PACKARD CROSSING:
79-83 GARDNER ST | 45-55 BRIGHTON AVE

Project Notification Form

July 29, 2016

Submitted Pursuant to Article 80B of the Boston Zoning Code

Submitted by:
The Hamilton Company
39 Brighton Avenue
Boston, MA 02134

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

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McPhail Associates
Soden Sustainability Consulting
Tech Environmental, Inc.

July 29, 2016

Brian Golden, Director
Boston Redevelopment Authority
Boston City Hall, 9th Floor
Boston, MA 02201
Attn: Edward M. McGuire III, Project Manager

Re: Packard Crossing: 79-83 Gardner Street/45-55 Brighton Avenue, Allston
Mixed-Use, Multi-Family Residential/Retail Development
Project Notification Form (PNF)

Dear Director Golden:

The Hamilton Company, together with its affiliates and related companies (collectively the "Proponent"), the owners of the real property located at 79-83 Gardner Street / 45-55 Brighton Avenue is happy to submit this Expanded Project Notification Form (the "PNF") with the Boston Redevelopment Authority ("BRA") pursuant to Article 80B, Large Project Review of the Boston Zoning Code (the "Code") for the Packard Crossing: Mixed-use, Multi-Family Residential / Retail Development on a 83,993 square foot (approximately 3-acre) site. The Proponent's proposal, to be developed in two phases, contemplates revitalizing an underutilized site in the Allston Neighborhood of Boston. The scope and scale of the Proponent's residential program is intended to further the residential policy goals of Boston Mayor Martin J. Walsh's 2030 Housing Plan.

The Proponent's proposal for the initial phase of the development at 79-83 Gardner Street (Phase 1) originally was proposed to be submitted in conformity with the BRA's Small Project Review Application ("SPRA") submission procedures as total gross square footage is below 50,000 gsf, while the proposal for 45-55 Brighton Avenue (Phase 2) would be submitted in conformity with Article 80B, Large Project Review ("LPR") requirements, as the project is in excess of 50,000 gsf. At the request of the BRA, the Proponent has voluntarily joined both phase developments together in one submission in accordance with LPR procedures which will allow for public and agency review of both phases and the overall master plan concept for the entire site.

The Phase 1: 79-83 Gardner Street Project Site contains an underutilized surface parking lot and an existing Victorian style house which will be incorporated into the proposal. The Phase 2: 45-55 Brighton Avenue Project Site contains an underutilized surface parking lot and an automotive store and related uses.

The Proposed Project will exceed the 50,000 square foot total build-out size requirement for a project within a Boston neighborhood and therefore requires the preparation of filing(s) under the Large Project Review regulations, pursuant to the Code. A Letter of Intent to File a Project Notification Form was filed with the BRA for the Proposed Project on June 24, 2016 (attached as **Appendix A** to this PNF).

In support of the required Article 80 Large Project Review process, the Proponent has conducted, and will continue to conduct, community outreach with neighbors and abutters of the Site, including meetings and discussions with the elected representatives and officials from the area, and with the residents of the adjacent Brighton neighborhood.

The public notice for the PNF appears in the August 1, 2016 edition of the *Boston Herald*. In accordance with BRA requirements, please find attached ten (10) copies of the PNF plus a CD disk for placing the PNF filing on the BRA online portal website for public review.

On behalf of the entire project team, we would like to thank you and the BRA staff assigned to the Packard Crossing Project, particularly Project Manager, Edward McGuire III and Senior Architect, Michael Cannizzo, for invaluable assistance provided to allow the Project Proponent to achieve this comprehensive PNF filing.

We believe that the Proposed Project will be a significant positive addition to Allston neighborhood, by revitalizing this under-utilized site with much-needed new multi-family housing and ground floor retail uses, and we look forward to reviewing this PNF with the BRA, City officials, members of the Impact Advisory Committee and the overall Allston Brighton community.

Sincerely,

THE HAMILTON COMPANY

Stephen Weinig, Vice President

Attachment: Packard Crossing Project Notification Form
(10 Copies Plus CD Disk)

Cc: Jonathan Greeley, BRA Director of Development Review and Policy
District City Councilor Ciommo
State Representative Honan
State Senator Brownsberger
Warren O'Reilly, Allston-Brighton Representative, MONS
Mitchell L. Fischman, MLF Consulting LLC

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

The Hamilton Company, together with its affiliates and related companies (collectively the "Proponent"), the owners of the real property located at 79-83 Gardner Street / 45-55 Brighton Avenue is submitting this Project Notification Form for the Packard Crossing, mixed-use residential/retail development. The Proponent's proposal contemplates revitalizing an underutilized site in the Allston/Brighton Neighborhood of Boston with a dynamic new mixed-use, retail/residential development, to be developed in two phases.

The Proponent's proposal for the initial phase of the development at 79-83 Gardner Street (Phase 1) originally was proposed to be submitted in conformity with the Small Project Review Application ("SPRA") submission regulations as total gross square footage is below 50,000 gsf, while the proposal for 45-55 Brighton Avenue (Phase 2) would to be submitted in conformity with Article 80B, Large Project Review ("LPR") requirements, as the project is in excess of 50,000 gsf. At the request of the Boston Redevelopment Authority, the Proponent has voluntarily joined both phase developments together in one submission in accordance with LPR requirements which will allow for review of both phases and the overall master plan concept for the entire site.

The Phase 1: 79-83 Gardner Street Project Site contains an underutilized surface parking lot and an existing Victorian style house. The Phase 2: 45-55 Brighton Avenue Project Site contains an underutilized surface parking lot and an automotive store and other related uses.

The overall Project Site (including Phases 1 and 2) contains approximately 83,993 square feet (approximately 1.93 acres) with the lot area for the Gardner Street Project Site containing 36,764 square feet (approximately 0.84 acres), and the Brighton Avenue Project Site containing 47,229 square feet (0.85 acres).

The Proponent's overall proposal includes development of two new residential buildings containing a total of 114 multi-family, dwelling units including the renovation of three existing units within an existing Victorian house located at 83 Gardner Street. There will be 3,050 gsf of street level retail space along Brighton Avenue and 212 covered parking. This will allow for a parking ratio of one parking space per unit (the "Overall Project") meet the requirements for the retail space and the existing parking demand on site. The proposed buildings will be interconnected through rich new landscaped walkways. The Overall Project will include one new building along Brighton Avenue and one new building along Gardner Street, as more specifically described below. The Overall Project's height, density and uses are in context to the immediate areas along both Brighton Avenue and Gardner Street. In addition, the Proposed Project will further the objectives of Mayor Martin J. Walsh's Housing Plan, Housing a Changing City: Boston 2030. (See **Figure 1-1.** Project Locus and **Figure 1-2.** USGS Map**)**.

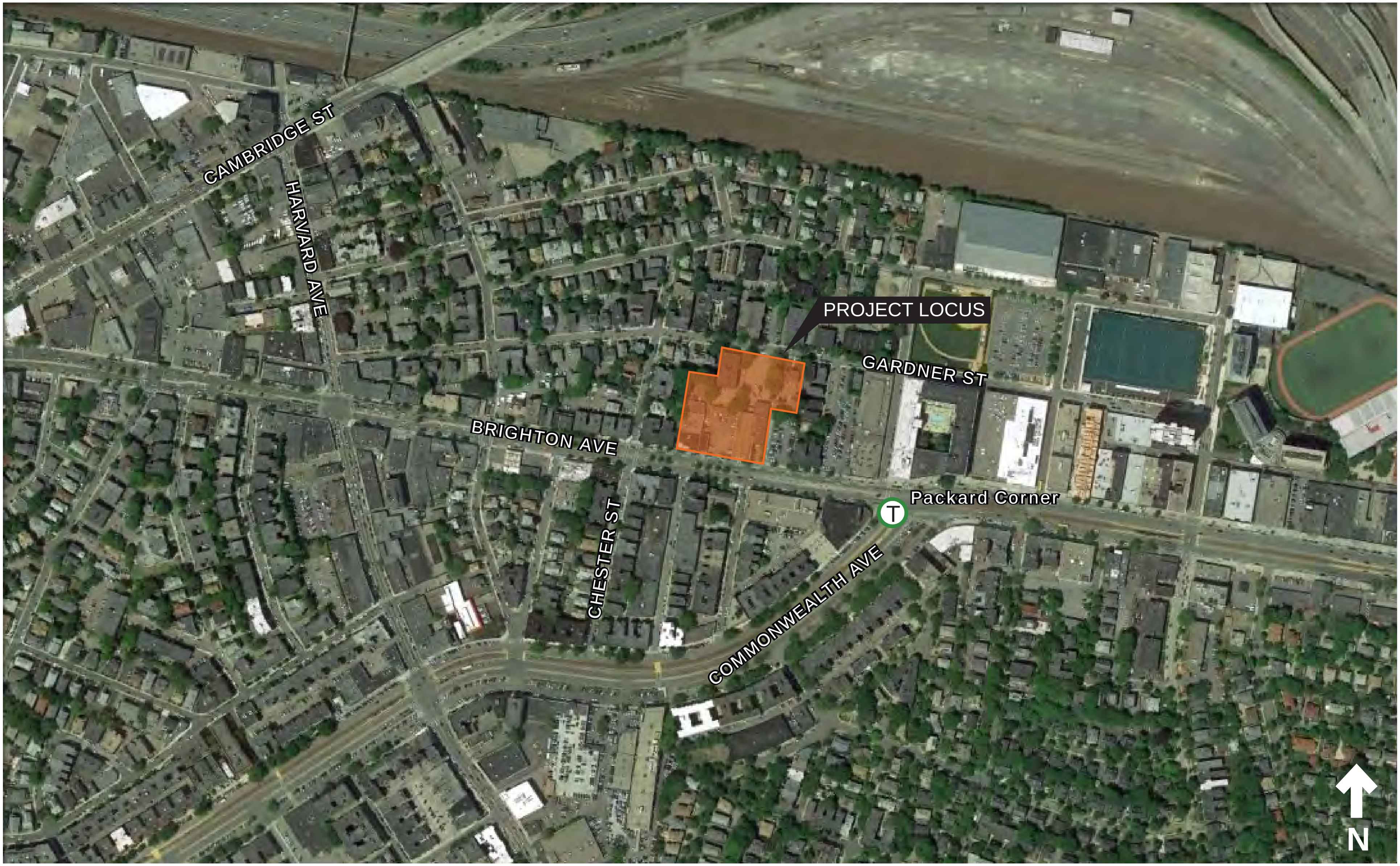


Figure 1 - 1
Project Locus - 79-83 Gardner Street/ 45-55 Brighton Avenue

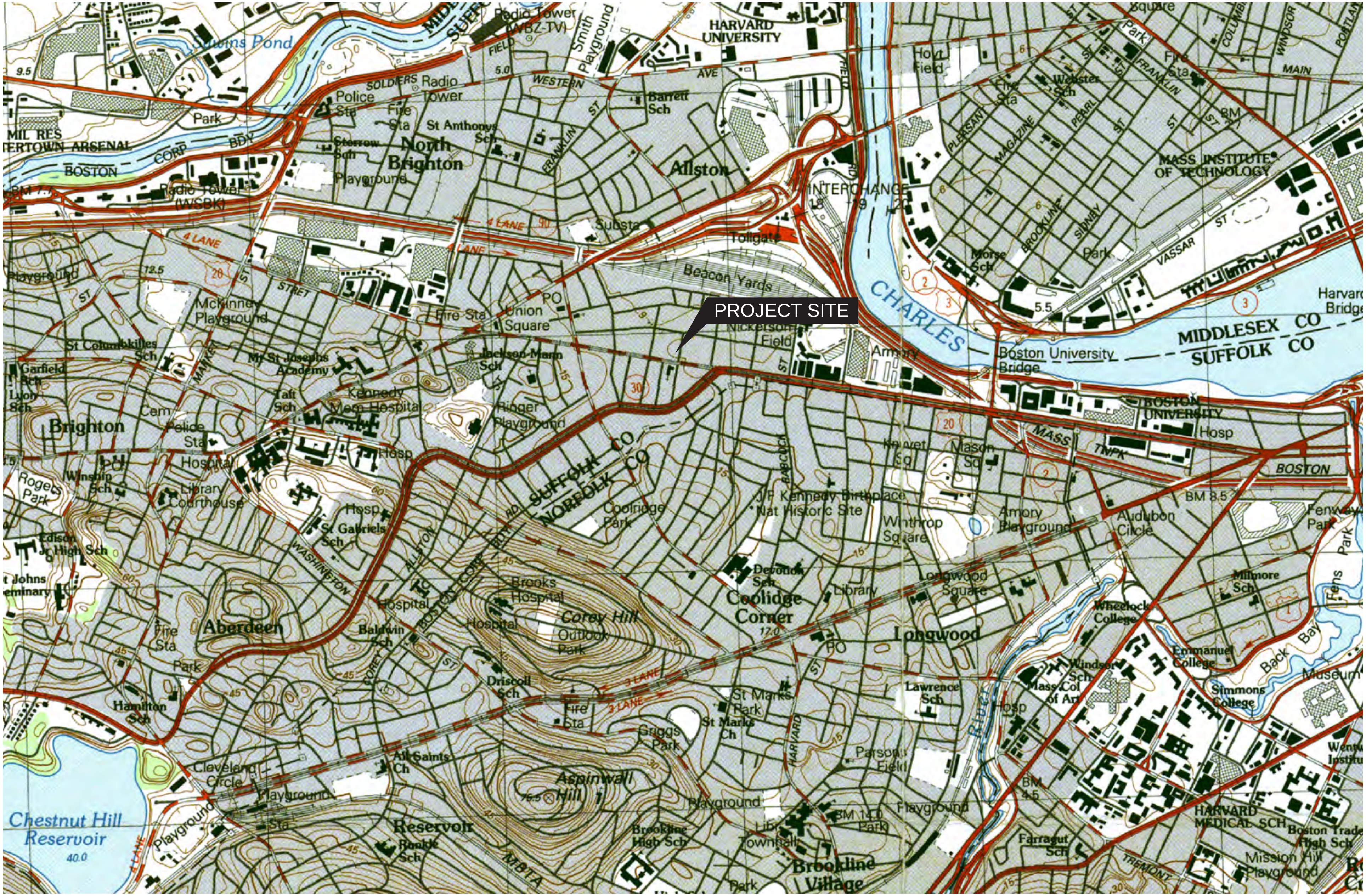


Figure 1 - 2
USGS Map

MLF CONSULTING LLC

Prior to submitting this PNF, the Proponent conducted preliminary community outreach with the surrounding community, neighborhood groups, local elected and appointed officials, the Mayor's Office of Neighborhood Services and other interested parties, including preliminary presentations before the Allston Civic Association, the Brighton Allston Improvement Association, and immediate abutters to the overall site. As a result of the input received, the Proponent has made revisions to the original design and has reflected these changes in this Project Notification Form ("PNF").

1.2 Detailed Project Phases

1.2.1 Phase 1: 79-83 Gardner Street Building

The building proposed for the Gardner Street Project Site will contain thirty eight (38) units, and covered parking for 39 vehicles with the existing Victorian house preserved and incorporated into the new structure (the "Gardner Street Project"). The Victorian house currently contains three units, 1 two-bedroom and 3 three-bedroom units. The Victorian house will be restored and renovated to contain a lounge/lobby for the building and maintain the existing three units. The remaining 35 units in the Gardner Street Project will all be two-bedroom units. The Gardner Street Project will contain a building with approximately 47,736 gross square feet ("gsf") and a building height of approximately 46 feet at its highest point in 4-stories. There will be significant new landscaping behind the building at the center of the Project Site with interconnected walkways. For a number of reasons, it is anticipated that the Gardner Street Project will initially be developed. After the Gardner Street Project has been completed, the Brighton Avenue Project will commence. The phasing of the Proposed Project will help ensure lower impacts on the community and allow for gradual growth.

1.2.2 Phase 2: 45-55 Brighton Avenue Building

The building proposed for the Brighton Avenue Project Site will contain 76 units, 3050 gsf of street level retail and covered parking for 175 spaces. The units will include 72 two-bedroom units and 4 one-bedroom units. The Brighton Avenue Project will be approximately 99,702 gross square feet and a building height of approximately 58 feet along Brighton Avenue and 68 feet at its highest point, and include 5- stories at the front and 6-stories at the back of the site. Like the Gardner Street Project, there will be significant new landscaping behind the building at the center of the Project Site with interconnected walkways.

1.3 Project Site and Surroundings

The site of Packard Crossing is located around and adjacent to the Hamilton Company's longtime Brighton Avenue headquarters, and sits equidistant from Boston University and the New Balance complex. The block, bounded by Brighton Avenue and Gardner, Malvern and Chester Streets includes a number of existing 19th and 20th Century apartment buildings and houses, and also includes large areas of surface parking and car-repair focused retail development. The existing Gardner Street buildings includes the one of the last remaining free standing Victorian houses of ‘Mahogany Row’, a group of houses which once lined Gardner Street.

A review of the Brighton Street building Site history by FSL Associates, Inc. during the Phase I Environmental Site Assessment investigation in 2016, indicated that there are currently two tenants in the building including an automobile hardware store (Autozone) and a mixed auto repair and towing company (Mike’s Towing). The Brighton Street site was formerly used as a stable and manufacturing company in 1925. Lovejoy Manufacturing Company and the building in which it was located was demolished sometime between 1934 and 1940, after which time the current site building was constructed during the 1950’s.

Packard’s Corner is located approximately 800 feet east of the Site. The Brighton Street building is located on a flat section approximately 9 meters (29-feet) above mean sea level. The Charles River is approximately 2,600 feet east-northeast of the Site. The Site is located in Zone C of the FEMA maps, outside of the boundary of the 500-year flood plain. See **Figures 1.3-1** thru **1.3-7** for overall site and surrounding area context photographs.

GARDNER ST LOOKING WEST

GARDNER ST LOOKING EAST

GARDNER ST LOOKING SOUTH

GARDNER ST - SITE AND SURROUNDING AREA PHOTOGRAPHS

EAST EDGE OF SITE LOOKING SOUTH

EAST EDGE OF SITE LOOKING WEST

NORTHERN EDGE OF SITE LOOKING SOUTH

SOUTHWEST EDGE OF SITE LOOKING NORTH

GARDNER ST - SITE AND SURROUNDING AREA PHOTOGRAPHS

EXISTING 83 GARDNER NORTH FACADE

EXISTING 83 GARDNER WEST FACADE

EXISTING 83 GARDNER SOUTH FACADE

EXISTING 83 GARDNER EAST FACADE

GARDNER ST - SITE AND SURROUNDING AREA PHOTOGRAPHS

89 & 87 GARDNER

83 GARDNER

BACK OF 39 BRIGHTON

75 GARDNER

72 GARDNER

80 GARDNER

84 GARDNER

BRIGHTON AVE LOOKING EAST

BRIGHTON AVE LOOKING WEST

BRIGHTON AVE LOOKING NORTH

BRIGHTON AVE - SITE AND SURROUNDING AREA PHOTOGRAPHS

REAR OF SITE LOOKING WEST

REAR OF SITE LOOKING SOUTH TO BRIGHTON AVE

REAR OF SITE LOOKING EAST

REAR OF SITE LOOKING NORTH

BRIGHTON AVE - SITE AND SURROUNDING AREA PHOTOGRAPHS

57-59 BRIGHTON

45-55 BRIGHTON

39 BRIGHTON

19-25 BRIGHTON

32 BRIGHTON

48 BRIGHTON

52 BRIGHTON

56-64 BRIGHTON

1.4 Summary of Project Dimensions

Table 1-1 79- 83 Gardner Street / 45-55 Brighton Ave Approximate Project Dimensions

Lot Area*:	Phase I: 47,229 SF Phase 2: 36,764 SF **TOTAL SF: 83,993 SF**
Number of Residential Units	Phase I: 38 units Phase 2: 76 Units **TOTAL: 114 Units**
Gross Square Feet:	Phase I: 47,736 gsf Phase 2: 99,702 gsf **TOTAL SF: 147,438 gsf**
FAR:	Phase I: 1.29 FAR Phase 2: 2.11 FAR
Number of Floors:	Phase I: 4- Floors Phase 2: 5-6 Floors
Height:	Phase I: 46 Feet (4-Stories) Phase 2: 58-68 Feet (5- to 6-Stories)
Parking Spaces:	Phase I: 39 Spaces Phase 2: 175 Spaces

*See Section 3, Urban Design Plans, for a locus map showing Lot A (Phase 1: 79-83Gardner Street) and Lot B (Phase 2: 45-55 Brighton Avenue).

1.5 Summary of Community Benefits

The Proposed Project will provide a number of community benefits including but not limited to the following:

- Creation of new market rate housing units that will serve Boston's middle class;
- Creation of new inclusionary development policy units in accordance with the Inclusionary Development Policy of the City of Boston;
- Commencing improvements to an underutilized area of Allston/Brighton Neighborhood through the development of the overall Proposed Project;
- Creation of new construction jobs during the development process and permanent jobs following construction completion; and
- Providing significant new annual real estate tax revenue.

1.6 Article 80B Review

Ordinarily, the Phase 1: Gardner Street Project would be subject to the filing of a Small Project Review Application ("SPRA") under Article 80E of the Code because of its limited gross square feet (under 50,000 gsf in a Boston neighborhood). As discussed, the BRA requested that the Proponent join the filings of both project phases in a Project Notification Form and to complete a coordinated review with the neighborhood and other interested parties.

The Phase 2: Brighton Avenue Project is subject to the Large Project Review requirements of Article 80B of the Boston Zoning Code (the "Code") because the Project it is a new development containing more than fifty-thousand (50,000) square feet of gross floor area in a Boston neighborhood.

The Proponent has completed this "expanded" PNF filing, which addresses the many issues normally presented in a Draft Project Impact Report including transportation, air and noise, shadow and infrastructure analyses; presentation of neighborhood historic resources; and completion of other environmental evaluations that help explain potential project impacts from Proposed Project uses, and needed mitigation measures to reduce these impacts.

1.7 Zoning Review

The overall Project Site is subject to Article 51, Allston Brighton Neighborhood District, of the Code. The Proposed Project will require zoning relief through the City of Boston Zoning Board of Appeal with respect to the multi-family dwelling use as well as the floor area ratio, height and certain other required dimensional requirements.

1.8 Filing of a Letter of Intent to the BRA

A Letter of Intent to File a Project Notification Form was filed with the Boston Redevelopment Authority for the Proposed Project, which include discussion of both project phases, on June 24, 2016 (See **Appendix A**).

1.9 Summary of Project Impacts and Mitigation

1.9.1 Urban Design and Landscape

The site of Packard Crossing, a 114-unit residential development on two sites in Allston, is located around and adjacent to the Hamilton Company's longtime Brighton Avenue headquarters, and sits equidistant from Boston University and the New Balance complex. The block, bounded by Brighton Avenue and Gardner, Malvern and Chester Streets includes a number of existing 19th and 20th Century apartment buildings and houses, many of them notable for their design, and also includes large areas of surface parking and low density, car-repair focused retail development. The design and development team's goals for the Packard Crossing project is to create a new paradigm for how urban blocks of this kind can be successfully infilled and redeveloped to reduce the impact of parking, enhance pedestrian, bicycle, and vehicular connections, add green space and strengthen the historic scale and character of the neighborhood. Through the sensitive introduction of new high quality residential development with below grade parking and street level retail, the Packard Crossing project aims to knit together the larger neighborhood. The project includes two new buildings, a 6-story apartment building on Brighton Avenue and a 4-story courtyard style apartment building on Gardner Street. Of special note, the Gardner Street project includes the restoration of one of the last remaining free standing Victorian houses of 'Mahogany Row', a group of houses which once lined Gardner Street and housed prominent 19th century Bostonian families who worked in the lumber trades. A comprehensive landscape master plan includes new streetscape improvements, through-block public pathways and landscaped courtyards and terraces to be enjoyed by all of the area's residents. The Packard Crossing project construction will be phased, and as such the 4-story addition on Gardner Street constitutes Phase 1, and the 5-6-story Brighton Avenue project will be Phase 2.

The landscape and open space of Packard Crossing has been designed to provide a fitting streetscape and an internal series of outdoor spaces shared between multiple buildings. The internal landscape areas including connecting paths, sitting areas, shade and ornamental trees, shrubs, perennials and groundcovers. Spanning from Brighton Avenue to Gardner Street is a pedestrian scaled path for cross block connections and occasional building servicing.

Phase 1: 79-83 Gardner Street

The proposed design intent of this adaptive reuse project at 79-83 Gardner Street is to retain and restore one of the last remaining free standing Victorian houses at 83 Gardner Street and enhance the public realm through an addition of a landscaped courtyard and building that is scaled appropriately for the existing house and area while recognizing its unique context.

The siting of the building attempts to reference the scale and setbacks present in context, minimize the area of connection to the existing house, create a covered parking solution that is less visually present, and create new through block connections.

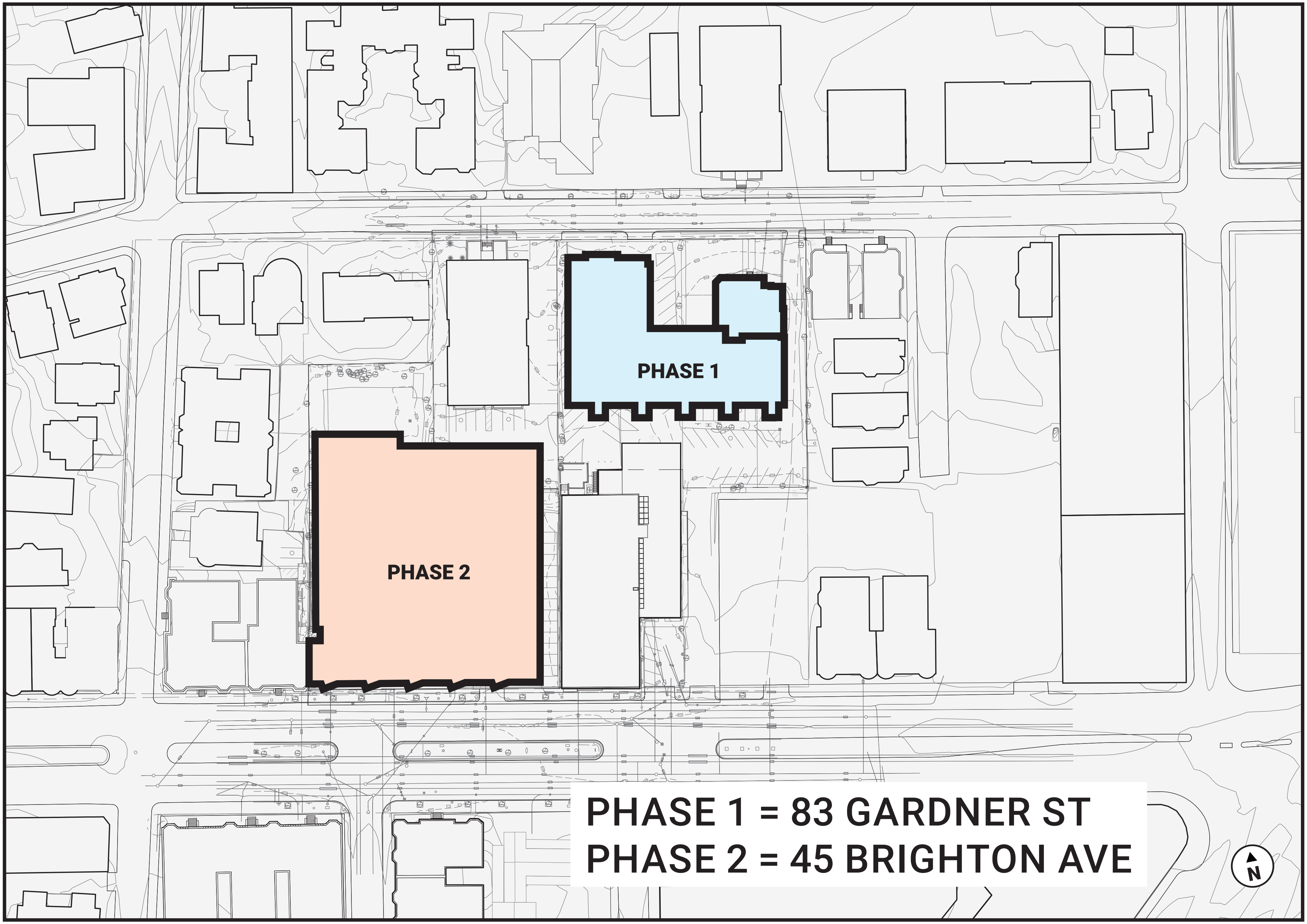
The massing of the building is U-shaped and designed to create a courtyard condition between the new addition and existing house while providing a buffer that is familiar in scale as if it were two separate buildings while at the same time allowing light to reach the courtyard and preserve existing trees.

Phase 2 : 45-55 Brighton Avenue

The design intent of the Brighton Avenue Project is to reference the context of its unique location and enhance the public realm through setbacks from the sidewalk, creating through-block connections, providing newly planted trees, replacing surface parking with covered parking structures, providing new retail space along Brighton Avenue, and to create a building that is scaled appropriately with a continuous street wall, strong cornice line, bay rhythm and articulated base found along Brighton Avenue and adjacent streets.

The siting of building attempts to reference the unique scale and setbacks present along Brighton Ave and its context, provides setback retail frontage along Brighton Avenue that visually hides a covered parking solution, and provides new lit through block connections.

The massing of the building is an elevated L-shape designed to allow ample lighting for the northern bar and to penetrate the large deck above the structured parking while still maintaining a continuous street wall along Brighton Avenue. See **Figure 1.9-1.** Phased Locus Plan and **Figure 1.9-2.** Sequence of Development Diagram.



1.9-1

PHASED LOCUS PLAN

H+A

1.9-2

SEQUENCE OF DEVELOPMENT DIAGRAM

H+A

1.9.2 Sustainable Design

Sustainability informs every design decision. Enduring and efficient buildings conserve embodied energy and preserve natural resources. The full development of 43-45 Brighton Ave embraces the opportunity to positively influence the urban environment. Its urban location takes advantage of existing infrastructure while convenient access to mass transportation will reduce dependence on single occupant vehicle trips and minimize transportation impacts.

Our team is committed to incorporating environmentally sensitive, sustainable design elements into the 43-45 Brighton Ave project. These elements will improve the quality of life for the residents of this project, as well as the neighborhood, while helping to protect the global environment. Ultimately, they will also reduce operating costs while increasing value for the project, improving its business viability.

The 83-85 Gardner Street project falls below the SF required for LEED Certifiability, however, since the building's HVAC design and materials are so similar we generated a draft checklist and intend to provide a narrative discussing the green elements of the project.

We are committed to identifying opportunities presented by the development of 43-45 Brighton Ave by setting proactive goals and ensuring an undertaking that is LEED Silver certifiable as a minimum and satisfies the requirements of the City of Boston Environment Department. The LEED rating system tracks the sustainable features of the project by achieving points in following categories: Sustainable Sites; Water Efficiency; Energy and Atmosphere; Materials and Resources; Indoor Environmental Quality; and Innovation and Design Process. A summary of the design intent of the LEED calculations is contained in **Section 3.6** and the more detailed draft of the Boston Green Building Report with detailed discussion of each of the LEED points proposed is contained in **Appendix G.**

1.9.3 Wind

The Proposed Project is similar in massing to buildings on the north and south sides of Washington Street. Although the proposed 58- 68 foot height for the Brighton Avenue Building will exceed the existing zoning allowance of 45 feet, the proposal will be within 15-20 feet of the heights of buildings in the immediate vicinity. Therefore, the overall wind environment is not expected to change as a result of the Proposed Project.

1.9.4 Shadow

Section 4-1 of this PNF provides a shadow analysis describing and graphically depicting the anticipated shadow impacts from the Proposed Project for the No Build and Build condition.

New shadows are generally limited within the site boundaries. Although early morning shadows will extend in easterly westerly direction onto the western edges of abutting properties, however an existing buffer of mature trees and vegetation is not reflected in the performed analysis which results in an exaggerated impact. Later evening shadows also have a similar effect casting in a north easterly direction, which have a lessening impact on abutter’s properties. Overall, the Project’s shadow impacts will not adversely impact the Project Site and surroundings.

1.9.5 Daylight

Although the Proposed Project would cause an increase in daylight obstruction when compared to the existing conditions at the site, the Proposed Project was designed to be of a similar massing to existing buildings along Brighton Avenue and Gardner Street. The Proposed Project would have reached a maximum of 58-68 feet in height along Brighton Avenue, which is somewhat higher than the existing abutting buildings along Brighton Avenue as well as the existing zoning. As a result, daylight obstruction values from the Proposed Project are expected to be generally consistent with and typical to the surrounding neighborhood.

1.9.6 Solar Glare

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

1.9.7 Air Quality

Tech Environmental, Inc., the Project’s air quality consultant, conducted analyses to evaluate the existing air quality in the Project area, predict the worst-case air quality impacts from the Project’s parking garage, and evaluate the potential impacts of Project-generated traffic on the air quality at the most congested local intersections (See **Section 4.2**).

Recent representative air quality measurements from the Massachusetts Department of Environmental Protection (DEP) monitors reveal that the existing air quality in the Project area is in compliance with Massachusetts and National Ambient Air Quality Standards (NAAQS) for all of the criteria air pollutants.

The worst-case air quality impacts from the Project's parking garages will not have an adverse impact on air quality. The maximum one-hour and eight-hour ambient CO impacts from the parking garage, at all locations around the Project site, including background CO concentrations, are predicted to be safely in compliance with the NAAQS for CO.

A microscale air quality analysis was not performed for the Proposed Project due to its extremely small motor vehicle trip generation. The extremely small number of motor vehicle trips generated by the Project will not have a significant impact on the delays or the level of service at the local intersections. Therefore, the motor vehicle traffic generated by the project will not have a significant impact on air quality at any intersection in the Project area and a microscale air quality analysis is not necessary for this Project. It is expected that the air quality in the Project area will remain safely in compliance with the NAAQS for CO after the Project is built.

1.9.8 Noise Analysis

It is expected that the operation of the Proposed Project will comply with the Massachusetts DEP Noise Policy and City of Boston Noise Regulations (See **Section 4.3**).

This acoustical analysis involved five steps: (1) establishment of pre-construction ambient sound levels in the vicinity of the Site; (2) identification of potential major noise sources; (3) development of noise source terms based on manufacturer specifications (where available) and similar project designs; (4) conservative predictions of maximum sound level impacts at sensitive locations using industry standard acoustic methodology; and (5) the incorporation of mitigation measures to ensure compliance with applicable City of Boston noise regulations, ordinances and guidelines and with the DEP Noise Policy.

Nighttime ambient baseline sound level (L_{90}) monitoring was conducted at four locations deemed to be representative of the nearby residential areas, during the time period when human activity is at a minimum and any future noise would be most noticeable. The lowest nighttime L_{90} measured in the Project area was 41.9 dBA. Sound levels at all nearby sensitive locations and at all property lines will fully comply with the most stringent City of Boston and DEP daytime and nighttime sound level limits.

1.9.9 Stormwater Management and Water Quality

The Proposed Project will improve the quality of stormwater leaving this site. Under existing conditions, there are no known stormwater treatment features. The proposed stormwater management features will include peak flow mitigation, groundwater recharge, and water quality treatment. The stormwater recharge system(s) will be based on the 1-inch, first-flush from the proposed impervious surfaces on site. Stormwater runoff from vehicular areas will be treated through the use of deep sump catch basins and water quality treatment structures. A Stormwater Operation and Maintenance Plan and a Long-Term Pollution Prevention Plan will be developed to support the long-term functionality of the proposed stormwater management system.

During construction, the project will include erosion and sediment control measures to minimize the transport of site soils to off-site areas and to the BWSC storm drain systems. Erosion and sediment controls will include perimeter sediment barriers, catch basin protection, dewatering controls, and stone tracking pad. All necessary dewatering will be conducted in accordance with applicable BWSC discharge permits. These controls will be inspected and maintained throughout the construction phase until the areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover. Once construction is completed, the Proposed Project will be in compliance with local and state stormwater management policies.

1.9.10 Solid and Hazardous Waste

Solid Waste

During the preparation of the Site, debris, including asphalt, trash, and demolition debris will be removed from the Project Site. The Proponent will ensure that waste removal and disposal during construction and operation will be in conformance with the City and DEP's Regulations for Solid Waste.

In order to meet the requirements for the Boston Environmental Department and the LEED^{TM} rating system, the Project will include space dedicated to the storage and collection of recyclables, including dedicated dumpsters at the loading area. The recycling program will meet or exceed the City's guidelines, and provide-areas for waste paper and newspaper, metal, glass, and plastics (21 through 27, co-mingled).

Hazardous Waste

A Phase I Environmental Site Assessment for 45-55 Brighton Avenue (the "Property") was completed by FSL Associates, Inc. on November 2, 2012. According to the FSL report, the 45-55 Brighton Avenue site was identified as a conditionally exempt small quality generator (CESQG) of hazardous waste as of July 10, 2012 because of the storage of waste oil in the two site uses. See **Section 4.5.2** for more detail on the FSL environmental site analysis.

1.9.11 Geotechnical / Groundwater Impacts Analysis

Based on the Foundation Engineering Report for 45-55 Brighton Ave and 79-83 Gardner Street completed by McPhail Associates on January 27, 2016, a subsurface exploration program consisting of nine borings was completed in December 2015. Underlying the asphalt pavement that is present across the majority of the site, an approximate 1 to 5-foot thick fill deposit was encountered. The fill deposit consists of a compact to dense, sandy gravel with some to trace silt, varying to a silty sand with trace gravel. Although not encountered during the subsurface exploration program conducted for the project, bedrock across the site is anticipated to extend to depths of greater than 100 feet below the existing ground surface. Groundwater levels recorded in the observation wells installed at the site generally ranged from about 13 to 15 feet below the existing ground surface, or approximately Elevation +30 to +28, respectively.

Based on the anticipated structural loads and subsurface conditions, the proposed buildings will be supported on conventional spread footing foundations in conjunction with a soil-supported slab-on-grade for the lowest level floor slab. Based on the observed site groundwater level and the proposed depth of excavation related to foundation construction, dewatering is expected to be minimal and limited to rainwater runoff.

Since conventional footing and slab-on-grade construction will be utilized for foundation construction, no pile driving is anticipated to be required. Thus, foundation-related noise and ground vibrations are anticipated to be minimal.

See **Section 4.6** for a more detailed analysis of the geotechnical/groundwater analysis.

1.9.12 Construction Impacts Analysis

Section 4.7 presents impacts likely to result from the construction of the Proposed Project and the steps that will be taken to avoid or minimize environmental and transportation-related impacts. Construction methodologies and scheduling will aim to minimize impacts on the surrounding environment. The Proponent will insure that the general contractor will be responsible for developing construction phasing and staging plans and for coordinating construction activities with all appropriate regulatory agencies. The Project’s geotechnical consultant will also provide consulting services associated with foundation design recommendations, prepare geotechnical specifications, and review the construction contractor's proposed procedures.

The construction period for the Proposed Project is expected to be completed in two phases. Phase I will include the proposed building at 79 Gardner Street and related site work and is expected to last fourteen months, beginning in the first quarter of 2017. Phase II will include the proposed building at 45-55 Brighton Avenue and is expected to last sixteen months, beginning in the second quarter of 2018.

1.9.13 Wetlands / Flood Hazard Zone

The Project Site is located in Zone C of the FEMA maps, outside of the boundary of the 100-year and 500-year flood plains. According to the Federal Emergency Management Agency (FEMA) National Flood Insurance Rate Map (F.I.R.M.), for Suffolk County, Massachusetts.

1.9.14 Responses to Climate Change Questionnaire

The Proponent's two responses (for each project phase) to the City of Boston's Climate Change Resiliency and Adaptability Questionnaire are contained in **Appendix E.**

1.9.15 Historic Resources Component

The Proposed Project site is located within a ¼ mile of the Harvard Avenue Historic District which is also on National and State Register of Historic Places. The edge of the Harvard Avenue District is on the ¼ mile edge to the west of the Project Site. There are several properties that have been inventoried by the Boston Landmarks Commission which are outlined in **Section 5.0.** There are not expected to be any impacts to the historically significant properties with the proposed new construction

No known archaeological resources were located within the Project site during the review of Massachusetts Historic Commission files and MACRIS, therefore no impacts to archaeological resources are anticipated.

1.9.16 Infrastructure Systems Component

The Project's Civil and MEP Engineers will coordinate with the City agencies and private utility companies responsible for the area's utility systems as the design progresses. Utility connections will be designed to minimize impacts to the surrounding area and all appropriate permits and approvals will be acquired prior to construction.

The existing infrastructure surrounding the Project site appears to have adequate capacity to service the needs of the Project. Per the geotechnical consultant's report, the bottom of the foundation excavation for the foundation is anticipated to be between 6feet and 7 feet above the elevation of anticipated ground water. In the unlikely event water is encounter it will be handled with on-site leaching pits.

The Project is moving into the Design Development phase where a detailed infrastructure analysis will be performed. The Project's team will coordinate with the appropriate utilities to address the capacity of the area utilities to provide services for the new building. A Boston Water and Sewer Commission (BWSC) Site Plan and General Service Application is required for the proposed new water, sanitary sewer, and storm drain connections.

A Drainage Discharge Permit Application will be submitted to the BWSC for any required construction dewatering. The appropriate approvals from the Massachusetts Department of Environmental Protection (MassDEP) and the U.S. Environmental Protection Agency (EPA) will also be sought.

The existing sewer system and water distribution and storm drain systems are shown in the figures in **Section 6.0.**

The following items will be coordinated with the respective city agencies and utility companies:

- The Boston Fire Department reviews projects with respect to fire protection measures such as fire department connections, standpipes and hydrants.
- Energy and telecommunication system sizing and connections will be coordinated with the respective utility providers.
- New utility connections are authorized by the City of Boston Public Works Department through the street opening permit process.

1.9.17 Transportation Component

Section 7.0 presents the comprehensive transportation study completed by Howard Stein Hudson for the proposed Project in conformance with the BTD *Transportation Access Plan Guidelines*. The study analyzes existing conditions within the Project study area, as well as conditions forecast to be in place under the seven-year planning horizon of 2023. Pre-filing meetings were held with BTD to confirm the geographic and overall scope of the transportation analysis for this analysis.

The Project will provide 39 garage parking spaces on the 79-83 Gardner Street site for residential uses and 175 garage parking spaces on the 45-55 Brighton Avenue site for both residential uses and to serve the adjacent commercial building at 39 Brighton Avenue. A total of approximately 123 spaces will be allocated to the commercial uses at 39 Brighton Avenue and the remaining 52 spaces will be used for the residential component. The allocation of the parking spaces will be flexible to meet the demand of both the commercial uses at 39 Brighton Avenue and the residential uses on the Project site. Based on the nature of the Project, including its proximity to nearby transit opportunities, vehicle and bike share outlets, and the walkability of the surrounding neighborhood, it is expected that the parking supply will accommodate the overall parking demand for the Project. The Project will also provide secure and covered storage for approximately 38 bicycles in the Gardner Street garage and 76 bicycles in the Brighton Avenue garage.

Vehicular access to the Gardner Street garage will be provided by an enter-only driveway on the eastern portion the site and an exit-only driveway on the western portion of the site. Vehicular access to the Brighton Avenue garage will be provided by a single curb cut along Brighton Avenue. Loading, service, trash and move-in/move-out activity related to the Brighton Avenue project site will take place in the ground floor level of the garage and will not have an impact on operations along the adjacent roadway or sidewalk. Move-in/move-out and service/delivery activity for the Gardner Street project is expected to be light and will occur along the curbside.

The Proponent is committed to implementing a transportation demand management ("TDM") program that supports the City's efforts to reduce dependency on the automobile by encouraging alternatives to driving alone, especially during the peak travel periods. Proposed measures include, but are not limited to, designating an on-site transportation coordinator, secure covered bicycle parking, transit incentives, and vehicle and bike-sharing incentive programs for residents.

The transportation analysis employed mode use data for the area surrounding the Project site based on 2000 U.S. Census data and BTD data for the surrounding neighborhoods and identifies the number of trips expected to be generated by the Project by mode (walk, bicycle, transit, and vehicle). Due to the transit-oriented nature of the Project and non-auto alternatives such as Zipcar and Hubway, it is anticipated that many of the Project-generated trips will occur via transit, on foot, and by bicycle.

The Project is expected to generate approximately 25 vehicle trips during the weekday a.m. peak hour and 28 vehicle trips during the weekday p.m. peak hour. This corresponds to an increase of less than one vehicle trip every two minutes on the adjacent roadway network during the peak periods.

Due to the low volume of vehicle trips generated by the Project, the overall LOS at the study area intersections will remain unchanged from No-Build conditions.

1.9.18 Response to Accessibility Guidelines

The Proponent's response to the City of Boston Accessibility Guidelines is contained in **Appendix F.**

2.0 GENERAL INFORMATION

2.1 Applicant Information

2.1.1 Project Proponent

Founded in 1954 with the acquisition of a six-unit building, The Hamilton Company, owned by Harold Brown, has become one of the largest privately held real estate organizations in the country. Originally involved in Residential Development, The Hamilton Company, Inc. has grown into a full service real estate firm, managing and leasing over 2,800,000 square feet of commercial space, 5,000 residential units, and developing and constructing both residential and commercial projects throughout New England.

The Hamilton Company employs 170 full-time employees and has full time accounting, legal, architectural, construction, maintenance and property management departments to assist in the management and leasing needs of all of the Company's commercial and residential buildings.

Hamilton Construction Management Corporation was formed as a separate business entity in 2002 and has successfully completed well over twenty-five similar projects in the last ten years for both The Hamilton Company and third party clients.

2.1.2 Project Team

Project Name	79-83 Gardner Street / 45-55 Brighton Avenue
Property Owner/Developer	**The Hamilton Company** 39 Brighton Avenue Boston, MA 02134 Carl Valeri, President Stephen Weinig Vice President sweinig@hcmcorp.com Tel: 617-783-0039
Article 80 Permitting Consultant	**Mitchell L. Fischman Consulting (“MLF Consulting”) LLC** 41 Brush Hill Road Newton, MA 02461 Mitch Fischman mitchfischman@gmail.com Tel: 781-760-1726

Legal Counsel	**Rubin and Rudman LLP** 50 Rowes Wharf Boston, MA 02110 Andrew Kara akara@rubinrudman.com Tel: 617-330-7148
Architect	**Hacin + Associates** 112 Shawmut Avenue, Studio 5A Boston, MA 02118 Tel: 617-426-0077 David Hacin, FAIA dhacin@hacin.com Tel: 617-426-0077 ext. 26 Jeffrey Brown, AIA jbrown@hacin.com Tel: 617-426-0077 ext. 28 Joshua H. Lentz, Assoc. AIA jlentz@hacon.com Tel: 617-426-0077 ext. 40 Michelangelo LaTona mlatona@hacin.com Tel: 617-426-0077
Transportation Planner / Engineer	**Howard Stein Hudson** 11 Beacon Street, Suite 1010 Boston, MA 02108 Tel: 617-482-7080 Michael Santos, P.E. msantos@hasassoc.com
Civil Engineer	**Howard Stein Hudson** 11 Beacon Street, Suite 1010 Boston, MA 02108 Tel: 617-482-7080 Rick Latini, P.E. rlatini@hshassoc.com Hilary Holmes, P.E. hholmes@hshassoc.com

Landscape Architect	**Ground Landscape** 6 Carlton Street Somerville, MA 02143 Shauna Gillies-Smith sgs@groundinc.com Tel: 617-718-0889 Olivera Berce oberce@groundinc.com Tel: 617-718-0889
Noise and Air Consultant	**Tech Environmental, Inc.** Hobbs Brook Office Park 303 Wyman Street, Suite 295 Waltham, MA 02451 Tel: 781-890-2220 Marc C. Wallace mwallace@techenv.com Tel: 781-890-2220 x30
Sustainability Consultant	**Soden Sustainability Consulting** 19 Richardson Street Winchester, MA 01890 Tel: 617-372-7857 Colleen Ryan Soden, LEED AP BD+C colleen@sodensustainability.com
Construction	**Hamilton Construction Management** 39 Brighton Avenue Boston, MA 02134 Stephen Weinig President sweinig@hcmcorp.com Tel: 617-783-0039 Samara Z. Tilkin, AIA stilkin@hcmcorp.com Tel: 617-850-7270 Marco Bader mbader@hcmcorp.com Tel: 617-783-0039

Environmental/21E Engineer	**FSL Associates, Inc.** 358 Chestnut Hill Avenue Boston, MA 02135
Geotechnical Engineer	**McPhail Associates** 2269 Massachusetts Avenue Cambridge, MA 02140 Chris Erickson, PE cme@mcphailgeo.com Tel: 617-868-1420 x318

Project Schedule	**79- 83 Gardner Street 45-55 Brighton Ave Project**
Construction Commencement	Phase 1: 1st Quarter 2017 Phase II: 2nd Quarter 2018
Construction Completion	Phase 1: 2nd Quarter 2018 Phase II: 3rd Quarter 2019
Status of Project Design	Schematic

2.2 Legal Information

Legal Judgments or Actions Pending Concerning the Proposed Project:

None.

History of Tax Arrears on Property Owned in Boston by the Applicant:

There are no tax arrears on property owned by the Proponent.

Nature and Extent of Any and All Public Easements:

The Project Site is bounded by Brighton Avenue and Gardner Street containing sewer, electric, telephone, and gas utilities.

2.3 Public Benefits

The Proposed Project will provide substantial benefits to the City of Boston and the Allston/Brighton community including:

- Creating much needed market rate housing in the Allston/Brighton Neighborhood.
- Creating affordable rental units within the Proposed Project.
- Encouraging alternative modes of transportation through the use of bicycling and walking, close proximity to the MBTA Commonwealth Avenue B-Line, and access to zip car spaces inside the development's parking garage.
- Creating racks for 114 bicycles within the proposed buildings to encourage bicycling as a mode of transportation, leading to less vehicular traffic.
- Adding revenue in the form of new property taxes to the City of Boston.
- Creating full time jobs (commercial/ retail).
- Creating temporary construction and labor jobs.
- Restoring and incorporating one of the last remaining Victorian homes on Gardner Street into the project

2.4 Regulatory Controls and Permits

The Overall Project is located within both (i) the Packard's Corner Community Commercial Subdistrict ("CC-2") and (ii) a Three-Family Residential Subdistrict (3F-4000) of the Allston-Brighton Neighborhood District (Article 51), which restricts and limits certain uses, dimensional, density, lot, floor area, off-street parking/loading and other requirements for the Proposed Project. Thus, the Proponent will seek zoning relief required for the Proposed Project by Variance and/or Conditional Use Permits with the City of Boston Board of Appeal.

2.4.1 Compliance with Zoning Code - Use / Dimensional Requirements

The Overall Site is located in a CC-2 and 3F-4000 subdistricts of the Allston-Brighton Neighborhood District, Article 51 of the Boston Zoning Code (the "Code"). (See **Table 2-1.** CC-2 and 3F Zoning District Requirements vs. Overall Project.)

The Overall Site consists of 83,993 square feet of land with proposed improvements of approximately 147,438 square feet of residential housing and street level retail space. Multi-family dwellings are a forbidden use under Article 51, Section 51-8, Table A and a conditional use under Article 51, Section 51-16, Table B.

The Proposed Project seeks zoning relief from the requirements in Article 51 as identified in **Table 2-1**. Each proposed structures exceeds the maximum allowable floor-area-ratio (“FAR”) for each Subdistrict. Each proposed structure also exceeds the height limitations for the district and will require relief from the Zoning Board of Appeals. The proposed structure along Brighton Avenue will have a FAR of 2.11 and a height of 68 feet at its highest point. The proposed structure along Gardner Street will have a FAR of 1.29 and height of 46 feet at its highest point. Design elements of the project will also be reviewed in accordance with the Large Project Review process by the BRA Urban Design Staff. Once issued a “Turndown” letter from the Inspectional Services Department (“ISD”) will establish the actual zoning relief required for the Project.

The Project Site fronts along Brighton Avenue and Gardner Street. The Brighton Avenue Site contains an underutilized surface parking lot and an automotive store. The Gardner Street Site contains an underutilized surface parking lot and an existing Victorian style house. The design team feels that given its location, the proposed height, mass and scale of each structure create an appropriate transition from the residential neighborhood to the larger scale buildings and elevated road structures beyond the Site.

2.4.2 Compliance with Parking and Off-Street Loading Requirements

For a project that is subject to Large Project Review, required off-street parking spaces and off-street loading facilities will be determined as a part of the Large Project Review in accordance with the provisions of Article 80 of the Code.

According to Article 51-56 of the Code, the parking and off-street loading requirements for the Overall Project will be determined as part of the Article 80 review process with the BRA. The Code requires 2.0 spaces per dwelling unit for residential uses greater than 10 units and 2 spaces per thousand SF of commercial use for a required total of a 244 parking spaces.

The Overall Project provides covered parking with a ratio of one parking space per residential unit. The Proponent has taken into consideration the sensitivity of the community and its desire to maximize parking for new developments in providing as much parking as possible on the Site. The Parking is also enhanced by the building location which is in close proximity to public transportation.

Table 2-1 CC-2 and 3F 4000 Zoning District Requirements vs. Proposed Project

1. 79 and 83 Gardner Street

Dimensional Regulation	Zoning Code Requirement	Project Dimensions
Maximum Floor Area Ratio (“FAR”)	0.80	**1.29***
Maximum Building Height	35	**46***
Maximum Stories	3	**4***
Minimum Lot Area, Lot Area Per Dwelling Unit	2,000 sq. ft. for 2 units and 2,000 sq. ft. for each additional unit, required 74,000 sf.	**36,764 sf.***
Minimum Usable Open Space Per Dwelling Unit	650 sq. ft. x 38 units = 24,700	**519 sf. / unit = 19,728.25 sf.***
Minimum Lot Width	45 ft.	202 ft.
Minimum Lot Frontage	45 ft.	202 ft.
Minimum Front Yard	20 ft.	**12 ft.***
Minimum Side Yard	5 ft. from side lot line and 10 feet from an existing structure on an abutting lot, aggregate of no less than 15 ft.	5 ft.
Minimum Rear Yard	30 ft.	30 ft.
Rear Yard Maximum Occupancy by Accessory Building	25%	N/A

*Anticipated Zoning Violations requiring zoning relief from the Board of Appeals.

Notes:

1. The Project Dimensions described in **Table 2-1** may change as the Proposed Project undergoes design review with the BRA and further community review.
2. The required off-street parking and loading requirements shall be determined through BRA’s Large Project Review Process in accordance with Article 80B of the Code.
3. **Table 2-1** is subject to revision based on a final “Turndown” Letter issued by the Inspectional Services Department.

2. 45 and 55 Brighton Avenue and Part of 75 Gardner Street

Dimensional Regulation	Zoning Code Requirement	Project Dimensions
Maximum Floor Area Ratio ("FAR")	2.0	**2.11***
Maximum Building Height	45	**68***
Maximum Stories	N/A	6
Minimum Lot Area, Lot Area Per Dwelling Unit	None	N/A
Minimum Usable Open Space Per Dwelling Unit	50 sq. ft. x 76 units = 3,800	336 sf / unit = 25,534
Minimum Lot Width	None	N/A
Minimum Lot Frontage	None	N/A
Minimum Front Yard	None	5 ft.
Minimum Side Yard	15 ft.	**5 ft.***
Minimum Rear Yard	20 ft. **but** increased by Section 12-3 to 30 ft for a lot in a business district abutting a residential district	**3.5 ft.***
Rear Yard Maximum Occupancy by Accessory Building	N/A	N/A

*Anticipated Zoning Violations requiring zoning relief from the Board of Appeals.

Notes: Also see notes under prior table.

2.5 Preliminary List of Permits or Other Approvals Which May be Sought

Agency Name	Permit or Action*
State Agencies	
MA Department of Environmental Protection, Division of Water Pollution Control	Sewer Connection Self Certification
Local Agencies	
Boston Redevelopment Authority	Article 80 Review and Execution of Related Agreements; Cooperation Agreement; Boston Residents Construction Employment Plan; Affordable Rental Housing Agreement; Design Review; Certificate of Compliance; Certificate of Completion
Boston Civic Design Commission	Design Review
Boston Transportation Department	Transportation Access Plan Agreement; Construction Management Plan
Boston Department of Public Works Public Improvements Commission	Possible Sidewalk Repair Plan; Curb-Cut Permit; Street/Sidewalk Occupancy Permit; Permit for Street Opening; Other
Boston Landmarks Commission	Art. 85- Demolition Delay Review; building at 45-55 Brighton Avenue (Auto Zone) is subject to Article 85 because it is at least fifty (50) years of age; Notice of Determination allowing the demolition was issued by the BLC on 07/25/16
Boston Zoning Board of Appeals	Possible Variances and Dimensional Relief from the Existing Zoning Code Requirements; Conditional Use Permits
Boston Public Safety Commission Committee on Licenses	Permit for Storage of Fuel in (Emergency Storage) Tanks; Garage License
Boston Fire Department	Approval of Fire Safety Equipment
Boston Water and Sewer Commission	Approval for Sewer and Water and Connections; Construction Site Dewatering; and Storm Drainage
Boston Department of Inspectional Services	Building Permits; Certificates of Occupancy; Other Construction-Related Permits

*This is a preliminary list based on project information currently available. It is possible that not all of these permits or actions will be required, or that additional permits may be needed.

2.6 Public Review Process and Agency Coordination

Prior to submitting this PNF, the Project Proponent conducted extensive preliminary community outreach to seek initial input and support for the Proposed Project; voluntarily canvassed the neighborhood, sponsored an initial abutters meeting on July 19, 2016, and hosted site visits with community leadership. On June 2, 2016, the Project Proponent and team also appeared before the Brighton/Allston Improvement Association, at its scheduled monthly meeting, to make an initial presentation and to receive community-wide input. No initial material concerns were raised by those in attendance upon the presentation and, with guidance by the BRA design staff, the Proponent integrated the articulated input and community values into its overall development program, and it looks forward to continuing to process and shape the Proposed Project with this most important constituency.

As part of the required community outreach process, the Boston Redevelopment Authority in collaboration with Allston / Brighton's elected officials has selected an Impact Advisory Group (IAG), with whom the development team will work in conjunction with on the design and community impacts of the Project. The Boston Redevelopment Authority will also hold its own Article 80 required public meeting during which the development team will make a presentation and public comments will be received.

The Proponent will continue to meet with public agencies, neighborhood representatives, local business organizations, abutting property owners, and other interested parties, and will follow the requirements of Article 80 pertaining to the public review process.

2.7 Development Impact Payment ("DIP") Status

Based on current schematic design plans, it is <u>not</u> anticipated that Development Impact Payments ("DIP"), in accordance with Article 80B-7 of the Code, will be required for Proposed Project. That project is expected to have approximately 3,050 gross non-residential FAR square feet, and be below the 100,000 gsf threshold where DIP is required.

3.0 URBAN DESIGN AND SUSTAINABILITY

3.1 Introduction

The urban design and sustainability section is divided into the Phase 1 and Phase 2 Projects, and includes LEED Checklists for each of the Phases.

3.2 Phase 1 (79-83 Gardner Street)

The Phase 1 project site is located in Allston and is bounded on the north by Gardner Street, on the south by the existing 2-story commercial building of Hamilton Company and an underutilized surface parking lot, on the east by 4 existing three story multi-unit residential townhouses, and on the west by an existing 4-story multi-unit residential building. The Gardner Street existing site contains an underutilized surface parking lot and an existing Victorian style house. The Victorian house currently contains 3units, one unit containing two 2-bedrooms and two units containing 3-bedrooms. The Victorian house will be retained as will the existing trees.

3.2.1 Project Description

The building proposed for the Gardner Street Project Site will contain 38 units, and covered parking for 39 vehicles with the existing Victorian house preserved and incorporated into the new structure (the "Gardner Street Project"). The Victorian house currently contains three units, one unit containing two 2-bedroom units and two units containing 3-bedrooms. The Victorian house will be restored and renovated to contain a lounge/lobby for the building and maintain three units including one 1-bedroom unit and two 3-bedroom units. The remaining thirty-five units will all be 2-bedroom units. The Gardner Street Project will contain a building with approximately 47,736 gross square feet and a building height of approximately 46 feet at its highest point in a 4-story structure. There will be significant new landscaping behind the building at the center of the Project Site with interconnected walkways.

For a number of reasons, it is anticipated that the Gardner Street Project will initially be developed. After the Gardner Street Project has been completed, the Brighton Avenue Project will commence. The phasing of the Proposed Project will help ensure lower impacts on the community and allow for more measured growth.

3.2.2 Proposed Building Uses and Dimensions

Tables 3-1 that follows provide a summary of the approximate Phase 1 Project

Table 3-1 79-83 Gardner Street - Summary of Proposed Project Dimensions		
Lot Area	36,764	Gross Sq Ft
Gross Floor Area		
Multi-Family Residential:	47,736	Gross Sq Ft
Parking GSF (Below-Grade):	13,869	Gross Sq Ft
Gross Floor Area (Per Boston Zoning Code)	47,736	Gross Sq Ft
Number of Residential Units	38	Units
Height of Tallest Portion of Building (Per Zoning Code)	46	Feet
Number of Stories	4	Stories
Floor Area Ratio	1.30	
Parking Spaces Below –Grade Garage	39	Spaces

3.2.3 Urban Design Concept

The proposed design intent of this adaptive reuse project at 79-83 Gardner is to retain and restore one of the last remaining free standing Victorian houses on Gardner St and enhance the public realm through the addition of a landscaped courtyard and building that is scaled appropriately for the existing house and area while recognizing its unique context.

The proposed architectural style is both contextual and sympathetic to the historic Victorian homes and triple-deckers found along Gardner St and the adjacent streets. The project references its neighbors by incorporating dormers and articulated rooflines akin to the Victorian home and through bays and decks which echo the syncopation of triple deckers. The wood material references the residential aspect of both the context and program through a restrained modern interpretation which allows the existing Victorian house to remain the focus of the site. The project provides a landscaped courtyard which enlivens the building and provides more “eyes on the street”. Landscaping also provides a framed entry to the new covered parking structures that replaces the underutilized surface lots.

The siting of the building attempts to fulfill a set of urban design goals: to reference the scale and setbacks present in context, to minimize the area of connection to the existing house, to preserve existing trees, and to create a covered parking solution that is less visually present. Along the Gardner St side we wanted to reference the scale and setbacks present in context. We set back the western mass of the building and created a condition similar to the triple-deckers. We also pushed the western mass away from the existing house to create a landscaped courtyard that preserves existing trees and enhances the public realm. The southern bar is also set back from the south edge of the site which accommodates the new cross block pass-through and its new plantings and ample lighting. The covered parking structure is less visible because of the southern bar's location and the existing topography.

The massing of the building is in the form of an U-shape but is broken down into three main forms, the existing Victorian House, at three stories with its tall gabled roof, the 4-storey southern bar that has a setback condition on its 4th floor and a traditional bay rhythm, and the western mass, which is three stories and whose massing refers to the nearby triple-deckers with formal decks along the Gardner St facade. The U-shape is designed to create a courtyard condition between the new addition and existing house while providing a buffer that is familiar in scale as if it were two separate buildings while at the same time allowing light to reach the courtyard and its deck which sits atop the structured parking while creating a platform to connect the buildings as one. See **Figures 3.0-1** thru **3.0-4-**for urban design diagram and contextual principles.

3.2.4 Materials and Finishes

The new addition of Gardner St will be built utilizing four primary exterior wall materials, Wood, Cement panel, Brick, and Wood screens. The dominant exterior materials will be wood and cement panel. The core connecting the facades of the existing house to the new addition will be clad with wood slats. The western mass will be two separate tones of wood and the southern bar with has a brick base, cement panel middle, and wood slatted top.

3.0-1

PACKARD CROSSING – CONTEXT PLAN

H+A

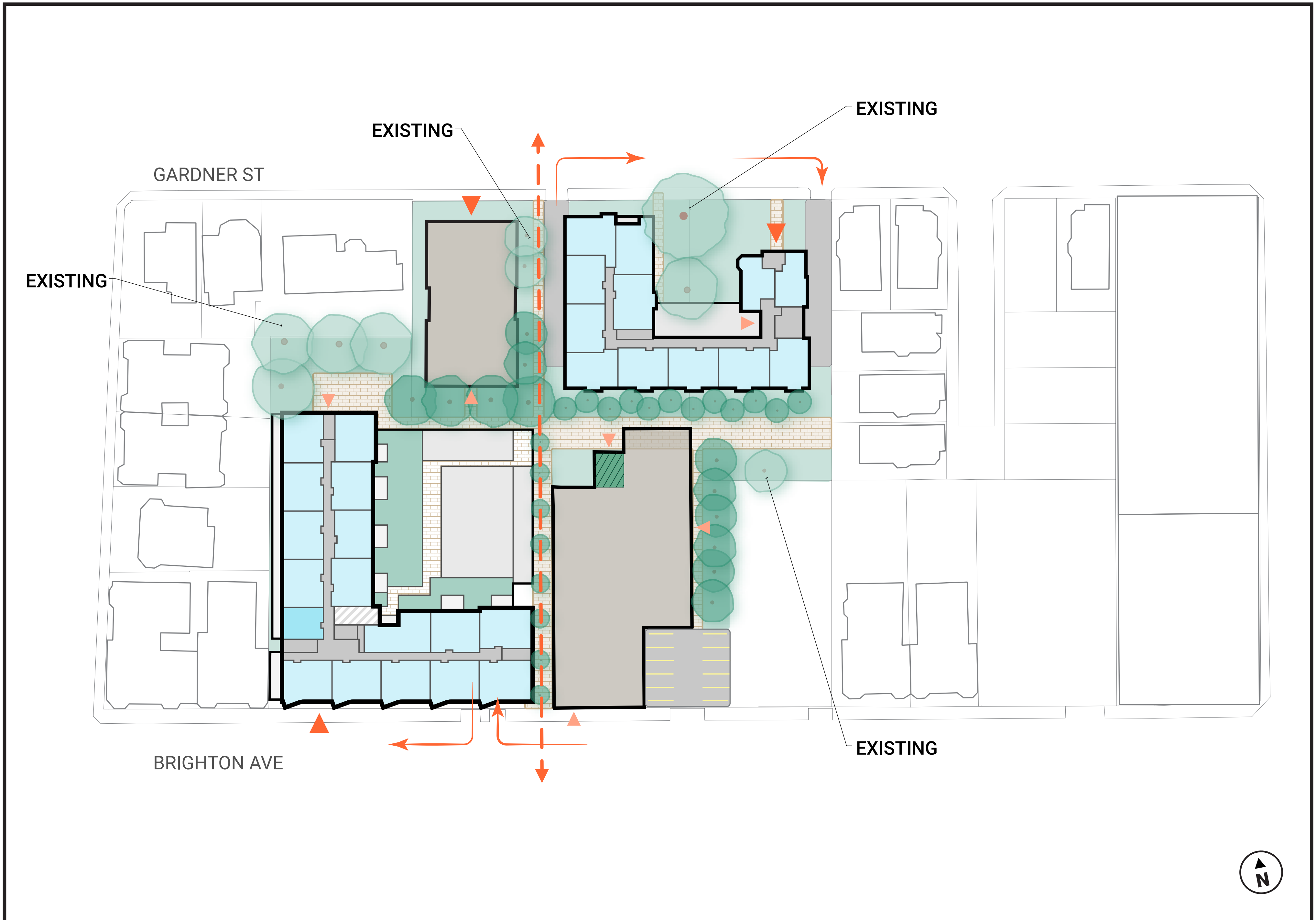
3.0-2

PACKARD CROSSING – EXISTING SITE AERIAL

H+A

PACKARD CROSSING – PROPOSED DEVELOPMENT PLAN

H+A



3.0-4

URBAN DESIGN DIAGRAM

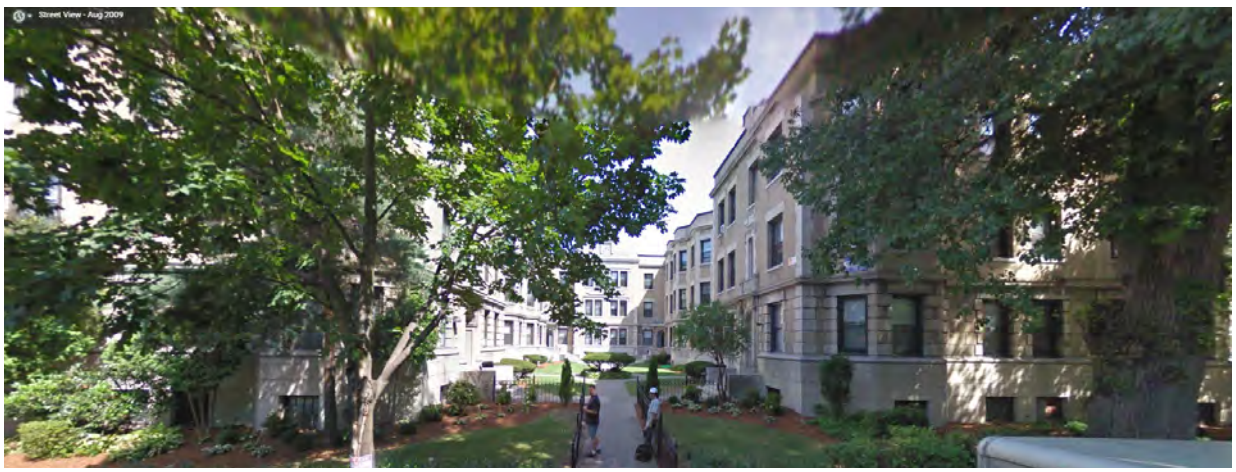
H+A

3.2.5 Phase 1: Urban Design Drawings

The Proposed Project's urban design drawings and perspectives, contained at the end of the Phase 1 section, include:

DORMER AND ROOFLINE

DOMESTIC SCALE AND THREE STORY PORCH



LANDSCAPED COURTYARD

3.2-2

GARDNER ST – VIEW TO WEST

H+A

3.2-3

GARDNER ST – VIEW OF COURTYARD

H+A

3.2-4

GARDNER ST – VIEW TO EAST

H+A

3.2-5

GARDNER ST – FROM REAR OF SITE TO GARDNER ST

H+A

3.2-6

GARDNER ST – ELEVATIONS: SOUTH (TOP), NORTH (BOTTOM)

H+A

3.2-7

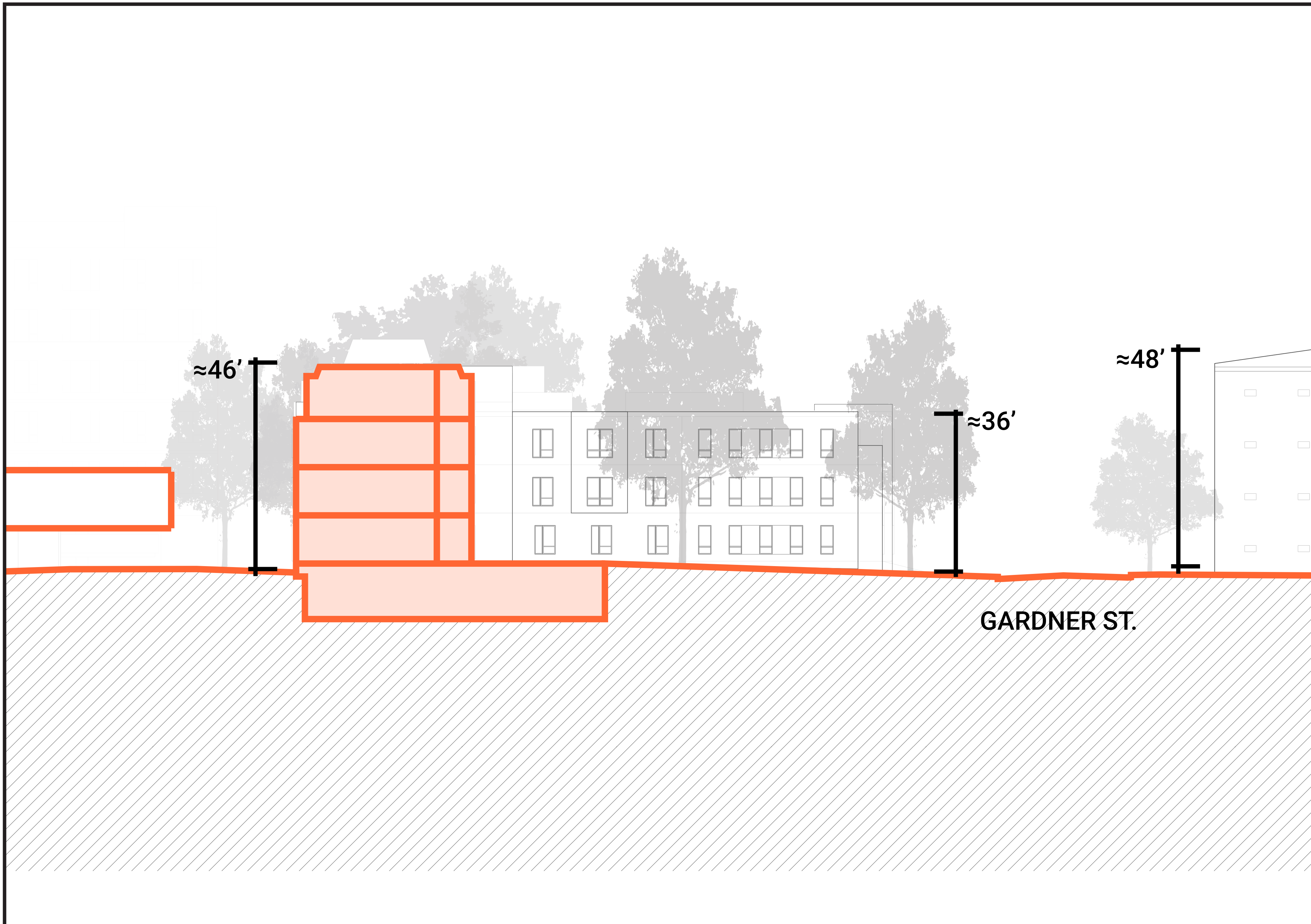
GARDNER ST – ELEVATIONS: WEST (TOP), **WEST COURTYARD** (BOTTOM)

H+A

3.2-8

GARDNER ST – ELEVATIONS: EAST (TOP)**, EAST COURTYARD** (BOTTOM)

H+A



GARDNER ST – SITE SECTION

3.2-10

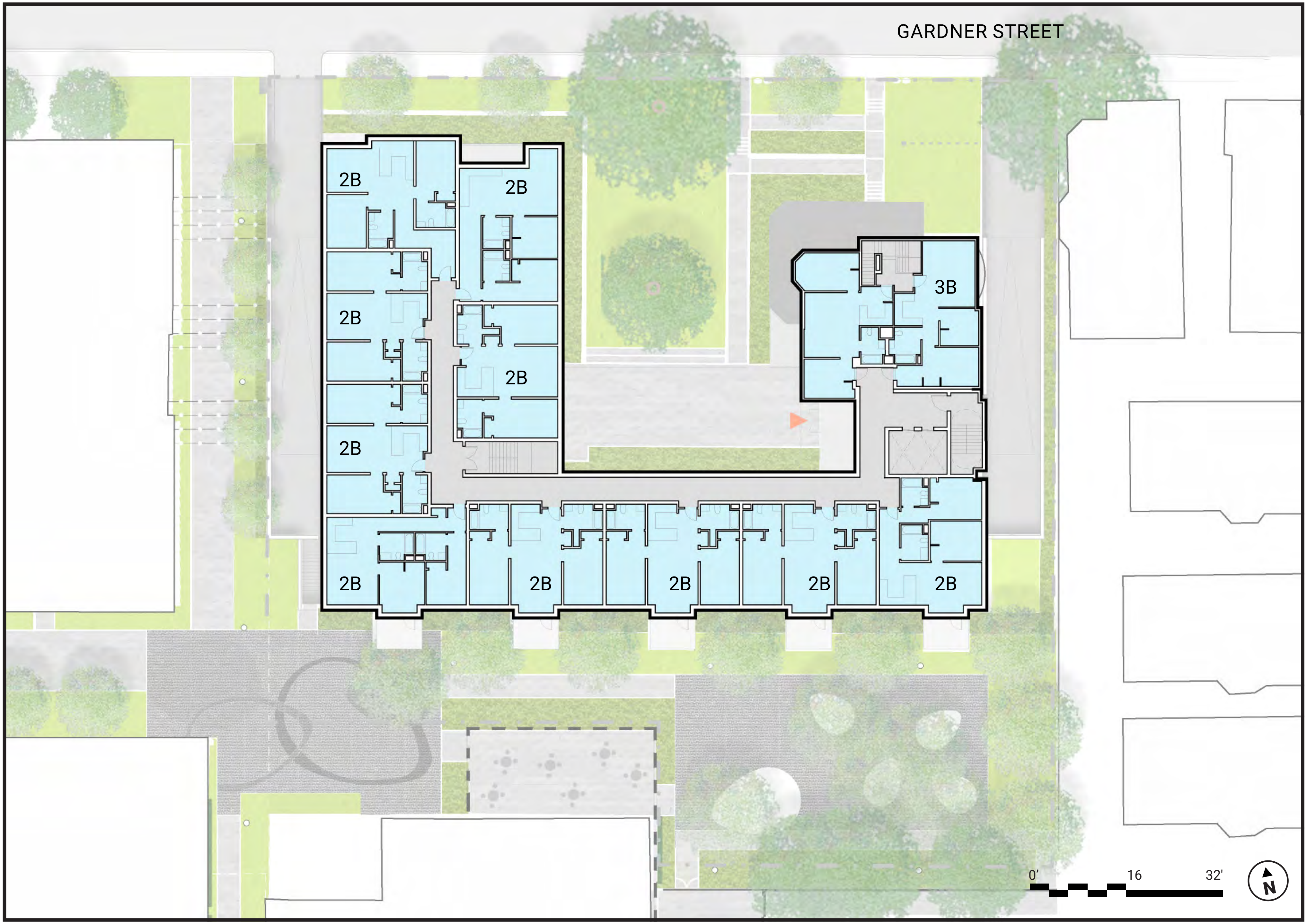
GARDNER ST – GARAGE LEVEL

H+A

3.2-11

GARDNER ST – FIRST LEVEL

H+A



3.2-12

GARDNER ST – TYPICAL LEVEL

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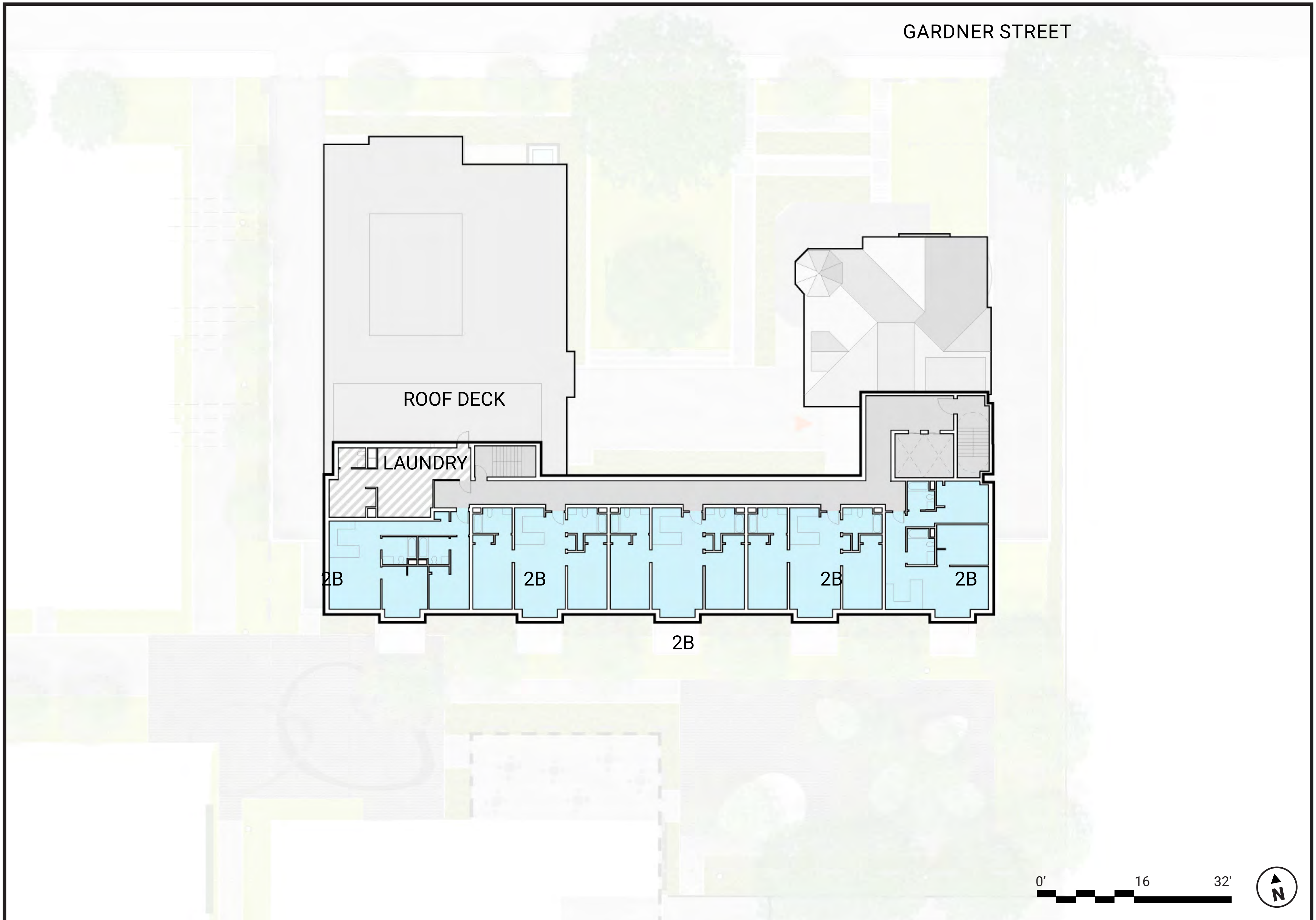


GARDNER ST – FOURTH LEVEL

H+A

3.3 Sustainable Design/Energy Conservation- 79-83 Gardner Street Project

3.3.1 Introduction

The development of sustainable sites is at the core of sustainable design. The sustainable sites credit category encourages development on previously developed land, minimizing a building's impact on ecosystems and waterways, regionally appropriate landscaping, smart transportation choices, stormwater runoff management, and reduction of erosion, light pollution, heat island effect, and pollution related to construction and site maintenance.

