135 Dudley Street, Roxbury
Mixed-Use Residential / Commercial Development

PROJECT NOTIFICATION FORM September 27, 2019

Submitted Pursuant to Article 80B of the Boston Zoning Code

SUBMITTED BY:

Cruz Development Corporation
One John Eliot Square
Roxbury, MA 02119

PREPARED BY:

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SUBMITTED TO:

Boston Planning and Development Agency
One City Hall Square, 9th Floor
Boston, MA 02201

IN ASSOCIATION WITH:

The Architectural Team
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McKenzie & Associates, PC
Bryant Associates
Howard Stein Hudson
Tech Environmental, Inc.
Soden Sustainability Consulting
GEI Consultants
John B. Cruz Construction Company
RWDI

September 27, 2019

VIA HAND DELIVERY

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

RE: Project Notification Form ("PNF")
Article 80 - Large Project Review
135 Dudley Street, Roxbury

Dear Director Golden:

Cruz Development Corporation ("Cruz"), a Massachusetts corporation, (the "Proponent" or "Cruz"), is happy to file a Project Notification Form ("PNF") with the BPDA pursuant to Article 80B, Large Project Review requirements of the Boston Zoning Code (the "Code").

The Proponent's Proposed Project involves an approximate 233,016 gross square feet of floor area (excluding the below-level parking garage) for a multi-use development at 135 Dudley Street in the Dudley Square and Roxbury neighborhood, including 160 housing units, 15,512 square feet of street level /commercial space, including office space for the Boston Chapter of the NAACP (with the Proponent providing this space rent free for 10-years) and a restaurant flexible space-tenant amenities / art space, and a parking garage for approximately 270 vehicles (the "Proposed Project"). One of the buildings will be a six-story building containing 55 units of affordable rental housing, and the other, a nine-story building containing 105 condominium units, providing homeownership opportunities to 50 households beginning at 70% of AMI, with the remaining 55 units proposed as market-rate. There will be a landscaped plaza between the two buildings, and one to the east of the retail affordable building adjacent to the Dudley BPL Branch Library, both opening on Dudley Street. In addition, the Proposed Project will further the objectives of Mayor Martin J. Walsh's Housing Plan, Housing a Changing City: Boston 2030.

In addition to Dudley Street, the approximate 69,835 SF (1.6-acre) project area is bordered by the Boston Police District B-2 Roxbury Station, The Roxbury Municipal Court, and the Dudley Literacy Center (the "Proposed Site").

The Proposed Site is within a highly commercialized area and is in the midst of a very active transportation node that includes major MBTA bus lines and the Dudley Square MBTA station across Dudley Street.

The Proposed Project exceeds the 50,000 square foot total build-out size requirement for a project in a Boston neighborhood and therefore requires preparation of filing(s) under the Large Project Review regulations, pursuant to Article 80 of the Code. A Letter of Intent to File a Project Notification Form was filed with the BPDA on August 27, 2019 (attached hereto as **Appendix "A"**). *Cruz Cares!*

In support of the Article 80 Large Project Review process, the Proponent has conducted, and continues to conduct, community outreach, neighbors, the Planned Dudley Project Review Committed, and abutters of the site, including meetings and with elected representatives and other officials.

On behalf of the entire project team, we would like to thank you and the BPDA staff assigned to the 135 Dudley Street Project, particularly the Project Manager Michael Sinatra and Dana Whiteside, the reviewing BPDA Urban Designers, Michael Cannizzo, and Matt Martin for their invaluable assistance to date in assisting the development team in shaping the Proposed Project and in completing this PNF filing.

We believe that the Proposed Project will constitute a significant positive addition to the Roxbury neighborhood, by revitalizing this underutilized site with much-needed new housing and commercial space in two attractive and thoughtfully designed buildings. We look forward to continuing the Large Project Review process and advancing the Proposed Project through public review with the cooperation of the BPDA, other City officials, members of the Planned Dudley Project Review Committee, and the Roxbury community.

In accordance with BPDA requirements, please find attached ten (10) copies of the PNF plus a CD containing the electronic PNF file to be uploaded to the BPDA's online portal for public review.

Thank you for your time and attention on our Proposed Project. Our team looks forward to working with you towards a successful outcome. We look forward to receiving any questions or comments that you may have regarding our Proposed Project.

Very truly yours,
CRUZ DEVELOPMENT COPORATION

John B. Cruz III, President

cc: Jonathan Greeley, BRA, Director of Development Review and Policy
Dana Whiteside, Deputy Director, Community Economic Development
Kim Janey, District 7-City Councilor
Chynah Tyler, State Senator – 7th Suffolk District
Daniel Joseph Ryan, State Representative – 2nd Suffolk District
Jessica Thomas, Mayor's Office of Neighborhood Services, Roxbury
Daniel Cruz, Jr., Cruz Development Corporation

PUBLIC NOTICE

The Boston Redevelopment Authority ("BRA"), d/b/a Boston Planning & Development Agency ("BPDA"), pursuant to Article 80A and Article 80B of the Boston Zoning Code ("Code"), hereby gives notice that Cruz Development Corporation (the "Proponent") has submitted a Project Notification Form for Large Project Review ("PNF") on September 27, 2019, to the BPDA for a mixed use multi-family residential / commercial development at 135 Dudley Street in the Roxbury neighborhood of Boston. The proposal is for construction of two mixed-use structures with approximately 346,716 gross square feet of floor area (including an at-grade parking garage for 270 vehicles), and includes 160 housing units, 15,512 gross square feet of street level /commercial space, including office space for the Boston Chapter of the NAACP (with the Proponent providing this space rent free for 10-years), and a restaurant flexible space-tenant amenities / art space (collectively, the "Proposed Project"). The Proposed Site includes an approximately 69,835 SF (1.6-acre) project area bordered by the Boston Police Department B-2 Station, the Roxbury Municipal Court, and the Dudley Literacy Center (the "Proposed Site"). Approvals are requested of the BPDA pursuant to Article 80. In the required Scoping Determination for this PNF, the BPDA may waive further review pursuant to Section 80B-5.3(d), if, after reviewing public comments, the BPDA finds that such PNF adequately describes the Proposed Project's impacts. The PNF may be reviewed at the Office of the Secretary of the BPDA, Room 910, Boston City Hall, One City Hall Square, Boston, MA 02201, between 9:00 AM and 5:00 PM, Monday through Friday except legal holidays. A copy of the PNF has been placed on reserve and available for review at the Dudley Branch - Boston Public Library, 65 Warren Street, Roxbury, MA 02119 during scheduled business hours. Public comments on the PNF, including the comments of public agencies, should be submitted by email to: michael.a.sinatra@boston.gov or in writing to: Mr. Michael Sinatra, Project Manager, BPDA, One City Hall Square, Boston, MA 02201 by October 28, 2019, at the close of business.

BOSTON REDEVELOPMENT AUTHORITY
Teresa Polhemus, Executive Director/Secretary

September 27, 2019

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Cruz Development Corporation ("Cruz"), a Massachusetts corporation, (the "Proponent" or "Cruz"),is submitting, this Project Notification Form ("PNF") for a mixed-use residential/commercial development project at 135 Dudley Street in the Roxbury neighborhood (the "Proposed Project"), in accordance with the Article 80 requirements of the Boston Zoning Code ("Code").

The Proposed Site includes an approximate 69,835 SF (1.6-acre) project area bordered by the Boston Police District B-2 Roxbury Station, the Roxbury Municipal Court, and the Dudley Literacy Center (the "Proposed Site"). The project area is vacant with no on-site buildings.

The Proposed Project involves construction of approximately 346,716 gross square feet of floor area (including an over-grade parking garage) and includes 160 housing units, 15,512 gross square feet of street level /commercial space, including office space for the Boston Chapter of the NAACP (with the Proponent providing this space rent free for 10-years) and a restaurant flexible space-tenant amenities / art space, and a structured parking garage for approximately 270 vehicles. One of the two proposed buildings (rental) will be six-stories containing 55 units of affordable rental housing for families starting at 30% of AMI, and the other building (condominiums) will be nine stories and contain 105 condominium units, providing homeownership opportunities to 50 households at 70% and 80% of AMI, with the remaining 55 units proposed as market-rate. There will be a landscaped plaza between the two buildings, and one to the east of the rental units affordable building adjacent to the Dudley BPL Branch Library, both opening on Dudley Street.

The Proposed Project will further the objectives of Mayor Martin J. Walsh's Housing Plan, Housing a Changing City: Boston 2030, and is responsive to the Department of Neighborhood Development's Request for Proposals ("RFP") for PLAN: Dudley Square - Dudley Street Commercial Area issued on July 16, 2018.

Cruz became the tentative designated developer of the city of Boston owned site on July 17, 2019 because of the proposal's ability to provide a variety of housing types with mixed-income levels serving all members of the community. During the construction phase the project is projected to support full-time employment for 125 construction jobs from a variety of trades. The development plans will also include approximately 120 parking spaces to be made available to the general public, providing both short-term and long-term parking.

The Project Site is within a highly commercialized area and is in the midst of a very active transportation node that includes major MBTA bus lines and the Dudley Square MBTA station across Dudley Street. It is also located in the Dudley Square Economic Development Area ("EDA") of the Roxbury Neighborhood Zoning District, Article 50 (Maps 6A-6C). The site is also within Neighborhood Design Review and Boulevard Planning subdistricts. While the proposed multi-family uses are "conditional"

above the first floor within the EDA subdistrict, the proposed retail uses are generally allowed uses. It is expected that relief will be required from the Boston Board of Appeal. Please see **Figures 1-1** through **1-7** for project locus and existing condition photographs.

A Letter of Intent to File a Project Notification Form was filed with the Boston Planning and Development Agency for the proposed mixed-use development project on August 26, 2019 (See **Appendix A**).

1.2 Project Details

1.2.1 Existing Conditions Plan

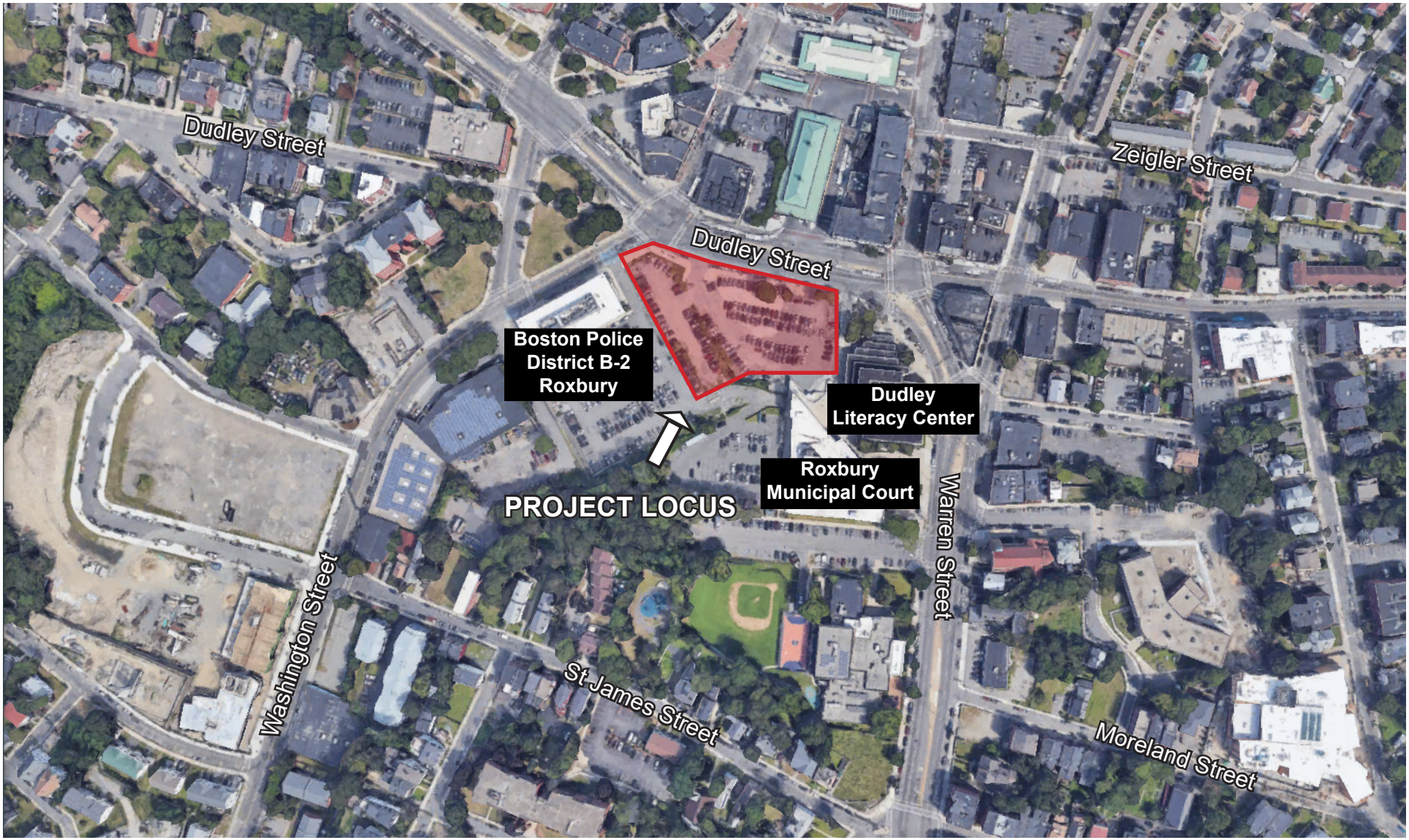
The overall project site includes an approximate 69,835 SF (1.6-acre) area bordered by the Boston Police District B-2 Roxbury Station, the Roxbury Municipal Court, and the Dudley Literacy Center (the "Proposed Site"). The Boston Assessor's Parcel Number is recorded as No. 118030. The project area is vacant with no on-site buildings. (see **Figure 3-3**. Existing Plan of Land).

1.2.2 Detailed Project Description

The total project will include 346,716 square feet of gross floor area on 1.6 acres with a Floor Area Ratio (F.A.R.) of 4.96. Total building area is distributed between 135,140 gross square feet for the Building 1: multi-family affordable rental building and 211,576 gross square feet for Building 2: multifamily residential condominium building, and provide overall onsite parking for 270 covered and surface spaces as well as other public realm improvements ("Proposed Project"). See Project Dimensions in **Table 1-1** below

Table 1-1. Approximate Project Dimensions of Proposed Project

Lot Area	**1.6 Acres (69,835 SF)**
Overall Gross Floor Area	**346,716 +/- gsf**
Overall FAR	**4.96**
Floors	**Building 1: 6-Floors** **Building 2: 9-Floors**
Height	**Building 1: 65 Feet** **Building 2: 95 Feet**



135 Dudley Street

Figure 1-1. Project Locus
135 Dudley Street, Roxbury

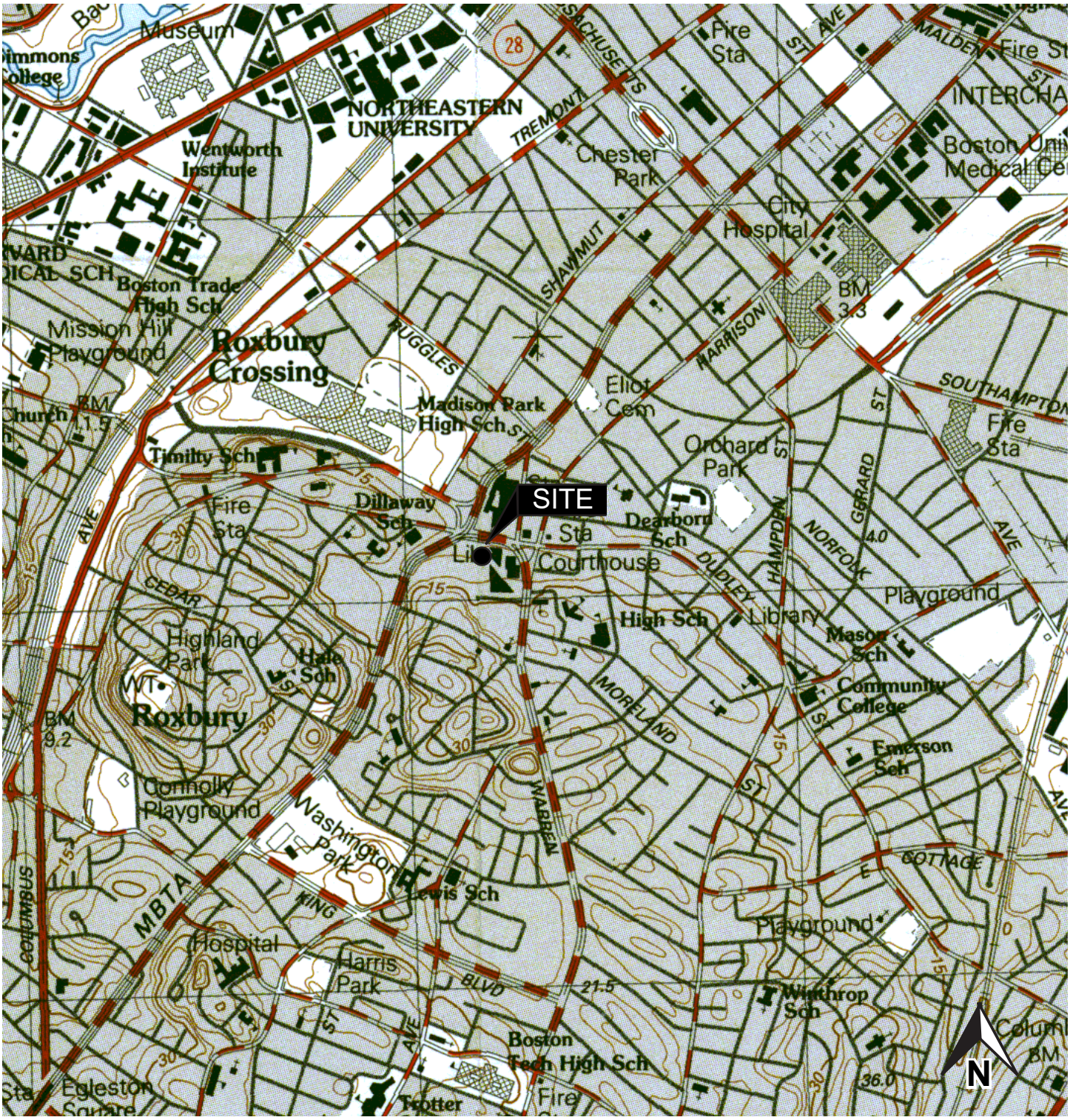


Figure 1-2. USGS Map
135 Dudley Street, Roxbury

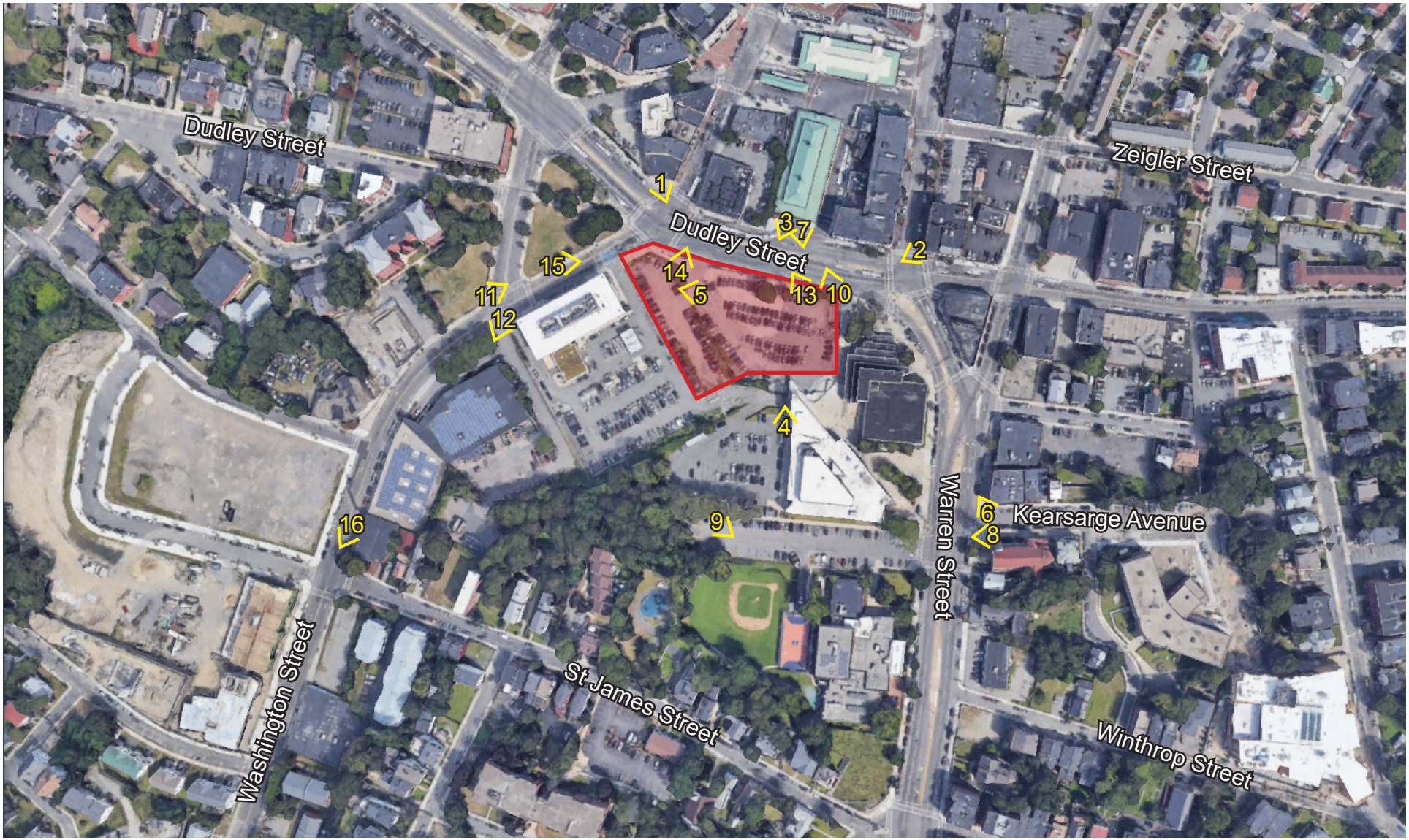


Figure 1-3. Existing Photographs Key
135 Dudley Street, Roxbury

Figure 1-4. Existing Site Photos

View of the Project Site from the intersection of Washington and Dudley Streets

View of the Project Site from the intersection of Warren and Dudley Streets

View of the Project Site from Dudley Square MBTA Station on Dudley Street

View of the Project Site from the Roxbury Municipal Court looking North

Figure 1-5. Existing Site Photos

View of the Boston Police District B-2 Roxbury Station

View of the Dudley Public Library Branch and Dudley Literacy Center on Adjacent Warren Street looking Northwest

View of the Dudley Literacy Center and Roxbury Municipal Court next to the Project Site from Dudley Street

View of the Roxbury Municipal Court from Kearsarge Avenue and Warren Street

Figure 1-6. Existing Site Photos

View of the Yawkey Boys & Girls Club of Roxbury and Adjoining Baseball Field behind the Roxbury Municipal Court

View of Dudley Square MBTA Station looking Northwest on Dudley Street

View of Justice Gourdin Park from the Intersection of Shawmut Avenue and Washington Streets

Hurley Wire & Cable Southwest of the Project Site

Figure 1-7. Existing Site Photos

View from the Project Site looking Northwest on Dudley Street

View of Bank of America on Dudley Street across from the Project Site

View looking Northeast on Adjacent Washington Street toward the Dudley Square MBTA Station

View looking Southwest on Adjacent Washington Street

The breakdown of the multi-family residential units includes, approximately 34 one-bedroom units, approximately 112 two-bedroom units, and approximately 14 three-bedroom units, as referenced in **Tables 1-2** and **1-3** that follow.

Table 1-2. Proposed Residential Units by Bedroom Size for Building: Condominiums

Floor Level/ Unit Types	Studio	1-BR	2-BR	3-BR	Approx. Total Units Per Floor
1st Floor					
2nd Floor		2	4	2	9
3rd Floor		3	5	1	8
4th Floor			6	2	9
5th Floor		3	6		19
6th Floor		3	15	1	18
7th Floor		1	17		18
8th Floor		2	16		18
9th Floor		2	14		16
Approx. Total	0 Units	16 Units	83 Units	6 Units	105 Units

Table 1-2. Proposed Units by Bedroom Size for Building 1: Affordable Rental

Floor Level/ Unit Types	Studio	1-BR	2-BR	3-BR	Approx. Total Units Per Floor
1st Floor					
2nd Floor			6	2	8
3rd Floor		1	7	2	10
4th Floor		6	3	2	11
5th Floor		6	3	2	11
6th Floor		5	10		15
Approx. Total	0 Units	18 Units	29 Units	8 Units	55 Units

The Site circulation plan is designed to create a safe and pleasant entry to the Proposed Project from Dudley Street. Service access and the covered and surface parking spaces will be accessed from Warren Street.

1.3 Summary of Project Impacts and Mitigation

1.3.1 Urban Design

The development at 135 Dudley Street is comprised of 160 dwelling units, divided in two buildings - a six-story rental building and a nine-story condominium building. The larger of the two buildings, consists of a mix of one hundred and five (105) one, two- and three-bedroom condominium units. The second building houses fifty-five (55) rental units.

The building massing constitutes a unified whole while also providing variety and visual interest. It is composed of two basic exterior cladding systems that break down the overall scale of the project into smaller sections. The primary cladding system is composed of articulated, horizontal fiber-cement panels. The secondary cladding system is a simpler, more background-like façade expression, with more conventional, neutral-colored fiber cement panels. Operable and fixed regular glazing units, along with bay windows, and strategically located "super bays" with integral balconies and projecting elements provide further visual interest and complete the exterior design.

1.3.2 Landscape Design

The design of the landscape is based on **four** objectives

1. Create a pedestrian-oriented landscape plan that fosters both commercial use and residential living on the site;
2. Create a public park next to the library that welcomes the neighborhood to Dudley Square and provides a place to rest and socialize;
3. Mitigate the impact of the new building and urban surroundings by increasing the area of plantings and utilizing permeable pavements; and
4. Utilize best practices for environmental landscape design.

Spatial Organization & Circulation

The public face of the building facing Dudley Street will include commercial storefronts to bolster the Dudley Square commercial district. Two residential lobbies are prominently located – one in the center of the frontage, and one at the public park (east) end of the site with direct access to the public sidewalks. A multistory garage will be located at the rear of the site, accessed via easements across the Courthouse, Urban Wild and Boston Police properties. A public park is designed in the space between the new building and the Dudley Branch Boston Public Library. A retaining wall at the rear of the park will separate the significant grade change between the Dudley streetscape and the sidewalks at the courthouse and library. The project will provide an elevator at the corner of the parking garage for easy access from the courthouse and library down to Dudley Street

Park

An accessible park has been developed that provides for the following uses for the enjoyment of the general public:

- Outdoor Café related to the retail space at the front corner of the building,
- Entry walkway and seat walls at the residential lobby,
- Picnic and gathering area with tables and chairs under proposed shade trees,
- Blue bike stations,
- Open lawn area for flexible play,
- Wood platform seat walls at the rear retaining wall,
- Space on the retaining wall designated for temporary murals to be installed by local artists,
- Greenscreen and vines as well as vitrine art display cases on the garage façade, and

- Evergreen tree and shrub planting above the wall to provide year-round green backdrop to the park.

Where feasible, design details from the granite seat wall and wood bench planters located in the library plaza redesign will be echoed in the detailing at this new park. The design includes nineteen new shade trees and seven new evergreen trees in the park. Shade trees along the rear of the site will also be planted. Additionally, the streetscape redesign by Utile includes many new street trees, planters and amenities along Dudley Street.

Courtyard

Within the building and above the first-floor level of the garage a shared courtyard is designed as an outdoor amenity space for the residents of the buildings. Constructed above the garage structure, the courtyard will include extensive green roof plantings as well as lightweight planters to support shrubs and trees. A pedestal paver or wood deck system will be designed to support outdoor dining, gathering, grilling, lounging, as well as possibly ping pong, shuffleboard, a TV wall and other amenities. Residential units that face this courtyard will have direct access to private patios with privacy fencing. Greenscreens with vine plantings are proposed to screen the two garage facades facing the courtyard.

1.3.3 Sustainable Design / Energy Conservation

The project is comprised of two separate buildings. The condominium building is 9-stories and has 105 units, and the rental building is 6-stories and has 55 affordable housing units. The Proponent is treating the development as one site for the purposes of LEED, and the individual buildings will have a separate energy performance for this PNF.

To meet the requirements of Article 37, the following section describes how the Project complies with the LEED Building Design & Construction v4 criteria.

The Project will demonstrate compliance with the LEED Certifiably Requirements. Further study over the coming weeks and months will determine and confirm final credit achievement. At this stage in the project we are tracking 64 YES credits and 18 MAYBE credits as presented in **Figure 3-25** in **Section 3.0**. Further study over the coming weeks and months will determine final credit achievement. We have outlined in the narrative below, how the project intends to achieve the prerequisites and credits for the LEED BD&C v4 certification

1.3.4 Pedestrian Wind Analysis

A detailed modeling study will be completed by RWDI, wind engineers, to predict the wind environment around the existing site, as well as those anticipated once the two proposed (six and nine) story buildings are constructed. RWDI and the design team will work jointly to develop

appropriate wind control measures, if wind activity is predicted to increase beyond appropriate thresholds.

1.3.5 Shadow Impact Analysis

The Architectural Team, the Proposed Project's architects, prepared a shadow study to assess the potential shadow impacts of the Proposed Project on the surrounding area (see **Section 4.1**).

With a proposed height of 6 and 9-floors above grade, the Proposed Project's shadow impacts are generally minimal to moderate. New shadow for most of the year is primarily limited to a small section of the Eastbound direction of Dudley Street to the north. During the evening hours in the spring and fall, and during the morning and evening hours in winter, some shadows will extend to nearby properties. Overall, the Proposed Project's shadow impacts will not adversely impact the Proposed Project Site and surroundings.

1.3.6 Daylight Analysis

A detailed daylight impact analysis will be completed by VHB for the Draft Project Impact Report (DPIR) to predict any increase in daylight obstruction when compared to the existing conditions at the vacant site. While daylight obstruction values from the Proposed Project will be greater than those currently present in this specific location, they are expected to be consistent with, and typical to, the future character of Dudley Street and portions of the surrounding area closest to Dudley Square.

1.3.7 Solar Glare

It is not expected that the Proposed Project will include the use of highly 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 Proposed Project's air quality consultant, will conduct analyses to evaluate the existing air quality in the Project area, predict the worst-case air quality impacts from the Proposed Project's fuel combustion equipment and standby generators, and evaluate the potential impacts of project-generated traffic on the air quality at the most congested local intersections. The worst-case air quality impacts from the Proposed Project's enclosed parking garage is not expected to have an adverse impact on air quality.

1.3.9 Noise Analysis

Tech Environmental, Inc., the Proposed Project's noise consultant, will conduct a noise study to determine whether the operation of the Proposed Project will comply with the Massachusetts

DEP Noise Policy and City of Boston Noise Regulations. The Proponent is committed to implementing the following sound level mitigation measures for the Proposed Project, as necessary, to comply with the applicable sound level limits. It is expected that 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 HUD's Residential Site Acceptability Standards.

1.3.10 Stormwater Management and Water Quality

The 135 Dudley St. Project is expected to reduce the volume of stormwater runoff leaving the site as well as substantially improve the water quality (See **Section 4.5**). The Proposed Project will meet and exceed Boston Water and Sewer Commission (BWSC) standards for stormwater management by mitigating 1.25 inches of stormwater runoff generated by proposed impervious surfaces. The DPIR will present a more detailed analysis of the existing and proposed stormwater drainage system as well as proposed water quality mitigation.

1.3.11 Solid and Hazardous Waste

Solid Waste

During the preparation of the site, debris, including asphalt, trash, and demolition debris will be removed from the Proposed 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. Additionally, construction waste will be managed in compliance with LEED requirements.

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

Hazardous Waste

The Proposed Project is located on a portion of the former Modern Electroplating Site, a Massachusetts Department of Environmental Protection (MassDEP) listed disposal site. The primary contaminants of concern at the Site are chlorinated Volatile Organic Compounds (VOCs) in soil and groundwater. Although the Modern Electroplating Site has been cleanup up under the Massachusetts Contingency Plan (MCP) residual soil and groundwater contamination remains on a portion of the Proposed Project.

The Proponent has considered these environmental findings during the Proposed Project planning process and will undertake the appropriate actions to further assess and mitigate such conditions. A soil reuse area will be identified on-site to relocate soil that would be classified as hazardous

waste if excavated and disposed off-site. This reuse area will be under the new building or pavement. To mitigate the potential for a complete vapor intrusion pathway and indoor air contamination, the Proposed Project incorporates two levels of open-air above ground parking with residential units above. A sub-slab vapor mitigation system will be installed in perimeter ground floor retail and commercial space to prevent a complete vapor intrusion pathway.

Overall, the Proponent will provide MCP and Licensed Site Professional (LSP) support services and engage licensed remedial contractors during property redevelopment activities in order to comply with applicable local, state and federal regulations and guidelines that govern the environmental conditions identified on the Proposed Project site. Additional information on addressing hazardous waste is in **Section 4.6.2.**

1.3.12 Geotechnical / Groundwater Impacts Analysis

The soil conditions at the site generally consists of vary thicknesses of fill, glacial tills, and bedrock. Bedrock is as shallow as 2 feet below ground surface on the eastern portion of the site and greater than 20 feet deep at the western portion. The first five feet of bedrock generally consists of a heavily weathered and severely fractured rock. The deeper, competent bedrock below the weathered rock was observed as Roxbury Conglomerate. Groundwater was encountered around 8 to 15 feet below ground surface and were similar elevations in the rock and sand layers measured.

Given the proposed building construction and the subsurface conditions, it is anticipated that the proposed building will be supported by conventional spread footing foundations in conjunction with a soil-supported slab-on-grade.

The project does not include any underground parking or basements and therefore excavation depths and quantities will be limited. However, there will be excavations required to install foundations, grade beams, utilities, and stormwater features. At the east side of the site, shallow bedrock will be encountered in these excavations. At the west side of the site, contaminated soils of excavated material will also be encountered due to shallow bedrock at the east and contaminated soils at the west area of the site. Measures will be taken to limit the amount of impact associated with encountering these conditions. Additional geotechnical information and analysis is provided in **Section 4.7.**

1.3.13 Construction Impacts Analysis

Section 4.8 describes impacts likely to result from the Proposed 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 that will be responsible for developing a construction phasing and staging plan and for coordinating construction activities with all appropriate regulatory agencies. The Proposed 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 1st Quarter 2023 and to be completed in the 2nd Quarter of 2025.

The Proponent will comply with applicable state and local regulations governing construction of the Proposed 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 Proposed Project and will include specific mitigation measures and staging plans to minimize impacts on abutters.

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.

1.3.14 Wetlands / Flood Hazard Zone

The existing Proposed Project site is not a part of a wetland resource area regulated by the Massachusetts Wetland Protection Act. Based on the Preliminary Flood Insurance Rate Maps (FIRM) for Suffolk County, the Proposed Project site is not located in a special flood hazard area, floodway area, or other flood area. It is located on City of Boston Sheet No. 25025COO79J, effective 03/16/16 as Flood Zone X, Area of Minimal Flood Hazard.

1.3.15 Wildlife Habitat

The existing site does not contain any significant flora or fauna that will require protection during the construction phase(s) of the proposed project.

1.3.16 Historic Resources Component

According to files at the Massachusetts Historical Commission, there are no on-site structures listed in the National or State Register of Historic Places, or the Inventory of Historical and Archaeological Assets of the Commonwealth. The Dudley Station and Roxbury Highland Historic Districts are in close proximity to the Project site, but it is not expected that the Proposed Project will cause adverse impacts on the historic or architectural elements of these districts or historic resources within 1/8 mile of the Project site (see **Section 5.0**).

1.3.17 Infrastructure Systems Component

An infrastructure system's analysis (**Section 6.0**) was completed by Bryant Associates, the Project's Civil Engineer. The existing infrastructure surrounding the site appears sufficient to service the needs of the Proposed 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.

1.3.18 Transportation Component

Section 7.0 presents the comprehensive transportation study completed by HSH for the Proposed Project in conformance with the BTD Transportation Access Plan Guidelines (2001). The study analyzes existing conditions within the Proposed Project study area, as well as conditions forecast to be in place under the seven-year planning horizon of 2026.

The Project will have imperceptible impacts to roadway operations or transit services in the area. 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, providing transit information (schedules, maps, and fare information) to residents and visitors, providing on-site secure, covered bicycle storage for every residential unit, The Proponent will designate a full-time, on-site employee as the transportation coordinator. The transportation coordinator will oversee all transportation issues including managing vehicular operations, parking, service and loading, and TDM programs. The detailed agreement of full TDM measures will be defined and codified in the Transportation Access Plan Agreement (TAPA).

1.3.19 Response to Climate Change Questionnaire

Please see **Appendix E** for the Proponent's Response to the City of Boston's Climate Change Questionnaire.

1.3.20 Response to City of Boston Accessibility Guidelines

Please see **Appendix F** for the Proponent's Response to the City of Boston's Accessibility Guidelines.

1.3.21 Response to BPDA Broadband Questionnaire

Please see **Appendix G** for the Proponent's Response to the BPDA Broadband Questionnaire.

1.3.22 Responses to BPDA Smart Utilities Checklist

Please see **Appendix H** for the Proponent's Response to the BPDA Smart Utilities Checklist.

2.0 GENERAL INFORMATION

2.1 Applicant Information

2.1.1 Project Proponent

The Project Proponent, Cruz Development Corporation (CDC), has been proudly entwined with the Roxbury community for decades. Its parent, the John B. Cruz Construction Company, Inc., was founded by John "Bertie" Cruz in 1948. CDC has completed more than $500,000,000 in multiple landmark projects over the past 40-years, including ground up construction, building rehabilitation, multi-family rehabilitation and office building construction. CDC has partnered with many local community groups and historical societies in and around the City of Boston as part of the process of gaining project approvals. John B. Cruz, III, CDC President, has been involved in real estate development/investment since 1973. CDC currently owns and manages over 1,000 apartment units for his own portfolio. Cruz's most recent development project is the ground-up 280-290 Warren Street mixed-use residential/commercial development as well as the moderate rehabilitation of a 349-unit, multi-family residential development, consisting of 23 scattered site properties, located in the Roxbury, Dorchester and Mattapan neighborhoods of Boston.

CDC, therefore, has experience in managing and developing real estate, and in managing local businesses, which will guide this Proposed Project to completion.

