Back Bay West Architectural Conservation District	<i>Local Historic District</i>	Structures within the District will not be impacted by the Project.
Audubon Circle	<i>Inventoried Area</i>	none
Charles River Esplanade	<i>National Register of Historic Places</i>	Very minor shadow during winter days
Inventoried Properties		
847 Beacon St	<i>Inventoried Property</i> Howard Coon Row House	None
121-125 Bay State Rd	<i>Local Historic District</i>	None
226 Bay State Rd	<i>Inventoried Property</i>	None

Location / Name	Description / Historic Name	Impact of Project on Resource
Boston University History Department Offices	Morris Rudnick Apartment Building	
110-112 Cummington St Boston University College of Engineering	<i>Inventoried Property</i> Henry Turner Stable and Blacksmith Shop	None
627 Commonwealth Ave Boston University Building	<i>Inventoried Property</i> Cummings - Wolf Row House	None
858 Beacon St Boston University Building	<i>Inventoried Property</i>	None
870 Beacon St Boston University Building	<i>Inventoried Property</i> W. D. Vinal Rowhouse	None
5 Buswell St Boston University Building	<i>Inventoried Property</i>	None
21 Buswell St	<i>Inventoried Property</i>	None
509 Park Dr Boston University Building	<i>Inventoried Property</i> The Plymouth Apartments	None
147 Bay State Rd Boston University	<i>Local Historic District</i> Dr. Charles Goddard Weld House	None
854 Beacon St	<i>Inventoried Property</i>	None
100 Mountfort St Boston University Building	<i>Inventoried Property</i> Auburndale Chambers	None
685 Commonwealth Ave	<i>Inventoried Property</i> Boston University Hayden Memorial Building	None
868 Beacon St	<i>Inventoried Property</i>	None
590 Commonwealth Ave	<i>Inventoried Property</i> Commonwealth Avenue Plaza	None
111 Bay State Rd	<i>Local Historic District</i> M. I. T. Student House	None
2 Cummington St Boston University Building	<i>Inventoried Property</i>	None

Location / Name	Description / Historic Name	Impact of Project on Resource
728 Commonwealth Ave Boston University Apartments	<i>Inventoried Property</i> Belview Apartments	None
635 Commonwealth Ave Boston University Sargent College	<i>Inventoried Property</i> Remington Rand Building	None
840-842 Beacon St Boston Bicycle	<i>Inventoried Property</i>	None
834 Beacon St Boston University Jessie W. Titcomb, Row House	<i>Inventoried Property</i> W. D. Vinal - George Wheatland, Jr. Row House	None
514-522 Park Dr Loren D. Towle Apartment Building	<i>Inventoried Property</i> Audubon Court	None
745 Commonwealth Ave	<i>Inventoried Property</i> Boston University School of Theology	None
640 Commonwealth Ave Boston University School of Public Relations	<i>Inventoried Property</i> Nash New England Auto Company Showroom and Garage	None
765 Commonwealth Ave	<i>Inventoried Property</i> Boston University School of Law	None
6 Buswell St Boston University Building	<i>Inventoried Property</i> Joseph Harris Apartment Building	None
14 Buswell St Boston University Building	<i>Inventoried Property</i> The Ambassador Apartments	None
98 Mountfort St Boston University Building	<i>Inventoried Property</i> Fairbanks Chambers	None
849 Beacon St	<i>Inventoried Property</i> Howard Coon Row House	None
857 Beacon St	<i>Inventoried Property</i> Inverness Apartments	None
46 Mountfort St Boston University Building	<i>Inventoried Property</i> Mountfort Chambers	None

Location / Name	Description / Historic Name	Impact of Project on Resource
851 Beacon St	<i>Inventoried Property</i> Joseph Feldman Row House	None
869 Beacon St	<i>Inventoried Property</i> A. F. Arnold Row House	None
155 Bay State Rd	<i>Local Historic District</i>	None
735 Commonwealth Ave	<i>Inventoried Property</i> Boston University Marsh Chapel	None
1 Buswell St Boston University Building	<i>Inventoried Property</i> The Longford Apartments	None
519 Park Dr,	<i>Inventoried Property</i> The Amsterdam Apartments	None
850 Beacon St Boston University Building	<i>Inventoried Property</i> W. D. Vinal Row House	None
8 Aberdeen St	<i>Inventoried Property</i> George Robert White Two-Family House	None
677 Beacon St Boston University Classroom	<i>Inventoried Property</i> Shell Eastern Petroleum Products Office Building	None
806-820 Beacon St Boston University Building	<i>Inventoried Property</i> Wedgemere Chambers Apartments	None
96 Mountfort St Boston University Building	<i>Inventoried Property</i> Mayfield Chambers	None
506 Park Dr	<i>Inventoried Property</i>	None
735 Commonwealth Ave	<i>Inventoried Property</i> Boston University Warren Alpert Mall	None
7 Miner St	<i>Inventoried Property</i> Catherine E. Hutchinson Town House	None
828 Beacon St Boston University John P. Cushing Row House	<i>Inventoried Property</i> W. D. Vinal, - George Wheatland, Jr. Row House	None
30-38 Cummington St Boston University Building	<i>Inventoried Property</i> Nash New England Auto Company Building	None

Location / Name	Description / Historic Name	Impact of Project on Resource
718 Commonwealth Ave Boston University Foreign Languages Department	<i>Inventoried Property</i> Commonwealth Hall Capron Apartments	None
708 Commonwealth Ave Boston University Building	<i>Inventoried Property</i> James P. Neal Row House	None
605 Commonwealth Ave Boston University School of Education	<i>Inventoried Property</i> Lahey Clinic	None
1A Buswell St Boston University Building	<i>Inventoried Property</i> The Melbourne Apartments	None
13 Buswell St		None
29 Buswell St Boston University Earth - Environment House	<i>Inventoried Property</i> Warren Vinal Row House	None
31 Buswell St Boston University Building	<i>Inventoried Property</i> Warren Vinal Row House	None
853 Beacon St Boston University Dormitory	<i>Inventoried Property</i> Joseph Feldman Row House	None
848 Beacon St Boston University Building	<i>Inventoried Property</i> Warren Vinal Row House	None
232 Bay State Rd Boston University Center for Social Sciences	<i>Inventoried Property</i> Bay State Hall Aparments	None
96-100 Cummington St Boston University Buildings & Grounds Department	<i>Inventoried Property</i> William Allen Hayes Automobile Garage	None
844 Beacon St Boston University Building	<i>Inventoried Property</i> The Arundel Apartments	None
602 Commonwealth Ave Boston University Morse Auditorium	<i>Inventoried Property</i> Temple Adath Israel	None

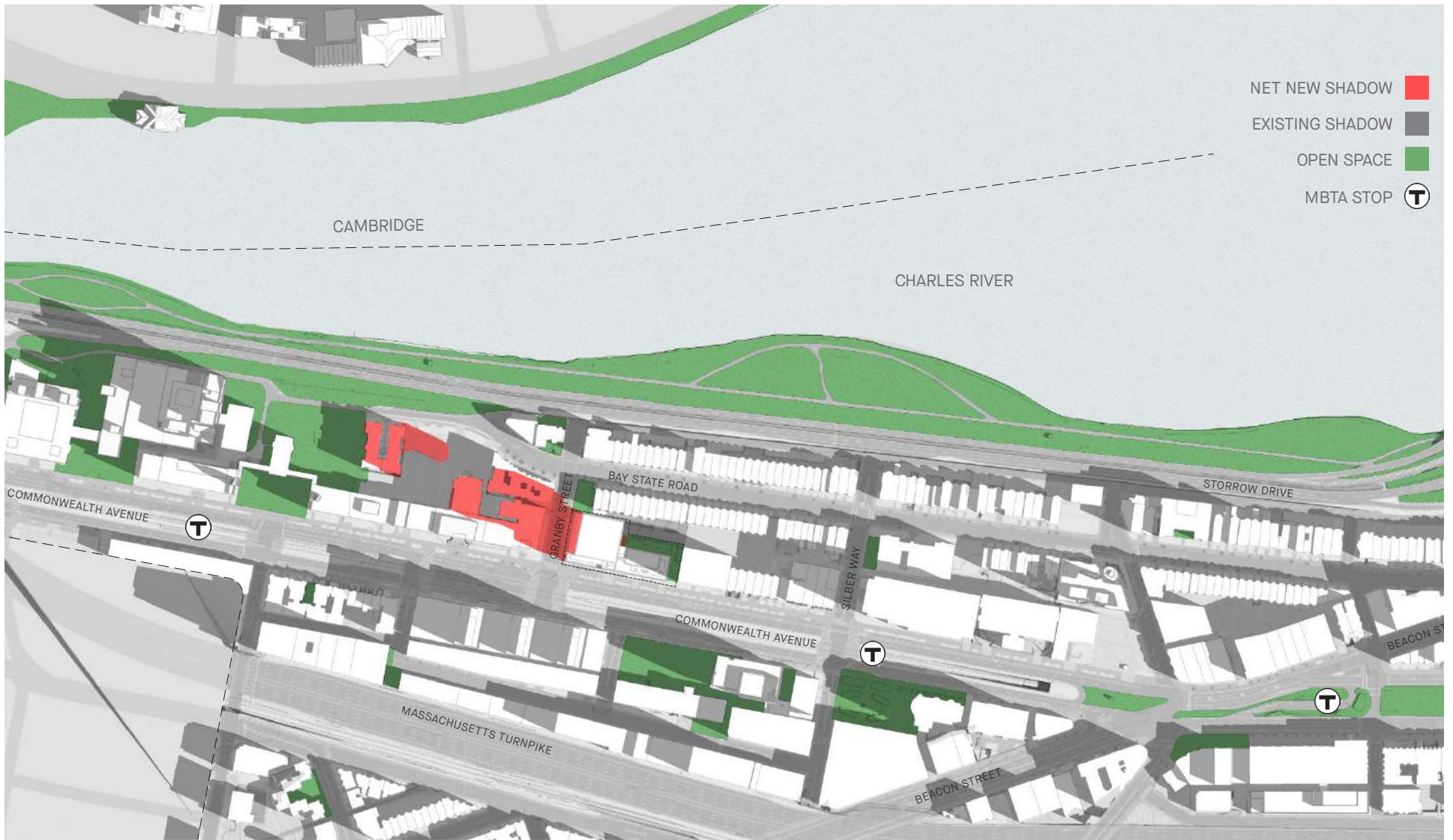
Location / Name	Description / Historic Name	Impact of Project on Resource
867 Beacon St Boston University Dormitory	<i>Inventoried Property</i> A. F. Arnold Row House	None
500-504 Park Dr Boston University Dormitory	<i>Inventoried Property</i> Audubon Terrace Apartments	
264-270 Bay State Rd Boston University School of Social Work	<i>Inventoried Property</i> Bay State Terrace Apartments	None
629 Commonwealth Ave Boston University Building	<i>Inventoried Property</i> N. Henry Chadwick Row House	None
619 Commonwealth Ave Boston University School of Education	<i>Inventoried Property</i> Shapleigh Row House Commonwealth Avenue Hospital	None
860 Beacon St Boston University Building	<i>Inventoried Property</i> Wheatland and Vinal Rowhouse	None
862 Beacon St Boston University Building	<i>Inventoried Property</i> Wheatland and Vinal Rowhouse	None
866 Beacon St Boston University Building	<i>Inventoried Property</i> Wheatland and Vinal Rowhouse	None
22 Buswell St Boston University Building	<i>Inventoried Property</i> Clemetis Apartments	None
722-726 Commonwealth Ave Boston University Apartments	<i>Inventoried Property</i> The Pretoria	None
704 Commonwealth Ave Boston University Apartments	<i>Inventoried Property</i> Alden Hall Apartments	None
710 Commonwealth Ave Boston University Building	<i>Inventoried Property</i> Grenville T. W. Braman Row House	None
767 Commonwealth Ave Boston University Alumni Auditorium	<i>Inventoried Property</i> Boston University Law Library	None