The previously developed site features connectivity to basic services in the community and is located in an urban setting that is well served by the existing utility infrastructure. The site's adjacency to basic services in the community and the development density of its urban context enable the project to satisfy available approaches to the Development Density and Community Connectivity credit. Access to the Green line is within 0.1 miles and the 57 and 57A buses within 0.1 miles of the project along and on-site bike storage/rental will offer environmentally sound transportation alternatives. Coupled with alternative parking options, the Project will reduce parking capacity below zoning requirements. Through these approaches, the Project also achieves many of the Alternative Transportation credits.

The planted gardens interspersed on the ground and roof help to limit stormwater runoff and promote infiltration. To achieve Heat Island Effect credits and minimize the project's impact on the creation of urban heat islands, a combination of high-albedo roofing membrane and planted areas to maximize solar reflectance and minimize heat gain. In addition more than 50% of the parking spaces are below grade. See **Figure 3.3-1.** 79-83 Gardner Street: LEED 2009 Checklist for New Construction and Major Renovations.

3.3.2 Water Efficiency

Buildings are major users of our potable water supply and conservation of water preserves a natural resource while reducing the amount of energy and chemicals used for sewage treatment. The goal of the Water Efficiency credit category is to encourage smarter use of water, inside and out. Water reduction is typically achieved through more efficient appliances, fixtures and fittings inside and water-wise landscaping outside. To satisfy the requirements of the Water Use Reduction Prerequisite and credit, the project will incorporate water conservation strategies that include low flow plumbing fixtures for water closets and faucets, showers and kitchen sinks. Further, drought tolerant plant species will be specified in landscaped areas to reduce the requirement for irrigation in most areas and satisfy the requirements for the Water Efficient Landscaping credit.

3.3.3 Energy and Atmosphere

According to the U.S. Department of Energy, buildings use 39% of the energy and 74% of the electricity produced each year in the United States. The Energy and Atmosphere credit category encourages a wide variety of energy strategies: commissioning; energy use monitoring; efficient design and construction; efficient appliances, systems and LED Lighting throughout and other innovative practices.

To meet the Optimize Energy Performance credit, the building envelope will include high performance glazing systems and high levels of insulation. In addition, the large amount of glass used in each building reduces the daytime requirement for electrical lighting.

The Project will meet or exceed the ASHRAE 90.1-2007 standard for Minimum Energy Performance through a variety of measures. Further, no chlorofluorocarbon (CFC) based refrigerants will be used in the project to reduce ozone depletion in the atmosphere and satisfy the Fundamental Refrigeration Management prerequisite.

3.3.4 Materials and Resources

During both construction and operations, buildings generate a lot of waste and use a lot of materials and resources. This credit category encourages the selection of sustainable materials, including those that are harvested and manufactured locally, contain high-recycled content, and are rapidly renewable. It also promotes the reduction of waste through building and material reuse, construction waste management, and ongoing recycling programs.

The project includes recycling facilities within the building for the convenience of the occupants in accordance with the requirements of the Storage and Collection of Recyclables prerequisite. A Demolition and Construction Waste Management Plan will be implemented to divert construction waste material from landfills per the Construction Waste Management credit. Building materials will be specified based on their recycled content and proximity of extraction and manufacturing locations to the project site such that points will be achieved in each of the Recycled Content and Regional Materials credits.

3.3.5 Indoor Environmental Quality

The U.S. Environmental Protection Agency estimates that Americans spend about 90% of their day indoors, where the air quality can be significantly worse than outside. The Indoor Environmental Quality credit category promotes strategies that can improve indoor air through low emitting materials selection and increased ventilation. It also promotes access to natural daylight and views.

During construction, an indoor air quality management plan will be implemented to prevent contamination of mechanical systems and absorptive materials. Material specifications will include only low-emitting interior finishes for paints, carpets, and woods to preserve indoor air quality. Occupants will also have control over lighting and their thermal environment. The project shall be designed to meet or exceed the rates as per ASHRAE 62.1-2007 "Ventilation for Acceptable Indoor Air Quality" and rooms will have access to daylight and views.

3.3.6 Innovation and Design Process

The Innovation in Design and Innovation in Operations credit categories provide additional points for projects that use new and innovative technologies, achieve performance well beyond what is required by LEED credits, or utilize green building strategies that are not specifically addressed elsewhere in LEED. This credit category also rewards projects for including a LEED Accredited Professional on the team to ensure a holistic, integrated approach to design, construction, operations and maintenance. Four credits are being pursued and could include the following.

- Innovation in Design: Exemplary Perf SS 4.1
- Innovation in Design: Exemplary Perf SS 5.2
- Innovation in Design: Exemplary Perf WEc3
- Innovation in Design: Green Housekeeping
- Innovation in Design: Education Plan

Regional Priority-

- Regional Priority: SS c3
- Regional Priority: Heat Island 7.1-Non- Roof
- Regional Priority: Heat Island 7.2 Roof
- Regional Priority: SS 6.1 Stormwater Quantity (Maybe)

Figure 3.3-1 79-83 Gardner Street

LEED 2009 for New Construction and Major Renovations

Project Checklist

Y	?	N		Sustainable Sites	Possible Points: 26
22	4				
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
5			Credit 2	Development Density and Community Connectivity	5
1			Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
3			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
	1		Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
	1		Credit 6.1	Stormwater Design—Quantity Control	1
	1		Credit 6.2	Stormwater Design—Quality Control	1
1			Credit 7.1	Heat Island Effect—Non-roof	1
1			Credit 7.2	Heat Island Effect—Roof	1
	1		Credit 8	Light Pollution Reduction	1

Y	?	N		Water Efficiency	Possible Points: 10
6	2	2			
Y			Prereq 1	Water Use Reduction—20% Reduction	
2	2		Credit 1	Water Efficient Landscaping	2 to 4
		2	Credit 2	Innovative Wastewater Technologies	2
4			Credit 3	Water Use Reduction	2 to 4

Y	?	N		Energy and Atmosphere	Possible Points: 35
4	14	16			
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
3	5	10	Credit 1	Optimize Energy Performance	1 to 19
	1	6	Credit 2	On-Site Renewable Energy	1 to 7
	2		Credit 3	Enhanced Commissioning	2
	2		Credit 4	Enhanced Refrigerant Management	2
1	2		Credit 5	Measurement and Verification	3
	2		Credit 6	Green Power	2

Y	?	N		Materials and Resources	Possible Points: 14
4	2	8			
Y			Prereq 1	Storage and Collection of Recyclables	
		3	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2
		2	Credit 3	Materials Reuse	1 to 2

Y	?	N		Materials and Resources, Continued	
1	1		Credit 4	Recycled Content	1 to 2
1	1		Credit 5	Regional Materials	1 to 2
		1	Credit 6	Rapidly Renewable Materials	1
		1	Credit 7	Certified Wood	1

Y	?	N		Indoor Environmental Quality	Possible Points: 15
9	2	4			
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
		1	Credit 1	Outdoor Air Delivery Monitoring	1
		1	Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
1			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
	1		Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
1			Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems—Lighting	1
1			Credit 6.2	Controllability of Systems—Thermal Comfort	1
		1	Credit 7.1	Thermal Comfort—Design	1
		1	Credit 7.2	Thermal Comfort—Verification	1
	1		Credit 8.1	Daylight and Views—Daylight	1
1			Credit 8.2	Daylight and Views—Views	1

Y	?	N		Innovation and Design Process	Possible Points: 6
4	2				
1			Credit 1.1	Innovation in Design: EP Open Space	1
1			Credit 1.2	Innovation in Design: EP Alt Transportation	1
1			Credit 1.3	Innovation in Design: EP Water Use Reduction	1
	1		Credit 1.4	Innovation in Design: Green Housekeeping	1
	1		Credit 1.5	Innovation in Design: Education	1
1			Credit 2	LEED Accredited Professional	1

Y	?	N		Regional Priority Credits	Possible Points: 4
3	1				
1			Credit 1.1	Regional Priority: SS c3	1
	1		Credit 1.2	Regional Priority: SS 6.1	1
1			Credit 1.3	Regional Priority: SS 7.1	1
1			Credit 1.4	Regional Priority: SS 7.2	1

Y	?	N		Total	Possible Points: 110
52	27	30			

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

3.4 Phase 2: 45-55 Brighton Avenue

The Phase 2 project site, adjacent to the Phase 1 site, is located in Allston and is bounded on the south by Brighton Avenue, on the north by a lot containing an existing 4-story multi-unit residential building and a lot containing an existing 3-story multi-unit residential house, on the west by 3 existing multi-unit residential buildings, and on the east by the existing 2-story commercial building of The Hamilton Company. The existing site contains an automotive store and an adjacent surface parking lot.

3.4.1 Project Description

The building proposed for the Brighton Avenue Project Site will contain 76 units, street level retail area and covered parking for 175 vehicles (the “Brighton Avenue Project”). The units will include 72 two bedroom units and 4 one bedroom units. The Brighton Avenue Project will contain a building with approximately 99,702 gross square feet and a building height of approximately 58 feet along Brighton Avenue and 68 feet at its highest point, and 5 stories at the front and 6 stories at the rear. Like the Gardner Street Project, there will be significant new landscaping behind the building at the center of the Project Site with interconnected walkways.

3.4.2 Proposed Building Uses and Dimensions

Table 3-2 that follows provides a summary of the approximate Phase 2 Project dimensions.

Table 3-2 45-55 Brighton Avenue - Summary of Proposed Project Dimensions		
Lot Area	47,229	Gross Sq Ft
Gross Floor Area: Multi-Family Residential Commercial GSF Parking GSF (Below-Grade)	 96,652 3,050 60,559	 Gross Sq Ft Gross Sq Ft Gross Sq Ft
Gross Floor Area (Per Boston Zoning Code)	99,702	Gross Sq Ft
Number of Residential Units	76	Units
Height of Tallest Portion of Building (Per Zoning Code)	68	Feet
Number of Stories	6	Stories
Floor Area Ratio	2.11	
Parking Spaces: Below-Grade Garage	175	Spaces

3.4.3 Urban Design Concept

The proposed design intent of this mixed use project at 45-55 Brighton Avenue is to enhance the public realm and develop an appropriately scaled building for the area that recognizes the unique context of its location. The proposed architectural style is contextual to Allston's traditional bay rhythm, articulated base, and strong street wall. The project translates its context into a more modern interpretation through its undulating bay form. The project provides a setback at the sidewalk along which resides ground floor retail. The new covered parking structure, which replaces the underutilized surface lot, sits hidden behind the retail portion of the ground floor. The addition of retail provides a presence to the area that extends use along Brighton Ave. from nearby Commonwealth Avenue.

The siting of this building attempts to fulfill a set of urban design goals. Along the Brighton Avenue side the project maintains the strong street wall character and setback present in the context. The building is set back 5-feet from the property line, which enhances the experience at the sidewalk. It also maintains a consistent street wall further improving the streetscape.. Between 45 and 55 Brighton Avenue, we propose a gated entry for the new through-block pedestrian connection. Proposed along the sidewalk and this through-block path are plantings and ample lighting, the entrance to the structured parking, retail storefronts with multiple entrances, and the residential entry. Providing multiple points of entry along the length of the façade will increase safety and provide activity throughout the day.

The massing of the building is an elevated L-shape. It is designed to allow ample lighting for the northern bar and to penetrate the large deck above the structured parking while still maintaining a continuous street wall along Brighton Avenue. The façade along Brighton Ave is an interpretation of the contextual bay rhythm and strong cornice line found in the immediate context**.** See **Figures 3.4-1** thru **3.4-12** at the end of this section.

3.4.4 Materials and Finishes

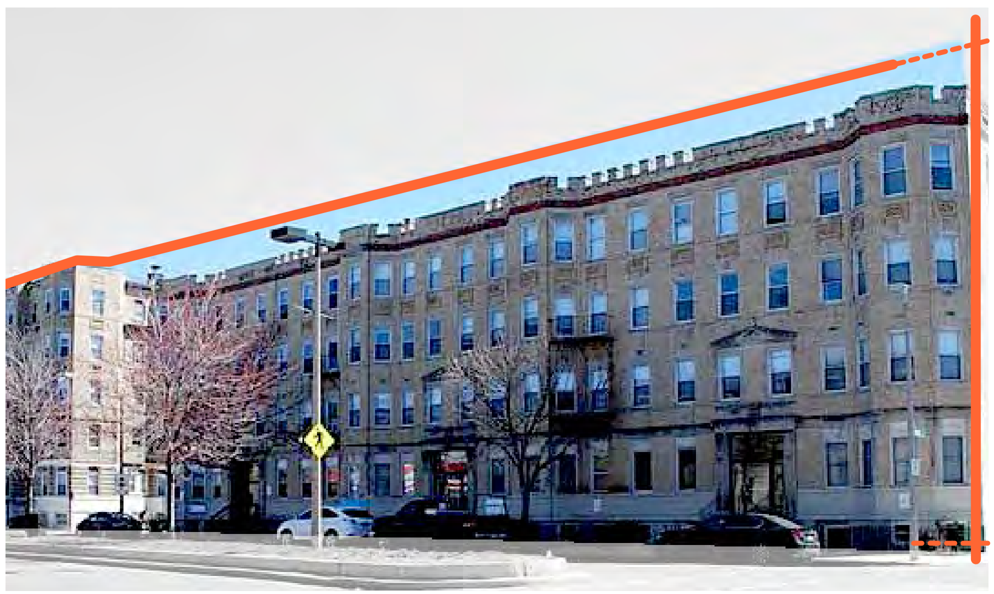
The building will be built utilizing three primary exterior wall materials, brick, metal panel, and cement panel. The dominant exterior material will be brick. The retail portion of the facade will be glass storefronts set into a dark brick base. Metal panel will be used on 5th floor of the South bar. Cement Panel will be used on the northern bar.

3.4.5 Phase 2: Urban Design Drawings

The Proposed Project's urban design drawings and perspectives for Phase 2 include:

CORNICE-LINE RHYTHM

ARTICULATED BASE



SETBACK FROM SIDEWALK

3.4-2

BRIGHTON AVE – VIEW TO WEST

H+A

3.4-3

BRIGHTON AVE – VIEW TO WEST

H+A

3.4-4

BRIGHTON AVE – VIEW TO WEST

H+A

3.4-5

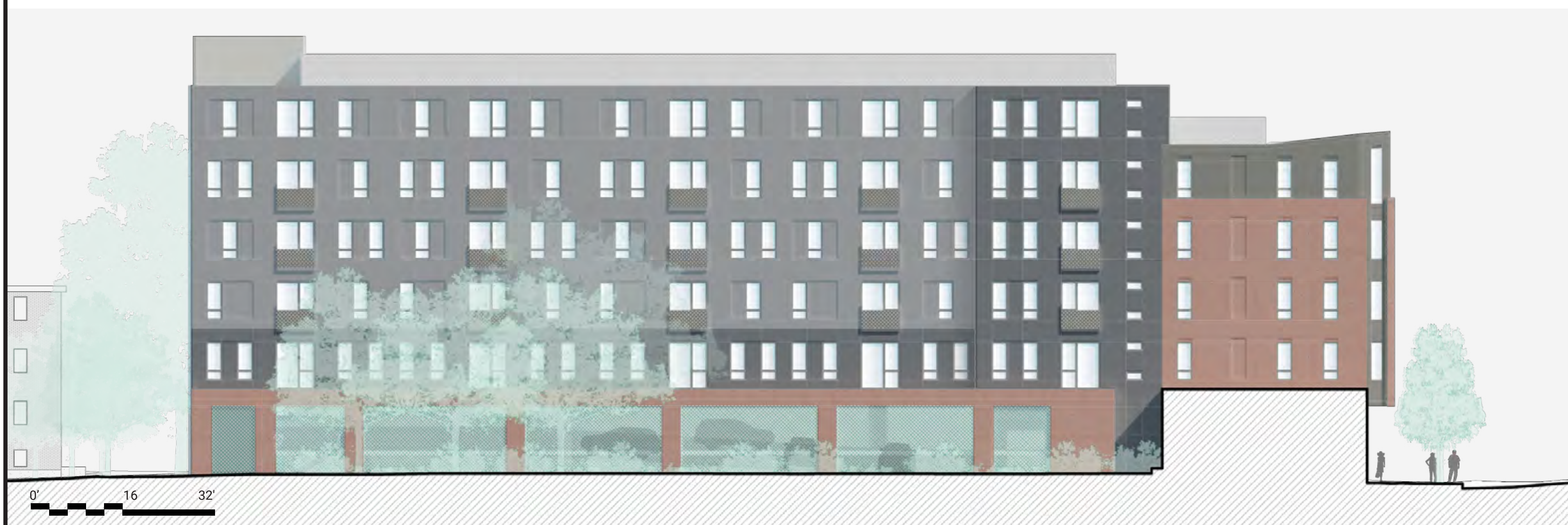
BRIGHTON AVE – VIEW TO WEST

H+A

3.4-6

BRIGHTON AVE – ELEVATIONS: SOUTH (TOP), **NORTH** (BOTTOM)

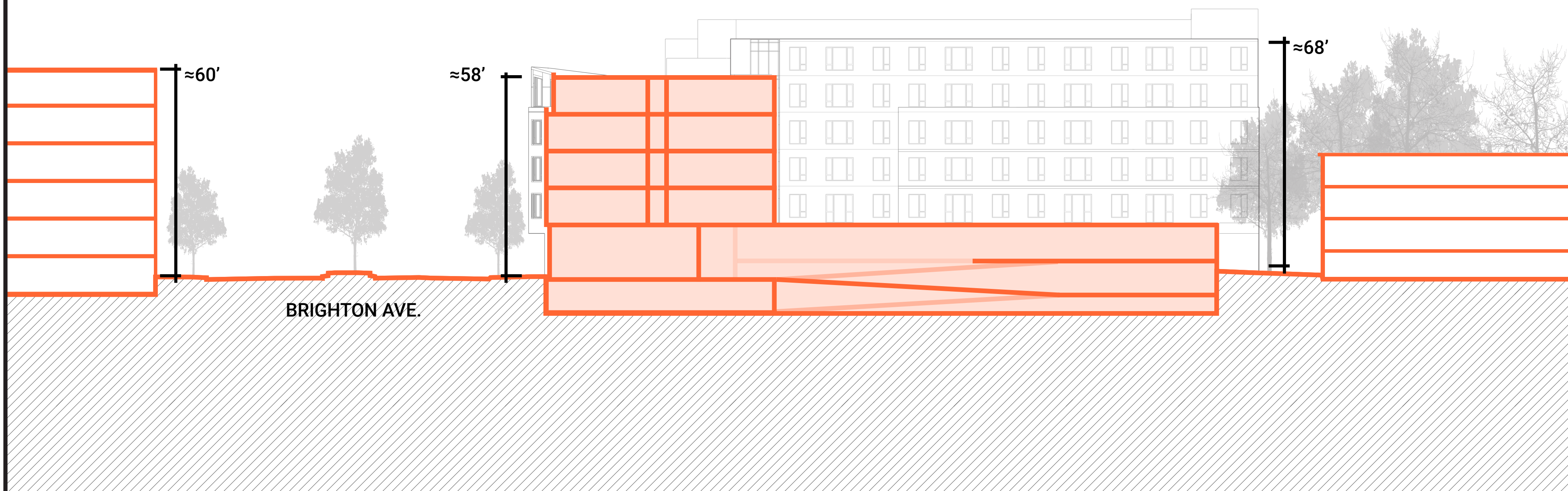
H+A



3.4-7

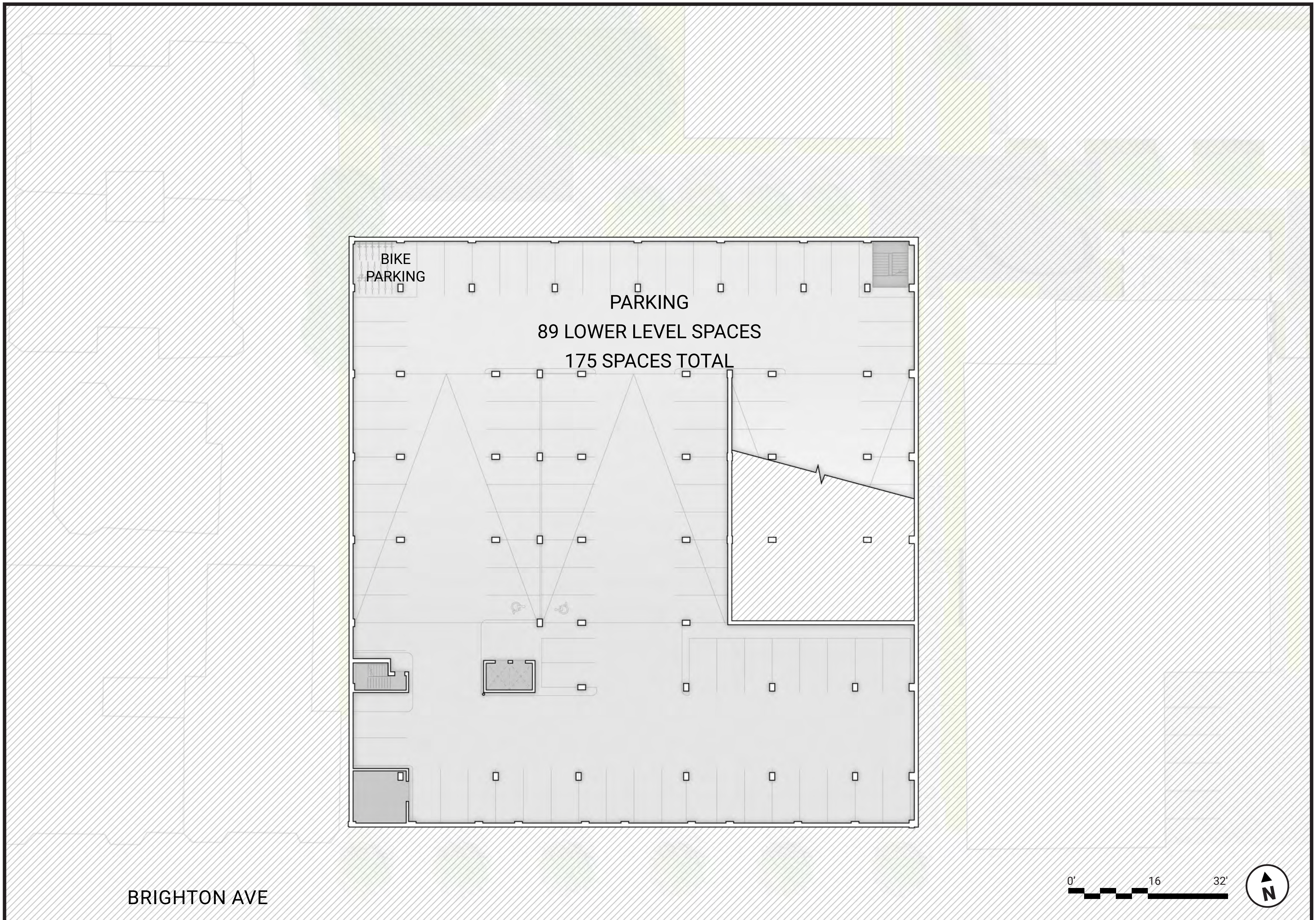
BRIGHTON AVE – ELEVATIONS: EAST (TOP), **WEST** (BOTTOM)

H+A



BRIGHTON AVE – SITE SECTION

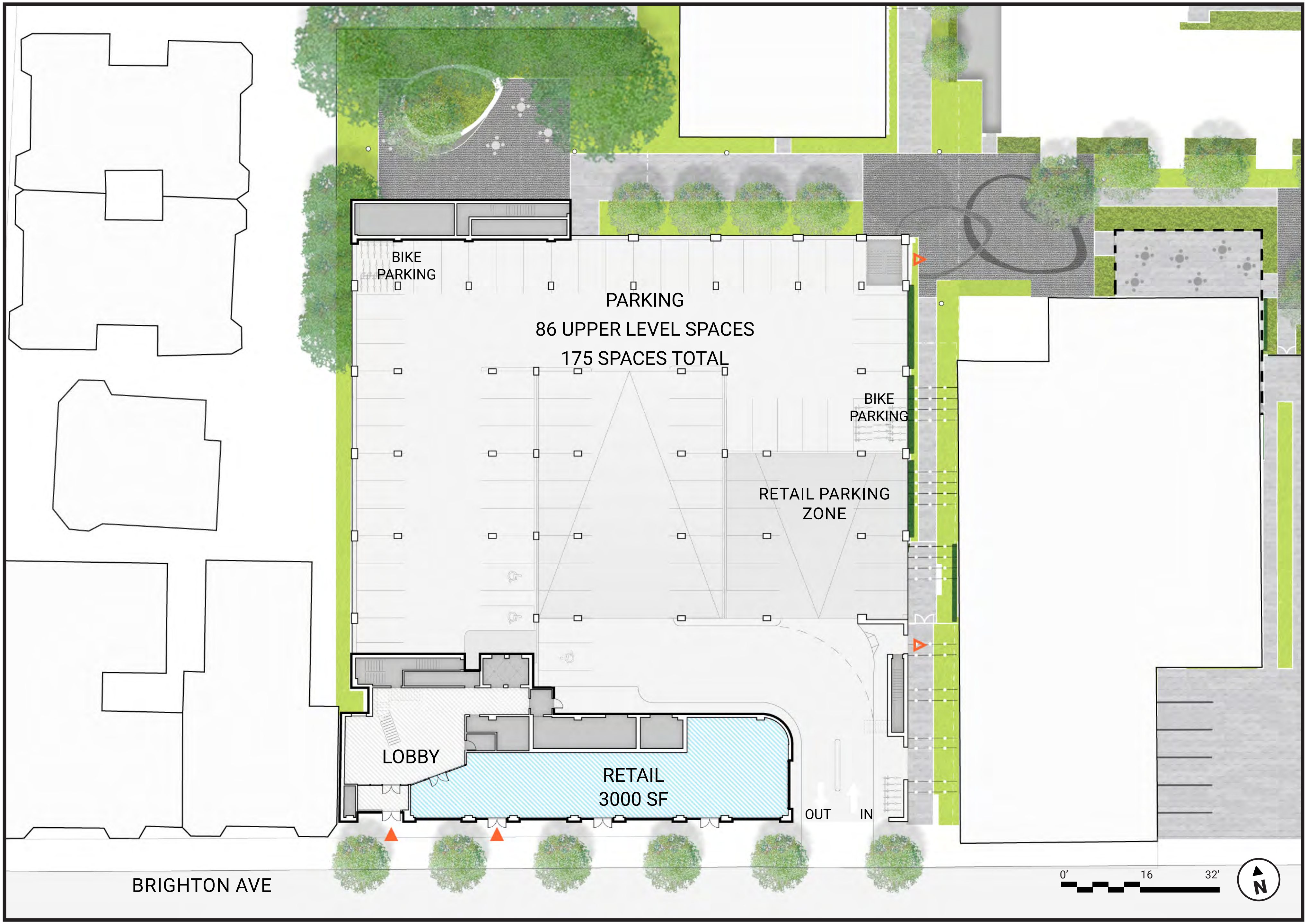
H+A



3.4-9

BRIGHTON AVE – GARAGE LOWER LEVEL

H+A



3.4-10

BRIGHTON AVE – GROUND / GARAGE UPPER LEVEL

H+A

3.4-11

BRIGHTON AVE – SECOND THROUGH FIFTH LEVEL

H+A

3.4-12

BRIGHTON AVE – SIXTH LEVEL

H+A

3.5 Sustainable Design/Energy Conservation- Brighton Avenue Project

3.5.1 Introduction

The development of sustainable sites is at the core of sustainable design. The sustainable sites credit category encourages development on previously developed land, minimizing a building's impact on ecosystems and waterways, regionally appropriate landscaping, smart transportation choices, stormwater runoff management, and reduction of erosion, light pollution, heat island effect, and pollution related to construction and site maintenance.

The previously developed site features connectivity to basic services in the community and is located in an urban setting that is well served by the existing utility infrastructure. The site's adjacency to basic services in the community and the development density of its urban context enable the project to satisfy available approaches to the Development Density and Community Connectivity credit. Access to the Green line is within 0.1 miles and the 57 and 57A buses within 0.1 miles of the project along and on-site bike storage/rental will offer environmentally sound transportation alternatives. Coupled with alternative parking options, the Project will reduce parking capacity below zoning requirements. Through these approaches, the Project also achieves many of the Alternative Transportation credits.

The planted gardens interspersed on the ground and roof help to limit stormwater runoff and promote infiltration. To achieve Heat Island Effect credits and minimize the project's impact on the creation of urban heat islands, a combination of high-albedo roofing membrane and planted areas to maximize solar reflectance and minimize heat gain. In addition more than 50% of the parking spaces are below grade. See **Figure 3.5-1.** 45-55 Brighton Avenue: LEED 2009 Checklist for New Construction and Major Renovations.

3.5.2 Water Efficiency

Buildings are major users of our potable water supply and conservation of water preserves a natural resource while reducing the amount of energy and chemicals used for sewage treatment. The goal of the Water Efficiency credit category is to encourage smarter use of water, inside and out. Water reduction is typically achieved through more efficient appliances, fixtures and fittings inside and water-wise landscaping outside. To satisfy the requirements of the Water Use Reduction Prerequisite and credit, the project will incorporate water conservation strategies that include low flow plumbing fixtures for water closets and faucets, showers and kitchen sinks. Further, drought tolerant plant species will be specified in landscaped areas to reduce the requirement for irrigation in most areas and satisfy the requirements for the Water Efficient Landscaping credit.

3.5.3 *Energy and Atmosphere*

According to the U.S. Department of Energy, buildings use 39% of the energy and 74% of the electricity produced each year in the United States. The Energy and Atmosphere credit category encourages a wide variety of energy strategies: commissioning; energy use monitoring; efficient design and construction; efficient appliances, systems and LED Lighting throughout and other innovative practices.

To meet the Optimize Energy Performance credit, the building envelope will include high performance glazing systems and high levels of insulation. In addition, the large amount of glass used in each building reduces the daytime requirement for electrical lighting.

The Project will meet or exceed the ASHRAE 90.1-2007 standard for Minimum Energy Performance through a variety of measures. Further, no chlorofluorocarbon (CFC) based refrigerants will be used in the project to reduce ozone depletion in the atmosphere and satisfy the Fundamental Refrigeration Management prerequisite.

3.5.4 *Materials and Resources*

During both construction and operations, buildings generate a lot of waste and use a lot of materials and resources. This credit category encourages the selection of sustainable materials, including those that are harvested and manufactured locally, contain high-recycled content, and are rapidly renewable. It also promotes the reduction of waste through building and material reuse, construction waste management, and ongoing recycling programs.

The project includes recycling facilities within the building for the convenience of the occupants in accordance with the requirements of the Storage and Collection of Recyclables prerequisite. A Demolition and Construction Waste Management Plan will be implemented to divert construction waste material from landfills per the Construction Waste Management credit. Building materials will be specified based on their recycled content and proximity of extraction and manufacturing locations to the project site such that points will be achieved in each of the Recycled Content and Regional Materials credits.

3.5.5 *Indoor Environmental Quality*

The U.S. Environmental Protection Agency estimates that Americans spend about 90% of their day indoors, where the air quality can be significantly worse than outside. The Indoor Environmental Quality credit category promotes strategies that can improve indoor air through low emitting materials selection and increased ventilation. It also promotes access to natural daylight and views.

During construction, an indoor air quality management plan will be implemented to prevent contamination of mechanical systems and absorptive materials. Material specifications will include only low-emitting interior finishes for paints, carpets, and woods to preserve indoor air quality. Occupants will also have control over lighting and their thermal environment. The project shall be designed to meet or exceed the rates as per ASHRAE 62.1-2007 “Ventilation for Acceptable Indoor Air Quality” and rooms will have access to daylight and views.

3.5.6 Innovation and Design Process

The Innovation in Design and Innovation in Operations credit categories provide additional points for projects that use new and innovative technologies, achieve performance well beyond what is required by LEED credits, or utilize green building strategies that are not specifically addressed elsewhere in LEED. This credit category also rewards projects for including a LEED Accredited Professional on the team to ensure a holistic, integrated approach to design, construction, operations and maintenance. Four credits are being pursued and could include the following.

- Innovation in Design: Exemplary Perf SS 4.1
- Innovation in Design: Exemplary Perf SS 5.2
- Innovation in Design: Exemplary Perf WEc3
- Innovation in Design: Green Housekeeping
- Innovation in Design: Education Plan

Regional Priority-

- Regional Priority: SS c3
- Regional Priority: Heat Island 7.1-Non- Roof
- Regional Priority: Heat Island 7.2 Roof
- Regional Priority: SS 6.1 Stormwater Quantity (Maybe)

Figure 3.5-1 45-55 Brighton Avenue

LEED 2009 for New Construction and Major Renovations

Project Checklist

45-55 Brighton Ave

Y	?	N	Sustainable Sites		Possible Points: 26
22	4				
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
5			Credit 2	Development Density and Community Connectivity	5
1			Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
3			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
	1		Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
	1		Credit 6.1	Stormwater Design—Quantity Control	1
	1		Credit 6.2	Stormwater Design—Quality Control	1
1			Credit 7.1	Heat Island Effect—Non-roof	1
1			Credit 7.2	Heat Island Effect—Roof	1
	1		Credit 8	Light Pollution Reduction	1

Y	?	N	Water Efficiency		Possible Points: 10
6	2	2			
Y			Prereq 1	Water Use Reduction—20% Reduction	
2	2		Credit 1	Water Efficient Landscaping	2 to 4
		2	Credit 2	Innovative Wastewater Technologies	2
4			Credit 3	Water Use Reduction	2 to 4

Y	?	N	Energy and Atmosphere		Possible Points: 35
6	13	16			
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
5	4	10	Credit 1	Optimize Energy Performance	1 to 19
	1	6	Credit 2	On-Site Renewable Energy	1 to 7
	2		Credit 3	Enhanced Commissioning	2
	2		Credit 4	Enhanced Refrigerant Management	2
1	2		Credit 5	Measurement and Verification	3
	2		Credit 6	Green Power	2

Y	?	N	Materials and Resources		Possible Points: 14
4	2	8			
Y			Prereq 1	Storage and Collection of Recyclables	
		3	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2
		2	Credit 3	Materials Reuse	1 to 2

Y	?	N	Materials and Resources, Continued		
1	1		Credit 4	Recycled Content	1 to 2
1	1		Credit 5	Regional Materials	1 to 2
		1	Credit 6	Rapidly Renewable Materials	1
		1	Credit 7	Certified Wood	1

Y	?	N	Indoor Environmental Quality		Possible Points: 15
9	2	4			
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
		1	Credit 1	Outdoor Air Delivery Monitoring	1
		1	Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
1			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
	1		Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
1			Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems—Lighting	1
1			Credit 6.2	Controllability of Systems—Thermal Comfort	1
		1	Credit 7.1	Thermal Comfort—Design	1
		1	Credit 7.2	Thermal Comfort—Verification	1
	1		Credit 8.1	Daylight and Views—Daylight	1
1			Credit 8.2	Daylight and Views—Views	1

Y	?	N	Innovation and Design Process		Possible Points: 6
4	2				
1			Credit 1.1	Innovation in Design: EP Open Space	1
1			Credit 1.2	Innovation in Design: EP Alt Transportation	1
1			Credit 1.3	Innovation in Design: EP Water Use Reduction	1
	1		Credit 1.4	Innovation in Design: Green Housekeeping	1
	1		Credit 1.5	Innovation in Design: Education	1
1			Credit 2	LEED Accredited Professional	1

Y	?	N	Regional Priority Credits		Possible Points: 4
3	1				
1			Credit 1.1	Regional Priority: SS c3	1
	1		Credit 1.2	Regional Priority: SS 6.1	1
1			Credit 1.3	Regional Priority: SS 7.1	1
1			Credit 1.4	Regional Priority: SS 7.2	1

Y	?	N	Total	Possible Points: 110
54	26	30		

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

3.6 Landscape Design

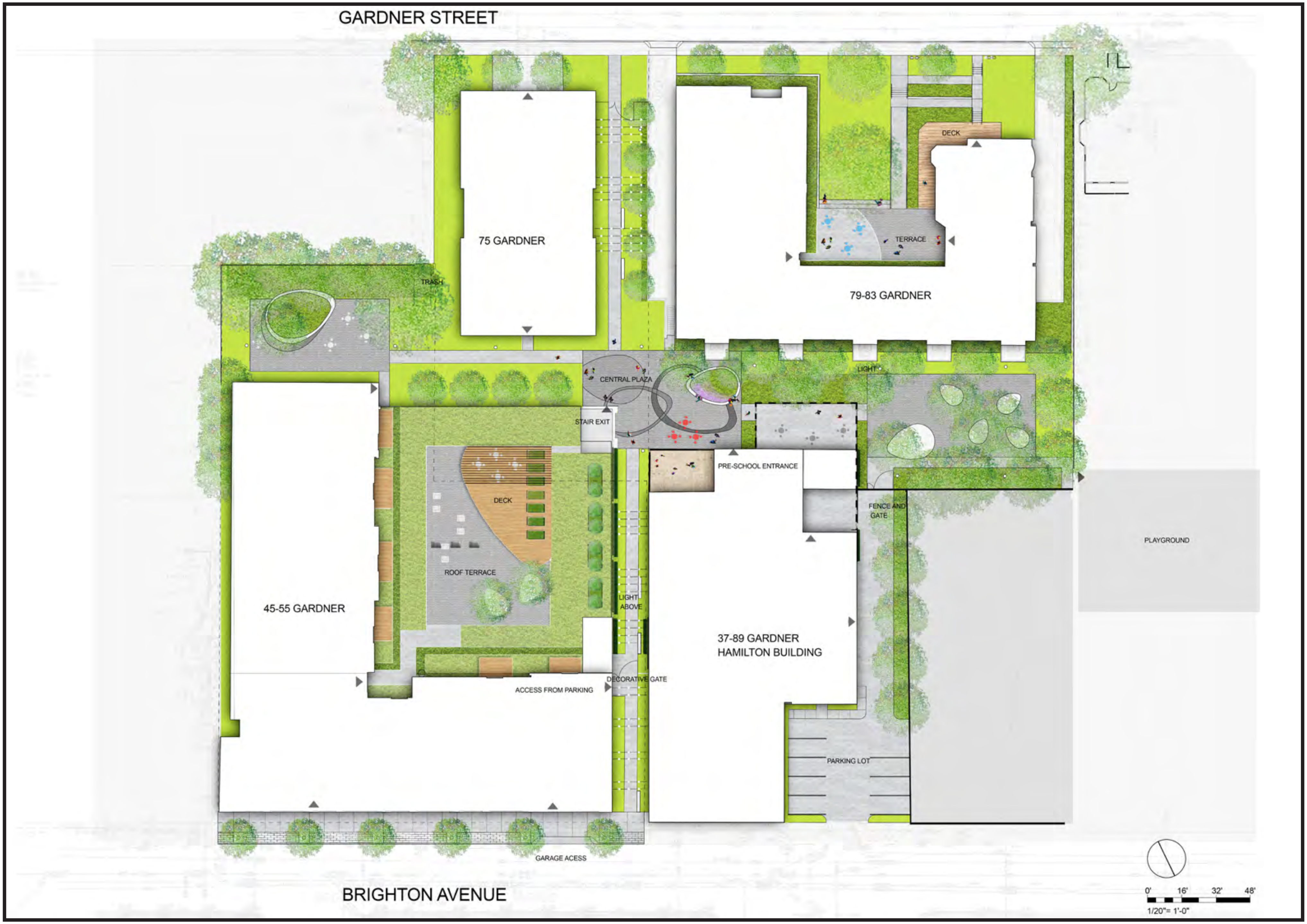
The landscape and open space improvements for Packard Crossing have been designed to provide a fitting streetscape and an internal series of outdoor spaces to be shared between multiple buildings. The internal landscape areas include connecting paths, sitting areas, shade and ornamental trees, shrubs, perennials and groundcovers. Spanning from Brighton Avenue to Gardner Street is a pedestrian scaled path for cross block connections and occasional building servicing. See **Figures 3.6-1** and **3.6-2** for landscape drawings.

Along Brighton Avenue new street trees continue the existing street tree pattern. These trees will sit within a permeable paving band that will also include bicycle racks. The entry to the cross block connector between 39 and 45 Brighton Avenue will be clearly visible and may be marked by a decorative gate that in the day will be in the open position. On the other side of the project, the landscaped connector path will emerge between 75 and 83 Gardner and Brighton Avenue entrance. Planting along the side of the path and pedestrian lighting will enhance the experience and visibility of the path. At the 3rd floor level of the 45 Brighton Avenue building, an occupiable green roof will overlook the internal landscape and will be designed to provide amenities and green space for the building tenants.

On Gardner Street an open lawn will sit between the existing retained Victorian house and the West portion of the new residential building. The grade of the lawn will be maintained close to the existing grade in order to maintain two large existing trees. The primary path to the residential building will cross the lawn directly with a wide path and stairs, and an associated sloping walkway. Surrounding the walkways, stair and terrace will be the planting of ornamental shrubs and perennials/ groundcovers. A low landscape wall will be fronted with flowering groundcovers.

The pedestrian scaled cross block connector will provide for both pedestrian and bicycle connections, and also allow for occasional servicing by small vehicles. The connecting path will have a consistent paving treatment along most of its length, expanding to a small plaza space at the center of the four site buildings. This central area will provide for easy connection in many directions: between buildings from the parking garage to the existing pre-school use, the sitting areas, and the cross block connector.

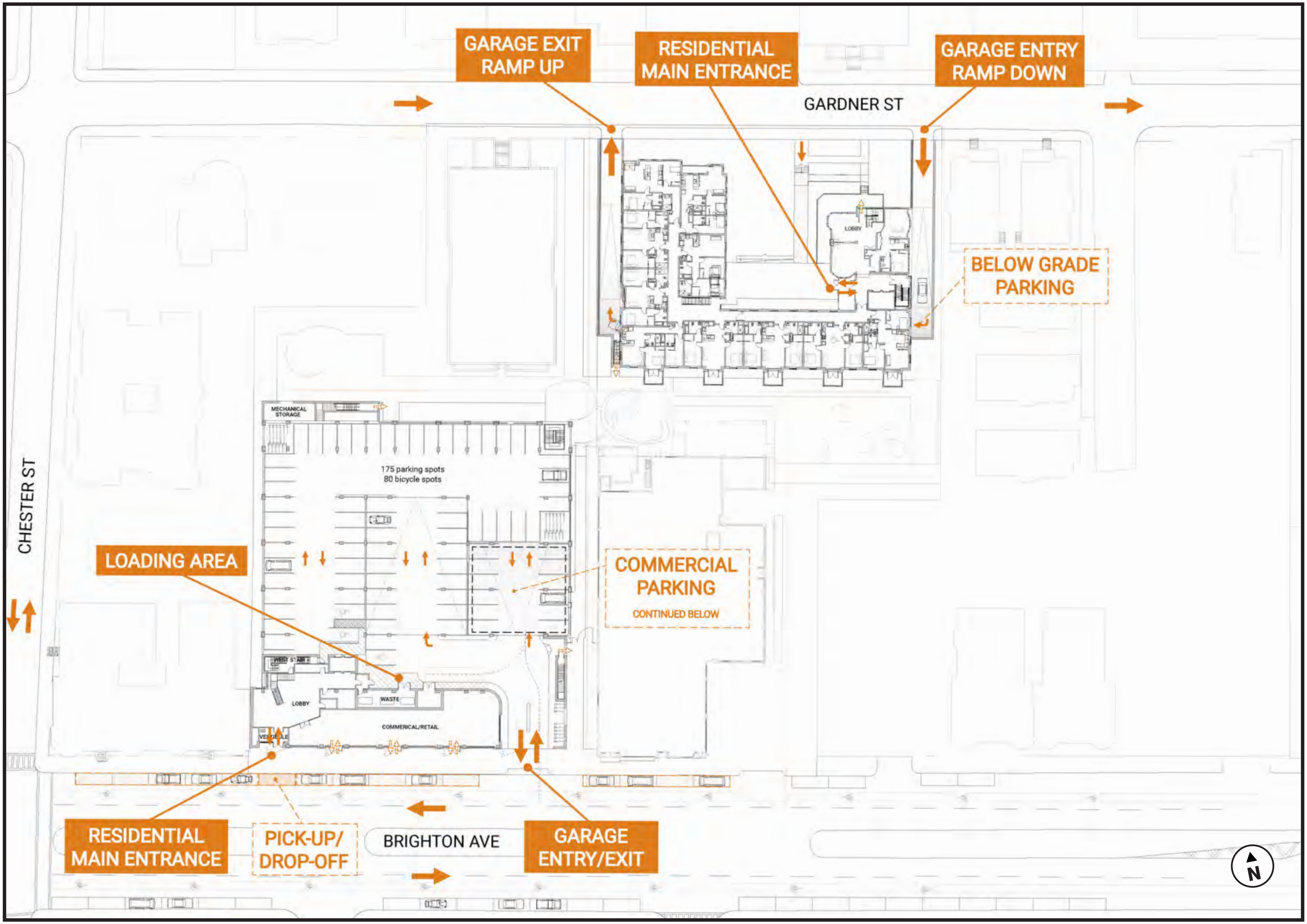
Pedestrian scale lighting will be carefully designed to provide for both safety and a feeling of intimacy. Planted screens will be used strategically to screen the Brighton Avenue parking garage along the path connector as well as to provide privacy for the apartments that face onto the internal landscape. Several existing large trees will be maintained to both the east and the west, and will be complemented with new shade and ornamental trees as well as other types of planting. The small parking area for the existing 39 Gardner building will be redesigned with a new striping and planting.



3.6-1

PACKARD CROSSING - LANDSCAPE DRAWING

ground H+A



3.6-1

PACKARD CROSSING - SITE CIRCULATION DIAGRAM

H+A

4.0 ENVIRONMENTAL PROTECTION COMPONENT

4.1 Shadow Impacts Analysis

4.1.1 Introduction

The following shadow analysis was prepared to analyze the shade impact of the project on the surrounding neighborhood. It was used to avoid adverse conditions for the neighborhood. The following times and dates were studied as a sample representative of the shadow cycle throughout a year.

Time of Year / Date	Time of Day
Vernal Equinox (March 21)	9:00 am, 12:00 noon, 3:00 pm
Summer Solstice (June 21)	9:00 am, 12:00 noon, 3:00 pm, 6:00 pm
Autumnal Equinox (September 21)	9:00am, 12:00noon, 3:00pm, 6:00 pm
Winter Solstice (December 21)	9:00 am, 12:00 noon, 3:00 pm

4.1.2 Vernal Equinox (March 21)

Figures 4.1-1 through **4.1-3** depict shadows on March 21.

At 9:00 AM, shadows are cast in a westerly direction onto portions of Chester Street and on the façade of some of the residential structures through existing trees.

At 12:00 Noon, shadows are cast in the northwesterly direction onto portions of Chester Street abutter's rear lots and slightly onto Gardner Street.

At 3:00 PM, shadow from the project is cast northeasterly across the site.

4.1.3 Summer Solstice (June 21)

Figures 4.1-4 through **4.1-7** depict shadow impacts on June 21.

At 9:00 AM, shadows are cast in a westerly direction onto portions of some of the Chester Street abutter's rear lots, and onto the lower east façade of 75 Gardner.

At 12:00 Noon, shadows are cast in the northwesterly direction onto a portion of the site.

At 3:00 PM, shadow from the project is cast northeasterly across the site.

At 6:00 PM, overall neighborhood shadows are long. New shadows from the project are cast easterly across the site and southerly across the enlarged public realm sidewalk on Brighton Ave. Shadows are also cast onto some Gardner Terrace abutter's rear lots.

4.1.4 Autumnal Equinox (September 21)

Figures 4.1-8 through **4.1-11** depict shadow impacts on September 21.

At 9:00 AM, shadows are cast in a northwesterly direction onto portions of some of the Chester Street abutter's rear lots, and onto the lower east façade of 75 Gardner.

At 12:00 Noon, shadows are cast in the northwesterly direction onto a portion of the site and slightly onto Gardner Street.

At 3:00 PM, shadow from the project is cast northeasterly across the site.

At 6:00 PM, new shadows from the project are cast easterly across the site onto portions of Gardner Terrace and on the façade of some of the residential structures through existing trees.

4.1.5 Winter Solstice (December 21)

Figures 4.1-12 through **4.1-14** depict shadow impacts on December 21. Winter sun casts the longest shadows of the year.

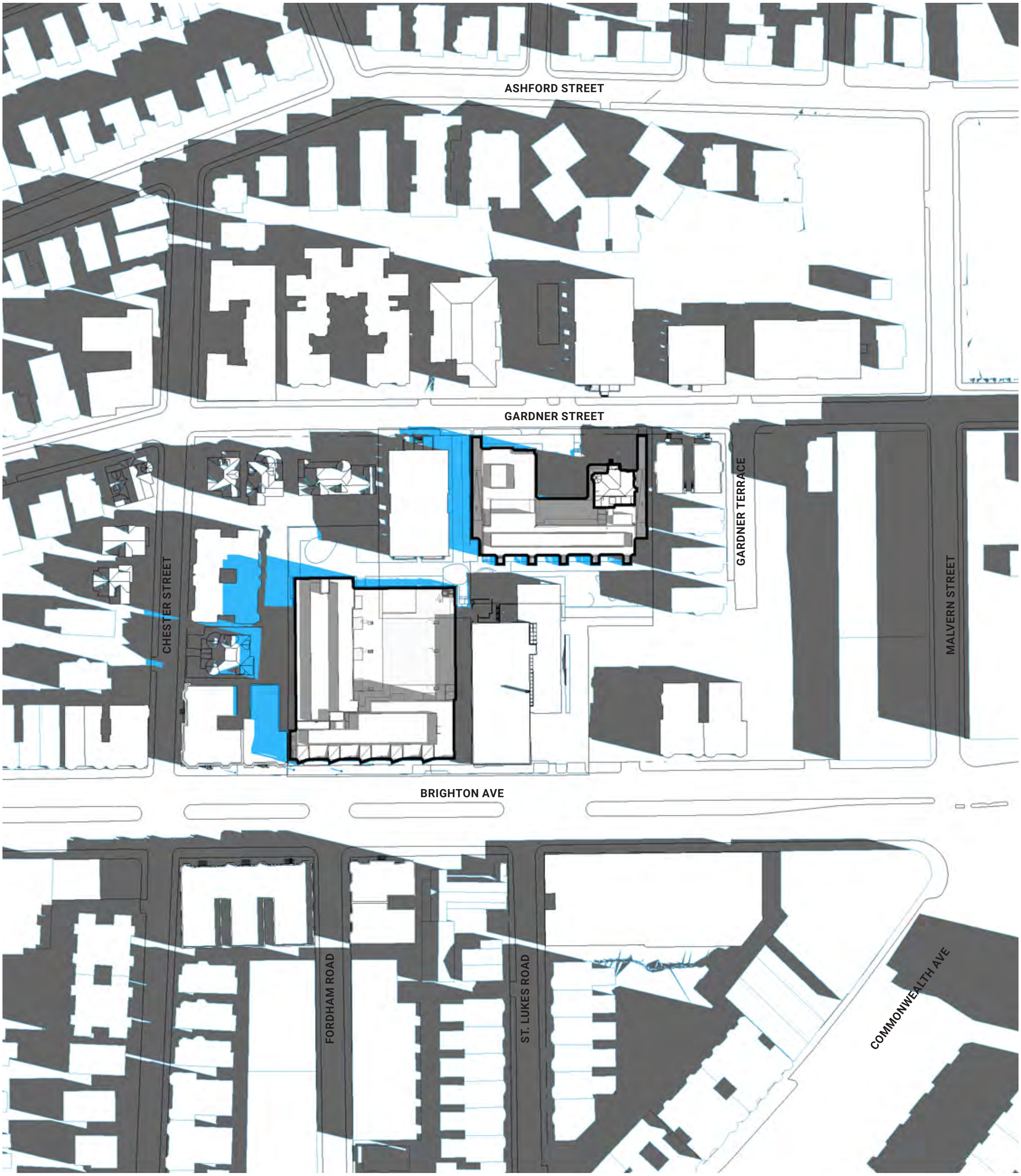
At 9:00 AM, shadows are cast in a northwesterly direction onto portions of some of the Chester Street abutter's rear lots.

At 12:00 Noon, shadows are cast in a northwesterly direction onto portions of the site, portions of Chester Street abutter's rear lots, Gardner Street abutter's rear lots.

At 3:00 PM, shadow from the project is cast northeasterly direction onto portions of the site, Gardner Street abutter's lots.

4.1.6 Summary

New shadows are generally limited within the site boundaries. Although early morning shadows will extend in easterly westerly direction onto the western edges of abutting properties, however an existing buffer of mature trees and vegetation is not reflected in the performed analysis which results in an exaggerated impact. Later evening shadows also have a similar effect casting in a north easterly direction, which have a lessening impact on abutter's properties. Overall, the Project's shadow impacts will not adversely impact the Project Site and surroundings.



EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 112.59, ELEVATION: 23.61

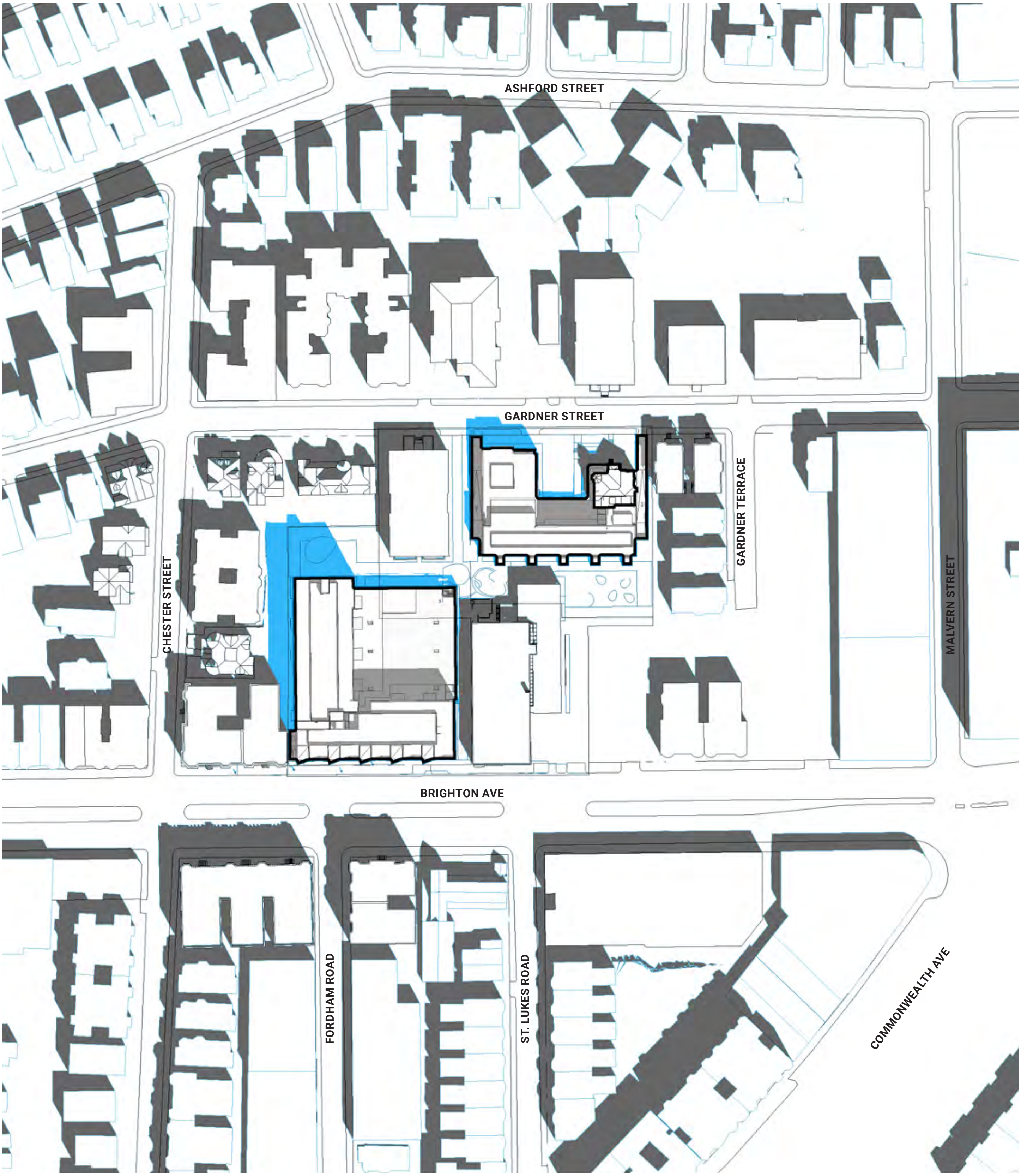
MARCH 21, 9:00 AM

4.1-1

SCALE
1" = 150' - 0"

0' 150' 300'

N



EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 161.17, ELEVATION: 46.69

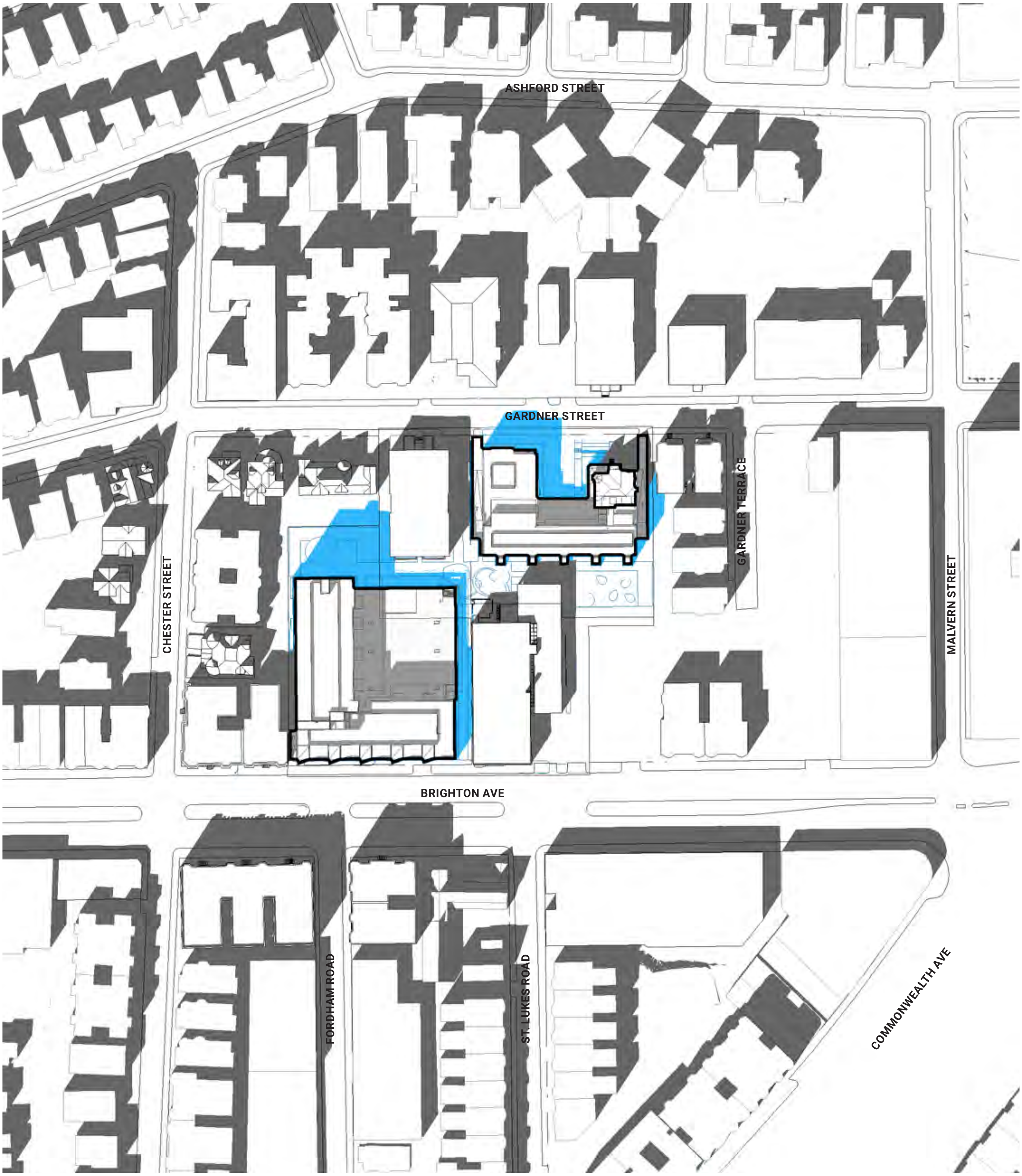
MARCH 21, 12:00 PM

4.1-2

SCALE
1" = 150' - 0"

0' 150' 300'

N



EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 223.5, ELEVATION: 39.26

MARCH 21, 3:00 PM

4.1-3

SCALE
1" = 150' - 0"

0' 150' 300'

N

EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 93.51, ELEVATION: 39.95

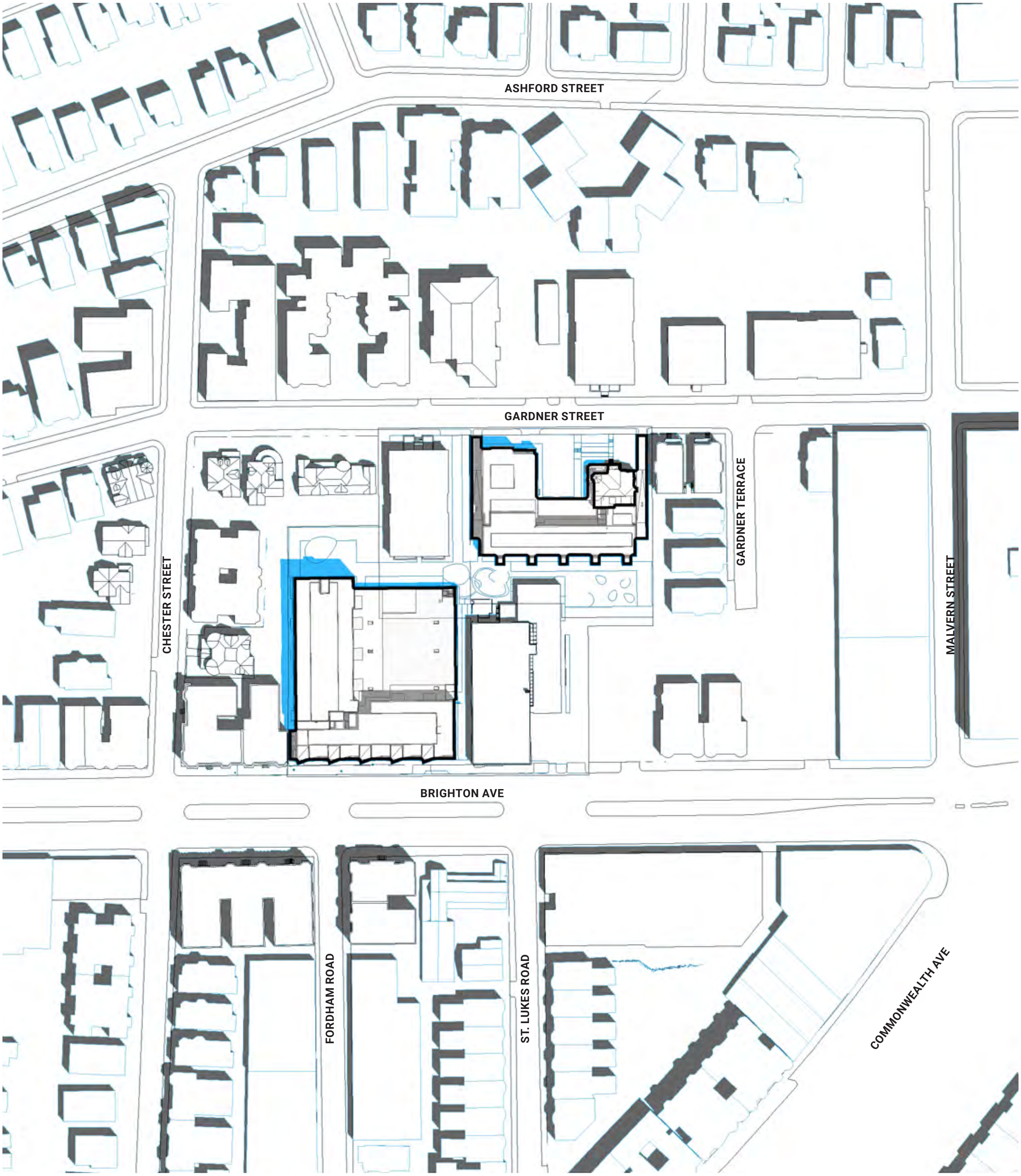
JUNE 21, 09:00 AM

4.1-4

SCALE
1" = 150' - 0"

0' 150' 300'

N



EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 149.52, ELEVATION: 68.8

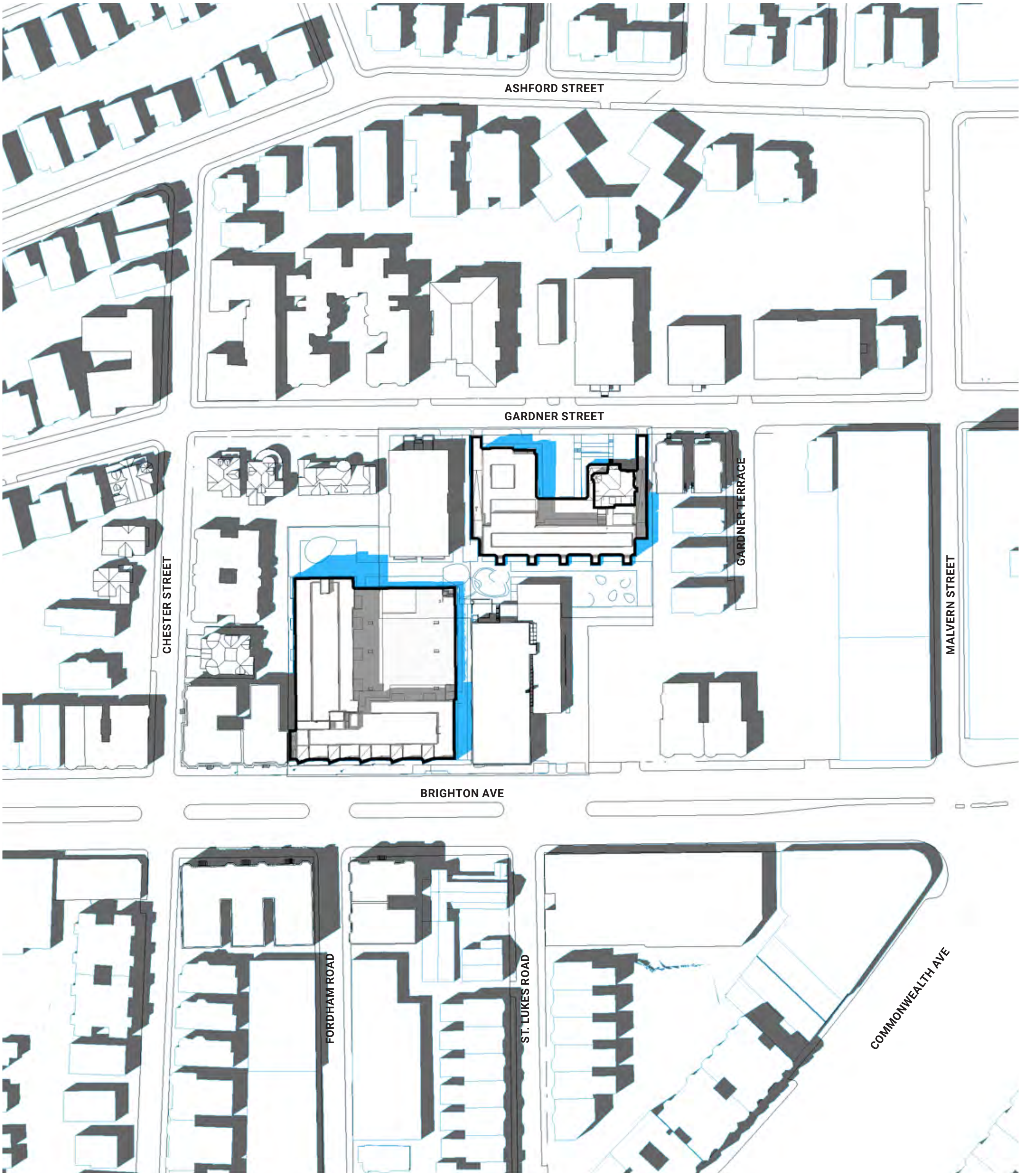
JUNE 21, 12:00 PM

4.1-5

SCALE
1" = 150' - 0"

0' 150' 300'

N



EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 246.32, ELEVATION: 56.48

JUNE 21, 3:00 PM

4.1-6

SCALE
1" = 150' - 0"

0' 150' 300'

N

EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 280.71, ELEVATION: 23.83

JUNE 21, 6:00 PM

4.1-7

SCALE
1" = 150' - 0"

0' 150' 300'

