

154 Terrace Street, Mission Hill

Phase II Multi-Family Residential Development



NOTICE OF PROJECT CHANGE II

November 4, 2019

*Submitted Pursuant to Article 80A-6
of the Boston Zoning Code*

SUBMITTED BY:

**Pickle-Ditson Phase II LP, a
Massachusetts Limited Partnership**

c/o Winn Development LLP
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SUBMITTED TO:



Boston Planning and Development Agency
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November 4, 2019

VIA HAND DELIVERY

Mr. Brian Golden, Director
Boston Planning and Development Agency
One City Hall Square, 9th Floor
Boston, MA 02201
Attn: Mr. Steven Harvey, Project Manager

**RE: Notice of Project Change II
Proposed Phase II Multi-Family Residential Development
154 Terrace Street, Mission Hill**

Dear Director Golden:

On behalf of Pickle- Ditson Phase II LP (the "Proponent"), we are pleased to submit this Second Notice of Project Change to the Boston Planning and Development Agency ("BPDA"), in accordance with the Article 80A-6 requirements of the Boston Zoning Code, for new construction of much-needed condominium home-ownership residences in Boston's Mission Hill neighborhood (the "NPC II Project").

The site consists of approximately 12,875 square feet of vacant land at 154 Terrace Street, which is currently used as overflow parking for the Proponent's abutting development at 166 Terrace Street (the "Phase I Project"). Completed in 2011, the Phase I Project was front-loaded with 43 deed restricted affordable housing units (69% of the 62 total units) to thereby exceed the Inclusionary Development Policy ("IDP") requirement. In this context and in compliance with the IDP as a distinct project, the Proponent proposes to deed restrict three (3) of the sixty-four (64) total units in the NPC II Project as IDP ownership units and also provide an IDP Contribution of approximately \$1,230,000 (to create affordable housing elsewhere in the Mission Hill neighborhood).

The NPC II Project would revitalize this under-utilized property site with the construction of a new six-story building, with 64-units of condominium homeownership and 27-onsite parking spaces accessed from Terrace Street.

The NPC II Project will help to address the disparity of condominium homeownership opportunities in the Mission Hill neighborhood, which suffers from a disproportionate share of rental housing. As part of its extensive preliminary outreach process, the Proponent has worked extensively with the leadership of the Mission Hill Neighborhood Housing Services ("MHNHS"), which has already provided its initial support for the NPC II Project, subject to further community process and input as part of Article 80 review with the BPDA.

On behalf of the entire project team, we would like to thank you and the BPDA staff assigned to the NPC II Project, particularly our Project Manager, Stephen Harvey, and BPDA Urban Designers, Michael Cannizzo and Matt Martin, for their invaluable assistance in helping to shape the proposed project and this resulting NPC. We believe that the revised project will contribute to and enhance the housing needs of the Mission Hill neighborhood, by providing much-needed condominium homeownership at an appropriately-scaled development.

We look forward to continuing to advance the NPC II Project through public review with the cooperation of the BPDA, other City officials, and the Mission Hill community. In accordance with BPDA requirements, please find attached seven (7) copies of the NPC plus an electronic copy for the BPDA Online Development Portal.

Very truly yours,

A handwritten signature in blue ink, appearing to read "Joe Hanley", is written over a horizontal line.

Joseph P. Hanley, Esq., Partner -- McDermott, Quilty & Miller, LLP

Cc: Stephen Harvey, BPDA Project Manager

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Pickle-Ditson Phase II LP, a Massachusetts Limited Partnership (the “Proponent”) is submitting this Second Notice of Project Change (“NPC II Project”) for new construction of a vacant and underutilized site located at 154 Terrace Street in Boston’s Mission Hill neighborhood, adjacent to the AMTRAK Mainline and MBTA Orange Line tracks (the “Project Site”). The site is currently used for overflow parking for the 166 Terrace Street (the “Phase I Project”) renovation which was completed in 2011 by the same Proponent DBA “The Pickle-Ditson Limited Partnership”. The proposed project (“Phase II Project”) will include approximately 61,250 gsf of floor area and contain 61 market-rate and three (3) affordable condominium homeownership units within a 5-floor building plus ground floor lobby and garage parking for 27 spaces accessed by a single ten-foot wide curb cut (driveway) from Terrace Street. Multi-family residential dwellings and small commercial establishments are located to the north on the opposite side of Terrace Street. Currently, the site is paved and used as overflow parking lot for the existing Phase I - 166 Terrace Street buildings. Please see **Figures 1-1 (Project Locus)** and **1-2 (USGS Map)**.

The rehabilitation of the existing Mission Hill Buildings at 164-166 Terrace Street was initially proposed by Global Ventures, Inc. with submission of a Project Notification Form (“Original PNF”) in October, 1998, and a Draft Project Impact Report (“DPIR”) in September, 2001. Highland Springs, LLC (a Briggs Capital Real Estate, LLC) subsequently acquired the project, and the revised program and design addressed concerns raised by the City and the abutting Mission Hill community from the Original PNF project, specifically the additional height proposed for the existing and proposed buildings.

1.1.1 Phase I (166 Terrace Street)

Phase I, described in the first Notice of Project Change (“NPC I”) has been completed and includes the conversion of the two former mill buildings into 62 units of affordable and workforce housing along with 48 parking spaces approved by the BRA on July 17, 2008. It represented a reduction from a previously approved DPIR project consisting of 175 condominium units and 134 underground parking spaces (Terrace Street Lofts Condominium to be developed by Highland Springs LLC (a Briggs Capital Real Estate LLC) which was approved by the BRA on January 26, 2006. Please see **Appendix A** for 2006 Board Memorandum and **Appendix B** for 2008 Board Memorandum.



-  Existing Phase One
-  Proposed Phase Two

Figure 1-1. Project Locus- 154 Terrace Street

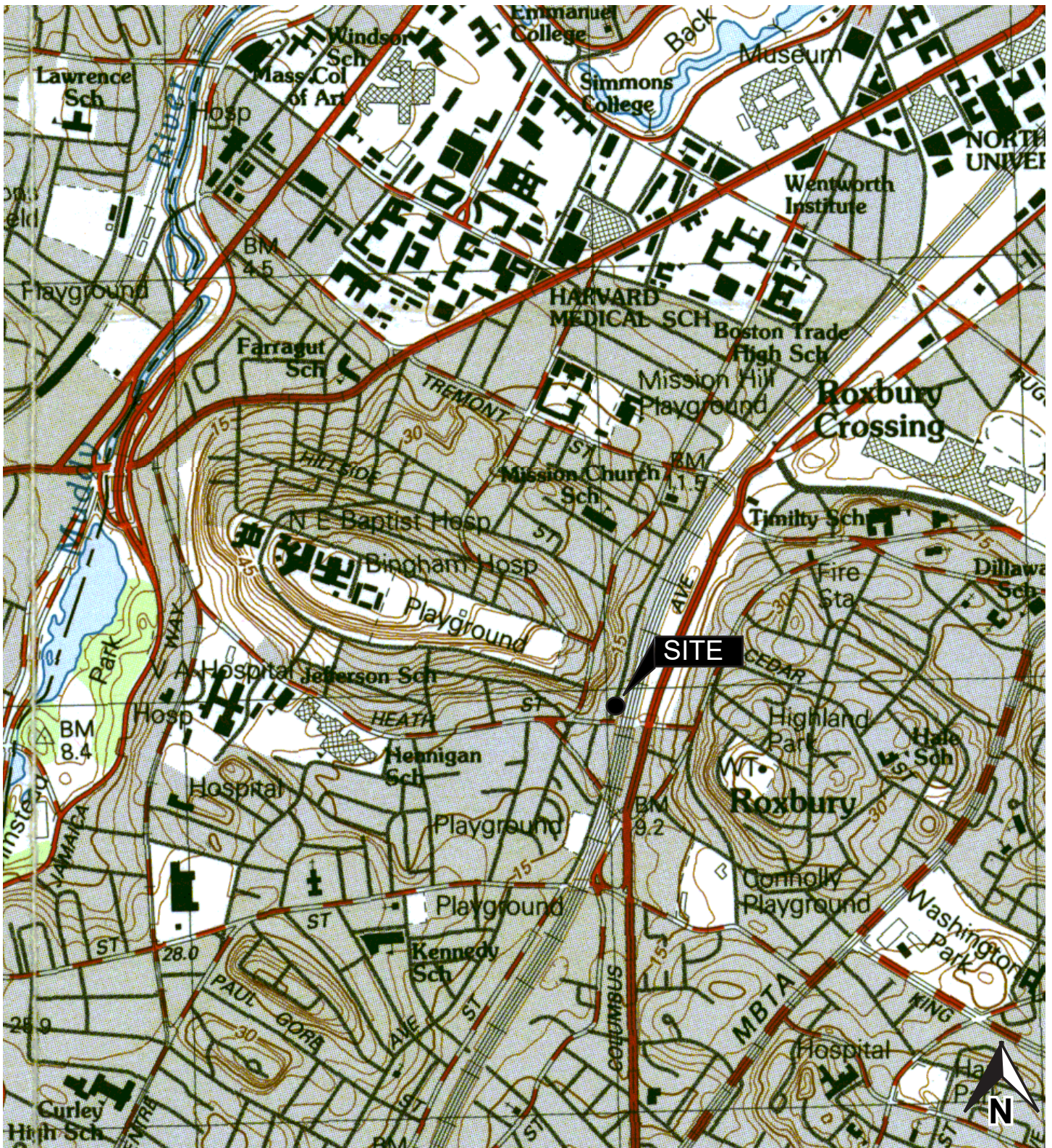


Figure 1-2. USGS Map- 154 Terrace Street

1.1.2 Phase II (154 Terrace Street)

The Proponent now seeks to complete the fully approved project for Phase II with a reduction in the approved overall building height and unit density. The proposed development will decrease the height and density of the previously approved project, as well as widen the sidewalk from 5 to 7 feet. The new building will include 61,250 gross square feet including sixty-one (61) market-rate and three (3) affordable condominium homeownership units (“NPC II Project”), resulting in a total (Phases I and II) of 126 units of which there is 43 existing onsite affordable units in the Phase I building, and will be three (3) onsite affordable units in the Phase II building, a total of 37% affordable between the two phases, plus an IDP Contribution of approximately \$1,230,000, which would be used to create affordable housing elsewhere in the neighborhood. With this contribution, the Phase II Project will be fully compliant with the Inclusionary Development Policy as a distinct project. There will also be 27 new parking spaces in a ground floor garage in the Phase II building.

Of the 62 units approved for Phase I, 43-units were made affordable and restricted to the incomes of the occupants of between 30% and 60% of the area median income, with the remaining 19-units targeted for workforce homeownership units which, due to their financing structure, were held by the developer and operated as rentals for the first five years, after which time they were sold. In addition, 3 of the 19 condominium units were rented/sold as affordable artist live-work space.

Of the proposed 64 NPC II Project units, there will be approximately 59 one-bedroom units and 5 two-bedroom residential units, all totaling 69 bedrooms. The residential units will range in size from approximately 695 square feet to 946 square feet.

With a height of 65 feet along Terrace Street, the NPC II Project will blend in with the significant Mission Hill hillside in the front of the site, and will generally conform to the heights of the existing Phase I Project building. Additionally, these new residential units will provide much-needed housing to the City.

Prior to submitting this NPC II, the Proponent and its development team presented the Proposed NPC II Project at community meeting(s) before Mission Hill Neighborhood Housing Services (“MHNHS”) on February 2, 2018, March 20, 2018, June 26, 2019, and more recently on October 21, 2019. Additionally, the Proponent also discussed its initial NPC concepts at a community meeting with the Community Alliance of Mission Hill (“CAMH”) on May 16, 2018, which voted in support of the initial NPC project (after its May 16, 2018 meeting). Finally, after its most recent meeting on October 21, 2019, MHNHS also voted to support the NPC II, as revised and with the understanding that the parties will continue to work together as part of this Article 80 process.

This Notice of Project Change presents both an overview of the NPC II Project and specific analyses or changes relative to urban design, environmental protection, transportation, infrastructure, and potential project impacts that were evaluated through the original Article 80B Large Project Review process. As detailed below, most Article 80B review components register few measurable changes due to the proposed revisions, as the NPC II Project changes have minor potential project impacts.

Section 80A-6 of the Code provides that “[i]n the event of a material change in a Proposed Project . . . the [BRA] Director . . . shall determine whether the . . . change . . . significantly increases those impacts of the Proposed Project . . . that are within the scope of the required review, and whether such increased impacts warrant resubmission of the PNF.” We believe that the information included in this NPC II submission indicates that the NPC II Project will result in no “significant increases” to any studied impacts, and respectfully request an adequacy determination waiving further review of the NPC II Project.

1.2 Detailed Project History and Permitting Review

1.2.1 PNF and Draft Project Impact Report (“Original Project”) - Highland Springs

The original Project Notification Form (“Original PNF”) was submitted to the BRA for Highland Springs Lofts at 150, 160 and 170 Terrace Street on October, 1998. The subsequent Draft Project Impact Report (“DPIR”) was submitted on September 5, 2001, which proposed the construction of 175 units within the three buildings including rehabilitation and rooftop additions to the two existing buildings at 160 and 170 Terrace Street, and replacement of an existing one-story structure at 150 Terrace Street with a new 7-story residential building. The DPIR project also included below-grade and surface parking for a total of 84 spaces. The building program proposed 145,000 gross square feet of floor area, consisting of artist live-work studios and parking facilities. The DPIR proposed building program decreased the density, height and massing of the two proposed buildings since the project had originally been proposed in the PNF.

1.2.2 Terrace Street Lofts Filing

In 2005, Highland Springs, LLC (an agent of Briggs Capital Real Estate, LLC) subsequently acquired the project and revised the program and design to address concerns raised by the City and the abutting community. The Terrace Street Lofts proposed program also called for the rehabilitation of the two existing Mill Buildings at 164 and 166 Terrace Street into 75 residential lofts and construction of a new residential building at 154 Terrace Street that would accommodate artist work/gallery spaces and 100 residential lofts. The proposed new structure on the 154 Terrace Street site would have a varied roofline starting at 5-stories and step up to 8-stories. No additional new massing was proposed for the existing buildings. The completed project was proposed to have approximately 180,000 gross square feet of artist/live-work space as well as first floor galleries, with underground parking for 138 vehicles. The October 31, 2005 filing relied extensively on the previously submitted documentation with supplemental information as

required to address changes in background conditions and in the building form. The project was approved by the BRA Board on January 26, 2006.

1.2.3 Notice of Project Change I (“NPC I”) - The Pickle-Ditson Limited Partnership

In 2008, the overall 30,208 sf property (154, 164, and 166 Terrace Street) was acquired by Winn Development with plans to proceed with the redevelopment of the project in two separate phases given the uncertainty at the time of the overall U.S. economy and the Boston residential market. Phase I which was proposed to proceed at that time included the renovation of the two mill buildings into 62 units of affordable and workforce housing including 3-units rented/sold as affordable artist live-work space, and 48 parking spaces. Forty-three (43) of the 62 units were approved as rental units to be made affordable and restricted to incomes between 30% and 60% of area median income with 19 units being designated as market rate rental units.

The BRA in its 2008 board approval stipulated that prior to Phase II moving forward, which involved the redevelopment of the adjacent vacant lot (also included in the DPIR project site and used as overflow parking for the Phase I Project), the developer would be expected to prepare a redevelopment plan acceptable to the community and BRA.

1.2.4 NPC II Project and Comparison to Previously Approved NPC I Project

Table 1-1 below compares the dimensional aspects of the NPC I and NPC II Projects.

Table 1-1. Proposed NPC II Project and Comparison to NPC I Project

Element	NPC I Project	Proposed NPC II Project
Lot Area	30,308 sf	Phase I: 17,333 sf Phase II: 12,875 sf
Building Height	72 feet (Existing Building) & 96 feet (Proposed New Building)	Phase I: 72 feet Phase II: 69'-10" feet
Number of Residential Units	62 Units (Existing Building) 100 Units (New Building)	Phase I: 62 units Phase II: 64 units
Parking Spaces	48 spaces	Phase I: 25 spaces Phase II: 27 spaces
Parking Space/ Dwelling Unit Ratio	0.35	0.42
Floor Area Ratio	5.95	6.4

1.2.5 Affordable Housing Commitment

The Phase I Project (154-166 Terrace Street) was front-end loaded with 43 income-restricted affordable housing units (69% of the 62 total units). That arrangement was formalized by the developer and the City of Boston (the “City”) through an Affordable Housing Agreement signed on December 23, 2009, which was further Amended and Restated on July 28, 2011.

For the Phase II Project, the Proponent has determined that including any more than three (3) deed-restricted units would result in a project that is financially infeasible and would therefore not be completed. Therefore, in accordance with the Inclusionary Development Policy, the Proponent proposes to deed-restrict three (3) of the sixty-four (64) total units in the Phase II Project as ownership Inclusionary Development Policy units and provide the City with an IDP Contribution of approximately \$1,230,000, which would be used to create affordable housing in the project neighborhood. In total, the Phase I and Phase II Projects would include 46 income-restricted affordable housing units (37% of the 126 total units) plus an IDP contribution of approximately \$1,230,000.

The Proponent has furthered its continued outreach with MHNHS, both on June 26, 2019, and on October 21, 2019, with MHNHS confirming their continued support of the initial Phase II Project at its meeting on June 18, 2018, as well as support the more defined and revised project again on June 26, 2019 and October 21, 2019.

1.3 Summary of Project Impacts and Mitigation

The following text for the NPC I Project is excerpted from the DPIR and the Terrace Street Lofts filings, and updated, as appropriate, reflecting the project which was approved by the BRA on July 17, 2008.

This summary provides an overview of the five development review components required by Article 80 of the Boston Zoning Code (urban design and sustainability, transportation, environmental protection, historic resources, and infrastructure systems), discusses anticipated impacts and mitigation measures, as applicable, for each, and compares the NPC II Project analysis with the original component review. Please See **Appendices C, D, and E** for copies of the technical studies completed for the DPIR.

1.3.1 Urban Design

The Phase II Project design was not outlined in the approved 2008 NPC I project, as the Phase II Project was delayed until better economic conditions existed. The only part of the development to move forward at the time was the rehabilitation of the two existing historic mill buildings into 62 units of affordable and workforce housing, as well as 48 below-level garage and surface parking spaces and related site improvements. Because of the historic characteristics of the existing buildings, the design and massing were carefully developed with input from Mission Hill residents, community organizations, neighbors.

The Phase II design for the 64 condominium homeownership residences in six-stories with ground floor lobby space and a parking garage for 27 vehicles, presents a slim building massing, and articulation that does not interfere with the adjoining historic mill building facades. The façade material is composed of a running bond style manufactured masonry to reflect the historic brick pattern on the Phase I Project. At select levels, horizontal bands break up the façade aligned with perceived horizontal movements in the historic building.

The Phase II Project's edges are kept close to a sidewalk which has been increased by 2-feet to a total of 7-feet to comply with Boston sidewalk suggestions and includes reconstructing the street wall on Terrace Street. Pedestrian access along Terrace Street will also be enhanced with the widened sidewalk. The Phase II Project will facilitate neighborhood access to the Roxbury Crossing and Jackson Square MBTA stations.

1.3.2 Landscape Design

On the north section of the site, a section of green space is proposed which is approximately ten feet wide by sixty-one feet deep. This area will consist of grass and non-invasive draught resistant shrubs. New street trees are proposed in a landscape strip along Terrace Street. The design team is also considering a sustainable rooftop garden to allow for residents to gather communally in an elevated open environment.

1.3.3 Sustainable Design

Sustainability informs every design decision. Enduring and efficient buildings conserve embodied energy and preserve natural resources. The development of 154 Terrace Street 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.

The Proponent and the Phase II Project design team is committed to an integrated design approach and is using the LEED BD+C: Multi-Family Midrise v4-LEED v4 and intends to be LEED Silver certifiable as presented in **Figure 3-19** at the end of **Section 3.0**. This rating will meet or exceed Boston's Green Building standard. The LEED rating system tracks the sustainable features of the project by achieving points in following categories: Integrative Process; Location and Transportation, Sustainable Sites; Water Efficiency; Energy and Atmosphere; Materials and Resources; Indoor Environmental Quality; Innovation in Design; and Regional Priority.

From development to operations, the Proponent embraces environmentally responsible decisions. The Proponent is a national leader in green development and the utilization of renewable energy. Their innovative approaches to sustainability have been recognized throughout the real estate industry and their award-winning green projects demonstrate their commitment to excellence – and to the planet. The Proponent is also proud to be a US Department of Energy Better Buildings

Challenge partner, committing to saving 20% energy usage across its portfolio within the next decade.

The Proponent follows certification best practices such as the U.S. Green Building Council's LEED for Homes and Enterprise Green communities, as well as Energy Star ratings. All of the Proponent's new developments embrace sustainability principles and integrate the best solutions based on the unique attributes of each development.

In fact, when completed, Phase I (166 Terrace Street / Oliver Lofts) was Boston's only mid-rise, multi-family redevelopment to earn the LEED Platinum distinction, demonstrating the Proponent's 21st century approach to historic preservation.

1.3.4 Pedestrian Level Wind Assessment

The 2001 pedestrian level wind assessment completed by Frank Durgin, P.E., concluded that the DPIR project would not result in any of the 48-locations evaluated experiencing wind levels that exceeded the acceptable pedestrian level winds (PLW). Acceptable PLW are defined by the BPDA as when an effective wind gust velocity of 31 miles per hour is not exceeded more than once in 100 hours. This evaluation was based on the original Phase II height of 95 feet, and Phase I heights of 72 feet and 96 feet based on additional stories proposed to be added to the existing Oliver Ditson and R& S Pickle Factory Buildings which were not implemented during the Phase I construction in 2010.

The 2001 DPIR qualitative analysis completed by Frank Durgin, and the 2005 letter from Mr. Durgin used to accompany the Terrace Street Lofts filing in 2005, is attached as **Appendix C**.

1.3.5 Shadow Impact Analysis

Similar to the NPC I project, during the morning hours, new shadow for the Phase II building is projected to be cast primarily onto Terrace Street. During the afternoon hours, shadow is cast in an easterly direction, and generally falls across portions of the Southwest Corridor/AMTRAK/MBTA Lines, extending beyond Columbus Avenue in the winter months. No new shadow impacts occur in a southerly direction.

Terrace Street and the Terrace Street sidewalk abutting the Phase II building are affected by new shadow throughout the year during the morning hours as was the case with the NPC I project. Nevertheless, these pedestrian areas will be sunny during the afternoon hours when they are likely to get considerable use.

1.3.6 Daylight Analysis

An in-depth Daylight Analysis was prepared for the DPIR which showed that the DPIR project (which was higher than proposed for the Phase II Project) did not result in a higher percentage of daylight obstruction than the general context value for the neighborhood with only a slightly

higher impact on Terrace Street over the existing condition, 74.3% for the no-build vs. 81.9 % for the build. The impact from Columbus Avenue was more significant: 11% no-build vs. 43% build, but the Phase I Project's distance from Columbus Avenue and the Parker Hill topography minimized the real visual impact on the skyplane. The Terrace Street Lofts noted that the massing reduction from the 2001 proposal should further reduce the impacts. The 2001 Daylight Analysis is attached as **Appendix D**.

1.3.7 Solar Glare Analysis

The NPC II Project does not include the use of reflective glass or other reflective materials on the building facades that would result in adverse impacts from reflected solar glare.

1.3.8 Air Quality Analysis

Tech Environmental, Inc., the project's air quality consultant, conducted updated analyses to evaluate the existing air quality in the NPC II Project area, predict the worst-case air quality impacts from the NPC II Project's rooftop heating and ventilation equipment and parking garage, and evaluate the potential impacts of Project-generated traffic on the air quality at the most congested local intersections (See **Section 4.3**).

Representative air quality measurements in 2018 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 NPC II Project's parking garage will not have an adverse impact on air quality. The maximum one-hour and eight-hour ambient CO impacts from the rooftop heating and ventilation equipment and 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 NPC II Project due to the estimated project trip generation having minimal impacts on the overall delays at the two 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. The air quality in the project area will remain safely in compliance with the NAAQS for CO after the project is built.

1.3.9 Noise Analysis

Tech Environmental, Inc., the NPC II Project's noise consultant, conducted an updated noise study to determine whether the operation of the NPC II Project will comply with the Massachusetts DEP Noise Policy and City of Boston Noise Regulations (See **Section 4.4**).

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) determination of 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 42.4 dBA.

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

- (1) Cooling Tower Capacity 200 GPM/100 Nominal Tons
- (1) Venmar 8,000 CFM ERV

The Proposed Project will not create a noise nuisance condition and will fully comply with the most stringent sound level limits set by the Massachusetts DEP Noise Policy, City of Boston Noise Regulations and the HUD Noise Guideline.

1.3.10 Stormwater Management and Water Quality

The NPC II Project will improve the quality of stormwater leaving this site. Erosion and sediment control measures will be implemented during construction to minimize the transport of site soils to off-site areas and BWSC storm drain systems. During construction, existing catch basins will be protected with filter fabric, straw bales and/or crushed stone, to provide for sediment removal from runoff. These controls will be inspected and maintained throughout the construction phase until the areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover. See Section 4.5 for additional information.

1.3.11 Geotechnical/Groundwater Impacts Analysis

McPhail Associates, LLC completed a subsurface investigation and foundation analysis for the Phase II building location. In general, the analysis found that an uncontrolled granular fill is underlain by a natural glacial deposit 5 to 10.2 feet below the ground surface. Surface bedrock was observed at depths ranging from 8 to 9 feet. Groundwater was not encountered with the explorations completed for the Phase II building. Groundwater levels, however, vary and are influenced by many environmental factors. In dense soils, short-duration measurement of the groundwater level is unreliable.

The geotechnical consultant recommends that spread footings with an underlying lean concrete or flowable fill over the glacial till be utilized. Other possible measures include using aggregate piers to support the footings and pile support if building loads are high.

The geotechnical consultant concluded that as the design development progresses and details of the proposed construction are finalized, some changes to current recommendations may be warranted.

1.3.12 Construction Impacts Analysis

Section 4.8 describes impacts likely to result from the NPC II Project's construction and the steps that will be taken to avoid or minimize environmental and transportation-related impacts. The Proponent will employ a construction manager who will be responsible for developing a construction phasing and staging plan and for coordinating construction activities with all appropriate regulatory agencies. The NPC II Project's geotechnical consultant will provide consulting services associated with foundation design recommendations, prepare geotechnical specifications, and review the construction contractor's proposed procedures.

Construction is expected to commence in the 2nd quarter 2020, and be completed in the 4th quarter 2021.

The Proponent will comply with applicable state and local regulations governing construction of the NPC II Project. The Proponent will require that the general contractor 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 construction manager will be bound by the CMP, which will establish the guidelines for the duration of the NPC II Project and will include specific mitigation measures and staging plans to minimize impacts on abutters. All deliveries will be from Terrace Street facilitated by a police detail.

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, there will be limited construction worker parking on-site, carpooling will be encouraged, secure on-site spaces will be provided for workers' supplies and tools so they do not have to be brought to the site each day, and subsidies for MBTA passes will be considered. The Construction Management Plan to be executed with the City prior to commencement of construction will document all committed measures.

1.3.13 Wetlands/Flood Hazard Zone

The existing Project Site is not a part of a wetland resource area regulated by the Massachusetts Wetland Protection Act. The Phase II Project, like the Phase I Project, falls within the Federal Emergency Management Agency's ("FEMA") Flood Insurance Rate Map (Community Panel Number 250286-0053E, effective 07/17/12, and defined by FEMA as an area of minimal flood hazard.

1.3.14 Historic Resources

The Project Site is currently vacant and used as an overflow parking lot for the Phase I Project. The two buildings adjoining as the Phase I portion of the overall project include the structure known as the Oliver Ditson building and R and S Pickle Factory, which were constructed as a part of the Highland Spring Brewery. These buildings have been preserved and converted by the Proponent in 2011 into 62-units of affordable and workforce housing. The DPIR Historic Resource Analysis contained in the 2005 Terrace Street Lofts filing is attached as **Appendix E**. Historic resources identified within 1/8 mile of the site are shown in **Figure 1-3** and listed on **Table 1-2** that follow.

Visual and Shadow Impacts on Nearby Historic Resources

The Phase II Project will replace a vacant lot which interrupts the rhythm of buildings along Terrace Street. The proposed size, scale, massing, materials, and use of the Phase II Project are compatible with nearby properties. The Phase II Project will create a new visually compelling street facade and eliminate the visibility of an unsightly, vacant site from the Terrace Street area and the Parker Hill / Mission Hill North Slope Area. The façade articulation and building height of the Phase II Project are compatible with the architectural expression of surrounding area, and the proposed height is consistent with the height of the adjoining Phase I buildings.

Overall, the NPC II Project's shadow impacts will be consistent with current patterns and is not expected to adversely impact the Project Site and any historical resources in surrounding areas.

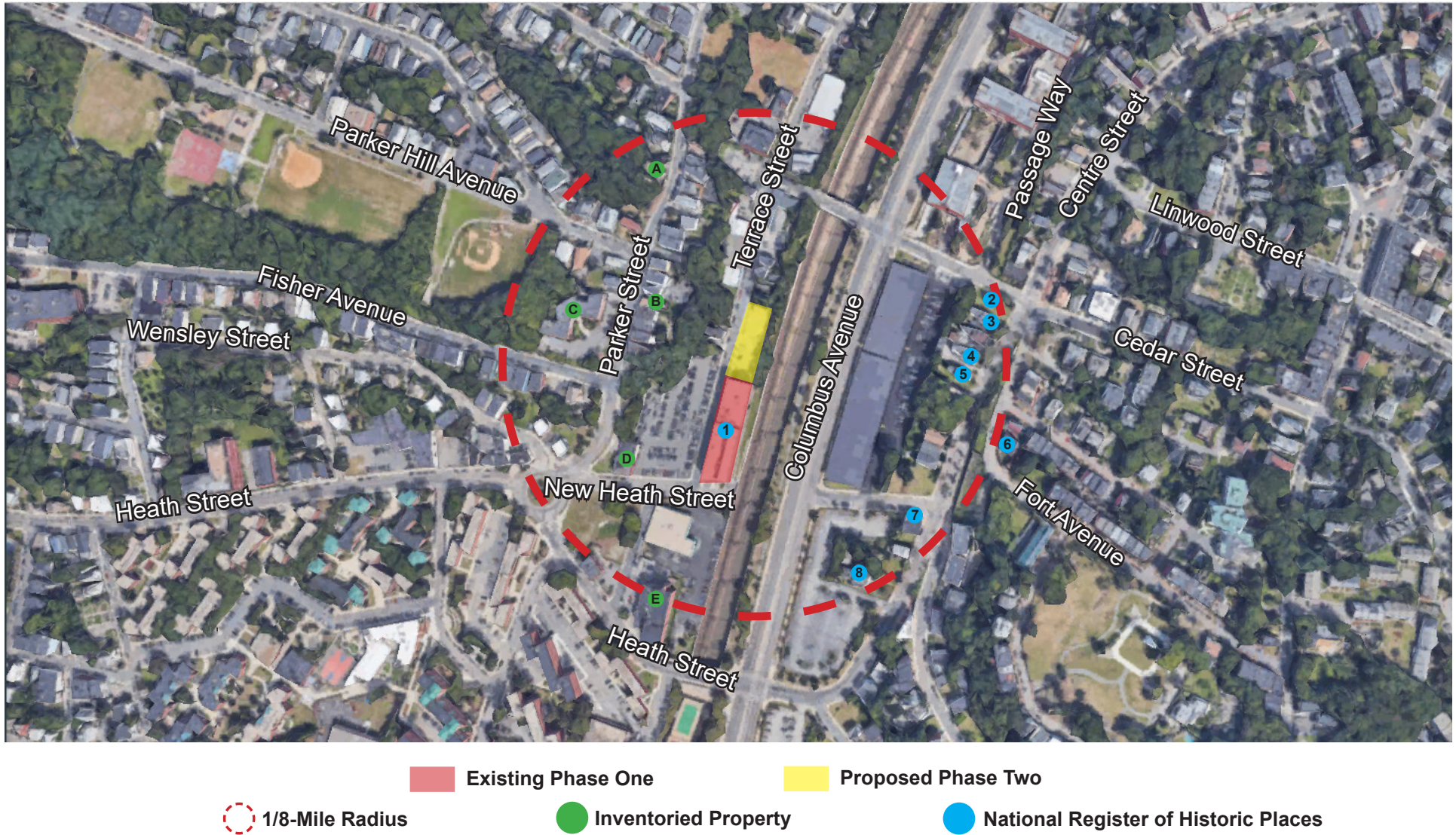


Table 1-2. Historic Resources within the Vicinity of the Site

Key to Historic Resources in Figure 1-3.	Historic Resource	Source of Listing
National Register of Historic Places		
1	Highland Spring Brewery - Croft Brewing Company	MHC Inventory
2	NA	MHC Inventory
3	NA	MHC Inventory
4	NA	MHC Inventory
5	NA	MHC Inventory
6	NA	MHC Inventory
7	NA	MHC Inventory
8	David Dudley House	MHC Inventory
Properties Included the MA Inventory of Historical and Archaeological Assets		
A	Charles T. Grant House	MHC Inventory
B	Edward Norley House	MHC Inventory
C	Charles Bulfinch Elementary School	MHC Inventory
D	Highland Spring Brewery Refrigeration Building	MHC Inventory
E	Roxbury Brewing Company	MHC Inventory

1.3.15 Infrastructure Systems

An infrastructure system's analysis (**Section 5.0**) was completed by Howard Stein Hudson (HSH), the project's Civil Engineer. The existing infrastructure surrounding the site appears sufficient to service the needs of the NPC II Project. This section describes the existing sewer, water, and drainage systems surrounding the site and explains how these systems will service the development. This analysis also discusses any anticipated project-related impacts on the utilities and identifies mitigation measures to address these potential impacts.

1.3.16 Transportation

Section 6.0 presents the comprehensive transportation study completed by HSH for the NPC II Project in conformance with the BTM Transportation Access Plan Guidelines. The study analyzes existing conditions within the NPC II Project study area, as well as conditions forecast to be in place under the seven-year planning horizon of 2025.

Access to the Project Site will be provided by a single curb-cut located on Terrace Street. The driveway will lead to an at grade parking garage.

The analysis identifies the number of trips generated by the Project using ITE's *Trip Generation Manual*, 10th Edition and employs mode use data for the area surrounding the Project site based on BTM data for Area 5 – Mission Hill. Based on the land use of the Project Site, the NPC II Project is estimated to generate approximately 162 vehicle trips on a daily basis, with 9 trips during the a.m. peak hour and 10 trips during the p.m. peak hour.

The NPC II Project will contain 27 parking spaces. This results in a parking ratio of approximately 0.42 parking spaces per residential unit, consistent with the BTM maximum parking goals. Loading and service operations will occur on-site.

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 peak travel periods. Proposed measures include, but are not limited to, employing an on-site transportation coordinator and orientation packets, providing on-site bicycle storage, electric vehicle charging, shared car service, and establishment of a project transportation web site. The transportation coordinator will oversee all transportation issues including managing valet operations, service and loading, and TDM programs.

1.3.17 Response to Climate Change Questionnaire

Please see **Appendix I**.

1.3.18 Response to COB Accessibility Guidelines

Please see **Appendix J**.

1.3.19 Response to BPDA Broadband Questionnaire

Please see **Appendix K**.

1.3.20 Response to BPDA Smart Utilities Checklist

Please see **Appendix L**.

2.0 GENERAL INFORMATION

2.1 Applicant Information

2.1.1 Project Proponent

Over four decades, Winn Development has earned a national reputation for award-winning excellence in real estate development, acquiring and developing holdings with a value in excess of \$2.5 billion. Winn Development has developed over 80 properties in 11 states, totaling 14,000 apartments. The Winn Development portfolio spans affordable housing, market-rate housing, mixed-use and mixed-income developments, urban and suburban garden-style and high-rise apartment communities (both family and elderly housing), along with office buildings, hotels, retail, and medical offices and parking garage facilities. These developments have primarily focused on their passion for providing affordable housing to the low-income community and have often included mixed income components. Furthermore, Winn has an impeccable track record, never having missed a mortgage payment.

2.1.2 Project Team

Team Member	154 Terrace Street, Mission Hill
Property Owner/Developer	Pickle-Ditson Phase II LP, a Massachusetts Limited Partnership c/o Winn Development LLP Six Faneuil Hall Marketplace Boston, MA 02109 Phil Cohen, Project Director PCohen@winnco.com Tel: 617-506-9557 Larry Curtis, President & Managing Partner Adam Stein, SVP Development David Thunell, SVP of Construction Darien Crimmin, VP of Energy and Sustainability
Brokerage	The Carucci Group Gibson Sotheby's International Realty 277 Dartmouth Street Boston, MA 02116 Jared Curtis, Global Real Estate Advisor Director of Capital Markets Jared.curtis@sothebysrealty.com Tel: 978-831-3019

Article 80 / Permitting Consultant	Mitchell L. Fischman Consulting ("MLF Consulting") LLC 41 Brush Hill Road Newton, MA 02461 Tel: 781-760-1726 Mitchell L. Fischman, Principal mitchfischman@gmail.com Yvette Niwa yvetteniwa.mlfconsulting@gmail.com Tel : 818-426-8157
Legal Counsel/Outreach	McDermott Quilty & Miller LLP 28 State Street, Suite 802 Boston, MA 02109 Tel: 617-946-4600 Joseph Hanley, Esq., Partner jhanley@mqmlp.com Tel: 617-946-4600, Ext. 4438 Nicholas Zozula, Esq. nzozula@mqmlp.com Tel: 617-946-4600 Ext. 4440
Architect	The Architectural Team 50 Commandants Way at Admiral Hill Chelsea, MA 02150 Tel: 617-889-4402 Robert Verrier, President, Managing Principal, Founder BVerrier@architecturalteam.com Jeff Sargis, Project Architect JSargis@architecturalteam.com
Transportation Planner / Engineer	Howard Stein Hudson 11 Beacon Street, 10th Floor Boston, MA 02108 Tel: 617-482-7080 Brian Beisel, PTP bbeisel@hshassoc.com Michael White mwhite@hshassoc.com Thomas J. Tinlin Institutional and Private Markets Director ttinlin@hshassoc.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 James Downing jdowning@hshassoc.com
Sustainability/LEED Consultant	CLEAResult 50 Washington Street, Suite 3000 Westborough, MA 01581 Mike Schofield, Senior Project Manager mike.schofield@clearresult.com Tel: 508-365-3205 x1304
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, QEP, INCE mwallace@techenv.com Tel: 781-890-2220 x30
Geotechnical Consultant	McPhail Associates, LLC 2269 Massachusetts Avenue Cambridge, MA 02140 Tel: 617-349-7321 Fatima Babic-Konjic FBK@mcphailgeo.com Jonathan Patch JWP@mcphailgeo.com
Environmental/21E Engineer	Loureiro 800 Hingham Street, Ste. 202S Rockland, MA 02370 Tel: 781-878- 1272 Sam Butcher, LSP, LEP, PG, LEED-AP

Project Construction Schedule 154 Terrace Street Project	
Construction Commencement	2 ND Quarter 2020
Construction Completion	4 TH Quarter 2021
Status of Project Design	Schematic / Design Development

2.1.3 Legal Information

Legal Judgments or Actions Pending Concerning the Phase II Project

The Proponent is not aware of any legal judgments or other actions pending which involve the Phase II Project.

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

The Proponent has no property in Boston on which real estate tax payments are in arrears.

Evidence of Site Control Over the Project Area

The Project Site is owned by the Pickle - Ditson Phase II LP, a Massachusetts Limited Partnership.

Nature and Extent of Any and All Public Easements

The Project Site is subject to no public easements. Please refer to **Figure 3-3** for the Existing Condition Plot Plan.

2.2 Public Benefits

The NPC II Project will provide substantial public benefits for the City and its residents in both the short-term and the long-term. These benefits include the following:

- Creates 64 units of much-needed residential condominium housing, of which three (3) on-site units will be designated as affordable, along with a IDP Contribution of approximately \$1,230,000, which would be used to create affordable housing in the project vicinity;
- Reduces the density of Phase II of the overall development, previously approved in 2008, consisting of a majority of market rate condominium homeownership units;
- Introduces new neighborhood residents who will provide support to the local community and utilize local businesses;
- Activates an underutilized site, replaces a 12,000 square foot vacant lot, and contributes to the future growth and stability of Terrace Street;
- Offers an opportunity for a transit-oriented location within walking distance of the Roxbury Crossing and Jackson Square MBTA Orange Line Stations as well as numerous bus routes along Columbus Avenue and the SW Corridor Park;
- Provides additional residential use to activate Terrace Street in a walkable and bicycle friendly location in vicinity of bicycle path along the SW Corridor Park;
- Introduces a thoughtfully-designed streetscape that improves and enhances the pedestrian landscape and experience through its use of natural vegetation and architectural elements;
- Establishes a premier example of sustainable construction and development;
- Temporarily creates many new jobs in the construction and building trade industries; and
- Adds substantial new annual property taxes for the City of Boston.

2.3 Compliance with Boston Zoning Code

The following section describes the NPC II Project and identifies the local zoning that is applicable to the project. A list is also included of the various permits/approvals that will likely be required for development of the NPC II Project.

The Project Site is located within the Mission Hill Neighborhood District and the Local Industrial Subdistrict governed by Article 59 of the City of Boston Zoning Code (the “Code”) and depicted on Map 6D of the City’s zoning maps (see **Figure 2-1. Existing Zoning Map**). The Mission Hill Neighborhood District was established to, among other goals and objectives, provide adequate density controls that protect established residential areas and direct growth to areas where it can be

COMPLIANCE WITH BOSTON ZONING CODE

Extract for Map "6D - Mission Hill" of the Boston Building Code

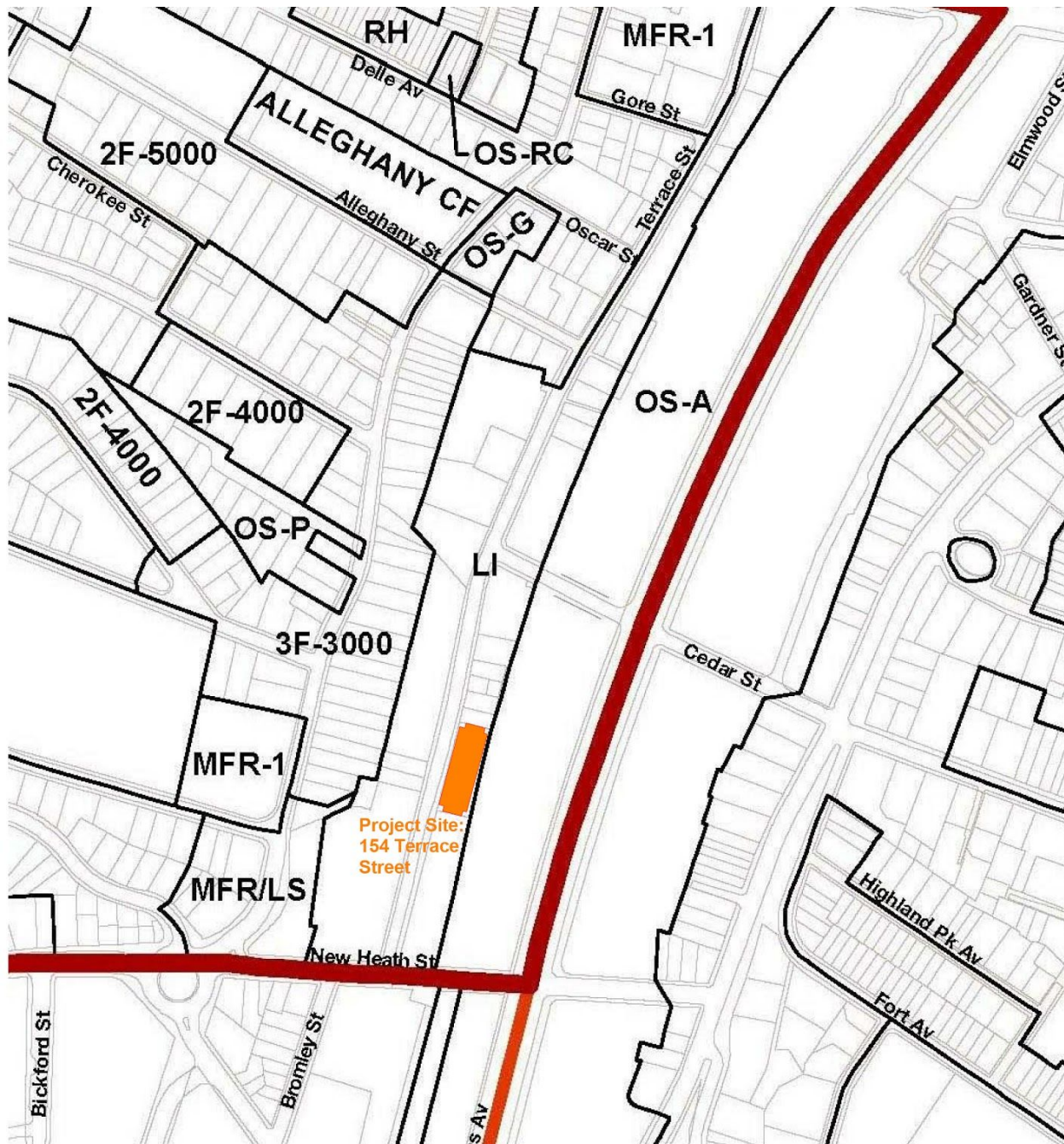


Figure 2 -1
Existing Zoning Map

accommodated; to retain and develop affordable housing compatible with adjacent areas, particularly for elderly residents; to promote the viable neighborhood economy; to preserve, maintain and create open space; to protect the environment and improve the quality of life; to promote the most appropriate use of land; and to promote the public safety, health, and welfare of the people of Boston.

The site is located in the Terrace Street Local Industrial (LI) Subdistrict as well. As such, the proposed multi-family residential development is categorized as a Forbidden Use under the existing zoning and will require a Use Variance for its implementation. The site is not subject to any additional zoning overlays.

A breakdown of the various dimensional zoning requirements is included in **Table 2-1**. The NPC II Project will require the issuance and/or confirmation of several dimensional Variances, potentially including building height and Floor Area Ratio (“FAR”). In 2011, the Proponent completed Phase I (166 Terrace Street) including the construction of 62 units of workforce and affordable housing, of which 43 units were deed-restricted rental units and 3 units for artist live-work space. Also included were 48 on-site parking spaces. Phase II (154 Terrace Street) will include a reduced density from the original approved Phase II with a 6-story, 64-unit building providing market-rate and affordable condominium homeownership opportunities, with at-grade structured parking.

2.4 Public Review Process and Agency Coordination

In support of the required NPC II 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 Mission Hill neighborhoods. Prior to submitting this NPC, the Proponent and its development team presented the Proposed NPC Project at community meeting(s) before MHNHS on February 2, 2018, March 20, 2018, June 18, 2018, June 26, 2019 and on October 21, 2012, and before the CAMH on May 16, 2018, in order to initiate receiving community-wide input from neighborhood organizations. In addition, as previously mentioned, CAMH voted to support the project after the May 16th meeting, and MHNHS likewise voted its approval on June 18, 2018, and the more defined and revised project again on June 26, 2019 and October 21, 2019.

Additionally, the Proponent has discussed the NPC II Project with representatives of the BPDA prior to filing this NPC, including on March 1, 2018, April 12, 2018, May 23, 2018, July 9, 2019, and on August 22, 2019, in order to identify areas for improvement as well as design goals related to the NPC II Project.

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.

Table 2-1. Local Industrial (“LI”) Sub-District - Dimensional and Off-Street Parking Requirements

Dimensional Element	Local Industrial Subdistrict (L1)	Existing NPC I	Proposed NPC II	Zoning Relief Required?
Minimum Lot Size	None	12,875 SF (0.3 Acres)	12,875 SF (0.3 Acres)	No
Minimum Lot Width	None	N/A	65.5 ft	No
Dwelling Units	N/A	62	64	No
Minimum Lot Area Per Dwelling Unit	None	N/A	201 sf	No
Minimum Usable Open Space (sq ft /unit)	50 sf Per DU	N/A	50 sf per DU (3,201 sf on roof deck)	No
Minimum Front Yard	None	0	0	No
Minimum Lot Frontage	None	N/A	207.8 sf	No
Minimum Side Yard	None	0	0	No
Minimum Rear Yard	20 feet	20 - 30 ft	0	Yes
Maximum Building Height	40 feet	95 ft or 107 ft	69’-10”	Yes
Maximum Floor Area Ratio (FAR)	2.0	5.8	4.8	Yes
Min. Number of Parking Spaces	Per Article 80	25 spaces	27 spaces	Art. 80
Min. Number of Loading Bays	Per Article 80	0	0	Art. 80

*The dimensions cited may change as the proposed NPC II Project undergoes review by the BPDA staff.
N/A = Not Available as Phase I constituted 100% rehabilitation of two existing buildings with no new construction.

2.5 Development Impact Payment (“DIP”) Status

Based on current schematic design plans, it is not anticipated that Development Impact Payments (“DIP”), in accordance with Article 80B-7 of the Code, will be required for the NPC II Project. The project is residential and will not exceed the 100,000 gsf threshold where a DIP is required.

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

Table 2-2: Summary of Anticipated Permits and Approvals	
State Agencies	Permit or Action*
MA Department of Environmental Protection, Division of Air Quality Control	Notice of Commencement of Demolition and Construction; Fossil Fuel Permit
MA Department of Environmental Protection, Division of Air / Water Pollution Control	Sewer Connection Permit
MA Department of Transportation	Chapter 40, Section 54A Consent
Local Agencies	
Boston Planning and Development Agency	NPC/Article 80 Review and Execution of Related Agreements; Article 37- Green Building Approval; Section 80B-6 Certificate of Compliance; Design Review
Boston Board of Appeal	Variances and/or Conditional Use Permits, as needed
Boston Transportation Dept	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 PIC Actions, as appropriate
Boston Fire Department	Approval of Fire Safety Equipment
Boston Public Safety Commission Committee on Licenses	Permit for Storage of Fuel in Tanks
Boston Water and Sewer Commission	Water and Sewer Connection Permit; Discharge of Water from Construction-Dewatering Permit
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.

3.0 URBAN DESIGN AND SUSTAINABILITY

3.1 Urban Design Overview

The development of 154 Terrace Street proposes to transform a 12,875 sf site, currently occupied by an open parking lot, into a vibrant, pedestrian-friendly, transit-oriented development with 64 new residential units in a unique building. The site is bordered by Terrace Street to the west and MBTA and AMTRAK rail lines to the east, which are adjacent to Columbus Avenue. The existing Phase I development is on the southern side, while the side yard of existing residences is adjacent to the north. Phase II will provide much-needed homes whose residents will support area businesses and be active members of the local community.

The Urban Design figures and Sustainability LEED Checklist are included at the end of this section (please see **Figures 3-1** thru **3-19**).

3.2 Building Design

The proposed NPC II Project is conceived as a single building whose character respects the neighboring context and improves the architectural quality of the neighborhood. 154 Terrace Street consists of 64 condominium units in a six-story building with a single level at-grade podium garage where space for mechanical equipment and bike storage are provided. Because of the historic characteristics of the existing Phase I buildings, the design and massing for Phase II was carefully developed with input from Mission Hill residents, community organizations, neighbors.

The building's ground floor plan organization creates an open space which provides secure parking for 27 cars. Single vehicle entrance/exit points are located on the northern side of Terrace Street. A single lobby is centrally located at the ground floor with a pedestrian entrance opening towards Terrace Street. Amenities for residents are offered in the lobby including social space, casual working environments, waiting areas, mailboxes, and secure delivery hubs. The Proponent is evaluating bicycle storage areas and charging stations for electric cars are in the central parking area. At the pedestrian level façade material changes at the main entrance to visually break up the pedestrian experience down the Terrace Street sidewalk. The main entrance is accented with a rectangular metal canopy. The design presents a simple building mass and articulation that does not compete with the Phase I historic mill building facades.

The project's first floor edge is kept back two feet from the existing Phase I sidewalk to comply with Boston sidewalks and construct a new more generous street wall down Terrace Street. Pedestrian access along Terrace Street will be enhanced with new trees proposed in a landscape strip along Terrace Street. These improvements to the public pedestrian environment will facilitate neighborhood access to the nearby Roxbury Crossing and Jackson Square Orange Line MBTA stations.

Phase II is proposed for five floors of homeownership residences over a first-floor parking garage with a mix of 59 one-bedroom units and 5 two-bedroom residential units with differing unit arrangements included throughout the building.

3.3 Landscape Design

On the north section of the site a section of green space is proposed approximately ten feet wide by sixty-one feet deep. The area will consist of grass and non-invasive draught resistant shrubs. New street trees are proposed in a landscape strip along Terrace Street. The design team is considering a sustainable rooftop garden to allow for residents to gather communally in an elevated open environment.

3.4 Sustainable Design/Energy Conservation

3.4.1 Introduction

Sustainability informs every design decision. Enduring and efficient buildings conserve embodied energy and preserve natural resources. The development of 154 Terrace Street 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.

The Proponent and the Project design team are committed to an integrated design approach and is using the LEED BD+C: Multi-Family Midrise v4-LEED v4 and intends to be LEED Silver certifiable as presented in **Figure 3-19** at the end of this section. This rating will meet or exceed Boston's Green Building standard. The LEED rating system tracks the sustainable features of the project by achieving points in following categories: Integrative Process, Location and Transportation, Sustainable Sites; Water Efficiency; Energy and Atmosphere; Materials and Resources; Indoor Environmental Quality; Innovation in Design; and Regional Priority.

3.4.2 Integrative Process

These credits are not being pursued at this time. The project will consider implementing a Trades Training, to educate subcontractors on green building and sustainability practices.

3.4.3 Location and Transportation

Prerequisite – Floodplain Avoidance

According to the most recent FEMA Flood Map, this project is located in an "Area of Minimal Flood Hazard."

Credit – Site Selection

The project will earn full credit in this category. It meets the requirements for Sensitive Land Protection because 100% of the site is previously developed. All of the land within ½-mile of this

project site is either previously developed or public parkland, qualifying this as an Infill project. The proximity to McLaughlin Playground meets the requirements for Open Space. The Neighborhood Street Network also exceeds the threshold of 90 intersections per square mile.

Credit – Compact Development

The project scope includes 64 residential units on a site less than a quarter acre, exceeding the credit threshold of 35 dwelling units/acre, achieving full credit plus an additional point for Exemplary Performance.

Credit – Community Resources

The project will earn full credit in this category, plus an additional point for Exemplary Performance. This location's proximity to Jackson Square and Roxbury Crossing provides many community resources within a ½-mile walking distance, including but not limited to:

- Educational – Roxbury Community College; Timilty Middle School
- Community/Recreation – Reggie Lewis Center; BCYF Tobin
- Places of Worship – Islamic Society of Boston; Our Lady of Perpetual Help Church
- Public Park – McLaughlin Playground; Southwest Corridor
- Social Services – Family Service of Greater Boston; Refugee/Immigrant Assistance Center
- Medical – Martha Eliot Health Center; Perfect Dental
- Restaurant – il Panino Café & Grill; MooYah Burgers
- Gym/Health Club – Crossfit on the Hill
- Supermarket – Stop & Shop
- Hardware Store – Boston Building Resources
- Laundry/Dry Cleaner – Jackson Sq Laundromat; Sunny Laundromat
- Art/Culture - Diablo Glass Blowing Studio
- Other Retail – Expressions; Frugal Furniture

Credit – Access to Transit

Located in between the Jackson Square and Roxbury Crossing MBTA stations, this development has access to the Orange Line as well as bus Routes 14, 22, 29, 41, 44, and 66. The Orange Line offers approximate 125 weekday trips and 100 weekend trips per day in each direction. The 22 is a major bus route offering approx. 80 weekday trips and 50 weekend trips in each direction. Including the other bus routes, this location exceeds the target for transit trips and will earn an additional point for Exemplary Performance in this category.

3.4.4 Sustainable Sites

Prerequisite – Construction Activity Pollution Prevention

This project will comply with all LEED requirements for controlling runoff and erosion during construction. This item also aligns with Boston Water & Sewer Commissions requirements for pollution prevention during construction.

Prerequisite – No Invasive Plants

Landscaping plans and plant lists are not finalized, but the designer will reference the Massachusetts Invasive Plant Advisory Group list to ensure compliance with this prerequisite.

Credit – Heat Island Reduction

These credits are not being pursued at this time.

Credit – Storm-Water Management

The site will be designed by a civil engineer to comply with BWSC Storm-water Best Management Practices. The building will be tied into the existing cistern of the adjacent Oliver Lofts development, which was sized appropriately to accommodate additional storm-water infiltration.

Credit – Nontoxic Pest Control

Pest control measures to be implemented include, but are not limited to:

- for below-grade walls, use solid concrete foundation walls
- sealing all external cracks and joints
- discharge moisture at least 24 inches from the foundation
- landscape features at least 18 inches from the exterior wall
- develop an integrated pest management policy

3.4.5 Water Efficiency

Prerequisite – Water Metering

The building will satisfy this requirement by installing a whole building water meter.

Credit – Indoor Water Use

No plumbing fixtures have been specified at this time, but the project team is committed to installing low-flow fixtures for all lavatory faucets (≤ 1 gallon per minute), showerheads (≤ 1.5 gpm), and toilets (≤ 1.1 gallon per flush). Additionally, clothes washers will be Energy Star qualified.

Credit – Outdoor Water Use

As landscaping plans are developed, the project will seek to limit the use of turf grass and promote the use of native or adapted species. The project is committed to achieving at least half credit in this category, with the goal of achieving full credit.

3.4.6 Energy and Atmosphere**Prerequisite – Minimum Energy Performance**

This project will hire a Commissioning Agent to satisfy this requirement under Option 2. Ductless fan coil units will be installed to meet the criteria for Reduced Distribution Losses for In-Unit HVAC. The Cx Agent will perform Fundamental Commissioning of the Central HVAC Systems. The Construction Documents will include a list of elements to be sealed, as well as air barrier and compartmentalization sheets. The LEED Green Rater will verify compliance with the Thermal Enclosure Checklist.

Prerequisite – Energy Metering

Electric submeters will be installed for each unit, while natural gas for the central boiler will be tied to a whole building meter.

Prerequisite – Education of Homeowner, Tenant, or Building Manager

An operations & maintenance manual will be provided to both the resident and the facility management staff, and a one-hour walkthrough of the home will be conducted with occupants.

Credit – Annual Energy Use

Energy modeling is ongoing; the project is required to achieve a minimum 10% reduction from ASHRAE 90.1-2013 to comply with the Stretch Code. This level of performance would net 5 points, superseding the LEED benchmark of 5% improvement over the ASHRAE 90.1-2010 standard. The units are smaller than the LEED baseline, and an additional 7.5 points are awarded through the Home Size Adjustment.

Credit – Efficient Hot Water Distribution

Hot water pipes will be insulated to a minimum R-4 to comply with Option 3.

Credit – Advanced Utility Tracking

The building owner will track utility data on WegoWise or Portfolio Manager and will investigate tenant use.

Prerequisite – Certified Tropical Wood

The design team will specify that any tropical woods used in the project will be FSC-certified.

Prerequisite – Durability Management

Project specifications will include all relevant durability management items, and the contractor will be responsible for successfully meeting the Energy Star Water Management System checklist. Wallboard installed in bathrooms will meet ASTM D3272, and water-resistant flooring will be installed in kitchens, baths, and laundry areas, as well as within 3 ft of exterior doors. No hot water tanks will be installed in or above living space, and all washing machines will be equipped with a drain pan and automatic water shut-off. All exhaust appliances, including dryers, will be vented to the outdoors.

Credit – Durability Management Verification

The LEED Green Rater will independently verify that all applicable items on the Water Management System checklist have been successfully completed.

Credit – Environmentally Preferable Products

Products have not been specified at this time; opportunities to include products that are locally produced or contain recycled content will be evaluated.

Credit – Construction Waste Management

Any waste generated on site will be evaluated for recycling opportunities. The project goal is at least a 60% reduction of construction waste below the LEED Reference Home Baseline, to achieve maximum points in this category.

3.4.7 Indoor Environmental Quality**Prerequisite – Ventilation**

A rooftop ERV will continuously supply fresh air to the units and exhaust air from the bathrooms. Kitchen range hoods will be ducted separately and vented directly to the outside.

Prerequisite – Combustion Venting

There will be no combustion appliances inside the units; building heating and hot water loops will be served by a central boiler, which will be sealed combustion.

Prerequisite – Garage Pollutant Protection

In conditioned spaces above the parking garage, all penetrations and connecting floor and ceiling joist bays will be sealed. In conditioned space next the garage, all doors will be weather stripped, CO detectors installed in rooms that share a door with the garage and all penetrations at the base of the walls will be sealed.

Prerequisite – Radon-Resistant Construction

The project is located in EPA Radon Zone 3, therefore no radon system is required.

Prerequisite – Air Filtering

All space conditioning systems will be equipped with an air filter rated MERV 8 or higher. All ventilation supply systems will be equipped with filters rated MERV 6 or higher.

Prerequisite – Environmental Tobacco Smoke

Smoking will be prohibited in all units and common areas within the building, and within 25 feet of the building. This policy will be backed up by appropriate signage and resident agreements.

Prerequisite – Compartmentalization

The units will be designed with a continuous air barrier separating each adjacent unit and common spaces. This air barrier will be verified by the Green Rater and tested to the LEED standard, for units smaller than 1,200 square feet, of 0.3 cfm50/ft².

Credit – Enhanced Ventilation

Options 1 and 2 of this credit will be achieved for full points. The continuously operating, balanced ventilation system will be sized to not exceed ASHRAE 62.2-2010 standards by more than 10%. Ventilation flow rates will be verified by the Green Rater.

Credit – Contamination Control

The project will install walk off mats that at least 10 feet long for exterior entryways in commons areas.

Credit – Balancing of Heating & Cooling Distribution Systems

The average unit size in this project is under 1,200 ft², satisfying the requirements for Option 1. Credit is also being pursued under Option 3, pressure balancing of the bedrooms with respect to the main living space. Green Rater will verify that bedrooms are not overly pressurized (≤ 3 Pa).

Credit – Enhanced Compartmentalization

The project is not seeking to earn points for this credit at this time. All efforts will be made to make the unit air barrier as airtight as possible.

Credit – Combustion Venting

No fireplaces or woodstoves will be installed, satisfying the requirements for full points under this credit.

Credit – Garage Pollution Protection

This point is awarded under Option 1 – for exhaust fan on controls in garage

- meet ASHRAE 62.1-2010 for garage ventilation
- sufficient exhaust to create negative pressure with respect to adjacent spaces with the doors to garage closed
- self-closing doors installed and deck to deck partitions have been installed
- exhaust fan runs on a carbon monoxide sensor

Credit – Low-Emitting Products

Products have not been specified, but the project will seek to earn a point for using low-VOC paints, sealants and adhesives that meet the CA Section 01350 requirements for emissions.

Credit – No Environmental Tobacco Smoke

Any condominium documents or lease agreements will reinforce the no smoking policy.

3.4.8 Innovation in Design

Points can be awarded in this category for meeting LEED thresholds for Exemplary Performance in certain credits throughout other sections of the LEED Rating System. A maximum of three points can be earned, while this project meets the requirements in two categories: Community Resources and Access to Transit.

3.4.9 Regional Priorities

Regional Priorities for this area include Compact Development and Access to Transit; the project will be awarded an additional two points for this.