Location / Name	Description / Historic Name	Impact of Project on Resource
838 Beacon St	<i>Inventoried Property</i> Audubon Restaurant	None
872 Beacon St Boston University Building	<i>Inventoried Property</i> W. D. Vinal Rowhouse	None
2 Buswell St Boston University Building	<i>Inventoried Property</i> The Nathan Apartments	None
27 Buswell St	<i>Inventoried Property</i>	None
735 Commonwealth Ave	<i>Inventoried Property</i> Boston University Daniel Marsh Plaza	None
824 Beacon St Boston University Lavinia Webster Row House	<i>Inventoried Property</i> W. D. Vinal – George Wheatland, Jr. Row House	None
836 Beacon St Boston University S. H. Whitwall Row House	<i>Inventoried Property</i> W. D. Vinal – George Wheatland, Jr. Row House	None
499-503 Park Dr	<i>Inventoried Property</i> Strathcona Terrace Apartment House	None
143 Bay State Rd Lahey Clinic Foundation	<i>Local Historic District</i>	None
225 Bay State Rd	<i>Local Historic District</i> William Lindsey House	None
714 Commonwealth Ave Boston University Building	<i>Inventoried Property</i> Grenville T. W. Braman Row House	None
621 Commonwealth Ave Boston University School of Education	<i>Inventoried Property</i> Hurlburt Row House Commonwealth Avenue Hospital	None
856 Beacon St Boston University Building	<i>Inventoried Property</i> Wheatland and Vinal Rowhouse	None
864 Beacon St Boston University Building	<i>Inventoried Property</i> Wheatland and Vinal Rowhouse	None
3 Buswell St Boston University Building	<i>Inventoried Property</i> W. D. Vinal Row House	None

Location / Name	Description / Historic Name	Impact of Project on Resource
7 Buswell St Boston University Building	<i>Inventoried Property</i> W. D. Vinal Apartment Building	None
17 Buswell St Boston University Building	<i>Inventoried Property</i>	None
515 Park Dr Boston University Building	<i>Inventoried Property</i> The Royal Apartments	None
235 Bay State Rd	<i>Inventoried Property</i> Boston University The Beach	None
736-738 Commonwealth Ave	<i>Inventoried Property</i>	None
826 Beacon St Boston University Dr. C. G. Cumston Row House	<i>Inventoried Property</i> W. D. Vinal – George Wheatland, Jr. Row House	None
830 Beacon St Boston University John P. Cushing Row House	<i>Inventoried Property</i> W. D. Vinal – George Wheatland, Jr. Row House	None
145 Bay State Rd Boston University Provost Office	<i>Local Historic District</i> Dr. Charles Goddard Weld House	None
675 Commonwealth Ave	<i>Inventoried Property</i> Boston University Stone Science Building	None
236 Bay State Rd Boston University English Department Offices	<i>Inventoried Property</i> Ashby Apartments	None
111 Cummington St Boston University Building	<i>Inventoried Property</i> Back Bay Realty Association Garage	None
625 Commonwealth Ave Boston University Building	<i>Inventoried Property</i> Mary E. Holden - Anna C. Hallian Row House	None
617 Commonwealth Ave Boston University School of Education	<i>Inventoried Property</i> Covel Row House Commonwealth Avenue Hospital	None
9 Buswell St	<i>Inventoried Property</i>	None
512 Park Dr	<i>Inventoried Property</i>	None

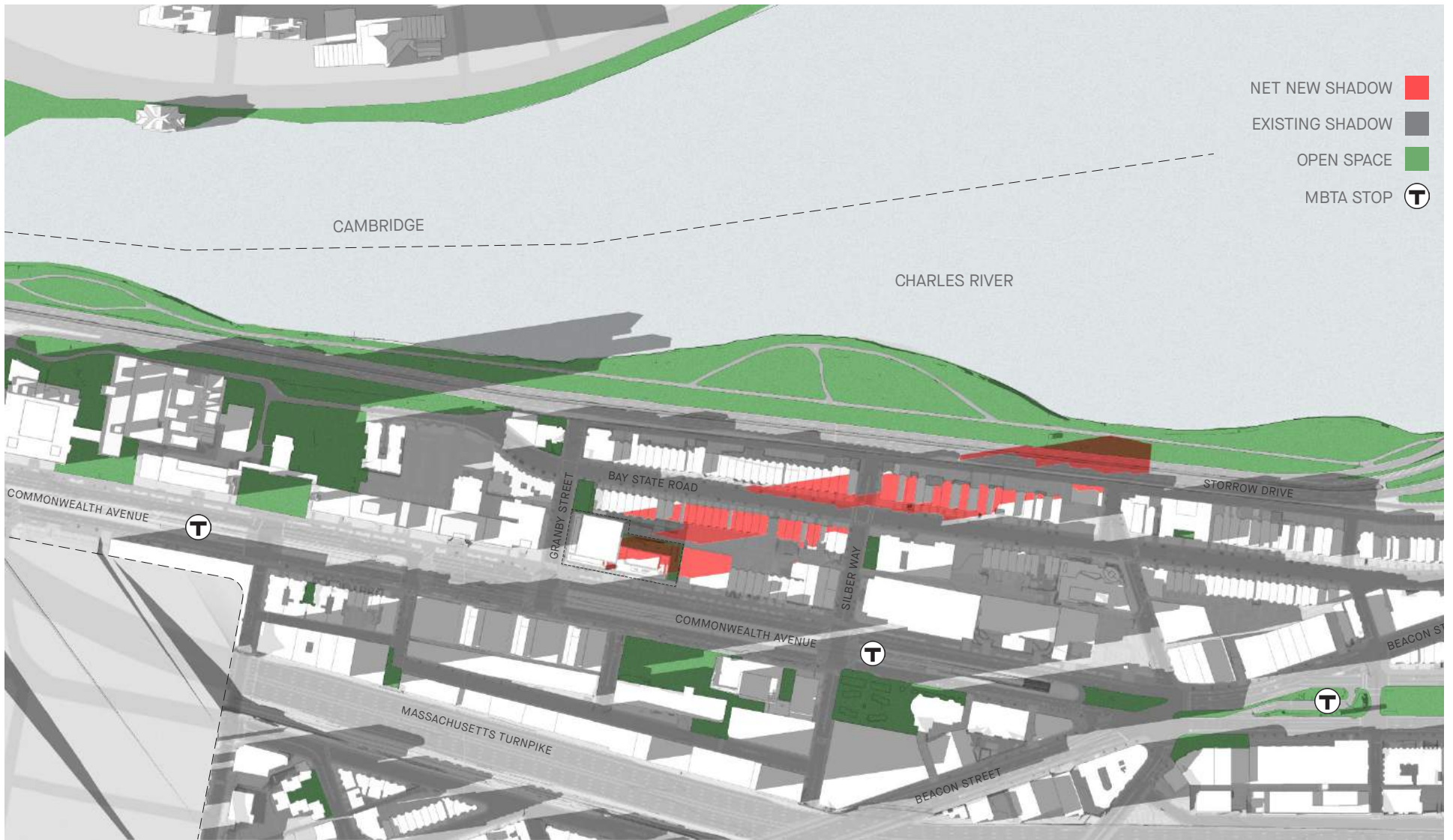
Location / Name	Description / Historic Name	Impact of Project on Resource
855 Beacon St Boston University Dormitory	<i>Inventoried Property</i> Joseph Feldman Row House	None
871 Beacon St	<i>Inventoried Property</i> A. F. Arnold Row House	None
874-880 Beacon St Ruggles Baptist Church	<i>National Register of Historic Places</i> Second Church in Boston	None
48-60 Cummington St Boston University College of Engineering	<i>Inventoried Property</i> William H. Flaherty Auto Repair	None
11 Buswell St Boston University Wellness House	<i>Inventoried Property</i> W. D. Vinal Rowhouse	None
15 Buswell St Boston University Building	<i>Inventoried Property</i>	None
730 Commonwealth Ave	<i>Inventoried Property</i> C. E. Fay Auto Sales Company	None
693 Beacon St	<i>Inventoried Property</i> Edison Electric Illuminating Transformer Station	None
822 Beacon St Charles F. Cutler Row House	<i>Inventoried Property</i> W. D. Vinal – George Wheatland, Jr. Row House	None
832 Beacon St, Boston University Mary F. Hill Row House	<i>Inventoried Property</i> W. D. Vinal – George Wheatland, Jr. Row House	None
211 Bay State Rd Boston Academy of Notre Dame W. D. Vinal House	<i>Local Historic District</i> Boston University Newman House Catholic Center	None
64-86 Cummington St Boston University Psychology Department	<i>Inventoried Property</i> C. C. Hathaway - Charles A. Dodge Building	None
565 Commonwealth Ave Boston University Building	<i>Inventoried Property</i> General Tire and Rubber Company Building	None
852 Beacon St Boston University Building	<i>Inventoried Property</i> W. D. Vinal Row House	None

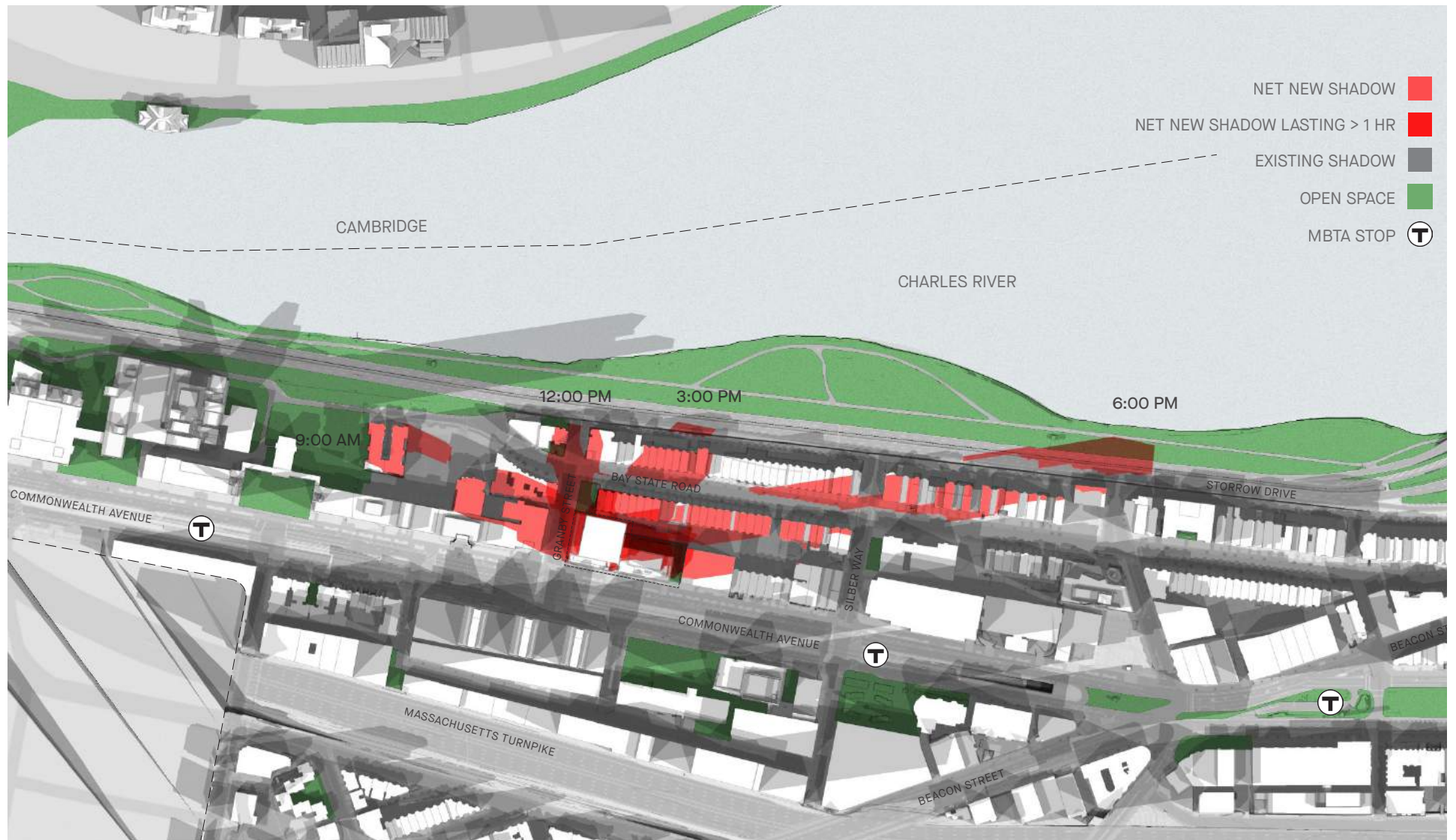
Location / Name	Description / Historic Name	Impact of Project on Resource
24 Buswell St Boston University Building	<i>Inventoried Property</i> Carminia Apartments	None
765 Commonwealth Ave	<i>Inventoried Property</i> Boston University School of Law Courtyard	None
630-640 Commonwealth Ave	<i>Inventoried Property</i> Boston University Communication Park	None