N

EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 115.54, ELEVATION: 25.89

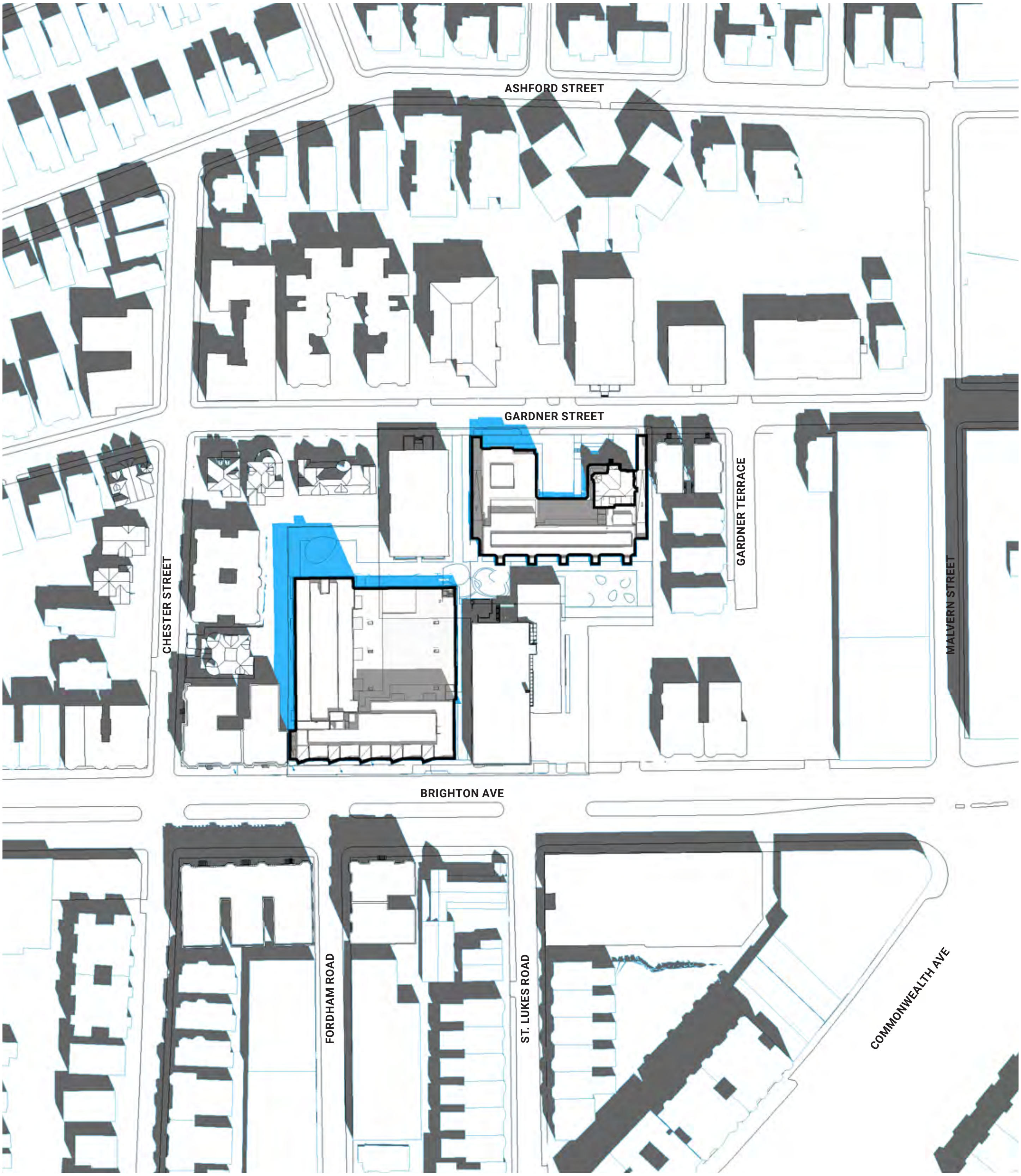
SEPTEMBER 21, 9:00 AM

4.1-8

SCALE
1" = 150' - 0"

0' 150' 300'

N



EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 166.28, ELEVATION: 47.2

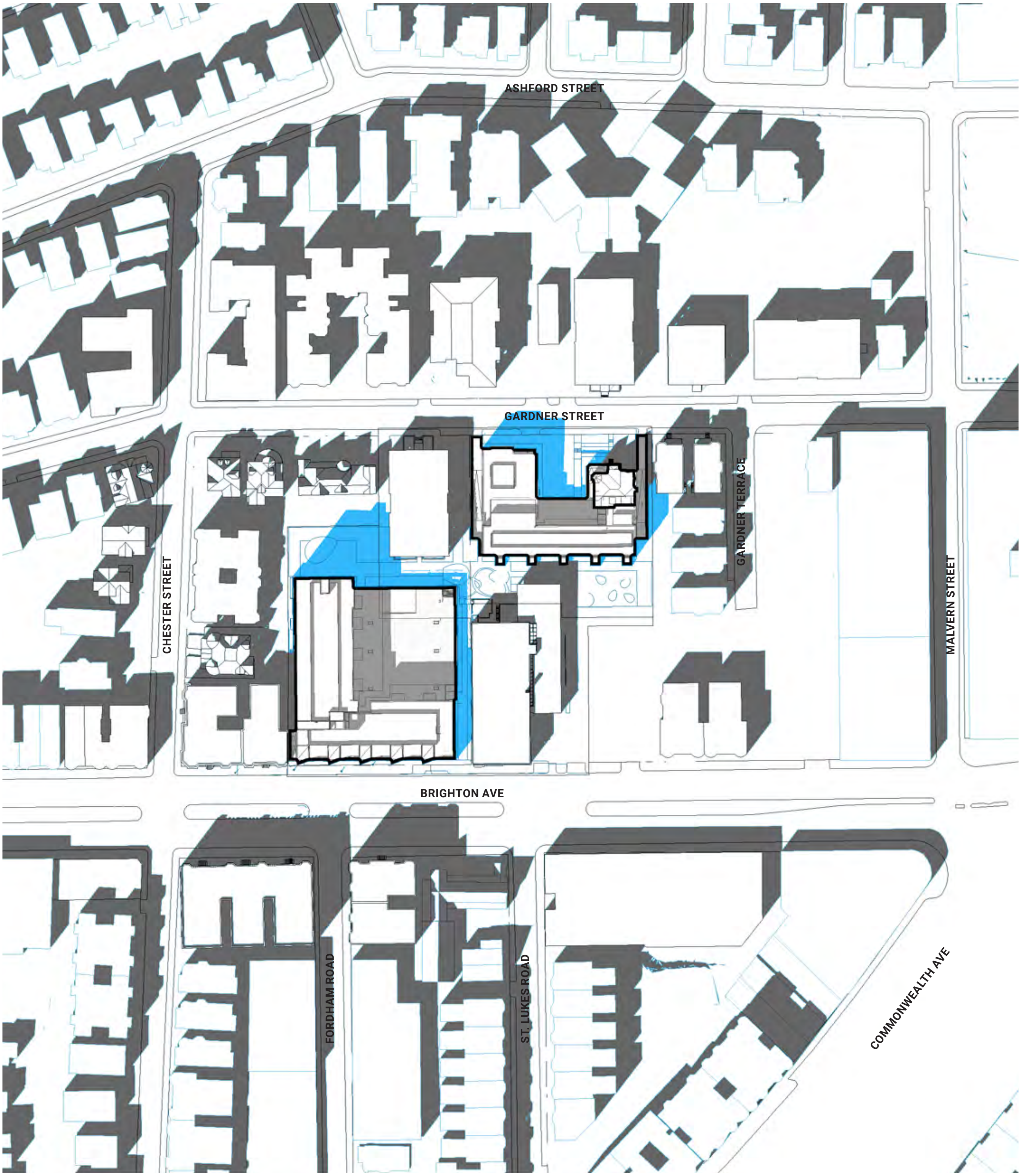
SEPTEMBER 21, 12:00 PM

4.1-9

SCALE
1” = 150’ - 0”

0’ 150’ 300’

N



EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 227.1, ELEVATION: 37.14

SEPTEMBER 21, 3:00 PM

4.1-10

SCALE
1" = 150' - 0"

0' 150' 300'

N

EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 263.93, ELEVATION: 7.12

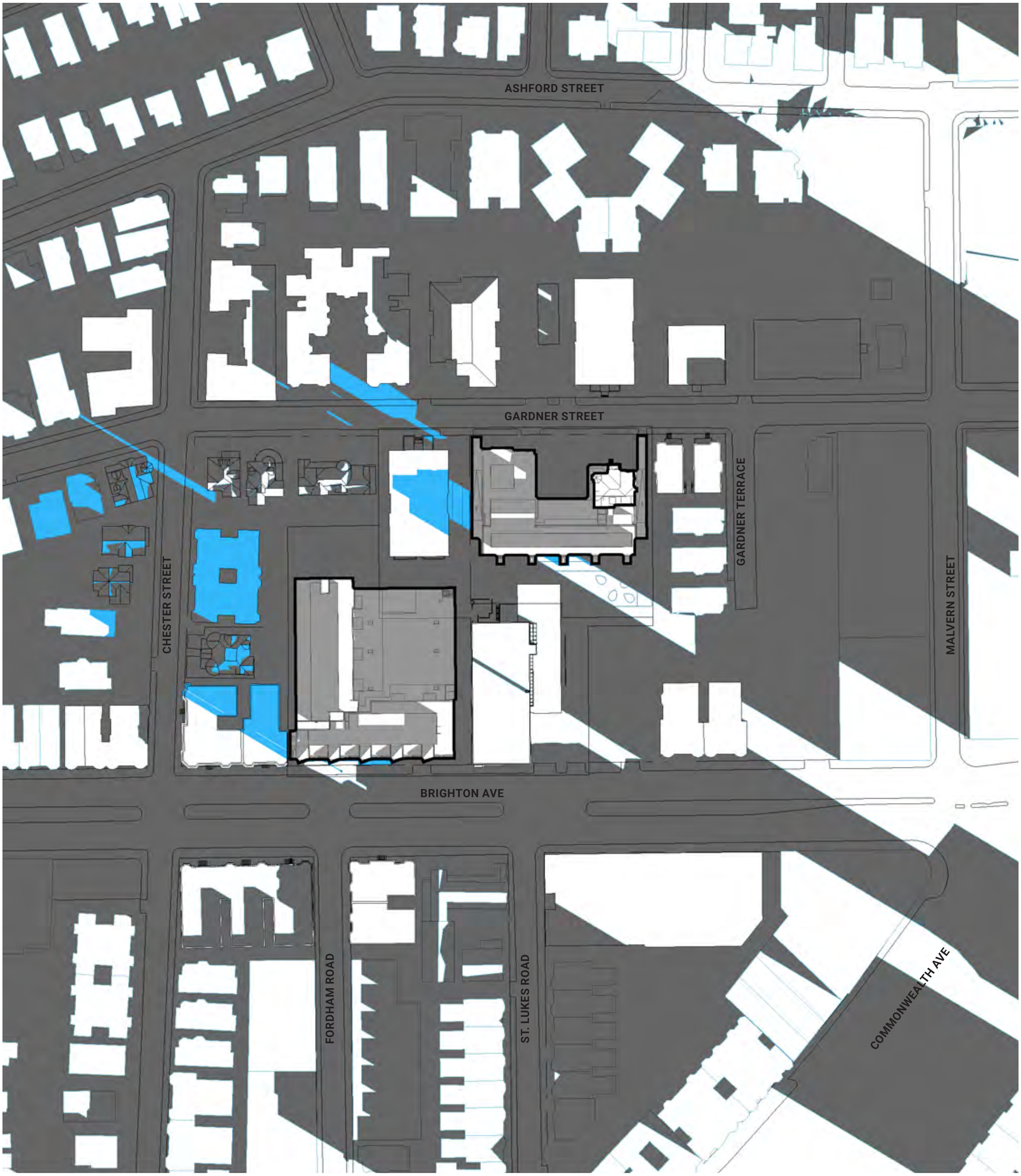
SEPTEMBER 21, 6:00 PM

4.1-11

SCALE
1" = 150' - 0"

0' 150' 300'

N



EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 130.32, ELEVATION: 6.72

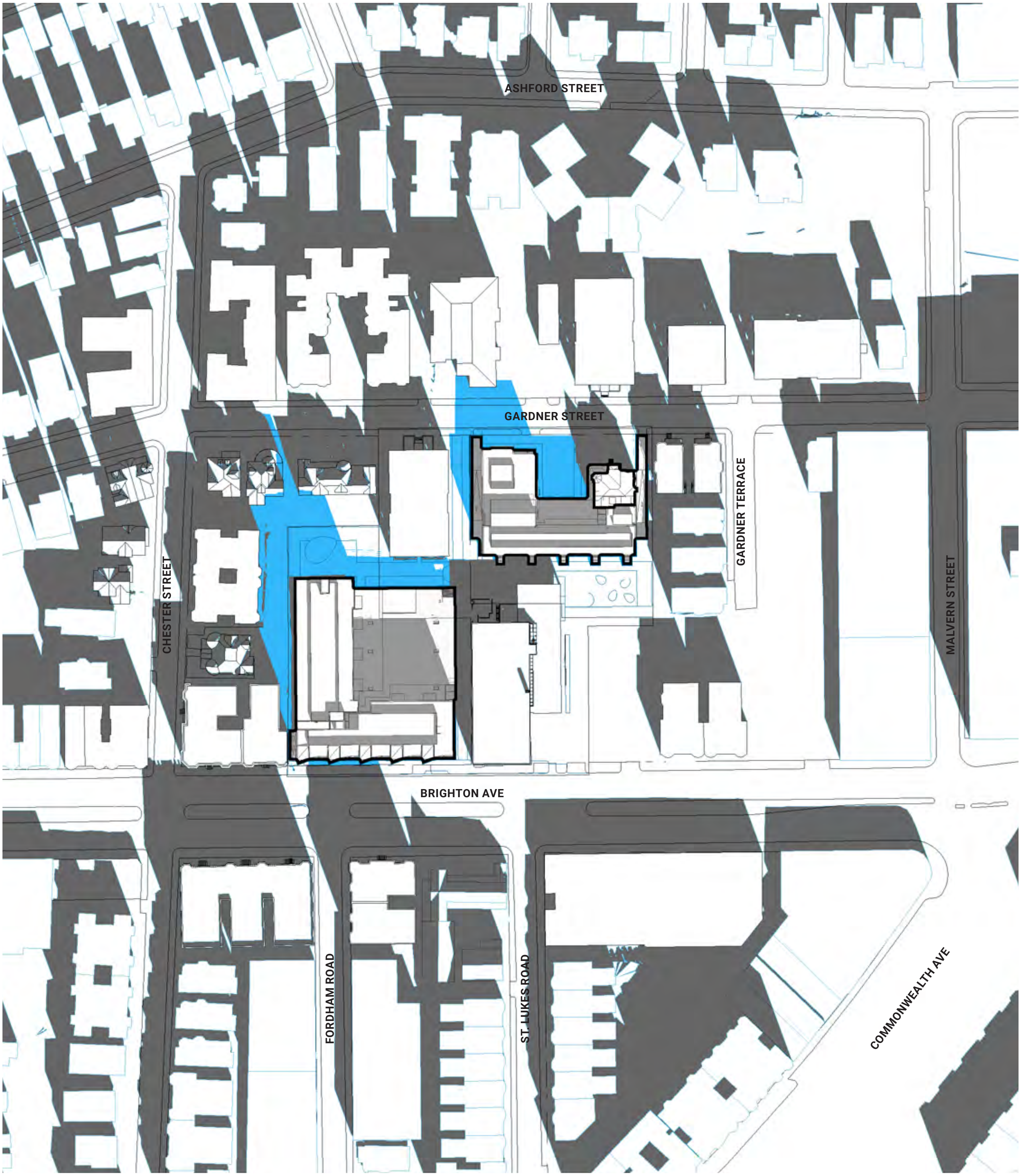
DECEMBER 21, 9:00 AM

4.1-12

SCALE
1" = 150' - 0"

0' 150' 300'

N



EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 169.34, ELEVATION: 23.52

DECEMBER 21, 12:00 PM

4.1-13

SCALE
1" = 150' - 0"

0' 150' 300'

N

EXISTING SHADOWS

NEW SHADOWS

AZIMUTH: 212.75, ELEVATION: 17.03

DECEMBER 21, 3:00 PM

4.1-14

SCALE
1" = 150' - 0"

0' 150' 300'

N

4.2 Air Quality

Tech Environmental, Inc. performed air quality analyses for the Proposed Project (the "Project") to be located at 45-55 Brighton Avenue and 79-83 Gardner Street in Boston, MA. These analyses consisted of: 1) an evaluation of existing air quality; 2) an evaluation of potential carbon monoxide (CO) impacts from the operation of the Project's underground parking garages, and 3) an analysis to determine whether the project meets the BRA criteria for requiring a microscale CO analysis.

4.2.1 Existing Air Quality

The City of Boston is currently classified as being in attainment of the Massachusetts and National Ambient Air Quality Standards ("NAAQS") for all of the criteria air pollutants except ozone (**see Table 4.2-1**). These air quality standards have been established to protect the public health and welfare in ambient air, with a margin for safety.

The Massachusetts Department of Environmental Protection ("DEP") currently operates air monitors in various locations throughout the city. The closest, most representative, DEP monitors for carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), fine particulate matter ($PM_{2.5}$), coarse particulate matter (PM_{10}), ozone (O_3) and lead (Pb) are located at Dudley Square (Harrison Avenue), Boston, MA. The closest, most representative, DEP monitor for ozone is located at Dudley Square (Harrison Avenue).

Table 4.2-2 summarizes the DEP air monitoring data, for the most recent available, complete, three-year period (2012-2014), that are considered to be representative of the project area. **Table 4.2-2** shows that the existing air quality in the Project area is generally much better than the NAAQS. The highest impacts relative to a NAAQS are for ozone and $PM_{2.5}$. Ozone is a regional air pollutant on which the small amount of additional traffic generated by this Project will have an insignificant impact. The Project's operations will not have a significant impact on local $PM_{2.5}$ concentrations.

Table 4.2-1 Massachusetts and National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Time	NAAQS (μg/m^3)
SO_2	1-hour[P] 24-hour[P] Annual[P] (Arithmetic Mean)	196[a] 365[b] 80
CO	1-hour[P] 8-hour[P]	40,000[b] 10,000[b]
NO_2	1-hour[P] Annual[P/S] (Arithmetic Mean)	188[c] 100
PM_{10}	24-hour[P/S]	150
$PM_{2.5}$	24-hour[P/S] Annual[P/S] (Arithmetic Mean)	35[d] 12[e,f]
O_3	8-hour[P/S]	138[g]
Pb	Rolling 3-Month Avg.[P/S] Calendar Quarter[P/S] (Arithmetic Mean)	0.15 1.5

P = primary standard; S = secondary standard.
a 99th percentile 1-hour concentrations in a year (average over three years).
b One exceedance per year is allowed.
c98th percentile 1-hour concentrations in a year (average over three years).
d98th percentile 24-hour concentrations in a year (average over three years).
e Three-year average of annual arithmetic means.
f As of March 18, 2013, the U.S. EPA lowered the PM2.5 annual standard from 15 ug/m3 to 12 ug/m3.
g Three-year average of the annual 4th-highest daily maximum 8-hour ozone concentration must not exceed 0.070 ppm (138 ug/m3) (effective October 28, 2015) and the annual PM10 standard was revoked in 2006.

Table 4.2-2 Representative Existing Air Quality in the Project Area

Pollutant, Averaging Period	Monitor Location	Value (μg/m³)	NAAQS (μg/m³)	Percent of NAAQS
CO, 1-hour	Harrison Avenue, Boston	2,519	40,000	6%
CO, 8-hour	Harrison Avenue, Boston	1,832	10,000	18%
NO_2, 1-hour	Harrison Avenue, Boston	90.9	188	48%
NO_2, Annual	Harrison Avenue, Boston	32.8	100	33%
Ozone, 8-hour	Harrison Avenue, Boston	125	138	91%
PM_{10}, 24-hour	Harrison Avenue, Boston	37	150	25%
$PM_{2.5}$, 24-hour	Harrison Avenue, Boston	16.4	35	47%
$PM_{2.5}$, Annual	Harrison Avenue, Boston	7.2	12	60%
Lead, Quarterly	Harrison Avenue, Boston	0.014	1.5	1.1%
SO_2, 1-hour	Harrison Avenue, Boston	30.8	196	16%

Source: MassDEP, http://www.mass.gov/dep/air/priorities/aqreports.htm., downloaded August 9, 2015.

Notes:

(1) Annual averages are highest measured during the most recent three-year period for which data are available (2012 - 2014). Values for periods of 24-hours or less are highest, second-highest over the three-year period unless otherwise noted.

(2) The eight-hour ozone value is the 3-year average of the annual fourth-highest values, the 24-hour $PM_{2.5}$ value is the 3-year average of the 98th percentile values, the annual $PM_{2.5}$ value is the 3-year average of the annual values – these are the values used to determine compliance with the NAAQS for these air pollutants.

(3) The one-hour NO_2 value is the -year average of the 98th percentile values and the one-hour SO_2 value is the -year average of the 99th percentile values.

(4) Three-year average of the annual 4th-highest daily maximum 8-hour ozone concentration must not exceed 0.070 ppm (138 ug/m³) (effective October 28, 2015); the annual PM_{10} standard was revoked in 2006 and the 3-hour SO_2 standard was revoked by the US EPA in 2010.

4.2.2 Parking Garages

The Project also includes two parking garages designed to provide parking spaces for 162 vehicles at the 45-55 Brighton Avenue garage and 41 vehicles at the 79-83 Gardner Street garage. An analysis of the worst-case air quality impacts from the proposed parking garage was performed (see **Appendix B**). The procedures used for this analysis are consistent with U.S. EPA's Volume 9 guidance.[1] The objective of this analysis was to determine the maximum CO concentrations inside the garage and at the closest sensitive receptors surrounding the Project. These closest sensitive receptors include: nearby existing buildings and pedestrians at ground

[1] US EPA, "Guidelines for Air Quality Maintenance Planning and Analysis Volume 9 (Revised): Evaluating Indirect Sources," EPA-450/4-78-001, September 1978.

level anywhere near the Project. CO emissions from motor vehicles operating inside each garage were calculated and the CO concentrations inside the garage and surrounding the Project were based on morning and afternoon peak traffic periods.

The objective of this analysis was to determine the maximum CO concentrations at the closest sensitive receptors surrounding the Project. These closest sensitive receptors include: the proposed buildings and nearby existing buildings, and pedestrians at ground level anywhere near the Project. The parking garages CO emissions were modeled using an U.S. EPA-approved air model.

Garage Ventilation System

The proposed parking garages will require mechanical ventilation. The garage ventilation system will be designed to provide adequate dilution of the motor vehicle emissions before they are vented outside. The design of the garage ventilation system will meet all building code requirements. The garage ventilation system will be a fan that will replace the air in the garages with 48,000 cubic feet per minute (cfm) of fresh air. This quantity of air is designed to meet the building code and will be more than adequate to dilute the emissions inside the parking garages to safe levels before they are vented outside. The garage ventilation exhausts will likely be located at the rooftop.

Peak Garage Traffic Volumes

The peak morning and afternoon one-hour entering and exiting traffic volumes for the garage are shown in **Table 4.2-3**.

Table 4.2-3 Peak-Hour Garage Traffic Volumes

Garage Location	Period	Entering (vehicles/hour)	Exiting (vehicles/hour)	Total (vehicles/hour)
43 Brighton Avenue	AM Peak Hour	30	16	46
	PM Peak Hour	22	40	62
79 Gardner Street	AM Peak Hour	2	7	9
	PM Peak Hour	6	3	9

Source: Howard Stein Hudson.

Motor Vehicle Emission Rates

The U.S. Environmental Protection Agency (EPA) MOVES2014 emission factor model was used to calculate single vehicle CO emissions rates, for a vehicle speed of 5 mph. The inputs to the MOVES2014 model followed the latest guidance from the Massachusetts Department of Environmental Protection (DEP). The CO emission rate calculated by MOVES2014, for idling vehicles in both garages, were 2.976 grams per mile (g/mi.) for each entering and exiting vehicle. These emission rates apply to wintertime conditions when motor vehicle CO emissions are greatest due to cold temperatures. MOVES2014 model output is provided in the **Appendix B.**

To determine the maximum one-hour CO emissions inside the garages it was necessary to estimate the amount of time each motor vehicle will be in the parking garage with its engine running. To be conservative, it was assumed that every car entering or leaving the garage will be operating during that peak hour. The calculations in **Appendix B** show how long each vehicle will be operating in the garage for both the morning and afternoon peak periods.

Peak Garage CO Emission Rate and CO Concentration Inside the Garage

The peak one-hour CO emission rate for the 45-55 Brighton Avenue garage was calculated to be 0.2122 for the morning peak hour and 0.286 grams/second for the afternoon peak hour. The peak one-hour CO emission rate for the 79-83 Gardner Street garage was calculated to be 0.006 grams/second for the morning peak hour and afternoon peak hour. Applying the maximum volumetric garage ventilation flow rate for the parking garage, the peak one-hour CO concentration inside the Brighton Avenue garage was calculated to be 8.17 parts of CO per million parts of air (ppm) for the morning and 11.02 ppm of CO for the afternoon peak hour. The peak one-hour CO concentration inside the Gardner garage was calculated to be 0.23 ppm for both the morning and afternoon peak hours. These predictions represent conservative estimates of the peak garage CO emissions and concentrations.

Peak Ambient CO Concentration

Worst-case concentrations of CO from the parking garages were predicted for locations around the buildings with using AERMOD model (Version 15181) in screening-mode. The results of the air quality analysis for locations outside and around the buildings are summarized in **Table 4.2-4**. The results in **Table 4.3-4** represent all outside locations on and near the Project Site, including nearby residences. **Appendix B** contains the AERMOD model output.

The AERMOD model in screening-mode was used to predict the maximum concentration of CO by modeling parking garages emissions as volume sources using worst-case meteorological conditions for an urban area. The screening-mode option simulates modeling results predicted by AERMOD. The predicted concentrations presented here represent the worst-case air quality impacts from the parking garages at all locations on and around the Project. AERMOD predicted one-hour average concentrations of air pollutants.

AERMOD predicted that the maximum one-hour CO concentration from parking garages will be 0.39 ppm (487.3 μg/m^3). This concentration represents the maximum CO concentration at any location surrounding the Project. AERSCREEN guidance allows the maximum eight-hour CO impact to be conservatively estimated by multiplying the maximum one-hour impact by a factor of 0.9 (i.e. the eight-hour impact is 90% of the one-hour impact). The maximum predicted eight-hour CO concentration was determined to be approximately 0.351 ppm (0.39 ppm x 0.9).

The U.S. EPA has established National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare in ambient air, with a margin for safety. The NAAQS for CO are 35 ppm for a one-hour average and 9 ppm for an eight-hour average. The Commonwealth of Massachusetts has established the same standards for CO. Conservative, urban CO background values of 1.8 ppm for a one-hour period and 1.5 ppm for an eight-hour period were added to the maximum predicted garage ambient impacts to represent the CO contribution from other, more distant, sources. With the conservative background concentration added, the peak, total, one-hour and eight-hour CO impacts from the parking garage, at any location around the building, will be no larger than 2.2 ppm and 1.9 ppm, respectively. These maximum predicted total CO concentrations (garage exhaust impacts plus background) are safely in compliance with the NAAQS. This analysis demonstrates that the operation of the parking garages will not have an adverse impact on air quality.

Table 4.2-4 Peak Predicted Parking Garage Air Quality Impacts

Location	Peak Predicted One-Hour Impact (ppm)	One-Hour NAAQS (ppm)	Peak Predicted Eight-Hour Impact (ppm)	Eight-Hour NAAQS (ppm)
Outside – Surrounding the Building* (Parking Garages)	2.19	35 (NAAQS)	1.85	9 (NAAQS)

NAAQS = Massachusetts and National Ambient Air Quality Standards for CO (ppm = parts per million)
* Representative of maximum CO impact at all nearby residences, buildings, and sidewalks.
** Includes background concentrations of 1.8 ppm for the one-hour period and 1.5 ppm for the eight-hour period.

4.2.3 Microscale CO Analysis for Selected Intersections

The Boston Redevelopment Authority (BRA) and the Massachusetts DEP typically require a microscale air quality analysis for any intersection in the Project study area where the level of service (LOS) is expected to deteriorate to D and the proposed project causes a 10% increase in traffic or where the level of service is E or F and the project contributes to a reduction in LOS. For such intersections, a microscale air quality analysis is required to examine the carbon monoxide (CO) concentrations at sensitive receptors near the intersection.

A microscale air quality analysis was not performed for this Project due to the Project trip generation having minimal impacts on the overall delays at the four intersections. The Project will generate approximately 19 motor vehicle trips during the morning peak traffic hour and approximately 22 motor vehicle trips during the afternoon traffic hour. Under the Build scenario, the overall LOS will be the same or better during the morning peak traffic hour for all intersections. Under the Build scenario, the overall LOS will be the same or better during the afternoon peak traffic hour for all intersections, except for the Linden Street/Brighton Avenue intersection where the overall LOS degrades from C to D. However, the increase in traffic at this intersection is less than 10%. **Table 4.2-4** shows a comparison of the Existing (2015) and Build (2020) LOS at the four intersections. The motor vehicle trip generation from the Project will not have a significant impact on motor vehicle delays and air pollutant emissions at the analyzed intersections. Therefore, the motor vehicle traffic generated by the Project will not have a significant impact on air quality at any intersection in the Project area and a microscale air quality analysis is not necessary for this Project.

Table 4.2-4 Summary of Build Case Level of Service

Intersection	Existing LOS (AM/PM)	Build LOS (AM/PM)	Requires Analysis?
Linden Street/Brighton Avenue	C/C	C/D	NO*
Commonwealth Avenue/Brighton Avenue	C/C	C/C	NO
Chester Street/Brighton Avenue	A/A	A/A	NO
Brighton Avenue/Malvern Street	A/A	A/A	NO
Linden Street/Gardner Street	A/A	A/A	NO
Chester Street/Gardner Street	A/A	A/A	NO
Malvern Street/Gardner Street	A/A	A/A	NO

The LOS shown represents the overall delay at each signalized intersection and the worst approach at the unsignalized intersection. Percentages shown for LOS D are percent increase in traffic from the Project.

*Project does not contribute to reduction in level of service.

Source: Howard Stein Hudson

4.2.4 Conclusions

The microscale CO air quality dispersion modeling analysis clearly indicates that the worst-case traffic generated by the Project will not cause or contribute to any violations of the NAAQS for CO, and will not significantly affect air quality. Total CO impacts at the intersections with the largest delays and at the Project site, including the impacts from the parking garages, are predicted to be safely in compliance with the NAAQS for CO.

4.3 Noise Impacts

Tech Environmental, Inc. performed a noise study to determine whether the operation of the proposed Project will comply with the City of Boston Noise Regulations and the Massachusetts Department of Environmental Protection ("DEP") Noise Policy.

4.3.1 Common Measures of Community Noise

The unit of sound pressure is the decibel (dB). The decibel scale is logarithmic to accommodate the wide range of sound intensities to which the human ear is subjected. A property of the decibel scale is that the sound pressure levels of two separate sounds are not directly additive. For example, if a sound of 70 dB is added to another sound of 70 dB, the total is only a 3-decibel increase (or 73 dB), not a doubling to 140 dB. Thus, every 3 dB increase represents a doubling of sound energy. For broadband sounds, a 3 dB change is the minimum change perceptible to the human ear. **Table 4.3-1** gives the perceived change in loudness of different changes in sound pressure levels.[2]

Table 4.3-1 Subjective Effects of Changes in Sound Pressure Levels

Change in Sound Level	Apparent Change in Loudness
3 dB	Just perceptible
5 dB	Noticeable
10 dB	Twice (or half) as loud

Non-steady noise exposure in a community is commonly expressed in terms of the A-weighted sound level (dBA); A-weighting approximates the frequency response of the human ear. Levels of many sounds change from moment to moment. Some are sharp impulses lasting 1 second or less, while others rise and fall over much longer periods of time. There are various measures of sound pressure designed for different purposes. To establish the background ambient sound level in an area, the L_{90} metric, which is the sound level exceeded 90 percent of the time, is typically used. The L_{90} can also be thought of as the level representing the quietest 10 percent of any time period. Similarly, the L_{10} can also be thought of as the level representing the quietest 90 percent of any time period. The L_{10} and L_{90} are broadband sound pressure measures, i.e., they include sounds at all frequencies.

Sound level measurements typically include an analysis of the sound spectrum into its various frequency components to determine tonal characteristics. The unit of frequency is Hertz (Hz), measuring the cycles per second of the sound pressure waves, and typically the frequency analysis examines nine octave bands from 32 Hz to 8,000 Hz. A source is said to create a pure

[2] American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., 1989 ASHRAE Handbook--Fundamentals (I-P) Edition, Atlanta, GA, 1989.

tone if acoustic energy is concentrated in a narrow frequency range and one octave band has a sound level 3 dB greater than both adjacent octave bands.

The acoustic environment in an urban area such as the Project area results from numerous sources. Observations show that major contributors to the background sound level in the Project area include motor vehicle traffic on local and distant streets, aircraft over-flights, mechanical equipment on nearby buildings, and general city noises such as street sweepers and police/fire sirens. Typical sound levels associated with various activities and environments are presented in **Table 4.3-2**.

4.3.2 Noise Regulations

Commonwealth Noise Policy

The DEP regulates noise through 310 CMR 7.00, "Air Pollution Control." In these regulations "air contaminant" is defined to include sound and a condition of "air pollution" includes the presence of an air contaminant in such concentration and duration as to "cause a nuisance" or "unreasonably interfere with the comfortable enjoyment of life and property."

Regulation 7.10 prohibits "unnecessary emissions" of noise. The DEP DAQC Policy Statement 90-001 (February 1, 1990) interprets a violation of this noise regulation to have occurred if the noise source causes either:

1. An increase in the broadband sound pressure level of more than 10 dBA above the ambient level; or
2. A "pure tone" condition.

The ambient background level is defined as the L_{90} level as measured during equipment operating hours. A "pure tone" condition occurs when any octave band sound pressure level exceeds both of the two adjacent octave band sound pressure levels by 3 dB or more.

The DEP does not regulate noise from motor vehicles accessing a site or the equipment backup notification alarms. Therefore, the provisions described above only apply to a portion of the sources that may generate sound following construction of the Project.

Local Regulations

The City of Boston Environment Department regulates noise through the Regulations for the Control of Noise as administered by the Air Pollution Control Commission. The Project is located in an area consisting of commercial and residential uses. The Project will have low-rise residential uses to the north, east, and south. The Project must comply with Regulation 2.2 for noise levels in Residential Zoning Districts at these residential locations**. Table 4.3-3** lists the maximum allowable octave band and broadband sound pressure levels for residential and business districts. Daytime is defined by the City of Boston Noise Regulations as occurring between the hours of 7:00 a.m. and 6:00 p.m. daily except Sunday. Compliance with the most restrictive nighttime residential limits will ensure compliance for other land uses with equal or higher noise limits.

Table 4.3-2 Common Indoor and Outdoor Sound Levels

Outdoor Sound Levels	Sound Pressure (μPa)	Sound Level (dBA)	Indoor Sound Levels
	6,324,555	110	Rock Band at 5 m
Jet Over-Flight at 300 m		105	
	2,000,000	100	Inside New York Subway Train
Gas Lawn Mower at 1 m		95	
	632,456	90	Food Blender at 1 m
Diesel Truck at 15 m		85	
Noisy Urban Area—Daytime	200,000	80	Garbage Disposal at 1 m
		75	Shouting at 1 m
Gas Lawn Mower at 30 m	63,246	70	Vacuum Cleaner at 3 m
Suburban Commercial Area		65	Normal Speech at 1 m
	20,000	60	
Quiet Urban Area—Daytime		55	Quiet Conversation at 1m
	6,325	50	Dishwasher Next Room
Quiet Urban Area—Nighttime		45	
	2,000	40	Empty Theater or Library
Quiet Suburb—Nighttime		35	
	632	30	Quiet Bedroom at Night
Quiet Rural Area—Nighttime		25	Empty Concert Hall
Rustling Leaves	200	20	Average Whisper
		15	Broadcast and Recording Studios
	63	10	
		5	Human Breathing
Reference Pressure Level	20	0	Threshold of Hearing

Notes: μPa, or micro-Pascals, describes sound pressure levels (force/area). DBA, or A-weighted decibels, describes sound pressure on a logarithmic scale with respect to 20 μPa (reference pressure level).

Table 4.3-3 Maximum Allowable Sound Pressure Levels (dB) City of Boston

Octave Band (Hz)	Zoning District		
	Residential (Daytime)	Residential (All Other Times)	Business (anytime)
32 Hz	76	68	79
63 Hz	75	67	78
125 Hz	69	61	73
250 Hz	62	52	68
500 Hz	56	46	62
1000 Hz	50	40	56
2000 Hz	45	33	51
4000 Hz	40	28	47
8000 Hz	38	26	44
Broadband (dBA)	**60**	**50**	**65**

4.3.3 Pre-Construction Sound Level Measurements

Existing baseline sound levels in the Project area were measured during the quietest overnight period when human activity and street traffic were at a minimum, and when the Project's mechanical equipment (the principal sound sources) could be operating. Since the Project's mechanical equipment may operate at any time during a 24-hour day, a weekday between 11:30 p.m. and 4:00 a.m. was selected as the worst-case time period, i.e., the time period when Project-related sounds may be most noticeable due to the quieter background sound levels. Establishing an existing background (L_{90}) during the quietest hours of the facility operation is a conservative approach for noise impact assessment and is required by the DEP Noise Policy.

The nighttime noise measurement locations are as follows (see the **Figure 1** in the **Appendix C**):

Monitoring Location #1: 79 Gardner St.

Monitoring Location #2: 8 Gardner Terrace

Monitoring Location #3: 37 Brighton Ave.

Monitoring Location #4: 66 Chester St.

Broadband (dBA) and octave band sound level measurements were made with a Larson Davis 831 environmental sound level analyzer, at each monitoring location, for a duration of approximately thirty minutes. The full octave band frequency analysis was performed on the frequencies spanning 16 to 16,000 Hertz. A time-integrated statistical analysis of the data used to quantify the sound variation was also performed, including the calculation of the L_{90}, which is used to set the ambient background sound level.

The Larson Davis model 831 is equipped with a ½" precision condenser microphone and has an operating range of 5 dB to 140 dB and an overall frequency range of 3.5 Hz to 20,000 Hz. This meter meets or exceeds all requirements set forth in the ANSI S1.4-1983 Standards for Type 1 quality and accuracy and the State and City requirements for sound level instrumentation. Prior to any measurements, this sound analyzer was calibrated with an ANSI Type 1 calibrator that has an accuracy traceable to the National Institute of Standards and Technology (NIST). During all measurements, the Larson Davis 831 was tripod mounted at approximately five feet above the ground in open areas away from vertical reflecting surfaces.

The sound level monitoring was conducted on Friday June 3, 2016. Weather conditions during the sound survey were conducive to accurate sound level monitoring: the temperature ranged from 56ºF to 58ºF, the skies were overcast, and the winds were 3 to 7 mph. The microphone of the sound level analyzer was fitted with a 3-inch windscreen to negate any effects of wind-generated noise.

The nighttime sound level measurements taken in the vicinity of the Project Site reveal sound levels that are typical for a densely populated area. A significant source of existing sound at all locations is motor vehicle traffic on nearby highways and local streets, residential and commercial air handling equipment, pedestrians, construction equipment, the MBTA train station/ commuter trains, and emergency vehicle noise.

The results of the nighttime baseline sound level measurements are presented in **Table 4.3-4**, and the complete measurement printouts are provided in **Appendix C**. The nighttime background L_{90} level was 45.2 dBA at Location #1, 46.4 dBA at Location #2, 44.5 at Location #3, and 41.9 at Location #4. The octave band data in **Table 4.3-4** show that no pure tones were detected in the nighttime noise measurements.

Table 4.3-4 Nighttime Baseline Sound Level Measurements, June 3, 2016

Sound Level Measurement	(Location #1) Gardner St. 12:24 a.m. - 12:54 a.m.	(Location #2) Gardner Terr. 1:01 a.m. - 1:31 a.m.	(Location #3) Brighton Ave. 1:41 a.m. - 2:11 a.m.	(Location #4) Chester St. 2:15 a.m. - 2:45 a.m.
Broadband (dBA)				
Background (L_{90})	45.2	46.4	44.5	41.9
Octave Band L_{90} (dB)				
16 Hz	49.3	49.3	50.3	46.7
32 Hz	51.9	53.8	53.4	48.6
63 Hz	52.1	56.3	58.9	47.7
125 Hz	48.2	51.4	51.6	42.7
250 Hz	48.2	45.7	45.0	40.3
500 Hz	42.0	43.5	41.9	39.9
1000 Hz	39.3	42.2	40.1	38.6
2000 Hz	38.5	38.1	36.5	36.0
4000 Hz	37.4	37.7	37.0	37.0
8000 Hz	40.1	40.2	40.1	40.1
16000 Hz	43.6	43.6	43.6	43.6
Pure Tone?	No	No	No	No

4.3.4 Reference Data and Candidate Mitigation Measures

The mechanical systems for the Proposed Project are in the early design stage. Typical sound power data for the equipment of the expected size and type for the Project have been used in the acoustic model to represent the Project's mechanical equipment. The sound levels from all potential significant Project noise sources are discussed in this section.

The design for the Proposed Project is expected to include the following significant mechanical equipment:

- Residential Buildings (Residential Units): One hundred twenty six (126) Carrier 24ABC6 Series Rooftop condenser units.
- Residential Buildings (Common Area): Two (2) P125 Energy Recovery Rooftop units.
- Residential Buildings (Garages): One (1) Garage exhaust fan, One (1) Garage supply fan

The equipment listed above, which will be located on the two buildings rooftops, was included in the noise impact analysis. The Project's traffic was not included in the noise analysis because motor vehicles are exempt under both the City of Boston and Massachusetts DEP noise regulations.

The sound generation profiles for the mechanical equipment noise sources operating concurrently under full-load conditions were used to determine the maximum possible resultant sound levels from the Project Site as a whole, to define a worst-case scenario. To be in compliance with City and DEP regulations, the resultant sound level must not exceed the allowable octave band limits in the City of Boston noise regulation and must be below the allowable incremental noise increase, relative to existing noise levels, as required in the DEP Noise Policy.

This sound level impact analysis was performed using sound generation data for representative equipment to demonstrate compliance with noise regulations. As the building designs evolve, the sound generation for the actual equipment selected may differ from the values that were utilized for the analysis.

Noise Mitigation

- The current proposed mechanical equipment will comply with both the Mass DEP and City of Boston noise policies without implementing additional mitigation measures.

4.3.5 Calculated Future Sound Levels

Methodology

Future maximum sound levels at the upper floors of all existing residences bordering the Project, and at the nearest residential property lines, were calculated with acoustic modeling software assuming simultaneous operation of all mechanical equipment at their maximum loads.

The Cadna-A computer program, a comprehensive 3-dimensional acoustical modeling software package was used to calculate Project generated sound propagation and attenuation.[3] The model is based on ISO 9613, an internationally recognized standard specifically developed to ensure the highly accurate calculation of environmental noise in an outdoor environment. ISO 9613 standard incorporates the propagation and attenuation of sound energy due to divergence with distance, surface and building reflections, air and ground absorption, and sound wave diffraction and shielding effects caused by barriers, buildings, and ground topography.

Receptors

The closest/worst-case sensitive (residential) location is to the east of the project area at 87 Gardner Street. This location was selected based on the proximity of the equipment (smaller distances correspond to larger noise impacts) and the amount of shielding by the project (residences further from the project will experience less shielding from the Project's rooftop mechanical equipment, which may result in larger potential noise impacts from the Project). This location is expected to receive the largest sound level impacts from the Project's rooftop mechanical equipment. It can be classified as a residential zone.

[3] Cadna-A Computer Aided Noise Abatement Program, Version 4.3

The sound level impacts from the building's mechanical equipment were predicted at the closest residential location, as well as additional residential uses to the north (72, 80, 84, and 88 Gardner Street), south (44-46, 48, & 56 Brighton Ave) east (19-21 & 23-25 Brighton Ave, 5, 7, 9 Gardner Terrace, and 87 & 89 Gardner Street) and west (65, 71, 73 Gardner Street, 57-59 Brighton Ave, and 67, 71, & 75 Chester Street). Figure 1 in Appendix C shows the locations of the modeled noise receptors. Noise impacts at other nearby noise-sensitive locations (residences, parks, etc.) farther from the Project Site will be less than those predicted for these receptors.

4.3.6 Compliance with State and Local Noise Standards

The City of Boston and DEP noise standards apply to the operation of the mechanical equipment at the proposed Project. The details of the noise predictions are presented in **Tables 4.3-5** through **4.3-17**. The sound impact analysis includes the simultaneous operation of the Project's rooftop HVAC equipment. The predicted sound levels are worst-case predictions that represent all hours of the day, as the analysis assumes full operation of the mechanical equipment 24-hours a day. The typical sound level impacts from the mechanical equipment will likely be lower than what is presented here, since most of the mechanical equipment will operate at full-load only during certain times of the day and during the warmer months of the year, it is not likely that all of the mechanical equipment will operate at the same time. Sound level impacts at locations farther from the Project (e.g. other residences, etc.) will be lower than those presented in this report.

City of Boston Noise Standards

The noise impact analysis results, presented in **Tables 4.3-5** through **4.3-17**, reveal that the sound level impact at the upper floors of the closest residences will be between 34.7 and 43.6 dBA. The smallest sound level impact of 34.7 dBA is predicted to occur at 67 Chester Street. The largest sound level impact of 43.6 dBA is predicted to occur at 87 Gardner Street. Noise impacts predicted at all locations are in compliance with the City of Boston's nighttime noise limit (50 dBA) for a residential area. Note that sound levels from the Project will be below the residential nighttime limits at all times. The results also demonstrate compliance with the City of Boston, residential, non-daytime, octave band noise limits at both closest locations.

The City of Boston noise limits for business areas are significantly higher than the nighttime noise limits for residential areas (see **Table 4.3-3**). The Project will also easily comply with the City of Boston business area noise limits at all surrounding commercial properties.

Massachusetts DEP Noise Regulations

The predicted sound level impacts at the worst-case residential locations were added to the measured L_{90} value of the quietest daily hour to test compliance with DEP's noise criteria. Assuming the Project's mechanical noise is constant throughout the day, the Project will cause the largest increase in sound levels during the period when the lowest background noise occurs. Minimum background sound levels (diurnal) typically occur between 12:00 a.m. and 5:00 a.m.

The predicted sound level impacts at the upper floors of the closest residences were added to the L_{90} values measured during the period with the least amount of background noise to test compliance with DEP's noise criteria. The predicted noise impacts at the property line and the closest residences were added to the most-representative measured L_{90} values to determine the largest possible increase in the sound level at each location during the quietest hour at the Project Site.

As shown in **Tables 4.3-5** through **4.3-17**, the Project is predicted to produce a less than 3 dBA change in the background sound levels at all modeled locations. Therefore, the Project's worst-case sound level impacts during the quietest nighttime periods will be in compliance with the Massachusetts DEP allowed noise increase of 10 dBA. The noise predictions for each octave band indicate that the mechanical equipment will not create a pure tone condition at any location.

Table 4.3-5 Estimated Future Sound Level Impacts – Anytime, 87 Gardner Street (Closest/Worst Case Residence)

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	64
63 Hz	67	54
125 Hz	61	48
250 Hz	52	43
500 Hz	46	40
1000 Hz	40	40
2000 Hz	33	32
4000 Hz	28	28
8000 Hz	26	22
Broadband (dBA)	**50**	**44**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #1)	45.2
43 Brighton Ave Project*	43.6
Calculated Combined Future Sound Level	47.5
Calculated Incremental Increase	+2.3
Compliance with DEP Noise Policy?	Yes

* Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA

Table 4.3-6 Estimated Future Sound Level Impacts – Anytime, 73 Gardner Street

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	64
63 Hz	67	53
125 Hz	61	45
250 Hz	52	40
500 Hz	46	37
1000 Hz	40	35
2000 Hz	33	31
4000 Hz	28	25
8000 Hz	26	17
Broadband (dBA)	**50**	**40**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #1)	45.2
43 Brighton Ave Project*	40.3
Calculated Combined Future Sound Level	46.4
Calculated Incremental Increase	+1.2
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.3-7 Estimated Future Sound Level Impacts – Anytime, 80 Gardner Street

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	62
63 Hz	67	53
125 Hz	61	45
250 Hz	52	41
500 Hz	46	39
1000 Hz	40	38
2000 Hz	33	33
4000 Hz	28	27
8000 Hz	26	17
Broadband (dBA)	**50**	**42**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #1)	45.2
43 Brighton Ave Project*	42.1
Calculated Combined Future Sound Level	46.9
Calculated Incremental Increase	+1.7
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.3-8 Estimated Future Sound Level Impacts – Anytime, 84 Gardner Street

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	61
63 Hz	67	52
125 Hz	61	44
250 Hz	52	41
500 Hz	46	39
1000 Hz	40	38
2000 Hz	33	33
4000 Hz	28	27
8000 Hz	26	17
Broadband (dBA)	**50**	**42**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #1)	45.2
43 Brighton Ave Project*	41.8
Calculated Combined Future Sound Level	46.8
Calculated Incremental Increase	+1.6
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.3-9 Estimated Future Sound Level Impacts – Anytime, 5 Gardner Terrace

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	64
63 Hz	67	55
125 Hz	61	48
250 Hz	52	42
500 Hz	46	39
1000 Hz	40	39
2000 Hz	33	31
4000 Hz	28	27
8000 Hz	26	21
Broadband (dBA)	**50**	**43**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #2)	46.4
43 Brighton Ave Project*	42.5
Calculated Combined Future Sound Level	47.9
Calculated Incremental Increase	+1.5
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.3-10 Estimated Future Sound Level Impacts – Anytime, 7 Gardner Terrace

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	64
63 Hz	67	55
125 Hz	61	47
250 Hz	52	41
500 Hz	46	38
1000 Hz	40	36
2000 Hz	33	30
4000 Hz	28	24
8000 Hz	26	15
Broadband (dBA)	**50**	**41**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #2)	46.4
43 Brighton Ave Project*	40.9
Calculated Combined Future Sound Level	47.5
Calculated Incremental Increase	+1.1
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.3-11 Estimated Future Sound Level Impacts – Anytime, 9 Gardner Terrace

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	64
63 Hz	67	55
125 Hz	61	48
250 Hz	52	42
500 Hz	46	38
1000 Hz	40	36
2000 Hz	33	30
4000 Hz	28	24
8000 Hz	26	12
Broadband (dBA)	**50**	**41**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #2)	46.4
43 Brighton Ave Project*	41.1
Calculated Combined Future Sound Level	47.5
Calculated Incremental Increase	+1.1
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.3-12 Estimated Future Sound Level Impacts – Anytime, 23-25 Brighton Avenue

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	64
63 Hz	67	53
125 Hz	61	45
250 Hz	52	40
500 Hz	46	37
1000 Hz	40	35
2000 Hz	33	30
4000 Hz	28	23
8000 Hz	26	11
Broadband (dBA)	**50**	**40**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #3)	44.5
43 Brighton Ave Project*	39.9
Calculated Combined Future Sound Level	45.8
Calculated Incremental Increase	+1.3
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.3-13 Estimated Future Sound Level Impacts – Anytime, 48 Brighton Avenue

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	68
63 Hz	67	58
125 Hz	61	47
250 Hz	52	43
500 Hz	46	39
1000 Hz	40	36
2000 Hz	33	32
4000 Hz	28	27
8000 Hz	26	19
Broadband (dBA)	**50**	**42**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #3)	44.5
43 Brighton Ave Project*	42.3
Calculated Combined Future Sound Level	46.5
Calculated Incremental Increase	+2.0
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.3-14 Estimated Future Sound Level Impacts – Anytime, 57-59 Brighton Avenue

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	68
63 Hz	67	56
125 Hz	61	41
250 Hz	52	36
500 Hz	46	33
1000 Hz	40	28
2000 Hz	33	22
4000 Hz	28	17
8000 Hz	26	7
Broadband (dBA)	**50**	**36**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #3)	44.5
43 Brighton Ave Project*	36.4
Calculated Combined Future Sound Level	45.1
Calculated Incremental Increase	+0.6
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.3-15 Estimated Future Sound Level Impacts – Anytime, 67 Chester Street

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	68
63 Hz	67	55
125 Hz	61	39
250 Hz	52	34
500 Hz	46	30
1000 Hz	40	26
2000 Hz	33	21
4000 Hz	28	16
8000 Hz	26	10
Broadband (dBA)	**50**	**35**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #4)	41.9
43 Brighton Ave Project*	34.7
Calculated Combined Future Sound Level	42.7
Calculated Incremental Increase	+0.8
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.3-16 Estimated Future Sound Level Impacts – Anytime, 71 Chester Street

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	67
63 Hz	67	55
125 Hz	61	42
250 Hz	52	38
500 Hz	46	35
1000 Hz	40	32
2000 Hz	33	27
4000 Hz	28	21
8000 Hz	26	11
Broadband (dBA)	**50**	**38**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #4)	41.9
43 Brighton Ave Project*	38.1
Calculated Combined Future Sound Level	43.4
Calculated Incremental Increase	+1.5
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

Table 4.3-17 Estimated Future Sound Level Impacts – Anytime, 75 Chester Street

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	66
63 Hz	67	54
125 Hz	61	42
250 Hz	52	38
500 Hz	46	35
1000 Hz	40	33
2000 Hz	33	28
4000 Hz	28	22
8000 Hz	26	11
Broadband (dBA)	**50**	**38**
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L_{90} (Location #4)	41.9
43 Brighton Ave Project*	38.3
Calculated Combined Future Sound Level	43.5
Calculated Incremental Increase	+1.6
Compliance with DEP Noise Policy?	Yes

*Assumes full-load operation of all mechanical equipment.
Note: DEP Policy allows a sound level increase of up to 10 dBA.

4.3.7 Conclusions

Sound levels at all nearby sensitive locations and at all property lines will fully comply with the most stringent City of Boston and DEP daytime and nighttime sound level limits.

This acoustic analysis demonstrates that the Project’s design will meet the applicable acoustic criteria.

4.4 Stormwater Management and Water Quality

4.4.1 Stormwater Management

The Proposed Project will improve the quality of stormwater leaving this site. Under existing conditions, there are no known stormwater treatment features. The proposed stormwater management features will include peak flow mitigation, groundwater recharge, and water quality treatment. The stormwater recharge system(s) will be based on the 1-inch, first-flush from the proposed impervious surfaces on site. Stormwater runoff from vehicular areas will be treated through the use of deep sump catch basins and water quality treatment structures. A Stormwater Operation and Maintenance Plan and a Long-Term Pollution Prevention Plan will be developed to support the long-term functionality of the proposed stormwater management system.

During construction, the project will include erosion and sediment control measures to minimize the transport of site soils to off-site areas and to the BWSC storm drain systems. Erosion and sediment controls will include perimeter sediment barriers, catch basin protection, dewatering controls, and stone tracking pad. All necessary dewatering will be conducted in accordance with applicable BWSC discharge permits. These controls will be inspected and maintained throughout the construction phase until the areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover. Once construction is completed, the Proposed Project will be in compliance with local and state stormwater management policies.

The proposed stormwater management systems will include water quality units and groundwater recharge systems. The Project will not increase the amount of impervious area at the site compared to the existing condition. It is anticipated that the stormwater recharge systems will work to passively infiltrate runoff into the ground with a gravity recharge system. The underground recharge systems, and any required site drainage systems, will be designed so that there will be no increase in the peak rate of stormwater discharge from the Project site in the developed condition compared to the existing condition. In addition, water quality units will be installed to reduce pollutants prior to discharging to the groundwater recharge systems. The groundwater recharge system will be designed to meet all of the City of Boston Stormwater Management Requirements

All improvements and connections to BWSC infrastructure will be reviewed as part of the site plan review process for the Proposed Project. This process includes an in depth design review of the proposed connections, a project demand and system capacity review and the establishment of service accounts.

4.4.2 Water Quality Impact

The Proposed Project will not impact the water quality of nearby water bodies. Erosion and sediment control measures will be implemented during construction to minimize the discharge of site materials off-site and to BWSC systems. Existing catch basins will be fitted with filter fabric, haybales and/or crushed stone to provide sediment removal from runoff. These controls will be maintained throughout construction until all disturbed areas have been stabilized.

All dewatering will be conducted in accordance with all applicable MWRA and BWSC discharge permits. Once completed, the project will be in compliance with all local and state stormwater management policies.

DEP Stormwater Management Policies:

MassDEP Stormwater Management Requirements. The project complies with the following Standards:

> <u>Standard 1</u>- No New stormwater conveyances discharge untreated stormwater directly to the waters of the Commonwealth;
>
> <u>Standard 2</u>- Post Development peak discharge rates are less than pre-development;
>
> <u>Standard 3</u>- The recharge volume required for this project is exceeded.
>
> <u>Standard 4</u>- The catch basins in conjunction with the deep sump manholes provide the 80% average annual post-construction load removal of Total Suspended Solids (TSS).
>
> <u>Standard 5</u>- This project is not associated with Higher Potential Pollutant Loads.
>
> <u>Standard 6</u>- This project will not discharge untreated stormwater to a sensitive or any other Area.
>
> <u>Standard 7</u>- The project is re-development and compliance with the Stormwater Management Standards is required to the maximum extent practicable. The Proposed Project complies with the Stormwater Management Standards applicable for the re-development
>
> <u>Standard 8</u>- Sedimentation and erosion controls will be incorporated into the project.
>
> <u>Standard 9</u>- An Operation and Maintenance Plan and long term BMP will be prepared for the Proposed Project and will assure proper maintenance of the system.
>
> <u>Standard 10</u>- All illicit discharges to the stormwater management system are and will be prohibited.

It is the Civil Engineer's belief that the Proposed Project complies with the Stormwater Management Standards to the maximum extent practicable. The project as proposed will protect the Abutters in the short term through proper construction and erosion protection techniques. It will also protect the Abutters form long term impacts due to the increase in vegetative cover and the increase in stormwater flow quality.

Protection During Construction:

> All public and private infrastructure located on or adjacent to the Proposed Project will be protected during construction. All work in the public way will be in accordance with BWSC, Boston Public Works, Dig-Safe and other applicable utility companies' requirements. All necessary permits will be obtained prior to the commencement of work.

The Proponent will coordinate with BWSC and all utility companies to ensure a coordinated utility operation throughout construction.

4.5 Solid and Hazardous Waste Materials

4.5.1 Solid Waste

During the preparation of the Site, debris, including asphalt, trash, and demolition debris will be removed from the Project Site. The Proponent will ensure that waste removal and disposal during construction and operation will be in conformance with the City and DEP's Regulations for Solid Waste.

Upon completion of construction, the Proposed Project will generate approximately 164 tons of solid waste per year, based on the assumption that each residential unit generates 8 lbs of solid waste per day. Residential waste will be handled through a trash chute extending to all floors, and then compacted before being brought to the loading / unloading area. The solid waste for the very limited commercial use will also be deposited in dumpster in the loading and unloading area.

The project will also include ambitious goals for construction waste management in order to meet the requirements for the LEED™ rating system. This strategy will divert demolition and construction waste by reusing and recycling materials.

In order to meet the requirements for the Boston Environmental Department and the LEED™ rating system, the Project will include space dedicated to the storage and collection of recyclables, including dedicated dumpsters at the loading area. The recycling program will meet or exceed the City's guidelines, and provide-areas for waste paper and newspaper, metal, glass, and plastics (21 through 27, co-mingled).

4.5.2 Hazardous Waste and Materials

A Phase I Environmental Site Assessment for 45-55 Brighton Avenue was completed by FSL Associates, Inc. on November 2, 2012. According to the FSL report, the 45-55 Brighton Avenue site was identified as a conditionally exempt small quality generator (CESQG) of hazardous waste as of July 10, 2012 because of the storage of waste oil in the two site uses. However, no corrective action was considered required or significant no-compliance. FSL did not find this to be recognized environmental conditions, and FSL recommended no further action for this site.

As appropriate, the Proponent will provide Licensed Site Professional support services during property redevelopment activities to maintain compliance with the Massachusetts Contingency Plan (MCP) requirements.

4.6 Geotechnical / Groundwater Impacts Analysis

Based on the Foundation Engineering Report for 79-83 Gardner Street and 45-55 Brighton Avenue completed by McPhail Associates on January 27, 2016, a subsurface exploration program consisting of nine borings was described as being completed in December 2015. Beneath the 6-inch thickness of the asphalt pavement present across the majority of the phased sites, fill deposit was generally encountered at 3.5 feet to 5 feet below the ground surface. In addition, groundwater levels ranged from 12.9 feet to 17 feet below the existing grade.

Based on McPhail's current understanding of the proposed structures for the Phase 1 & 2 projects, it is recommended that a spread footing foundation system be employed in conjunction with slab-on-grade construction for the lowest level floor slabs. McPhail Associates' foundation report is available upon request.

Detail design assistance will be provided by McPhail Associates during the final design phases of the project, and also additional geotechnical exploration and engineering is expected to be completed as the project design progresses. Additional details of McPhail's analysis are contained in the sections that follow:

4.6.1 Subsurface Soil and Bedrock Conditions

Underlying the asphalt pavement that is present across the majority of the site, an approximate 1 to 5-foot thick fill deposit was encountered. The fill deposit consists of a compact to dense, sandy gravel with some to trace silt, varying to a silty sand with trace gravel. The fill deposit was also observed to contain occasional organic fibers, wood pieces, brick and asphalt fragments.

Below the fill deposit, a natural glacial outwash deposit is present consisting of a compact to very dense, light brown to gray, silty sand and gravel, transitioning to a silty sand with trace gravel. At one exploration location, the deposit extended to a depth of 62 feet below the existing ground surface, with the lower portion of the deposit observed to generally consist of very dense, gray, sand with some gravel and trace silt, transitioning to a dense, gray, silty sand with trace gravel.

Although not encountered during the subsurface exploration program conducted for the project, bedrock across the site is anticipated to extend to depths of greater than 100 feet below the existing ground surface.

4.6.2 Groundwater

Groundwater levels recorded in the observation wells installed at the site generally ranged from about 13 to 15 feet below the existing ground surface, or approximately Elevation +30 to +28, respectively. It is anticipated that future groundwater levels across the project sites may vary from those reported herein based on such factors such as normal seasonal changes, runoff during or following periods of heavy precipitation and alterations to existing drainage patterns.

It should be noted that the project site is not located within the Groundwater Conservation Overlay District (GCOD) as defined by Article 32 of the Boston Zoning Code.

4.6.3 Project Impacts and Foundation Considerations

The proposed development will consist of two structures ranging from 3 to 6 stories in height. A partial below-grade parking level extending 4 to 6 feet below the existing grade is planned as part of the proposed construction of both buildings. Based on the anticipated structural loads and subsurface conditions, the proposed building will be supported on conventional spread footing foundations in conjunction with a soil-supported slab-on-grade for the lowest level floor slab. The footings will bear either on the natural glacial outwash deposit or on compacted structural fill placed over the surface of the glacial outwash deposit after removal of the existing fill from the building footprint.

Based on the observed site groundwater level and the proposed depth of excavation related to foundation construction, dewatering is expected to be minimal and limited to rainwater runoff.

Perimeter and underslab foundation drainage is planned to be installed as part of the proposed construction to control temporary storm-related increases in the groundwater level. However, no impact to the site pre-construction groundwater level is anticipated.

Since conventional footing and slab-on-grade construction will be utilized for foundation construction, no pile driving is anticipated to be required. Thus, foundation-related noise and ground vibrations are anticipated to be minimal.

Provisions will be incorporated into the design and contract documents to limit potential impacts to adjacent structures, streets and utilities. Thus, the impact to adjacent structures, streets and utilities is anticipated to be minimal.

4.7 Construction Impact

The following section describes impacts likely to result from the construction of the Proposed Project and the steps that will be taken to avoid or minimize environmental and transportation-related impacts.

Construction methodologies and scheduling will aim to minimize impacts on the surrounding environment. The Proponent will insure that the general contractors will be responsible for developing construction phasing and staging plans and for coordinating construction activities with all appropriate regulatory agencies. The Project's geotechnical consultant will also provide consulting services associated with foundation design recommendations, prepare geotechnical specifications, and review the construction contractor's proposed procedures.

4.7.1 Construction Management Plan

The Proponent will comply with applicable state and local regulations governing construction of the Project. The Proponent will insure that general contractors comply with the Construction Management Plan, ("CMP") developed in consultation with and approved by the Boston Transportation Department ("BTD"), prior to the commencement of construction. The CMPs will establish the guidelines for the duration of the Project phases and will include specific mitigation measures and staging plans to minimize impacts on abutters.

Construction methodologies that will ensure safety will be employed, signage will include General Contractor contact information with emergency contact numbers.

4.7.2 Proposed Construction Program

Construction Activity Schedule

The construction period for the Proposed Project is expected to be completed in two phases. Phase I will include the proposed building at 79-83 Gardner Street and related site work and is expected to extend for 14 months, beginning in the first quarter of 2017. Phase II will include the proposed building at 45-55 Brighton Avenue and is expected to extend for 16 months, beginning in the second quarter of 2018. The City of Boston Noise and Work Ordinances will dictate the normal work hours, which will be from 7:00 AM to 6:00 PM, Monday through Friday. Saturday work will be only in the event of schedule delay or unusual tasks such as street openings, etc.

Perimeter Protection/Public Safety

The CMP will describe any necessary sidewalk closures, pedestrian re-routings, and barrier placements and/or fencing deemed necessary to ensure safety around the Site perimeter. When possible, the sidewalk will remain open to pedestrian traffic during the construction period. Barricades and secure fencing will be used to isolate construction areas from pedestrian traffic. In addition, sidewalk areas and walkways near construction activities will be well marked to ensure pedestrian safety.

Proper signage will be placed at every corner of the Proposed Project as well as those areas that may be confusing to pedestrians and automobile traffic.

The Proponent will continue to coordinate with all pertinent regulatory agencies and representatives of the surrounding neighborhoods to ensure they are informed of any changes in construction activities.

4.7.3 Construction Traffic Impacts

Construction Vehicle Routes

Specific truck routes will be established with BTD through the CMPs. Construction contracts will include clauses restricting truck travel to BTD requirements. Maps showing approved truck routes will be provided to all suppliers, contractors, and subcontractors. It is anticipated that all deliveries will be transported via the major regional highway system including Interstate 90 directly to the site, passing through residential areas in Allston and Brighton as little as possible.

Construction Worker Parking

The number of workers required for construction of the Proposed Project will vary during the construction period and during each of the phases. However, it is anticipated that all construction workers will arrive and depart prior to peak traffic periods.

Limited parking in designated areas of the Project Site and lay-down area(s) will be allowed. Parking will be discouraged in the immediate neighborhood. Further, given the Proposed Project’s close proximity to transit service (e.g., MBTA Green Line, as well as bus service) public transit use will be encouraged with the Proponent and general contractor working to ensure the construction workers are informed of the many public transportation options immediately adjacent to this area. Terms and conditions related to worker parking will be written into each subcontractor’s contract. The general contractors will provide a weekly orientation with all new personnel to ensure enforcement of this policy.

Pedestrian Traffic

Pedestrian traffic may be temporarily impacted on Brighton Avenue. The general contractor will minimize the impact the construction of the proposed building will have on the adjacent sidewalks. The general contractor will implement plans that will clearly denote all traffic patterns. Safety measures such as jersey barriers, fencing, and signage will be used to direct pedestrian traffic around the construction site and to secure the work area.

4.7.4 Construction Environmental Impacts and Mitigation

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 the emission of fugitive dust and minimize impacts on the local environment the construction contractor will adhere to a number of strictly enforceable mitigation measures. These measures may include:

- Using wetting agents to control and suppress dust from construction debris;
- Ensuring that all trucks traveling to and from the Project Site will be fully covered;
- Removing construction debris regularly;
- Monitoring construction practices closely to ensure any emissions of dust are negligible;
- Cleaning streets and sidewalks to minimize dust and dirt accumulation;
- Monitoring construction activities by the job site superintendent; and
- Wheel-washing trucks before they leave the Project Site during the excavation phase.

Erosion and sediment control measures will be implemented during construction to minimize the transport of site soils to off-site areas and Boston Water and Sewer ("BWSC") storm drain systems. During construction, existing catch basins will be protected from sediments with filter fabric, silt sacks or hay bale filters.

Construction Noise Impacts

To reduce the noise impacts of construction on the surrounding neighborhood, a number of noise mitigation measures will be included in the CMP. Some of the measures that may be taken to ensure a low level of noise emissions include:

- Initiating a proactive program for compliance to the City of Boston's noise limitation requirements;
- Scheduling of work during regular working hours as much as possible;
- Using mufflers on all equipment and ongoing maintenance of intake and exhaust mufflers;
- Muffling enclosures on continuously operating equipment, such as air compressors and power and welding generators;
- Scheduling construction activities so as to avoid the simultaneous operation of the noisiest construction activities;
- Turning off all idling equipment;
- Reminding truck drivers that trucks cannot idle more than five (5) minutes unless the engine is required for operational activity;
- Locating noisy equipment at locations that protect sensitive receptors and neighborhood homes through shielding or distance;

- Installing a site barricade as required;
- Identifying and maintaining truck routes to minimize traffic and noise throughout the project;
- Maintaining all equipment to have proper sound attenuation devices.

4.7.5 Rodent Control

The City of Boston enforces the requirements established under Massachusetts State Sanitary Code, Chapter 11, 105 CMR 410.550. This policy establishes that the elimination of rodents and ongoing rodent control is required for issuance of any building permits. Before and during construction, rodent control service visits will be made by a certified rodent control firm to monitor the situation.

4.7.6 Utility Protection During Construction

During construction, the City and the Commonwealth's infrastructure will be protected using sheeting and shoring, temporary relocations, and construction staging as required. See **Section 6.9** for additional information.

5.0 HISTORIC RESOURCES COMPONENT

The Proposed Project site is located in Allston. The historic resources within one-quarter-mile radius of the Proposed Project are summarized below and the Harvard Avenue Historic and National Register Districts are identified in **Figure 5-1**.

5.1 Historic Resources Within and Nearby the Project Site

The project site in Packard's Corner is located next to Hamilton Company's longtime Brighton Avenue headquarters, and sits equidistant from Boston University and the New Balance mixed-use office complex. The project site is bounded by Brighton Avenue and Gardner, Malvern and Chester Streets and includes a number of existing 19th and 20th Century apartment buildings and houses, and as well as large surface parking areas and retail and service car-repair uses. The site's existing Gardner Street buildings includes 83 Gardner Street, one of the last remaining free standing Victorian houses of "Mahogany Row", a group of houses which once lined Gardner Street. Based on recent 2015 PNF filing completed for nearby 89 Brighton Avenue and Boston landmarks Commission's Information Forms, Gardner Street showed on earlier historical Atlas and Sanborn Maps with a few 19th Century estates that began to be subdivided for homes occupied by the upper middle class around 1880, in styles such as Shingle, Queen Anne or Colonial Revival. Later in the 20th Century these Gardner Street homes were often removed and infilled with brick apartment buildings such as exists opposite the portion of the project site along Gardner Street.

A review of the Brighton Avenue building Site history by FSL Associates, Inc. during a Phase I Environmental Site Assessment investigation in 2016, indicated that there are currently two tenants in the building including an automobile hardware store (Autozone) and a mixed auto repair and towing company (Mike's Towing). The Brighton Avenue site was formerly used as a stable and manufacturing company in 1925. Lovejoy Manufacturing Company and the building in which it was located was demolished sometime between 1934 and1940, after which time the current site building was constructed during the 1950's. On July 15, 2016, a demolition delay application was submitted to the Boston Landmarks Commission for the Brighton Street building.

In addition to the auto-related uses along Brighton Avenue and based on the 2015 PNF filing, development in the general vicinity along Brighton and Commonwealth Avenues included blond brick apartment houses of early 20th Century vintage, many decorated with case stone details in Classical Revival, Renaissance Revival and Georgian Revival Styles.

5.2 Historic Resources Within the Vicinity of the Project Site

In 1978, according to records from the Boston Landmark's Commission ("BLC"), The Allston-Brighton Preservation Study was undertaken to gain an in-depth examination of several Brighton neighborhoods including Gardner Street (Nos. 4-98 and 9-95) and Packard's Corner areas. There are several properties that are in the Inventory of Historic and Archaeological Assets of the Commonwealth and the National and State Registers of Historic Places within a radius of one-quarter mile from the Project Site.

The Harvard Avenue Historic District which is listed on National and State Register of Historic Places (BOS KN/NR #00000415), although the edge of the Harvard Avenue District is located on the ¼ mile edge to the west of the Project Site. The Project Site is also adjacent to the Packard's Corner inventoried area which includes a triangular shaped pattern of streets formed by the intersections of Commonwealth Avenue, Brighton Avenue and Linden Street (BOS.KO). Finally, the 4-98 Gardner Street inventoried area includes the portion of Gardner Street between Harvard Avenue and Malvern Street (BOS.LC). There are no historically registered landmarks within ¼ mile. There are not expected to be any impacts to the historically significant properties with the proposed new construction. See **Figure 5-1.** Historic Resources for location of the only the Historic and National Register District within ¼ mile of the Project Site. The historic district and inventoried properties and areas are presented in more detail below:

5.2.1 Harvard Avenue Historic District

Extending along Harvard Avenue and side streets, the Harvard Avenue Historic and NR District was developed nearly entirely between 1900 and 1920. The District was listed in the National Register in 2000, under Criteria A & C, for its association with significant events or period, and for its distinctive collection of architecture.

5.2.2 Inventoried Properties

Nos. 4-98, 9-95 Gardner Street

Gardner Street includes several large single-family and formerly single-family homes, mixed with newer apartment buildings, with architectural styles including mansard, stick, Queen Anne Shingle, Colonial Revival and Neo-Classical, although several of the exterior alterations include use of artificial siding. Several of the original 19^{th} Century single family houses have been replaced by modern brick apartment buildings (#32-34, 47, 75, 84 and 88) and parking lots (#75). There has been retention of some of the homes and apartment houses more intact from this earlier period including the Queen Anne Style site building at No. 83, and 72 Gardner Street (Ivanhoe Court Apartments), a U-shaped English Tudor apartment complex with a decorative shield pediment around an open-ended courtyard facing Gardner Street, standing as a pioneer in the line of concrete block construction, and opposite the project site.

46 Brighton Avenue (7 St. Lukes Road)

St. Lukes Church and Rectory are located on the other side of Brighton Avenue, opposite the Phase 2 project site. The church was constructed in 1913 by the architect, Berry & Davidson. It is considered a fine example of Jacobethan style used in church architecture at the turn of the century. The church is brick with half-timbered clearstory and stain glass windows, brick stepped gables at front and side and offset left entrance and 1-story porch. Rectory is clapboard on the 1^{st} floor & half-timbered above, with front three-bay porch with Tudor arch supports.

67 Chester Street

This Chester Street building originally designed as a single-family home between 1986-1899 is in a symmetrical Colonial Revival style with round corner bays with conical caps, having a one-story entrance porch with flutted ionic columns. It was considered in the 1978 BLC study as a still intact lavish Colonial Revival Mansion. It was converted to a three-family dwelling in 1954. The building was formerly at the corner of Brighton Avenue and Chester Street and was moved to its present location between 1909 and 1916.

5.3 Archaeological Resources

No known archaeological resources were located within the project site during the review of Massachusetts Historic Commission files and MACRIS, therefore no impacts to archaeological resources are anticipated.

Figure 5 - 1
Historic Resources

6.0 INFRASTRUCTURE SYSTEMS COMPONENT

6.1 Introduction

The existing infrastructure surrounding the site of 79-83 Gardner Street and 45-55 Brighton Avenue appear of adequate capacity to service the needs of the Project. The following sections describe the existing sanitary sewer, water, and storm drain systems surrounding the site and explain how these systems will service the development. The analysis also discusses any anticipated Project-related impacts on the utilities and identifies mitigation measures to address these potential impacts.

The Project is moving into the Design Development phase where a detailed infrastructure analysis will be performed. The Project's team will coordinate with the appropriate utilities to address the capacity of the area utilities to provide services for the new building. A Boston Water and Sewer Commission (BWSC) Site Plan and General Service Application is required for the proposed new water, sanitary sewer, and storm drain connections.

A Drainage Discharge Permit Application will be submitted to the BWSC for any required construction dewatering. The appropriate approvals from the Massachusetts Department of Environmental Protection (MassDEP) and the U.S. Environmental Protection Agency (EPA) will also be sought.

6.2 Wastewater

6.2.1 45-55 Brighton Avenue - Existing Sanitary Sewer System

The sanitary sewer system in the vicinity of the Project site is owned, operated, and maintained by BWSC (see **Figure 6-1**). There is an existing 15-inch sewer located in Brighton Avenue to the south of the Project site.

The total sewer flow from the existing building is estimated at 664 gallons per day (gpd) based on the existing building uses and design sewer flows provided in 314 CMR 7.00-Sewer System Extension and Connection Permit Program as summarized in **Table 6-1.**

Figure 6-1.
Sanitary Sewer System Located in the Vicinity of 45 Brighton Avenue Site (Owned and Maintained by BWSC)

Table 6-1 45-55 Brighton Avenue - Existing Sanitary Sewer Flows

Use	Quantity	Unit Flow Rate	Estimated Maximum Daily Flow (gpd)
Retail Store	13,279 sf	50 gpd/1,000 sf	664 gpd
Total			**664 gpd**

6.2.2 79-83 Gardner Street - Existing Sanitary Sewer System

The sanitary sewer system in the vicinity of the Project site is owned, operated, and maintained by BWSC (see **Figure 6-2**). There is an existing 12-inch sewer located in Gardner Street to the north of the Project site.