2.1.2 Project Team

Project Name	135 Dudley Street, Roxbury
Owner	**City of Boston / Department of Neighborhood Development (DND)**
Developer	**Cruz Development Corporation** One John Eliot Square Roxbury, MA 02119 John B. Cruz III, President Daniel Cruz, Jr., Vice President Armond McCoy, Project Manager amccoy@cruzcompanies.com Tel: 617-445-6901 McCall Cruz mcruz@cruzcompanies.com

Article 80 Permitting Consultant	**Mitchell L. Fischman Consulting ("MLF Consulting") LLC** 41 Brush Hill Road Newton, MA 02461 Mitchell Fischman mitchfischman@gmail.com Tel: 781-760-1726 Yvette Niwa yvetteniwa.mlfconsulting@gmail.com Tel : 818-426-8157
Legal Counsel	**McKenzie & Associates, PC (Zoning & Permitting)** 183 State Street, Suite 6 Boston. MA 02109 Tel: 617-723-0400 Denzil McKenzie, Esq. dmckenzie@mckenzielawpc.com Timothy A.M. Fraser, Esq. tfraser@mckenzielawpc.com **Tourse & Associates PC (Corporate & Real Estate)** 3 Cannon Street Newton, MA 02461 Tel: 617-969-8035 Dennis Tourse dtourse@tourseassoc.com

Architects	**The Architectural Team** 50 Commandants Way at Admiral Hill Chelsea, MA 02150 Tel: 617-889-4402 Robert Verrier AIA rverrier@architecturalteam.com Al Donovan AIA adonovan@architecturalteam.com Jeffrey Sargis AIA jsargis@architecturalteam.com **Micheal Washington Architects** 891 Centre Street, Suite 401 Jamaica Plain, MA 02130 Tel: 617-390-5515 Micheal Washington mwashington@mwaboston.com Elvin Phillips ephillips@mwaboston.com
Transportation Planner / Engineer	**Howard Stein Hudson** 11 Beacon Street, Suite 1010 Boston, MA 02108 Tel: 617-482-7080 Elizabeth Peart epeart@hshassoc.com Michael White mwhite@hshassoc.com
Civil Engineer	**Bryant Associates** 90 Canal Street Suite 301 Boston, MA 02114 Tel: 617-248-0300 James Comeau Jcomeau@bryant-engrs.com Todd Brayton Tbrayton@bryant-engrs.com

Landscape Architect	**Verdant Landscape Architecture** 318 Harvard Street, Suite 25 Brookline, MA 02446 Tel: 617-735-1180 Katya Podsiadlo kp@verdantla.com Blair Hines, Principal bh@verdantla.com
Noise and Air Consultant	**Tech Environmental, Inc.** Hobbs Brook Office Park 303 Wyman Street, Suite 295 Waltham, MA 02451 Tel: 781-890-2220 Marc C. Wallace mwallace@techenv.com Tel: 781-890-2220 x30
Sustainability / Article 37 Consultant	**Soden Sustainability Consulting** 19 Richardson Street Winchester, MA 01890 Tel: 617-372-7857 Colleen Ryan Soden, LEED AP BD+C colleen@sodensustainability.com
General Contractor	**John B. Cruz Construction Company** One John Eliot Square Roxbury, MA 02119 John B. Cruz, III
Wind Engineer	**RWDI** 600 Southgate Drive Guelph, Canada N1G4P6 Tel: 519-823-1311 Sonia Beaulieu Sonia.beaulieu@rwdi.com

Geotechnical / Environmental / 21E Engineer	**GEI Consultants** 400 Unicorn Park Drive Woburn, MA 01801 Ileen Gladstone, Senior VP lgladstone@geiconsultants.com Tel: 781-721-4012
Construction Commencement	1st Quarter 2023
Construction Completion	2nd Quarter 2025
Status of Project Design	Schematic

2.1.3 Legal Information

Legal Judgments or Actions Pending Concerning the Proposed Project

To the Proponent's knowledge, there are no legal judgments or actions pending concerning the Proposed Project.

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

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

Nature and Extent of Any and All Public Easements

There are many utility easements for sewer, electric, cable, telephone and gas on or adjacent to the Proposed Project site based on the existing survey. Final design plans will accommodate these easements - not known at this time.

2.2 Public Benefits

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

- The Proposed Project will provide multi-family residential units with ground floor retail, service and cultural uses to meet community objectives and enhance the vibrancy of Dudley Square;
- As a transit-oriented development ("TOD"), the Proposed Project will achieve the DND RFP's affordable housing goals for affordable / income restricted housing for both rental and home ownership units;

- The Proposed Project will provide office space for the Boston Chapter of the NAACP (with the Proponent providing this space rent-free for 10-years);
- The Proposed Project will provide a significant public open space to support existing uses in the area including the Dudley BPL Branch Library and Court House, and the pedestrian experience will be enhanced with new street trees and other streetscape amenities;
- The Proposed Project responds to the RFP by striving to achieve the highest LEED/Green Building requirements, as feasible;
- The Proposed Project will support economic development in the district by providing new local employment opportunities;
- The Proposed Project will also include approximately 120-parking spaces to be made available to the general public, providing both short-term and long-term parking, out of the available approximately 270 total spaces;
- During the construction phase, the Proposed Project is expected to support full-time employment for 125 construction jobs from a variety of trades; and
- The Proposed Project will provide additional real estate tax revenue to the City

2.3 Regulatory Controls and Permits

Large Project Review Requirement

Because the Project involves new construction in excess of 50,000 square feet of Gross Floor Area, the Project is subject to Large Project Review pursuant to Article 80B of the Boston Zoning Code. On August 26, 2019, the Applicant filed a Letter of Intent to file this Project Notification Form to commence study of the potential impacts of the Project. Under the Mayor's Executive Order dated October 10, 2000, and amended on April 3, 2001, regarding mitigation for development projects, the Mayor has appointed an Project Review Committee / Impact Advisory Group to advise the BPDA on mitigation measures for projects undergoing Large Project Review. In connection with Large Project Review, the Project will be subject to, among other requirements, Boston Civic Design Commission review and the green building requirements of Article 37 of the Boston Zoning Code.

Zoning District and Overlay Subdistricts

The Project Site is located entirely within the Dudley Square Economic Development Area (EDA) Subdistrict of the Roxbury Neighborhood Zoning District, governed by Article 50 of the Boston Zoning Code. The Project site is also located within overlay Neighborhood Design Review and Boulevard Planning Subdistricts, each which have special design review requirements and design guidelines as set forth in Subsections 50-38.1, 50-39, 50-40 and 50-41.

Under the Dudley Square EDA underlying zoning, multifamily dwelling use is conditional on the first floor and allowed on the second story and above. Local retail business, and certain service and restaurant

uses are allowed with certain limitations. The stipulated maximum building height is 55 feet, the minimum rear yard requirement is 20 feet, and the maximum floor area ratio is 2.0. Off-street parking and loading requirements are determined through Large Project Review requirements.

Anticipated related relief required from the Zoning Board of Appeal is set forth below.

The following table provides additional details regarding use and dimensional zoning requirements the overall Proposed Project (**Table 2-1**).

Table 2-1. 135 Dudley Street - Overall Rental and Home-Ownership/Condominium Buildings - Use and Dimensional Requirements

Use / Dimensional Element	Dudley Sq. EDA District Requirements	Proposed Overall Project (Rental and Condominium Buildings) (1)	Relief Required
Multi-Family Use	Conditional: 1st Floor Allowed: Above 1st Floor	160 units	No
Local Retail Use	Local Retail Uses Allowed	Up to 15,512 SF	No
Restaurant Use	Allowed (other than drive-in) with limitations	Up to 2,000 SF	No
Max. Floor Area Ratio	2.0	4.96	Variance
Min. Lot Size	None	69,835 SF	No
Min. Usable Open Space (SF Per DU)	None	11,546 SF	No
Max. Building Height	55 feet	95 feet	Variance
Min. Lot Width	None	386 feet	No

Use / Dimensional Element	Dudley Sq. EDA District Requirements	Proposed Overall Project (Rental and Condominium Buildings) (1)	Relief Required
Min. Lot Frontage	None	394 feet	No
Minimum Front Yard	None	2 feet – 10 feet	No
Minimum Side Yard	None	2 feet to 20 feet BPD side; 62 feet Library side	No
Minimum Rear Yard	20 feet	4 feet	Yes
Minimum Parking	Determined Through Large Project Review	Approx. 270 spaces	No
Minimum Loading	Determined Through Large Project Review	Loading Dock Spaces Integrated into the first-floor parking scheme	No

1. The dimensions described in this above table may change as the Proposed Project undergoes design review with the BPDA

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

Preliminary List of Permits or Other Approvals Which May be Sought

The table below presents a preliminary list of governmental permits and approvals that are expected to be required for the proposed redevelopment of 135 Dudley Street. This preliminary list is based on currently available information and is subject to change as the redevelopment program and design evolve. See **Table 2-4** that follows.

MEPA Review

Because of State/Federal funding possibilities, the Proponent anticipates that the Project will require review by the Massachusetts Environmental Policy Act Office of the Massachusetts Office of Energy and Environmental Affairs.

Table 2-2. Preliminary List of Permits or Other Approvals Which May be Sought

Agency Name	Permit or Action
City of Boston	
Boston Planning & Development Agency	Large Project Review and associated reviews and agreements (including Cooperation Agreement, Boston Residents Construction Employment Plan, Green Building Review, Response to Climate Change Preparedness and Resiliency Checklist, Response to Accessibility Questionnaire, and Response to Broadband Questionnaire, Response to SMART Utilities Checklist); Section 80B-6 Certificate of Compliance
Boston Department of Neighborhood Development (DND)	99-Year Ground Lease; Design Review
Boston Civic Design Commission (BCDC)	Advisory Design Review
Boston Transportation Department (BTD)	Transportation Access Plan Agreement Construction Management Plan
Boston Parks and Recreation Commission	Design review under City of Boston Municipal Code Section 7-4.11
Zoning Board of Appeal (BOA)	Zoning Relief
Boston Water and Sewer Commission (BWSC)	Site Plan Review Water and Sewer Connection Permits
Public Improvement Commission (PIC) / Public Works Department	Specific Repair Plan approval for changes to the public right of way; Specific Repairs Plans; Curb-Cut and Street/Sidewalk Opening Permits
Boston Inspectional Services Department	Building/Occupancy Permits

Commonwealth of Massachusetts	
MA Executive Office of Energy and Environmental Affairs (MEPA Office)	State Environmental Review
MA Historical Commission	State Register Review (if required)
Federal	
Environmental Protection Agency	Coverage under National Pollutant Discharge Elimination System Permit - General Permit
Federal Aviation Administration	Determination of No Hazard to Air Navigation (if required for cranes)

2.4 Public Review Process and Agency Coordination

Preliminary plans for the Proposed Project have been discussed with Roxbury elected officials and will be more fully discussed with the Roxbury neighborhood during the Article 80 public review process.

The Proponent has also discussed the Proposed Project with representatives of the Boston Planning and Development Agency ("BPDA") prior to filing this Project Notification Form in order to identify issues/concerns as well as design requirements related to the Project.

The Proponent, since it was recommended by the Plan Dudley PRC as developer on June 3, 2019, and the subsequent approval of same by the Roxbury Strategic Master Plan Oversight Committee (RMPOC), has held a series of meetings with city officials and community representatives. The Proponent has met with a team from the Department of Neighborhood Development (DND) on four occasions - 06/24/19, 07/01/19, 07/15/19, and 07/22/19. The last meeting (07/22/19) included meeting with representatives from the Boston Public Library, who are undergoing renovations to their building that abuts the 135 Dudley Street site. The Proponent has also had four pre-filing meetings with the Boston Planning and Development Agency (BPDA) on 08/06/19, 08/13/19, 08/23/19 and 09/10/19, in conjunction with the DND, to discuss design, advisory impact group meetings, scheduling, etc. The Proponent also met with the Plan Dudley PRC on September 10, 2019 to update them on the status of the project. The Proponent submitted a letter of intent to the BPDA on August 21, 2019, and is filing the Project Notification Form no later than September 27, 2019.

In accordance with Article 80 requirements, a Project Review Committee ("PRC") is expected to be utilized as an Impact Advisory Committee and neighborhood meeting(s) will be scheduled to review the PNF and receive community comments on the Project during the PNF public review period.

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 as the amount of square footage (100,000 gsf) for a DIP eligible project is below the amount that would trigger a payment.

3.0 URBAN DESIGN AND SUSTAINABILITY COMPONENT

3.1 Urban Design Overview

The siting of the project creates a welcoming gesture for circulation coming from Malcolm X Boulevard and Gourdin Park and provides an activated edge along Dudley Street and a portion of Washington Street to the Boston Police substation. Approximately 270 spaces of above grade, structured parking is accessed via the existing Warren Street curb cut, well away from Dudley Street. This parking is intended to serve residents, visitors, as well as a component of public neighborhood parking, and will be architecturally and programmatically screened from direct view from Dudley and Washington Streets. Above the retail level, the site is split into two buildings, creating an elevated courtyard between the buildings. Each building has its own architectural character, further integrating it into the diverse architectural context of Dudley Square.

The project provides a community park between the eastern boundary of the site and the Dudley Branch of the Boston Public Library. This shared green space is intended for tenants as well as neighborhood and Library uses. Through the course of development, the project team has coordinated with Boston Public Library staff and will continue to discuss mutually beneficial programming opportunities for this space. It is the desire of the project to use multiple types of public art displays as a screening tool against the structured parking and retaining walls, as well as an accent to the public park.

3.2 Building Design, Streetscape, Materials and Massing

To mitigate the height due to the density, the building mass steps back from the street edge, locating taller elements towards the center of the site, distanced from Dudley Street to preserve context in the street wall. Key elevations are matched with the existing Boston Police substation and Public Library to flow in a tiered massing. Views from Washington and Warren Streets show that the development scale and materials integrate with the existing buildings of Dudley Square in height, character, and density.

The project engages Dudley Street at sidewalk level with approximately 15,000 gsf of retail space, including a prominent location for the NAACP offices, as well as provisions for an outdoor café. The project will provide a generous sidewalk within the project boundaries along Dudley and Washington Streets, complete with bicycle racks and street trees to heighten the pedestrian experience. Further, the project has strategically located the residential entries and permanent offices along Dudley Street to enliven the streetscape and integrate them into the retail storefront. Provisions for an outdoor café have been made adjacent to the community park, to further draw visitors from Dudley Square Station to the retail shops located on the street level of the building.

The material color palette is selected from the surrounding neighborhood character. Most prominently, the project refers to the stone from the police department, and concrete tones from the Boston Public Library. A composite metal panel rainscreen cladding system, with sandstone coloring, has been chosen to complement with the Boston Police Department's stone façade. The light warm color palette pays homage to the existing buildings of the neighborhood, while introducing a more modern take on the

neighborhood. Likewise, in select locations to break up the façade, similar color metal panels are used to provide interest and rhythm to the façade. Several areas of full height window wall have been introduced at specific locations to accent or frame prominent views both towards the building, and outward to downtown Boston. The dark metallic window frames and accent material are reminiscent of the metallic tones found on the Dudley Station building as well as on several surrounding buildings. The bay windows located at regular intervals on the façade are a nod to the façade sculpting of the prominent Hotel Dartmouth building across the street.

The proposal provides five levels of above-grade parking for approximately 270 spaces, with access through the rear of the site to the access road that connects with Warren Street. These are anticipated to be for tenants and neighborhood needs, with approximately 110 spaces available for the visitor parking and use by the general public. Bike parking is designed both externally along Dudley Street and within tenant amenity areas in accordance with the project's LEED Gold goals. Indoor resident bike storage is anticipated to be located adjacent the residential lobbies for easy access from tenant circulation.

The urban design drawings, perspectives, and LEED v4 for BD+C Checklists are included at the end of this section (**Figures 3-1** thru **3-25**).

3.3 Landscape Design

The design of the landscape is based on **four** objectives

- Create a pedestrian-oriented landscape plan that fosters both commercial use and residential living on the site;
- Create a public park next to the library that welcomes the neighborhood to Dudley Square and provides a place to rest and socialize;
- Mitigate the impact of the new building and urban surroundings by increasing the area of plantings and utilizing permeable pavements; and
- Utilize best practices for environmental landscape design.

Spatial Organization & Circulation

The public face of the building facing Dudley Street will include commercial storefronts to bolster the Dudley Square commercial district. Two residential lobbies are prominently located – one in the center of the frontage, and one at the public park (east) end of the site with direct access to the public sidewalks. A multistory garage will be located at the rear of the site, accessed via easements across the Courthouse, Urban Wild and Boston Police properties. A public park is designed in the space between the new building and the Dudley Branch Boston Public Library. A retaining wall at the rear of the park will separate the significant grade change between the Dudley streetscape and the sidewalks at the courthouse and library. The project will provide an elevator at the corner of the parking garage for easy access from the courthouse and library down to Dudley Street

Park

An accessible park has been developed that provides for the following uses for the enjoyment of the general public:

- Outdoor Café related to the retail space at the front corner of the building,
- Entry walkway and seat walls at the residential lobby,
- Picnic and gathering area with tables and chairs under proposed shade trees,
- Blue bike stations,
- Open lawn area for flexible play,
- Wood platform seat walls at the rear retaining wall,
- Space on the retaining wall designated for temporary murals to be installed by local artists,
- Greenscreen and vines as well as vitrine art display cases on the garage façade, and
- Evergreen tree and shrub planting above the wall to provide year-round green backdrop to the park.

Where feasible, design details from the granite seat wall and wood bench planters located in the library plaza redesign will be echoed in the detailing at this new park. The design includes nineteen new shade trees and seven new evergreen trees in the park. Shade trees along the rear of the site will also be planted. Additionally, the streetscape redesign by others include many new street trees, planters and amenities along Dudley Street.

Courtyard

Within the building and above the first-floor level of the garage a shared courtyard is designed as an outdoor amenity space for the residents of the buildings. Constructed above the garage structure, the courtyard will include extensive green roof plantings as well as lightweight planters to support shrubs and trees. A pedestal paver or wood deck system will be designed to support outdoor dining, gathering, grilling, lounging, as well as possibly ping pong, shuffleboard, a TV wall and other amenities. Residential units that face this courtyard will have direct access to private patios with privacy fencing. Greenscreens with vine plantings are proposed to screen the two garage facades facing the courtyard.

3.4 Sustainable Design/Energy Conservation

3.4.1 Introduction

The project is comprised of two separate buildings. The condo building is 9 stories and has 105 units, the rental building is 6 stories and has 55 affordable housing units. We are treating the development as one site for the purposes of LEED and the individual buildings will have a separate energy performance for this PNF.

To meet the requirements of Article 37, the following section describes how the Project complies with the LEED Building Design & Construction v4 criteria.

The Project will demonstrate compliance with the LEED Certifiably Requirements. Further study over the coming weeks and months will determine and confirm final credit achievement. At this stage in the project we are tracking 64 YES credits and 17 Maybe credits.

3.4.2 Overview

Sustainability informs every design decision. Enduring and efficient buildings conserve embodied energy and preserve natural resources. The Project embraces the opportunity to positively influence the urban environment. Its urban location takes advantage of existing infrastructure while access to public transit will reduce dependence on single-occupancy vehicle trips and minimize transportation impacts.

The LEED v4 for Building Design and Construction (BD&C) rating system tracks the sustainable features of a Project by achieving points in following categories: Integrative Process; Location & Transportation; Sustainable Sites; Water Efficiency; Energy and Atmosphere; Materials and Resources; Indoor Environmental Quality; and Innovation and Design Process.

3.4.3 Integrative Process

The Proponent and Project team are committed to an integrated design approach using early modeling and extensive design team coordination to achieve synergies across disciplines and building systems.

3.4.4 Location and Transportation

The Location and Transportation credit category encourages development on previously developed land, minimizing a building's impact on ecosystems and waterways, regionally appropriate landscaping, and smart transportation choice.

The Project site has been previously developed, meeting the criteria for the sensitive land protection credit. The Project site is also located on a brownfield where soil or groundwater contamination has been identified, and where the local, state, or national authority requires its remediation. The Project team will perform remediation to the satisfaction of that authority.

The project will be providing EV charging stations for a minimum of 2% of the total parking.

The Project site area exceeds the density requirements of 12 units/acre providing 29.6 units/acre and is in a neighborhood with several amenities within 0.5 miles of the Project site. The Project is providing bicycle facilities and showers for the occupants of the building.

The transit available to the site is exceptional. We are achieving all of the base points for LEED (5) in addition to exemplary performance.

3.4.5 Sustainable Sites

The development of sustainable sites is at the core of sustainable design. Sustainable Site design provides quality open space with active landscape elements that can both mitigate stormwater and provide shade and thermal comfort for the building occupants.

The Project will evaluate Low Impact Development (LID) Strategies to promote infiltration for quality stormwater management. The Project will attempt to meet the 90th percentile of rainfall retained on site for the Rainwater Management credit.

The building roof and all hardscape material will comply with the SRI standards set forth by LEED and achieve both Heat Island credits. All exterior lighting fixtures will comply with the Light Pollution Reduction credit, but we will confirm this in the next submission.

As required by LEED, the Project will create and implement an erosion and sedimentation control plan for all construction activities associated with the Project. The plan will conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent.

The Project is developing the site assessment credit that will demonstrate the relationships between the Project site features and topics, Topography, Hydrology, Climate, Vegetation, Soils, Human use.

The project is exceeding the open space requirement by more than 25%.

3.4.6 Water Efficiency

Buildings are major users of our potable water supply and conservation of water preserves a natural re-source while reducing the amount of energy and chemicals used for sewage treatment. The goal of the Water Efficiency credit category is to encourage smarter use of water, both inside and outside.

Water reduction is typically achieved through more efficient appliances, fixtures and fittings inside and water-wise landscaping outside. To satisfy the requirements of the Indoor Water Use Reduction Prerequisite and credit, the Project will incorporate water conservation strategies that include low-flow plumbing fixtures for water closets and faucets. The project is currently achieving a 47% water use reduction.

To satisfy the requirements of the Outdoor Water Use Reduction Prerequisite and credit, the landscape will be designed to only use irrigation for plant establishment and will only have plant material that is native and adaptive.

The Project will also install permanent water meters that measure the total potable water use for the building and associated grounds in addition to water meters for two or more of the following water sub-systems, as applicable to the project: irrigation, indoor plumbing fixtures and fittings, domestic hot water and the boiler for additional metering.

The project will assess the ability to meet the Cooling Tower credit alternative compliance path, once the MEP is on board.

Metering data will be compiled into monthly and annual summaries, and the resulting whole-project water usage data will be shared with USGBC.

3.4.7 Energy & Atmosphere

According to the U.S. Department of Energy, buildings use 39 percent of the energy and 74 percent of the electricity produced each year in the United States. The Energy and Atmosphere credit category encourages a wide variety of energy strategies: commissioning; energy use monitoring; efficient design and construction; efficient appliances, systems and lighting; the use of renewable and clean sources of energy, generated on-site or off-site; and other innovative practices.

Fundamental Commissioning and Enhanced Commissioning will be pursued for the Project. Envelope Commissioning will also be evaluated as an alternative.

A whole-building energy simulation was performed for the Project. This is included in **Appendices B.1 and B.2**. Points were calculating using EA pilot credit 95 – Alternative Energy Performance Metric, the average of the energy cost and carbon emissions savings is 27.5%, resulting in 11 LEED points.

The Project team will continue to analyze efficiency measures during the design process and account for the results in design decision making. The team will use energy simulation of efficiency opportunities and past energy simulation analyses for similar buildings. The Project will also prove compliance with the Stretch Code, which requires a minimum of 10 percent improvement over ASHRAE Standard 90.1–2013.

The Project will evaluate installing new building-level energy meters, or submeters that can be aggregated to provide building-level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, biomass, etc.).

The Project will be incorporating clean/renewable energy production.

As required by LEED, the Project will not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems. The Project will target the use of refrigerants used in heating, ventilating, air-conditioning, and refrigeration (HVAC&R) equipment that minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change.

The Proponent is evaluating engaging in a contract for 100 percent of the Project's energy from green power, carbon offsets, or renewable energy certificates (RECs).

3.4.8 Materials & Resources

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

As required by LEED, the Project will provide dedicated areas accessible to waste haulers and building occupants for the collection and storage of recyclable materials for the entire building. Collection and storage areas may be separate locations. Recyclable materials will include mixed paper, corrugated cardboard, glass, plastics, and metals. The Project will also take appropriate measures for the safe collection, storage, and disposal of two of the following: batteries, mercury-containing lamps, and electronic waste.

To comply with both the prerequisite and credit requirements related to construction waste management, the Project will develop and implement a construction and demolition waste management plan that will identifying at least five materials (both structural and nonstructural) targeted for diversion and approximate a percentage of the overall Project waste that these materials represent. The Project will divert a minimum of 75 percent of the total construction and demolition material; diverted materials will include at least four material streams.

Careful material selection will be performed for the Project. The Project will evaluate products that have Environmental Product Declarations (EPDs), Sourcing of Raw Materials and Material Ingredients disclosures to meet the LEED Criteria.

3.4.9 Indoor Environmental Quality

The U.S. Environmental Protection Agency estimates that Americans spend about 90 percent of their day in-doors, where the air quality can be significantly worse than outside. The Indoor Environmental Quality credit category promotes strategies that can improve indoor air through

low emitting materials selection and increased ventilation. It also promotes access to natural daylight and views.

As required by LEED, the Project will meet the minimum requirements of ASHRAE Standard 62.1–2010, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata), or a local equivalent, whichever is more stringent. Also, during building operations the Proponent will institute a No Smoking Policy to prohibit the use of all tobacco products inside the building and within 25 feet of the building entrance, air intakes, and operable windows.

The Project will provide entryway systems, interior cross-contamination prevention, and filtration. The Project will develop and implement an indoor air quality (IAQ) management plan for the construction and preoccupancy phases of the building, meeting or exceeding all applicable recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3. The Project will follow strict IAQ guidelines and protect absorptive materials stored on-site from moisture damage.

The Project will meet the thermal comfort criteria both for controllability and the ASHRAE 55 standards.

Daylight is being evaluated for energy efficiency opportunities and benefits for the occupants. The Project will also evaluate the ability to provide views with a direct line of sight to the outdoors for at least 75 percent of all regularly occupied floor area. These credits are not included in our YES column until further study is completed.

3.4.10 Innovation and Design Process

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

- Innovation in Design- Exemplary Performance-Transit
- Innovation in Design: Green Housekeeping & Integrated Pest Management
- Innovation in Design: Thermal Comfort Survey

- Innovation in Design: City of Boston Cogeneration Credit
- Innovation in Design: LEED Accredited Professional

Regional Priority

The Project anticipates achieving the following regional priority credits.

- Regional Priority: Indoor Water Use Reduction (yes)
- Regional Priority: High Priority Site (yes)
- Regional Priority: Optimize Energy Performance (yes)
- Regional Priority: Rainwater Management (yes)

3.5 Urban Design Drawings and LEED Checklist

Urban design drawings and renderings depicting the Proposed Project and the LEED v4 for BD+C Checklist include:

135 Dudley Street

Boston, MA | September 19, 2019 | 18143 | © The Architectural Team, Inc.

Figure 3-1
Proposed Development Aerial View

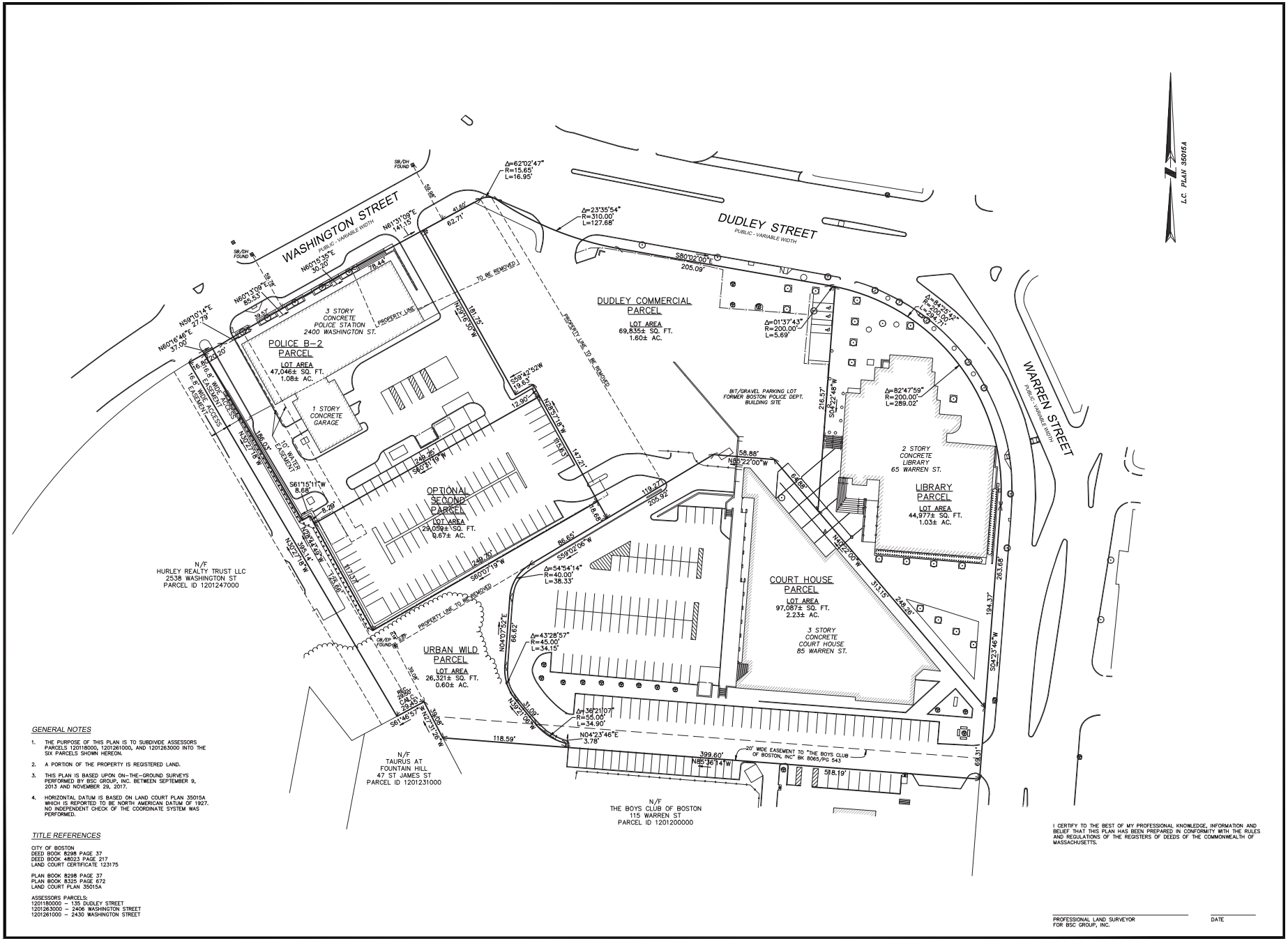
CRUZ DEVELOPMENT tat

135 Dudley Street

Boston, MA | September 19, 2019 | 18143 |

Figure 3-2
Aerial Perspective | Existing Conditions

CRUZ DEVELOPMENT tat



135 Dudley Street

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Figure 3-3
Existing Land Plan

CRUZ DEVELOPMENT tat

VERDANT LANDSCAPE ARCHITECTURE

CRUZ DEVELOPMENT tat

135 Dudley Street

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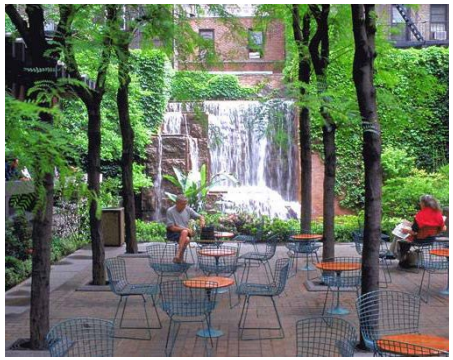
Figure 3-4
Proposed Landscape Plan

TEMPORARY MURAL



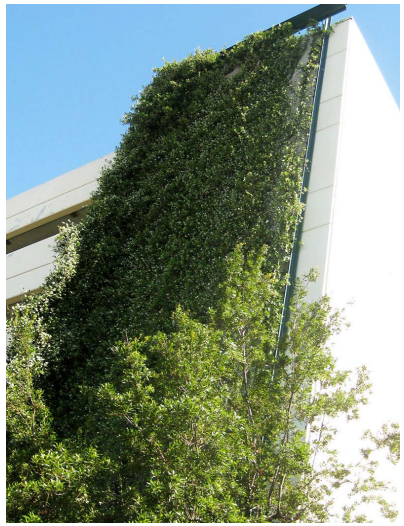
PICNIC AREA WITH BACKDROP

URBAN PLAZA AT ENTRY

PICNIC & PLAY URBAN SPACE

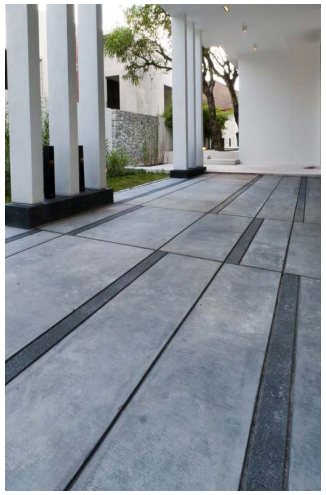
TALL ADIRONDACK CHAIR (FLAT)
by LOLL DESIGNS

MOVABLE LOG SEATS



GREEN SCREENS ON PARKING GARAGE

SAWCUT CONCRETE PATTERNS



VERDANT
LANDSCAPE ARCHITECTURE

CRUZ DEVELOPMENT tat

135 Dudley Street

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Figure 3-5
Proposed Landscape Precedent Images

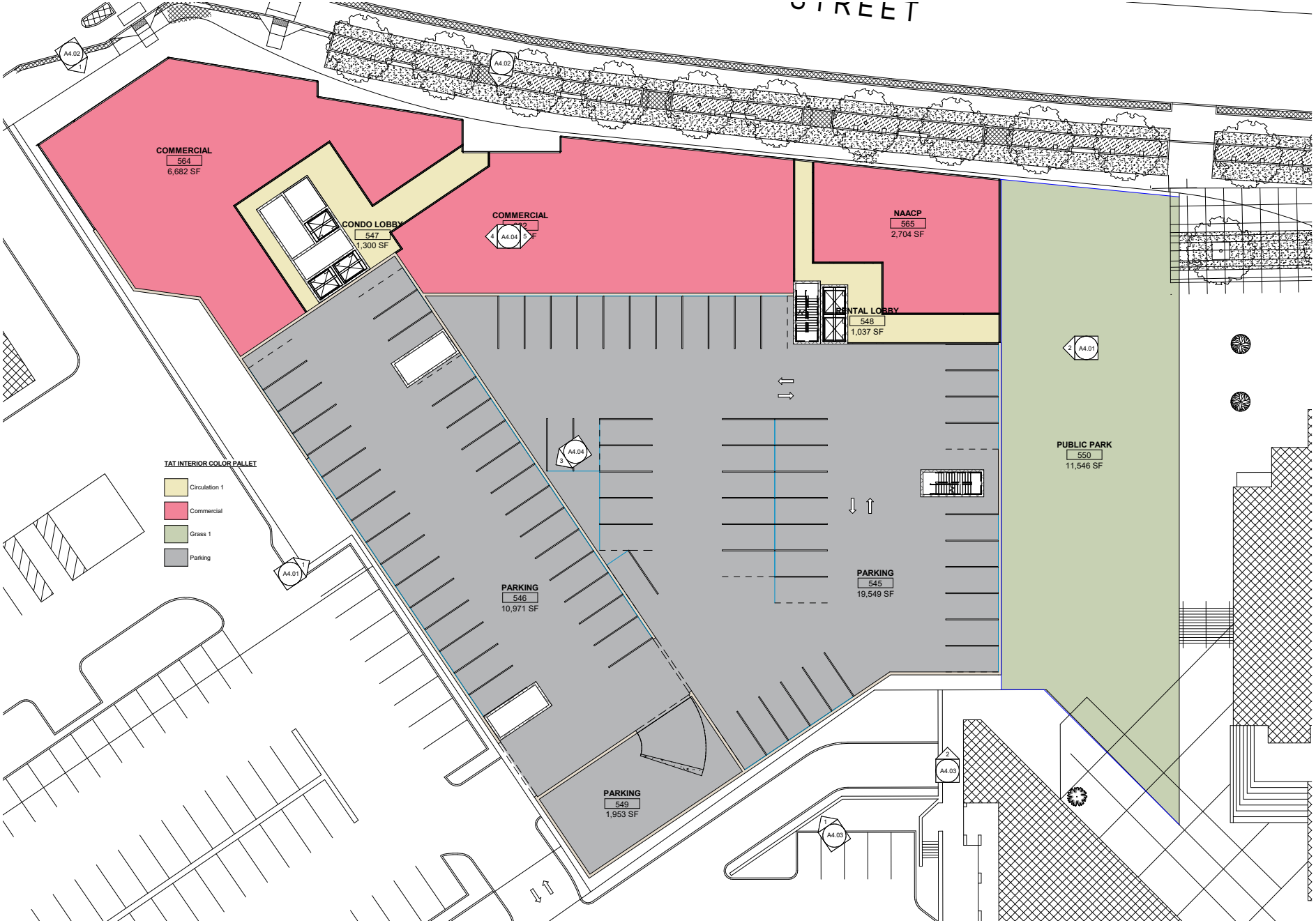

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Figure 3-6
First Floor Plan

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Figure 3-7
Second Floor Plan

CRUZ DEVELOPMENT tat

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Figure 3-8
Third Floor Plan

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Figure 3-9
Fourth Floor Plan

CRUZ DEVELOPMENT tat

135 Dudley Street

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Figure 3-10
Fifth Floor Plan

CRUZ DEVELOPMENT tat

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Figure 3-11
Sixth Floor Plan

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Figure 3-12
Seventh Floor Plan