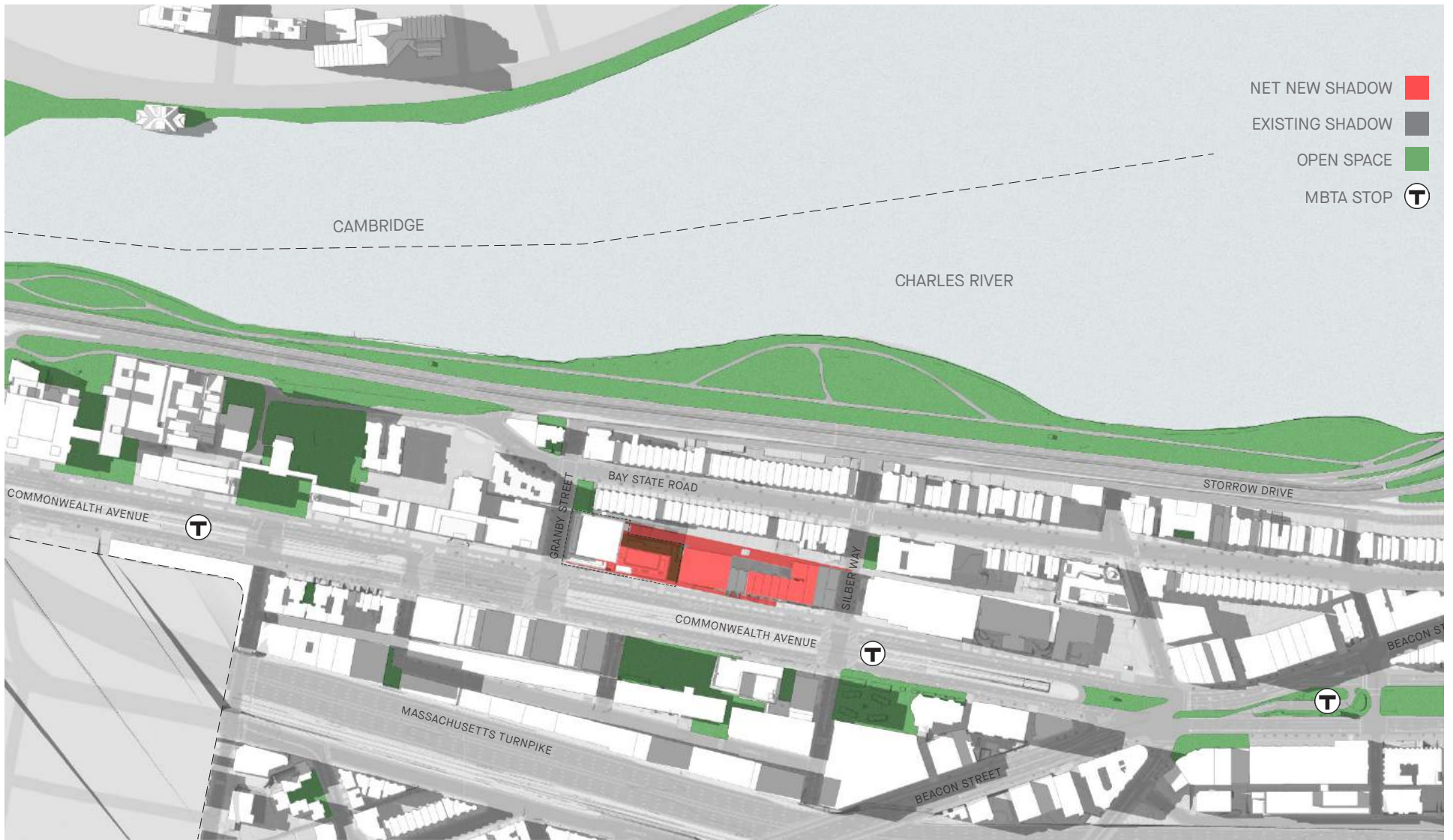




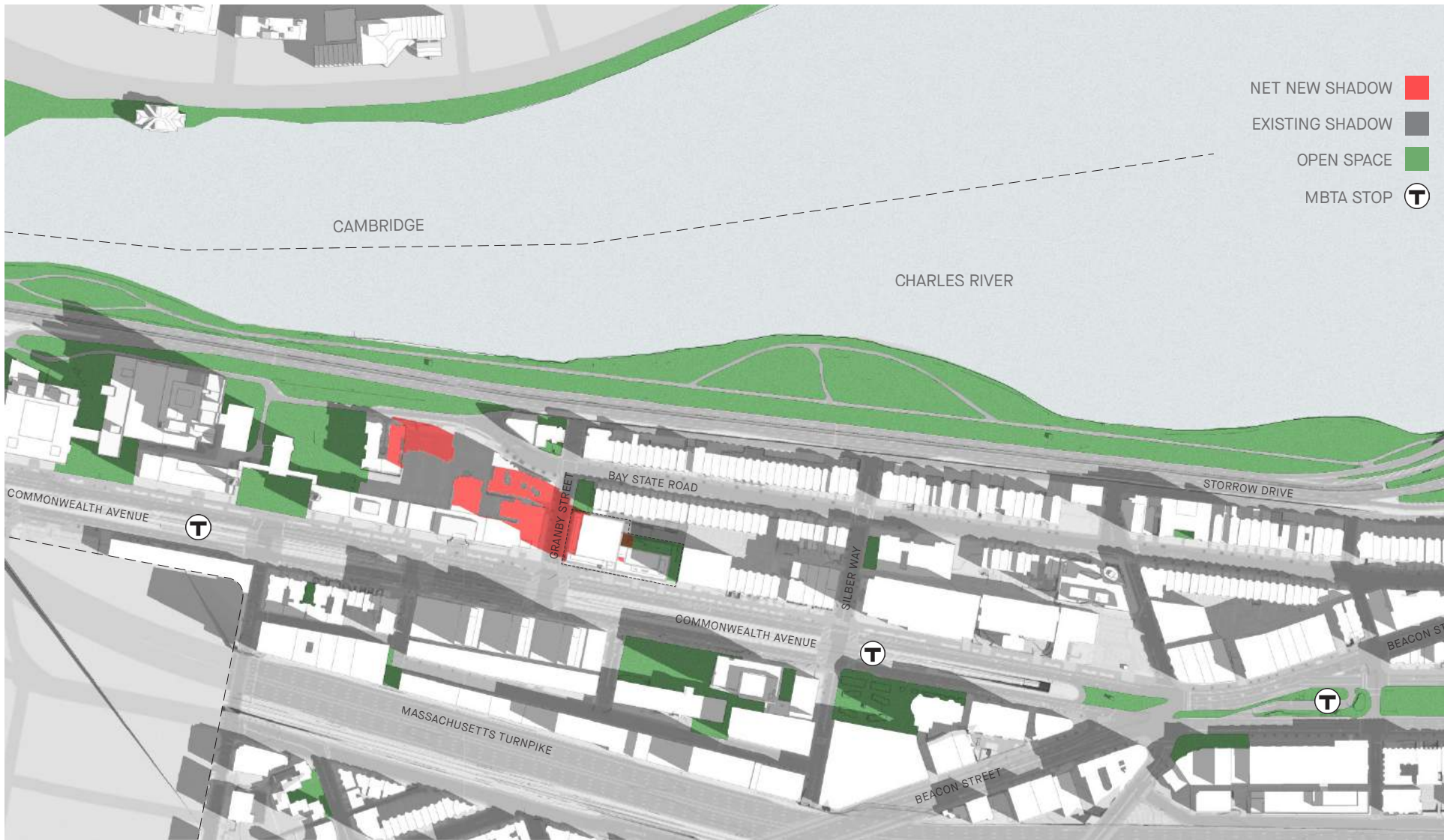






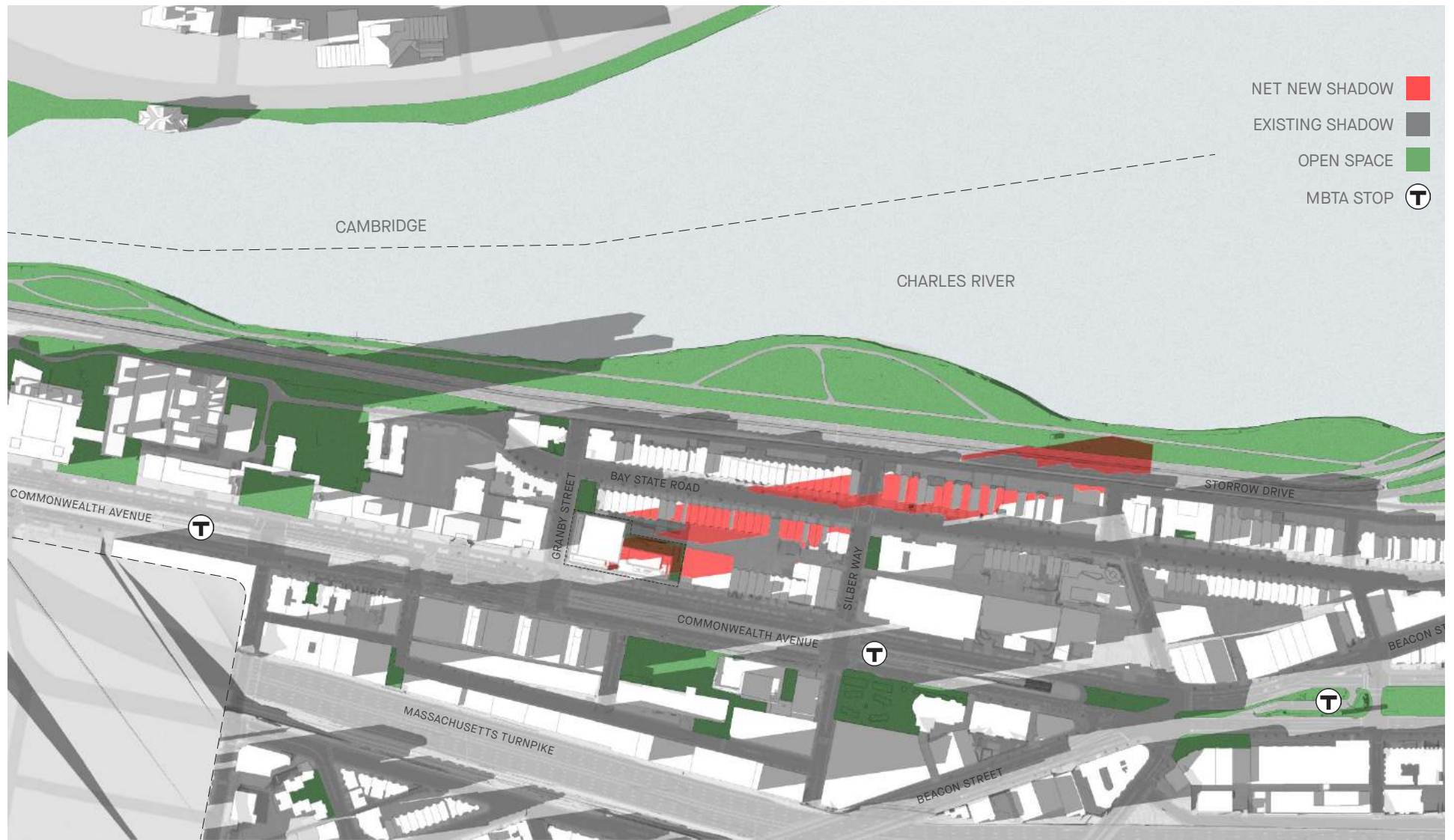


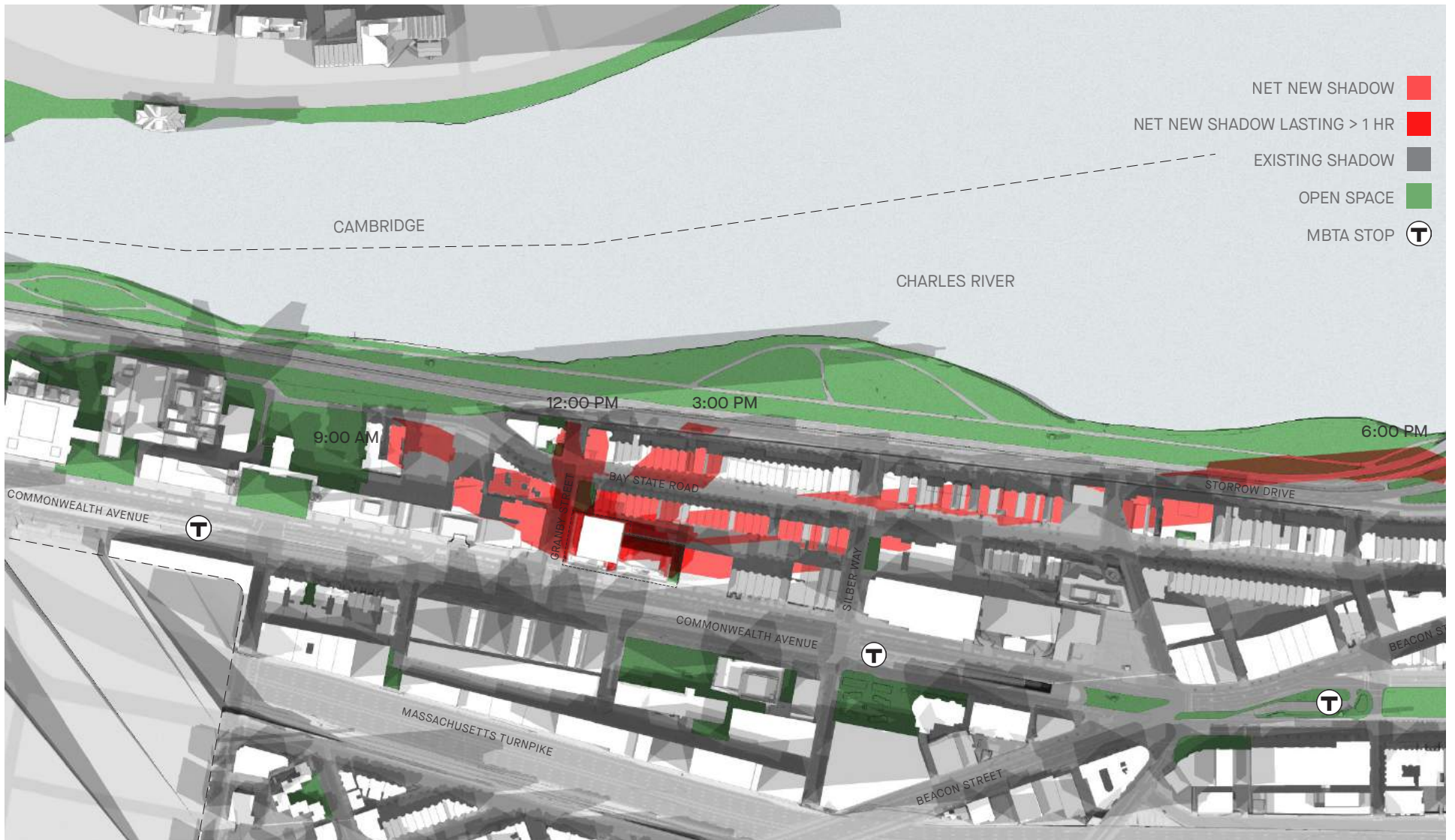


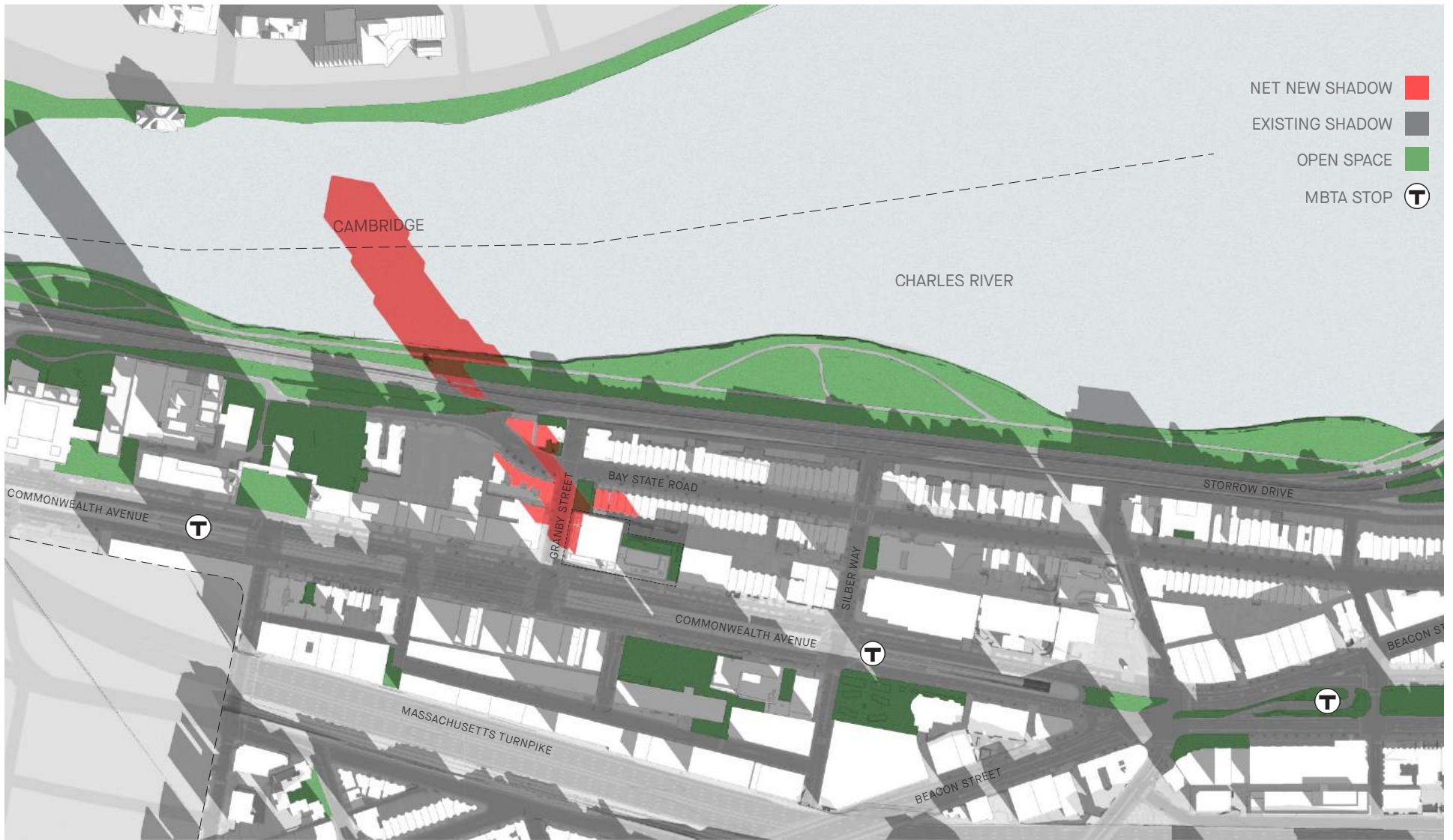




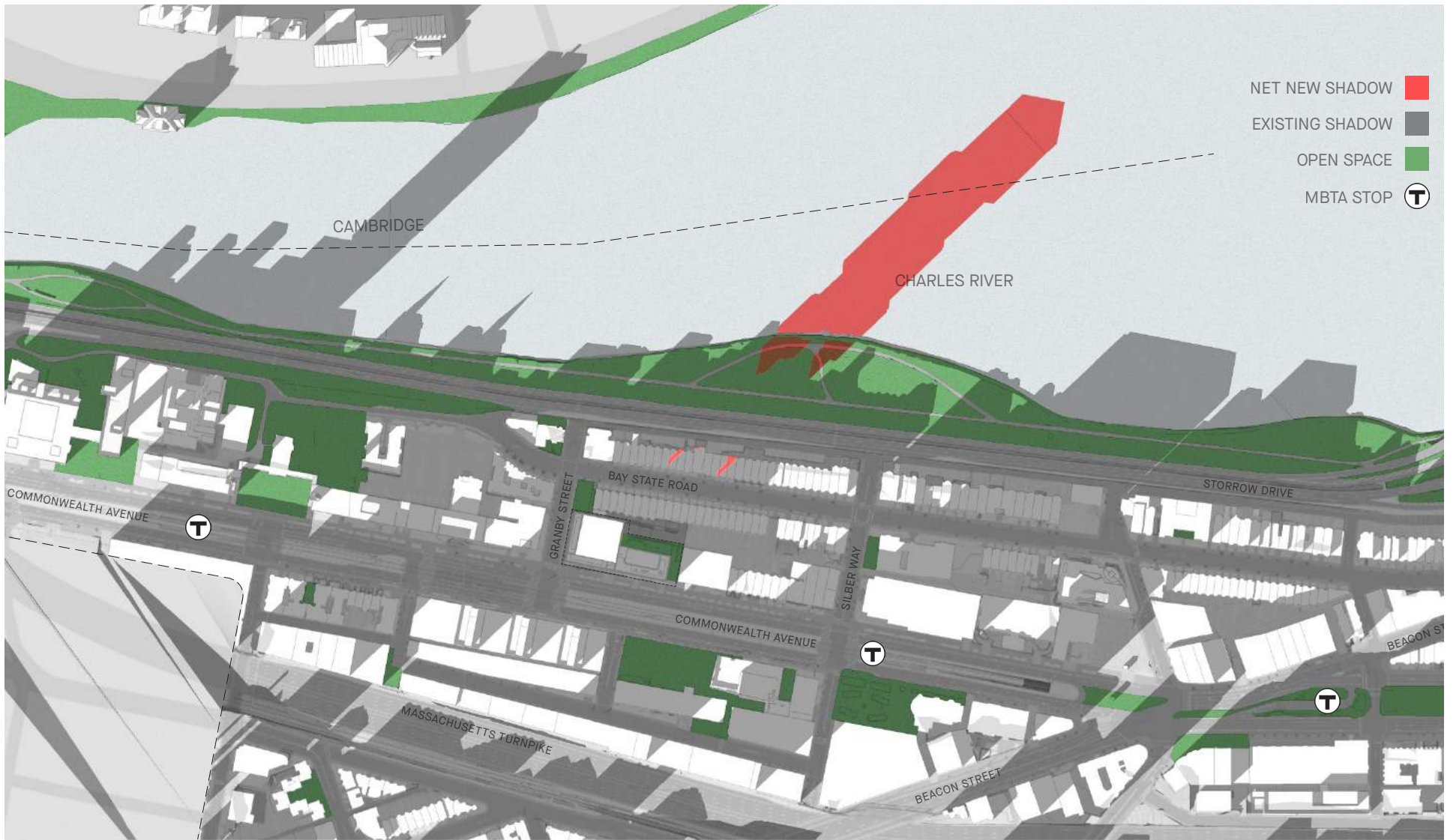


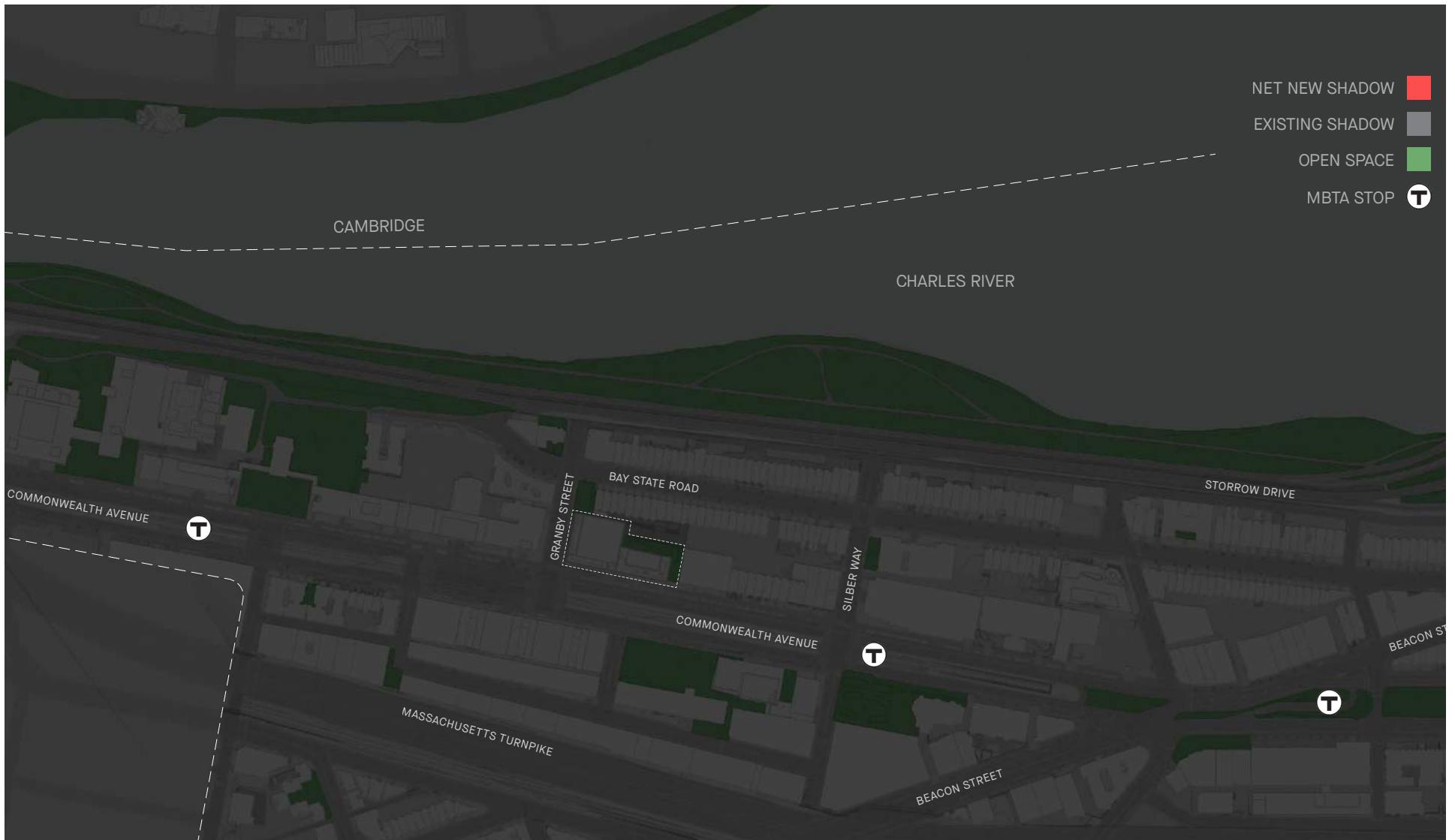


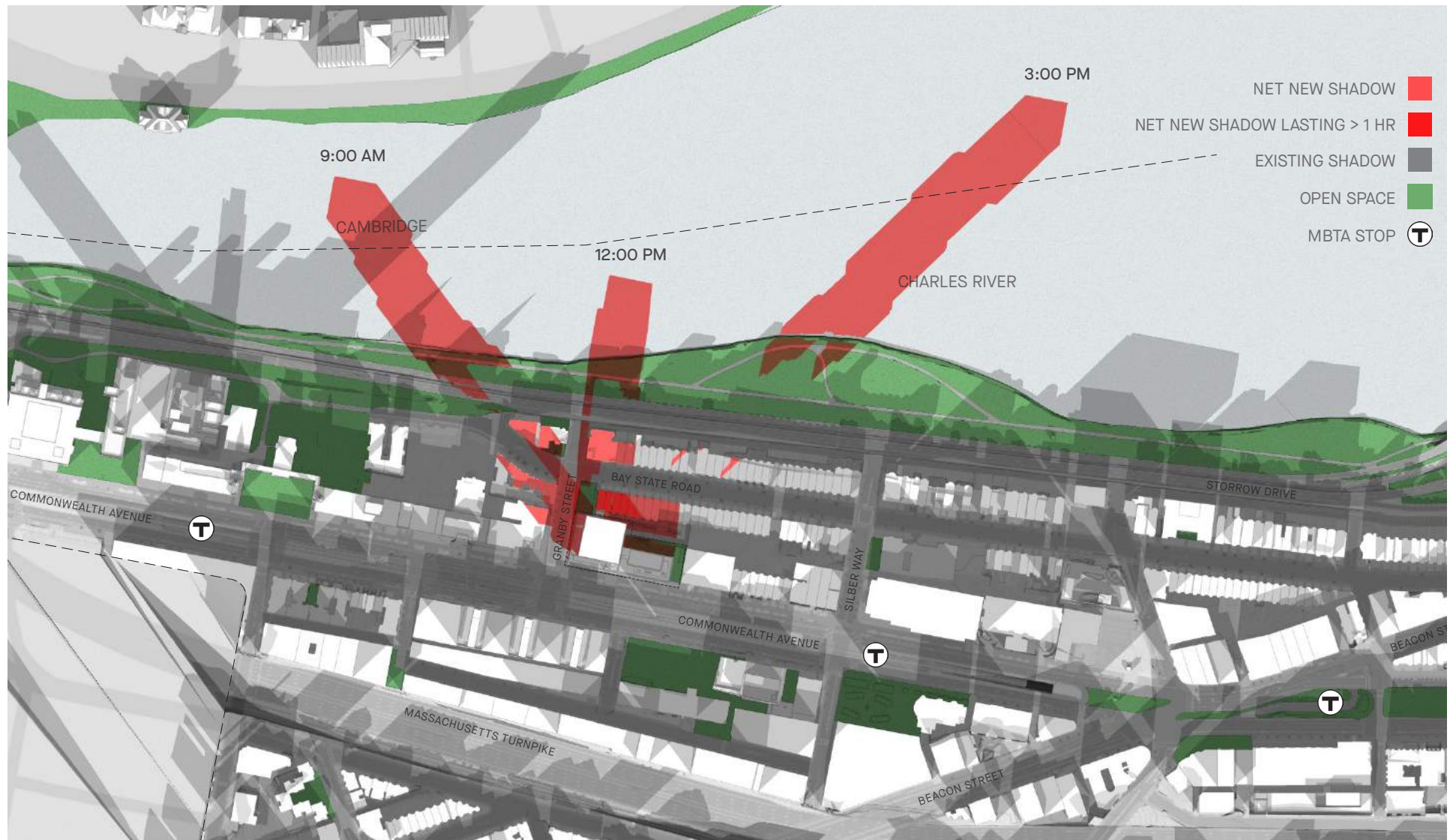


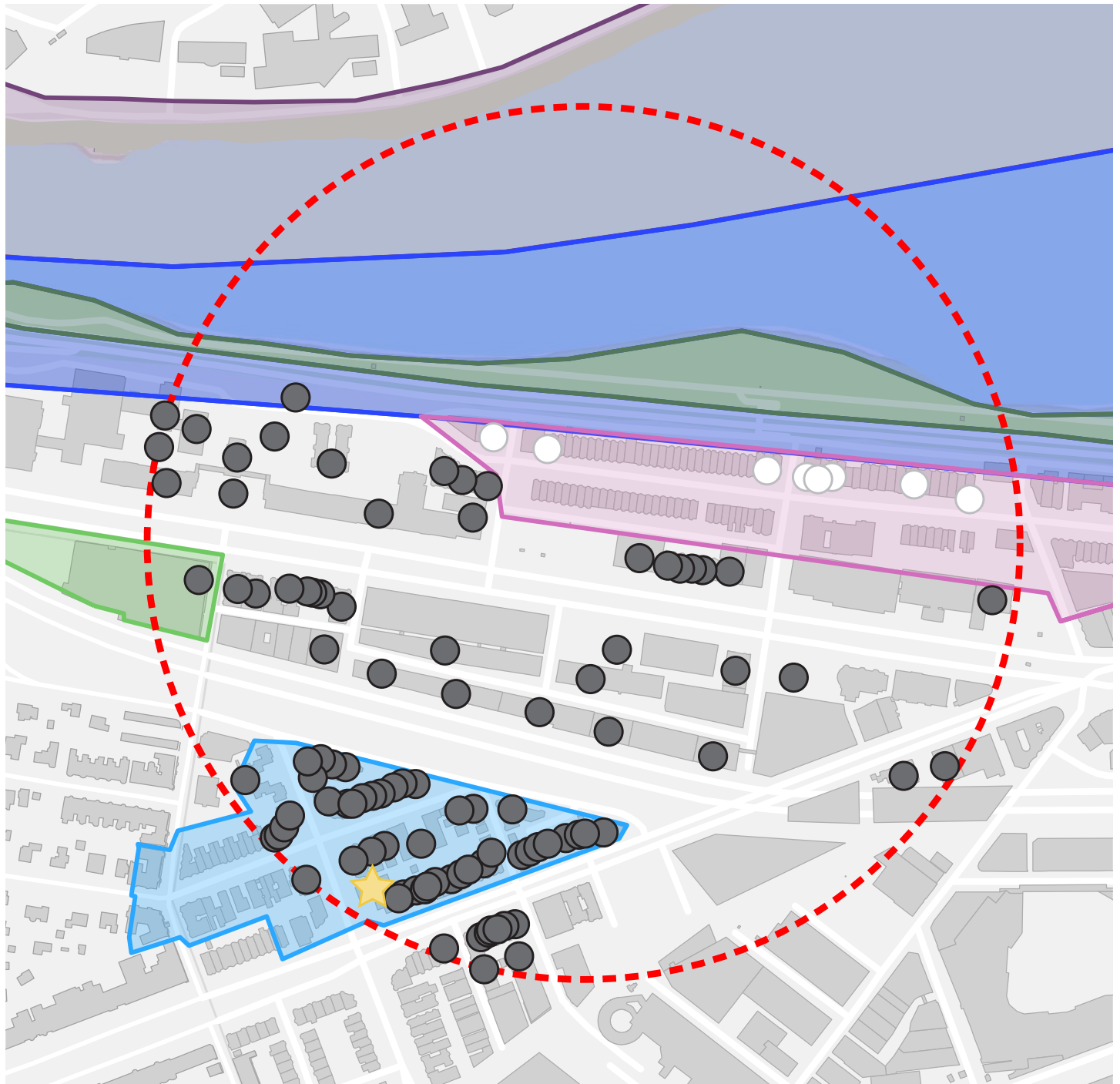














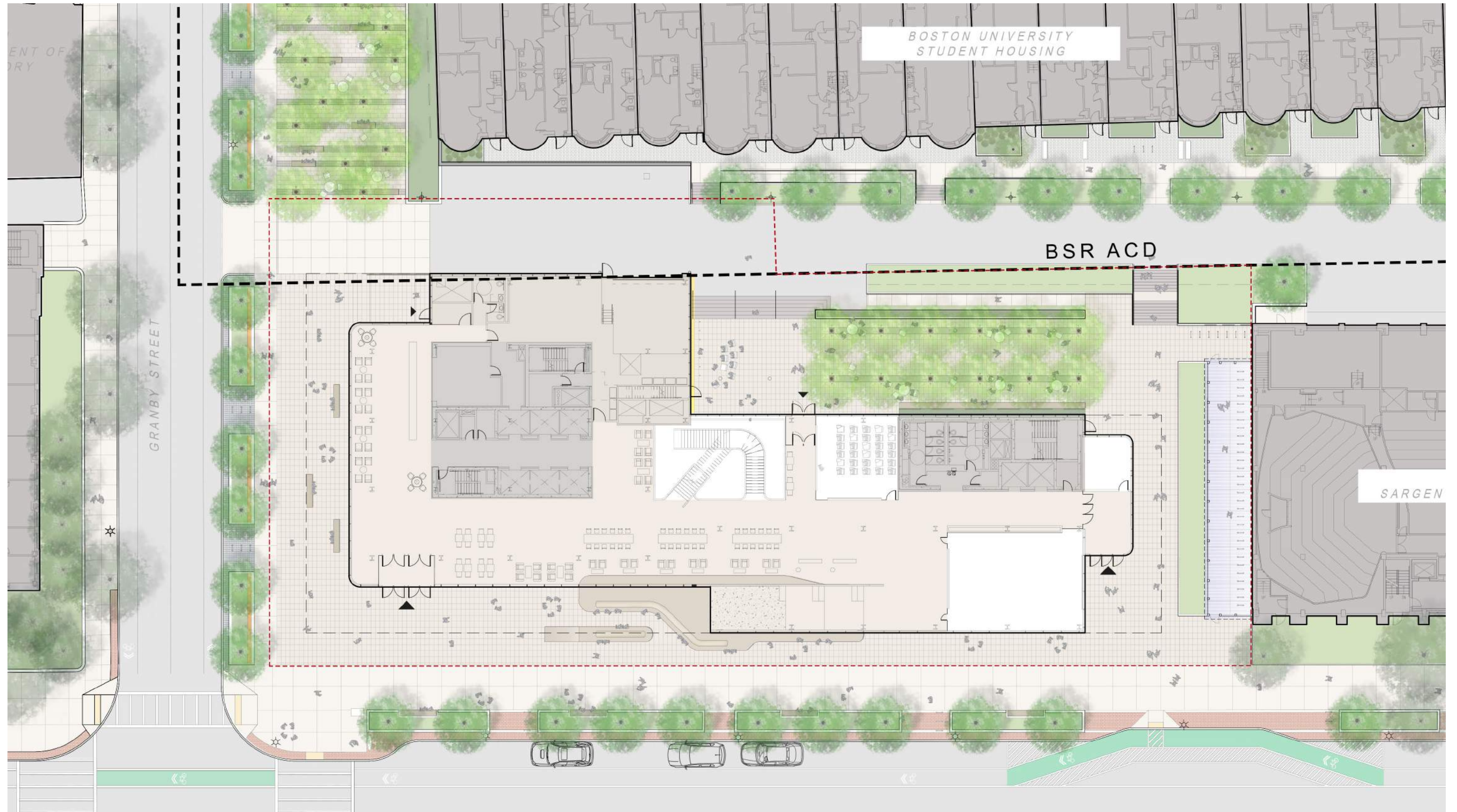


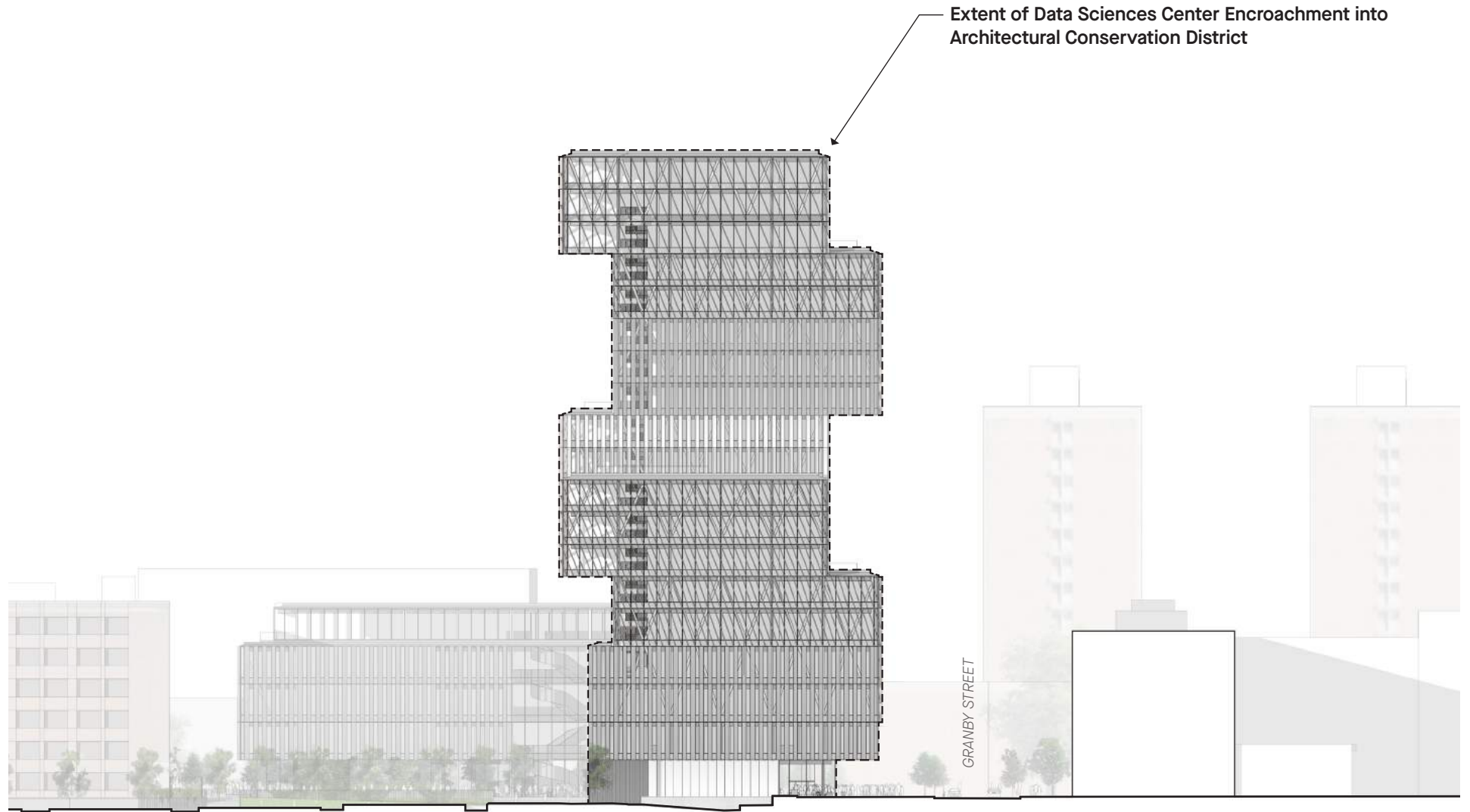


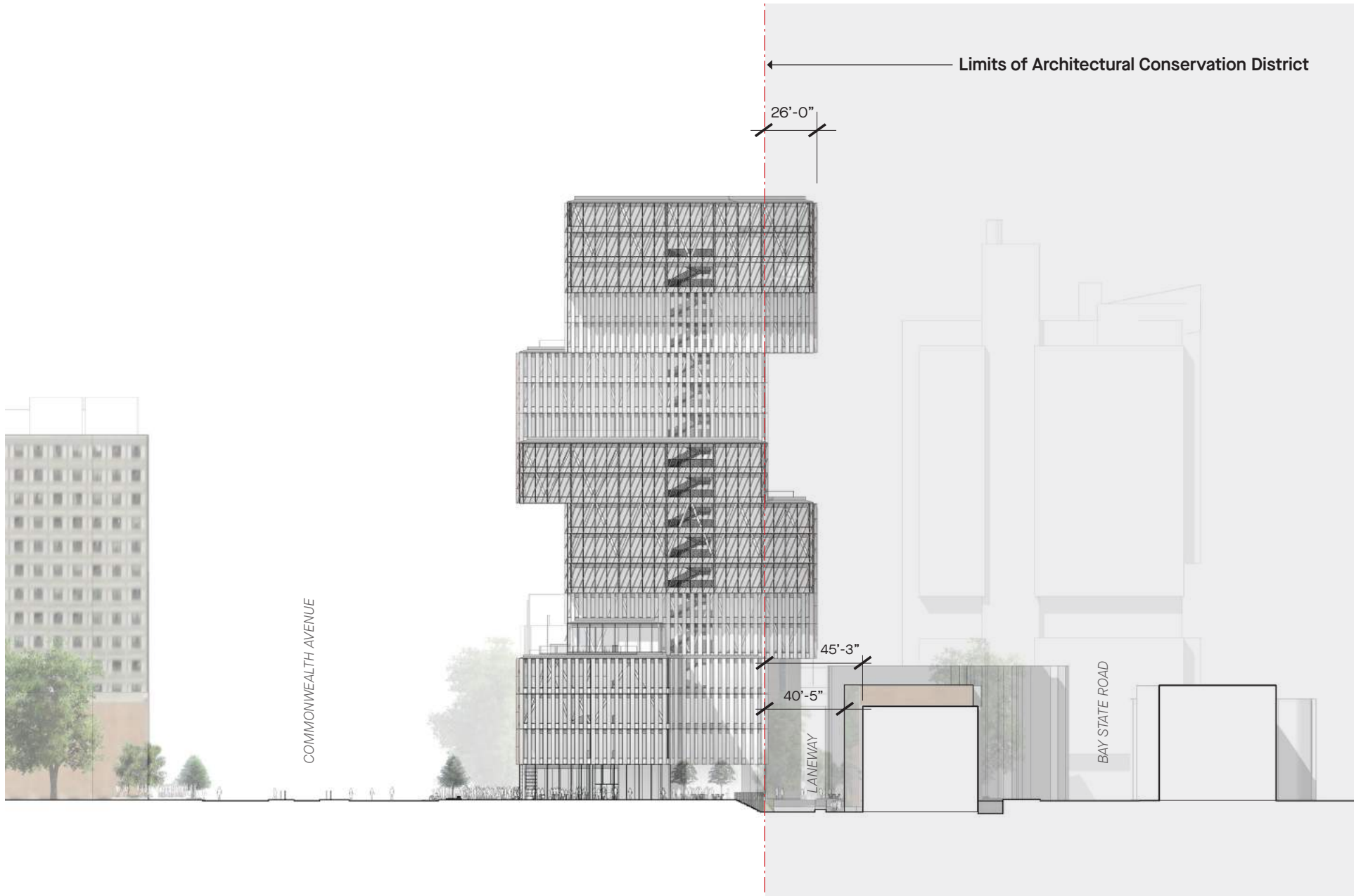


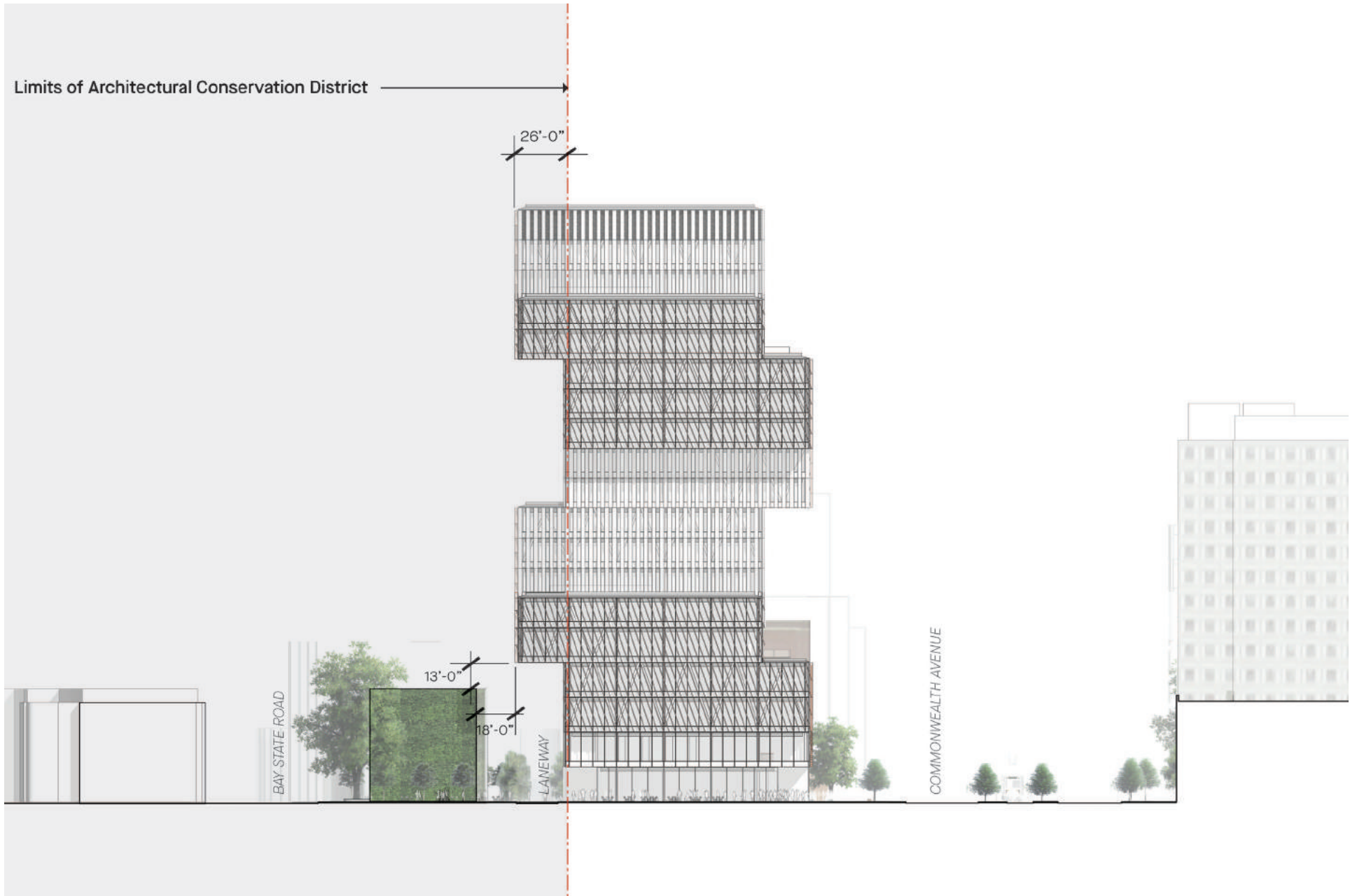


- | | | |
|--|---|---|
|  Inventory Area |  Charles River Basin Historic District - Cambridge |  Bay State Road/Back Bay West Architectural District |
|  Inventoried Property |  Charles River Basin Historic District - Boston |  Commonwealth Avenue Area |
|  Local Historic District |  Charles River Esplanade |  Audubon Circle |
|  National Register of Historic Places | | |









Chapter 7

INFRASTRUCTURE

CHAPTER 7: INFRASTRUCTURE

7.1 INTRODUCTION

This chapter outlines the existing utilities surrounding the 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:

- District heating and cooling
- Sewer
- Domestic water
- Fire protection
- Drainage
- Electricity
- Telecommunications

The Project, located on an existing surface parking lot, is comprised of approximately 305,000 sf of GFA that will house academic, meeting, office and research space on nineteen floors.

7.2 WASTEWATER

7.2.1 EXISTING SEWER SYSTEM