The total sewer flow from the existing building is estimated at 990 gallons per day (gpd) based on the existing building uses and design sewer flows provided in 314 CMR 7.00-Sewer System Extension and Connection Permit Program as summarized in **Table 6-2**.

Table 6-2 79-83 Gardner Street - Existing Sanitary Sewer Flows

Use	Quantity	Unit Flow Rate	Estimated Maximum Daily Flow (gpd)
Residential	9 bedrooms	110 gpd	990 gpd
Total			**990 gpd**

6.2.3 45-55 Brighton Avenue - Project-Generated Sanitary Sewer Flow

The building will generate an estimated 16,480 gallons per day (gpd) based on design sewer flows provided in 314 CMR 7.00-Sewer System Extension and Connection Permit Program as summarized in **Table 6-3**. This is a net increase of 15,816 gpd over the estimated flows from the existing buildings.

Table 6-3 45-55 Brighton Avenue - Projected Sanitary Sewer Flows

Use	Quantity	Unit Flow Rate	Estimated Maximum Daily Flow (gpd)
4 1-Bedroom Units	4 bedrooms	110 gpd/bedroom	440 gpd
72 2- Bedroom Units	144 bedrooms	110 gpd/bedroom	15,840 gpd
Retail Space	3,000 sf	50 gpd/1,000 sf	(150) 200 min gpd
Total			**16,480 gpd**

Figure 6-2.
Sanitary Sewer System Located in the Vicinity of the 83 Gardner Street Site (Owned and Maintained by BWSC)

6.3.4 79-83 Gardner Street - Project Generated Sanitary Sewer Flow

The building will generate an estimated 8,580 gallons per day (gpd) based on design sewer flows provided in 314 CMR 7.00-Sewer System Extension and Connection Permit Program as summarized in **Table 6-4**. This is a net increase of 7,590 gpd over the estimated flows from the existing buildings. See **Figure 6-2.**

Table 6-4 79-83 Gardner Street - Projected Sanitary Sewer Flows

Use	Quantity	Unit Flow Rate	Estimated Maximum Daily Flow (gpd)
1 1-Bedroom Units	1 room	110 gpd/bedroom	110 gpd
37 2- Bedroom Units	74 rooms	110 gpd/bedroom	8,140 gpd
1 3- Bedroom Units	3 room	110 gpd/bedroom	330 gpd
Total			**8,580 gpd**

6.3.5 Sanitary Sewer Connection

It is anticipated that the sanitary services for the proposed building at 45 Brighton Avenue will tie into the 15-inch sewer in Brighton Avenue. It is expected that the building will have one 10-inch sanitary service. The proposed building at 79-83 Gardner Street will tie into the 12-inch sewer in Gardner Street. It is expected that the building will have 8-inch sanitary service. The proponent will submit a Site Plan to BWSC for review and approval. All existing building services will be cut and capped at the main if the wyes are not reused.

6.2.6 Effluent Quality

The Project is not expected to generate industrial wastes.

6.2.7 Sewer System Mitigation

The environmental design goals for the Proposed Project include reducing wastewater volumes by incorporating efficient fixtures into the design. Low-flow faucets, aerated shower-heads, and dual-flush toilets are being considered to reduce water usage and sewer generation.

The Project shall be designed, constructed and maintained so as to minimize all inflow and infiltration into the BWSC's sanitary sewer system and to meet the needs of the Commission's ongoing Infiltration and Inflow reduction program.

6.4 Water System

6.4.1 45-55 Brighton Avenue - Existing Water Service

The water distribution system in the vicinity of the Project site is owned and maintained by BWSC (see **Figure 6-3**). There is a 16-inch pit cast iron distribution line located in Brighton Ave on the south side of the Avenue that is part of BWSC's Southern low service network. Originally, installed in 1875, it was cleaned and cement-lined in 1990. There is an 8-inch DICL distribution line located on the north side of Brighton Avenue (closest to the project site) that is part of BWSC's Southern low service network and was installed in 1989.

According to BWSC records, the existing building has a 1 ½ -inch water service. The service connects to the 8-inch (Southern low) water main in Brighton Ave. The locations of the existing water services will be confirmed as the Project moves to the Design Development phase. The services are not expected to be reused and will be cut and capped at the main.

There are two fire hydrants located in the vicinity of the Project site. There is one hydrant on the north side of Brighton Ave located in the sidewalk in front of the property (H 72). There is also a hydrant to the south (H62) on Brighton Ave across the street from the property. It appears that these hydrants will provide sufficient coverage for the Project. The Proponent will confirm this with BWSC and the Boston Fire Department (BFD) during the detailed design phase.

6.4.2 45-55 Brighton Avenue - Anticipated Water Consumption

The maximum daily water demand for the building is estimated to be 18,128 gpd based on the sewage flow estimate and an added factor for system losses including the average requirements for the Project's cooling system. More detailed water use and meter sizing calculations will be submitted to BWSC as part of the Site Plan approval process.

6.4.3 45 -55 Brighton Avenue - Proposed Water Service

It is anticipated that separate domestic water and fire protection services for the building will be directly tapped from the 16-inch (Southern Low) service main in Brighton Avenue. The water supply systems servicing the building will be gated so as to minimize public hazard or inconvenience in the event of a water main break. Final locations and sizes of the services will be provided on a Site Plan during the detailed design phase and submitted to BWSC for review and approval.

Water service to the building will be metered in accordance with BWSC's requirements. The property owner will provide a suitable location for a Meter Transmission Unit (MTU) as part of BWSC's Automatic Meter Reading System. Water meters over 3-inches will be provided with a bypass to allow BWSC testing without service interruption. A backflow preventer will be installed on the fire protection service and will be coordinated with BWSC's Cross Connection Control Department. Separate services will be provided for domestic use and fire protection.

Figure 6-3.
Water Distribution System in the Vicinity of the 45 Brighton Avenue Site (Owned and Maintained by BWSC)

6.4.4 79-83 Gardner Street - Existing Water Service

The water distribution system in the vicinity of the Project site is owned and maintained by BWSC (see **Figure 6-4**). There is a 12-inch DICL (1998) distribution line located in Gardner Street on the south side of the Street that is part of BWSC's Southern low service network.

According to BWSC records, the existing building has a 2 -inch water service. The service connects to the 12-inch (Southern low) water main in Gardner Street. The locations of the existing water services will be confirmed as the Project moves to the Design Development phase. The services are not expected to be reused and will be cut and capped at the main.

There are two fire hydrants located in the vicinity of the Project site. There is one hydrant on the south side of Gardner Street located to the west of the property (H 74). There is also a hydrant to the east (H96) of the property on Gardner Street. It appears that these hydrants will provide sufficient coverage for the Project. The Proponent will confirm this with BWSC and the Boston Fire Department (BFD) during the detailed design phase.

6.4.5 79-83 Gardner Street - Anticipated Water Consumption

The maximum daily water demand for the building is estimated to be 9,438 gpd based on the sewage flow estimate and an added factor for system losses including the average requirements for the Project's cooling system. More detailed water use and meter sizing calculations will be submitted to BWSC as part of the Site Plan approval process.

6.4.6 79-83 Gardner Street - Proposed Water Service

It is anticipated that separate domestic water and fire protection services for the Project will be directly tapped from the 12-inch (Southern Low) service main in Gardner Street. The water supply systems servicing the building will be gated so as to minimize public hazard or inconvenience in the event of a water main break. Final locations and sizes of the services will be provided on a Site Plan during the detailed design phase and submitted to BWSC for review and approval.

Water service to the building will be metered in accordance with BWSC's requirements. The property owner will provide a suitable location for a Meter Transmission Unit (MTU) as part of BWSC's Automatic Meter Reading System. Water meters over 3-inches will be provided with a bypass to allow BWSC testing without service interruption. A backflow preventer will be installed on the fire protection service and will be coordinated with BWSC's Cross Connection Control Department. Separate services will be provided for domestic use and fire protection.

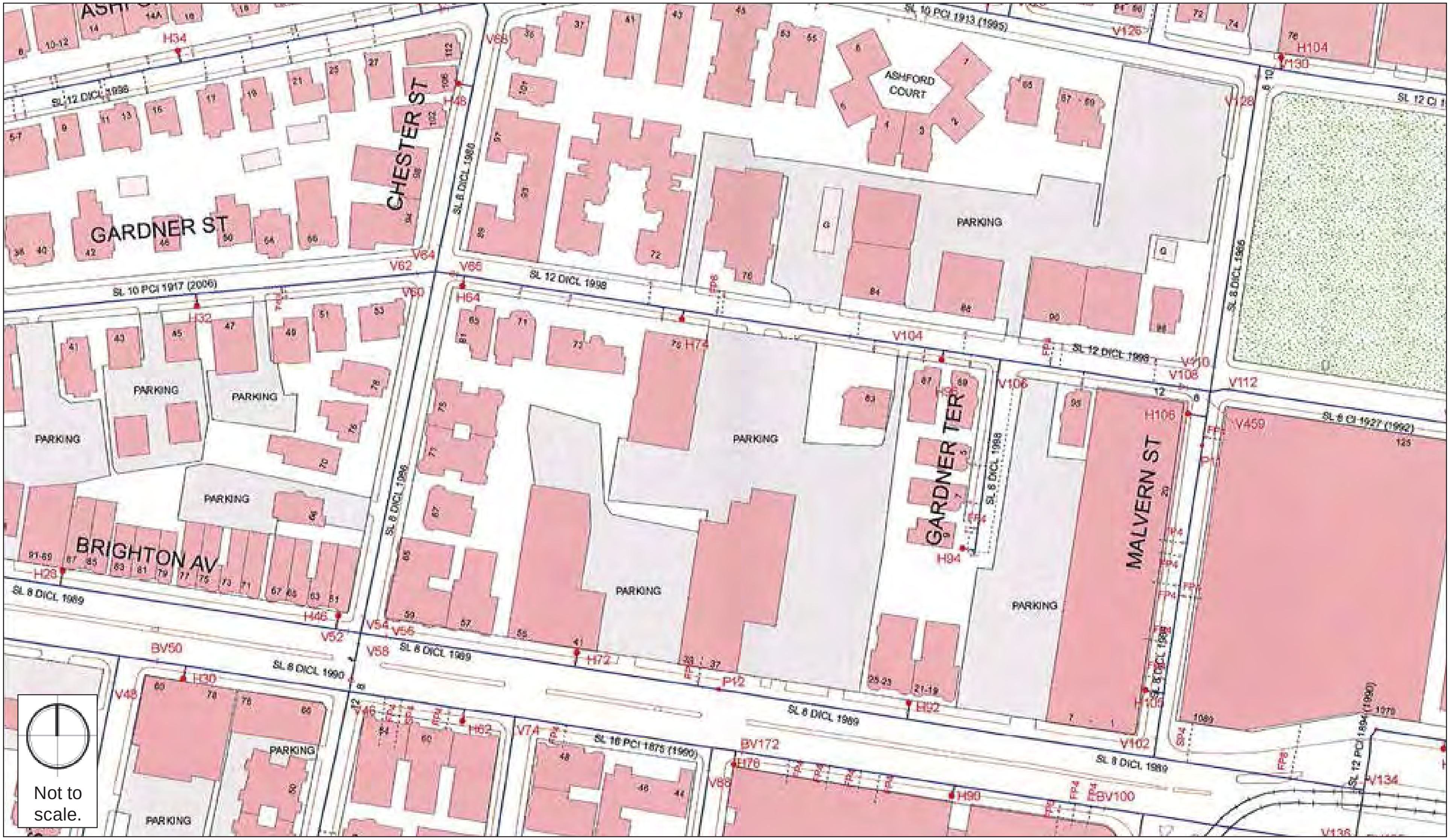


Figure 6-4.
Water Distribution System in the Vicinity of the 83 Gardner Street Site (Owned and Maintained by BWSC)

6.4.7 79-83 Gardner Street - Water Supply Conservation Measures

As discussed in the Sewer System Mitigation Section, water conservation measures such as low-flow fixtures, aerated showerheads, and dual-flush toilets are being considered to reduce potable water usage.

6.4.8 45-55 Brighton Avenue - Existing Storm Drainage System

The storm drain system in the vicinity of the Project site is owned and maintained by BWSC (see **Figure 6-1**). There is an existing 18-inch storm drain in Brighton Avenue to the south of the Project site.

The existing building occupies a large portion of the site. Rooftop runoff from the existing building is conveyed by building service pipes to the surrounding municipal storm drain system. Runoff from parking lot and paved surfaces around the property is generally captured in catch basins. The stormwater runoff from the Project site eventually discharges to the 18-inch storm drain in Brighton Avenue. There are no existing stormwater management systems that would attenuate peak flows and the Project site provides little opportunity for recharge. Very little water quality treatment is realized before these areas are drained to the municipal storm drain system.

6.4.9 45-55 Brighton Avenue - Proposed Storm Water System

The proposed building will occupy almost the entire front portion of the Phase 2 Project site, however there is an opportunity at the rear of the property to infiltrate stormwater. The overflow from the infiltration system will discharge to the 18-inch storm drain in Brighton Avenue.

After construction, the Project will reduce the discharge due to the introduction of more permeable area. This will improve the existing drainage patterns although runoff from roof drains will continue to enter the surrounding municipal storm drain systems.

All storm drain system improvements will be designed in accordance with BWSC's design standards and the BWSC "Requirements for Site Plans." A Site Plan will be submitted for BWSC approval and a General Service Application will be completed prior to any off-site storm drain work. Any storm drain connections terminated as a result of construction will be cut and capped at the storm drain in the street in accordance with BWSC standards.

Erosion and sediment controls will be used during construction to protect adjacent properties and the municipal storm drain system. An operation and maintenance plan will be developed to support the long-term functionality of the proposed stormwater management system.

6.4.10 79-83 Gardner Street - Existing Storm Drainage System

The storm drain system in the vicinity of the Project site is owned and maintained by BWSC (see **Figure 6-2**). There is an existing 18-inch storm drain in Brighton Ave to the south of the Project site. There is no Storm drain in Gardner Ave.

The existing building occupies a large portion of the Phase 2 project site. Rooftop runoff from the existing building is conveyed by building service pipes to the surrounding municipal storm drain system. Runoff from parking lot and paved surfaces around the property is generally captured in catch basins. The stormwater runoff from the Project site eventually discharges to the 18-inch storm drain in Brighton Avenue. There are no existing stormwater management systems that would attenuate peak flows and the Project site provides little opportunity for recharge. Very little water quality treatment is realized before these areas are drained to the municipal storm drain system.

6.4.11 79-83 Gardner Street - Proposed Storm Water System

The proposed building will occupy much of the front portion of the Phase 2 Project site, however there is an opportunity at the rear of the property to infiltrate stormwater. The overflow from the infiltration system will discharge to the 18-inch storm drain in Brighton Avenue.

After construction, the Project will reduce the discharge due to the introduction of more permeable area. This will improve the existing drainage patterns although runoff from roof drains will continue to enter the surrounding municipal storm drain systems.

All storm drain system improvements will be designed in accordance with BWSC's design standards and the BWSC "Requirements for Site Plans." A Site Plan will be submitted for BWSC approval and a General Service Application will be completed prior to any off-site storm drain work. Any storm drain connections terminated as a result of construction will be cut and capped at the storm drain in the street in accordance with BWSC standards.

Erosion and sediment controls will be used during construction to protect adjacent properties and the municipal storm drain system. An operation and maintenance plan will be developed to support the long-term functionality of the proposed stormwater management system.

6.5 Electrical Service

Eversource owns and maintains the electrical transmission system located in Brighton Avenue & Gardner Street. The actual size and location of the proposed building services will be coordinated with Eversource during the detailed design phase. It is anticipated that a transformer room will be provided on the first floor of the proposed building. The Proponent is investigating energy conservation measures, including high efficiency lighting.

6.6 Telecommunications Systems

Verizon owns and maintains infrastructure in the vicinity of the Project site. It is anticipated Verizon will supply telephone and high-speed internet service to the proposed building. The actual size and location of the proposed building services will be coordinated with Verizon during the detailed design phase.

6.7 Gas Systems

National Grid owns and maintains a 16-inch low pressure gas main and a 30-inch low pressure gas main in Brighton Avenue. National Grid owns and maintains a 20-inch low pressure gas main and a 6-inch low pressure gas main in Gardner Street. The Project is expected to use natural gas for heating and domestic hot water. The actual size and location of the building services will be coordinated with National Grid during the detailed design phase.

6.8 Steam Systems

Veolia Energy does not own or maintain any steam infrastructure within the vicinity of the Project site.

6.9 Utility Protection During Construction

The Project's Contractor will notify utility companies and call "Dig Safe" prior to excavation. During construction, infrastructure will be protected using sheeting and shoring, temporary relocations, and construction staging as required. The Construction Contractor will be required to coordinate all protection measures, temporary supports, and temporary shutdowns of all utilities with the appropriate utility owners and/or agencies. The Construction Contractor will also be required to provide adequate notification to the utility owner prior to any work commencing on their utility. Also, in the event a utility cannot be maintained in service during switch over to a temporary or permanent system, the Construction Contractor will be required to coordinate the shutdown with the utility owners and Project abutters to minimize impacts and inconveniences.

The existing infrastructure surrounding the site of 45 Brighton Avenue appears to have adequate capacity to service the needs of the Project. The following sections describe the existing sanitary sewer, water, and storm drain systems surrounding the site and explain how these systems will service the development. The analysis also discusses any anticipated Project-related impacts on the utilities and identifies mitigation measures to address these potential impacts.

The Project is moving into the Design Development phase where a detailed infrastructure analysis will be performed. The Project's team will coordinate with the appropriate utilities to address the capacity of the area utilities to provide services for the new building. A Boston Water and Sewer Commission (BWSC) Site Plan and General Service Application is required for the proposed new water, sanitary sewer, and storm drain connections.

A Drainage Discharge Permit Application will be submitted to the BWSC for any required construction dewatering. The appropriate approvals from the Massachusetts Department of Environmental Protection (MassDEP) and the U.S. Environmental Protection Agency (EPA) will also be sought.

7.0 TRANSPORTATION COMPONENT

7.1 Introduction

Howard Stein Hudson (HSH) has conducted an evaluation of the transportation impacts of the proposed Projects. This transportation study adheres to the Boston Transportation Department (BTD) *Transportation Access Plan Guidelines* and Boston Redevelopment Authority Article 80 Large Project Review process. This study includes an evaluation of the existing conditions, future conditions with and without the Project, projected parking demand, loading operations, transit services, and pedestrian and bicycle activity. This transportation evaluation includes impacts of both Projects independently and cumulatively. The individual characteristics of each project are discussed where appropriate. The Projects will have minimal impact on the study area intersections and the pedestrian and public transportation facilities in the area.

7.1.1 Project Description

The Project consists of two sites, to be developed in phases, which are located west of Packard's Corner between Brighton Avenue and Gardner Street. The 45-55 Brighton Avenue site (the "Brighton Avenue Project") currently contains an automobile parts supply store, an automobile service center, and an underutilized surface parking lot and is served by a single curb cut on Brighton Avenue. The 79-83 Gardner Street site (the "Gardner Street Project") currently contains a surface parking lot and an existing Victorian style house and is served by two curb cuts along Gardner Street. The existing house will be retained on the site and incorporated into the Project. The surface lot on the Gardner Street site currently serves the commercial building at 39 Brighton Avenue, adjacent to the east side of the Brighton Avenue Project site. A curb cut along Brighton Avenue also provides access to the surface parking lot along Gardner Street site via an existing driveway that runs along the eastern edge of the 39 Brighton Avenue building.

Phase 1: Gardner Street Project

The 79-83 Gardner Street Project will contain 38 residential units and covered parking for 39 vehicles. The entrance to the garage will be provided by a curb cut on the eastern portion of the site, with the exit being provided by a curb cut on the western portion of the site. It is anticipated that move-in/move-out and service/delivery activity will be light for the Gardner Street Project and will occur curbside with a permit. The parking spaces will be allocated for residential uses of both the Gardner Street Project and the Brighton Avenue Project, if needed. Secure, covered storage will be provided for 38 bicycles in the garage.

Phase 2: Brighton Avenue Project

The Brighton Avenue Project will contain 76 residential units and a small area of ancillary, ground-floor retail with covered parking will be provided for 175 vehicles in a ground-floor and below-grade parking garage. A total of approximately 123 parking spaces will be allocated to replace the existing surface parking lot along Gardner Street that serves the commercial building at 39 Brighton Avenue. The remaining 52 parking spaces will be used for the residential component of the Brighton Avenue Project. The allocation of parking spaces will be flexible to meet the demand of both the commercial uses at 39 Brighton Avenue and the residential uses of the Brighton Avenue Project. The parking will also serve the needs of the 39 Brighton Avenue commercial building. Access to the site will be provided by a single new curb cut along Brighton Avenue. Loading, service, trash, and move-in/move-out activity will take place on the Project site in the ground floor level of the garage. Secure, covered storage for 76 bicycles will be provided in the garage.

7.1.2 Study Area

The transportation study area is bounded by Brighton Avenue to the south, Gardner Street to the north, Linden Street to the west, and Malvern Street and Commonwealth Avenue to the east. The study area consists of the following seven intersections in the vicinity of the Project site:

- Brighton Avenue/Linden Street (signalized);
- Brighton Avenue/Commonwealth Avenue (signalized);
- Brighton Avenue/Chester Street (unsignalized);
- Brighton Avenue/Malvern Street (unsignalized);
- Gardner Street/Linden Street (unsignalized);
- Gardner Street/Chester Street (unsignalized); and
- Gardner Street/Malvern Street (unsignalized).

The study area is shown in **Figure 7-1.**

7.1.3 Study Methodology

This transportation study and its supporting analyses were conducted in accordance with BTD guidelines, and are described below.

The Existing (2016) Condition analysis includes an inventory of the existing transportation conditions such as traffic characteristics, parking, curb usage, transit, pedestrian circulation, bicycle facilities, loading, and site conditions. Existing counts for vehicles, bicycles, and pedestrians were collected at the study area intersections. A traffic data collection effort forms the basis for the transportation analysis conducted as part of this evaluation.

The future transportation conditions analyses evaluate potential transportation impacts associated with the Project. The long-term transportation impacts are evaluated for the year 2023, based on a seven-year horizon from the year of the filing of this traffic study.

The No-Build (2023) Condition analysis includes general background traffic growth, traffic growth associated with specific developments (not including this Project), and transportation improvements that are planned in the vicinity of the Project site.

The Build (2023) Condition analysis includes a net increase in traffic volume due to the addition of Project-generated trip estimates to the traffic volumes developed as part of the No-Build (2023) Condition analysis. The transportation study identifies expected roadway, parking, transit, pedestrian, and bicycle accommodations, as well as loading capabilities and deficiencies.

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

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

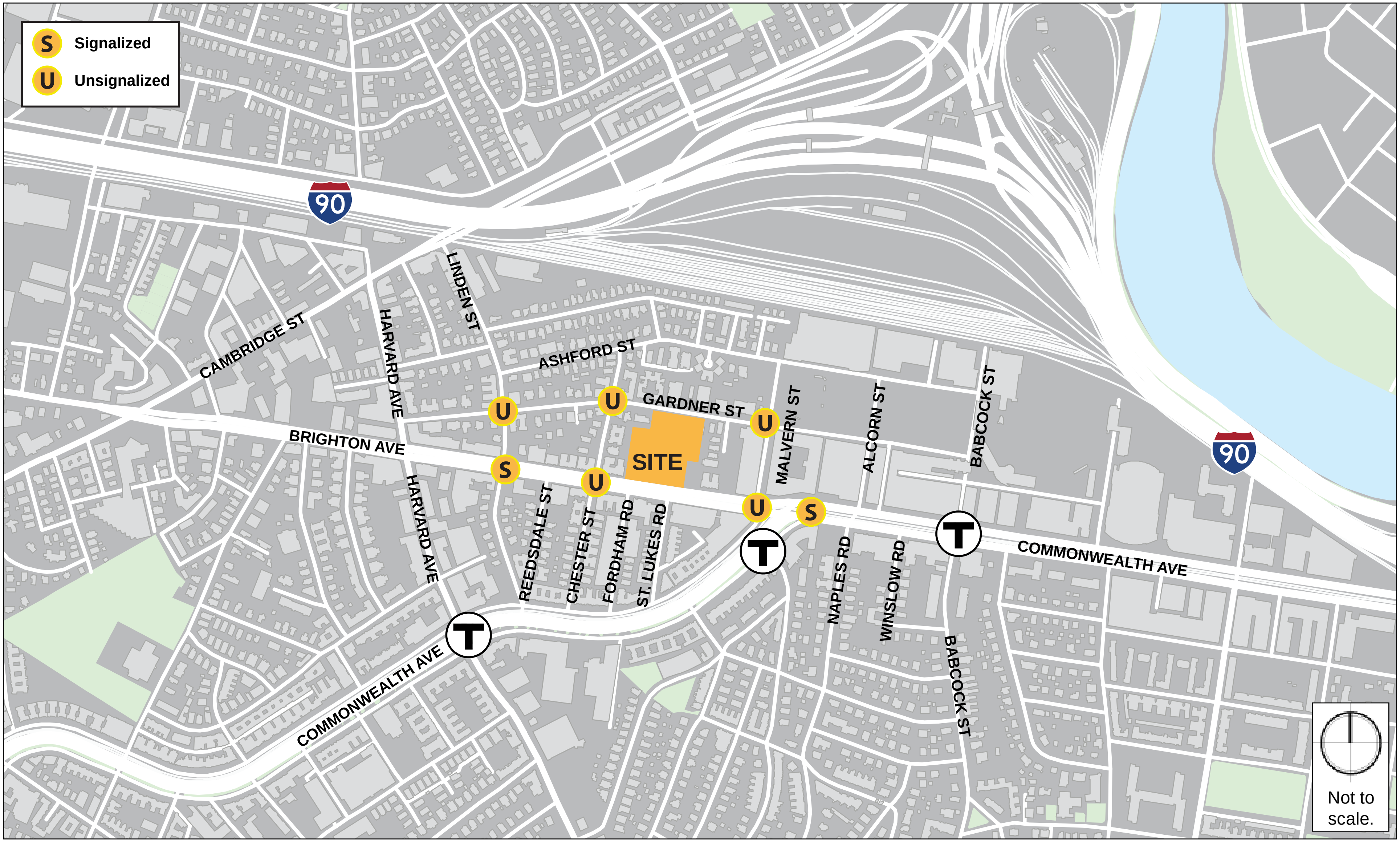


Figure 7-1.
Study Area Intersections

7.1.4 Existing (2016) Condition

This section includes descriptions of existing study area roadway geometries, intersection geometry and traffic control, parking and curb usage, public transportation services, peak-hour traffic volumes for vehicles, bicycles, and pedestrians, and intersection traffic operations.

7.1.5 Existing Roadway Conditions

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

Brighton Avenue is a two-way four-lane roadway located to the south of the Project site that runs in an east-west direction between Cambridge Street to the west, where the alignment continues as North Beacon Street, and Commonwealth Avenue/Malvern Street to the east, where the alignment continues as Commonwealth Avenue. There are two travel lanes in each direction, the outside lane being a shared-use lane for motorized vehicles and bicycles. Brighton Avenue is classified as an urban principal arterial roadway under BTD jurisdiction. On-street parking and sidewalks are provided on both sides of Brighton Avenue.

Commonwealth Avenue is a two-way roadway located south and east of the Project site. It is classified as an urban principal arterial roadway under BTD jurisdiction and generally runs in an east-west direction between I-95 (Route 128) in Weston to the west and Arlington Street in Boston’s Back Bay neighborhood to the east. At the southeast corner of the study area, the roadway turns from running east-west to a northeast-southwest orientation, and the east-west alignment continues to the west as Brighton Avenue. To the east, Commonwealth Avenue has two eastbound lanes and three westbound lanes, plus a dedicated bicycle lane in each direction. To the south, the roadway has two lanes in each direction, and one-way carriage roads are provided along both sides of the roadway, providing access to local destinations, parking, and minor streets. The carriage roads are separated from the main roadway by raised medians ranging in width from approximately five feet to over 30 feet, with occasional breaks for access. The carriage road along Commonwealth Avenue eastbound will be herein referred to as the “eastbound carriage road” and the carriage road along Commonwealth Avenue westbound will be herein referred to as the “westbound carriage road.” The B Branch of the MBTA Green line travels along Commonwealth Avenue in the Project vicinity. To the east, the trolley line is located in a wide median between the two directions of travel. To the south, it is located in the median between the westbound main line and the westbound carriage road. Sidewalks and on-street parking are provided along both sides of the roadway to the east and along both carriage roads to the south.

Gardner Street is a one-way one-lane roadway located north of the Project site. It generally runs in an east-west direction between Harvard Avenue to the west and Babcock Street to the east. The direction of travel is westbound from Linden Street to Harvard Avenue and eastbound from

Linden Street to Babcock Street. It is classified as a local roadway under BTD jurisdiction. Sidewalks and parallel parking are provided along both sides of Gardner Street.

Linden Street is located to the west of the Project site and runs in a north-south direction from Commonwealth Avenue in the south to Cambridge Street in the north. Linden Street is classified as an urban collector roadway under BTD jurisdiction. South of Brighton Avenue, Linden Street is a one-way street northbound with one lane, and on-street parking and sidewalks are provided on both sides. From Brighton Avenue to Pratt Street, Linden Street is a two-way two-lane roadway with on-street parking provided on the east side and sidewalks provided on both sides. North of Pratt Street, it becomes a one-way street northbound again with one lane, parking on the east side, and sidewalks provided on both sides.

Chester Street is a one-way, one lane roadway located to the west of the Project site and runs in a north-south direction from Commonwealth Avenue in the south to Ashford Street in the north. The direction of travel is southbound from Brighton Avenue to Commonwealth Avenue, and northbound from Brighton Avenue to Ashford Street. It is classified as a local roadway under BTD jurisdiction. Sidewalks and on-street parking are provided along both sides of the roadway.

Malvern Street is a two-way, two lane roadway located to the east of the Project site that runs in a north-south direction between Brighton Avenue to the south and Ashford Street to the north. It is classified as a local roadway under BTD jurisdiction. On-street parking is provided on the east side of the roadway, and sidewalks are provided along both sides.

7.1.6 Existing Intersection Conditions

The existing study area intersections are described below. Intersection characteristics such as traffic control, lane usage, pedestrian facilities, pavement markings, and adjacent land use are described.

Brighton Avenue/Linden Street is a four-leg, signalized intersection. The eastbound Brighton Avenue approach has three lanes: an exclusive left-turn lane and two through lanes, where the outer lane is marked as a shared-use lane for bicycles. There is a bus stop with pullout on this approach on the near side of the intersection. The westbound Brighton Avenue approach has a through lane and a shared through/right-turn lane that is also a shared-use lane for bicycles. There is a bus stop with pullout on this approach on the near side of the intersection. The Linden Street northbound approach is one-way with a single lane approaching the intersection. Left-turn, through, and right-turn movements are permitted from these lanes. The southbound Linden Street approach has one lane for left-turn and right-turn movements.

Parallel parking is provided on both sides of Brighton Avenue except at the bus stops. Sidewalks are provided on both sides of all legs of the intersection, and crosswalks are provided across all legs. Pedestrian signal heads and push buttons are provided for all crossings.

Brighton Avenue/Commonwealth Avenue is a signalized intersection with four approaches: Brighton Avenue eastbound, Commonwealth Avenue westbound, Commonwealth Avenue eastbound (referred to as “northbound” at this intersection), and the eastbound carriage road of Commonwealth Avenue (referred to as the “northbound” approach direction at this intersection). There are corresponding departures for the first three approaches, plus one additional departure on the westbound carriage road (referred to as the “southbound” departure direction at this intersection). Additionally, the eastbound (inbound) and westbound (outbound) tracks of the MBTA Green Line B Branch trolley travel through the intersection along Commonwealth Avenue, in the center median to the east and in the median between the westbound main line lanes and the westbound carriage road to the south and west. Packard’s Corner Station, serving both directions, is located in the median to the south of the intersection.

The unsignalized intersection of Brighton Avenue/Malvern Street is located immediately west of this intersection and shares eastbound Brighton Avenue approach lanes with this intersection. That intersection is discussed in further detail below. The Brighton Avenue eastbound approach has three lanes: a left-turn lane onto Malvern Street, a through lane, and a shared through/right-turn lane that is also a shared-use lane for bicycles. The hard-right-turn movement onto the westbound carriage road is channelized and is not under signal control. The left-turn lane serves the intersection of Brighton Avenue and Malvern Street and is not signalized. A dedicated bicycle lane originates approximately 55 feet in advance of the stop line and continues through the intersection and onto eastbound Commonwealth Avenue. There is a bus stop with pullout on this approach on the near side of the intersection, just in advance of the dedicated bicycle lane. The westbound Commonwealth Avenue approach has three approach lanes: a left-turn lane, a shared left-turn/bear-left-turn lane, and a through lane. The through lane is separated from the left-turn lanes by a channelized island. A dedicated bicycle lane is provided on this approach, and it terminates on the far side of the intersection where the outer travel lane becomes a shared-use lane. There is a bus stop with pullout on this approach on the near side of the intersection. The northbound approach of Commonwealth Avenue has two approach lanes, both for right-turn movements. The northbound approach of the eastbound carriage road consists of a single right-turn lane. Left-turn movements are prohibited on both northbound approaches.

Parallel parking is provided on both sides of Brighton Avenue and the east leg of Commonwealth Avenue, including around the curve of the southeast corner. Diagonal parking is provided on the south leg of Commonwealth Avenue in the vicinity of the intersection. Sidewalks are provided along both sides of Brighton Avenue and the east leg of Commonwealth Avenue, and along the outer edge of the carriage roads on the south leg of Commonwealth Avenue. Crosswalks are marked across the south and west legs, including the crossing of the eastbound channelized right-turn, with pedestrian signal heads and push buttons provided for the crossings of Brighton Avenue and the main line of Commonwealth Avenue’s south leg, including equipment in the center median. Wheelchair ramps or depressions in the raised medians are provided at every point a crosswalk meets a curb except the center median of Commonwealth Avenue’s south leg where the raised median runs approximately halfway across the striped crosswalk. Traffic signal equipment is provided for vehicular movements, pedestrians, and the both approaches of the Green Line trolley.

Brighton Avenue/Chester Street is a four-leg unsignalized intersection with two approaches. The eastbound and westbound Brighton Avenue approaches each consist of a shared left-turn/through lane and a shared through/right-turn lane that is also a shared-use lane for bicycles. The north and south legs of Chester Street are both departure-only legs as the roadway is one-way in the departure direction, southbound to the south of the intersection, and northbound to the north.

Parallel parking and sidewalks are provided along both sides of all intersection legs, and crosswalks are provided across all legs. Wheelchair ramps are provided on all four corners.

Brighton Avenue/Malvern Street is a three-leg unsignalized intersection located immediately west of the Brighton Avenue/Commonwealth Avenue intersection that was described previously. The eastbound Brighton Avenue approach consists of one left-turn lane onto Malvern Street, a through lane, and a shared through/right-turn lane that is also a shared-use lane for bicycles. The through and shared-movement lanes are subject to signalization at the intersection of Brighton Avenue/Commonwealth Avenue, and the right-turn movements are really movements at the other intersection. The westbound Brighton Avenue approach is the continuation of the Commonwealth Avenue westbound through lane from the adjacent intersection. Immediately west of Brighton Avenue/Commonwealth Avenue, the pavement widens to accommodate two lanes but there is no lane striping. The two resulting westbound approach lanes are a through lane and a shared through/right-turn lane. The dedicated bicycle lane from westbound Commonwealth Avenue continues to this intersection where it ends, and the outermost receiving lane on the other side of this intersection is a shared-use lane. The southbound Malvern Street approach has a single right-turn-only lane.

Parallel parking is provided on the east side of Malvern Street. Sidewalks are provided along both sides of all intersection legs, and a crosswalk is provided across Malvern Street. Wheelchair ramps are provided on both corners. The crosswalk across the east leg is under signal control and was described previously as the crosswalk across Brighton Avenue at the adjacent intersection.

Gardner Street/Linden Street is a four-leg unsignalized intersection with two approaches. The northbound and southbound Linden Street approaches each consist of a single lane for left-turn, through, and right-turn movements. The east and west legs of Gardner Street are both departure-only legs as the roadway is one-way in the departure direction, westbound to the west of the intersection, and eastbound to the east.

Parallel parking is provided on both sides of Gardner Street and the east side of Linden Street. Sidewalks are provided along both sides of all intersection legs. Wheelchair ramps are provided on all four corners, but there are no crosswalk markings.

Gardner Street/Chester Street is a four-leg unsignalized intersection with two approaches. Both roadways are one-way at this intersection, with Gardner Street running eastbound and Chester

Street running northbound. The eastbound Gardner Street approach consists of a single lane for left-turn and through movements, and the northbound Chester Street approach consists of a single lane for through and right-turn movements.

Parallel parking and sidewalks are provided along both sides of all intersection legs. Wheelchair ramps are provided on all four corners, but there are no crosswalk markings.

Gardner Street/Malvern Street is a four-leg unsignalized intersection with three approaches. Gardner Street is one-way eastbound at this intersection. The eastbound Gardner Street approach consists of one lane for left-turn, through, and right-turn movements. The northbound Malvern Street approach has one lane for through and right-turn movements, and the southbound Malvern Street approach has one lane for left-turn and through movements.

Parallel parking is provided on both sides of Gardner Street and on the east side of Malvern Street. Sidewalks are provided along both sides of all intersection legs. Wheelchair ramps are provided on all four corners, but there are no crosswalk markings.

7.1.7 Existing Parking and Curb Use

On-street parking surrounding the Project Site generally consists of residential parking, metered parking, and two-hour parking. The on-street parking regulations within the study area are shown in **Figure 7-2**.

7.1.8 Car and Bicycle Sharing Services

Car sharing services enable easy access to short-term vehicular transportation. Vehicles are rented on an hourly or daily basis, and all vehicle costs (gas, maintenance, insurance, and parking) are included in the rental fee. Vehicles are checked out for a specific time period and returned to their designated location. Pick-up/drop-off locations are typically in existing parking lots or other parking areas throughout neighborhoods as a convenience to users of the services. Nearby car sharing services provide an important transportation option and reduce the need for private vehicle ownership.

Two major car sharing services with vehicle locations near the Project site are Zipcar and Enterprise CarShare. There are currently six Zipcar locations and four Enterprise CarShare locations within a half-mile walk of the Project site. The nearest location to the Project site is a Zipcar location in a parking lot adjacent to the Project site’s eastern boundary at 83 Gardner Street.

The Project site is also located in proximity to a bicycle sharing station provided by Hubway. Hubway is the Boston area’s bicycle sharing service, which was launched in 2011 and currently consists of more than 1,600 shared bicycles at more than 160 stations throughout Boston, Brookline, Cambridge, and Somerville. The nearest Hubway station to the Project site is located at Packard’s Corner at the intersection of Brighton Avenue/Commonwealth Avenue. This station has 19 bicycle docks and is less than a 0.2-mile walk to the east from the Project site. The nearby car and bicycle sharing locations within a half-mile of the Project site are shown in **Figure 7-3.**

7.1.9 Existing Traffic Conditions

Turning Movement Counts

Traffic volume data was collected at the seven study area intersections on May 11 and May 12, 2016. Traffic volume data was also collected at all of the existing curb cuts that serve the two sites. Turning Movement Counts (TMCs) and vehicle classification counts were conducted during the weekday a.m. and weekday p.m. peak periods (7:00 – 9:00 a.m. and 4:00 – 6:00 p.m., respectively). The traffic classification counts included car, heavy vehicle, pedestrian, and bicycle movements. Detailed traffic counts are provided in **Appendix D.**

Seasonal Adjustment

In order to account for seasonal variation in traffic volumes throughout the year, data provided by MassDOT were reviewed. The most recent (2011) MassDOT Weekday Seasonal Factors were used to determine the need for seasonal adjustments to the May 2016 TMCs. The seasonal adjustment factor for roadways similar to the study area (Group 6) during the month of May is 0.91. This indicates that average month traffic volumes are approximately nine percent less than the traffic volumes that were collected. The traffic counts were not adjusted downward to reflect average month conditions in order to provide a conservatively high analysis consistent with the peak season traffic volumes.

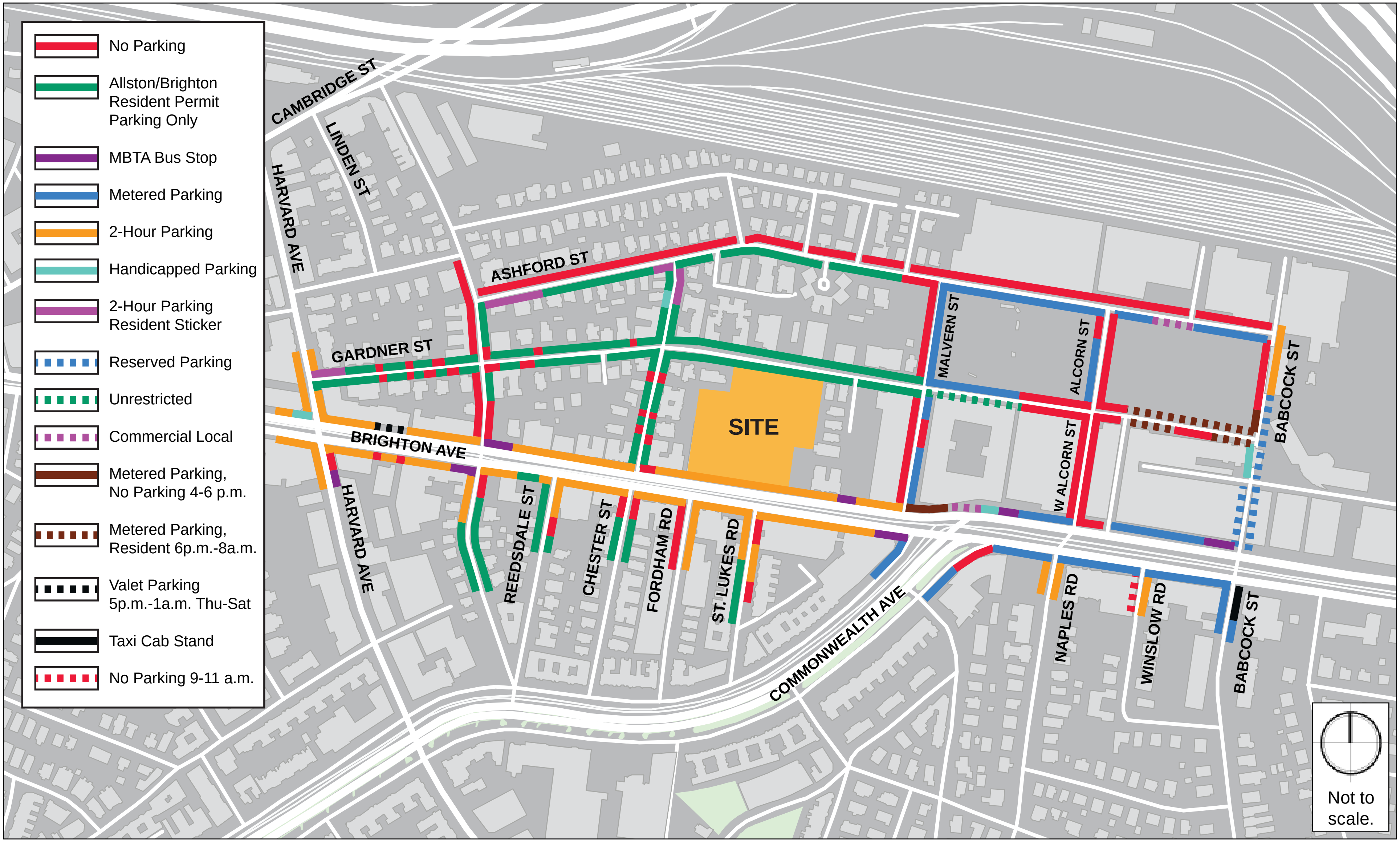


Figure 7-2.
On-Street Parking

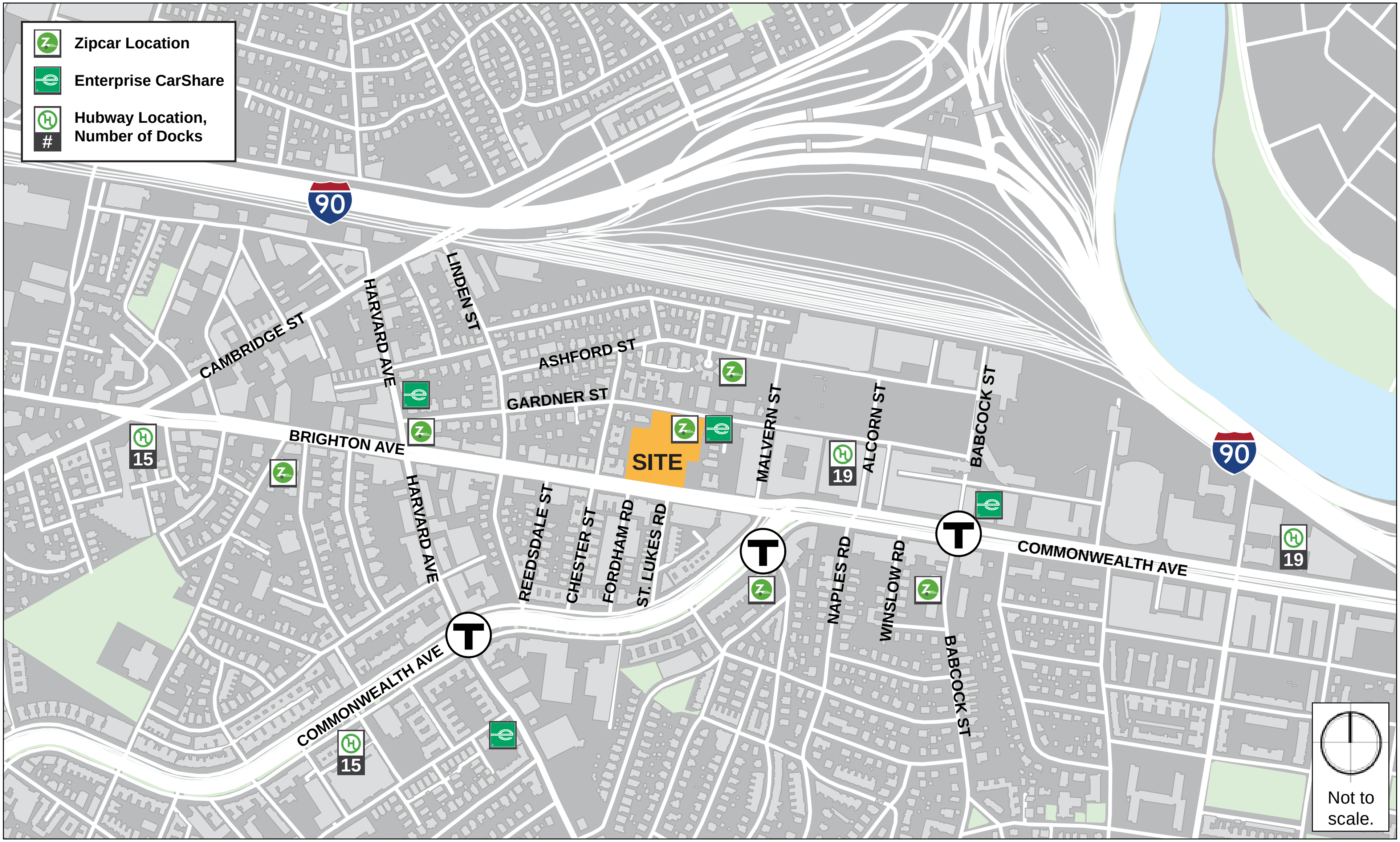


Figure 7-3.
Car and Bicycle Sharing

Turning Movement Counts

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Existing traffic volumes were collected to develop the 2016 Existing Condition vehicular traffic volumes. The 2016 Existing Condition weekday a.m. Peak Hour and weekday p.m. Peak Hour traffic volumes are shown in **Figures 7-4** and **7-5**, respectively.

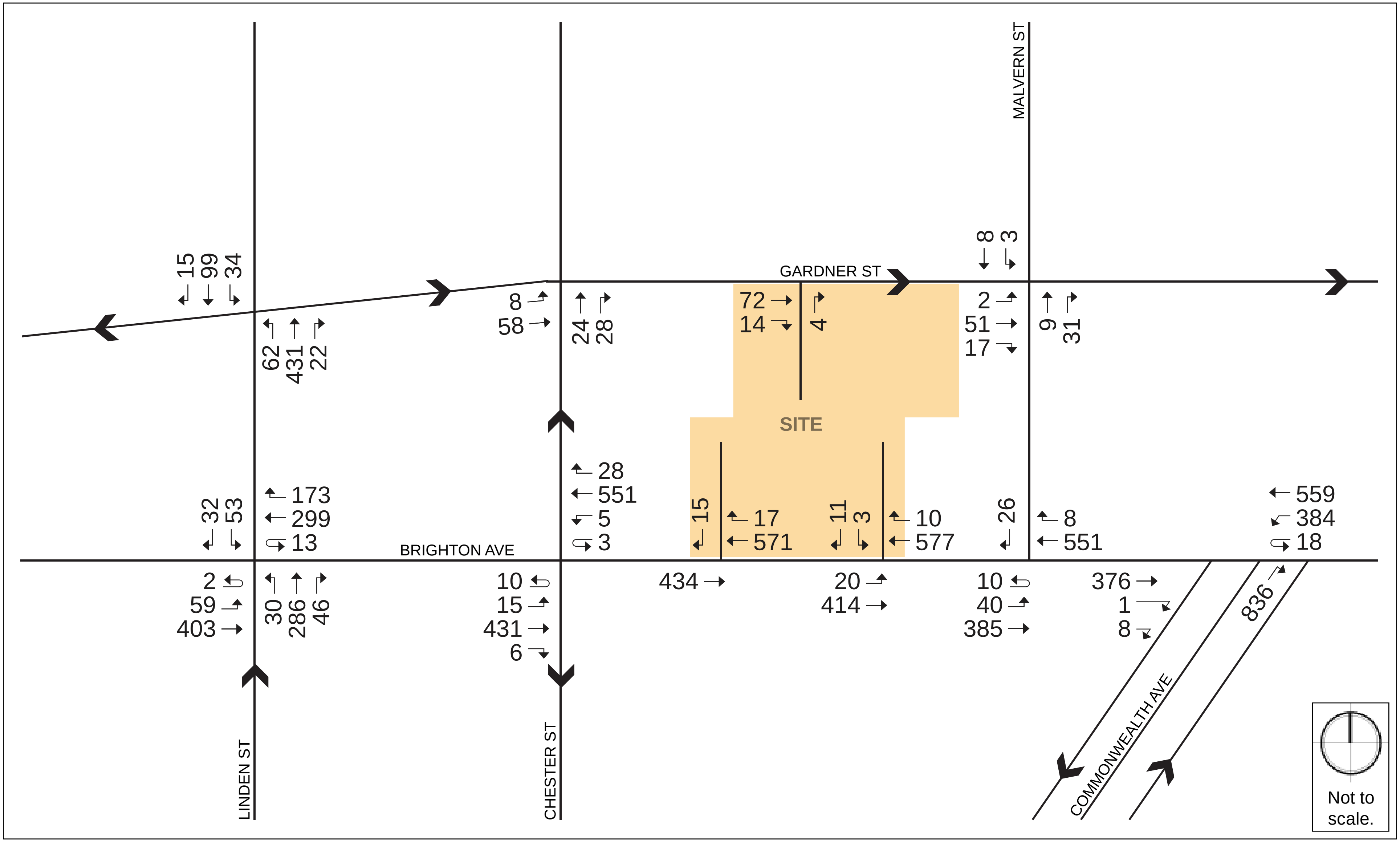

Figure 7-4.
Existing (2016) Condition Traffic Volumes, Weekday a.m. Peak Hour

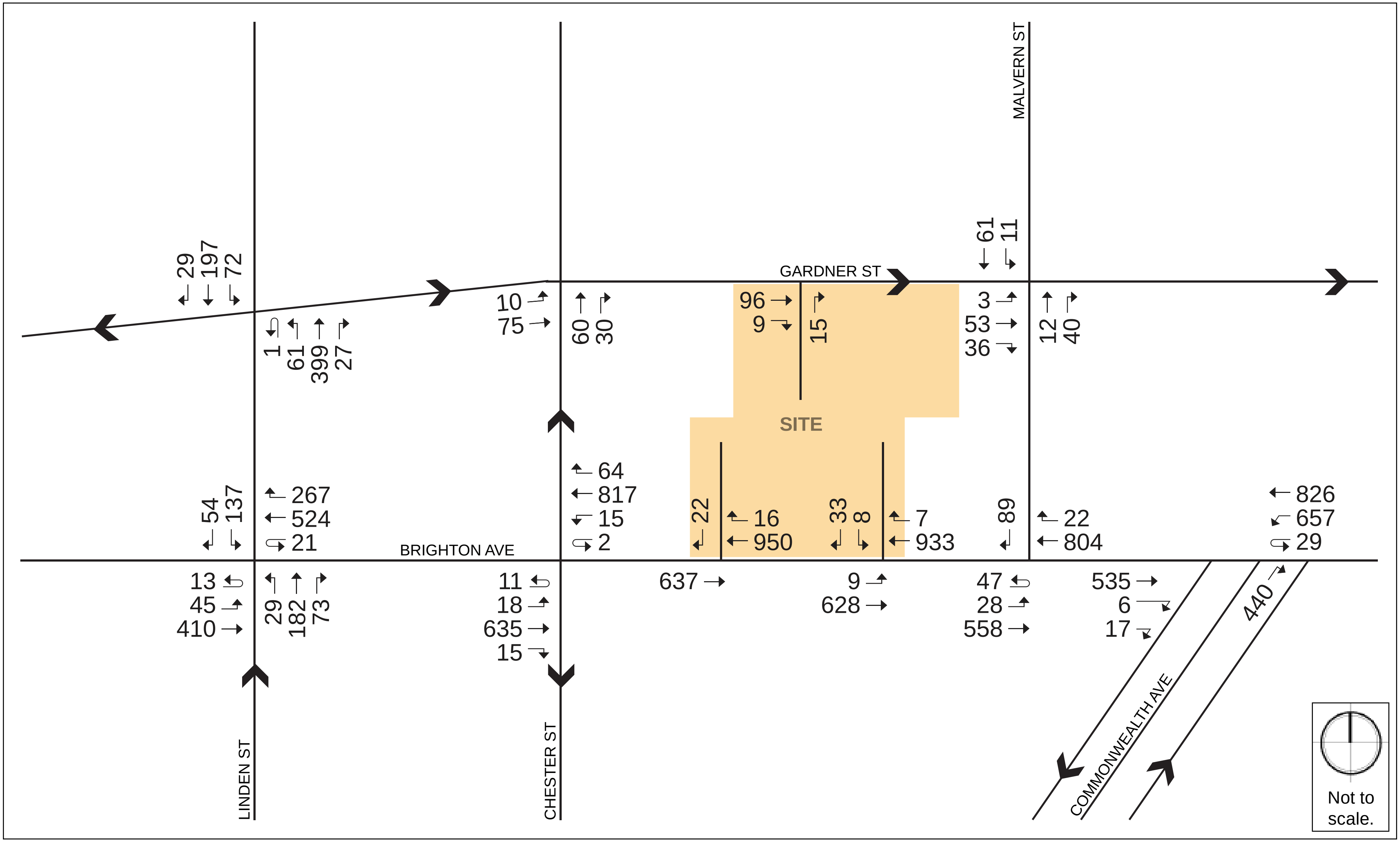

Figure 7-5.
Existing (2016) Condition Traffic Volumes, Weekday p.m. Peak Hour

7.1.10 Existing Pedestrian Conditions

Sidewalks are provided along all roadways in the study area and are generally in good condition. Crosswalks are provided at both signalized study area intersections and at the one unsignalized intersection directly adjacent to the signalized intersection. Pedestrian signal equipment is provided at both of the signalized intersections.

To determine the amount of pedestrian activity within the study area, pedestrian counts were conducted concurrent with the TMCs at the study area intersections and are presented in **Figure 7-6**.

7.1.11 Existing Bicycle Conditions

In recent years, bicycle use has increased dramatically throughout the City of Boston. The Project site is conveniently located in close proximity to several bicycle facilities. The City of Boston's 2013 "Bike Routes of Boston" map designates the Commonwealth Avenue/Brighton Avenue/North Beacon Street corridor as an advanced route, suitable for experienced and traffic-confident cyclists. The Commonwealth Avenue portion of that corridor has designated bicycle lanes in both directions, Brighton Avenue is marked for bicycles with shared road symbols, and North Beacon Street is a recommended bicycle route with no bicycle markings on the roadway. Harvard Avenue is also designated an advanced route, from the Brookline town line to the south to Cambridge Street to the north. It has designated bicycle lanes in both directions south of Brighton Avenue, and north of Brighton Avenue it has a designated bicycle lane southbound and a shared-use lane northbound.

The portion of Commonwealth Avenue heading south and west from Packard's Corner is designated an advanced route and has no bicycle markings on the roadway, as is Cambridge Street northeast of Brighton Avenue. That portion of Cambridge Street leads to the Charles River. Along both sides of the river is the Paul Dudley White Bicycle Path / Charles River Bike Path, which is a mixed-use path designated as beginner-level bike routes, suitable for all types of cyclists including newer cyclists, cyclists with limited on-road experience, and children. Other beginner routes in the vicinity of the Project include Gardner Street and Ashford Street, which have no bicycle markings on the roadway.

Cambridge Street southwest of Brighton Avenue is designated an intermediate route, suitable for riders with some on-road experience, and the roadway is marked with a bike lane. Linden Street and Babcock Street are also intermediate routes, and they have no bicycle markings on the roadway.

Bicycle counts were conducted concurrent with the vehicular TMCs and are presented in **Figure 7-7**.

7.1.12 *Existing Public Transportation*

The Project site area is well-served by public transportation. The MBTA's Green Line trolley, commuter rail, and several bus lines provide access throughout the city. The closest Green Line station, Packard's Corner, is less than 0.2 miles away and serves the Green Line's B Branch between Boston College and Park Street. The commuter rail's Framingham/Worcester Line runs parallel to I-90 (the Massachusetts Turnpike), north of the project. A new commuter rail station, Boston Landing, is under construction 0.9 miles away from the Project site and is expected to open in the fall of 2016. The route 57 bus travels along Brighton Avenue adjacent to the Project site. Bus stops are provided for buses traveling in both directions on Brighton Avenue at Linden Street and at Commonwealth Avenue, just a few hundred feet to the west and to the east of the Project site, respectively. The MBTA operates to additional bus routes in close proximity to the Project. The nearby public transit services are shown in **Figure 7-8** and summarized in below **Table 7-1**.

Table 7-1 Existing Public Transportation

Transit Service	***Description***	***Peak-Hour Headway (minutes)[1]***
	Subway/Trolley Lines	
Green Line – B Branch	Boston College - Park Street	6
	Commuter Rail Line[2]	
Framingham/ Worcester	Worcester / Union Station - South Station	22-25
	Bus Routes	
57	Watertown Yard - Kenmore Sta. via Newton Corner & Brighton Ctr.	6-8
64	Oak Sq. - University Park, Cambridge or Kendall/MIT via North Beacon St.	17-29
66	Harvard Square - Dudley Station via Allston & Brookline Village	5-10

[1] Headway is the scheduled time between trains or buses. Headways are approximate. Source: www.mbta.com, March 2016.

[2] Commuter rail routes have irregular headways; customers typically plan trips according to schedule rather than using walk-up services. Headways given are for peak direction (inbound in a.m., outbound in p.m.).

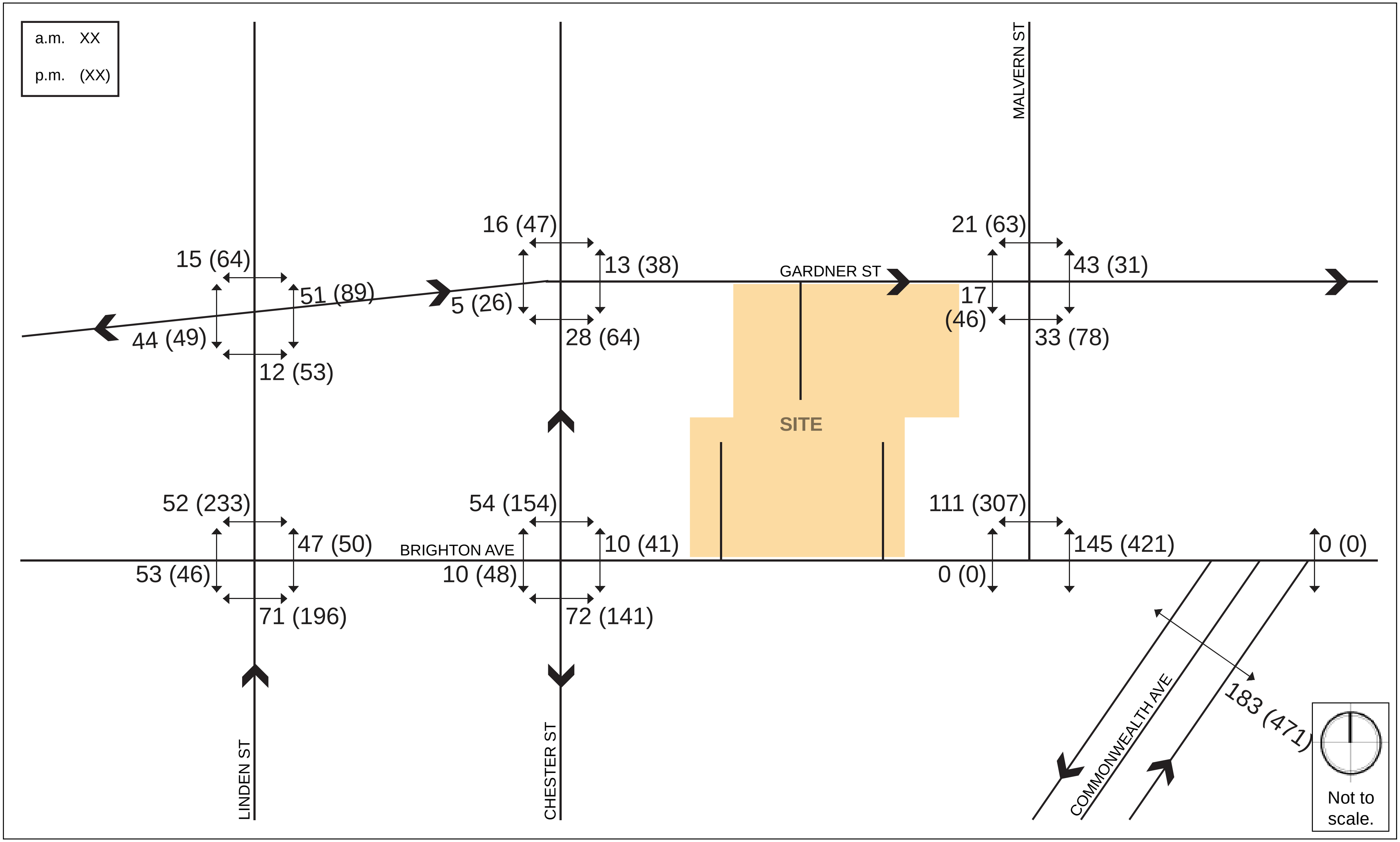

Figure 7-6.
Existing (2016) Condition Pedestrian Volumes, Weekday a.m. and p.m. Peak Hours

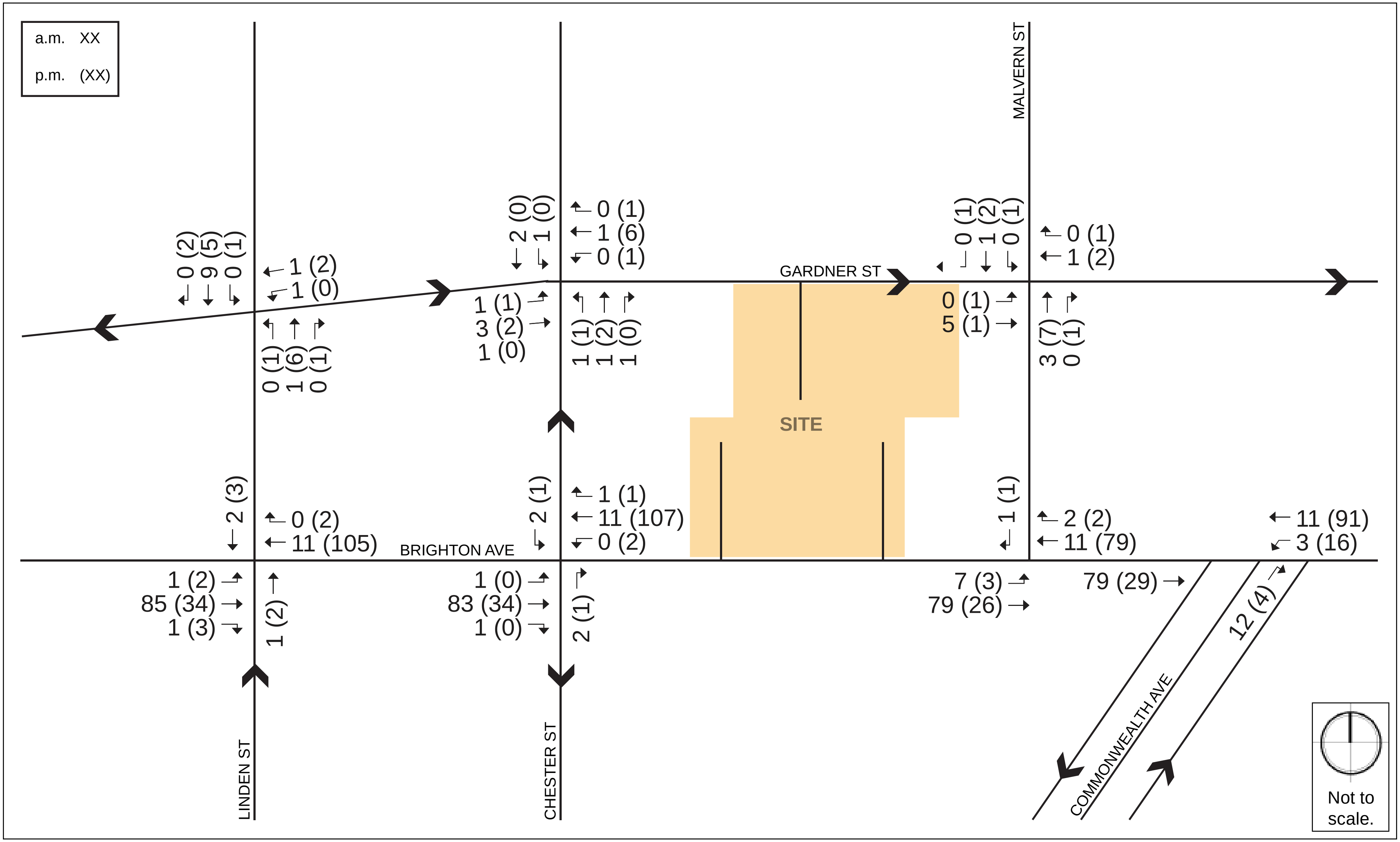

Figure 7-7.
Existing (2016) Condition Bicycle Volumes, Weekday a.m. and p.m. Peak Hours

Figure 7-8.
Public Transportation

7.1.13 Traffic Operations Analysis

Trafficware's Synchro (version 9) software package was used to calculate average delay and associated LOS at the study area intersections. This software is based on the traffic operational analysis methodology of the Transportation Research Board's 2000 Highway Capacity Manual (HCM).

LOS designations are based on average delay per vehicle for all vehicles entering an intersection. **Table 7-2** displays the intersection LOS criteria. LOS A indicates the most favorable condition, with minimum traffic delay, while LOS F represents the worst condition, with significant traffic delay. LOS D or better is typically considered acceptable in an urban area. However, LOS E or F is often typical for a stop controlled minor street that intersects a major roadway.

Table 7-2 Vehicle Level of Service Criteria

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

Source: 2000 Highway Capacity Manual, Transportation Research Board.

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

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

The 50th percentile queue length, measured in feet, represents the maximum queue length during a cycle of the traffic signal with typical (or median) entering traffic volumes.

The 95th percentile queue length, measured in feet, represents the farthest extent of the vehicle queue (to the last stopped vehicle) upstream from the stop line during five percent of all signal cycles. The 95th percentile queue will not be seen during each cycle. The queue would be this long only five percent of the time and would typically not occur during off-peak hours. Since volumes fluctuate throughout the hour, the 95th percentile queue represents what can be considered a "worst case" scenario. Queues at the intersection are generally below the 95th percentile queue throughout the course of the peak hour. It is also unlikely that the 95th percentile queues for each approach to the intersection will occur simultaneously.

7.1.14 Existing (2016) Condition Traffic Operations Analysis

Table 7-3 and **Table 7-4** summarize the Existing (2016) Condition capacity analysis for the study area intersection during the weekday a.m. Peak Hour and the weekday p.m. Peak Hour. The detailed analysis sheets are provided in **Appendix D.**

The signalized intersection of **Brighton Avenue/Linden Street** currently operates at LOS C during the weekday a.m. and p.m. peak hours. During the p.m. peak hour, the Linden Street southbound approach operates at LOS E. All other movements at the intersection operate at LOS D or better during the a.m. and p.m. peak hours. The longest queues at the intersection occur along the Linden Street northbound approach during the a.m. peak hour and the Brighton Avenue westbound approach during the p.m. peak hour.

The signalized intersection of **Brighton Avenue/Commonwealth Avenue** currently operates at LOS C during the weekday a.m. and p.m. peak hours. All movements at the intersection operate at LOS D or better during the a.m. and p.m. peak hours. The longest queues at the intersection occur along the Commonwealth Avenue northbound approach during the a.m. peak hour and the Commonwealth Avenue westbound thru lane during the p.m. peak hour.

Most of the movements at the unsignalized intersections in the study area currently operate at LOS A or LOS B with minimal queuing during the weekday a.m. and p.m. peak hours. The Malvern Street southbound right lane at the intersection of Brighton Avenue and Malvern Street currently operates at LOS D during the p.m. peak hour which is typical for a minor stop-controlled street intersecting a major roadway.

Table 7-3 Existing (2016) Condition Capacity Analysis Summary, Weekday a.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
Brighton Avenue / Linden Street	**C**	**30.9**	**-**	**-**	**-**
Brighton Avenue EB U-turn/left	C	30.6	0.27	29	79
Brighton Avenue EB thru | thru	C	25.4	0.37	107	176
Brighton Avenue WB thru | thru/right	C	28.4	0.52	150	227
Linden Street NB left/thru/right	D	47.6	0.84	215	287
Linden Street SB left/right	B	12.0	0.39	17	30
Brighton Avenue / Commonwealth Avenue	**C**	**20.3**	**-**	**-**	**-**
Brighton Avenue EB thru | thru/right	D	41.5	0.54	145	184
Commonwealth Avenue WB left | left	C	26.0	0.36	115	177
Commonwealth Avenue WB thru	A	8.8	0.51	177	266
Commonwealth Avenue NB right | right	B	15.6	0.58	201	306
Unsignalized Intersections					
Brighton Avenue / Chester Street	-	-	**-**	**-**	**-**
Brighton Avenue EB U-turn/left/thru	A	0.8	0.02	-	1
Brighton Avenue EB thru/right	A	0.0	0.14	-	0
Brighton Avenue WB U-turn/left/thru	A	0.3	0.01	-	1
Brighton Avenue WB thru/right	A	0.0	0.21	-	0
Brighton Avenue / Malvern Street	-	-	**-**	**-**	**-**
Brighton Avenue EB U-turn/left	B	10.1	0.06	-	5
Brighton Avenue EB thru | thru	A	0.0	0.12	-	0
Brighton Avenue WB thru	A	0.0	0.26	-	0
Brighton Avenue WB thru/right	A	0.0	0.13	-	0
Malvern Street SB right	B	12.6	0.06	-	5
Gardner Street / Linden Street	-	-	**-**	**-**	**-**
Linden Street NB left/thru/right	A	1.4	0.05	-	4
Linden Street SB left/thru/right	A	2.3	0.04	-	3
Gardner Street / Chester Street	**-**	**-**	**-**	**-**	**-**
Gardner Street EB left/thru	A	0.9	0.01	-	0
Chester Street NB thru/right	A	9.5	0.07	-	6
Gardner Street / Malvern Street	-	-	-	-	-
Gardner Street EB left/thru/right	A	7.3	0.08	-	6
Malvern Street NB thru/right	A	7.0	0.05	-	4
Malvern Street SB left/thru	A	7.4	0.02	-	2

Table 7-4 Existing (2016) Condition Capacity Analysis Summary, Weekday p.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
Brighton Avenue / Linden Street	**C**	**22.9**	**-**	**-**	**-**
Brighton Avenue EB U-turn/left	B	10.2	0.19	13	44
Brighton Avenue EB thru | thru	A	7.7	0.22	52	100
Brighton Avenue WB thru | thru/right	B	10.9	0.50	124	235
Linden Street NB left/thru/right	D	48.4	0.80	164	228
Linden Street SB left/right	E	70.5	0.95	89	#193
Brighton Avenue / Commonwealth Avenue	**C**	**25.6**	**-**	**-**	**-**
Brighton Avenue EB thru | thru/right	D	40.3	0.67	221	266
Commonwealth Avenue WB left | left	D	35.3	0.63	228	312
Commonwealth Avenue WB thru	B	12.2	0.69	303	437
Commonwealth Avenue NB right | right	B	14.7	0.31	98	147
Unsignalized Intersections					
Brighton Avenue / Chester Street	-	-	**-**	**-**	**-**
Brighton Avenue EB U-turn/left/thru	A	1.0	0.03	-	2
Brighton Avenue EB thru/right	A	0.0	0.21	-	0
Brighton Avenue WB U-turn/left/thru	A	0.6	0.02	-	2
Brighton Avenue WB thru/right	A	0.0	0.29	-	0
Brighton Avenue / Malvern Street	-	-	**-**	**-**	**-**
Brighton Avenue EB U-turn/left	B	14.8	0.08	-	7
Brighton Avenue EB thru | thru	A	0.0	0.19	-	0
Brighton Avenue WB thru	A	0.0	0.33	-	0
Brighton Avenue WB thru/right	A	0.0	0.18	-	0
Malvern Street SB right	D	31.6	0.49	-	64
Gardner Street / Linden Street	-	-	**-**	**-**	**-**
Linden Street NB left/thru/right	A	1.5	0.05	-	4
Linden Street SB left/thru/right	A	2.7	0.07	-	6
Gardner Street / Chester Street	**-**	**-**	**-**	**-**	**-**
Gardner Street EB left/thru	A	0.9	0.01	-	1
Chester Street NB thru/right	B	10.2	0.13	-	11
Gardner Street / Malvern Street	-	-	-	-	-
Gardner Street EB left/thru/right	A	7.5	0.11	-	8
Malvern Street NB thru/right	A	7.0	0.07	-	4
Malvern Street SB left/thru	A	7.7	0.11	-	8

95th percentile volume exceeds capacity. Queue shown is the maximum after two cycles.

Grey shading indicates LOS E or F.

Most of the movements at the unsignalized intersections in the study area currently operate at LOS A or LOS B with minimal queuing during the weekday a.m. and p.m. peak hours. The Malvern Street southbound right lane at the intersection of Brighton Avenue and Malvern Street currently operates at LOS D during the p.m. peak hour which is typical for a minor stop-controlled street intersecting a major roadway.

7.2 No-Build (2023) Condition

The No-Build (2023) Condition reflects a future scenario that incorporates anticipated traffic volume changes associated with background traffic growth independent of any specific project, traffic associated with other planned specific developments, and planned infrastructure improvements that will affect travel patterns throughout the study area. The No-Build (2023) Condition does not include the Project-related impacts. These infrastructure improvements include roadway, public transportation, pedestrian and bicycle improvements.

7.2.1 Background Traffic Growth

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

7.2.2 Specific Development Traffic Growth

Traffic volumes associated with known, larger or adjacent development projects can affect traffic patterns throughout the study area within the future analysis time horizon. A total of ten development projects were identified in the vicinity of the Project and are shown in **Figure 7-9**. Traffic volumes associated with two projects were directly incorporated into the future conditions traffic volumes:

89 Brighton Avenue – This project, located to the west of the Project site, calls for the demolition of three buildings and the construction of an approximately 120,600 gross square-foot (gsf) mixed-use structure varying from three to six stories, consisting of 130 residential units and approximately 7,500 sf of ground-floor retail space, with 69 surface-level parking spaces.