CRUZ DEVELOPMENT tat

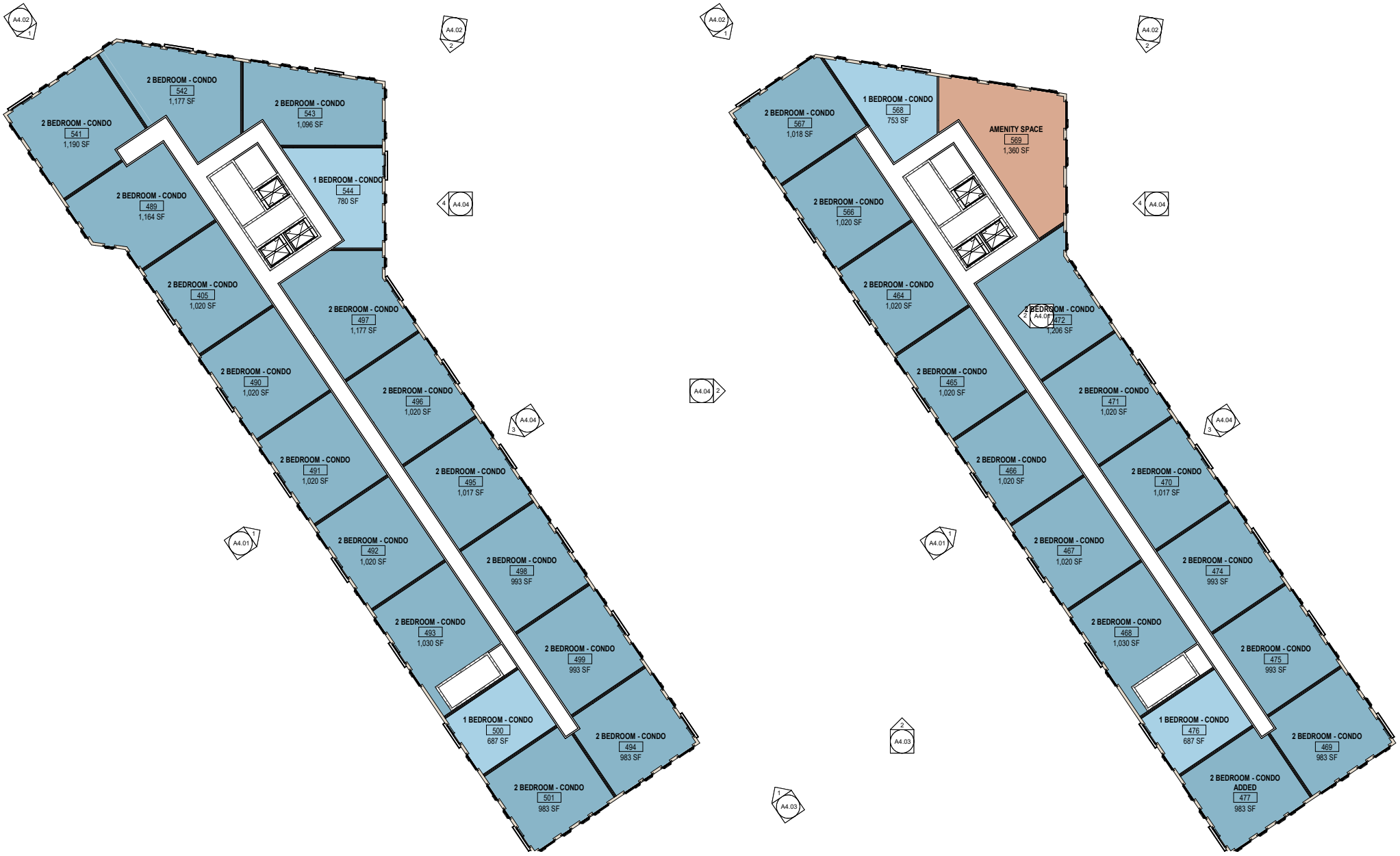
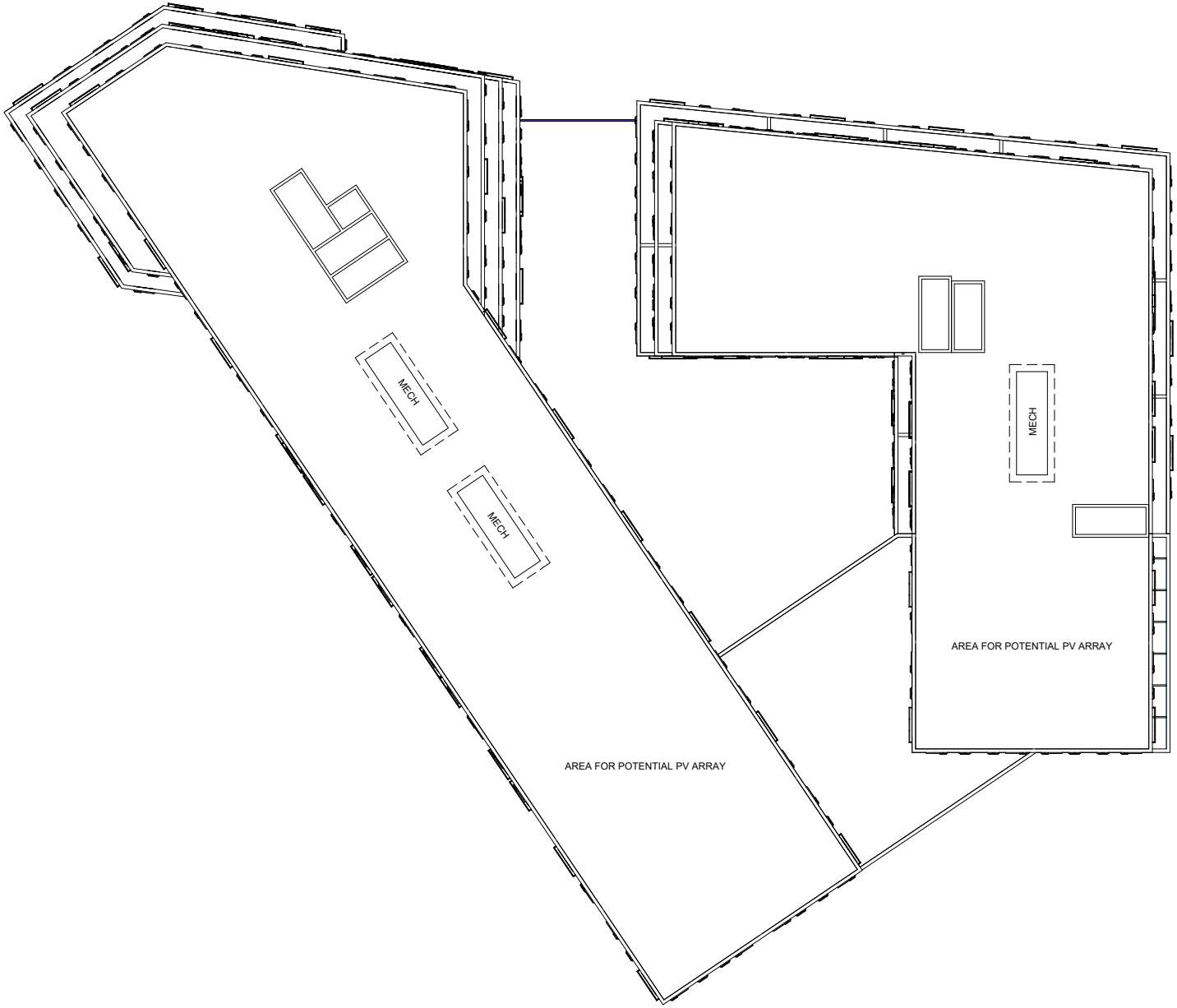


Figure 3-13
Eighth & Ninth Floor Plans

CRUZ DEVELOPMENT tat



135 Dudley Street

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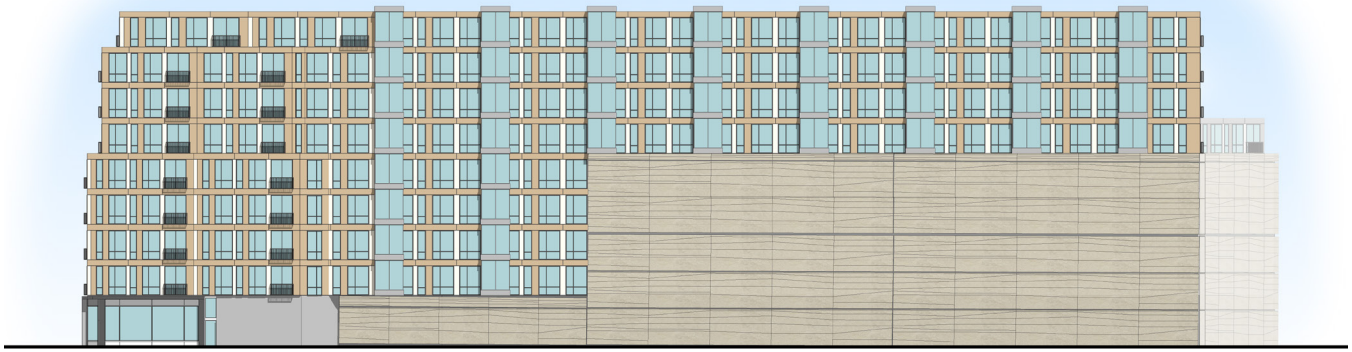
Figure 3-14
Roof Plan

CRUZ DEVELOPMENT tat

North Elevation (Facing Dudley Street)



West Elevation (Facing Boston Police Dept.)

East Elevation (Facing Library)

135 Dudley Street

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Figure 3-15
Building Elevations

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135 Dudley Street

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Figure 3-16
Building Section

CRUZ DEVELOPMENT tat

135 Dudley Street

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Figure 3-17
Proposed Northwest Aerial Perspective

CRUZ DEVELOPMENT tat

135 Dudley Street

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Figure 3-18
Existing View from Malcolm X Blvd. Looking South

CRUZ DEVELOPMENT tat

135 Dudley Street

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Figure 3-19
Proposed View from Malcolm X Blvd. Looking South

CRUZ DEVELOPMENT tat

135 Dudley Street

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Figure 3-20
Existing View from Dudley Station Looking South

CRUZ DEVELOPMENT tat

135 Dudley Street

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Figure 3-21
Proposed View from Dudley Station Looking South

CRUZ DEVELOPMENT tat

135 Dudley Street

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Figure 3-22
Existing View from Dudley Street Looking South

CRUZ DEVELOPMENT tat

135 Dudley Street

Boston, MA | September 19, 2019 | 18143 |

Figure 3-23
Proposed View from Dudley Street Looking South

CRUZ DEVELOPMENT tat

135 Dudley Street

Boston, MA | September 19, 2019 | 18143 |

Figure 3-24
Proposed North Aerial Perspective

CRUZ DEVELOPMENT tat

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

Project Checklist

Project Name: 135 Dudley Condo Building
Date: 18-Sep-19

Figure 3-25

Y	?	N			
1			Credit	Integrative Process	1

15	1	0	**Location and Transportation**		16
			Credit	LEED for Neighborhood Development Location	16
1			Credit	Sensitive Land Protection	1
2			Credit	High Priority Site	2
5			Credit	Surrounding Density and Diverse Uses	5
5			Credit	Access to Quality Transit	5
1			Credit	Bicycle Facilities	1
	1		Credit	Reduced Parking Footprint	1
1			Credit	Green Vehicles	1

8	1	1	**Sustainable Sites**		10
Y			Prereq	Construction Activity Pollution Prevention	Required
1			Credit	Site Assessment	1
	1	1	Credit	Site Development - Protect or Restore Habitat	2
1			Credit	Open Space	1
3			Credit	Rainwater Management	3
2			Credit	Heat Island Reduction	2
1			Credit	Light Pollution Reduction	1

8	3	0	**Water Efficiency**		11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
2			Credit	Outdoor Water Use Reduction	2
5	1		Credit	Indoor Water Use Reduction	6
	2		Credit	Cooling Tower Water Use	2
1			Credit	Water Metering	1

17	7	9	**Energy and Atmosphere**		33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
3	1	2	Credit	Enhanced Commissioning	6
11	2	5	Credit	Optimize Energy Performance	18
	1		Credit	Advanced Energy Metering	1
		2	Credit	Demand Response	2
1	2		Credit	Renewable Energy Production	3
	1		Credit	Enhanced Refrigerant Management	1
2			Credit	Green Power and Carbon Offsets	2

1	3	9	**Materials and Resources**		13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
		5	Credit	Building Life-Cycle Impact Reduction	5
	1	1	Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
		2	Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
	1	1	Credit	Building Product Disclosure and Optimization - Material Ingredients	2
1	1		Credit	Construction and Demolition Waste Management	2

4	3	9	**Indoor Environmental Quality**		16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
1	1		Credit	Enhanced Indoor Air Quality Strategies	2
		3	Credit	Low-Emitting Materials	3
1			Credit	Construction Indoor Air Quality Management Plan	1
	1	1	Credit	Indoor Air Quality Assessment	2
1			Credit	Thermal Comfort	1
1		1	Credit	Interior Lighting	2
		3	Credit	Daylight	3
	1		Credit	Quality Views	1
		1	Credit	Acoustic Performance	1

6	0	0	**Innovation**		6
5			Credit	Innovation -EP Transit, Green Housekeeping, , IPM,Thermal Comfort Survey, City of	5
1			Credit	LEED Accredited Professional	1

4	0	0	**Regional Priority**		4
1			Credit	Regional Priority: Indoor Water Use	1
1			Credit	Regional Priority: High Priority Site	1
1			Credit	Regional Priority: Optimize Energy	1
1			Credit	Regional Priority: Rainwater	1

64	18	28	**TOTALS**	Possible Points:	110

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

4.0 ENVIRONMENTAL PROTECTION COMPONENT

4.1 Shadow Impacts Analysis

4.1.1 Introduction

The following shadow study describes and graphically depicts anticipated new shadow impacts from the Proposed Project compared to shadows from existing buildings. The study presents the existing and built conditions for the Proposed Project 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 vernal equinox, summer solstice and autumnal equinox.

4.1.2 Vernal Equinox (March 21)

Figures 4.1-1 through **4.1-4** depict shadows on March 21.

At 9:00 AM, shadows are cast in a westerly direction onto the southwest portion of Gourdin Park and the Boston Police Department B-2.

At 12:00 Noon, new shadow is cast in a northwesterly direction mostly onto the east bound portion of Dudley street and the Washington, Dudley, and Malcom X Blvd intersection.

At 3:00 PM, new shadow from the Proposed Project is cast in a northeasterly direction mostly onto the eastbound direction of Dudley Street and onto a small section of the westbound direction of Dudley Street towards the Malcom X Blvd intersection.

At 6:00 PM, new shadow from the Proposed Project is cast in an easterly direction across Dudley Street and onto the neighboring Boston Public Library parcel and the adjacent proposed on-site community park.

4.1.3 Summer Solstice (June 21)

Figures 4.1-5 through **4.1-8** depict shadow impacts on June 21.

At 9:00 AM, shadows are cast in a westerly direction onto portions of the Boston Police Department B-2 parcel.

At 12:00 Noon, new shadow is cast in a northwesterly direction onto portions of the Proposed Project site.

At 3:00 PM, new shadow from the Proposed Project is cast in a northeasterly direction mostly onto the Proposed Project site and a small section of Dudley Street.

At 6:00 PM, new shadow from the Proposed Project is cast in an easterly direction across the neighboring Boston Public Library parcel and the adjacent proposed on-site community park.

4.1.4 Autumnal Equinox (September 21)

Figures 4.1-9 through **4.1-12** depict shadow impacts on September 21.

At 9:00 AM, shadows are cast in a westerly direction onto the southwestern portion of Gourdin Park and onto the adjacent Boston Police Department B-2 parcel.

At 12:00 Noon, new shadow is cast in a northwesterly direction mostly onto the east bound portion of Dudley street and the Washington, Dudley, and Malcom X Blvd intersection.

At 3:00 PM, new shadow from the Proposed Project is cast in a northeasterly direction mostly onto the eastbound direction of Dudley Street and onto a small section of the westbound direction of Dudley Street towards the Malcom X Blvd intersection.

At 6:00 PM, new shadow from the Proposed Project is cast in an easterly direction across Dudley Street and onto the neighboring Boston Public Library parcel and the adjacent proposed on-site community park.

4.1.5 Winter Solstice (December 21)

Figures 4.1-13 through **4.1-15** depict shadow impacts on December 21. Winter sun casts the longest shadows of the year.

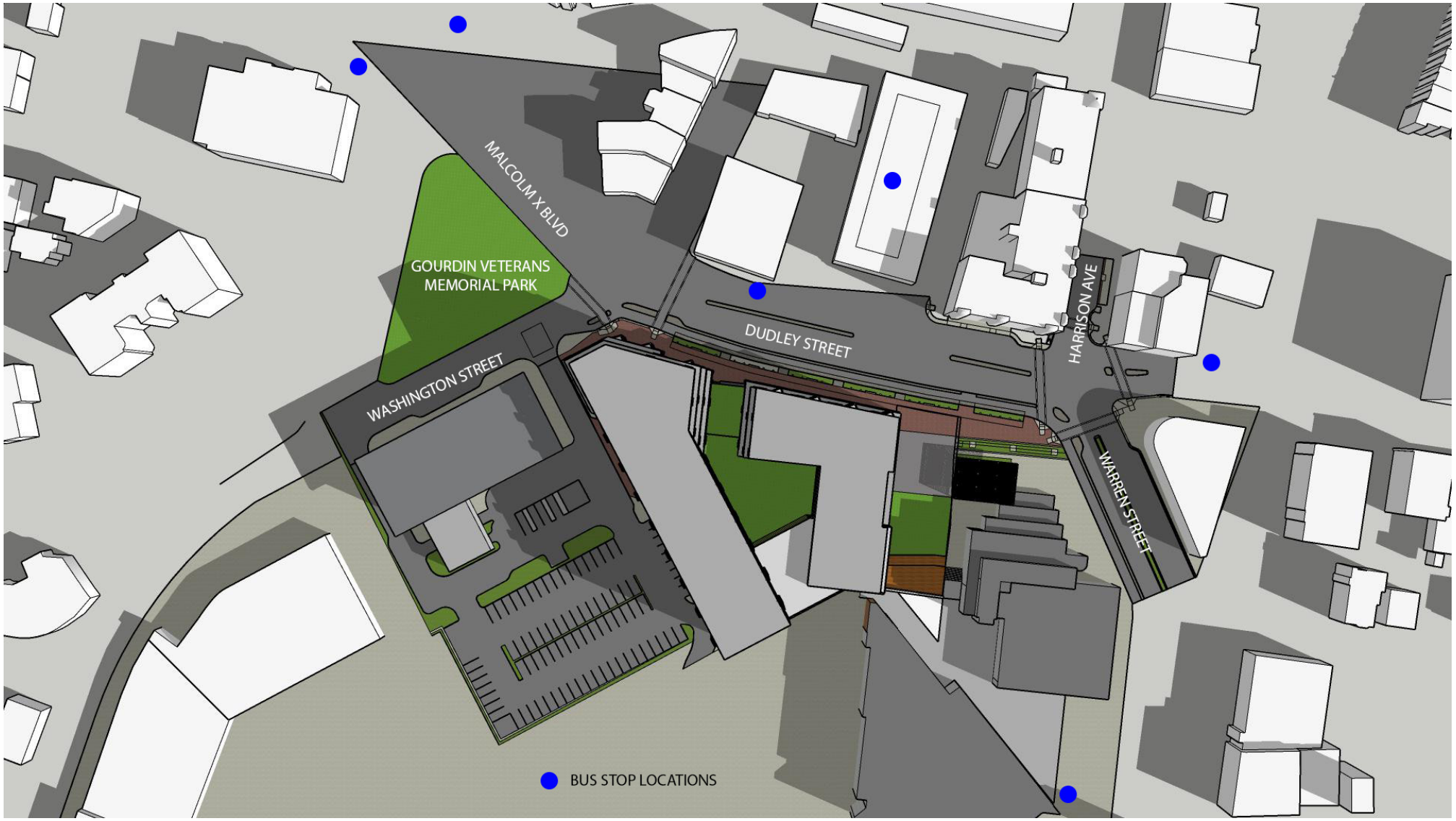
At 9:00 AM, shadows are cast in a northwesterly direction across the Northeastern portion of Gourdin Park and the Washington, Dudley, and Malcom X Blvd intersection and onto the western section of Dudley Street and portions of the neighboring properties to the North.

At 12:00 Noon, new shadow is cast in a northern direction mostly onto Dudley Street but partially onto the neighboring properties to the north across Dudley.

At 3:00 PM, new shadow from the Proposed Project is cast in a north-northeasterly direction, mostly onto Dudley Street and the adjacent properties to the north.

4.1.6 Summary

With a proposed height of 6 and 9-floors above grade, the Proposed Project's shadow impacts are generally minimal to moderate. New shadow for most of the year is primarily limited to a small section of the Eastbound direction of Dudley Street to the north. During the evening hours in the spring and fall, and during the morning and evening hours in winter, some shadows will extend to nearby properties. Overall, the Proposed Project's shadow impacts will not adversely impact the Proposed Project Site and surroundings.



135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-1
Shadow Study: March 21, 9am

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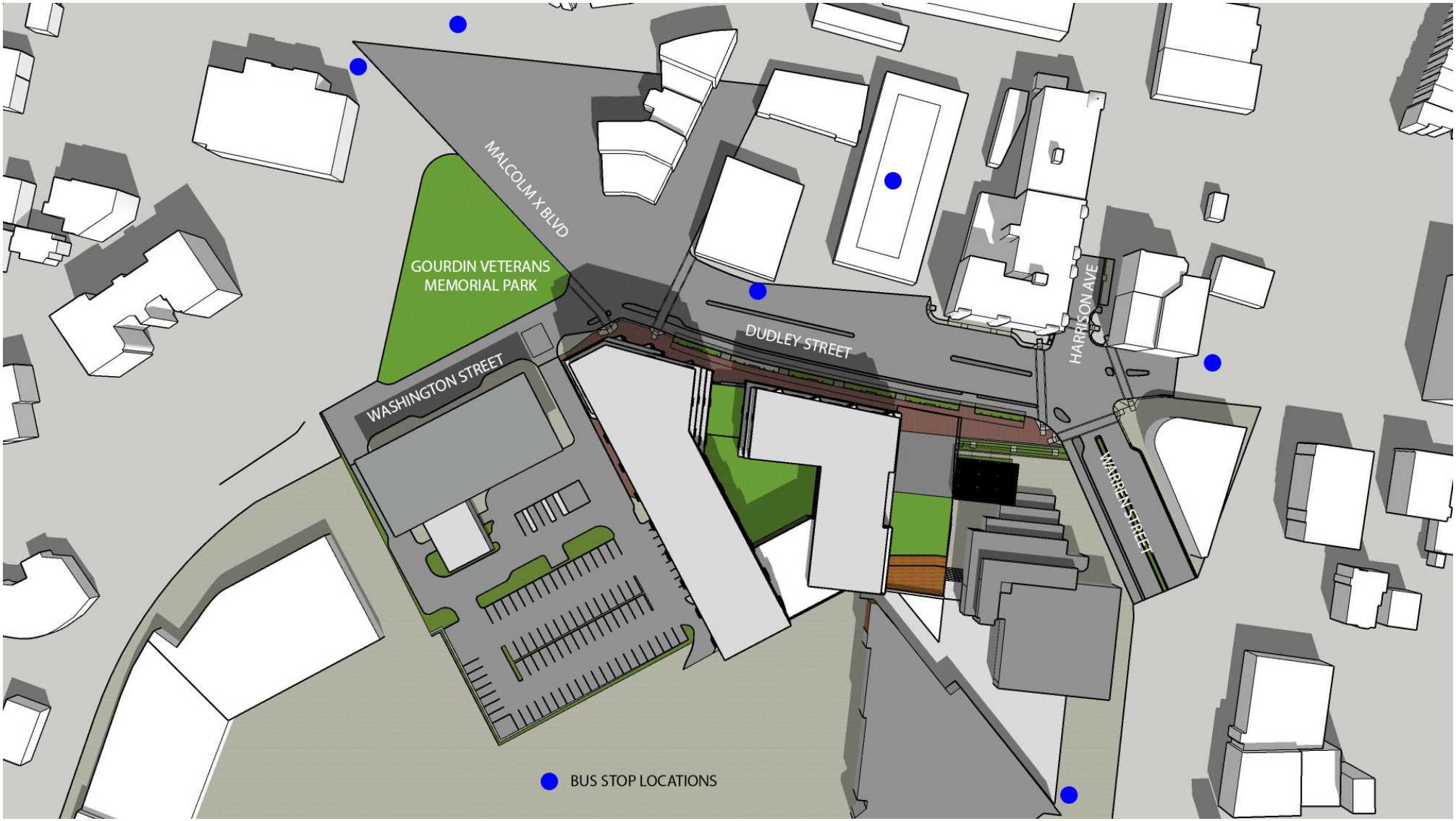

135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-2
Shadow Study: March 21, 12pm

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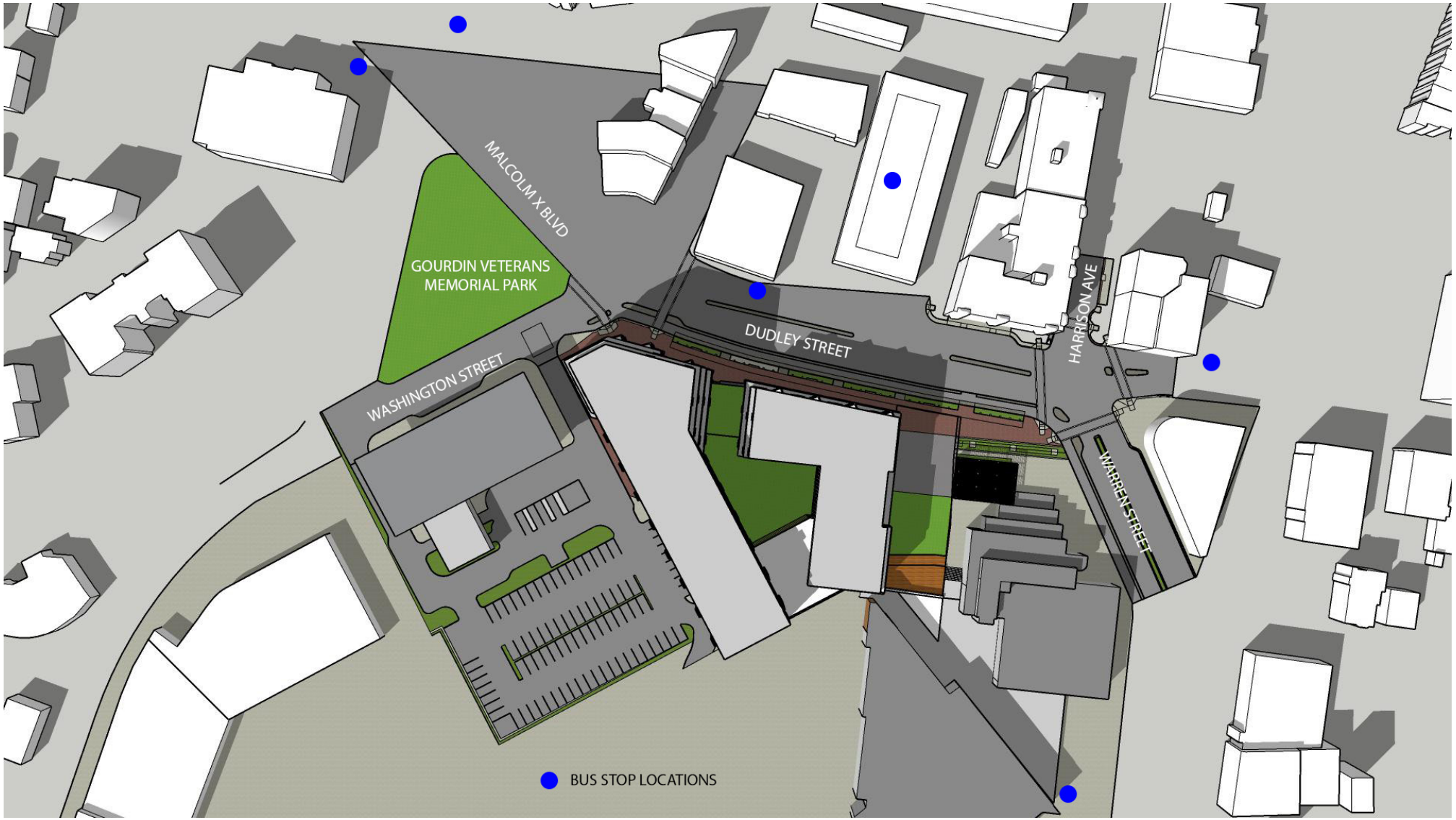

135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-3
Shadow Study: March 21, 3pm

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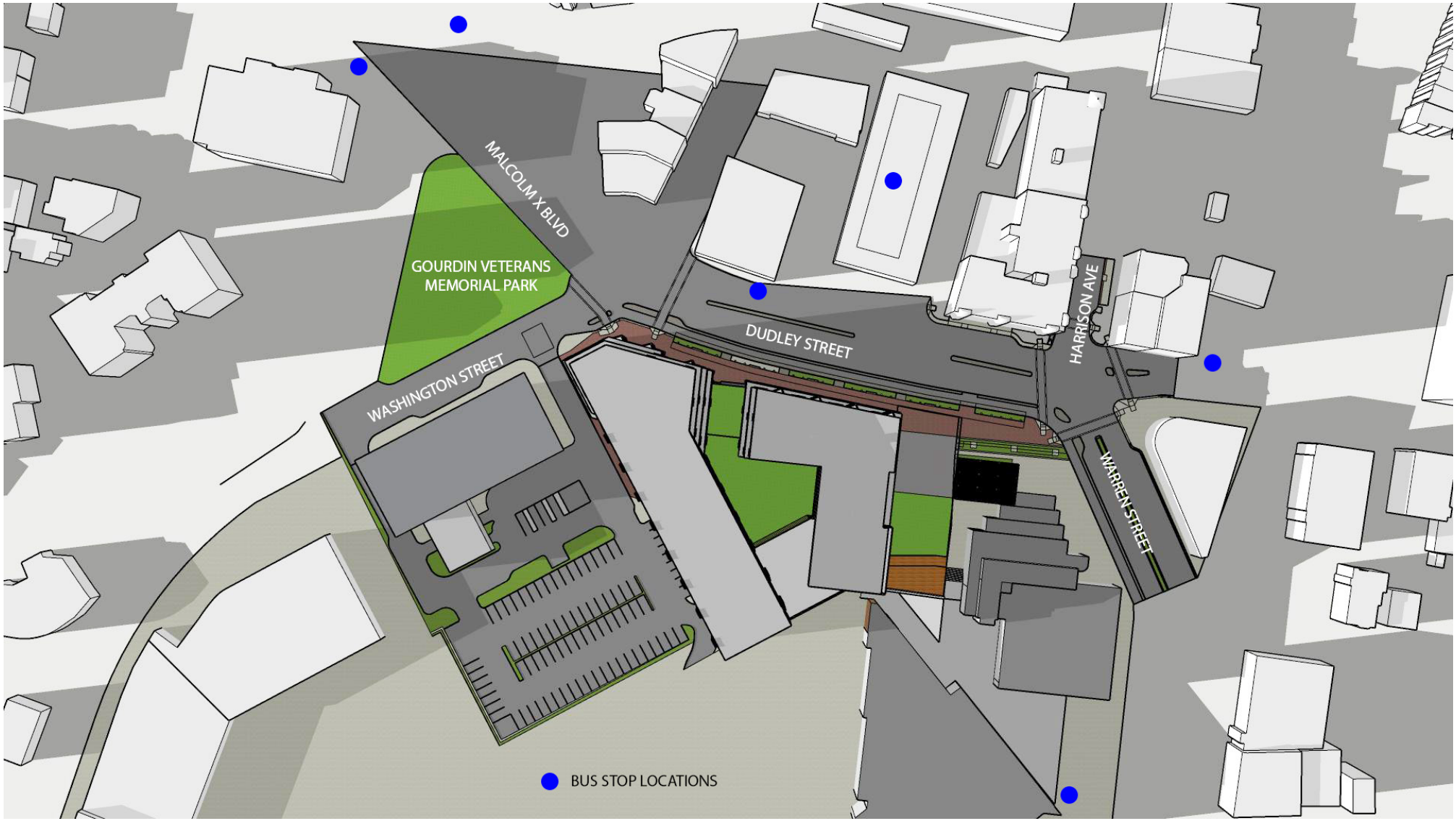

135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-4
Shadow Study: March 21, 6pm

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135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-5
Shadow Study: June 21, 9am

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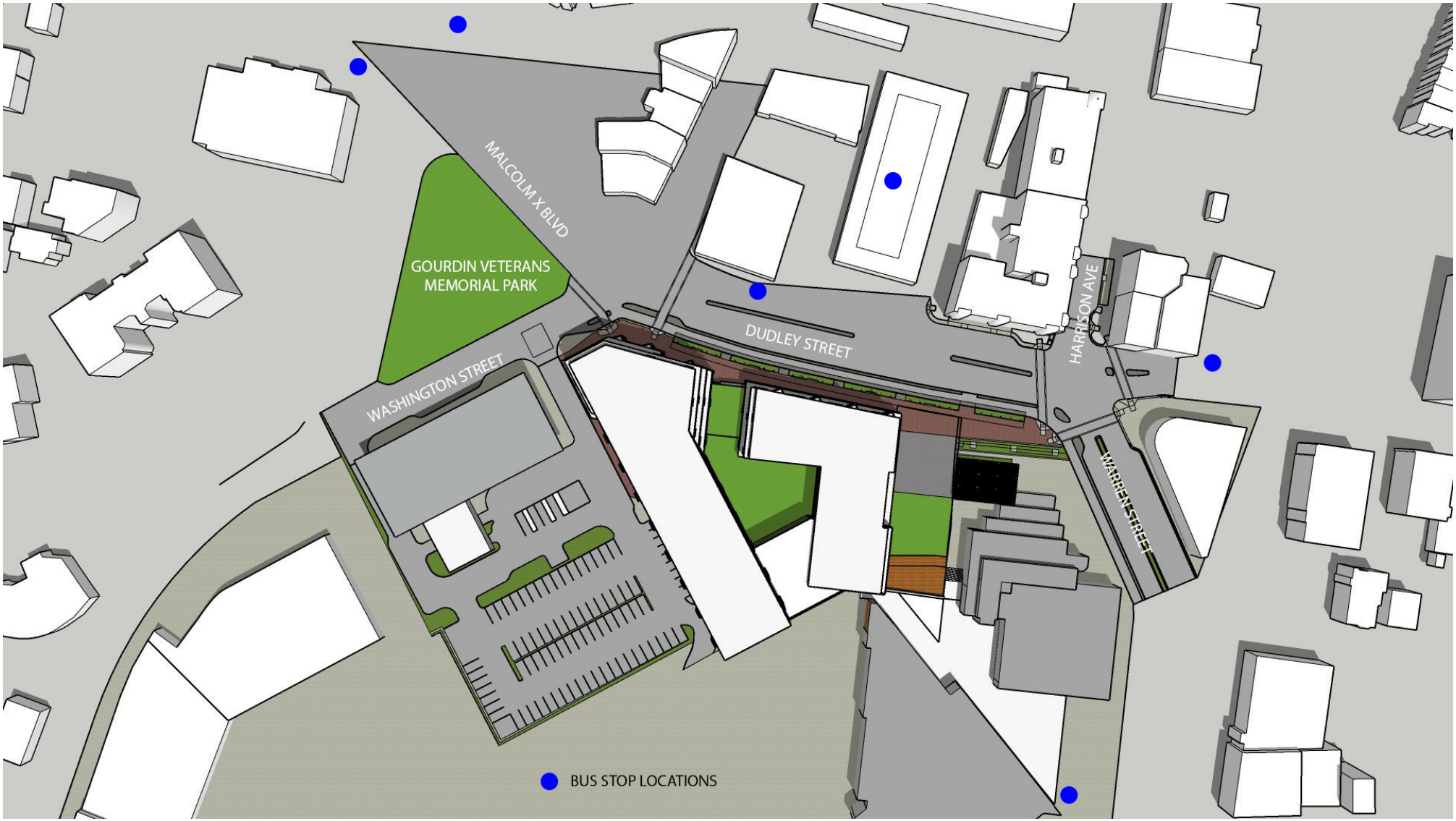

135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-6
Shadow Study: June 21, 12pm

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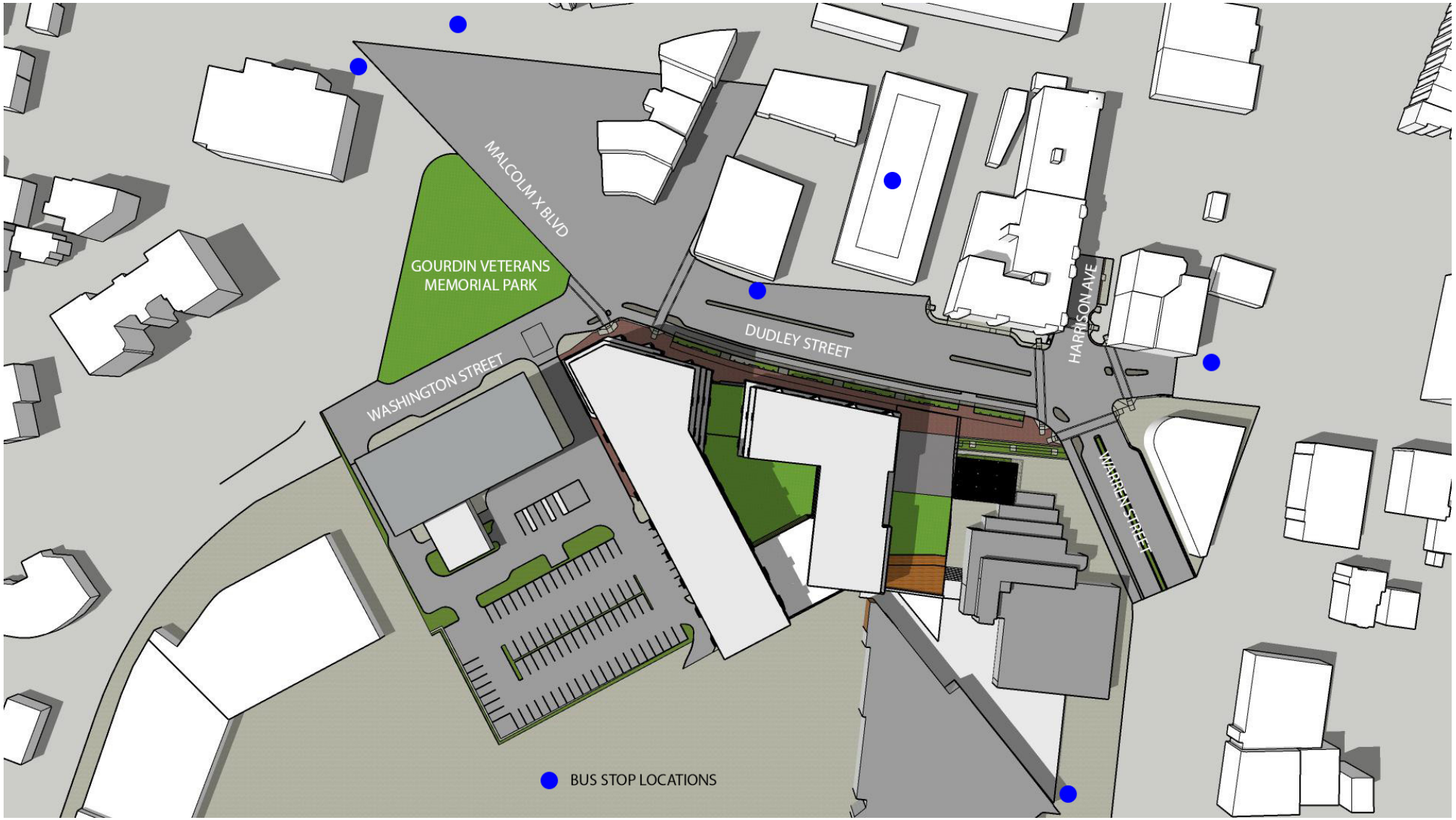

135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-7
Shadow Study: June 21, 3pm