There are existing sewer mains in Granby Street and Commonwealth Avenue. An 18-inch Boston Water and Sewer Commission sewer main located in Granby Street flows southerly below Granby Street and westerly into an 18-inch main that runs through Boston University's property. There is also an existing 18-inch BWSC sewer main in Commonwealth Avenue, which flows westerly below the sidewalk on the north side of Commonwealth Avenue. The sewer mains eventually flow to an 84-inch x 89-inch Massachusetts Water Resource Authority (MWRA) combined sewer that ultimately ends up at the MWRA Deer Island Waste Water Treatment plant for treatment and disposal. See Figure 7-1, BWSC Sewer System Map.

7.2.2 PROJECTED SANITARY SEWER FLOW

The Project's sewage generation rates were estimated using the MassDEP Environmental Code (Title V) Section 310 CMR 15.00 and the proposed building program. Typical generation values are conservative values for estimating the

sewage flows from new construction and are used to evaluate new sewage flows or an increase in flows to existing conditions in gallons per day (GPD).

For the floors for which the architect has provided the average number of persons per floor, the generation unit was treated as a secondary school without cafeteria, gymnasium, or showers. For the floors without an average person per floor value, the office and classroom square footage were treated as an office building.

The Site is currently a parking lot, therefore there is no sewer generation from the existing use. A breakdown of the current sewer generation values for the Project are presented in Table 7-1.

The total sanitary flow for the Project is estimated to be 11,920 GPD.

Table 7-1: Projected Wastewater Generation

Use Category	Size/Units	Rate	Total Flow (GPD)
Offices	29,724 sf	75 GPD/1000 sf	2,230