3.5 Urban Design Drawings and LEED Checklist

Urban design drawings and perspectives, and the LEED Checklist for Phase II Project include:

- Figure 3-1: Proposed Development Aerial View
- Figure 3-2: Aerial Perspective – Existing Conditions
- Figure 3-3: Existing Condition Plot Plan
- Figure 3-4: Proposed Landscape Plan
- Figure 3-5: First Floor Plan
- Figure 3-6: Second Floor Plan
- Figure 3-7: Typical Floor Plan Three through Six
- Figure 3-8: Roof Deck Floor Plan
- Figure 3-9: Building Elevations
- Figure 3-10: Building Elevations
- Figure 3-11: Northwest Aerial Perspective
- Figure 3-12: Existing View from New Heath Street Looking Northeast
- Figure 3-13: Proposed View from New Heath Street Looking Northeast
- Figure 3-14: Existing View from Terrace Street Looking North
- Figure 3-15: Proposed View from Terrace Street Looking North
- Figure 3-16: Existing View from Terrace Street Looking South
- Figure 3-17: Proposed View from Terrace Street Looking South
- Figure 3-18: Proposed View from Columbus Avenue
- Figure 3-19: HOME Phase II - LEED Checklist



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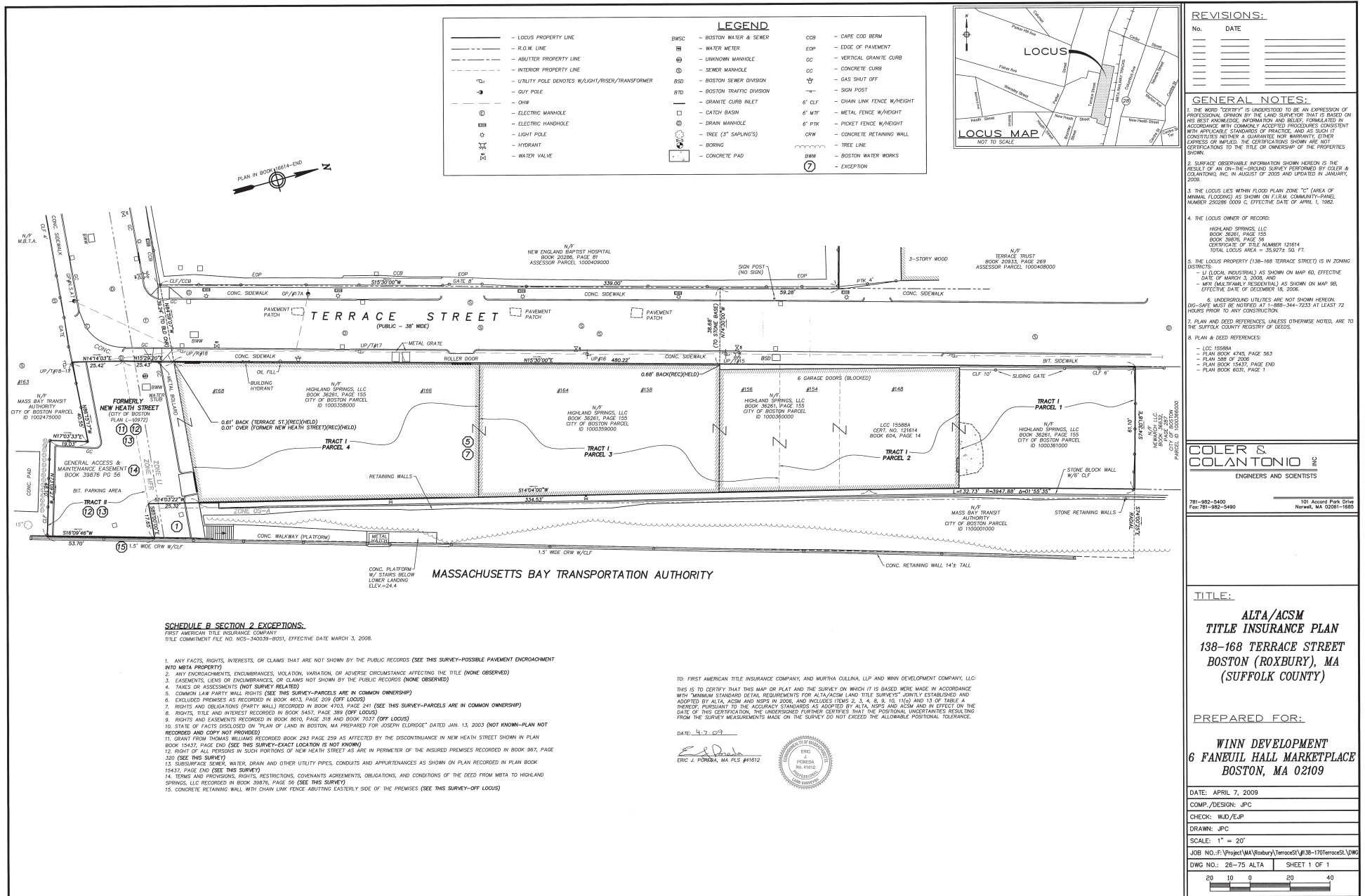
Figure 3-1
Proposed Development Aerial View



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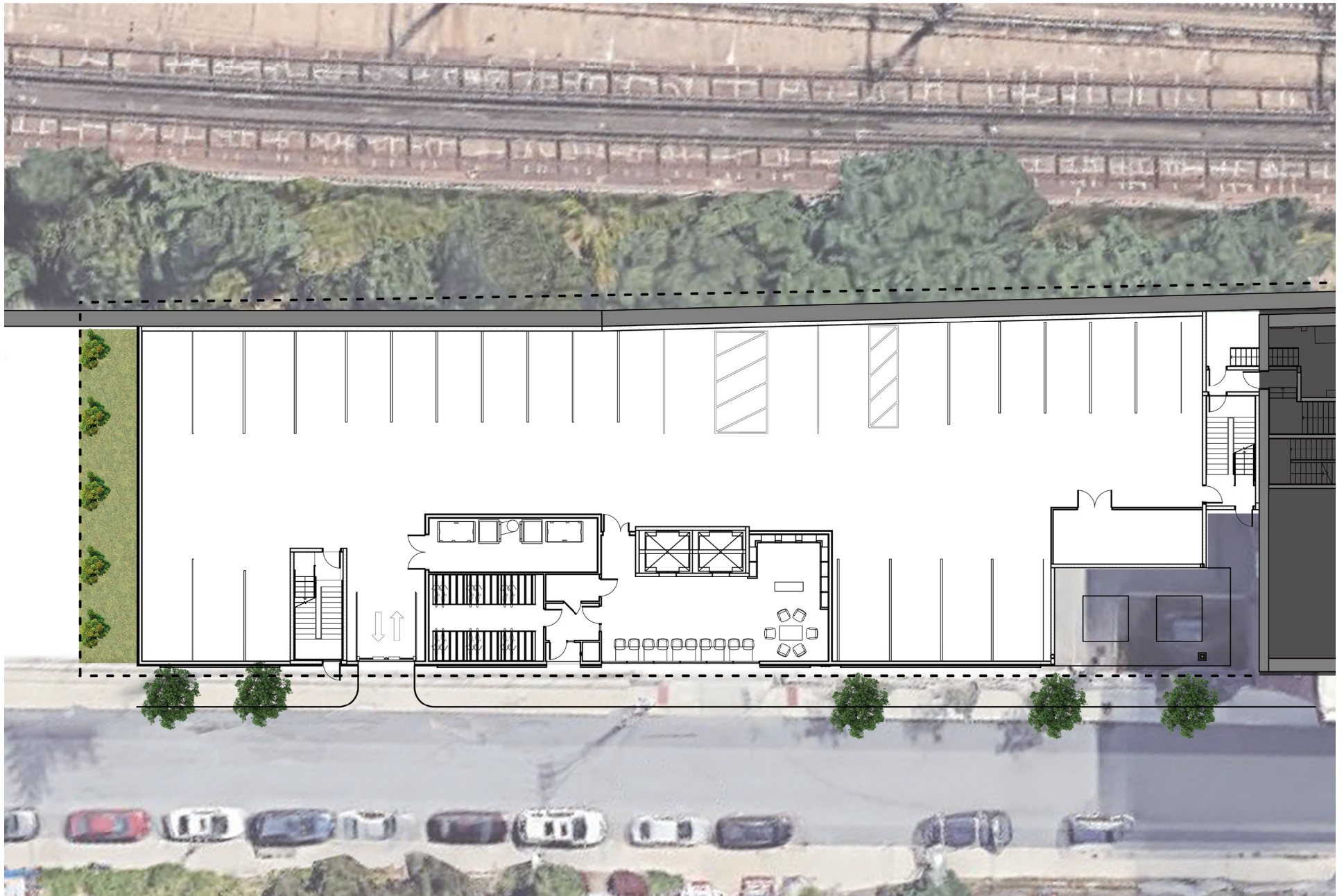
Figure 3-2
Aerial Perspective | Existing Conditions



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Figure 3-3
Existing Land Plan



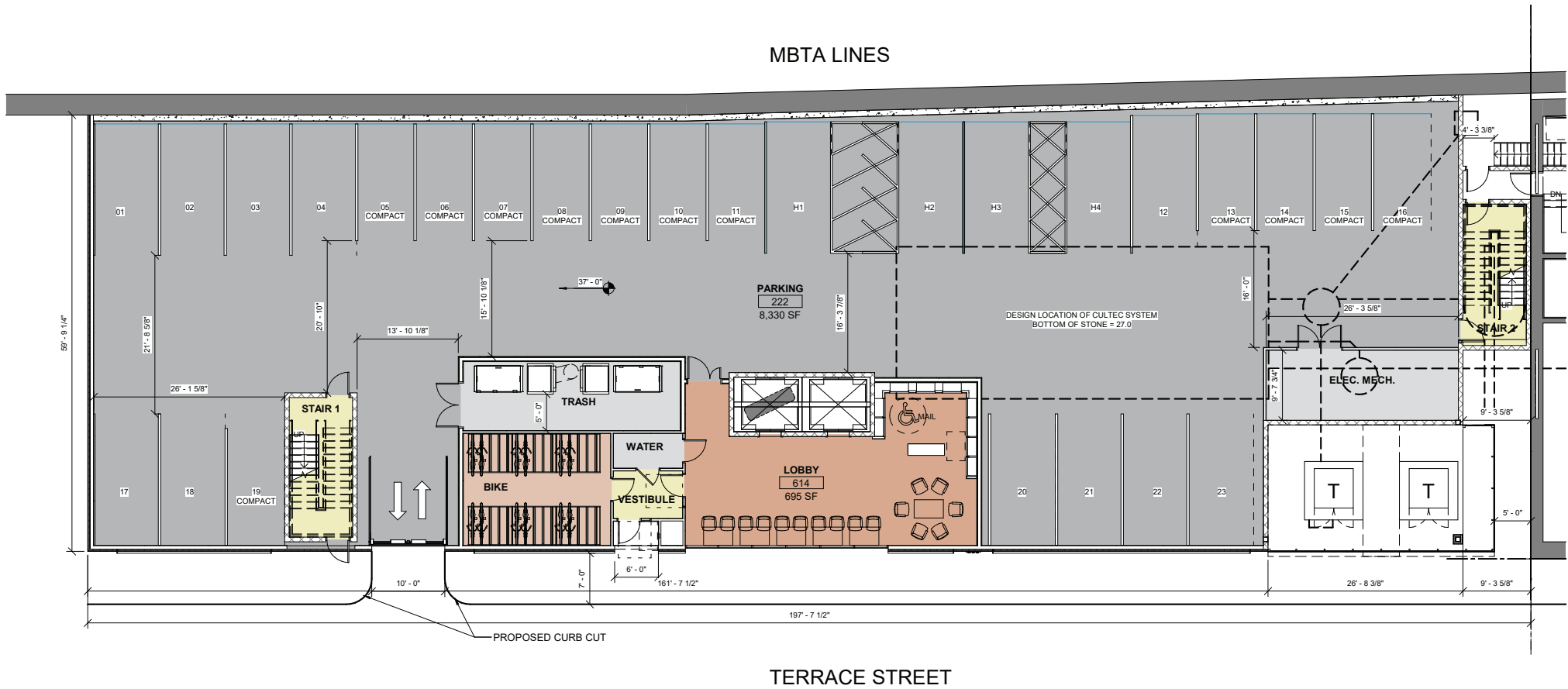
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Figure 3-4
Proposed Landscape Plan

PARKING SCHEDULE		
# of SPACES	SPACE TYPE	REMARKS
12	8' x 16' Compact	
11	9' x 18'	
3	9' x 18' (5' Aisle)	
1	9' x 18' (9' Aisle)	

Grand total: 27

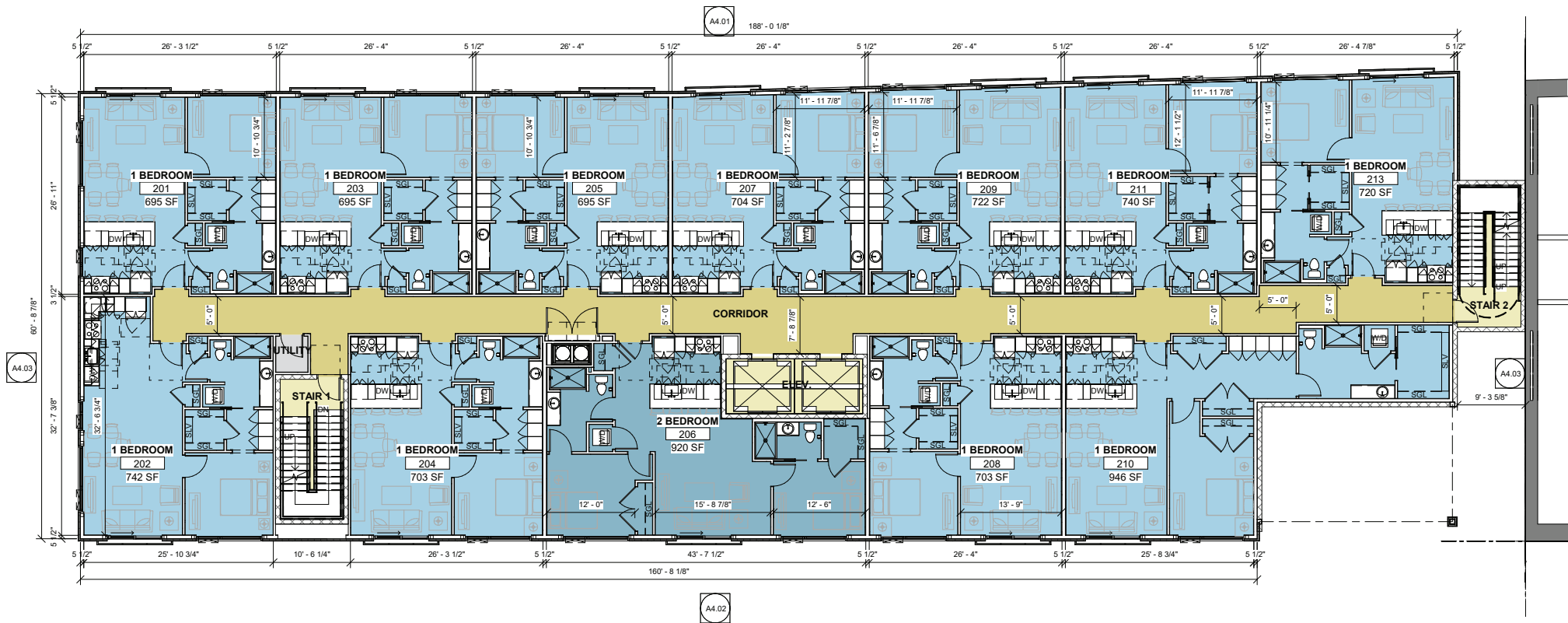


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Figure 3-5
First Floor Plan

UNIT TYPES		
UNIT BED #	UNIT TYPE	UNIT COUNT
1 BEDROOM	1 BED	59
2 BEDROOM	2 BED	5
Grand total		64

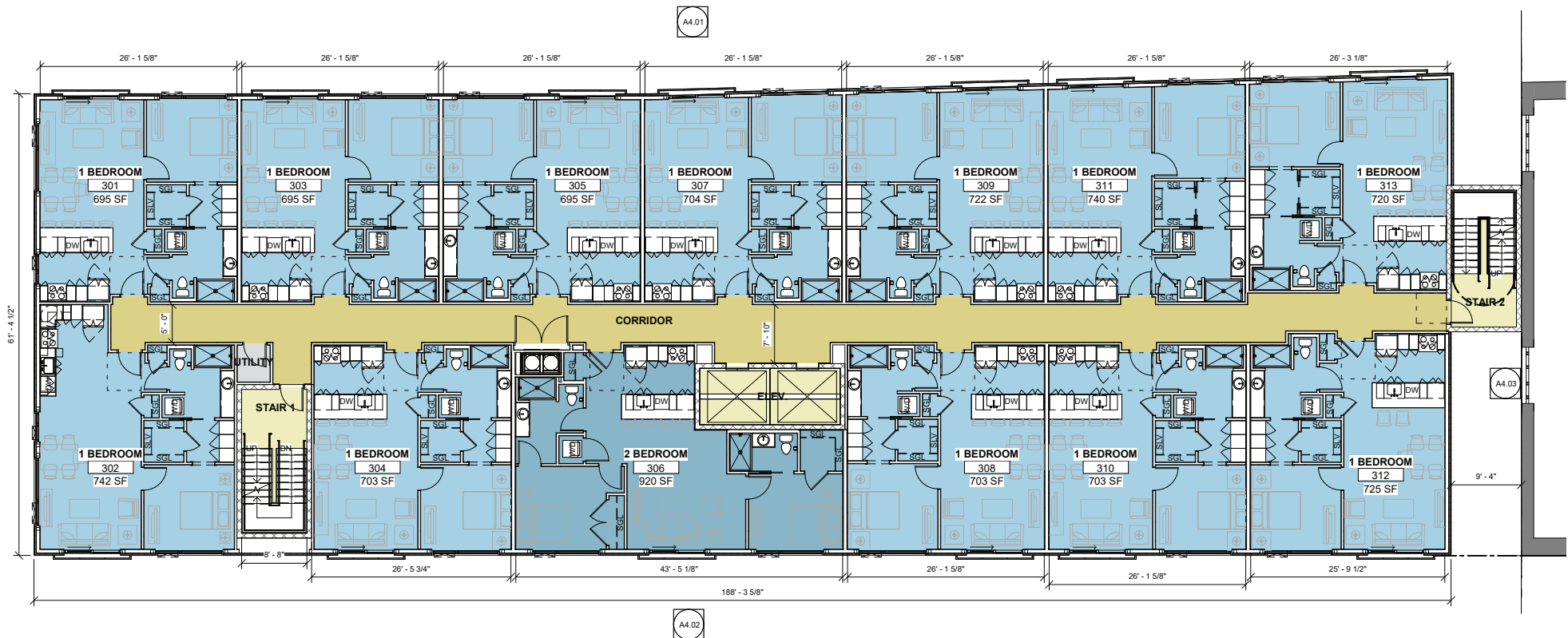


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Figure 3-6
Second Floor Plan

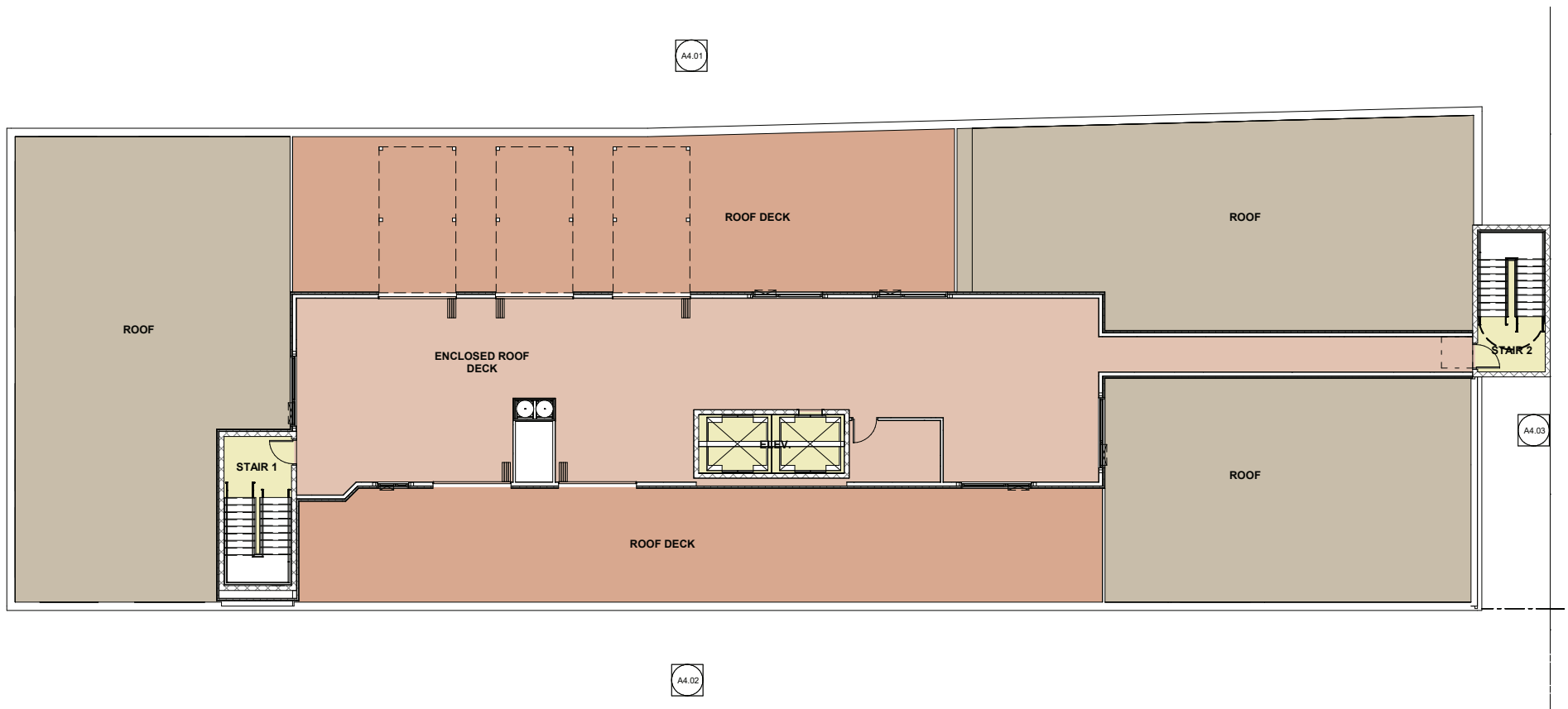
UNIT TYPES		
UNIT BED #	UNIT TYPE	UNIT COUNT
1 BEDROOM	1 BED	59
2 BEDROOM	2 BED	5
Grand total		64



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Figure 3-7
Typical Floor Plan Three Through Six



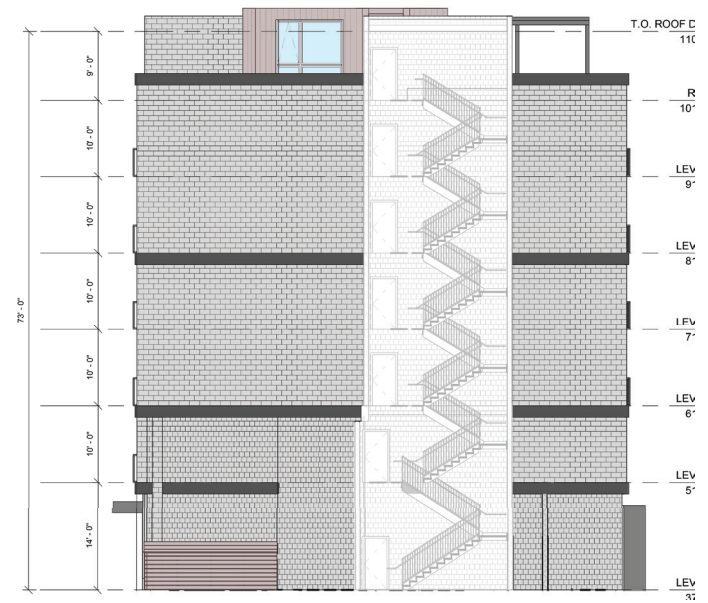
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Figure 3-8
Roof Deck Floor Plan



North Elevation



South Elevation (Facing Phase 1)

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Figure 3-10
Building Elevations



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Figure 3-11
Northwest Aerial Perspective



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Figure 3-12

Existing View from New Heath Street Looking Northeast



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Figure 3-13

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Proposed View from New Heath Street Looking Northeast



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Figure 3-14
Existing View from Terrace Street Looking North



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Figure 3-15
Proposed View from Terrace Street Looking North



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Figure 3-16

Existing View from Terrace Street Looking South



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Figure 3-17

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Proposed View from Terrace Street Looking South



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Figure 3-18
Proposed View from Columbus Avenue

Misison Lofts Scorecard

Location: 154 Terrace St, Roxbury Crossing, MA 02120,

Note: The information on this tab is READ-ONLY. To edit this information, see the Credit Category tabs.



Integrative Process		Preliminary	Y	0 of 2	M	1	Verified	0
IPc	Integrative Process			0 of 2		1		



Location and Transportation		Preliminary	Y	15 of 15	M	0	Verified	0
LTP	Floodplain Avoidance			Required				Not Verified
<i>Performance Path</i>								
LTc	LEED for Neighborhood Development			0 of 15		0		
<i>Prescriptive Path</i>								
LTc	Site Selection			8 of 8		0		
LTc	Compact Development			3 of 3		0		
LTc	Community Resources			2 of 2		0		
LTc	Access to Transit			2 of 2		0		



Sustainable Sites		Preliminary	Y	1.5 of 7	M	3	Verified	0
SSp	Construction Activity Pollution Prevention			Required				Not Verified
SSp	No Invasive Plants			Required				Not Verified
SSc	Heat Island Reduction			0 of 2		0		
SSc	Rainwater Management			0 of 3		3		
SSc	Nontoxic Pest Control			1.5 of 2		0		



Water Efficiency		Preliminary	Y	6 of 12	M	0.5	Verified	0
WEp	Water Metering			Required				Not Verified
<i>Performance Path</i>								
WEc	Total Water Use			0 of 12		0		
<i>Prescriptive Path</i>								
WEc	Indoor Water Use			6 of 6		0		
WEc	Outdoor Water Use			0 of 4		0.5		



Energy and Atmosphere		Preliminary	Y	20.5 of 37	M	3	Verified	0
EAp	Minimum Energy Performance			Required				Not Verified
EAp	Energy Metering			Required				Not Verified
EAp	Education of the Homeowner, Tenant or Building Manager			Required				Not Verified
EAc	Annual Energy Use			17.5 of 30		0		
EAc	Efficient Hot Water Distribution System			2 of 5		2		
EAc	Advanced Utility Tracking			1 of 2		1		



Materials and Resources		Preliminary	Y	1.5 of 9	M	1.5	Verified	0
MRp	Certified Tropical Wood	Required					Not Verified	
MRp	Durability Management	Required					Not Verified	
MRc	Durability Management Verification	1 of 1		0				
MRc	Environmentally Preferable Products	0.5 of 5		0				
MRc	Construction Waste Management	0 of 3		1.5				



Indoor Environmental Quality		Preliminary	Y	9.5 of 18	M	1.5	Verified	0
EQp	Ventilation	Required					Not Verified	
EQp	Combustion Venting	Required					Not Verified	
EQp	Garage Pollutant Protection	Required					Not Verified	
EQp	Radon-Resistant Construction	Required					Not Verified	
EQp	Air Filtering	Required					Not Verified	
EQp	Environmental Tobacco Smoke	Required					Not Verified	
EQp	Compartmentalization	Required					Not Verified	
EQc	Enhanced Ventilation	3 of 3		0				
EQc	Contaminant Control	0.5 of 2		0				
EQc	Balancing of Heating and Cooling Distribution Systems	2 of 3		0				
EQc	Enhanced Compartmentalization	0 of 3		0				
EQc	Combustion Venting	2 of 2		0				
EQc	Enhanced Garage Pollutant Protection	1 of 1		0				
EQc	Low-Emitting Products	0 of 3		1.5				
EQc	No Environmental Tobacco Smoke	1 of 1		0				



Innovation		Preliminary	Y	2 of 6	M	0	Verified	0
INp	Preliminary Rating	Required					Not Verified	
INc	Innovation	2 of 5		0				
INc	LEED Accredited Professional	0 of 1		0				



Regional Priority		Preliminary	Y	2 of 4	M	0	Verified	0
RPc	Regional Priority	2 of 4		0				

Point Floors

The project earned at least 8 points total in Location and Transportation and Energy and Atmosphere

No

The project earned at least 3 points in Water Efficiency

No

The project earned at least 3 points in Indoor Environmental Quality

No

Total	Preliminary	Y	58 of 110	M	10.5	Verified	0
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Certification Thresholds Certified: 40-49, Silver: 50-59, Gold: 60-79, Platinum: 80-110

4.0 ENVIRONMENTAL PROTECTION COMPONENT

4.1 Pedestrian Level Wind Assessment

The 2001 pedestrian level wind assessment completed by Frank Durgin, P.E., concluded that the PNF project would not result in any of the 48 locations evaluated experiencing wind levels that exceeded the acceptable pedestrian level winds (PLW). Acceptable PLW are defined by the BPDA as when an effective wind gust velocity of 31 miles per hour is not exceeded more than once in 100 hours. This evaluation was based on a Phase II height of 95 feet, and the Phase I heights being 72 feet and 96 feet based on additional stories being added to the existing Oliver Ditson and R& S Pickle Factory Buildings which was not implemented during the Phase I construction in 2010.

The 2001 DPIR qualitative analysis completed by Frank Durgin, and the 2005 letter from Mr. Durgin used to accompany the Terrace Street Lofts filing in 2005 is attached as **Appendix C**.

4.2 Shadow Impacts Analysis

4.2.1 Introduction

The following shadow study describes and graphically depicts anticipated new shadow impacts from the Phase II Project compared to shadows from the existing site. The study presents the existing and built conditions for Phase II for the hours 9:00 AM, 12:00 Noon, and 3:00 PM for the vernal equinox, summer solstice, autumnal equinox, and winter solstice. In addition, shadows are depicted for 6:00 PM during the summer solstice and autumnal equinox.

4.2.2 Vernal Equinox (March 21)

Figures 4-1 through 4-4 depict shadows on March 21. The resulting shadows are similar in some cases better than the NPC I Project which was proposed as approximately 25 feet higher

At 9:00 AM, new shadow is cast in the northwesterly direction. This new shadow falls on Terrace Street, as well as on land bounded by Terrace Street. The three-story wood frame residential building opposite the Phase II structure will be in new shadow at this time similar to the DPIR project.

At 12:00 Noon, new shadow falls onto a small portion of Terrace Street.

By 3:00 PM, new shadow falls in an easterly direction to the eastern termination of the Southwest Corridor AMTRAK/MBTA rail lines at the rear of Phase II.

By 6:00 PM, new shadow crosses the Mainline Tracks and extends onto the Columbus Avenue roadway.

4.2.3 Summer Solstice (June 21)

Figures 4-5 through 4-8 depict shadow impacts on June 21. The resulting shadows are similar in some cases better than the NPC I Project which was proposed as approximately 25 feet higher

At 9:00 AM, new shadow is cast in a westerly direction onto Terrace Street.

At 12:00 Noon, shadows are diminished, and new shadow only appears on a small portion of the Terrace Street sidewalk to the west of the Phase II building.

At 3:00 PM, new shadow is cast in an easterly direction, to the eastern termination of the Southwest Corridor AMTRAK/MBTA rail lines at the rear of Phase II.

At 6:00 PM, new shadow is cast further distance across the Southwest Corridor AMTRAK/MBTA rail lines.

4.2.4 Autumnal Equinox (September 21)

Figures 4-9 through 4-12 depict shadow impacts on September 21. The resulting shadows are similar in some cases better than the NPC I Project which was proposed as approximately 25 feet higher

At 9:00 AM, new shadow falls on Terrace Street. The three-story wood frame residential building opposite the Phase II building is also in shadow.

At 12:00 Noon, shadows are diminished, falling onto a small portion of Terrace Street, and to the north of the Phase II building.

At 3:00 PM, new shadow is cast in an easterly direction, across the Southwest Corridor AMTRAK/MBTA rail lines, and almost onto a small portion of land located east of the tracks approaching Columbus Avenue.

4.2.5 Winter Solstice (December 21)

Figures 4-13 through 4-15 depict shadow impacts on December 21. Winter sun casts the longest shadows of the year. The resulting shadows are similar in some cases better than the NPC I project which was originally proposed as approximately 25 feet higher for the Phase II Project.

At 9:00 AM, new shadow is cast on the three-story wood frame building opposite the Phase II building as well as on areas further up the hill.

At 12:00 Noon, shadows are diminished but fall to the north of the Phase II building.

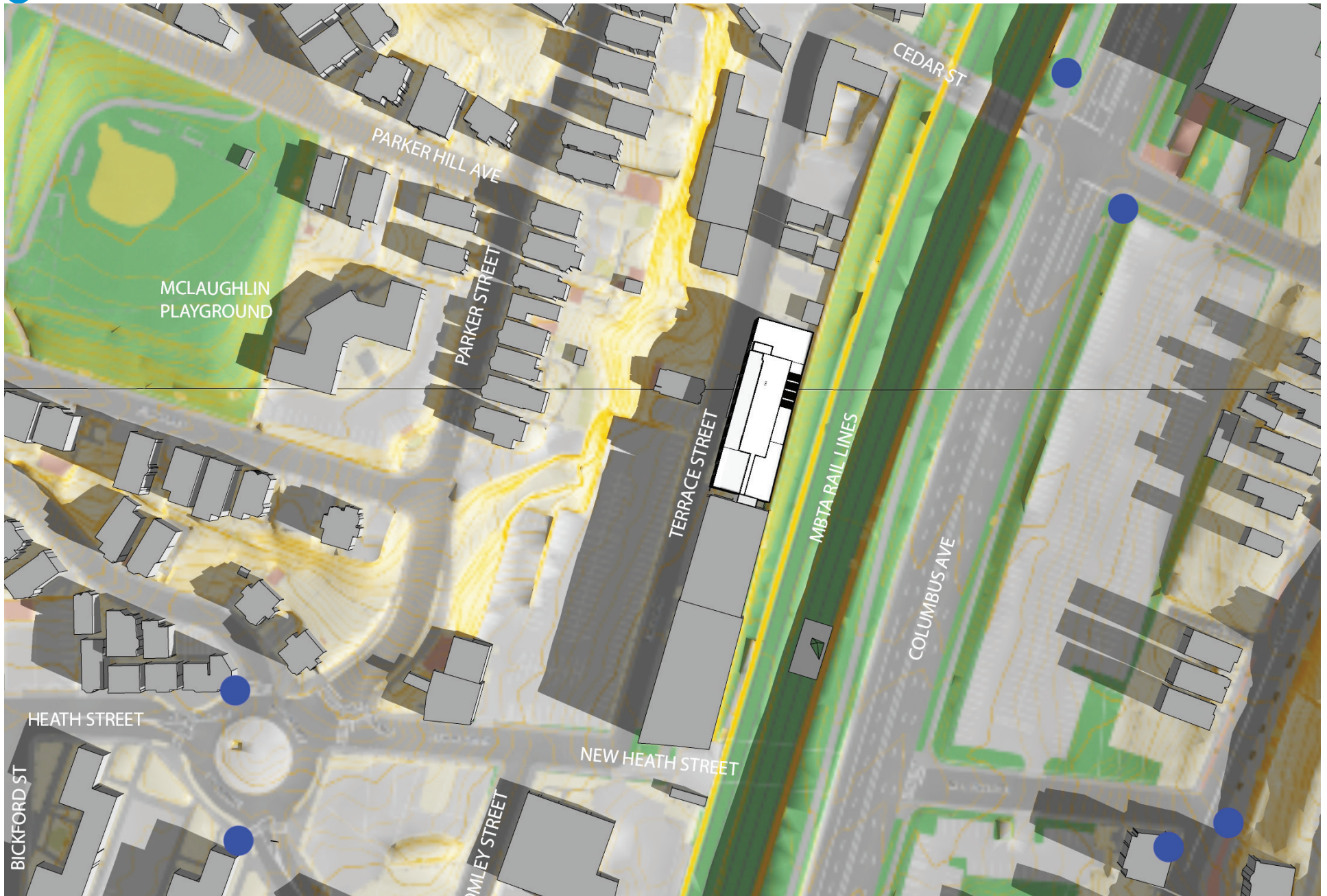
At 3:00 PM, a large new shadow is cast in the northeasterly direction, across the Southwest Corridor AMTRAK/MBTA rail lines, and as far as Columbus Avenue.

4.2.6 Conclusions

Similar to the NPC I Project, during the morning hours, new shadow for the Phase II building is projected to be cast primarily onto Terrace Street. During the afternoon hours, shadow is cast in an easterly direction, and generally falls across portions of the Southwest Corridor/AMTRAK/MBTA Lines, extending beyond Columbus Avenue in the winter months. No new shadow impacts occur in a southerly direction.

Terrace Street and the Terrace Street sidewalk abutting the Phase II building are affected by new shadow throughout the year as was the case with the NPC I Project, during the morning hours. However, these pedestrian areas will be sunny during the afternoon hours when they are likely to get considerable use. Overall, the NPC II Project's shadow impacts will be consistent with current patterns and will not adversely impact the Project Site and any historical resources in surrounding areas.

● = BUS STOP LOCATIONS



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Figure 4.1-1
Shadow Study: March 21, 9am
Alt 23.4 Azimuth 112.7



● = BUS STOP LOCATIONS



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Figure 4.1-2
Shadow Study: March 21, 12pm
Alt 46.4 Azimuth 161.1



● = BUS STOP LOCATIONS



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Figure 4.1-3
Shadow Study: March 21, 3pm
Alt 39.1 Azimuth 223.2



● = BUS STOP LOCATIONS



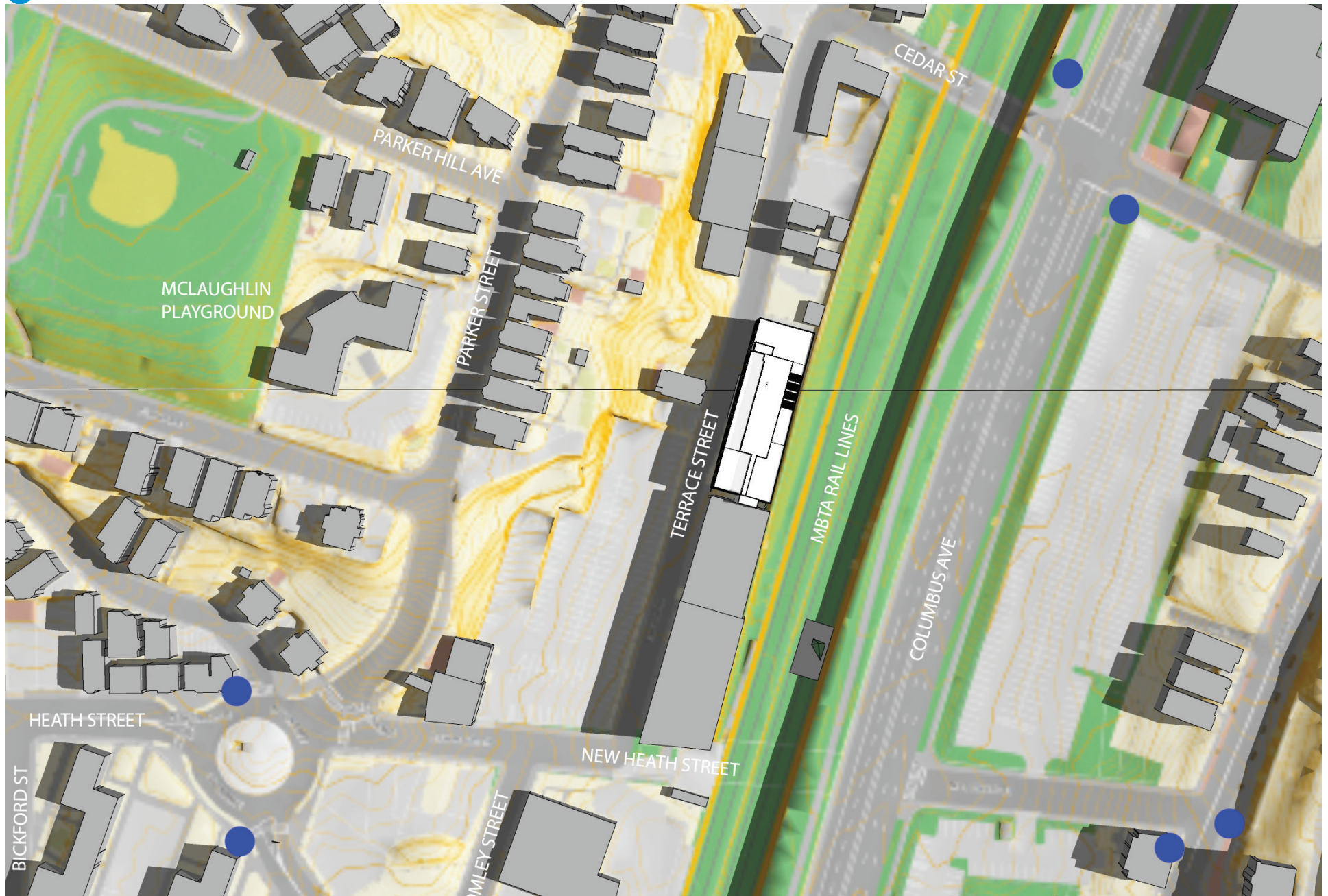
154 Terrace Street

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Figure 4.1-4
Shadow Study: March 21, 6pm
Alt 9.8 Azimuth 261.5



● = BUS STOP LOCATIONS



154 Terrace Street

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Figure 4.1-5
Shadow Study: June 21, 9am
Alt 40.0 Azimuth 93.5



● = BUS STOP LOCATIONS



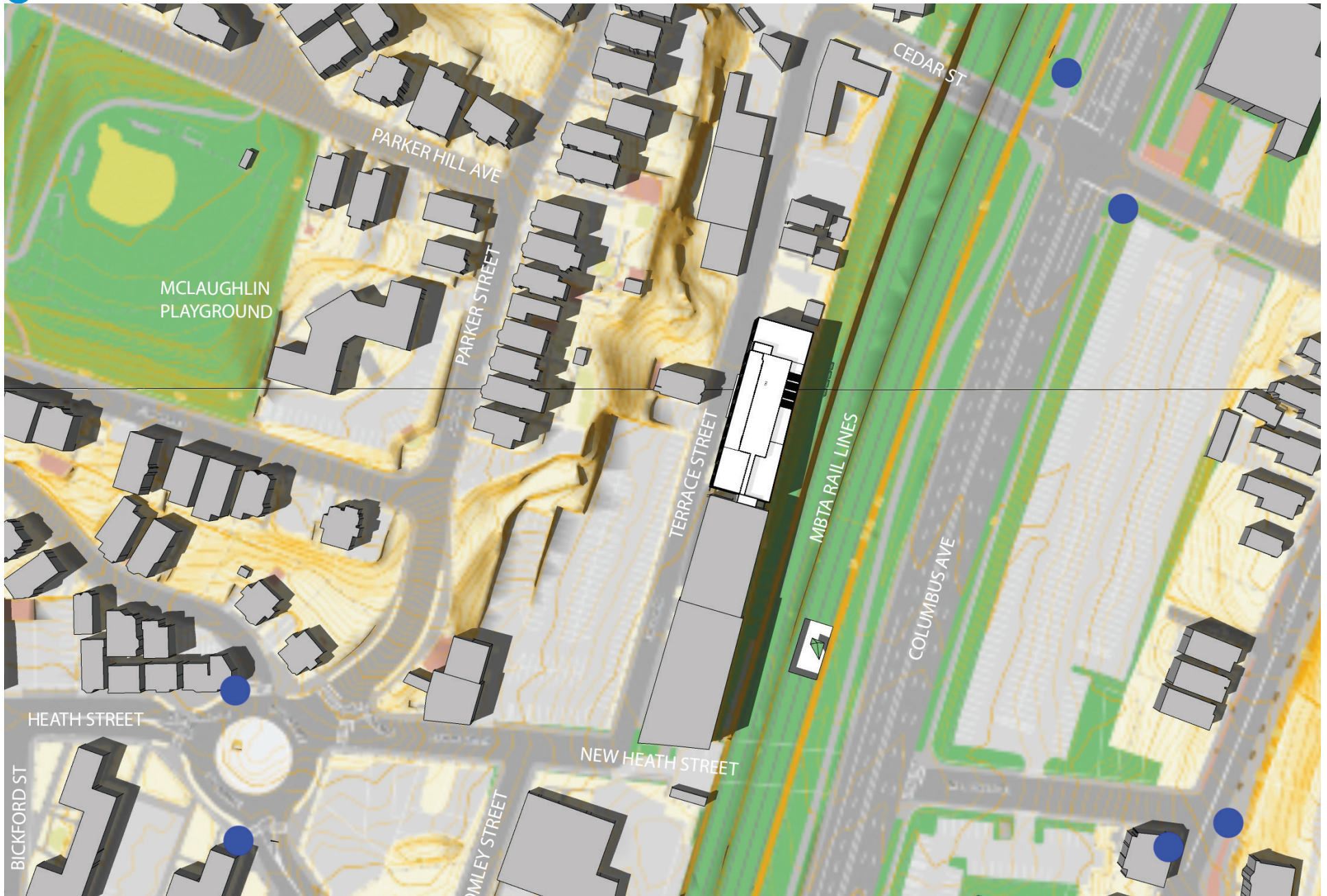
154 Terrace Street

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Figure 4.1-6
Shadow Study: June 21, 12pm
Alt 68.8 Azimuth 149.5



● = BUS STOP LOCATIONS



154 Terrace Street

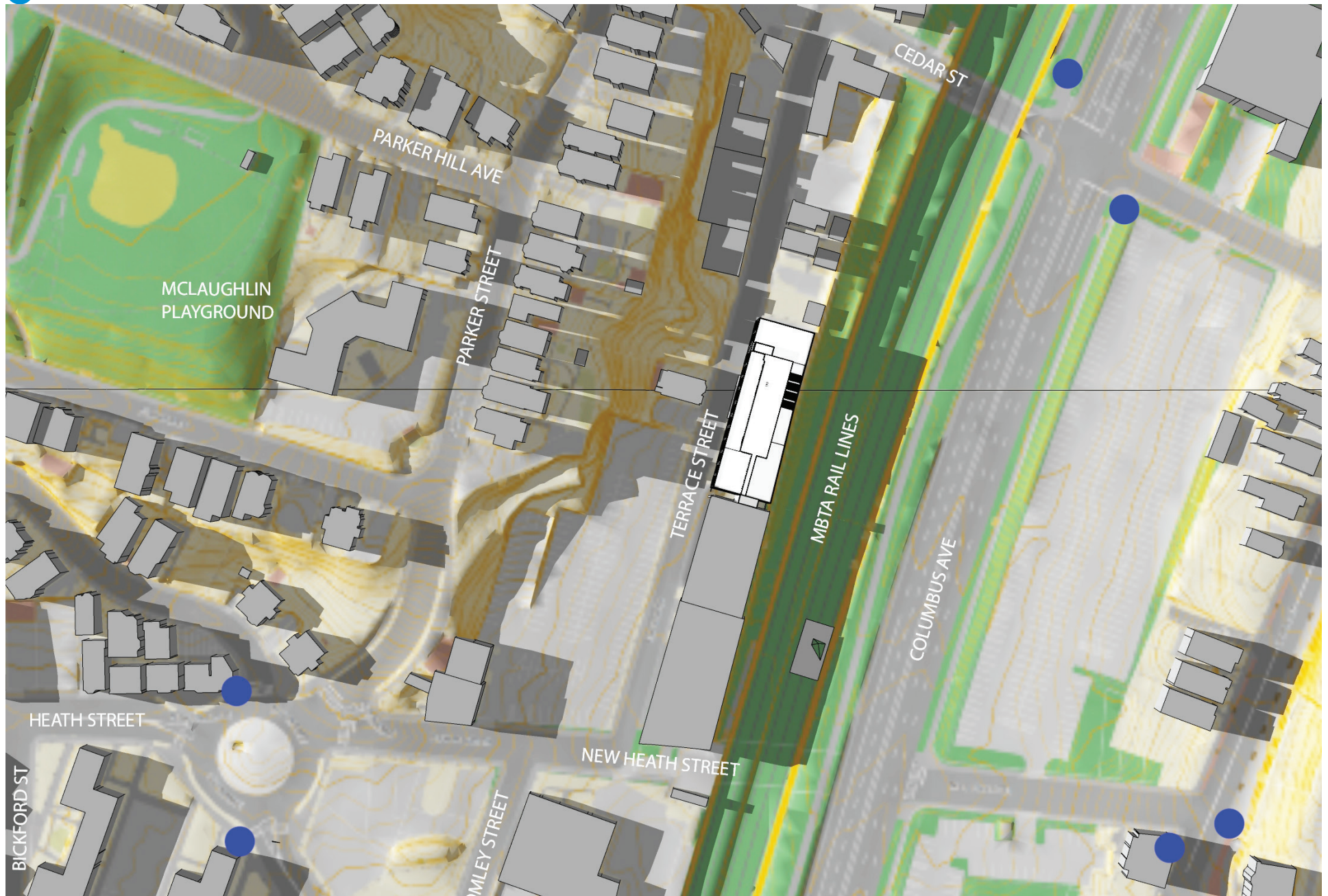
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Figure 4.1-7
Shadow Study: June 21, 3pm
Alt 56.5 Azimuth 246.4



WinnCompanies **tat**
Development | Residential | Military

● = BUS STOP LOCATIONS



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Figure 4.1-8
Shadow Study: June 21, 6pm
Alt 23.8 Azimuth 280.7



● = BUS STOP LOCATIONS



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Figure 4.1-9
Shadow Study: September 21, 9am
Alt 26.1 Azimuth 115.2



● = BUS STOP LOCATIONS



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Figure 4.1-10
Shadow Study: September 21, 12pm
Alt 47.5 Azimuth 166.1



● = BUS STOP LOCATIONS



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Figure 4.1-11
Shadow Study: September 21, 3pm
Alt 37.5 Azimuth 227.2



● = BUS STOP LOCATIONS



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Figure 4.1-12
Shadow Study: September 21, 6pm
Alt 7.4 Azimuth 264.2



● = BUS STOP LOCATIONS



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Figure 4.1-13
Shadow Study: December 21, 9am
Alt 14.4 Azimuth 142.0



● = BUS STOP LOCATIONS



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Figure 4.1-14
Shadow Study: December 21, 12pm
Alt 24.2 Azimuth 184.4



● = BUS STOP LOCATIONS



154 Terrace Street

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Figure 4.1-15
Shadow Study: December 21, 3pm
Alt 10.1 Azimuth 255.0



WinnCompanies **tat**
Development | Residential | Military

4.3 Air Quality Impacts

Tech Environmental, Inc. performed air quality analyses for the NPC II Project. 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 NPC II Project's enclosed parking garage and rooftop heating and ventilation equipment, and 3) a microscale CO analysis for intersections in the project area that meet the BPDA criteria for requiring such an analysis.

4.3.1 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 4.3-1**). 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 (SO₂), nitrogen dioxide (NO₂), ozone (O₃), fine particulate matter (PM_{2.5}), coarse particulate matter (PM₁₀), and lead are located at 1159 Harrison Avenue in Boston, MA.

Table 4.3-2 summarizes the DEP air monitoring data, for the most recent available, complete, three-year period (2016-2018), that are considered to be representative of the project area. **Table 4.3-2** 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, NO₂ and PM_{2.5}. Ozone is a regional air pollutant on which the small amount of additional traffic generated by the NPC II Project will have an insignificant impact. The NPC II Project's operations will not have a significant impact on local NO₂ and PM_{2.5} concentrations.

Table 4.3-1. Massachusetts and National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Time	NAAQS ($\mu\text{g}/\text{m}^3$)
Sulfur Dioxide (SO_2)	1-hour ^P 3-hour ^S Annual ^P (Arithmetic Mean)	196 ^a 1,300 ^b 80
Carbon Monoxide (CO)	1-hour ^P 8-hour ^P	40,000 ^b 10,000 ^b
Nitrogen Dioxide (NO_2)	1-hour ^P Annual ^{P/S} (Arithmetic Mean)	188 ^c 100
Coarse Particulate Matter (PM_{10})	24-hour ^{P/S}	150
Fine Particulate Matter ($\text{PM}_{2.5}$)	24-hour ^{P/S} Annual ^P (Arithmetic Mean) Annual ^S (Arithmetic Mean)	35 ^d 12 ^{e,f} 15
Ozone (O_3)	8-hour ^{P/S}	137 ^g
Lead (Pb)	Rolling 3-Month Avg. ^{P/S}	0.15

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.

^c 98th percentile 1-hour concentrations in a year (average over three years).

^d 98th 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 $\text{PM}_{2.5}$ annual standard from 15 $\mu\text{g}/\text{m}^3$ to 12 $\mu\text{g}/\text{m}^3$.

^g Three-year average of the annual 4th-highest daily maximum 8-hour ozone concentration must not exceed 0.070 ppm (137 $\mu\text{g}/\text{m}^3$) (effective December 28, 2015); the annual PM_{10} standard was revoked in 2006.

Table 4.3-2. Representative Existing Air Quality in the Project Area

Pollutant, Averaging Period	Monitor Location	Value ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)	Percent of NAAQS
CO, 1-hour	Harrison Avenue, Boston	2,758	40,000	7%
CO, 8-hour	Harrison Avenue, Boston	1,438	10,000	14%
NO ₂ , 1-hour	Harrison Avenue, Boston	89.7	188	48%
NO ₂ , Annual	Harrison Avenue, Boston	24.8	100	25%
Ozone, 8-hour	Harrison Avenue, Boston	127	137	93%
PM ₁₀ , 24-hour	Harrison Avenue, Boston	28	150	19%
PM _{2.5} , 24-hour	Harrison Avenue, Boston	13.5	35	35%
PM _{2.5} , Annual	Harrison Avenue, Boston	5.5	12	44%
Lead, Quarterly	Harrison Avenue, Boston	0.017	0.15	12%
SO ₂ , 1-hour	Harrison Avenue, Boston	10.9	196	6%

Source: MassDEP, <https://www.mass.gov/lists/massdep-air-monitoring-plans-reports-studies>, downloaded September 16, 2019.

Notes:

- (1) Annual averages are highest measured during the most recent three-year period for which data are available (2016 - 2018). 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 NO₂ value is the -year average of the 98th percentile values and the one-hour SO₂ 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 (137 $\mu\text{g}/\text{m}^3$) (effective December 28, 2015); the annual PM₁₀ standard was revoked in 2006 and the 3-hour SO₂ standard was revoked by the US EPA in 2010.

4.3.2 Impacts from Parking Garage and Rooftop Heating and Ventilation Equipment

The project includes an enclosed ground level parking garage designed to provide parking spaces for 27 vehicles. The NPC II Project will also include fuel-combusting rooftop equipment that will emit air pollutants to the atmosphere when operating. Fuel-combusting equipment for the NPC II Project will include 3 individual gas-fired boilers (each with a heat input capacity of 2.375 million Btu per hour (MMBtu/hour)). An analysis of the worst-case air quality impacts from the proposed parking garage and rooftop equipment 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 Site.

These closest sensitive receptors include: air intakes located on the proposed building and nearby existing buildings and pedestrians at ground level anywhere near the Project Site. CO emissions from motor vehicles operating inside the garage were calculated and the CO concentrations inside the garage and surrounding the Project Site were based on morning and afternoon peak traffic periods. CO emission from fuel-combusting rooftop equipment were also calculated based on peak operating conditions.

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

Garage Ventilation System

The proposed parking garage 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. Full ventilation of the garage will require a maximum flow of approximately 12,500 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 garage to safe levels before they are vented outside.

Peak Garage Traffic Volumes

The peak morning and afternoon one-hour entering and exiting traffic volumes for the garage are shown in **Table 4.3-3**.

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

Table 4.3-3. Peak-Hour Garage Traffic Volumes

Period	Entering (vehicles/hour)	Exiting (vehicles/hour)	Total (vehicles/hour)
Morning Peak Hour	3	4	7
Afternoon Peak Hour	4	5	9

Source: Howard-Stein Hudson, Inc.

Motor Vehicle Emission Rates

The U.S. Environmental Protection Agency (EPA) MOVES2014b emission factor model was used to calculate single vehicle CO emissions rates, for a vehicle speed of 5 mph. The inputs to the MOVES2014b model followed the latest guidance from the DEP and were performed for the future traffic year of 2025. The CO emission rate calculated by MOVES2014b, for vehicles moving at 5 miles per hour (mph), was 3.045 grams per vehicle-mile for each entering and exiting vehicle. These emission rates apply to wintertime conditions when motor vehicle CO emissions are greatest due to cold temperatures. MOVES2014b model output is provided in the **Appendix B**.

To determine the maximum one-hour CO emissions inside the garage 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 and traveling to or from the garage at the furthest parking spot. 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 parking garage was calculated to be 0.013 grams per minute for the morning peak hour and 0.017 grams per minute for the afternoon peak hour. Applying the maximum volumetric garage ventilation flow rate for the parking garage, the peak one-hour CO concentration inside the garage was calculated to be 0.033 parts of CO per million parts of air (ppm) for the morning peak hour and 0.043 ppm for the afternoon peak hour. Therefore, the peak one-hour CO concentration inside the garage will be 0.043 ppm with a peak one-hour emission rate of 0.017 grams/minute (0.00029 grams/second), corresponding to the afternoon peak period. These predictions represent conservative estimates of the peak garage CO emissions and concentrations.

Peak Rooftop Heating and Ventilation CO Emission Rate

EPA's AP-42 document was used to determine the uncontrolled CO emission rate for the gas-fired boilers. The gas-fired boiler heat input capacity for the project will be 7.125 MMBtu/hour. Assuming a heating value of 1,020 Btu/cubic foot of natural gas this translates to approximately 6,985 cubic feet of natural gas burned per hour. Using a CO emission factor of 0.084 lb/MMBtu,² the maximum total CO emissions from the heating and ventilation equipment will be 0.60 lbs/hour (0.075 gram/second). This calculation conservatively assumes that all of the gas-fired fuel combustion equipment is operating simultaneously at its full design capacity.

Peak Ambient CO Concentration

Worst-case concentrations of CO from the parking garage and rooftop equipment were predicted for locations around the building using AERMOD model (Version 18081) in screening-mode. The results of the air quality analysis for locations outside and around the building are summarized in **Table 4.3-4**. The results in Table 4.3-4 represent all outside locations on and near the Project Site, including nearby building air intakes and 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 the parking garage and rooftop equipment 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 building heating and ventilation system and parking garage at all locations on and around the Project Site. AERMOD predicted one-hour average concentrations of air pollutants.

AERMOD predicted that the maximum one-hour CO concentration from the fuel combustion equipment and parking garage will be 0.45 ppm (461.87 µg/m³). 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 0.41 ppm (0.45 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 2.41 ppm for a one-hour period and 1.26 ppm for an eight-hour period were added to

² US EPA, "Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition Volume I: Stationary Point and Area Sources", Table 1.4-1, January 1995 (revised July 1998).

the maximum predicted garage and rooftop equipment 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 and rooftop equipment, at any location around the building, will be no larger than 2.86 ppm and 1.67 ppm, respectively. These maximum predicted total CO concentrations (garage exhaust and rooftop equipment exhaust impacts plus background) are safely in compliance with the NAAQS. This analysis demonstrates that the operation of the parking garage and fuel-combusting rooftop equipment will not have an adverse impact on air quality.

Table 4.3-4. Predicted Parking Garage and Building Heating and Ventilation 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*	2.86**	35 (NAAQS)	1.67**	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 1.68 ppm for the one-hour period and 1.24 ppm for the eight-hour period.

4.3.3 Microscale CO Analysis for Selected Intersections

The Boston Planning & Development Agency (BPDA) 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 NPC II Project causes a 10% increase in traffic or where the LOS 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 the NPC II Project due to the project trip generation having minimal impacts on the overall delays at the two intersections. **Table 4.3-5** shows a comparison of the Existing (2017) and Build (2025) LOS at the two intersections. The motor vehicle trip generation from the NPC II 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 NPC II Project will not have a significant impact on air quality at any intersection in the NPC II Project area and a microscale air quality analysis is not necessary for the NPC II Project.

Table 4.3-5. Summary of Build Case Level of Service

Intersection	Existing LOS (AM/PM)	Build LOS (AM/PM)	Requires Analysis?
Bromley Street, New Heath Street & Terrace Street	B/B	B/B	NO
Terrace Street and Cedar Street	B/B	C/B	NO

The LOS shown represents the overall delay at each intersection

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

Source: Howard/Stein-Hudson Associates, Inc.

Conclusions

The microscale CO air quality dispersion modeling analysis clearly indicates that the worst-case traffic generated by the NPC II 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 building heating and ventilation, are predicted to be safely in compliance with the NAAQS for CO.

4.4 Noise Impacts

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

4.4.1 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 4.5-1 gives the perceived change in loudness of different changes in sound pressure levels.³

³ American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., 1989 ASHRAE Handbook--Fundamentals (I-P) Edition, Atlanta, GA, 1989.

Table 4.4-1. 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 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 4.4-2**.

4.4.2 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 NPC II 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 NPC II Project is located in an area consisting of commercial and residential uses. The NPC II Project will have low-rise residential uses to the north, east, and south. The NPC II Project must comply with Regulation 2.2 for noise levels in Residential Zoning Districts at these residential locations. **Table 4.5-3** 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 4.4-2. 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 4.4-3. 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

4.4.3 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 11:00 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 G**):

Monitoring Location #1: Parker Street at Fisher Avenue

Monitoring Location #2: 2430 New Heath Street

Monitoring Location #3: 143 Terrace Street

Broadband (dBA) and octave band sound level measurements were made with a Larson Davis Type 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 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 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 Tuesday night April 24th, 2018 through Wednesday early morning April 25th, 2018. Weather conditions during the sound survey were conducive to accurate sound level monitoring: the temperature was 52°F, the skies were clear, and the winds were 9 to 11 mph. The microphone of the sound level analyzer was fitted with a 7-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 an urban area. A significant source of existing sound at all locations is motor vehicle traffic on nearby local streets, and trains.

The results of the nighttime baseline sound level measurements are presented in **Table 4.4-4**, and the complete measurement printouts are provided in **Appendix G**. The nighttime background L_{90} level was 42.4 dBA at Location #1, 46.6 dBA at Location #2 and 44.7 dBA at Location #3. The octave band data in **Table 4.4-4** show that there were no pure tones detected in the nighttime noise measurements.

Noise monitoring at the Project Site during the day peak traffic period was used to evaluate the existing ambient sound levels and to evaluate conformance with the Site Acceptability Standards established by HUD for residential development. The purpose of the HUD guidelines is to provide standards for determining the acceptability of residential project locations with regards to existing sound levels. The HUD criteria regarding the day-night average sound level (L_{dn}) are listed below. These standards apply to L_{dn} measurements taken several feet from the building in the direction of the predominant source of noise.

- Normally Acceptable – L_{dn} not exceeding 65 dBA
- Normally Unacceptable – L_{dn} above 65 dBA but not exceeding 75 dBA
- Unacceptable – L_{dn} above 75 dBA

These HUD standards do not apply to this project, but are used as guidance regarding the suitability of the project area with regard to background sound levels.

Daytime sound level measurements were taken to help estimate the L_{dn} for the Project Site. A 30-minute sound level measurement was taken during the morning, on Wednesday, April 18, 2018 between 9:50 a.m. and 10:20 a.m. at 2430 New Heath Street (the closest location to the project). The weather conditions during the sound survey were conducive to accurate sound level monitoring: the skies were clear, and the winds were approximately 16 mph. The microphone of the sound level analyzer was fitted with a 7-inch windscreen to negate any effects of wind-generated noise.

The daytime sound level measurements taken in the vicinity of the Project Site reveal sound levels that are typical for an urban area. The main sources of noise during the morning period sound level measurements were motor vehicle traffic on nearby local streets, birds, and HVAC systems.

The L_{eq} measured during the morning period was 66 dBA at 2430 New Heath Street. The L_{eq} sound level measured during the nighttime at the same location was 69 dBA. Using both the daytime and nighttime L_{eq} sound levels, the calculated L_{dn} for the site is 73 dBA, which is above the HUD guideline noise limit of 65 dBA primarily due to the local traffic and trains passing by.

It is assumed that standard building construction practices will result in at least a 30-dBA reduction of sound from outdoor sound levels. The Proponent will incorporate sound mitigation, as necessary, to assure that the typical urban sound sources do not result in noise impacts greater than 45 dBA inside the residential units closest to the neighboring streets.

Table 4.4-4. Nighttime Baseline Sound Level Measurements, April 24 - 25, 2018

Sound Level Measurement	(Location #1) Parker Street at Fisher Avenue 12:11 a.m. - 12:41 a.m.	(Location #2) 2430 New Heath Street 11:39 p.m.- 12:09 a.m.	(Location #3) 143 Terrace Street 11:06 p.m.- 11:36 p.m.
Broadband (dBA)			
Background (L ₉₀)	42.4	46.6	44.7
Octave Band L ₉₀ (dB)			
16 Hz	50	50	50
32 Hz	51	57	56
63 Hz	49	55	54
125 Hz	47	52	47
250 Hz	41	46	43
500 Hz	38	44	42
1000 Hz	37	43	43
2000 Hz	31	37	36
4000 Hz	25	28	25
8000 Hz	20	20	17
16000 Hz	10	11	3.8
Pure Tone?	No	No	No

4.4.4 Reference Data and Candidate Mitigation Measures

The mechanical systems for the NPC II 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 NPC II Project's mechanical equipment. The sound levels from all potential significant project noise sources are discussed in this section.

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

- (1) Cooling Tower Capacity 200 GPM/100 Nominal Tons
- (1) Venmar 8,000 CFM ERV

The equipment listed above, which will be located on building roof level, was included in the noise impact analysis. The NPC II 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 design evolves, the sound generation for the actual equipment selected may differ from the values that were utilized for the analysis.

4.4.5 Calculated Future Sound Levels

Methodology

Future maximum sound levels at the upper floors of all existing residences bordering the NPC II 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 NPC II Project generated sound propagation and attenuation.⁴ 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 south of the project area at 166 Terrace St. This location was selected based on the proximity of the equipment (smaller distances correspond to larger noise impacts) and the amount of shielding by other buildings (taller nearby residential locations will experience less shielding from the NPC II 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 NPC II Project's rooftop mechanical equipment. It can be classified as a residential zone.

The sound level impacts from the building's mechanical equipment were predicted at the closest residential location, as well as at the residential buildings to the west (151 Terrace, and 828 – 832 Parker St) and the north (123 Terrace St, 126 Terrace St and 124 Terrace St) Figure 1 in **Appendix G** 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.

⁴Cadna-A Computer Aided Noise Abatement Program, Version 4.3

4.4.6 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 NPC II Project. The details of the noise predictions are presented in **Tables 4.4-6 through 4.4-13**. The sound impact analysis includes the simultaneous operation of the NPC II 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 Site (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 4.4-6 through 4.4-13**, reveal that the sound level impact at the worst-case property line and the closest residence will be between 31.3 and 38.9 dBA. The smallest sound level impact of 31.3 dBA is predicted to occur at 830 Parker Street. The largest sound level impact of 38.9 dBA is predicted to occur at the closest residence at 166 Terrace 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 NPC II 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 4.4-3**). The NPC II 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 property line and 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 NPC II 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 worst-case property line and 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 4.4-6** through **4.4-13**, the NPC II Project is predicted to produce a less than 3 dBA change in the background sound levels at all modeled locations. Therefore, the NPC II 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 4.4-6. Estimated Future Sound Level Impacts – Anytime, 166 Terrace (Closest Residence) – Location R1

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	6
63 Hz	67	18
125 Hz	61	26
250 Hz	52	36
500 Hz	46	31
1000 Hz	40	31
2000 Hz	33	28
4000 Hz	28	23
8000 Hz	26	11
Broadband (dBA)	50	39
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L ₉₀ (Location # 1)	44.7
150 Terrace Street Project*	38.9
Calculated Combined Future Sound Level	45.7
Calculated Incremental Increase	+1.0
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 4.4-7. Estimated Future Sound Level Impacts – Anytime,
151 Terrace St – Location R2**

Octave Bands	Residential Nighttime	Maximum Predicted Sound Levels*
32 Hz	68	8
63 Hz	67	19
125 Hz	61	26
250 Hz	52	34
500 Hz	46	27
1000 Hz	40	27
2000 Hz	33	24
4000 Hz	28	20
8000 Hz	26	14
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 # 2)	44.7
150 Terrace St Project*	36.4
Calculated Combined Future Sound Level	45.3
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 4.4-8. Estimated Future Sound Level Impacts – 832 Parker St – Location R3

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	1
63 Hz	67	14
125 Hz	61	23
250 Hz	52	34
500 Hz	46	31
1000 Hz	40	31
2000 Hz	33	30
4000 Hz	28	25
8000 Hz	26	12
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 # 2)	42.4
150 Terrace St Project*	38.0
Calculated Combined Future Sound Level	43.7
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 4.4-9. Estimated Future Sound Level Impacts – 830 Parker St – Location R4

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	-5
63 Hz	67	8
125 Hz	61	17
250 Hz	52	29
500 Hz	46	23
1000 Hz	40	24
2000 Hz	33	21
4000 Hz	28	12
8000 Hz	26	-13
Broadband (dBA)	50	31
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L ₉₀ (Location # 2)	42.4
150 Terrace St Project*	31.3
Calculated Combined Future Sound Level	42.7
Calculated Incremental Increase	+ 0.3
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 4.4-10. Estimated Future Sound Level Impacts – 828 Parker St – Location R5

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	2
63 Hz	67	15
125 Hz	61	24
250 Hz	52	34
500 Hz	46	31
1000 Hz	40	32
2000 Hz	33	30
4000 Hz	28	26
8000 Hz	26	12
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 # 2)	42.4
150 Terrace St Project*	38.4
Calculated Combined Future Sound Level	43.9
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 4.4-11. Estimated Future Sound Level Impacts – 123 Terrace St – Location R6

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	2
63 Hz	67	15
125 Hz	61	24
250 Hz	52	34
500 Hz	46	31
1000 Hz	40	32
2000 Hz	33	30
4000 Hz	28	26
8000 Hz	26	12
Broadband (dBA)	50	39
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L ₉₀ (Location # 2)	44.7
150 Terrace St Project*	38.6
Calculated Combined Future Sound Level	45.7
Calculated Incremental Increase	+ 1.0
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 4.4-12. Estimated Future Sound Level Impacts – 126 Terrace St – Location R7

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	6
63 Hz	67	17
125 Hz	61	23
250 Hz	52	30
500 Hz	46	24
1000 Hz	40	24
2000 Hz	33	21
4000 Hz	28	17
8000 Hz	26	10
Broadband (dBA)	50	33
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L ₉₀ (Location # 2)	44.7
150 Terrace St Project*	32.7
Calculated Combined Future Sound Level	45.0
Calculated Incremental Increase	+ 0.3
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 4.4-13. Estimated Future Sound Level Impacts – 124 Terrace St – Location R8

Octave Bands	Residential Nighttime Noise Standards	Maximum Predicted Sound Levels*
32 Hz	68	7
63 Hz	67	17
125 Hz	61	23
250 Hz	52	27
500 Hz	46	22
1000 Hz	40	24
2000 Hz	33	22
4000 Hz	28	18
8000 Hz	26	12
Broadband (dBA)	50	32
Compliance with the City of Boston Noise Regulation?		Yes

Sound Level Metric	Maximum Sound Levels* (dBA)
Existing Nighttime Background, L ₉₀ (Location # 2)	49.6
150 Terrace St Project*	31.5
Calculated Combined Future Sound Level	44.9
Calculated Incremental Increase	+ 0.2
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.

4.4.7 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 NPC II Project's design will meet the applicable acoustic criteria.

4.5 Stormwater Management and Water Quality

The NPC II Project will improve the quality of stormwater leaving this site. Erosion and sediment control measures will be implemented during construction to minimize the transport of site soils to off-site areas and BWSC storm drain systems. During construction, existing catch basins will be protected with filter fabric, straw bales and/or crushed stone, to provide for sediment removal from runoff. These controls will be inspected and maintained throughout the construction phase until the areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover.

The project will promote stormwater recharge to groundwater. It is anticipated that the equivalent of 1 inch over the site's impervious area can be recharged as prescribed in BWSC's Site Plan Requirements. Stormwater runoff from paved areas will be treated through the use of deep sump catch basins and water quality treatment structures. An operation and maintenance plan will be developed to support the long-term functionality of the proposed stormwater management system.

The project will meet the Department of Environmental Protection's (DEP) Stormwater Management Standards for redevelopment. All necessary dewatering will be conducted in accordance with applicable MWRA and BWSC discharge permits. Once construction is completed, the NPC II Project will improve the quality of stormwater leaving this site. Erosion and sediment control measures will be implemented during construction to minimize the transport of site soils to off-site areas and BWSC storm drain systems. During construction, existing catch basins will be protected with filter fabric, straw bales and/or crushed stone, to provide for sediment removal from runoff. These controls will be inspected and maintained throughout the construction phase until the areas of disturbance have been stabilized through the placement of pavement, structure, or vegetative cover.

The project will promote stormwater recharge to groundwater. It is anticipated that the equivalent of 1 inch over the site's impervious area can be recharged as prescribed in BWSC's Site Plan Requirements. Stormwater runoff from vehicular areas will be treated through the use of deep sump catch basins and water quality treatment structures. An operation and maintenance plan will be developed to support the long-term functionality of the proposed stormwater management system.

The project will meet the Department of Environmental Protection's (DEP) Stormwater Management Standards for redevelopment. All necessary dewatering will be conducted in accordance with applicable MWRA and BWSC discharge permits. Once construction is complete, the Phase II Project will be in compliance with local and state stormwater management policies.

4.6 Solid and Hazardous Waste Materials

4.6.1 Solid Waste

During the preparation of the Project 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, Phase II will generate approximately 512 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 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 NPC II 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).

4.6.2 Hazardous Waste and Materials

Loureiro conducted a Phase I - Environmental Site Assessment in May 2018 to document the environmental conditions of the site, to assess the potential for activities conducted at the site and in the surrounding area to have affected the environmental condition of the site, and to perform an inquiry into the previous ownership and use of the property. Loureiro's findings are summarized in the following:

- The site is currently improved with a paved parking area for the abutting multi-family residential apartment building to the south. According to a review of available historical resources, the site was previously improved with a mill building originally used as a bottling department and store-house for a brewery from approximately 1930-1960, then as a pickling factory from approximately 1960 to 1990. Prior to 1930, the site was occupied by residential buildings and store houses.
- On May 29, 1998, a Release Notification and Notice of Responsibility from MassDEP to Jerry Kay, site owner regarding an April 1998 72-hour release from a 5,000-gallon UST or pipe containing fuel oil at the site during tank removal. Following the removal of up to 200 cubic yards of contaminated soils for reuse / recycling off site. Based upon a review of the available documentation, Loureiro believes that the release was addressed and no further action was considered necessary; however, the release did not constitute an HREC at the site.

Loureiro recommends that a soil management plan be developed for any excavation work associated with future site development to address any residual petroleum within the soil.

4.7 Geotechnical Analysis

McPhail Associates, LLC completed a subsurface investigation and foundation analysis for the Phase II building location. In general, the analysis found that an uncontrolled granular fill is underlain by a natural glacial deposit 5 to 10.2 feet below ground surface. Surface bedrock was observed at depths ranging from 8 to 9 feet. Groundwater was not encountered with the explorations completed for the Phase II building. Groundwater levels, however, vary and are influenced by many environmental factors. In dense soils, short-duration measurement of the groundwater level is unreliable.

The geotechnical consultant recommends that spread footings with and underlying lean concrete or flowable fill over the glacial till be utilized. Other possible measures include using aggregate piers to support the footings and pile support if building loads are high.