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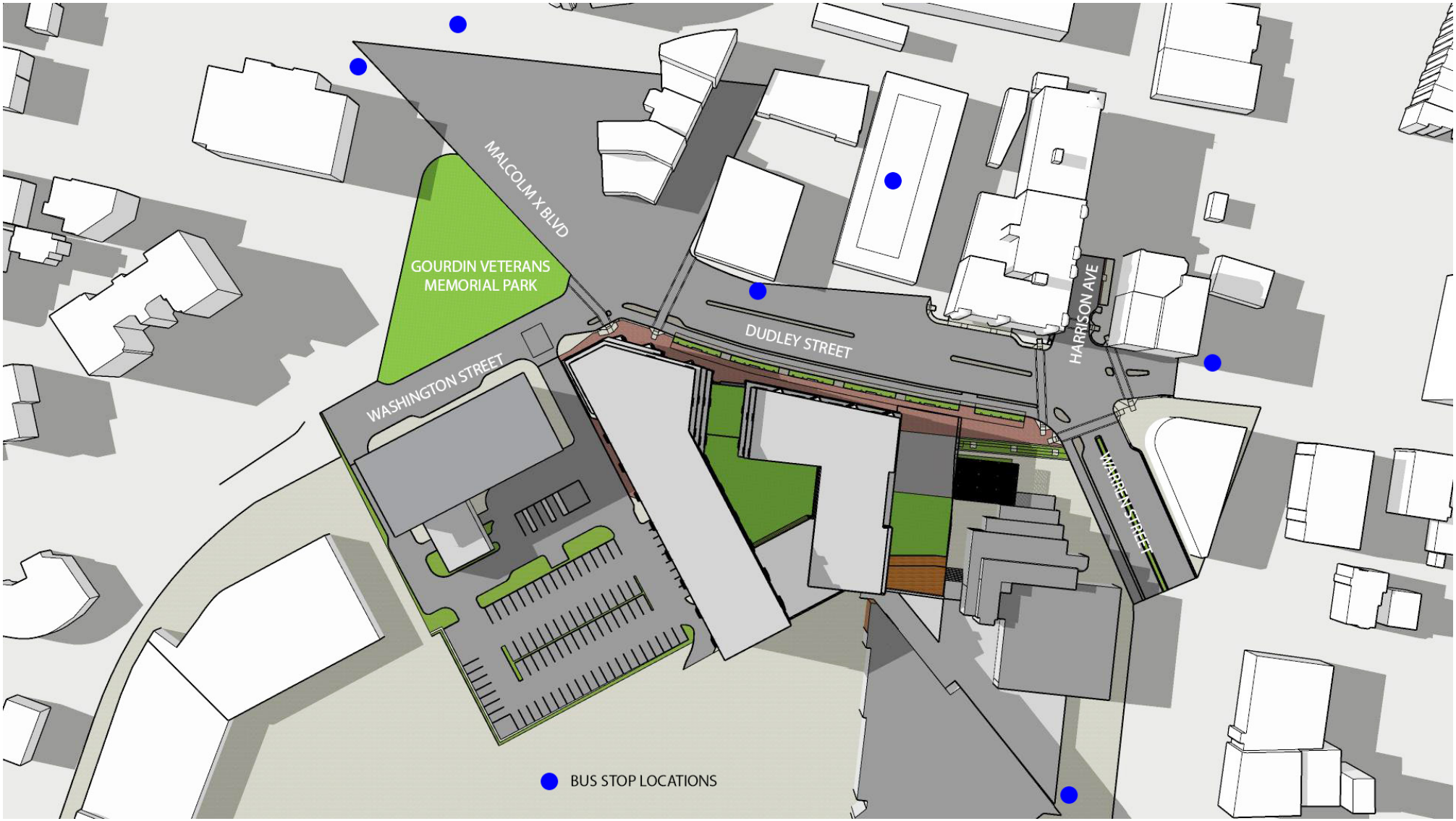

135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-8
Shadow Study: June 21, 6pm

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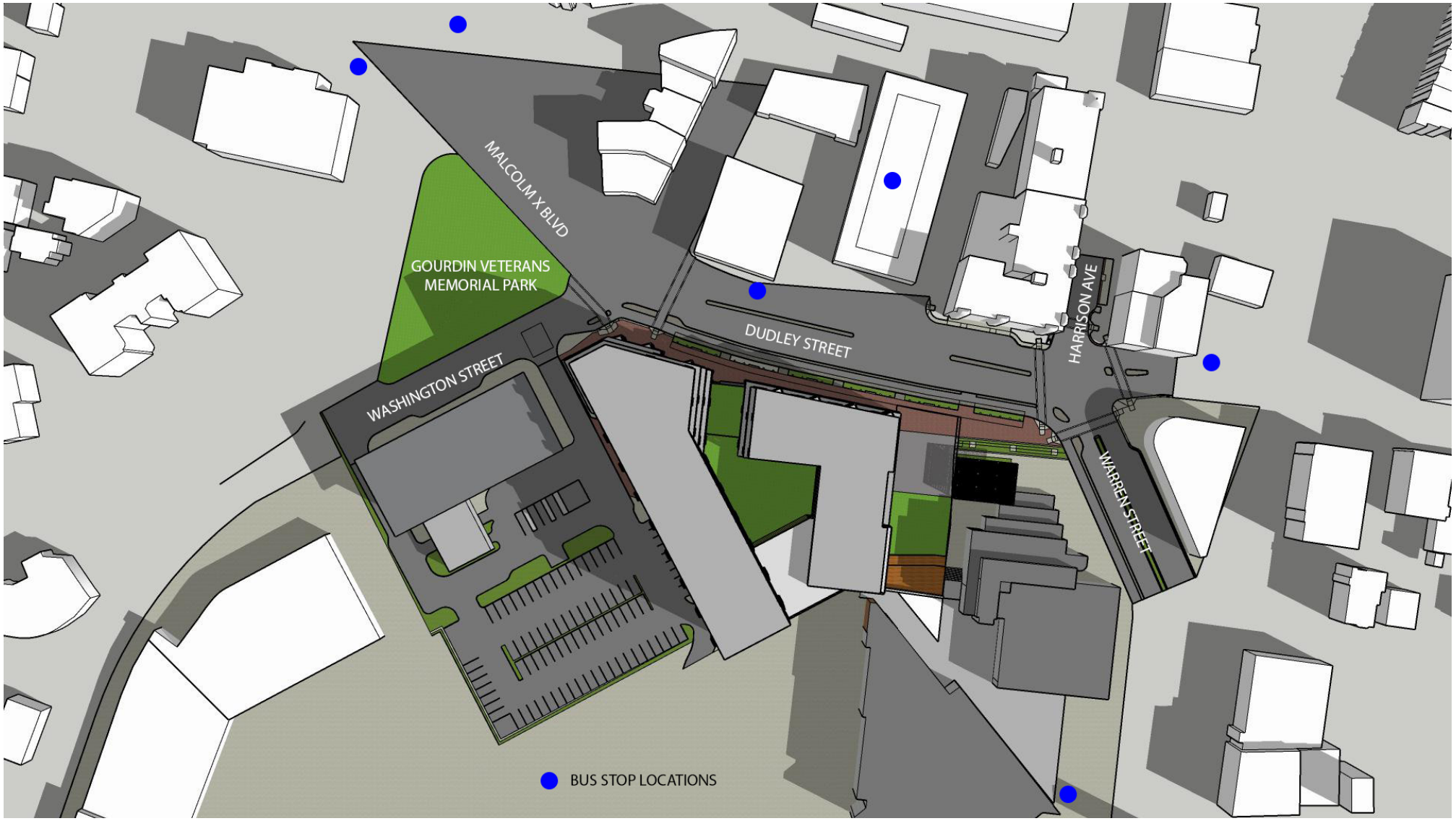

135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-9
Shadow Study: September 21, 9am

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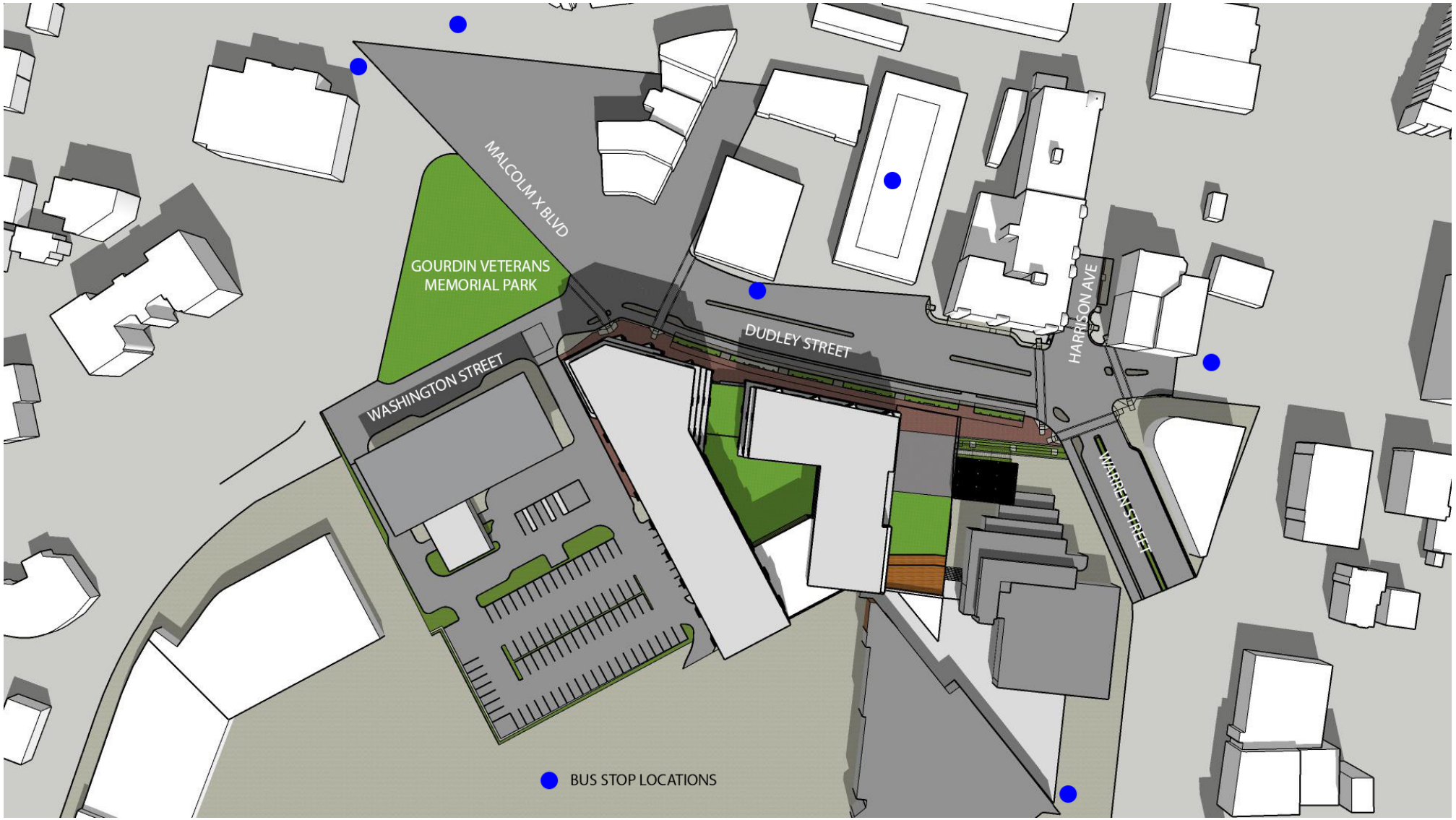

135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-10
Shadow Study: September 21, 12pm

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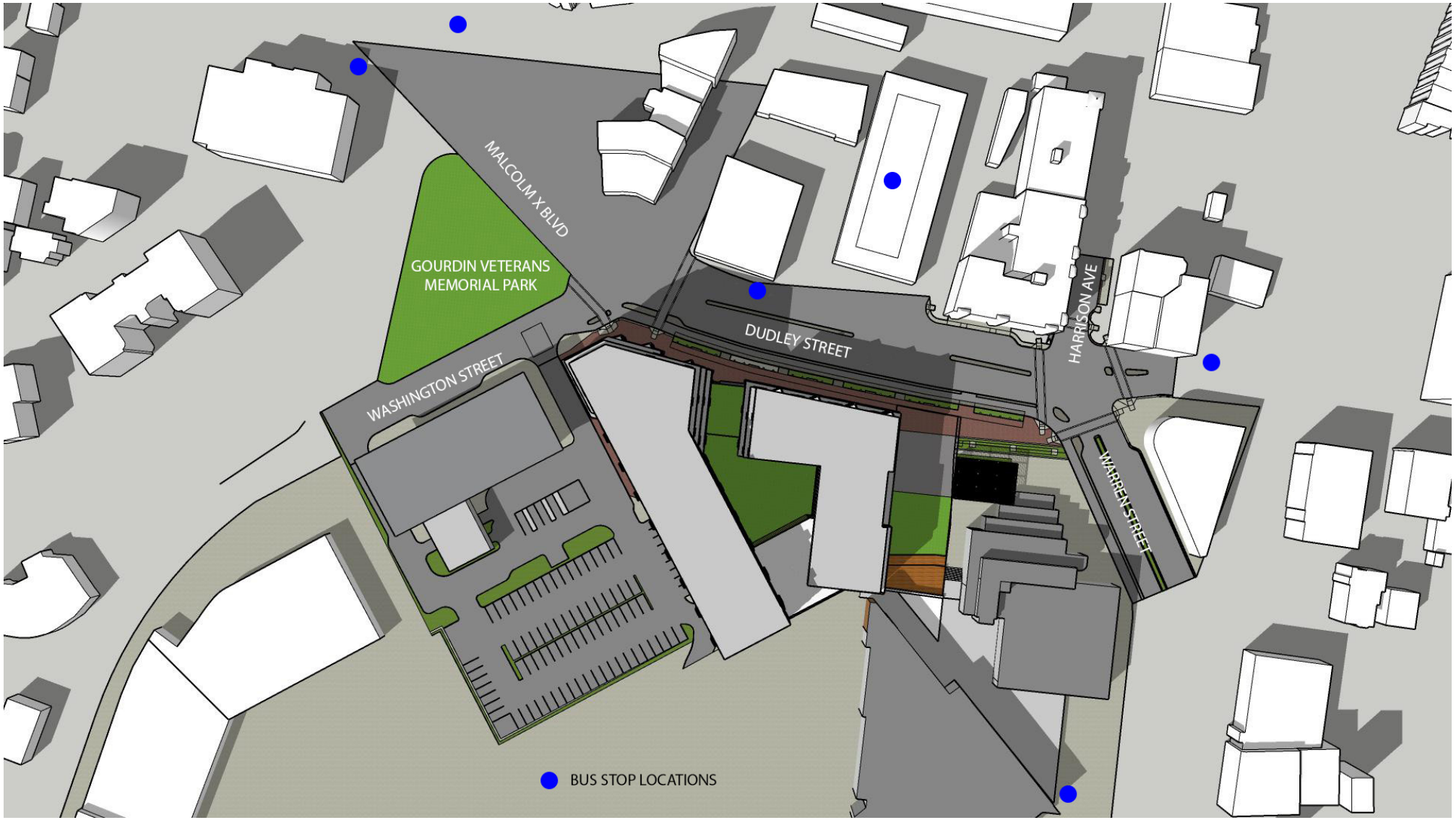

135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-11
Shadow Study: September 21, 3pm

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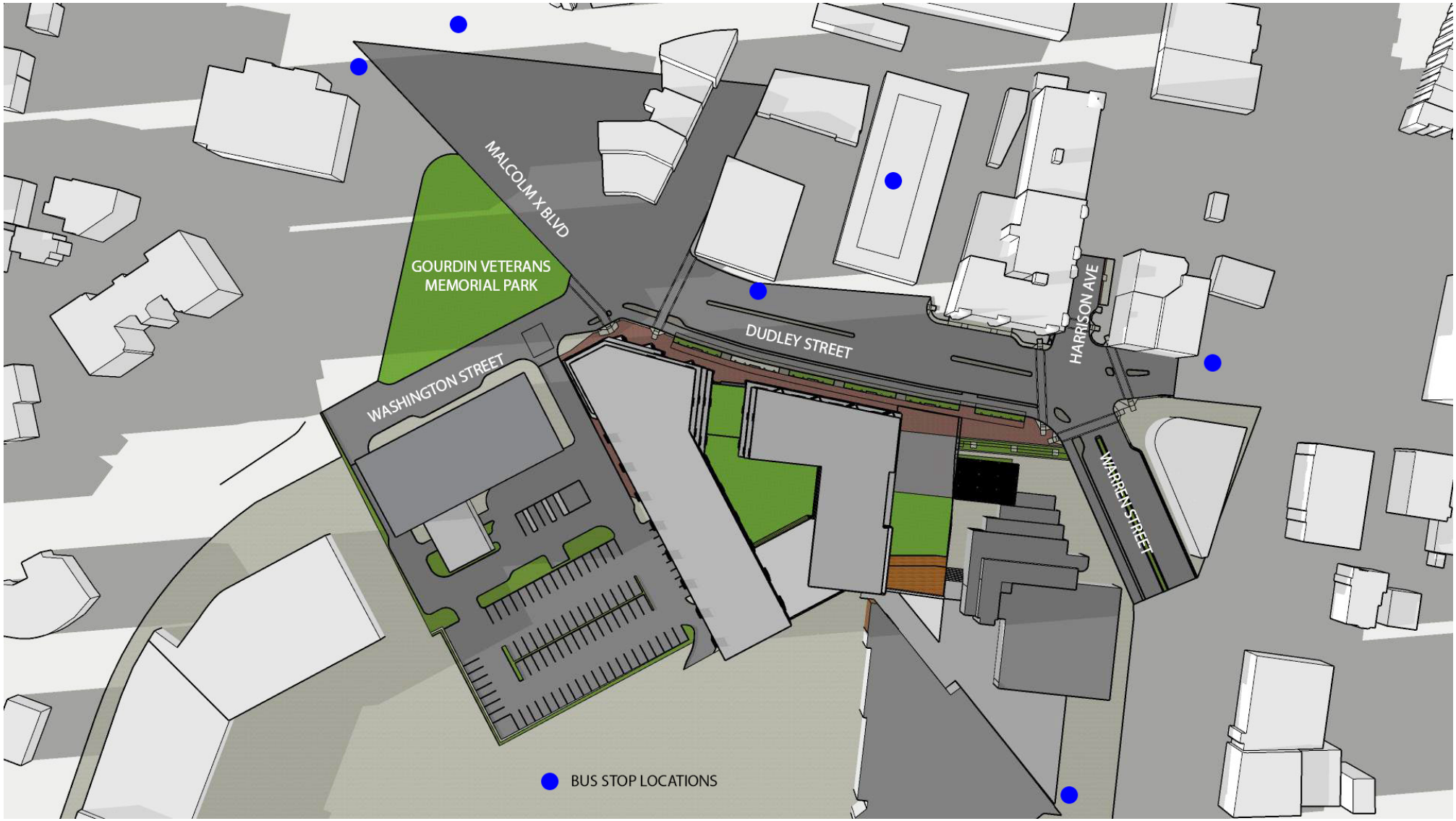

135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-12
Shadow Study: September 21, 6pm

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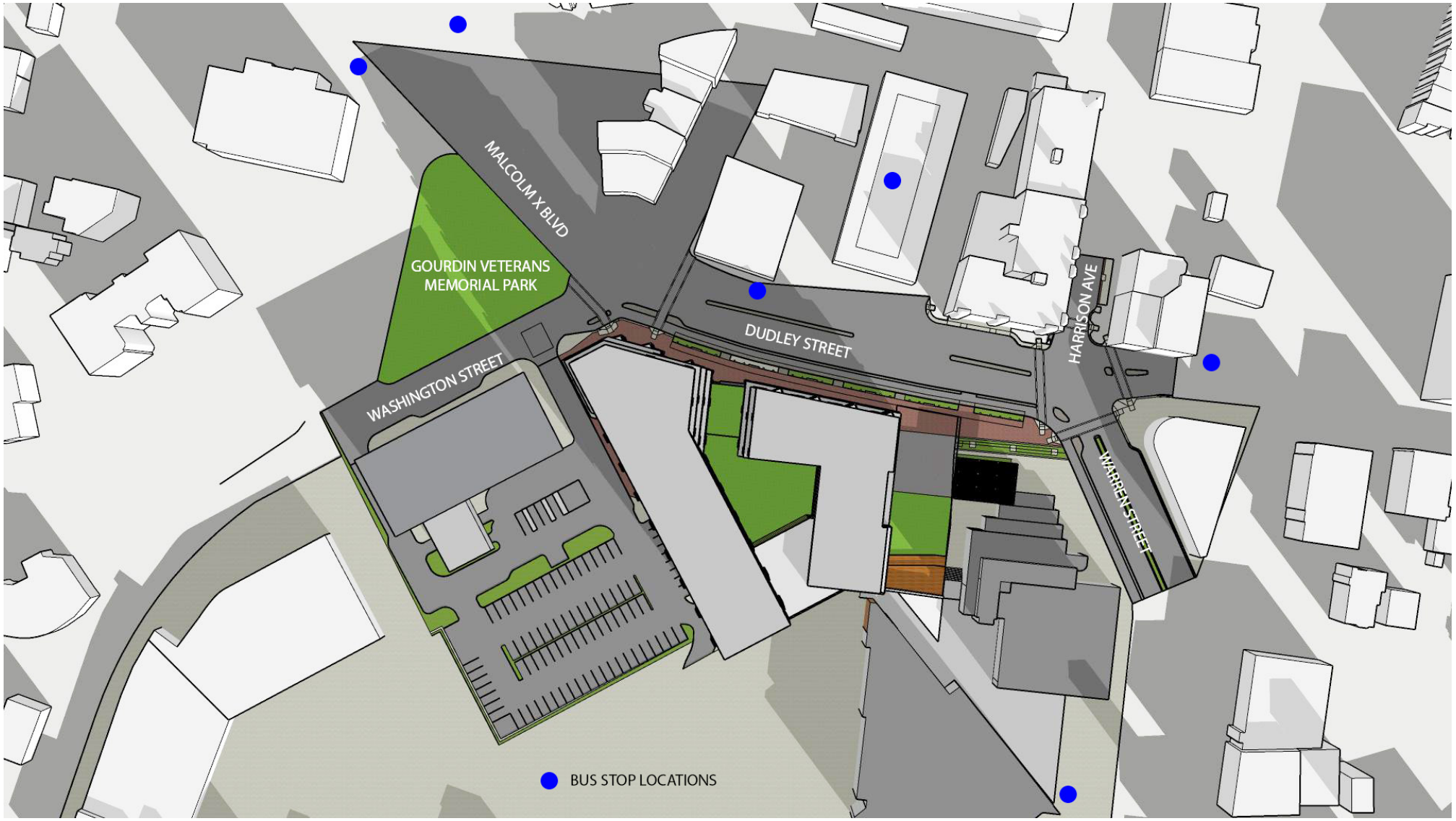

135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-13
Shadow Study: December 21, 9am

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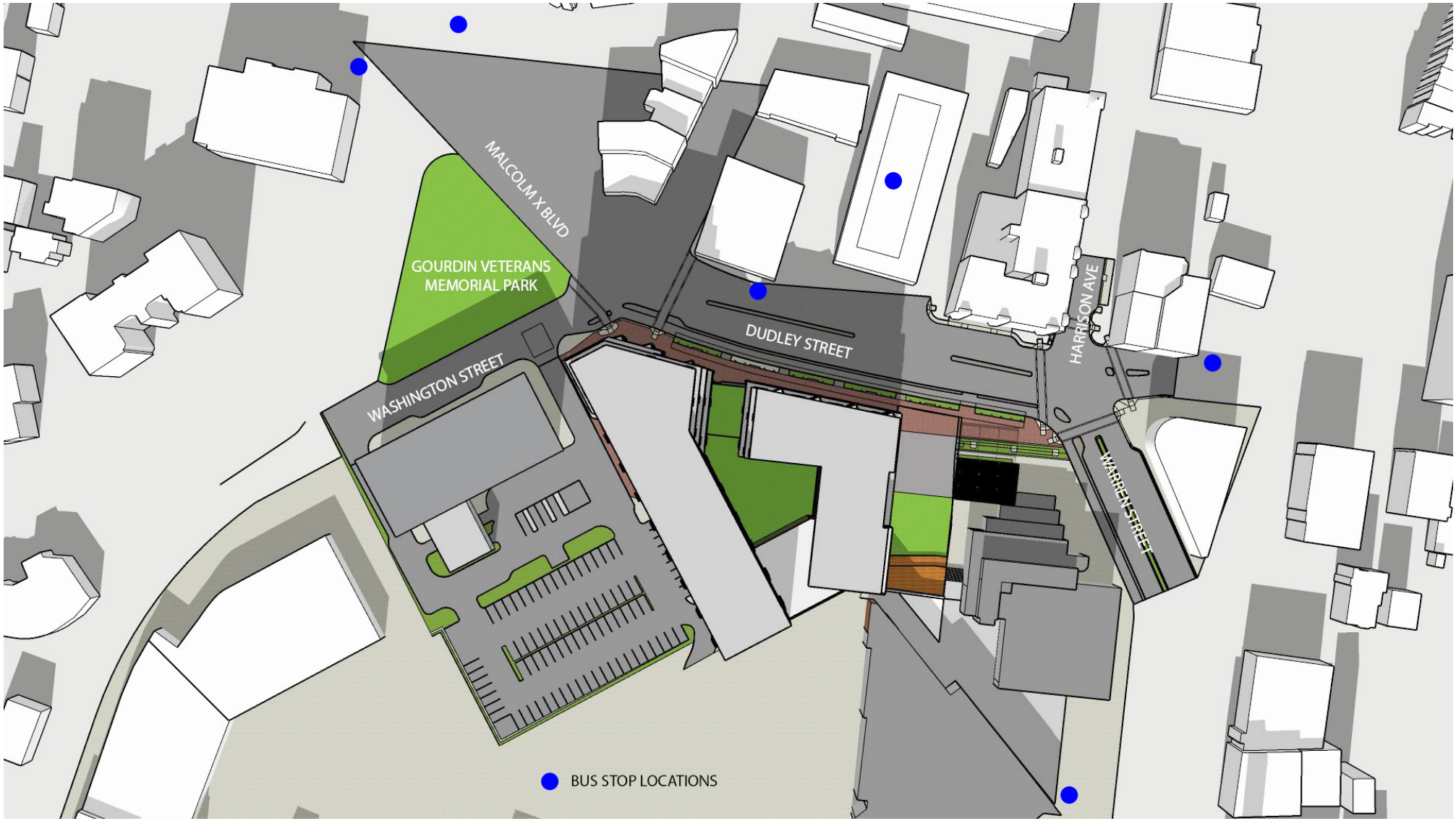

135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-14
Shadow Study: December 21, 12pm

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135 Dudley Street

Boston, MA | September 27, 2019 | 18143 |

Figure 4.1-15
Shadow Study: December 21, 3pm

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4.2 Daylight

It is anticipated that the Draft Project Impact Report ("DPIR") will provide a detailed daylight analysis indicating some increase in daylight obstruction against the existing condition of a vacant site. It is also anticipated that the increase will be consistent with the values of nearby buildings in the Dudley Square area.

4.3 Air Quality

Tech Environmental, Inc. will perform an air quality analyses as a part of the DPIR filing. These analyses will consist of: 1) an evaluation of existing air quality; 2) an evaluation of potential carbon monoxide (CO) impacts from the operation of the Proposed Project's enclosed parking garage, and 3) a microscale CO analysis for intersections in the Proposed Project area that meet the BPDA criteria for requiring such an analysis.

4.4 Noise Impacts

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

4.5 Stormwater Management and Water Quality

The Proposed Project is expected to reduce the volume of stormwater runoff leaving the site as well as substantially improve the water quality. The Proposed Project will meet Boston Water and Sewer Commission (BWSC) standards for stormwater management. The DPIR will present a more detail analysis of the existing and proposed stormwater drainage system as well as proposed water quality mitigation.

The volume of stormwater runoff leaving the site will be reduced dues to the construction of a subsurface infiltration/ detention system. It is expected that rooftop runoff from the proposed building will be collected and conveyed to a subsurface infiltration system. The infiltration system will have an overflow tied into the drain system in Dudley St.. It is anticipated that the equivalent of 1.25-inches over the site's impervious area can be recharged as prescribed in BPDA's Smart Utilities design criteria, which will also satisfy BWSC's Site Plan Review requirements.

Stormwater runoff will be treated through the use of water quality treatment units. An operation and maintenance plan will be developed to support the long-term functionality of the proposed stormwater management system.

Erosion and sediment controls will be used during construction to protect adjacent properties, the municipal storm drain system, and the on-site storm drain system. A stormwater pollution prevention plan will be prepared for use during construction including during demolition activity.

4.6 Solid and Hazardous Waste Materials

4.6.1 Solid Waste

During the preparation of the Site, debris from the existing lot will be removed from the Proposed 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. The DPIR will present information on solid waste to be generated by the Proposed Project and recycling strategies. The Proposed Project will also include ambitious goals for construction waste management in order to meet the requirements for the LEED™ rating system. This strategy will also divert demolition and construction waste by reusing and recycling materials.

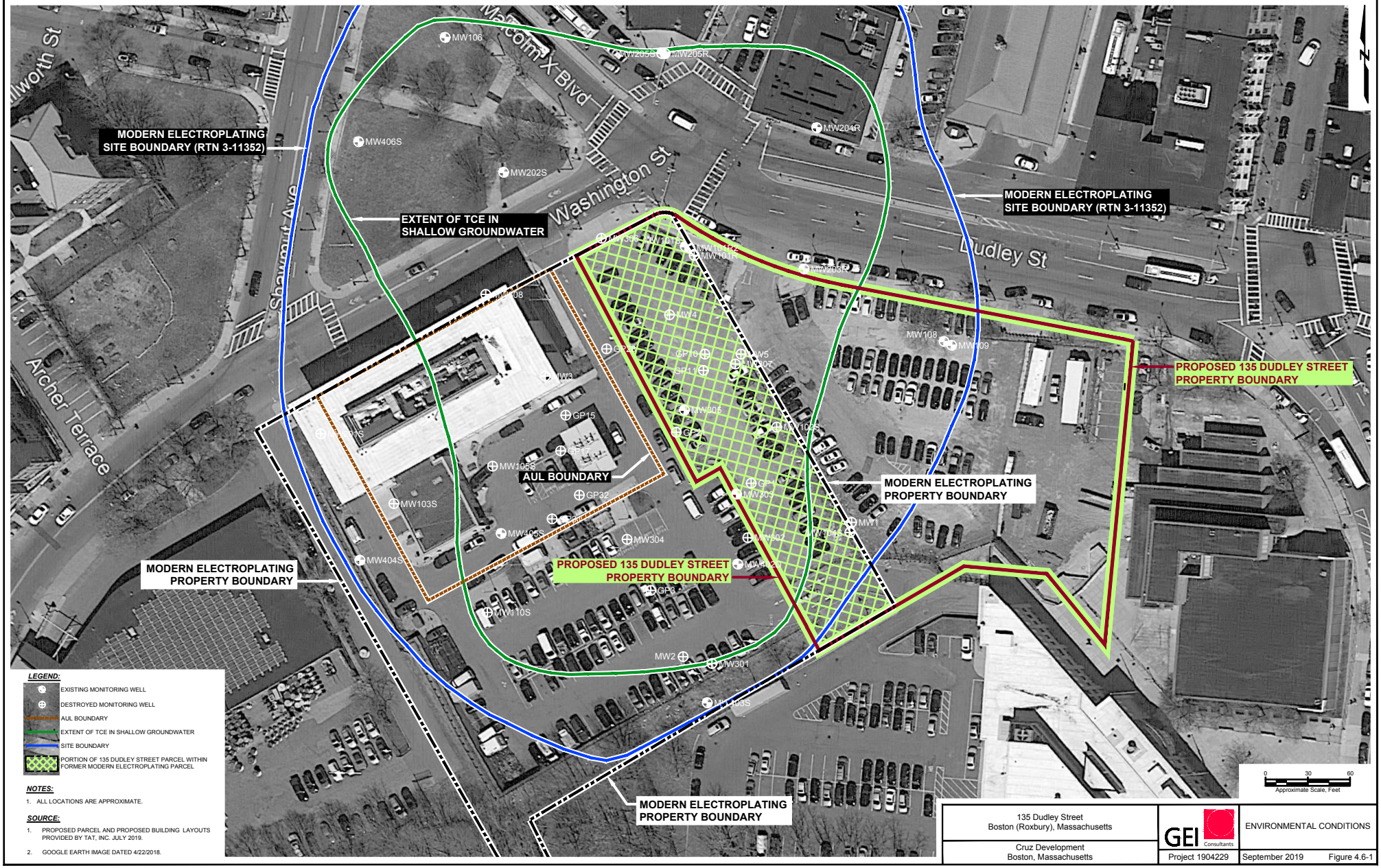
In order to meet the requirements for the Boston Environmental Department and the LEED™ rating system, the Proposed Project will include space dedicated to the storage and collection of recyclables. The recycling program will meet or exceed the City's guidelines, and provide areas for waste paper and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

4.6.2 Hazardous Waste and Materials

A portion of the Proposed Project site is located on the Former Modern Electroplating Site, a Massachusetts Department of Environmental Protection (MassDEP) disposal site tracked by Release Tracking Number (RTN) 3-11352 (Fig. 4.6.1). A "Revised Phase IV Remedy Implementation Plan, Termination of Remedy Operation Status, and Partial Permanent Solution with Conditions Statement," dated July 2, 2018 was prepared by GEI Consultants for the disposal site (see **Figure 4.6-1**. Environmental Conditions).

History: Modern Electroplating operated an electroplating facility at the Site from 1955 to 1994. MassDEP listed the Site on July 22, 1994, following a MassDEP Site inspection. Subsequent investigations and response actions conducted between 1995 and 2009 identified contamination in soil, groundwater, soil vapor, and indoor air including chlorinated volatile organic compounds (VOCs), particularly trichloroethylene [TCE]), metals (particularly cadmium, chromium, and nickel), and cyanide.

The source of the chlorinated VOC contamination was an in-ground degreaser located in the southeast quadrant of the first floor of the Former Modern Electroplating building. Releases of TCE from the in-ground degreaser, floor trenches, and/or the sumps were likely sources of VOCs in soil and groundwater at the Site. Plating operations and wastewater treatment performed in the basement of the Modern Electroplating Facility were likely sources of the metals and cyanide present in soil and groundwater at the Site.



135 Dudley Street Boston (Roxbury), Massachusetts	GEI Consultants	ENVIRONMENTAL CONDITIONS
Cruz Development Boston, Massachusetts	Project 1904229	September 2019 Figure 4.6-1

\\geiconsulta B:\Working\CRUZ DEVELOPMENT\1904229 135 Dudley St\00_CAD\Figures\Environmental Conditions\1904229-01.dwg - 9/16/2019

Contamination related to the Modern Electroplating Site affected both "the Property" which referred to parcels formerly occupied by Modern Electroplating and the Roxbury's Children's Services buildings (where the City of Boston B-2 Police Station is currently located), and off-Property including the City of Boston property located at 135 Dudley Street.

Response Actions: The Modern Electroplating and Children's Services buildings were demolished prior to construction of the Boston B-2 Police Station. Significant source removal was incorporated into the Police Station building construction. More than 2,500 tons of metals, cyanide, and VOC contaminated soil were excavated from beneath the footprint of the Modern Electroplating building and disposed of as hazardous waste. An additional 17,000 tons of soil was recycled / disposed of at off Site facilities. An active exposure pathway mitigation measure (AEPMM) in the form of a sub slab depressurization system (SSDS) was incorporated into the Police Station building construction to mitigate potential indoor air contamination. The cleanup of contaminated soil on Modern Electroplating Site meets the residential cleanup standards in the MCP; however, residual chlorinated VOC soil contamination remains on the Site. An Activity and Use Limitation (AUL) was placed on a portion of the Modern Electroplating Site requiring operation of the AEPMM at the Police Station to mitigate the potential for indoor air contamination.

The significant effects of the Modern Electroplating Site on the Proposed Project site and the proposed mitigation measures are as follows:

Condition: Residual chlorinated VOCs remain in the soil on a portion of the Proposed Project site that is part of the Modern Electroplating Site. Since the average residual soil contamination concentrations meet the MCP residential cleanup standards that were in place at the time the Permanent Solution was prepared, these soils can remain in place with no further consideration. However, if these soils are excavated for off-site disposal that must be managed, transported and disposed of as hazardous waste in accordance with the federal Resource Conservation and Recovery Act (RCRA, 40 CFR Parts 239 through 282) and the Massachusetts Hazardous Waste Regulations (310 CMR 30.000). The transport and disposal of soils classified as hazardous waste can be up to 10 times more expensive than the transport and disposal of typical urban fill.

Mitigation: The proposed Project does not include underground parking or a basement, therefore there will not be a significant bulk excavation. However, soils will be excavated and likely disposed off-site for foundations, grade beams, utilities and stormwater structures. A location within the Modern Electroplating disposal site boundary that is not affected by chlorinated VOC soil contamination will be identified as a soil reuse area. Soil in this reuse area will be excavated and disposed off-site as cover material, likely at a Massachusetts solid waste landfill. The excavation in the soil reuse area will be backfilled with soils from other portions of the Proposed Project that would be classified as hazardous waste. The soil reuse area will be located beneath the building footprint or other type of hardscape, eliminating exposure to the soil.

Condition: In addition to residual chlorinated VOCs, contaminates in soil are likely semi-Volatile Organic Compounds (SVOCS), extractable petroleum hydrocarbons (EPH) fractions including polyaromatic hydrocarbons (PAHs), volatile petroleum hydrocarbons (VPH) fractions, metals, pesticides, polychlorinated biphenyls (PCBs), and cyanide.

Mitigation: The average concentration of these contaminants met the MCP residential cleanup standards that were in place at the time the Permanent Solution was prepared and no specific MCP remedial response actions are necessary to leave the soils in place. However, placement of geotextile fabric and clean soil on future pervious areas of the Site (i.e., landscape/grassed areas) may be considered as a conservative risk reduction measure depending on the concentration of these contaminants in these areas.

For soils that will excavated and disposed off-site, a soil pre-characterization study will be performed prior to construction and earthwork activities to characterize the soils as typically required by in-state landfills. Soil data will be compared to MassDEP's Policy No. COMM-97-001 "Reuse and Disposal of Contaminated Soil at Massachusetts Landfills" to determine if soils can be disposed of or re-used at in-state landfills (lined or unlined). Assuming that the soil pre-characterization study obtains the appropriate number of samples and satisfied a facility analytical testing requires, the selected general contractor will be allowed to 'live-load' soils for transportation of the selected facility (as compared to on-property stockpiling).

Real-time ambient air monitoring for particulates (i.e., dust) at the perimeter of the Site will be performed. The purpose of the perimeter air monitoring is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses) from potential airborne contaminant releases as a direct result of remedial work activities. The contractor will provide appropriate dust control measures.