Secondary School without cafeteria, gymnasium, or showers	969 people	10 GPD/person	9,690
Total			11,920

7.2.3 SANITARY SEWER CONNECTIONS

The sewer services for the Project are expected to connect to the existing BWSC-owned 18-inch sanitary sewer mains in Granby Street and Commonwealth Avenue. The proposed improvements and connections to BWSC infrastructure will be reviewed as part of the BWSC’s Site Plan Review process for the Project. The BWSC’s review 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.

7.2.4 CAPACITY OF EXISTING SEWERS

An evaluation of the capacities of the sewer lines in Granby Street and Commonwealth Avenue was performed to determine their ability to accommodate proposed flows from the Project. The results are presented in Table 7-2 and Table 7-3.

Table 7-2: Existing Sewer Capacity Evaluation – Commonwealth Avenue

Segment: MH to MH	Street Name	Segment Size (inches)	Length (feet)	Slope (%)	Capacity (MGD)
5-4E	Commonwealth Ave	18	252	0.40	4.32
4-3E	Commonwealth Ave	18	259	0.41	4.32
3-2	Commonwealth Ave	18	249	0.41	4.32
2-4W	Commonwealth Ave	18	249	0.38	4.17

Table 7-3: Existing Sewer Capacity Evaluation – Granby Street

Segment: MH to MH	Street Name	Segment Size (inches)	Length (feet)	Slope (%)	Capacity (MGD)
22-133	Granby Street	18	99	0.48	4.73
133-20	Granby Street	18	25	0.48	4.70
20-19	Granby Street	18	285	0.40	4.31
19-18	Granby Street	18	220	0.40	4.29