The geotechnical consultant concluded that as the design development progresses and details of the proposed construction are finalized, some changes to current recommendations may be warranted.

4.8 Construction Impact

4.8.1 Construction Management Plan

The Proponent will comply with applicable state and local regulations governing construction of the NPC II Project. The Proponent will require that the general contractor 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 construction manager will be bound by the CMP, which will establish the guidelines for the duration of the project and will include specific mitigation measures and staging plans to minimize impacts on abutters.

Proper pre-construction planning with the neighborhood will be essential to the successful construction of this project. Construction methodologies that will ensure safety will be employed, signage will include construction manager contact information with emergency contact numbers.

The Proponent will also coordinate construction with other ongoing projects in the neighborhood.

4.8.2 Proposed Construction Program

Construction Activity Schedule

The construction period for the NPC II Project is expected to last approximately 16 months, beginning in the Second Quarter 2020 and reaching completion in the Fourth Quarter 2021. 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.

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. If 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 and lighted to ensure pedestrian safety.

Proper signage will be placed at every corner of the NPC II 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.

4.8.3 Construction Traffic Impacts

Construction Vehicle Routes

Specific truck routes will be established with BTM through the CMP. These established truck routes will prohibit travel on any residential side streets. Construction contracts will include clauses restricting truck travel to BTM requirements. Maps showing approved truck routes will be provided to all suppliers, contractors, and subcontractors. It is anticipated that all deliveries will be via Terrace Street directly to the site and facilitated by a police detail.

Construction Worker Parking

The number of workers required for construction of the Phase II Project will vary during the construction period. 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, public transit use will be encouraged with the Proponent and construction manager working to ensure the construction workers are informed of the public transportation options serving the area. Terms and conditions related to worker parking will be written into each subcontractor's contract. The contractor will provide a weekly orientation with all new personnel to ensure enforcement of this policy.

Pedestrian Traffic

The Site abuts sidewalks on two streets. Pedestrian traffic may be temporarily impacted in these areas. The Construction Manager will minimize the impact the construction of the proposed building will have on the adjacent sidewalks. The contractor will implement a plan 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.

4.8.4 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 safety officer; and
- Wheel-washing trucks before they leave the Project Site during the excavation phase.

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 impact;
- 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 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 to operate lifts of refrigeration units;
- Locating noisy equipment at locations that protect sensitive locations and neighborhoods through shielding or distance;
- Installing a site barricade at certain locations;
- Identifying and maintaining truck routes to minimize traffic and noise throughout the project
- Replacing specific construction techniques by less noisy ones where feasible, e.g., using vibration pile driving instead of impact driving if practical and mixing concrete off-site instead of on-site; and
- Maintaining all equipment to have proper sound attenuation devices.

4.8.5 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 is required for issuance of any building permits. During construction, rodent control service visits will be made by a certified rodent control firm to monitor the situation.

5.0 INFRASTRUCTURE SYSTEMS COMPONENT

5.1 Introduction

The existing infrastructure surrounding 154 Terrace Street appears to have adequate capacity to service the needs of the Phase II 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 Project related impacts on the utilities and identifies mitigation measures to address these potential impacts. The Project is in the early design stages where a detailed infrastructure analysis will be performed.

A Boston Water and Sewer Commission (BWSC) Site Plan and General Service Application will be required for the proposed new water and sewer 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.

5.2 Wastewater

5.2.1 Existing Sanitary Sewer System

BWSC record drawings indicate that the sanitary sewer system in the Project area (See **Figure 5-1**) is owned and maintained by the BWSC. BWSC records indicated a 15 x 20-inch sanitary in Terrace Street to the west of the Project Site.

The existing 154 Terrace Street site includes two parking lots which provide no wastewater generation.

5.2.2 Project-Generated Sanitary Sewer Flow

The Phase II Project will generate an estimated 7,590 gallons per day (gpd) based on design sewer flows provided in 310 CMR 15.00-The State Environmental Code, Title 5: Standard Requirements for the Siting, Construction, Inspection, Upgrade and Expansion of On-Site Sewage Treatment and Disposal Systems and for the Transport and Disposal of Septage ("Title V"), as summarized in **Table 5-1**.

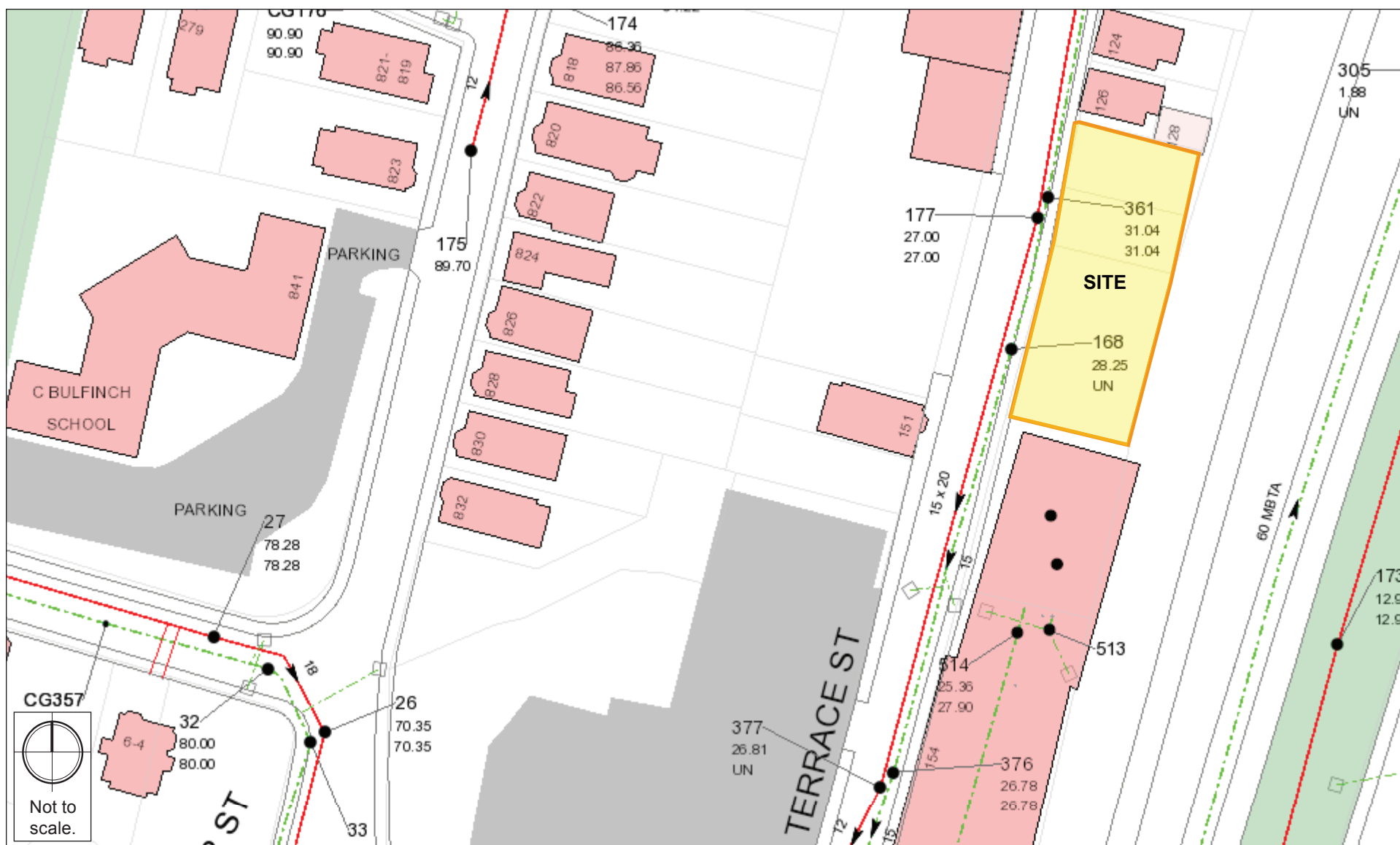


Figure 5-1 – BWSC Sanitary Sewer Map

Table 5-1. Projected Sanitary Sewer Flows

Use	Quantity	Unit Flow Rate	Estimated Maximum Daily Flow (gpd)
Residential	69 bedrooms	110 gpd/bedroom	7,590 gpd
		Total	7,590 gpd

5.2.3 Sanitary Sewer Connection

It is anticipated that the sanitary services for the Project will tie into the 15 x 20-inch sewer in Terrace Street. It is expected that the building will have one 8-inch sanitary service. The proponent will submit a Site Plan to BWSC for review and approval.

5.2.4 Sewer System Mitigation

The environmental design goals for the NPC II 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 NPC II 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.

5.3 Water System

5.3.1 Existing Water Service

The water distribution system in the vicinity of the Project Site is owned and maintained by BWSC (see **Figure 5-2**). There is a 16-inch ductile iron concrete lined distribution line located in Terrace Street to the west of the Project Site.

There is one fire hydrant located to the west of the Project Site on Terrace Street (H186). The Proponent will confirm this with BWSC and the Boston Fire Department (BFD) during the detailed design phase.

5.3.2 Anticipated Water Consumption

The maximum daily water demand is estimated to be approximately 8,349 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.

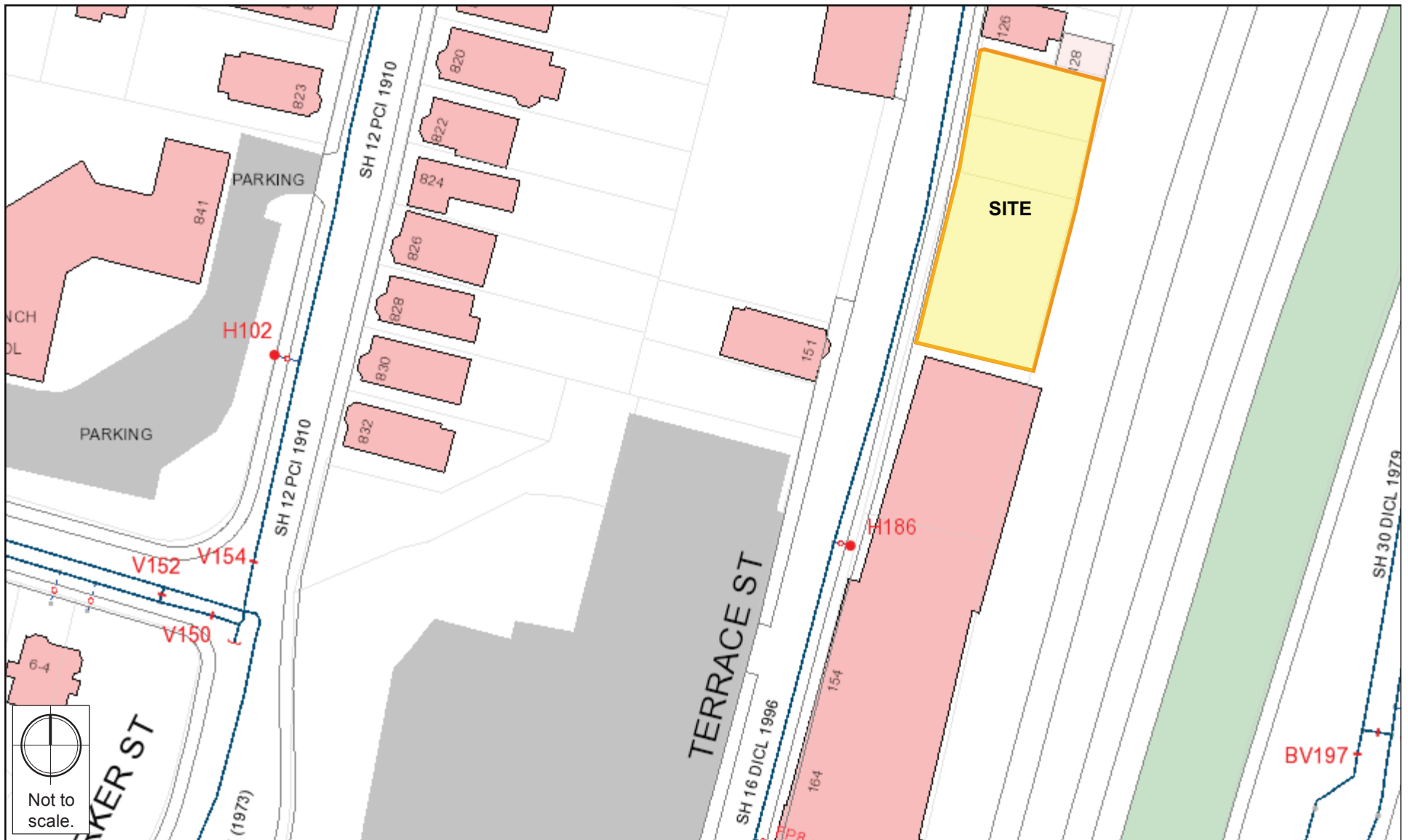


Figure 5-2 – BWSC Water Supply Map

5.3.3 Proposed Water Service

It is anticipated that separate domestic water and fire protection services for the NPC II Project will be directly tapped from the 16-inch service main in Terrace 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.

5.3.4 Water Supply Conservation and Mitigation 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.

5.4 Storm Drainage System

5.4.1 Existing Storm Drainage System

The storm drain system near the Project Site is owned and maintained by BWSC (see **Figure 5-1**). There is an existing 15-inch storm drain in Terrace Street to the west of the Project Site.

The majority of the Project Site is paved parking. There is an existing stormwater infiltration system located on site that services the parking area and the adjacent off-site Oliver Lofts building. Catch basins on the south of the Project Site collect runoff and direct it to water quality units before entering the infiltration system. Roof runoff from the adjacent off-site building is directed to the stormwater infiltration system before discharging south to the BWSC system.

5.4.2 Proposed Storm Water System

The proposed building will occupy almost the NPC II Project Site. It is anticipated to reuse the existing stormwater infiltration system. The overflow from the existing infiltration system discharges to the surrounding storm sewer system in Terrace Street. The existing drainage patterns will not change significantly as the runoff will continue to drain to 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.

5.5 Electrical Service

Eversource owns and maintains the electrical transmission system located near the Project Site. The actual size and location of the proposed building services will be coordinated with Eversource during the detailed design phase.

5.6 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.

5.7 Gas Systems

National Grid owns and maintains the gas infrastructure in the project area. The NPC II 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.

5.8 Utility Protection During Construction

The NPC II 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 NPC II Project abutters to minimize impacts and inconvenience.

6.0 TRANSPORTATION COMPONENT

The Proponent engaged Howard Stein Hudson (“HSH”) to conduct an evaluation of the transportation impacts of the proposed residential development project (the “Project”) located in the Mission Hill neighborhood of Boston. The following transportation study adheres to the Boston Transportation Department (BTD) Transportation Access Plan Guidelines and Boston Planning and Development Agency (BPDA) Article 80 Large Project Review Process. This study includes an evaluation of existing transportation conditions, future transportation conditions with and without the Project, projected parking demand, loading operations, transit services, pedestrian and bicycle activity, and construction period impacts. As shown by this study, the Project will have minimal impact on the study area intersections and the pedestrian and public transportation facilities in the area.

6.1 Project Description

The Project Site is located at 154 Terrace in Boston’s Mission Hill neighborhood and consists of 12,574 sf (square feet) of land area. The site is composed of a parking lot adjacent to the existing Oliver Lofts building. The site is bounded by the MBTA orange line to the east, Terrace Street to the west, a residential lot to the north, and the existing Oliver Lofts building to the south.

The Project Site is conveniently located in proximity to multiple modes of transportation including the Roxbury Crossing and Jackson Square T stations on the MBTA Orange Line, which are both approximately one-third of a mile to the north and south, respectively. The Project Site is also less than one-third of a mile from six MBTA bus stops.

Upon completion, the NPC II Project would include the development of 64 condominium units, and approximately 27 at-grade garage parking. Vehicular access/egress for the Project will be provided via a curb cut on Terrace Street.

6.1.1 Study Area

The transportation study area generally consists of Terrace Street between Cedar Street to the north and the intersection of New Heath Street and Bromley Street to the south. The study area is shown in **Figure 6-1** and includes the following two unsignalized intersections:

- Terrace Street at Cedar Street; and
- New Heath Street at Bromley Street.



Figure 6-1.
Study Area

6.1.2 Study Methodology

The Existing 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 each study area intersection. 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 Phase II Project and developments in the surrounding area. The long-term transportation impacts are evaluated for the year 2025.

The No-Build (2025) 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 (2025) 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 (2025) 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 manage traffic demand, mitigate Project-related impacts and addresses 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.

6.2 Existing Transportation Conditions

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

6.2.1 Existing Roadway Conditions

The major study area roadways are described below. The descriptions reflect functional classifications by the Massachusetts Department of Transportation (MassDOT) Highway Division's Office of Transportation Planning.

Terrace Street is a local, two-way roadway that borders the west edge of the Project Site. Terrace Street follows a north-south direction from its intersection with Tremont Street in the north to its intersection with New Heath Street in the south. In the vicinity of the Project Site, on-street parking is provided along the west side of the roadway from 151 Terrace Street to Cedar

Street and along the east side of the roadway north of Cedar Street to Tremont Street. Sidewalks are provided along both sides of the road and are generally in good condition.

New Heath Street is local, two-way roadway located to the south of the Project Site. New Heath Street follows an east-west direction and is split into two segments by the Southwest Corridor Park train tracks, and Columbus Avenue. West of the Southwest Corridor Park, New Heath Street runs from its intersection with the Heath Square roundabout to its terminus just south of the existing Oliver Lofts Building. East of Columbus Avenue, New Heath Street continues between Columbus Avenue and Centre Street. New Heath Street consists of one travel lane in each direction. In the vicinity of the Project Site, on-street parking is only allowed on the north side of the roadway, west of Bromley Street. Sidewalks are provided along both sides of the road and are generally in good condition.

Bromley Street is a local, two-way roadway located to the south-west of the Project Site. Bromley Street runs in a north-south direction between New Heath Street to the north and Heath Street to the south. Bromley Street consists of one travel lane in each direction. On-street parking is only allowed on the east side of the roadway. Sidewalks are provided along both sides of the road and are generally in good condition.

Cedar Street is a local, two-way roadway located to the north of the Project Site. Cedar Street follows an east-west direction between Washington Street to the east and Terrace Street to the west. Cedar Street consists of one travel lane in each direction. In the vicinity of the Project Site, on-street parking is prohibited on both sides of the roadway. Sidewalks are provided along both sides of the road and are generally in good condition.

6.2.2 Existing Intersection Conditions

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

New Heath Street/Bromley Street is an unsignalized intersection with three approaches. The New Heath Street eastbound approach consists of a 15-foot shared through/right-turn lane. The New Heath Street westbound approach consists of an 18-foot shared left-turn/through lane. The Bromley Street northbound approach is stop-controlled and consists of a 10-foot shared left-turn/right-turn lane. Sidewalks are provided along both sides of the road at all approaches and are generally in good condition. Non-ADA compliant curb-ramps are provided on both sides of Bromley Street. Crosswalks are not provided across any of the approaches.

Terrace Street/Cedar Street/Santana Towing Driveway is an unsignalized intersection with four approaches. The Santana Towing Driveway eastbound approach consists of a shared left-turn/through/right-turn lane. The Cedar Street westbound approach is stop-controlled and consists of a 12-foot shared left-turn/through/right-turn lane. The Terrace Street northbound approach is stop-controlled and consists of a 9-foot shared left-turn/through/right-turn lane. The Terrace

Street southbound approach is stop-controlled and consists of a 9-foot shared left-turn/through/right-turn lane. Sidewalks are provided along both sides of the road at all approaches and are generally in good condition. Non-ADA compliant curb-ramps are provided across Cedar Street. Crosswalks are not provided across any of the approaches.

6.2.3 Existing Parking

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

On-Street Parking

On-street curb use surrounding the Project Site consists predominately of two-hour parking, resident permit parking, and no parking. The on-street parking regulations within the study area are shown in **Figure 6-2**.

Car 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.

Zipcar is the primary car share company in the Boston car sharing market, however other companies such as Turo and Getaround also operate within the city. There are currently four Zipcar locations within a five-minute walk (one-half mile) of the Project Site. There are no Turo or Getaround locations in proximity to the Project Site. The nearby car sharing locations are shown in **Figure 6-3**

6.2.4 Existing Public Transportation

The Project Site is located within one-third mile walk from the Roxbury Crossing MBTA station and the Jackson Square MBTA station. The stations provide access to the MBTA Orange Line, a number of MBTA bus routes and local shuttle services. The MBTA public transportation services are shown in **Figure 6-4** and summarized in **Table 6-1**.

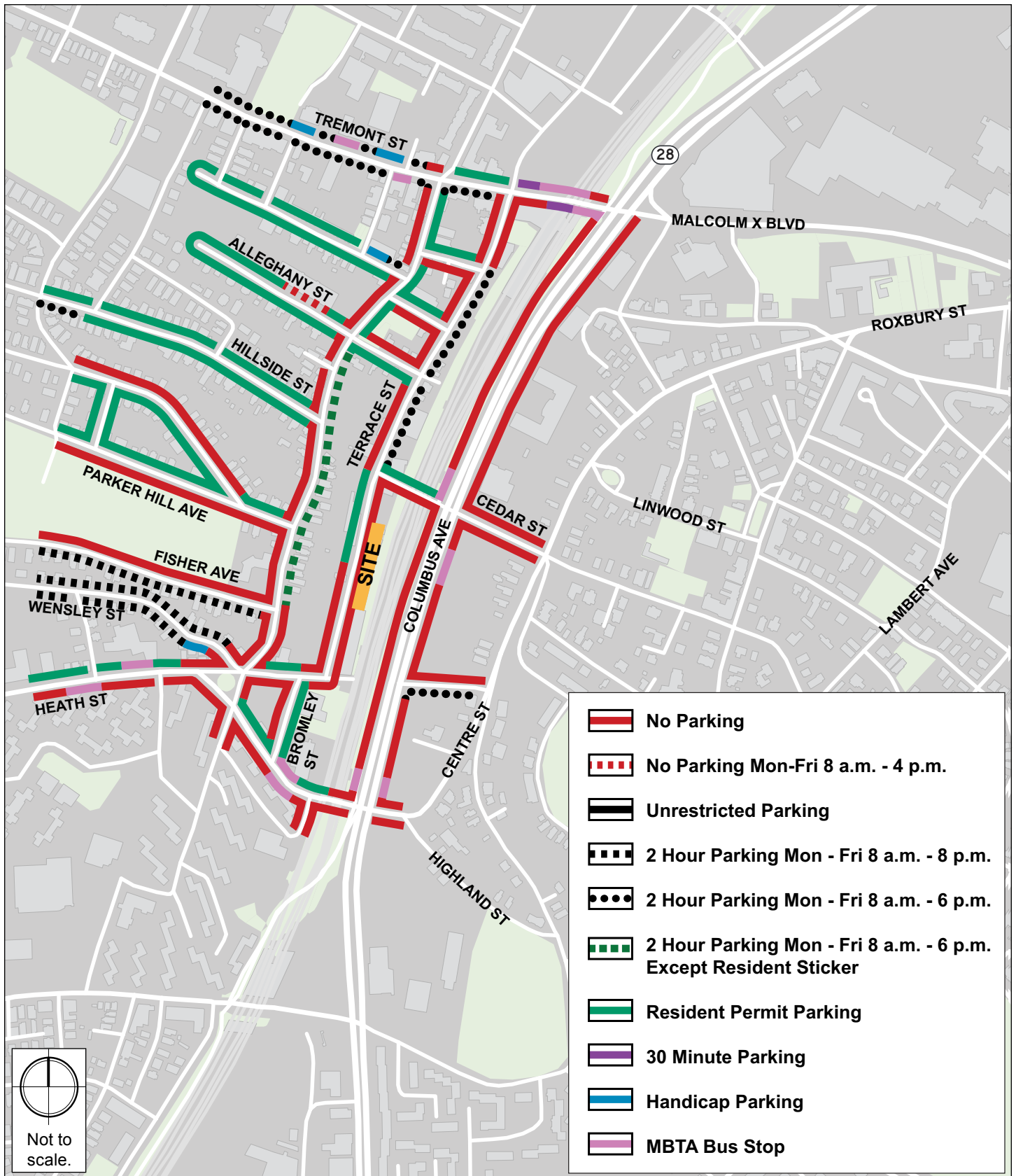


Figure 6-2.
On-Street Parking

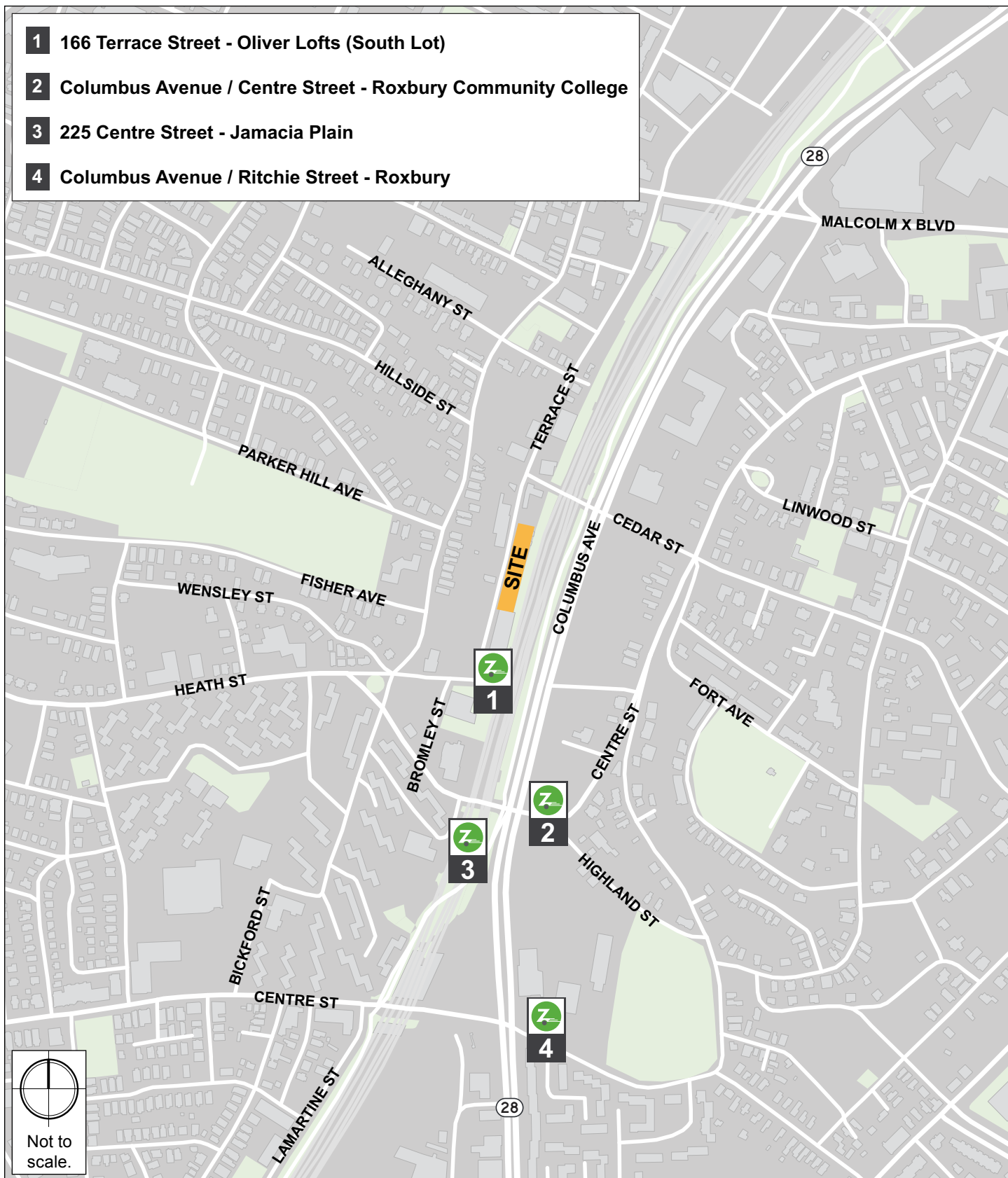


Figure 6-3.
Car Sharing Locations

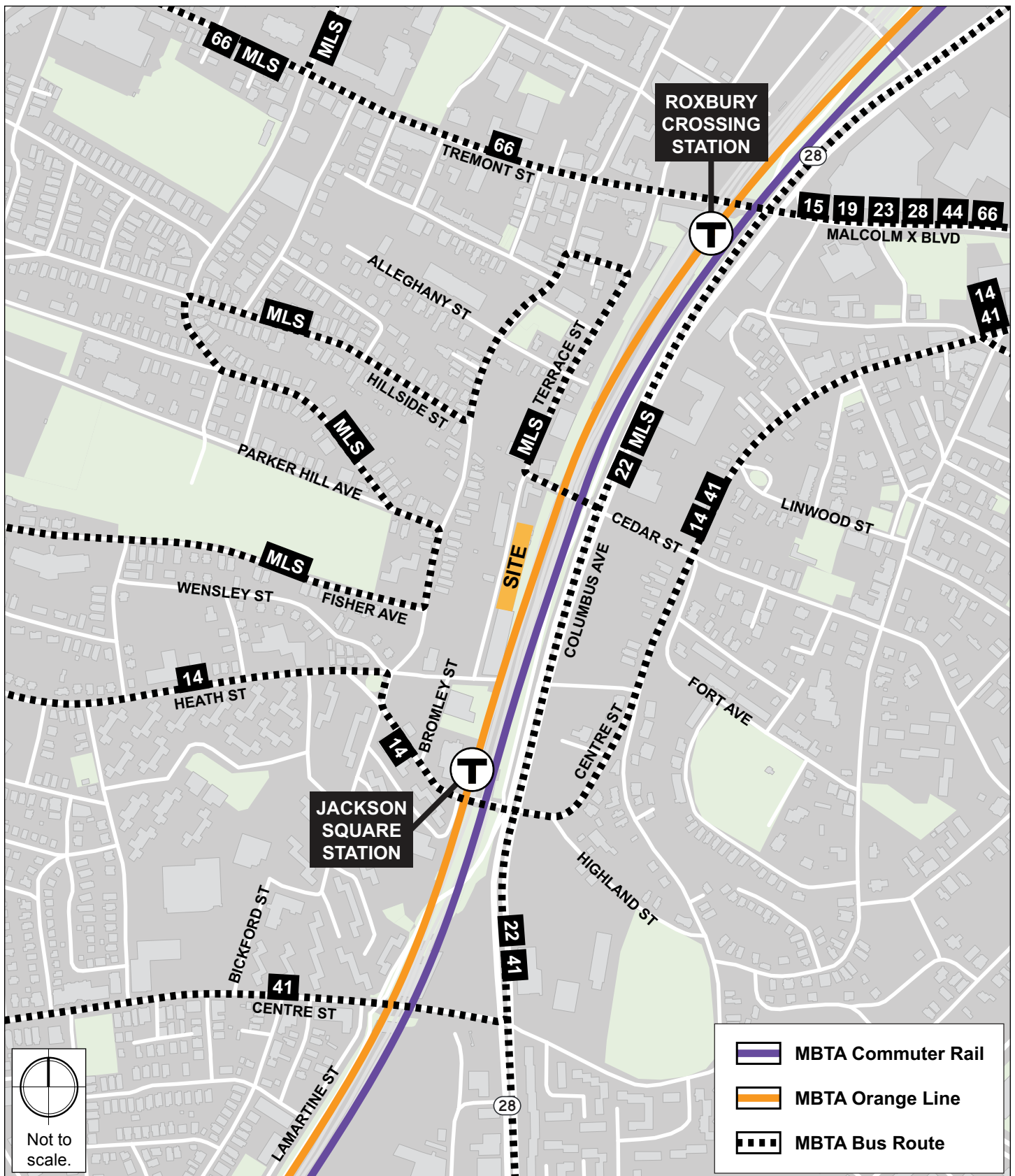


Figure 6-4.
Public Transportation

Table 6-1. Public Transportation

Transit Service	Description	Peak-Hour Headway (minutes)¹
Subway Lines		
Green Line	E Branch: Lechmere Station – Heath Street Station	6-7
Orange Line	Oak Grove Station – Forest Hills Station	6
Bus Routes		
MIS	Mission Hill LINK Bus: Brigham Circle – Mission Main	-
14	Roslindale Square – Heath Street Station	45
15	Kane Square or Fields Corner Station – Ruggles Station	8-10
19	Fields Corner – Kenmore Station or Ruggles Station	19-25
22	Ashmont Station – Ruggles Station via Talbot Avenue	8-10
23	Ashmont Station – Ruggles Station via Washington Street	7-10
28	Mattapan Station – Ruggles Station	9-11
41	Center & Eliot Streets – JFK/UMass Station	23-30
44	Jackson Square Station – Ruggles Station	16-18
45	Franklin Park Zoo – Ruggles Station	10-16
66	Harvard Square – Dudley Station	10

1. Headways are approximate.

Source: www.mbtta.com, September 2019

6.2.5 Existing Traffic Conditions

Turning Movement Counts (TMCs) and vehicle classification counts were conducted on Wednesday, March 28th, 2018 during the weekday a.m. and weekday p.m. peak periods (7:00 – 9:00 a.m. and 4:00 – 6:00 p.m., respectively). The traffic classification counts included car, heavy vehicle, pedestrian, and bicycle movements. The detailed traffic counts for the study area intersections are provided in **Appendix H**.

6.2.6 Existing Vehicular Traffic Volumes

The traffic volumes collected in March 2018 were used to develop the Existing Condition traffic volumes. The volumes were balanced where necessary across the roadway network within the study area.

To account for seasonal variation in traffic volumes throughout the year, data provided by MassDOT was reviewed. The most recent (2017) MassDOT Weekday Seasonal Factors were used to determine the need for seasonal adjustments to the March 2018 TMCs. The seasonal adjustment factor for roadways similar to the study area (Group U7) in the month of March is 1.02. This indicates that average month traffic volumes are approximately two percent more than the traffic volumes that were collected. Therefore, the traffic counts were adjusted upward to

reflect average month conditions in order to provide a conservatively analysis consistent with the peak season traffic volumes. The MassDOT 2017 Weekday Seasonal Factors table is provided in **Appendix H**.

The resulting Existing weekday a.m. peak hour and weekday p.m. peak hour traffic volumes are shown in **Figure 6-5** and **Figure 6-6**, respectively.

6.2.7 Existing Bicycle Conditions

Bicycle counts were conducted concurrent with the vehicular TMCs and the weekday a.m. and p.m. peak hour volumes are presented in **Figure 6-7**. The City of Boston's 2013 "Bike Routes of Boston" map designates Hillside Street, Sachem Street and the Southwest Corridor Park as beginner routes, suitable for all types of riders. Terrace Street, Parker Street, Parker Hill Avenue, Heath Street, Calumet Street, St. Alphonsus Street and Cedar Street are all designated as intermediate routes, suitable for riders with some on-road experience. Huntington Avenue, and Tremont Street are designated as Advanced routes, suitable for experienced and traffic-confident cyclists.

6.2.8 Bicycle Sharing Services

The Project Site is also located in proximity to two bicycle sharing stations provided by BLUEBike. BLUEBike is the Boston area's largest bicycle sharing service, which was launched in 2011 and currently consists of more than 3,000 shared bicycles at more than 300 stations throughout five greater Boston municipalities. The nearest BLUEBike stations to the Project Site are located at the Roxbury Crossing and Jackson Square MBTA train stations which are both located approximately one-third of a mile away from the Project Site. The BLUEBike station at the Roxbury Crossing MBTA train station has 13 bicycle docks while the BLUEBike station at the Jackson Square MBTA train station has 14 bicycle docks. The bicycle sharing locations within a half-mile of the Project Site are shown in **Figure 6-8**.

6.2.9 Existing Pedestrian Volumes and Accommodations

Sidewalks are provided along all streets within the study area and are generally in good condition. Adjacent to the Project Site, the sidewalks are approximately 6 feet in width along Terrace Street. Non-ADA compliant curb-ramps are provided across both Cedar Street and Bromley Street, however there are not any crosswalks at the study area intersections.

To determine the amount of pedestrian activity within the study area, pedestrian counts were conducted concurrent with the vehicular TMCs at the study area intersections. The weekday a.m. and p.m. peak hour pedestrian volumes are presented in **Figure 6-9**.

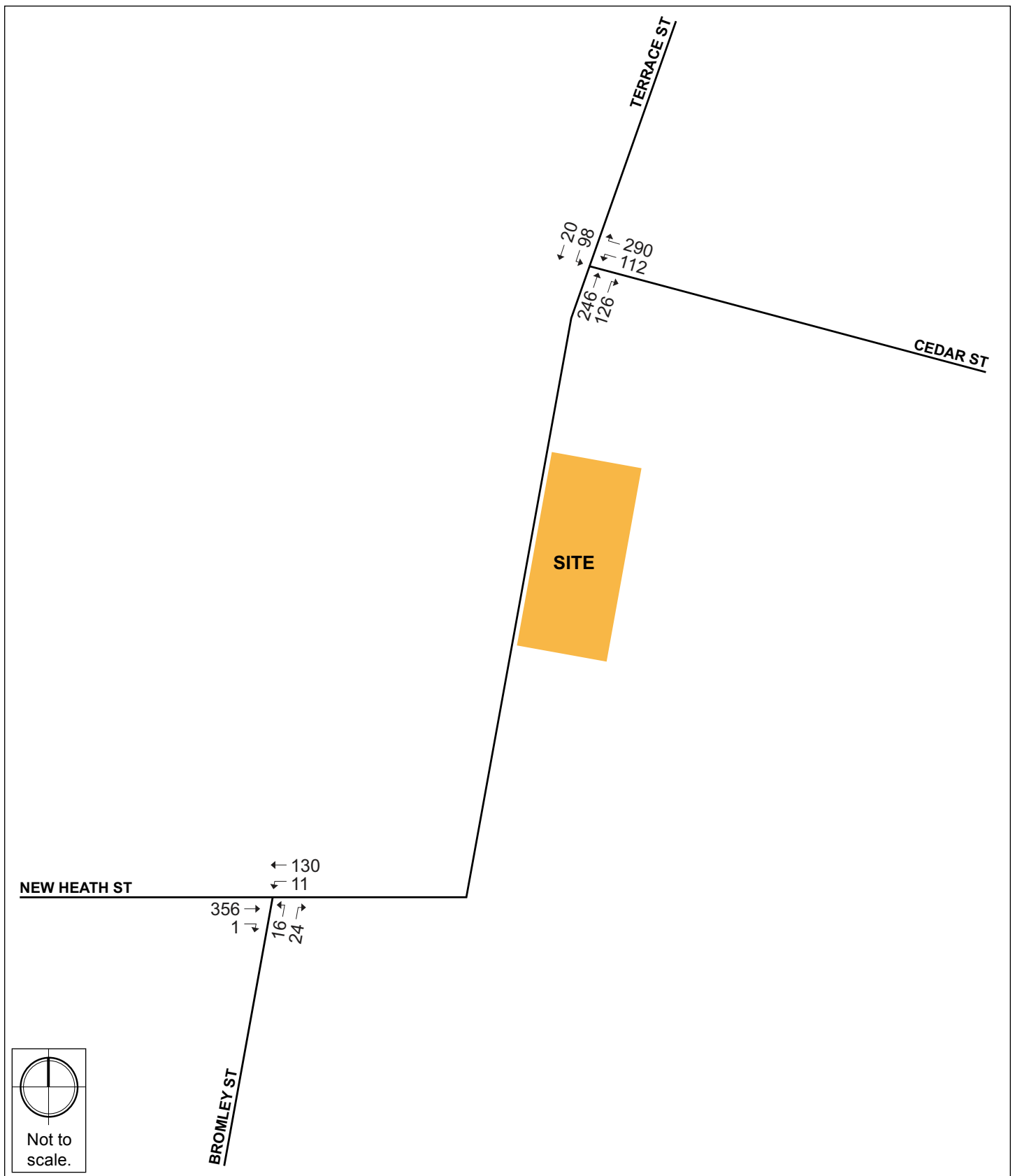


Figure 6-5.
Existing (2018) Condition Traffic Volumes, Weekday a.m. Peak Hour

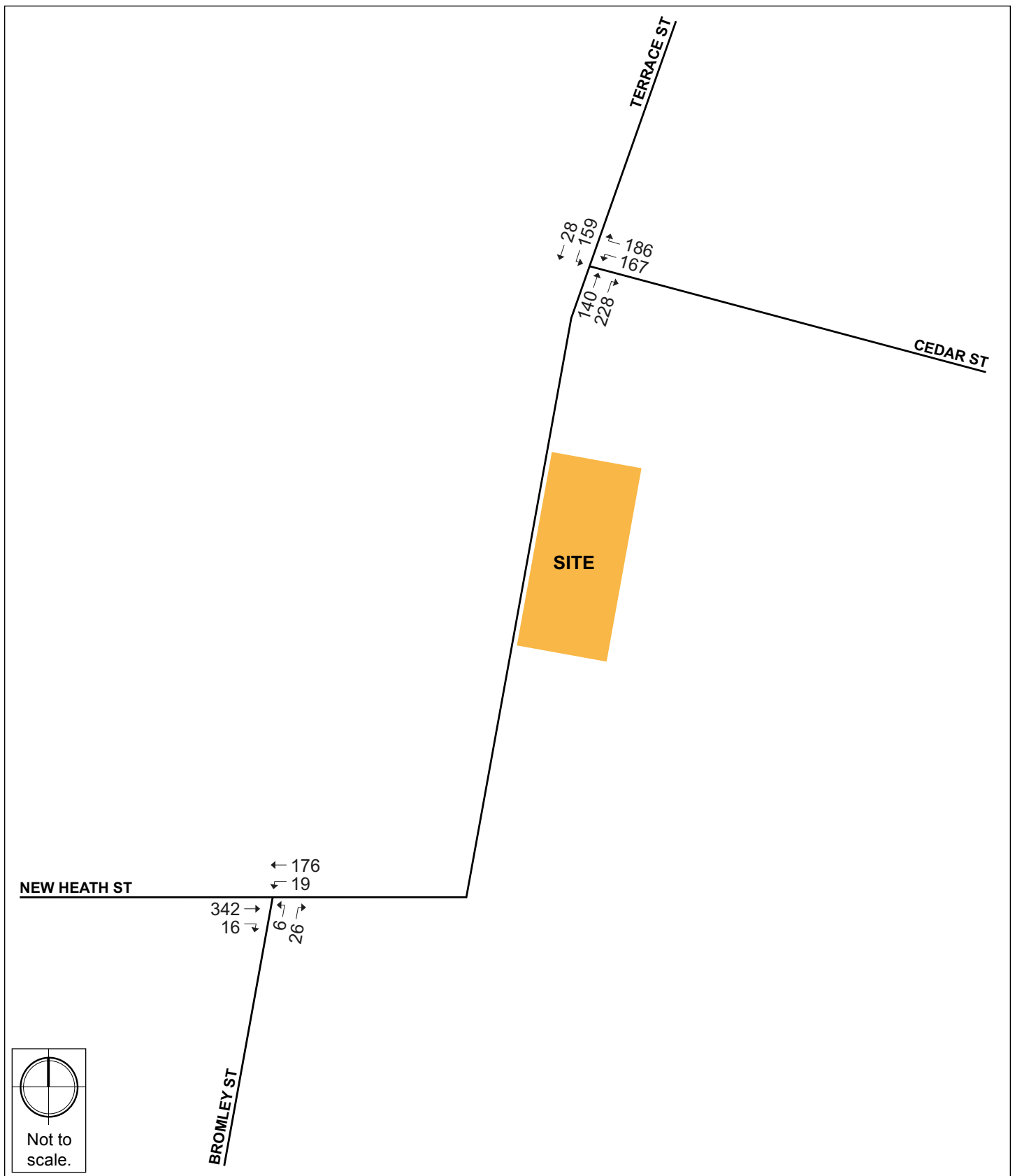


Figure 6-6.
Existing (2018) Condition Traffic Volumes, Weekday p.m. Peak Hour

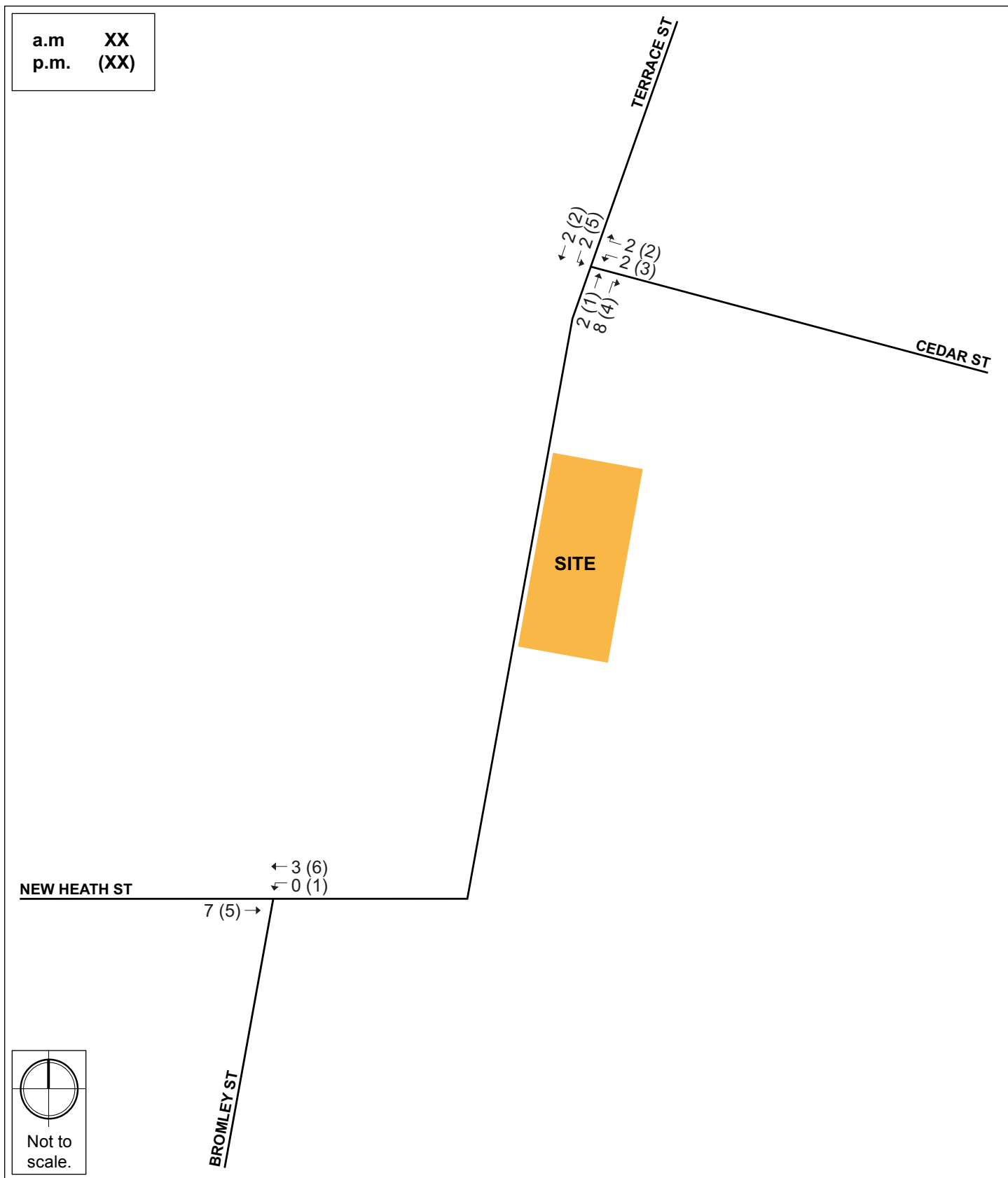


Figure 6-7.
Existing (2018) Condition Bicycle Volumes, Weekday a.m. and p.m. Peak Hours

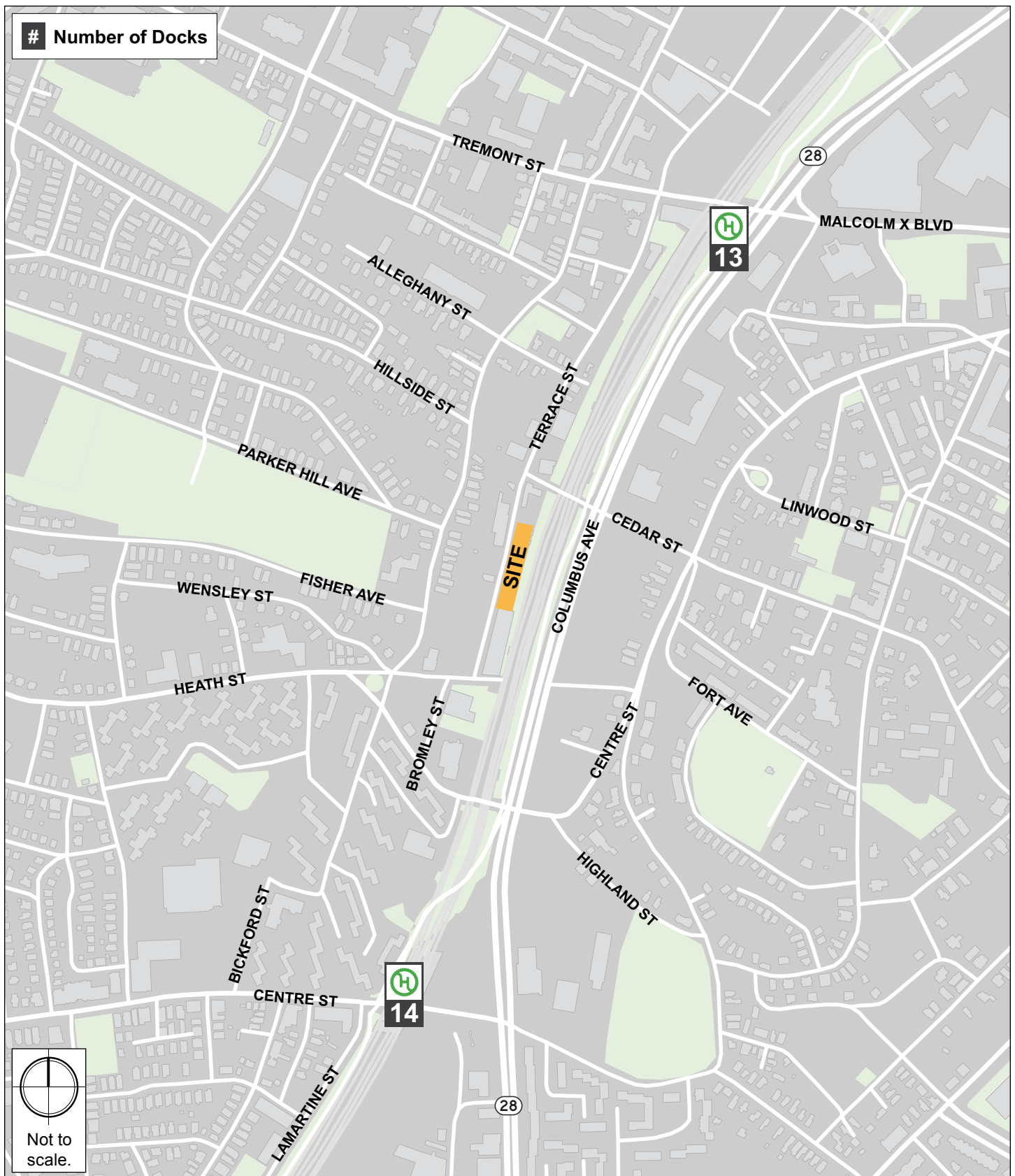


Figure 6-8.
Bicycle Sharing Locations

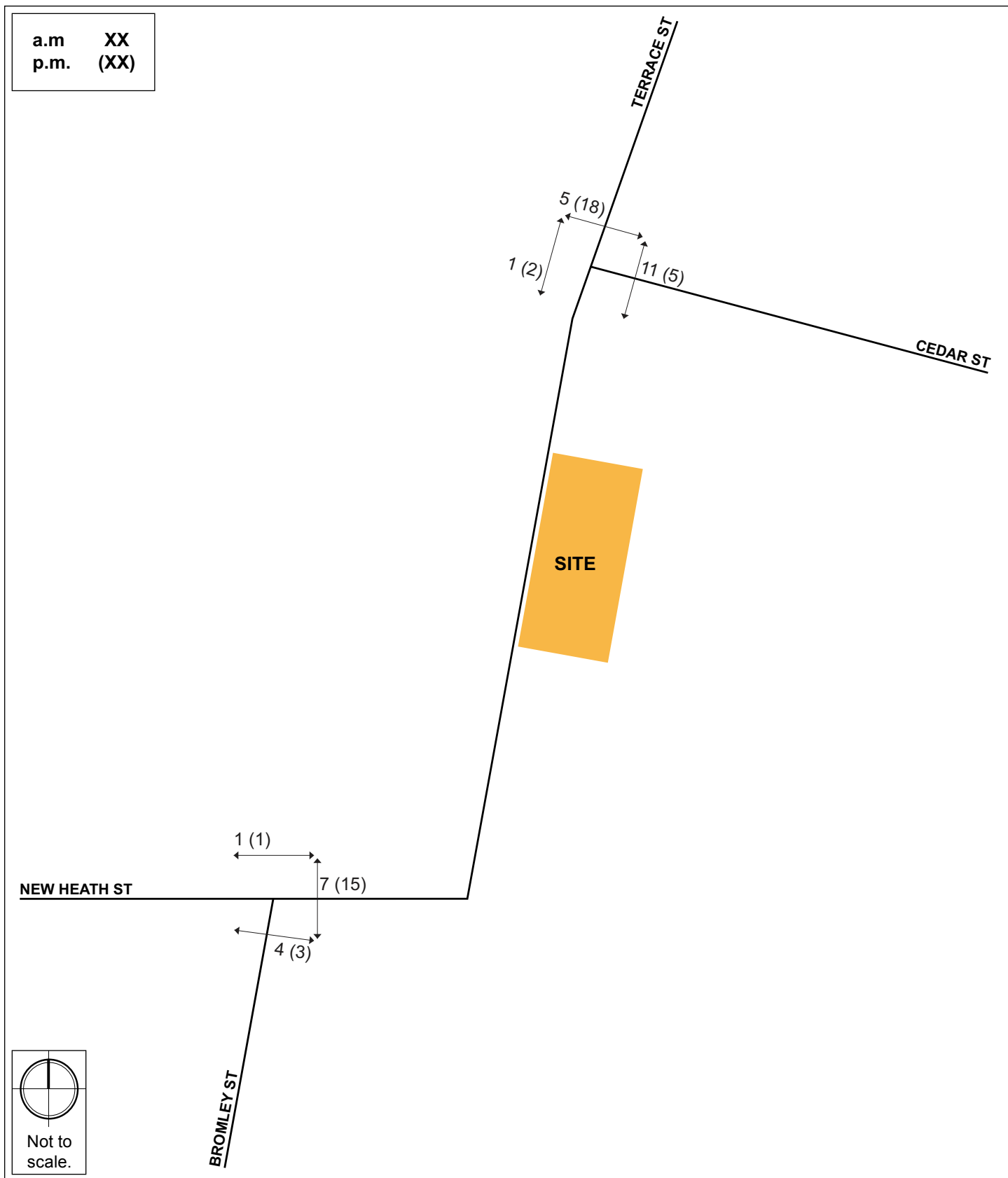


Figure 6-9.
Existing (2018) Condition Pedestrian Volumes, Weekday a.m. and p.m. Peak Hours

6.3 No-Build (2025) Condition

The No-Build (2025) Condition reflects a future scenario that incorporates anticipated traffic volume changes associated with background traffic growth independent of the Project, and any planned infrastructure improvements that will affect travel patterns throughout the study area. These infrastructure improvements include roadway, public transportation, or pedestrian and bicycle facility improvements. The methodology to account for future traffic growth, independent of the Phase II Project, consists of two factors; an annual background growth rate and vehicles associated with specific developments near the Phase II Project. The No-Build (2026) Condition does not include the impact of the Project.

6.3.1 Background Growth Traffic

The first part of the methodology accounts for general future background traffic growth independent of large development projects. The background traffic growth rate 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 traffic growth rate of one-half percent (0.5%) per year, compounded annually through the horizon year seven years in the future, was used.

6.3.2 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. Nearby development projects were identified in the vicinity of the Project Site and are shown in **Figure 6-10**. It is assumed that any such traffic increases from the seven projects below would be accounted for in the background growth rate.

The Parker and Terrace Street Development – This project proposes the construction of 44 residential units and 30 parking spaces. This project has been approved by the BPDA board.

44-64 Terrace Street – This project includes the construction of a four-story building with 21 residential units and 20 off-street parking spaces. This development has submitted a Letter of Intent with the BPDA board.

1457 Tremont Street – This project includes the construction of a five story, 40 residential unit, mix-use development with approximately 7,200 square feet of ground floor retail space. This project is currently under construction.

1470 Tremont Street – This project includes the renovation of 8 existing residential units in multiple townhouses and the construction of 25 new residential units in a 5-story structure. The project will include approximately 10 garage parking spaces and 1,480 square feet of ground floor retail space. This project is currently under construction.

9-11 Burney Street – This project includes the construction of a six-story, 31 residential unit, mix-use development with approximately 1,900 square feet of ground floor restaurant/retail space and six garage parking spaces. This project has been approved by the BPDA board.

Jackson Square Site III Phase 3 – This phase of the Jackson Square redevelopment project includes the construction of approximately 150 residential units, 20,100 square feet of ground floor restaurant/retail space and the redevelopment of the DPW facility. The completion of the Jackson Square redevelopment project will provide approximately 500 off-street, structured parking spaces. This project has been approved by the BPDA board.

Jackson Square Recreation Center - This project includes the construction of a two-story, 75,000 sf recreational center with approximately 50 at grade parking spaces. This project has been approved by the BPDA board.

Wensley Heights Condominium Project Phase 1 – The first phase of this project includes the construction of 21 residential condominium units, 27 parking spaces and related site improvements. This project has been approved by the BPDA board.

111 Terrace Street – This project consists of the construction of a five-story residential buildings housing 39 rental units and 22 off-street parking spaces. This project has been approved by the BPDA board.

Traffic volumes associated with the following projects were directly incorporated into the future conditions traffic volumes:

General Heath Square – This project, currently under construction, consists of the development of a four-story, 56,290 gross-square-foot building with 47 affordable housing units, 1,116 sf of community space, 1,006 sf of office space and 20 parking spaces.

Parcel 25 – This project consists of the construction of 88 residential units, approximately 7,500 sf of community space, 11,000 sf of retail space, 185,000 sf of office space and 178 parking spaces. Phase 1A has been completed, which consists of 40 affordable rental units. This project was under construction during the turning movement count data collection effort, and therefore will remain accounted for in the future condition volumes.



Figure 6-10.
Background Development Projects

6.3.3 Proposed Infrastructure Improvements

A review of planned improvements to roadway, transit, bicycle, and pedestrian facilities was conducted to determine if there are any nearby improvement projects in the vicinity of the study area. The proposed infrastructure improvements are listed below:

JP/ROX Transportation Action Plan – this improvement plan will use the Plan JP/ROX initiative recommendations as a starting point to create short- and long-term improvements to the Washington Street and Columbus Avenue Corridors.

Jamaica Plain Centre Street and South Street Corridor Transportation and Streetscape Action Plan – This improvement plan will use recommendations provided by local residents, business owners, and neighborhood organizations to implement short- and long-term projects along the Centre Street and South Street Corridors.

6.3.4 No-Build Traffic Volumes

The one-half percent per year annual growth rate, compounded annually, was applied to the Existing Condition traffic volumes, then the traffic volumes associated with the background development projects listed above were added to develop the No-Build (2025) Condition traffic volumes. The No-Build (2025) weekday a.m. and p.m. peak hour traffic volumes are shown on **Figure 6-11** and **Figure 6-12**, respectively.

6.4 Build Condition

As previously stated, the NPC II Project includes the development of 64 condominium units. The NPC II Project also includes 27 at-grade garage parking spaces.

6.4.1 Site Access and Circulation

Vehicular access and egress will occur via a curb cut on Terrace Street. Pedestrian access to the buildings will be provided on Terrace Street. The site access plan is shown on **Figure 6-13**.

6.4.2 Loading and Service Accommodations

Residential units primarily generate delivery trips related to small packages and prepared food. Deliveries to the Project Site will be limited to SU-36 (36 foot box truck) trucks and smaller delivery vehicles. Residential move-in/move-out and loading and service operations activity will take place along the curb in front of the building.

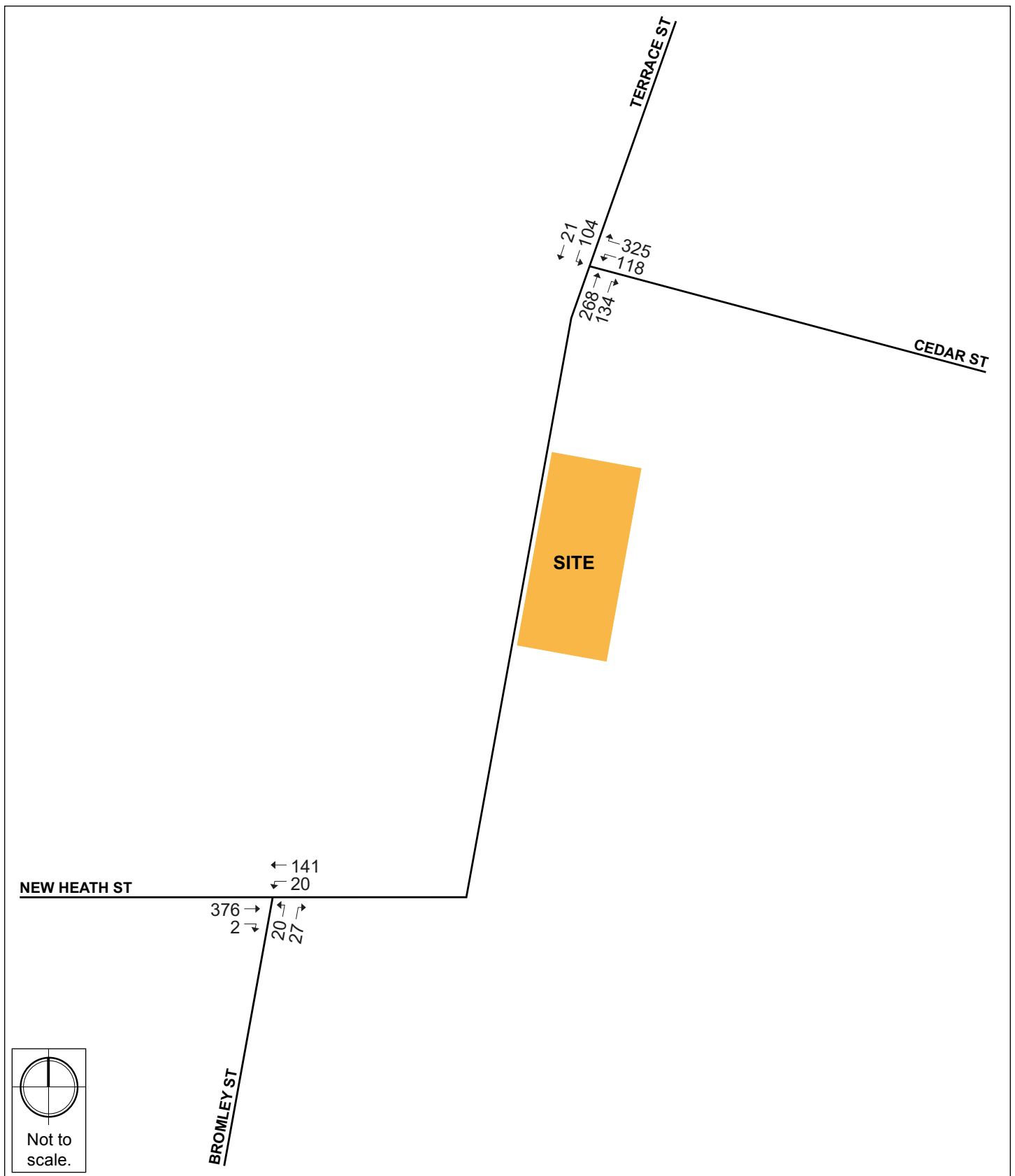


Figure 6-11.
No-build (2018) Condition Traffic Volumes, Weekday a.m. Peak Hour

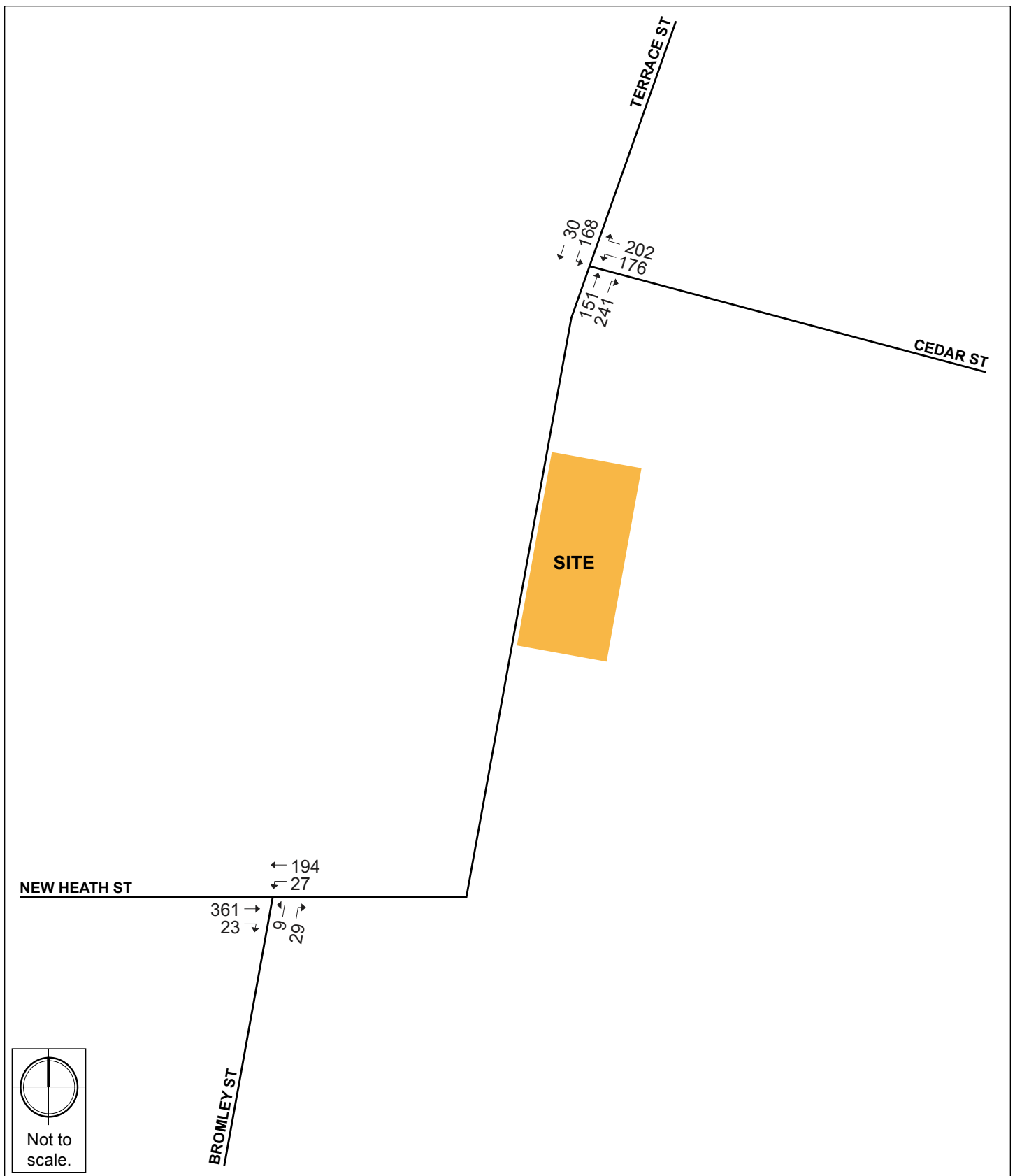


Figure 6-12.
No-build (2018) Condition Traffic Volumes, Weekday p.m. Peak Hour

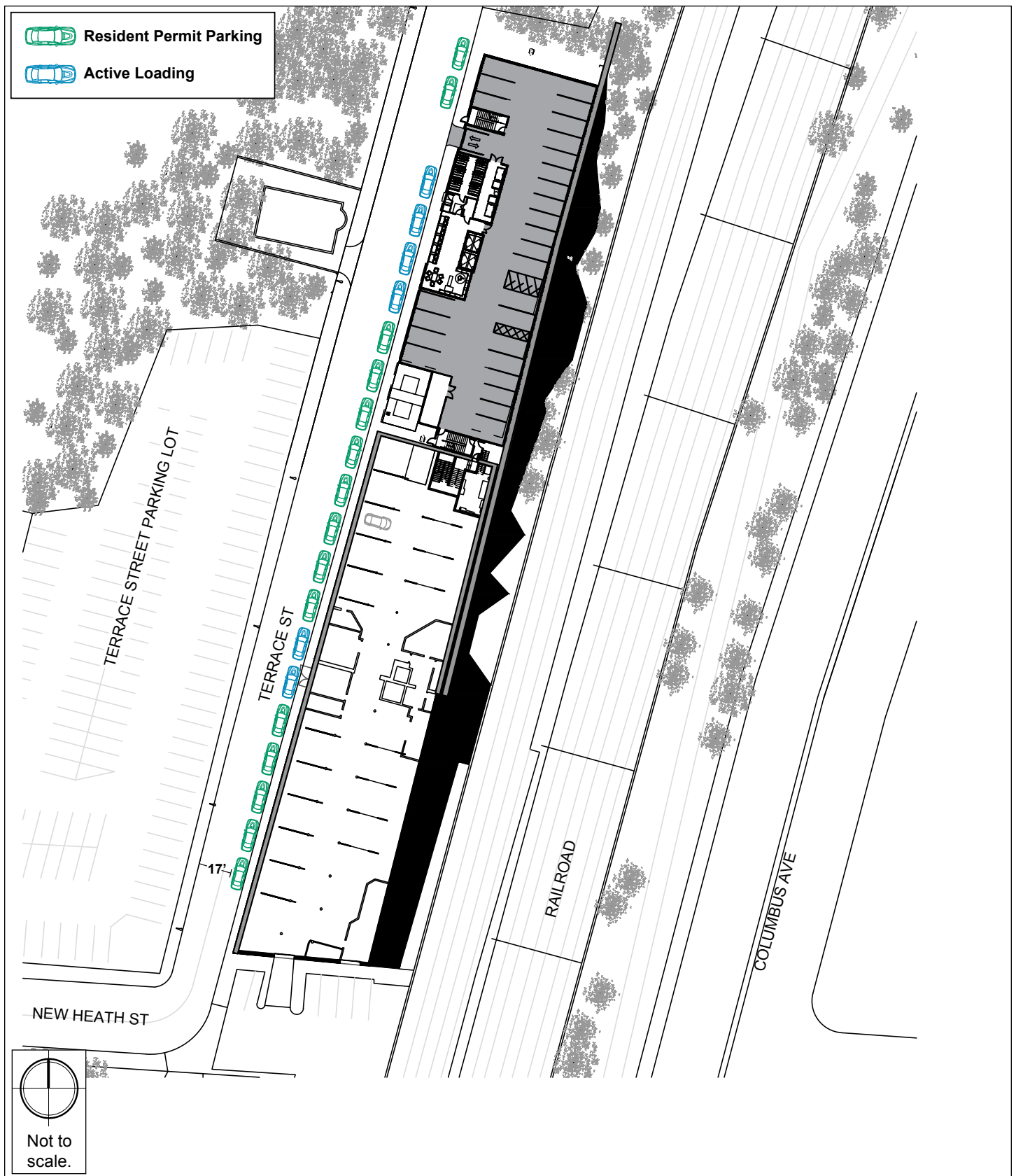


Figure 6-13.
Site Access Plan

6.4.3 Project Parking

The Project will provide a total of 27 at-grade garage parking spaces on the ground floor.