Boston Landing – This project, located northwest of the Project site on Guest Street, includes the construction of a new 250,000 sf world headquarters office building for New Balance, 650,000 sf of other office space, a 323,000 sf sports complex, a 175-room hotel, 65,000 sf of restaurant and retail space, two garages supplying up to 1,750 parking spaces, and a commuter rail station on the Framingham/Worcester line. This project is currently under construction, with the headquarters building complete and at partial occupancy.

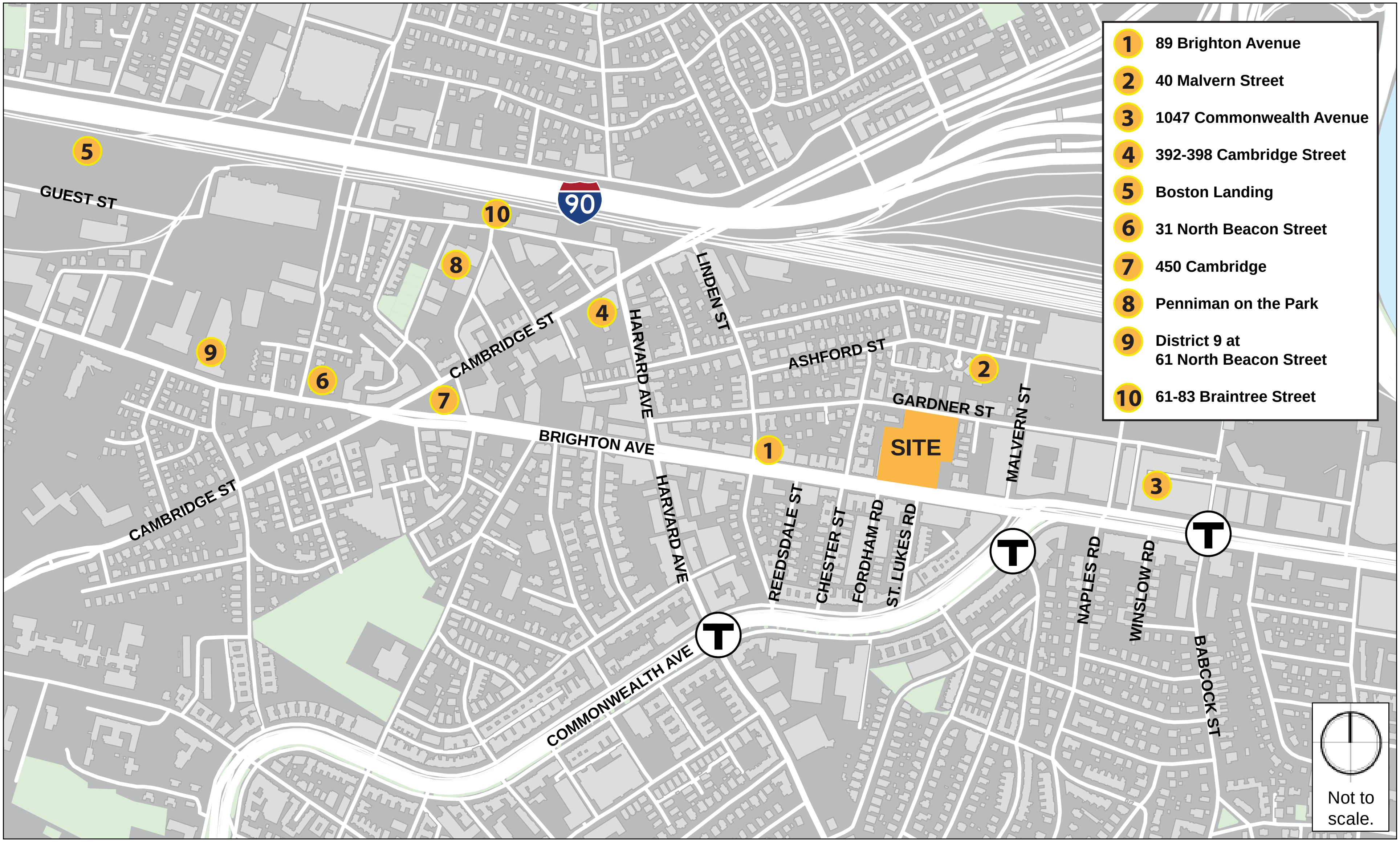

Figure 7-9.
Area Development Projects

Traffic volumes for all other nearby development projects, listed in **Table 7-5**, are included in the general background traffic growth. In addition to these development projects, the I-90 Allston Interchange project will introduce a new Framingham/Worcester commuter rail station, known as West Station, just north of the project area.

Table 7-5 Other Development Projects in the Project Vicinity

Project	*Program Description*	*Status*
31 North Beacon Street	• Approximately 32,000 gsf, 5-story mixed-use building o 20 residential rental units o 2,170 sf ground-floor retail • 22 parking spaces in a single-level garage	Board-approved
40 Malvern Street	• 48 residential rental units in a 6-story building • 44 surface parking spaces	Under Construction
61-83 Braintree Street	• Approximately 93,000 sf, 5-story mixed-use building o 80 residential rental units o 2,550 sf ground-floor retail • 67 parking spaces in underground parking facility	Under Construction
392-398 Cambridge Street	• Approximately 48,500 gsf, 5-story mixed-use building o 32 residential units o 5,100 sf ground-floor retail • 17 surface parking spaces and 41 parking spaces in underground garage	Board-approved
450 Cambridge Street	• Approximately 49,810 gsf, 4-story mixed-use building o 40 residential rental units o 1,631 sf ground-floor retail • 40 parking spaces in underground garage	Board-approved
1047 Commonwealth Avenue	• Renovation of existing 2-story building into a 6-story mixed-use building o 180 residential rental units o One space ground-floor commercial • Up to 53 parking spaces in underground garage	Under Construction
District 9 at 61 North Beacon Street	• 71 condominium units • 81 parking spaces	Board-approved
Penniman on the Park	• 32 condominium units • 27 surface parking spaces	Board-approved

7.2.3 Proposed Infrastructure Improvements

A review of planned improvements to roadway, transit, bicycle, and pedestrian facilities was conducted to determine if there are any nearby improvement projects in the vicinity of the study area. Based on this review, no planned infrastructure improvements in the area are expected.

7.2.4 No-Build (2023) Condition Traffic Volumes

The one-half percent per year annual growth rate was applied to the Existing (2016) Condition traffic volumes, then the traffic volumes associated with the background development project listed above was added to develop the No-Build (2023) Condition traffic volumes. The No-Build (2023) weekday a.m. Peak Hour and weekday p.m. Peak Hour traffic volumes are shown on **Figure 7-10** and **Figure 7-11**, respectively.

7.2.5 No-Build (2023) Condition Traffic Operations Analysis

The No-Build (2023) Condition capacity analysis uses the same methodology as the Existing (2016) Condition capacity analysis. **Table 7-6** and **Table 7-7** present the No-Build (2023) Condition capacity analysis for the a.m. and p.m. peak hours, respectively. The shaded cells in the tables indicate a worsening in LOS between the Existing (2016) Condition and the No-Build (2023) Condition. The detailed analysis sheets are provided in **Appendix D**.

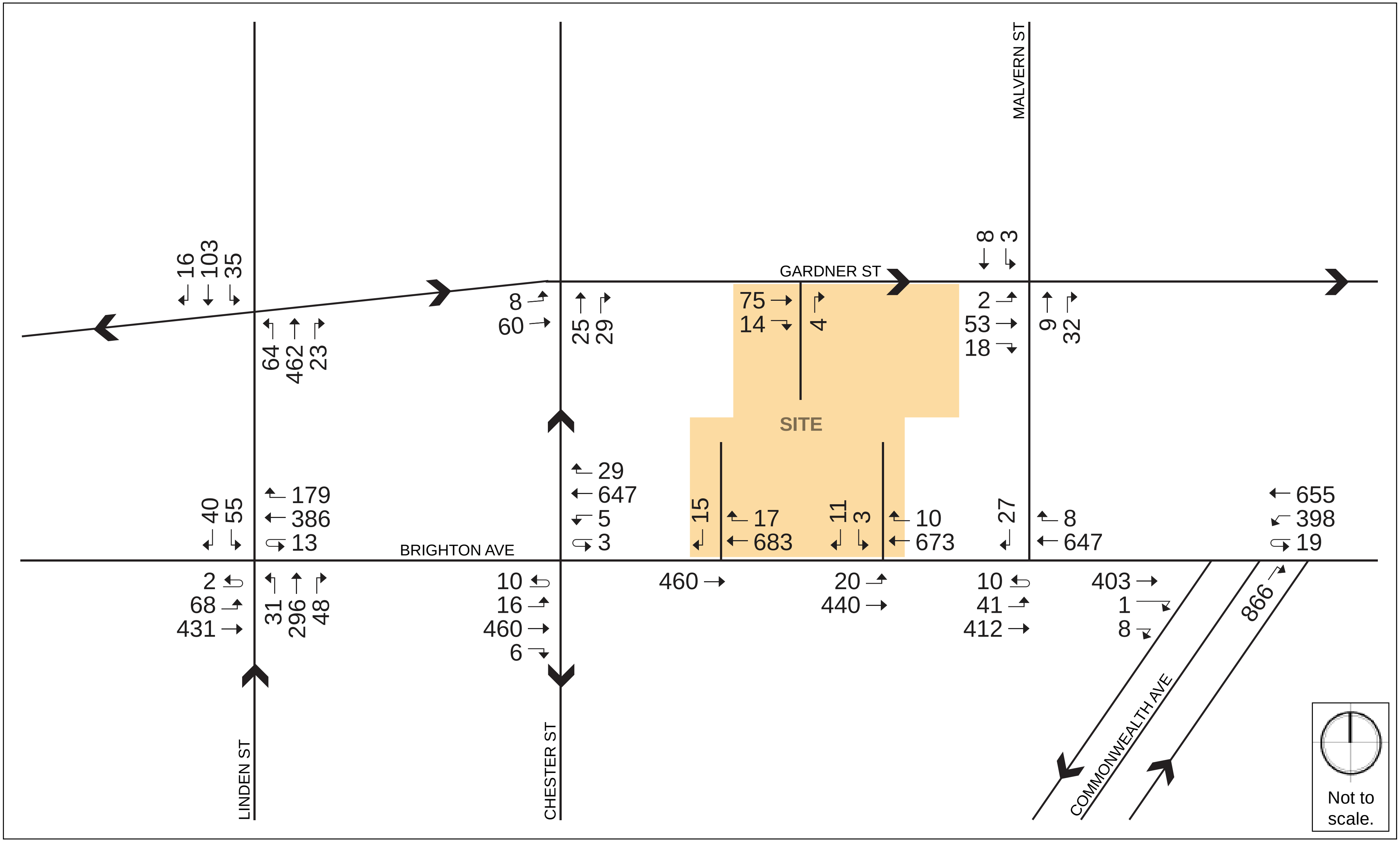

Figure 7-10.
No-Build (2023) Condition Traffic Volumes, Weekday a.m. Peak Hour

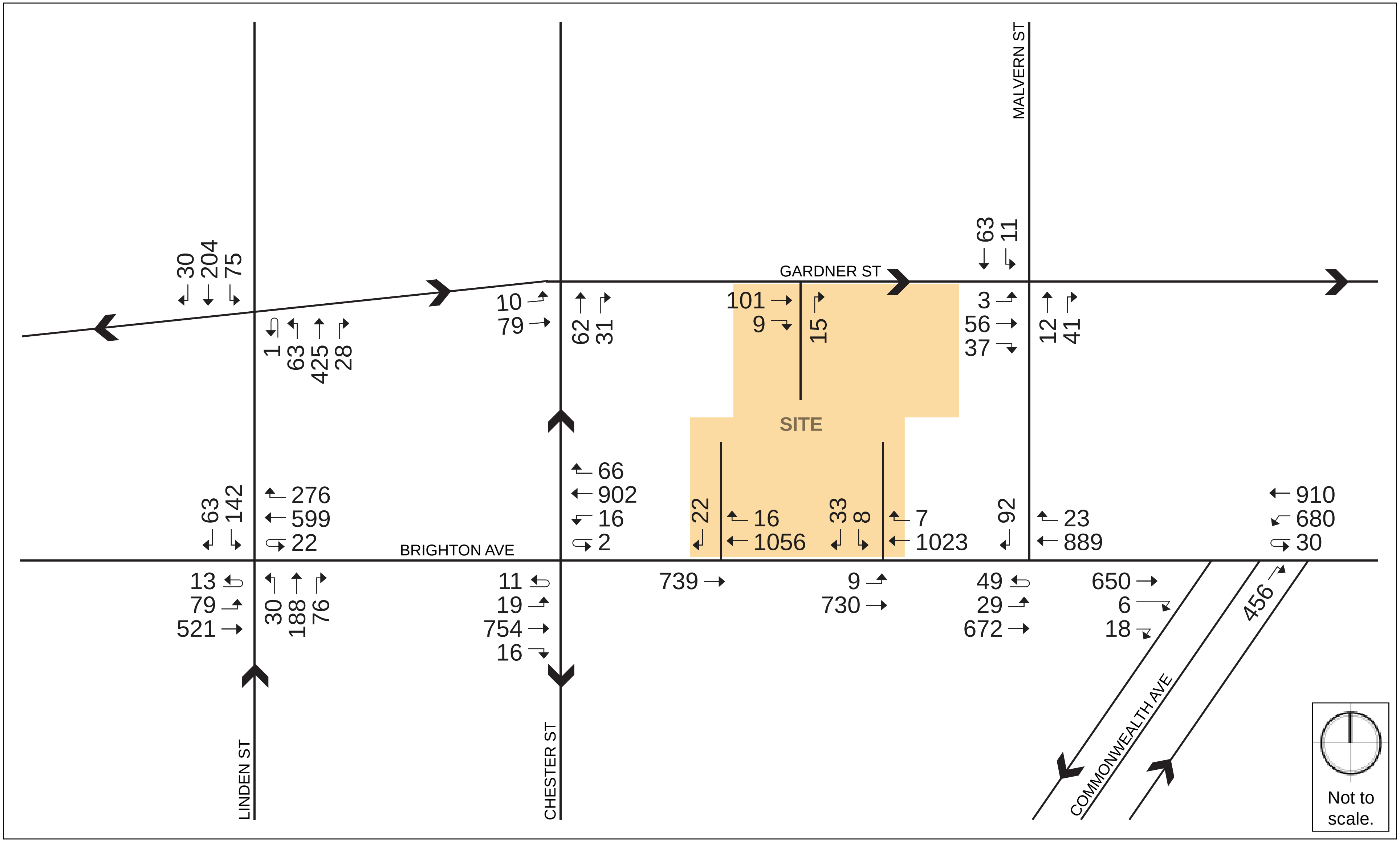

Figure 7-11.
No-Build (2023) Condition Traffic Volumes, Weekday p.m. Peak Hour

Table 7-6 No-Build (2023) Condition Capacity Analysis Summary, Weekday a.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
Brighton Avenue / Linden Street	**C**	**33.3**	**-**	**-**	**-**
Brighton Avenue EB U-turn/left	D	37.2	0.39	38	#111
Brighton Avenue EB thru | thru	C	27.6	0.42	123	197
Brighton Avenue WB thru | thru/right	C	32.0	0.60	180	#322
Linden Street NB left/thru/right	D	47.4	0.86	234	311
Linden Street SB left/right	A	8.0	0.28	7	39
Brighton Avenue / Commonwealth Avenue	**C**	**21.9**	**-**	**-**	**-**
Brighton Avenue EB thru | thru/right	D	39.8	0.55	163	190
Commonwealth Avenue WB left | left	C	28.5	0.39	120	199
Commonwealth Avenue WB thru	B	10.3	0.59	227	349
Commonwealth Avenue NB right | right	B	19.0	0.65	232	397
Unsignalized Intersections					
Brighton Avenue / Chester Street	-	-	**-**	**-**	**-**
Brighton Avenue EB U-turn/left/thru	A	0.8	0.02	-	2
Brighton Avenue EB thru/right	A	0.0	0.15	-	0
Brighton Avenue WB U-turn/left/thru	A	0.2	0.01	-	0
Brighton Avenue WB thru/right	A	0.0	0.23	-	0
Brighton Avenue / Malvern Street	-	-	**-**	**-**	**-**
Brighton Avenue EB U-turn/left	B	10.3	0.06	-	5
Brighton Avenue EB thru | thru	A	0.0	0.13	-	0
Brighton Avenue WB thru	A	0.0	0.28	-	0
Brighton Avenue WB thru/right	A	0.0	0.14	-	0
Malvern Street SB right	B	12.9	0.06	-	5
Gardner Street / Linden Street	-	-	**-**	**-**	**-**
Linden Street NB left/thru/right	A	1.4	0.05	-	4
Linden Street SB left/thru/right	A	2.3	0.04	-	3
Gardner Street / Chester Street	**-**	**-**	**-**	**-**	**-**
Gardner Street EB left/thru	A	0.9	0.01	-	0
Chester Street NB thru/right	A	9.4	0.07	-	5
Gardner Street / Malvern Street	-	-	-	-	-
Gardner Street EB left/thru/right	A	7.2	0.09	-	0
Malvern Street NB thru/right	A	7.0	0.05	-	2
Malvern Street SB left/thru	A	7.2	0.01	-	6

95th percentile volume exceeds capacity. Queue may be longer. Queue shown is the maximum after two cycles.

Table 7-7 No-Build (2023) Condition Capacity Analysis Summary, Weekday p.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
Brighton Avenue / Linden Street	**C**	**22.4**	**-**	**-**	**-**
Brighton Avenue EB U-turn/left	B	15.6	0.37	26	85
Brighton Avenue EB thru | thru	A	9.0	0.29	73	134
Brighton Avenue WB thru | thru/right	B	13.5	0.59	170	306
Linden Street NB left/thru/right	D	47.9	0.82	179	246
Linden Street SB left/right	E	62.3	0.92	89	#206
Brighton Avenue / Commonwealth Avenue	**C**	**29.1**	**-**	**-**	**-**
Brighton Avenue EB thru | thru/right	D	39.5	0.71	255	325
Commonwealth Avenue WB left | left	D	41.8	0.76	276	357
Commonwealth Avenue WB thru	B	17.5	0.81	443	667
Commonwealth Avenue NB right | right	B	16.8	0.37	122	166
Unsignalized Intersections					
Brighton Avenue / Chester Street	-	-	**-**	**-**	**-**
Brighton Avenue EB U-turn/left/thru	A	1.1	0.04	-	3
Brighton Avenue EB thru/right	A	0.0	0.25	-	0
Brighton Avenue WB U-turn/left/thru	A	0.7	0.03	-	2
Brighton Avenue WB thru/right	A	0.0	0.33	-	0
Brighton Avenue / Malvern Street	-	-	**-**	**-**	**-**
Brighton Avenue EB U-turn/left	C	16.2	0.09	-	7
Brighton Avenue EB thru | thru	A	0.0	0.21	-	0
Brighton Avenue WB thru	A	0.0	0.38	-	0
Brighton Avenue WB thru/right	A	0.0	0.20	-	0
Malvern Street SB right	D	31.0	0.42	-	49
Gardner Street / Linden Street	-	-	**-**	**-**	**-**
Linden Street NB left/thru/right	A	1.5	0.05	-	4
Linden Street SB left/thru/right	A	2.9	0.08	-	7
Gardner Street / Chester Street	**-**	**-**	**-**	**-**	**-**
Gardner Street EB left/thru	A	0.9	0.01	-	1
Chester Street NB thru/right	B	10.2	0.13	-	11
Gardner Street / Malvern Street	-	-	-	-	-
Gardner Street EB left/thru/right	A	7.5	0.11	-	8
Malvern Street NB thru/right	A	7.0	0.06	-	4
Malvern Street SB left/thru	A	7.6	0.09	-	6

95th percentile volume exceeds capacity. Queue may be longer. Queue shown is the maximum after two cycles.

The signalized intersection of **Brighton Avenue/Linden Street** will continue to operate at LOS C during the weekday a.m. and p.m. peak hours under the No-Build Condition. During the p.m. peak hour the Linden Street southbound approach continues to operate at LOS E. All other movements at the intersection will continue to operate at LOS D or better during the a.m. and p.m. peak hours. The longest queues at the intersection both now occur along the Brighton Avenue westbound approach during the a.m. and p.m. peak hours.

The signalized intersection of **Brighton Avenue/Commonwealth Avenue** will continue to operate at LOS C during the weekday a.m. and p.m. peak hours under the No-Build Condition. All movements at the intersection will continue operate at LOS D or better during the a.m. and p.m. peak hours. The longest queues at the intersection will continue to occur along the Commonwealth Avenue northbound approach during the a.m. peak hour and the Commonwealth Avenue westbound thru lane during the p.m. peak hour.

Most of the movements at the unsignalized intersections in the study area will continue to operate at LOS A or LOS B with minimal queueing during the weekday a.m. and p.m. peak hours under the No-Build Condition. At the intersection of Brighton Avenue and Malvern Street the Brighton Avenue eastbound left-turn lane will decrease to LOS C and the Malvern Street southbound right-turn lane will continue to operate at LOS D under the No-Build Condition.

7.3 Build (2023) Condition

As previously summarized, The Brighton Avenue Project will include the demolition of the existing uses on the site and the construction of 76 residential units with 175 total spaces in two levels of covered parking. Approximately 123 of these parking spaces will be used to serve the commercial building at 39 Brighton Avenue, with the remainder serving the residential needs of the Project. A total of 76 secure and covered bicycle parking spaces will also be provided in the garage. A small space for ancillary, ground-floor retail will also be provided along the Brighton Avenue frontage. Access to the site will be provided by a single curb cut that will also serve the move-in/move-out, delivery, service, and trash/recycling needs of the Project.

The Gardner Street Project will include the redevelopment of the existing parking lot on the site and will retain the existing residential structure, which will be incorporated into the Project. Approximately 39 parking spaces will be provided for the residential uses in a covered garage. A total of 38 secure and covered bicycle parking spaces will also be provided in the garage. Access to the site will be provided by two curb cuts. The entrance will be provided along the eastern side of the site and the exit will be provided along the western side of the site.

7.3.1 Vehicle Site Access and Circulation

As shown in the Project site plan in **Figure 7-12**, vehicular access to the Brighton Avenue Project will be provided by a single curb cut along the north side of Brighton Avenue. This driveway will operate as a right-in/right-out driveway, as left turns are physically restricted by the median that runs along Brighton Avenue. This driveway will serve the residents of the site as well as the commercial tenants at 39 Brighton Avenue. Vehicular access to the Gardner Street Project will be provided by two curb cuts along the south side of Gardner Street. The entrance driveway will be located along the eastern side of the site and will be one-way in the southbound direction. The exit driveway will be located along the western side of the site and will be one-way in the northbound direction.

The existing curb cut that serves the 39 Brighton Avenue parcel will be retained and will continue to provide access to a limited number of parking spaces that will serve that building.

7.3.2 Parking

This section presents the Project's parking supply and an evaluation of the Project's parking demand. As previously mentioned, the Brighton Avenue Project will contain 175 parking spaces. Approximately 123 of these spaces will serve the existing commercial uses at 39 Brighton Avenue, with the remainder serving the residential uses of the Project. The allocation of the parking spaces on the Brighton Avenue Project site will be flexible to meet the demands of both the commercial property at 39 Brighton Avenue and the residential uses on the Project. No parking will be provided for the ancillary retail uses on the site. A total of 76 secure, covered bicycle parking spaces will also be provided as part of the Brighton Avenue Project.

The Gardner Street Project will contain a total of 39 parking spaces for the residential uses on the site, with 38 secure and covered bicycle parking spaces provided in the garage.

The overall parking ratio for the two sites will be approximately 0.8 parking spaces per unit after accounting for the spaces that will be allocated for the commercial uses of the adjacent property, which is consistent with the BTD recommended parking ratios for residential developments in this part of Allston (0.75 to 1.25 parking spaces per unit).

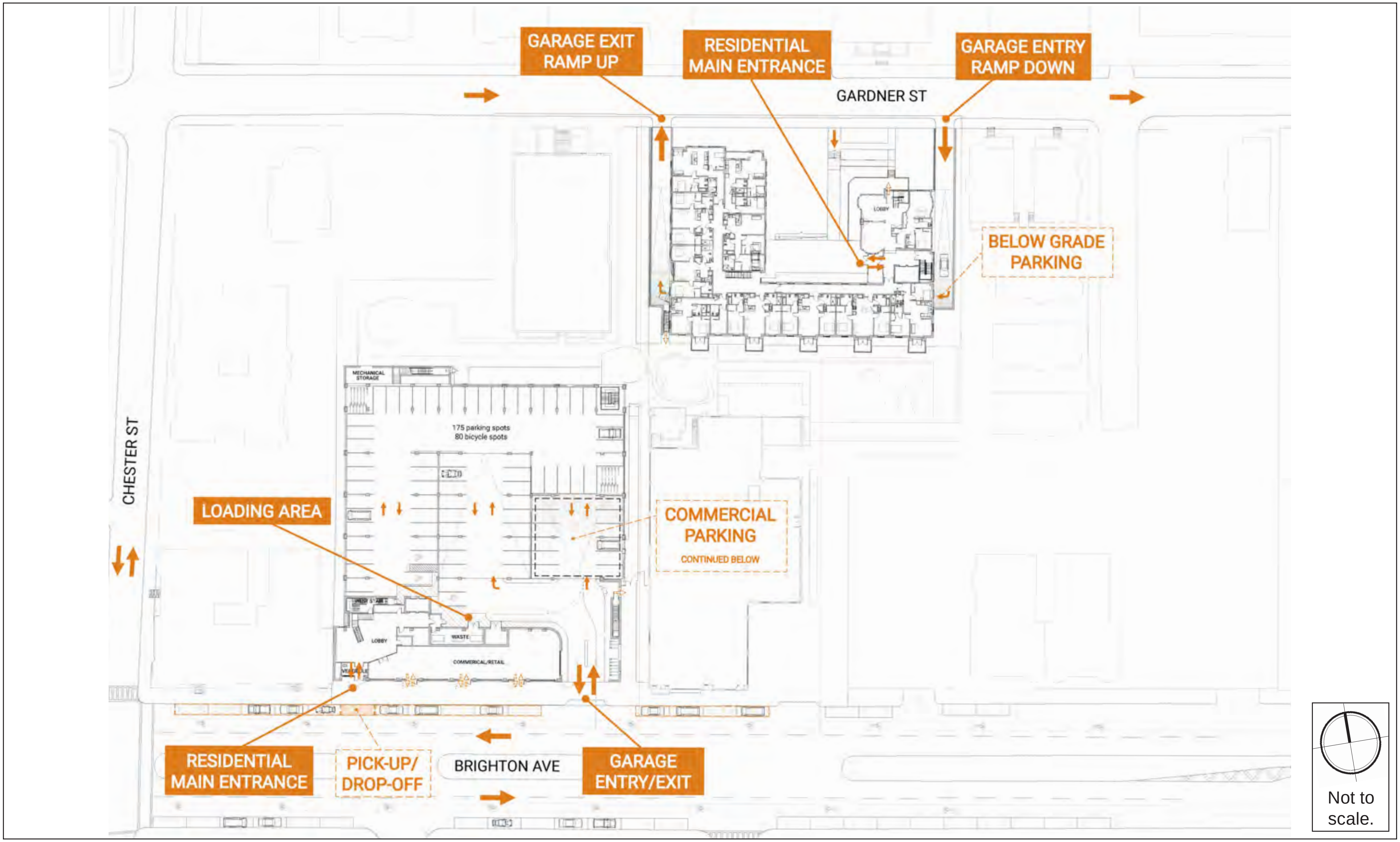

Figure 7-12.
Site Access Plan

7.3.3 Loading and Service Accommodations

Loading and service operations for the Brighton Avenue Project will occur on the site and will accommodate up to an SU-36 box truck, which is expected to be the largest vehicle traveling to the site. Trash pick-up can also occur on the site without impacting pedestrian and vehicular movements along Brighton Avenue.

Loading and service operations for the Gardner Street Project will generally occur along the curb, with move-in/move-out operations being conducted through obtaining a temporary permit from BTD.

Delivery estimates for the residential element of the Project are based on data provided in the Truck Trip Generation Rates by Land Use in the Central Artery/Tunnel Project Study Area report[4]. Deliveries to the Project site will likely be SU-36 trucks and smaller delivery vehicles. Residential units primarily generate delivery trips related to small packages and prepared food. Based on the CTPS report, the Project is expected to generate one light truck trip per day to both of the sites combined.

7.3.4 Bicycle Accommodations

BTD has established guidelines requiring projects subject to Transportation Access Plan Agreements to provide secure bicycle parking for residents and short-term bicycle racks for visitors. Based on BTD guidelines, the Brighton Avenue Project will supply a minimum of 76 secure bicycle parking/storage spaces within the parking garage and the Gardner Street Project will supply a minimum of 38 secure bicycle parking/storage spaces within the garage.

7.3.5 Trip Generation Methodology

Determining the future trip generation of the Project is a complex, multi-step process that produces an estimate of vehicle trips, transit trips, walk trips, and bicycle trips associated with a proposed development and a specific land use program. A project's location and proximity to different travel modes determines how people will travel to and from a project site.

To estimate the number of trips expected to be generated by the Project, data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual*[5] were used. ITE provides data to estimate the total number of unadjusted vehicular trips associated with the Project. In an urban setting well-served by transit, adjustments are necessary to account for other travel mode shares such as walking, bicycling, and transit.

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

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

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

Land Use Code 220 – Apartment. This land use code refers to dwelling units located within the same building with at least three other dwelling units. Calculation of the number of trips uses ITE's average rate per dwelling unit.

Retail trips were not estimated for the Brighton Avenue Project, as no parking is going to be provided and they are expected to be ancillary trips that will serve both the Project and the surrounding neighborhood. It is expected that most of the trips to and from the retail uses will be by pedestrians in the neighborhood.

7.3.6 Mode Share

BTD provides vehicle, transit, and walking mode split rates for different areas of Boston. Project is located within designated Area 17 – North Allston. The unadjusted vehicular trips were converted to person trips by using vehicle occupancy rates published by the Federal Highway Administration (FHWA)[6]. The person trips were then distributed to different modes according to the mode shares shown in **Table 7-8**.

Table 7-8 Travel Mode Shares

Time Period		LUC	Vehicle Occupancy Rate[a]	Walk/Bike Share[b]	Transit Share[b]	Vehicle Share[b]
Daily	In	220	1.13	31%	22%	47%
	Out		1.13	31%	22%	47%
a.m. Peak Hour	In	220	1.13	33%	30%	37%
	Out		1.13	36%	21%	43%
p.m. Peak Hour	In	220	1.13	36%	21%	43%
	Out		1.13	33%	30%	37%

a 2009 National Household Travel Survey.
b Based on rates published by the Boston Transportation Department for Area 17 – North Allston.

7.3.7 Project Trip Generation

The mode share percentages shown in **Table 7-8** were applied to the number of person trips to develop walk/bicycle, transit, and vehicle trip generation estimates. The trip generation for the two Projects by mode is shown in **Table 7-9**. The detailed trip generation information is provided in **Appendix D**.

[6] *Summary of Travel Trends: 2009 National Household Travel Survey*; FHWA; Washington, D.C.; June 2011.

Table 7-9 Trip Generation Summary

Time Period		Walk/Bicycle Trips	Transit Trips	Primary Vehicle Trips
Brighton Avenue Project				
Daily				
Apartment [a]	In	89	63	119
	Out	89	63	119
	Total	**178**	**126**	**238**
a.m. Peak Hour				
Apartment	In	3	3	3
	Out	13	7	13
	Total	**16**	**10**	**16**
p.m. Peak Hour				
Apartment	In	13	7	13
	Out	6	5	6
	Total	**19**	**12**	**19**
Gardner Street Project				
Daily				
Apartment [b]	In	44	31	59
	Out	44	31	59
	Total	**88**	**62**	**118**
a.m. Peak Hour				
Apartment	In	2	1	2
	Out	6	4	7
	Total	**8**	**5**	**9**
p.m. Peak Hour				
Apartment	In	6	4	6
	Out	3	3	3
	Total	**9**	**7**	**9**

a Based on ITE LUC 220 – 76 Apartment units, average rate.
b Based on ITE LUC 220 – 38 Apartment units, average rate.

7.3.8 Trip Distribution

The trip distribution identifies the various travel paths for vehicles arriving and leaving the Project site. Trip distribution patterns for the Project were based on BTD's origin-destination data for Area 17 – North Allston and trip distribution patterns presented in traffic studies for nearby projects. The trip distribution patterns for the Project are illustrated in **Figure 7-13**.

7.3.9 Build (2023) Traffic Volumes

The vehicle trips were distributed through the study area. The project-generated trips for the weekday a.m. Peak Hour and weekday p.m. Peak Hour are shown in **Figure 7-14** and **Figure 7-15**, respectively. The existing trips currently accessing the Brighton Avenue Project site were subtracted from the volumes, as the uses on that site are going to be eliminated. The existing trips accessing the parking lot that exists on the Gardner Street Project site were reassigned to the Brighton Avenue Project site garage, as they will be retained and relocated. The trip assignments were added to the No-Build (2023) Condition vehicular traffic volumes to develop the Build (2023) Condition vehicular traffic volumes. The Build (2023) weekday a.m. Peak Hour and weekday p.m. Peak Hour traffic volumes are shown on **Figure 7-16** and **Figure 7-17**, respectively.

7.3.10 Build (2023) Condition Traffic Operations Analysis

The Build (2023) Condition capacity analysis uses the same methodology as the Existing (2016) Condition capacity analysis and the No-Build (2023) Condition capacity analysis. **Table 7-10** and **Table 7-11** present the Build (2023) Condition capacity analysis for the weekday a.m. Peak Hour and weekday p.m. Peak Hour, respectively. The shaded cells in the tables indicate a worsening of LOS between the No-Build (2023) Condition and the Build (2023) Condition. The detailed analysis sheets are provided in **Appendix D**.

Figure 7-13.
Vehicle Trip Distribution

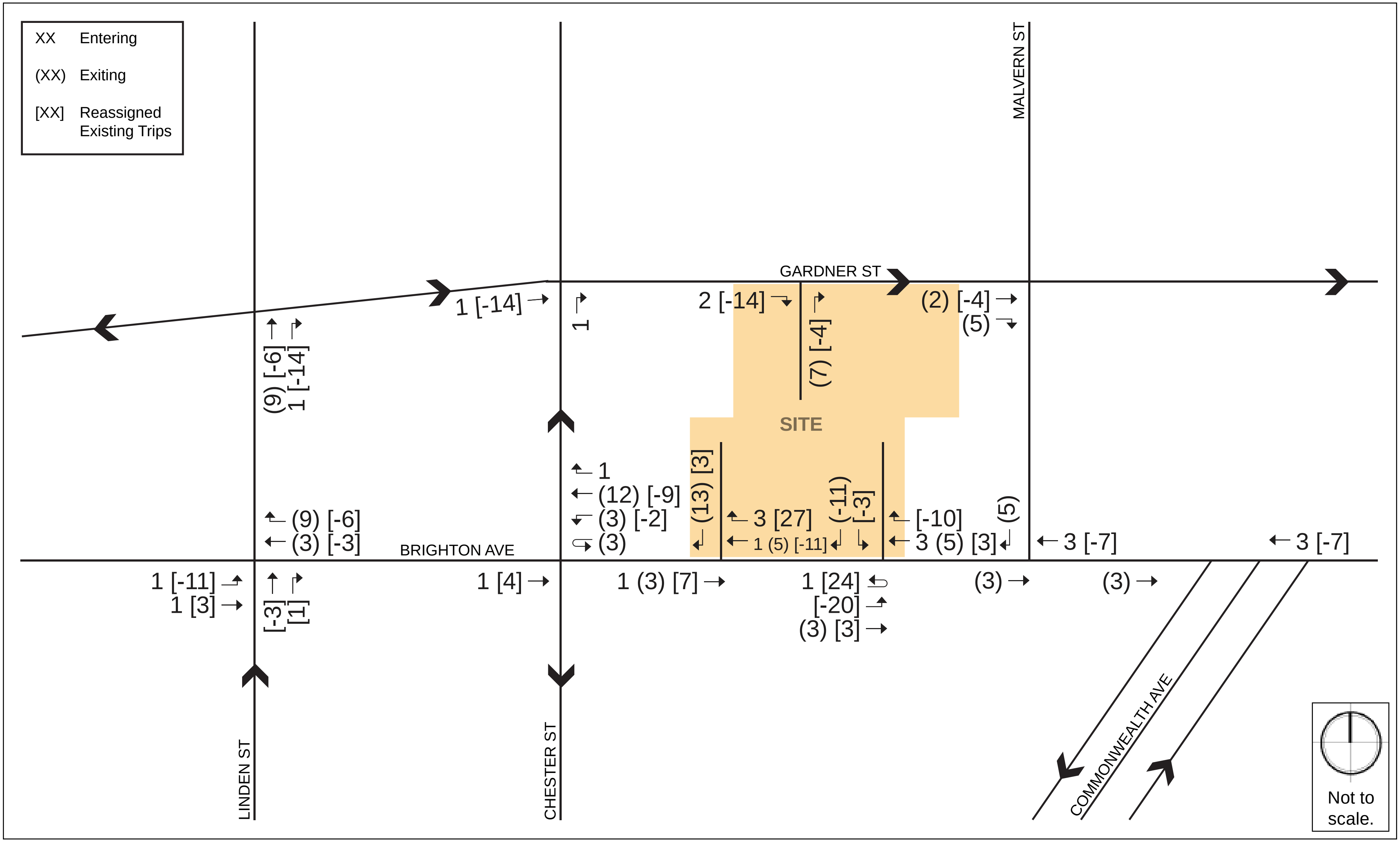

Figure 7-14.
Project-generated Vehicle Trips, Weekday a.m. Peak Hour

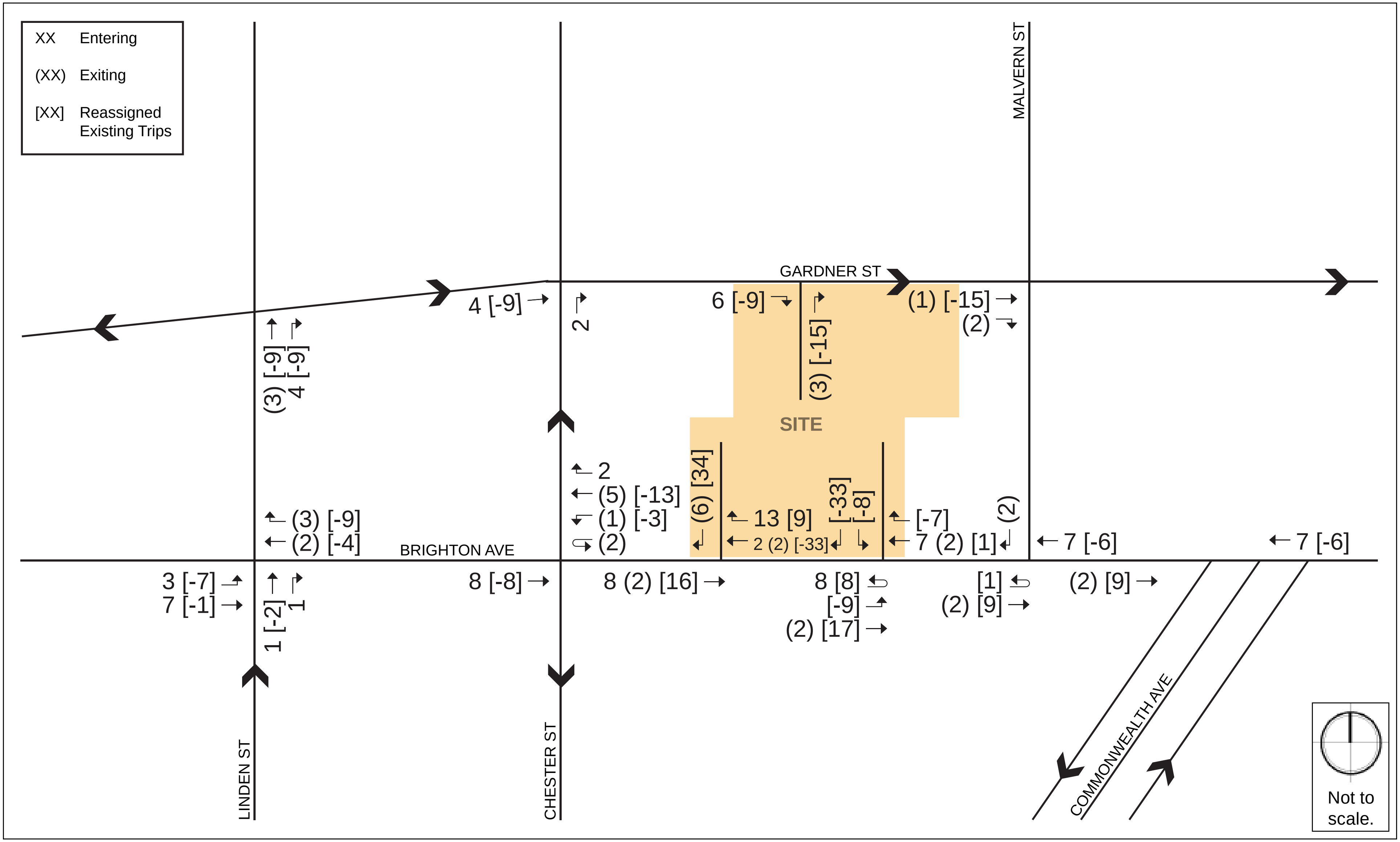

Figure 7-15.
Project-generated Vehicle Trips, Weekday p.m. Peak Hour

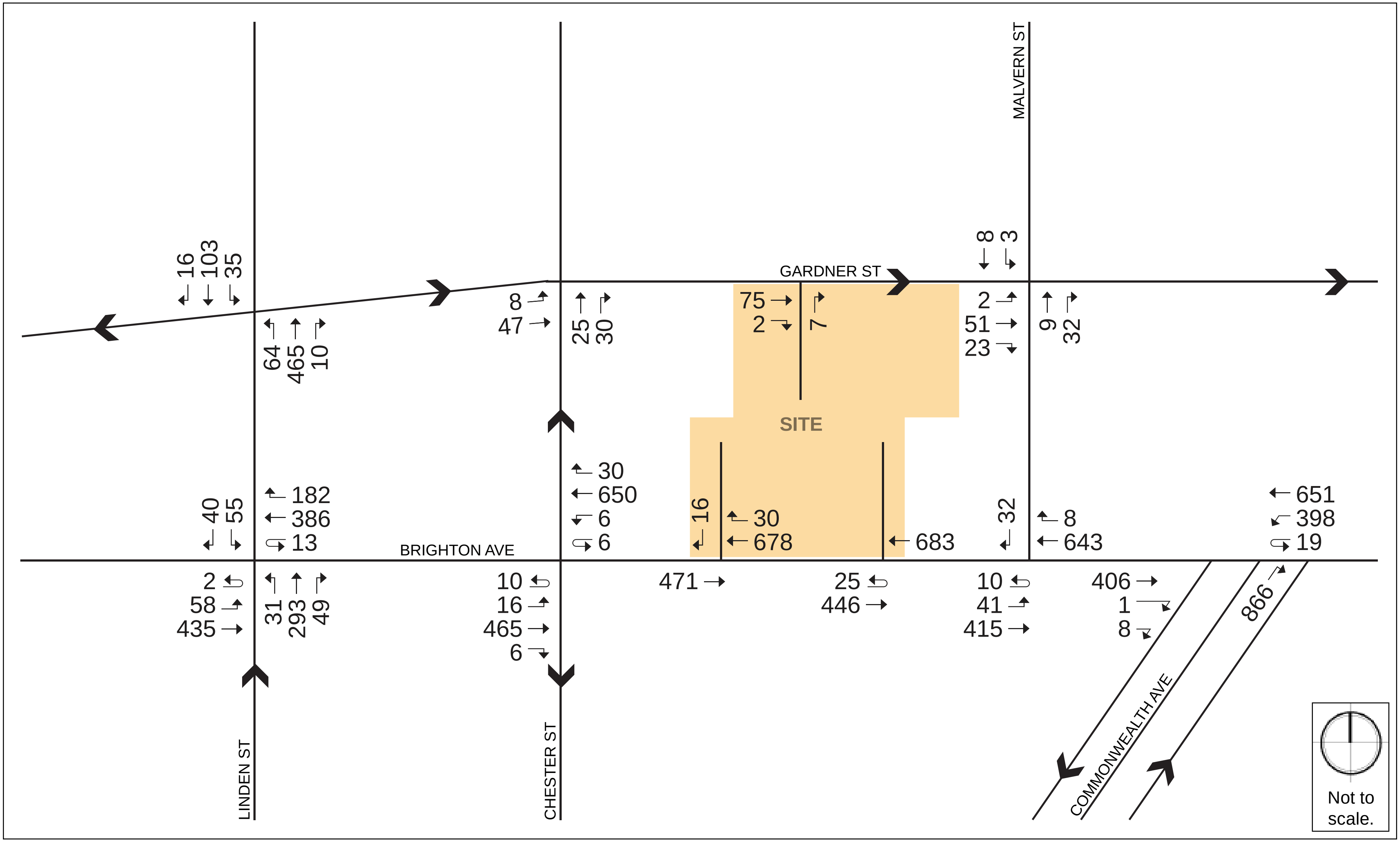

Figure 7-16.
Build (2023) Condition Traffic Volumes, Weekday a.m. Peak Hour

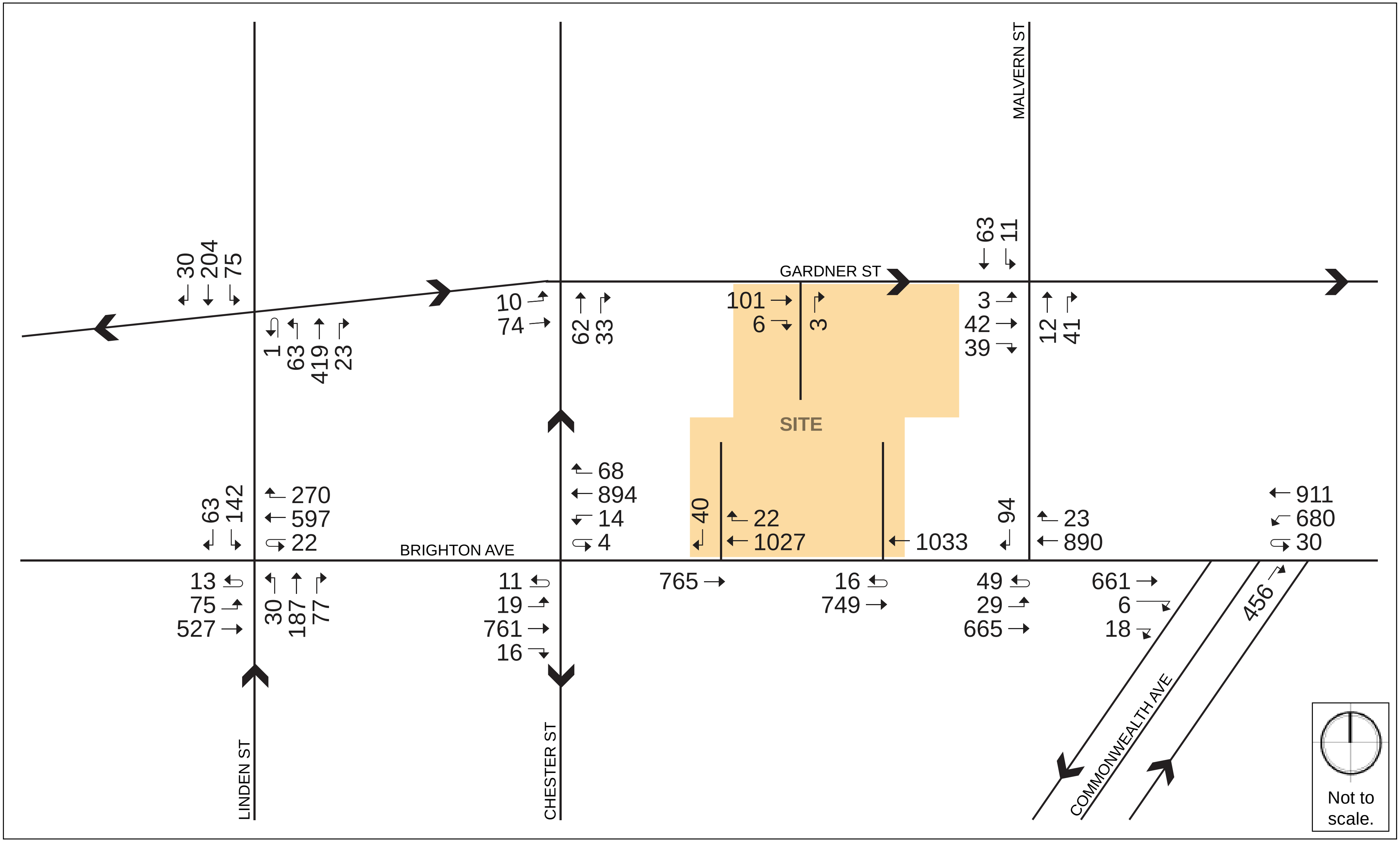

Figure 7-17.
Build (2023) Condition Traffic Volumes, Weekday p.m. Peak Hour

Table 7-10 Build (2023) Condition Capacity Analysis Summary, Weekday a.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
Brighton Avenue / Linden Street	**C**	**33.3**	**-**	**-**	**-**
Brighton Avenue EB U-turn/left	C	35.0	0.33	31	#91
Brighton Avenue EB thru | thru	C	27.6	0.42	124	199
Brighton Avenue WB thru | thru/right	C	32.4	0.60	182	#326
Linden Street NB left/thru/right	D	47.4	0.85	233	310
Linden Street SB left/right	A	8.1	0.28	7	39
Brighton Avenue / Commonwealth Avenue	**C**	**21.9**	**-**	**-**	**-**
Brighton Avenue EB thru | thru/right	D	40.0	0.56	165	191
Commonwealth Avenue WB left | left	C	28.4	0.39	120	199
Commonwealth Avenue WB thru	B	10.3	0.59	225	345
Commonwealth Avenue NB right | right	B	18.9	0.65	232	397
Unsignalized Intersections					
Brighton Avenue / Chester Street	-	-	**-**	**-**	**-**
Brighton Avenue EB U-turn/left/thru	A	0.8	0.02	-	2
Brighton Avenue EB thru/right	A	0.0	0.15	-	0
Brighton Avenue WB U-turn/left/thru	A	0.3	0.01	-	1
Brighton Avenue WB thru/right	A	0.0	0.23	-	0
Brighton Avenue / Malvern Street	-	-	**-**	**-**	**-**
Brighton Avenue EB U-turn/left	B	10.3	0.06	-	5
Brighton Avenue EB thru | thru	A	0.0	0.13	-	0
Brighton Avenue WB thru	A	0.0	0.27	-	0
Brighton Avenue WB thru/right	A	0.0	0.14	-	0
Malvern Street SB right	B	13.0	0.07	-	6
Gardner Street / Linden Street	-	-	**-**	**-**	**-**
Linden Street NB left/thru/right	A	1.4	0.05	-	4
Linden Street SB left/thru/right	A	2.3	0.04	-	3
Gardner Street / Chester Street	**-**	**-**	**-**	**-**	**-**
Gardner Street EB left/thru	A	0.9	0.01	-	0
Chester Street NB thru/right	A	9.3	0.07	-	5
Gardner Street / Malvern Street	-	-	-	-	-
Gardner Street EB left/thru/right	A	7.2	0.09	-	0
Malvern Street NB thru/right	A	7.0	0.05	-	2
Malvern Street SB left/thru	A	7.2	0.01	-	6
Gardner Street / Site Driveway	-	-	-	-	-
Gardner Street EB thru/right	A	0.0	0.05	-	0
Site Driveway NB right	A	8.7	0.01	-	1

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Brighton Avenue / Site Driveway	-	-	-	-	-
Brighton Ave EB thru | thru	A	0.0	0.15	-	0
Brighton Ave WB thru | thru/right	A	0.0	0.29	-	0
Site Driveway SB right	B	11.0	0.03	-	2

95th percentile volume exceeds capacity. Queue may be longer. Queue shown is the maximum after two cycles.

Table 7-11 Build (2023) Condition Capacity Analysis Summary, Weekday p.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersections					
Brighton Avenue / Linden Street	**D**	**37.8**	**-**	**-**	**-**
Brighton Avenue EB U-turn/left	E	66.0	0.74	54	#174
Brighton Avenue EB thru | thru	C	23.5	0.42	138	223
Brighton Avenue WB thru | thru/right	C	34.6	0.80	298	#523
Linden Street NB left/thru/right	D	47.9	0.82	179	246
Linden Street SB left/right	E	62.3	0.92	89	#206
Brighton Avenue / Commonwealth Avenue	**C**	**29.2**	**-**	**-**	**-**
Brighton Avenue EB thru | thru/right	D	39.9	0.72	260	332
Commonwealth Avenue WB left | left	D	41.9	0.76	279	357
Commonwealth Avenue WB thru	B	17.6	0.81	443	669
Commonwealth Avenue NB right | right	B	16.9	0.37	122	166
Unsignalized Intersections					
Brighton Avenue / Chester Street	-	-	**-**	**-**	**-**
Brighton Avenue EB U-turn/left/thru	A	1.0	0.04	-	3
Brighton Avenue EB thru/right	A	0.0	0.25	-	0
Brighton Avenue WB U-turn/left/thru	A	0.6	0.02	-	2
Brighton Avenue WB thru/right	A	0.0	0.33	-	0
Brighton Avenue / Malvern Street	-	-	**-**	**-**	**-**
Brighton Avenue EB U-turn/left	C	16.2	0.09	-	7
Brighton Avenue EB thru | thru	A	0.0	0.21	-	0
Brighton Avenue WB thru	A	0.0	0.38	-	0
Brighton Avenue WB thru/right	A	0.0	0.20	-	0
Malvern Street SB right	D	31.4	0.43	-	51
Gardner Street / Linden Street	-	-	**-**	**-**	**-**
Linden Street NB left/thru/right	A	1.5	0.05	-	4
Linden Street SB left/thru/right	A	2.8	0.08	-	7
Gardner Street / Chester Street	**-**	**-**	**-**	**-**	**-**
Gardner Street EB left/thru	A	0.9	0.01	-	1
Chester Street NB thru/right	B	10.2	0.13	-	11
Gardner Street / Malvern Street	-	-	-	-	-
Gardner Street EB left/thru/right	A	7.3	0.10	-	6
Malvern Street NB thru/right	A	6.9	0.06	-	4
Malvern Street SB left/thru	A	7.6	0.09	-	6
Gardner Street / Site Driveway	-	-	-	-	-
Gardner Street EB thru/right	A	0.0	0.07	-	0
Site Driveway NB right	A	8.8	0.00	-	0

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Brighton Avenue / Site Driveway	-	-	-	-	-
Brighton Ave EB thru | thru	A	0.0	0.24	-	0
Brighton Ave WB thru | thru/right	A	0.0	0.44	-	0
Site Driveway SB right	B	13.5	0.09	-	8

95th percentile volume exceeds capacity. Queue may be longer. Queue shown is the maximum after two cycles.
Grey shading indicates a decrease to LOS E or F.

The signalized intersection of **Brighton Avenue/Linden Street** will continue to operate at LOS C during the weekday a.m. peak hour and will decrease to LOS D during the p.m. peak hours under the Build Condition. During the p.m. peak hour the Brighton Avenue eastbound left-turn lane will decrease to LOS E and the Linden Street southbound approach will continue to operate at LOS E. All other movements at the intersection will continue to operate at LOS D or better during the a.m. and p.m. peak hours. The longest queues at the intersection will both continue to occur in the Brighton Avenue westbound approach during the a.m. and p.m. peak hours.

The signalized intersection of **Brighton Avenue/Commonwealth Avenue** will continue to operate at LOS C during the weekday a.m. and p.m. peak hours under the Build Condition. All movements at the intersection will continue operate at LOS D or better during the a.m. and p.m. peak hours. The longest queues at the intersection will continue to occur in the Commonwealth Avenue northbound approach during the a.m. peak hour and in the Commonwealth Avenue westbound thru lane during the p.m. peak hour.

Most of the movements at unsignalized intersections in the study area will continue to operate at LOS A or LOS B with minimal queueing during the weekday a.m. and p.m. peak hours under the Build Condition. All of the movements at the new site driveway intersections will operate at LOS A or LOS B during the weekday a.m. and p.m. peak hours. At the intersection of Brighton Avenue and Malvern Street the Brighton Avenue eastbound left-turn lane will continue to operate at LOS C and the Malvern Street southbound right-turn lane will continue to operate at LOS D under the Build Condition.

7.4 Transportation Demand Management

The Proponent is committed to implementing Transportation Demand Management (TDM) measures to minimize automobile usage and Project related traffic impacts. TDM will be facilitated by the nature of the Project (which does not generate significant peak hour trips) and its proximity to numerous public transit alternatives.

On-site management will keep a supply of transit information (schedules, maps, and fare information) to be made available to the residents and patrons of the site. The Proponent will work with the City to develop a TDM program appropriate to the Project and consistent with its level of impact.

The Proponent is prepared to take advantage of good transit access in marketing the site to future residents by working with them to implement the following TDM measures to encourage the use of non-vehicular modes of travel.

The TDM measures for the Project may include but are not limited to the following:

- Orientation Packets: The Proponent will provide orientation packets to new residents and tenants containing information on available transportation choices, including transit routes/schedules and nearby vehicle sharing and bicycle sharing locations. On-site management will work with residents and tenants as they move in to help facilitate transportation for new arrivals.
- Provide an annual (or more frequent) newsletter or bulletin summarizing transit, ridesharing, bicycling, alternative work schedules, and other travel options.
- Transportation Coordinator: The Proponent will designate a transportation coordinator to oversee transportation issues, including parking, service and loading, and deliveries, and will work with residents as they move in to raise awareness of public transportation, bicycling, and walking opportunities.
- Provide information on travel alternatives for employees and visitors via the Internet and in the building lobby.
- Electric Vehicle Charging: The Proponent will explore the feasibility of providing electric vehicle charging station(s) within the garage.
- Vehicle Sharing Program: The Proponent will explore the feasibility of providing spaces in the garage for a car sharing service.

7.5 Transportation Mitigation Measures

The Proponent will continue to work with the City of Boston to create a Project that efficiently serves vehicle trips, improves the pedestrian environment, and encourages transit and bicycle use. As part of the Project, the Proponent will bring all abutting sidewalks and pedestrian ramps to the City of Boston standards in accordance with the Boston Complete Streets design guidelines. This will include the reconstruction and widening of the sidewalks where possible, the installation of new, accessible ramps, improvements to street lighting where necessary, planting of street trees, and providing bicycle storage racks surrounding the site, where appropriate.

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

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

7.6 Evaluation of Short-term Construction Impacts

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

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

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

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

8.0 COORDINATION WITH GOVERNMENTAL AGENCIES

8.1 Architectural Access Board Requirements

This Proposed Project will comply with the requirements of the Architectural Access Board. The Project will also be designed to comply with the Standards of the Americans with Disabilities Act.

8.2 Massachusetts Environmental Policy Act

Based on information currently available, development of the Proposed Project is not expected to result in a state permit/state agency action and meet a review threshold that would require MEPA review by the MEPA Office of the Executive Office of Energy and Environmental Affairs.

8.3 Boston Civic Design Commission

It is anticipated that the Proposed Project will be reviewed by the Boston Civic Design Commission as the total build out will exceed the 100,000 gross square feet size threshold requirement for required review by the Boston Civic Design Commission.

9.0 PROJECT CERTIFICATION

This form has been circulated to the Boston Redevelopment Authority as required by Article 80 of the Boston Zoning Code.

The Hamilton Company

Signature of Proponent
Stephen Weinig, Vice President

Date July 29, 2016

Mitchell L. Fischman Consulting LLC

Signature of Preparer
Mitchell L. Fischman, Principal

Date 7/29/16

APPENDIX A – LETTER OF INTENT TO FILE PNF, JUNE 24, 2016

RUBIN and RUDMAN LLP
T: 617.330.7000 F: 617.330.7550
50 Rowes Wharf, Boston, MA 02110

Andrew H. Kara
Direct Dial: (617) 330-7148
E-mail: akara@rubinrudman.com

June 24, 2016

Via Hand Delivery

Mr. Brian Golden, Director
Boston Redevelopment Authority
One City Hall Square, 9th Floor
Boston, MA 02201
Attn: Mr. Edward McGuire, Project Manager

Re: Letter of Intent to File Project Notification Form
Article 80B - Large Project Review
Packard Crossing, 45-55 Brighton Avenue and 79-83 Gardner Street
Allston/Brighton, Massachusetts

Dear Director Golden:

This office is counsel to The Hamilton Company, together with its affiliates and related companies (collectively the "Proponent"), the owners of that certain property located at (i) 45-55 Brighton Avenue (the "Brighton Ave Project Site") and (ii) 79-83 Gardner Street (the "Gardner Street Project Site"), Allston/Brighton, Massachusetts (collectively the "Project Site"). The purpose of this letter is to notify the Boston Redevelopment Authority (the "BRA") of the Proponent's intent to file a Project Notification Form ("PNF") with the BRA in accordance with the Mayor's Executive Order entitled "An Order Relative To The Provision Of Mitigation By Development Projects In Boston", as amended.

Proposed Project

The Proponent's proposed project contemplates revitalizing an underutilized site in the Allston/Brighton Neighborhood of Boston with a dynamic new mixed use, retail/residential development. The Project Site fronts along Brighton Avenue and Gardner Street. The Brighton Avenue Project Site contains an underutilized surface parking lot and an automotive store. The Gardner Street Project Site contains an underutilized surface parking lot and an existing Victorian style house. The Project Site is comprised of an overall lot area of approximately 83,993 gross square feet (1.9 acres) with the lot area of the Brighton Avenue Project Site containing 47,229 gross square feet (1.1 acres) and the lot area of the Gardner Street Project Site containing 36,764 gross square feet (approximately 0.8 acres) (**See Figure 1. Project Locus – 45-55 Brighton Avenue / 79-83 Gardner Street)**.

Specifically, the Proponent's project proposes the development of two (2) new residential buildings containing (i) a total of one hundred fourteen (114) multi-family dwelling units including three (3) existing units within the Victorian house located at 83 Gardner Street and one hundred eleven (111) new units (the "Units"), (ii) street level retail space along Brighton Avenue and (iii) covered parking for all of the Units and retail space at a parking ratio of 1.0 parking space per 1.0 unit for the Units (the "Proposed Project"). The buildings will be interconnected through rich new landscaped walkways. The Proposed Project will include one (1) new building along Brighton Avenue and one (1) new building along Gardner Street, as more specifically described below. The Proposed Project's height, density and uses are in context to the immediate areas along both Brighton Avenue and Gardner Street. In addition, the Proposed Project will further the objectives of Mayor Martin J. Walsh's Housing Plan, Housing a Changing City: Boston 2030.

I. Gardner Street Building

The building proposed for the Gardner Street Project Site will contain thirty eight (38) units, and covered parking for thirty nine (40) vehicles with the existing Victorian house preserved and incorporated into the new structure (the "Gardner Street Project"). The Victorian house currently contains three (3) units, one unit containing two (2) bedrooms and two (2) units containing three (3) bedrooms. The Victorian house will be restored and renovated to contain a lounge/lobby for the building and maintain three (3) units, one (1) unit containing one (1) bedroom and two (2) units containing three (3) bedrooms. The remaining thirty-five (35) units will all be two (2) bedroom units. The Gardner Street Project will contain a building with approximately forty seven thousand seven hundred thirty six (47,736) gross square feet and a building height of approximately forty six (46) feet at its highest point and four (4) stories. There will be significant new landscaping behind the building at the center of the Project Site with interconnected walkways. For a number of reasons, it is anticipated that the Gardner Street Project will be developed first. After the Gardner Street Project has been completed, the Brighton Avenue Project will commence. The phasing of the Proposed Project will help ensure lower impacts on the community and allow for more measured growth.

II. Brighton Avenue Building

The building proposed for the Brighton Avenue Project Site will contain seventy six (76) units, street level retail area and covered parking for one hundred seventy five (175) vehicles (the "Brighton Avenue Project"). The units will include seventy two (72) two bedroom units and four (4) one bedroom units. The Brighton Avenue Project will contain a building with approximately ninety nine thousand seven hundred two (99,702) gross square feet and a building height of approximately fifty eight feet along Brighton Avenue and sixty eight (68) feet at its highest point, and five (5) stories at the front and six (6) stories at the back. Like the Gardner Street Project, there will be significant new landscaping behind the building at the center of the Project Site with interconnected walkways.

Prior to submitting this Letter of Intent, the Proponent conducted preliminary community outreach with the surrounding community, neighborhood groups, local elected and appointed officials, the Mayor's Office of Neighborhood Services and other interested parties, including preliminary presentations before the Allston Civic Association and the Brighton Allston Improvement Association. As a result of the input received, the Proponent has made revisions to the original design and overall scope of the Proposed Project.

The Proposed Project will provide a number of community benefits including but not limited to the following: (i) the creation of new market rate housing units that will serve Boston's middle class; (ii) the creation of new inclusionary development policy units in accordance with the Inclusionary Development Policy of the City of Boston; (iii) the commencement of the improvement of an underutilized area of Allston/Brighton Neighborhood through the development of the Proposed Project; (iv) the creation of new construction jobs during the development process and permanent jobs following construction completion and (v) significant new annual real estate tax revenue.

The Proposed Project will be subject to the Large Project Review requirements of Article 80B of the Boston Zoning Code (the "Code") because the Proposed Project is a new development project creating more than Fifty Thousand (50,000) square feet of gross floor area in a Boston neighborhood. Ordinarily, the Gardner Street Building would be subject to the filing of a Small Project Review Application under Article 80E of the Code because of its limited size, and the BRA asked the Proponent to join the filings of both projects together as a part of a Large Project Review submission, in accordance with Article 80B requirements, to complete a coordinated review with the neighborhood and other interested parties. Nevertheless, the Proponent is hopeful to complete the required analyses, presentations and evaluations as expeditiously as possible, to allow the Gardner Street Building to be permitted and initially constructed. To this end, the Proponent has proposed the completion of an "expanded" PNF filing which is expected to address many issues normally presented in a Draft Project Impact Report including transportation, air and noise, shadow and infrastructure analyses; presentation of neighborhood historic resources; and completion of other environmental evaluations that will help explain potential project impacts from Proposed Project uses, and any needed mitigation measures to reduce these impacts.

The Project Site is subject to Article 51, Allston Brighton Neighborhood District, of the Code. The Proposed Project will require zoning relief through the City of Boston Zoning Board of Appeal with respect to the multi-family dwelling use as well as the floor area ratio, height and certain other dimensional requirements.

The project team looks forward to working with the community, BRA and other stakeholders in creating a vibrant new project for the City of Boston.

Very truly yours,

Andrew H. Kara

AHK/mk

Attachment: Figure 1. Project Locus - 45-55 Brighton Avenue / 79- 83 Gardner Street

cc: Mr. Jonathan Greeley, BRA, Director of Development Review and Policy
Mr. Edward McGuire, BRA, Project Manager
Mr. Mark Ciommo, District 6 City Councilor
Mr. Kevin G. Honan, State Representative Brighton District
Mr. Michael J. Moran, State Representative Brighton District
Mr. Tomas Gonzalez, Mayor's Office of Neighborhood Services
Mr. Carl Valeri, President and Chief Operating Officer, The Hamilton Company
Mr. Steve Weinig, President, Hamilton Construction Management Corp.
Mr. David Hacin, Hacin + Associates
Mr. Jeffrey Brown, Hacin + Associates
Mr. Mitchell L. Fischman, MLF Consulting LLC
Mr. James H. Greene, Esq., Rubin and Rudman, LLP

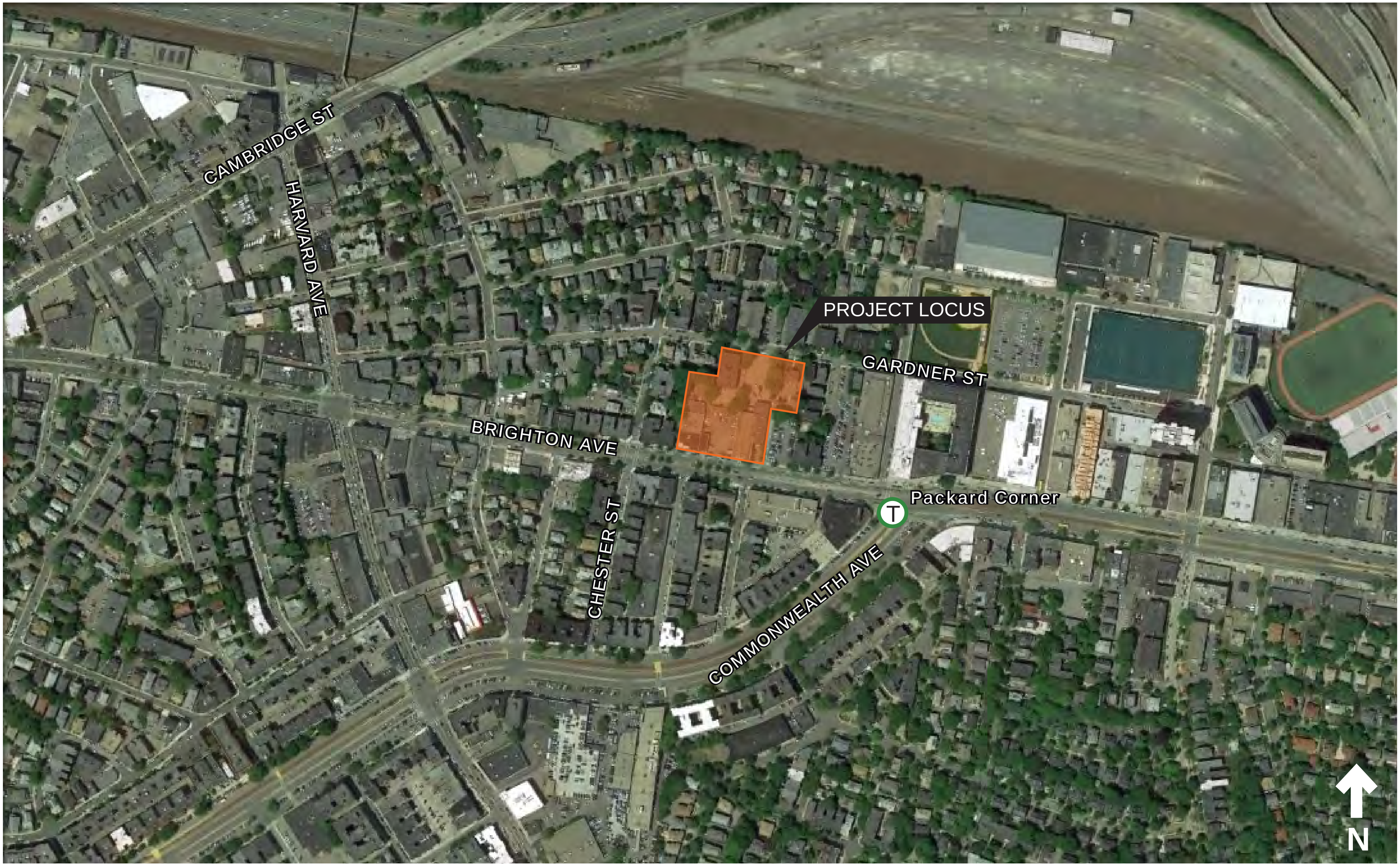

Figure 1
Project Locus - 45-55 Brighton Avenue / 75-83 Gardner Street

APPENDIX B - AIR QUALITY APPENDIX

APPENDIX B
AIR QUALITY

45-55 BRIGHTON AVENUE
79-83 GARDNER STREET
PROJECT NOTIFICATION FORM

Pages Contents

MOVES2014 2016 and 2021 CO Emission Rates (grams/hour)

Zone ID	Road Type ID	Link Length (miles)	Link Volume (Vehicles/Hr)	Link Avg Speed (Miles/Hr)	Pollutant	Emission Factor (Grams/veh-mi)
250250	5	0.09	9	5	CO	2.976
250250	5	0.09	62	5	CO	2.976

```
INDOOR GARAGE ANALYSIS PROGRAM

  PROJECT:  BRIGHTON AVE PARKING GARAGE PEAK AM HOUR


 TOTAL VOLUME:           46 VEH/HOUR

                 CO RATE:     2.976 GRAMS CO/VEH-MI

  VENT CFM:                   48,000 CFM



  TOTAL CO EMISSIONS =   12.73 GRAMS/MIN  =  0.2122 GRAMS/SEC
  TOTAL VENTILATION  =     1,360 CU. M/MIN


      PEAK 1-HOUR CO CONCENTRATION FROM VEHICLES:   8.17 PPM

********************************************************************************

PROJECT:  BRIGHTON AVE PARKING GARAGE PEAK PM HOUR

  TOTAL VOLUME:           62 VEH/HOUR

                 CO RATE:     2.976 GRAMS CO/VEH-MI


  VENT CFM:                   48,000 CFM



  TOTAL CO EMISSIONS =   17.16 GRAMS/MIN  =  0.2860 GRAMS/SEC
  TOTAL VENTILATION  =     1,360 CU. M/MIN



      PEAK 1-HOUR CO CONCENTRATION FROM VEHICLES:  11.02 PPM
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```
INDOOR GARAGE ANALYSIS PROGRAM

  PROJECT:  GARDNER ST PARKING GARAGE PEAK AM HOUR


 TOTAL VOLUME:           9 VEH/HOUR

                  CO RATE:     2.976 GRAMS CO/VEH-MI

  VENT CFM:                   48,000 CFM


  TOTAL CO EMISSIONS =   0.36 GRAMS/MIN  =  0.006 GRAMS/SEC
  TOTAL VENTILATION  =     1,360 CU. M/MIN

      PEAK 1-HOUR CO CONCENTRATION FROM VEHICLES:   0.23 PPM

********************************************************************************

PROJECT:  GARDNER ST PARKING GARAGE PEAK PM HOUR

  TOTAL VOLUME:           9 VEH/HOUR

                  CO RATE:     2.976 GRAMS CO/VEH-MI


  VENT CFM:                   48,000 CFM


  TOTAL CO EMISSIONS =   0.36 GRAMS/MIN  =  0.006 GRAMS/SEC
  TOTAL VENTILATION  =     1,360 CU. M/MIN


      PEAK 1-HOUR CO CONCENTRATION FROM VEHICLES:  0.23 PPM
```

```
*** AERMOD - VERSION  15181 ***   *** 113 Washington Street                                                  ***        04/29/16
 *** AERMET - VERSION 14134  ***   *** CO 1-hour Screening Modeling                                           ***        14:13:55
                                                                                                                          PAGE   1
 **MODELOPTs:   NonDFAULT CONC      FLAT      FLGPOL    NOCHKD    SCREEN    NODRYDPLT NOWETDPLT URBAN

                                           ***     MODEL SETUP OPTIONS SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for     1 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =       500.0 ;  Urban Roughness Length =  1.000 m

 **Model Allows User-Specified Options:
         1. Stack-tip Downwash.
         2. Model Assumes Receptors on FLAT Terrain.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Used.

 **Other Options Specified:
         NOCHKD   - Suppresses checking of date sequence in meteorology files
         SCREEN   - Use screening option
 which forces calculation of centerline values

 **Model Accepts FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  OTHER

 **Model Calculates  1 Short Term Average(s) of:   1-HR

 **This Run Includes:      1 Source(s);       1 Source Group(s); and     176 Receptor(s)

               with:      0 POINT(s), including
                          0 POINTCAP(s) and      0 POINTHOR(s)
                and:      1 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 OPENPIT source(s)


 **Model Set To Continue RUNning After the Setup Testing.

 **The AERMET Input Meteorological Data Version Date: 14134

 **Output Options Selected:
          Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
          Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
          Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =     5.00 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                  Emission Units = GRAMS/SEC                                ;  Emission Rate Unit Factor =   0.10000E+07
                  Output Units   = MICROGRAMS/M**3

 **Approximate Storage Requirements of Model =      3.5 MB of RAM.

 **Input Runstream File:          CO.DTA
 **Output Print File:             CO.LST

 **File for Summary of Results:   W:\Apps\aermod\CO.SUM
 *** AERMOD - VERSION  15181 ***   *** 113 Washington Street                                                  ***        04/29/16
 *** AERMET - VERSION 14134  ***   *** CO 1-hour Screening Modeling                                           ***        14:13:55
                                                                                                                          PAGE   2
 **MODELOPTs:   NonDFAULT CONC      FLAT      FLGPOL    NOCHKD    SCREEN    NODRYDPLT NOWETDPLT URBAN

                                         *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                            (1=YES; 0=NO)

           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1

               NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                                     *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                         (METERS/SEC)
```

1.54, 3.09, 5.14, 8.23, 10.80,

*** AERMOD - VERSION 15181 *** *** 113 Washington Street *** 04/29/16
*** AERMET - VERSION 14134 *** *** CO 1-hour Screening Modeling *** 14:13:55
PAGE 3

**MODELOPTs: NonDFAULT CONC FLAT FLGPOL NOCHKD SCREEN NODRYDPLT NOWETDPLT URBAN

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: Urban.sfc Met Version: 14134
Profile file: Urban.PFL
Surface format: FREE
Profile format: FREE
Surface station no.: 11111 Upper air station no.: 22222
Name: UNKNOWN Name: UNKNOWN
Year: 2010 Year: 2010

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
10	01	01	1	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	10.	10.0	255.2	2.0
10	01	02	2	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	20.	10.0	255.2	2.0
10	01	03	3	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	30.	10.0	255.2	2.0
10	01	04	4	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	40.	10.0	255.2	2.0
10	01	05	5	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	50.	10.0	255.2	2.0
10	01	06	6	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	60.	10.0	255.2	2.0
10	01	07	7	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	70.	10.0	255.2	2.0
10	01	08	8	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	80.	10.0	255.2	2.0
10	01	09	9	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	90.	10.0	255.2	2.0
10	01	10	10	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	100.	10.0	255.2	2.0
10	01	11	11	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	110.	10.0	255.2	2.0
10	01	12	12	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	120.	10.0	255.2	2.0
10	01	13	13	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	130.	10.0	255.2	2.0
10	01	14	14	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	140.	10.0	255.2	2.0
10	01	15	15	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	150.	10.0	255.2	2.0
10	01	16	16	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	160.	10.0	255.2	2.0
10	01	17	17	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	170.	10.0	255.2	2.0
10	01	18	18	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	180.	10.0	255.2	2.0
10	01	19	19	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	190.	10.0	255.2	2.0
10	01	20	20	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	200.	10.0	255.2	2.0
10	01	21	21	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	210.	10.0	255.2	2.0
10	01	22	22	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	220.	10.0	255.2	2.0
10	01	23	23	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	230.	10.0	255.2	2.0
10	01	24	24	01	-1.2	0.043	-9.000	0.020	-999.	21.	5.5	1.00	1.62	0.21	0.50	240.	10.0	255.2	2.0

First hour of profile data

YR	MO	DY	HR	HEIGHT	F	WDIR	WSPD	AMB_TMP	sigmaA	sigmaW	sigmaV
10	01	01	01	10.0	1	10.	0.50	255.3	99.0	-99.00	-99.00

F indicates top of profile (=1) or below (=0)

*** AERMOD - VERSION 15181 *** *** 113 Washington Street *** 04/29/16
*** AERMET - VERSION 14134 *** *** CO 1-hour Screening Modeling *** 14:13:55
PAGE 4

**MODELOPTs: NonDFAULT CONC FLAT FLGPOL NOCHKD SCREEN NODRYDPLT NOWETDPLT URBAN

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

GROUP ID			AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
ALL	HIGH	1ST HIGH VALUE IS	5.53709	ON 10062502: AT (	229254.40, 899421.00, 5.00, 5.00, 8.20)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** AERMOD - VERSION 15181 *** *** 113 Washington Street *** 04/29/16
*** AERMET - VERSION 14134 *** *** CO 1-hour Screening Modeling *** 14:13:55
PAGE 5

**MODELOPTs: NonDFAULT CONC FLAT FLGPOL NOCHKD SCREEN NODRYDPLT NOWETDPLT URBAN

*** Message Summary : AERMOD Model Execution ***

--------- Summary of Total Messages --------

A Total of 0 Fatal Error Message(s)
A Total of 2 Warning Message(s)
A Total of 0 Informational Message(s)

A Total of 18504 Hours Were Processed

A Total of 0 Calm Hours Identified

A Total of 0 Missing Hours Identified (0.00 Percent)

******** FATAL ERROR MESSAGES ********
*** NONE ***

APPENDIX C - NOISE APPENDIX

APPENDIX C
NOISE

45-55 BRIGHTON AVENUE
79-83 GARDNER STREET
PROJECT NOTIFICATION FORM

Page **Contents**

Figure 1

Sound Monitoring and Modeling Receptor Locations
For the 43 Brighton Ave/83 Gardner Street Project
Brighton, MA

TECH environmental
FOCUSED KNOWLEDGE. REAL SOLUTIONS.