Condition: Groundwater within the footprint of the Proposed Project is known to be contaminated with chlorinated VOCs, particularly TCE, greater than MCP GW-2 standards and there is the potential for a complete vapor intrusion pathway in site buildings.

Mitigation: The Proposed Project incorporates two levels of open-air above ground parking with residential units above. This open-air parking is an intrinsically safe design to mitigate the potential for vapors from subsurface contamination. Vapors from the subsurface are vented and dissipated through the open-air structure eliminating the potential for migration into the residences constructed on top of the parking garage.

The Proposed Project also includes ground floor retail and commercial space along a portion of the perimeters of the buildings. For these spaces, SSDSs will be incorporated into the foundations. The SSDS will include a sub-slab venting system and vapor barrier. It is anticipated that the SSDS will be a passive system; however, provisions for converting it into active system will be incorporated into the building infrastructure.

It is anticipated that any dewatering effluent will be recharged on-site within the boundaries of the Modern Electroplating disposal Site. If recharge cannot be done, dewatering effluent will be discharged into the storm drain following pre-treatment under a BWSC Dewatering Discharge Permit and an NPDES Remediation General Permit.

Condition: A Partial Permanent Solution with Conditions has been prepared for the Modern Electroplating Site. The conditions include an AUL for operating the APEMM at the Police Station, the absence of an occupied building in areas where the MCP GW-2 Standard is exceeded and the need for Best Management Practices (BMPs) if gardening was to occur on the property.

Mitigation: Construction of the Proposed Project will be conducted as a Release Abatement Measure (RAM) under the MCP. A RAM Plan will be prepared by a Licensed Site Professional (LSP) prior to initiating construction activities. The RAM Plan will address soil management and mitigation for preventing a complete vapor intrusion pathway. Periodic Status Reports and a RAM Completion Report will be prepared and submitted to MassDEP.

4.7 Geotechnical/Groundwater Impacts Analysis

The following provides a summary of the geotechnical and groundwater impacts on the proposed building construction. Existing available subsurface exploration data generally consists of borings and monitoring wells installed since 2001 associated with the evaluation of contamination at the Modern Electroplating site, including several on the proposed project site.

The ground surface at the site is generally relatively flat with the exception of some grading variation (approximately 0-4 feet) between the existing gravel and paved/concrete parking areas. The gravel parking area does gently slope down towards the northeast as it approaches Dudley Street. Beneath the parking materials the soils consist of fill that generally is 2 to 8 feet deep. The fill consists of a widely graded sand with gravel and some coal, brick, and clinker fragments. The thickness of the fill is less at the eastern portion of the site. Beneath the fill is a layer dense to very dense glacial tills. The glacial tills consist of sand with varying amounts of gravel and silt. Similar to the fill, the thickness is less at the eastern portion of the site. Bedrock was encountered in several of the borings. Bedrock is as shallow as 2 feet below ground surface on the eastern portion of the site and greater than 20 feet deep at the western portion. The first five feet of bedrock generally consists of a heavily weathered and severely fractured rock. The deeper, competent bedrock below the weathered rock was observed as Roxbury Conglomerate.

Groundwater was encountered around 8 to 15 feet below ground surface and were similar elevations in the rock and sand layers measured.

Given the proposed building construction and the subsurface conditions presented above, it is anticipated that the proposed building will be supported by conventional spread footing foundations in conjunction with a soil-supported slab-on-grade.

4.7.1 Groundwater Control

It is anticipated that limited dewatering during construction will be required and when necessary will be accomplished using filtered sumps. Temporary construction dewatering effluent will be recharged to the ground on-site, or if necessary, will be discharged off-site under a National Pollutant Discharge Elimination System (NPDES) general or exclusion permit. Temporary construction dewatering effluent will be treated before discharge as required by the permit.

Perimeter foundation and underslab drainage will be installed to protect the below grade areas against groundwater intrusion. All localized depressions in the lowest level slab, such as elevator pits, should be provided with properly tied continuous waterstops in all construction joints and cementitious waterproofing to protect against groundwater intrusion.

Construction of the proposed foundations and the installation of the perimeter and underslab drainage systems are not expected to have adverse short or long-term impact on the existing groundwater conditions. A groundwater recharge system will be installed as part the development of the site.

Based on the anticipated groundwater levels and the proposed scope of construction, it is anticipated that there will be negligible impact to groundwater levels due to this project.

4.7.2 Probable Project Impacts and Mitigation Measures

The project does not include any underground parking or basements and therefore excavation depths and quantities will be limited. There will be excavations required to install foundations, grade beams, utilities, and stormwater features. At the east side of the site, shallow bedrock will be encountered in these excavations. At the west side of the site, contaminated soils of excavated material due to shallow bedrock at the east and contaminated soils at the west area of the site.

Condition - Due to the depth of the subsurface structures, excavations will generally be open cut. However, excavations near the sidewalk and road may need to be cut vertically due to space constraints.

Mitigation Measure - If required, support of excavation will be utilized to protect public and limit movement and settling near existing structures and utilities. Should the installation of the support of excavation extend onto City property, the Proposed Project will obtain the necessary approval from the City of Boston Public Improvement Commission (PIC). Where support of excavation is required along the property lines, the project documents will require that a settlement monitoring program of the ground surface of the adjacent public and private properties be performed.

Condition - The bedrock encountered will likely be extremely weathered and excavatable. However, if competent rock is encountered, it may need to be excavated with a hoe ram or

jackhammer attached to the excavator. Vibrations from competent rock removal could be transmitted to nearby structures and utilities.

Mitigation Measure - If competent bedrock is encountered and hoe rams are used to remove the materials, vibration monitoring will be performed to monitor vibrations. Peak particle velocities induced in any structure or utility by rock removal will not exceed generally acceptable levels which are anticipated to cause damage.

4.8 Construction Impact

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

4.8.1 Construction Management Plan

The Proponent will comply with applicable state and local regulations governing construction of the Proposed 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 Proposed 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.

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 proposed Project is expected to begin in the 1st Quarter 2023 and reaching completion in the 2nd Quarter 2025. 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 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

Estimated truck deliveries and routes are identified in at the end of this section. Specific truck routes will be established with BTD through the CMP. These established truck routes will prohibit travel on any residential side streets. Construction contracts will include clauses restricting truck travel to BTD requirements. Maps showing approved truck routes will be provided to all suppliers, contractors, and subcontractors. It is anticipated that all deliveries will be via Hyde Park Avenue and not passing through local residential areas.

Construction Worker Parking

The number of workers required for construction of the 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 and 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 Proposed 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 Proposed 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 Proposed 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 HISTORIC RESOURCES COMPONENT

This section provides a discussion of the history of the Proposed Project site and the historic resources/ districts in the Proposed Project vicinity.

5.1 Historic Resources on the Proposed Project Site

Based on a review of buildings identified in this area on the Massachusetts Historical Commission's MACRIS website, as the site is vacant, there were no buildings inventoried on site.

5.2 Historic Resources Within the Vicinity of the Proposed Project Site

The Proposed Project site is located in the vicinity of several historic resources listed in the State and National Registers of Historic Places or included in the Inventory of Historic and Archaeological Assets of the Commonwealth, including the nearby Dudley Station and Roxbury Highlands Historic Districts. In addition, there are 41 buildings recorded in the MHC Inventory and on the National Register of Historic Places, for the most part within these two historic districts.

It is not expected that the Proposed Project will cause adverse impacts on any historic or architectural elements of nearby historic resources outside the Proposed Project Site.

The historic resources within 1/8-mile radius of the Proposed Project are presented in **Table 5-1** and summarized in **Figure 5-1** that follows.

Table 5.1. Historic Resources in the Vicinity of the Project Site

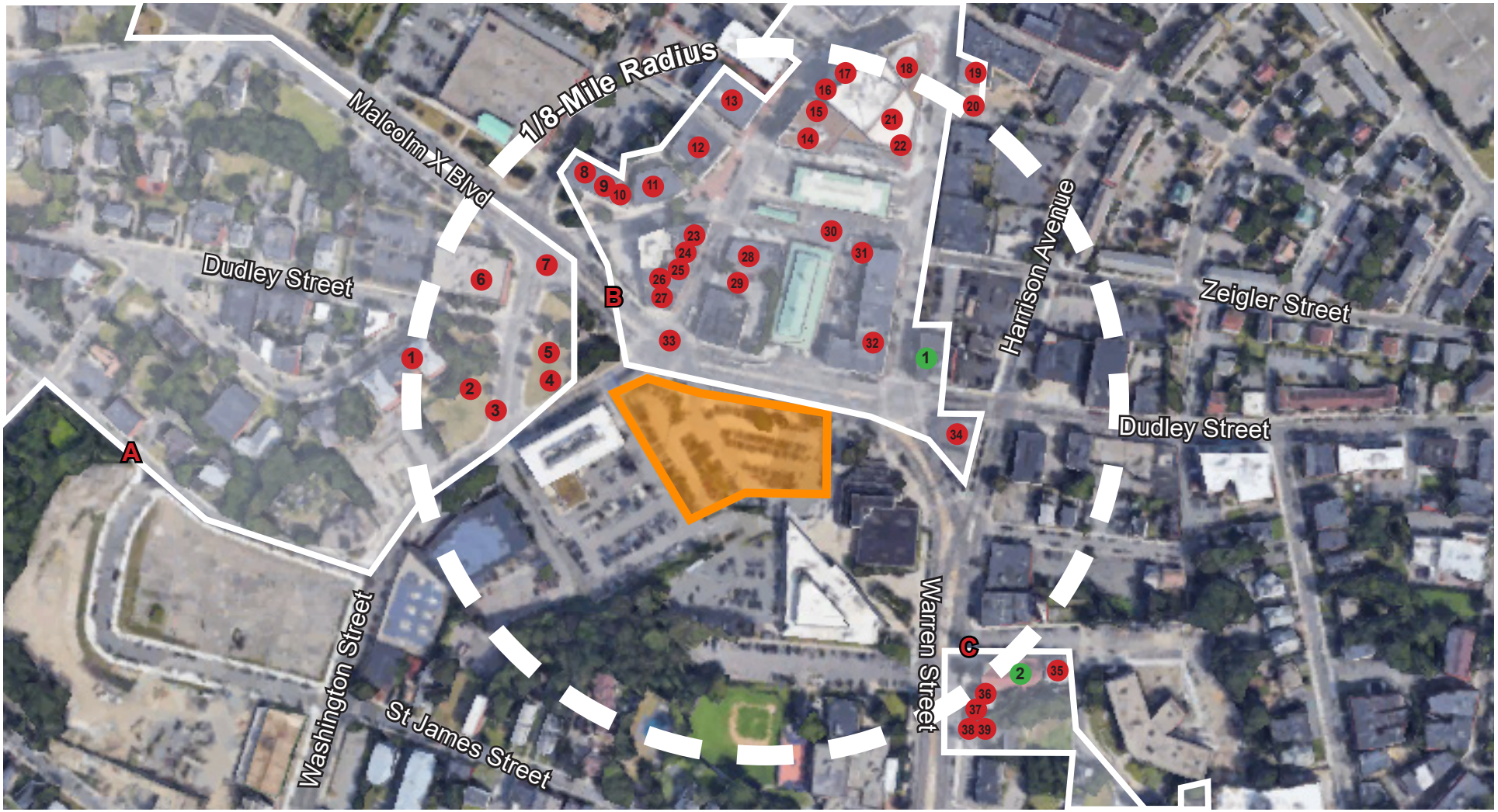
Key to Historic Resources Figure (Figure 5-1)	Historic Resource	Address/Description
National Register of Historic Places		
A	Roxbury Highlands Historic District	Roxbury Highlands Historic District, established in 1989, is a 0.4 sq mile area bound by Malcolm X Boulevard, Washington Street, and Columbus Avenue.
B	Dudley Station Historic District/ Dudley Station	Dudley Station Historic District, established in 1985, centrally features the Dudley Square MBTA station and is bound by Washington, Warren, and Dudley Streets.

C	Moreland Street Historic District/ Mount Pleasant	Moreland Street Historic District, established in 1984, is a 63-acre area bound by Kearsarge, Blue Hill Avenues, and Warren, Waverly, and Winthrop Streets.
1	Dillaway School	16-20 Kenilworth St
2	Unnamed	2453 Washington Street
3	Unnamed	2451 Washington Street
4	Circle Supply Company	2407-2411 Washington Street
5	Unnamed	95 Dudley Street
6	Roxbury Boys Club of Boston	80 Dudley Street
7	U. S. Post Office - Roxbury Branch	44-50 Roxbury Street
8	H. B. Sargent - Frederick Octavius Prince Block	37-51 Roxbury Street
9	Unnamed	35 Roxbury Street
10	Unnamed	33 Roxbury Street
11	Boston Consolidated Gas Company Building	11-29 Roxbury Street
12	Institution for Savings in Roxbury	2343-2345 Washington Street
13	Unnamed	2321-2337 Washington Street
14	J. S. Waterman and Sons Building	2326-2328 Washington St
15	Curtis Block	2304-2308 Washington Street
16	Graham Block	2286-2300 Washington St
17	Unnamed	2278-2282 Washington Street
18	Ferdinand's Blue Store	9-15 Warren Street
19	Henry S. Lawrence Commercial Block	6-16 Warren Street
20	Josiah Richardson Block	18-20 Warren Street
21	Ferdinand's Blue Store Addition	17-19 Warren Street
22	Boston Elevated Railway - Dudley Substation	25 Warren Street
23	Unnamed	2355-2359 Washington Street

24	Unnamed	2363 Washington Street
25	Joseph Warren Cooperative Bank	2369-2371 Washington Street
26	W. Bowman Cutter Hardware Store	2377 Washington Street
27	Unnamed	2395 Washington Street
28	Unnamed	2360-2362 Washington Street
29	First National Bank	2364-2374 Washington St
30	Dudley Station and Elevated North of Dudley	Washington Street
31	Unnamed	39-49 Warren Street
32	Hotel Dartmouth	51-61 Warren Street
33	Dudley Street Elevated Railway Signal Tower F	Washington Street
34	Edison Building	62-78 Warren Street
35	Unnamed	9 Kearsarge Avenue
36	Unnamed	96 Warren Street
37	Unnamed	98 Warren Street
38	Unnamed	102 Warren Street
39	Unnamed	100 Warren Street
Preservation Restriction		
A	Palladio Hall - Rose Croix Hall	50-62 Warren Street
B	Swedish Evangelical Lutheran Church	94 Warren Street

5.3 Archaeological Resources

The Proposed Project site has been disturbed with existing and prior uses.



135 Dudley Street

National Register of Historic Places Area

Preservation Restriction

National Register of Historic Places

National Register of Historic Places Points and Areas

A. Roxbury Highlands Historic District
B. Dudley Station Historic District
C. Moreland Street Historic District/ Mt. Pleasant
1. Dillaway School
2. 2453 Washington Street
3. 2451 Washington Street
4. Circle Supply Company
5. 95 Dudley Street
6. Roxbury Boys Club of Boston
7. U.S. Post Office- Roxbury Branch
8. H.B. Sargent - Frederick Octavius Prince
9. 35 Roxbury Street
10. 33 Roxbury Street
11. Boston Consolidated Gas Company Building
12. Institution for Savings in Roxbury
13. 2321-2337 Washington Street
14. J.S. Waterman and Sons Building
15. Curtis Block
16. Graham Block
17. 2278-2282 Washington Street
18. Ferdinand's Blue Store
19. Henry S. Lawrence Commercial Block
20. Josiah Richardson Block 21. Ferdinand's Blue Store Addition
22. Boston Elevated Railway - Dudley Substation
23. 2355-2359 Washington Street
24. 2363 Washington Street
25. Joseph Warren Cooperative Bank
26. W. Bowman Cutter Hardware Store
27. 2395 Washington Street
28. 2360-2362 Washington Street
29. First National Bank
30. Dudley Station and Elevated North of Dudley
31. 39-49 Warren Street
32. Hotel Dartmouth 33. Dudley Street Elevated Railway Signal Tower F
34. Edison Building
35. 9 Kearsarge Avenue
36. 96 Warren Street
37. 98 Warren Street
38. 102 Warren Street
39. 100 Warren Street

Preservation Restriction

1. Palladio Hall - Rose Croix Hall

2. Swedish Evangelical Lutheran Church

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Figure 5-1. 135 Dudley Street Historic Resources

Historic Resources Component

6.0 INFRASTRUCTURE SYSTEMS COMPONENT

6.1 Overview of Utility Services

This section provides a description of the existing utility systems in the vicinity of the Proposed Project site and evaluates potential impacts to those systems. The existing infrastructure surrounding the site appears sufficient to service the needs of the Proposed Project. The following sections describe the existing sewer, water, and drainage systems surrounding the site and explain how these systems will service the development. Appropriate mitigation measures are discussed to address project related impacts. The Proposed Project is in the early design phases and as a more definitive design evolves, the proponent will coordinate with the various utility companies to ensure full service for the new multi-family residential building.

The Proposed Project area is located within existing at-grade parking facilities primarily located at 135 Dudley Street immediately south of the Dudley Street right-of-way, abutting the District B-2 City of Boston Police Station to the northwest, the Dudley Literacy Center to the east and the Roxbury Municipal Court to the southeast. As shown on **Figures 6-1** and **6-2,** there are existing utilities located within Dudley Street, Warren Street and Washington Street. Utilities in Warren Street include two separate water mains, one combined sewer line, two gas mains, underground electric conduits, underground cable television, and telecommunications conduits. Utilities in Washington Street include a water main, a combined sewer, two gas mains, fire alarm conduits, and underground electric conduits.

The water, drain, and sewer lines are all Boston Water and Sewer Commission (BWSC) Utilities and the other utilities are privately owned by their respective utility companies.

Permits and approvals for the Proposed Project may include approvals from the Boston Water and Sewer Commission (BWSC) and the U.S. Environmental Protection Agency (EPA). Boston Water and Sewer Commission (BWSC) Site Plans and General Service Application will be required for the proposed new water and sewer connections, and the stormwater management system will be designed in conformance with BWSC's design standards. The gas, electric and telecommunications utilities will be coordinated with their respective companies.

6.2 Sanitary Sewer Service

6.2.1 Existing Sanitary Sewer Services

In the vicinity of the Proposed Project site, the BWSC owns, operates and maintains the local sanitary sewer system (see **Figure 6-1)**. In front of the Proposed Project in Warren Street, there is a 48"x32" brick combined sewer line owned by the BWSC. The sewer line is located near the center of Warren Street and flows in an Easterly direction. A dedicated 10" sanitary sewer is located in Washington Street immediately north of the Dudley Street/Washington Street

intersection and flows north. An additional 12" sanitary sewer is located in Warren Street. which eventually flows into the combined sewer system in Dudley Street.

The local BWSC sanitary sewer system ultimately flows to the Massachusetts Resources Authority's (MWRA's) Deer Island Treatment Plant, where it is treated and discharged to Cape Cod Bay.

6.2.2 Estimated Proposed Project Wastewater Generation

The Massachusetts Department of Environmental Protection (MassDEP) has specified certain sewerage generation rates for a variety of building establishments and uses in the Sewer System Extension and Connection Program, under their regulations 314 CMR 7.15.

The Proposed Project is anticipated to generate 34,164 gallons per day (gpd) of sanitary sewage. **Table 6-1** shows a breakdown of the sewage generation.

Table 6-1. Projected Sanitary Sewer Flows

Dwelling Unit	Number of Units	Number of Bedrooms	Sewerage Generation	Flow
1-Bedroom	34	34	110 gal/bedroom	3,740
2-Bedroom	112	224	110 gal/bedroom	24,640
3- Bedroom	14	42	110 gal/bedroom	4,620
Sub-Total	**160**	**300**		**33,000 GPD**

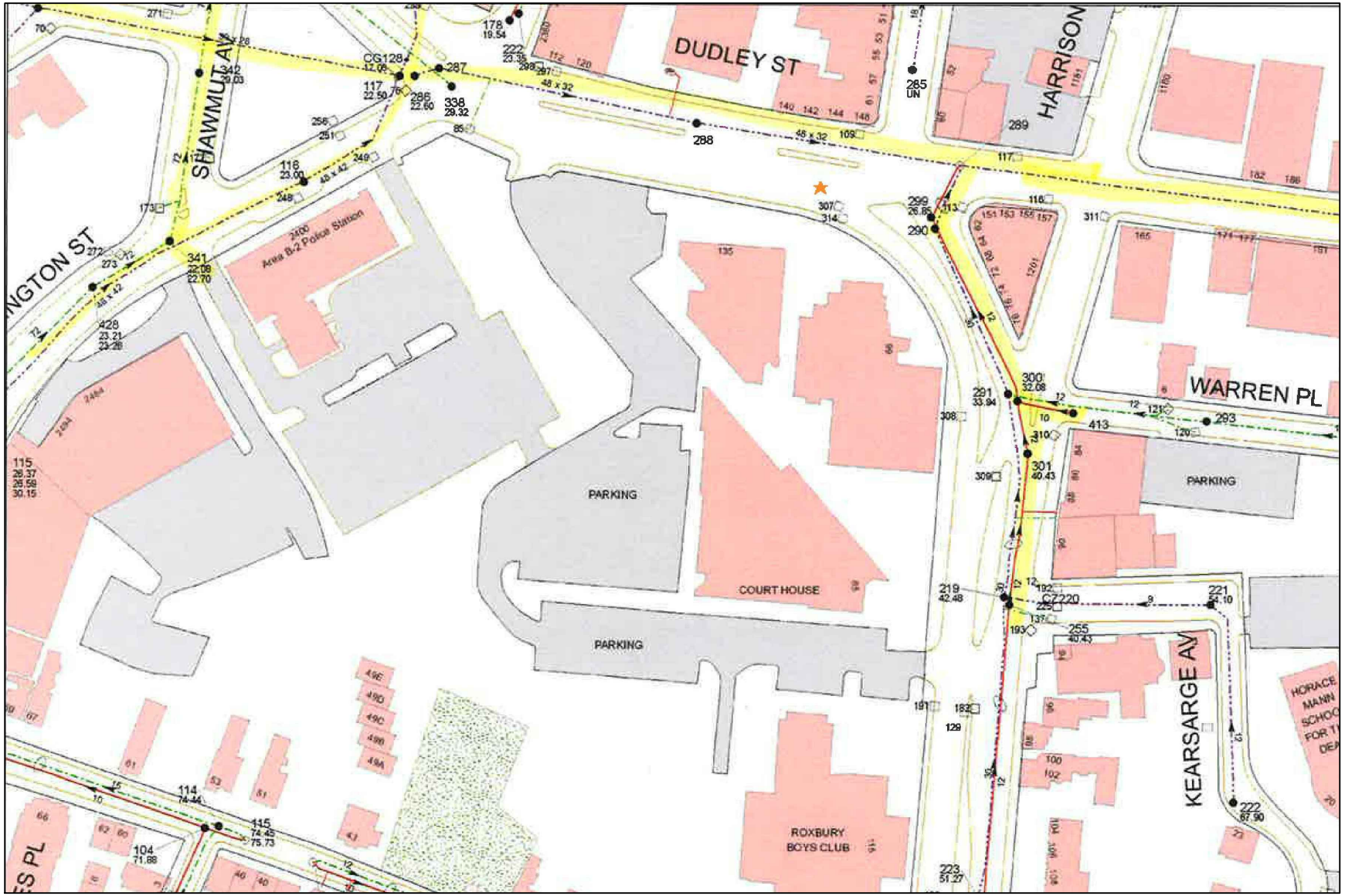
Commercial	Number of Sq. Ft. Office Space		Sewerage Generation	Flow
	15,512		75 gal/day/1,000 sq. ft.	1,164
Sub-Total	**15,512**			**1,164 GPD**

Total	**34,164 GPD**

Pursuant to MassDEP regulations 314 CMR7.00 Sewer System Extension and Connection Permit Program, the Proposed Project does not require the issuance of a MassDEP Sewer Connection or Extension Permit. The sewer connection review and approval process will be through BWSC.

6.2.3 Sanitary Sewer Connection

The Proposed Project is in the preliminary design stages and a detailed plan of the proposed site utilities has not been developed. However, it is anticipated that the Proposed Project will connect to the 48"x32" brick combined sewer located in the center of Dudley Street. Floor drains from the enclosed parking garage will be collected and routed through an MWRA approved oil-water separator prior to discharge to the BWSC sewer system.



PLAN: NOT TO SCALE

FIGURE 6.1
SANITARY WASTEWATER SYSTEM

6.2.4 Wastewater Flow Mitigation

To help conserve water and reduce the amount of wastewater generated by the Proposed Project, the Proposed Project is anticipated to include water conservation measures such as low flow toilets, restricted flow aerators in faucets and showerheads and water saving appliances.

In addition, since the Proposed Project generates more than 15,000 gpd, it is anticipated that Inflow/Infiltration (I/I) reduction will be required by BWSC. Currently BWSC requires I/I reduction at a 4:1 ratio (4-gallons of I/I removed for every 1-gallon of wastewater added). Currently BWSC charges a fee of $2.41 per gallon of I/I removed or $9.64 per gallon of new wastewater added to their system, in order to pay for I/I removal and other improvements to BWSC's sewer system.

6.3 Water Supply System

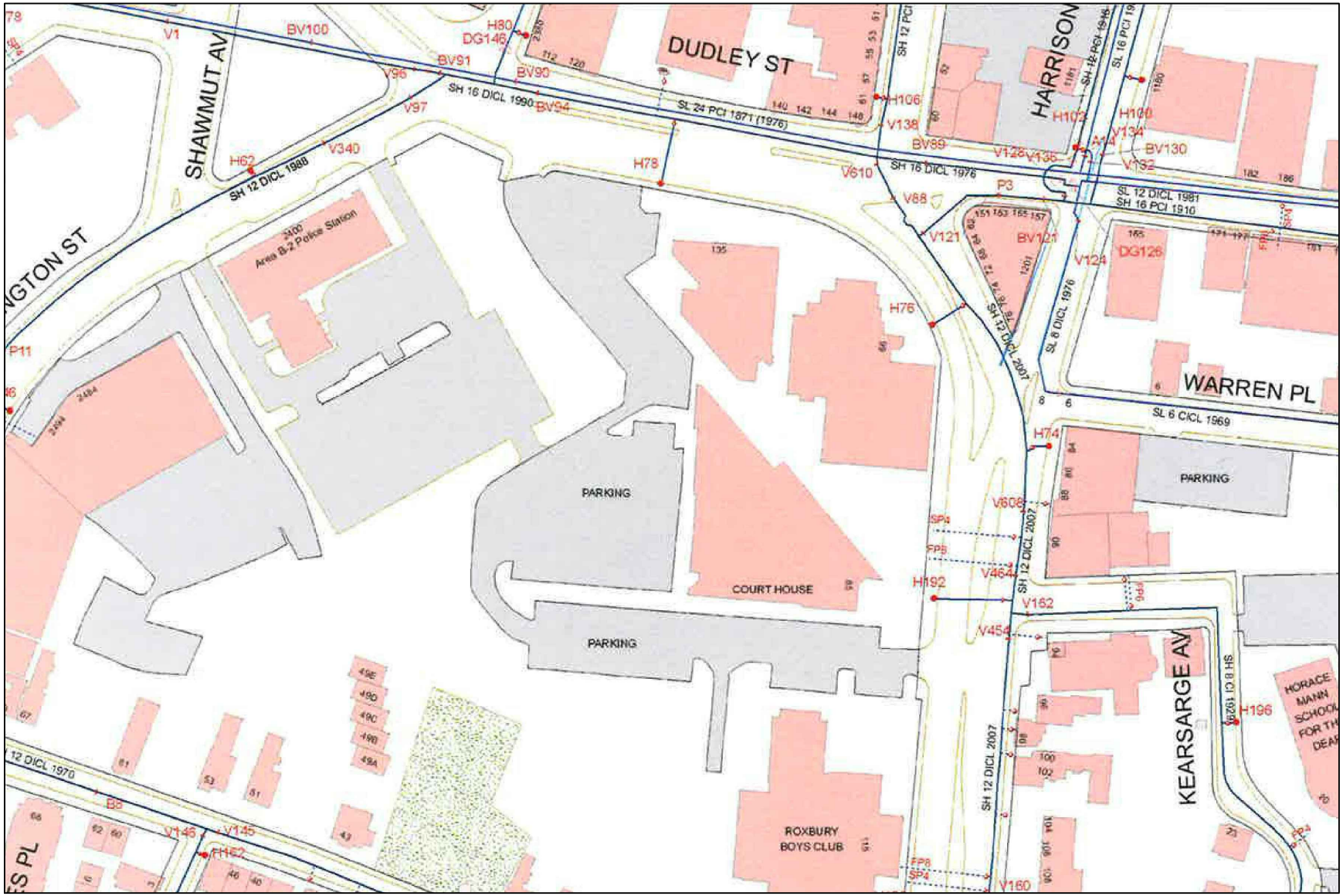
6.3.1 Existing Water Supply

BWSC owns, operates and maintains the water distribution system in the vicinity of the Proposed Project (see **Figure 6-2**). According to record plans, there are two water mains located in front of the Proposed Project in Dudley Street and one water main in Washington Street. There is a 16-inch ductile iron cement lined water main located near the center of Dudley Street that was installed in 1990 (high pressure service), a 24-inch pit cast iron water main in the northerly side of Dudley Street that was installed in 1871 and upgraded in 1976 (low service) and a 12-inch ductile iron water main in the westerly side of Washington Street that was installed in 1988 (high pressure service). There is a fire hydrant directly in front of the Proposed Project on the south side of Dudley Street that is fed by the 16-inch high pressure service water main.

6.3.2 Estimated Proposed Project Water Consumption

The estimated water consumption for the Proposed Project is 37,581 gpd. This estimate is based on DEP's Standard wastewater generation plus 10% or 110% of the wastewater generation discussed in **Section 6.2.2** above.

There are no known water capacity issues in the vicinity of the Proposed Project. This will be confirmed later in the design process when fire flow tests are conducted. Water demand and availability will be coordinated with BWSC during the Site Plan Review process to ensure the Proposed Project's needs are met, while maintaining adequate water flows to the surrounding neighborhood.



PLAN: NOT TO SCALE

FIGURE 6.2
WATER DISTRIBUTION SYSTEM

6.3.3 Water Supply Conservation and Mitigation

To help conserve water used by the Proposed Project, it is anticipated that the Proposed Project will incorporate water conservation measures such as low flow toilets, restricted flow aerations in faucets and showerheads, and water saving appliances.

6.4 Storm Drainage System

6.4.1 Existing Stormwater Drainage system

The existing site is 69,835 square feet or approximately 1.6 acres in size. The entire area is virtually a 100% parking lot impervious surface. All parking lot stormwater is collected within a series of catch basins and is assumed to drain into an 18" polyvinyl chloride pipe which discharges into the 48"x32" brick combined sewer located in the center of Dudley Street.

6.4.2 Proposed Storm Drainage System

The 135 Dudley St. Project is expected to reduce the volume of stormwater runoff leaving the site as well as substantially improve the water quality (See **Section 4.5**). The Proposed Project will exceed Boston Water and Sewer Commission (BWSC) standards for stormwater management by mitigating 1.25-inches of stormwater runoff generated by proposed impervious surfaces.

The volume of stormwater runoff leaving the site will be reduced do to the construction of a subsurface infiltration/ detention system. It is expected that rooftop runoff from the proposed building will be collected and conveyed to a subsurface infiltration system. The infiltration system will have an overflow tied into the drain system in Dudley St.. It is anticipated that the equivalent of 1.25-inches over the site's impervious area can be recharged as prescribed in BPDA's Smart Utilities design criteria, which will also satisfy BWSC's Site Plan Review requirements.

Stormwater runoff will be treated through the use of water quality treatment units. An operation and maintenance plan will be developed to support the long-term functionality of the proposed stormwater management system.

Erosion and sediment controls will be used during construction to protect adjacent properties, the municipal storm drain system, and the on-site storm drain system. A stormwater pollution prevention plan will be prepared for use during construction including during demolition activity.

6.5 Utility Protection During Construction

The contractor will notify the utility companies and will contact "Dig Safe" prior to any excavation at the Proposed Project. During construction, the infrastructure will be protected using sheeting and shoring, temporary relocations and construction staging as required. The contractor will be required to coordinate

all protection measures, temporary supports, and temporary shutdowns of all utilities with the appropriate utility company and / or agency. The contractor will also be required to provide adequate notification to the utility company prior to any work commencing on their utility. Also, in the event that a utility cannot be maintained in service during switch over to a temporary or permanent system, the contractor will be required to coordinate the shutdown with the utility company and Proposed Project abutters to minimize impacts and inconveniences.

7.0 TRANSPORTATION COMPONENT

7.1 Overview

Howard Stein Hudson (HSH) has conducted an evaluation of the transportation impacts of the proposed development located at 135 Dudley Street (the "Project" and/or "Site") in the Roxbury neighborhood of Boston. This section presents a summary of the Project's transportation impacts including site access, parking, public transportation, bicycle facilities, trip generation, loading and service, and Transportation Demand Management (TDM) measures.

7.1.1 Project Description

The Project site consists of an existing approximately 70,000 square foot parking lot that has recently been used as parking for employees of Bruce C. Bolling Municipal Building, which is located approximately 500 feet north of the Project site on Washington Street. The Project, a mixed-use development, will include approximately 160 residential units, approximately 15,500 sf of ground floor retail space, and approximately 270 parking spaces provided in a five-story parking garage. **Table 7-1** presents a summary of the development program.

Table 7-1. 135 Dudley Street Development Program

Land Use	Proposed Project
Residential	Approx. 160 units *(with approx. 105 condominium units and 55 rental apartments)*
Retail	Approx.15,500 gsf
Parking	approx. 270 spaces total *(with approx. 150 spaces designated to residential uses and approx. 120 spaces designated to commercial uses)*

7.1.2 Study Area

The proposed study area, shown in **Figure 7-1**, is generally bound by Warren Street to the east, Washington Street to the west, St. James Street to the south and Dudley Street to the north. The designated study area includes the signalized intersection of Warren Street at the driveway for the Boys & Girls Club and Roxbury Court. This driveway will also serve the Project site in the future.

Figure 7-1.
Study Area

7.1.3 Study Methodology

This transportation study and its supporting analyses were conducted in accordance with BTD guidelines as described below:

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

- The future transportation conditions analysis evaluates potential transportation impacts associated with the Project. Long-term impacts are evaluated for the year 2026, based on a seven-year horizon from the year of the filing of this traffic study.

- The No-Build (2026) Condition includes both general background traffic growth, traffic growth associated with specific developments (not including this Project), and transportation improvements that are planned near the Project site.

- The Build (2026) Condition analysis includes the No-Build (2026) Condition plus the net change in traffic volume due to the Project. Expected roadway, parking, transit, pedestrian, and bicycle accommodations, as well as loading facilities associated with the Project, are identified.

- The final sections of the transportation study identify the transportation demand management measures to minimize automobile usage and Project-related impacts, and outline the requirements of the Transportation Access Plan Agreement (TAPA) and Construction Management Plan.

7.2 Existing Condition

This section includes descriptions of existing study area roadway geometries, curb usage parking, public transportation services, and bicycle and pedestrian facilities.

7.2.1 Existing Roadway Conditions

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

Dudley Street is an urban minor arterial located along the north edge of the Project site. It runs east-west from Washington Street to Columbia Road in Uphams Corner. The Dudley Street alignment continues in both directions as Malcolm X Boulevard west of Washington Street and Stoughton Street east of Columbia Road. Dudley Street is a two-way, four lane roadway with

two lanes in each direction west of Warren Street. Additional turn lanes are provided at Warren Street. East of Warren Street, Dudley Street becomes a two-way, two-lane roadway.

Warren Street is an urban minor arterial, under the jurisdiction of the city of Boston, that is located to the east of the Project site. It runs in a predominantly north-south direction from Washington Street to Blue Hill Avenue. Warren Street stands as the western boundary edge of the Dudley Square neighborhood. Warren Street is a two-way, four-lane roadway between Dudley Street and Quincy Street. All but two intersection between Dudley Street and Quincy Street have a northbound left-turn pocket. The two intersections that do not have a northbound left-turn pocket have a southbound left-turn pocket instead. South of Quincy Street, Warren Street is a two-way, two-lane roadway.

7.2.2 Existing Intersection Conditions

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

Warren Street / Boys & Girls Club and Roxbury Court Driveway (future Project driveway) is a three-legged, signalized intersection with three approaches. The driveway eastbound approach consists of a 12-foot, shared left-turn/right-turn lane. The Warren Street northbound approach consists of a 10-foot exclusive left-turn lane with approximately 70-feet of storage and two 10-foot wide exclusive through lanes. On-street parking is not restricted adjacent to the northbound approach. The Warren Street southbound approach consists of an 11-foot exclusive through lane as well as a 12-foot shared through/right-turn lane. An MBTA bus stop exists adjacent to the Warren Street southbound approach. A 5-foot wide dedicated bike lane exists on both sides of Warren Street south of the driveway. An Americans with Disabilities Act (ADA) compliant crosswalk, curb-ramps, and pedestrian signals exist across the Warren Street northbound approach. ADA compliant curb-ramps and crosswalk exist across the eastbound driveway approach.

7.2.3 Existing Parking and Curb Use

An inventory of the on-street parking and curbside regulations near the Project site was conducted. Along the Dudley Street frontage of the Site, spaces are primarily signed with a two-hour limit. Additional curb use regulations in the area include handicap accessible parking, police station related business parking, non-metered 15-minute parking, commercial vehicle parking, cab stands, and a food truck staging area. Several MBTA bus stops exist along Washington Street, Dudley Street, and Warren Street in the vicinity of the Project site. The on-street parking regulations within the study area are shown in **Figure 7-2**.