The parking goals developed by the BTD for a residential building in this section of Mission Hill are a maximum of 0.5 to 1.0 spaces per residential unit. The parking ratio of 0.42 parking spaces per residential unit is within the allowable maximum required by BTD. Based on the nature of the Project, and its proximity to the nearby transit opportunities, it is expected that this parking ratio will be adequate to accommodate the overall parking demand for the project.

In addition to the on-site parking spaces, the Project is investigating the implementation of Resident Permit Parking (RPP) on Terrace Street in front of the proposed site. Currently, on-street parking exists along Terrace Street to the north of the site but the curb use is restricted on both sides of the street in front of the site. This parking would be available to Project residents and members of the public that have a valid Mission Hill RPP sticker.

6.4.4 Trip-Generation Methodology

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

To estimate the number of trips expected to be generated by the Project, data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual*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 modes such as walking, bicycling, and transit.

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

Land Use Code 221 – Multifamily Housing (Mid-Rise). Mid-Rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have between three and 10 levels (floors). Calculations of the number of trips use ITE's average rate per dwelling units.

6.4.5 Travel Mode Share

BTD provides vehicle, transit, and walking mode share rates for different areas of Boston. The Project is located in the western portion of designated Area 5 – Mission Hill. The unadjusted

⁵ Trip Generation Manual, 10th Edition; Institute of Transportation Engineers; Washington, D.C.; 2017.

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 6-2**.

Table 6-2. Travel Mode Shares

Land Use/Direction		Transit Share	Walk/Bike Share	Auto Share	Vehicle Occupancy Rate
Daily					
Residential	In	15%	38%	47%	1.18
	Out	15%	38%	47%	1.18
a.m. Peak Hour					
Residential	In	21%	39%	40%	1.18
	Out	17%	46%	37%	1.18
p.m. Peak Hour					
Residential	In	17%	46%	37%	1.18
	Out	21%	39%	40%	1.18

6.4.6 Project Trip Generation

The mode share percentages shown in **Table 6-2** were applied to the number of person trips to develop walk/bicycle, transit, and vehicle trip generation estimates for the Project. The trip generation for the Project by travel mode is shown in **Table 6-3**. The detailed trip generation information is provided in **Appendix H**.

As shown in **Table 6-3**, the Project is expected to generate approximately 9 vehicle trips during the weekday a.m. peak hour and 10 vehicle trips during the weekday p.m. peak hour. The level of traffic volume increase associated with the NPC II Project is minimal when compared to the existing traffic volumes within the study area.

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

Table 6-3. Project Trip Generation

Land Use		Walk/Bicycle Trips	Transit Trips	Vehicle Trips
Daily				
Residential	In	78	31	81
	Out	<u>78</u>	<u>31</u>	<u>81</u>
	Total	156	62	162
a.m. Peak Hour				
Residential	In	3	1	3
	Out	<u>10</u>	<u>3</u>	<u>6</u>
	Total	13	4	9
p.m. Peak Hour				
Residential	In	10	3	6
	Out	<u>5</u>	<u>3</u>	<u>4</u>
	Total	15	6	10

6.4.7 Trip Distribution

The trip distribution identifies the various travel paths for vehicles associated with the Project. Trip distribution patterns for the Project were based on BTD's origin-destination data for Area 5, Mission Hill and trip distribution patterns presented in traffic studies for nearby projects. The trip distribution patterns for the Project are illustrated in **Figure 6-14**.

6.4.8 Build Traffic Volumes

The vehicle trips associated with Build (2025) Condition were distributed through the study area based on the trip distribution shown in **Figure 6-14** to the Project Site. The project-generated trips for the weekday a.m. and p.m. peak hours are shown in **Figure 6-15** and **Figure 6-16**. The project-generated trips were added to the No-Build (2025) Condition vehicular traffic volumes to develop the Build (2025) Condition vehicular traffic volumes.

The Build (2025) Condition weekday a.m. and p.m. peak hour traffic volumes are shown in **Figure 6-17** and **Figure 6-18**, respectively.

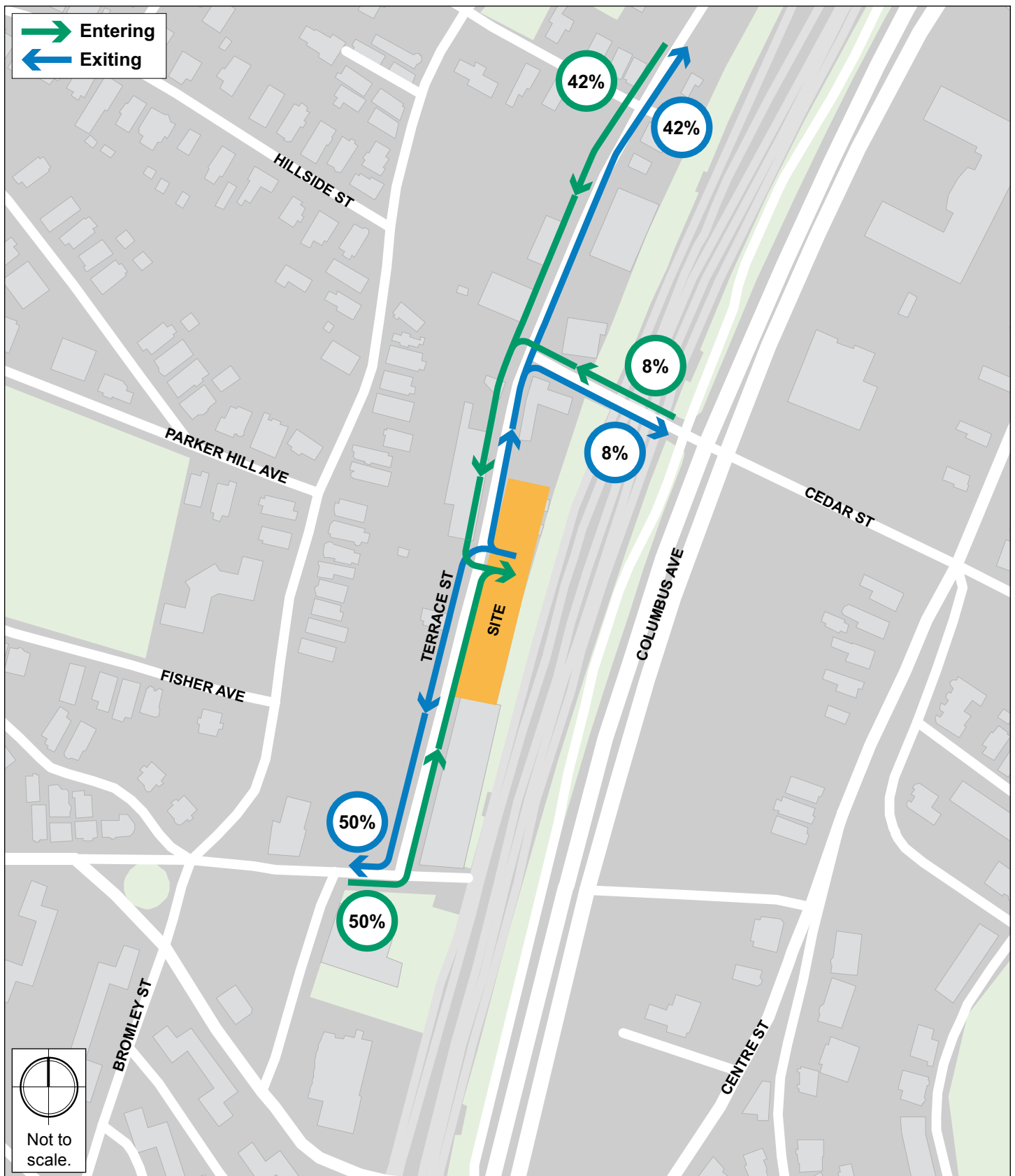


Figure 6-14.
Trip Distribution

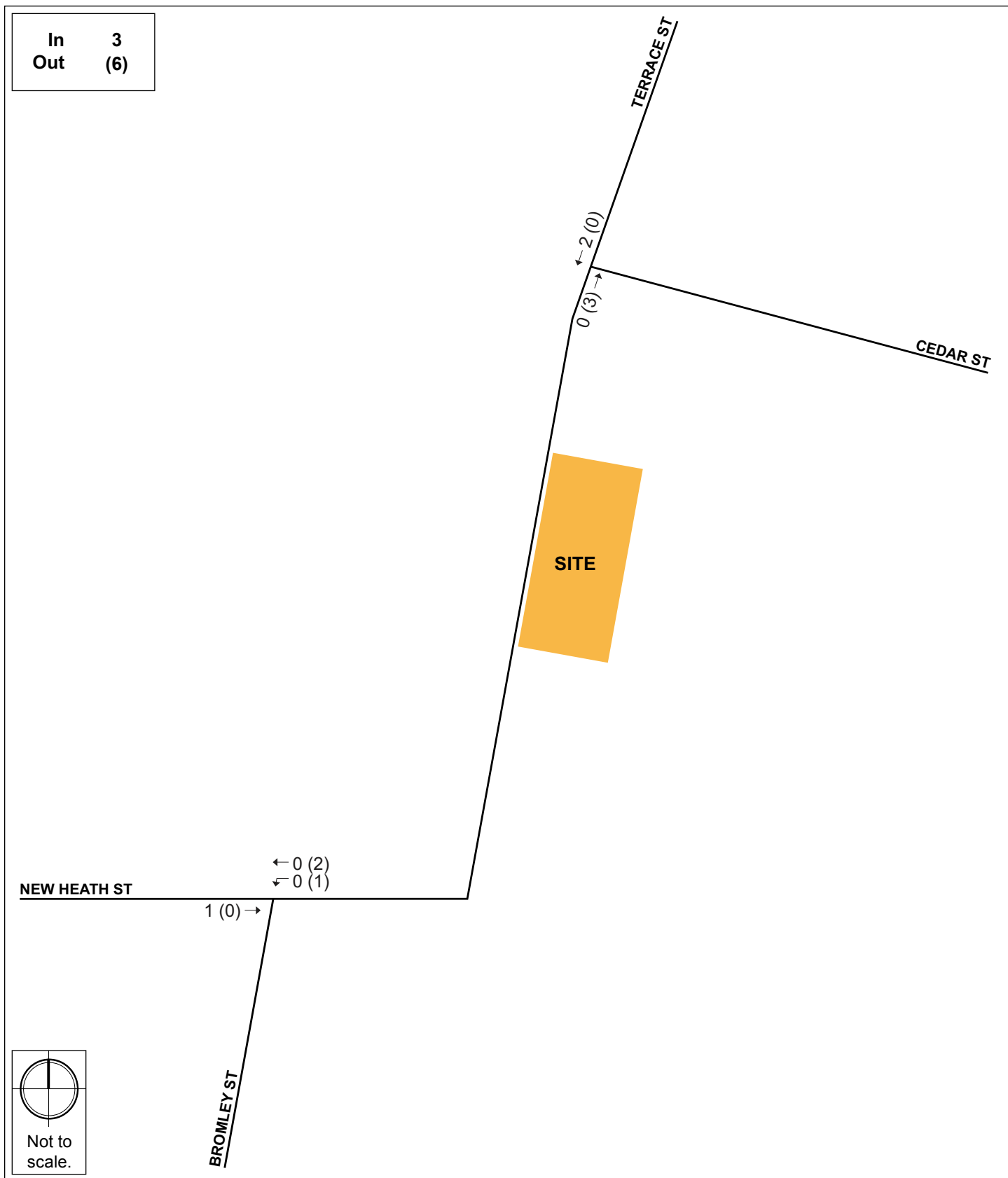


Figure 6-15.
Project Generated Vehicle Trips, Weekday a.m. Peak Hour

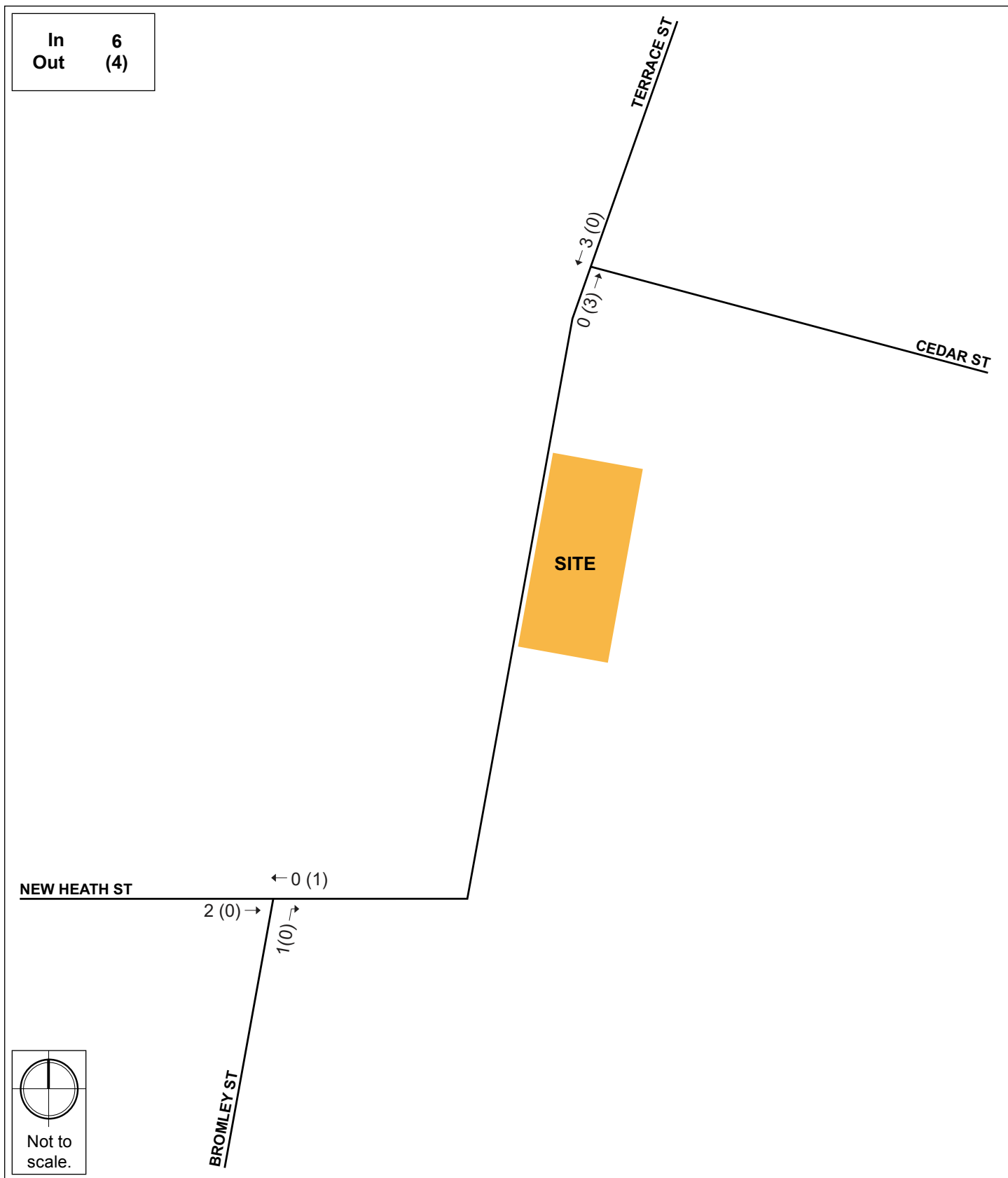


Figure 6-16.
Project Generated Vehicle Trips, Weekday p.m. Peak Hour

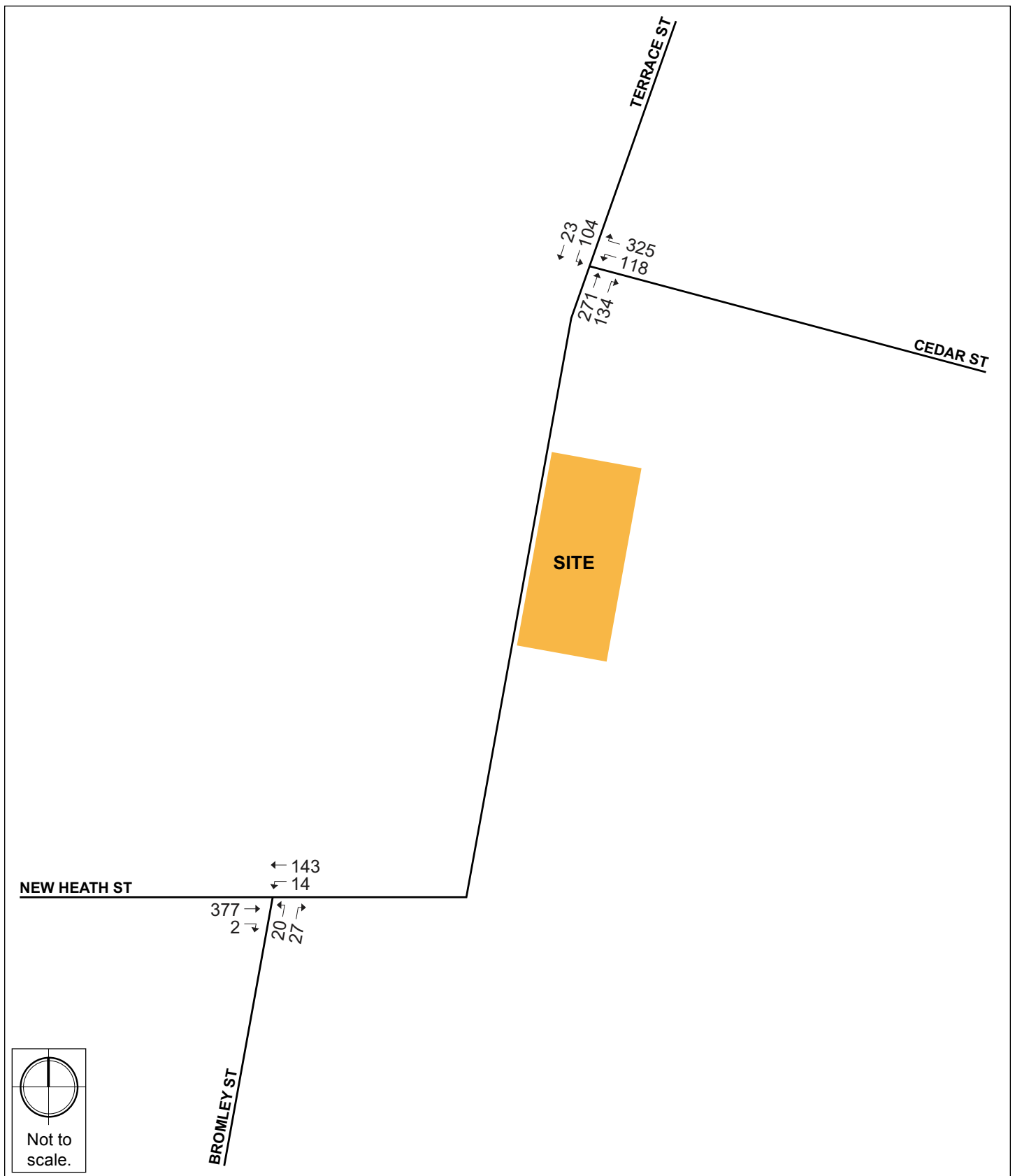


Figure 6-17.
Build (2025) Condition Traffic Volumes, Weekday a.m. Peak Hour

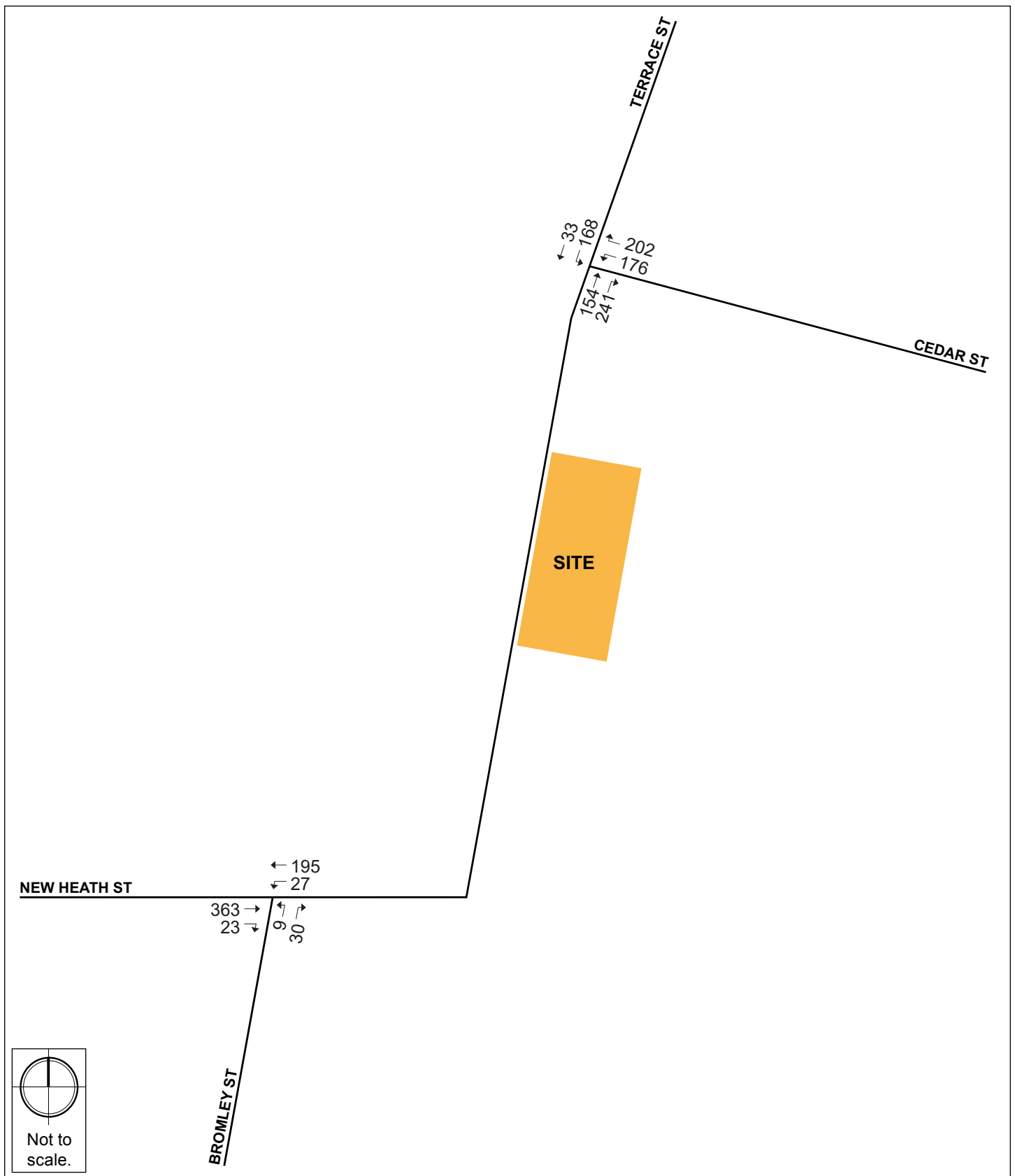


Figure 6-18.
Build (2025) Condition Traffic Volumes, Weekday p.m. Peak Hour

6.4.9 Bicycle Accommodations

BTD has established guidelines requiring projects subject to Transportation Access Plan Agreements to provide secure bicycle parking for residents and employees, as well as short-term bicycle racks for guests and visitors. Based on BTD guidelines, the Project will supply a minimum of 64 secure bicycle parking/storage spaces within the building at a rate of 1 secure/covered bicycle parking space per residential unit. The project is investigating additional storage with outdoor bicycle racks accessible to visitors to the site in accordance with BTD guidelines.

6.5 Traffic Capacity Analysis

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

LOS designations are based on average delay per vehicle for all vehicles entering an intersection. **Table 6-4** 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.

Table 6-4. Vehicle Level of Service Criteria

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

Source: 2000 Highway Capacity Manual, Transportation Research Board.

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

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

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

Tables 6-5 and 6-6 present, respectively, the weekday a.m. and p.m. peak hours capacity analysis for the study area intersections under each analysis condition: Existing Condition, No-Build (2025) Condition, and the Build (2025) Condition. The detailed analysis sheets are provided in **Appendix H**. The sections below present results for each condition.

6.5.1 Existing Condition Traffic Analysis

The study area intersections and approaches operate below capacity and at acceptable levels of delay (LOS D or better) under the Existing Condition. There are no locations where the movements are at capacity or operating at high delays (LOS E or LOS F).

6.5.2 No-Build (2025) Condition Traffic Analysis

The study area intersections and approaches continue to operate below capacity and at acceptable levels of delay (LOS D or better) under the No-Build (2025) Condition. There are no locations where movements decrease to be at capacity or operating at high delays (LOS E or LOS F).

6.5.3 Build (2025) Condition Traffic Analysis

The study area intersections and approaches continue to operate below capacity and at acceptable levels of delay (LOS D or better) under the Build (2025) Condition. There are no locations where movements decrease to be at capacity or operating at high delays (LOS E or LOS F).

Table 6-5. Capacity Analysis Summary, a.m. Peak

Intersection/Approach	Existing				No-Build (2025)				Build (2025)			
	LOS	Delay (sec.)	v/c Ratio	95 th Queue	LOS	Delay (sec.)	v/c Ratio	95 th Queue	LOS	Delay (sec.)	v/c Ratio	95 th Queue
Terrace St/Cedar St												
Cedar St WB left/right	C	15.1	0.59	4	C	17.2	0.65	5	C	17.4	0.65	5
Terrace St NB left/right	B	14.5	0.56	4	C	16.2	0.61	4	C	16.4	0.61	4
Terrace St SB left/right	B	10.5	0.22	1	B	10.9	0.24	1	B	11.0	0.24	1
New Heath St/Bromley St												
New Heath St EB thru/right	A	0.0	0.22	0	A	0.0	0.23	0	A	0.0	0.23	0
New Heath St WB left/thru	A	0.7	0.01	1	A	0.8	0.01	1	A	0.8	0.01	1
Bromley St NB left/right	B	11.6	0.07	6	B	11.9	0.09	7	B	12.0	0.09	8

Table 6-6. Capacity Analysis Summary, p.m. Peak

Intersection/Approach	Existing				No-Build (2025)				Build (2025)			
	LOS	Delay (sec.)	v/c Ratio	95 th Queue	LOS	Delay (sec.)	v/c Ratio	95 th Queue	LOS	Delay (sec.)	v/c Ratio	95 th Queue
Terrace St/Cedar St												
Cedar St WB left/right	B	14.2	0.53	3	C	15.2	0.57	4	C	15.3	0.58	4
Terrace St NB left/right	B	13.2	0.52	3	B	14.1	0.55	3	B	14.3	0.56	4
Terrace St SB left/right	B	11.5	0.33	1	B	11.9	0.35	2	B	12.0	0.35	2
New Heath St/Bromley St												
New Heath St EB thru/right	A	0.0	0.22	0	A	0.0	0.23	0	A	0.0	0.23	0
New Heath St WB left/thru	A	0.9	0.02	1	A	1.2	0.02	2	A	1.2	0.02	2
Bromley St NB left/right	B	11.1	0.06	5	B	11.5	0.07	6	B	11.5	0.07	6

6.6 Transportation Demand Management

TDM measures encourage travelers to use alternatives to driving, especially during peak periods and will be facilitated by the transit oriented nature of the NPC II Project and its convenient proximity to a wide range of non-auto alternatives. The Proponent will emphasize the site's convenient transit and pedestrian access in marketing the Project to future residents and tenants.

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 ZipCar locations. On-site management will work with residents and tenants as they move in to help facilitate transportation for new arrivals.
- **Bicycle Accommodation:** The Proponent will provide bicycle storage for all users of the building in secure, sheltered locations and near major building entrances consistent with City of Boston *Bicycle Parking Guidelines*.
- **Electric Vehicle Charging:** The Proponent will explore the feasibility of providing electric vehicle charging stations within the garage.
- **Shared-car Services:** The Proponent will explore the feasibility of providing a shared car service (e.g., ZipCar) on-site to help reduce the need for residents to own a vehicle.
- **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.
- **Project Web Site:** The web site will include transportation-related information for residents, workers, and visitors.

The Proponent will work with BTM to determine an appropriate TDM program and will formalize this program in a Transportation Access Plan Agreement (TAPA).

6.7 Transportation Mitigation Measures

While the traffic impacts associated with the new trips are minimal, 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 BTB. 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 BTB. 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 BTB. The CMP will detail the schedule, staging, parking, delivery, and other associated impacts of the construction of the Project.

6.8 Evaluation of Short-Term Construction Impacts

Details of the overall construction schedule, working hours, number of construction workers, worker transportation and parking, number of construction vehicles, and routes will be addressed in detail in a Construction Management Plan (CMP) to be filed with BTB in accordance with the City's transportation maintenance plan requirements. The CMP will also address the need for pedestrian detours, temporary parking for the project, lanes closures, and/or parking restrictions, if necessary, to accommodate a safe and secure work zone. To minimize transportation impacts during the construction period, the following measures will be incorporated into the Construction Management Plan:

- Construction workers will be encouraged to use public transportation and/or carpool.
- A subsidy for MBTA passes will be considered for construction workers; and
- Secure spaces will be provided on-site for workers' supplies and tools so they do not have to be brought to the site each day.

7.0 COORDINATION WITH GOVERNMENTAL AGENCIES

7.1 Architectural Access Board Requirements

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

7.2 Massachusetts Environmental Policy Act

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

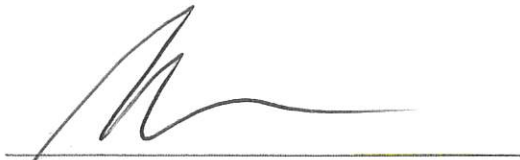
7.3 Boston Civic Design Commission

The NPC II Project will not exceed the 100,000 gross square feet size threshold requirement for review by the Boston Civic Design Commission.

8.0 PROJECT CERTIFICATION

This form has been circulated to the Boston Planning and Development Agency as required by Article 80 of the Boston Zoning Code.

PICKLE - DITSON PHASE II LP



Signature of Proponent
Lawrence H. Curtis

10/30/19

Date

MITCHELL L. FISCHMAN CONSULTING ("MLF Consulting") LLC



Signature of Preparer
Mitchell L. Fischman, Principal

10/30/19

Date

***APPENDIX A – BRA BOARD MEMORANDUM, TERRACE STREET
LOFTS CONDOMINIUMS , JANUARY 26, 2006***

MEMORANDUM**JANUARY 26, 2006**

TO: BOSTON REDEVELOPMENT AUTHORITY AND
MARK MALONEY, DIRECTOR

FROM: THOMAS MILLER, DIRECTOR OF ECONOMIC DEVELOPMENT
ARMINDO GONCALVES, ASSISTANT DIRECTOR, COMMUNITY
DEVELOPMENT
MICHAEL CANNIZZO, SENIOR ARCHITECT

SUBJECT: TERRACE STREET LOFTS CONDOMINIUM: 154, 164, AND 166
TERRACE STREET IN THE MISSION HILL NEIGHBORHOOD OF
BOSTON.

SUMMARY: This Memorandum seeks authorization for the Director to: (1) issue a Scoping Determination, in connection with the Terrace Street Lofts Condominium Project, waiving the requirement of further review pursuant to Article 80, Section 80B-5.3(d) of the Boston Zoning Code (the "Code"); (2) issue a Certification of Compliance upon successful completion of Article 80 review; and (3) execute a Cooperation Agreement, a Boston Residents Construction Employment Plan, an Affordable Housing Agreement, and any and all other documents necessary in the determination of the Director, in connection with the proposed project.

PROJECT HISTORY

A Project Notification Form ("PNF") for the Terrace Street Property was originally submitted to the BRA in October 1998 and a Draft Project Impact Report ("DPIR") submitted in September 2001. The original project comprised 175 residential units and 84 parking spaces with over 200,000 gross square feet of renovated space in two existing buildings and an adjacent new building. Highland Springs, LLC, (the "Proponent") initiated an open review process with the Mission Hill community in the spring of 2005 and as a result of that process submitted a new PNF in October 2005 for a 175,000 square foot, mixed-use condominium project comprised of nine (9) artist live-work units, 166 loft style-units, 4,000 square feet of artist studio/gallery space and 134 underground parking spaces (the "Proposed Project"). The Proposed Project renovates two existing brewery buildings and constructs a 107 foot new mid-rise residential building on a 30,000 square foot parcel.

PROJECT REVIEW

The Proposed Project is subject to Large Project Review pursuant to Article 80 of the Code. Accordingly the proponent submitted a PNF to the Boston Redevelopment Authority ("BRA") on October 31, 2005, notice of which was published on October 28, 2005 in the Boston Herald. The BRA held a Scoping Session with the City's public agencies on December 2, 2005. The BRA conducted a publicly advertised meeting on November 16, 2005, at Mississippi's Restaurant in Mission Hill to solicit input from the community on the Proposed Project. The public meeting notice was published in The Mission Hill. The original comment period of November 30, 2005 was further extended to December 15, 2005 to allow for additional community participation and review of the Proposed Project.

The Proponent has reached out to the Mission Hill community to understand their concerns. Three public meetings were held over the summer and fall to discuss reuse of the existing buildings and massing alternatives for the site. Architects with strong ties to the community, Stull and Lee, Inc. and Gail Sullivan Associates, Inc., were retained to lead these meetings. An artist focus group was established to understand the particular needs of Mission Hill's growing artist community.

As a result of these proactive efforts by the Proponent to solicit community input and respond to issues raised, the Mission Hill community supports the Proposed Project and continues to work with the Proponent to develop a mitigation program that addresses their concerns. Modifications and mitigation measures include:

- Adding of artist live/work spaces and artist galleries,
- Increasing onsite parking to achieve 0.75 spaces per unit,
- Providing subsidies to the Mission Hill Link Shuttle System,
- Proposing traffic calming measures for Terrace Street,
- Providing onsite parking for a shared vehicle program like Zipcar,
- Providing an indoor bicycle storage area,
- Proposing pedestrian improvements to the Terrace Street sidewalks, and
- Providing a T Pass program.

The Proponent continues to work with the community through the Impact Advisory Group ("IAG") to explore alternatives to car ownership and transportation mitigation strategies.

The design schematics for the Proposed Project has been reviewed and approved by BRA design staff and the BCDC. Consistent with the provisions of Article 65 allowing for certain design matters to be addressed and resolved as part of Large Project Review, BRA staff feels that the various impacts associated with the Proposed Project are minimized in comparison the original project submitted in 2001. The BRA has received several letters of support in connection with the Proposed Project (see attached).

AFFORDABLE HOUSING

Twenty-six (26) of the one hundred seventy-five (175) condominium units within the Proposed Project will be created as affordable housing (the "Affordable Units"). The affordable units will consist of seven (7) studio units measuring approximately 513 to 699 square feet, nine (9) one-bedroom units measuring approximately 700 to 777 square feet and ten (10) two-bedroom units measuring approximately 948 to 1,129 square feet. All of the units will be marketed to households earning up to 100% of the Area Median Income ("AMI") for the Boston Standard Metropolitan Statistical Area as promulgated by the United States Department of Housing and Urban Development. The remaining one hundred forty-nine (149) units will be sold at market rate. The quality of the affordable units shall be comparable to the market units and they will be dispersed evenly throughout the development.

The location, size, and income limits of the Affordable Units are as follows:

Table I

<u>Location</u>	<u>Number of Units</u>	<u>Number of Bedrooms</u>	<u>SF</u>	<u>% of AMI</u>	<u>HH Size</u>	<u>Sales Price</u>
1st Fl. Ditson	3	Two	1,003, 1,042, 1,129	100%	2-3	220,200
1st Fl. Pickle	6	Two	1,000; 1,034; 1,056; 1,058; 1,063; 1,118	100%	2-3	220,200
2nd Fl. Ditson	1	Studio	638	100%	1	174,800
2nd Fl. Ditson	1	Two	948	100%	2-3	220,200
2nd Fl. Pickle	2	One	700, 702	100%	1-2	197,600
3rd Fl. Ditson	1	One	755	100%	1	197,600
3rd Fl. Pickle	1	Studio	630	100%	1	174,800
3rd Fl. Pickle	1	One	702	100%	1-2	197,600
3rd Fl. Phase II	1	Studio	619	100%	1	174,800
3rd Fl. Phase II	1	One	777	100%	1	197,600
4th Fl. Pickle	1	Studio	699	100%	1	174,800
4th Fl. Pickle	1	One	700	100%	1-2	197,600
4th Fl. Phase II	1	Studio	619	100%	1	174,800
5th Fl. Phase II	1	Studio	591	100%	1	174,800
6th Fl. Phase II	1	Studio	513	100%	1	174,800
6th Fl. Phase II	1	One	777	100%	1-2	197,600
7th Fl. Phase II	2	One	777	100%	1-2	197,600

The Developer will enter into an Affordable Housing Agreement with the BRA for the Affordable Units. The Affordable Housing Agreement must be executed along with, or prior to, issuance of Certification of Compliance. The Developer has also agreed to submit a Marketing Plan (the "Plan") to the Boston Fair Housing Commission and the BRA, which shall be approved along with the execution of the Affordable Housing Agreement. A preference will be given to Boston residents. The Affordable Units will not be marketed prior to the submission and approval of the Plan. A deed restriction will be placed on the Affordable Units to maintain affordability for a period of fifty (50) years.

In addition to the affordable units, the 4,000 square feet of artist work space will be made available for ownership and lease at below market rates. In total, approximately 18% of the project will meet affordability guidelines. The deeded parking spaces will be marketed separately from the units but will be available to all residents.

The Developer has agreed to contribute, upon the issuance of the full building permit for the proposed project, Fifty-Thousand Dollars (\$50,000.00) to be held in an escrow account by the BRA, for the use toward community improvements. Disbursements of the funds will be made by the BRA.

RECOMMENDATION

It is, therefore, the staff's recommendation, pursuant to Article 80, that the Director be authorized to issue a Scoping Determination waiving further review ("Determination") indicating that the PNF and supplemental filings adequately describe and address the impacts arising from the Proposed Project located at 154, 164, and 166 Terrace Street in Mission Hill, subject to further BRA design review and approval, and that a notice of the issuance of the Determination be published in the Boston Herald. Upon the expiration of the subsequent 19-day public comment period, assuming that no new information has been submitted indicating the likelihood of significant adverse impacts, such Determination shall become final.

Further, the staff recommends that the Director be authorized: (1) to issue a Certification of Compliance upon successful completion of Article 80 review; and (2) to execute a Cooperation Agreement, a Boston Residents Construction Employment Plan, an Affordable Housing Agreement, and any other documents required in connection with the Proposed Project.

Appropriate votes follow:

VOTED: That the Director be, and hereby is, authorized to issue a Scoping Determination under Section 80B-5.3(d) of the Boston Zoning Code (the "Code") which (i) finds that the Project Notification Form submitted to the Boston Redevelopment Authority (the "Authority") on October 31, 2005, as modified and supplemented by a Response to Comments submitted to the Authority on January 9, 2006 for the Terrace Street Lofts Condominium Project to be located at 154, 164, and 166 Terrace Street in Boston ("Revised Project") adequately describes the potential impacts arising from the Proposed Project, and provides sufficient mitigation measures to minimize these impacts; and (ii) waives further review of said Revised Project under Section 80B of the Code, subject to continuing design review by the Authority, and

FURTHER

VOTED: That the Director be, and hereby is, authorized to issue a Certification of Compliance for the Revised Project, upon the successful completion of the Article 80 processes;

FURTHER

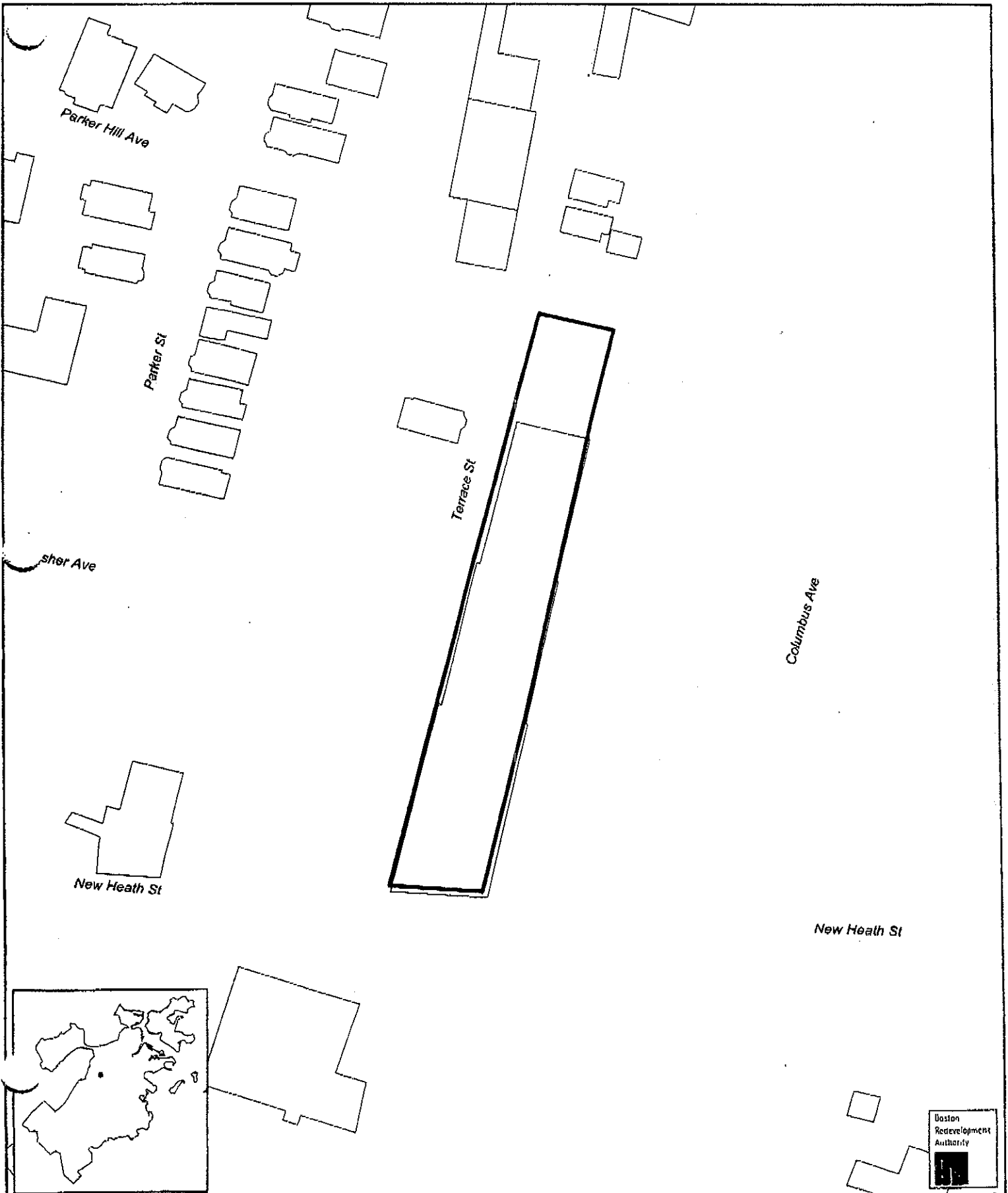
VOTED: That the Director be, and hereby is, authorized to execute a Cooperation Agreement, a Boston Residents Construction Employment Plan, an Affordable Housing Agreement, and any and all other documents that the Director deems necessary, in connection with the Revised Project, that includes terms the Director deems appropriate and in the best interest of the Boston Redevelopment Authority; and

FURTHER

VOTED: In reference to petition BZC-2634, Highland Spring LLC/Briggs Capital Real Estate LLC, 164-166 Terrace Street, Mission Hill, for six (6) variances to erect a 175-unit residential building, the Boston Redevelopment Authority recommends APPROVAL WITH PROVISIO: that the plans be submitted to the Authority for design review approval.

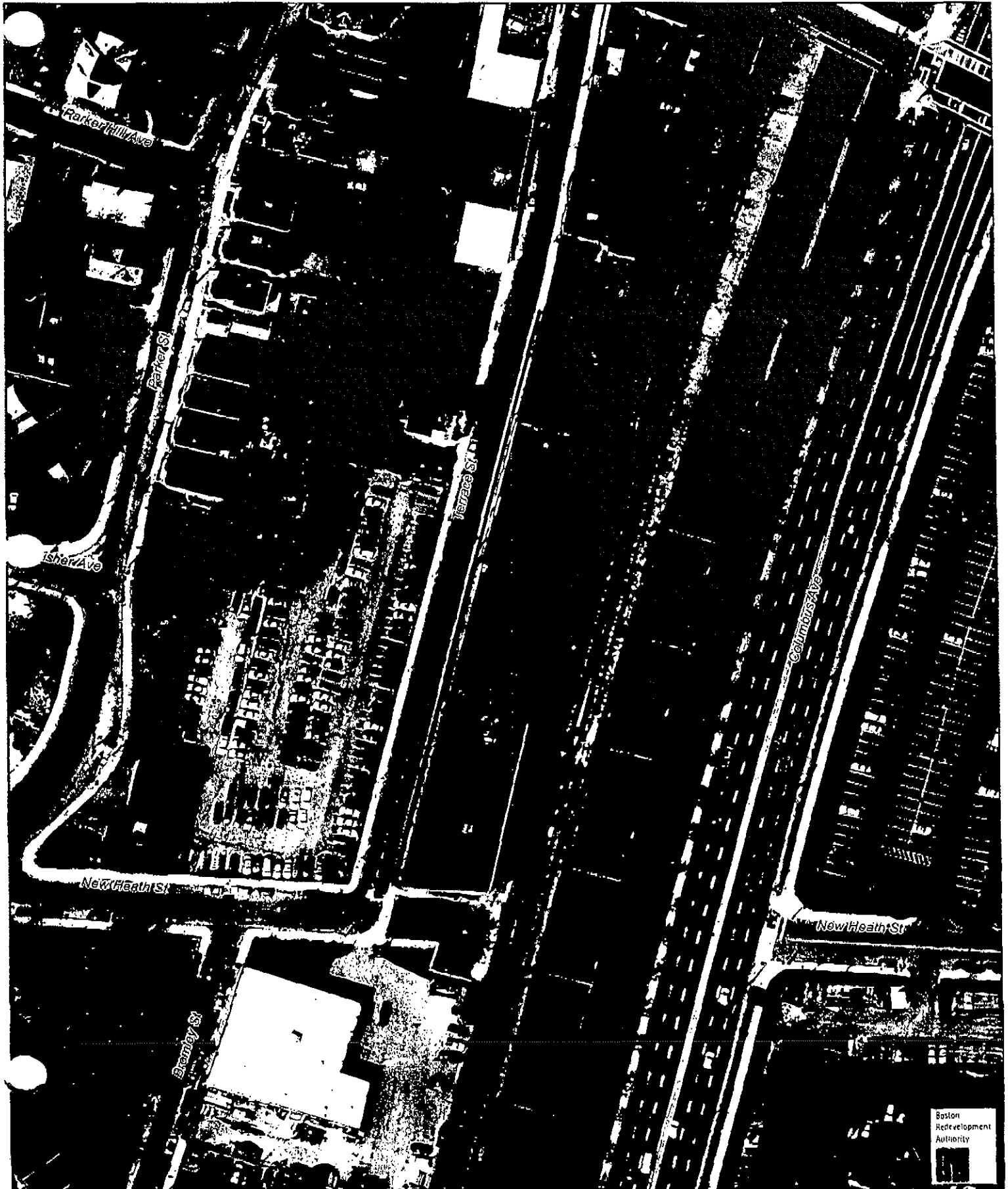
Terrace Street Lofts Project

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Terrace Street Lofts Project

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2003 BWCS aerial



Boston
Redevelopment
Authority

***APPENDIX B – BRA BOARD MEMORANDUM, NOTICE OF PROJECT
CHANGE I, JULY 17, 2008***

MEMORANDUM

JULY 17, 2008

TO: BOSTON REDEVELOPMENT AUTHORITY AND
JOHN F. PALMIERI, DIRECTOR

FROM: BRENDA McKENZIE, DIRECTOR OF ECONOMIC DEVELOPMENT
~~ARMANDO GONCALVES~~, DEPUTY DIRECTOR, ECONOMIC
DEVELOPMENT PLANNING
MICHAEL CANNIZZO, SENIOR ARCHITECT

SUBJECT: NOTICE OF PROJECT CHANGE FOR THE PICKLE-DITSON LIMITED
PARTNERSHIP - PROPOSED MIXED-INCOME RENTAL HOUSING
PROJECT LOCATED AT 164 - 166 TERRACE STREET IN THE MISSION
HILL NEIGHBORHOOD OF BOSTON.

SUMMARY: This Memorandum requests that the Boston Redevelopment Authority (the "Authority") take certain actions regarding changes to the proposed The Pickle-Ditson Limited Partnership Project (formerly known as the "Terrace Street Lofts Project"), which will cause the transformation of two historic mill buildings into sixty-two (62) units of affordable and workforce housing and forty-eight (48) parking spaces and related site improvements ("Phase I of the Revised Project"). The actions requested are the following: (1) to authorize the Director to issue a Determination under Article 80A-6.2 of the Boston Zoning Code (the "Code"), that the Notice of Project Change adequately addresses any impacts of the Revised Project; (2) to authorize the Director to issue a Certification of Compliance for the Revised Project upon successful completion of the Article 80 process; and (3) to authorize the Director to execute a Cooperation Agreement, a Boston Residents Construction Employment Plan, and any or all other documents the Director, in his sole discretion, deems necessary and appropriate and upon terms and conditions that are in the best interest of the Authority in connection with the Project.

PROJECT HISTORY

On January 26, 2008, the Authority authorized the Director to issue a Scoping Determination waiving the requirement of further review of the Terrace Street Lofts Project pursuant to Article 80 of the Code, to issue a Certification of Compliance pursuant to Section 80B-6 of the Code upon successful completion of the Article 80 Large Project Review process, and to execute a Cooperation Agreement and other

documents in connection with the Terrace Street Lofts Project. The Terrace Street Lofts Project was then comprised of 175 loft style condominium units and artist live workspace, 4,000 square feet of artist studio and gallery space and a below grade parking garage for 134 underground parking spaces. Following the Authority's January 26, 2008 votes, the real estate market and in particular the condominium market experienced a terrible downturn in terms of sales prices and financial feasibility. This property has suffered through multiple developers, none of which have been successful in rehabilitating the existing buildings or creating a viable redevelopment at the site.

PROJECT CHANGES

The property was recently acquired by WinnDevelopment Company which plans to proceed with the redevelopment of the project in two separate phases. Phase I will include the conversion of the existing two mill buildings into 62 units of affordable workforce housing and 48 parking spaces, as opposed to the previously approved project consisting of 175 condominium units and 134 underground parking spaces. Of these units, forty-three (43) will be made affordable and restricted to incomes between 30% to 60% of the area median income. The remaining nineteen (19) units will be workforce homeownership units which, due to their financing structure, will be held by the developer and operated as rentals for the first five years, after which time they will be sold. Three (3) of the 19 condominium units will be rented/sold as affordable artist live-work space.

Prior to Phase II moving forward, which involves the redevelopment of the adjacent vacant lot, the developer will prepare a redevelopment plan that will be acceptable to the community and the BRA. The proposed Phase I represents a 2/3rd reduction of the original project scope, and the various community benefits and artist live-workspace have been proportioned accordingly among the two phases. In addition, the zoning relief, which was set to expire on June 28, 2008, has been extended by the Board of Appeal for an additional one (1) calendar year.

Finally, Phase I of the Revised Project has been reviewed and approved by Authority design staff. The Authority staff has determined that the Notice of Project Change ("NPC") and supplemental filings adequately describe the potential impacts arising from the Phase I of the Revised Project and that further review through Article 80 is not necessary with the exception of further design review.

ARTICLE 80 REVIEW

The Phase I of the Revised Project has been undergoing review under Article 80 of the Code for Large Project Review. Formal Article 80 review of Phase I of the Revised Project began with the submission by Winn Development of a Notice of Project Change ("NPC"). Phase I of the Revised Project underwent an extensive review process, which

included a publicly advertised meeting held by the BRA on July 10, 2008 at the Mississippi's Catering Facility in Roxbury. This meeting was duly advertised on June 26, 2008 and on July 3, 2008 in The Banner and on July 7 in the Mission Hill Gazette. The development has also presented the proposed project to all of the appropriate elected officials. Prior to submitting the NPC, the development team held three community meetings with the local CDC's and immediate abutters to discuss the project. To date, no adverse reports or comments have been submitted to the BRA that would affect the timeline of this much needed mixed-income housing development project.

AFFORDABLE HOUSING

The Developer will enter into Affordable Housing Agreements with the BRA for the Affordable Units. The Affordable Housing Agreement must be executed along with, or prior to, issuance of Certificate of Compliance. The developer has also agreed to submit a Marketing Plans (the "Plan") to the Boston Fair Housing Commission and the BRA, which shall be approved with the execution of each Affordable Housing Agreement. A preference will be given to Boston residents. The Affordable Units will not be marketed prior to the submission and approval of the Plan. A deed restriction will be placed on the Affordable Units to maintain affordability for a period of fifty (50) years.

COMMUNITY BENEFITS

The developer has agreed to contribute, upon the issuance of the full building permit for the Phase I of the Revised Project, \$17,000 to be held in an escrow account by the BRA, for use toward community improvements and \$33,000 upon the issuance of a building permit for Phase II of the Revised Project. Disbursements of the funds will be made by the BRA. In addition, the Developer has agreed to a financial contribution of \$25,000 for the purpose of funding the Mission Hill Link Shuttle Service.

RECOMMENDATION

Authority staff has examined the Article 80 submissions and supplemental material and has heard representations made by the Applicant and find that all such information contains sufficient evidence in support of Phase I of the Revised Project to permit the Authority to make the findings and determinations necessary to proceed with Phase I of the Revised Project. Affordable housing and artist live-work space use is appropriate and desirable at this location and is consistent with plans for the area and the most suitable development of the neighborhood. The Revised Project will provide affordable housing in the City of Boston and will enhance the Mission Hill neighborhood. Therefore, the staff recommends that the Authority take the following actions in connection with Phase I of the Revised Project: (1) authorize the Director to issue a Determination under Article 80A-6 of the Code, which finds that the NPC filed with

the BRA on June 6, 2008 adequately addresses any impacts of Phase I of the Revised Project; (2) authorize the Director to issue a Certification of Compliance upon successful completion of the Article 80 process; (3) authorize the Director to enter into a Cooperation Agreement, Boston Residents Construction Employment Plan, Affordable Housing Agreements and any or all other documents the Director, in his sole discretion, deems necessary and appropriate and upon terms and conditions that are in the best interest of the Authority.

Appropriate votes follow:

VOTED: That the Director be, and hereby is, authorized to issue a Determination pursuant to Section 80A-6 of the Boston Zoning Code which finds that the Notice of Project Change submitted by The Pickle-Ditson Limited Partnership on June 6, 2008 adequately describes the impacts arising from Phase I of the Revised Pickle-Ditson Project (the "Phase I of the Revised Project") and determines that no further review of Phase I of the Revised Project under said Section 80A-6 of the Code is required, subject to continuing design review by Authority staff;

FURTHER

VOTED: That the Director be, and hereby is, authorized to issue a Certification of Compliance for Phase I of the Revised Project upon successful completion of the Article 80 process for Phase I of the Revised Project, when appropriate and subject to continuing design review by the Authority; and

FURTHER

VOTED: That the Director be, and hereby is, authorized to execute a Cooperation Agreement, a Boston Residents Construction Employment Plan, Affordable Housing Agreements, and any or all other documents that the Director, in his sole discretion, deems necessary and appropriate and upon terms and conditions that are in the best interest of the Authority in connection with Phase I of the Revised Project.

McDERMOTT, QUILTY & MILLER LLP
21 CUSTOM HOUSE STREET - SUITE 300
BOSTON, MASSACHUSETTS 02110

TELEPHONE: 617-946-4600
FACSIMILE: 617-946-4624

June 6, 2008

VIA HAND DELIVERY

John F. Palmieri, Director
Boston Redevelopment Authority
City Hall 9th Floor
One City Hall Square
Boston, MA 02201

**RE: Notice of Project Change
164-166 Terrace Street, Ward 10**

Dear Director Palmieri:

As counsel to the proposed developer/owner of the above-referenced premises, WinnDevelopment (the "New Developer"), I am writing to provide you with this Notice of Project Change (this "NPC") regarding the New Developer's request to amend the project description for 164-166 Terrace Street, Boston, MA (the "Premises") pursuant to Article 80A-6 of the Boston Zoning Code ("Article 80").

The Project will consist of the creation of affordable housing through the preservation and redevelopment of two connected historic, vacant mill buildings located at 164-166 Terrace Street in Boston (Mission Hill), MA. This property has suffered through multiple developers, none of which have been successful in rehabilitating the existing buildings or creating a viable redevelopment at the site. Therefore, the New Developer's plan to divide the Project into two phases, while concentrating its current efforts on the renovation of the existing buildings only as Part or Phase I, will offer immediate financial and marketplace feasibility for the creation of an affordable housing redevelopment with a workforce housing homeownership component at a site which has remained vacant for over twenty years. Phase I, as currently proposed, will consist of sixty-two (62) units of affordable and workforce housing. Of these units, forty-three (43) will be affordable and therefore restricted to incomes between 30% and 60% of the area median income. The remaining nineteen (19) units will be workforce homeownership units which, due to their financing structure, will be held by the New Developer and operated as rentals for the first five years, after which time they will be sold. Three (3) of the 19 condominiums are set aside as affordable artist live-work space. Prior to Phase II moving forward, the New Developer will present the plan to both the community and the BRA and work together toward an acceptable development plan.

John F. Palmieri, Director
Boston Redevelopment Authority
June 6, 2008
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By way of background, the Premises was the subject of Article 80 proceedings for the Terrace Street Lofts Condominium Project (the "Project") proposed by Highland Springs, LLC/Briggs Capital Real Estate, LLC (the "Prior Owner/Developer"). In this regard, the Project contemplated the development of a 175,000 square foot, mixed-use condominium project comprised of nine (9) artist live-work units, 166 loft style-units, 4,000 square feet of artist studio/gallery space and 134 underground parking spaces at the Premises. On January 26, 2006, the Boston Redevelopment Authority (the "BRA") Board voted to authorize its Director to (1) issue a Scoping Determination under section 80B-5.3(d) of the Boston Zoning Code without further review, (2) issue Certificate(s) of Compliance under Article 80, (3) execute a Cooperation Agreement, Affordable Housing Agreement, Boston Residents Construction Employment Plan and any and all other agreements and documents with the Director deems appropriate or necessary ("Project Agreements") and (4) recommend to the Board of Appeal approval of zoning petitions BZC-27148 with the proviso that plans be submitted to the BRA for design review approval. By decision entered in the Inspectional Services Department on June 28, 2006 (the "Decision") the Board of Appeal granted the requested zoning relief in BZC-27148.

While the Project has been fully-approved for almost two (2) years, the Prior Owner/Developer was unable to secure appropriate financing and therefore never commenced final permitting and/or construction. Recently, the New Developer entered into an option agreement to become the new owner/developer of the Premises and is presently engaged in the process of reviewing the Project dynamics and developing a strategy to revise its scope to fit its own assessment of current market demands. With its headquarters in Boston's Historic Faneuil Hall, the New Developer has over thirty-five (35) years experience in the acquisition and development of multi-family and mixed income properties throughout the United States, and has particular experience and expertise in performing on projects of this scope. As such, we submit that the New Developer is prepared to finally bring this Project to fruition, and provide the City of Boston with the long-anticipated benefits of the Project, including much needed affordable housing. In this regard, the New Developer has reexamined the marketing plan for the Project, and now seeks to amend the Project through this NPC.

Please note that the zoning decision previously determined by the Board of Appeal was set to expire on June 28, 2008. The New Developer presented the Project to the Board of Appeal Final Arbiter at their April 29, 2008 public hearing and the Board voted to grant a one-year extension to their previous zoning decision. Therefore, the New Developer will have a one-year extension from June 28, 2008 in order to proceed with the Project.

Finally, as detailed in its related submission hereto, the New Developer is willing to adhere to the community impact items, approvals and related community benefits previously agreed to in connection with the Project ("Project Agreements"), commensurate however with this multi-phased Amended Project and timed accordingly among the phases. In particular, the applicable

John F. Palmieri, Director
Boston Redevelopment Authority
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Project Agreements and artist live-work program would be proportioned accordingly among the two phases as follows:

PHASE I:

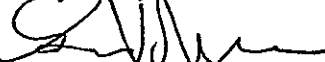
- 3 units of affordable artist live-work spaces,
- Increasing onsite parking to achieve 0.75 spaces per unit,
- Providing subsidies to the Mission Hill Link Shuttle System,
- Proposing traffic calming measures for Terrace Street (will work with the community),
- Providing onsite parking for one (1) shared vehicle program like Zipcar,
- Providing an indoor bicycle storage area,
- Providing a T Pass program,
- \$17,000.00 pro rata community benefits contribution, due and payable upon the issuance of a full building permit for Phase I (remaining balance due upon issuance of same for Phase II).

PHASE II:

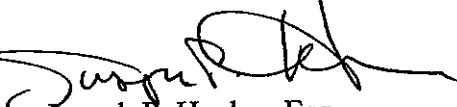
- 6 more units and 4,000 square feet of artist work space at affordable rates,
- The remaining \$33,000.00 community benefits contribution (\$50,000 total).

Thank you for your attention to this request for Notice of Project Change. If acceptable, kindly process this matter for the necessary review and approval by your Board.

Very Truly Yours,


Stephen V. Miller, Esq.


Dennis A. Quilty, Esq.


Joseph P. Hanley, Esq.

***APPENDIX C – DPIR PEDESTRIAN LEVEL WIND ASSESSMENT AND
2005 FRANK DURGIN LETTER***

Frank H. Durgin, P.E.
19 Payson Road
Belmont, MA 02478-2720
October 20, 2005

Re: Wind Assessment of Pickle Factory lofts

Thomas Maistros
1049 Adams Street
Dorchester, MA 02124

Dear Tom,

You have asked me to comment on pedestrian level winds (PLWs) in the vicinity of the proposed Pickle Factory Loft buildings. This project is on the same site as the 2001 proposed Highland Springs Loft buildings for which I did a qualitative assessment of PLWs in 2001. In fact, the plan of the Pickle Factory Buildings is quite similar to the plan of the Highland Springs Lofts Buildings.

The site is quite sheltered from westerly winds by Mission Hill.

In both cases the two existing buildings at the south end of the site are to be gutted and remodeled. In the current plan the heights of those two buildings are unchanged, but in the Highland Springs Lofts plan one story was to be added to each. On the other hand, the new building at the North end of the site that was to be eight-stories in the Highland Springs loft case but will be nine-stories in the new plan.

The entrances to the Pickle factory buildings will be along Terrace Street with one in middle of the building on New Heath Street (Location 18 in the 2001 study (see figure 2 from that report)). Location 8 in that study is approximately on the sidewalk in front of the main entrance to the new building and locations 6 and 8 cover the sidewalk in front of the other entrances along Terrace Street. All the entrances to the new building along Terrace Street are set back into the building and so will be very sheltered. The entrance at location 18 at the south end of the building actually juts out from the building and will be a little windier (not change category) than in the Highland Springs Plan.

In the Highland Springs plan three locations (9, 10, and 13) were on the roof of the middle building where a roof garden was planned. The estimated PLW categories for locations 10 and 13 will be the same for the Pickle Factory Buildings as for the Highland Springs Lofts buildings, but the winds at location 9 will be reduced because it is on the roof of the three-story entrance building.

Because of the added story to the most northerly of the three buildings, the

PLWs at location 4 will be a little higher than those predicted for the Highland Springs Loft building. There will be no change in PLW Category, nor will the PLW there exceed the BRA guideline wind speed.

I conclude that the 2001 PLW assessment for the highland Springs lofts development is applicable to the proposed Pickle Factory Lofts project.

Yours truly,

Frank H. Durgin, P.E.

3.0 Environmental Protection Component

3.1 Qualitative Pedestrian Level Wind Assessment

Frank Durgin, P.E., a highly regarded professional wind engineer who has analyzed wind impacts for numerous Boston projects, prepared an assessment to determine the effect of the proposed project on pedestrian level winds ("PLWs") in and near the project site. This study includes a screening of potential PLW impacts from the project. It identifies any areas where wind velocities are expected to exceed acceptable levels, including the BRA's guideline of an effective gust velocity of 31 miles per hour ("MPH") which should not be exceeded more than 1% of the time. None of the 48 locations considered for either the existing or build conditions was found to have PLWs that exceed the Boston Redevelopment Authority's ("BRA") effective gust guideline wind speed of 31 mph more often than once in 100-hours.

3.1.1 Summary

A qualitative pedestrian level wind assessment has been made to determine the effect of the proposed Highland Springs Lofts development buildings on pedestrian level winds (PLWs) in their vicinity. This is a large project in a site that is rather exposed to the wind. The proposed added height to the southerly and middle buildings has little affect on PLWs near those buildings. However, the new seven-story building at the north end of the project causes increases in PLWs at its northwest ("NW") and northeast ("NE") corners. The proposed roof garden over the middle building will probably be less windy than that roof is at present. On an annual basis the site will be slightly windier than it is now.

None of the 20 locations considered for either existing or build conditions will have PLWs that exceed the BRA guideline wind speed of 31 mph more often than once in 100 hours.

The detailed results are presented in Figures 3.1-12 through 3.1-23 and Table 3.1-1 and are summarized in Tables 3.1-2 and 3.1-3 (at the end of this Wind section). For this assessment, it has been assumed that the trees in the open areas near the site are there for both existing and build conditions, and that there is no landscaping associated with the new or renovated buildings or the roof garden.

3.1.2 Introduction

This is an assessment of PLWs for the proposed Highland Spring Lofts development in the Mission Hill section of Roxbury in Boston, Massachusetts. The assessment is based on the following:

1. Topographic and planimetric survey maps of the area from the Boston Redevelopment Authority (BRA);
2. Elevations and roof and floor plans of the proposed buildings from Daylor Consulting Group;

3.0 Environmental Protection Component

3. An aerial view of the site from Daylor Consulting Group;
4. One site visit to the area for this assessment;
5. Nine photographs taken during the site visit and 20 additional photographs provided by Daylor Consulting Group;
6. An evaluation of the urban context of the Proposed Project Site;
7. A review of the Boston wind climate; and
8. The author's 30 years of experience dealing with PLWs.

The interaction of the wind with buildings and structures is highly complicated and, at times, difficult to predict, especially for an urban area that is influenced by two large hills. Therefore, this evaluation provides an assessment of PLWs which is qualitative.

3.1.3 Description of Existing Conditions

The Project Site lies between Terrace Street and the MBTA train tracks. Columbus Avenue runs parallel to and on the east side of the tracks. Starting at New Heath Street, the site runs about 1,200 feet to the north. Three buildings currently exist on the site. The five-story, 80 foot high Oliver Ditson building, known as 31 New Heath Street and 158-168 Terrace Street, is the southernmost building within the existing development. Directly abutting and to the north of the Ditson building is a four-story, 60 foot high building. Connected to this middle building and to the north of it is a run down one-story garage located at 148 Terrace Street, which is 24.5 feet high. These three buildings occupy the entire Project Site (see Figure 3.1-1). The 20 locations at which PLWs will be evaluated are shown in Figure 3.1-1.