Sound Monitoring Results

		S1	S2	S3	S4
Broadband					
Lmax		61.6	66.7	77.2	75.1
Leq		47.0	51.8	58.8	51.5
L90		45.2	46.4	44.5	41.9
Octave Bands L90					
16		49.3	49.3	50.3	46.7
31.5		51.9	53.8	53.4	48.6
63		52.1	56.3	58.9	47.7
125		48.2	51.4	51.6	42.7
250		48.2	45.7	45.0	40.3
500		42.0	43.5	41.9	39.9
1000		39.3	42.2	40.1	38.6
2000		38.5	38.1	36.5	36.0
4000		37.4	37.7	37.0	37.0
8000		40.1	40.2	40.1	40.1
16000		43.6	43.6	43.6	43.6

Cadna Noise Modeling Results

Name	ID	Sound	Octave Band Day								
		Level	31	63	125	250	500	1000	2000	4000	8000
		(dBA)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
73 Gardner St	2nd_Floor	40.3	64	53	45	40	37	35	31	25	17
80 Gardner St	3rd_Floor	42.1	62	53	45	41	39	38	33	27	17
84 Gardner St	3rd_Floor	41.8	61	52	44	41	39	38	33	27	17
87 Gardner St	3rd_Floor	43.6	64	54	48	43	40	40	32	28	22
5 Gardner Ter	3rd_Floor	42.5	64	55	48	42	39	39	31	27	21
7 Gardner Ter	3rd_Floor	40.9	64	55	47	41	38	36	30	24	15
9 Gardner Ter	3rd_Floor	41.1	64	55	48	42	38	36	30	24	12
23-25 Brighton Ave	3rd_Floor	39.9	64	53	45	40	37	35	30	23	11
48 Brighton Ave	4th_Floor	42.3	68	58	47	43	39	36	32	27	19
57-59 Brighton Ave	3rd_Floor	36.4	68	56	41	36	33	28	22	17	7
67 Chester St	2nd_Floor	34.7	68	55	39	34	30	26	21	16	10
71 Chester St	3rd_Floor	38.1	67	55	42	38	35	32	27	21	11
75 Chester St	3rd_Floor	38.3	66	54	42	38	35	33	28	22	11
Boston Limits		50	68.5	67	61	52	46	40	33	28	26

Name	ID	Sound	Octave Band Day								
		Level	31	63	125	250	500	1000	2000	4000	8000
		(dBA)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
91 & 95 Washington St	First_Floor	40.3	54	52	47	43	39	33	28	23	16
91 & 95 Washington St	Sixth_Floor	43.1	55	54	49	46	42	36	30	25	17
108 Washington St	First_Floor	39.8	51	49	45	42	39	32	28	22	15
108 Washington St	Third_Floor	41.4	52	50	47	44	40	34	29	23	15
116 Washington St	First_Floor	38.6	50	48	44	41	38	31	27	21	14
116 Washington St	Sixth_Floor	43.4	51	50	48	46	42	37	33	26	16
120 & 122 Washington St	First_Floor	37.9	49	47	44	41	37	31	25	19	10
120 & 122 Washington St	Second_Floor	39	49	48	45	42	38	32	26	20	10
124 Washington St	First_Floor	35.6	46	44	41	38	35	28	24	18	8
124 Washington St	Second_Floor	36.8	47	44	42	40	36	30	24	18	8
128 & 130 Washington St	First_Floor	34.6	45	43	40	37	33	28	23	17	6
128 & 130 Washington St	Second_Floor	36	45	43	42	38	34	29	24	17	6
127 & 135 Washington St	First_Floor	31.6	45	42	40	35	28	24	20	15	5
127 & 135 Washington St	Fifth_Floor	42.2	49	47	48	45	39	36	33	26	17
132 Washington St	First_Floor	32.7	44	42	39	35	31	26	22	16	3
132 Washington St	Second_Floor	34	44	42	40	37	32	27	22	16	4
6 & 8 Fidelis Way	First_Floor	37	50	49	43	40	35	30	24	17	6
6 & 8 Fidelis Way	Sixth_Floor	40	51	50	45	43	38	33	29	22	9
12 Fidelis Way	First_Floor	38.3	52	51	45	41	36	32	26	18	5
16 Fidelis Way	First_Floor	40.3	52	51	46	42	38	35	29	21	8
16 Fidelis Way	Sixth_Floor	42.9	52	52	47	45	41	38	33	26	17
32 & 34 Fidelis Way	First_Floor	32	45	44	39	34	29	26	21	13	-1
32 & 34 Fidelis Way	Sixth_Floor	37.7	46	44	41	39	33	33	30	23	10

APPENDIX D - TRANSPORTATION APPENDIX

TRAFFIC COUNTS

Client: Santos, P.E., PTOE
Location: 01
BTD #: 0002_HSH
Location: Allston, MA
Street 1: Comm Ave
Street 2: Brighton Ave
Count Date: 5/11/2016
Day of Week: Wednesday
Weather: Sunny, High of 68 F

BOSTON TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
DataRequest@BostonTrafficData.com
www.BostonTrafficData.com

TOTAL (CARS & TRUCKS)

	Comm Ave Northbound				Southbound				Brighton Eastbound				Comm Ave Westbound			
Start Time	U-Turn	EB Trolley	WB Trolley	Right	U-Turn	Left	Thru	Right	U-Turn	Thru	Right	Hard Right	U-Turn	Left	Thru	Right
7:00 AM	0	2	1	119	0	0	0	0	0	75	0	0	2	64	99	0
7:15 AM	0	3	3	134	0	0	0	0	0	70	0	1	3	69	105	0
7:30 AM	0	3	2	149	0	0	0	0	0	88	0	1	4	71	112	0
7:45 AM	0	3	2	205	0	0	0	0	0	97	0	0	4	95	130	0
8:00 AM	0	3	3	210	0	0	0	0	0	85	0	0	5	91	166	0
8:15 AM	0	3	1	216	0	0	0	0	0	100	0	1	5	103	143	0
8:30 AM	0	2	3	205	0	0	0	0	0	94	0	0	4	95	120	0
8:45 AM	0	3	2	175	0	0	0	0	0	81	0	0	3	97	123	0

	Comm Ave Northbound				Southbound				Brighton Eastbound				Comm Ave Westbound			
Start Time	U-Turn	EB Trolley	WB Trolley	Right	U-Turn	Left	Thru	Right	U-Turn	Thru	Right	Hard Right	U-Turn	Left	Thru	Right
4:00 PM	0	3	1	109	0	0	0	0	0	92	0	1	7	115	208	0
4:15 PM	0	3	3	115	0	0	0	0	0	86	0	2	6	147	212	0
4:30 PM	0	4	2	113	0	0	0	0	0	110	0	2	8	152	207	0
4:45 PM	0	3	3	111	0	0	0	0	0	118	0	1	9	155	216	0
5:00 PM	0	4	2	110	0	0	0	0	0	133	0	2	5	168	203	0
5:15 PM	0	3	3	109	0	0	0	0	0	149	0	2	7	165	200	0
5:30 PM	0	2	4	110	0	0	0	0	0	135	0	1	8	169	193	0
5:45 PM	0	3	2	111	0	0	0	0	0	128	0	2	6	161	195	0

AM PEAK HOUR	Comm Ave Northbound				Southbound				Brighton Eastbound				Comm Ave Westbound			
7:45 AM to	U-Turn	EB Trolley	WB Trolley	Right	U-Turn	Left	Thru	Right	U-Turn	Thru	Right	Hard Right	U-Turn	Left	Thru	Right
8:45 AM	**0**	**11**	**9**	**836**	**0**	**0**	**0**	**0**	**0**	**376**	**0**	**1**	**18**	**384**	**551**	**0**
PHF	**0.97**								**0.93**				**0.92**			
HV %	**2.5%**								**7.7%**				**3.3%**			

PM PEAK HOUR	Comm Ave Northbound				Southbound				Brighton Eastbound				Comm Ave Westbound			
4:45 PM to	U-Turn	EB Trolley	WB Trolley	Right	U-Turn	Left	Thru	Right	U-Turn	Thru	Right	Hard Right	U-Turn	Left	Thru	Right
5:45 PM	**0**	**12**	**12**	**440**	**0**	**0**	**0**	**0**	**0**	**535**	**0**	**6**	**29**	**657**	**795**	**0**
PHF	**0.99**								**0.90**				**0.99**			
HV %	**1.3%**								**2.4%**				**2.1%**			

Client:	Santos, P.E., PTOE
Location:	01
BTD #:	0002_HSH
Location:	Allston, MA
Street 1:	Comm Ave
Street 2:	Brighton Ave
Count Date:	5/11/2016
Day of Week:	Wednesday
Weather:	Sunny, High of 68 F

BOSTON TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
DataRequest@BostonTrafficData.com
www.BostonTrafficData.com

TRUCKS

	Comm Ave Northbound				Southbound				Brighton Eastbound				Comm Ave Westbound			
Start Time	U-Turn	EB Trolley	WB Trolley	Right	U-Turn	Left	Thru	Right	U-Turn	Thru	Right	Hard Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	2	0	0	0	0	0	6	0	0	0	2	5	0
7:15 AM	0	0	0	4	0	0	0	0	0	5	0	0	0	1	3	0
7:30 AM	0	0	0	3	0	0	0	0	0	4	0	0	0	2	3	0
7:45 AM	0	0	0	6	0	0	0	0	0	6	0	0	0	2	7	0
8:00 AM	0	0	0	4	0	0	0	0	0	8	0	0	0	3	4	0
8:15 AM	0	0	0	5	0	0	0	0	0	10	0	0	0	3	6	0
8:30 AM	0	0	0	6	0	0	0	0	0	5	0	0	0	2	5	0
8:45 AM	0	0	0	5	0	0	0	0	0	6	0	0	0	2	6	0

	Comm Ave Northbound				Southbound				Brighton Eastbound				Comm Ave Westbound			
Start Time	U-Turn	EB Trolley	WB Trolley	Right	U-Turn	Left	Thru	Right	U-Turn	Thru	Right	Hard Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	2	0	0	0	0	0	3	0	0	0	1	4	0
4:15 PM	0	0	0	1	0	0	0	0	0	2	0	0	0	3	11	0
4:30 PM	0	0	0	2	0	0	0	0	0	4	0	0	0	3	8	0
4:45 PM	0	0	0	1	0	0	0	0	0	2	0	0	0	2	4	0
5:00 PM	0	0	0	2	0	0	0	0	0	3	0	0	0	3	6	0
5:15 PM	0	0	0	2	0	0	0	0	0	6	0	0	0	2	5	0
5:30 PM	0	0	0	1	0	0	0	0	0	2	0	0	0	2	7	0
5:45 PM	0	0	0	2	0	0	0	0	0	2	0	0	0	2	4	0

AM PEAK HOUR 7:45 AM to 8:45 AM	Comm Ave Northbound				Southbound				Brighton Eastbound				Comm Ave Westbound			
	U-Turn	EB Trolley	WB Trolley	Right	U-Turn	Left	Thru	Right	U-Turn	Thru	Right	Hard Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**21**	**0**	**0**	**0**	**0**	**0**	**29**	**0**	**0**	**0**	**10**	**22**	**0**
PHF	**0.88**								**0.73**				**0.89**			

PM PEAK HOUR 4:15 PM to 5:15 PM	Comm Ave Northbound				Southbound				Brighton Eastbound				Comm Ave Westbound			
	U-Turn	EB Trolley	WB Trolley	Right	U-Turn	Left	Thru	Right	U-Turn	Thru	Right	Hard Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**0**	**11**	**27**	**0**
PHF	**0.75**								**0.69**				**0.71**			

Client:	Santos, P.E., PTOE
Location:	01
BTD #:	0002_HSH
Location:	Allston, MA
Street 1:	Comm Ave
Street 2:	Brighton Ave
Count Date:	5/11/2016
Day of Week:	Wednesday
Weather:	Sunny, High of 68 F

BOSTON
TRAFFIC DATA
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PEDESTRIANS & BICYCLES

	Comm Ave Northbound					Southbound					Brighton Eastbound					Comm Ave Westbound				
Start Time	Left	Thru	Right	PED	PED 2	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	3	27	5	0	0	0	0		0	18	0	0		0	3	0	0	
7:15 AM	0	0	2	30	8	0	0	0	0		0	16	0	0		1	2	0	0	
7:30 AM	0	0	3	27	12	0	0	0	0		0	15	0	0		0	3	0	0	
7:45 AM	0	0	1	32	9	0	0	0	0		0	13	0	0		1	2	0	0	
8:00 AM	0	0	4	36	10	0	0	0	0		0	21	0	0		1	4	0	0	
8:15 AM	0	0	4	38	13	0	0	0	0		0	25	0	0		0	2	0	0	
8:30 AM	0	0	3	35	10	0	0	0	0		0	20	0	0		1	3	0	0	
8:45 AM	0	0	3	33	11	0	0	0	0		0	24	0	0		0	3	0	0	

	Comm Ave Northbound					Southbound					Brighton Eastbound					Comm Ave Westbound				
Start Time	Left	Thru	Right	PED	PED 2	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	44	18	0	0	0	0		0	6	0	0		5	21	0	0	
4:15 PM	0	0	1	47	16	0	0	0	0		0	5	0	0		3	19	0	0	
4:30 PM	0	0	2	45	12	0	0	0	0		0	4	0	0		3	17	0	0	
4:45 PM	0	0	0	65	26	0	0	0	0		0	5	0	0		2	14	0	0	
5:00 PM	0	0	3	85	32	0	0	0	0		0	8	0	0		6	23	0	0	
5:15 PM	0	0	0	91	35	0	0	0	0		0	9	0	0		4	25	0	0	
5:30 PM	0	0	1	98	39	0	0	0	0		0	7	0	0		4	29	0	0	
5:45 PM	0	0	1	95	38	0	0	0	0		0	6	0	0		8	32	0	0	

AM PEAK HOUR[1] 7:45 AM to 8:45 AM	Comm Ave Northbound					Southbound					Brighton Eastbound					Comm Ave Westbound				
	Left	Thru	Right	PED	PED 2	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	0	12	141	42	0	0	0	0		0	79	0	0		3	11	0	0	

PM PEAK HOUR[1] 4:45 PM to 5:45 PM	Comm Ave Northbound					Southbound					Brighton Eastbound					Comm Ave Westbound				
	Left	Thru	Right	PED	PED 2	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	0	4	339	132	0	0	0	0		0	29	0	0		16	91	0	0	

[1] *Peak hours corresponds to vehicular peak hours.*

Client:	Santos, P.E., PTOE
Location:	02
BTD #:	0002_HSH
Location:	Allston, MA
Street 1:	Malvern St
Street 2:	Brighton Ave
Count Date:	5/11/2016
Day of Week:	Wednesday
Weather:	Sunny, High of 68 F

BOSTON TRAFFIC DATA
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Office: 978-746-1259
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TOTAL (CARS & TRUCKS)

	Northbound				Malvern St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	6	3	9	75	3	0	0	95	4
7:15 AM	0	0	0	0	0	0	0	5	2	8	70	2	0	0	100	5
7:30 AM	0	0	0	0	0	0	0	4	0	5	88	1	0	0	111	1
7:45 AM	0	0	0	0	0	0	0	8	3	11	97	3	0	0	129	1
8:00 AM	0	0	0	0	0	0	0	6	2	5	85	3	0	0	162	4
8:15 AM	0	0	0	0	0	0	0	6	1	14	100	0	0	0	142	1
8:30 AM	0	0	0	0	0	1	0	6	4	10	94	2	0	0	118	2
8:45 AM	0	0	0	0	0	0	0	7	3	11	81	3	0	0	120	3

	Northbound				Malvern St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	1	0	20	12	3	92	4	0	0	197	11
4:15 PM	0	0	0	0	0	0	0	26	10	8	86	2	0	0	201	11
4:30 PM	0	0	0	0	0	0	0	33	9	11	110	5	0	0	198	9
4:45 PM	0	0	0	0	0	0	0	16	11	3	118	3	0	0	211	5
5:00 PM	0	0	0	0	0	1	0	21	14	6	133	4	0	0	200	3
5:15 PM	0	0	0	0	0	1	0	19	13	8	149	5	0	0	195	5
5:30 PM	0	0	0	0	0	0	0	16	11	5	135	3	0	0	189	4
5:45 PM	0	0	0	0	0	0	0	18	12	7	128	4	0	0	190	5

AM PEAK HOUR 7:45 AM to 8:45 AM	Northbound				Malvern St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**1**	**0**	**26**	**10**	**40**	**376**	**8**	**0**	**0**	**551**	**8**
PHF					**0.84**				**0.94**				**0.84**			
HV %					**3.7%**				**7.4%**				**3.9%**			

PM PEAK HOUR 4:30 PM to 5:30 PM	Northbound				Malvern St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**2**	**0**	**89**	**47**	**28**	**510**	**17**	**0**	**0**	**804**	**22**
PHF					**0.69**				**0.86**				**0.96**			
HV %					**3.3%**				**3.0%**				**2.8%**			

Client: Santos, P.E., PTOE
Location: 02
BTD #: 0002_HSH
Location: Allston, MA
Street 1: Malvern St
Street 2: Brighton Ave
Count Date: 5/11/2016
Day of Week: Wednesday
Weather: Sunny, High of 68 F

BOSTON TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
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TRUCKS

	Northbound				Malvern St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	1	1	6	1	0	0	5	0
7:15 AM	0	0	0	0	0	0	0	1	0	0	5	0	0	0	3	0
7:30 AM	0	0	0	0	0	0	0	0	0	1	4	0	0	0	2	1
7:45 AM	0	0	0	0	0	0	0	0	1	0	6	1	0	0	7	0
8:00 AM	0	0	0	0	0	0	0	1	0	0	8	0	0	0	4	0
8:15 AM	0	0	0	0	0	0	0	0	0	1	10	0	0	0	6	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	0

	Northbound				Malvern St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	1	0	0	3	1	0	0	4	0
4:15 PM	0	0	0	0	0	0	0	1	0	1	2	1	0	0	10	1
4:30 PM	0	0	0	0	0	0	0	2	0	1	4	0	0	0	7	1
4:45 PM	0	0	0	0	0	0	0	1	0	0	2	0	0	0	4	0
5:00 PM	0	0	0	0	0	0	0	0	0	1	3	0	0	0	6	0
5:15 PM	0	0	0	0	0	0	0	0	0	1	6	0	0	0	5	0
5:30 PM	0	0	0	0	0	0	0	1	0	0	2	1	0	0	7	0
5:45 PM	0	0	0	0	0	0	0	1	0	0	2	0	0	0	4	0

AM PEAK HOUR	Northbound				Malvern St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
7:45 AM to 8:45 AM	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**29**	**1**	**0**	**0**	**22**	**0**
PHF					**0.25**				**0.73**				**0.79**			

PM PEAK HOUR	Northbound				Malvern St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
4:15 PM to 5:15 PM	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**3**	**11**	**1**	**0**	**0**	**27**	**2**
PHF					**0.50**				**0.75**				**0.66**			

Client: Santos, P.E., PTOE
Location: 02
BTD #: 0002_HSH
Location: Allston, MA
Street 1: Malvern St
Street 2: Brighton Ave
Count Date: 5/11/2016
Day of Week: Wednesday
Weather: Sunny, High of 68 F

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PEDESTRIANS & BICYCLES

						Malvern St					Brighton Ave					Brighton Ave				
	Northbound					Southbound					Eastbound					Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	27		0	0	0	11		1	18	1	0		0	3	0	14	
7:15 AM	0	0	0	30		1	1	1	16		3	16	0	0		0	2	0	21	
7:30 AM	0	0	0	27		1	0	0	22		0	15	1	0		0	3	0	22	
7:45 AM	0	0	0	32		0	0	0	25		1	13	0	0		0	2	1	29	
8:00 AM	0	0	0	36		1	0	1	27		3	21	0	0		0	4	0	35	
8:15 AM	0	0	0	38		0	0	0	29		2	25	1	0		0	2	1	41	
8:30 AM	0	0	0	35		0	1	0	30		1	20	0	0		0	3	0	40	
8:45 AM	0	0	0	33		1	0	0	28		0	24	1	0		0	3	0	38	

						Malvern St					Brighton Ave					Brighton Ave				
	Northbound					Southbound					Eastbound					Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	44		1	0	1	77		0	6	0	0		0	21	0	72	
4:15 PM	0	0	0	47		0	1	0	81		2	5	1	0		0	19	1	79	
4:30 PM	0	0	0	45		1	1	0	70		1	4	3	0		0	17	0	83	
4:45 PM	0	0	0	65		0	0	1	75		0	5	1	0		0	14	1	95	
5:00 PM	0	0	0	85		0	0	0	67		0	8	0	0		0	23	0	108	
5:15 PM	0	0	0	91		2	1	0	95		2	9	1	0		0	25	1	135	
5:30 PM	0	0	0	98		0	0	0	129		0	7	2	0		0	29	0	141	
5:45 PM	0	0	0	95		1	0	1	100		0	6	1	0		0	32	1	139	

AM PEAK HOUR[1]						Malvern St					Brighton Ave					Brighton Ave				
7:45 AM	Northbound					Southbound					Eastbound					Westbound				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
8:45 AM	0	0	0	141		1	1	1	111		7	79	1	0		0	11	2	145	

PM PEAK HOUR[1]						Malvern St					Brighton Ave					Brighton Ave				
4:30 PM	Northbound					Southbound					Eastbound					Westbound				
to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
5:30 PM	0	0	0	286		3	2	1	307		3	26	5	0		0	79	2	421	

[1] *Peak hours corresponds to vehicular peak hours.*

Client:	Santos, P.E., PTOE
Location:	03
BTD #:	0002_HSH
Location:	Allston, MA
Street 1:	Chester St
Street 2:	Brighton Ave
Count Date:	5/11/2016 (AM), 5/12/16 (PM)
Day of Week:	Wednesday
Weather:	Sunny, High of 68 F

BOSTON
TRAFFIC DATA
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TOTAL (CARS & TRUCKS)

	Chester St Northbound				Chester St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	3	2	90	2	0	1	98	5
7:15 AM	0	0	0	0	0	0	0	0	2	2	81	3	1	3	99	4
7:30 AM	0	0	0	0	0	0	0	0	3	1	93	0	1	2	111	1
7:45 AM	0	0	0	0	0	0	0	0	3	2	113	2	1	1	132	6
8:00 AM	0	0	0	0	0	0	0	0	2	3	95	2	0	2	159	9
8:15 AM	0	0	0	0	0	0	0	0	3	4	115	1	0	1	141	7
8:30 AM	0	0	0	0	0	0	0	0	2	6	108	1	2	1	119	6
8:45 AM	0	0	0	0	0	0	0	0	3	3	98	1	0	0	124	6

	Chester St Northbound				Chester St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	3	3	110	2	1	1	212	15
4:15 PM	0	0	0	0	0	0	0	0	4	4	104	4	2	3	214	18
4:30 PM	0	0	0	0	0	0	0	0	3	5	133	2	2	0	216	22
4:45 PM	0	0	0	0	0	0	0	0	2	3	135	0	0	2	217	19
5:00 PM	0	0	0	0	0	0	0	0	0	5	157	2	0	4	221	10
5:15 PM	0	0	0	0	0	0	0	0	4	4	174	3	1	3	207	16
5:30 PM	0	0	0	0	0	0	0	0	5	5	153	6	1	6	189	20
5:45 PM	0	0	0	0	0	0	0	0	2	4	151	4	0	2	200	18

AM PEAK HOUR 7:45 AM to 8:45 AM	Chester St Northbound				Chester St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**10**	**15**	**431**	**6**	**3**	**5**	**551**	**28**
PHF									**0.94**				**0.86**			
HV %									**8.9%**				**3.9%**			

PM PEAK HOUR 5:00 PM to 6:00 PM	Chester St Northbound				Chester St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**18**	**635**	**15**	**2**	**15**	**817**	**64**
PHF									**0.92**				**0.96**			
HV %									**3.4%**				**1.7%**			

Client:	Santos, P.E., PTOE
Location:	03
BTD #:	0002_HSH
Location:	Allston, MA
Street 1:	Chester St
Street 2:	Brighton Ave
Count Date:	5/11/2016 (AM), 5/12/16 (PM)
Day of Week:	Wednesday
Weather:	Sunny, High of 68 F

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TRUCKS

	Chester St Northbound				Chester St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	7	0	0	0	5	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	7	1	0	1	6	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	6	0	0	1	5	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	9	1	0	1	7	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	11	0	0	0	8	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	10	0	0	0	4	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	9	1	0	0	3	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	10	0	0	0	4	0

	Chester St Northbound				Chester St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	7	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	4	1	0	1	6	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	7	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	6	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	7	1	0	1	4	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	3	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	6	0	0	0	4	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	3	0

AM PEAK HOUR 7:15 AM to 8:15 AM	Chester St Northbound				Chester St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**33**	**2**	**0**	**3**	**26**	**0**
PHF									**0.80**				**0.91**			

PM PEAK HOUR 4:15 PM to 5:15 PM	Chester St Northbound				Chester St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**19**	**2**	**0**	**2**	**23**	**0**
PHF									**0.66**				**0.89**			

Client:	Santos, P.E., PTOE
Location:	03
BTD #:	0002_HSH
Location:	Allston, MA
Street 1:	Chester St
Street 2:	Brighton Ave
Count Date:	5/11/2016 (AM), 5/12/16 (PM)
Day of Week:	Wednesday
Weather:	Sunny, High of 68 F

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PEDESTRIANS & BICYCLES

	Chester St Northbound				Chester St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
7:00 AM	0	0	1	6	0	0	0	10	0	19	1	5	0	3	0	3
7:15 AM	0	0	0	9	1	0	0	9	1	18	0	2	0	3	0	2
7:30 AM	0	0	0	13	1	0	0	13	0	15	0	2	0	3	0	4
7:45 AM	0	0	1	16	0	0	0	12	0	13	0	3	0	2	0	2
8:00 AM	0	0	0	18	0	0	0	14	0	24	1	1	0	4	1	2
8:15 AM	0	0	1	22	1	0	0	16	0	26	0	4	0	2	0	3
8:30 AM	0	0	0	16	1	0	0	12	1	20	0	2	0	3	0	3
8:45 AM	0	0	1	19	0	0	0	12	0	24	0	2	0	3	0	2

	Chester St Northbound				Chester St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
4:00 PM	0	0	0	15	0	0	0	14	0	6	0	4	0	22	0	3
4:15 PM	0	0	1	22	0	0	0	19	0	7	0	5	0	18	1	5
4:30 PM	0	0	0	19	0	0	0	21	0	8	0	7	0	17	0	8
4:45 PM	0	0	0	25	1	0	0	26	1	5	0	6	1	14	0	7
5:00 PM	0	0	1	29	0	0	0	26	0	7	0	8	0	22	1	4
5:15 PM	0	0	0	36	0	0	0	39	0	12	0	7	0	25	0	8
5:30 PM	0	0	0	35	1	0	0	43	0	8	0	18	1	28	0	15
5:45 PM	0	0	0	41	0	0	0	46	0	7	0	15	1	32	0	14

AM PEAK HOUR[1] 7:45 AM to 8:45 AM	Chester St Northbound				Chester St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
	0	0	2	72	2	0	0	54	1	83	1	10	0	11	1	10

PM PEAK HOUR[1] 5:00 PM to 6:00 PM	Chester St Northbound				Chester St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
	0	0	1	141	1	0	0	154	0	34	0	48	2	107	1	41

[1] *Peak hours corresponds to vehicular peak hours.*

Client:	Santos, P.E., PTOE
Project #:	04
BTD #:	0002_HSH
Location:	Allston, MA
Street 1:	Linden St
Street 2:	Brighton Ave
Count Date:	5/11/2016
Day of Week:	Wednesday
Weather:	Sunny, High of 68 F

BOSTON
TRAFFIC DATA
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TOTAL (CARS & TRUCKS)

	Linden St Northbound				Linden St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	3	62	14	0	15	0	7	0	4	63	0	1	0	42	42
7:15 AM	0	6	69	12	0	14	0	9	1	6	71	0	2	0	49	39
7:30 AM	0	8	70	6	0	14	0	8	1	6	78	0	1	0	57	38
7:45 AM	0	9	72	9	0	10	0	6	1	14	95	0	3	0	68	45
8:00 AM	0	8	70	10	0	7	0	9	0	16	100	0	5	0	89	47
8:15 AM	0	7	73	13	0	13	0	9	0	15	110	0	3	0	79	43
8:30 AM	0	6	71	14	0	23	0	8	1	14	98	0	2	0	63	38
8:45 AM	0	6	69	11	0	19	0	7	0	12	91	0	3	0	65	39

	Linden St Northbound				Linden St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	11	45	15	0	30	0	14	3	9	91	0	4	0	126	69
4:15 PM	0	8	40	17	0	33	0	12	4	8	85	0	3	0	139	70
4:30 PM	0	4	36	15	0	32	0	13	3	6	112	0	5	0	146	61
4:45 PM	0	5	41	19	0	30	0	14	2	12	102	0	6	0	135	65
5:00 PM	0	7	44	22	0	29	0	12	4	11	82	0	7	0	119	74
5:15 PM	0	8	46	18	0	35	0	15	3	10	106	0	5	0	138	68
5:30 PM	0	7	48	16	0	39	0	16	4	13	112	0	4	0	138	61
5:45 PM	0	7	44	17	0	34	0	11	2	11	110	0	5	0	129	64

AM PEAK HOUR 7:45 AM to 8:45 AM	Linden St Northbound				Linden St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**30**	**286**	**46**	**0**	**53**	**0**	**32**	**2**	**59**	**403**	**0**	**13**	**0**	**299**	**173**
PHF	**0.97**				**0.69**				**0.93**				**0.86**			
HV %	**1.7%**				**1.2%**				**8.6%**				**4.9%**			

PM PEAK HOUR 5:00 PM to 6:00 PM	Linden St Northbound				Linden St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**29**	**182**	**73**	**0**	**137**	**0**	**54**	**13**	**45**	**410**	**0**	**21**	**0**	**524**	**267**
PHF	**0.97**				**0.87**				**0.91**				**0.96**			
HV %	**0.7%**				**1.0%**				**4.9%**				**2.2%**			

Client:	Santos, P.E., PTOE
Project #:	04
BTD #:	0002_HSH
Location:	Allston, MA
Street 1:	Linden St
Street 2:	Brighton Ave
Count Date:	5/11/2016
Day of Week:	Wednesday
Weather:	Sunny, High of 68 F

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TRUCKS

	Linden St Northbound				Linden St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	1	0	0	0	0	0	0	0	7	0	0	0	5	0
7:15 AM	0	0	2	0	0	0	0	0	0	0	7	0	0	0	6	1
7:30 AM	0	0	1	0	0	0	0	0	0	0	6	0	0	0	5	0
7:45 AM	0	0	1	0	0	0	0	0	0	0	9	0	0	0	7	0
8:00 AM	0	0	2	0	0	0	0	0	0	0	11	0	0	0	8	1
8:15 AM	0	0	1	0	0	0	0	0	0	0	10	0	0	0	4	0
8:30 AM	0	0	2	0	0	1	0	0	0	0	10	0	0	0	3	1
8:45 AM	0	0	1	0	0	0	0	0	0	0	10	0	0	0	4	0

	Linden St Northbound				Linden St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	1	0	0	1	0	0	0	0	5	0	0	0	7	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	5	0	0	0	6	1
4:30 PM	0	0	1	0	0	1	0	0	0	0	5	0	0	0	7	2
4:45 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	6	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	8	0	0	0	4	1
5:15 PM	0	0	1	0	0	1	0	0	0	0	5	0	0	0	3	1
5:30 PM	0	0	1	0	0	1	0	0	0	0	6	0	0	0	4	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	4	0	0	0	3	1

AM PEAK HOUR	Linden St Northbound				Linden St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
7:45 AM to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
8:45 AM	**0**	**0**	**6**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**40**	**0**	**0**	**0**	**22**	**2**
PHF	**0.75**				**0.25**				**0.91**				**0.67**			

PM PEAK HOUR	Linden St Northbound				Linden St Southbound				Brighton Ave Eastbound				Brighton Ave Westbound			
4:00 PM to	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
5:00 PM	**0**	**0**	**2**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**18**	**0**	**0**	**0**	**26**	**6**
PHF	**0.50**				**0.50**				**0.90**				**0.89**			

Client: Santos, P.E., PTOE
Project #: 04
BTD #: 0002_HSH
Location: Allston, MA
Street 1: Linden St
Street 2: Brighton Ave
Count Date: 5/11/2016
Day of Week: Wednesday
Weather: Sunny, High of 68 F

BOSTON TRAFFIC DATA
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PEDESTRIANS & BICYCLES

	Linden St Northbound					Linden St Southbound					Brighton Ave Eastbound					Brighton Ave Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	10		0	0	0	8		0	20	0	11		0	3	0	11	
7:15 AM	0	1	0	12		0	0	0	10		1	19	0	9		0	3	0	10	
7:30 AM	0	0	0	15		0	1	0	9		0	15	1	11		0	3	0	8	
7:45 AM	0	0	0	13		0	0	0	14		0	13	0	14		0	2	0	9	
8:00 AM	0	1	0	21		0	1	0	13		0	25	1	13		0	4	0	13	
8:15 AM	0	0	0	19		0	0	0	14		0	26	0	14		0	2	0	13	
8:30 AM	0	0	0	18		0	1	0	11		1	21	0	12		0	3	0	12	
8:45 AM	0	0	0	18		0	0	0	12		0	24	0	12		0	3	0	14	

	Linden St Northbound					Linden St Southbound					Brighton Ave Eastbound					Brighton Ave Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	19		0	0	0	25		0	6	0	11		0	22	0	12	
4:15 PM	0	1	0	30		0	1	0	33		0	7	1	16		0	18	0	11	
4:30 PM	0	0	0	32		0	0	0	27		0	8	0	12		0	16	1	9	
4:45 PM	0	0	0	39		0	0	0	47		1	6	0	15		0	14	0	14	
5:00 PM	0	1	0	38		0	1	0	51		0	7	0	13		0	21	1	13	
5:15 PM	0	0	0	45		0	1	0	59		1	12	1	11		0	25	0	11	
5:30 PM	0	1	0	59		0	0	0	68		0	8	0	9		0	27	1	12	
5:45 PM	0	0	0	54		0	1	0	55		1	7	2	13		0	32	0	14	

AM PEAK HOUR[1] 7:45 AM to 8:45 AM	Linden St Northbound					Linden St Southbound					Brighton Ave Eastbound					Brighton Ave Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	1	0	71		0	2	0	52		1	85	1	53		0	11	0	47	

PM PEAK HOUR[1] 5:00 PM to 6:00 PM	Linden St Northbound					Linden St Southbound					Brighton Ave Eastbound					Brighton Ave Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	2	0	196		0	3	0	233		2	34	3	46		0	105	2	50	

[1] *Peak hours corresponds to vehicular peak hours.*

Client: Santos, P.E., PTOE
Project #: 05
BTD #: 0002_HSH
Location: Allston, MA
Street 1: Linden St
Street 2: Gardner St
Count Date: 5/11/2016
Day of Week: Wednesday
Weather: Sunny, High of 68 F

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TOTAL (CARS & TRUCKS)

	Linden Northbound				Linden Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	112	3	0	5	18	4	0	0	0	0	0	0	0	0
7:15 AM	1	3	105	4	0	7	20	5	0	0	0	0	0	0	0	0
7:30 AM	1	5	104	5	0	8	22	4	0	0	0	0	0	0	0	0
7:45 AM	0	18	106	6	0	7	21	4	0	0	0	0	0	0	0	0
8:00 AM	0	21	109	5	0	6	19	3	0	0	0	0	0	0	0	0
8:15 AM	0	15	110	5	0	9	26	4	0	0	0	0	0	0	0	0
8:30 AM	0	8	106	6	0	12	33	4	0	0	0	0	0	0	0	0
8:45 AM	0	9	105	4	0	10	27	2	0	0	0	0	0	0	0	0

	Linden Northbound				Linden Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	2	22	91	5	0	9	41	4	0	0	0	0	0	0	0	0
4:15 PM	0	20	90	7	0	12	42	9	0	0	0	0	0	0	0	0
4:30 PM	1	17	73	8	0	14	40	15	0	0	0	0	0	0	0	0
4:45 PM	1	21	85	6	0	16	43	8	0	0	0	0	0	0	0	0
5:00 PM	0	23	98	5	0	18	46	8	0	0	0	0	0	0	0	0
5:15 PM	1	18	99	8	0	17	48	6	0	0	0	0	0	0	0	0
5:30 PM	0	8	102	7	0	20	52	7	0	0	0	0	0	0	0	0
5:45 PM	0	12	100	7	0	17	51	8	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:45 AM to 8:45 AM	Linden Northbound				Linden Southbound				Gardner St Eastbound				Gardner St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**62**	**431**	**22**	**0**	**34**	**99**	**15**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.95**				**0.76**											
HV %	**2.3%**				**2.0%**											

PM PEAK HOUR 5:00 PM to 6:00 PM	Linden Northbound				Linden Southbound				Gardner St Eastbound				Gardner St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	1	**61**	**399**	**27**	**0**	**72**	**197**	**29**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.97**				**0.94**											
HV %	**2.0%**				**2.7%**											

Client: Santos, P.E., PTOE
Project #: 05
BTD #: 0002_HSH
Location: Allston, MA
Street 1: Linden St
Street 2: Gardner St
Count Date: 5/11/2016
Day of Week: Wednesday
Weather: Sunny, High of 68 F

BOSTON TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
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TRUCKS

	Linden Northbound				Linden Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
7:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	1	4	0	0	0	1	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0

	Linden Northbound				Linden Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	1	4	0	0	0	2	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0
5:15 PM	0	1	3	0	0	1	1	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	3	0	0	1	2	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 8:00 AM to 9:00 AM	Linden Northbound				Linden Southbound				Gardner St Eastbound				Gardner St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**1**	**11**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.60**				**0.63**											

PM PEAK HOUR 4:45 PM to 5:45 PM	Linden Northbound				Linden Southbound				Gardner St Eastbound				Gardner St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**1**	**9**	**0**	**0**	**3**	**6**	**0**								
PHF	**0.63**				**0.75**											

Client: Santos, P.E., PTOE
Project #: 05
BTD #: 0002_HSH
Location: Allston, MA
Street 1: Linden St
Street 2: Gardner St
Count Date: 5/11/2016
Day of Week: Wednesday
Weather: Sunny, High of 68 F

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PEDESTRIANS & BICYCLES

	Linden Northbound				Linden Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
7:00 AM	0	0	0	1	0	0	0	4	0	0	0	7	0	0	0	8
7:15 AM	0	0	0	3	0	0	0	4	0	0	0	6	0	0	0	10
7:30 AM	0	0	0	4	0	3	0	3	0	0	2	5	0	0	0	16
7:45 AM	0	0	0	3	0	0	0	5	0	0	0	5	0	0	0	15
8:00 AM	0	0	0	2	0	2	0	5	0	0	0	6	0	0	0	11
8:15 AM	0	0	0	4	0	0	0	3	0	1	0	15	1	0	0	13
8:30 AM	0	1	0	3	0	7	0	2	0	1	0	18	0	1	0	12
8:45 AM	0	0	0	2	0	0	0	3	0	0	0	15	0	0	0	14

	Linden Northbound				Linden Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
4:00 PM	0	3	0	4	0	0	0	5	0	0	1	15	0	1	0	4
4:15 PM	0	0	0	5	0	0	0	8	0	0	0	16	0	0	0	8
4:30 PM	0	2	1	5	0	2	1	11	0	2	0	11	0	2	0	10
4:45 PM	0	0	0	8	0	0	0	18	0	0	0	14	0	0	0	15
5:00 PM	0	3	0	9	1	2	1	17	0	1	0	9	0	1	0	20
5:15 PM	1	0	1	12	0	0	1	16	0	0	0	13	0	0	0	19
5:30 PM	0	3	0	16	0	3	0	17	0	1	0	12	0	1	0	26
5:45 PM	0	0	0	16	0	0	0	14	0	0	0	15	0	0	0	24

AM PEAK HOUR[1]	Linden Northbound				Linden Southbound				Gardner St Eastbound				Gardner St Westbound			
7:45 AM to	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
8:45 AM	0	1	0	12	0	9	0	15	0	2	0	44	1	1	0	51

PM PEAK HOUR[1]	Linden Northbound				Linden Southbound				Gardner St Eastbound				Gardner St Westbound			
5:00 PM to	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED
6:00 PM	1	6	1	53	1	5	2	64	0	2	0	49	0	2	0	89

[1] *Peak hours corresponds to vehicular peak hours.*

Client:	Santos, P.E., PTOE
Location:	06
BTD #:	0002_HSH
Location:	Allston, MA
Street 1:	Chester St
Street 2:	Gardner St
Count Date:	5/11/2016
Day of Week:	Wednesday
Weather:	Sunny, High of 68 F

BOSTON TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
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www.BostonTrafficData.com

TOTAL (CARS & TRUCKS)

	Chester St Northbound				Chester St Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	7	0	0	0	0	0	0	3	3	0	0	0	0	0
7:15 AM	0	0	8	2	0	0	0	0	0	5	6	0	0	0	0	0
7:30 AM	0	0	3	1	0	0	0	0	0	7	7	0	0	0	0	0
7:45 AM	0	0	5	6	0	0	0	0	0	5	8	0	0	0	0	0
8:00 AM	0	0	7	8	0	0	0	0	0	1	11	0	0	0	0	0
8:15 AM	0	0	6	7	0	0	0	0	0	3	14	0	0	0	0	0
8:30 AM	0	0	6	6	0	0	0	0	0	2	19	0	0	0	0	0
8:45 AM	0	0	5	7	0	0	0	0	0	2	14	0	0	0	0	0

	Chester St Northbound				Chester St Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	10	10	0	0	0	0	0	2	15	0	0	0	0	0
4:15 PM	0	0	12	9	0	0	0	0	0	2	19	0	0	0	0	0
4:30 PM	0	0	12	8	0	0	0	0	0	2	21	0	0	0	0	0
4:45 PM	0	0	16	9	0	0	0	0	0	3	18	0	0	0	0	0
5:00 PM	0	0	17	6	0	0	0	0	0	2	17	0	0	0	0	0
5:15 PM	0	0	15	7	0	0	0	0	0	3	19	0	0	0	0	0
5:30 PM	0	0	13	5	0	0	0	0	0	3	20	0	0	0	0	0
5:45 PM	0	0	15	5	0	0	0	0	0	2	18	0	0	0	0	0

AM PEAK HOUR 8:00 AM to 9:00 AM	Chester St Northbound				Chester St Southbound				Gardner St Eastbound				Gardner St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**24**	**28**	**0**	**0**	**0**	**0**	**0**	**8**	**58**	**0**	**0**	**0**	**0**	**0**
PHF	**0.87**								**0.79**							
HV %	**1.9%**								**3.0%**							

PM PEAK HOUR 4:30 PM to 5:30 PM	Chester St Northbound				Chester St Southbound				Gardner St Eastbound				Gardner St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**60**	**30**	**0**	**0**	**0**	**0**	**0**	**10**	**75**	**0**	**0**	**0**	**0**	**0**
PHF	**0.90**								**0.92**							
HV %	**1.1%**								**2.4%**							

Client: Santos, P.E., PTOE
Location: 06
BTD #: 0002_HSH
Location: Allston, MA
Street 1: Chester St
Street 2: Gardner St
Count Date: 5/11/2016
Day of Week: Wednesday
Weather: Sunny, High of 68 F

BOSTON TRAFFIC DATA
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TRUCKS

	Chester St Northbound				Chester St Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

	Chester St Northbound				Chester St Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 7:00 AM to 8:00 AM	Chester St Northbound				Chester St Southbound				Gardner St Eastbound				Gardner St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
PHF	**0.75**															

PM PEAK HOUR 4:00 PM to 5:00 PM	Chester St Northbound				Chester St Southbound				Gardner St Eastbound				Gardner St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**
PHF	**0.25**								**0.75**							

Client:	Santos, P.E., PTOE
Location:	06
BTD #:	0002_HSH
Location:	Allston, MA
Street 1:	Chester St
Street 2:	Gardner St
Count Date:	5/11/2016
Day of Week:	Wednesday
Weather:	Sunny, High of 68 F

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PEDESTRIANS & BICYCLES

	Chester St Northbound					Chester St Southbound					Gardner St Eastbound					Gardner St Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	2		0	0	0	3		0	0	0	5		0	0	0	4	
7:15 AM	0	0	1	4		0	1	0	4		0	1	0	4		0	0	0	5	
7:30 AM	0	1	0	6		0	0	0	5		0	2	0	0		1	0	0	7	
7:45 AM	0	0	0	8		0	0	0	4		0	0	0	2		0	0	0	6	
8:00 AM	0	0	1	7		0	0	0	3		0	1	1	1		0	0	0	2	
8:15 AM	0	0	0	8		0	0	1	5		0	1	0	1		0	0	0	4	
8:30 AM	1	1	0	6		0	0	0	4		1	1	0	2		0	1	0	3	
8:45 AM	0	0	0	7		0	0	0	4		0	0	0	1		0	0	0	4	

	Chester St Northbound					Chester St Southbound					Gardner St Eastbound					Gardner St Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	1	0	7		0	0	0	7		1	0	0	4		0	2	0	4	
4:15 PM	0	0	1	10		1	0	0	8		0	1	0	5		0	1	0	6	
4:30 PM	0	1	0	11		0	0	0	5		0	1	0	6		0	1	1	6	
4:45 PM	0	0	0	15		0	1	0	13		0	0	0	7		0	2	0	9	
5:00 PM	0	1	0	16		0	0	0	17		0	1	0	5		0	2	0	11	
5:15 PM	1	0	0	22		0	1	0	12		1	0	0	8		1	1	0	12	
5:30 PM	1	2	0	28		0	0	0	16		0	0	2	6		0	1	0	11	
5:45 PM	0	0	0	24		0	0	0	16		0	1	0	4		0	1	0	10	

AM PEAK HOUR[1] 8:00 AM to 9:00 AM	Chester St Northbound					Chester St Southbound					Gardner St Eastbound					Gardner St Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	1	1	1	28		0	0	1	16		1	3	1	5		0	1	0	13	

PM PEAK HOUR[1] 4:30 PM to 5:30 PM	Chester St Northbound					Chester St Southbound					Gardner St Eastbound					Gardner St Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	1	2	0	64		0	2	0	47		1	2	0	26		1	6	1	38	

[1] *Peak hours corresponds to vehicular peak hours.*

Client:	Santos, P.E., PTOE
Location:	07
BTD #:	0002_HSH
Location:	Allston, MA
Street 1:	Malvern St
Street 2:	Gardner St
Count Date:	5/11/2016
Day of Week:	Wednesday
Weather:	Sunny, High of 68 F

BOSTON TRAFFIC DATA
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TOTAL (CARS & TRUCKS)

	Malvern St Northbound				Malvern St Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	4	6	0	1	1	0	0	0	6	5	0	0	0	0
7:15 AM	0	0	3	5	0	1	2	0	0	1	8	3	0	0	0	0
7:30 AM	0	0	0	5	0	0	2	0	0	0	7	1	0	0	0	0
7:45 AM	0	0	3	4	0	1	1	0	0	1	10	3	0	0	0	0
8:00 AM	0	0	3	5	0	0	1	0	0	0	12	5	0	0	0	0
8:15 AM	0	0	2	8	0	0	2	0	0	0	11	5	0	0	0	0
8:30 AM	0	0	1	11	0	2	3	0	0	1	14	4	0	0	0	0
8:45 AM	0	0	3	7	0	1	2	0	0	1	14	3	0	0	0	0

	Malvern St Northbound				Malvern St Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	3	8	0	0	13	0	0	0	14	9	0	0	0	0
4:15 PM	0	0	4	12	0	3	16	0	0	1	13	10	0	0	0	0
4:30 PM	0	0	3	12	0	5	18	0	0	1	11	11	0	0	0	0
4:45 PM	0	0	2	8	0	3	14	0	0	1	15	6	0	0	0	0
5:00 PM	0	0	1	5	0	2	16	0	0	0	13	5	0	0	0	0
5:15 PM	0	0	2	9	0	2	15	0	0	0	18	6	0	0	0	0
5:30 PM	0	0	1	10	0	2	8	0	0	1	20	7	0	0	0	0
5:45 PM	0	0	1	9	0	3	10	0	0	0	17	6	0	0	0	0

AM PEAK HOUR 8:00 AM to 9:00 AM	Malvern St Northbound				Malvern St Southbound				Gardner St Eastbound				Gardner St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**9**	**31**	**0**	**3**	**8**	**0**	**0**	**2**	**51**	**17**	**0**	**0**	**0**	**0**
PHF	**0.83**				**0.55**				**0.92**							
HV %	**2.5%**				**9.1%**				**2.9%**							

PM PEAK HOUR 4:00 PM to 5:00 PM	Malvern St Northbound				Malvern St Southbound				Gardner St Eastbound				Gardner St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**12**	**40**	**0**	**11**	**61**	**0**	**0**	**3**	**53**	**36**	**0**	**0**	**0**	**0**
PHF	**0.81**				**0.78**				**0.96**							
HV %	**2.6%**				**1.7%**				**0.0%**							

Client: Santos, P.E., PTOE
Location: 07
BTD #: 0002_HSH
Location: Allston, MA
Street 1: Malvern St
Street 2: Gardner St
Count Date: 5/11/2016
Day of Week: Wednesday
Weather: Sunny, High of 68 F

BOSTON TRAFFIC DATA
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TRUCKS

	Malvern St Northbound				Malvern St Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

	Malvern St Northbound				Malvern St Southbound				Gardner St Eastbound				Gardner St Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AM PEAK HOUR 8:00 AM to 9:00 AM	Malvern St Northbound				Malvern St Southbound				Gardner St Eastbound				Gardner St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**
PHF	**0.25**				**0.25**				**0.50**							

PM PEAK HOUR 4:00 PM to 5:00 PM	Malvern St Northbound				Malvern St Southbound				Gardner St Eastbound				Gardner St Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**
PHF					**0.75**				**0.50**							

Client: Santos, P.E., PTOE
Location: 07
BTD #: 0002_HSH
Location: Allston, MA
Street 1: Malvern St
Street 2: Gardner St
Count Date: 5/11/2016
Day of Week: Wednesday
Weather: Sunny, High of 68 F

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PEDESTRIANS & BICYCLES

	Malvern St Northbound					Malvern St Southbound					Gardner St Eastbound					Gardner St Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	5		0	0	0	8		0	0	0	3		0	0	0	9	
7:15 AM	0	1	0	9		0	0	0	5		0	2	0	3		0	0	0	9	
7:30 AM	0	1	0	8		0	0	0	7		0	1	0	2		0	1	0	12	
7:45 AM	0	0	0	10		0	0	0	6		0	0	0	1		0	0	0	10	
8:00 AM	0	1	0	9		0	1	0	6		0	2	0	4		0	0	0	12	
8:15 AM	0	1	0	7		0	0	0	4		0	1	0	7		0	0	0	10	
8:30 AM	0	1	0	8		0	0	0	5		0	1	0	2		0	1	0	11	
8:45 AM	0	0	0	9		0	0	0	6		0	1	0	4		0	0	0	10	

	Malvern St Northbound					Malvern St Southbound					Gardner St Eastbound					Gardner St Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	1	0	4		0	3	0	9		0	0	0	5		0	2	1	5	
4:15 PM	0	2	0	12		0	1	0	12		0	0	1	8		0	1	0	4	
4:30 PM	0	0	0	22		0	1	0	10		0	1	0	7		0	0	0	2	
4:45 PM	1	1	0	19		1	1	0	12		0	0	0	5		1	0	0	6	
5:00 PM	0	1	0	20		0	0	0	14		0	0	0	8		0	1	0	4	
5:15 PM	0	2	0	23		0	0	1	18		1	1	0	14		0	1	1	7	
5:30 PM	0	3	0	14		1	2	0	15		0	0	0	13		0	0	0	11	
5:45 PM	0	1	1	21		0	0	0	16		0	0	0	11		0	0	0	9	

AM PEAK HOUR[1]	Malvern St Northbound					Malvern St Southbound					Gardner St Eastbound					Gardner St Westbound				
8:00 AM to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
9:00 AM	0	3	0	33		0	1	0	21		0	5	0	17		0	1	0	43	

PM PEAK HOUR[1]	Malvern St Northbound					Malvern St Southbound					Gardner St Eastbound					Gardner St Westbound				
4:00 PM to	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
5:00 PM	0	7	1	78		1	2	1	63		1	1	0	46		0	2	1	31	

[1] *Peak hours corresponds to vehicular peak hours.*

SEASONAL ADJUSTMENT FACTORS

MASSACHUSETTS HIGHWAY DEPARTMENT - STATEWIDE TRAFFIC DATA COLLECTION

2011 WEEKDAY SEASONAL FACTORS *

* Note: These are weekday factors. The average of the factors for the year will not equal 1, as weekend data are not considered.

FACTOR GROUP	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GROUP **1** - WEST INTERSTATE	0.98	0.93	0.90	0.89	0.90	0.88	0.91	0.90	0.89	0.89	0.93	0.95
Use group 2 for R5, R6, & R0 GROUP **2** - **RURAL MAJOR COLLECTOR (R-5)**	1.12	1.12	1.07	0.99	0.91	0.90	0.86	0.86	0.92	0.93	1.01	1.05
GROUP **3A** - RECREATIONAL **(1-4) See below	1.26	1.25	1.20	1.06	0.96	0.89	0.76	0.76	0.92	0.99	1.08	1.14
GROUP **3B** - RECREATIONAL ***(5) See below	1.22	1.26	1.22	1.06	0.96	0.90	0.72	0.74	0.97	1.02	1.14	1.15
GROUP **4** - I-495 INTERSTATE	1.02	1.00	1.00	0.96	0.92	0.89	0.85	0.83	0.93	0.96	1.01	1.03
GROUP **5** - EAST INTERSTATE	1.04	1.00	0.96	0.93	0.92	0.91	0.91	0.89	0.93	0.93	0.96	1.01
GROUP **6**: Use group 6 for U2, U3, U5, U6, U0, R2, & R3 **URBAN ARTERIALS, COLLECTORS & RURAL ARTERIALS (R-2, R-3)**	1.03	1.01	0.96	0.92	0.91	0.90	0.92	0.92	0.93	0.92	0.97	0.97
GROUP **7** - I-84 PROXIMITY (STA. 17, 3921)	1.24	1.24	1.15	1.04	0.99	1.00	0.93	0.89	1.05	1.05	1.05	1.12
GROUP **8** - I-295 PROXIMITY (STA. 6590)	1.00	0.99	0.95	0.92	0.94	0.91	0.93	0.92	0.95	0.94	0.97	0.95
GROUP **9** - I-195 PROXIMITY (STA. 7)	1.13	1.05	1.03	0.95	0.89	0.87	0.86	0.79	0.88	0.91	0.99	1.03

RECREATIONAL: (ALL YEARS)

**GROUP 3A:

1. CAPE COD (ALL TOWNS)

2.PLYMOUTH(SOUTH OF RTE.3A)

7014, 7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108,7178

3.MARTHA'S VINEYARD

4.NANTUCKET

***GROUP 3B:

5.PERMANENTS 2 & 189

1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,

1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,

1105,1106,1107,1108,1113,1114,1116,2196,2197,2198

2011 AXLE CORRECTION FACTORS

ROAD INVENTORY FUNCTIONAL CLASSIFICATION	AXLE CORRECTION FACTOR
RURAL	
1	0.95
2	0.97
3	0.98
0,5,6	0.98
URBAN	
1	0.96
2,3	0.98
5	0.98
0,6	0.99
I-84	0.90

ROUND OFF

0 - 999............10

> 1,000..........100

Apply I-84 factor to stations:

3290, 3921, 3929

TRIP GENERATION CALCULATIONS

15117.01 45 Brighton Ave-83 Gardner St

Trip Generation Assessment

HOWARD STEIN HUDSON

14-Jun-2016

XX HARD CODED TO BALANCE (Manually change formatting)

Land Use	Size	Category	Directional Split	Average Trip Rate	Unadjusted Vehicle Trips	Assumed National Vehicle Occupancy Rate[1]	Unadjusted Person-Trips	Internal Capture Person-Trips[2]	Pass-By Person-Trips Share	Pass-By Person-Trips	Non-Primary Person-Trips	Primary Person Trips	Transit Share[3]	Transit Person-Trips	Walk/Bike/ Other Share[3]	Walk/ Bike/ Other Trips	Auto Share[3]	Auto Person-Trips	Assumed Local Auto Occupancy Rate[4]	Total Adjusted Auto Trips
Daily Peak Hour																				
Apartment[5]	76	Total		6.650	506	1.13	**572**	0		0	0	**572**	22%	**126**	31%	**178**	47%	**268**	1.13	**238**
45-55 Brighton	units	In	50%	3.325	253	1.13	**286**		0%	0	0	**286**	22%	**63**	31%	**89**	47%	**134**	1.13	**119**
		Out	50%	3.325	253	1.13	**286**		0%	0	0	**286**	22%	**63**	31%	**89**	47%	**134**	1.13	**119**
Apartment[5]	38	Total		6.650	252	1.13	**284**	0		0	0	**284**	22%	**62**	31%	**88**	47%	**134**	1.13	**118**
79-83 Gardner	units	In	50%	3.325	126	1.13	**142**		0%	0	0	**142**	22%	**31**	31%	**44**	47%	**67**	1.13	**59**
		Out	50%	3.325	126	1.13	**142**		0%	0	0	**142**	22%	**31**	31%	**44**	47%	**67**	1.13	**59**
Total		Total			**758**		**856**	**0**		**0**	0	**856**		**188**		**266**		**402**		**356**
		In			**379**		**428**	**0**		**0**	0	**428**		**94**		**133**		**201**		**178**
		Out			**379**		**428**	**0**		**0**	0	**428**		**94**		**133**		**201**		**178**
AM Peak Hour																				
Apartment[5]	76	Total		0.51	39	1.13	**44**	0		0	0	**44**		**10**		**16**		**18**	1.13	**16**
45-55 Brighton	units	In	20%	0.102	8	1.13	**9**		0%	0	0	**9**	30%	**3**	33%	**3**	37%	**3**	1.13	**3**
		Out	80%	0.408	31	1.13	**35**		0%	0	0	**35**	21%	**7**	36%	**13**	43%	**15**	1.13	**13**
Apartment[5]	38	Total		0.51	20	1.13	**23**	0		0	0	**23**		**5**		**8**		**10**	1.13	**9**
79-83 Gardner	units	In	20%	0.102	4	1.13	**5**		0%	0	0	**5**	30%	**1**	33%	**2**	37%	**2**	1.13	**2**
		Out	80%	0.408	16	1.13	**18**		0%	0	0	**18**	21%	**4**	36%	**6**	43%	**8**	1.13	**7**
Total		Total			**59**		**67**	**0**		**0**	0	**67**		**15**		**24**		**28**		**25**
		In			**12**		**14**	**0**		**0**	0	**14**		**4**		**5**		**5**		**5**
		Out			**47**		**53**	**0**		**0**	0	**53**		**11**		**19**		**23**		**20**
PM Peak Hour																				
Apartment[5]	76	Total		0.62	47	1.13	**53**	0		0	0	**53**		**12**		**19**		**22**	1.13	**19**
45-55 Brighton	units	In	65%	0.403	31	1.13	**35**		0%	0	0	**35**	21%	**7**	36%	**13**	43%	**15**	1.13	**13**
		Out	35%	0.217	16	1.13	**18**		0%	0	0	**18**	30%	**5**	33%	**6**	37%	**7**	1.13	**6**
Apartment[5]	38	Total		0.62	23	1.13	**26**	0		0	0	**26**		**7**		**9**		**10**	1.13	**9**
79-83 Gardner	units	In	65%	0.403	15	1.13	**17**		0%	0	0	**17**	21%	**4**	36%	**6**	43%	**7**	1.13	**6**
		Out	35%	0.217	8	1.13	**9**		0%	0	0	**9**	30%	**3**	33%	**3**	37%	**3**	1.13	**3**
Total		Total			**70**		**79**	**0**		**0**	0	**79**		**19**		**28**		**32**		**28**
		In			**46**		**52**	**0**		**0**	0	**52**		**11**		**19**		**22**		**19**
		Out			**24**		**27**	**0**		**0**	0	**27**		**8**		**9**		**10**		**9**

1. 2009 National vehicle occupancy rates - 1.13:home to work; 1.84: family/personal business; 1.78: shopping; 2.2 social/recreational
2. Based on ITE Trip Generation Handbook, 3rd Edition method
3. Mode shares based on peak-hour BTD Data for Area 17
4. Local vehicle occupancy rates based on 2009 National vehicle occupancy rates
5. ITE Trip Generation Manual, 9th Edition, LUC 220 (Apartment), average rate

INTERSECTION CAPACITY ANALYSIS WORKSHEETS

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations															
Traffic Volume (vph)	2	59	403	0	13	0	299	173	30	286	46	53	0	32	
Future Volume (vph)	2	59	403	0	13	0	299	173	30	286	46	53	0	32	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	11	11	12	11	11	12	12	12	12	12	12	12	
Grade (%)			0%				0%			0%			0%		
Storage Length (ft)		140		0		0		0	25		0	0		0	
Storage Lanes		1		0		0		0	0		0	0		0	
Taper Length (ft)		45				25			25			25			
Lane Util. Factor	0.95	1.00	0.95	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor							0.99			1.00			1.00		
Frt							0.947			0.983			0.950		
Flt Protected		0.950					0.999			0.996			0.970		
Satd. Flow (prot)	0	1570	2855	0	0	0	2802	0	0	1481	0	0	1549	0	
Flt Permitted		0.354					0.940			0.970			0.525		
Satd. Flow (perm)	0	585	2855	0	0	0	2636	0	0	1442	0	0	838	0	
Right Turn on Red				Yes				No			Yes			Yes	
Satd. Flow (RTOR)										9			87		
Link Speed (mph)			30				30			30			30		
Link Distance (ft)			412				517			268			300		
Travel Time (s)			9.4				11.8			6.1			6.8		
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)								11			1			2	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.86	0.86	0.86	0.86	0.97	0.97	0.97	0.69	0.69	0.69	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	0%	0%	10%	0%	0%	0%	7%	1%	0%	2%	0%	2%	0%	0%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Parking (#/hr)										0					
Mid-Block Traffic (%)			0%				0%			0%			0%		
Adj. Flow (vph)	2	63	433	0	15	0	348	201	31	295	47	77	0	46	
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	65	433	0	0	0	564	0	0	373	0	0	123	0	
Turn Type	Perm	Perm	NA		Perm		NA		Perm	NA		Perm	NA		
Protected Phases			1				1			3			3		2
Permitted Phases	1	1			1				3			3			
Detector Phase	1	1	1		1		1		3	3		3	3		
Switch Phase															
Minimum Initial (s)	10.0	10.0	10.0		10.0		10.0		8.0	8.0		8.0	8.0		5.0
Minimum Split (s)	18.0	18.0	18.0		18.0		18.0		12.0	12.0		12.0	12.0		25.0
Total Split (s)	29.0	29.0	29.0		29.0		29.0		46.0	46.0		46.0	46.0		25.0
Total Split (%)	29.0%	29.0%	29.0%		29.0%		29.0%		46.0%	46.0%		46.0%	46.0%		25%
Maximum Green (s)	25.0	25.0	25.0		25.0		25.0		42.0	42.0		42.0	42.0		18.0
Yellow Time (s)	3.0	3.0	3.0		3.0		3.0		3.0	3.0		3.0	3.0		3.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0		1.0	1.0		1.0	1.0		4.0
Lost Time Adjust (s)		0.0	0.0				0.0			0.0			0.0		
Total Lost Time (s)		4.0	4.0				4.0			4.0			4.0		
Lead/Lag	Lead	Lead	Lead		Lead		Lead								Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes								Yes
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0		2.0	2.0		2.0	2.0		2.0
Minimum Gap (s)	2.0	2.0	2.0		2.0		2.0		2.0	2.0		2.0	2.0		2.0
Time Before Reduce (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0		0.0	0.0		0.0
Time To Reduce (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0		0.0	0.0		0.0
Recall Mode	C-Max	C-Max	C-Max		C-Max		C-Max		None	None		None	None		None
Walk Time (s)	7.0	7.0	7.0		7.0		7.0								7.0
Flash Dont Walk (s)	7.0	7.0	7.0		7.0		7.0								11.0
Pedestrian Calls (#/hr)	0	0	0		0		0								100
Act Effct Green (s)		41.5	41.5				41.5			30.5			30.5		
Actuated g/C Ratio		0.42	0.42				0.42			0.30			0.30		
v/c Ratio		0.27	0.37				0.52			0.84			0.39		
Control Delay		30.6	25.4				28.4			47.6			12.0		
Queue Delay		0.0	0.0				0.0			0.0			0.0		
Total Delay		30.6	25.4				28.4			47.6			12.0		
LOS		C	C				C			D			B		
Approach Delay			26.1				28.4			47.6			12.0		
Approach LOS			C				C			D			B		
Queue Length 50th (ft)		29	107				150			215			17		
Queue Length 95th (ft)		79	176				227			287			30		
Internal Link Dist (ft)			332				437			188			220		
Turn Bay Length (ft)		140													
Base Capacity (vph)		242	1185				1094			610			402		
Starvation Cap Reductn		0	0				0			0			0		
Spillback Cap Reductn		0	0				0			0			0		
Storage Cap Reductn		0	0				0			0			0		
Reduced v/c Ratio		0.27	0.37				0.52			0.61			0.31		

Intersection Summary

Area Type: CBD
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 21 (21%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 30.9 — Intersection LOS: C
Intersection Capacity Utilization 62.0% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: Linden St & Brighton Ave

Lane Group	EBT	EBR	EBR2	WBL2	WBT	NBR	NWR	Ø2
Lane Configurations								
Traffic Volume (vph)	376	1	8	402	559	836	0	
Future Volume (vph)	376	1	8	402	559	836	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	11	12	11	12	
Grade (%)	0%				0%			
Storage Length (ft)		0				0	0	
Storage Lanes		0				2	1	
Taper Length (ft)								
Lane Util. Factor	0.95	0.95	0.95	0.97	1.00	0.88	1.00	
Ped Bike Factor	1.00							
Frt	0.997					0.850		
Flt Protected				0.950				
Satd. Flow (prot)	2997	0	0	2958	1644	2401	1660	
Flt Permitted				0.950				
Satd. Flow (perm)	2997	0	0	2958	1644	2401	1660	
Right Turn on Red							No	
Satd. Flow (RTOR)								
Link Speed (mph)	30				30			
Link Distance (ft)	165				656			
Travel Time (s)	3.8				14.9			
Confl. Peds. (#/hr)			42					
Confl. Bikes (#/hr)			79					
Peak Hour Factor	0.95	0.95	0.95	0.92	0.92	0.97	0.97	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	8%	0%	0%	3%	4%	3%	3%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	
Parking (#/hr)								
Mid-Block Traffic (%)	0%				0%			
Adj. Flow (vph)	396	1	8	437	608	862	0	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	405	0	0	437	608	862	0	
Turn Type	NA			Prot	NA	pt+ov	custom	
Protected Phases	3			1	1 3	1 2!	1 2!	2
Permitted Phases								
Detector Phase	3			1	1	1 2	1	
Switch Phase					3		2	
Minimum Initial (s)	8.0			10.0				8.0
Minimum Split (s)	37.0			17.0				25.0
Total Split (s)	49.0			44.0				27.0
Total Split (%)	40.8%			36.7%				23%
Maximum Green (s)	41.0			37.0				20.0
Yellow Time (s)	3.0			3.0				3.0
All-Red Time (s)	5.0			4.0				4.0
Lost Time Adjust (s)	0.0			0.0				
Total Lost Time (s)	8.0			7.0				
Lead/Lag				Lead				Lag
Lead-Lag Optimize?				Yes				Yes
Vehicle Extension (s)	2.0			2.0				2.0
Minimum Gap (s)	2.0			2.0				2.0
Time Before Reduce (s)	0.0			0.0				0.0
Time To Reduce (s)	0.0			0.0				0.0
Recall Mode	Min			C-Max				Min
Walk Time (s)	7.0							7.0
Flash Dont Walk (s)	22.0							11.0
Pedestrian Calls (#/hr)	100							100
Act Effct Green (s)	30.2			49.4	87.6	74.8		
Actuated g/C Ratio	0.25			0.41	0.73	0.62		
v/c Ratio	0.54			0.36	0.51	0.58		
Control Delay	41.5			26.0	8.8	15.6		
Queue Delay	0.0			0.0	0.0	0.0		
Total Delay	41.5			26.0	8.8	15.6		
LOS	D			C	A	B		
Approach Delay	41.5				16.0			
Approach LOS	D				B			
Queue Length 50th (ft)	145			115	174	201		
Queue Length 95th (ft)	184			177	266	306		
Internal Link Dist (ft)	85				576			
Turn Bay Length (ft)								
Base Capacity (vph)	1023			1217	1200	1527		
Starvation Cap Reductn	0			0	0	0		
Spillback Cap Reductn	0			0	0	0		
Storage Cap Reductn	0			0	0	0		
Reduced v/c Ratio	0.40			0.36	0.51	0.56		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 38 (32%), Referenced to phase 1:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 20.3 Intersection LOS: C
Intersection Capacity Utilization 80.3% ICU Level of Service D
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: Commonwealth Ave & Brighton Ave

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (veh/h)	10	15	431	6	3	5	551	28	0	0	0	0	0	0
Future Volume (Veh/h)	10	15	431	6	3	5	551	28	0	0	0	0	0	0
Sign Control			Free				Free			Stop			Stop	
Grade			0%				0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.86	0.86	0.86	0.86	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	16	459	6	0	6	641	33	0	0	0	0	0	0
Pedestrians										54			72	
Lane Width (ft)										0.0			0.0	
Walking Speed (ft/s)										3.5			3.5	
Percent Blockage										0			0	
Right turn flare (veh)														
Median type			None				None							
Median storage veh)														
Upstream signal (ft)			517				1028							
pX, platoon unblocked	0.00				0.00	0.97			0.97	0.97	0.97	0.97	0.97	
vC, conflicting volume	0	746			0	519			880	1306	286	1003	1292	409
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	0	746			0	448			820	1257	209	946	1244	409
tC, single (s)	0.0	4.1			0.0	5.3			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)														
tF (s)	0.0	2.2			0.0	2.8			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0	98			0	99			100	100	100	100	100	100
cM capacity (veh/h)	0	871			0	766			254	161	775	206	164	592

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	246	236	326	354
Volume Left	16	0	6	0
Volume Right	0	6	0	33
cSH	871	1700	766	1700
Volume to Capacity	0.02	0.14	0.01	0.21
Queue Length 95th (ft)	1	0	1	0
Control Delay (s)	0.8	0.0	0.3	0.0
Lane LOS	A		A	
Approach Delay (s)	0.4		0.1	
Approach LOS				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (veh/h)	10	40	385	551	8	0	26
Future Volume (Veh/h)	10	40	385	551	8	0	26
Sign Control			Free	Free		Stop	
Grade			0%	0%		0%	
Peak Hour Factor	0.93	0.93	0.93	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	0	43	414	656	10	0	31
Pedestrians						111	
Lane Width (ft)						11.0	
Walking Speed (ft/s)						3.5	
Percent Blockage						10	
Right turn flare (veh)							
Median type			None	None			
Median storage veh)							
Upstream signal (ft)				165			
pX, platoon unblocked	0.00						
vC, conflicting volume	0	777				1065	444
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	0	777				1065	444
tC, single (s)	0.0	4.2				6.8	7.0
tC, 2 stage (s)							
tF (s)	0.0	2.2				3.5	3.3
p0 queue free %	0	94				100	94
cM capacity (veh/h)	0	748				188	502