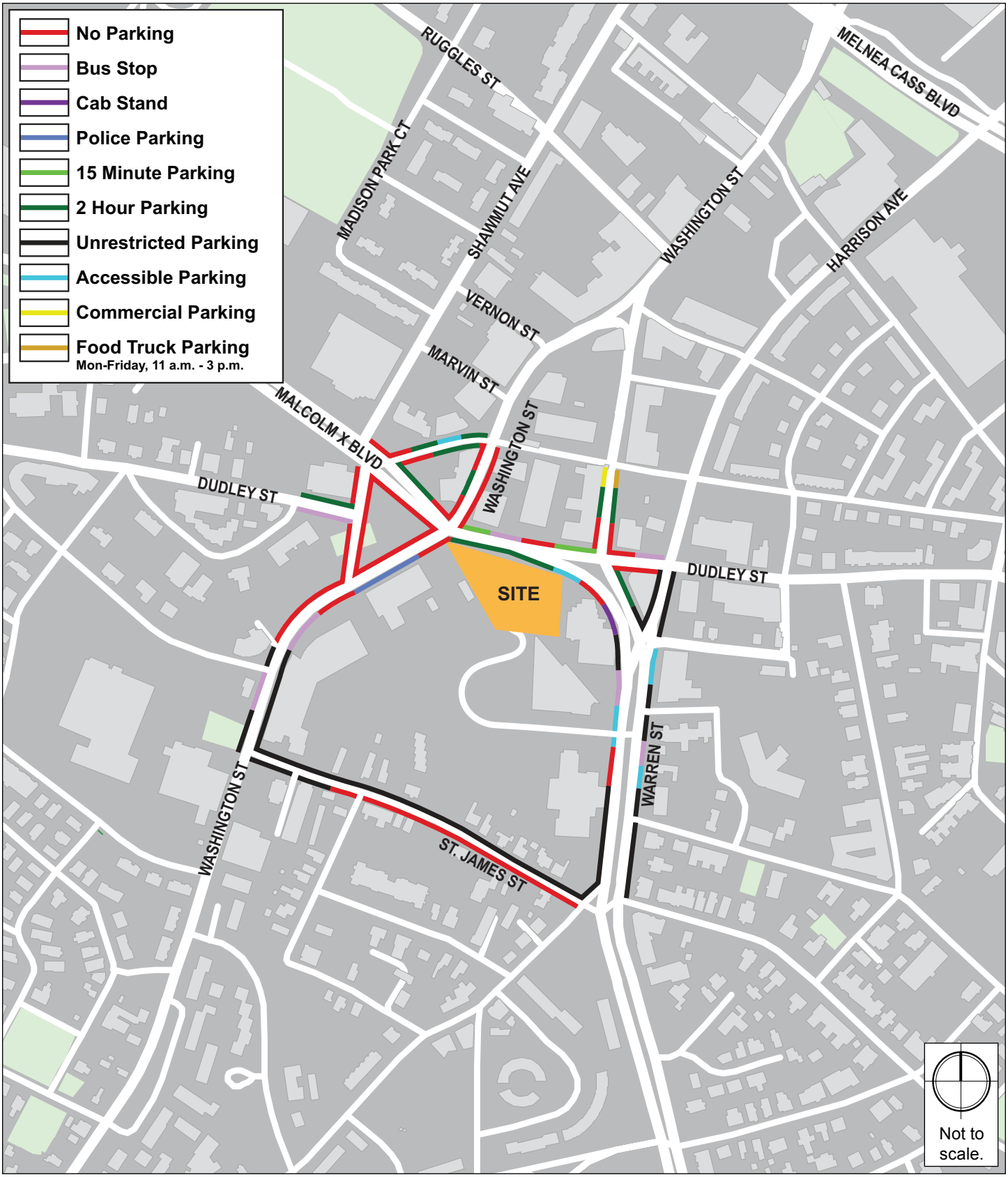


Figure 7-2.
On-Street Parking

7.2.4 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.

While Zipcar is the primary car share company in the Boston car sharing market, other companies such as Turo and Getaround also operate within the city. One Zipcar location is within a five-minute walk (one-quarter mile) of the Project site. Additionally, three Zipcar locations and two Turo location exist within a ten-minute walk (one-half mile) from the Project site. The nearby car sharing locations are shown in **Figure 7-3**.

7.2.5 Existing Traffic Data

Turning Movement Counts (TMCs) were conducted during the weekday a.m. and p.m. peak periods (7:00 – 9:00 a.m. and 4:00 – 6:00 p.m., respectively) at the study area intersection. Traffic volume data was obtained from the Boston Transportation Department (BTD). Because the data was collected in 2016 (Thursday, October 13, 2016), the data was increased by a one-half percent annual rate over a three-year period to more accurately reflect 2019 conditions. The TMCs collected vehicle classification including car, heavy vehicle, pedestrian, and bicycle movements. Within the peak periods, 7:45 a.m. – 8:45 a.m. and 4:00 p.m. – 5:00 p.m. were identifies as the a.m. and p.m. peak hours, respectively. The detailed traffic counts are provided in **Appendix F.**

To account for seasonal variation in traffic volumes throughout the year, data provided by MassDOT were reviewed. The MassDOT Weekday Seasonal Factors were used to determine the need for seasonal adjustments for the October counts. The seasonal adjustment factor for roadways like the study area (Group U3 – Other Principal Arterials-Urban) during the month of October is 0.92. This indicates that average monthly traffic volumes area approximately 8% lower than the traffic volumes that were collected. Therefore, the traffic counts were not adjusted downward to reflect average month conditions and provide a conservatively high analysis consistent with the peak season traffic volumes. The MassDOT 2017 Weekday Season Adjustment table is provided in Appendix F.

The Existing Condition weekday a.m. and p.m. peak hour traffic volumes are shown in **Figure 7-4**.

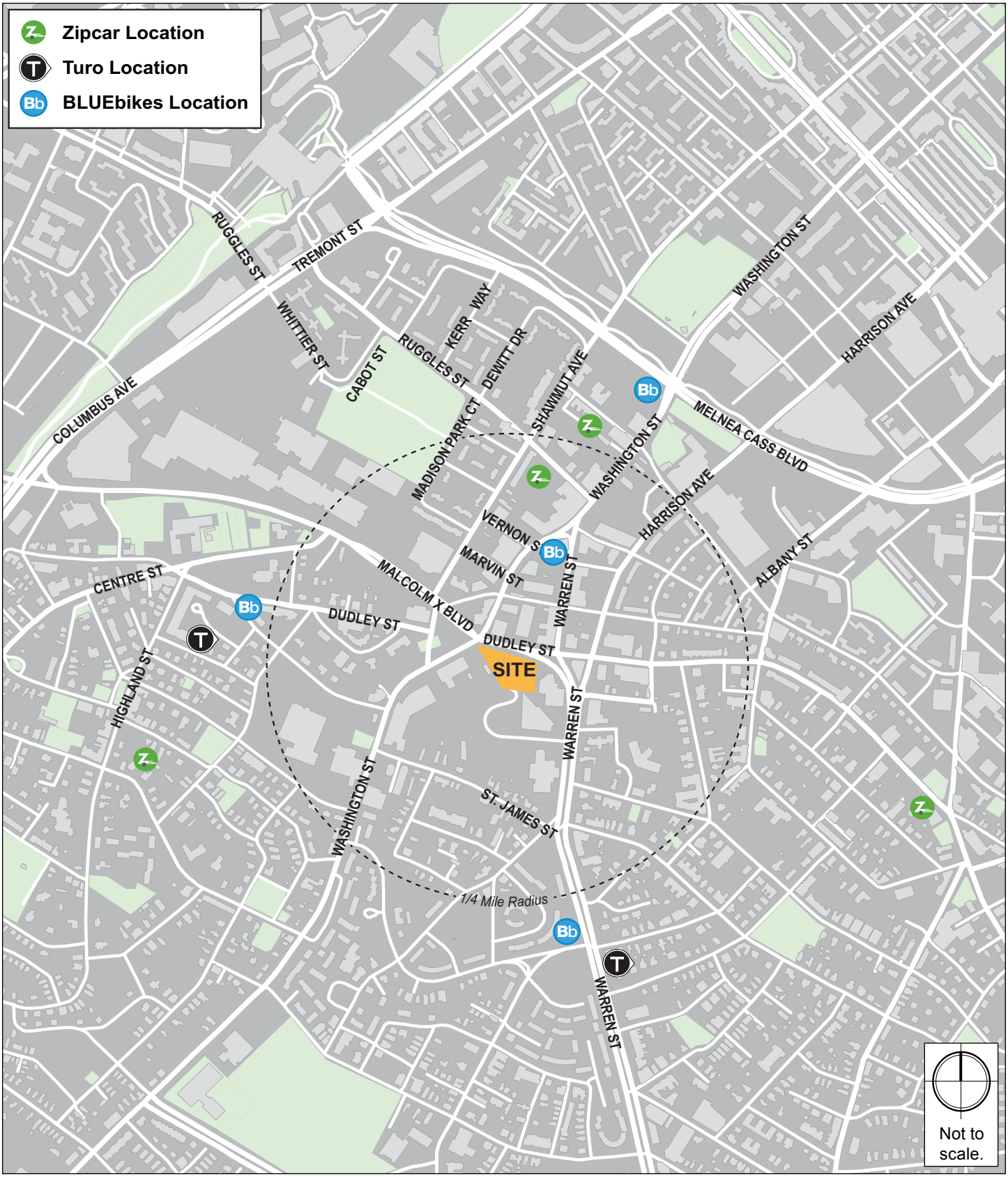
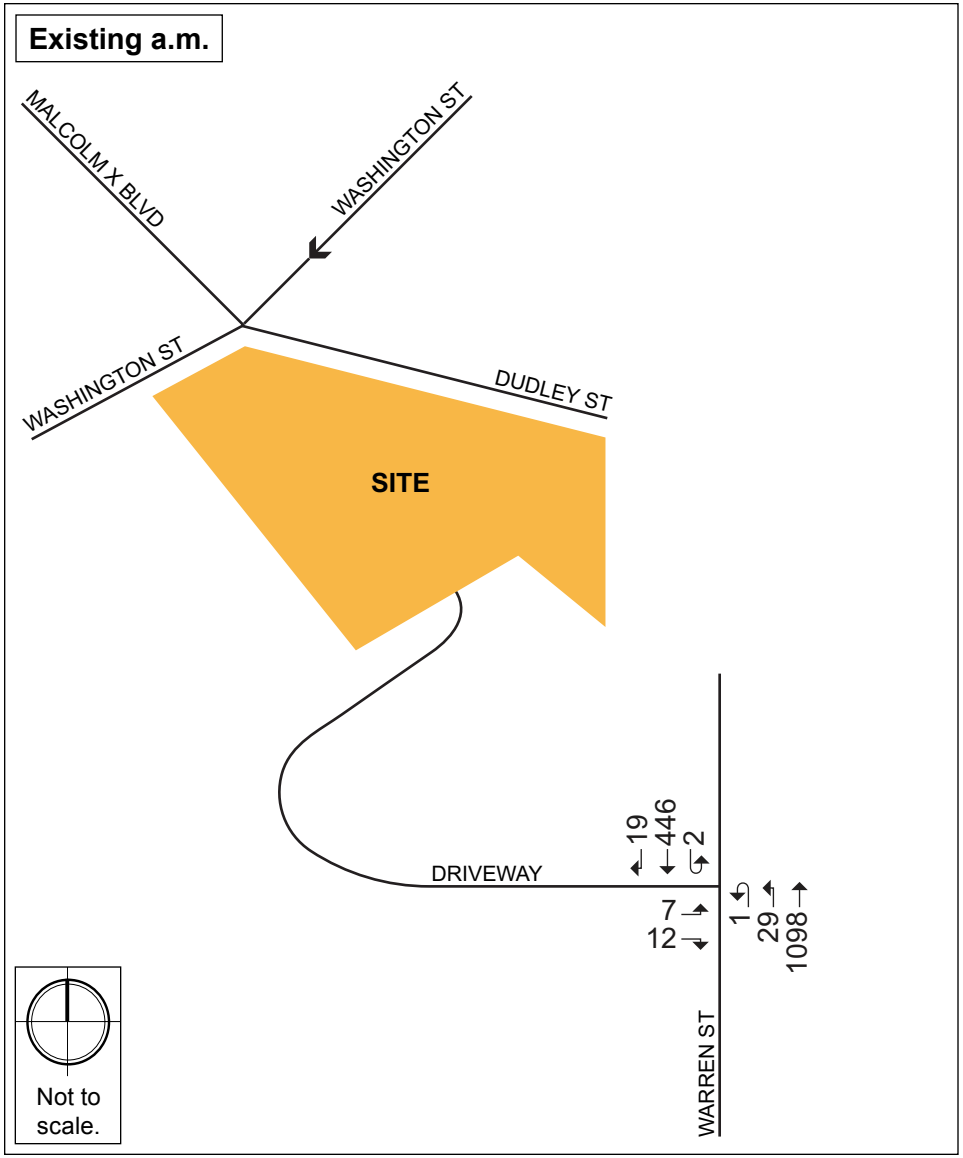


Figure 7-3.
Car and Bicycle Share Locations



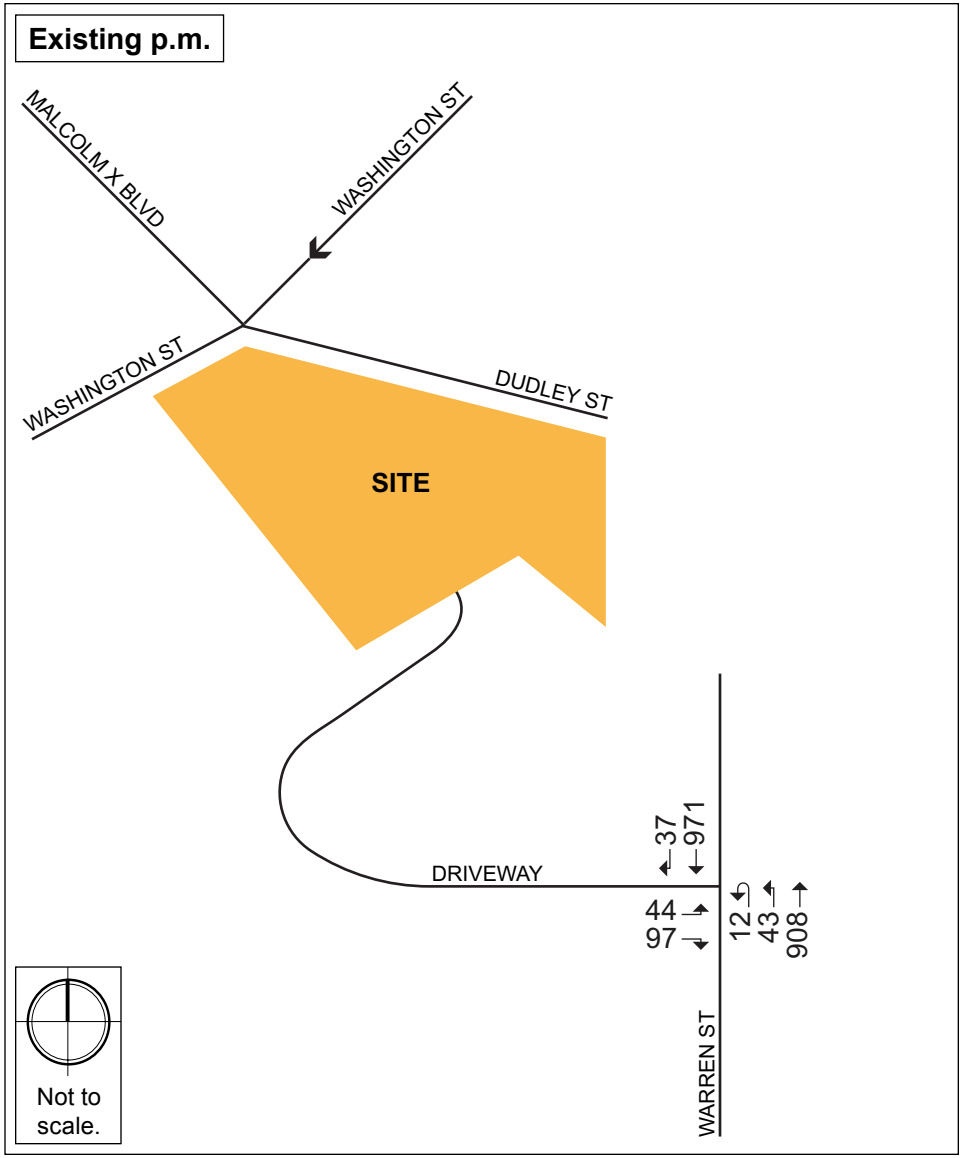


Figure 7-4.
Existing Condition Traffic Volumes, Weekday a.m. and p.m. Peak Hours

7.2.6 Existing Pedestrian Conditions

In general, the sidewalks provided along nearby roadways are in good condition. The sidewalk along Dudley Street, adjacent to the northern edge of the Project site, is approximately 12 feet wide. The sidewalk along Warren Street near the Boys & Girls Club/Roxbury Court Driveway range between approximately ten and 20-feet wide. ADA compliant curb-ramps, crosswalks and pedestrian signal equipment exist across the northbound approach of the Warren Street/ the Boys & Girls Club/Roxbury Court Driveway (Project Driveway) intersection. ADA compliant curb-ramps and crosswalk exist across the Project Driveway.

To determine the amount of pedestrian activity within the study area, pedestrian counts were conducted concurrent with the TMCs at the study area intersections. The weekday a.m. and p.m. peak hour pedestrian volumes are presented in **Figure 7-5**.

7.2.7 Existing Bicycle Conditions

Bicycle counts were conducted concurrently with the vehicular TMCs and are presented in **Figure 7-5**. Near the Project site, sharrows exist along Washington Street and Warren Street to the north of the Project Driveway. A dedicated bike lane exists on both sides of Warren Street south of the Boys & Girls Club/Roxbury Court Driveway. The City of Boston's "Bike Routes of Boston" map, updated in August 2013, designates Shawmut Avenue as a beginner route that does not have bicycle markings or signage, which is suitable for all riders including new cyclists with no on road experience. Dudley Street is designated as an intermediate route that does not have bicycle markings or signage, which is suitable for riders with some on-road experience. Warren Street is designated as an intermediate route that has a dedicated bike lane. Malcolm X Boulevard is designated as an advanced route that does not have bicycle markings or signage, which is suitable for experienced and traffic confident cyclists. South of its intersection with Dudley Street and Malcolm X Boulevard, Washington Street is designated as an Advanced route that has share the road (sharrow) symbols and/or signage. North of its intersection with Dudley Street and Malcolm X Boulevard, Washington Street is designated as an intermediate route that is marked with share the road (sharrow) symbols.

7.2.8 Bicycle Sharing Services

The site is also located in proximity to bicycle sharing stations provided by BLUEbikes. BLUEbikes is the major bicycle sharing system in the Boston area, which was launched in 2011 and consists of over 300 stations and 3,000 bicycles in five municipalities. One BLUEbike facility is located within one-quarter mile (5-minute walk) of the Project site and three BLUEbike facilities are within one-half mile (10-minute walk). The nearby BLUEbike sharing locations are shown in **Figure 7-3**.

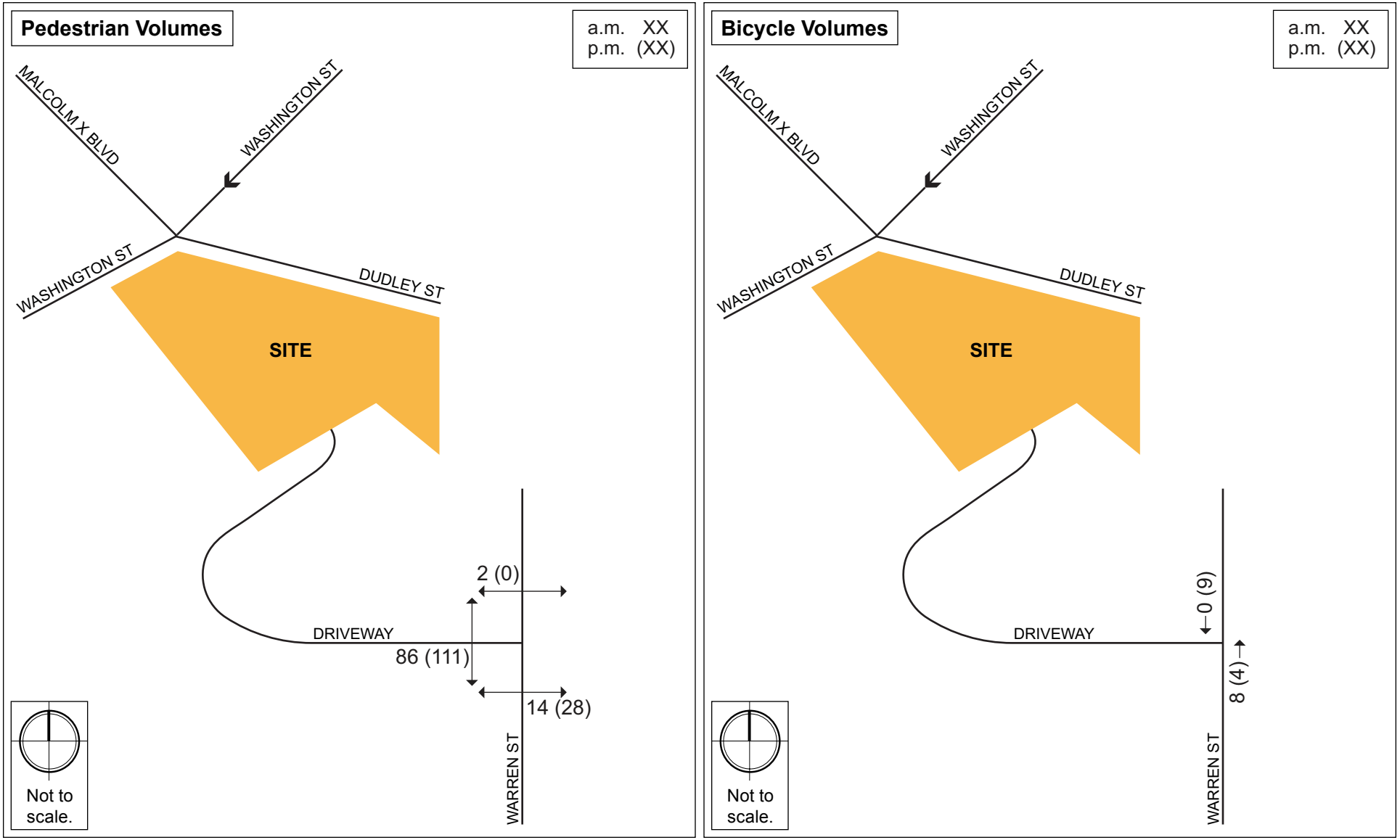


Figure 7-5.
Existing Condition Pedestrian and Bicycle Volumes, Weekday a.m. and p.m. Peak Hours

7.2.9 Existing Public Transportation

The Project site area is well-served by public transportation. Dudley Station, with access to several MBTA bus lines including two Silver Line rapid transit bus routes, is located directly across Dudley Street. Additionally, the Project site is located within walking distance from two other MBTA stations: the Roxbury Crossing Station is approximately 0.6 miles west of the site and the Ruggles Station is approximately 0.7 miles to the northwest. Both stations provide access to the MBTA Orange Line, as well as several bus routes. The Ruggles Station also provides access to three MBTA Commuter Rail lines. The MBTA public transportation services are shown in **Figure 7-6** and summarized in **Table 7-2** and **Table 7-3**.

Figure 7-6.
Public Transportation

Table 7-2. Existing Public Transportation – Rapid Transit and Commuter Rail

Service	Description	Peak-hour Headway[1] (minutes)
Rapid Transit Lines		
Orange Line	Oak Grove Station – Forest Hills Station	9
Silver Line: SL4	Dudley Station – South Station at Essex Street via Washington Street	12
Sliver Line: SL5	Dudley Station – Downtown Crossing at Temple Place via Washington Street	12
Commuter Rail[2]		
Needham	Needham Heights – South Station (via Ruggles Station)	30-50
Providence/ Stoughton	Wickford Junction – South Station (via Ruggles Station)	30-60
Franklin	Forge Park / 495 – South Station (via Ruggles Station)	30-40

1. Source: MBTA.com, September 2019. Headway is the time between vehicles
2. Headway taken from arrivals/departures at Ruggles Station.

Table 7-3. Existing Public Transportation – Bus Routes

Route	Description	Average Peak-hour Headway (minutes)[1]
1	Harvard/Holyoke Gate - Dudley Sta. via Mass Ave.	8
8	Harbor Point/UMass - Kenmore Sta. via B.U. Medical Center & Dudley Sta.	15-30
14	Roslindale Sq. - Heath St. via Dudley Sta., Grove Hall & Jackson Sq. Sta.	45-55
15	Kane Sq. or Fields Corner Sta. - Ruggles Sta. via Uphams Corner	8-10
19	Fields Corner Sta. - Kenmore or Ruggles Sta. via Grove Hall & Dudley Sta.	17-30
22	Ashmont Sta. - Ruggles Sta. via Talbot Avenue & Jackson Square	10
23	Ashmont Sta. - Ruggles Sta. via Washington Street	7-10
28	Mattapan Sta. - Ruggles Sta. via Dudley Sta.	10
41	Centre & Eliot Sts. - JFK/UMass Sta. via Dudley Sta., Centre St. & Jackson Sq. Sta.	23-30
42	Forest Hills Sta. - Dudley or Ruggles Sta. via Washington Street	15-30
43	Ruggles Sta. - Park & Tremont Streets via Tremont St.	20-30
44	Jackson Sq. Sta. - Ruggles Sta. via Seaver St. & Humboldt Ave.	18
45	Franklin Park Zoo - Ruggles Sta. via Blue Hills Avenue	16
47	Central Sq., Cambridge - Broadway Sta. via B.U. Medical Center, Dudley Sta. & Longwood Medical Area	10-20
66	Harvard Square - Dudley Sta. via Allston & Brookline Village	10
170	Central Square, Waltham - Dudley Sq.	15-30[2]
171	Dudley Sta. - Logan Airport via Andrew Sta.	N/A[3]
CT2	Sullivan Sta. - Ruggles Sta. via Kendall/MIT	20-30
CT3	Beth Israel Deaconess Medical Cntr. - Andrew Sta. via B.U. Medical Cntr.	20

1. Source: MBTA.com, September 2019. Headway is the time between vehicles
2. Express bus, runs two buses inbound in the a.m. and two buses outbound in the p.m.
3. Route operates in one direction only with limited service of two daily trips, leaving Dudley Sta. at 3:50 a.m. and 4:20 a.m.

7.3 No-Build (2026) Condition

The No-Build (2026) Condition reflects a future scenario that incorporates anticipated traffic volume changes associated with background traffic growth independent of any specific project, traffic associated with planned specific developments, and planned infrastructure improvements that will affect travel patterns throughout the study area. These infrastructure improvements include roadway, public transportation, pedestrian and bicycle improvements.

7.3.1 Background Traffic Growth

The methodology to account for generic future background traffic growth, independent of this Project, may be affected by changes in demographics, smaller scale development projects, or projects unforeseen at this time.

Based on a review of recent and historic traffic data to account for any additional unforeseen traffic growth, a traffic growth rate of one-half (0.5%) percent per year, compounded annually, was used.

7.3.2 Specific Development Traffic Growth

Traffic volumes associated with known development projects can affect traffic patterns throughout the study area within the future analysis time horizon. Key background development projects were identified in the vicinity of the Project site and are shown in **Figure 7-7**. Traffic volumes associated with the following projects were directly incorporated into the future conditions traffic volumes:

2147 Washington Street – This development is located north of the Project site and proposes to replace an existing surface parking lot with approximately 74 residential units, 1,440 sf of ground floor retail space, an expansion of the existing Haley House Café, and 47 parking spaces for residential use only.

The Rio Grande Tower – This development site encompasses an existing surface parking lot as well as the historically significant Roxbury Institute for Savings Building and the former Boston Consolidated Gas Building. This development is located to the northwest of the Project site and proposes to replace the existing surface parking lot with a 25-story residential tower that includes 211 units, approximately 2,700 sf of ground floor retail space, and 28,200 gross sf of commercial office space.

Bartlett Place – This development is a former MBTA bus depot and maintenance yard, located to the west of the Project site. This development proposes to construct the site in phases, over an extended period, to eventually create a mixed-use urban village. The full project build-out will include approximately 22,000 sf of commercial space, 31,000 sf of retail space, 323 residential units, 328 parking spaces and a 15,500 square foot public plaza. Additionally, the project

Figure 7-7.
Background Projects

proposes to construct two new roadways within the site, connecting Guild Street and Bartlett Street as well as Washington Street and Bartlett Street.

280 - 290 Warren Street – This development is located to the southeast of the Project site and the first phase is to construct a 55-unit mixed-income housing development. The first phase will also include ground-floor commercial space and two levels of structured parking for a total of approximately 72 spaces. The second phase of development will include a mixed-use building housing ground-floor commercial space and 44-units of elderly housing as well as a 28-space parking garage. In total the development is proposed to include 95 residential units and 102 parking spaces.

7.3.3 Proposed Infrastructure Improvements

Planned area improvements to roadway, transit, bicycle, and pedestrian facilities, independent of the Project, are describe below:

Dudley Square Streetscape – The goals set forth for this project include creating a more safe environment for all users, especially pedestrians, seniors and the disabled; reduce traffic congestion issues for motorists and transit riders; add bicycle facilities; add to and improve existing green space; and limit the impact to on-street parking.

The first phase of this project will encompass the southern edge of Dudley Street from Washington Street to Warren Street, both sides of Warren Street between Dudley Street and Harrison Avenue, the western edge of Warren Street from Harrison Avenue to Kearsarge Street, a portion of the Washington Street/Dudley Street intersection, the entirety of the Warren Street/Dudley Street intersection, and a large portion of the Warren Street/Harrison Avenue intersection. Phase one will include the construction of new sidewalks, pedestrian ramps, protected corners, crosswalks, and a grade-separated cycle track; the installation of new traffic and pedestrian signal equipment, streetlights, signage, and pavement markings; updating the existing electrical system and drainage system; planting new street trees, and garden beds; implementing green infrastructure; and a new plaza and pedestrian orientation for the renovated Dudley Library.

The second phase of this project will encompass the northern edge of Dudley Street from Washington Street to Harrison Avenue, the intersections of Malcolm X Boulevard/Shawmut Avenue and Dudley Street/Harrison Avenue, the remaining portions of the Washington Street/Dudley Street intersection and Warren Street/Harrison Avenue intersection, and all crossings, intersections and streetscape along both Washington Street and Warren Street between Dudley Street and Ruggles Street. Phase two will include the same general improvements as phase one as well as install Rapid Flashing Beacons at selected crossings, constructing dedicated bike lanes on Washington Street and Warren Street, and a raised island at the Washington

Street/Warren Street intersection for future green-space opportunities. Additionally, there is a potential for the installation of a parking meter system.

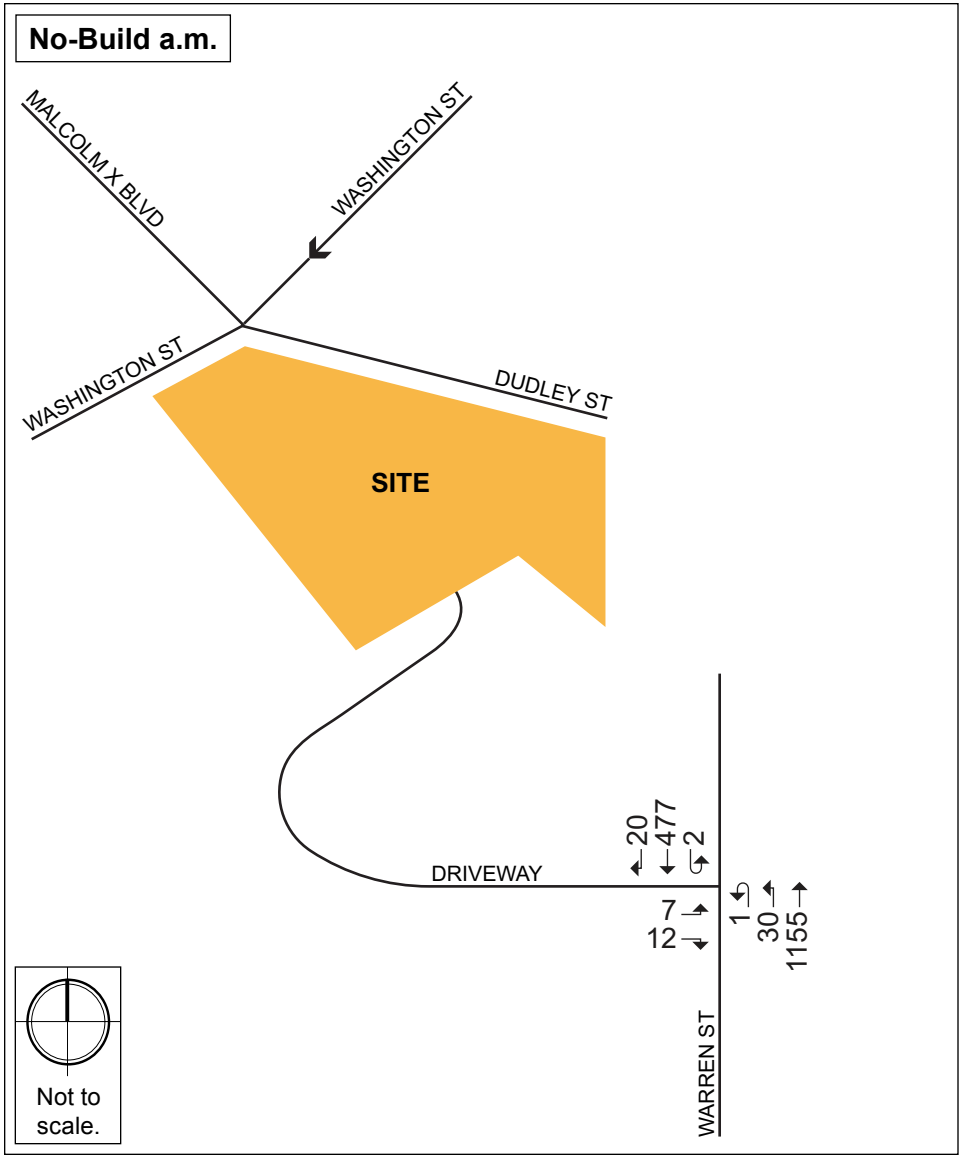
Melnea Cass Boulevard Redesign – Melnea Cass Boulevard will be rebuilt from Columbus Avenue to Massachusetts Avenue as a "complete street" in order to better serve not only drivers but pedestrians, cyclists and transit riders as well. The project will include improved sidewalk conditions with 8-foot wide sidewalks, separated bike lanes within the roadway, new traffic signal equipment and timings, and improved bus stops along the corridor.

Ruggles Station Commuter Rail Platform Extension – will include the construction of a second, 800-foot long commuter rail platform at Track 2 that will allow passengers the ability to by-pass traveling to Back Bay Station on the commuter rail and transferring to the orange line to return to Ruggles Station.

MBTA Better Bus Project is the first step of an effort to improve bus services in the greater Boston area. The MBTA has proposed near-term changes that will enable better service per dollar invested. Those changes include the consolidation of duplicate routes, improve the space available at some existing bus stops and eliminate obsolete variants of some bus routes. This first step could potentially adjust Routes 8, 19, and 47 to by-pass Ruggles Station as well as divert Route 44 away from Dudley Street after 8 p.m.

7.3.4 No-Build (2026) Condition Traffic Volumes

The one-half percent per year annual growth rate, compounded annually, was applied to the Existing (2019) Condition traffic volumes, the traffic volumes associated with the background development projects listed above were added, and the geometric modifications, as appropriate, were incorporated into the No-Build (2026) Condition traffic volumes. The No-Build (2026) weekday a.m. and p.m. peak hour traffic volumes are shown on **Figure 7-8**.



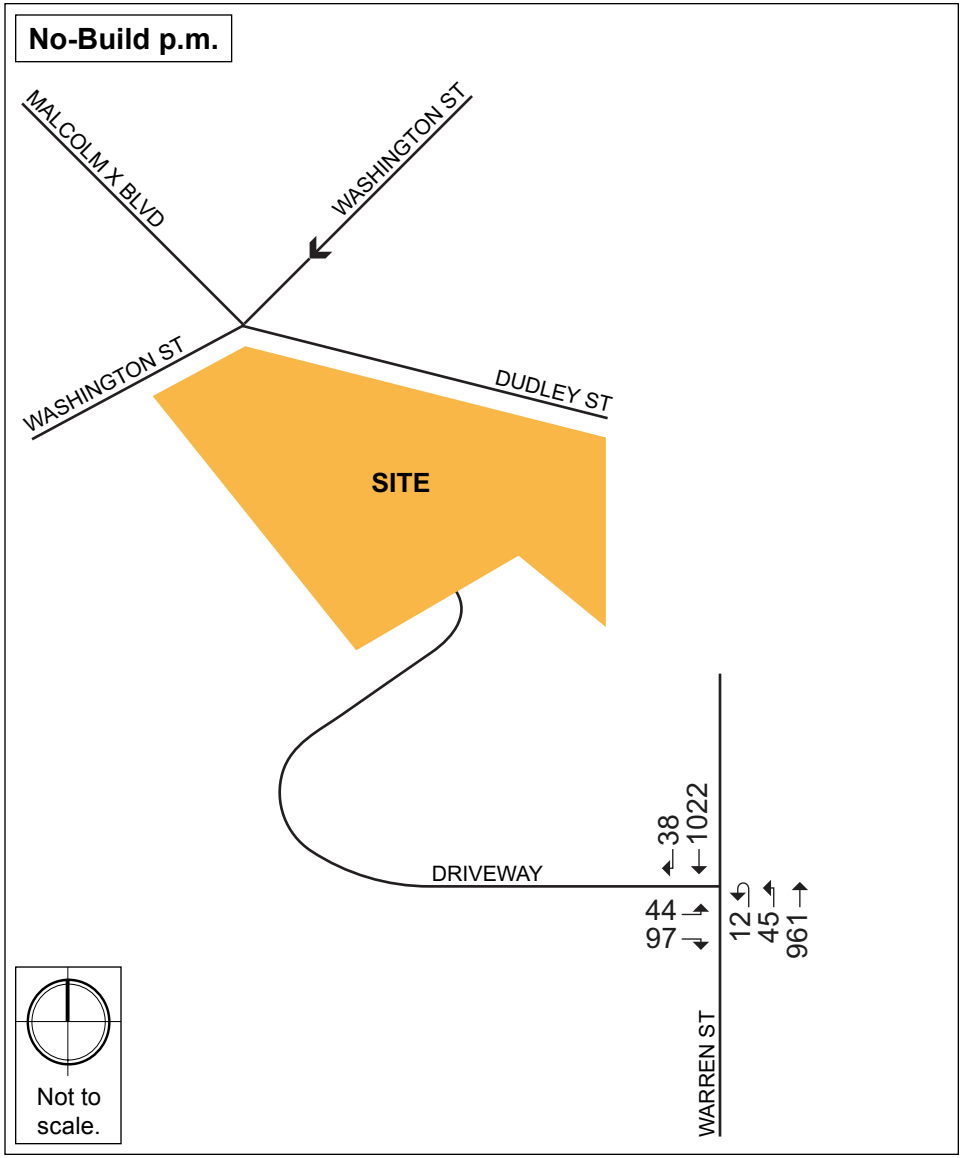


Figure 7-8.
No-Build (2026) Condition Traffic Volumes, Weekday a.m. and p.m. Peak Hours

7.4 Build (2026) Condition

As previously summarized, the proposed Project, a multi-use development, will include approximately 160 residential units, approximately 15,500 sf of ground floor retail space, and approximately 270 parking spaces provided in a five-story parking garage.

7.4.1 Site Access and Circulation

Vehicular access to the Project site will be provided through the existing driveway that services both the Boys & Girls Club and the Roxbury Municipal Court. The driveway has a 26 feet wide curb-cut along Warren Street and will provide residents access to the parking garage. Pedestrian access to the residential lobbies will be provided in two locations along Dudley Street. The retail storefronts will also have pedestrian doorways along Dudley Street. The site access plan is shown in **Figure 7-9**.