3.1.4 Description of Build Conditions

The one-story structure at 148 Terrace Street will be demolished and replaced with a one-story underground parking garage with a seven-story residential building above. The other two buildings will be completely renovated and converted to residential use. One story will be added to each of these two existing buildings. An open garden area is planned for the rooftop of the middle building, to be 160 Terrace Street. That garden area will be sheltered from north/northeast ("NNE") and south/southwest ("SSW") winds by the two end buildings with their mechanical rooftop extensions. The area will be sheltered from other winds by a parapet 50% open fence along the open edges of the roof. The heights of the buildings and the mechanical rooftop buildings are shown in Figure 3.1-2. The 20 locations evaluated are also shown in Figure 3.1-2. Location 6, 8, 12, and 18 are at main entrances to the buildings. Locations 9, 10 and 13 are in the rooftop garden (for existing conditions they are assumed to be on the roof of the middle building). The other locations were chosen for areas of expected pedestrian activity.

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3.1.5 The Surrounding Area

The Project Site is characterized as open and exposed to the wind. The highest building near the Site is the five-story building at 31 New Heath Street and 158-168 Terrace Street, pictured at the bottom of Figure 3.1-2. The remaining buildings shown in Figure 3.1-2 are one, two, and three stories. Figure 3.1-2 does not show the topographical feature of Mission Hill itself, to the west/southwest ("WSW"), which rises sharply to approximately 60 feet above Terrace Street; and Fort Hill to the southeast ("SE"), which rises approximately 50 feet from Columbus Avenue. The tops of the roofs and trees near the tops of these hills will be at roughly the same height (100 feet above Terrace Street) as the tops of the two end buildings on the Site. The net effect of these hills is to redirect northerly winds south down Terrace Street, and southerly winds north up Terrace Street. The use of the parking lot to the west of the site is restricted to the area shown, due the sharp rise of the ground from the parking lot to Parker Street.

The open spaces between Terrace and Parker Streets, as well as the space north of the site up to the first buildings north of the site, are covered with trees. In estimating the PLWs at the various locations those trees are assumed to be there for both existing and build conditions. Although landscaping is planned for the Project, new features have not been finalized at this time.

3.1.6 The Wind Climate

The Variation of Wind Speed With Height

In general, the natural wind is unsteady (i.e. it is gusty) and its average speed increases with height above the ground¹. Figure 3.1-3 depicts how the average wind speed varies with height for different types of terrain. Although the frequency of such incidents is low, when any building is constructed there is a possibility that the building will bring higher speed winds at the top of the building down to ground level.

Figure 3.1-4 shows schematically how an isolated building typically interacts with the wind. Because wind speed increases with height, as the wind is forced to a stop at the upwind façade, the pressure recovered on that façade is higher near the top than at the bottom of the façade. As a result, the wind flows down the windward façade and forms the vortex upwind of the building shown in Figure 3.1-4. This vortex is stretched and accelerated as it goes around the two upwind lower corners, causing the accelerated flow areas (A) shown on the left hand side of Figure 3.1-4. Similar accelerated areas also occur for winds blowing at the corners of the building (shown in Figure 3.1-4). For southerly winds, the flow around the south end of the Ditson building will behave somewhat like that surrounding an isolated building.

Monolithic buildings (i.e. those that do not change shape with height), if they are significantly taller than most of the surrounding buildings, almost invariably will be

¹ The numbering system for the Categories was reversed in December, 1999. Before December, 1999, the slowest winds were in Category 5 and the fastest in Category 1. Since the December, 1999, the slowest are in Category 1 and the fastest in Category 5.

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windy at their bases. However, when there are many buildings of similar height in an area, they tend to shelter one another.

Statistical Description of the Boston Wind Climate

The Project Site is located about three miles from Logan Airfield. Thus, the wind data from Logan Airfield usually used to define the winds for Boston is applicable. Figure 3.1-5 depicts a wind rose for Boston. The wind speeds are estimated at pedestrian level at the airport. The length of each line radiating from the center of Figure 3.1-5 to the outermost crossing line is proportional to the total time the wind comes from that direction. The other lines crossing the radial lines indicate the frequency of winds less than 7, 10, and 15 mph. As noted in the figure, the wind rose is based on surface wind data from Logan Airfield taken from 1945 to 1965. Data from 1965 to 1999 is also available, but it is not believed to be as representative of the true winds in Boston. Many 25 to 40-story buildings have been built in the financial district of Boston since 1965. The financial district is just one mile west ("W") of Logan Airfield.

Figure 3.1-5 shows that the winds in Boston come primarily from the NW, W, and southwest ("SW"). Figure 3.1-6 through Figure 3.1-9 show pedestrian level wind roses for Boston for winter (Dec., Jan., and Feb.), spring (Mar., Apr., and May), summer (Jun., Jul., and Aug.), and fall (Sept., Oct., and Nov.). These figures show that NW winds tend to occur during the colder months and SW winds during the warmer months. Spring and fall are transitional, but winds are stronger in the spring than in the fall. Strong easterly winds usually occur during storms when there is precipitation.

The average wind speed at Logan Airfield at 58 feet (the average height at which the data was taken) is 12.9 mph. At pedestrian height (i.e. at chest height, 4.5 feet) it is about 8.6 mph. The average wind speeds at 58 and 4.5 feet at Logan Airfield for each month are shown in Figure 3.1-10. Seasonally, the average wind speed at pedestrian level is 9.4 mph in the winter, 9.2 mph in the spring, 7.4 mph in the summer, and 8.2 mph in the fall.

3.1.7 Criteria

Since the early 1980s, the BRA has used a guideline criterion for acceptable winds of not exceeding a 31 mph effective gust more often than once in one hundred hours. The effective gust is defined as the average wind speed plus 1.5 times the root mean square variation about the average. The effective gust can be shown to be about the fastest one-minute gust in an hour. When many locations are considered, the effective gust averages about 1.4 times the average hourly wind speed. However, the ratio can vary widely from 1.4 for individual locations.

In 1978, Melbourne² developed probabilistic criteria for average and peak PLWs, which accounted for different types of pedestrian activity as well as the safety aspects of such winds. Durgin³ has reinterpreted his criteria to apply to Equivalent Average winds (Figure 3.1-11). The Equivalent Average used in this figure is similar to an hourly average, but combines the effects of steady and gusting winds. Five categories of PLWs are defined:

² Melbourne, W.H., "Criteria for Environmental Wind Conditions," Journal of Industrial Aerodynamics, Vol. 3, 1978, pp. 241-249.

³ Durgin, F.H., "Pedestrian Level Wind Criteria Using the Equivalent Average", Journal

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- 1) Comfortable for Long Periods of Standing or Sitting;¹
- 2) Comfortable for Short Periods of Standing and Sitting;
- 3) Comfortable for Walking;
- 4) Uncomfortable for Walking;
- 5) Dangerous and Unacceptable.

These criteria are not absolute (any location can have dangerous winds in a major storm or hurricane). Rather, they imply that the location would have wind speeds such that the activity suggested is possible most of the time, and would be perceived as such, by most people who frequent the location. For example, the PLWs at pedestrian level at Logan Airfield, are on the dividing line between Category 4 (uncomfortable for walking) and Category 3 (comfortable for walking) (see Figure 3.1-11). But they are well under the BRA 31mph effective gust wind speed guideline (converted to an equivalent average wind), which is in the middle of Category 4. Therefore, most people would perceive conditions in the open at Logan Airfield as marginally comfortable for walking.

3.1.8 Pedestrian Level Winds at the Site

The objective of this study is to examine the effects of the proposed Highland Spring Lofts Development buildings on PLWs about them and at nearby buildings.

In the following sections, the effects of NW winter winds, SW summer winds, and easterly storm winds will be discussed for no build and build conditions. The results from these directions will be summarized by an estimated prediction of annual PLWs at each location considered.

The estimated categories for all locations, wind directions, and annual winds for no build and build conditions are shown in Figures 3.1-12 to 3.1-23. The results for all locations, wind directions, and annual winds are tabulated in Table 3.1-1 and summarized in Tables 3.1-2 and 3.1-3 (see the end of this section). Table 3.1-2 indicates both the number of locations that will not change category and those that will change up or down one or two categories. Table 3.1-3 lists each location for which the PLW is expected to change and what that change is expected to be.

For the most part the weather in New England is dominated by either large coastal storms (fall, winter, and spring) or the Bermuda High (summer). Typically, when a coastal storm occurs, it rains or snows for 4 to 12 hours, then it clears, and, as the storm moves to the NE, the winds blow from the NW for three or four days until the next weather system arrives. These storms and the NW winds following them occur mostly in the fall, winter, and spring. NW winds are particularly uncomfortable in the winter, when typically they occur on cold days. The Bermuda High is generally responsible for the SW winds that occur in the summer.

¹ The numbering system for the Categories was reversed in December, 1999. Before December, 1999, the slowest winds were in Category 5 and the fastest in Category 1. Since the December, 1999, the slowest are in Category 1 and the fastest in Category 5.

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3.1.9 Northwest (Winter) Winds

Introduction

NW winds blow diagonally across the site approximately from upper left to lower right. The estimated categories for all locations for existing and build conditions are shown in Figures 3.1-12 and 3.1-13 (also see Tables 3.1-1, 3.1-2 and 3.1-3).

Discussion

For NW winds, PLWs at 19 of the 20 locations considered are not expected to change Category. Thus the PLW Categories at most of the locations considered are not expected to be changed by the proposed buildings. The PLW Category at location 6 increases from Category 2 to 3 because of the increased height (one-to-seven stories) of the most northerly building. See Figures 3.1-12 and 3.1-13.

3.1.10 Southwest (Summer) Winds

Introduction

The prevailing winds in the summer are from the SW. SW winds also blow diagonally across the site, but from the lower left hand corner of Figures 3.1-14 and 3.1-15 to the upper right hand corner. It should be borne in mind that, on hot summer days, some windiness may be desirable. The estimated categories for all locations for existing and build conditions are shown in Figures 3.1-14 and 3.1-15 (also see Tables 3.1-1, 3.1-2 and 3.1-3).

Discussion

For SW winds PLWs at 17 of the 20 locations considered are not expected to change category, or in fact, be significantly affected by the new buildings. The PLW Category at location 4 at the NW corner of the new seven-story building increases from 2-4 as might be expected. At locations 9 and 10 on the roof of the middle building, the PLW Category decreases from 3 to 2 primarily due to the 50% open fence parapet along the W side of the garden. See Figures 3.1-14 and 3.1-15.

3.1.11 Easterly Storm Winds

Easterly winds occur about one third of the time. Light easterly winds occur as a storm starts or in the summer as a sea breeze. During the first 4-12 hours of a typical coastal storm, it rains or snows depending on the temperature. The wind is from the NE or SE depending on whether the center of the storm passes to the east or west of the city.

Since for strong easterly winds, it will generally be raining or snowing, and people expect it to be windy, the emphasis in evaluating the effect of the proposed buildings should be on entering or exiting buildings. Also, because easterly winds cover such a wide range of wind directions, the discussion will cover NE, east ("E"), and SE winds separately in that order. Bear in mind that the total time the winds come from all three of these directions is about the same as the time the wind comes from either the NW or SW.

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3.1.12 Northeast Storm Winds

Introduction

NE winds are the most common of the easterly winds. They approach the site in the opposite direction as SW winds, that is, NE winds blow roughly from the upper right hand corner to the lower left hand corner of **Figures 3.1-16 and 3.1-17**. The estimated categories for all locations for existing and build conditions are shown in **Figures 3.1-16 and 3.1-17** (also see **Tables 3.1-1, 3.1-2 and 3.1-3**).

Discussion

For NE winds, PLWs at 14 of the 20 locations considered are not expected to change PLW Category. Of the six that are estimated to change PLW Category, the Category at location 4 at the NW corner of the new seven-story building increases from 2 to 4 and the Category at location 7 near the NE corner of that new building increases from 3 to 4. The PLW Category at the other four locations (9, 10, 13, and 16) decrease by one Category. Locations 9, 10, and 13 are in the roof garden. See **Figures 3.1-16 and 3.1-17**.

3.1.13 East Storm Winds

Introduction

E winds blow across the site from right to left in **Figures 3.1-18 and 3.1-19**. The estimated categories for all locations for existing and build conditions are shown in these figures (also see **Tables 3.1-1, 3.1-2 and 3.1-3**).

Discussion

For E winds, the PLW categories at 16 of the 20 locations considered are not expected to change. Of the four that are expected to change Category, only location 4 increases its PLW Category (from 2 to 4). Locations 5 and 9 are estimated to have their PLW Category decrease by one, and the PLW Category at location 9 in the middle of the roof garden will decrease from 4 to 2. Again, the locations whose PLW Category increases are at the N end of the proposed seven-story building. See **Figure 3.1-18 and 3.1-19**.

3.1.14 Southeast Storm Winds

Introduction

SE winds are the least common of the easterly winds. They blow the opposite of NW winds; that is, they blow from the lower right to the upper left, as illustrated in **Figures 3.1-20 and 3.1-21**. The estimated Categories for all locations for existing and build conditions are shown in **Figure 3.1-20 and 3.1-21** (also see **Tables 3.1-1, 3.1-2 and 3.1-3**).

Discussion

For SE winds, PLWs at 19 of the 20 locations considered are not expected to change category. Location 7, at the NE corner of the proposed seven-story building is the only

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one that is expected to have its PLW Category change (up from 2 to 3). Location 7 is at an egress doorway and not expected to see much use.

3.1.15 Annual Winds

Introduction

In the above discussion, only winds from five of the eight major compass directions are discussed. South ("S"), W, and North ("N") are not considered. Further, while specific important directions are considered, one cannot infer the overall annual windiness at any location. To remedy this situation, PLW Categories were estimated for the missing S, W, and N wind directions. Those Categories, along with the five for the other wind directions, were then used with an eight compass point statistical description of the Boston wind climate to estimate the overall annual category for each of the 42 locations considered. The resulting estimated Categories for each location for both existing and build conditions are listed in the last two columns in **Table 3.1-1**. In comparing these annual estimates with those for the five specific directions, one must remember that the total occurrence of winds from the NE, E, and SE directions is roughly equal to that for either NW or SW. These annual estimates are qualitative and must be treated as such.

Discussion

For Annual winds the PLW Categories at 14 of the 20 locations are not expected to change. Of the six locations whose PLW Categories do change, the PLW Category increases at three and decreases at the other three. Thee PLW Category at location 4 increases from 2 to 4 and that at locations 2 and 7 from 2 to 3. At locations 9, 10, and 14 the PLW Category decreases from 3 to 2.

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TABLE 3.1-1

ESTIMATED CATEGORIES FOR NW, SW, NE, E, AND SE WIND DIRECTIONS AND ANNUALLY FOR EXISTING AND BUILD CONDITIONS

No.	NW		SW		NE		E		SE		ANNUAL	
	Ex.	Bld.	Ex.	Bld.	Ex.	Bld.	Ex.	Bld.	Ex.	Bld.	Ex.	Bld.
1	1	1	2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2	2	2	3
3	1	1	1	1	2	2	2	2	2	2	2	2
4	2	2	2	4	2	4	2	4	1	1	2	4
5	2	2	3	3	2	2	2	1	1	1	2	2
6	2	3	2	2	1	1	1	1	1	1	2	2
7	1	1	1	1	3	4	3	3	2	3	2	3
8	2	2	3	3	1	1	1	1	1	1	3	3
9	1	1	3	2	2	1	4	2	2	2	3	2
10	2	2	3	2	3	2	3	2	2	2	3	2
11	2	2	3	3	1	1	1	1	1	1	2	2
12	2	2	3	3	1	1	1	1	1	1	3	3
13	2	2	1	1	4	3	3	3	1	1	3	3
14	2	2	3	3	3	3	2	2	3	3	3	2
15	2	2	3	3	3	3	2	2	3	3	3	3
16	2	2	3	3	2	1	1	1	3	3	3	3
17	2	2	3	3	1	1	1	1	4	4	3	3
18	1	1	3	3	1	1	2	2	3	3	3	3
19	2	2	3	3	2	2	2	2	1	1	3	3
20	2	2	3	3	2	2	2	2	2	2	3	3

3.0 Environmental Protection Component

TABLE 2

**SUMMARY OF LOCATIONS THAT CHANGED CATEGORY
BETWEEN EXISTING AND BUILD**

Direction	NW	SW	NE	E	SE	Annual
No Change	19	17	14	16	19	14
Up 2 Cat.	0	1	1	1	0	1
Up 1 Cat.	1	0	1	0	1	2
Down 1 Cat.	0	2	4	2	0	3
Down 2 Cat.	0	0	0	1	0	0

TABLE 3

**LOCATIONS THAT CHANGED CATEGORY
BETWEEN EXISTING AND BUILD AND HOW THEY CHANGED**

Wind Dir.	Category Change	Locations That Changed
NW	2-3	6
SW	2-4	4
	3-2	9, 10
NE	2-1	9, 16
	2-4	4
	3-2	10
	3-4	7
	4-3	13
E	2-1	5
	2-4	4
	3-2	10
	4-2	9
SE	2-3	7
ANNUAL	2-3	2, 7
	2-4	4
	3-2	9, 10, 14

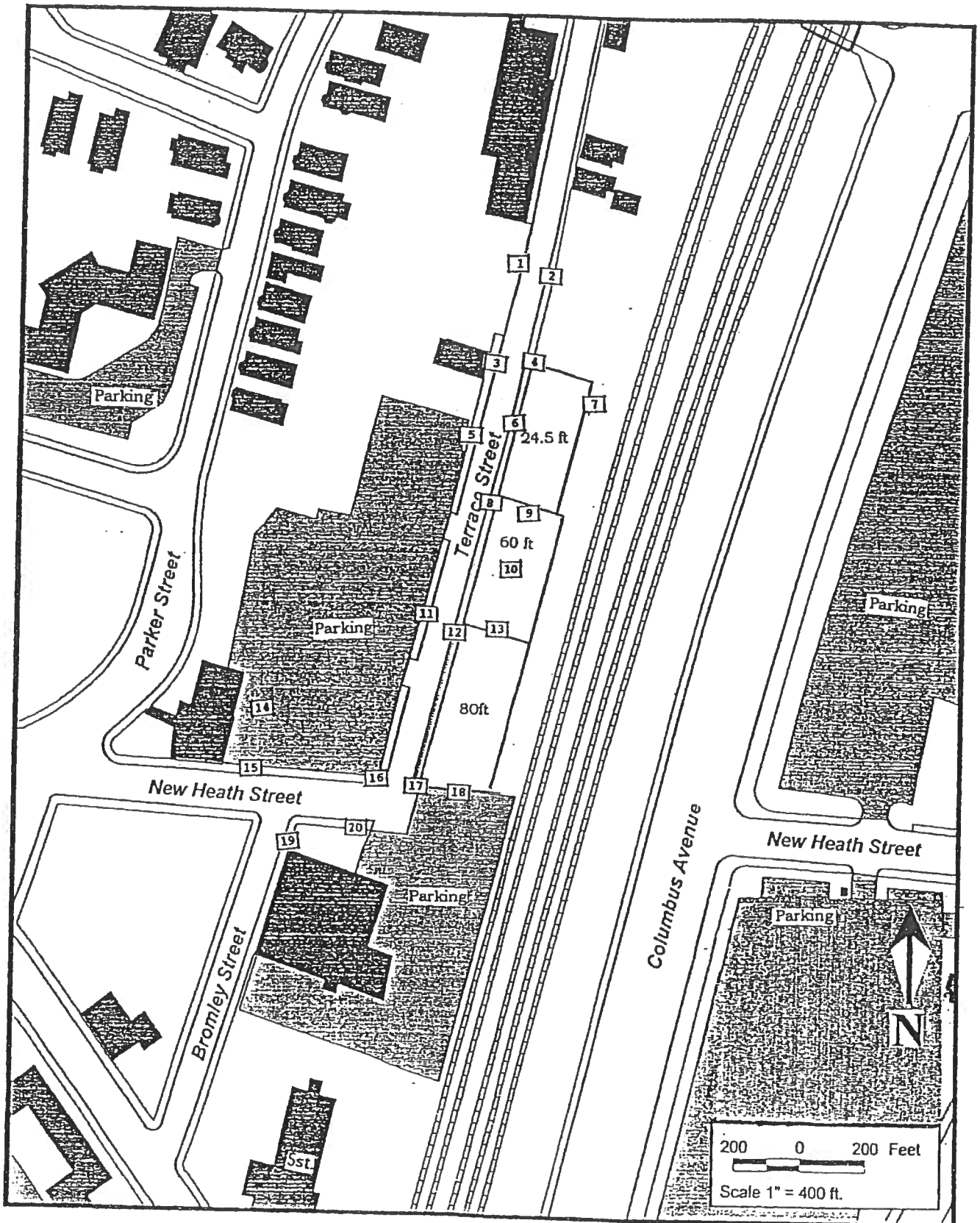


Figure 3.1-1 Area Map of Existing Conditions, Showing PLW Location Numbers.

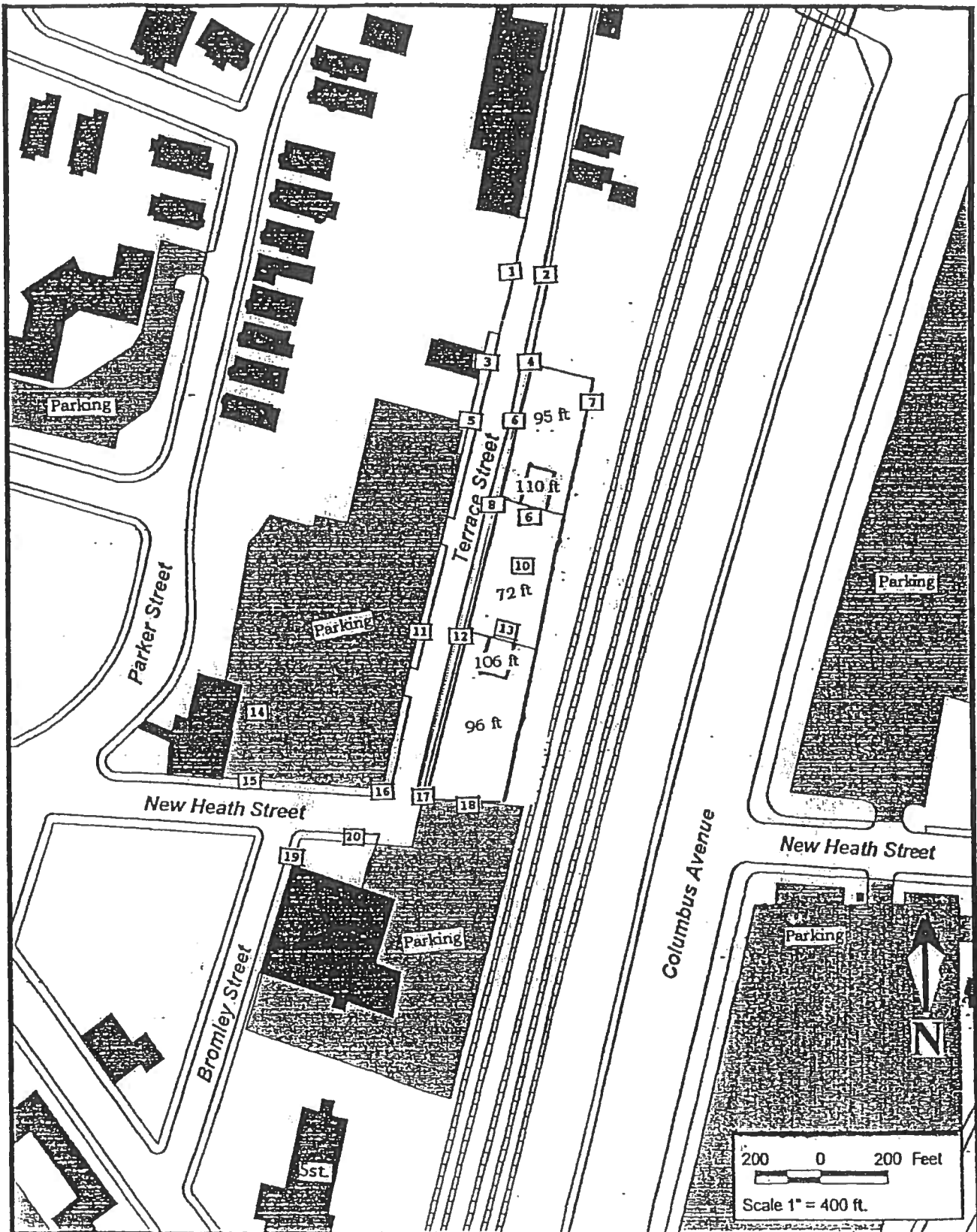


Figure 3.1-2 Map of Highland Springs Lofts Build Conditions and Showing PLW Location Numbers.

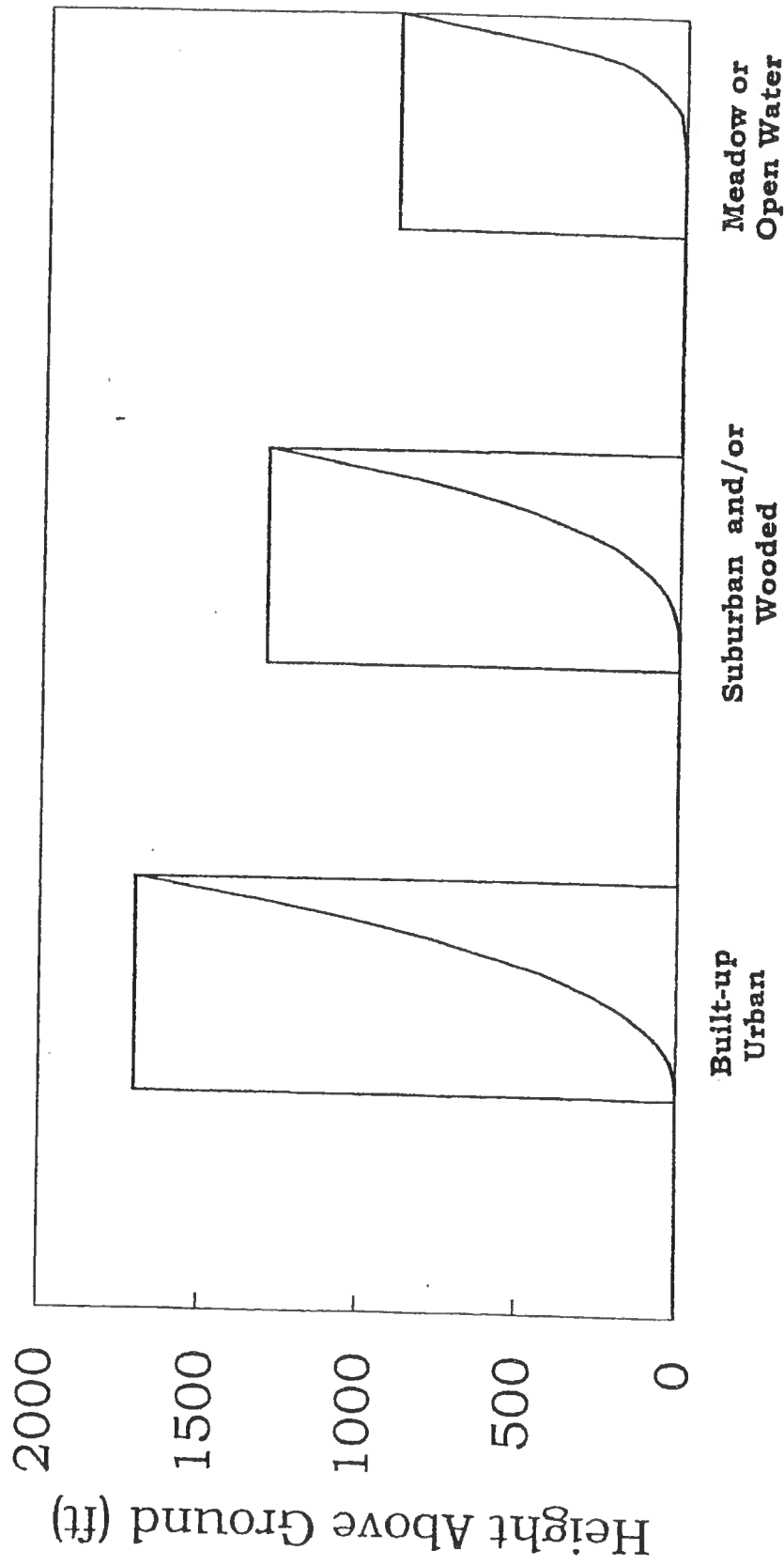


Figure 3.1-3 Types of Earth's Boundary Layer after Davenport¹.

¹ Davenport, A.G., and Isyumov, N., "The Application of the Boundary Layer Wind Tunnel to the Prediction of Wind Loading", Proceedings of Intl. Seminar on Wind Effects on Buildings and Structures, Ottawa, Canada, September, 1967.

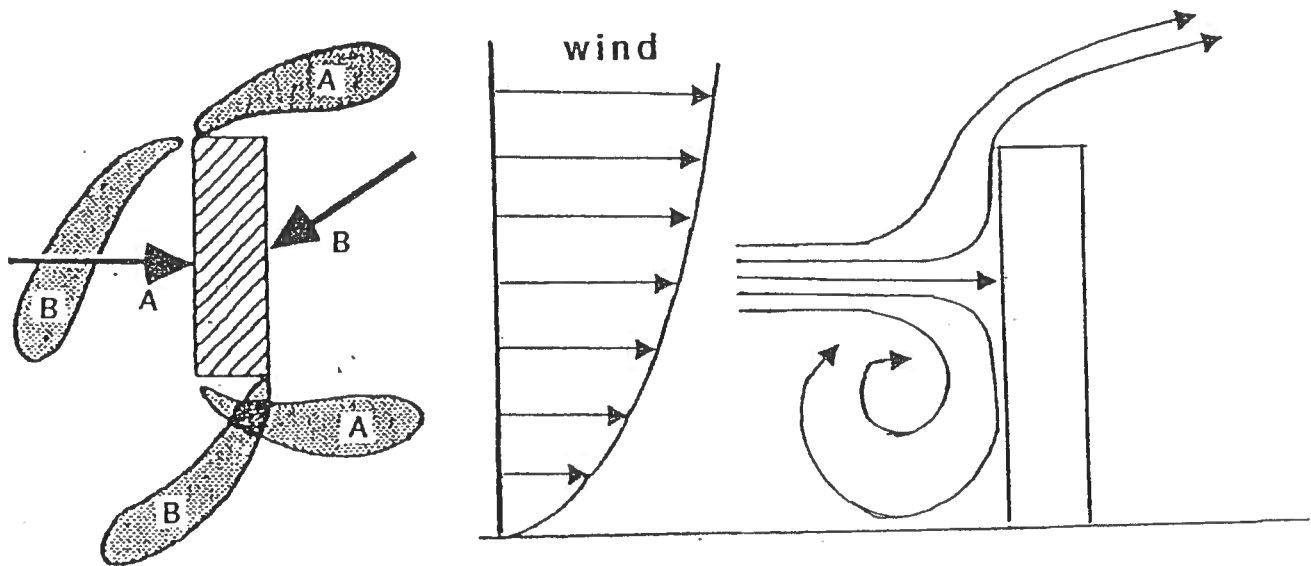


Figure 3.1-4 Schematic of how the Wind interacts with an Isolated Building.

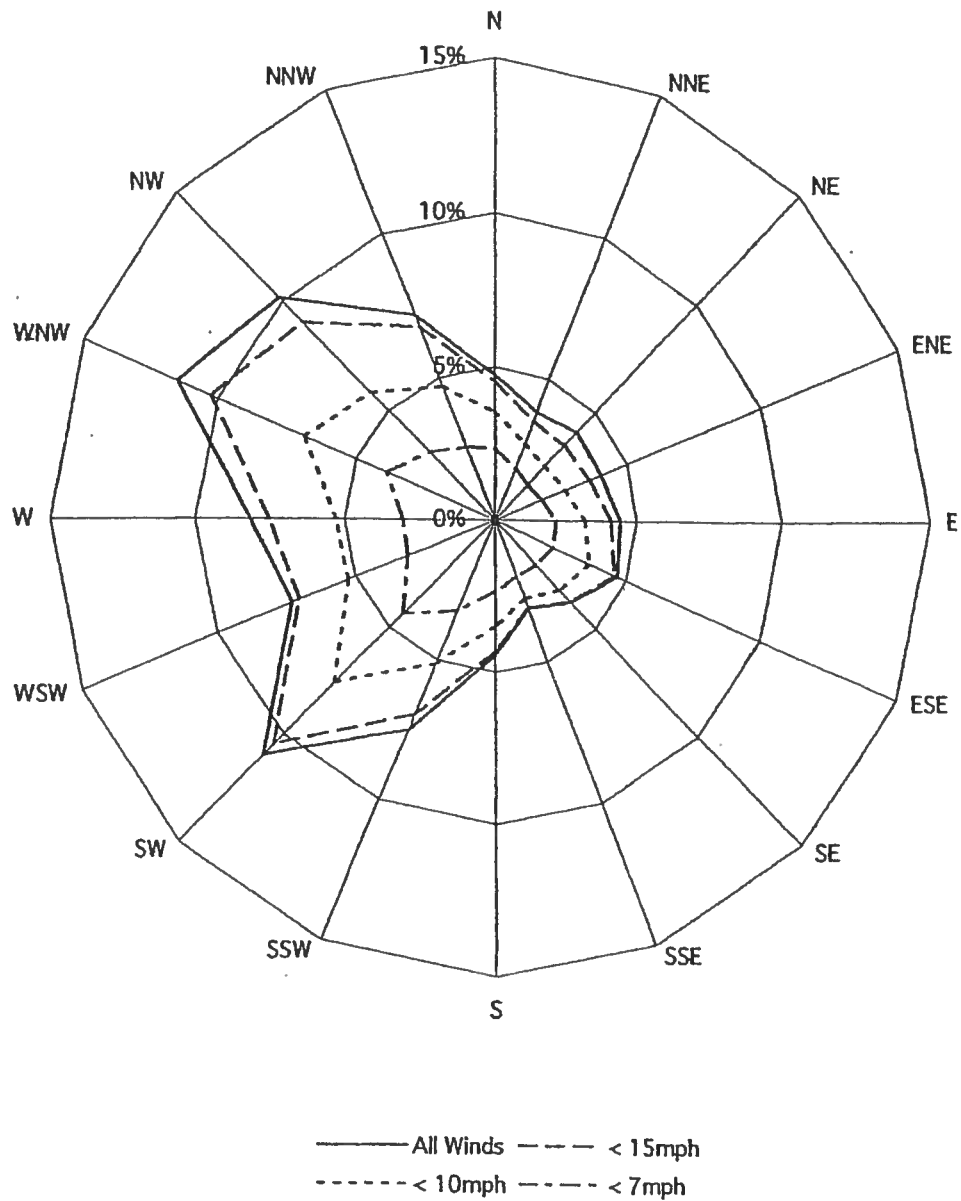


Figure 3.1-5 Annual Pedestrian Level Wind Rose for Boston Based on Surface Data from Logan Airfield 1945-1965.

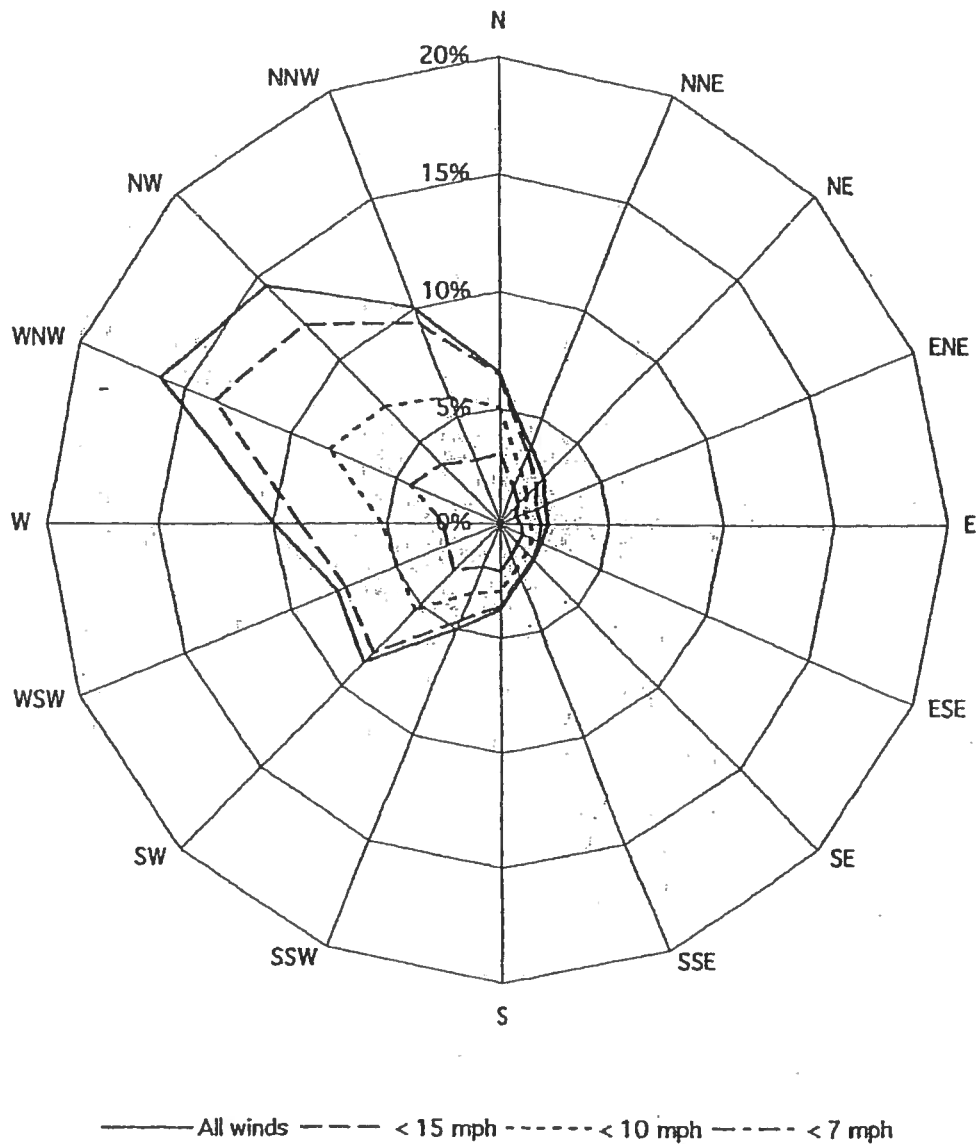


Figure 3.1-6 Winter (December, January, February) Pedestrian Level Wind Rose for Boston Based on Surface Data from Logan Airfield 1945-1965.

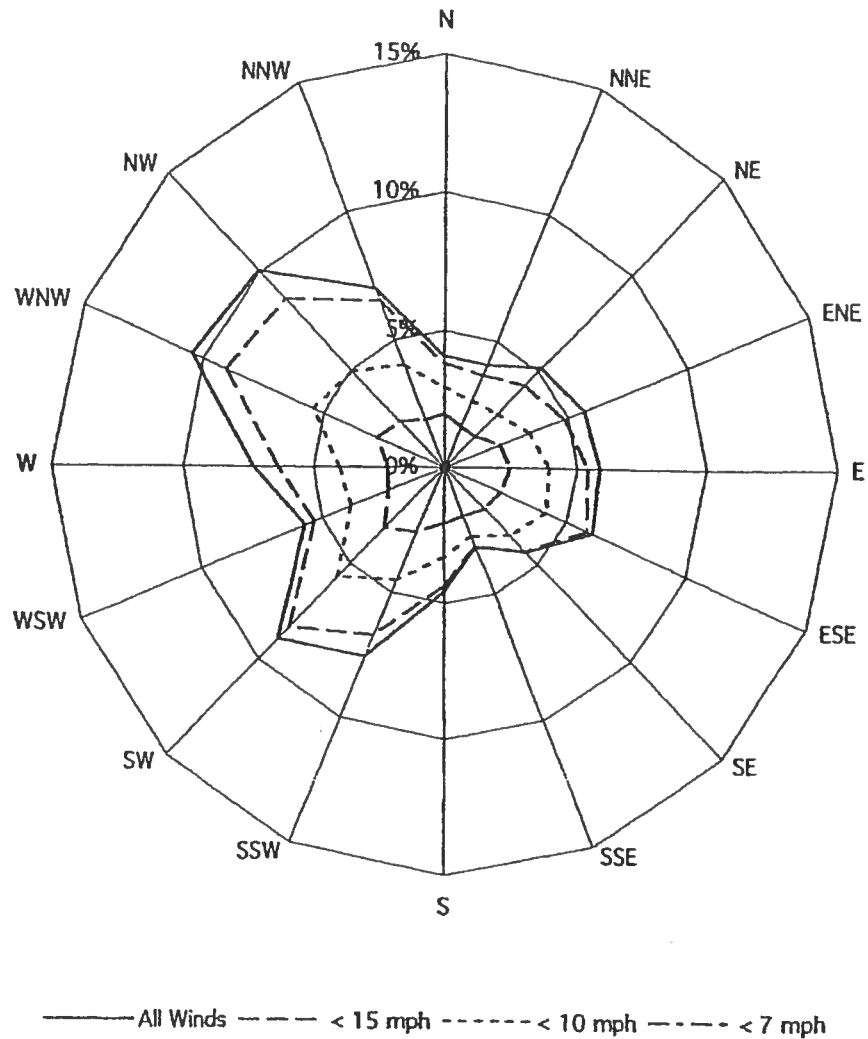


Figure 3.1-7 Spring (March, April, May) Pedestrian Level Wind Rose for Boston Based on Surface Data from Logan Airfield 1945-1965.

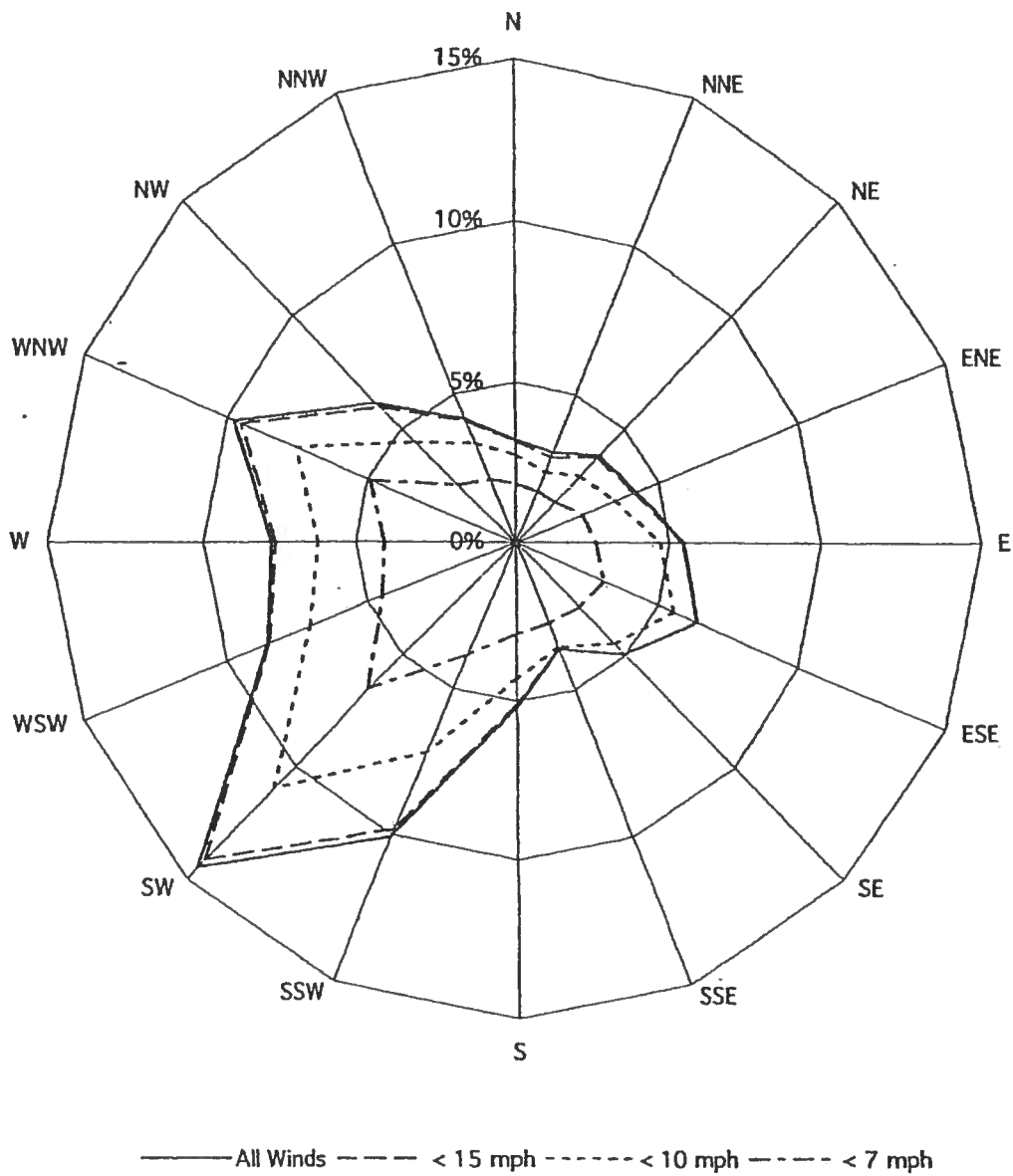


Figure 3.1-8 Summer (June, July, August) Pedestrian Level Wind Rose for Boston Based on Surface Data from Logan Airfield 1945-1965.

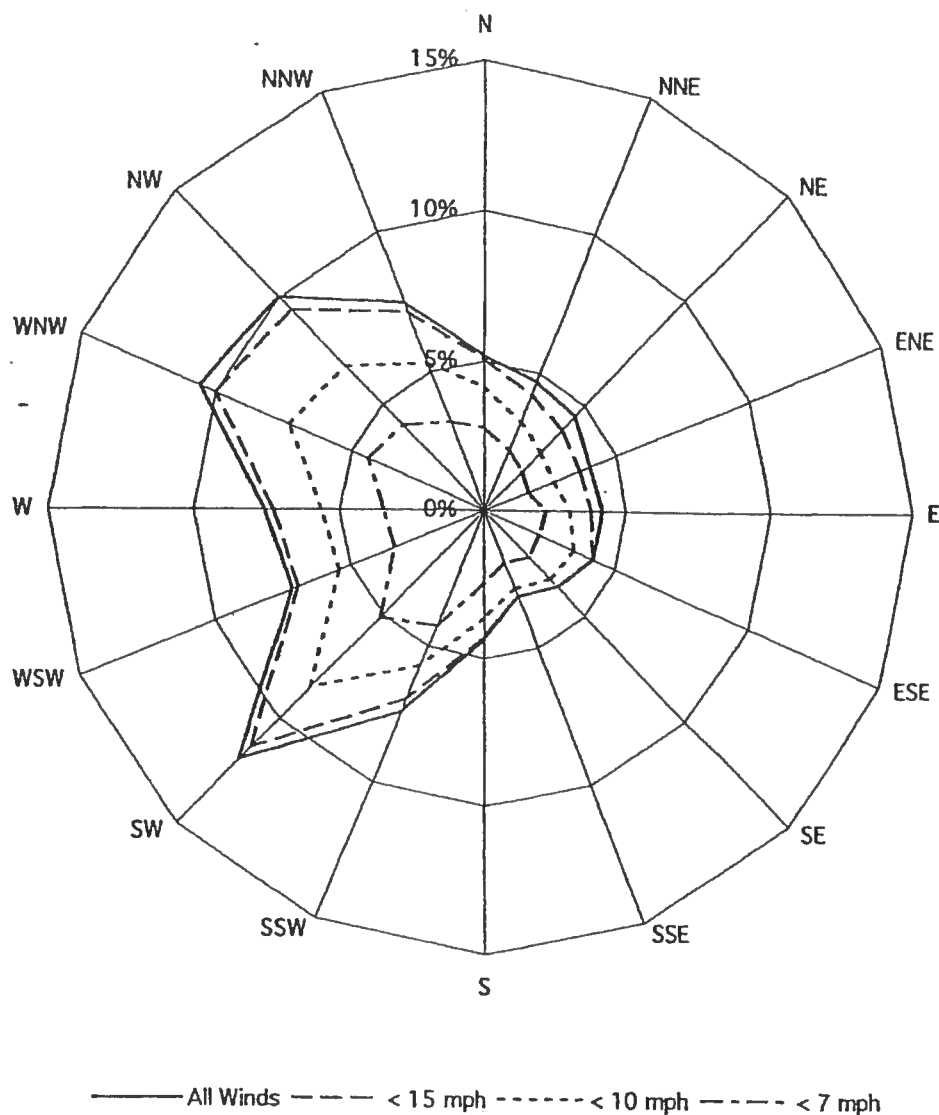
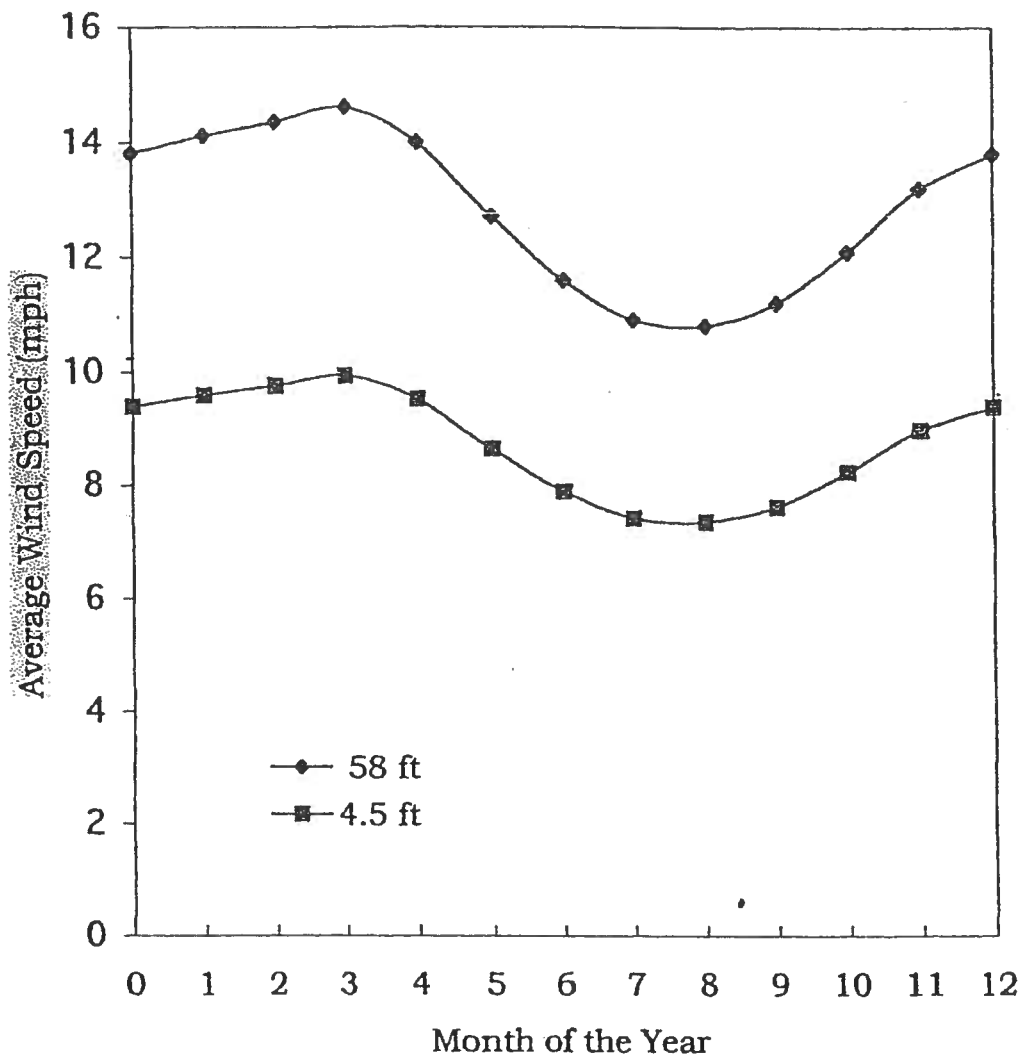


Figure 3.1-9 Fall (September, October, November) Pedestrian Level Wind Rose for Boston Based on Surface Data from Logan Air Field 1945-1965.



Yearly Average is 12.9 mph at 58 feet

Figure 3.1-10 Average Wind Speed at Logan Airfield Based on Surface Data from 1945-1965.

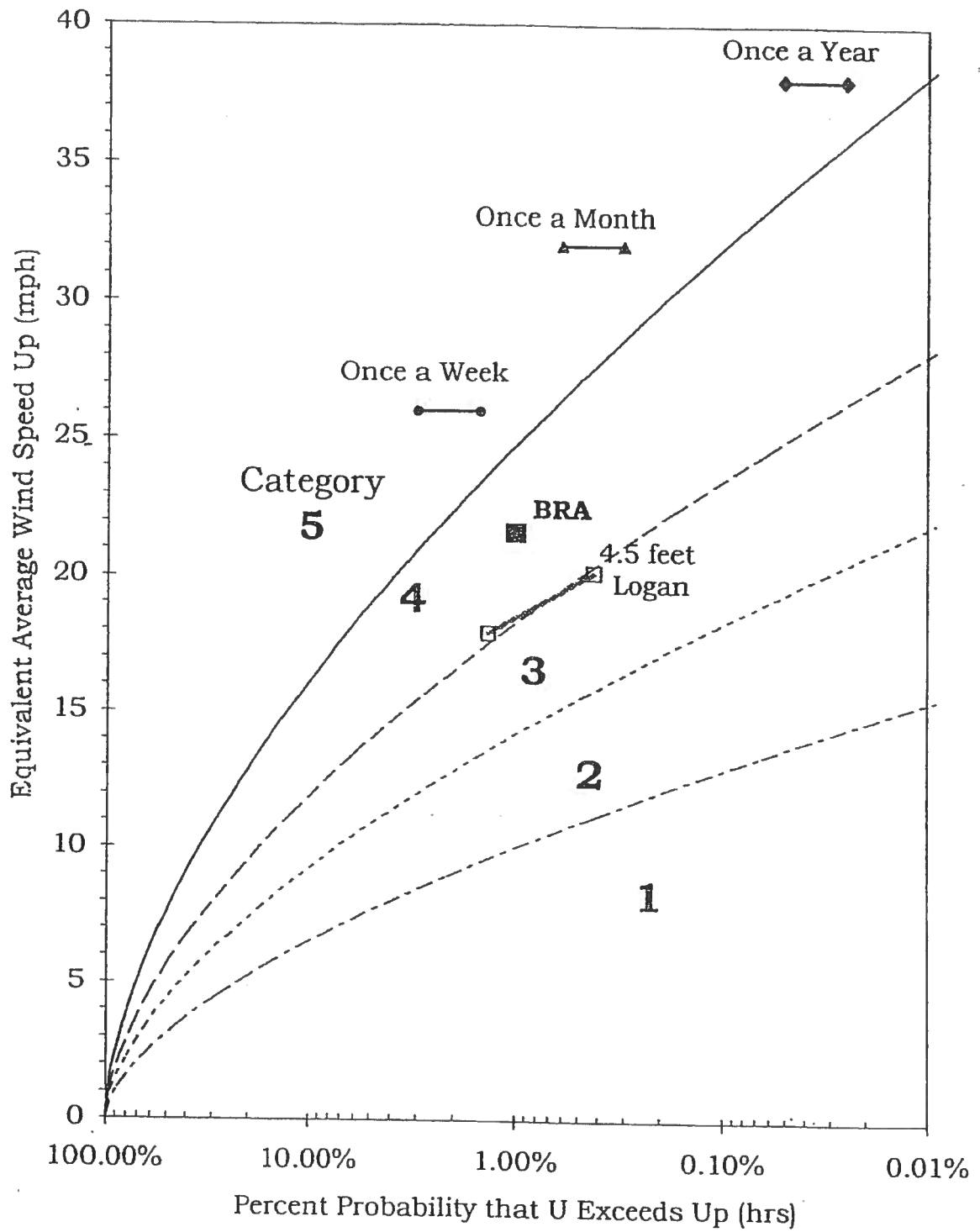


Figure 3.1-11 Pedestrian Level Wind Criteria for Equivalent Average Winds.

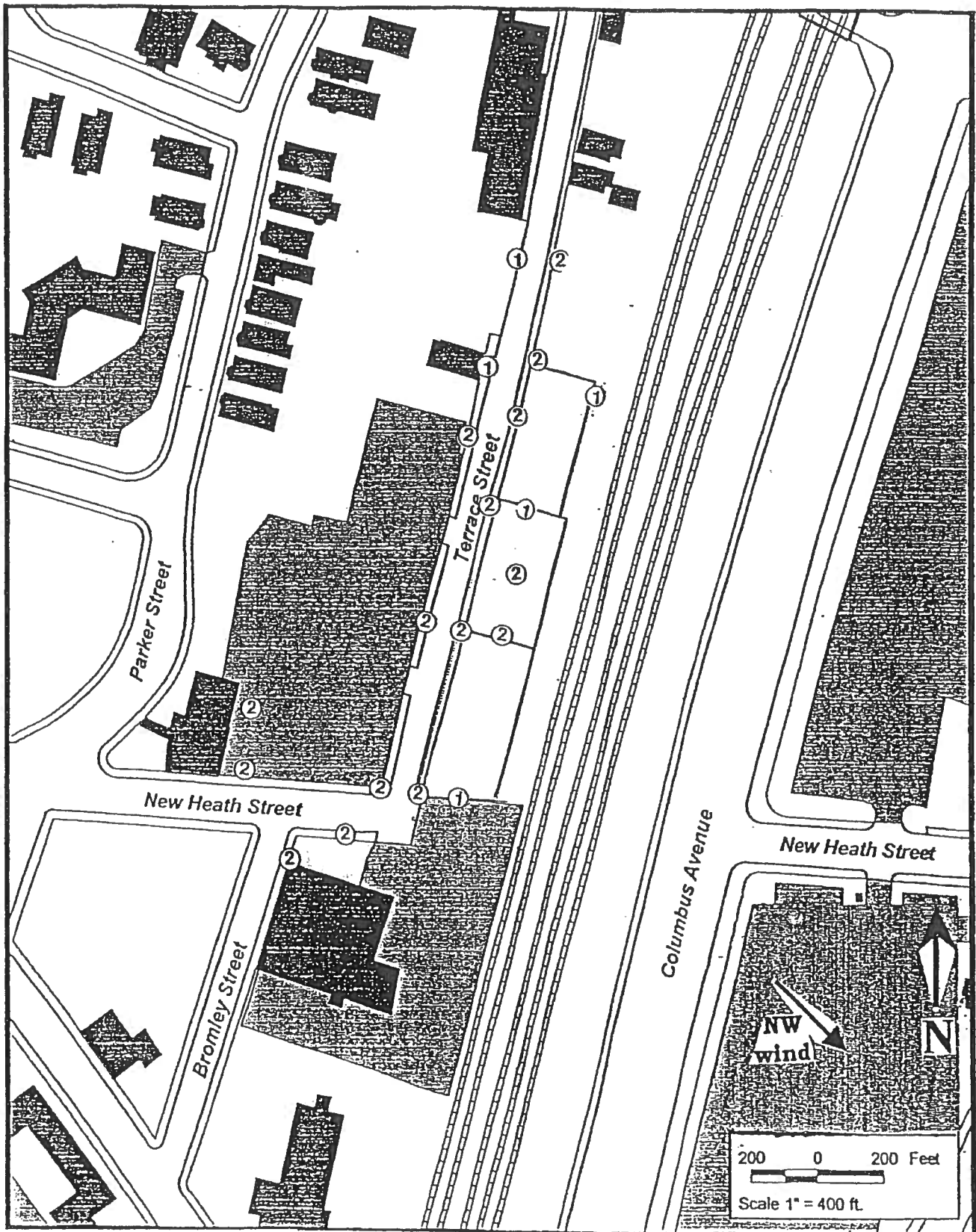


Figure 3.1-12 Categories for Existing Conditions with NW Winds.

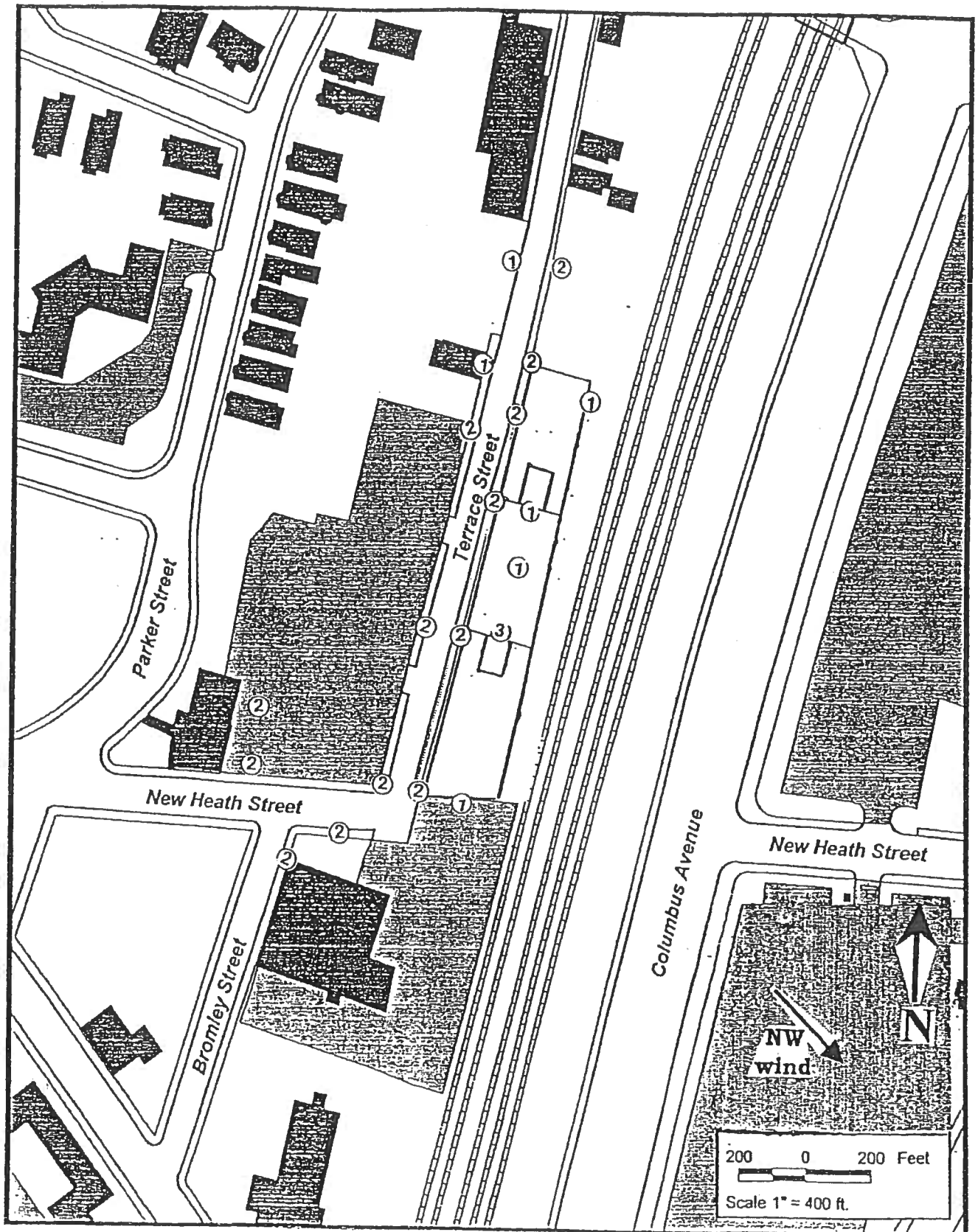


Figure 3.1-13 Categories for Highland Springs Lofts Build Conditions with NW Winds.

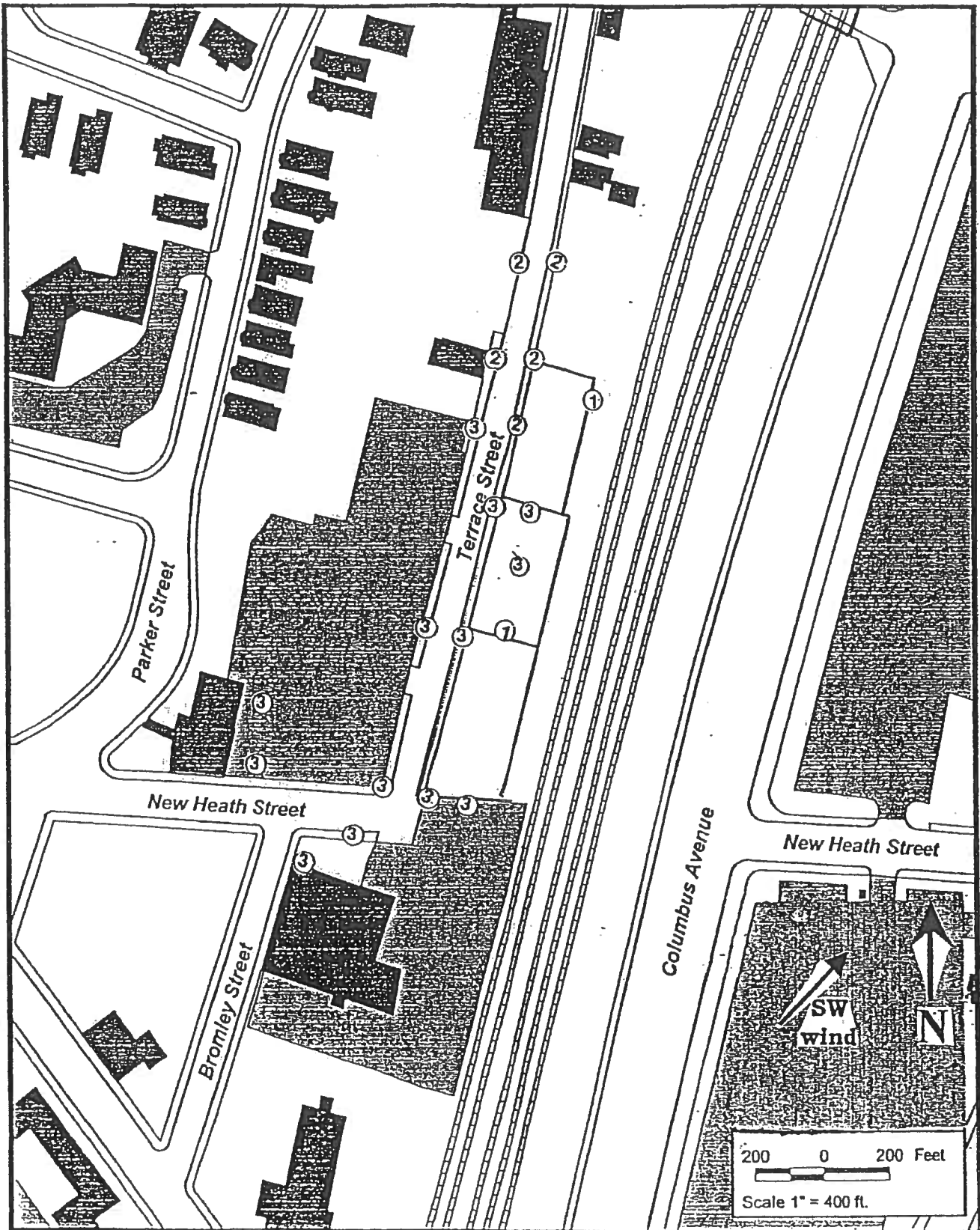


Figure 3.1-14 Categories for Existing Conditions with SW Winds.

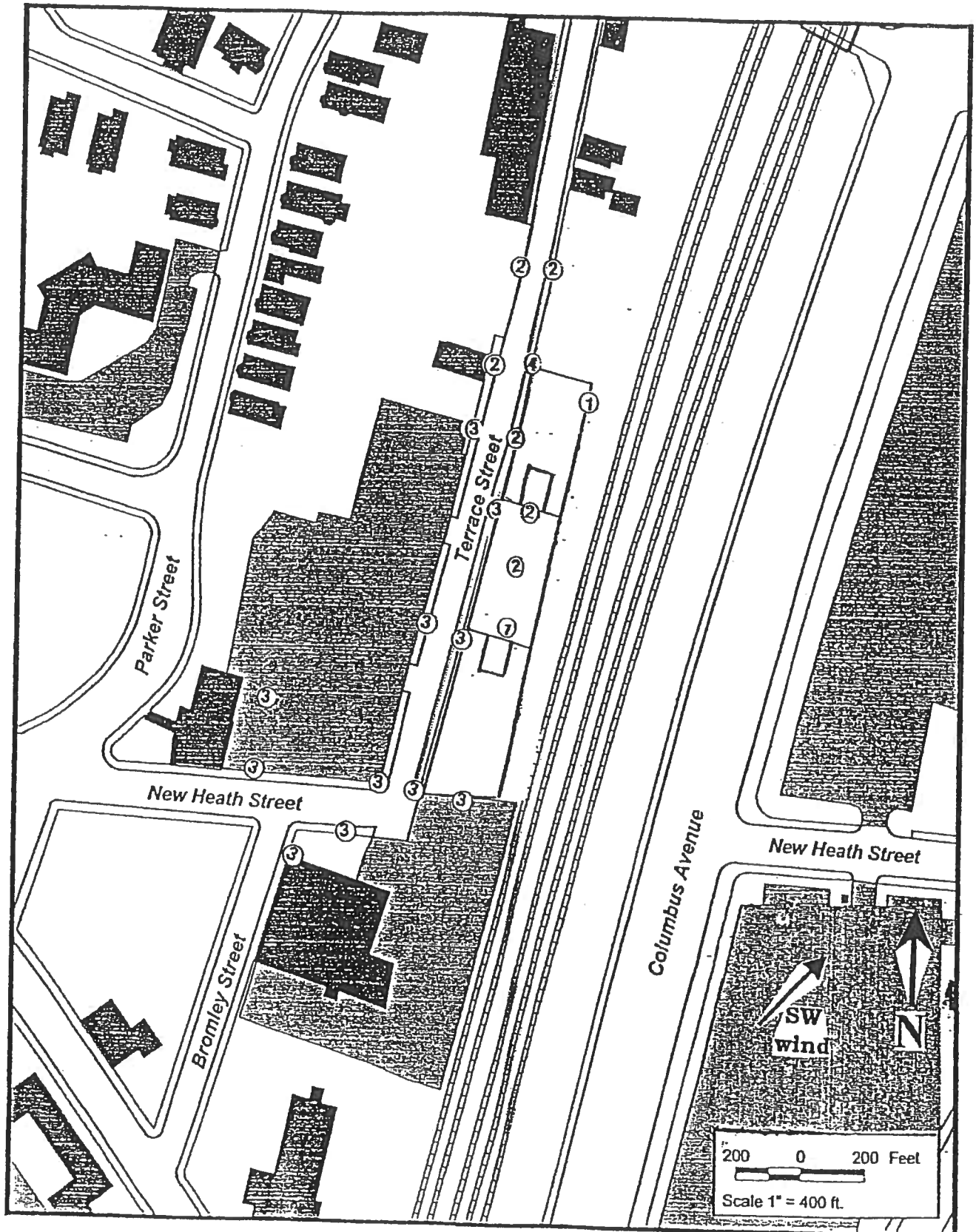


Figure 3.1-15 Categories for Highland Springs Lofts Build Conditions with SW Winds.