Note: The Manning's equation was used to calculate tabulated values. The roughness coefficient of 0.013, fair condition PVC or DIP, was used in the equation. Pipe sizes, slopes, and segment lengths were obtained from BWSC record drawings and GIS Maps. Segment lengths were approximated and rounded to the nearest foot. Manhole numbers were taken from BWSC GIS Maps, see Fig 7-1. Where inverts were not provided, an average slope was assumed between known inverts.

From Table 7-1, the estimated sewage discharge for the Project is 11,920 GPD, with a peaking factor of 10 0.12 million gallons per day (MGD) (total estimate = $0.012 \times 10 = 0.12$ MGD). This peak sewer discharge value is significantly less than the minimum 4.17 MGD full flow capacity of the 18-inch sanitary sewer main in Commonwealth Avenue and less than the 4.29 MGD full flow capacity of the 18-inch sanitary sewer main in Granby Street. On this basis, it is concluded that there is sufficient capacity in both sanitary sewer mains. The Proponent will coordinate with BWSC throughout the design process to ensure capacity is not an issue.

7.2.5 SEWER SYSTEM CONSERVATION AND MITIGATION MEASURES

To reduce impacts of the Project's sewage generation and help conserve water, the Project will meet all applicable code requirements including the installation of low-flow toilets and flow-restricting faucets. As part of the Project's goal to achieve LEED Certification, the Project will incorporate water conservation measures in accordance with LEED credits. New sanitary sewer services for the Project will be designed and construction to BWSC construction standards to minimize inflow into the sanitary sewer collection system.

7.3 WATER SYSTEM

7.3.1 EXISTING WATER SYSTEM