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	43	207	207	437	229	31
Volume Left	43	0	0	0	0	0
Volume Right	0	0	0	0	10	31
cSH	748	1700	1700	1700	1700	502
Volume to Capacity	0.06	0.12	0.12	0.26	0.13	0.06
Queue Length 95th (ft)	5	0	0	0	0	5
Control Delay (s)	10.1	0.0	0.0	0.0	0.0	12.6
Lane LOS	B					B
Approach Delay (s)	1.0			0.0		12.6
Approach LOS						B

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	34.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	62	431	22	34	99	15
Future Volume (Veh/h)	0	0	0	0	0	0	62	431	22	34	99	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95	0.76	0.76	0.76
Hourly flow rate (vph)	0	0	0	0	0	0	65	454	23	45	130	20
Pedestrians		44			51							
Lane Width (ft)		0.0			0.0							
Walking Speed (ft/s)		3.5			3.5							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								300				
pX, platoon unblocked	0.87	0.87		0.87	0.87	0.87				0.87		
vC, conflicting volume	870	932	184	876	930	516	194			528		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	779	851	184	787	849	375	194			389		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	95			96		
cM capacity (veh/h)	255	237	858	252	238	587	1379			1033		

Direction, Lane #	NB 1	SB 1
Volume Total	542	195
Volume Left	65	45
Volume Right	23	20
cSH	1379	1033
Volume to Capacity	0.05	0.04
Queue Length 95th (ft)	4	3
Control Delay (s)	1.4	2.3
Lane LOS	A	A
Approach Delay (s)	1.4	2.3
Approach LOS		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	58	0	0	0	0	0	24	28	0	0	0
Future Volume (Veh/h)	8	58	0	0	0	0	0	24	28	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.79	0.79	0.79	0.92	0.92	0.92	0.87	0.87	0.87	0.92	0.92	0.92
Hourly flow rate (vph)	10	73	0	0	0	0	0	28	32	0	0	0
Pedestrians					13						16	
Lane Width (ft)					0.0						0.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	16			73			93	109	86	168	109	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	16			73			93	109	86	168	109	16
tC, single (s)	4.1			4.1			7.1	6.6	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.1	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	96	97	100	100	100
cM capacity (veh/h)	1615			1527			891	756	978	745	776	1063

Direction, Lane #	EB 1	NB 1
Volume Total	83	60
Volume Left	10	0
Volume Right	0	32
cSH	1615	860
Volume to Capacity	0.01	0.07
Queue Length 95th (ft)	0	6
Control Delay (s)	0.9	9.5
Lane LOS	A	A
Approach Delay (s)	0.9	9.5
Approach LOS		A

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	17.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Traffic Vol, veh/h	0	2	51	17	0	0	0	0	0	0	9	31	0	3
Future Vol, veh/h	0	2	51	17	0	0	0	0	0	0	9	31	0	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.83	0.83	0.83	0.92	0.55
Heavy Vehicles, %	2	0	4	0	2	2	2	2	2	0	11	0	2	0
Mvmt Flow	0	2	55	18	0	0	0	0	0	0	11	37	0	5
Number of Lanes	0	0	1	0	0	0	0	0	0	0	1	0	0	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.3	7	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	0%	3%	27%
Vol Thru, %	22%	73%	73%
Vol Right, %	78%	24%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	40	70	11
LT Vol	0	2	3
Through Vol	9	51	8
RT Vol	31	17	0
Lane Flow Rate	48	76	20
Geometry Grp	1	1	1
Degree of Util (X)	0.05	0.082	0.023
Departure Headway (Hd)	3.771	3.878	4.126
Convergence, Y/N	Yes	Yes	Yes
Cap	947	924	866
Service Time	1.803	1.902	2.16
HCM Lane V/C Ratio	0.051	0.082	0.023
HCM Control Delay	7	7.3	7.3
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.3	0.1

Intersection		
Intersection Delay, s/veh		
Intersection LOS		

Movement	SBT	SBR
Traffic Vol, veh/h	8	0
Future Vol, veh/h	8	0
Peak Hour Factor	0.55	0.55
Heavy Vehicles, %	13	0
Mvmt Flow	15	0
Number of Lanes	1	0

Approach	
Opposing Approach	
Opposing Lanes	
Conflicting Approach Left	
Conflicting Lanes Left	
Conflicting Approach Right	
Conflicting Lanes Right	
HCM Control Delay	
HCM LOS	

Lane

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations															
Traffic Volume (vph)	13	45	410	0	21	0	524	267	29	182	73	137	0	54	
Future Volume (vph)	13	45	410	0	21	0	524	267	29	182	73	137	0	54	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	11	11	12	11	11	12	12	12	12	12	12	12	
Grade (%)			0%				0%			0%			0%		
Storage Length (ft)		140		0		0		0	25		0	0		0	
Storage Lanes		1		0		0		0	0		0	0		0	
Taper Length (ft)		45				25			25			25			
Lane Util. Factor	0.95	1.00	0.95	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor							0.94			1.00			1.00		
Frt							0.951			0.965			0.962		
Flt Protected		0.950					0.999			0.995			0.965		
Satd. Flow (prot)	0	1570	3020	0	0	0	2707	0	0	1463	0	0	1570	0	
Flt Permitted		0.300					0.937			0.958			0.409		
Satd. Flow (perm)	0	496	3020	0	0	0	2539	0	0	1409	0	0	665	0	
Right Turn on Red				Yes				No			Yes			Yes	
Satd. Flow (RTOR)										21			87		
Link Speed (mph)			30				30			30			30		
Link Distance (ft)			412				517			268			300		
Travel Time (s)			9.4				11.8			6.1			6.8		
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)								105			2			3	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.96	0.96	0.96	0.96	0.97	0.97	0.97	0.87	0.87	0.87	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	0%	0%	4%	0%	0%	0%	5%	2%	0%	1%	0%	1%	0%	0%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Parking (#/hr)										0					
Mid-Block Traffic (%)			0%				0%			0%			0%		
Adj. Flow (vph)	14	49	451	0	22	0	546	278	30	188	75	157	0	62	
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	63	451	0	0	0	846	0	0	293	0	0	219	0	
Turn Type	Perm	Perm	NA		Perm		NA		Perm	NA		Perm	NA		
Protected Phases			1				1			3			3		2
Permitted Phases	1	1			1				3			3			
Detector Phase	1	1	1		1		1		3	3		3	3		
Switch Phase															
Minimum Initial (s)	10.0	10.0	10.0		10.0		10.0		8.0	8.0		8.0	8.0		5.0
Minimum Split (s)	18.0	18.0	18.0		18.0		18.0		12.0	12.0		12.0	12.0		25.0
Total Split (s)	29.0	29.0	29.0		29.0		29.0		46.0	46.0		46.0	46.0		25.0
Total Split (%)	29.0%	29.0%	29.0%		29.0%		29.0%		46.0%	46.0%		46.0%	46.0%		25%
Maximum Green (s)	25.0	25.0	25.0		25.0		25.0		42.0	42.0		42.0	42.0		18.0
Yellow Time (s)	3.0	3.0	3.0		3.0		3.0		3.0	3.0		3.0	3.0		3.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0		1.0	1.0		1.0	1.0		4.0
Lost Time Adjust (s)		0.0	0.0				0.0			0.0			0.0		
Total Lost Time (s)		4.0	4.0				4.0			4.0			4.0		
Lead/Lag	Lead	Lead	Lead		Lead		Lead								Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes								Yes
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0		2.0	2.0		2.0	2.0		2.0
Minimum Gap (s)	2.0	2.0	2.0		2.0		2.0		2.0	2.0		2.0	2.0		2.0
Time Before Reduce (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0		0.0	0.0		0.0
Time To Reduce (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0		0.0	0.0		0.0
Recall Mode	C-Max	C-Max	C-Max		C-Max		C-Max		None	None		None	None		None
Walk Time (s)	7.0	7.0	7.0		7.0		7.0								7.0
Flash Dont Walk (s)	7.0	7.0	7.0		7.0		7.0								11.0
Pedestrian Calls (#/hr)	0	0	0		0		0								0
Act Effct Green (s)		67.2	67.2				67.2			24.8			24.8		
Actuated g/C Ratio		0.67	0.67				0.67			0.25			0.25		
v/c Ratio		0.19	0.22				0.50			0.80			0.95		
Control Delay		10.2	7.7				10.9			48.4			70.5		
Queue Delay		0.0	0.0				0.0			0.0			0.0		
Total Delay		10.2	7.7				10.9			48.4			70.5		
LOS		B	A				B			D			E		
Approach Delay			8.0				10.9			48.4			70.5		
Approach LOS			A				B			D			E		
Queue Length 50th (ft)		13	52				124			164			89		
Queue Length 95th (ft)		44	100				235			228			#193		
Internal Link Dist (ft)			332				437			188			220		
Turn Bay Length (ft)		140													
Base Capacity (vph)		333	2029				1706			603			329		
Starvation Cap Reductn		0	0				0			0			0		
Spillback Cap Reductn		0	0				0			0			0		
Storage Cap Reductn		0	0				0			0			0		
Reduced v/c Ratio		0.19	0.22				0.50			0.49			0.67		

Intersection Summary

Area Type: CBD
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 21 (21%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 22.9 Intersection LOS: C
Intersection Capacity Utilization 81.7% ICU Level of Service D
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Linden St & Brighton Ave

Lane Group	EBT	EBR	EBR2	WBL2	WBT	NBR	NWR	Ø2
Lane Configurations								
Traffic Volume (vph)	535	6	17	686	826	440	0	
Future Volume (vph)	535	6	17	686	826	440	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	11	12	11	12	
Grade (%)	0%				0%			
Storage Length (ft)		0				0	0	
Storage Lanes		0				2	1	
Taper Length (ft)								
Lane Util. Factor	0.95	0.95	0.95	0.97	1.00	0.88	1.00	
Ped Bike Factor	0.99							
Frt	0.994					0.850		
Flt Protected				0.950				
Satd. Flow (prot)	3144	0	0	2987	1660	2448	1693	
Flt Permitted				0.950				
Satd. Flow (perm)	3144	0	0	2987	1660	2448	1693	
Right Turn on Red							No	
Satd. Flow (RTOR)								
Link Speed (mph)	30				30			
Link Distance (ft)	165				656			
Travel Time (s)	3.8				14.9			
Confl. Peds. (#/hr)			132					
Confl. Bikes (#/hr)			29					
Peak Hour Factor	0.89	0.89	0.89	0.99	0.99	0.99	0.99	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	2%	0%	0%	2%	3%	1%	1%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	
Parking (#/hr)								
Mid-Block Traffic (%)	0%				0%			
Adj. Flow (vph)	601	7	19	693	834	444	0	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	627	0	0	693	834	444	0	
Turn Type	NA			Prot	NA	pt+ov	custom	
Protected Phases	3			1	1 3	1 2!	1 2!	2
Permitted Phases								
Detector Phase	3			1	1	1 2	1	
Switch Phase					3		2	
Minimum Initial (s)	8.0			10.0				8.0
Minimum Split (s)	37.0			17.0				25.0
Total Split (s)	49.0			44.0				27.0
Total Split (%)	40.8%			36.7%				23%
Maximum Green (s)	41.0			37.0				20.0
Yellow Time (s)	3.0			3.0				3.0
All-Red Time (s)	5.0			4.0				4.0
Lost Time Adjust (s)	0.0			0.0				
Total Lost Time (s)	8.0			7.0				
Lead/Lag				Lead				Lag
Lead-Lag Optimize?				Yes				Yes
Vehicle Extension (s)	2.0			2.0				2.0
Minimum Gap (s)	2.0			2.0				2.0
Time Before Reduce (s)	0.0			0.0				0.0
Time To Reduce (s)	0.0			0.0				0.0
Recall Mode	Min			C-Max				Min
Walk Time (s)	7.0							7.0
Flash Dont Walk (s)	22.0							11.0
Pedestrian Calls (#/hr)	100							100
Act Effct Green (s)	35.7			44.3	88.0	69.3		
Actuated g/C Ratio	0.30			0.37	0.73	0.58		
v/c Ratio	0.67			0.63	0.69	0.31		
Control Delay	40.3			35.3	12.2	14.7		
Queue Delay	0.0			0.0	0.0	0.0		
Total Delay	40.3			35.3	12.2	14.7		
LOS	D			D	B	B		
Approach Delay	40.3				22.7			
Approach LOS	D				C			
Queue Length 50th (ft)	221			228	303	98		
Queue Length 95th (ft)	266			312	437	147		
Internal Link Dist (ft)	85				576			
Turn Bay Length (ft)								
Base Capacity (vph)	1074			1101	1217	1453		
Starvation Cap Reductn	0			0	0	0		
Spillback Cap Reductn	0			0	0	0		
Storage Cap Reductn	0			0	0	0		
Reduced v/c Ratio	0.58			0.63	0.69	0.31		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 38 (32%), Referenced to phase 1:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 25.6 Intersection LOS: C
Intersection Capacity Utilization 67.9% ICU Level of Service C
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: Commonwealth Ave & Brighton Ave

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (veh/h)	11	18	635	15	2	15	817	64	0	0	0	0	0	0
Future Volume (Veh/h)	11	18	635	15	2	15	817	64	0	0	0	0	0	0
Sign Control			Free				Free			Stop			Stop	
Grade			0%				0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.96	0.96	0.96	0.96	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	20	690	16	0	16	851	67	0	0	0	0	0	0
Pedestrians										154			141	
Lane Width (ft)										0.0			0.0	
Walking Speed (ft/s)										3.5			3.5	
Percent Blockage										0			0	
Right turn flare (veh)														
Median type			None				None							
Median storage veh)														
Upstream signal (ft)			517				1028							
pX, platoon unblocked	0.00				0.00	0.97			0.97	0.97	0.97	0.97	0.97	
vC, conflicting volume	0	1059			0	860			1350	1983	507	1442	1958	600
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	0	1059			0	799			1302	1954	436	1398	1928	600
tC, single (s)	0.0	4.1			0.0	4.4			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)														
tF (s)	0.0	2.2			0.0	2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0	97			0	98			100	100	100	100	100	100
cM capacity (veh/h)	0	665			0	731			110	58	553	94	61	444

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	365	361	442	492
Volume Left	20	0	16	0
Volume Right	0	16	0	67
cSH	665	1700	731	1700
Volume to Capacity	0.03	0.21	0.02	0.29
Queue Length 95th (ft)	2	0	2	0
Control Delay (s)	1.0	0.0	0.6	0.0
Lane LOS	A		A	
Approach Delay (s)	0.5		0.3	
Approach LOS				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (veh/h)	47	28	558	804	22	0	89
Future Volume (Veh/h)	47	28	558	804	22	0	89
Sign Control			Free	Free		Stop	
Grade			0%	0%		0%	
Peak Hour Factor	0.86	0.86	0.86	0.96	0.96	0.69	0.69
Hourly flow rate (vph)	0	33	649	838	23	0	129
Pedestrians						307	
Lane Width (ft)						11.0	
Walking Speed (ft/s)						3.5	
Percent Blockage						27	
Right turn flare (veh)							
Median type			None	None			
Median storage veh)							
Upstream signal (ft)				165			
pX, platoon unblocked	0.00						
vC, conflicting volume	0	1168				1547	738
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	0	1168				1547	738
tC, single (s)	0.0	4.3				6.8	7.0
tC, 2 stage (s)							
tF (s)	0.0	2.3				3.5	3.3
p0 queue free %	0	92				100	51
cM capacity (veh/h)	0	399				72	261

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	33	324	324	559	302	129
Volume Left	33	0	0	0	0	0
Volume Right	0	0	0	0	23	129
cSH	399	1700	1700	1700	1700	261
Volume to Capacity	0.08	0.19	0.19	0.33	0.18	0.49
Queue Length 95th (ft)	7	0	0	0	0	64
Control Delay (s)	14.8	0.0	0.0	0.0	0.0	31.6
Lane LOS	B					D
Approach Delay (s)	0.7			0.0		31.6
Approach LOS						D

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (veh/h)	0	0	0	0	0	0	1	61	399	27	72	197	29
Future Volume (Veh/h)	0	0	0	0	0	0	1	61	399	27	72	197	29
Sign Control		Stop			Stop				Free			Free	
Grade		0%			0%				0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.97	0.97	0.97	0.94	0.94	0.94
Hourly flow rate (vph)	0	0	0	0	0	0	0	63	411	28	77	210	31
Pedestrians		49			89								
Lane Width (ft)		0.0			0.0								
Walking Speed (ft/s)		3.5			3.5								
Percent Blockage		0			0								
Right turn flare (veh)													
Median type									None			None	
Median storage veh)													
Upstream signal (ft)									300				
pX, platoon unblocked							0.00						
vC, conflicting volume	980	1082	274	1020	1084	514	0	290			528		
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	980	1082	274	1020	1084	514	0	290			528		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	0.0	4.1			4.1		
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	0	95			93		
cM capacity (veh/h)	208	191	764	195	191	560	0	1272			1029		

Direction, Lane #	NB 1	SB 1
Volume Total	502	318
Volume Left	63	77
Volume Right	28	31
cSH	1272	1029
Volume to Capacity	0.05	0.07
Queue Length 95th (ft)	4	6
Control Delay (s)	1.5	2.7
Lane LOS	A	A
Approach Delay (s)	1.5	2.7
Approach LOS		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	75	0	0	0	0	0	60	30	0	0	0
Future Volume (Veh/h)	10	75	0	0	0	0	0	60	30	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.90	0.90	0.90	0.92	0.92	0.92
Hourly flow rate (vph)	11	82	0	0	0	0	0	67	33	0	0	0
Pedestrians					38						47	
Lane Width (ft)					0.0						0.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	47			82			104	151	120	256	151	47
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	47			82			104	151	120	256	151	47
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	91	96	100	100	100
cM capacity (veh/h)	1573			1515			876	735	937	623	735	1022

Direction, Lane #	EB 1	NB 1
Volume Total	93	100
Volume Left	11	0
Volume Right	0	33
cSH	1573	792
Volume to Capacity	0.01	0.13
Queue Length 95th (ft)	1	11
Control Delay (s)	0.9	10.2
Lane LOS	A	B
Approach Delay (s)	0.9	10.2
Approach LOS		B

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Traffic Vol, veh/h	0	3	53	36	0	0	0	0	0	0	12	40	0	11
Future Vol, veh/h	0	3	53	36	0	0	0	0	0	0	12	40	0	11
Peak Hour Factor	0.92	0.96	0.96	0.96	0.92	0.92	0.92	0.92	0.92	0.81	0.81	0.81	0.92	0.78
Heavy Vehicles, %	2	0	4	0	2	2	2	2	2	0	0	0	2	0
Mvmt Flow	0	3	55	38	0	0	0	0	0	0	15	49	0	14
Number of Lanes	0	0	1	0	0	0	0	0	0	0	1	0	0	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.5	7	7.7
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	0%	3%	15%
Vol Thru, %	23%	58%	85%
Vol Right, %	77%	39%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	52	92	72
LT Vol	0	3	11
Through Vol	12	53	61
RT Vol	40	36	0
Lane Flow Rate	64	96	92
Geometry Grp	1	1	1
Degree of Util (X)	0.066	0.105	0.106
Departure Headway (Hd)	3.676	3.94	4.148
Convergence, Y/N	Yes	Yes	Yes
Cap	964	901	859
Service Time	1.737	2.002	2.196
HCM Lane V/C Ratio	0.066	0.107	0.107
HCM Control Delay	7	7.5	7.7
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.4	0.4

Intersection		
Intersection Delay, s/veh		
Intersection LOS		

Movement	SBT	SBR
Traffic Vol, veh/h	61	0
Future Vol, veh/h	61	0
Peak Hour Factor	0.78	0.78
Heavy Vehicles, %	5	0
Mvmt Flow	78	0
Number of Lanes	1	0

Approach	
Opposing Approach	
Opposing Lanes	
Conflicting Approach Left	
Conflicting Lanes Left	
Conflicting Approach Right	
Conflicting Lanes Right	
HCM Control Delay	
HCM LOS	

Lane

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations															
Traffic Volume (vph)	2	68	431	0	13	0	386	179	31	296	48	55	0	40	
Future Volume (vph)	2	68	431	0	13	0	386	179	31	296	48	55	0	40	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	11	11	12	11	11	12	12	12	12	12	12	12	
Grade (%)			0%				0%			0%			0%		
Storage Length (ft)		140		0		0		0	25		0	0		0	
Storage Lanes		1		0		0		0	0		0	0		0	
Taper Length (ft)		45				25			25			25			
Lane Util. Factor	0.95	1.00	0.95	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor							0.99			1.00			0.99		
Frt							0.953			0.983			0.944		
Flt Protected		0.950					0.999			0.996			0.972		
Satd. Flow (prot)	0	1570	2855	0	0	0	2816	0	0	1481	0	0	1543	0	
Flt Permitted		0.304					0.941			0.971			0.591		
Satd. Flow (perm)	0	503	2855	0	0	0	2653	0	0	1444	0	0	938	0	
Right Turn on Red				Yes				No			Yes			Yes	
Satd. Flow (RTOR)										9			87		
Link Speed (mph)			30				30			30			30		
Link Distance (ft)			412				517			268			300		
Travel Time (s)			9.4				11.8			6.1			6.8		
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)								11			1			2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	0%	0%	10%	0%	0%	0%	7%	1%	0%	2%	0%	2%	0%	0%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Parking (#/hr)										0					
Mid-Block Traffic (%)			0%				0%			0%			0%		
Adj. Flow (vph)	2	74	468	0	14	0	420	195	34	322	52	60	0	43	
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	76	468	0	0	0	629	0	0	408	0	0	103	0	
Turn Type	Perm	Perm	NA		Perm		NA		Perm	NA		Perm	NA		
Protected Phases			1				1			3			3		2
Permitted Phases	1	1			1				3			3			
Detector Phase	1	1	1		1		1		3	3		3	3		
Switch Phase															
Minimum Initial (s)	10.0	10.0	10.0		10.0		10.0		8.0	8.0		8.0	8.0		5.0
Minimum Split (s)	18.0	18.0	18.0		18.0		18.0		12.0	12.0		12.0	12.0		25.0
Total Split (s)	29.0	29.0	29.0		29.0		29.0		46.0	46.0		46.0	46.0		25.0
Total Split (%)	29.0%	29.0%	29.0%		29.0%		29.0%		46.0%	46.0%		46.0%	46.0%		25%
Maximum Green (s)	25.0	25.0	25.0		25.0		25.0		42.0	42.0		42.0	42.0		18.0
Yellow Time (s)	3.0	3.0	3.0		3.0		3.0		3.0	3.0		3.0	3.0		3.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0		1.0	1.0		1.0	1.0		4.0
Lost Time Adjust (s)		0.0	0.0				0.0			0.0			0.0		
Total Lost Time (s)		4.0	4.0				4.0			4.0			4.0		
Lead/Lag	Lead	Lead	Lead		Lead		Lead								Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes								Yes
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0		2.0	2.0		2.0	2.0		2.0
Minimum Gap (s)	2.0	2.0	2.0		2.0		2.0		2.0	2.0		2.0	2.0		2.0
Time Before Reduce (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0		0.0	0.0		0.0
Time To Reduce (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0		0.0	0.0		0.0
Recall Mode	C-Max	C-Max	C-Max		C-Max		C-Max		None	None		None	None		None
Walk Time (s)	7.0	7.0	7.0		7.0		7.0								7.0
Flash Dont Walk (s)	7.0	7.0	7.0		7.0		7.0								11.0
Pedestrian Calls (#/hr)	0	0	0		0		0								100
Act Effct Green (s)		39.3	39.3				39.3			32.7			32.7		
Actuated g/C Ratio		0.39	0.39				0.39			0.33			0.33		
v/c Ratio		0.39	0.42				0.60			0.86			0.28		
Control Delay		37.2	27.6				32.0			47.4			8.0		
Queue Delay		0.0	0.0				0.0			0.0			0.0		
Total Delay		37.2	27.6				32.0			47.4			8.0		
LOS		D	C				C			D			A		
Approach Delay			28.9				32.0			47.4			8.0		
Approach LOS			C				C			D			A		
Queue Length 50th (ft)		38	123				180			234			7		
Queue Length 95th (ft)		#111	197				#322			311			39		
Internal Link Dist (ft)			332				437			188			220		
Turn Bay Length (ft)		140													
Base Capacity (vph)		197	1123				1043			611			444		
Starvation Cap Reductn		0	0				0			0			0		
Spillback Cap Reductn		0	0				0			0			0		
Storage Cap Reductn		0	0				0			0			0		
Reduced v/c Ratio		0.39	0.42				0.60			0.67			0.23		

Intersection Summary

Area Type: CBD
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 21 (21%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 33.3 — Intersection LOS: C
Intersection Capacity Utilization 67.0% — ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Linden St & Brighton Ave

Ø1 (R)	Ø2	Ø3
29 s	25 s	46 s

Lane Group	EBT	EBR	EBR2	WBL2	WBT	NBR	NWR	Ø2
Lane Configurations								
Traffic Volume (vph)	403	1	8	417	655	866	0	
Future Volume (vph)	403	1	8	417	655	866	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	11	12	11	12	
Grade (%)	0%				0%			
Storage Length (ft)		0				0	0	
Storage Lanes		0				2	1	
Taper Length (ft)								
Lane Util. Factor	0.95	0.95	0.95	0.97	1.00	0.88	1.00	
Ped Bike Factor	1.00							
Frt	0.997					0.850		
Flt Protected				0.950				
Satd. Flow (prot)	2997	0	0	2958	1644	2401	1660	
Flt Permitted				0.950				
Satd. Flow (perm)	2997	0	0	2958	1644	2401	1660	
Right Turn on Red							No	
Satd. Flow (RTOR)								
Link Speed (mph)	30				30			
Link Distance (ft)	165				656			
Travel Time (s)	3.8				14.9			
Confl. Peds. (#/hr)			42					
Confl. Bikes (#/hr)			79					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	8%	0%	0%	3%	4%	3%	3%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	
Parking (#/hr)								
Mid-Block Traffic (%)	0%				0%			
Adj. Flow (vph)	438	1	9	453	712	941	0	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	448	0	0	453	712	941	0	
Turn Type	NA			Prot	NA	pt+ov	custom	
Protected Phases	3			1	1 3	1 2!	1 2!	2
Permitted Phases								
Detector Phase	3			1	1	1 2	1	
Switch Phase					3		2	
Minimum Initial (s)	8.0			10.0				8.0
Minimum Split (s)	37.0			17.0				25.0
Total Split (s)	49.0			44.0				27.0
Total Split (%)	40.8%			36.7%				23%
Maximum Green (s)	41.0			37.0				20.0
Yellow Time (s)	3.0			3.0				3.0
All-Red Time (s)	5.0			4.0				4.0
Lost Time Adjust (s)	0.0			0.0				
Total Lost Time (s)	8.0			7.0				
Lead/Lag				Lead				Lag
Lead-Lag Optimize?				Yes				Yes
Vehicle Extension (s)	2.0			2.0				2.0
Minimum Gap (s)	2.0			2.0				2.0
Time Before Reduce (s)	0.0			0.0				0.0
Time To Reduce (s)	0.0			0.0				0.0
Recall Mode	Min			C-Max				Min
Walk Time (s)	7.0							7.0
Flash Dont Walk (s)	22.0							11.0
Pedestrian Calls (#/hr)	100							100
Act Effct Green (s)	32.4			47.2	87.6	72.6		
Actuated g/C Ratio	0.27			0.39	0.73	0.60		
v/c Ratio	0.55			0.39	0.59	0.65		
Control Delay	39.8			28.5	10.3	19.0		
Queue Delay	0.0			0.0	0.0	0.0		
Total Delay	39.8			28.5	10.3	19.0		
LOS	D			C	B	B		
Approach Delay	39.8				17.4			
Approach LOS	D				B			
Queue Length 50th (ft)	163			120	227	232		
Queue Length 95th (ft)	190			199	349	397		
Internal Link Dist (ft)	85				576			
Turn Bay Length (ft)								
Base Capacity (vph)	1023			1162	1199	1483		
Starvation Cap Reductn	0			0	0	0		
Spillback Cap Reductn	0			0	0	0		
Storage Cap Reductn	0			0	0	0		
Reduced v/c Ratio	0.44			0.39	0.59	0.63		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 38 (32%), Referenced to phase 1:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 21.9 Intersection LOS: C
Intersection Capacity Utilization 81.7% ICU Level of Service D
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: Commonwealth Ave & Brighton Ave

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (veh/h)	10	16	460	6	3	5	647	29	0	0	0	0	0	0
Future Volume (Veh/h)	10	16	460	6	3	5	647	29	0	0	0	0	0	0
Sign Control			Free				Free			Stop			Stop	
Grade			0%				0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	17	500	7	0	5	703	32	0	0	0	0	0	0
Pedestrians										54			72	
Lane Width (ft)										0.0			0.0	
Walking Speed (ft/s)										3.5			3.5	
Percent Blockage										0			0	
Right turn flare (veh)														
Median type			None				None							
Median storage veh)														
Upstream signal (ft)			517				1028							
pX, platoon unblocked	0.00				0.00	0.92			0.92	0.92	0.92	0.92	0.92	
vC, conflicting volume	0	807			0	561			953	1408	308	1085	1396	440
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	0	807			0	354			780	1274	79	923	1260	440
tC, single (s)	0.0	4.1			0.0	5.3			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)														
tF (s)	0.0	2.2			0.0	2.8			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0	98			0	99			100	100	100	100	100	100
cM capacity (veh/h)	0	827			0	805			258	149	890	203	152	565

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	267	257	356	384
Volume Left	17	0	5	0
Volume Right	0	7	0	32
cSH	827	1700	805	1700
Volume to Capacity	0.02	0.15	0.01	0.23
Queue Length 95th (ft)	2	0	0	0
Control Delay (s)	0.8	0.0	0.2	0.0
Lane LOS	A		A	
Approach Delay (s)	0.4		0.1	
Approach LOS				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (veh/h)	10	41	412	647	8	0	27
Future Volume (Veh/h)	10	41	412	647	8	0	27
Sign Control			Free	Free		Stop	
Grade			0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	45	448	703	9	0	29
Pedestrians						111	
Lane Width (ft)						11.0	
Walking Speed (ft/s)						3.5	
Percent Blockage						10	
Right turn flare (veh)							
Median type			None	None			
Median storage veh)							
Upstream signal (ft)				165			
pX, platoon unblocked	0.00						
vC, conflicting volume	0	823				1132	467
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	0	823				1132	467
tC, single (s)	0.0	4.2				6.8	7.0
tC, 2 stage (s)							
tF (s)	0.0	2.2				3.5	3.3
p0 queue free %	0	94				100	94
cM capacity (veh/h)	0	719				169	485

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	45	224	224	469	243	29
Volume Left	45	0	0	0	0	0
Volume Right	0	0	0	0	9	29
cSH	719	1700	1700	1700	1700	485
Volume to Capacity	0.06	0.13	0.13	0.28	0.14	0.06
Queue Length 95th (ft)	5	0	0	0	0	5
Control Delay (s)	10.3	0.0	0.0	0.0	0.0	12.9
Lane LOS	B					B
Approach Delay (s)	0.9			0.0		12.9
Approach LOS						B

Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	36.9%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	64	462	23	35	103	16
Future Volume (Veh/h)	0	0	0	0	0	0	64	462	23	35	103	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	70	502	25	38	112	17
Pedestrians		44			51							
Lane Width (ft)		0.0			0.0							
Walking Speed (ft/s)		3.5			3.5							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								300				
pX, platoon unblocked	0.78	0.78		0.78	0.78	0.78				0.78		
vC, conflicting volume	895	958	164	902	954	566	173			578		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	721	803	164	730	797	297	173			313		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	95			96		
cM capacity (veh/h)	248	225	880	245	226	577	1404			978		

Direction, Lane #	NB 1	SB 1
Volume Total	597	167
Volume Left	70	38
Volume Right	25	17
cSH	1404	978
Volume to Capacity	0.05	0.04
Queue Length 95th (ft)	4	3
Control Delay (s)	1.4	2.3
Lane LOS	A	A
Approach Delay (s)	1.4	2.3
Approach LOS		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	40.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	60	0	0	0	0	0	25	29	0	0	0
Future Volume (Veh/h)	8	60	0	0	0	0	0	25	29	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	65	0	0	0	0	0	27	32	0	0	0
Pedestrians					13						16	
Lane Width (ft)					0.0						0.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	16			65			83	99	78	158	99	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	16			65			83	99	78	158	99	16
tC, single (s)	4.1			4.1			7.1	6.6	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.1	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	96	97	100	100	100
cM capacity (veh/h)	1615			1537			905	766	988	758	787	1063

Direction, Lane #	EB 1	NB 1
Volume Total	74	59
Volume Left	9	0
Volume Right	0	32
cSH	1615	873
Volume to Capacity	0.01	0.07
Queue Length 95th (ft)	0	5
Control Delay (s)	0.9	9.4
Lane LOS	A	A
Approach Delay (s)	0.9	9.4
Approach LOS		A

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	18.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	2	53	18	0	0	0	0	0	0	9	32	0	3	8	0
Future Vol, veh/h	0	2	53	18	0	0	0	0	0	0	9	32	0	3	8	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	4	0	2	2	2	2	2	0	11	0	2	0	13	0
Mvmt Flow	0	2	58	20	0	0	0	0	0	0	10	35	0	3	9	0
Number of Lanes	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.2	7	7.2
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	0%	3%	27%
Vol Thru, %	22%	73%	73%
Vol Right, %	78%	25%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	41	73	11
LT Vol	0	2	3
Through Vol	9	53	8
RT Vol	32	18	0
Lane Flow Rate	45	79	12
Geometry Grp	1	1	1
Degree of Util (X)	0.047	0.085	0.014
Departure Headway (Hd)	3.768	3.857	4.129
Convergence, Y/N	Yes	Yes	Yes
Cap	948	930	865
Service Time	1.798	1.876	2.163
HCM Lane V/C Ratio	0.047	0.085	0.014
HCM Control Delay	7	7.2	7.2
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.3	0

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations															
Traffic Volume (vph)	13	79	521	0	22	0	599	276	30	188	76	142	0	63	
Future Volume (vph)	13	79	521	0	22	0	599	276	30	188	76	142	0	63	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	11	11	12	11	11	12	12	12	12	12	12	12	
Grade (%)			0%				0%			0%			0%		
Storage Length (ft)		140		0		0		0	25		0	0		0	
Storage Lanes		1		0		0		0	0		0	0		0	
Taper Length (ft)		45				25			25			25			
Lane Util. Factor	0.95	1.00	0.95	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor							0.95			1.00			1.00		
Frt							0.954			0.965			0.959		
Flt Protected		0.950					0.999			0.995			0.966		
Satd. Flow (prot)	0	1570	3020	0	0	0	2724	0	0	1463	0	0	1567	0	
Flt Permitted		0.250					0.933			0.956			0.410		
Satd. Flow (perm)	0	413	3020	0	0	0	2544	0	0	1406	0	0	665	0	
Right Turn on Red				Yes				No			Yes			Yes	
Satd. Flow (RTOR)										22			87		
Link Speed (mph)			30				30			30			30		
Link Distance (ft)			412				517			268			300		
Travel Time (s)			9.4				11.8			6.1			6.8		
Confl. Peds. (#/hr)															
Confl. Bikes (#/hr)								105			2			3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	0%	0%	4%	0%	0%	0%	5%	2%	0%	1%	0%	1%	0%	0%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Parking (#/hr)										0					
Mid-Block Traffic (%)			0%				0%			0%			0%		
Adj. Flow (vph)	14	86	566	0	24	0	651	300	33	204	83	154	0	68	
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	100	566	0	0	0	975	0	0	320	0	0	222	0	
Turn Type	Perm	Perm	NA		Perm		NA		Perm	NA		Perm	NA		
Protected Phases			1				1			3			3		2
Permitted Phases	1	1			1				3			3			
Detector Phase	1	1	1		1		1		3	3		3	3		
Switch Phase															
Minimum Initial (s)	10.0	10.0	10.0		10.0		10.0		8.0	8.0		8.0	8.0		5.0
Minimum Split (s)	18.0	18.0	18.0		18.0		18.0		12.0	12.0		12.0	12.0		25.0
Total Split (s)	29.0	29.0	29.0		29.0		29.0		46.0	46.0		46.0	46.0		25.0
Total Split (%)	29.0%	29.0%	29.0%		29.0%		29.0%		46.0%	46.0%		46.0%	46.0%		25%
Maximum Green (s)	25.0	25.0	25.0		25.0		25.0		42.0	42.0		42.0	42.0		18.0
Yellow Time (s)	3.0	3.0	3.0		3.0		3.0		3.0	3.0		3.0	3.0		3.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0		1.0	1.0		1.0	1.0		4.0
Lost Time Adjust (s)		0.0	0.0				0.0			0.0			0.0		
Total Lost Time (s)		4.0	4.0				4.0			4.0			4.0		
Lead/Lag	Lead	Lead	Lead		Lead		Lead								Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes								Yes
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0		2.0	2.0		2.0	2.0		2.0
Minimum Gap (s)	2.0	2.0	2.0		2.0		2.0		2.0	2.0		2.0	2.0		2.0
Time Before Reduce (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0		0.0	0.0		0.0
Time To Reduce (s)	0.0	0.0	0.0		0.0		0.0		0.0	0.0		0.0	0.0		0.0
Recall Mode	C-Max	C-Max	C-Max		C-Max		C-Max		None	None		None	None		None
Walk Time (s)	7.0	7.0	7.0		7.0		7.0								7.0
Flash Dont Walk (s)	7.0	7.0	7.0		7.0		7.0								11.0
Pedestrian Calls (#/hr)	0	0	0		0		0								0
Act Effct Green (s)		65.3	65.3				65.3			26.7			26.7		
Actuated g/C Ratio		0.65	0.65				0.65			0.27			0.27		
v/c Ratio		0.37	0.29				0.59			0.82			0.92		
Control Delay		15.6	9.0				13.5			47.9			62.3		
Queue Delay		0.0	0.0				0.0			0.0			0.0		
Total Delay		15.6	9.0				13.5			47.9			62.3		
LOS		B	A				B			D			E		
Approach Delay			10.0				13.5			47.9			62.3		
Approach LOS			A				B			D			E		
Queue Length 50th (ft)		26	73				170			179			89		
Queue Length 95th (ft)		85	134				306			246			#206		
Internal Link Dist (ft)			332				437			188			220		
Turn Bay Length (ft)		140													
Base Capacity (vph)		269	1971				1660			603			329		
Starvation Cap Reductn		0	0				0			0			0		
Spillback Cap Reductn		0	0				0			0			0		
Storage Cap Reductn		0	0				0			0			0		
Reduced v/c Ratio		0.37	0.29				0.59			0.53			0.67		

Intersection Summary

Area Type: CBD
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 21 (21%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 22.4 Intersection LOS: C
Intersection Capacity Utilization 89.3% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Linden St & Brighton Ave

Lane Group	EBT	EBR	EBR2	WBL2	WBT	NBR	NWR	Ø2
Lane Configurations								
Traffic Volume (vph)	650	6	18	710	910	456	0	
Future Volume (vph)	650	6	18	710	910	456	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	11	12	11	12	
Grade (%)	0%				0%			
Storage Length (ft)		0				0	0	
Storage Lanes		0				2	1	
Taper Length (ft)								
Lane Util. Factor	0.95	0.95	0.95	0.97	1.00	0.88	1.00	
Ped Bike Factor	0.99							
Frt	0.994					0.850		
Flt Protected				0.950				
Satd. Flow (prot)	3147	0	0	2987	1660	2448	1693	
Flt Permitted				0.950				
Satd. Flow (perm)	3147	0	0	2987	1660	2448	1693	
Right Turn on Red							No	
Satd. Flow (RTOR)								
Link Speed (mph)	30				30			
Link Distance (ft)	165				656			
Travel Time (s)	3.8				14.9			
Confl. Peds. (#/hr)			132					
Confl. Bikes (#/hr)			29					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Growth Factor	100%	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	2%	0%	0%	2%	3%	1%	1%	
Bus Blockages (#/hr)	0	0	0	0	0	0	0	
Parking (#/hr)								
Mid-Block Traffic (%)	0%				0%			
Adj. Flow (vph)	707	7	20	772	989	496	0	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	734	0	0	772	989	496	0	
Turn Type	NA			Prot	NA	pt+ov	custom	
Protected Phases	3			1	1 3	1 2!	1 2!	2
Permitted Phases								
Detector Phase	3			1	1	1 2	1	
Switch Phase					3		2	
Minimum Initial (s)	8.0			10.0				8.0
Minimum Split (s)	37.0			17.0				25.0
Total Split (s)	49.0			44.0				27.0
Total Split (%)	40.8%			36.7%				23%
Maximum Green (s)	41.0			37.0				20.0
Yellow Time (s)	3.0			3.0				3.0
All-Red Time (s)	5.0			4.0				4.0
Lost Time Adjust (s)	0.0			0.0				
Total Lost Time (s)	8.0			7.0				
Lead/Lag				Lead				Lag
Lead-Lag Optimize?				Yes				Yes
Vehicle Extension (s)	2.0			2.0				2.0
Minimum Gap (s)	2.0			2.0				2.0
Time Before Reduce (s)	0.0			0.0				0.0
Time To Reduce (s)	0.0			0.0				0.0
Recall Mode	Min			C-Max				Min
Walk Time (s)	7.0							7.0
Flash Dont Walk (s)	22.0							11.0
Pedestrian Calls (#/hr)	100							100
Act Effct Green (s)	39.3			40.7	88.0	65.7		
Actuated g/C Ratio	0.33			0.34	0.73	0.55		
v/c Ratio	0.71			0.76	0.81	0.37		
Control Delay	39.5			41.8	17.5	16.8		
Queue Delay	0.0			0.0	0.0	0.0		
Total Delay	39.5			41.8	17.5	16.8		
LOS	D			D	B	B		
Approach Delay	39.5				28.2			
Approach LOS	D				C			
Queue Length 50th (ft)	255			279	443	122		
Queue Length 95th (ft)	325			357	667	166		
Internal Link Dist (ft)	85				576			
Turn Bay Length (ft)								
Base Capacity (vph)	1075			1011	1217	1380		
Starvation Cap Reductn	0			0	0	0		
Spillback Cap Reductn	0			0	0	0		
Storage Cap Reductn	0			0	0	0		
Reduced v/c Ratio	0.68			0.76	0.81	0.36		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 38 (32%), Referenced to phase 1:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 29.1 Intersection LOS: C
Intersection Capacity Utilization 68.5% ICU Level of Service C
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: Commonwealth Ave & Brighton Ave

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (veh/h)	11	19	754	16	2	16	902	66	0	0	0	0	0	0
Future Volume (Veh/h)	11	19	754	16	2	16	902	66	0	0	0	0	0	0
Sign Control			Free				Free			Stop			Stop	
Grade			0%				0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	21	820	17	0	17	980	72	0	0	0	0	0	0
Pedestrians										154			141	
Lane Width (ft)										0.0			0.0	
Walking Speed (ft/s)										3.5			3.5	
Percent Blockage										0			0	
Right turn flare (veh)														
Median type			None				None							
Median storage veh)														
Upstream signal (ft)			517				1028							
pX, platoon unblocked	0.00				0.00	0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	0	1193			0	991			1548	2252	572	1643	2224	667
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	0	1193			0	872			1463	2207	429	1563	2178	667
tC, single (s)	0.0	4.1			0.0	4.4			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)														
tF (s)	0.0	2.2			0.0	2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0	96			0	97			100	100	100	100	100	100
cM capacity (veh/h)	0	592			0	664			81	39	542	68	41	401

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	431	427	507	562
Volume Left	21	0	17	0
Volume Right	0	17	0	72
cSH	592	1700	664	1700
Volume to Capacity	0.04	0.25	0.03	0.33
Queue Length 95th (ft)	3	0	2	0
Control Delay (s)	1.1	0.0	0.7	0.0
Lane LOS	A		A	
Approach Delay (s)	0.5		0.3	
Approach LOS				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (veh/h)	49	29	672	889	23	0	92
Future Volume (Veh/h)	49	29	672	889	23	0	92
Sign Control			Free	Free		Stop	
Grade			0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	32	730	966	25	0	100
Pedestrians						307	
Lane Width (ft)						11.0	
Walking Speed (ft/s)						3.5	
Percent Blockage						27	
Right turn flare (veh)							
Median type			None	None			
Median storage veh)							
Upstream signal (ft)				165			
pX, platoon unblocked	0.00						
vC, conflicting volume	0	1298				1714	802
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	0	1298				1714	802
tC, single (s)	0.0	4.3				6.8	7.0
tC, 2 stage (s)							
tF (s)	0.0	2.3				3.5	3.3
p0 queue free %	0	91				100	58
cM capacity (veh/h)	0	354				55	236

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	32	365	365	644	347	100
Volume Left	32	0	0	0	0	0
Volume Right	0	0	0	0	25	100
cSH	354	1700	1700	1700	1700	236
Volume to Capacity	0.09	0.21	0.21	0.38	0.20	0.42
Queue Length 95th (ft)	7	0	0	0	0	49
Control Delay (s)	16.2	0.0	0.0	0.0	0.0	31.0
Lane LOS	C					D
Approach Delay (s)	0.7			0.0		31.0
Approach LOS						D

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (veh/h)	0	0	0	0	0	0	1	63	425	28	75	204	30
Future Volume (Veh/h)	0	0	0	0	0	0	1	63	425	28	75	204	30
Sign Control		Stop			Stop				Free			Free	
Grade		0%			0%				0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	68	462	30	82	222	33
Pedestrians		49			89								
Lane Width (ft)		0.0			0.0								
Walking Speed (ft/s)		3.5			3.5								
Percent Blockage		0			0								
Right turn flare (veh)													
Median type									None			None	
Median storage veh)													
Upstream signal (ft)									300				
pX, platoon unblocked							0.00						
vC, conflicting volume	1064	1168	288	1104	1170	566	0	304			581		
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	1064	1168	288	1104	1170	566	0	304			581		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	0.0	4.1			4.1		
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	0	95			92		
cM capacity (veh/h)	180	168	752	169	167	524	0	1257			983		

Direction, Lane #	NB 1	SB 1
Volume Total	560	337
Volume Left	68	82
Volume Right	30	33
cSH	1257	983
Volume to Capacity	0.05	0.08
Queue Length 95th (ft)	4	7
Control Delay (s)	1.5	2.9
Lane LOS	A	A
Approach Delay (s)	1.5	2.9
Approach LOS		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	79	0	0	0	0	0	62	31	0	0	0
Future Volume (Veh/h)	10	79	0	0	0	0	0	62	31	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	86	0	0	0	0	0	67	34	0	0	0
Pedestrians					38						47	
Lane Width (ft)					0.0						0.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	47			86			108	155	124	260	155	47
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	47			86			108	155	124	260	155	47
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	91	96	100	100	100
cM capacity (veh/h)	1573			1510			871	732	932	617	732	1022

Direction, Lane #	EB 1	NB 1
Volume Total	97	101
Volume Left	11	0
Volume Right	0	34
cSH	1573	789
Volume to Capacity	0.01	0.13
Queue Length 95th (ft)	1	11
Control Delay (s)	0.9	10.2
Lane LOS	A	B
Approach Delay (s)	0.9	10.2
Approach LOS		B

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	23.4%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	3	56	37	0	0	0	0	0	0	12	41	0	11	63	0
Future Vol, veh/h	0	3	56	37	0	0	0	0	0	0	12	41	0	11	63	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	4	0	2	2	2	2	2	0	0	0	2	0	5	0
Mvmt Flow	0	3	61	40	0	0	0	0	0	0	13	45	0	12	68	0
Number of Lanes	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.5	7	7.6
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	0%	3%	15%
Vol Thru, %	23%	58%	85%
Vol Right, %	77%	39%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	53	96	74
LT Vol	0	3	11
Through Vol	12	56	63
RT Vol	41	37	0
Lane Flow Rate	58	104	80
Geometry Grp	1	1	1
Degree of Util (X)	0.059	0.113	0.093
Departure Headway (Hd)	3.68	3.91	4.158
Convergence, Y/N	Yes	Yes	Yes
Cap	964	909	857
Service Time	1.739	1.968	2.205
HCM Lane V/C Ratio	0.06	0.114	0.093
HCM Control Delay	7	7.5	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.4	0.3

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations															
Traffic Volume (vph)	2	58	435	0	13	0	386	182	31	293	49	55	0	40	
Future Volume (vph)	2	58	435	0	13	0	386	182	31	293	49	55	0	40	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	11	11	12	11	11	12	12	12	12	12	12	12	
Storage Length (ft)		140		0		0		0	25		0	0		0	
Storage Lanes		1		0		0		0	0		0	0		0	
Taper Length (ft)		45				25			25			25			
Lane Util. Factor	0.95	1.00	0.95	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor							0.99			1.00			0.99		
Frt							0.953			0.982			0.944		
Flt Protected		0.950					0.999			0.996			0.972		
Satd. Flow (prot)	0	1570	2855	0	0	0	2816	0	0	1480	0	0	1543	0	
Flt Permitted		0.304					0.941			0.970			0.591		
Satd. Flow (perm)	0	503	2855	0	0	0	2653	0	0	1441	0	0	938	0	
Right Turn on Red				Yes				No			Yes			Yes	
Satd. Flow (RTOR)										9			87		
Link Speed (mph)			30				30			30			30		
Link Distance (ft)			412				517			268			300		
Travel Time (s)			9.4				11.8			6.1			6.8		
Confl. Bikes (#/hr)								11			1			2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	0%	10%	0%	0%	0%	7%	1%	0%	2%	0%	2%	0%	0%	
Parking (#/hr)										0					
Adj. Flow (vph)	2	63	473	0	14	0	420	198	34	318	53	60	0	43	
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	65	473	0	0	0	632	0	0	405	0	0	103	0	
Turn Type	Perm	Perm	NA		Perm		NA		Perm	NA		Perm	NA		
Protected Phases			1				1			3			3		2
Permitted Phases	1	1			1				3			3			
Detector Phase	1	1	1		1		1		3	3		3	3		
Switch Phase															
Minimum Initial (s)	10.0	10.0	10.0		10.0		10.0		8.0	8.0		8.0	8.0		5.0
Minimum Split (s)	18.0	18.0	18.0		18.0		18.0		12.0	12.0		12.0	12.0		25.0
Total Split (s)	29.0	29.0	29.0		29.0		29.0		46.0	46.0		46.0	46.0		25.0
Total Split (%)	29.0%	29.0%	29.0%		29.0%		29.0%		46.0%	46.0%		46.0%	46.0%		25%
Yellow Time (s)	3.0	3.0	3.0		3.0		3.0		3.0	3.0		3.0	3.0		3.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0		1.0	1.0		1.0	1.0		4.0
Lost Time Adjust (s)		0.0	0.0				0.0			0.0			0.0		
Total Lost Time (s)		4.0	4.0				4.0			4.0			4.0		
Lead/Lag	Lead	Lead	Lead		Lead		Lead								Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes								Yes
Recall Mode	C-Max	C-Max	C-Max		C-Max		C-Max		None	None		None	None		None
Act Effct Green (s)		39.5	39.5				39.5			32.5			32.5		
Actuated g/C Ratio		0.40	0.40				0.40			0.32			0.32		
v/c Ratio		0.33	0.42				0.60			0.85			0.28		
Control Delay		35.0	27.6				32.4			47.4			8.1		
Queue Delay		0.0	0.0				0.0			0.0			0.0		
Total Delay		35.0	27.6				32.4			47.4			8.1		
LOS		C	C				C			D			A		
Approach Delay			28.5				32.4			47.4			8.1		
Approach LOS			C				C			D			A		
Queue Length 50th (ft)		31	124				182			233			7		
Queue Length 95th (ft)		#91	199				#326			310			39		
Internal Link Dist (ft)			332				437			188			220		
Turn Bay Length (ft)		140													
Base Capacity (vph)		198	1127				1047			610			444		
Starvation Cap Reductn		0	0				0			0			0		
Spillback Cap Reductn		0	0				0			0			0		
Storage Cap Reductn		0	0				0			0			0		
Reduced v/c Ratio		0.33	0.42				0.60			0.66			0.23		

Intersection Summary

Area Type: CBD
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 21 (21%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 33.3 Intersection LOS: C
Intersection Capacity Utilization 67.1% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Linden St & Brighton Ave

Lane Group	EBT	EBR	EBR2	WBL2	WBT	NBR	NWR	Ø2
Lane Configurations								
Traffic Volume (vph)	406	1	8	417	651	866	0	
Future Volume (vph)	406	1	8	417	651	866	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	11	12	11	12	
Lane Util. Factor	0.95	0.95	0.95	0.97	1.00	0.88	1.00	
Ped Bike Factor	1.00							
Frt	0.997					0.850		
Flt Protected				0.950				
Satd. Flow (prot)	2997	0	0	2958	1644	2401	1660	
Flt Permitted				0.950				
Satd. Flow (perm)	2997	0	0	2958	1644	2401	1660	
Right Turn on Red							No	
Satd. Flow (RTOR)								
Link Speed (mph)	30				30			
Link Distance (ft)	165				656			
Travel Time (s)	3.8				14.9			
Confl. Peds. (#/hr)			42					
Confl. Bikes (#/hr)			79					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	8%	0%	0%	3%	4%	3%	3%	
Adj. Flow (vph)	441	1	9	453	708	941	0	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	451	0	0	453	708	941	0	
Turn Type	NA			Prot	NA	pt+ov	custom	
Protected Phases	3			1	1 3	1 2!	1 2!	2
Permitted Phases								
Detector Phase	3			1	1	1 2	1	
Switch Phase					3		2	
Minimum Initial (s)	8.0			10.0				8.0
Minimum Split (s)	37.0			17.0				25.0
Total Split (s)	49.0			44.0				27.0
Total Split (%)	40.8%			36.7%				23%
Yellow Time (s)	3.0			3.0				3.0
All-Red Time (s)	5.0			4.0				4.0
Lost Time Adjust (s)	0.0			0.0				
Total Lost Time (s)	8.0			7.0				
Lead/Lag				Lead				Lag
Lead-Lag Optimize?				Yes				Yes
Recall Mode	Min			C-Max				Min
Act Effct Green (s)	32.4			47.2	87.6	72.6		
Actuated g/C Ratio	0.27			0.39	0.73	0.60		
v/c Ratio	0.56			0.39	0.59	0.65		
Control Delay	40.0			28.4	10.3	18.9		
Queue Delay	0.0			0.0	0.0	0.0		
Total Delay	40.0			28.4	10.3	18.9		
LOS	D			C	B	B		
Approach Delay	40.0				17.4			
Approach LOS	D				B			
Queue Length 50th (ft)	165			120	225	232		
Queue Length 95th (ft)	191			199	345	397		
Internal Link Dist (ft)	85				576			
Turn Bay Length (ft)								
Base Capacity (vph)	1023			1164	1199	1484		
Starvation Cap Reductn	0			0	0	0		
Spillback Cap Reductn	0			0	0	0		
Storage Cap Reductn	0			0	0	0		
Reduced v/c Ratio	0.44			0.39	0.59	0.63		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 38 (32%), Referenced to phase 1:WBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.65
Intersection Signal Delay: 21.9 Intersection LOS: C
Intersection Capacity Utilization 81.7% ICU Level of Service D
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: Commonwealth Ave & Brighton Ave

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (veh/h)	10	16	465	6	6	6	650	30	0	0	0	0	0	0
Future Volume (Veh/h)	10	16	465	6	6	6	650	30	0	0	0	0	0	0
Sign Control			Free				Free			Stop			Stop	
Grade			0%				0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	17	505	7	0	7	707	33	0	0	0	0	0	0
Pedestrians										54			72	
Lane Width (ft)										0.0			0.0	
Walking Speed (ft/s)										3.5			3.5	
Percent Blockage										0			0	
Right turn flare (veh)														
Median type			None				None							
Median storage veh)														
Upstream signal (ft)			517				1028							
pX, platoon unblocked	0.00				0.00	0.92			0.92	0.92	0.92	0.92	0.92	
vC, conflicting volume	0	812			0	566			964	1422	310	1096	1410	442
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	0	812			0	357			789	1287	79	932	1273	442
tC, single (s)	0.0	4.1			0.0	5.3			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)														
tF (s)	0.0	2.2			0.0	2.8			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0	98			0	99			100	100	100	100	100	100
cM capacity (veh/h)	0	823			0	802			253	146	890	199	149	563

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	270	260	360	386
Volume Left	17	0	7	0
Volume Right	0	7	0	33
cSH	823	1700	802	1700
Volume to Capacity	0.02	0.15	0.01	0.23
Queue Length 95th (ft)	2	0	1	0
Control Delay (s)	0.8	0.0	0.3	0.0
Lane LOS	A		A	
Approach Delay (s)	0.4		0.1	
Approach LOS				

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	39.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (veh/h)	10	41	415	643	8	0	32
Future Volume (Veh/h)	10	41	415	643	8	0	32
Sign Control			Free	Free		Stop	
Grade			0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	45	451	699	9	0	35
Pedestrians						111	
Lane Width (ft)						11.0	
Walking Speed (ft/s)						3.5	
Percent Blockage						10	
Right turn flare (veh)							
Median type			None	None			
Median storage veh)							
Upstream signal (ft)				165			
pX, platoon unblocked	0.00						
vC, conflicting volume	0	819				1130	465
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	0	819				1130	465
tC, single (s)	0.0	4.2				6.8	7.0
tC, 2 stage (s)							
tF (s)	0.0	2.2				3.5	3.3
p0 queue free %	0	94				100	93
cM capacity (veh/h)	0	721				170	486

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	45	226	226	466	242	35
Volume Left	45	0	0	0	0	0
Volume Right	0	0	0	0	9	35
cSH	721	1700	1700	1700	1700	486
Volume to Capacity	0.06	0.13	0.13	0.27	0.14	0.07
Queue Length 95th (ft)	5	0	0	0	0	6
Control Delay (s)	10.3	0.0	0.0	0.0	0.0	13.0
Lane LOS	B					B
Approach Delay (s)	0.9			0.0		13.0
Approach LOS						B

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	0	0	0	64	465	10	35	103	16
Future Volume (Veh/h)	0	0	0	0	0	0	64	465	10	35	103	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	70	505	11	38	112	17
Pedestrians		44			51							
Lane Width (ft)		0.0			0.0							
Walking Speed (ft/s)		3.5			3.5							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								300				
pX, platoon unblocked	0.79	0.79		0.79	0.79	0.79				0.79		
vC, conflicting volume	891	948	164	898	950	562	173			567		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	726	798	164	735	801	307	173			314		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	95			96		
cM capacity (veh/h)	250	229	880	246	228	577	1404			989		

Direction, Lane #	NB 1	SB 1
Volume Total	586	167
Volume Left	70	38
Volume Right	11	17
cSH	1404	989
Volume to Capacity	0.05	0.04
Queue Length 95th (ft)	4	3
Control Delay (s)	1.4	2.3
Lane LOS	A	A
Approach Delay (s)	1.4	2.3
Approach LOS		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	47	0	0	0	0	0	25	30	0	0	0
Future Volume (Veh/h)	8	47	0	0	0	0	0	25	30	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	51	0	0	0	0	0	27	33	0	0	0
Pedestrians					13						16	
Lane Width (ft)					0.0						0.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	16			51			69	85	64	144	85	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	16			51			69	85	64	144	85	16
tC, single (s)	4.1			4.1			7.1	6.6	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.1	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	97	100	100	100
cM capacity (veh/h)	1615			1555			924	780	1006	773	801	1063

Direction, Lane #	EB 1	NB 1
Volume Total	60	60
Volume Left	9	0
Volume Right	0	33
cSH	1615	890
Volume to Capacity	0.01	0.07
Queue Length 95th (ft)	0	5
Control Delay (s)	1.1	9.3
Lane LOS	A	A
Approach Delay (s)	1.1	9.3
Approach LOS		A

Intersection Summary			
Average Delay	5.2		
Intersection Capacity Utilization	17.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	471	678	30	0	16
Future Volume (Veh/h)	0	471	678	30	0	16
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	512	737	33	0	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		856	689			
pX, platoon unblocked					0.97	
vC, conflicting volume	770				1010	385
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	770				951	385
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	97
cM capacity (veh/h)	840				251	613

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	256	256	491	279	17
Volume Left	0	0	0	0	0
Volume Right	0	0	0	33	17
cSH	1700	1700	1700	1700	613
Volume to Capacity	0.15	0.15	0.29	0.16	0.03
Queue Length 95th (ft)	0	0	0	0	2
Control Delay (s)	0.0	0.0	0.0	0.0	11.0
Lane LOS					B
Approach Delay (s)	0.0		0.0		11.0
Approach LOS					B

Intersection Summary				
Average Delay		0.1		
Intersection Capacity Utilization		29.7%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	75	2	0	0	0	7
Future Volume (Veh/h)	75	2	0	0	0	7
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	82	2	0	0	0	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			84		83	83
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			84		83	83
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	99
cM capacity (veh/h)			1513		919	976

Direction, Lane #	EB 1	NB 1
Volume Total	84	8
Volume Left	0	0
Volume Right	2	8
cSH	1700	976
Volume to Capacity	0.05	0.01
Queue Length 95th (ft)	0	1
Control Delay (s)	0.0	8.7
Lane LOS		A
Approach Delay (s)	0.0	8.7
Approach LOS		A

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	14.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	2	51	23	0	0	0	0	0	0	9	32	0	3	8	0
Future Vol, veh/h	0	2	51	23	0	0	0	0	0	0	9	32	0	3	8	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	4	0	2	2	2	2	2	0	11	0	2	0	13	0
Mvmt Flow	0	2	55	25	0	0	0	0	0	0	10	35	0	3	9	0
Number of Lanes	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.2	7	7.2
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	0%	3%	27%
Vol Thru, %	22%	67%	73%
Vol Right, %	78%	30%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	41	76	11
LT Vol	0	2	3
Through Vol	9	51	8
RT Vol	32	23	0
Lane Flow Rate	45	83	12
Geometry Grp	1	1	1
Degree of Util (X)	0.047	0.088	0.014
Departure Headway (Hd)	3.772	3.823	4.133
Convergence, Y/N	Yes	Yes	Yes
Cap	947	938	864
Service Time	1.804	1.842	2.169
HCM Lane V/C Ratio	0.048	0.088	0.014
HCM Control Delay	7	7.2	7.2
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.3	0

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø2
Lane Configurations															
Traffic Volume (vph)	13	75	527	0	22	0	597	270	30	187	77	142	0	63	
Future Volume (vph)	13	75	527	0	22	0	597	270	30	187	77	142	0	63	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	11	11	12	11	11	12	12	12	12	12	12	12	
Storage Length (ft)		140		0		0		0	25		0	0		0	
Storage Lanes		1		0		0		0	0		0	0		0	
Taper Length (ft)		45				25			25			25			
Lane Util. Factor	0.95	1.00	0.95	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor							0.99			1.00			1.00		
Frt							0.955			0.965			0.959		
Flt Protected		0.950					0.999			0.995			0.966		
Satd. Flow (prot)	0	1570	3020	0	0	0	2850	0	0	1464	0	0	1567	0	
Flt Permitted		0.174					0.931			0.956			0.410		
Satd. Flow (perm)	0	288	3020	0	0	0	2656	0	0	1406	0	0	665	0	
Right Turn on Red				Yes				No			Yes			Yes	
Satd. Flow (RTOR)										22			87		
Link Speed (mph)			30				30			30			30		
Link Distance (ft)			412				517			268			300		
Travel Time (s)			9.4				11.8			6.1			6.8		
Confl. Bikes (#/hr)								11			1			2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	0%	4%	0%	0%	0%	5%	2%	0%	1%	0%	1%	0%	0%	
Parking (#/hr)										0					
Adj. Flow (vph)	14	82	573	0	24	0	649	293	33	203	84	154	0	68	
Shared Lane Traffic (%)															
Lane Group Flow (vph)	0	96	573	0	0	0	966	0	0	320	0	0	222	0	
Turn Type	Perm	Perm	NA		Perm		NA		Perm	NA		Perm	NA		
Protected Phases			1				1			3			3		2
Permitted Phases	1	1			1				3			3			
Detector Phase	1	1	1		1		1		3	3		3	3		
Switch Phase															
Minimum Initial (s)	10.0	10.0	10.0		10.0		10.0		8.0	8.0		8.0	8.0		5.0
Minimum Split (s)	18.0	18.0	18.0		18.0		18.0		12.0	12.0		12.0	12.0		25.0
Total Split (s)	29.0	29.0	29.0		29.0		29.0		46.0	46.0		46.0	46.0		25.0
Total Split (%)	29.0%	29.0%	29.0%		29.0%		29.0%		46.0%	46.0%		46.0%	46.0%		25%
Yellow Time (s)	3.0	3.0	3.0		3.0		3.0		3.0	3.0		3.0	3.0		3.0
All-Red Time (s)	1.0	1.0	1.0		1.0		1.0		1.0	1.0		1.0	1.0		4.0
Lost Time Adjust (s)		0.0	0.0				0.0			0.0			0.0		
Total Lost Time (s)		4.0	4.0				4.0			4.0			4.0		
Lead/Lag	Lead	Lead	Lead		Lead		Lead								Lag
Lead-Lag Optimize?	Yes	Yes	Yes		Yes		Yes								Yes
Recall Mode	C-Max	C-Max	C-Max		C-Max		C-Max		None	None		None	None		None
Act Effct Green (s)		45.3	45.3				45.3			26.7			26.7		
Actuated g/C Ratio		0.45	0.45				0.45			0.27			0.27		
v/c Ratio		0.74	0.42				0.80			0.82			0.92		
Control Delay		66.0	23.5				34.6			47.9			62.3		
Queue Delay		0.0	0.0				0.0			0.0			0.0		
Total Delay		66.0	23.5				34.6			47.9			62.3		
LOS		E	C				C			D			E		
Approach Delay			29.6				34.6			47.9			62.3		
Approach LOS			C				C			D			E		
Queue Length 50th (ft)		54	138				298			179			89		
Queue Length 95th (ft)		#174	223				#523			246			#206		
Internal Link Dist (ft)			332				437			188			220		
Turn Bay Length (ft)		140													
Base Capacity (vph)		130	1367				1202			603			329		
Starvation Cap Reductn		0	0				0			0			0		
Spillback Cap Reductn		0	0				0			0			0		
Storage Cap Reductn		0	0				0			0			0		
Reduced v/c Ratio		0.74	0.42				0.80			0.53			0.67		

Intersection Summary

Area Type: CBD
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 21 (21%), Referenced to phase 1:EBWB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 37.8 Intersection LOS: D
Intersection Capacity Utilization 89.2% ICU Level of Service E
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Linden St & Brighton Ave

Lane Group	EBT	EBR	EBR2	WBL2	WBT	NBR	NWR	Ø2
Lane Configurations								
Traffic Volume (vph)	661	6	18	710	911	456	0	
Future Volume (vph)	661	6	18	710	911	456	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	12	11	12	11	12	
Lane Util. Factor	0.95	0.95	0.95	0.97	1.00	0.88	1.00	
Ped Bike Factor	0.99							
Frt	0.995					0.850		
Flt Protected				0.950				
Satd. Flow (prot)	3147	0	0	2987	1660	2448	1693	
Flt Permitted				0.950				
Satd. Flow (perm)	3147	0	0	2987	1660	2448	1693	
Right Turn on Red							No	
Satd. Flow (RTOR)								
Link Speed (mph)	30				30			
Link Distance (ft)	165				656			
Travel Time (s)	3.8				14.9			
Confl. Peds. (#/hr)			132					
Confl. Bikes (#/hr)			79					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	0%	0%	2%	3%	1%	1%	
Adj. Flow (vph)	718	7	20	772	990	496	0	
Shared Lane Traffic (%)								
Lane Group Flow (vph)	745	0	0	772	990	496	0	
Turn Type	NA			Prot	NA	pt+ov	custom	
Protected Phases	3			1	1 3	1 2!	1 2!	2
Permitted Phases								
Detector Phase	3			1	1	1 2	1	
Switch Phase					3		2	
Minimum Initial (s)	8.0			10.0				8.0
Minimum Split (s)	37.0			17.0				25.0
Total Split (s)	49.0			44.0				27.0
Total Split (%)	40.8%			36.7%				23%
Yellow Time (s)	3.0			3.0				3.0
All-Red Time (s)	5.0			4.0				4.0
Lost Time Adjust (s)	0.0			0.0				
Total Lost Time (s)	8.0			7.0				
Lead/Lag				Lead				Lag
Lead-Lag Optimize?				Yes				Yes
Recall Mode	Min			C-Max				Min
Act Effct Green (s)	39.4			40.6	88.0	65.6		
Actuated g/C Ratio	0.33			0.34	0.73	0.55		
v/c Ratio	0.72			0.76	0.81	0.37		
Control Delay	39.9			41.9	17.6	16.9		
Queue Delay	0.0			0.0	0.0	0.0		
Total Delay	39.9			41.9	17.6	16.9		
LOS	D			D	B	B		
Approach Delay	39.9				28.2			
Approach LOS	D				C			
Queue Length 50th (ft)	260			279	443	122		
Queue Length 95th (ft)	332			357	669	166		
Internal Link Dist (ft)	85				576			
Turn Bay Length (ft)								
Base Capacity (vph)	1075			1011	1217	1379		
Starvation Cap Reductn	0			0	0	0		
Spillback Cap Reductn	0			0	0	0		
Storage Cap Reductn	0			0	0	0		
Reduced v/c Ratio	0.69			0.76	0.81	0.36		

Intersection Summary

Area Type: CBD
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 38 (32%), Referenced to phase 1:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 29.2 Intersection LOS: C
Intersection Capacity Utilization 68.5% ICU Level of Service C
Analysis Period (min) 15
! Phase conflict between lane groups.

Splits and Phases: 2: Commonwealth Ave & Brighton Ave

Ø1 (R)	Ø2	Ø3
44 s	27 s	49 s

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (veh/h)	11	19	761	16	4	14	894	68	0	0	0	0	0	0
Future Volume (Veh/h)	11	19	761	16	4	14	894	68	0	0	0	0	0	0
Sign Control			Free				Free			Stop			Stop	
Grade			0%				0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	21	827	17	0	15	972	74	0	0	0	0	0	0
Pedestrians										154			141	
Lane Width (ft)										0.0			0.0	
Walking Speed (ft/s)										3.5			3.5	
Percent Blockage										0			0	
Right turn flare (veh)														
Median type			None				None							
Median storage veh)														
Upstream signal (ft)			517				1028							
pX, platoon unblocked	0.00				0.00	0.89			0.89	0.89	0.89	0.89	0.89	
vC, conflicting volume	0	1187			0	998			1548	2248	576	1636	2220	664
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	0	1187			0	748			1366	2155	273	1465	2123	664
tC, single (s)	0.0	4.1			0.0	4.4			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)														
tF (s)	0.0	2.2			0.0	2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	0	96			0	98			100	100	100	100	100	100
cM capacity (veh/h)	0	595			0	700			90	40	644	76	42	403

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	434	430	501	560
Volume Left	21	0	15	0
Volume Right	0	17	0	74
cSH	595	1700	700	1700
Volume to Capacity	0.04	0.25	0.02	0.33
Queue Length 95th (ft)	3	0	2	0
Control Delay (s)	1.0	0.0	0.6	0.0
Lane LOS	A		A	
Approach Delay (s)	0.5		0.3	
Approach LOS				

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (veh/h)	49	29	665	890	23	0	94
Future Volume (Veh/h)	49	29	665	890	23	0	94
Sign Control			Free	Free		Stop	
Grade			0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	32	723	967	25	0	102
Pedestrians						307	
Lane Width (ft)						11.0	
Walking Speed (ft/s)						3.5	
Percent Blockage						27	
Right turn flare (veh)							
Median type			None	None			
Median storage veh)							
Upstream signal (ft)				165			
pX, platoon unblocked	0.00						
vC, conflicting volume	0	1299				1712	803
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	0	1299				1712	803
tC, single (s)	0.0	4.3				6.8	7.0
tC, 2 stage (s)							
tF (s)	0.0	2.3				3.5	3.3
p0 queue free %	0	91				100	57
cM capacity (veh/h)	0	354				55	236

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	32	362	362	645	347	102
Volume Left	32	0	0	0	0	0
Volume Right	0	0	0	0	25	102
cSH	354	1700	1700	1700	1700	236
Volume to Capacity	0.09	0.21	0.21	0.38	0.20	0.43
Queue Length 95th (ft)	7	0	0	0	0	51
Control Delay (s)	16.2	0.0	0.0	0.0	0.0	31.4
Lane LOS	C					D
Approach Delay (s)	0.7			0.0		31.4
Approach LOS						D

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (veh/h)	0	0	0	0	0	0	1	63	419	23	75	204	30
Future Volume (Veh/h)	0	0	0	0	0	0	1	63	419	23	75	204	30
Sign Control		Stop			Stop				Free			Free	
Grade		0%			0%				0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	68	455	25	82	222	33
Pedestrians		49			89								
Lane Width (ft)		0.0			0.0								
Walking Speed (ft/s)		3.5			3.5								
Percent Blockage		0			0								
Right turn flare (veh)													
Median type									None			None	
Median storage veh)													
Upstream signal (ft)									300				
pX, platoon unblocked							0.00						
vC, conflicting volume	1055	1156	288	1095	1160	556	0	304			569		
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	1055	1156	288	1095	1160	556	0	304			569		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	0.0	4.1			4.1		
tC, 2 stage (s)													
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	0.0	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	0	95			92		
cM capacity (veh/h)	183	170	752	172	170	530	0	1257			993		

Direction, Lane #	NB 1	SB 1
Volume Total	548	337
Volume Left	68	82
Volume Right	25	33
cSH	1257	993
Volume to Capacity	0.05	0.08
Queue Length 95th (ft)	4	7
Control Delay (s)	1.5	2.8
Lane LOS	A	A
Approach Delay (s)	1.5	2.8
Approach LOS		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	74	0	0	0	0	0	62	33	0	0	0
Future Volume (Veh/h)	10	74	0	0	0	0	0	62	33	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	80	0	0	0	0	0	67	36	0	0	0
Pedestrians					38						47	
Lane Width (ft)					0.0						0.0	
Walking Speed (ft/s)					3.5						3.5	
Percent Blockage					0						0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	47			80			102	149	118	256	149	47
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	47			80			102	149	118	256	149	47
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	91	96	100	100	100
cM capacity (veh/h)	1573			1518			879	737	939	620	737	1022

Direction, Lane #	EB 1	NB 1
Volume Total	91	103
Volume Left	11	0
Volume Right	0	36
cSH	1573	797
Volume to Capacity	0.01	0.13
Queue Length 95th (ft)	1	11
Control Delay (s)	0.9	10.2
Lane LOS	A	B
Approach Delay (s)	0.9	10.2
Approach LOS		B

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	765	1027	22	0	40
Future Volume (Veh/h)	0	765	1027	22	0	40
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	832	1116	24	0	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		856	689			
pX, platoon unblocked					0.92	
vC, conflicting volume	1140				1544	570
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1140				1413	570
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	91
cM capacity (veh/h)	609				118	465

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	416	416	744	396	43
Volume Left	0	0	0	0	0
Volume Right	0	0	0	24	43
cSH	1700	1700	1700	1700	465
Volume to Capacity	0.24	0.24	0.44	0.23	0.09
Queue Length 95th (ft)	0	0	0	0	8
Control Delay (s)	0.0	0.0	0.0	0.0	13.5
Lane LOS					B
Approach Delay (s)	0.0		0.0		13.5
Approach LOS					B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	101	6	0	0	0	3
Future Volume (Veh/h)	101	6	0	0	0	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	110	7	0	0	0	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			117		114	114
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			117		114	114
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1471		883	939

Direction, Lane #	EB 1	NB 1
Volume Total	117	3
Volume Left	0	0
Volume Right	7	3
cSH	1700	939
Volume to Capacity	0.07	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	8.8
Lane LOS		A
Approach Delay (s)	0.0	8.8
Approach LOS		A

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	15.7%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	7.3
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL	SBT	SBR
Lane Configurations																
Traffic Vol, veh/h	0	3	42	39	0	0	0	0	0	0	12	41	0	11	63	0
Future Vol, veh/h	0	3	42	39	0	0	0	0	0	0	12	41	0	11	63	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	4	0	2	2	2	2	2	0	0	0	2	0	5	0
Mvmt Flow	0	3	46	42	0	0	0	0	0	0	13	45	0	12	68	0
Number of Lanes	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.3	6.9	7.6
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	0%	4%	15%
Vol Thru, %	23%	50%	85%
Vol Right, %	77%	46%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	53	84	74
LT Vol	0	3	11
Through Vol	12	42	63
RT Vol	41	39	0
Lane Flow Rate	58	91	80
Geometry Grp	1	1	1
Degree of Util (X)	0.059	0.098	0.092
Departure Headway (Hd)	3.656	3.864	4.134
Convergence, Y/N	Yes	Yes	Yes
Cap	972	920	864
Service Time	1.708	1.919	2.175
HCM Lane V/C Ratio	0.06	0.099	0.093
HCM Control Delay	6.9	7.3	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.2	0.3	0.3

APPENDIX E - CLIMATE CHANGE RESILIENCY AND ADAPTABILITY QUESTIONNAIRE

Climate Change Preparedness and Resiliency Checklist for New Construction

In November 2013, in conformance with the Mayor's 2011 Climate Action Leadership Committee's recommendations, the Boston Redevelopment Authority adopted policy for all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding project resiliency, preparedness, and to mitigate any identified adverse impacts that might arise under future climate conditions.