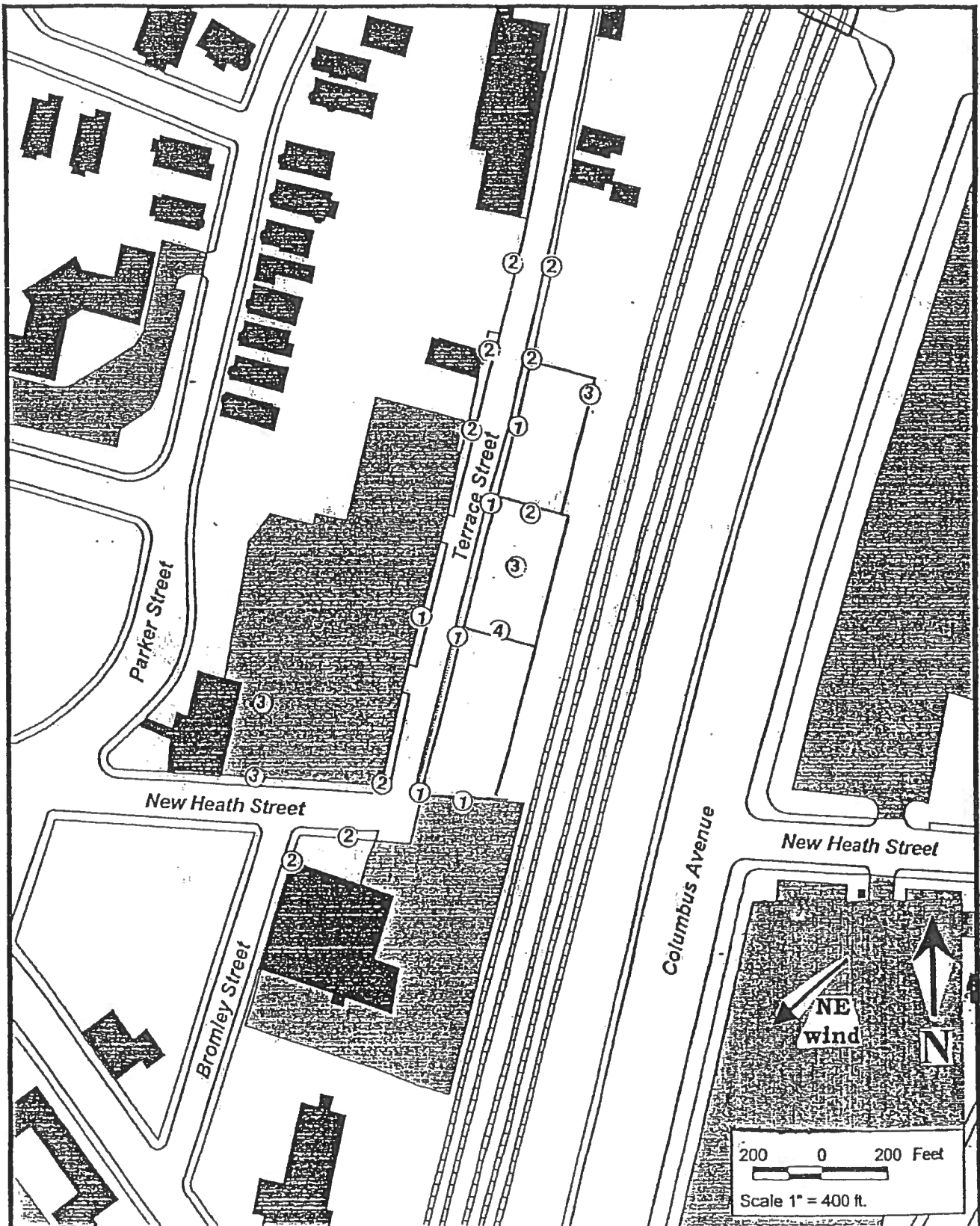


Figure 3.1-16 Categories for Existing Conditions with NE Winds.

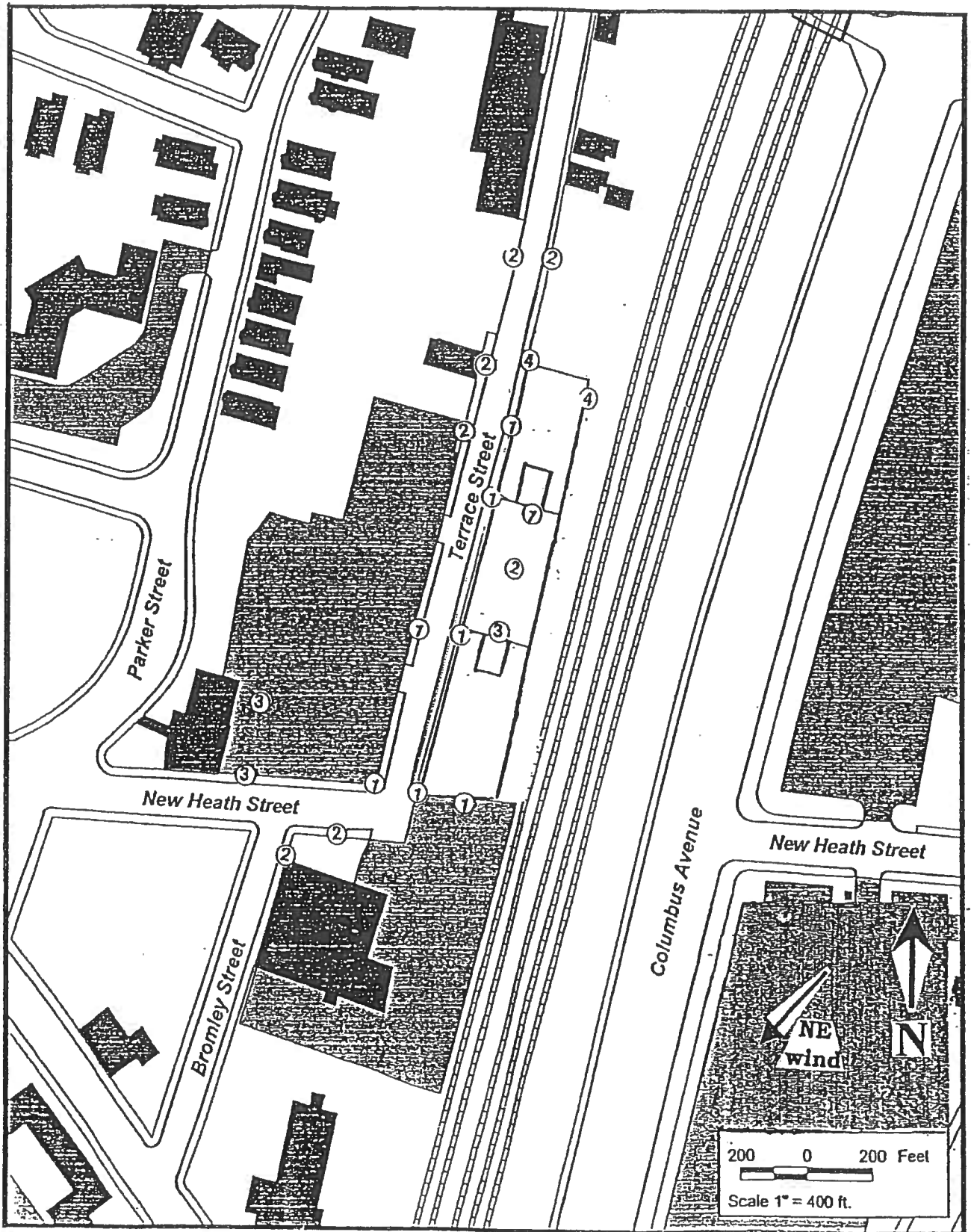


Figure 3.1-17 Categories for Highland Springs Lofts Build Conditions with NE Winds.

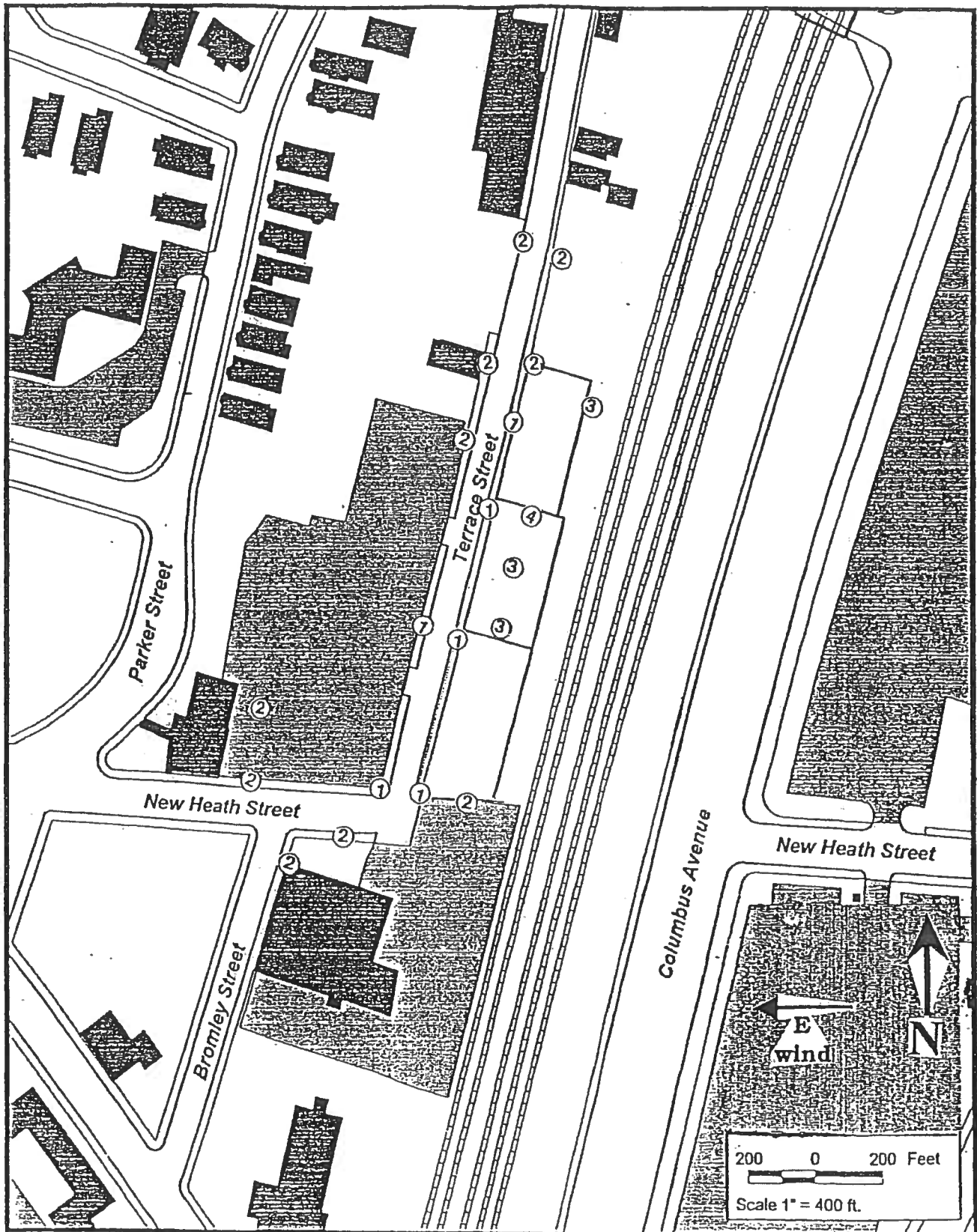


Figure 3.1-18 Categories for Existing Conditions E Winds.

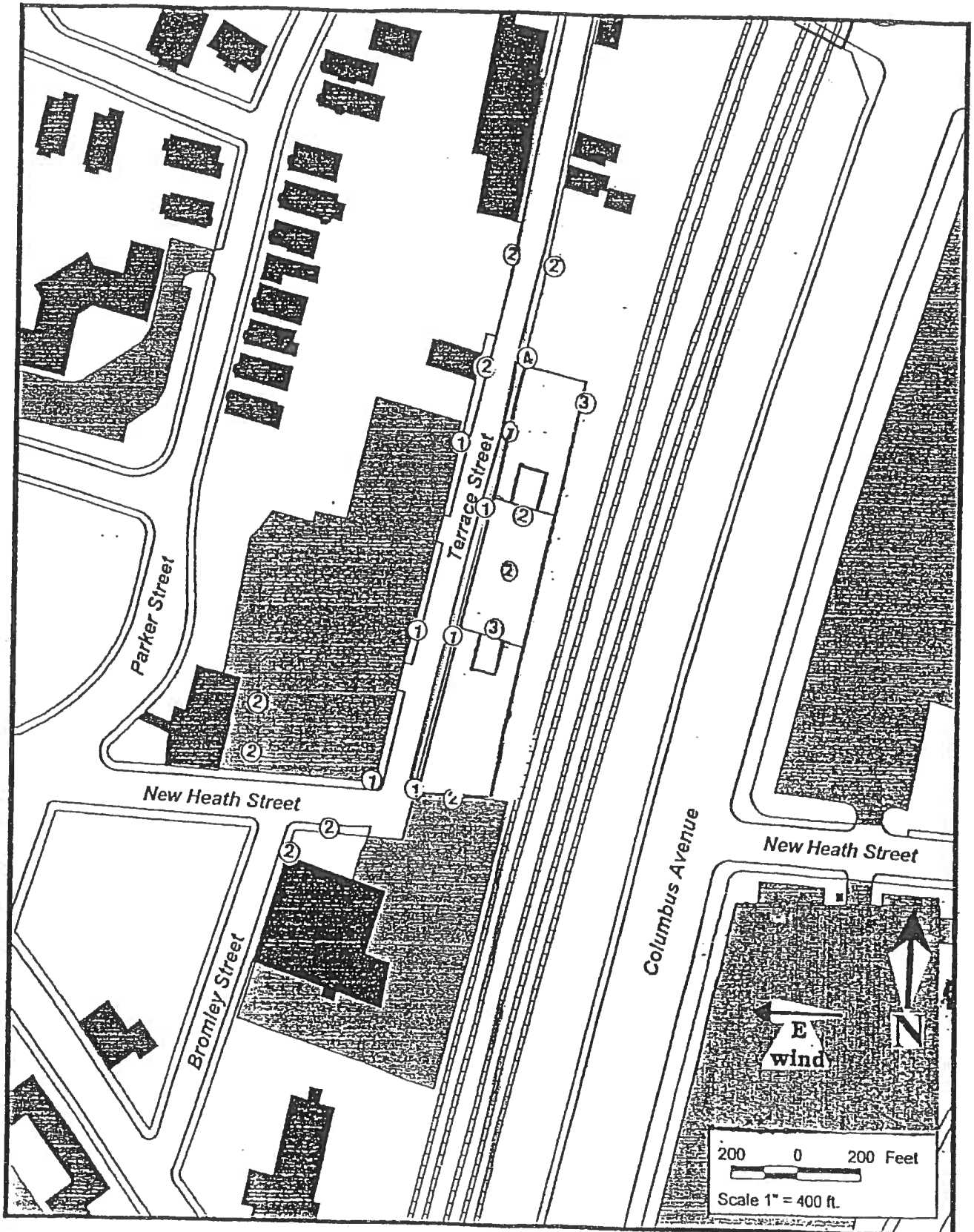


Figure 3.1-19 Categories for Highland Springs Lofts Build Conditions with E Winds.

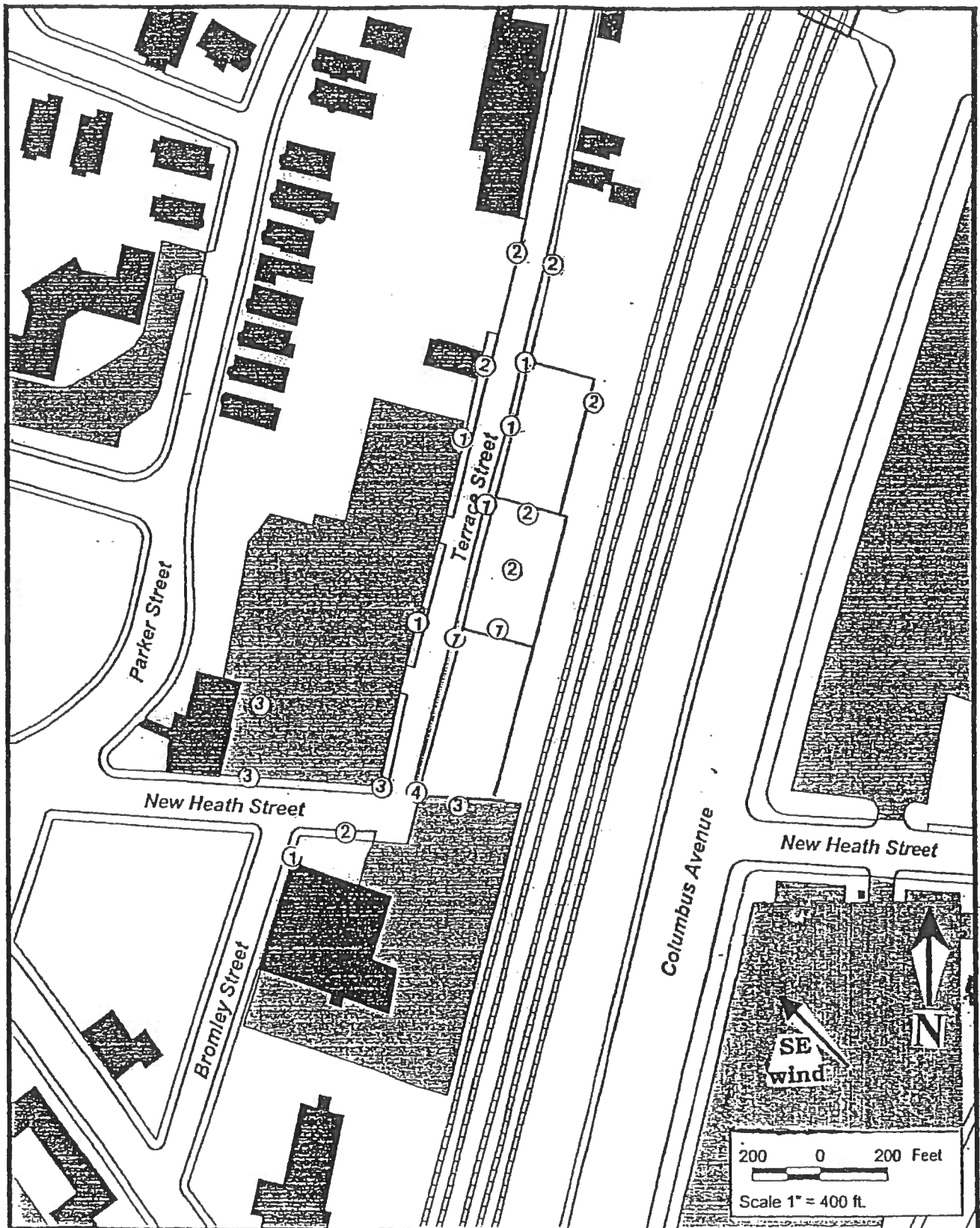


Figure 3.1-20 Categories for Existing Conditions with SE Winds.

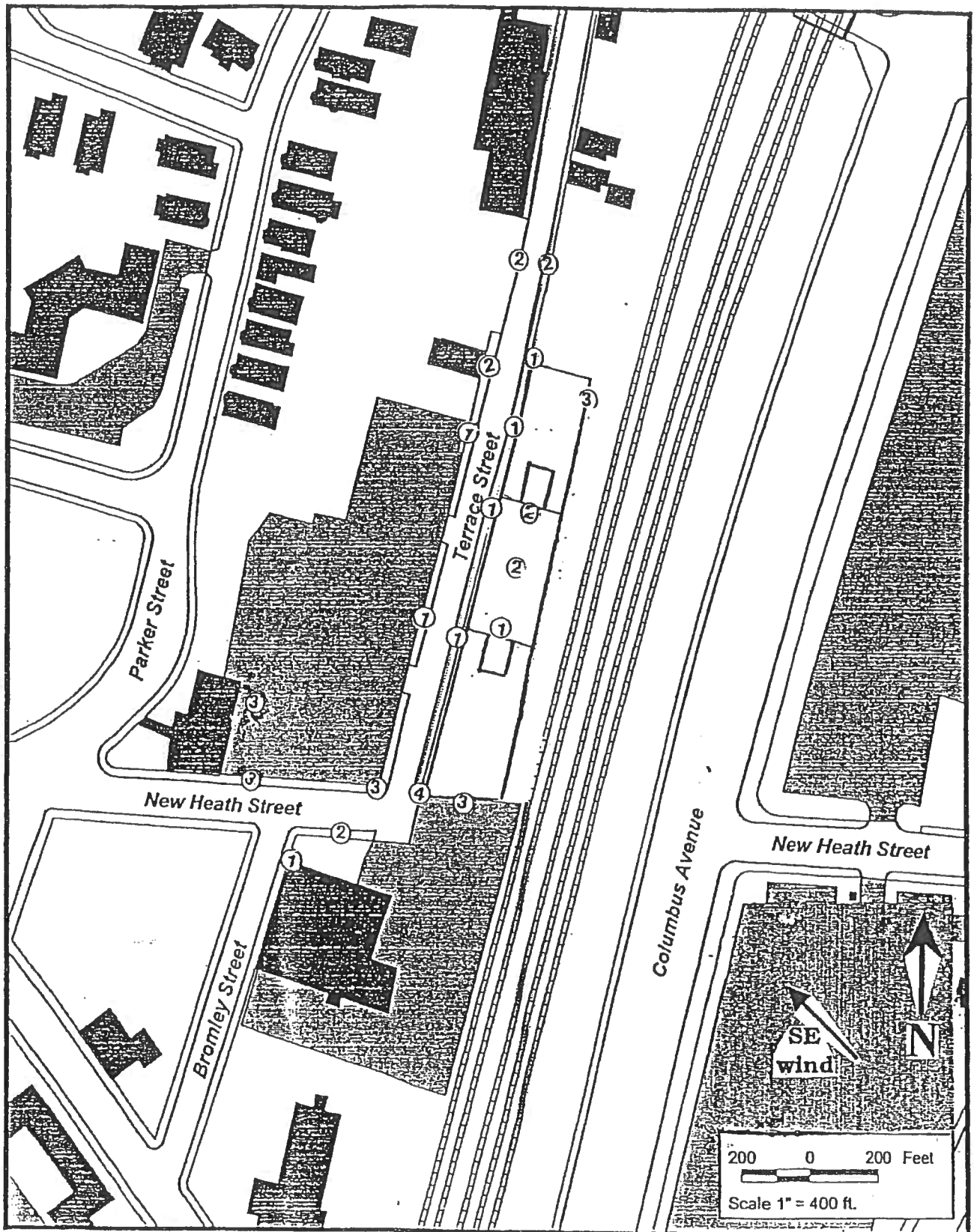


Figure 3.1-21 Categories for Highland Springs Lofts Build Conditions with SE Winds.

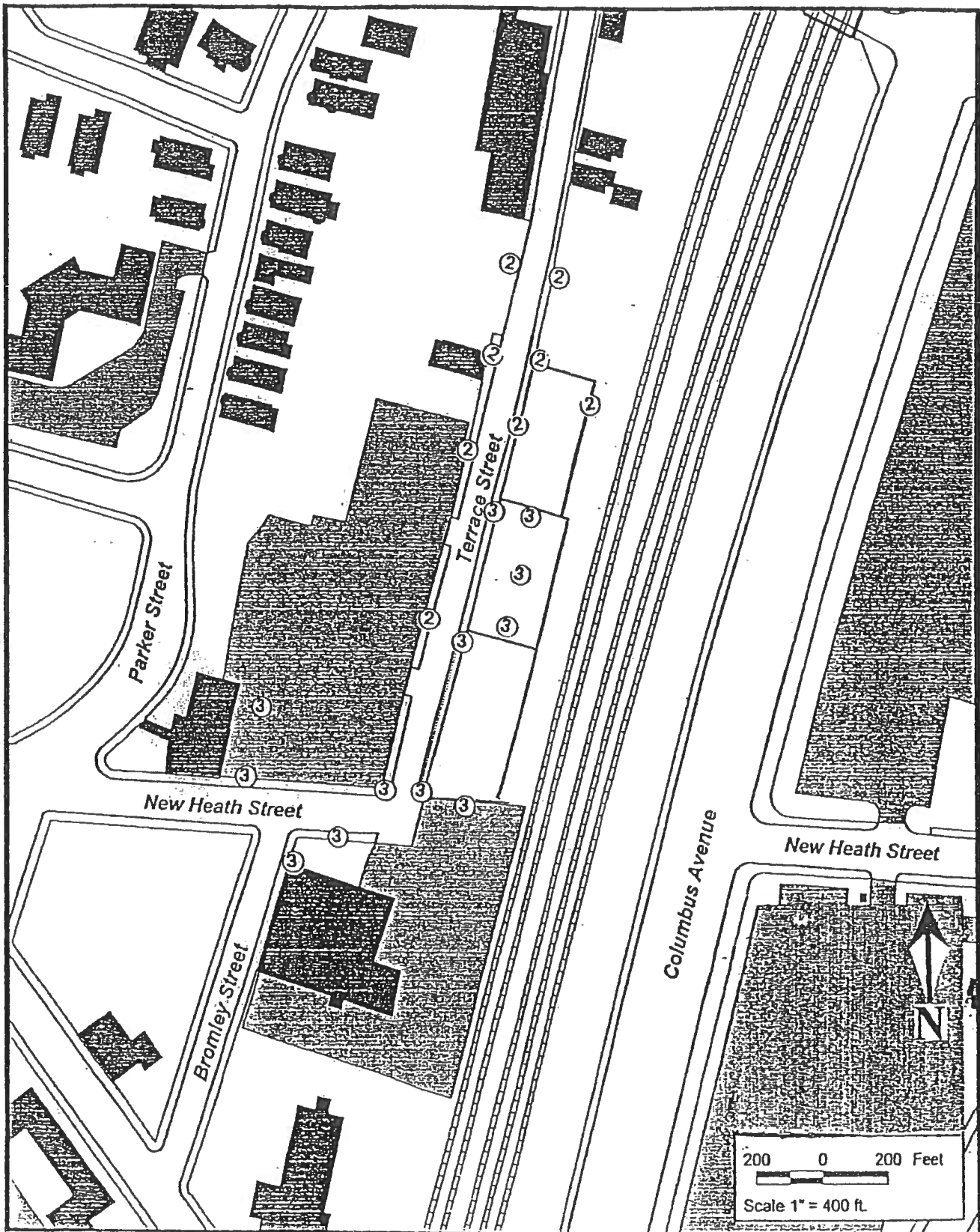


Figure 3.1-22 Estimated Annual Categories for Existing Conditions.

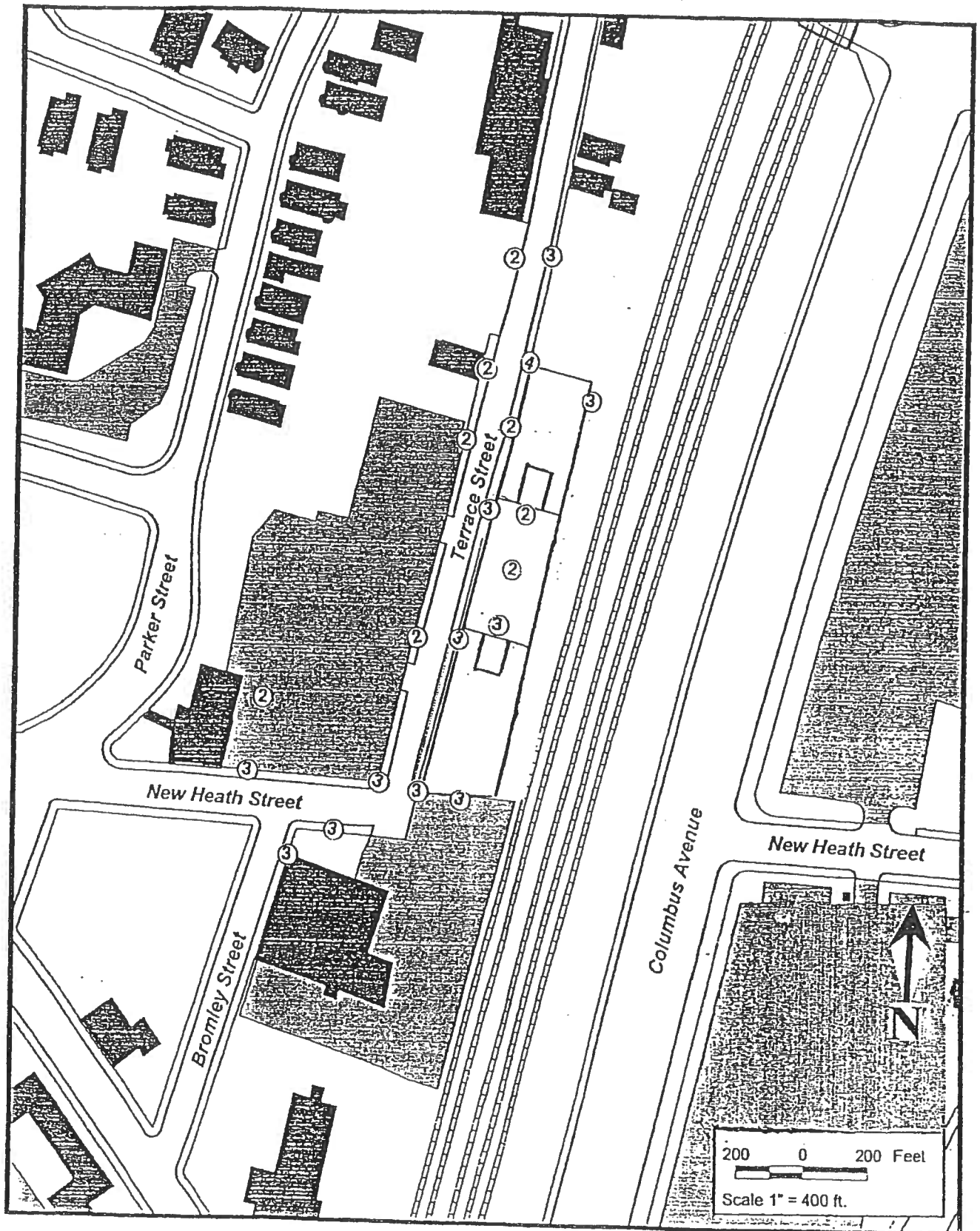


Figure 3.1-23 Estimated Annual Categories for Highland Springs Lofts Build Conditions.

APPENDIX D – DPIR DAYLIGHT IMPACTS ANALYSIS

**Daylight Analysis – Prepared by Daylor
Consulting Group**

3.0 Environmental Protection Component

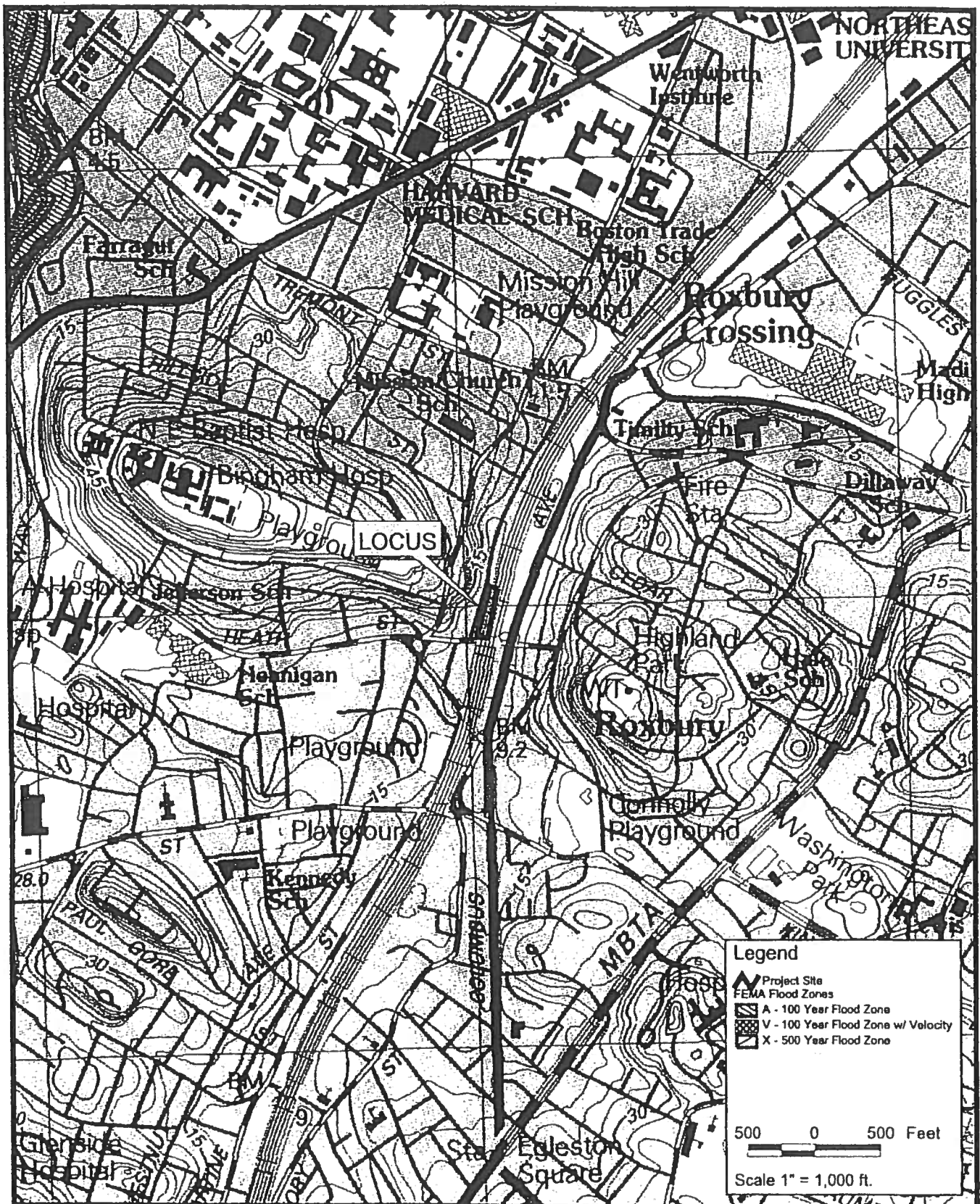
3.6 Daylight Component

3.6.1 Introduction

The purpose of the daylight study is to estimate the extent to which the Proposed Project restricts the amount of daylight reaching streets or pedestrian ways in the immediate vicinity of the Project Site. This study has evaluated daylight obstruction for the existing (no build) and proposed (build) configurations along Terrace Street and across the railroad tracks at Columbus Avenue. The building located at 31 Heath Street was also evaluated as a comparative neighborhood context value.

3.6.2 Methodology

The daylight study was performed utilizing the Boston Redevelopment Authority Daylight Analysis ("BRADA") computer program. Using BRADA, a silhouette view of the building is taken at ground level from the middle of the adjacent city streets or pedestrian ways centered on the building(s) in question. The façade of the building facing the observation point, including heights, setbacks, corners, and other features is plotted onto a base map using lateral and elevation angles. The two-dimensional base map produced by BRADA represents a figure of the building in the "sky dome" from the observation point chosen. The percent obstruction of daylight from the observation point is calculated by BRADA based on the width of the view, the distance between the observation point and the building, and the massing and setbacks incorporated into the design of the building. Wide sites or complex buildings sometimes require breaking the Site up into multiple portions that are run through the BRADA software separately, and the results are summed up to estimate the total daylight obstruction for the Site.



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Inc.

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Created by Scott FitzGerald

FEMA Flood Zone Boundaries

148-166 Terrace Street

6/19/01



Figure
3.5-1

Sources: MassGIS, USGS, FEMA

1864 apr

3.0 Environmental Protection Component

3.6.3 Observation Points

The daylight analysis encompassed consideration of four observation points around the Project Site including:

- Terrace Street (Observation Point A): No Build and Build
- Columbus Avenue (Observation Point B): No Build and Build
- Bromley Street (Observation Point C): Context [View of 31 Heath Street]
- Heath Street (Observation Point D): Context [View of 31 Heath Street]

A plot plan of the existing configuration and the observation points used for the study is shown on **Figure 3.6-1, Existing Configuration: Observation Points**, at the end of this section (**Figures 3.6-2 through 3.6-5** follow). A plot plan of the proposed configuration and the observation points used for the study is shown on **Figure 3.6-2, Proposed Configuration: Observation Points**.

3.6.4 Results

A daylight analysis was conducted to evaluate the daylight obstruction of the proposed buildings versus the daylight obstruction of the existing buildings both on the Site and in proximity to the Site. **Figure 3.6-1** and **Figure 3.6-2** identify the observation point locations analyzed. **Figures 3.6-3 through Figure 3.6-5** graphically illustrate the analysis results. Daylight obstruction will increase along both the Terrace Street and Columbus Avenue façades. The results of the daylight analysis are summarized below:

Table 3.6-1. Summary of Daylight Obstruction

Observation Point	Street/Elevation	Existing (No Build) Configuration	Proposed (Build) Configuration
A	Terrace Street	74.3%	81.9%
B	Columbus Avenue	11.0%	43.1%
C	Bromley Street (Context)	9.7%	-
D	Heath Street (Context)	18.5%	-

3.6.5 Analysis of Results

Terrace Street Elevation – Observation Point A

Observation Point A is located in Terrace Street centered halfway along the proposed façade. **Figure 3.6-3** shows perspectives of the No Build and Build configurations. Under the existing case, 74.3% of the daylight is obstructed, while the Proposed Project has an 81.9% daylight obstruction.

3.0 Environmental Protection Component

Columbus Avenue – Observation Point B

Observation Point B is located in Columbus Avenue centered halfway along the proposed façade. Figure 3.6-4 shows perspectives of the No Build and Build configurations. Under the existing case, 11.0% of the daylight is obstructed, while the Proposed Project has a 43.1% daylight obstruction.

Bromley Street – Observation Point C

Observation Point C is located in Bromley Street centered halfway along the existing façade of the building located at 31 Heath Street. Figure 3.6-5 (top image) shows a perspective of the building. The building obstructs 9.7% of the daylight.

Heath Street – Observation Point D

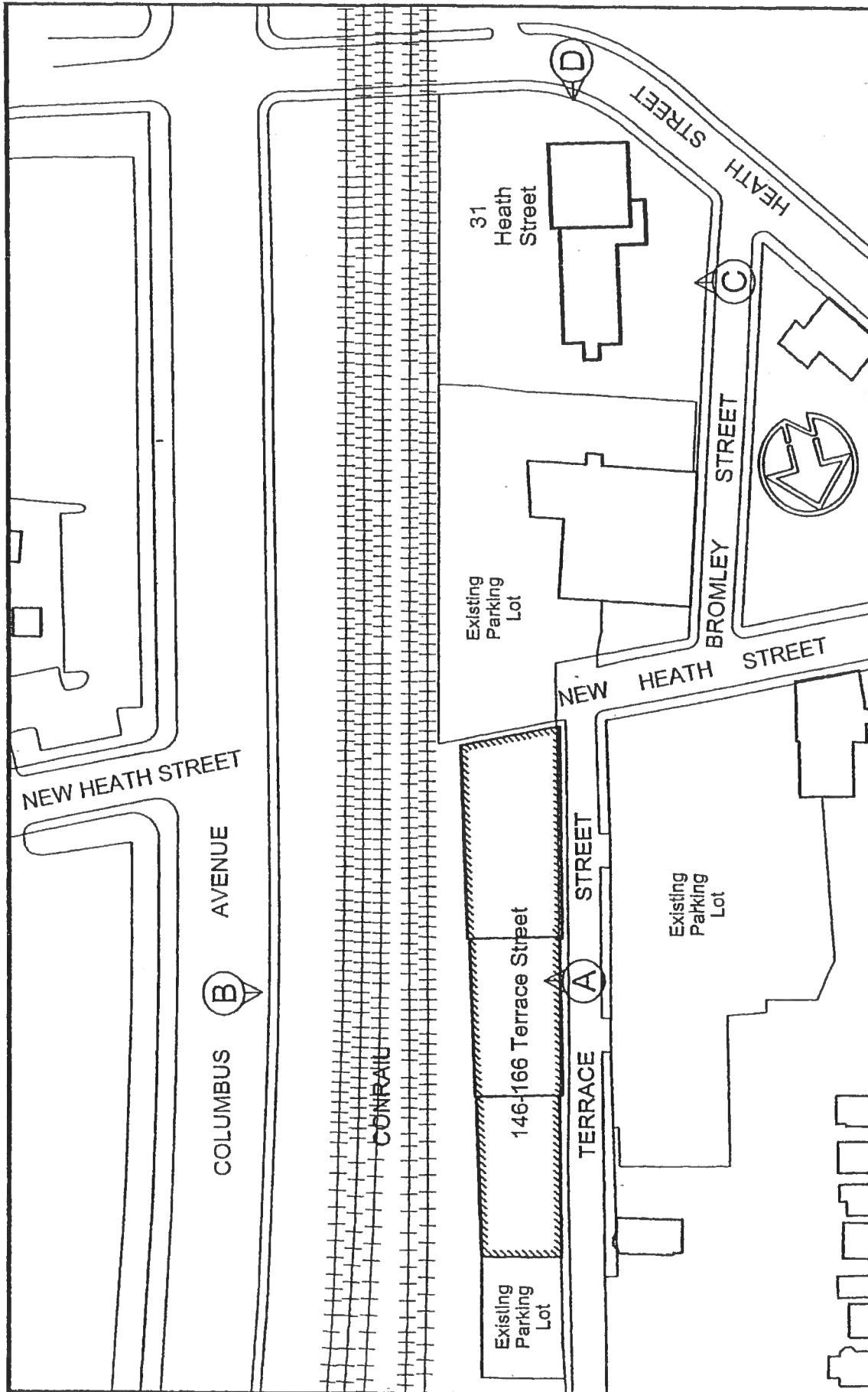
Observation Point D is located in Heath Street centered halfway along the existing façade of the building located at 31 Heath Street. Figure 3.6-5 (bottom image) shows a perspective of the building. The building obstructs 18.5% of the daylight.

Summary of Existing vs. Proposed

The Proposed Project slightly increases the daylight obstruction along Terrace Street and increases the daylight obstruction along Columbus Avenue. The increase in daylight obstruction along Columbus Avenue can be attributed to the distance the site is from Columbus Avenue; the further a building is away from an observation point, the more the bulk of the building is concentrated along the center of the “sky dome” and any increases in height near the center of the “sky dome” results in a greater increase in daylight obstruction than increases in height off to the sides of the “sky dome”. The Proposed Project value of 43.1% along Columbus Avenue is still a relatively low daylight obstruction value.

Summary of Proposed vs. Context

The Proposed Project values of 81.9% and 43.1% along Terrace Street and Columbus Avenue, respectively, are higher than the context value of 31 Heath Street at 9.7% and 18.5% daylight obstruction; however, the existing daylight obstructions value of 74.3% along Terrace Street is also higher than the context building daylight obstruction values.



Highland Springs Lofts Daylight Study Existing Configuration: Observation Points

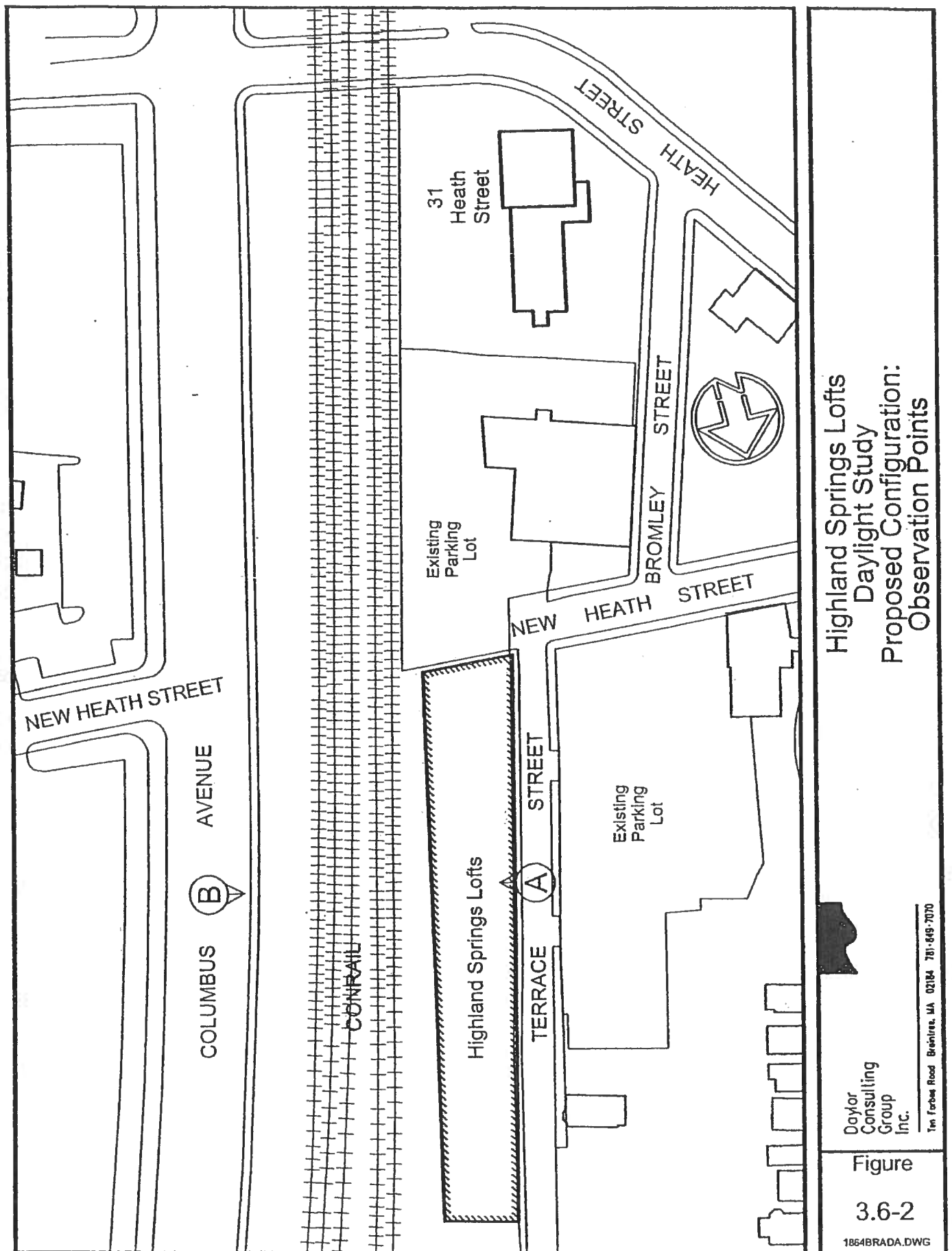
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Figure

3.6-1

1864BRADA.DWG



Highland Springs Lofts Daylight Study Proposed Configuration: Observation Points

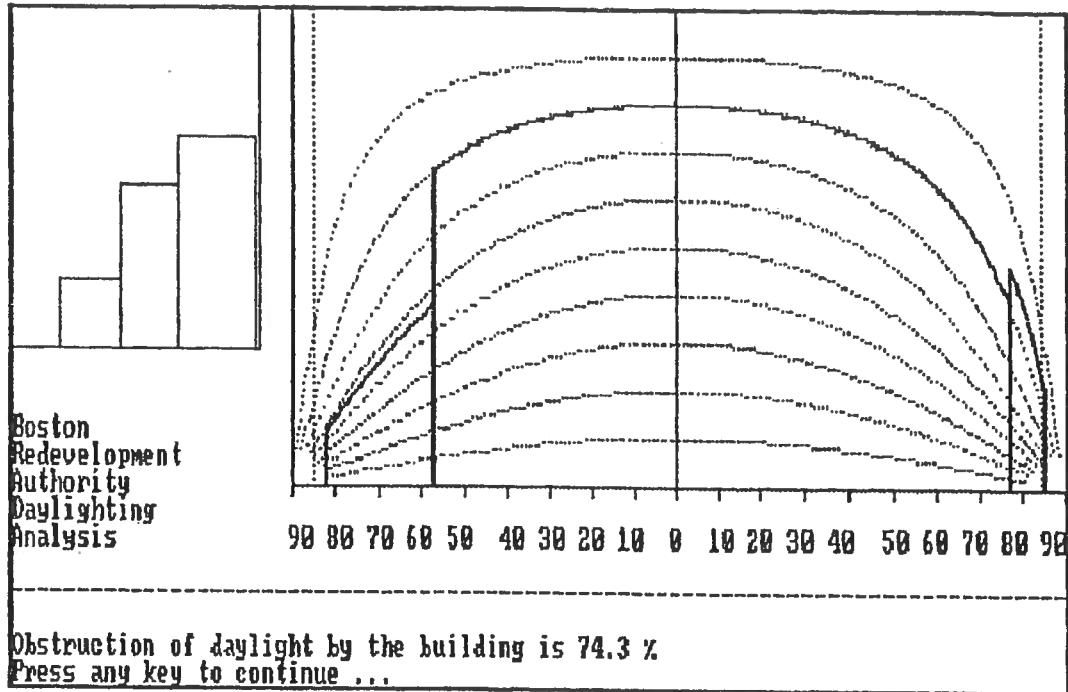
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Inc.

Ten Forbes Road, Brentwood, TN 37027
731-849-7070

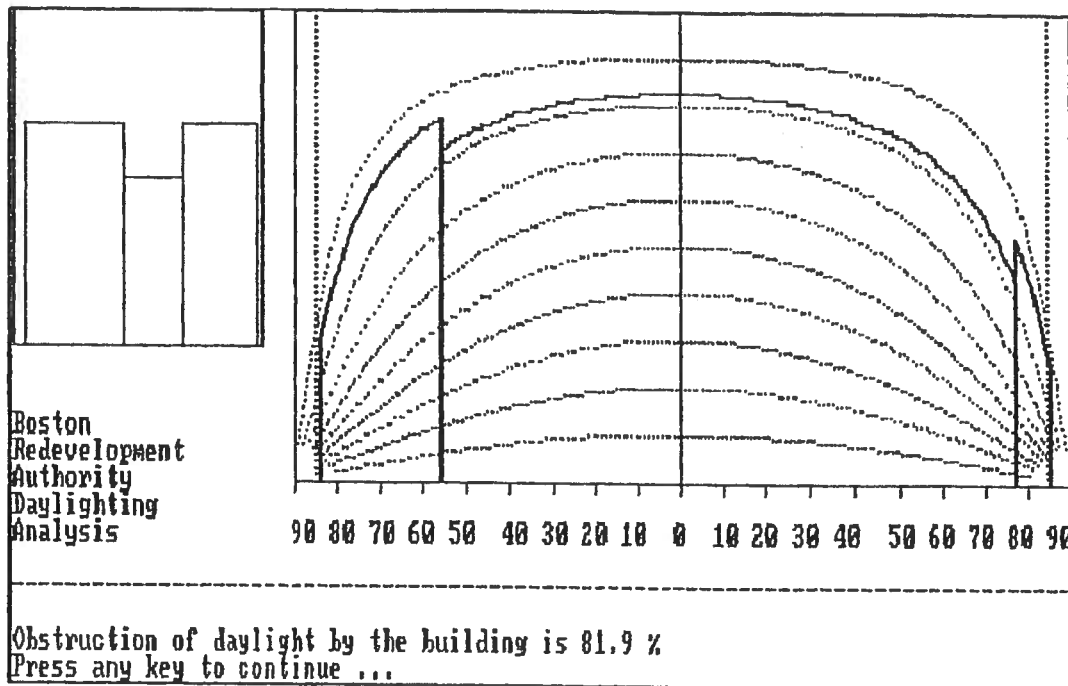
Figure

3.6-2

1864BRADA.DWG



No Build - 74.3%



Build - 81.9%

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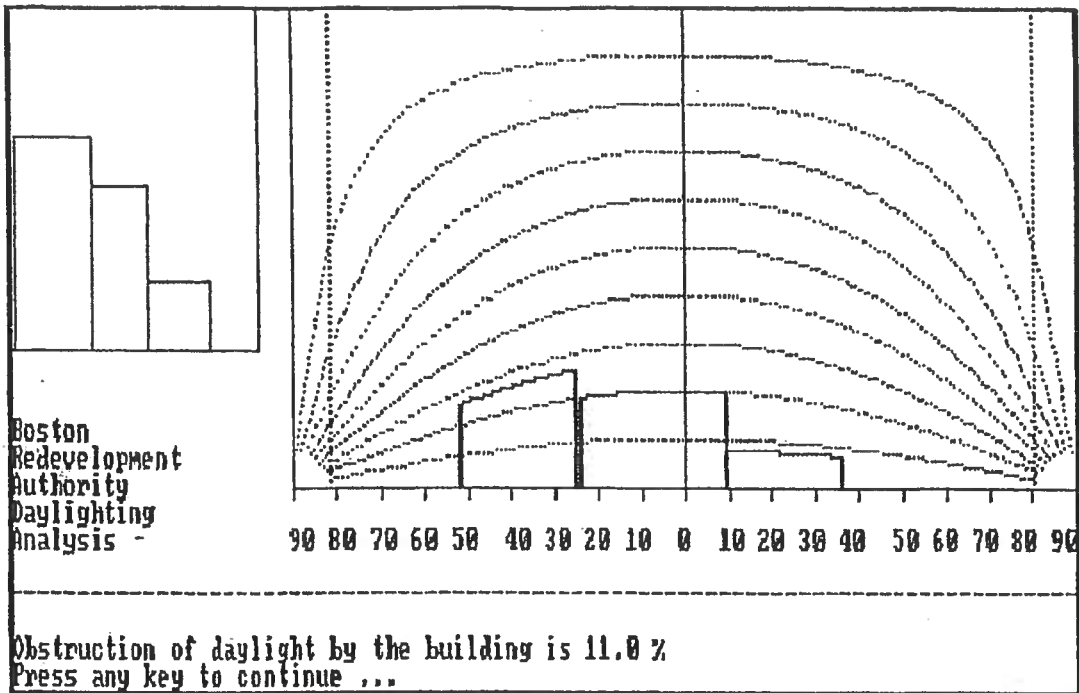
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Highland Springs Lofts Daylight Study Terrace Street (Observation Point A)

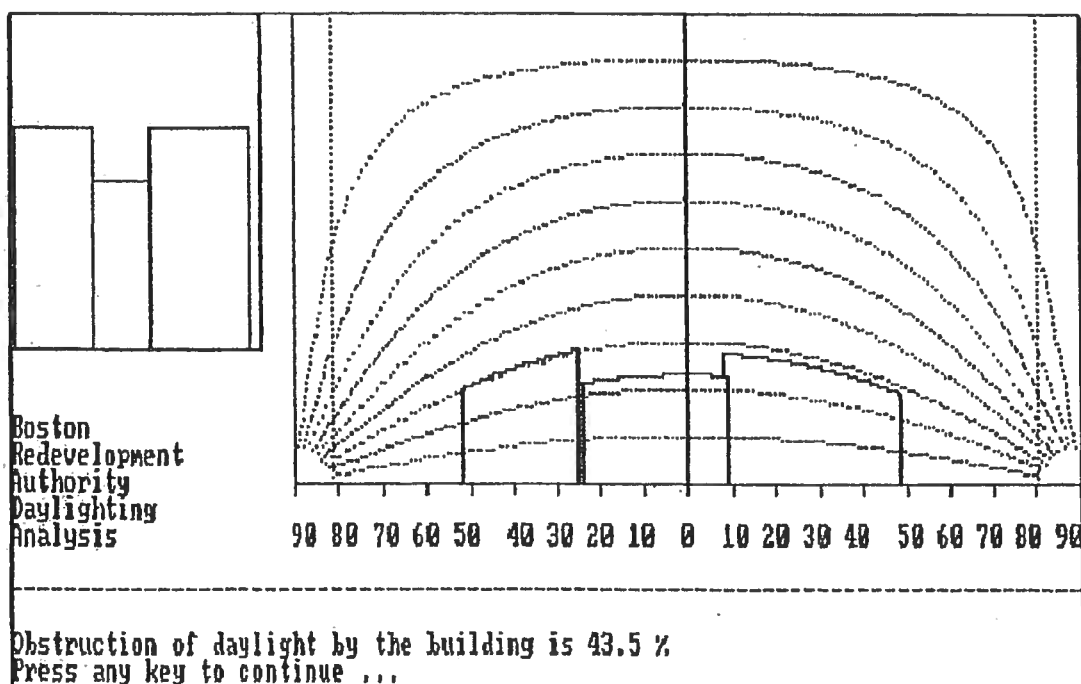
Figure

3.6-3

1864BRADA.DWG



No Build - 11.0%



Build - 43.5%

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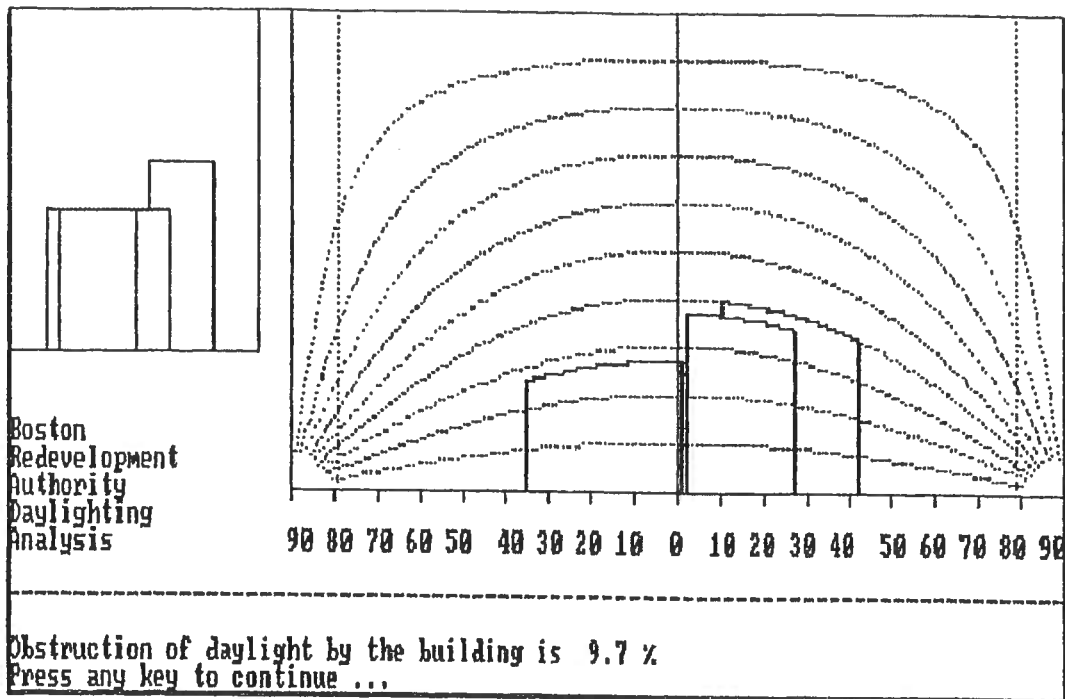
Ten Forbes Road Braintree, MA 02184 781-849-7070

Highland Springs Lofts Daylight Study Columbus Avenue (Observation Point B)

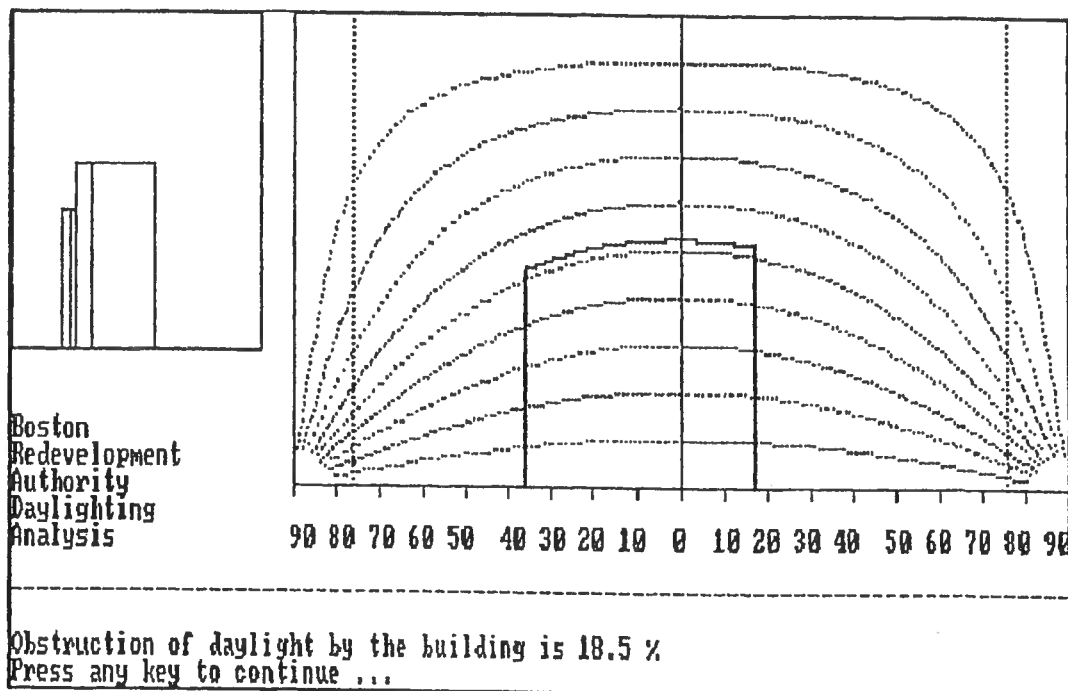
Figure

3.6-4

1864BRADA.DWG



Bromley Street (Observation Point C) - 9.7%



Heath Street (Observation Point D) - 18.5%

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Highland Springs Lofts Daylight Study 31 Heath Street (Context)

Figure
3.6-5

1864BRADA.DWG

APPENDIX E – DPIR HISTORIC RESOURCES STUDY

3.2 Historic Resources

Introduction

The Proposed Project involves rehabilitation of two existing structures known as the Oliver Ditson Building and R and S Pickle Factory, demolition of a one story garage, and construction of a new building in its place. The existing buildings were constructed as part of the Highland Spring Brewery. Although the brewery is no longer extant, the two distinct, yet interconnected buildings remain a prominent landmark at the foot of Parker Hill/Mission Hill in the Stony Brook Valley, now Columbus Avenue and the Southwest Corridor.



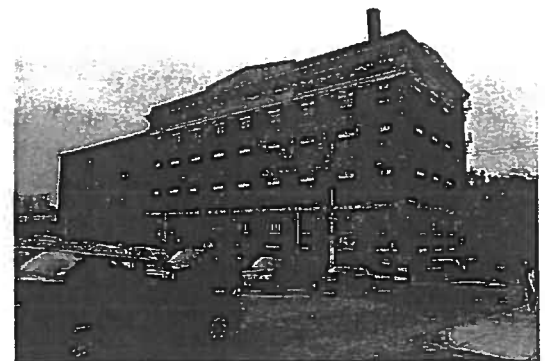
1876 Highland Springs Brewery

Boston's Breweries and Other Industry along Stony Brook

By the early nineteenth century, Roxbury had become an important tanning center within the Northeast. A mill dam was constructed over the Back Bay and industrial activity began in Roxbury Village. At Roxbury Crossing, access was created to fresh spring water, and the town's first brewery began operations. The Town of Roxbury grew substantially during the mid-nineteenth century, leading to improvements in transportation between Roxbury and Boston.

In the late 1800's, Boston was the hub of US beer production, most of which was concentrated in Roxbury and Jamaica Plain, along the Stony Brook, a large brook running from West Roxbury to the Muddy River in the Fenway. Stony Brook now runs in a culvert, which runs roughly under Columbus Avenue in this area. While the number of breweries varies according to different records, there were at least a dozen in Mission Hill and Jamaica Plain. The breweries, along with foundries, the first lithography press in the U.S., and other industry along the Stony Brook, were an economic force for much of the development of Mission Hill, Fort Hill/Highland Park and Jamaica Plain, giving rise to triple deckers and tenements built for brewery and other workers. The Boston and Providence Railroad roughly followed the brook's path in this area, and provided a means to distribute the beer produced.

The two existing structures referenced in this report, along with another located at 55 New Heath Street, are all that remains of the Highland Spring Brewery Complex, which was founded in 1867 by Henry H. Rueter and John R. Alley. The Oliver Ditson Building at 31 New Heath (right in photo) and R and S Pickle Factory at 158-164 Terrace Street (left in photo) meet criteria for listing on the National Register of Historic Places. While there was a proposal to create a Stony Brook Breweries Thematic National Register District a number of years ago, they have not been listed individually or as part of a district on the National of Massachusetts Registers of Historic Places. Largely vacant for nearly twenty years, the buildings have received scant attention or maintenance, with visible damage at the masonry, especially on the Ditson Building, and the interiors exposed to the elements.



Existing Conditions of Property

Site History

Henry A. Rueter and John R. Alley, brewers from Germany and Ireland respectively, opened the Highland Spring Brewery in 1867, deriving its name from its early water source at the foot of the nearby range of hills. By 1872 it was the largest brewery in the United States that produced only ale and porter and sales averaged 8,000 barrels per month. By 1877, Highland Spring maintained a sizeable physical plant along New Heath Street on both sides of Terrace Street, and employed as many as 40 men. The lithograph at the left shows the 1872 brewery building on the opposite side of Terrace Street from the project site. Where this building stood is currently a parking lot at the base of Parker Street owned by N.E. Baptist Hospital.



Lithograph circa 1890

Like other local beer barons, the Rueters lived in Jamaica Plain, where the Jamaica Towers now stand, in large mansard-roofed Victorian houses that were later abandoned. In 1885 the firm was reorganized as Rueter and Co. The late Victorian building, constructed in 1892 at 158-164 Terrace Street housed the firm's bottling plant. The brewery remained a family managed and owned business after Rueter's death in 1899, when his three sons retained official control of the business. The massive Georgian Revival addition at 31 New Heath Street (a/k/a 166 Terrace Street), built by Rueter's sons in 1912, was a storehouse for the casks and tanks of ale and porter. (Records differ on names and addresses for each).

During Prohibition, the five story Georgian Revival building at 31 New Heath Street, seen at right in photo, was purchased by the Oliver Ditson Co., Boston's largest publisher of sheet music (see more below). The late Victorian was converted to a number of other industrial uses. Stories vary about what happened to the Highland Spring property during the 13 years of Prohibition, including use by a metal and rubber company and a chocolate company. All may be true, as there were at least four large buildings at that time on both sides of Terrace Street. The two buildings to the left of the photo stood on opposite sides of New Heath Street, they are no longer in existence. The wood frame building in foreground at left is now the location of the MDC Southwest Corridor Office, and the three story brick building with awnings is now the location of the N.E. Baptist Hospital parking lot. After Prohibition was lifted in 1933, Walter Croft, the brew master for Highland Spring Brewery, took over and reopened the brewery under the name Croft Brewery. While highly popular initially, the company had problems with storage tanks, and later with competition from larger brewers during World War II. Narragansett Brewing of Rhode Island bought them out in 1952, and closed the plant a year later.



Brewery Complex circa 1955

158-164 Terrace Street -- R and S Pickle Factory

158-164 Terrace Street was designed by Boston-based architect J. Williams Beal (1855-1919). Built in 1892 as a bottling and storage plant, it was connected to Highland Spring's main brewery complex on the opposite side of Terrace Street by an underground tunnel.

The four story late Victorian era building is well proportioned, with pairs of tall, narrow four-over-four windows in a rhythm along Terrace Street. A strong base is created with a granite sill above which there are alternating bands of red and off-white brick, capped by two header courses of bricks alternating to create a dentil effect, topped by a stone cornice. The detailing

at the first floor enhances the building's presence at the sidewalk. There are two larger arched entries into the building, both raised substantially off the sidewalk at the level of the basement window heads. One has been bricked in, the other appears to have been used as a loading area, but they might have originally been the main entrances into the building. The windows and entryways are all topped with brick jack arch lintels, and all have granite sills. Brick pilasters rise to the head of the fourth floor, with dentil and other decorative masonry courses topping the wall. The building is capped by a bracketed flat roof.

Because of Prohibition, the building was converted to other industrial uses in the 1920's. In the early 1930's it was returned to its former use as a beer bottling plant and case storage facility by Croft Brewing under Walter Croft, former master brewer for Highland Spring. After Narragansett closed the brewery, R and S Pickle Works owned the building from the mid 1950's through the mid 1980's. Local residents recall shopping at the Pickle Factory. The building has remained vacant for most of the years since, has been made other than being used for storage of plumbing supplies.