There are existing water mains in Granby Street and Commonwealth Avenue. Water for the Site will be provided by BWSC. There are five water systems within the City that provide service to portions of the City based on ground surface elevation. The five systems are southern low (commonly known as low service), southern high (commonly known as high service), southern extra high, northern low, and northern high.

There is an existing 8-inch, ductile iron, cement lined, southern low water main operated by BWSC along the east side of Granby Street that was installed below Granby Street in 2000.

There is an existing 16-inch, pit cast iron, southern low water main operated by BWSC on the north side of Commonwealth Avenue that was originally installed in 1893 but was replaced in 1990. This 16-inch water main feeds a hydrant on the north side of Commonwealth Avenue and an existing 4-inch fire protection service that might be abandoned. There is also an existing 12-inch low water main operated by BWSC on the south side of Commonwealth Avenue. The Project does not propose any utility crossings for the water main on the south side of Commonwealth Avenue. See Figure 7-2, BWSC Water System Map.

A capacity analysis will be performed by conducting hydrant flow tests on the existing water systems to confirm the availability of water supply for both the domestic and fire protection needs of the Project.

7.3.2 ANTICIPATED WATER CONSUMPTION

The Project's estimated water demand was estimated assuming 110 percent of the Project's sewer generation; typical engineering practice assumes a 10 percent loss between the Project's water demand and sewer generation through typical building uses. The Site is currently used as a parking lot, therefore there is no water demand at present.