For more information about the City of Boston's climate policies and practices, and the 2011 update of the climate action plan, *A Climate of Progress*, please see the City's climate action web pages at http://www.cityofboston.gov/climate

In advance we thank you for your time and assistance in advancing best practices in Boston.

Climate Change Analysis and Information Sources:

1. Northeast Climate Impacts Assessment (www.climatechoices.org/ne/)
2. USGCRP 2009 (http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/)
3. Army Corps of Engineers guidance on sea level rise (http://planning.usace.army.mil/toolbox/library/ECs/EC11652212Nov2011.pdf)
4. Proceeding of the National Academy of Science, “Global sea level rise linked to global temperature”, Vermeer and Rahmstorf, 2009 (http://www.pnas.org/content/early/2009/12/04/0907765106.full.pdf)
5. “Hotspot of accelerated sea-level rise on the Atlantic coast of North America”, Asbury H. Sallenger Jr*, Kara S. Doran and Peter A. Howd, 2012 (http://www.bostonredevelopmentauthority.org/planning/Hotspot of Accelerated Sea-level Rise 2012.pdf)
6. “Building Resilience in Boston”: Best Practices for Climate Change Adaptation and Resilience for Existing Buildings, Linnean Solutions, The Built Environment Coalition, The Resilient Design Institute, 2103 (http://www.greenribboncommission.org/downloads/Building_Resilience_in_Boston_SML.pdf)

Checklist

Please respond to all of the checklist questions to the fullest extent possible. For projects that respond “Yes” to any of the D.1 – Sea-Level Rise and Storms, Location Description and Classification questions, please respond to all of the remaining Section D questions.

Checklist responses are due at the time of initial project filing or Notice of Project Change and final filings just prior seeking Final BRA Approval. A PDF of your response to the Checklist should be submitted to the Boston Redevelopment Authority via your project manager.

Please Note: When initiating a new project, please visit the BRA web site for the most current Climate Change Preparedness & Resiliency Checklist.

Climate Change Resiliency and Preparedness Checklist

A.1 - Project Information

Project Name:	79-83 Gardner St.
Project Address Primary:	79-83 Gardner St.
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	Steve Weinig, Vice President, Hamilton Company sweinig@hcmcorp.com, 617-783-0039

A.2 - Team Description

Owner / Developer:	The Hamilton Company
Architect:	Hacin + Associates
Engineer (building systems):	RDK Engineers
Sustainability / LEED:	Soden Sustainability
Permitting:	MLF Consulting LLC
Construction Management:	Hamilton Construction
Climate Change Expert:	Soden Sustainability

A.3 - Project Permitting and Phase

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

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

A.4 - Building Classification and Description

List the principal Building Uses:	38 units
List the First Floor Uses:	Residential

Describe the building?

Podium Construction	**Wood Frame**	Steel	**Concrete**

Site Area:	*36,764 sq ft 0.8 acres*	Building Area:	*47,736 sq ft.*
Building Height:	*35'* Ft. per Zoning *36'-46'* Ft. Per *IMP*	Number of Stories:	*3-4 Flrs.*
First Floor Elevation (reference Boston City Base):	*48'* Elev.	Are there below grade spaces/levels, if yes how many:	*Yes 1 level parking*

A.5 - Green Building

Which LEED Rating System(s) and version has or will your project use (by area for multiple rating systems)?

Select by Primary Use:	**New Construction**	Core & Shell	Healthcare	Schools
	Retail	Homes Midrise	Homes	Other
Select LEED Outcome:	Certified	**Silver**	Gold	Platinum

Will the project be USGBC Registered and / or USGBC Certified?

Registered:	*Yes / **No***	Certified:	*Yes / **No***

A.6 - Building Energy

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

Electric:	*320* ***(kW)***	Heating:	*360 (MMBtu/hr)*
What is the planned building Energy Use Intensity:	*(kbut/SF or 6.6 kWh/SF)*	Cooling:	*70 (Tons/hr)*

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

Electric:	*24 (kW)*	Heating:	*N/A (MMBtu/hr)*
		Cooling:	*N/A (Tons/hr)*

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

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

Fire Pump is not anticipated based on adjacent Brighton Ave hydrant flow calcs. Emergency Generator is deleted. Emergency lighting source will be inverters.

B - Extreme Weather and Heat Events

Climate change will result in more extreme weather events including higher year round average temperatures, higher peak temperatures, and more periods of extended peak temperatures. The section explores how a project responds to higher temperatures and heat waves.

B.1 - Analysis

What is the full expected life of the project?

Select most appropriate:	10 Years	25 Years	**50 Years**	75 Years

What is the full expected operational life of key building systems (e.g. heating, cooling, ventilation)? **The residential compressors will not last 25 yrs, but the furnaces in the units and building wide systems will last 25 yrs.**

Select most appropriate:	10 Years	**25 Years**	50 Years	75 Years

What time span of future Climate Conditions was considered?

Select most appropriate:	10 Years	**25 Years**	50 Years	75 Years

Analysis Conditions - What range of temperatures will be used for project planning – Low/High?

Deg.

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

Deg.	*Days*	*Events / yr.*

Design Criteria

A. **Design temperatures in the apartments will meet ASHRAE 55-2004 guidelines**.
B. Summer:
1. Outside Design Condition per ASHRAE: 90.8°F DB, 73.3°F WB (0.4%)
2. Interior Conditions: 75°F dry bulb, 50% relative humidity
C. Winter:
1. Outside Design Conditions per ASHRAE; 7.4°F dry bulb (99.6%).
2. Interior Conditions: 68°F dry bulb.
3. Humidity: No humidity control will be provided. Humidity can drop to lows of 10% relative humidity.
D. Ventilation **will meet ASHRAE 62.1-2007 criteria.**

What Drought characteristics will be used for project planning – Duration and Frequency?

Days	*Events / yr.*

What Extreme Rain Event characteristics will be used for project planning – Seasonal Rain Fall, Peak Rain Fall, and Frequency of Events per year?

Inches / yr.	*Inches*	*Events / yr.*

+

mph Peak Wind	*Hours*	*Events / yr.*

B.2 - Mitigation Strategies

What will be the overall energy performance, based on use, of the project and how will performance be determined?

Building energy use below code:	*25%*
How is performance determined:	**90.1 Appendix G Performance Rating Method**

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

Select all appropriate:	**High performance building envelope**	**High performance lighting & controls**	**Building day lighting**	EnergyStar equip. / appliances
	High performance HVAC equipment	Energy recovery ventilation	No active cooling	No active heating
Describe any added measures:				

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

Roof:	*R = 30 min.*	Walls / Curtain Wall Assembly:	*R = 17.5 min*
Foundation:	*R = N/A Parking below grade parking*	Basement / Slab:	*R =N/A Parking below grade parking*
Windows:	*R = / U =.29Winter -.26 Summer*	Doors:	*R = / U =11/ .09*

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

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

Will the project employ Distributed Energy / Smart Grid Infrastructure and /or Systems?

Select all appropriate:	Connected to local distributed electrical	Building will be Smart Grid ready	Connected to distributed steam, hot, chilled water	Distributed thermal energy ready

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

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

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

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

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

Select all appropriate:	High reflective paving materials	Shade trees & shrubs	High reflective roof materials	Vegetated roofs
Describe other strategies:				

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

Select all appropriate:	On-site retention systems & ponds	Infiltration galleries & areas	vegetated water capture systems	Vegetated roofs
Describe other strategies:	On site water infiltration system consistent with BWSC requirements			

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

Select all appropriate:	Hardened building structure & elements	Buried utilities & hardened infrastructure	Hazard removal & protective landscapes	**Soft & permeable surfaces (water infiltration)**
Describe other strategies:	Trees, Hedges and Arc enclosure walls that shelter pedestrians from harsh winds.			

C - Sea-Level Rise and Storms

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

C.1 - Location Description and Classification:

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

Yes / ***No*** ***Above the 500 flood plain Zone C***

Describe site conditions?

Site Elevation – Low/High Points:	*Boston City Base. (Ft.)*
Building Proximity to Water:	*2,600 Ft. to the Charles River*

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

Coastal Zone:	*Yes* / ***No***	Velocity Zone:	*Yes* / ***No***
Flood Zone:	*Yes* / ***No***	Area Prone to Flooding:	*Yes* / ***No***

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

2013 FEMA Prelim. FIRMs:	*Yes* / ***No***	Future floodplain delineation updates:	*Yes* / ***No***

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

Ft.

If you answered YES to any of the above Location Description and Classification questions, please complete the following questions. Otherwise you have completed the questionnaire; thank you!

C - Sea-Level Rise and Storms

This section explores how a project responds to Sea-Level Rise and / or increase in storm frequency or severity.

C.2 - Analysis

How were impacts from higher sea levels and more frequent and extreme storm events analyzed:

Sea Level Rise:	*Ft.*	Frequency of storms:	*per year*

C.3 - Building Flood Proofing

Describe any strategies to limit storm and flood damage and to maintain functionality during an extended periods of disruption.

What will be the Building Flood Proof Elevation and First Floor Elevation:

Flood Proof Elevation:	*Boston City Base Elev.(Ft.)*	First Floor Elevation:	*Boston City Base Elev. (Ft.)*

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

	Yes / No	If Yes, to what elevation	*Boston City Base Elev. (Ft.)*
If Yes, describe:			

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

Systems located above 1st Floor.	Water tight utility conduits	Waste water back flow prevention	Storm water back flow prevention

Were the differing effects of fresh water and salt water flooding considered:

Yes / No

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

Yes / No	If yes, to what height above 100 Year Floodplain:	*Boston City Base Elev. (Ft.)*

Will the project employ hard and / or soft landscape elements as velocity barriers to reduce wind or wave impacts?

	Yes / No
If Yes, describe:	

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

Yes / No	If Yes, for how long:	*days*

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

C.4 - Building Resilience and Adaptability

Describe any strategies that would support rapid recovery after a weather event and accommodate future building changes that respond to climate change:

Will the building be able to withstand severe storm impacts and endure temporary inundation?

Select appropriate:	*Yes / No*	Hardened / Resilient Ground Floor Construction	Temporary shutters and or barricades	Resilient site design, materials and construction

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

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

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

Select appropriate:	*Yes / No*	Solar PV	Solar Thermal	Clean Energy / CHP System(s)
		Potable water storage	Wastewater storage	Back up energy systems & fuel
Describe any specific or additional strategies:				

Thank you for completing the Boston Climate Change Resilience and Preparedness Checklist!

For questions or comments about this checklist or Climate Change Resiliency and Preparedness best practices, please contact: John.Dalzell.BRA@cityofboston.gov

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1. Northeast Climate Impacts Assessment (www.climatechoices.org/ne/)
2. USGCRP 2009 (http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/)
3. Army Corps of Engineers guidance on sea level rise (http://planning.usace.army.mil/toolbox/library/ECs/EC11652212Nov2011.pdf)
4. Proceeding of the National Academy of Science, “Global sea level rise linked to global temperature”, Vermeer and Rahmstorf, 2009 (http://www.pnas.org/content/early/2009/12/04/0907765106.full.pdf)
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Climate Change Resiliency and Preparedness Checklist

A.1 - Project Information

Project Name:	45-55 Brighton Avenue
Project Address Primary:	45-55 Brighton Avenue
Project Address Additional:	
Project Contact (name / Title / Company / email / phone):	Steve Weinig, Vice President, Hamilton Company sweinig@hcmcorp.com, 617-783-0039

A.2 - Team Description

Owner / Developer:	The Hamilton Company
Architect:	Hacin + Associates
Engineer (building systems):	RDK Engineers
Sustainability / LEED:	Soden Sustainability
Permitting:	MLF Consulting LLC
Construction Management:	Hamilton Construction
Climate Change Expert:	Soden Sustainability

A.3 - Project Permitting and Phase

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

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

A.4 - Building Classification and Description

List the principal Building Uses:	76 units
List the First Floor Uses:	Retail, Parking

Describe the building?

Podium Construction	**Wood Frame**	Concrete	**Steel**

Site Area:	*47,229 sq ft 1.1 acres*	Building Area:	*SF 99,702 sq ft.*
Building Height:	*45' per Zoning 58'-68' Proposed*	Number of Stories:	*5-6 Flrs.*
First Floor Elevation (reference Boston City Base):	*43.6' Elev.*	Are there below grade spaces/levels, if yes how many:	*Yes 1 level parking*

A.5 - Green Building

Which LEED Rating System(s) and version has or will your project use (by area for multiple rating systems)?

Select by Primary Use:	**New Construction**	Core & Shell	Healthcare	Schools
	Retail	Homes Midrise	Homes	Other
Select LEED Outcome:	Certified	**Silver**	Gold	Platinum

Will the project be USGBC Registered and / or USGBC Certified?

Registered:	*Yes / **No***	Certified:	*Yes / **No***

A.6 - Building Energy

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

Electric:	*480 (kW)*	Heating:	*750 (MMBtu/hr)*
What is the planned building Energy Use Intensity:	*4.25 (kbut/SF or kWh/SF)*	Cooling:	*150 (Tons/hr)*

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

Electric:	*43 (kW)*	Heating:	*N/A (MMBtu/hr)*
		Cooling:	*N/A (Tons/hr)*

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

Electrical Generation:	***N/A*** *(kW)*		Fuel Source:	*Diesel*
System Type and Number of Units:	Combustion Engine	Gas Turbine	Combine Heat and Power	*(Units)*

Fire Pump is not required based on hydrant flow calcs. Emergency Generator is deleted. Emergency lighting source will be inverters.

B - Extreme Weather and Heat Events

Climate change will result in more extreme weather events including higher year round average temperatures, higher peak temperatures, and more periods of extended peak temperatures. The section explores how a project responds to higher temperatures and heat waves.

B.1 - Analysis

What is the full expected life of the project?

Select most appropriate:	10 Years	25 Years	**50 Years**	75 Years

What is the full expected operational life of key building systems (e.g. heating, cooling, ventilation)?
The residential compressors will not last 25 yrs, but the furnaces in the units and building wide systems will last 25 yrs.

Select most appropriate:	10 Years	**25 Years**	50 Years	75 Years

What time span of future Climate Conditions was considered?

Select most appropriate:	10 Years	**25 Years**	50 Years	75 Years

Analysis Conditions - What range of temperatures will be used for project planning – Low/High?

Interior design temp 70 winter and 75 summer Deg.

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

Deg.	*Days*	*Events / yr.*

Design Criteria

A. **Design temperatures in the apartments will meet ASHRAE 55-2004 guidelines**.
B. Summer:
1. Outside Design Condition per ASHRAE: 90.8°F DB, 73.3°F WB (0.4%)
2. Interior Conditions: 75°F dry bulb, 50% relative humidity
C. Winter:
1. Outside Design Conditions per ASHRAE; 7.4°F dry bulb (99.6%).
2. Interior Conditions: 68°F dry bulb.
3. Humidity: No humidity control will be provided. Humidity can drop to lows of 10% relative humidity.

D. Ventilation **will meet ASHRAE 62.1-2007 criteria.**

What Drought characteristics will be used for project planning – Duration and Frequency?

Days	*Events / yr.*

What Extreme Rain Event characteristics will be used for project planning – Seasonal Rain Fall, Peak Rain Fall, and Frequency of Events per year?

Inches / yr.	*Inches*	*Events / yr.*

What Extreme Wind Storm Event characteristics will be used for project planning – Peak Wind Speed, Duration of Storm Event, and Frequency of Events per year?

mph Peak Wind	*Hours*	*Events / yr.*

Storm loading will be per code requirements

B.2 - Mitigation Strategies

What will be the overall energy performance, based on use, of the project and how will performance be determined?

Building energy use below code:	*25%*
How is performance determined:	90.1 Appendix G Performance Rating Method

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

Select all appropriate:	**High performance building envelope**	**High performance lighting & controls**	**Building day lighting**	EnergyStar equip. / appliances
	High performance HVAC equipment	Energy recovery ventilation	No active cooling	No active heating
Describe any added measures:				

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

Roof:	*R = 30 min.*	Walls / Curtain Wall Assembly:	*R = 17.5 min*
Foundation:	*R = N/A Parking below grade parking*	Basement / Slab:	*R =N/A Parking below grade parking*
Windows:	*R = / U =.29Winter -.26 Summer*	Doors:	*R = / U =11/ .o9*

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

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

Will the project employ Distributed Energy / Smart Grid Infrastructure and /or Systems?

Select all appropriate:	Connected to local distributed electrical	Building will be Smart Grid ready	Connected to distributed steam, hot, chilled water	Distributed thermal energy ready

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

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

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

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

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

Select all appropriate:	High reflective paving materials	Shade trees & shrubs	High reflective roof materials	Vegetated roofs
Describe other strategies:				

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

Select all appropriate:	On-site retention systems & ponds	Infiltration galleries & areas	vegetated water capture systems	Vegetated roofs
Describe other strategies:	On site water infiltration system will be consistent with BWSC requirements			

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

Select all appropriate:	Hardened building structure & elements	Buried utilities & hardened infrastructure	Hazard removal & protective landscapes	**Soft & permeable surfaces (water infiltration)**
Describe other strategies:	Trees, Hedges and Arc enclosure walls that shelter pedestrians from harsh winds.			

C - Sea-Level Rise and Storms

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

C.1 - Location Description and Classification:

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

	Yes / ***No*** *Above the 500 flood plane in Zone C*

Describe site conditions?

Site Elevation – Low/High Points:	*Boston City Base. (Ft.)*
Building Proximity to Water:	*2,600 Ft. to the Charles River*

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

Coastal Zone:	Yes / **No**	Velocity Zone:	Yes / **No**
Flood Zone:	Yes / **No**	Area Prone to Flooding:	Yes / **No**

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

2013 FEMA Prelim. FIRMs:	Yes / **No**	Future floodplain delineation updates:	Yes / **No**

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

Ft.

If you answered YES to any of the above Location Description and Classification questions, please complete the following questions. Otherwise you have completed the questionnaire; thank you!

C - Sea-Level Rise and Storms

This section explores how a project responds to Sea-Level Rise and / or increase in storm frequency or severity.

C.2 - Analysis

How were impacts from higher sea levels and more frequent and extreme storm events analyzed:

Sea Level Rise:	*Ft.*	Frequency of storms:	*per year*

C.3 - Building Flood Proofing

Describe any strategies to limit storm and flood damage and to maintain functionality during an extended periods of disruption.

What will be the Building Flood Proof Elevation and First Floor Elevation:

Flood Proof Elevation:	*Boston City Base Elev.(Ft.)*	First Floor Elevation:	*Boston City Base Elev. (Ft.)*

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

	Yes / No	If Yes, to what elevation	*Boston City Base Elev. (Ft.)*
If Yes, describe:			

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

Systems located above 1st Floor.	Water tight utility conduits	Waste water back flow prevention	Storm water back flow prevention

Were the differing effects of fresh water and salt water flooding considered:

Yes / No

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

Yes / No	If yes, to what height above 100 Year Floodplain:	*Boston City Base Elev. (Ft.)*

Will the project employ hard and / or soft landscape elements as velocity barriers to reduce wind or wave impacts?

	Yes / No
If Yes, describe:	

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

	Yes / No	If Yes, for how long:	*days*

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

C.4 - Building Resilience and Adaptability

Describe any strategies that would support rapid recovery after a weather event and accommodate future building changes that respond to climate change:

Will the building be able to withstand severe storm impacts and endure temporary inundation?

Select appropriate:	*Yes / No*	Hardened / Resilient Ground Floor Construction	Temporary shutters and or barricades	Resilient site design, materials and construction

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

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

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

Select appropriate:	*Yes / No*	Solar PV	Solar Thermal	Clean Energy / CHP System(s)
		Potable water storage	Wastewater storage	Back up energy systems & fuel
Describe any specific or additional strategies:				

Thank you for completing the Boston Climate Change Resilience and Preparedness Checklist!

For questions or comments about this checklist or Climate Change Resiliency and Preparedness best practices, please contact: John.Dalzell.BRA@cityofboston.gov

APPENDIX F –RESPONSE TO ACCESSIBILITY GUIDELINES

Accessibility Checklist

(to be added to the BRA Development Review Guidelines)

In 2009, a nine-member Advisory Board was appointed to the Commission for Persons with Disabilities in an effort to reduce architectural, procedural, attitudinal, and communication barriers affecting persons with disabilities in the City of Boston. These efforts were instituted to work toward creating universal access in the built environment.

In line with these priorities, the Accessibility Checklist aims to support the inclusion of people with disabilities. In order to complete the Checklist, you must provide specific detail, including descriptions, diagrams and data, of the universal access elements that will ensure all individuals have an equal experience that includes full participation in the built environment throughout the proposed buildings and open space.

In conformance with this directive, all development projects subject to Boston Zoning Article 80 Small and Large Project Review, including all Institutional Master Plan modifications and updates, are to complete the following checklist and provide any necessary responses regarding the following:

- improvements for pedestrian and vehicular circulation and access;
- encourage new buildings and public spaces to be designed to enhance and preserve Boston's system of parks, squares, walkways, and active shopping streets;
- ensure that persons with disabilities have full access to buildings open to the public;
- afford such persons the educational, employment, and recreational opportunities available to all citizens; and
- preserve and increase the supply of living space accessible to persons with disabilities.

We would like to thank you in advance for your time and effort in advancing best practices and progressive approaches to expand accessibility throughout Boston's built environment.

Accessibility Analysis Information Sources:

1. Americans with Disabilities Act – 2010 ADA Standards for Accessible Design
    a. http://www.ada.gov/2010ADAstandards_index.htm
2. Massachusetts Architectural Access Board 521 CMR
    a. http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/aab/aab-rules-and-regulations-pdf.html
3. Boston Complete Street Guidelines
    a. http://bostoncompletestreets.org/
4. City of Boston Mayors Commission for Persons with Disabilities Advisory Board
    a. http://www.cityofboston.gov/Disability
5. City of Boston – Public Works Sidewalk Reconstruction Policy
    a. http://www.cityofboston.gov/images_documents/sidewalk%20policy%200114_tcm3-41668.pdf
6. Massachusetts Office On Disability Accessible Parking Requirements
    a. www.mass.gov/anf/docs/mod/hp-parking-regulations-mod.doc
7. MBTA Fixed Route Accessible Transit Stations
    a. http://www.mbta.com/about_the_mbta/accessibility/

Project Information

Project Name:	**Packard Crossing**
Project Address Primary:	45 Brighton Ave.
Project Address Additional:	83 Gardner St.
Project Contact (name / Title / Company / email / phone):	**Steve Weinig, President** **Hamilton Construction Co.** sweinig@hcmcorp.com 617-783-0039

Team Description

Owner / Developer:	The Hamilton Company
Architect:	Hacin Associates
Engineer (building systems):	RDK
Sustainability / LEED:	Soden Sustainability
Permitting:	MLF Consulting LLC
Construction Management:	**Hamilton Construction Co.**

Project Permitting and Phase

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

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

Building Classification and Description

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

Residential – One to Three Unit	☑ Residential - Multi-unit, Four +	Institutional	Education
Commercial	Office	☑ Retail	Assembly (religious)
Laboratory / Medical	Manufacturing / Industrial	Mercantile	Storage, Utility and Other

First Floor Uses (List)

45 Brighton – Below Grade Parking
45 Brighton – Lobby, Retail and Parking
45 Brighton – 2-6 Residential
83 Gardner - Below Grade Parking
83 Gardner – 1-4 Residential

What is the Construction Type – select most appropriate type?

45 Brighton:	☑ **Wood Frame**	Masonry	Steel Frame	☑Concrete
83 Gardner:	☑ **Wood Frame**	Masonry	☑Steel Frame	Concrete

Describe the building?

45 Brighton Ave.

Site Area:	**47,229**	Building Area:	**99,702 sq. ft.**
Building Height:	**45 Ft**. per Zoning at 45 Brighton Ave	Number of Stories:	**6 Stories**
First Floor Elevation (reference Boston City Base):	43.6' Elev.	Are there below grade spaces/levels, if yes how many:	**Yes** **1** level below-grade parking

83 Gardner St.

Site Area:	**36,764**	Building Area:	**47,736 SF**
Building Height:	**35'** per Zoning at 83 Gardner St	Number of Stories:	**4 stories above grade**
First Floor Elevation (reference Boston City Base):	**48'** Elev.	Are there below grade spaces/levels, if yes how many:	**Yes** **1** level below-grade parking

Assessment of Existing Infrastructure for Accessibility:

This section explores the proximity to accessible transit lines and proximate institutions such as, but not limited to hospitals, elderly and disabled housing, and general neighborhood information. The proponent should identify how the area surrounding the development is accessible for people with mobility impairments and should analyze the existing condition of the accessible routes through sidewalk and pedestrian ramp reports.

Provide a description of the development neighborhood and identifying characteristics.	45 Brighton Ave is located just west of the intersection of Brighton Ave and Commonwealth Avenue in Allston. The site and its immediate surroundings are a mix of residential multifamily up to 6-story multi-family buildings – and commercial uses – including restaurants, grocery stores and retail stores and religious institutions. The site fronts onto Brighton Ave, or Rte. 20 - a street that makes connections from Boston and to the West and enhanced by MBTA bus route 57 and 57A. 83 Gardner St. is just to the north east of the Brighton Ave site. The Gardner St site is surrounded by 1- and 2-family dwellings and with up to 5-story multi-family buildings.
List the surrounding ADA compliant MBTA transit lines and the proximity to the development site: Commuter rail, subway, bus, etc.	• MBTA Subway – Green Line, B branch: Packard Corner. 800 away; one block south Brighton Ave to the intersection with Commonwealth Avenue. The closest accessible stops are at Harvard Ave. and BU West. • MBTA Bus lines: Route 57 and 57A follows Brighton Ave., directly adjacent to the site. Routes 66 operate along Harvard Ave., 0.5 miles west of the site. The 501 and 503 also operate on Cambridge St. All MBTA Bus Routes are accessible.
List the surrounding institutions: hospitals, public housing and elderly and disabled housing developments, educational facilities, etc.	The project site is in close proximity to public transit including the MBTA B-Branch Greenline and multiple bus routes (57,64, and 66) as well as the Framingham/Worcester commuter rail, providing convenient access to major job centers such as downtown Boston, Kenmore Square, Boston University, Boston College, Longwood Medical Area, and Kendall Square (Cambridge). In addition, many large scale employers are in proximity to the project site such as Boston University, St. Elizabeth's Medical Center, WGBH, New Balance and Harvard University. See Section 7.0, Transportation, for further details on specific bus routes and commuter rail line(s).
Is the proposed development on a priority accessible route to a key public use facility? List the surrounding: government buildings, libraries, community centers and recreational facilities and other related facilities.	No

Surrounding Site Conditions – Existing:

This section identifies the current condition of the sidewalks and pedestrian ramps around the development site.

Are there sidewalks and pedestrian ramps existing at the development site?	Yes
If yes above, list the existing sidewalk and pedestrian ramp materials and physical condition at the development site.	The existing sidewalk material is concrete with granite curbing. The physical condition of the existing concrete sidewalk and pedestrian ramps are inconsistent.
Are the sidewalks and pedestrian ramps existing-to-remain? If yes, have the sidewalks and pedestrian ramps been verified as compliant? If yes, please provide surveyors report.	The sidewalks that are in good condition and those not disturbed by the construction will remain. Where curb cuts are new or to be removed, the final conditions will be brought into compliance. No, the existing sidewalks and pedestrian ramps have not been verified as being in compliance at this time but will be verified during the project design.
Is the development site within a historic district? If yes, please identify.	The development team is not aware of the project site being located within a historic district, although the Harvard Street Historic District is with ¼ mile of the site.

Surrounding Site Conditions – Proposed

This section identifies the proposed condition of the walkways and pedestrian ramps in and around the development site. The width of the sidewalk contributes to the degree of comfort and enjoyment of walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Typically, a five foot wide Pedestrian Zone supports two people walking side by side or two wheelchairs passing each other. An eight foot wide Pedestrian Zone allows two pairs of people to comfortably pass each other, and a ten foot or wider Pedestrian Zone can support high volumes of pedestrians.

Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? See: www.bostoncompletestreets.org	Yes (pending confirmation of existing cross slopes and clearances).
If yes above, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, Boulevard.	Brighton Ave. Neighborhood Connector Gardner St. Residential
What is the total width of the proposed sidewalk? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone.	(@ 45 Brighton): 15'-6" Greenspace/Furnishing Zone + Curb: 4'-6" Pedestrian Zone: 5'-6" Frontage Zone: 5'-6" (@ 83 Gardner St. Green Space: 2'-6" Pedestrian Zone: 4'-6"
List the proposed materials for each Zone. Will the proposed materials be on private property or will the proposed materials be on the City of Boston pedestrian right-of-way?	Curb Zone: stone curbs, typical Greenscape Zone: landscaped tree beds alternating with poured-in-place scored concrete and/or permeable unit pavers. Street furniture, City of Boston signage, street lights, bicycle parking, etc. Pedestrian Zone: varies Typical: poured-in-place scored concrete Frontage Zone: varies Multi-Family Residential Building (45 Brighton): Typical: poured-in-place scored concrete Multi-Family Residential Building (83 Gardner): landscaped lawn and groundcover with occasional shrubs; decks/patios and hardscaped entry plaza for Lobby
If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the City of Boston Public Improvement Commission?	*N/A*
Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way?	No
If yes above, what are the proposed dimensions of the sidewalk café or furnishings and what will the right-of-way clearance be?	*N/A*

Proposed Accessible Parking:

See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirement counts and the Massachusetts Office of Disability Handicap Parking Regulations.

What is the total number of parking spaces provided at the development site parking lot or garage?	Brighton 175 spaces total in the parking garage. Gardner 40 spaces in the basement parking garage
What is the total number of accessible spaces provided at the development site?	45 Brighton 6 total accessible spaces - 1 Van accessible parking space at grade (Van Accessible) - 5 Accessible parking spaces, 3 in the basement parking garage and 2 at the first floor. 83 Gardner -2 accessible spaces in garage adjacent to the elevator.
Will any on street accessible parking spaces be required? If yes, has the proponent contacted the Commission for Persons with Disabilities and City of Boston Transportation Department regarding this need?	All accessible parking requirements are met on site, in the parking garage.
Where is accessible visitor parking located?	Accessible parking spaces are located in the parking garage on both levels and are the closest spaces to the elevator core.
Has a drop-off area been identified? If yes, will it be accessible?	An off street drop-off area has been created within both project phases that is accessible.
Include a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations. Please include route distances.	See Attached Drawings/Figures F1-01 thru F1-05 (Gardner Street), and F2-01 thru F2-08 (Brighton Avenue)

Circulation and Accessible Routes:

The primary objective in designing smooth and continuous paths of travel is to accommodate persons of all abilities that allow for universal access to entryways, common spaces and the visit-ability* of neighbors.

**Visit-ability – Neighbors ability to access and visit with neighbors without architectural barrier limitations*

Provide a diagram of the accessible route connections through the site.	See attached drawings.
Describe accessibility at each entryway: Flush Condition, Stairs, Ramp Elevator.	Main entries for all buildings will be Flush Condition.
Are the accessible entrance and the standard entrance integrated?	Yes
If no above, what is the reason?	
Will there be a roof deck or outdoor courtyard space? If yes, include diagram of the accessible route.	Roof deck will be accessible. See attached Drawings/Figures
Has an accessible routes way-finding and signage package been developed? If yes, please describe.	No, signage has not been developed. All future way-finding signage will be developed to meet Building Code and Accessibility Board Requirements

Accessible Units: (If applicable)

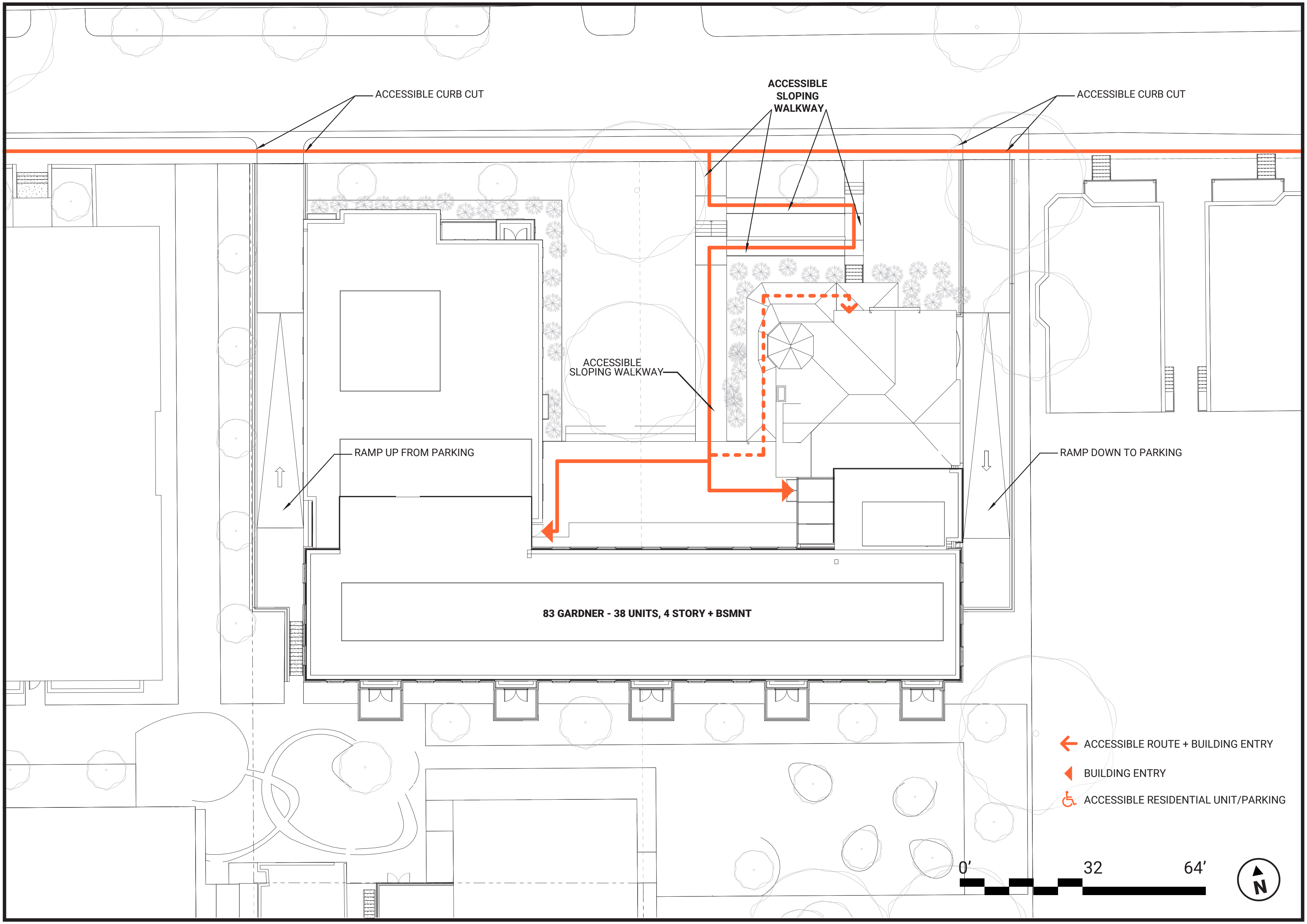
In order to facilitate access to housing opportunities this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing choice.

What is the total number of proposed units for the development?	38 units in Gardner Street (Phase 1) 76 units in Brighton Avenue (Phase 2)
How many units are for sale; how many are for rent? What is the market value vs. affordable breakdown?	All 76 units in Brighton and 38 units in Gardner are rental apartments The development will include affordable units in compliance with the City of Boston's Inclusionary Housing Policy.
How many accessible units are being proposed?	4 rental units in Brighton Ave and 2 units in Gardner St will be provided in full compliance with MAAB Group-2A regulations

Please provide plan and diagram of the accessible units.	See attached Drawings/Figures
How many accessible units will also be affordable? If none, please describe reason.	Accessible units will include a mix of affordable and market rate units, in a proportion similar to the overall composition of units. Final breakdown to be determined.
Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs at entry or step to balcony. If yes, please provide reason.	No
Has the proponent reviewed or presented the proposed plan to the City of Boston Mayor's Commission for Persons with Disabilities Advisory Board?	No
Did the Advisory Board vote to support this project? If no, what recommendations did the Advisory Board give to make this project more accessible?	

Thank you for completing the Accessibility Checklist!
For questions or comments about this checklist or accessibility practices, please contact:

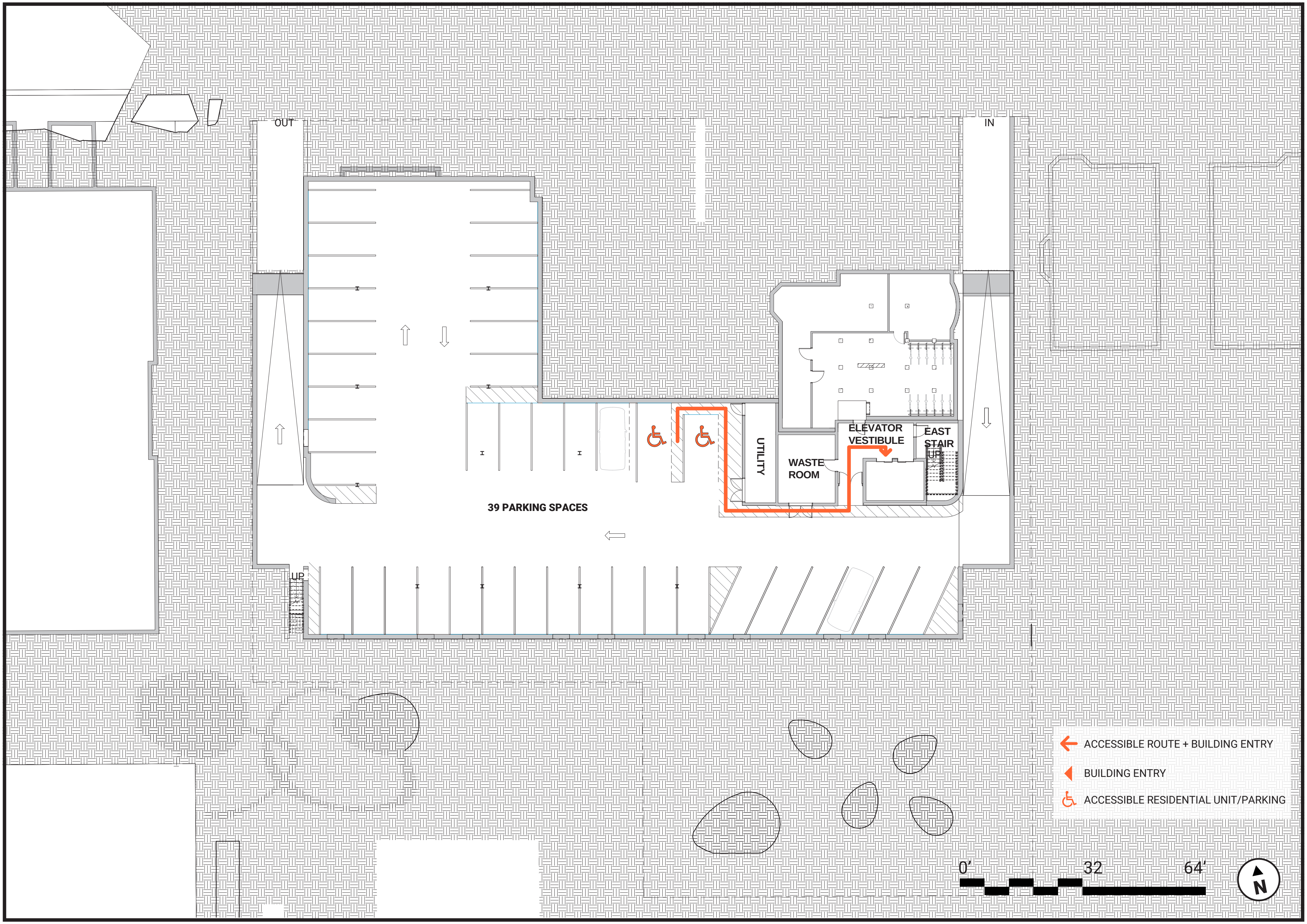
kathryn.quigley@boston.gov | Mayors Commission for Persons with Disabilities



F1-01

GARDNER ST - ACCESSIBILITY DIAGRAM - SITE

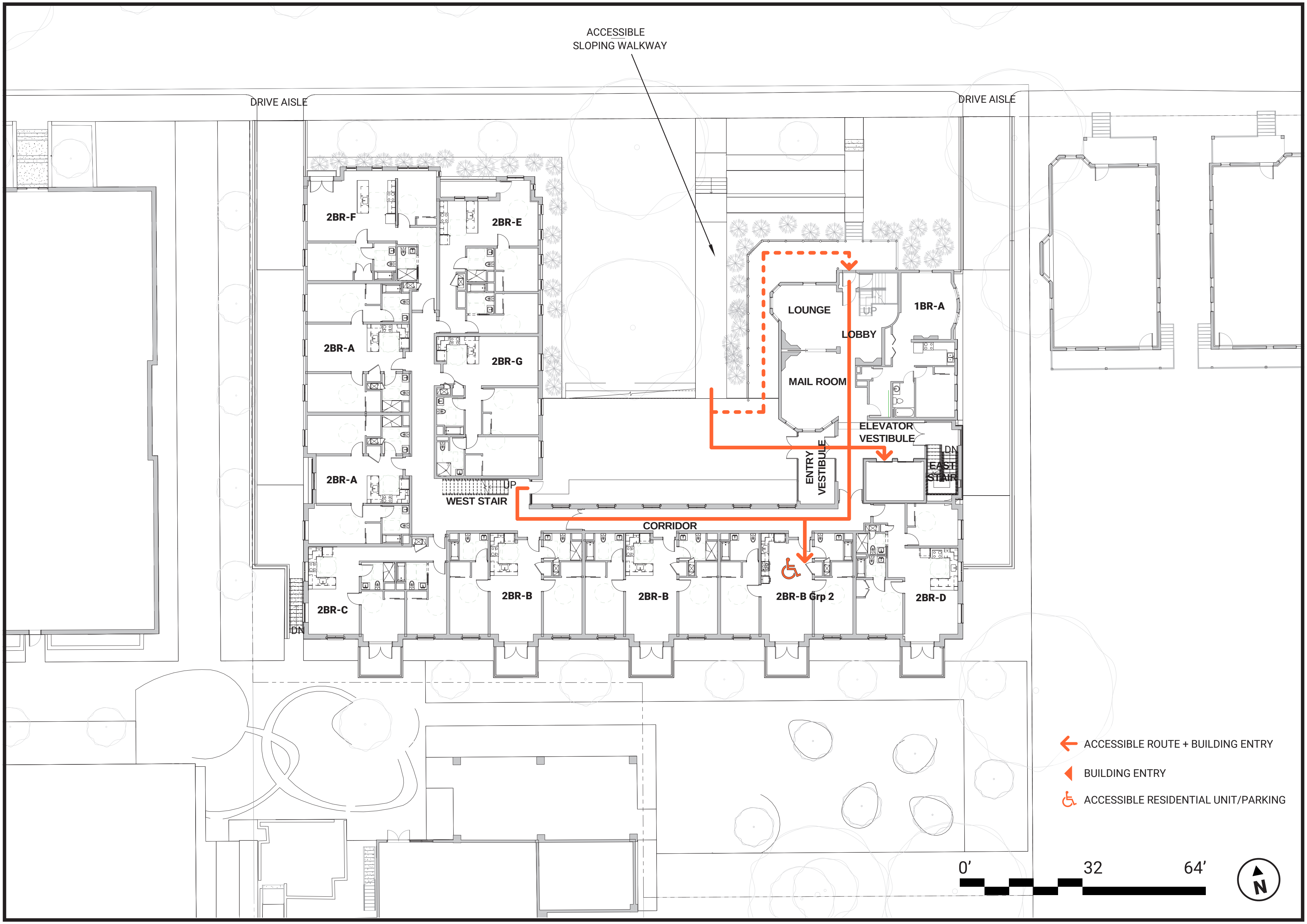
H+A



F1-02

GARDNER ST - ACCESSIBILITY DIAGRAM - PARKING LEVEL

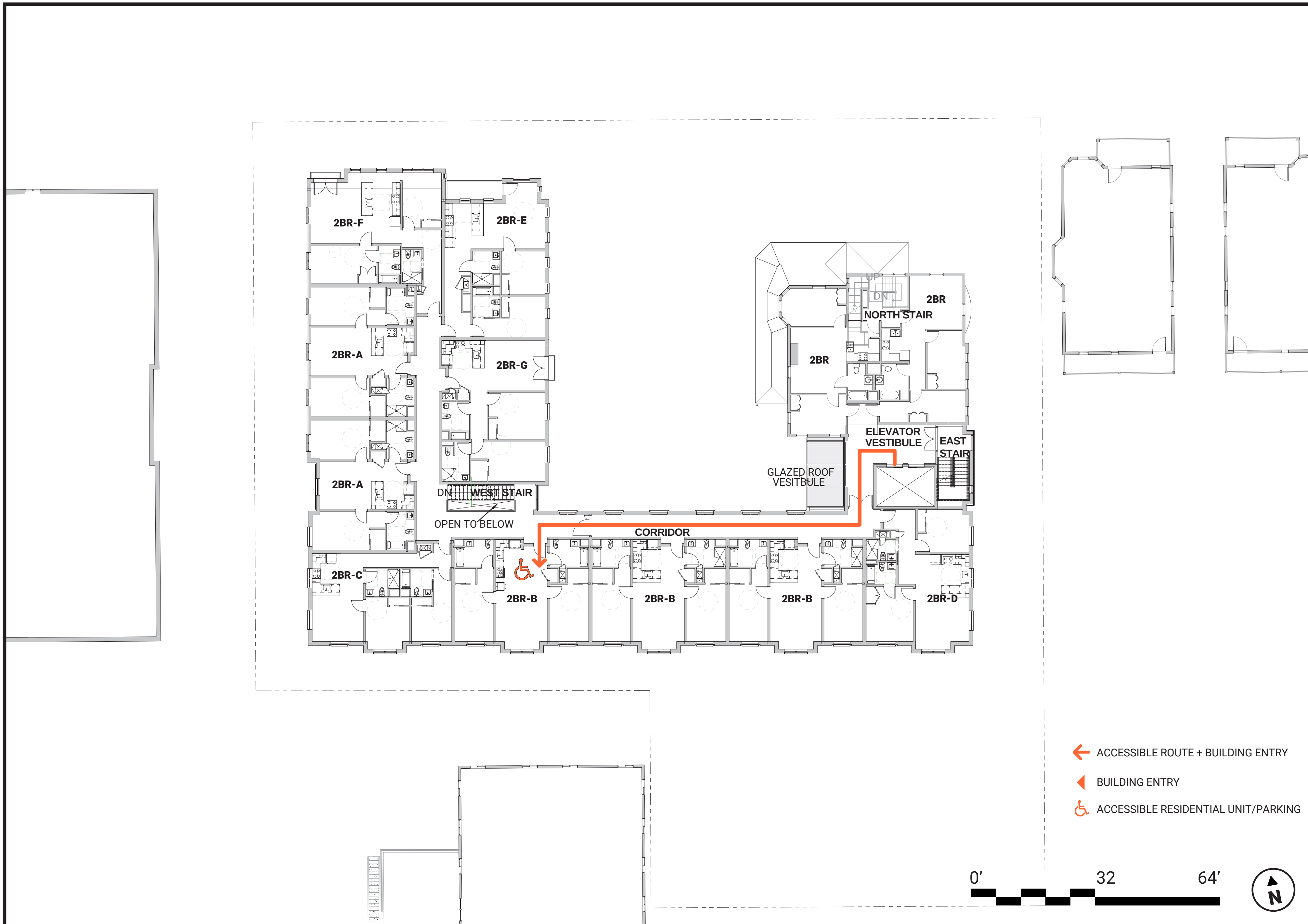
H+A



F1-03

GARDNER ST - ACCESSIBILITY DIAGRAM - 1ST LEVEL

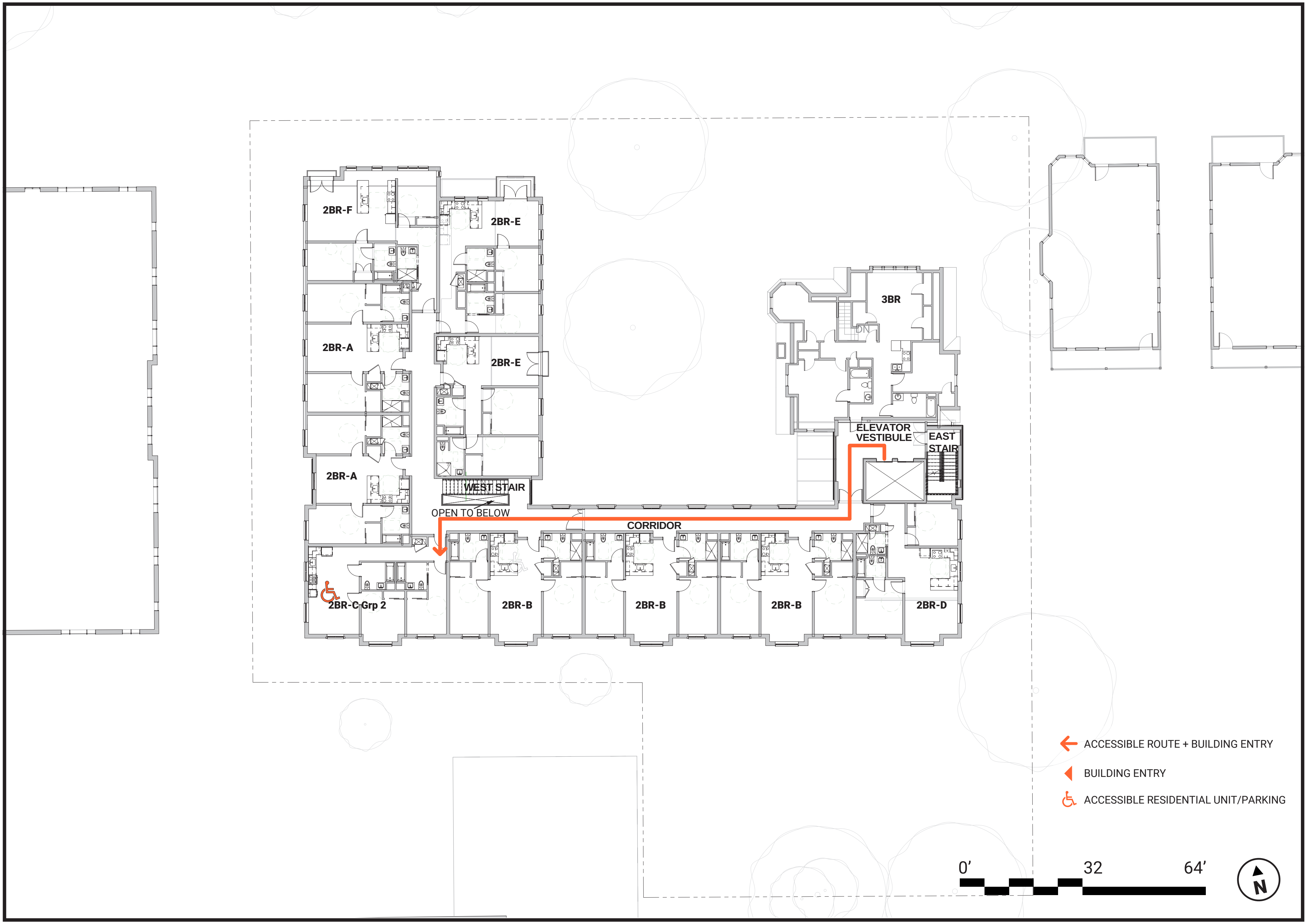
H+A



F1-03

GARDNER ST - ACCESSIBILITY DIAGRAM - 2ND LEVEL

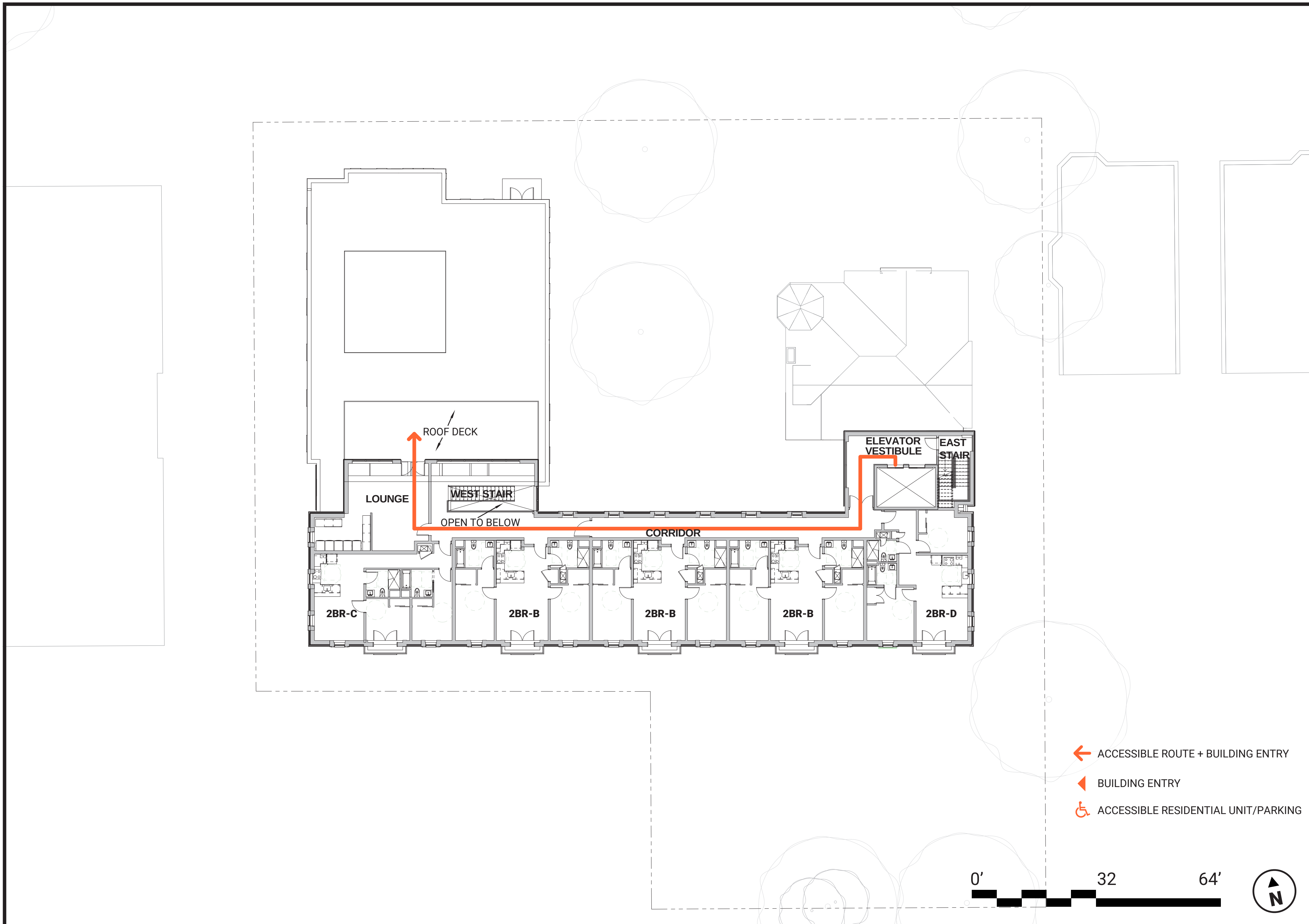
H+A



F1-04

GARDNER ST - ACCESSIBILITY DIAGRAM - 3RD LEVEL

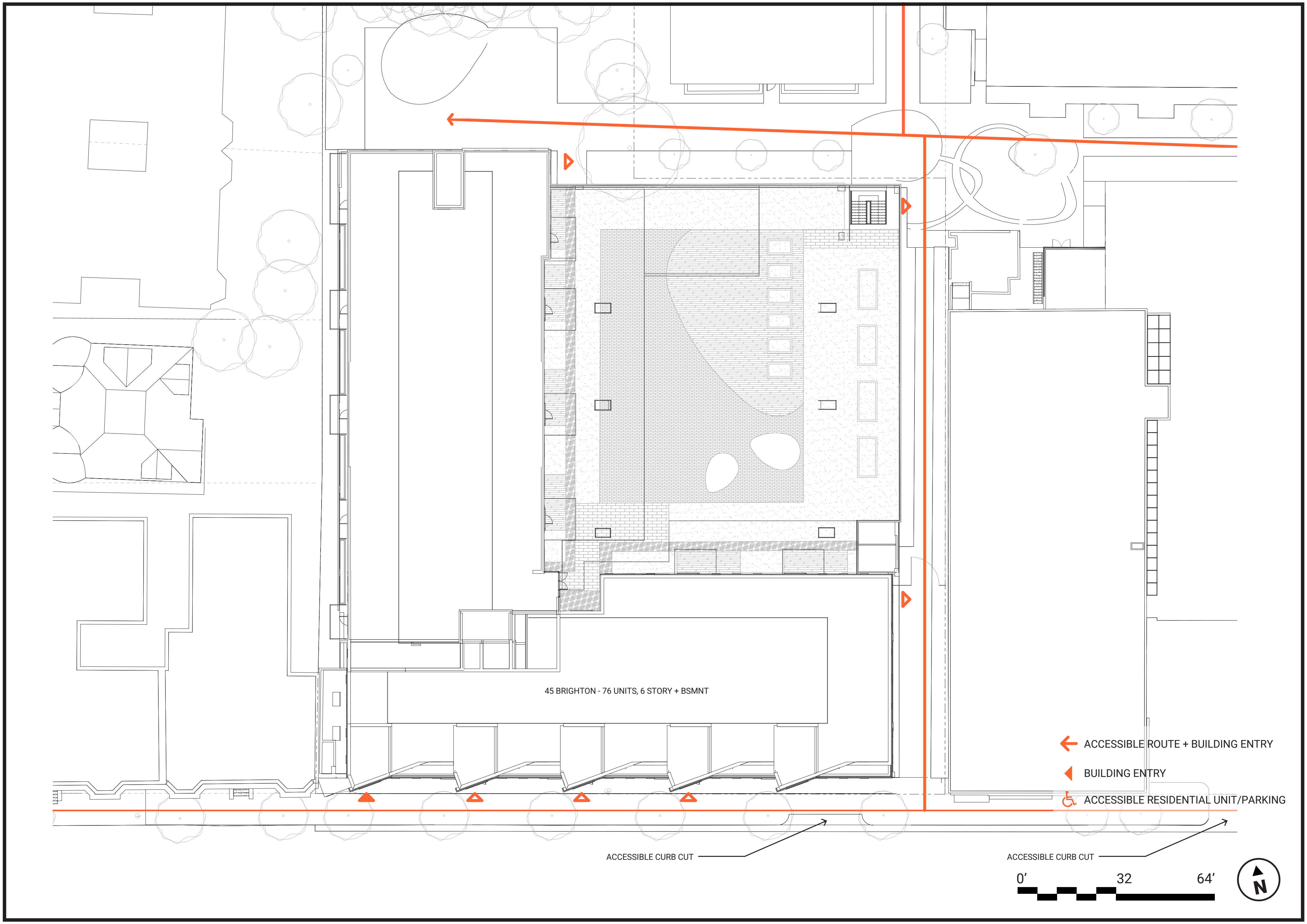
H+A



F1-05

GARDNER ST - ACCESSIBILITY DIAGRAM - 4TH LEVEL

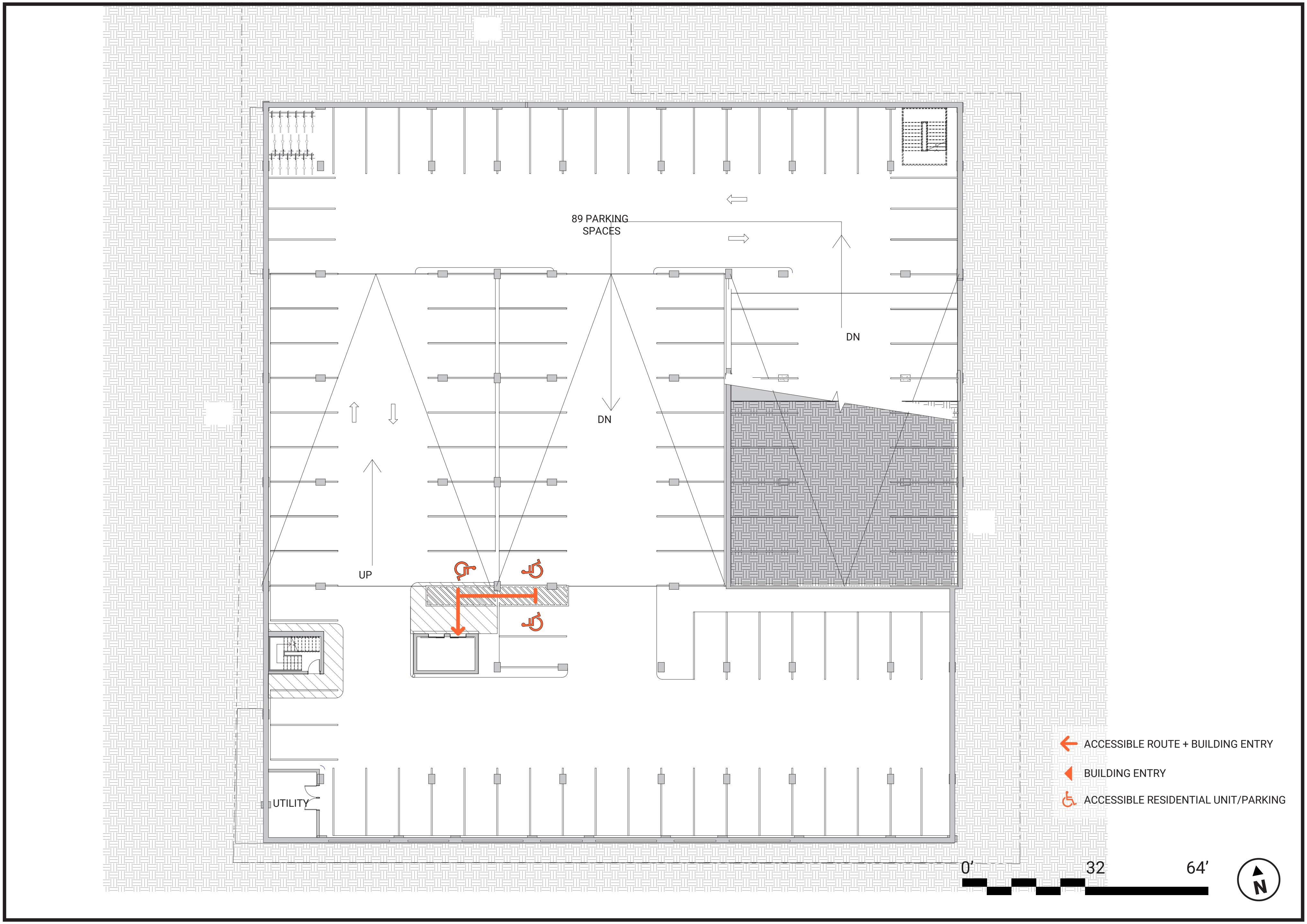
H+A



F2-01

BRIGHTON AVE - ACCESSIBILITY DIAGRAM - SITE

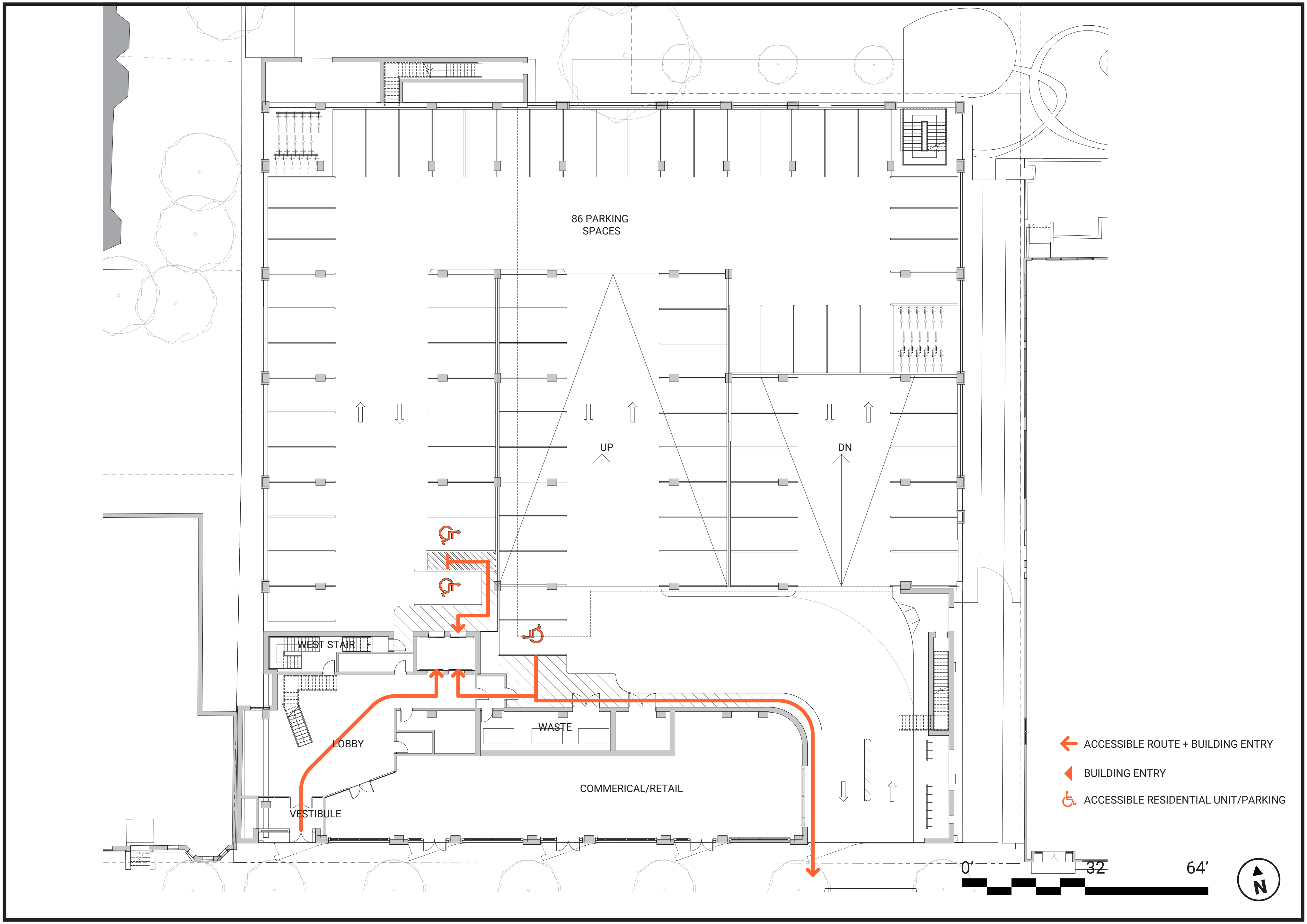
H+A



F2-02

BRIGHTON AVE - ACCESSIBILITY DIAGRAM - PARKING LEVEL -1

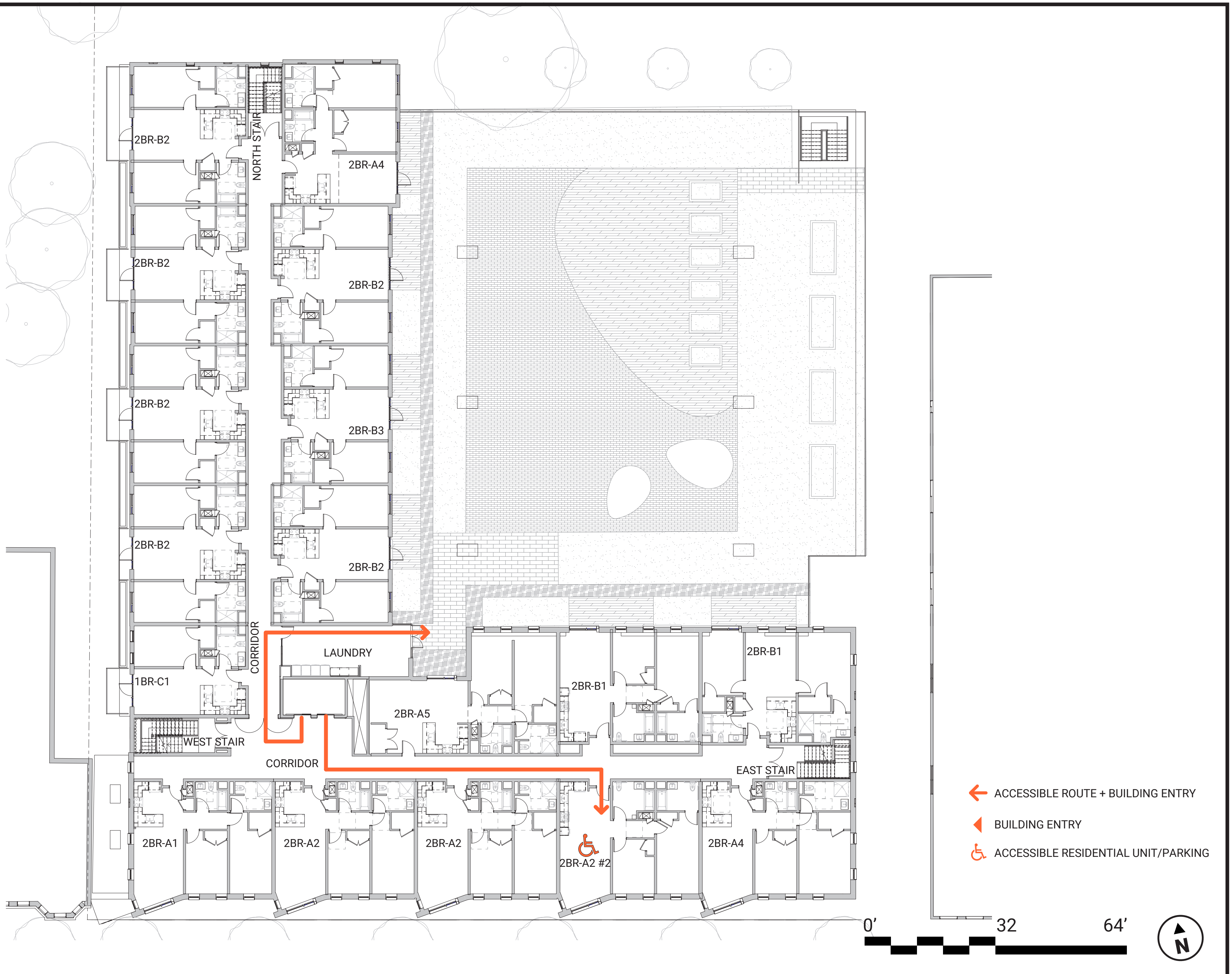
H+A



F2-03

BRIGHTON AVE - ACCESSIBILITY DIAGRAM - GROUND LEVEL

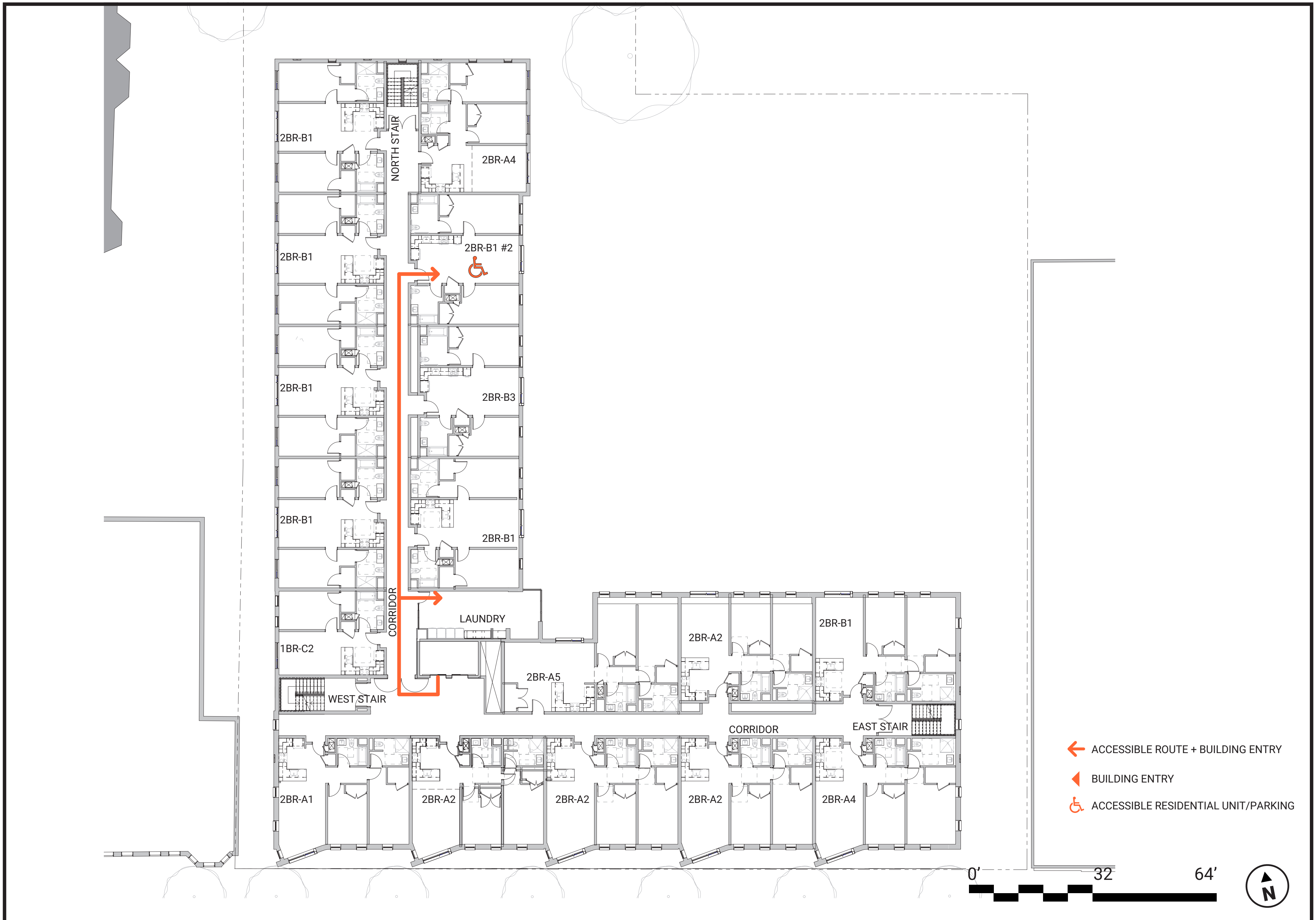
H+A



F2-04

BRIGHTON AVE - ACCESSIBILITY DIAGRAM - SECOND LEVEL

H+A



F2-05

BRIGHTON AVE - ACCESSIBILITY DIAGRAM - THIRD LEVEL

H+A

F2-06

BRIGHTON AVE - ACCESSIBILITY DIAGRAM - FOURTH LEVEL

H+A

F2-07

BRIGHTON AVE - ACCESSIBILITY DIAGRAM - FIFTH LEVEL

H+A

F2-08

BRIGHTON AVE - ACCESSIBILITY DIAGRAM - SIXTH LEVEL

H+A

THE HAMILTON COMPANY

H+A

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