7.4.2 Project Parking

BTD has set parking space goals and guidelines throughout the City to establish the amount of parking supply provided with new developments. BTD's maximum parking ratio guidelines for residential uses in Lower Roxbury is 1.5 spaces per unit. The Project is proposing to construct a total of 270 parking spaces within a five-story, above grade parking garage. Spaces will be allocated to residents, guests, and public/commercial uses.

The parking goals developed by the BTD for this section of Roxbury (within a ten-minute walk of an MBTA station) are a maximum of 0.5 to 1.0 spaces per residential unit. Reflecting these goals, the Project will provide 1.0 parking spaces per condominium unit and 0.47 parking spaces per apartment. The remaining spaces will be used for residential visitors and public/commercial uses to support parking demands of local business. **Table 7-4** summarizes the parking space allocation.

Table 7-4. Parking Space Allocation

User Type	Parking Spaces
Residential – Condominium	105
Residential – Apartments	26
Visitors to Residential	20
Public / Commercial	119
Total	**270 Spaces**

Figure 7-9.
Site Plan

7.4.3 Loading and Service Accommodations

Residential loading activity includes move-in/move-out, furniture deliveries, contractor/repair calls and shorter-term activity such as package delivery (USPS, UPS, Fed-Ex). Loading activity will occur off-street and be located on first floor of the parking garage.

7.4.4 Bicycle Accommodations

Based on BTD guidelines, the Project will provide secure covered bicycle storage for up to 160 bicycles (one space per residential unit) within the proposed building, available for building residents. Additional bicycle racks will be provided near main entrances to the new building for workers, visitors, and guests.

All bicycle racks, signs, and parking areas will conform to BTD standards and be sited in safe, secure locations. The Proponent will work with BTD to identify the most appropriate quantity and location for bicycle racks on the Project site as part of the Transportation Access Plan Agreement (TAPA) process.

7.4.5 Trip Generation Methodology

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

To estimate the number of new trips expected to be generated by the Project, data published by the Institute of Transportation Engineers (ITE) in the Trip Generation Manual[1] was used. ITE provides data to estimate the total number of unadjusted vehicle trips associated with the Project. In an urban setting served by transit, adjustments are necessary to account for other travel mode shares such as walking, bicycling, and transit.

Below is a description of the ITE land use codes (LUC) identified as most appropriate for the Project:

- **Land Use Code 220 – Multifamily Housing (Low-Rise)**. The Multifamily Housing Low-Rise LUC includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have one or two floors. Calculations of the number of trips uses ITE's average rate per dwelling units. ITE also provides data for mid-rise residential buildings with more than two floors. While the Project will include residential units that are considered mid-rise in height, the study team

[1] Trip Generation Manual, 10th Edition; Institute of Transportation Engineers; Washington, D.C.; 2018.

adopted trip rates associated with the Low-Rise Residential LUC, which are higher, resulting in a more conservative analysis (higher impact).

- **Land Use Code 820 – Retail/Shopping Center.** A retail shopping center is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. A shopping center's composition is related to its market area in terms of size, location, and type of store. Of the ITE retail categories, this one best suits the retail component proposed within the Project. Calculations of the number of trips use ITE's average rate per 1,000 sf.

7.4.6 Travel Mode Share

BTD provides vehicle, transit, and walking mode split rates for different areas of Boston. The Project is in Area 15 – Roxbury. The unadjusted vehicular trips were converted to person trips by using vehicle occupancy rates published by the Federal Highway Administration (FHWA)[2]. The person trips were then distributed to different modes according to the mode shares shown in **Table 7-5.**

Table 7-5. Travel Mode Shares and Vehicle Occupancy Rate

Land Use/ Direction		Vehicle Occupancy Rate[1]	Walk/Bike Share	Transit Share	Vehicle Share
Daily					
Residential	In Out	1.18	27% 27%	17% 17%	56% 56%
Retail	In Out	1.82	35% 35%	12% 12%	53% 53%
a.m. Peak Hour					
Residential	In Out	1.18	27% 27%	19% 29%	54% 44%
Retail	In Out	1.82	36% 37%	13% 21%	51% 42%
p.m. Peak Hour					
Residential	In Out	1.18	27% 27%	29% 19%	44% 54%
Retail	In Out	1.82	37% 36%	21% 13%	42% 51%

[2] Summary of Travel Trends: 2017 National Household Travel Survey; FHWA; Washington, D.C.; 2017.

7.4.7 Project Trip Generation

The mode share percentages shown in **Table 7-5** were applied to the number of person trips to develop walk/bicycle, transit, and vehicle trip generation estimates for the Project. The trip generation for the Project by mode is shown in **Table 7-6**. The detailed trip generation information is provided in Appendix F.

Table 7-6. Project Trip Generation

Land Use/ Direction		Walk/Bike Trips	Transit Trips	Vehicle Trips
a.m. Peak Hour				
Residential	In	5	4	11
	Out	18	19	30
	Total	23	23	41
Retail	In	6	2	8
	Out	4	2	5
	Total	10	4	13
p.m. Peak Hour				
Residential	In	18	19	29
	Out	11	7	21
	Total	29	26	50
Retail	In	20	11	21
	Out	19	7	29
	Total	39	18	50

7.4.8 Trip Distribution

The trip distribution identifies the various travel paths for vehicles arriving and leaving the Project site. Trip distribution patterns for the Project were based on BTD's origin-destination data for Area 15 – Roxbury and trip distribution patterns presented in traffic studies for nearby projects. The trip distribution patterns for the Project are shown in **Figure 7-10.**

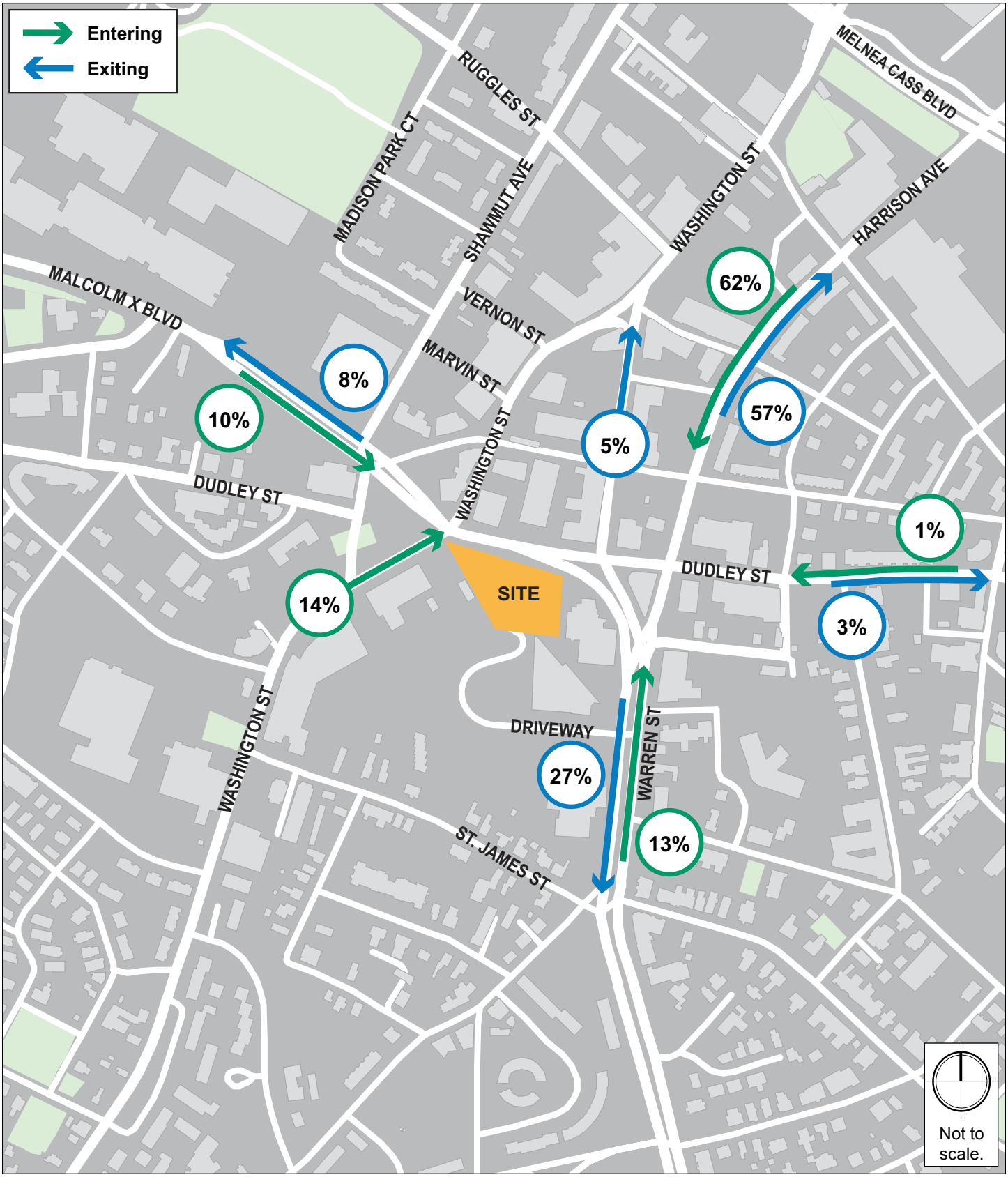


Figure 7-10.
Trip Distribution

7.4.9 Build (2026) Traffic Volumes

The vehicle trips were distributed through the study area based on the trip distribution shown in **Figure 7-10** to the Project site. The Project generated trips for the a.m. and the p.m. peak hours are shown in **Figure 7-11**. The trip assignments were added to the No-Build (2026) Condition vehicular traffic volumes to develop the Build (2026) Condition vehicular traffic volumes. The Build (2026) Condition a.m. and p.m. peak hour traffic volumes are shown in **Figure 7-12**.

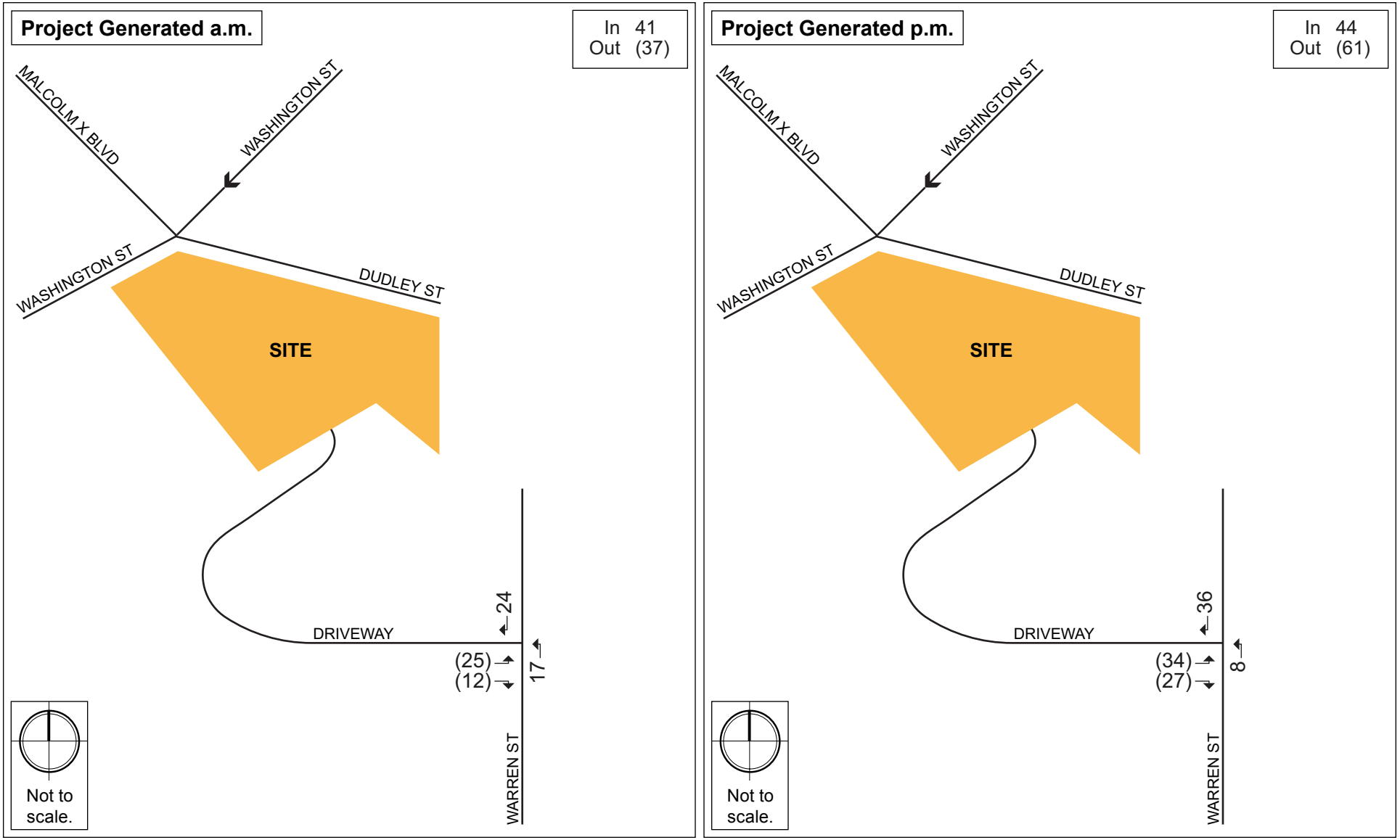


Figure 7-11.
Project Generated Vehicle Trips, Weekday a.m. and p.m. Peak Hours

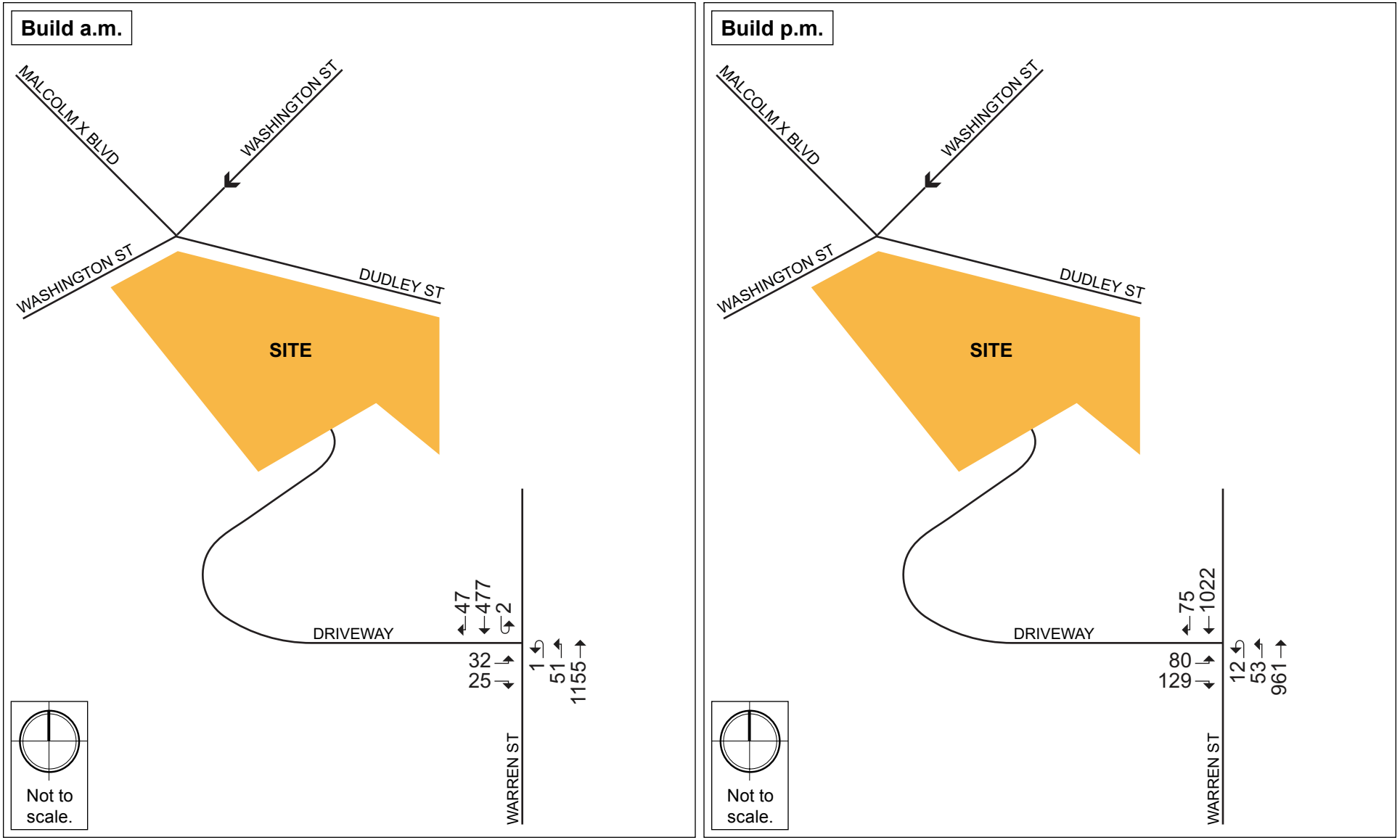


Figure 7-12.
Build (2026) Condition Traffic Volumes, Weekday a.m. and p.m. Peak Hours

7.5 Traffic Capacity Analysis

Trafficware's Synchro (version 9) software package was used to calculate average delay and associated LOS at the study area intersections. This software is based on the traffic operational analysis methodology of the Transportation Research Board's 2010 Highway Capacity Manual (HCM).

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

Table 7-7. Vehicle Level of Service Criteria

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

Source: 2010 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 length, measured in feet, denotes the farthest extent of the vehicle queue (to the last stopped vehicle) upstream from the stop line. This maximum queue occurs five percent, or less, of the time during the peak hour, and typically does not develop during off-peak hours. Since volumes fluctuate throughout the hour, the 95th percentile queue represents what can be considered a "worst case" condition. Queues at an intersection are generally below the 95th percentile length throughout most of the peak hour. It is also unlikely that 95th percentile queues for each approach to an intersection occur simultaneously.

Table 7-8 and **Table 7-9** present, respectively, the a.m. and p.m. peak hour capacity analysis for the study area intersections under each analysis condition: Existing (2019) Condition, No-Build (2026) Condition, and the Build (2026) Condition. The sections below present results for each condition. The detailed analysis sheets are provided in **Appendix F**.

7.5.1 Existing Condition Traffic Operations Analysis

As shown in **Table 7-8** and **Table 7-9**, under the Existing Condition, the study area intersection and approaches operate at acceptable levels of service (LOS D or better) during the weekday a.m. and p.m. peak hours.

7.5.2 No-Build (2026) Condition Traffic Operations Analysis

As shown in **Table 7-8** and **Table 7-9**, under the No-Build (2026) Condition, the study area intersection and approaches continue to operate at acceptable levels of service (LOS D or better) during the weekday a.m. and p.m. peak hours.

7.5.3 Build (2026) Condition Traffic Operations Analysis

As shown in **Table 7-8** and **Table 7-9**, under the Build (2026) Condition, the study area intersection and approaches continue to operate at acceptable levels of service (LOS D or better) during the weekday a.m. and p.m. peak hours.

Table 7-8. Capacity Analysis Summary, a.m. Peak hour

Intersection/Approach	Existing Condition					No-Build (2026) Condition					Build (2026) Condition				
	LOS	Delay (s)	V/C Ratio	Queue (ft) 50th	Queue (ft) 95th	LOS	Delay (s)	V/C Ratio	Queue (ft) 50th	Queue (ft) 95th	LOS	Delay (s)	V/C Ratio	Queue (ft) 50th	Queue (ft) 95th
Signalized															
Warren St / Boys & Girls Club and Roxbury Court Driveway	A	2.2	-	-	-	A	2.2	-	-	-	A	3.5	-	-	-
B&G Club Driveway EB left/right	C	33.3	0.25	7	24	C	33.3	0.25	7	24	D	39.8	0.42	23	63
Warren St NB left/thru	A	1.3	0.05	2	7	A	1.3	0.05	2	7	A	1.9	0.08	4	12
Warren Street NB thru | thru	A	2.0	0.38	55	90	A	2.1	0.40	60	97	A	2.8	0.42	70	121
Warren Street SB thru | thru/right	A	1.0	0.19	16	25	A	1.0	0.20	17	27	A	1.5	0.22	21	43

Table 7-9. Capacity Analysis Summary, p.m. Peak hour

Intersection/Approach	Existing Condition					No-Build (2026) Condition					Build (2026) Condition				
	LOS	Delay (s)	V/C Ratio	Queue (ft) 50th	Queue (ft) 95th	LOS	Delay (s)	V/C Ratio	Queue (ft) 50th	Queue (ft) 95th	LOS	Delay (s)	V/C Ratio	Queue (ft) 50th	Queue (ft) 95th
Signalized															
Warren St / Boys & Girls Club and Roxbury Court Driveway	A	6.2	-	-	-	A	6.5	-	-	-	A	7.8	-	-	-
B&G Club Driveway EB left/right	D	44.7	0.75	74	109	D	47.0	0.75	80	115	D	54.4	0.80	103	#200
Warren St NB left/thru	A	2.8	0.17	5	m10	A	3.1	0.19	5	m11	A	3.7	0.23	6	m12
Warren Street NB thru | thru	A	2.1	0.36	42	m54	A	2.3	0.38	47	m60	A	2.5	0.23	50	m61
Warren Street SB thru | thru/right	A	3.4	0.42	81	m141	A	3.7	0.44	91	154	A	4.3	0.47	121	166

m: Volume for 95th percentile queue is metered by upstream signal

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

7.6 Transportation Demand Management

While the results presented in **Section 7.5** show that the Project will not have any impact to the adjacent roadway system, the Proponent is committed to implementing comprehensive travel demand management (strategies to minimize dependence on automobile travel.

Because the Project is entirely residential, its trip generation will already be lower than that of an office or retail use project. TDM will be facilitated by the Project's proximity to two Orange Line transit stations, workplaces, and shopping, thereby helping to reduce auto use by residents and visitors alike. The Proponent is committed to implementing the TDM commitments listed below:

- Limited Parking: The Project will provide approximately 150 parking spaces for residents, with 1.0 parking spaces per condominium unit and 0.47 parking spaces per apartment. It is expected that many residents will not own an automobile and will instead rely on car sharing services, taxicabs, or Uber/Lyft, for trips requiring a vehicle.
- Public Transportation:
  - Provide orientation packets to new residents containing information on the available transportation choices, including transit routes and schedules.
  - Provide information on travel alternatives for residents and visitors via the Internet and in the building lobby.
  - Provide an annual (or more frequent) newsletter or bulletin summarizing transit, ridesharing, bicycling, alternative work schedules, and other travel options.
- Bicycle Spaces: Secure bicycle storage will be made available to tenants and visitors to encourage bicycling as an alternative mode of transportation. In accordance with BTD guidelines, the Proponent will provide one secure/covered bicycle parking spaces for each residential unit. Bicycle racks, signs, and parking areas will conform to BTD standards and be sited in safe, secure locations.
- Transportation Coordinator: The Proponent will designate a transportation coordinator to manage loading and service activities and provide alternative transportation materials to Project residents.
- Electric Vehicles: Provide electric vehicle charging stations to accommodate five percent of the total parking and enough infrastructure capacity for future accommodations of at least 15 percent of the total parking spaces and designating at least four percent of the parking spaces as preferred parking for low emission vehicles.
- Vehicle Sharing Program: The Proponent will explore the feasibility of providing spaces in the garage for a car sharing service.

A Transportation Access Plan Agreement will be entered between the Proponent and BTD. The TAPA will memorialize the specific measures and agreements between the Proponent and the City of Boston.

7.7 Evaluation of Short-Term Construction Impacts

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

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

- Limit construction worker parking on-site;
- Encourage worker carpooling;
- Consider a subsidy for MBTA passes for full-time employees; and
- Provide secure spaces on-site for workers' supplies and tools so they do not have to be brought to the site each day.

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

8.0 COORDINATION WITH GOVERNMENTAL AGENCIES

8.1 Architectural Access Board Requirements

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

8.2 Massachusetts Environmental Policy Act

Because of State/Federal funding possibilities, the Proponent anticipates that the Project will require review by the Massachusetts Environmental Policy Act Office of the Massachusetts Office of Energy and Environmental Affairs.

8.3 Boston Civic Design Commission

The Proposed Project will exceed the 100,000 gross square feet size threshold requirement for review by the Boston Civic Design Commission.

8.4 Massachusetts Historical Commission

Because of permits required from the Commonwealth of Massachusetts, the Proposed Project may require Massachusetts Historical Commission State Register Review.

9.0 PROJECT CERTIFICATION

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

THE CRUZ DEVELOPMENT CORPORATION

Signature of Proponent
John B. Cruz, III, President

09/27/19
Date

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

Signature of Preparer
Mitchell L. Fischman, Principal

09/27/19
Date

APPENDIX A – LETTER OF INTENT TO FILE PNF, AUGUST 26, 2019

August 26, 2019

VIA HAND DELIVERY

Mr. Brian Golden, Director
Boston Planning and Development Agency
One City Hall Square, 9th Floor
Boston, MA 02201
Attn: Mr. Dana Whiteside, Deputy Director, Community Economic Development

RE: Letter of Intent to File Project Notification Form
Article 80 - Large Project Review
135 Dudley Street, Roxbury

Dear Director Golden:

The purpose of this letter is to notify the Boston Planning and Development Agency (the "BPDA") of Cruz Development Corporation ("Cruz"), a Massachusetts corporation, (the "Proponent" or "Cruz"), intent to file a Project Notification Form ("PNF") with the BPDA pursuant to Article 80B, Large Project Review requirements of the Boston Zoning Code (the "Code").

The Proponent's Proposed Project involves an approximate 201,662 gross square feet of floor area (excluding the parking garage) for a multi-use development at 135 Dudley Street in the Dudley Square and Roxbury neighborhood, including 150 housing units, 10,727 square feet of street level /commercial space, including office space for the Boston Chapter of the NAACP (with the Proponent providing this space rent free for 10-years) and a restaurant flexible space-tenant amenities / art space, and a parking garage for approximately 245 vehicles (the "Proposed Project"). One of the buildings will be a six-story building containing 50 units of affordable rental housing for families at 30% and 50% of AMI, and the other, an eight-story building containing 100 condominium units, providing homeownership opportunities to 50 households at 70% and 80% of AMI, with the remaining 50 units proposed as market-rate. There will be a landscaped plaza between the two buildings, and one to the east of the retail affordable building adjacent to the Dudley BPL Branch Library, opening on Dudley Street. In addition, the Proposed Project will further the objectives of Mayor Martin J. Walsh's Housing Plan, Housing a Changing City: Boston 2030.

In addition to Dudley Street, the approximate 69,835 SF (1.8-acre) project area is bordered by the Boston Police District B-2 Roxbury Station, The Roxbury Municipal Court, and the Dudley Literacy Center (the "Proposed Site"). The project area is vacant with no on-site buildings. Please see **Figure 1: Project Locus**.

The Site is within a highly commercialized area and is in the midst of a very active transportation node that includes major MBTA bus lines and the Dudley Square MBTA station across Dudley Street.

Cruz became the tentative designated developer of the city of Boston owned site on July 17, 2019 because of the proposal's ability to provide a variety of housing types with mixed-income levels serving all members of the community. During the construction phase the project is projected to support full-time employment for 125 construction jobs from a variety of trades. The development plans will also include approximately 100 parking spaces to be made available to the general public, providing both short-term and long-term parking.

The Proposed Project will exceed the 50,000 square foot total build-out size requirement for a project in a Boston neighborhood and therefore will require preparation of filing(s) under the Large Project Review regulations, pursuant to Article 80 of the Code.

The Project Site is located in the Dudley Square Economic Development Area ("EDA") of the Roxbury Neighborhood Zoning District, Article 50 (Maps 6A-6C). The site is also within Neighborhood Design Review and Boulevard Planning subdistricts. While the proposed multi-family uses are "conditional" within the EDA subdistrict, the proposed retail uses are generally allowed uses. It is expected that relief will be required from the Boston Zoning Board of Appeal.

In support of the required Article 80 Large Project Review process, the Proponent will continue to conduct extensive community outreach with neighbors and abutters of the Project Site, including meetings and discussions with the Roxbury neighborhood and local elected and appointed officials for the neighborhood. The Proponent and its team will continue to meet with the BPDA and Department of Neighborhood Development project team being coordinated by Dana Whiteside, Deputy Director, Community Economic Development.

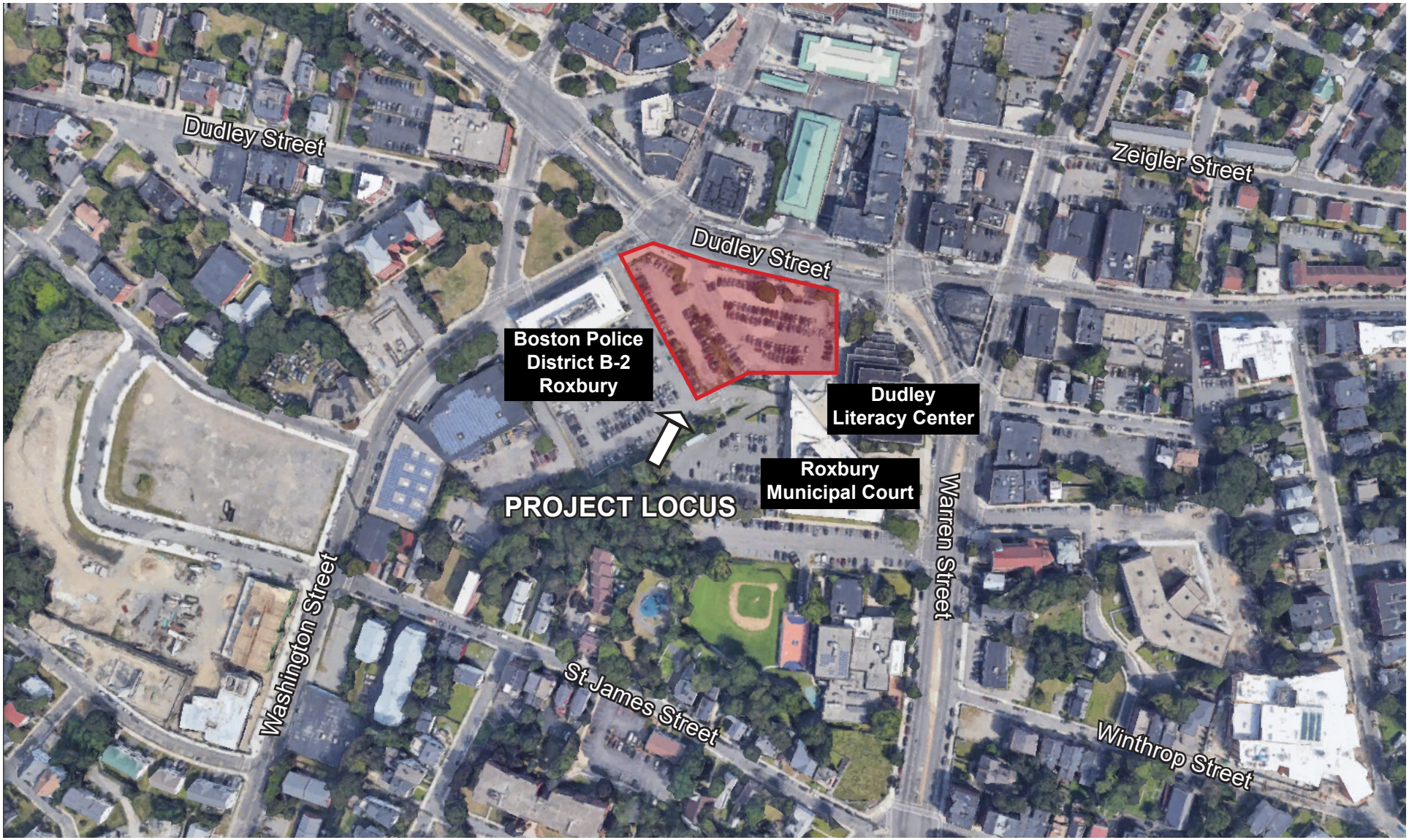
Thank you for your time and attention on our Proposed Project. Our team looks forward to working with you towards a successful outcome. We look forward to receiving any questions or comments that you may have regarding our Proposed Project.

Very truly yours,
CRUZ DEVELOPMENT COPORATION

John B. Cruz III, President

Attachment: Figure 1: Project Locus

cc: Jonathan Greeley, BRA, Director of Development Review and Policy
Kim Janey, District 7-City Councilor
Chynah Tyler, State Senator – 7th Suffolk District
Daniel Joseph Ryan, State Representative – 2nd Suffolk District
Jessica Thomas, Mayor's Office of Neighborhood Services, Roxbury
Daniel Cruz, Jr. Cruz Development Corporation



135 Dudley Street

Figure 1. Project Locus
135 Dudley Street, Roxbury

APPENDIX B – RESPONSES TO CLIMATE CHANGE QUESTIONNAIRE

boston planning & development agency

Appendix B. Climate Resiliency Checklist
135 Dudley Street, Roxbury

A.1 - Project Information

Project Name:	135 Dudley Street			
Project Address:	135 Dudley Street, Roxbury MA			
Project Address Additional:				
Filing Type (*select*)	***PNF***			
Filing Contact	*Colleen Soden*	*Soden Sustainability*	*colleen@sodensustainability.com*	*617-372-7857*
Is MEPA approval required	***Yes***/*no*		*Date 2020*	

A.3 - Project Team

Owner / Developer:	Cruz Development Corporation One John Eliot Square Roxbury, MA 02119 John B. Cruz III, President Daniel Cruz, Jr., Vice President Armond McCoy, Project Manager amccoy@cruzcompanies.com Tel: 617-445-6901
Architect:	The Architectural Team
Engineer:	Bryant Associates
Sustainability / LEED:	Soden Sustainability Consulting
Permitting:	MLF Consulting LLC
Construction Management:	Cruz Construction

A.3 - Project Description and Design Conditions

List the principal Building Uses:	The principal building use is residential R-2 with Group B (Business) and Group M (Mercantile) on the first floor.
List the First Floor Uses:	First floor consists of 15,512 SF of commercial, condominium and rental entry lobbies, bike storage, and structured parking.
List any Critical Site Infrastructure and or Building Uses:	5 Story structured parking garage located within the 9-story condominium building. Rooftop mechanical.

Site and Building:

Site Area:	*69,835 SF*	Building Area:	*346,716 SF*
Building Heights:	*65 & 95 Ft*	Building Height:	*6 & 9 Stories*

Existing Site Elevation – Low:	*21 Ft BCB*	Existing Site Elevation – High:	*25 Ft BCB*
Proposed Site Elevation – Low:	*21Ft BCB*	Proposed Site Elevation – High:	*25Ft BCB*
Proposed First Floor Elevation:	*Ft BCB*	Below grade levels:	*9,6 Stories*

Article 37 Green Building:

LEED Version - Rating System :	BD&C v4	LEED Certification:	*Yes / No*
Proposed LEED rating:	*Certified/Silver/ Gold/Platinum*	Proposed LEED point score:	*64 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:	*45 ci (R)*	Exposed Floor:	*30 ci (R)*
Foundation Wall:	*7.5 ci (R)*	Slab Edge (at or below grade):	*7.5 (R)*

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

Area of Opaque Curtain Wall & Spandrel Assembly:	*0 (%)*	Wall & Spandrel Assembly Value:	*0.048 (U)*
Area of Framed & Insulated / Standard Wall:	*65.8 (%)*	Wall Value	*R13 + R13 ci (R)*
Area of Vision Window:	*33.7 %*	Window Glazing Assembly Value:	*0.40 (U)*
		Window Glazing SHGC:	*0.40 (SHGC)*
Area of Doors:	*0.5 %*	Door Assembly Value:	*0.5 (U)*

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined	*Energy loads and performance were estimated using an eQuest 3.65 energy model based on the September 13, 2019 schematic drawings*		
Annual Electric:	*1,148,910 (kWh)*	Peak Electric:	*279.75 (kW)*
Annual Heating:	*1860 (MMbtu)*	Peak Heating:	*1.6 (MMbtu/hr)*
Annual Cooling:	*30,325 (Tons-hr)*	Peak Cooling:	*30.36 (Tons)*
Energy Use - Below ASHRAE 90.1 - 2013:	*29.4 %*	Have the local utilities reviewed the building energy performance?:	*Yes / no*
Energy Use - Below Mass. Code:	*28.2 %*	Energy Use Intensity:	*46 (kBtu/SF)*

Back-up / Emergency Power System

Electrical Generation Output:	*200 (kW)*	Number of Power Units:	1
System Type:	Ground	Fuel Source:	Natural Gas

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

Electric:	*50 (kW)*	Heating:	*0.75 (MMbtu/hr)*
		Cooling:	*15 (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: *1,073 (Tons)*

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

High energy performance of the building has been incorporated in the project via condensing boilers, condensing DHW heaters, improved envelope, low flow hot water fixtures, and energy star appliances.

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

There is passive energy savings in the orientation of the glazing as well as operable windows and sliders at the balconies.

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

The high efficiency equipment includes: low flow plumbing fixtures, high efficiency condensing boilers, high efficiency condensing domestic hot water heaters, as well as variable speed hot water pumps.

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

A PV array on the roof will provide on-site renewable energy. An onsite cogeneration plant is also being considered.

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

The PV array will provide onsite renewable energy that will provide energy directly to the building.

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

There will not be any energy efficiency assistance offered except that tenants will pay for their own utilities which will encourage individuals to be energy efficient.

B.2 - GHG Reduction - Adaptation Strategies

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

The building design includes a solar PV array to offset electrical use and solar hot water heaters may be added in the future to reduce natural gas use in the building.

C - Extreme Heat Events

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

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low:	*3 Deg.*	Temperature Range - High:	*103 Deg.*
Annual Heating Degree Days:	5,596	Annual Cooling Degree Days	900

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

Days - Above 90°:	*25 #*	Days – Above 100°:	*10 #*
Number of Heatwaves / Year:	*5 #*	Average Duration of Heatwave (Days):	*4 #*

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

Heat island effect is reduced by incorporating reflective building materials as well as covered parking. The roof garden and white roof will also reduce the heat-island effect.

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:

The building is cooled by many individual heat pumps that can operate independently to maintain indoor conditions at higher outdoor average temperatures.

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:

Interruptions of power can be mitigated in the short term by the emergency generator. Longer power outages could require operable windows to provide ventilation and natural cooling.

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:	*6 In.*

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

On-site stormwater infiltration devices will be designed to accommodate 1.25” of runoff generated by on-site impervious surfaces.

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):

On-site stormwater infiltration devices will be designed to accommodate 1.25" of runoff generated by on-site impervious surfaces.