A breakdown of the proposed water demand values is presented in Table 7-4. The proposed water demand for the Project is expected to be 13,112 GPD. The Proponent does not anticipate capacity issues for the Project. The Proponent will coordinate with BWSC throughout the design process to ensure capacity is not an issue.

Table 7-4: Project Water Demand

110% Sewer Generation	Average Daily Use (GPD)
110% x 11,920 GPD	13,112

7.3.3 PROPOSED WATER SERVICE

The Project’s domestic and fire protection services are expected to tie into the BWSC-owned water main located in Commonwealth Avenue and/or Granby Street via new domestic and fire protection service laterals.

The domestic and fire protection water service connections required for the Project will meet the applicable BWSC, state, and federal codes and standards, including cross-connection backflow prevention. Compliance with the standards for the 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.

7.3.4 WATER SUPPLY CONSERVATION AND MITIGATION MEASURES

Measures to reduce water consumption will be incorporated into the Project design. 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. The Project will comply with the Commonwealth’s Stretch Energy Code and as such, will reduce energy use from the baseline energy conservation by approximately 30 percent. Backflow preventers will be installed at both domestic and fire protection service connections. New meters will be installed with Meter Transmitter Units as part of the BWSC’s Automatic Meter Reading system.

The State Building Code requires the use of water-conserving fixtures. Water conservation measures such as low-flow toilets and restricted flow faucets will help reduce the domestic water demand on the existing distribution system. The installation of sensor-operated sinks with water conserving aerators and sensor-operated toilets in all non-residential restrooms will be incorporated into the design plans for the Project.

7.4 STORM DRAINAGE SYSTEM

7.4.1 EXISTING STORM DRAINAGE SYSTEM

There is an existing 15-inch to 21-inch BWSC-owned storm drain that flows westerly under Commonwealth Avenue. The storm drain eventually flows to an 84-inch x 89-inch MWRA combined sewer that ultimately ends up at the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

There is an existing 12-inch BWSC owned storm drain that flows northerly under Granby Street and easterly to a 116-inch x 120-inch storm drain outfall into the Charles River.

The Site is currently used as a parking lot, and the majority of the lot is impervious cover. See Figure 7-3, BWSC Stormwater System Map.

The Project's potential impact of the existing storm drain mains in Granby Street was analyzed. The existing storm drain system capacity calculations for Granby Street are presented in Table 7-5.

Table 7-5: Existing Storm Sewer Capacity Evaluation – Granby Street

Segment: MH to MH	Street Name	Segment Size (inches)	Length (feet)	Slope (%)	Capacity (MGD)
46-45	Granby Street	12	46	0.40	4.32
45-47	Granby Street	18	120	0.41	4.32
47-102	Granby Street	18	14	0.41	4.32
102-106	Granby Street	24	800	0.38	4.17

BWSC did not have record information or as-builts showing the information required to analyze the storm drains in Commonwealth Avenue. The Proponent does not anticipate capacity issues for the Project since the proposed stormwater management systems will be designed to decrease or maintain the existing peak flow rate and volume of stormwater runoff from the Site. The Proponent will coordinate with BWSC throughout the design process to ensure capacity is not an issue.

7.4.2 PROPOSED STORM DRAINAGE SYSTEM

Stormwater improvements will be reviewed as a part of the BWSC Site Plan Review process. This process includes a comprehensive design review of the proposed service connections, assessment of Project demands and system capacity, and establishment of service accounts. The proposed stormwater management system will collect site runoff and retain 1.25 inches of rainfall over the Project's

impervious area, per the BWSC stormwater management and the requirements of the BostonGCOD. The Project's storm drainage system will discharge to the BWSC-owned storm drain systems in Granby Street and Commonwealth Avenue.

Site runoff will be collected by closed drainage systems and treated before overflowing to the BWSC storm drainage system. Stormwater runoff will be directed to various proposed recharge systems on the Site. The recharge systems will be comprised of a combination of subsurface systems and stormwater injection wells.

Stormwater flows to the laneway will be designed to prevent an increase of flows to this area. Subsurface stormwater recharge tanks and injection wells will be installed to promote infiltration of water within the laneway and from the adjacent buildings.

All work on the drainage systems will be performed in accordance with BWSC standards and will be submitted to the necessary agencies for review and approval prior to implementation.

7.4.3 MITIGATION MEASURES

The stormwater management system will maintain or decrease the peak flow rate and volume of stormwater runoff from the Site to both the storm drain systems in Granby Street and Commonwealth Avenue to the maximum extent practicable. New stormwater runoff will not be directed toward abutters. No capacity issues in the existing storm drain pipes are anticipated as a result of the Project.

Catch basins installed will be standard BWSC catch basins with deep sediment sumps and traps. BWSC "Don't Dump – Drains to Charles River" plaques will be installed at new catch basins and at existing catch basins if they are not already present.

The Project will not adversely 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 remove sediment from runoff. These erosion 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.

If required, site dewatering permits will be obtained, and work 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 described in the following section.

7.4.4 MASSDEP STORMWATER MANAGEMENT POLICY STANDARDS

In March 1997, MassDEP adopted a new Stormwater Management Policy to address non-point source pollution. The Massachusetts Stormwater Handbook was published the same year as guidance on the Stormwater Policy and 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 brief explanation of each Policy Standard and the system compliance is provided 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. 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.

Compliance: The proposed design will comply with this Standard to the maximum extent practicable. The post-development peak discharge rates will not exceed the pre-development peak discharge rates through methods involving stormwater recharge on site to the maximum extent practicable and will be coordinated with BWSC throughout the design process.

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 to the maximum extent practicable

Standard #4: Stormwater management systems shall be designed to remove 80 percent 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. The Project will not have an impact on stormwater runoff quality. The Project storm drain service will not discharge to a combined sewer.

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 Project is not associated with Higher Potential Pollutant Loads (per the Policy, Volume I, page 1-6).

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 "stormwater discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

Compliance: The Project will not discharge untreated stormwater to a sensitive area or any other 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 stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

Compliance: The Project is considered a re-development per the MassDEP Standards and will meet the credits 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 Project will comply with this standard. Sedimentation and erosion controls will be incorporated as part of the design of the Project and employed during construction.

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 BMP operation requirements will be prepared for the 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 Project.

7.4.5 STORMWATER QUALITY DURING CONSTRUCTION

Stormwater Management Best Management Practices relative to stormwater pollution prevention, erosion, and sediment control will be implemented during construction. These will include:

- Protection of adjacent catch basins by installation of either hay bales or filter fabrics to prevent sedimentation from entering stormwater conveyance system.
- Installation of wheel wash stations at construction site egress points to prevent tracking of mud and dirt onto public roads by construction vehicles.
- Utilization of sedimentation tanks or pits where appropriate to control and contain runoff during construction, including that derived from dewatering activities. Dewatering discharge will pass through a MassDEP approved sedimentation basin prior to discharge into the BWSC drainage system.
- Implementation of dust/emission controls. Examples of measures for dust control include use of wet suppression (alone or with approved binding agents) on a routine basis using a water truck and the use of wet spray power vacuum street sweepers on paved roadways.

7.5 ELECTRICAL SERVICES

The local electrical service provider is Eversource. During preliminary discussions, Eversource indicated that there is existing infrastructure running in the sidewalk of Commonwealth Avenue next to the Site consisting of a 15KV duct bank with eight conduits arranged in a four by two configuration and two 115 KV lines.

The building is proposed to be fed from the utility company as a primary metered electrical service. The building incoming service shall consist of a new dual line 15KV primary switchgear arrangement configured in accordance with the standards and criteria of Eversource and located in a new utility vault within the new building. A new private property manhole will be provided on the Site adjacent to the building vault location with conduits stubbed out to the property line for extension to the utility company existing infrastructure and manholes in Commonwealth Ave provided by the utility company.

7.6 TELECOMMUNICATIONS SYSTEM

Redundant Telecommunications Duct Banks will be extended from the street into the Main Distribution Frame (MDF) of the building to provide Boston University campus network and

telephone services to the building. Single mode fiber optic cables will be used to distribute network and telephone services from the MDF to Intermediate Distribution Frames (IDFs) located on the individual floors. The floor IDFs will serve as an aggregation point for all the network and telephone outlet cabling located within 250'-0". The network and telephone workstation outlet will be Category 6A structured cabling system designed to meet Boston University's campus standards.

Network and Telephone switching and routing equipment will be provided by Boston University IS&T and will be located in the MDF and IDFs to distribute the Local Area Network (LAN) to the Internet, Telephone Service Provider, and Boston University Campus Data Center. All network equipment located in the MDF or IDFs will be powered by a Centralized Uninterruptible Power Supply (UPS) located in the MDF and distributed throughout the IDFs.

7.7 DISTRICT HEATING AND COOLING OR GROUND SOURCE HEAT EXCHANGE SYSTEMS

The heating/cooling infrastructure serving the Project will be exclusive to the Data Sciences Center. The goal is to provide a very low energy consumption heating, cooling, and lighting system that is leading-edge in its design and annual efficiency. The systems are being designed in collaboration with highly effective building envelope systems and shading systems to minimize external environmental cooling and heating loads. There will be no connection to existing Boston University campus chilled water and steam systems.

The Proponent is exploring, after installing and evaluating the results from three test wells, the installation of a stand-alone heating/cooling system that relies upon geothermal heating and cooling for the majority of the annual loads. If this option proves to be feasible, fossil fuels will not be used for primary heating and cooling.

The systems within the Data Sciences Center could include a combination of high efficiency air handling systems consisting of air handling units, geothermal heat recovery chillers, geothermal wells, load-peaking electric boilers (for partial heating), pumps, and miscellaneous fan systems.

7.8 NATURAL GAS SYSTEM

At this time, no natural gas is expected to be provided to the building under the Base building design, which uses electric boilers for heating load peaking capacity and during power outages.

7.9 UTILITY PROTECTION DURING CONSTRUCTION

Existing public and private infrastructure located within nearby public rights-of-way and the alley will be protected during the construction of the Project. The installation of proposed utility connections within public ways will be undertaken in accordance with the BWSC, Boston Public Works Department, the Dig Safe Program, and applicable utility company requirements. Specific methods for constructing proposed utilities where they are near to, or connect with, existing water, sewer, and drain facilities will be reviewed by the BWSC as part of its Site Plan Review process. All necessary permits will be obtained prior to the commencement of work.

The Proponent will continue to work and coordinate with the BWSC and the utility companies to ensure safe and coordinated utility operations in connection with the Project.

7.10 FIRE PROTECTION

Two 8" fire services shall be provided to the building supplied from the municipal water supply located on Granby Street. Each service shall be protected with an 8" double check valve assembly.

The fire protection system is proposed to be supplied by a fire pump rated for 1,500 GPM and 225 PSI. The fire pump shall be located in a dedicated 2-hour rated room located in the Basement Level of the building and will have direct access to the exterior of the building via 2-hour rated corridors and stairs. Two fire department connections and electric bells are required at the exterior of the building and must be located within 100' of a fire hydrant.

The standpipe system shall consist of three interconnected combination sprinkler/standpipe risers located on the main landing within egress stairs and one additional standpipe riser (required to satisfy 200' travel distance requirements between stairs). All standpipes shall be 6", consist of 2-1/2" fire department valves, and be designed to deliver 100 PSI at the top most outlet of the building.

The sprinkler system shall be zoned per floor, with sprinkler floor control valve assemblies located within two egress stairs at each level to dual feed each sprinkler zone. All sprinklers within the atrium compartment shall be zoned separately, requiring additional sprinkler floor control valves on all floors that open to the atrium.