The current condition of the building reflects its decades of neglect and abandonment. A portion of the first floor facade has been covered with a thin stone veneer with a narrow doorway. Many of the windows are broken, exposing the interior to the elements. Inside, a narrow cast iron stair has collapsed at the interior lower levels, and the other stair doesn't approximate current code requirements for stairways. Generations of interior changes have been made through its multiplicity of uses, all of which are easily removed without damaging the basic structure.

31 New Heath -- Oliver Ditson Building

In 1912-1913, Henry Rueter's sons had a Georgian Revival storage facility for ale and porter built for Highland Spring Brewery. It was built on the site of a former wood-frame spring house at the corner of New Heath and Terrace Streets that was part of Highland Spring Brewery. The address is 31 New Heath and 166 Terrace Street.

The late Georgian Revival building was designed by local architects Monks and Johnson, specialists in the design of storehouses, garages, and power plants. The massive five story building offers an imposing presence at the corner of Terrace Street, located as it is tight to the back of the sidewalk. Typical of Georgian Revival buildings, this one is highly symmetrical, with a modestly ornamented facade. The building continued the granite base and stone cornice above the first floor of the adjacent Victorian era building, creating a strong horizontal alignment between the two buildings, despite their stylistic differences. Flat, decorative pilasters rise from that cornice line, emphasizing the building's verticality. They are capped by another stone lintel at the top of the fourth floor, which is the base for the entablature at the fifth floor. A deep cornice line caps the building, from which pediment rise at each facade. There are no windows in the entablature, thereby rendering the fifth floor uninhabitable without new windows being cut. One surprising element is the lack of a clearly defined central entryway, a typical feature of Georgian Revival architecture. The windows are typically paired in a masonry opening, with stone lintels and sills. The original windows appear to have been replaced. Basement and first floor windows are stacked in large masonry openings with recessed brick panels between.

During Prohibition the building was purchased by the Oliver Ditson Co., Boston's largest publisher of sheet music, for printing and storage purposes and continued in that capacity into the 1950s. The company name was inscribed in the entablature of the building facing New Heath, and at the south facade, was inscribed over still visible signage for Highland Spring Brewery. During the period of its occupancy at New Heath Street, the company was also known by the names William R. Timpany Company and John Worley Company. For a portion of the 1970's, the building was owned by Barb Corporation and Salem Press, and it served as a warehouse for Graphique du France in the 1980's.

It is apparent from its current condition that the building was not well maintained. Little or no investment has been made in the property for at least a generation. It has been essentially vacant for 20 years, and underutilized for the previous decade or more. The masonry shows efflorescence on all facades at the exterior, there is ample evidence of water penetration inside the building, and it lacks any systems.

Historic Resources in the Parker Hill/Mission Hill Area

There are a number of historic resources, including individual historic buildings and historic districts, in the vicinity of the Project Site and within the larger Parker Hill/Mission Hill Area. Boston Landmarks Commission (BLC) surveys and a Parker Hill/Mission Hill Preservation Study completed by BLC in 1985, reflect the post-Civil War urbanization of Parker Hill, and the establishment of breweries during the 1860s through the 1890s. See Figure 6-1, Historic Resources.

Historic Districts

Roxbury Highlands Historic District

Designation Status: This district was included in the National Register of Historic Places in 1989.

Location: Roxbury Highlands, also known as Highland Park and Fort Hill, is the hill on the other side of Stony Brook Valley, roughly bounded by Dudley St., Washington St., and Columbus Ave..



Paige Academy: 26 and 28 Highland Ave

History: The Roxbury Highlands Historic District is noteworthy for its historic associations with the Revolutionary War, and as an architecturally significant example of a "streetcar suburb" of Boston. The district embodies a cross-section of late eighteenth, nineteenth, and early twentieth century building types and styles, including the Federal, Greek Revival, Italianate, Second Empire, Queen Anne, Shingle and Bungalow styles.

Roxbury Highlands became strategically important during the Revolutionary War, due to its commanding height overlooking a land connection to Boston along Washington Street. During the summer of 1775, two forts were constructed in the Highlands as part of a ring of defenses, which ultimately led to the evacuation of the British from Boston.

During the first quarter of the nineteenth century the period of the "streetcar" development began in the Highlands, when land was filled along the tidal marshes of Roxbury Neck (now Lower Roxbury), and turnpike routes and omnibus service brought people to the area. The extension of Tremont Street through Roxbury as a free road took place in 1832, and construction of the Boston and Providence Railroad occurred in 1834, further increasing the residential population of the Highlands. In 1856 the Metropolitan Horse Railway tied the area to downtown Boston via service along Tremont and Washington Streets. Streetcar service was introduced in 1889, and rapid transit service in 1901. Roxbury's annexation to Boston in 1868 triggered a second wave of suburbanization within the District. The construction of the Cochituate standpipe in 1869, as part of the city water system, signified an effort to create better public services within Roxbury. During this period suburban row housing was constructed in blocks, which were then sold off individually. After the 1873 Depression, construction of single-family residences continued. Another wave of residential development took place again at the turn of the century, with the construction of a number of multi-story apartments.

Roxbury Highlands reached its peak of development during the early twentieth century. Into the twentieth century, the area experienced a period of decline, which saw the demolition of numerous vacant and derelict structures. During the 1980s renovations projects targeted deteriorating buildings and structures that were contributing to the overall decline of the

Roxbury Highlands neighborhood. Private rehabilitation work continues into the present, in an ongoing effort to preserve the history and neighborhood character of the district.

Mission Hill Triangle Historic District

Designation Status: This district was included in the National Register of Historic Places in 1989.

Location: Roughly bounded by Smith St., Worthington St., Tremont St., and Huntington Ave.

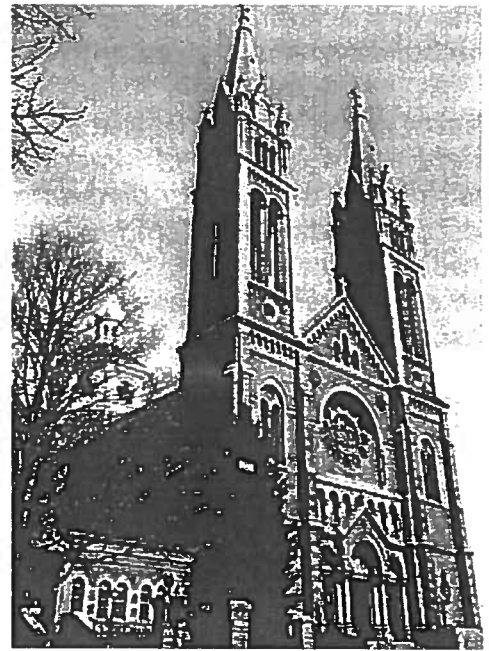
History: The Mission Hill Triangle Historic District is a four-block area that contains mostly rowhouses constructed between 1872 and 1892. The predominant residential architecture of the Mission Hill Triangle area is characterized as townhouses constructed of brick, brownstone, sand stone and marble, featuring decoration reflective of the Second Empire, Queen Anne, Panel Brick and Renaissance Revival styles.

The development of the Mission Hill Triangle area began in June 1871, when a local builder named George D. Cox purchased a parcel of land located on Tremont Street. Additional lots were purchased in 1871. Cox subdivided his tract into nearly 200 house lots, after which time a large number of single-family homes were constructed (1870s- 1890s). In 1882, the extension of Huntington Avenue through the area, and extension of the electric streetcar route, triggered further residential development along the Huntington Avenue thoroughfare. Construction of the Boston and Providence railroad and the introduction of the horse-drawn streetcar in 1856, spurred new, middle class residential development along Tremont Street, which was formerly lined with large residences and farms. From ca. 1870-1900 lower middle class families, many Irish, moved into the Tremont Street district, largely as a result of this improved transportation. The decade between 1885 and 1895 saw a later period of construction that covered a substantial area stretching from Mission Hill to the West Roxbury line.

Apart from residential development, factories were constructed in the Stony Brook Valley within the Mission Hill Triangle area as early as 1873, and included the Sewell, Day and Company cordage works, a brewery, floor oil cloth manufactory, and currying works. The Church of Our Lady of Perpetual Help (currently known as the Mission Church) was built in 1871 on Tremont Street and Alphonsus Street. A newer masonry church was constructed in 1878, replacing this original church building.

Another phase of construction took place in the Mission Hill Triangle area during the late nineteenth century. This development utilized remaining open space for new construction. A triangular tract of land of approximately 40,000 sq.ft., located at Tremont Street and Huntington Avenue, was sold to private developers from an existing estate in 1884. This land was subsequently developed as a multi-family housing tract. Remaining lots from Cox's original 1871 purchase, which had been vacant until 1890, were filled with five Panel Brick style buildings after this date. Two apartment complexes, the "Helvetia," (1884-1885; 1910) and the "Esther" (1912), both located on Huntington Avenue, were also constructed during this period of development.

The growth of medical institutions in the Mission Hill Triangle area also began during the late nineteenth century. Land located off of Huntington Avenue (a portion of the tract originally purchased in 1871 by George Cox), was developed by the Harvard School of Dental Medicine and Harvard Medical School. During the twentieth century the area north of Huntington Avenue



Mission Church, 1545 Tremont Street

was developed for Harvard Medical School (its Longwood Avenue site opened in 1906). Also constructed in the Longwood Avenue vicinity during the first quarter of the twentieth century were the Peter Bent Brigham Hospital (ca. 1913), now part of Brigham & Women's Hospital; the Massachusetts College of Pharmacy (1918); and Children's Hospital (dedicated 1914).

Dimock Community Health Center Complex

Designation Status: This district was included in the National Register of Historic Places in 1985.

Location: 41 and 55 Dimock St., across Columbus Avenue, ½ mile to the south.

History: The New England Hospital for Women and Children, known today as the Dimock Community Health Center, is comprised of eight buildings constructed on a nine-acre site located on a small hill in Roxbury, between Washington Street and Columbus Avenue.

The first New England Hospital for Women at 60 Pleasant Street opened in 1861. In 1864 a move was made to a location on Warrenton Street, where the hospital remained until 1871. After 1871, a new site was purchased at the present location of Columbus Avenue in Roxbury. The eight buildings comprising the site of the New England Hospital for Women and Children were constructed over a nearly 60-year period between 1872 and 1930, and embody various late nineteenth-century styles, ranging from Stick and High Victorian Gothic to Classical and Georgian Revival. The site, including all eight buildings, survives today largely intact. The buildings include the Cary Cottage (1872), designed by Boston architects Charles Cummings and Willard Sears as a maternity ward, and the oldest building in the New England Hospital for Women and Children complex. The Dr. Marie E. Zakrewska Medical Building (1873), is an architecturally distinctive example of the High Victorian Gothic style, and won an 1876 award at the Centennial International Exhibition in Philadelphia for its innovative design.

Other Breweries and Historic Resources in the Area

In the late 19th and early 20th century, there were over twenty breweries within a mile of Roxbury Crossing. The pre-eminent beer barons were Rueter, Haffenreffer, Burkhardt, Roesoje, Pfaff, and Souther. National prohibition (1919-1933) was disastrous for the local beer industry (though some kept going by making near beer) and, if not knocked out by the Depression, the majority was gone by World War II.

Roxbury Brewing Company

The former Roxbury Brewing Company at 31 Heath Street is one block away from the project site. Family Services of Boston purchased the site and has renovated the existing building and built an addition that includes a new elevator facing north toward the project site.

American Brewing Company

By 1900, the alphabetically named American Brewing Company (ABC can still be seen posted above the great double arches) became the largest branch of the great ten-brewery consortium, Massachusetts Breweries Company, and was producing 100,000 barrels a year. The family members of Gottlieb Rothfuss ran the brewery and could walk to work from their houses on Zamora Street and Wyman Street in Jamaica Plain. During Prohibition (1920-1933),

APPENDIX F – AIR QUALITY APPENDIX

APPENDIX F AIR QUALITY

154 TERRACE STREET NOTICE OF PROJECT CHANGE

<u>Pages</u>	<u>Contents</u>
2-4	AERMOD Model Output
5	Garage Emission Analysis Calculations – AM and PM Peak Hour
6	MOVES2014b Output for Garage Analysis
7	Fuel-Combusting Equipment Emissions Analysis Calculations

*** AERMOD - VERSION 18081 *** *** 154 Terrace Phase II Development Project *** 09/17/19
*** AERMET - VERSION 16126 *** *** CO 1-Hour Screening Modeling *** 10:55:46
PAGE 1

*** MODELOPTS: NonDEFAULT CONC FLAT FLGPOL NOCHKD SCREEN NODRYDPLT NOWETDPLT URBAN NoUrbTran

*** 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 3 Source(s),
for Total of 1 Urban Area(s):

Urban Population = 31279.0 ; Urban Roughness Length = 1.000 m

**Non-DEFAULT option to ignore morning transition from nighttime urban boundary layer (NoUrbTran) selected.

**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. Full Conversion Assumed for NO2.
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: CO

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

**This Run Includes: 3 Source(s); 4 Source Group(s); and 762 Receptor(s)

with: 0 POINT(s), including
0 POINTCAP(s) and 0 POINTHOR(s)
and: 3 VOLUME source(s)
and: 0 AREA type source(s)
and: 0 LINE source(s)
and: 0 OPENPIT source(s)
and: 0 BUOYANT LINE source(s) with 0 line(s)

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

**The AERMET Input Meteorological Data Version Date: 16126

**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

Appendix F Air Quality

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 18081 ***	*** 154 Terrace Phase II Development Project	***	09/17/19
*** AERMET - VERSION 16126 ***	*** CO 1-Hour Screening Modeling	***	10:55:46
			PAGE 4

*** MODELOPTS: NonFAULT CONC FLAT FLGPOL NOCHKD SCREEN NODRYDPLT NOWETDPLT URBAN NoUrbTran

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

GROUP ID		AVERAGE CONC		DATE (YYMMDDHH)		RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)		OF TYPE		GRID-ID
ALL	HIGH	1ST HIGH VALUE IS	461.87470	ON 10091303:	AT (327113.92,	4688259.71,	5.00,	5.00,	24.13)	DC
PHASE2	HIGH	1ST HIGH VALUE IS	429.05499	ON 10091303:	AT (327113.92,	4688259.71,	5.00,	5.00,	24.13)	DC
PHASE1	HIGH	1ST HIGH VALUE IS	172.75873	ON 10090303:	AT (327086.54,	4688212.04,	5.00,	5.00,	19.81)	DC
GARAGE	HIGH	1ST HIGH VALUE IS	19.95775	ON 10040712:	AT (327114.62,	4688239.11,	5.00,	5.00,	1.52)	DC

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

*** AERMOD - VERSION 18081 ***	*** 154 Terrace Phase II Development Project	***	09/17/19
*** AERMET - VERSION 16126 ***	*** CO 1-Hour Screening Modeling	***	10:55:46
			PAGE 5

*** MODELOPTS: NonFAULT CONC FLAT FLGPOL NOCHKD SCREEN NODRYDPLT NOWETDPLT URBAN NoUrbTran

*** 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 ***

INDOOR GARAGE ANALYSIS PROGRAM

PROJECT: 154 TERRACE STREET GARAGE PEAK PM HOUR - YEAR: 2025

DISTANCE IN: 61 METERS
DISTANCE OUT: 61 METERS

NUMBER OF EXIT LANES: 1 LANE(S)
PEAK VOLUME: 9 VEH/HOUR

CO RATE: 3.045 GRAMS CO/MILE

SPEED IN GARAGE: 5.0 M.P.H.

VENT CFM: 12,500 CFM

TOTAL CO EMISSIONS = 0.017 GRAMS/MIN = 0.00029 GRAMS/SEC
TOTAL VENTILATION = 354 CU. M/MIN

PEAK 1-HOUR CO CONCENTRATION FROM VEHICLES: 0.043 PPM

MOVES2014B OUTPUT

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	0.037878788	7	5	CO	3.04536
250250	5	0.037878788	9	5	CO	3.04536

Heating and Ventilation Calculations									
Vitodens 200 or equal									
2,375,000 BTU/hr									
3 residential units									
	3	X	$\frac{2,375,000 \text{ BTU}}{1 \text{ hr}}$	X	$\frac{1 \text{ mmbTU}}{1000000 \text{ BTU}}$	=	$\frac{7.125 \text{ mmbTU}}{\text{hr}}$		
NG heating value:									
	1,020	BTU	7125000	btu	6985.294				
		ft ³		hr					
AP-42 CO emission factor:									
	0.084	lbs							
		mmbTU							
	7.125	mmbTU	X	0.084	lbs	=	0.5985	lbs	
	1	hr		1	mmbTU			hr	
	0.5985	lb	X	454	g	X	1	hr	=
	1	hr		1	lb		3600	sec	$\frac{0.075478 \text{ g}}{\text{sec}}$

APPENDIX G– NOISE APPENDIX

APPENDIX G NOISE

154 TERRACE ST PROJECT NOTICE OF PROJECT CHANGE

<u>Page</u>	<u>Contents</u>
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2	Figure 1: Modeling Receptor Locations
3	Cadna Noise Modeling Results

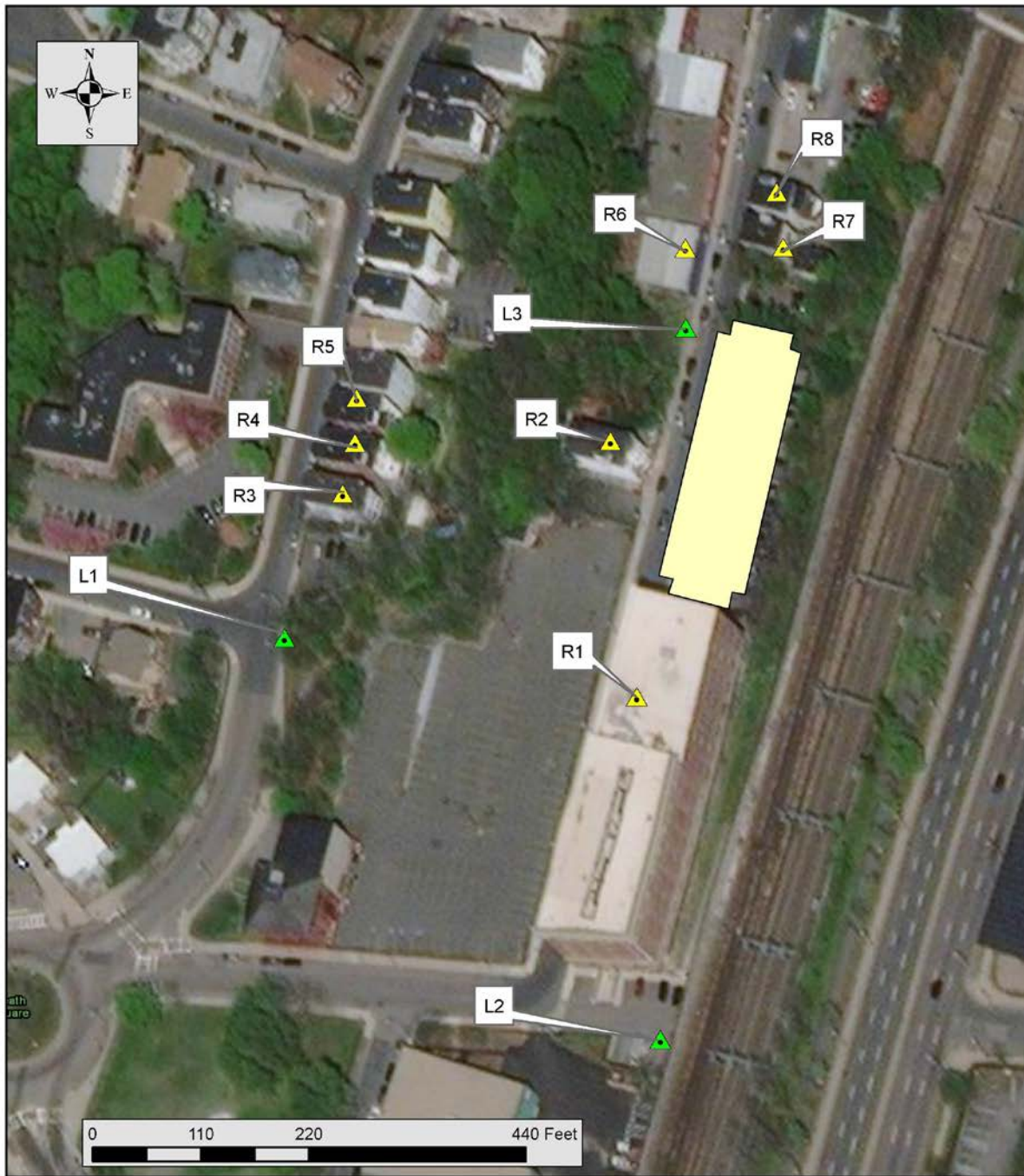


Figure 1
Sound Monitoring & Modeling Locations
154 Terrace Street Boston, MA



Cadna Noise Modeling Results

City of Boston Noise Ordinance Analysis

ID	Name	Sound	Octave Band Day								
		Level	31	63	125	250	500	1000	2000	4000	8000
		(dBA)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)
R1	166 Terrace St	38.9	5.9	18.0	26.3	35.9	30.8	30.9	28.3	22.8	10.6
R2	151 Terrace St	36.4	7.6	19.0	26.0	33.9	27.4	26.5	24.1	19.9	13.7
R3	832 Parker St	38.0	1.2	14.2	23.4	33.6	30.5	31.4	30.0	25.3	11.6
R4	830 Parker St	31.3	-4.7	8.3	16.9	28.6	23.2	23.6	21.0	12.4	-13.0
R5	828 Parker St	38.4	1.5	14.5	23.7	33.9	31.1	31.6	30.2	25.5	12.1
R6	123 Terrace St	38.6	1.7	14.7	23.9	34.3	31.3	31.8	30.4	25.7	12.4
R7	126 Terrace St	32.7	5.7	16.7	23.1	29.7	23.8	23.7	21.2	16.8	9.8
R8	124 Terrace St	31.5	6.6	16.9	22.8	26.9	22.4	24.2	22.1	17.9	11.5

MassDEP Noise Policy Analysis

<u>Nighttime</u>						
	Name	ID	Project	Background	Total New	Increase Over
			Level	Level	Level	Existing
			(dBA)	(dBA)	(dBA)	(dBA)
R1	166 Terrace St	Top_Floor	38.9	44.7	45.7	1.0
R2	151 Terrace St	Top_Floor	36.4	44.7	45.3	0.6
R3	832 Parker St	Top_Floor	38	42.4	43.7	1.3
R4	830 Parker St	Top_Floor	31.3	42.4	42.7	0.3
R5	828 Parker St	Top_Floor	38.4	42.4	43.9	1.5
R6	123 Terrace St	Top_Floor	38.6	44.7	45.7	1.0
R7	126 Terrace St	Top_Floor	32.7	44.7	45.0	0.3
R8	124 Terrace St	Top_Floor	31.5	44.7	44.9	0.2
<u>Daytime</u>						
	Name	ID	Project	Background	Total New	Increase Over
			Level	Level	Level	Existing
			(dBA)	(dBA)	(dBA)	(dBA)
R1	166 Terrace St	Top_Floor	38.9	49.6	50.0	0.4
R2	151 Terrace St	Top_Floor	36.4	49.6	49.8	0.2
R3	832 Parker St	Top_Floor	38	54.4	54.5	0.1
R4	830 Parker St	Top_Floor	31.3	54.4	54.4	0.0
R5	828 Parker St	Top_Floor	38.4	54.4	54.5	0.1
R6	123 Terrace St	Top_Floor	38.6	49.6	49.9	0.3
R7	126 Terrace St	Top_Floor	32.7	49.6	49.7	0.1
R8	124 Terrace St	Top_Floor	31.5	49.6	49.7	0.1

APPENDIX H – TRANSPORTATION APPENDIX

APPENDIX H – TRANSPORTATION APPENDIX

H1 – Detailed Traffic Counts

H2 – MassDOT Weekday Seasonal Adjustment Factors

H3 – Detailed Trip Generation Calculations

H4 - Synchro Analysis

APPENDIX H1 – Detailed Traffic Counts

Client: Melissa Restrepo
 Project #: 182_054_HSH
 BTM #: Location 1
 Location: Mission Hill, MA
 Street 1: Terrace Street
 Street 2: Cedar Street
 Count Date: 3/28/2018
 Day of Week: Wednesday
 Weather: Partly Sunny, 45°F

TOTAL (CARS & TRUCKS)

Terrace Street Northbound					Terrace Street Southbound				Eastbound				Cedar Street 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	62	31	0	15	3	0	0	0	0	0	0	33	0	73
7:15 AM	0	0	61	34	0	17	3	0	0	0	0	0	0	33	0	71
7:30 AM	0	0	64	33	0	21	5	0	0	0	0	0	0	31	0	75
7:45 AM	0	0	63	32	0	24	4	0	0	0	0	0	0	29	0	72
8:00 AM	0	0	59	30	0	26	5	0	0	0	0	0	0	26	0	73
8:15 AM	0	0	60	31	0	27	6	0	0	0	0	0	0	26	0	70
8:30 AM	0	0	61	28	0	29	6	0	0	0	0	0	0	24	0	71
8:45 AM	0	0	57	25	0	25	5	0	0	0	0	0	0	22	0	69

Terrace Street Northbound					Terrace Street Southbound				Eastbound				Cedar Street 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	30	48	0	36	9	0	0	0	0	0	0	32	0	37
4:15 PM	0	0	32	52	0	41	11	0	0	0	0	0	0	36	0	41
4:30 PM	0	0	33	53	0	38	10	0	0	0	0	0	0	38	0	43
4:45 PM	0	0	35	57	0	33	8	0	0	0	0	0	0	41	0	46
5:00 PM	0	0	34	58	0	39	7	0	0	0	0	0	0	42	0	48
5:15 PM	0	0	36	57	0	44	5	0	0	0	0	0	0	44	0	47
5:30 PM	0	0	35	56	0	43	8	0	0	0	0	0	0	40	0	45
5:45 PM	0	0	33	54	0	41	6	0	0	0	0	0	0	38	0	42

AM PEAK HOUR 7:30 AM to 8:30 AM PHF HV %	Terrace Street Northbound				Terrace Street Southbound				Eastbound				Cedar Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	0	246	126	0	98	20	0	0	0	0	0	0	112	0	290
	0.96				0.89				0.00				0.95			
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

PM PEAK HOUR 4:45 PM to 5:45 PM PHF HV %	Terrace Street Northbound				Terrace Street Southbound				Eastbound				Cedar Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	0	140	228	0	159	28	0	0	0	0	0	0	167	0	186
	0.99				0.92				0.00				0.97			
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Client: Melissa Restrepo
 Project #: 182_054_HSH
 BTM #: Location 1
 Location: Mission Hill, MA
 Street 1: Terrace Street
 Street 2: Cedar Street
 Count Date: 3/28/2018
 Day of Week: Wednesday
 Weather: Partly Sunny, 45°F

BOSTON

TRAFFIC DATA

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

TRUCKS

Terrace Street Northbound					Terrace Street Southbound				Eastbound				Cedar Street 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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Terrace Street Northbound					Terrace Street Southbound				Eastbound				Cedar Street 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	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	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 PHF	Terrace Street Northbound				Terrace Street Southbound				Eastbound				Cedar Street 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	0	0	0	0	0	0
	0.00				0.00				0.00				0.00			

PM PEAK HOUR 4:00 PM to 5:00 PM PHF	Terrace Street Northbound				Terrace Street Southbound				Eastbound				Cedar Street 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	0	0	0	0	0	0
	0.00				0.00				0.00				0.00			

Client: Melissa Restrepo
 Project #: 182_054_HSH
 BTM #: Location 1
 Location: Mission Hill, MA
 Street 1: Terrace Street
 Street 2: Cedar Street
 Count Date: 3/28/2018
 Day of Week: Wednesday
 Weather: Partly Sunny, 45°F

PEDESTRIANS & BICYCLES

Terrace Street Northbound					Terrace Street Southbound					Eastbound					Cedar Street 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	0		1	0	0	0		0	0	0	0		1	0	0	1
7:15 AM	0	1	2	1		0	0	0	0		0	0	0	0		0	0	0	1
7:30 AM	0	1	2	2		0	1	0	0		0	0	0	0		1	0	0	2
7:45 AM	0	0	1	1		1	0	0	1		0	0	0	0		0	0	0	0
8:00 AM	0	1	3	4		0	1	0	0		0	0	0	0		0	0	1	2
8:15 AM	0	0	2	4		1	0	0	0		0	0	0	0		1	0	1	1
8:30 AM	0	1	8	10		0	0	0	1		0	0	0	0		0	0	1	1
8:45 AM	0	0	3	3		0	0	0	0		0	0	0	0		0	0	0	2

Terrace Street Northbound					Terrace Street Southbound					Eastbound					Cedar Street 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	1		1	1	0	0		0	0	0	0		1	0	0	3
4:15 PM	0	0	1	0		0	0	0	0		0	0	0	0		0	0	1	2
4:30 PM	0	0	0	2		1	1	0	1		0	0	0	0		1	0	0	6
4:45 PM	0	0	2	1		0	1	0	0		0	0	0	0		0	0	1	4
5:00 PM	0	0	1	1		2	0	0	1		0	0	0	0		0	0	0	6
5:15 PM	0	0	1	0		1	0	0	1		0	0	0	0		1	0	0	3
5:30 PM	0	1	0	3		2	1	0	0		0	0	0	0		2	0	1	5
5:45 PM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	2

Terrace Street Northbound					Terrace Street Southbound					Eastbound					Cedar Street Westbound				
AM PEAK HOUR ¹	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED
7:30 AM to 8:30 AM	0	2	8	11		2	2	0	1		0	0	0	0		2	0	2	5

Terrace Street Northbound					Terrace Street Southbound					Eastbound					Cedar Street Westbound				
PM PEAK HOUR ¹	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED
4:45 PM to 5:45 PM	0	1	4	5		5	2	0	2		0	0	0	0		3	0	2	18

¹ Peak hours corresponds to vehicular peak hours.

Client: Melissa Restrepo
 Project #: 182_054_HSH
 BTM #: Location 2
 Location: Mission Hill, MA
 Street 1: New Heath Street
 Street 2: Bromley Street
 Count Date: 3/28/2018
 Day of Week: Wednesday
 Weather: Partly Sunny, 45°F

TOTAL (CARS & TRUCKS)

Bromley Street Northbound					Southbound				New Heath Street Eastbound				New Heath Street 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	0	8	0	0	0	0	0	0	85	0	0	4	32	0
7:15 AM	0	4	0	7	0	0	0	0	0	0	88	0	0	3	33	0
7:30 AM	0	4	0	5	0	0	0	0	0	0	92	0	0	2	34	0
7:45 AM	0	5	0	4	0	0	0	0	0	0	91	1	0	2	31	0
8:00 AM	0	3	0	3	0	0	0	0	0	0	86	0	0	1	30	0
8:15 AM	0	4	0	4	0	0	0	0	0	0	87	0	0	2	31	0
8:30 AM	0	2	0	3	0	0	0	0	0	0	86	1	0	1	29	0
8:45 AM	0	2	0	3	0	0	0	0	0	0	79	0	0	2	25	0

Bromley Street Northbound					Southbound				New Heath Street Eastbound				New Heath Street 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	2	0	4	0	0	0	0	0	0	74	5	0	2	39	0
4:15 PM	0	3	0	6	0	0	0	0	0	0	78	5	0	3	43	0
4:30 PM	0	3	0	5	0	0	0	0	0	0	81	4	0	4	45	0
4:45 PM	0	2	0	7	0	0	0	0	0	0	85	5	0	5	44	0
5:00 PM	0	1	0	8	0	0	0	0	0	0	84	4	0	6	43	0
5:15 PM	0	2	0	6	0	0	0	0	0	0	87	3	0	5	44	0
5:30 PM	0	1	0	5	0	0	0	0	0	0	86	4	0	3	45	0
5:45 PM	0	2	0	4	0	0	0	0	0	0	83	3	0	4	40	0

AM PEAK HOUR 7:00 AM to 8:00 AM PHF HV %	Bromley Street Northbound				Southbound				New Heath Street Eastbound				New Heath Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	16	0	24	0	0	0	0	0	0	356	1	0	11	130	0
	0.91				0.00				0.97				0.98			
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

PM PEAK HOUR 4:45 PM to 5:45 PM PHF HV %	Bromley Street Northbound				Southbound				New Heath Street Eastbound				New Heath Street Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	6	0	26	0	0	0	0	0	0	342	16	0	19	176	0
	0.89				0.00				0.99				0.99			
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Client: Melissa Restrepo
 Project #: 182_054_HSH
 BTM #: Location 2
 Location: Mission Hill, MA
 Street 1: New Heath Street
 Street 2: Bromley Street
 Count Date: 3/28/2018
 Day of Week: Wednesday
 Weather: Partly Sunny, 45°F

BOSTON

TRAFFIC DATA

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

TRUCKS

Bromley Street									New Heath Street				New Heath Street			
Northbound					Southbound				Eastbound				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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Bromley Street Northbound					Southbound				New Heath Street Eastbound				New Heath Street 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	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	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 PHF	Bromley Street Northbound				Southbound				New Heath Street Eastbound				New Heath Street 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	0	0	0	0	0	0
0.00				0.00				0.00				0.00				

PM PEAK HOUR 4:00 PM to 5:00 PM PHF	Bromley Street Northbound				Southbound				New Heath Street Eastbound				New Heath Street 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	0	0	0	0	0	0
0.00				0.00				0.00				0.00				

Client: Melissa Restrepo
 Project #: 182_054_HSH
 BTM #: Location 2
 Location: Mission Hill, MA
 Street 1: New Heath Street
 Street 2: Bromley Street
 Count Date: 3/28/2018
 Day of Week: Wednesday
 Weather: Partly Sunny, 45°F



PEDESTRIANS & BICYCLES

Bromley Street Northbound					Southbound					New Heath Street Eastbound					New Heath Street 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	0		0	0	0	0		0	0	0	0		0	1	0	0
7:15 AM	0	0	0	2		0	0	0	0		0	2	0	1		0	2	0	0
7:30 AM	0	0	0	4		0	0	0	0		0	2	0	0		0	0	0	0
7:45 AM	0	0	0	1		0	0	0	0		0	3	0	3		0	0	0	1
8:00 AM	0	0	1	0		0	0	0	0		0	3	0	0		0	1	0	0
8:15 AM	0	0	0	1		0	0	0	0		0	3	0	1		0	0	0	0
8:30 AM	0	0	0	2		0	0	0	0		0	8	0	1		0	1	0	0
8:45 AM	0	0	0	0		0	0	0	0		0	3	0	0		0	0	0	0

Bromley Street Northbound					Southbound					New Heath Street Eastbound					New Heath Street 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	1		0	0	0	0		0	1	0	3		1	1	0	1
4:15 PM	0	0	1	1		0	0	0	0		0	0	0	0		0	1	0	0
4:30 PM	0	0	0	1		0	0	0	0		0	0	0	0		0	0	0	0
4:45 PM	0	0	0	3		0	0	0	0		0	2	0	1		0	2	0	0
5:00 PM	0	0	0	4		0	0	0	0		0	0	0	0		0	1	0	0
5:15 PM	0	0	0	2		0	0	0	0		0	2	0	2		0	1	0	0
5:30 PM	0	0	0	6		0	0	0	0		0	1	0	0		1	2	0	1
5:45 PM	0	0	0	1		0	0	0	0		0	0	0	0		0	0	0	0

Bromley Street Northbound					Southbound					New Heath Street Eastbound					New Heath Street Westbound				
7:00 AM to 8:00 AM	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED
	0	0	0	7		0	0	0	0		0	7	0	4		0	3	0	1

Bromley Street Northbound					Southbound					New Heath Street Eastbound					New Heath Street Westbound				
4:45 PM to 5:45 PM	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED
	0	0	0	15		0	0	0	0		0	5	0	3		1	6	0	1

¹ Peak hours corresponds to vehicular peak hours.

APPENDIX H2 – MassDOT Weekday Seasonal Adjustment Factors

Massachusetts Highway Department
Statewide Traffic Data Collection
2017 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.30	1.23	1.21	1.04	0.98	0.92	0.86	0.81	0.95	0.99	1.03	1.10	0.80
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.05	1.01	1.04	0.99	0.94	0.93	0.91	0.92	0.96	0.94	1.01	1.03	0.97
R4-R7	1.10	1.07	1.09	1.00	0.95	0.89	0.88	0.87	0.92	0.95	1.04	1.09	0.93
U1-Boston	1.01	1.04	0.99	0.94	0.93	0.92	0.96	0.93	0.94	0.93	0.95	0.98	0.95
U1-Essex	1.04	1.05	1.00	0.96	0.93	0.89	0.90	0.90	0.93	0.93	0.98	1.03	0.90
U1-Southeast	1.07	1.05	1.02	0.97	0.95	0.90	0.89	0.88	0.92	0.94	0.98	1.01	0.97
U1-West	1.00	0.96	0.94	0.92	0.93	0.92	0.95	0.93	0.92	0.92	0.97	0.97	0.89
U1-Worcester	1.10	1.10	1.04	0.97	0.95	0.94	0.93	0.91	0.95	0.96	0.98	1.04	0.89
U2	1.01	1.03	0.98	0.95	0.93	0.91	0.94	0.92	0.95	0.95	0.95	0.97	0.98
U3	1.03	1.05	1.01	0.95	0.92	0.90	0.94	0.93	0.93	0.92	0.96	0.99	0.96
U4-U7	1.06	1.05	1.02	0.96	0.92	0.89	0.95	0.95	0.92	0.92	0.98	1.03	0.98
Rec - East	1.18	1.17	1.08	1.03	0.95	0.87	0.83	0.83	0.97	0.98	1.19	1.19	0.98
Rec - West	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.95

Round off:

0-999 = 10

>1000 = 100

U = Urban

R = Rural

1 - Interstate

2 - Freeway and Expressway

3 - Other Principal Arterial

4 - Minor Arterial

5 - Major Collector

6 - Minor Collector

7 - Local Road and Street

Recreational - East Group - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.

Recreational - West Group - Continuous Stations 2 and 189 including stations 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 and 2198.

APPENDIX H3 – Detailed Trip Generation Calculations

154 Terrace Street
Trip Generation Assessment

HOWARD STEIN HUDSON
9-May-2018

Land Use	Size	Category	Directional Split	Average Trip Rate	Unadjusted Vehicle Trips	Assumed National Vehicle Occupancy Rate ¹	Unadjusted Person-Trips	Primary Person Trips	Transit Share ²	Transit Person-Trips	Walk/Bike/ Other Share ²	Walk/ Bike/ Other Trips	Auto Share ²	Auto Person-Trips	Private Auto Person-Trips	Assumed Local Auto Occupancy Rate ³	Total Adjusted Private Auto Trips
Daily Peak Hour																	
Multifamily Housing (Mid Rise) ⁴	64 units	Total		5.440	348	1.18	410	410	15%	62	38%	156	47%	192	192	1.18	162
		In	50%	2.720	174	1.18	205	205	15%	31	38%	78	47%	96	96	1.18	81
		Out	50%	2.720	174	1.18	205	205	15%	31	38%	78	47%	96	96	1.18	81
Total		Total			348		410	410		62		156		192	192		162
		In			174		205	205		31		78		96	96		81
		Out			174		205	205		31		78		96	96		81
AM Peak Hour																	
Multifamily Housing (Mid Rise) ⁴	64 units	Total		0.360	23	1.18	27	27		4		13		10	10	1.18	9
		In	26%	0.094	6	1.18	7	7	21%	1	39%	3	40%	3	3	1.18	3
		Out	74%	0.266	17	1.18	20	20	17%	3	46%	10	37%	7	7	1.18	6
Total		Total			23		27	27		4		13		10	10		9
		In			6		7	7		1		3		3	3		3
		Out			17		20	20		3		10		7	7		6
PM Peak Hour																	
Multifamily Housing (Mid Rise) ⁴	64 units	Total		0.440	28	1.18	33	33		6		15		12	12	1.18	10
		In	61%	0.268	17	1.18	20	20	17%	3	46%	10	37%	7	7	1.18	6
		Out	39%	0.172	11	1.18	13	13	21%	3	39%	5	40%	5	5	1.18	4
Total		Total			28		33	33		6		15		12	12		10
		In			17		20	20		3		10		7	7		6
		Out			11		13	13		3		5		5	5		4

1. 2017 National vehicle occupancy rates - 1.18: home to work; 1.82: family/personal business; 1.82: shopping; 2.1 social/recreational
2. Mode shares based on peak-hour BTD Data for Area 5
3. Local vehicle occupancy rates based on 2017 National vehicle occupancy rates
4. ITE Trip Generation Manual, 10th Edition, LUC 221 (Multifamily Housing Mid-Rise (3-10 floors)), average rate

APPENDIX H4 – Detailed Synchro Analysis

Intersection

Intersection Delay, s/veh	14.2
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	114	296	251	129	100	20
Future Vol, veh/h	114	296	251	129	100	20
Peak Hour Factor	0.95	0.95	0.96	0.96	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	120	312	261	134	112	22
Number of Lanes	1	0	1	0	0	1
Approach	WB		NB		SB	
Opposing Approach			SB		NB	
Opposing Lanes	0		1		1	
Conflicting Approach Left	NB				WB	
Conflicting Lanes Left	1		0		1	
Conflicting Approach Right	SB		WB			
Conflicting Lanes Right	1		1		0	
HCM Control Delay	15.1		14.5		10.5	
HCM LOS	C		B		B	

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	28%	83%
Vol Thru, %	66%	0%	17%
Vol Right, %	34%	72%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	380	410	120
LT Vol	0	114	100
Through Vol	251	0	20
RT Vol	129	296	0
Lane Flow Rate	396	432	135
Geometry Grp	1	1	1
Degree of Util (X)	0.561	0.595	0.219
Departure Headway (Hd)	5.106	4.959	5.844
Convergence, Y/N	Yes	Yes	Yes
Cap	705	729	613
Service Time	3.139	2.992	3.887
HCM Lane V/C Ratio	0.562	0.593	0.22
HCM Control Delay	14.5	15.1	10.5
HCM Lane LOS	B	C	B
HCM 95th-tile Q	3.5	4	0.8

Synchro 9 Report

HCM Unsignalized Intersection Capacity Analysis

2: Bromley Street & New Heath Street/Terrace Street

Timing Plan: AM Peak

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	363	1	11	133	16	24
Future Volume (Veh/h)	363	1	11	133	16	24
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.98	0.98	0.91	0.91
Hourly flow rate (vph)	374	1	11	136	18	26
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			375		532	374
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			375		532	374
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		96	96
cM capacity (veh/h)			1183		503	672
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	375	147	44			
Volume Left	0	11	18			
Volume Right	1	0	26			
cSH	1700	1183	591			
Volume to Capacity	0.22	0.01	0.07			
Queue Length 95th (ft)	0	1	6			
Control Delay (s)	0.0	0.7	11.6			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.7	11.6			
Approach LOS			B			
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			29.2%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection

Intersection Delay, s/veh	13.2
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	170	190	143	233	162	29
Future Vol, veh/h	170	190	143	233	162	29
Peak Hour Factor	0.97	0.97	0.99	0.99	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	175	196	144	235	176	32
Number of Lanes	1	0	1	0	0	1
Approach	WB		NB		SB	
Opposing Approach			SB		NB	
Opposing Lanes	0		1		1	
Conflicting Approach Left	NB				WB	
Conflicting Lanes Left	1		0		1	
Conflicting Approach Right	SB		WB			
Conflicting Lanes Right	1		1		0	
HCM Control Delay	14.2		13.2		11.5	
HCM LOS	B		B		B	

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	47%	85%
Vol Thru, %	38%	0%	15%
Vol Right, %	62%	53%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	376	360	191
LT Vol	0	170	162
Through Vol	143	0	29
RT Vol	233	190	0
Lane Flow Rate	380	371	208
Geometry Grp	1	1	1
Degree of Util (X)	0.52	0.538	0.328
Departure Headway (Hd)	4.93	5.214	5.679
Convergence, Y/N	Yes	Yes	Yes
Cap	729	690	633
Service Time	2.967	3.249	3.72
HCM Lane V/C Ratio	0.521	0.538	0.329
HCM Control Delay	13.2	14.2	11.5
HCM Lane LOS	B	B	B
HCM 95th-tile Q	3	3.2	1.4

Synchro 9 Report

HCM Unsignalized Intersection Capacity Analysis

2: Bromley Street & New Heath Street/Terrace Street

Timing Plan: PM Peak

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	349	16	19	180	6	27
Future Volume (Veh/h)	349	16	19	180	6	27
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.89	0.89
Hourly flow rate (vph)	353	16	19	182	7	30
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			369		581	361
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			369		581	361
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	96
cM capacity (veh/h)			1190		468	684
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	369	201	37			
Volume Left	0	19	7			
Volume Right	16	0	30			
cSH	1700	1190	629			
Volume to Capacity	0.22	0.02	0.06			
Queue Length 95th (ft)	0	1	5			
Control Delay (s)	0.0	0.9	11.1			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.9	11.1			
Approach LOS			B			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			35.3%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection

Intersection Delay, s/veh	15.9
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	118	325	268	134	104	21
Future Vol, veh/h	118	325	268	134	104	21
Peak Hour Factor	0.95	0.95	0.96	0.96	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	124	342	279	140	117	24
Number of Lanes	1	0	1	0	0	1
Approach	WB		NB		SB	
Opposing Approach			SB		NB	
Opposing Lanes	0		1		1	
Conflicting Approach Left	NB				WB	
Conflicting Lanes Left	1		0		1	
Conflicting Approach Right	SB		WB			
Conflicting Lanes Right	1		1		0	
HCM Control Delay	17.2		16.2		10.9	
HCM LOS	C		C		B	

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	27%	83%
Vol Thru, %	67%	0%	17%
Vol Right, %	33%	73%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	402	443	125
LT Vol	0	118	104
Through Vol	268	0	21
RT Vol	134	325	0
Lane Flow Rate	419	466	140
Geometry Grp	1	1	1
Degree of Util (X)	0.61	0.655	0.235
Departure Headway (Hd)	5.244	5.054	6.02
Convergence, Y/N	Yes	Yes	Yes
Cap	687	713	594
Service Time	3.285	3.095	4.075
HCM Lane V/C Ratio	0.61	0.654	0.236
HCM Control Delay	16.2	17.2	10.9
HCM Lane LOS	C	C	B
HCM 95th-tile Q	4.2	4.9	0.9

Synchro 9 Report

HCM Unsignalized Intersection Capacity Analysis

2: Bromley Street & New Heath Street/Terrace Street

Timing Plan: AM Peak

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	376	2	13	141	20	27
Future Volume (Veh/h)	376	2	13	141	20	27
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.98	0.98	0.91	0.91
Hourly flow rate (vph)	388	2	13	144	22	30
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			390		559	389
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			390		559	389
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		95	95
cM capacity (veh/h)			1169		485	659
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	390	157	52			
Volume Left	0	13	22			
Volume Right	2	0	30			
cSH	1700	1169	572			
Volume to Capacity	0.23	0.01	0.09			
Queue Length 95th (ft)	0	1	7			
Control Delay (s)	0.0	0.8	11.9			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.8	11.9			
Approach LOS			B			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			29.9%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection

Intersection Delay, s/veh	14.1
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	176	202	151	241	168	30
Future Vol, veh/h	176	202	151	241	168	30
Peak Hour Factor	0.97	0.97	0.99	0.99	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	181	208	153	243	183	33
Number of Lanes	1	0	1	0	0	1
Approach	WB		NB		SB	
Opposing Approach			SB		NB	
Opposing Lanes	0		1		1	
Conflicting Approach Left	NB				WB	
Conflicting Lanes Left	1		0		1	
Conflicting Approach Right	SB		WB			
Conflicting Lanes Right	1		1		0	
HCM Control Delay	15.2		14.1		11.9	
HCM LOS	C		B		B	

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	47%	85%
Vol Thru, %	39%	0%	15%
Vol Right, %	61%	53%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	392	378	198
LT Vol	0	176	168
Through Vol	151	0	30
RT Vol	241	202	0
Lane Flow Rate	396	390	215
Geometry Grp	1	1	1
Degree of Util (X)	0.552	0.572	0.346
Departure Headway (Hd)	5.02	5.287	5.784
Convergence, Y/N	Yes	Yes	Yes
Cap	717	682	620
Service Time	3.061	3.327	3.83
HCM Lane V/C Ratio	0.552	0.572	0.347
HCM Control Delay	14.1	15.2	11.9
HCM Lane LOS	B	C	B
HCM 95th-tile Q	3.4	3.6	1.5

Synchro 9 Report

HCM Unsignalized Intersection Capacity Analysis

2: Bromley Street & New Heath Street/Terrace Street

Timing Plan: PM Peak

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	361	23	27	194	9	29
Future Volume (Veh/h)	361	23	27	194	9	29
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.89	0.89
Hourly flow rate (vph)	365	23	27	196	10	33
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			388			626
vC1, stage 1 conf vol						376
vC2, stage 2 conf vol						
vCu, unblocked vol			388			626
tC, single (s)			4.1			6.4
tC, 2 stage (s)						6.2
tF (s)			2.2			3.5
p0 queue free %			98			98
cM capacity (veh/h)			1170			437
						670
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	388	223	43			
Volume Left	0	27	10			
Volume Right	23	0	33			
cSH	1700	1170	596			
Volume to Capacity	0.23	0.02	0.07			
Queue Length 95th (ft)	0	2	6			
Control Delay (s)	0.0	1.2	11.5			
Lane LOS		A	B			
Approach Delay (s)	0.0	1.2	11.5			
Approach LOS			B			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			42.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection

Intersection Delay, s/veh	16.1
Intersection LOS	C

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	118	325	271	134	104	23
Future Vol, veh/h	118	325	271	134	104	23
Peak Hour Factor	0.95	0.95	0.96	0.96	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	124	342	282	140	117	26
Number of Lanes	1	0	1	0	0	1
Approach	WB		NB		SB	
Opposing Approach			SB		NB	
Opposing Lanes	0		1		1	
Conflicting Approach Left	NB				WB	
Conflicting Lanes Left	1		0		1	
Conflicting Approach Right	SB		WB			
Conflicting Lanes Right	1		1		0	
HCM Control Delay	17.4		16.4		11	
HCM LOS	C		C		B	

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	27%	82%
Vol Thru, %	67%	0%	18%
Vol Right, %	33%	73%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	405	443	127
LT Vol	0	118	104
Through Vol	271	0	23
RT Vol	134	325	0
Lane Flow Rate	422	466	143
Geometry Grp	1	1	1
Degree of Util (X)	0.616	0.657	0.239
Departure Headway (Hd)	5.254	5.071	6.028
Convergence, Y/N	Yes	Yes	Yes
Cap	688	713	594
Service Time	3.295	3.112	4.083
HCM Lane V/C Ratio	0.613	0.654	0.241
HCM Control Delay	16.4	17.4	11
HCM Lane LOS	C	C	B
HCM 95th-tile Q	4.3	4.9	0.9

Synchro 9 Report

HCM Unsignalized Intersection Capacity Analysis

2: Bromley Street & New Heath Street/Terrace Street

Timing Plan: AM Peak

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	377	2	14	143	20	27
Future Volume (Veh/h)	377	2	14	143	20	27
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.97	0.98	0.98	0.91	0.91
Hourly flow rate (vph)	389	2	14	146	22	30
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			391			564
vC1, stage 1 conf vol						390
vC2, stage 2 conf vol						
vCu, unblocked vol			391			564
tC, single (s)			4.1			6.4
tC, 2 stage (s)						6.2
tF (s)			2.2			3.5
p0 queue free %			99			95
cM capacity (veh/h)			1168			481
						658
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	391	160	52			
Volume Left	0	14	22			
Volume Right	2	0	30			
cSH	1700	1168	570			
Volume to Capacity	0.23	0.01	0.09			
Queue Length 95th (ft)	0	1	8			
Control Delay (s)	0.0	0.8	12.0			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.8	12.0			
Approach LOS			B			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			30.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection

Intersection Delay, s/veh	14.2
Intersection LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	176	202	154	241	168	33
Future Vol, veh/h	176	202	154	241	168	33
Peak Hour Factor	0.97	0.97	0.99	0.99	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	181	208	156	243	183	36
Number of Lanes	1	0	1	0	0	1
Approach	WB		NB		SB	
Opposing Approach			SB		NB	
Opposing Lanes	0		1		1	
Conflicting Approach Left	NB				WB	
Conflicting Lanes Left	1		0		1	
Conflicting Approach Right	SB		WB			
Conflicting Lanes Right	1		1		0	
HCM Control Delay	15.3		14.3		12	
HCM LOS	C		B		B	

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	47%	84%
Vol Thru, %	39%	0%	16%
Vol Right, %	61%	53%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	395	378	201
LT Vol	0	176	168
Through Vol	154	0	33
RT Vol	241	202	0
Lane Flow Rate	399	390	218
Geometry Grp	1	1	1
Degree of Util (X)	0.558	0.574	0.351
Departure Headway (Hd)	5.034	5.305	5.791
Convergence, Y/N	Yes	Yes	Yes
Cap	714	678	620
Service Time	3.073	3.345	3.838
HCM Lane V/C Ratio	0.559	0.575	0.352
HCM Control Delay	14.3	15.3	12
HCM Lane LOS	B	C	B
HCM 95th-tile Q	3.5	3.7	1.6

Synchro 9 Report

HCM Unsignalized Intersection Capacity Analysis

2: Bromley Street & New Heath Street/Terrace Street

Timing Plan: PM Peak

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	356	23	27	195	9	30
Future Volume (Veh/h)	356	23	27	195	9	30
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.89	0.89
Hourly flow rate (vph)	360	23	27	197	10	34
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			383	622		372
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			383	622		372
tC, single (s)			4.1	6.4		6.2
tC, 2 stage (s)						
tF (s)			2.2	3.5		3.3
p0 queue free %			98	98		95
cM capacity (veh/h)			1175	440		674
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	383	224	44			
Volume Left	0	27	10			
Volume Right	23	0	34			
cSH	1700	1175	601			
Volume to Capacity	0.23	0.02	0.07			
Queue Length 95th (ft)	0	2	6			
Control Delay (s)	0.0	1.2	11.5			
Lane LOS		A	B			
Approach Delay (s)	0.0	1.2	11.5			
Approach LOS			B			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			43.0%	ICU Level of Service		A
Analysis Period (min)			15			

APPENDIX I – RESPONSE TO CLIMATE CHANGE QUESTIONNAIRE

Appendix I. Response to Climate Change Questionnaire 154 Terrace Street NPC II

A.1 - Project Information

Project Name:	154 Terrace Street, Phase II		
Project Address:	154 Terrace Street, Boston MA 02120		
Project Address Additional:			
Filing Type (select)	Initial (PNF, EPNF, NPC or other substantial filing)		
Filing Contact	Name Michael Schofield	Company CLEAResult	Email: Mike.Schofield@clearresult.com
Is MEPA approval required	No		Date 10/22/19

A.3 - Project Team

Owner / Developer:	154 Terrace St c/o Winn Development
Architect:	The Architectural Team Inc.
Engineer:	Wozny Barbar Associates
Sustainability / LEED:	CLEAResult
Permitting:	Mitchell L. Fischman Consulting LLC (MLF Consulting)
Construction Management:	Waypoint

A.3 - Project Description and Design Conditions

List the principal Building Uses:	R-2 Residential
List the First Floor Uses:	Parking and amenity space R-2
List any Critical Site Infrastructure and or Building Uses:	N/A

Site and Building:

Site Area:	12,875 SF	Building Area:	70,313 SF
Building Height:	75 Ft	Building Height:	6-Stories
Existing Site Elevation – Low:	+/- 31.27 Ft BCB	Existing Site Elevation – High:	+/- 38.0 Ft BCB
Proposed Site Elevation – Low:	Ft BCB	Proposed Site Elevation – High:	+/- 38.0 Ft BCB
Proposed First Floor Elevation:	+/- 37.0 Ft BCB	Below grade levels:	0 Stories

Article 37 Green Building:

LEED Version - Rating System :

LEED BD+C:
Multifamily
Midrise v4 -

LEED Certification:

No

Proposed LEED rating:

Silver

Proposed LEED point score:

58 Pts.

Building Envelope

When reporting R values, differentiate between R discontinuous and R continuous. For example, use "R13" to show R13 discontinuous and use R10c.i. to show R10 continuous. When reporting U value, report total assembly U value including supports and structural elements.

Roof:

R-45ci

Exposed Floor:

R30 – U-0.038

Foundation Wall:

R-7.5ci

Slab Edge (at or below grade):

10 (R)

Vertical Above-grade Assemblies (%'s are of total vertical area and together should total 100%):

Area of Opaque Curtain Wall &
Spandrel Assembly:

485 SF (1.5%)

Wall & Spandrel Assembly Value:

0.40(U)

Area of Framed & Insulated
/ Standard Wall:

26,461 SF (71%)

Wall Value

R13 + R13ci – U-
0.048

Area of Vision Window:

10,320 SF (27%)

Window Glazing Assembly Value:

U-0.40

Window Glazing SHGC:

Assembly SHGC-0.4

Area of Doors:

163 SF (0.5%)

Door Assembly Value:

0.37(U)

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined

The DOE II based energy simulation program, eQuest 3.65, has been used in this analysis to generate the estimated annual energy savings associated with each proposed option as compared to the ASHRAE 90.1-2013 Baseline model

Annual Electric:

714,825 (kWh)

Peak Electric:

130.6(kW)

Annual Heating:

239 (MMbtu/hr)

Peak Heating:

.5(MMbtu)

Annual Cooling:

22,476 (Tons/hr)

Peak Cooling:

20.3(Tons)

Energy Use -
Below ASHRAE 90.1 - 2013:

29.5%

Have the local utilities reviewed the
building energy performance?

No

Energy Use - Below Mass. Code:

27.5 %

Energy Use Intensity:

42 (kBtu/SF)

Back-up / Emergency Power System

Electrical Generation Output:

35(kW)

Number of Power Units:

1

System Type:

Stand-by 35 (kW)

Fuel Source:

Oil

Emergency and Critical System Loads (in the event of a service interruption) MEP

Electric:

30(kW)

Heating:

N/A(MMbtu/hr)

Cooling:

N/A(Tons/hr)

B – Greenhouse Gas Reduction and Net Zero / Net Positive Carbon Building Performance

Reducing GHG emissions is critical to avoiding more extreme climate change conditions. To achieve the City's goal of carbon neutrality by 2050 new buildings performance will need to progressively improve to net carbon zero and positive.

B.1 – GHG Emissions - Design Conditions

For this Filing - Annual Building GHG Emissions: 274 (Tons)

For this filing - describe how building energy performance has been integrated into project planning, design, and engineering and any supporting analysis or modeling:

We started the energy analysis early on and evaluated several energy efficiency measures. In order to reduce the annual energy consumption and GHG emissions of this building, the design team will implement a series of integrated strategies and energy efficiency measures in the design of this project

Describe building specific passive energy efficiency measures including orientation, massing, envelop, and systems:

Optimum orientation, high-performance window assembly, increased roof insulation (R-45) and high-performance wall system.

Describe building specific active energy efficiency measures including equipment, controls, fixtures, and systems:

Within residential units high-efficiency VRF systems, Energy Star Appliances, LED lighting, and individual thermostats will be utilized; Building will be equipped with a Dedicated Outdoor Air System with Energy Recovery, low-flow plumbing fixtures, and reduced interior lighting power density is targeted throughout the project, including the parking garage.

Describe building specific load reduction strategies including on-site renewable, clean, and energy storage systems:

TBD

Describe any area or district scale emission reduction strategies including renewable energy, central energy plants, distributed energy systems, and smart grid infrastructure:

Describe any energy efficiency assistance or support provided or to be provided to the project:

The project will participate in Mass Save Incentive program.

B.2 - GHG Reduction - Adaptation Strategies

Describe how the building and its systems will evolve to further reduce GHG emissions and achieve annual carbon net zero and net positive performance (e.g. added efficiency measures, renewable energy, energy storage, etc.) and the timeline for meeting that goal (by 2050):

The project is investigating the feasibility of electrification and utilization of all electric systems. Also, a portion of the roof might be covered by solar PVs which will offset a percentage of the building annual energy consumption. In the future, when the building systems need to be replaced, the new components will be more energy efficient than the initial systems and if the building is all-electric, 100% of its energy consumption can be provided by renewable resources.

C - Extreme Heat Events MEP

Annual average temperature in Boston increased by about 2 °F in the past hundred years and will continue to rise due to climate change. By the end of the century, the average annual temperature could be 56° (compared to 46° now) and the number of days above 90° (currently about 10 a year) could rise to 90.

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low:	8.5Deg.	Temperature Range - High:	90.6Deg.
Annual Heating Degree Days:	5512	Annual Cooling Degree Days	776

What Extreme Heat Event characteristics will be / have been used for project planning

Days - Above 90°:	5#	Days – Above 100°:	2#
Number of Heatwaves / Year:	5#	Average Duration of Heatwave (Days):	3#

Describe all building and site measures to reduce heat-island effect at the site and in the surrounding area:

Reduction of glazed area and exterior shading will be considered.

C.2 - Extreme Heat – Adaptation Strategies

Describe how the building and its systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heatwaves, and longer heatwaves:

TBD

Describe all mechanical and non-mechanical strategies that will support building functionality and use during extended interruptions of utility services and infrastructure including proposed and future adaptations:

TBD

D - Extreme Precipitation Events

From 1958 to 2010, there was a 70 percent increase in the amount of precipitation that fell on the days with the heaviest precipitation. Currently, the 10-Year, 24-Hour Design Storm precipitation level is 5.25". There is a significant probability that this will increase to at least 6" by the end of the century. Additionally, fewer, larger storms are likely to be accompanied by more frequent droughts.

D.1 – Extreme Precipitation - Design Conditions

10 Year, 24 Hour Design Storm:

Describe all building and site measures for reducing storm water run-off:

A subsurface infiltration system has been installed in Phase 1 capable of handling Phase 1 & 2. This system will store and infiltrate the first inch of stormwater of site impervious area.

D.2 - Extreme Precipitation - Adaptation Strategies

Describe how site and building systems will be adapted to efficiently accommodate future more significant rain events (e.g. rainwater harvesting, on-site storm water retention, bio swales, green roofs):

Additional stormwater detention and/or infiltration through the use of green roofs, storage tanks or other infrastructure will be considered as needed to adapt to future more significant rain events

E – Sea Level Rise and Storms

Under any plausible greenhouse gas emissions scenario, sea levels in Boston will continue to rise throughout the century. This will increase the number of buildings in Boston susceptible to coastal flooding and the likely frequency of flooding for those already in the floodplain.

Is any portion of the site in a FEMA SFHA?

What Zone:

Current FEMA SFHA Zone Base Flood Elevation:

Is any portion of the site in a BPDA Sea Level Rise - Flood Hazard Area? Use the online [BPDA SLR-FHA Mapping Tool](#) to assess the susceptibility of the project site.

*If you answered YES to either of the above questions, please complete the following questions.
Otherwise you have completed the questionnaire; thank you!*

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

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented on the BPDA Sea Level Rise - Flood Hazard Area (SLR-FHA) map, which depicts a modeled 1% annual chance coastal flood event with 40 inches of sea level rise (SLR). Use the online [BPDA SLR-FHA Mapping Tool](#) to identify the highest Sea Level Rise - Base Flood Elevation for the site. The Sea Level Rise - Design Flood Elevation is determined by adding either 24" of freeboard for critical facilities and infrastructure and any ground floor residential units OR 12" of freeboard for other buildings and uses.

Sea Level Rise - Base Flood Elevation:	Ft BCB		
Sea Level Rise - Design Flood Elevation:	Ft BCB	First Floor Elevation:	Ft BCB
Site Elevations at Building:	Ft BCB	Accessible Route Elevation:	Ft BCB

Describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Describe how the proposed Building Design Flood Elevation will be achieved including dry / wet flood proofing, critical systems protection, utility service protection, temporary flood barriers, waste and drain water back flow prevention, etc.:

Describe how occupants might shelter in place during a flooding event including any emergency power, water, and waste water provisions and the expected availability of any such measures:

Describe any strategies that would support rapid recovery after a weather event:

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

Describe future site design and or infrastructure adaptation strategies for responding to sea level rise including future elevating of site areas and access routes, barriers, wave / velocity breaks, storm water systems, utility services, etc.:

Describe future building adaptation strategies for raising the Sea Level Rise Design Flood Elevation and further protecting critical systems, including permanent and temporary measures:

A pdf and word version of the Climate Resiliency Checklist is provided for informational use and off-line preparation of a project submission. **NOTE: Project filings should be prepared and submitted using the online [Climate Resiliency Checklist](#).**

For questions or comments about this checklist or Climate Change best practices, please contact:
John.Dalzell@boston.gov

Energy Performance Analysis

Notice of Project Change

Mission Lofts

154 Terrace Street, Roxbury, MA

October 31, 2019

enviENERGY Studio is providing energy modeling services for the Mission Lofts project, located at 154 Terrace Street, Roxbury, Massachusetts and has investigated the project’s compliance with LEED v4 minimum and annual energy performance criteria and Massachusetts Energy Code requirements. The minimum requirements of ASHRAE 90.1-2010 (LEED v4 Baseline) and ASHRAE 90.1-2013 (MA Energy Code Baseline), as well as the proposed design assumptions, are listed in the Energy Modeling Assumptions table. In order to reduce the annual energy consumption and GHG emissions of this building, the design team evaluated a series of integrated strategies, and implemented the optimum energy efficiency measures in the design of this project.

This energy analysis shows that Mission Lofts project meets and exceeds the LEED v4 and MA Energy Code requirements.

Methodology

The DOE II based energy simulation program, eQuest 3.65, has been used in this analysis to generate the estimated annual energy savings associated with each proposed option. The building geometries are based on the revised architectural drawing sets, and the window-to-wall ratio is estimated at 27%.

Please note that the proposed estimated energy performance and cost are not predictions of actual energy consumptions or costs for the proposed design after construction. The actual energy use will differ from these estimates due to the variations in occupancy patterns and schedules, weather conditions, and building operation and maintenance, but the energy modeling results should serve as an accurate comparison tool.

The following energy models were generated:

- **Massachusetts Energy Code Baseline:** Following the Appendix G – Performance Rating Method, the envelope, HVAC, lighting, and service water heating systems are modified to meet the minimum requirements of ASHRAE 90.1-2013. This model is used as the baseline for MA Energy Code analysis.
- **LEED v4 Baseline:** Following the Appendix G – Performance Rating Method, the envelope, HVAC, lighting and, service water heating systems are modified to meet the minimum requirements of ASHRAE 90.1-2010. This model is used as the baseline for LEED v4 analysis. In the current analysis, we are using ASHRAE 90.1-2013 as the Baseline case for the LEED Analysis. Per LEED Interpretation #10488, projects that are subject to ASHRAE 90.1-2013 for Code compliance may document achievement of LEED v4 BD+C Minimum and Optimize Energy Performance in accordance with ANSI/ASHRAE/IESNA Standard 90.1-2013, Appendix G. The number of LEED points will be adjusted according to the tables included in the ruling document.
- **Proposed Design:** The proposed design represents the actual design.
- **Proposed Carbon Neutral:** This case represents the Zero Carbon Design alternative.

The results of the energy analysis show that the project as designed has an annual energy use that is 29.6% less than the ASHRAE 90.1-2013 Baseline model and 27.7% less than the Massachusetts Energy Code Baseline case - following the whole building performance path.

If there are any questions or if additional information is needed, please feel free to contact me at samira.ahmadi@envien-studio.com.

Sincerely,

Samira Ahmadi, BEMP, LEED AP BD+C, ID+C, Homes

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Energy Modeling Inputs

	Residential	LEED Baseline ASHRAE 90.1-2010	Energy Code Baseline ASHRAE 90.1-2013		Proposed Design & ECMs (Energy Conservation Measures)	Proposed Design Carbon Neutral Option
Envelope	Windows	Metal framing (Storefront/ Curtainwall): U-value 0.45; SHGC-0.4 Metal Framing (other): U-0.55 and SHGC-0.40	Metal framing (fixed): U-0.42; SHGC-0.40 Metal framing (operable): U-0.50; SHGC-0.40		Metal Framing, Double pane windows: U-0.40 and SHGC-0.40	Triple Low-E: U-0.20 and SHGC-0.31
	Window-To-Wall Ratio	as proposed or 40%; whichever is less (27%)	as proposed or 40%; whichever is less (27%)		27.0%	27.0%
	Roof	Insulation entirely above deck; Residential: R-20 c.i.; U-0.048	Insulation entirely above deck; Residential: R-30 c.i.; U-value of 0.032		R-45 continuous insulation above deck U-0.022	R-50 continuous insulation above deck U-0.020
	Slab-on-grade/ Exposed Floor	Non-Residential: Unheated: No Insulation R-30 batt for exposed floor; U-0.038	Unheated: R-15 for 24 inch R-30 batt for exposed floor; U-0.038		Slab edge: R-10 R-30 insulation for exposed floor: U-0.038	R-30 insulation for exposed floor: U-0.038
	Exterior Walls	Steel-framed: Residential & Non-residential: R-13 + R-7.5 c.i.; U-0.064	Steel-framed: Residential & Non-residential: R-13 + R-10 c.i.; U-0.055		Podium: R-13 + R-13 ci; U-0.048 Upper levels - wood-frame: R-13 + R-13 ci; U-0.040	R-21 + R-15 ci; U-0.030
	Envelope Infiltration Rate	0.40 CFM per square feet of envelope	0.40 CFM per square feet of envelope		0.40 CFM per square feet of envelope	0.06 CFM per square feet of envelope
Interior Loads	Occupancy	Number of people per unit = number of bedrooms + 1; Total: 136	Number of people per unit = number of bedrooms + 1; Total: 136		Number of people per unit = number of bedrooms + 1; Total: 136	Number of people per unit = number of bedrooms + 1; Total: 136
	Interior Lighting	0.19 W/SF Parking Area 0.90 W/SF Residential Units 0.66 W/SF Corridor 0.73 W/SF Lounge at Roof Deck 0.90 W/SF Lobby	0.19 W/SF Parking Area, Interior (0.17 W/SF) 0.90 W/SF Living quarters 0.66 W/SF Corridor (0.59 W/SF) 0.73 W/SF Lounge (0.657 W/SF) 0.90 W/SF Lobby (0.81 W/SF) 10% LPD Reduction for MA Energy Code Baseline		0.14 W/SF Parking Area, Interior 0.90 W/SF Living quarters 0.50 W/SF Corridor 0.73 W/SF Lounge 0.81 W/SF Lobby	0.07 W/SF Parking Area, Interior 0.50 W/SF Living quarters (Should be hard-wired) 0.40 W/SF Corridor 0.70 W/SF Lounge 0.75 W/SF Lobby
	Plug Load	Residential: 1.79 W/SF Lobby/ Transition: 0.2 W/SF	Residential: 1.79 W/SF Lobby/ Transition: 0.2 W/SF		Residential: 1.68 W/SF; All Energy Star Lobby/ Transition: 0.2 W/SF	Residential: 1 W/SF Lobby/ Transition: 0.2 W/SF
	Elevator Load	As Proposed	As Proposed		2 cars at 15 kW/ each	2 cars at 15 kW/ each
DHW	Low-Flow Hot Water Fixtures	Peak Residential Flow at DHW Heater (utilizing LEED Multifamily Calculator): 4.8 GPM	Peak Residential Flow at DHW Heater (utilizing LEED Multifamily Calculator): 4.8 GPM		Peak Residential Flow at DHW Heater (utilizing LEED Multifamily Calculator): 3.25 GPM	Peak Residential Flow at DHW Heater (utilizing LEED Multifamily Calculator): 2.9 GPM
	Water Heater type & Efficiency	Same energy source as design; 80% efficient	Gas storage; 80% efficient		Central gas-fired DHW; 95% efficient	Electric Heat Pump Heater
Primary HVAC System	System Type	System #1: PTAC	System #1: PTAC		Individual VRF with a gas central boiler for DHW	Individual VRF
	Cooling Type & Efficiency	9.3 ≤ EER ≤ 11.7	9.5 ≤ EER ≤ 11.9 10% increase in efficiency for MA Energy Code Baseline: 10.4 ≤ EER ≤ 13.1		Cooling EFF: 20.8 SEER	Cooling EFF: 14 EER
	Heating Type & Efficiency	Gas-fired Boiler; 82% efficiency	Gas-fired Boiler; 82% efficiency 10% increase in efficiency for MA Energy Code Baseline: 90%		Heating EFF: 4.1 COP	Heating EFF: 5 COP
	HW Supply Temperature & Control	180° F; OA Temperature Control	180° F; OA Temperature Control		N/A	N/A
	Hot Water ΔT	50° F	50° F		N/A	N/A
	HW Pump Control	Primary only; constant volume	Primary only; constant volume		N/A	N/A
Air-Side HVAC	Ventilation	As proposed; meets ASHRAE 62.1-2010	As proposed; meets ASHRAE 62.1-2013		Dedicated ERV with enthalpy wheel; meets ASHRAE 62.1	Dedicated ERV with enthalpy wheel; meets ASHRAE 62.1
	Supply Fan Control	Constant Volume	Constant Volume		ERV: Constant Volume Res. Units: Cycling	ERV: Constant Volume Res. Units: Cycling

Energy Performance and Greenhouse Gas Emissions Analysis

Energy Modeling Runs	Interior Lighting	Misc. Equipment	Elevator	Space Heating	Space Cooling	Pumps & Aux.	Ventilation Fans	Exterior Lighting	Domestic HW		Domestic HW	Space Heating		MA Energy Code		LEED v4 (ASHRAE 2013 Baseline)		Energy Use Intensity	
	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh		Therms	Therms		Total Site Energy	Energy Savings Compared to Baseline	Total Energy Cost	Energy Cost Savings Compared to Baseline	Site	Source
														MBTU	Compared to ASHRAE 90.1-2013 + two Additional ECMs required	\$	Compared to ASHRAE 90.1-2013	kBTU/SF/YR	
ASHRAE 90.1-2013 Baseline	136,150	375,195	48,065	0	114,893	6,717	107,528	3,830	0		6,637	9,467		4,315		\$ 164,304		60	142
MA Energy Code Baseline	133,313	375,195	48,065	0	104,108	6,761	107,388	3,830	0		6,637	8,764		4,198	%	\$ 160,994	%	58	138
Proposed Design	131,062	352,334	48,065	40,531	79,025	2,172	57,806	3,830	0		4,419	1,550		3,037	27.7%	\$ 139,118	15.3%	42	115
Proposed Carbon Neutral	79,770	211,016	48,065	45,572	52,974	1,355	53,661	3,830	47,613		0	0		1,856	55.8%	\$ 100,787	37.4%	26	81

Greenhouse Gas Emissions

Energy Consumption	Area Light (kWh)	Misc. Equipment (kWh)	Elevator (kWh)	Gas Space Heating (Therm)	Electric Space Heating (kWh)	Space Cooling (kWh)	Pump & Aux (kWh)	DHW (kWh)	Ventilation Fans (kWh)	DHW (Therm)	Exterior Usage (kWh)		Total Electricity (kWh)	Total Natural Gas (Therm)	Total Energy (MBTU)
MA Energy Code Baseline	133,313	375,195	48,065	8,764	0	104,108	6,761	0	107,388	6,637	3,830		778,660	15,401	4,198
Proposed Design	131,062	352,334	48,065	1,550	40,531	79,025	2,172	0	57,806	4,419	3,830		714,825	5,969	3,037
Proposed Carbon Neutral	79,770	211,016	48,065	0	45,572	52,974	1,355	47,613	53,661	0	3,830		543,856	0	1,856
% Savings	Proposed Design vs MA Energy Code Baseline												8%	61%	28%
	Proposed Design (Carbon Neutral Option) vs MA Energy Code Baseline												30%	100%	56%

Greenhouse Gas Emissions	Area Light (tons of CO2)	Misc. Equipment (tons of CO2)	Residential Lighting (tons of CO2)	Gas Space Heating (tons of CO2)	Electric Space Heating (tons of CO2)	Space Cooling (tons of CO2)	Pump & Aux (tons of CO2)	Electric DHW (tons of CO2)	Ventilation Fans (tons of CO2)	Gas DHW (tons of CO2)	Exterior Usage (tons of CO2)		Total Electricity GHG (Ton)	Total Natural Gas GHG (Ton)	Total GHG (Ton)
MA Energy Code Baseline	47	133	17	51	0	37	2	0	38	39	1		276	90	367
Proposed Design	47	125	17	9	14	28	1	0	21	26	1		254	35	289
Proposed Carbon Neutral	28	75	17	0	16	19	0	17	19	0	1		193	0	193
% Savings	Proposed Design vs MA Energy Code Baseline												8%	61%	21%
	Proposed Design (Carbon Neutral Option) vs MA Energy Code Baseline												30%	100%	47%

Conversion:

MWH to Lbs of CO2 (Electricity)

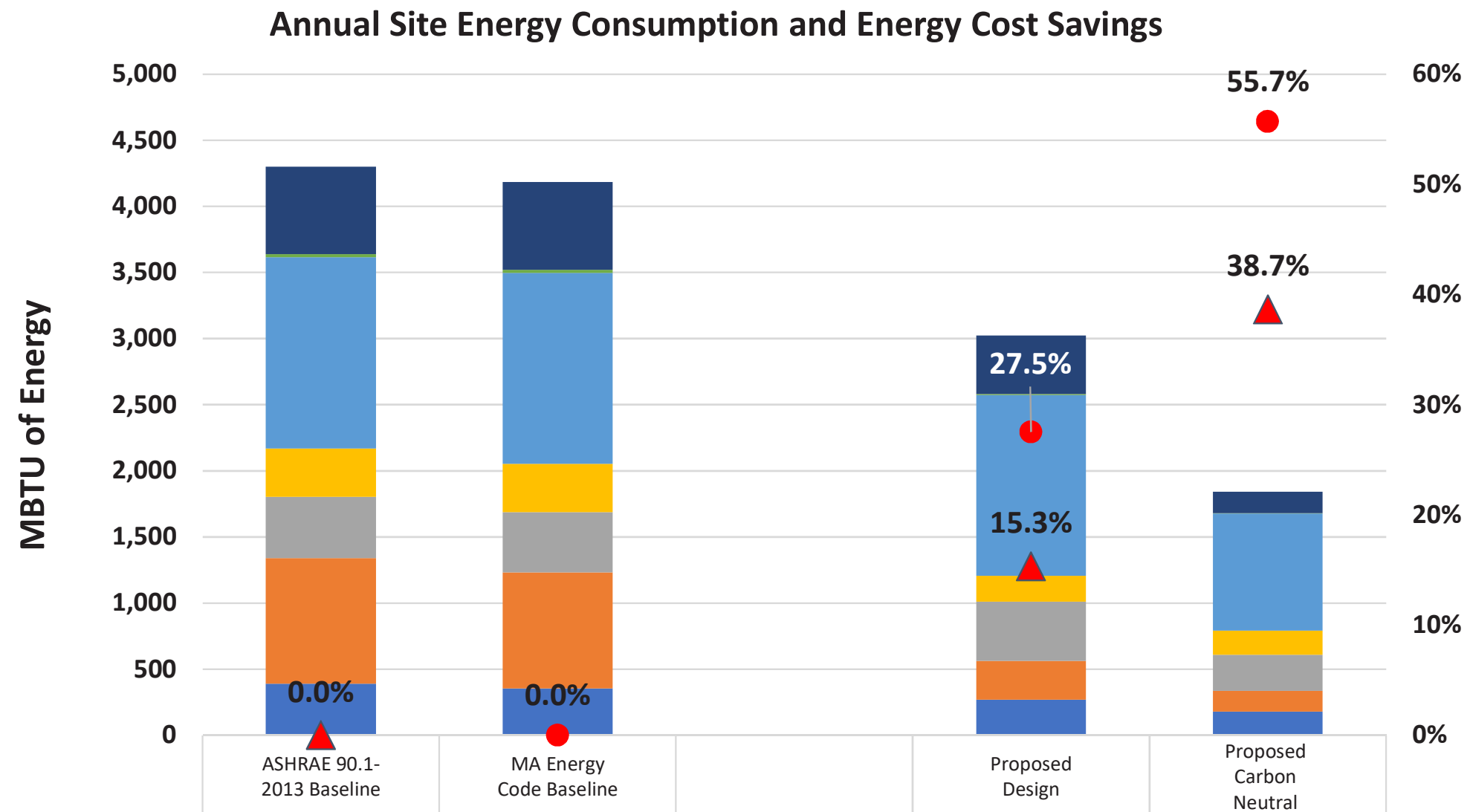
710 ISO New England CO2 Emission factor: 710 lb of CO2 per MWH reduction in electricity use

MBTU to Lbs of CO2 (Natural Gas)

117.08 Direct GHG Emissions Factor for the US from EPA

Lbs to Short Tons

0.0005



4

Carbon Neutral Building Assessment

154 Terrace Street is a 6-story plus a roof deck residential complex, which is being designed as a high-performance building. Per the preliminary energy modeling results, the current design creates a lower than average predicted site and source energy use intensity (pEUI) - 42 kBtu/SF and 115 kBtu/SF respectively - which are approximately 37% better than the EPA Energy Star Median Property statistics.

EPA Energy Star Target Finder - Summary Statistics for Multifamily Residential Building

Metric	Energy Star Design Target	Median Property
ENERGY STAR Score (1-100)	75	50
Source EUI (kBtu/SF)	88.6	105.9
Site EUI (kBtu/SF)	56.5	67.5
Total GHG Emissions (Metric Tons CO2e)	205.2	245.3

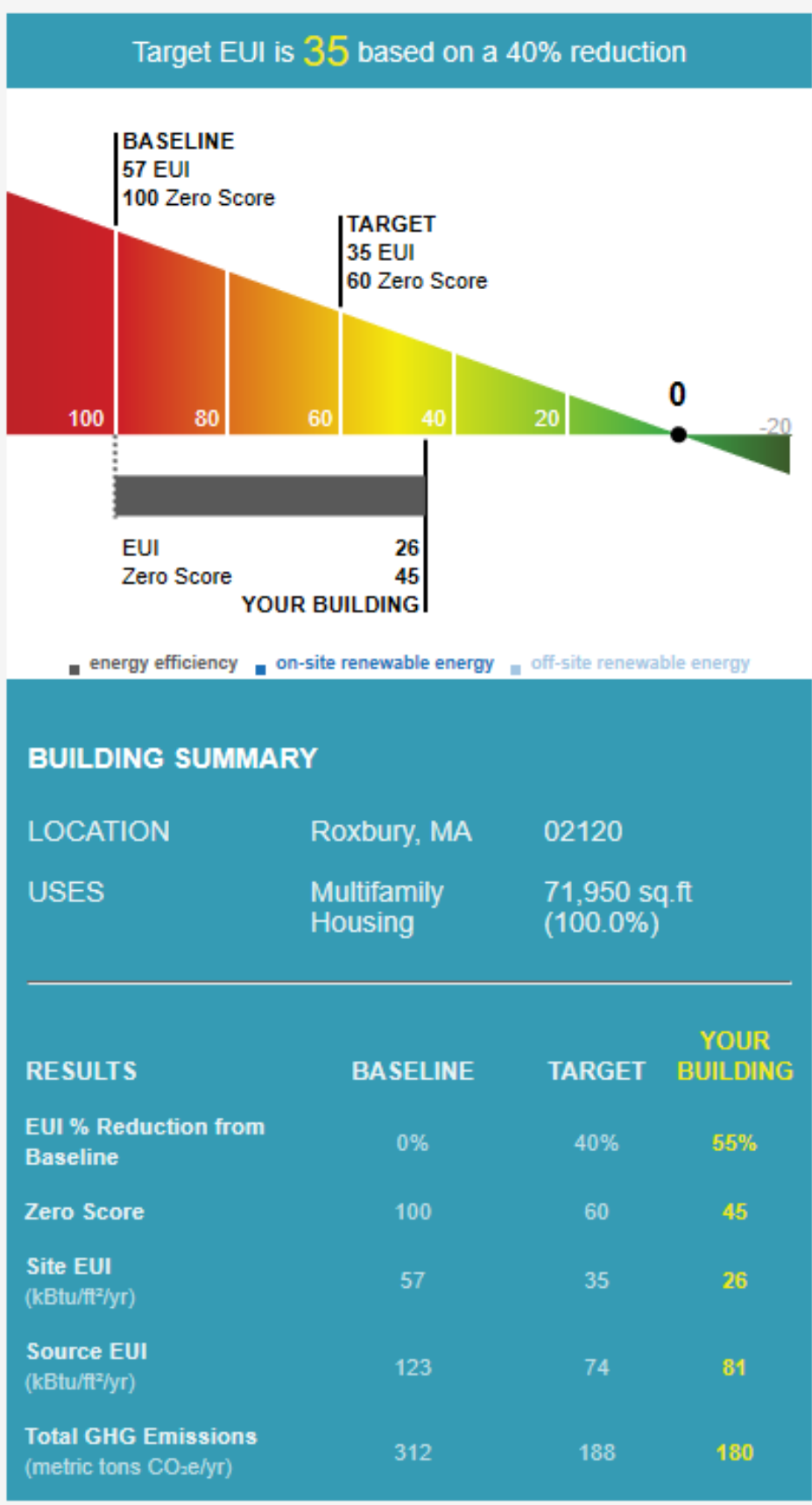
enviENERGY Studio has developed building energy models, which will be used throughout the design process to evaluate various pathways for achieving targeted energy performance improvements. The preliminary energy analysis shows that the project as designed is anticipated to result in an annual energy savings of 27.7% compared to the current Massachusetts Energy Code baseline.

In order to bring the building to Zero Energy/ Carbon status, the project has been converted to an all electric building; since the Basis of Design utilizes the VRF system for the space heating and cooling, only the Domestic Hot Water and the central Energy Recovery Unit have been changed from gas-fired to all electric systems. The design team has divided the building elements into passive, building envelope, and active, MEP systems, and implemented measures so that the overall building envelope meets and exceeds the PHIUS (Passive House US) envelope performance recommendations before introducing any active energy efficiency measures.

The proposed Carbon Neutral Design incorporates the following energy conservation measures:

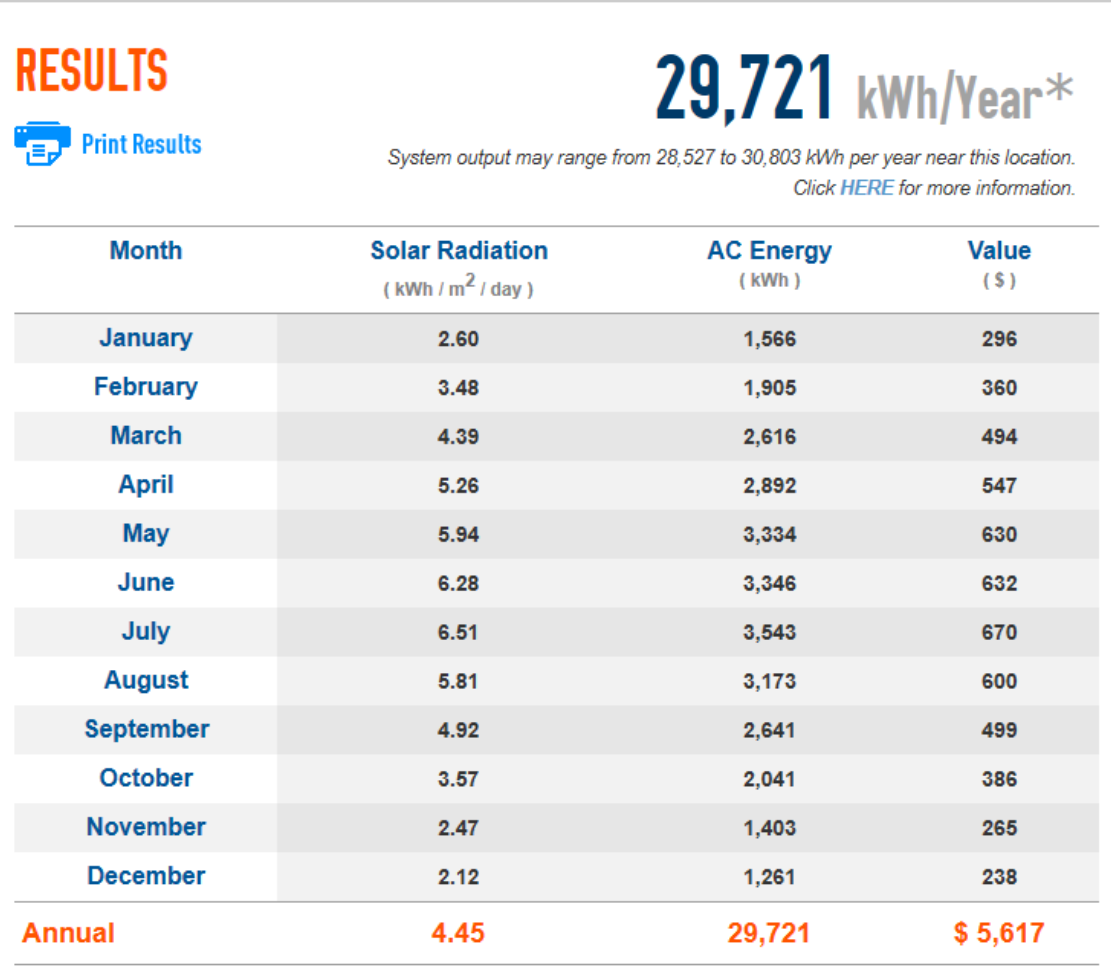
- High-performance window system; U-0.20 and SHGC-0.31
- Increased roof insulation – R-50 c.i.
- Increased wall insulation – R-21 + R-15 c.i
- Reduced infiltration rate: 0.06 CFM/SF of envelope area
- Additional reduction in the interior lighting power density
- High-efficiency VRF system
- Energy recovery units (included in the proposed design) with heat pump heating
- Electric heat pump DHW

Implementing these measures results in an additional 38.8% reduction in the estimated building annual energy consumption and reduces the building site pEUI to 26 kBtu/SF and source pEUI to 81 kBtu/SF. We used the AIA Architecture 2030 Zero Tool to benchmark the proposed Zero Carbon case against the 2030 baseline case. As shown, the proposed design can achieve a Zero Score of 45 before introducing any on-site or off-site renewable energy sources.

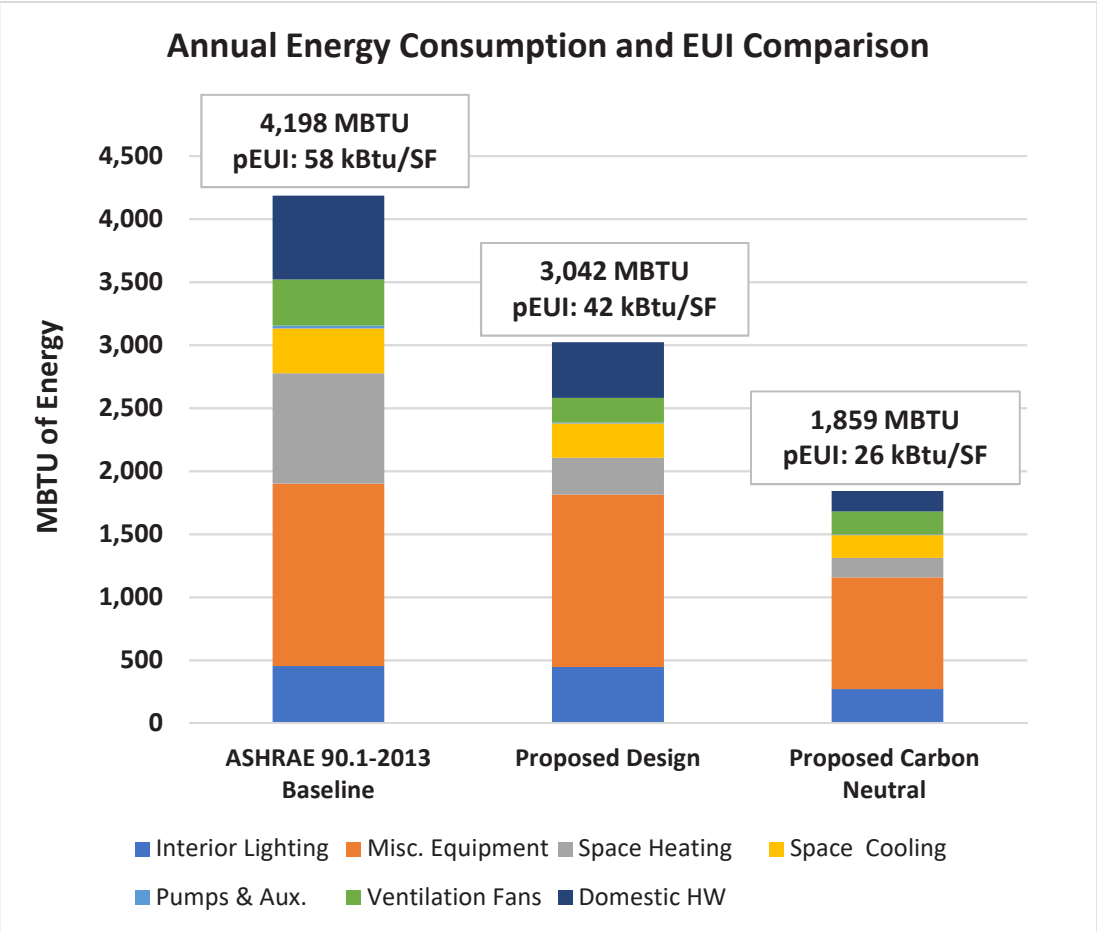


On-site and Off-site Renewable Energy Sources

The building annual electricity consumption is estimated at approximately 544,000 kWh which outperforms the Massachusetts Energy Code baseline by 56% before incorporating any on-site or off-site renewable energy production. Due to the limited roof area, the proponent is exploring a combination of on-site and off-site renewable energy sources. The available roof area which can be used for installing photovoltaic array is approximately 3,000 SF. Utilizing 295-W modules, the on-site photovoltaic array would be a 24-kW system which could generate approximately 29,700 kWh per year. The proponent will investigate the opportunities for off-site power purchase, such as Renewable Energy Credits (RECs), to offset the remainder of the on-site energy consumption, which is estimated at 514,300 kWh/yr with the additional energy production included from the photovoltaic system.



As the design progresses, the project team will investigate opportunities for further improvements and will conduct a Life Cost Assessment to evaluate the financial feasibility of this option. Since the project is in the early stages of design, obtaining accurate cost estimates in a short period of time was not possible but the project team is committed to performing the Life Cycle Assessment and will continue the study throughout the design process and will submit the findings.



APPENDIX J – RESPONSE TO COB ACCESSIBILITY GUIDELINES

Appendix J: Response to COB Accessibility Checklist- 154 Terrace St.

Article 80 – Accessibility Checklist

A requirement of the Boston Planning & Development Agency (BPDA) Article 80 Development Review Process

The Mayor's Commission for Persons with Disabilities strives to reduce architectural, procedural, attitudinal, and communication barriers that affect persons with disabilities in the City of Boston. In 2009, a Disability Advisory Board was appointed by the Mayor to work alongside the Commission in creating universal access throughout the city's built environment. The Disability Advisory Board is made up of 13 volunteer Boston residents with disabilities who have been tasked with representing the accessibility needs of their neighborhoods and increasing inclusion of people with disabilities.

In conformance with this directive, the BDPA has instituted this Accessibility Checklist as a tool to encourage developers to begin thinking about access and inclusion at the beginning of development projects, and strive to go beyond meeting only minimum MAAB / ADAAG compliance requirements. Instead, our goal is for developers to create ideal design for accessibility which will ensure that the built environment provides equitable experiences for all people, regardless of their abilities. As such, any project subject to Boston Zoning Article 80 Small or Large Project Review, including Institutional Master Plan modifications and updates, must complete this Accessibility Checklist thoroughly to provide specific detail about accessibility and inclusion, including descriptions, diagrams, and data.

For more information on compliance requirements, advancing best practices, and learning about progressive approaches to expand accessibility throughout Boston's built environment. Proponents are highly encouraged to meet with Commission staff, prior to filing.

Accessibility Analysis Information Sources:

1. Americans with Disabilities Act – 2010 ADA Standards for Accessible Design
http://www.ada.gov/2010ADASTandards_index.htm
2. Massachusetts Architectural Access Board 521 CMR
<http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/aab/aab-rules-and-regulations-pdf.html>
3. Massachusetts State Building Code 780 CMR
<http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/csl/building-codebbrs.html>
4. Massachusetts Office of Disability – Disabled Parking Regulations
<http://www.mass.gov/anf/docs/mod/hp-parking-regulations-summary-mod.pdf>
5. MBTA Fixed Route Accessible Transit Stations
http://www.mbta.com/riding_the_t/accessible_services/
6. City of Boston – Complete Street Guidelines
<http://bostoncompletestreets.org/>
7. City of Boston – Mayor's Commission for Persons with Disabilities Advisory Board
www.boston.gov/disability
8. City of Boston – Public Works Sidewalk Reconstruction Policy
http://www.cityofboston.gov/images_documents/sidewalk%20policy%200114_tcm3-41668.pdf
9. City of Boston – Public Improvement Commission Sidewalk Café Policy
http://www.cityofboston.gov/images_documents/Sidewalk_cafes_tcm3-1845.pdf

Glossary of Terms:

1. **Accessible Route** – A continuous and unobstructed path of travel that meets or exceeds the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 20
2. **Accessible Group 2 Units** – Residential units with additional floor space that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 9.4
3. **Accessible Guestrooms** – Guestrooms with additional floor space, that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 8.4
4. **Inclusionary Development Policy (IDP)** – Program run by the BPDA that preserves access to affordable housing opportunities, in the City. For more information visit: <http://www.bostonplans.org/housing/overview>

Appendix J: Response to COB Accessibility Checklist- 154 Terrace St.

5. **Public Improvement Commission (PIC)** – The regulatory body in charge of managing the public right of way. For more information visit: <https://www.boston.gov/pic>
6. **Visitability** – A place's ability to be accessed and visited by persons with disabilities that cause functional limitations; where architectural barriers do not inhibit access to entrances/doors and bathrooms.

1. Project Information: <i>If this is a multi-phased or multi-building project, fill out a separate Checklist for each phase/building.</i>	
Project Name:	154 Terrace Street
Primary Project Address:	154 Terrace Street, Roxbury
Total Number of Phases/Buildings:	1 Building, 1 Phase
Primary Contact (Name / Title / Company / Email / Phone):	Phil Cohen, Project Director PCohen@winnco.com Tel: 617-506-9557
Owner / Developer:	Pickle-Ditson Phase II LP, a Massachusetts Limited Partnership c/o Winn Development LLP Six Faneuil Hall Marketplace Boston, MA 02109 Phil Cohen, Project Director PCohen@winnco.com Tel: 617-506-9557 Larry Curtis, President & Managing Partner Adam Stein, SVP Development David Thunell, SVP of Construction Darien Crimmin, VP of Energy and Sustainability
Architect:	The Architectural Team 50 Commandants Way at Admiral Hill Chelsea, MA 02150 Tel: 617-889-4402 Robert Verrier FAIA, NCARB rverrier@architecturalteam.com Jeffrey Sargis jsargis@architecturalteam.com

Appendix J: Response to COB Accessibility Checklist- 154 Terrace St.

Civil Engineer:	Howard Stein Hudson 11 Beacon Street, Suite 1010 Boston, MA 02108 Tel: 617-482-7080 Rick Latini, P.E. rlatini@hshassoc.com James Downing jdowning@hshassoc.com		
Landscape Architect:	N/A		
Permitting:	Mitchell L. Fischman Consulting ("MLF Consulting") LLC 41 Brush Hill Road Newton, MA 02461 Mitch Fischman mitchfischman@gmail.com Tel: 781-760-1726 Yvette Niwa Yvetteniwa.mlfconsulting@gmail.com Tel : 818-426-8157		
Construction Management:	TBD		
At what stage is the project at time of this questionnaire? Select below:			
	NPC / NPC Submitted	Draft / Final Project Impact Report Submitted	BPDA Board Approved
	BPDA Design Approved	Under Construction	Construction Completed:
Do you anticipate filing for any variances with the Massachusetts Architectural Access Board (MAAB)? <i>If yes</i> , identify and explain.	Yes; we anticipate filing for relief from 521 CMR 43.3.2 – Sink Depth for Group 1 units.		
2. Building Classification and Description: <i>This section identifies preliminary construction information about the project including size and uses.</i>			
What are the dimensions of the project?			
Site Area:	12,875 SF	Building Area:	82,344 GSF
Building Height:	69 FT. 10 IN.	Number of Stories:	6-Flrs.
First Floor Elevation:		Is there below grade space:	No

Appendix J: Response to COB Accessibility Checklist- 154 Terrace St.

What is the Construction Type? (Select most appropriate type)				
	Wood Frame	Masonry	Steel Frame	Concrete
What are the principal building uses? (IBC definitions are below – select all appropriate that apply)				
	Residential— One—Three Unit	Residential - Multi-unit, Four +	Institutional	Educational
	Business	Mercantile	Factory	Hospitality
	Laboratory / Medical	Storage, Utility and Other		
List street-level uses of the building:	Group S2 (Parking)			
3. Assessment of Existing Infrastructure for Accessibility: <i>This section explores the proximity to accessible transit lines and institutions, such as (but not limited to) hospitals, elderly & disabled housing, and general neighborhood resources. Identify how the area surrounding the development is accessible for people with mobility impairments and analyze the existing condition of the accessible routes through sidewalk and pedestrian ramp reports.</i>				
Provide a description of the neighborhood where this development is located and its identifying topographical characteristics:	The project site is on Terrace street, by the Phase 1 Pickle Ditson and the MBTA tracks. The site is sloped from Phase 1 up towards the adjacent northeastern property.			
List the surrounding accessible MBTA transit lines and their proximity to development site: commuter rail / subway stations, bus stops:	Within a 400' circle of the site there are six bus stops at, Heath St. Parker St., Wensley, Columbus Ave., Centre St., Cedar St.			
List the surrounding institutions: hospitals, public housing, elderly and disabled housing developments, educational facilities, others:	The proposed project is adjacent to Pickle Ditson Phase 1 and the MBTA rail lines. Southwest of the project is the Southwest Corridor Park, to the West the McLaughlin Playground.			
List the surrounding government buildings: libraries, community centers, recreational facilities, and other related facilities:	See above.			
4. Surrounding Site Conditions – Existing: <i>This section identifies current condition of the sidewalks and pedestrian ramps at the development site.</i>				
Is the development site within a historic district? <i>If yes</i> , identify which district:	The project is not located in a Historic District.			

Appendix J: Response to COB Accessibility Checklist- 154 Terrace St.

Are there sidewalks and pedestrian ramps existing at the development site? <i>If yes</i> , list the existing sidewalk and pedestrian ramp dimensions, slopes, materials, and physical condition at the development site:	There is currently an existing sidewalk along Terrace Street. This sidewalk is in moderate condition and is approximately 5'-0" over the length of the project site.
Are the sidewalks and pedestrian ramps existing-to-remain? <i>If yes</i> , have they been verified as ADA / MAAB compliant (with yellow composite detectable warning surfaces, cast in concrete)? <i>If yes</i> , provide description and photos:	It is undetermined at this time.
5. Surrounding Site Conditions – Proposed <i>This section identifies the proposed condition of the walkways and pedestrian ramps around the development site. Sidewalk width contributes to the degree of comfort walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Wider sidewalks allow people to walk side by side and pass each other comfortably walking alone, walking in pairs, or using a wheelchair.</i>	
Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? <i>If yes</i> , choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, or Boulevard.	It is expected that the new sidewalks will be fully consistent with a Neighborhood Main Street-type use in the Boston Complete Street Guidelines. The proposed building is set back 2'-0" to achieve a 7'-0" sidewalk.
What are the total dimensions and slopes of the proposed sidewalks? List the widths of the proposed zones: Frontage, Pedestrian and Furnishing Zone:	The full scope of sidewalk work has not yet been determined. We anticipate a combined width of 7 feet for the Frontage and Pedestrian zones.
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?	We are proposing cast-in-place concrete for all zones of the sidewalks. In accordance with other sidewalks in the neighborhood; we expect a number of street trees in the planting zone.
Will sidewalk cafes or other furnishings be programmed for the pedestrian right-of-way? <i>If yes</i> , what are the proposed dimensions of the sidewalk café or furnishings and what will the remaining right-of-way clearance be?	We are not anticipating any café or furnishing area.

Appendix J: Response to COB Accessibility Checklist- 154 Terrace St.

If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the Public Improvement Commission (PIC)?	Not Applicable.
Will any portion of the Project be going through the PIC? <i>If yes</i> , identify PIC actions and provide details.	We believe a portion of the total development project will require PIC review.
6. Accessible Parking: <i>See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirement counts and the Massachusetts Office of Disability – Disabled Parking Regulations.</i>	
What is the total number of parking spaces provided at the development site? Will these be in a parking lot or garage?	It is anticipated that 27 parking spaces within a parking garage are being constructed.
What is the total number of accessible spaces provided at the development site? How many of these are “Van Accessible” spaces with an 8 foot access aisle?	Of the 27 spaces, 4 spaces will be designated accessible. 1 of the spaces is van accessible with an 8-foot aisle.
Will any on-street accessible parking spaces be required? <i>If yes</i> , has the proponent contacted the Commission for Persons with Disabilities regarding this need?	No on-street accessible parking spaces are expected to be provided at this time.
Where is the accessible visitor parking located?	No visitor parking is provided.
Has a drop-off area been identified? <i>If yes</i> , will it be accessible?	An on-street Drop-off and loading area will be proposed.
7. Circulation and Accessible Routes: <i>The primary objective in designing smooth and continuous paths of travel is to create universal access to entryways and common spaces, which accommodates persons of all abilities and allows for visitability-with neighbors.</i>	
Describe accessibility at each entryway: Example: Flush Condition, Stairs, Ramp, Lift or Elevator:	All entryways will be a flush condition. Access to the upper floors of each building will be via elevator.

Appendix J: Response to COB Accessibility Checklist- 154 Terrace St.

Are the accessible entrances and standard entrance integrated? <i>If yes, describe. If no, what is the reason?</i>	Yes; the standard entrances will be accessible.
<i>If project is subject to Large Project Review/Institutional Master Plan, describe the accessible routes wayfinding / signage package.</i>	The project will provide wayfinding signage as required by 521 CMR.
8. Accessible Units (Group 2) and Guestrooms: (If applicable) <i>In order to facilitate access to housing and hospitality, this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing and hotel rooms.</i>	
What is the total number of proposed housing units or hotel rooms for the development?	The project is providing (64) residential for-sale dwelling units.
<i>If a residential development, how many units are for sale? How many are for rent? What is the breakdown of market value units vs. IDP (Inclusionary Development Policy) units?</i>	The project is providing (64) for-sale condominium units. The developer will provide the breakdown of market value vs IDP units.
<i>If a residential development, how many accessible Group 2 units are being proposed?</i>	All units are for sale and will be Group 1 Designated units.
<i>If a residential development, how many accessible Group 2 units will also be IDP units? If none, describe reason.</i>	Developer will provide the number of IDP units.
<i>If a hospitality development, how many accessible units will feature a wheel-in shower? Will accessible equipment be provided as well? If yes, provide amount and location of equipment.</i>	N/A
Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs / thresholds at entry, step to balcony, others. <i>If yes, provide reason.</i>	No barriers are anticipated.

Appendix J: Response to COB Accessibility Checklist- 154 Terrace St.

Are there interior elevators, ramps or lifts located in the development for access around architectural barriers and/or to separate floors? <i>If yes</i> , describe:	Yes; elevators are being provided at the building to provide an Accessible Route to all Dwelling Units.
9. Community Impact: <i>Accessibility and inclusion extend past required compliance with building codes. Providing an overall scheme that allows full and equal participation of persons with disabilities makes the development an asset to the surrounding community.</i>	
Is this project providing any funding or improvements to the surrounding neighborhood? Examples: adding extra street trees, building or refurbishing a local park, or supporting other community-based initiatives?	The project anticipates it will be providing street trees along Terrace Street.
What inclusion elements does this development provide for persons with disabilities in common social and open spaces? Example: Indoor seating and TVs in common rooms; outdoor seating and barbeque grills in yard. Will all of these spaces and features provide accessibility?	Accessible outdoor seating will be provided at the roof deck. On the interior; accessible features and common amenities will be provided as required by 521 CMR.
Are any restrooms planned in common public spaces? <i>If yes</i> , will any be single-stall, ADA compliant and designated as "Family"/ "Companion" restrooms? <i>If no</i> , explain why not.	Restrooms will be provided on the interior roof deck. The restrooms will be designed in accordance with 521 CMR requirements.
Has the proponent reviewed the proposed plan with the City of Boston Disability Commissioner or with their Architectural Access staff? <i>If yes</i> , did they approve? <i>If no</i> , what were their comments?	This review has not yet occurred.
Has the proponent presented the proposed plan to the Disability Advisory Board at one of their monthly meetings? Did the Advisory Board vote to support this project? <i>If no</i> , what recommendations did the Advisory Board give to make this project more accessible?	The plan has not yet been presented to the Disability Advisory Board

Appendix J: Response to COB Accessibility Checklist- 154 Terrace St.

10. Attachments

Include a list of all documents you are submitting with this Checklist. This may include drawings, diagrams, photos, or any other material that describes the accessible and inclusive elements of this project.

Provide a diagram of the accessible routes to and from the accessible parking lot/garage and drop-off areas to the development entry locations, including route distances. See attached **Figures J-1** thru **J-4**.

Provide a diagram of the accessible route connections through the site, including distances.

Provide a diagram the accessible route to any roof decks or outdoor courtyard space? (if applicable)

Provide a plan and diagram of the accessible Group 2 units, including locations and route from accessible entry.

Provide any additional drawings, diagrams, photos, or any other material that describes the inclusive and accessible elements of this project.

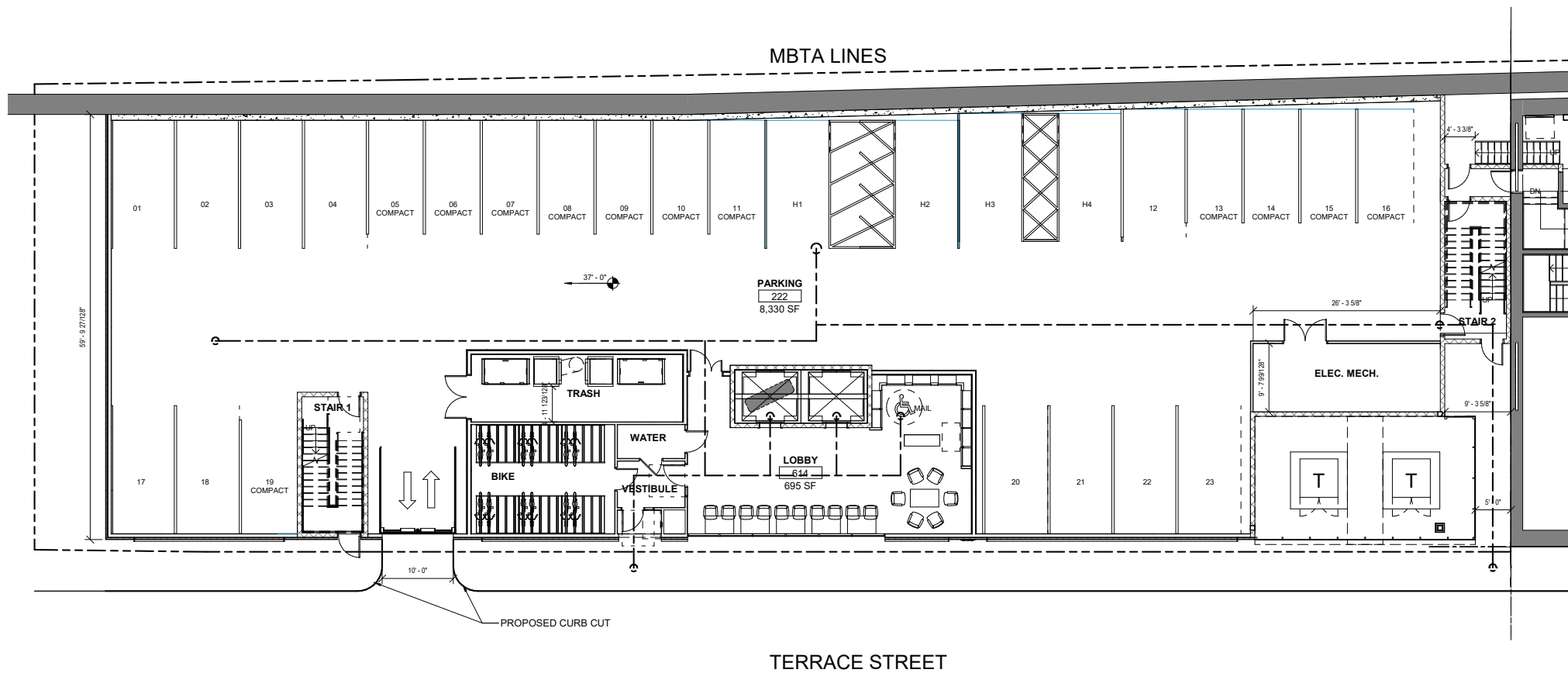
This completes the Article 80 Accessibility Checklist required for your project. Prior to and during the review process, Commission staff are able to provide technical assistance and design review, in order to help achieve ideal accessibility and to ensure that all buildings, sidewalks, parks, and open spaces are usable and welcoming to Boston's diverse residents and visitors, including those with physical, sensory, and other disabilities.

For questions or comments about this checklist, or for more information on best practices for improving accessibility and inclusion, visit www.boston.gov/disability, or our office:

The Mayor's Commission for Persons with Disabilities
1 City Hall Square, Room 967,
Boston MA 02201.

Architectural Access staff can be reached at:

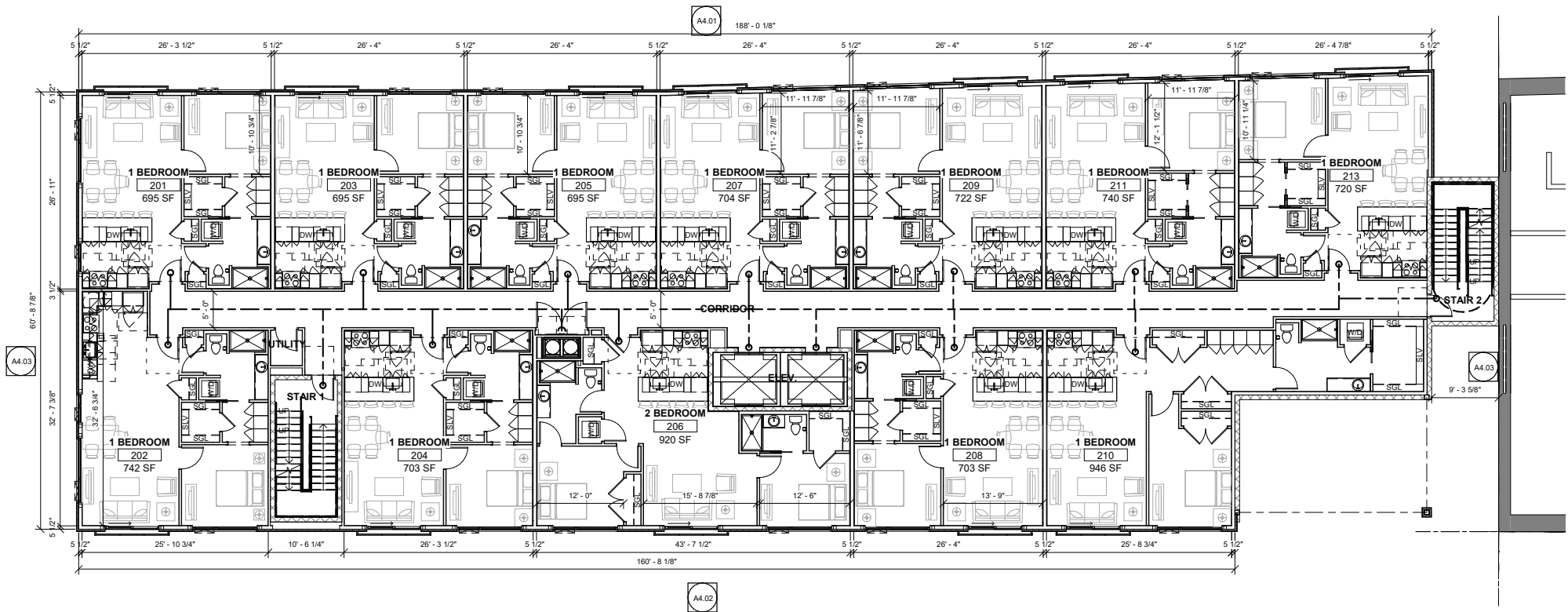
accessibility@boston.gov | patricia.mendez@boston.gov | sarah.leung@boston.gov | 617-635-3682



154 Terrace Street

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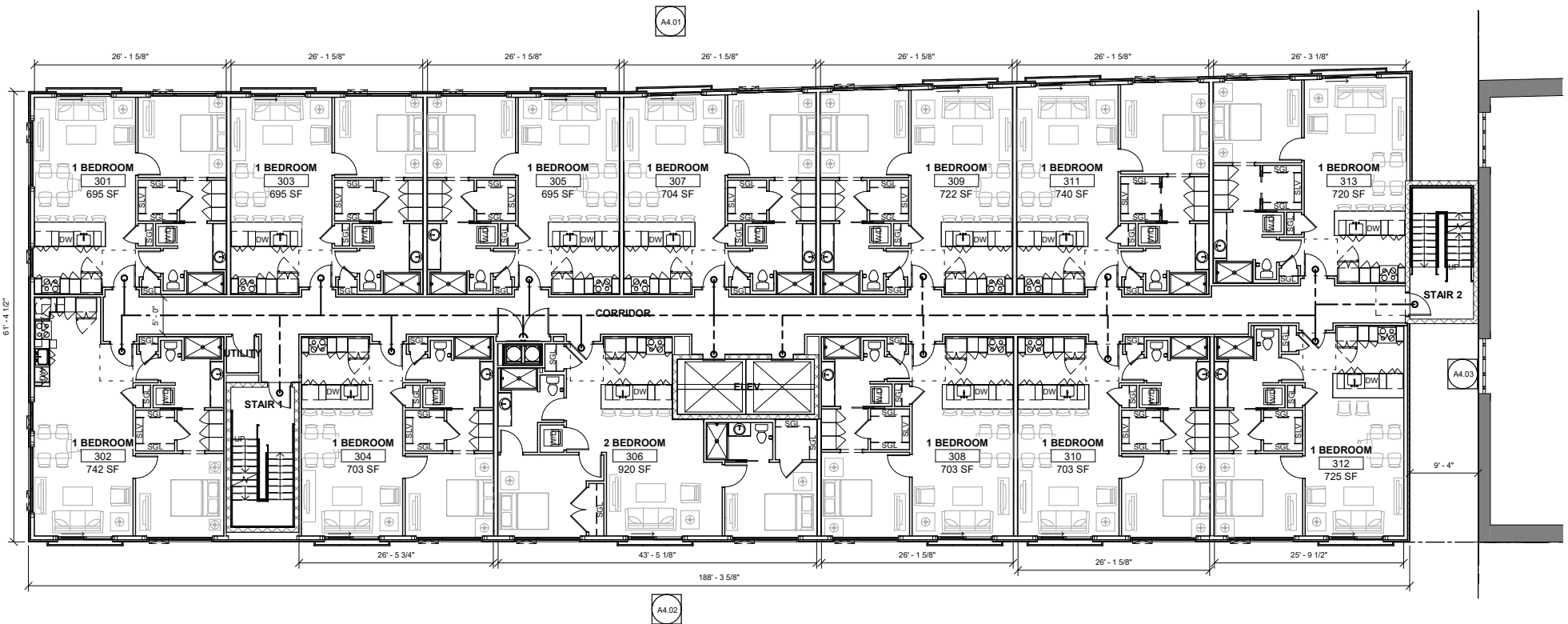
Figure J-1
Proposed First Floor and Site Accessibility



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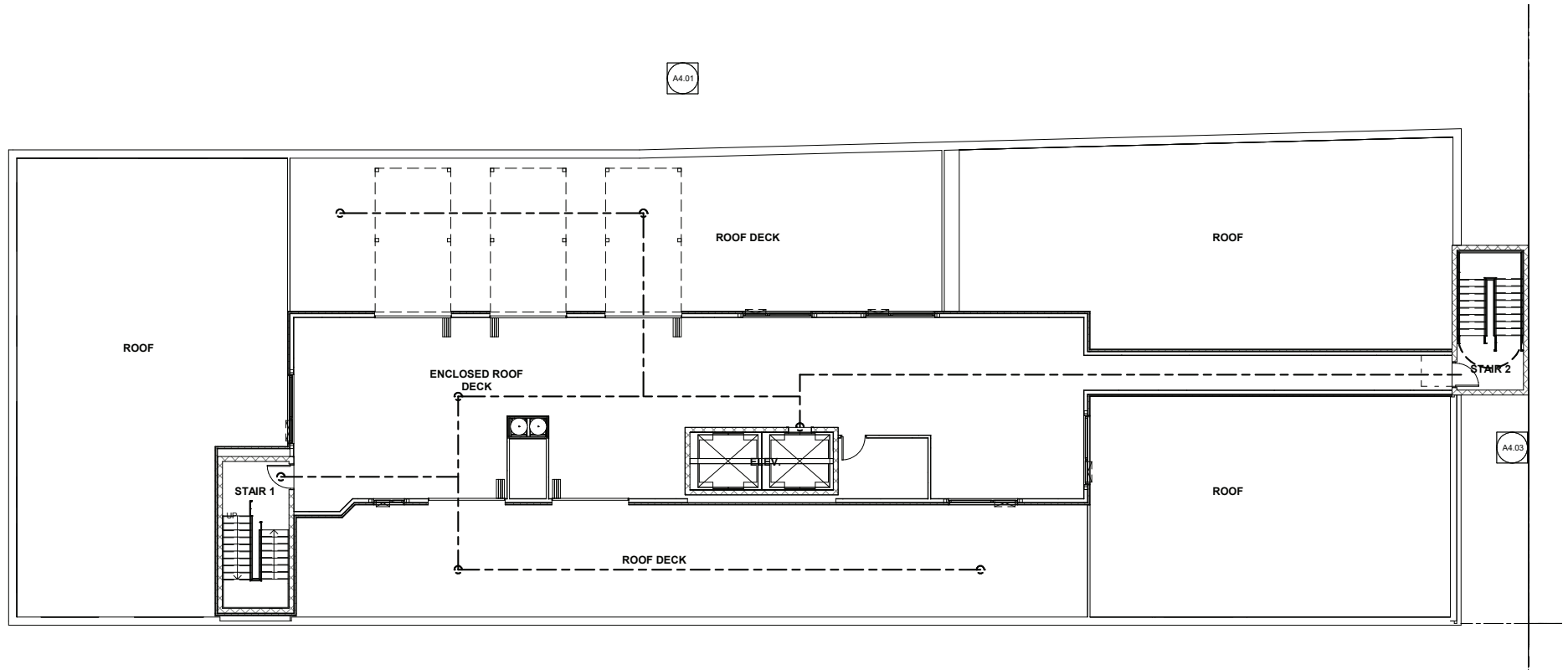
Figure J-2
Second Floor Plan Access



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Figure J-3
Typical Upper Floor Plan Access



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Figure J-4
Roof Deck Floor Plan Access

***APPENDIX K – RESPONSE TO BPDA BROADBAND
QUESTIONNAIRE***

Appendix K- Response to BPDA Broadband Questionnaire

Broadband Ready Buildings Questionnaire for Inclusion in BPDA Article 80 Development Review

The City of Boston is working to cultivate a broadband ecosystem that serves the current and future connectivity needs of residents, businesses, and institutions. The real estate development process offers a unique opportunity to create a building stock in Boston that enables this vision. In partnership with the development community, the Boston Planning and Development Authority and the City of Boston will begin to leverage this opportunity by adding a broadband readiness component to the Article 80 Design Review. This component will take the form of a set of questions to be completed as part of the Project Notification Form. Thoughtful integration of future-looking broadband practices into this process will contribute to progress towards the following goals:

1. Enable an environment of competition and choice that results in all residents and businesses having a choice of 2 or more wireline or fixed wireless high-speed Internet providers
2. Create a built environment that is responsive to new and emerging connectivity technologies
3. Minimize disruption to the public right of way during and after construction of the building

The information that is shared through the Project Notification Form will help BPDA and the City understand how developers currently integrate telecommunications planning in their work and how this integration can be most responsive to a changing technological landscape.

Upon submission of this online form, a PDF of the responses provided will be sent to the email address of the individual entered as Project Contact. Please include this PDF in the Project Notification Form packet submitted to BPDA.

Appendix K- Response to BPDA Broadband Questionnaire

Section 1: General Questions

For consistency, general intake questions below are modeled after Boston Planning and Development Agency Climate Change Resiliency and Preparedness Checklist.

Project Information:

- Project Name: **154 Terrace Street**
- Project Address Primary: **154 Terrace Street, Mission Hill**
- Project Address Additional:
- Project Contact: **Jared Curtis / The Carucci Group,**
Jared.curtis@sothebysrealty.com / 978-831-3019
- Expected completion date: **4th Quarter, 2021**

Team Description:

- Owner / Developer: **Pickle-Ditson Phase II LP**
- Architect: **The Architectural Team**
- Engineer (building systems): **TBD**
- Permitting: **MLF Consulting LLC**
- Construction Management: **Suffolk Construction**

Section 2: Right of Way to Building

Point of Entry Planning

Point of entry planning has important implications for the ease with which your building's telecommunications services can be installed, maintained, and expanded over time.

#1: Please provide the following information for your building's point of entry planning (conduits from building to street for telecommunications). Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

- Number of Points of Entry: **Terrace Street**
- Locations of Points of Entry: **TBD- Unknown**
- Quantity and size of conduits: **TBD-Unknown**

Appendix K- Response to BPDA Broadband Questionnaire

- Location where conduits connect (e.g. building-owned manhole, carrier-specific manhole or stubbed at property line): **TBD- Unknown**
- Other information/comments:

#2: Do you plan to conduct a utility site assessment to identify where cabling is located within the street? This information can be helpful in determining the locations of POEs and telco rooms. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

- Yes
- No
- **Unknown**

Section 3: Inside of the Building

Riser Planning

Riser capacity can enable multiple telecom providers to serve tenants in your building.

#3: Please provide the following information about the riser plans throughout the building. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

- Number of risers **TBD- Unknown**
- Distance between risers (if more than one): **TBD- Unknown**
- Dimensions of riser closets: **TBD- Unknown**
- Riser or conduit will reach to top floor: **TBD- Unknown**
- Number and size of conduits or sleeves within each riser: **TBD- Unknown**
- Proximity to other utilities (e.g. electrical, heating): **TBD- Unknown**
- Other information/comments

Telecom Room

A well designed telecom room with appropriate security and resiliency measures can be an enabler of tenant choice and reduce the risk of service disruption and costly damage to telecom equipment.

Appendix K- Response to BPDA Broadband Questionnaire

#4: Please provide the following information about the telecom room plans. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

- What is the size of the telecom room? **TBD- Unknown**
- Describe the electrical capacity of the telecom room (i.e. # and size of electrical circuits) **TBD- Unknown**
- Will the telecom room be located in an area of the building containing one or more load bearing walls? **TBD- Unknown**
- Will the telecom room be climate controlled?
 - Yes
 - No
 - **Unknown**
- If the building is within a flood-prone geographic area, will the telecom equipment will be located above the floodplain?
 - Yes
 - No
 - **Unknown**
- Will the telecom room be located on a floor where water or other liquid storage is present?
 - Yes
 - No
 - **Unknown**
- Will the telecom room contain a flood drain?
 - Yes
 - No
 - **Unknown**

Appendix K- Response to BPDA Broadband Questionnaire

- Will the telecom room be single use (telecom only) or shared with other utilities?
 - Telecom only
 - Shared with other utilities
 - **Unknown**
- Other information/comments

Delivery of Service Within Building (Residential Only)

Please enter 'unknown' if these decisions have not yet been made or you are presently unsure. Questions 5 through 8 are for residential development only.

#5: Will building/developer supply common inside wiring to all floors of the building?

- Yes
- No
- **Unknown**

#6: If so, what transmission medium (e.g. coax, fiber)? Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

#7: Is the building/developer providing wiring within each unit?

- Yes
- No
- **Unknown**

#8: If so, what transmission medium (e.g. coax, fiber)? Please enter 'unknown' if these decisions have not yet been made or you are presently unsure. **TBD-Unknown**

Section 4: Accommodation of New and Emerging Technologies

Cellular Reception

The quality of cellular reception in your building can have major impacts on quality of life and business operations.

Appendix K- Response to BPDA Broadband Questionnaire

Please provide the following information on your plans to facilitate high quality cellular coverage in your building. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure.

#9: Will the building conduct any RF benchmark testing to assess cellular coverage?

- Yes
- No
- **Unknown**

#10: Will the building allocate any floor space for future in-building wireless solutions (DAS/small cell/booster equipment)?

- Yes
- No
- **Unknown**

#11: Will the building be providing an in-building solution (DAS/ Small cell/ booster)?

- Yes
- No
- **Unknown**

#12: If so, are you partnering with a carrier, neutral host provider, or self-installing?

- Carrier
- Neutral host provider
- Self-installing

Rooftop Access

Building rooftops are frequently used by telecommunications providers to install equipment critical to the provision of service to tenants.

Please provide the following information regarding your plans for roof access and usage. Please enter 'unknown' if these decisions have not yet been made or you are presently unsure

Appendix K- Response to BPDA Broadband Questionnaire

#13: Will you allow cellular providers to place equipment on the roof?

- Yes
- No
- **Unknown**

#14: Will you allow broadband providers (fixed wireless) to install equipment on the roof?

- Yes
- No
- **Unknown**
-

Section 5: Telecom Provider Outreach

Supporting Competition and Choice

Having a choice of broadband providers is a value add for property owners looking to attract tenants and for tenants in Boston seeking fast, affordable, and reliable broadband service. In addition to enabling tenant choice in your building, early outreach to telecom providers can also reduce cost and disruption to the public right of way. The following questions focus on steps that property owners can take to ensure that multiple wireline or fixed wireless broadband providers can access your building and provide service to your tenants.

#15: (Residential Only) Please provide the date upon which each of the below providers were successfully contacted, whether or not they will serve the building, what transmission medium they will use (e.g. coax, fiber) and the reason they provided if the answer was 'no'.

- Comcast - enter contact info
- RCN - enter contact info
- Verizon - enter contact info
- Wicked Broadband - enter contact info
- WebPass
- Starry
- Level 3
- Cogent

Appendix K- Response to BPDA Broadband Questionnaire

- Lighttower
- XO Communications
- AT&T
- Zayo
- Other(s) - please specify - enter contact info: **TBD- Unknown**

#16: Do you plan to abstain from exclusivity agreements with broadband and cable providers?

- Yes
- No
- **Unknown**

#17: Do you plan to make public to tenants and prospective tenants the list of broadband/cable providers who serve the building?

- Yes
- No
- **Unknown**

Section 6: Feedback for Boston Planning and Development Agency

The Boston Planning and Development Agency looks forward to supporting the developer community in enabling broadband choice for resident and businesses. Please provide feedback on your experience completing these questions.

APPENDIX L – RESPONSE TO BPDA SMART UTILITIES CHECKLIST

Appendix L. Response to Boston Smart Utilities Checklist **154 Terrace Street, Mission Hill**

Date Submitted:

10/30/19

Submitted by:

Mitchell L. Fischman Consulting LLC

Background

The Smart Utilities Checklist will facilitate the Boston Smart Utilities Steering Committee's review of:

- a) compliance with the Smart Utilities Policy for Article 80 Development Review, which calls for the integration of five (5) Smart Utility Technologies (SUTs) into Article 80 developments
- b) integration of the Smart Utility Standards

More information about the Boston Smart Utilities Vision project, including the Smart Utilities Policy and Smart Utility Standards, is available at: [www.http://bostonplans.org/smart-utilities](http://bostonplans.org/smart-utilities)

Note: Any documents submitted via email to manuel.esquivel@boston.gov will not be attached to the pdf form generated after submission, but are available upon request.

Part 1 - General Project Information

1.1 Project Name

Phase II, 154 Terrace Street

1.2 Project Address

154 Terrace Street, Mission Hill

1.3 Building Size (square feet)

Approx. 61,250 gsf

**For a multi-building development, enter total development size (square feet)*

1.4 Filing Stage

Notice of Project Change ("NPC")

Appendix L. Response to Boston Smart Utilities Checklist

154 Terrace Street, Mission Hill

1.5 Filing Contact Information

1.5a Name	Mitchell L. Fischman
1.5b Company	Mitchell L. Fischman ("MLF") Consulting LLC
1.5c E-mail	mitchfischman@gmail.com
1.5d Phone Number	781-760-1726

1.6 Project Team

1.6a Project Owner/Developer	Pickle-Ditson Phase II LP, a Massachusetts Limited Partnership
1.6b Architect	The Architectural Team
1.6c Permitting	MLF Consulting LLC
1.6d Construction Management	Winn Development

Part 2 - District Energy Microgrids

Fill out this section if the proposed project's total development size is equal to or greater than 1.5 million square feet.

Note on submission requirements timeline:

Feasibility Assessment Part A should be submitted with PNF or any other initial filing.

Feasibility Assessment Part B should be submitted with any major filing during the Development Review stage (i.e., DPIR)

District Energy Microgrid Master Plan Part A should be submitted before submission of the Draft Board Memorandum by the BPDA Project Manager (Note: Draft Board Memorandums are due one month ahead of the BPDA Board meetings)

District Energy Microgrid Master Plan Part B should be submitted before applying for a Building Permit

Appendix L. Response to Boston Smart Utilities Checklist **154 Terrace Street, Mission Hill**

Please email submission to manuel.esquivel@boston.gov

2.1 Consultant Assessing/Designing District Energy Microgrid (if applicable)

2.2 Latest document submitted

2.3 Date of latest submission

2.4 Which of the following have you had engagement/review meetings with regarding District Energy Microgrids? (select all that apply)

2.5 What engagement meetings have you had with utilities and/or other agencies (i.e., MA DOER, MassCEC) regarding District Energy Microgrids? (Optional: include dates)

Part 3 - Telecommunications Utilidor

Fill out this section if the proposed project's total development size is equal to or greater than 1.5 million square feet OR if the project will include the construction of roadways equal to or greater than 0.5 miles in length.

Please submit a map/diagram highlighting the sections of the roads on the development area where a Telecom Utilidor will be installed, including access points to the Telcom Utilidor (i.e., manholes)

Please email submission to manuel.esquivel@boston.gov



**BOSTON
SMART
UTILITIES**



boston planning &
development agency

Appendix L. Response to Boston Smart Utilities Checklist **154 Terrace Street, Mission Hill**

**3.1 Consultant Assessing/Designing Telecom Utilidor
(if applicable)**

**3.2 Date Telecom Utilidor Map/Diagram was
submitted**

3.3 Dimensions of Telecom Utilidor (include units)

3.3a Cross-section (i.e., diameter, width X height)

3.3b Length

**3.4 Capacity of Telecom Utilidor (i.e., number of
interducts, 2 inch (ID) pipes, etc.)**

**3.5 Which of the following have you had
engagement/review meetings with regarding the
Telecom Utilidor? (select all that apply)**

**3.6 What engagement meetings have you had with
utilities and/or other agencies (i.e., State agencies)
regarding the Telecom Utilidor? (Optional: include
dates)**

Appendix L. Response to Boston Smart Utilities Checklist **154 Terrace Street, Mission Hill**

Part 4 - Green Infrastructure

Fill out this section if the proposed project's total development size is equal to or greater than 100,000 square feet.

Please submit a map/diagram highlighting where on the development Green Infrastructure will be installed.

Please email submission to manuel.esquivel@boston.gov

4.1 Consultant Assessing/Designing Green Infrastructure (if applicable)

4.2 Date Green Infrastructure Map/Diagram was submitted

4.3 Types of Green Infrastructure included in the project (select all that apply)

4.4 Total impervious area of the development (in square inches)

4.5 Volume of stormwater that will be retained (in cubic inches)*

**Note: Should equal to at least "Total impervious area (entered in section 4.3)" times "1.25 inches"*

4.6 Which of the following have you had engagement/review meetings with regarding Green Infrastructure? (select all that apply)

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4.7 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding Green Infrastructure? (Optional: include dates)

Part 5 - Adaptive Signal Technology (AST)

Fill out this section if as part of your project BTM will require you to install new traffic signals or make significant improvements to the existing signal system.

Please submit a map/diagram highlighting the context of AST around the proposed development area, as well as any areas within the development where new traffic signals will be installed or where significant improvements to traffic signals will be made.

Please email submission to manuel.esquivel@boston.gov

5.1 Consultant Assessing/Designing Adaptive Signal Technology (if applicable)

5.2 Date AST Map/Diagram was submitted

5.3 Describe how the AST system will benefit/impact the following transportation modes

5.3a Pedestrians

5.3b Bicycles

5.3c Buses and other Public Transportation

5.3d Other Motorized Vehicles

Appendix L. Response to Boston Smart Utilities Checklist

154 Terrace Street, Mission Hill

5.4 Describe the components of the AST system (including system design and components)

5.5 Which of the following have you had engagement/review meetings with regarding AST? (select all that apply)

5.6 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding AST? (Optional: include dates)

Part 6 - Smart Street Lights

Fill out this section if as part of your project PWD and PIC will require you to install new street lights or make significant improvements to the existing street light system.

Please submit a map/diagram highlighting where new street lights will be installed or where improvements to street lights will be made.

Please email submission to manuel.esquivel@boston.gov

6.1 Consultant Assessing/Designing Smart Street Lights (if applicable)

Howard Stein Hudson, The Architectural Team, and MEP to be determined.

6.2 Date Smart Street Lights Map/Diagram was submitted

Will be determined and provided at the time of the PIC Review.

6.3 Which of the following have you had engagement/review meetings with regarding Smart Street Lights? (select all that apply)

Will be determined at the time of the PIC Review.

Appendix L. Response to Boston Smart Utilities Checklist **154 Terrace Street, Mission Hill**

6.4 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding Smart Street Lights? (Optional: include dates)

Will include discussions with Boston Street Lighting at the time of the PIC Review.

Part 7 - Smart Utility Standards

The Smart Utility Standards set forth guidelines for planning and integration of SUTs with existing utility infrastructure in existing or new streets, including cross-section, lateral, and intersection diagrams. The Smart Utility Standards are intended to serve as guidelines for developers, architects, engineers, and utility providers for planning, designing, and locating utilities. The Smart Utility Standards will serve as the baseline for discussions on any deviations from the standards needed/proposed for any given utility infrastructure.

Please submit typical below and above grade cross section diagrams of all utility infrastructure in the proposed development area (including infrastructure related to the applicable SUTs).

Please submit typical below and above grade lateral diagrams of all utility infrastructure in the proposed development area (including infrastructure related to the applicable SUTs).

Please email submission to manuel.esquivel@boston.gov

7.1 Date Cross Section Diagram(s) was submitted

To Be Provided at Time of PIC

7.2 Date Lateral Diagram(s) was submitted



154 Terrace Street, Mission Hill
Phase II Multi-Family Residential Development