E – Sea Level Rise and Storms

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

Is any portion of the site in a FEMA SFHA?	*Yes / **No***	What Zone:	A, AE, AH, AO, AR, A99, V, VE
		Current FEMA SFHA Zone Base Flood Elevation:	*Ft BCB*

Is any portion of the site in a BPDA Sea Level Rise - Flood Hazard Area? Use the online BPDA SLR-FHA Mapping Tool to assess the susceptibility of the project site.	*Yes / **No***

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

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

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

Sea Level Rise - Base Flood Elevation:	*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

Appendix B.1

135 Dudley St Condo, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Summary

For the 135 Dudley Street Condo Project PNF application, an energy analysis was performed based on the geometry and orientation described in the September 13, 2019 schematic building drawings. Analysis was performed by Allison Gaiko, PE, LEED AP for Soden Sustainability Consulting using eQuest3.65 to compare the proposed design case to two baseline scenarios:

- Energy cost comparison to ASHRAE 90.1-2010 Appendix G in accordance with LEED v4 requirements
- Energy use comparison to ASHRAE 90.1-2013 in accordance with MA Energy Code requirements

Model Input Assumptions

Below is a table summarizing the input of the proposed design and two baseline energy models

		ASHRAE 90.1-2010	ASHRAE 90.1-2013		Proposed
Opaque Assemblies	Roof	R20ci insulation – U-0.048	R30ci insulation – U-0.032		R45ci insulation - U-0.022
	Above Grade Walls	R13 + R7.5ci – U-0.064	R13 + R10ci – U-0.055		R13 + R13ci – U-0.048
	Exposed Floor	R30 – U-0.038	R30 – U-0.038		R30 – U-0.038
	Slab on Grade (unheated)	F-0.730	F-0.520		F-0.520
Glazing	Metal Framing U-Factor (other)	Assembly U-0.55 Condo Assembly U-0.45 Retail	Assembly U-0.50 (operable) U-0.42 (fixed)		Assembly U-0.40
	SHGC	Assembly SHGC - 0.4	Assembly SHGC - 0.4		Assembly SHGC - 0.4
Lighting	Residential Dwelling[3]	0.90 W/SF	0.9 W/SF		0.9 W/SF
	Retail[3]	1.68 W/SF	1.30 W/SF		1.26 W/SF
	Corridor/Transition[3]	0.66 W/SF	0.59 W/SF		0.50 W/SF
	Parking Garage[3]	0.19 W/SF	0.17 W/SF		0.14 W/SF
Process Loads	Residential Dwelling[1]	1.38 W/SF	1.38 W/SF		1.31 W/SF
	Corridor/Transition	0.2 W/SF	0.2 W/SF		0.2 W/SF
	Elevator	30 kW/car	30 kW/car		30 kW/car

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135 Dudley St Condo, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

		ASHRAE 90.1-2010	ASHRAE 90.1-2013		Proposed
DHW	Hot Water Heater Efficiency	80%	88%		95%
	Lavatory Sink Flow[2]	2.2 GPM	2.2 GPM		0.5 GPM
	Kitchen Sink Flow[2]	2.2 GPM	2.2 GPM		1.5 GPM
	Shower Flow[2]	2.5 GPM	2.5 GPM		1.5 GPM
HVAC	Boiler[3]	80%	88%		95%
	HW temperature	180 °F	180 °F		150 °F
	PTAC EER[3]	9.3 EER	10.45 EER		13 EER
	Chiller[3]	0.78 kW/ton	0.675 kW/ton		0.65 kW/ton

Please note that the energy model is not created to predict actual energy use for the proposed building but rather to compare energy consumption between the design case and baseline cases. Inputs such as occupancy, weather data and individual occupants' habits affect the proposed model's ability to predict energy use. For this reason, the baseline and design models were created with identical weather data as well as identical schedules for parameters such as occupancy, lighting EFLH (electrical full load hours), and temperature set points. Schedules were based on the EFLH Tab of the v4 Minimum Energy Performance Calculator created for LEED v4 and are summarized in the attached Appendix.

Table notes:

1. Reduction in plug load in the residential units is based on Energy Star appliances that have been incorporated in the project and has been calculated based on the Multi-Family Tab of the v4 Minimum Energy Performance Calculator created for LEED v4 and are summarized in the attached Appendix.
2. Reduction in domestic hot water flow in the residential units is based on the reduced flow fixtures and Energy Star appliances that have been incorporated in the project and has been calculated based on the Multi-Family Tab of the v4 Minimum Energy Performance Calculator created for LEED v4 and are summarized in the attached Appendix.
3. In accordance with Massachusetts Code requirements section C406, two additional efficiency package options were included in the ASHARAE 90.1-2013 baseline case. The two options selected were (1) More efficient HVAC performance – Exceed energy efficiency provisions by 10% and (2) Reduced lighting power density by 10%.

Appendix B.1

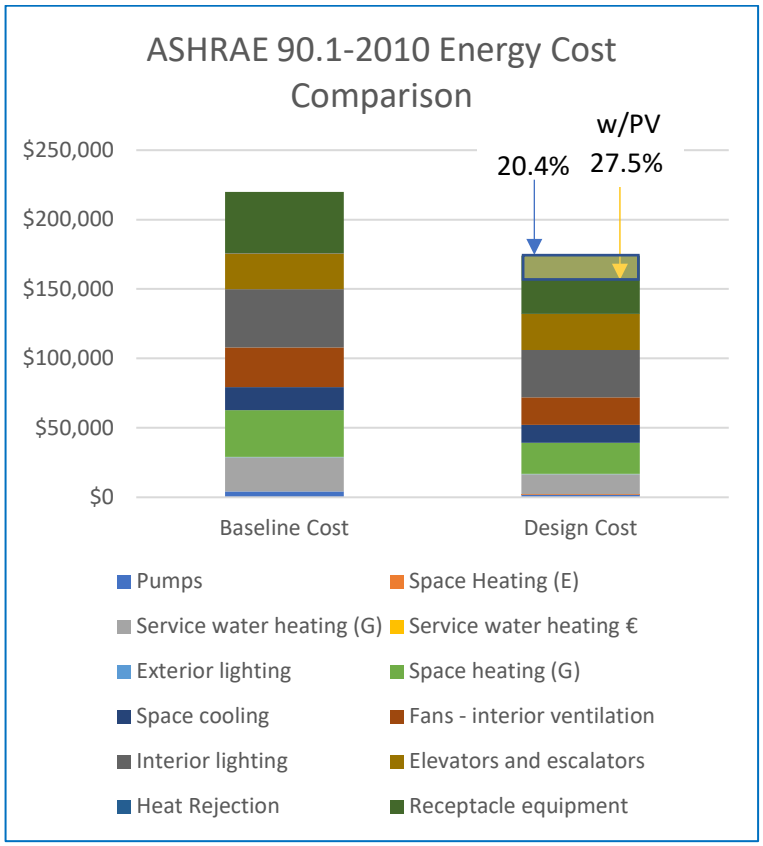
135 Dudley St Condo, Roxbury, MA

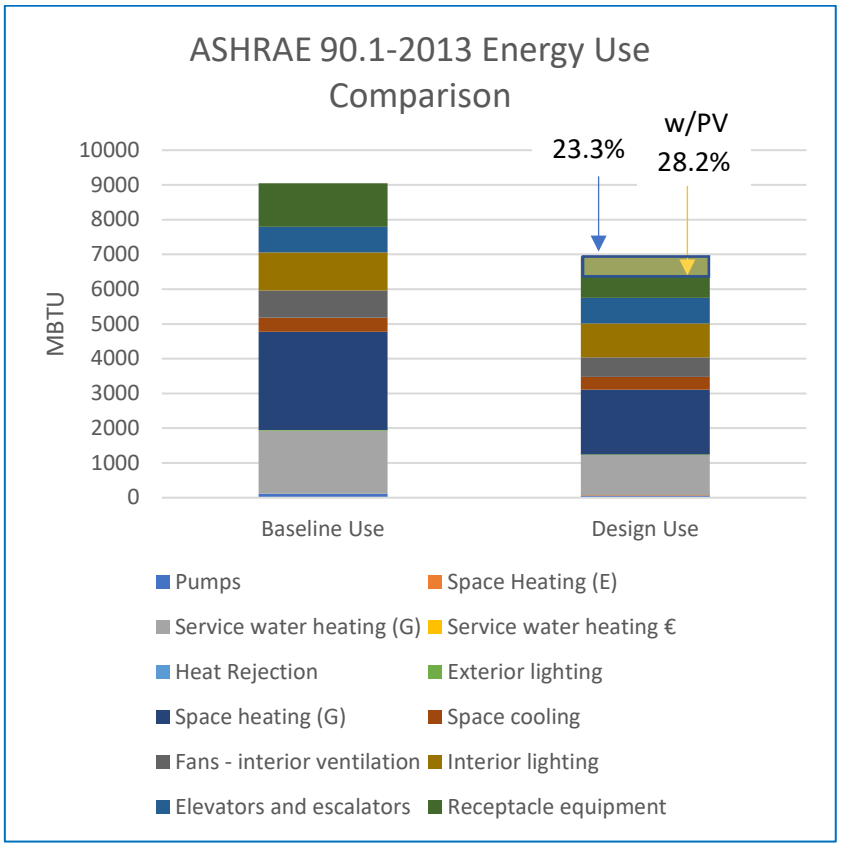
PNF Application Preliminary Energy Model Analysis

Model Results

The results of the 135 Dudley Street preliminary energy model analysis show:

- 27.5% annual energy cost reduction vs ASHRAE 90.1-2010 (12 LEEDv4 points)
- 28.2% annual energy use reduction vs ASHRAE 90.1-2013 (MA Energy Code)





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135 Dudley St Condo, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Most of the energy savings in the 135 Dudley Street Condo project are the result of efficient envelope design, reduced lighting power, condensing domestic hot water heaters and boilers, and solar photovoltaic panels; and are represented in the above graphs by reductions in space heating, interior lighting and service water heating energy use and cost. PV savings is shown as the yellow shaded block at the top of each design graph.

Appendix B.1

135 Dudley St Condo, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Appendix

(OPTIONAL) Equivalent Full Load Hours Calculator

Default Schedules

Residential Dwelling Unit Default Schedules

Schedule Name: Dwelling Unit Thermostat setpoint schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	Hours/day	Hours/year
Daily Heating Setpoint	70.0	70.0	70.0	70.0	70.0	70.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	70.0	24.00	8,760
Daily Cooling Setpoint	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	80.0	80.0	80.0	80.0	80.0	80.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	24.00	8,760

Schedule Name: Dwelling Unit Lighting Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	7.7%	14.0%	14.0%	10.8%	10.8%	10.8%	7.7%	7.7%	7.7%	7.7%	7.7%	10.8%	21.7%	21.7%	21.7%	21.7%	18.6%	1.6%	2.34	585
Weekend	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	7.7%	14.0%	14.0%	10.8%	10.8%	10.8%	7.7%	7.7%	7.7%	7.7%	7.7%	10.8%	21.7%	21.7%	21.7%	21.7%	18.6%	1.6%	2.34	243
Holiday	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	7.7%	14.0%	14.0%	10.8%	10.8%	10.8%	7.7%	7.7%	7.7%	7.7%	7.7%	10.8%	21.7%	21.7%	21.7%	21.7%	18.6%	1.6%	2.34	26
Total Equivalent Full Load Hours of Operation per Year																										854

Schedule Name: Dwelling Unit Miscellaneous Equipment Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	5%	5%	50%	50%	50%	50%	30%	50%	50%	50%	50%	50%	35%	5%	5%	5%	5%	5%	5.80	1,450
Weekend	5%	5%	5%	5%	5%	5%	5%	5%	50%	50%	50%	50%	30%	50%	50%	50%	50%	50%	35%	5%	5%	5%	5%	5%	5.80	603
Holiday	5%	5%	5%	5%	5%	5%	5%	5%	50%	50%	50%	50%	30%	50%	50%	50%	50%	50%	35%	5%	5%	5%	5%	5%	5.80	64
Total Equivalent Full Load Hours of Operation per Year																										2,117

Schedule Name: Residential Common Area Miscellaneous Equipment Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	10%	10%	10%	10%	10%	30%	45%	45%	45%	45%	30%	30%	30%	30%	30%	30%	30%	30%	60%	80%	90%	80%	60%	30%	9.00	2,250
Weekend	10%	10%	10%	10%	10%	30%	45%	45%	45%	45%	30%	30%	30%	30%	30%	30%	30%	30%	60%	80%	90%	80%	60%	30%	9.00	936
Holiday	10%	10%	10%	10%	10%	30%	45%	45%	45%	45%	30%	30%	30%	30%	30%	30%	30%	30%	60%	80%	90%	80%	60%	30%	9.00	99
Total Equivalent Full Load Hours of Operation per Year																										3,285

Schedule Name: Residential DHW Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	30%	50%	40%	30%	30%	35%	40%	35%	35%	30%	30%	50%	50%	40%	35%	45%	30%	5%	6.70	1,675
Weekend	5%	5%	5%	5%	5%	5%	30%	50%	40%	30%	30%	35%	40%	35%	35%	30%	30%	50%	50%	40%	35%	45%	30%	5%	6.70	697
Holiday	5%	5%	5%	5%	5%	5%	30%	50%	40%	30%	30%	35%	40%	35%	35%	30%	30%	50%	50%	40%	35%	45%	30%	5%	6.70	74
Total Equivalent Full Load Hours of Operation per Year																										2,446

Schedule Name: Apt Elev

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	20%	40%	50%	40%	40%	35%	35%	30%	30%	30%	40%	45%	50%	40%	35%	30%	10%	5%	6.35	1,588
Weekend	5%	5%	5%	5%	5%	5%	10%	25%	50%	50%	50%	40%	45%	45%	40%	40%	50%	45%	45%	45%	30%	30%	25%	15%	7.10	738
Holiday	5%	5%	5%	5%	5%	5%	10%	25%	50%	50%	50%	40%	45%	45%	40%	40%	50%	45%	45%	45%	30%	30%	25%	15%	7.10	78
Total Equivalent Full Load Hours of Operation per Year																										2,404

Appendix B.1

135 Dudley St Condo, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Schedule Name: Retail HVAC System - ON/OFF Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	Hours/day	Hours/year
Weekday	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	15.00	3,750
Saturday	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	16.00	832
Sunday	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	9.00	468
Holiday	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	9.00	99
Total hours of operation per year																										5,149

Schedule Name: Retail Occupancy Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	0%	0%	0%	0%	0%	0%	0%	10%	20%	50%	50%	70%	70%	70%	70%	80%	70%	50%	50%	30%	30%	0%	0%	0%	7.20	1,800
Saturday	0%	0%	0%	0%	0%	0%	0%	10%	20%	50%	60%	80%	80%	80%	80%	80%	80%	60%	20%	20%	20%	10%	0%	0%	7.50	390
Sunday	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	20%	20%	40%	40%	40%	40%	40%	20%	10%	0%	0%	0%	0%	0%	2.80	146
Holiday	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	20%	20%	40%	40%	40%	40%	40%	20%	10%	0%	0%	0%	0%	0%	2.80	31
Total Equivalent Full Load Hours of Operation per Year																										2,366

Schedule Name: Retail Lighting Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	5%	20%	50%	85%	85%	85%	85%	85%	85%	85%	85%	85%	55%	55%	50%	20%	5%	5%	10.60	2,650
Saturday	5%	5%	5%	5%	5%	5%	5%	10%	30%	55%	85%	85%	85%	85%	85%	85%	85%	85%	50%	30%	30%	10%	5%	5%	9.40	489
Sunday	5%	5%	5%	5%	5%	5%	5%	5%	10%	10%	40%	40%	55%	55%	55%	55%	55%	40%	20%	5%	5%	5%	5%	5%	5.00	260
Holiday	5%	5%	5%	5%	5%	5%	5%	5%	10%	10%	40%	40%	55%	55%	55%	55%	55%	40%	20%	5%	5%	5%	5%	5%	5.00	55
Total Equivalent Full Load Hours of Operation per Year																										3,454

Schedule Name: Retail Receptacle Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	5%	20%	50%	90%	90%	90%	90%	90%	90%	90%	90%	90%	60%	60%	50%	20%	5%	5%	11.15	2,788
Saturday	5%	5%	5%	5%	5%	5%	5%	10%	30%	60%	90%	90%	90%	90%	90%	90%	90%	90%	50%	30%	30%	10%	5%	5%	9.85	512
Sunday	5%	5%	5%	5%	5%	5%	5%	5%	10%	10%	40%	40%	55%	55%	55%	55%	55%	40%	20%	5%	5%	5%	5%	5%	5.00	260
Holiday	5%	5%	5%	5%	5%	5%	5%	5%	10%	10%	40%	40%	55%	55%	55%	55%	55%	40%	20%	5%	5%	5%	5%	5%	5.00	55
Total Equivalent Full Load Hours of Operation per Year																										3,615

Schedule Name: Retail DHW Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	4%	5%	5%	4%	4%	4%	4%	15%	23%	32%	41%	57%	62%	61%	50%	45%	46%	47%	42%	34%	33%	23%	13%	8%	6.62	1,655
Saturday	11%	10%	8%	6%	6%	6%	7%	20%	24%	27%	42%	54%	59%	60%	49%	48%	47%	46%	44%	36%	29%	22%	16%	13%	6.90	359
Sunday	7%	7%	7%	6%	6%	6%	7%	10%	12%	14%	29%	31%	36%	36%	34%	35%	37%	34%	25%	27%	21%	16%	10%	6%	4.59	239
Holiday	7%	7%	7%	6%	6%	6%	7%	10%	12%	14%	29%	31%	36%	36%	34%	35%	37%	34%	25%	27%	21%	16%	10%	6%	4.59	50
Total Equivalent Full Load Hours of Operation per Year																										2,303

Appendix B.1

135 Dudley St Condo, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Multifamily Home Details

Complete the table for each building in the project. Input the number of units and the average floor area for units with the corresponding bedroom number.

Building Unit summary

Building ID	Studio		1 Bedroom		2 Bedrooms		3 Bedrooms		4 Bedrooms		5 Bedrooms		6 Bedrooms		7 Bedrooms		8 Bedrooms	
	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq
135 Dudley St Condo			15	800	84	1,200	7	1,350										
Total number of units																		106
Total number of bedrooms																		204
Total Area of Dwelling Units (square feet)																		122,250

Building ID	Total Number of Units	Total Number of Bedrroms	Total Area of Dwelling Units (square feet)	Average Number of Bedrooms Per Unit	Average Floor Area per Unit (square feet)	Average Floor Area Per Unit for Reference Building (square feet)
135 Dudley St Condo	106	204	122,250	1.92	1,153	1,554

Homes Dwelling Unit Equipment Calculator

Enter the appliances and equipment that is present in the residential dwelling units for the project. For clothes washers and dryers, enter the quantity of each unit installed within the project scope of work. For fans, enter the total supply volume for all fans installed for the project.

Building ID	Load Source	Quantity (or sum total fan volume [cfm] for fans)	Energy Star Eqp?	Average bedrooms per dwelling unit		Electric Loads					Natural Gas Loads					Annual Service Hot Water Load (gallons/year)			
						Annual Consumption (kWh/year)		Sensible Ratio	Latent Ratio		Annual Consumption (therms/year)		Sensible Ratio	Latent Ratio		Baseline Per Equipment	Proposed Per Equipment	Baseline Total	Proposed Total
						Baseline	Proposed				Baseline	Proposed							
135 Dudley St C	Refrigerator	106	Yes	1.924528		56074	44838	1	0		0	0	0.00	0.00		0.00	0.00	0.00	0
135 Dudley St C	Dishwasher	106	Yes	1.924528		21836	17384	0.6	0.15		0	0	0.00	0.00		1290.00	860.00	136740.00	91160
135 Dudley St C	Cooking (electric stove/range)	106	Yes	1.924528		64024	64024	0.4	0.3		0	0	0.00	0.00		0.00	0.00	0.00	0
135 Dudley St C	Clothes Dryer (In-unit electric)	106	Yes	1.924528		72664	72664	0.15	0.05		0	0	0.00	0.00		0.00	0.00	0.00	0
135 Dudley St Cor	Bath / Utility Fan, 10 to 89 cfm	2825	Yes	1.924528		1,719	1,473	0	0		0	0	0.00	0.00		0.00	0.00	0.0	0.0
135 Dudley St Cor	Bath / Utility Fan, 10 to 89 cfm	5300	Yes	1.924528		3,224	2,764	0	0		0	0	0.00	0.00		0.00	0.00	0.0	0.0
135 Dudley St Cor	Clothes Washer (In-unit)	106	Yes	1.924528		8,586	6,042	0.8	0		0	0	0.00	0.00		2,435.80	1,127.40	258,194.8	119,504.4

Homes Dwelling Unit Equipment Modeling Summary

Report the modeled Receptacle Equipment and Appliances Equivalent Full Load Hours of Operation in the Schedules tab before referring to the table below. The Equivalent Full Load Hours of Operation is used to calculate the equipment power density for resdential dwelling units that must be modeled based on the building equipment reported for the building. After confirming the Equivalent Full Load Hours of Operation in the schedules tab, use the values below for the Baseline and Proposed Miscellaneous Equipment Loads in the Dwelling Units. These loads include 0.5 Watts per square foot of electric miscellaneous equipment load with a 0.9 sensible ratio and 0.1 latent ratio in addition to the equipment load sources selected above.

Building ID	Equivalent Full Load Hours of Dwelling Unit Miscellaneous Equipment Operation Per Year	Total Area of Dwelling Units (square feet)		Electric Miscellaneous Loads in Dwelling Unit (including appliances and equipment listed above)							Natural Gas Miscellaneous Loads in Dwelling Unit (including appliances and equipment listed above)							Dwelling Unit Equipment Hot Water Loads	
				Baseline			Proposed				Baseline			Proposed					
				Equipment Power Density (Watts/sq ft)	Sensible Ratio	Latent Ratio	Equipment Power Density (Watts/sq ft)	Sensible Ratio	Latent Ratio		Equipment Power Density (Btu/sq ft)	Sensible Ratio	Latent Ratio	Equipment Power Density (Btu/sq ft)	Sensible Ratio	Latent Ratio		Base	Proposed
135 Dudley St Cor	2,117	122250		1.38	0.64	0.11	1.31	0.63	0.11		0.00			0.00				394334.80	210664.40

Appendix B.1

135 Dudley St Condo, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Homes Service Water Heating Load Summary

Residential Usage Profile Dependent on Project Demographics		Baseline Residential Usage per person Excluding Clothes / Dish Washers	
Low	Demographics such as all occupants working, seniors, middle income, and higher population density.	12	gallons/day
Medium	Demographics such as mixture of working / non-working occupants, mixture of age groups, medium population densities.	25	gallons/day
High	Demographics such high percentages of children, low income, public assistance, or no occupants working.	44	gallons/day

Report the modeled Service Water Heating Full Load Hours of Operation in the Schedules tab before referring to the table below. The Equivalent Full Load Hours of Operation is used to calculate the DHW modeled peak residential flow a the DHW Heater that must be modeled to be consistent with the annual hot water consumption calculated here. After confirming the Equivalent Full Load Hours of Operation in the schedules tab,Identify the residential service water heating usage profile, and the average fixture flows for sink and shower fixtures. Supply temperature at fixture point of use shall be 120 degrees F. If the modeled supply DHW temperature from the DHW heater is higher than this, indicate the supply DHW temperature from the DHW heater and the average cold water input temperature below.

This information along with the appliance information entered above and the schedule data from the schedules tab is used to determine the DHW modeled Peak Flow at DHW heater,which should be input into the energy model.

Building ID	Residential Usage Profile	Average Fixture Flows (gallons/minute)		DHW Temperature Settings (degrees F)			DHW Sink and Shower Fixture Loads at Point of Use (gallons / year)		DHW In-Unit Appliance Loads at Point of Use (gallons / year)		DHW Laundry Room Equipment Loads at Point of Use (gallons / year)		DHW Total Residential Loads at Point of Use (gallons / year)		DHW Total Residential Loads at DHW Heater (gallons / year)		DHW Equivalent Full Load Hours of Operation	DHW Modeled Peak Residential Flow at DHW Heater (gallons / minute)	
		Showers	Sinks	DHW Supply Temp	Average Cold Water Temp	DHW Temp at Fixture Point of Use	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed		Baseline	Proposed
135 Dudley St Cor	High	1.50	0.50	135.0	50.0	120.0	3,276,240	2,315,408	394,935	210,664	0	0	3,671,175	2,526,073	3,023,320	2,080,295	2,446	20.605	14.178

Appendix B.1

135 Dudley St Condo, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

RESULTS

Print Results

130,327 kWh/Year*

System output may range from 125,088 to 135,071 kWh per year near this location.
Click HERE for more information.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)	Value ($)
January	3.14	7,933	952
February	3.95	8,916	1,070
March	4.66	11,509	1,381
April	5.51	12,569	1,508
May	5.60	13,032	1,564
June	6.06	13,423	1,611
July	6.54	14,761	1,771
August	5.96	13,503	1,620
September	5.27	11,735	1,408
October	3.98	9,419	1,130
November	2.94	6,998	840
December	2.61	6,529	784
Annual	4.69	130,327	$ 15,639

Appendix B.1

135 Dudley St Condo, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Location and Station Identification	
Requested Location	135 Dudley St, Roxbury, MA
Weather Data Source	Lat, Lon: 42.33, -71.1 0.8 mi
Latitude	42.33° N
Longitude	71.1° W

Appendix B.2

135 Dudley St Apartment, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Summary

For the 135 Dudley Street Apartment PNF application, an energy analysis was performed based on the geometry and orientation described in the September 13, 2019 schematic building drawings. Analysis was performed by Allison Gaiko, PE, LEED AP for Soden Sustainability Consulting using eQuest3.65 to compare the proposed design case to two baseline scenarios:

- Energy cost comparison to ASHRAE 90.1-2010 Appendix G in accordance with LEED v4 requirements
- Energy use comparison to ASHRAE 90.1-2013 in accordance with MA Energy Code requirements

Model Input Assumptions

Below is a table summarizing the input of the proposed design and two baseline energy models

		ASHRAE 90.1-2010	ASHRAE 90.1-2013		Proposed
Opaque Assemblies	Roof	R20ci insulation – U-0.048	R30ci insulation – U-0.032		R45ci insulation - U-0.022
	Above Grade Walls	R13 + R7.5ci – U-0.064	R13 + R10ci – U-0.055		R13 + R13ci – U-0.048
	Exposed Floor	R30 – U-0.038	R30 – U-0.038		R30 – U-0.038
	Slab on Grade (unheated)	F-0.730	F-0.520		F-0.520
Glazing	Metal Framing U-Factor (other)	Assembly U-0.55 Apartment Assembly U-0.45 Retail	Assembly U-0.50 (operable) U-0.42 (fixed)		Assembly U-0.40
	SHGC	Assembly SHGC - 0.4	Assembly SHGC - 0.4		Assembly SHGC - 0.4
Lighting	Residential Dwelling[3]	0.90 W/SF	0.9 W/SF		0.9 W/SF
	Retail[3]	1.68 W/SF	1.30 W/SF		1.26 W/SF
	Corridor/Transition[3]	0.66 W/SF	0.59 W/SF		0.50 W/SF
	Parking Garage[3]	0.19 W/SF	0.17 W/SF		0.14 W/SF
Process Loads	Residential Dwelling[1]	1.38 W/SF	1.38 W/SF		1.31 W/SF
	Corridor/Transition	0.2 W/SF	0.2 W/SF		0.2 W/SF
	Elevator	30 kW/car	30 kW/car		30 kW/car

Appendix B.2

135 Dudley St Apartment, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

		ASHRAE 90.1-2010	ASHRAE 90.1-2013		Proposed
DHW	Hot Water Heater Efficiency	80%	88%		95%
	Lavatory Sink Flow[2]	2.2 GPM	2.2 GPM		0.5 GPM
	Kitchen Sink Flow[2]	2.2 GPM	2.2 GPM		1.5 GPM
	Shower Flow[2]	2.5 GPM	2.5 GPM		1.5 GPM
HVAC	Boiler[3]	80%	88%		95%
	HW temperature	180 °F	180 °F		150 °F
	PTAC EER[3]	9.3 EER	10.45 EER		13 EER
	Chiller[3]	0.78 kW/ton	0.675 kW/ton		0.65 kW/ton

Please note that the energy model is not created to predict actual energy use for the proposed building but rather to compare energy consumption between the design case and baseline cases. Inputs such as occupancy, weather data and individual occupants' habits affect the proposed model's ability to predict energy use. For this reason, the baseline and design models were created with identical weather data as well as identical schedules for parameters such as occupancy, lighting EFLH (electrical full load hours), and temperature set points. Schedules were based on the EFLH Tab of the v4 Minimum Energy Performance Calculator created for LEED v4 and are summarized in the attached Appendix.

Table notes:

1. Reduction in plug load in the residential units is based on Energy Star appliances that have been incorporated in the project and has been calculated based on the Multi-Family Tab of the v4 Minimum Energy Performance Calculator created for LEED v4 and are summarized in the attached Appendix.
2. Reduction in domestic hot water flow in the residential units is based on the reduced flow fixtures and Energy Star appliances that have been incorporated in the project and has been calculated based on the Multi-Family Tab of the v4 Minimum Energy Performance Calculator created for LEED v4 and are summarized in the attached Appendix.
3. In accordance with Massachusetts Code requirements section C406, two additional efficiency package options were included in the ASHARAE 90.1-2013 baseline case. The two options selected were (1) More efficient HVAC performance – Exceed energy efficiency provisions by 10% and (2) Reduced lighting power density by 10%.

Appendix B.2

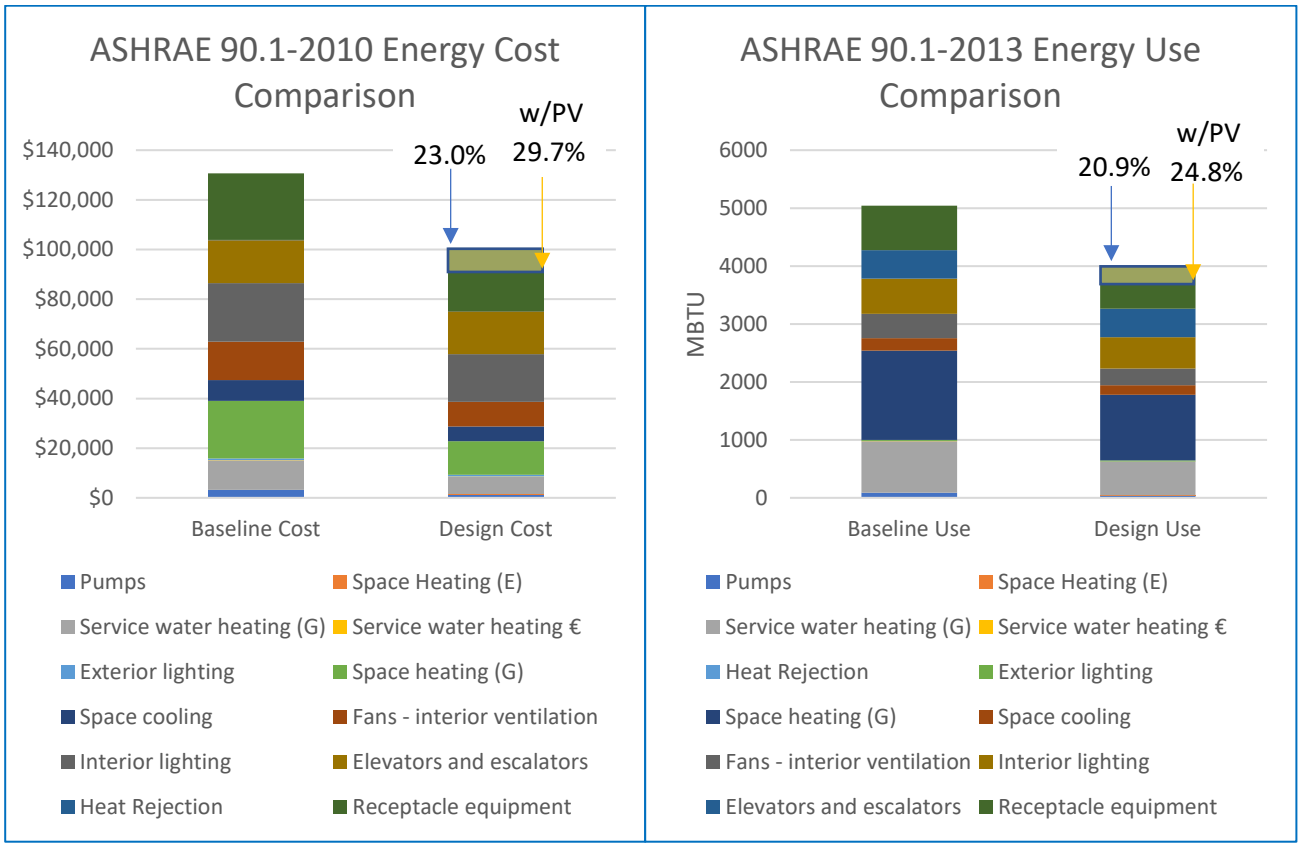
135 Dudley St Apartment, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Model Results

The results of the 135 Dudley Street Apartment Building preliminary energy model analysis show:

- 29.7% annual energy cost reduction vs ASHRAE 90.1-2010 (12 LEEDv4 points)
- 24.8% annual energy use reduction vs ASHRAE 90.1-2013 (MA Energy Code)



Appendix B.2

135 Dudley St Apartment, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Most of the energy savings in the 135 Dudley Street Apartment are the result of efficient envelope design, reduced lighting power, condensing domestic hot water heaters and boilers, and solar photovoltaic panels; and are represented in the above graphs by reductions in space heating, interior lighting and service water heating energy use and cost. PV savings is shown as the yellow shaded block at the top of each design graph.

Appendix B.2

135 Dudley St Apartment, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Appendix

(OPTIONAL) Equivalent Full Load Hours Calculator

Default Schedules

Residential Dwelling Unit Default Schedules

Schedule Name: Dwelling Unit Thermostat setpoint schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	Hours/day	Hours/year
Daily Heating Setpoint	70.0	70.0	70.0	70.0	70.0	70.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	72.0	70.0	24.00	8,760
Daily Cooling Setpoint	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	80.0	80.0	80.0	80.0	80.0	80.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	24.00	8,760

Schedule Name: Dwelling Unit Lighting Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	7.7%	14.0%	14.0%	10.8%	10.8%	10.8%	7.7%	7.7%	7.7%	7.7%	7.7%	10.8%	21.7%	21.7%	21.7%	21.7%	18.6%	1.6%	2.34	585
Weekend	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	7.7%	14.0%	14.0%	10.8%	10.8%	10.8%	7.7%	7.7%	7.7%	7.7%	7.7%	10.8%	21.7%	21.7%	21.7%	21.7%	18.6%	1.6%	2.34	243
Holiday	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	7.7%	14.0%	14.0%	10.8%	10.8%	10.8%	7.7%	7.7%	7.7%	7.7%	7.7%	10.8%	21.7%	21.7%	21.7%	21.7%	18.6%	1.6%	2.34	26
Total Equivalent Full Load Hours of Operation per Year																										854

Schedule Name: Dwelling Unit Miscellaneous Equipment Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	5%	5%	50%	50%	50%	50%	30%	50%	50%	50%	50%	50%	35%	5%	5%	5%	5%	5%	5.80	1,450
Weekend	5%	5%	5%	5%	5%	5%	5%	5%	50%	50%	50%	50%	30%	50%	50%	50%	50%	50%	35%	5%	5%	5%	5%	5%	5.80	603
Holiday	5%	5%	5%	5%	5%	5%	5%	5%	50%	50%	50%	50%	30%	50%	50%	50%	50%	50%	35%	5%	5%	5%	5%	5%	5.80	64
Total Equivalent Full Load Hours of Operation per Year																										2,117

Schedule Name: Residential Common Area Miscellaneous Equipment Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	10%	10%	10%	10%	10%	30%	45%	45%	45%	45%	30%	30%	30%	30%	30%	30%	30%	30%	60%	80%	90%	80%	60%	30%	9.00	2,250
Weekend	10%	10%	10%	10%	10%	30%	45%	45%	45%	45%	30%	30%	30%	30%	30%	30%	30%	30%	60%	80%	90%	80%	60%	30%	9.00	936
Holiday	10%	10%	10%	10%	10%	30%	45%	45%	45%	45%	30%	30%	30%	30%	30%	30%	30%	30%	60%	80%	90%	80%	60%	30%	9.00	99
Total Equivalent Full Load Hours of Operation per Year																										3,285

Schedule Name: Residential DHW Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	30%	50%	40%	30%	30%	35%	40%	35%	35%	30%	30%	50%	50%	40%	35%	45%	30%	5%	6.70	1,675
Weekend	5%	5%	5%	5%	5%	5%	30%	50%	40%	30%	30%	35%	40%	35%	35%	30%	30%	50%	50%	40%	35%	45%	30%	5%	6.70	697
Holiday	5%	5%	5%	5%	5%	5%	30%	50%	40%	30%	30%	35%	40%	35%	35%	30%	30%	50%	50%	40%	35%	45%	30%	5%	6.70	74
Total Equivalent Full Load Hours of Operation per Year																										2,446

Schedule Name: Apt Elev

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	20%	40%	50%	40%	40%	35%	35%	30%	30%	30%	40%	45%	50%	40%	35%	30%	10%	5%	6.35	1,588
Weekend	5%	5%	5%	5%	5%	5%	10%	25%	50%	50%	50%	40%	45%	45%	40%	40%	50%	45%	45%	45%	30%	30%	25%	15%	7.10	738
Holiday	5%	5%	5%	5%	5%	5%	10%	25%	50%	50%	50%	40%	45%	45%	40%	40%	50%	45%	45%	45%	30%	30%	25%	15%	7.10	78
Total Equivalent Full Load Hours of Operation per Year																										2,404

Appendix B.2

135 Dudley St Apartment, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Schedule Name: Retail HVAC System - ON/OFF Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	Hours/day	Hours/year
Weekday	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	15.00	3,750
Saturday	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	16.00	832
Sunday	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	9.00	468
Holiday	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	9.00	99
Total hours of operation per year																										5,149

Schedule Name: Retail Occupancy Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	0%	0%	0%	0%	0%	0%	0%	10%	20%	50%	50%	70%	70%	70%	70%	80%	70%	50%	50%	30%	30%	0%	0%	0%	7.20	1,800
Saturday	0%	0%	0%	0%	0%	0%	0%	10%	20%	50%	60%	80%	80%	80%	80%	80%	80%	60%	20%	20%	20%	10%	0%	0%	7.50	390
Sunday	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	20%	20%	40%	40%	40%	40%	40%	20%	10%	0%	0%	0%	0%	0%	2.80	146
Holiday	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	20%	20%	40%	40%	40%	40%	40%	20%	10%	0%	0%	0%	0%	0%	2.80	31
Total Equivalent Full Load Hours of Operation per Year																										2,366

Schedule Name: Retail Lighting Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	5%	20%	50%	85%	85%	85%	85%	85%	85%	85%	85%	85%	55%	55%	50%	20%	5%	5%	10.60	2,650
Saturday	5%	5%	5%	5%	5%	5%	5%	10%	30%	55%	85%	85%	85%	85%	85%	85%	85%	85%	50%	30%	30%	10%	5%	5%	9.40	489
Sunday	5%	5%	5%	5%	5%	5%	5%	5%	10%	10%	40%	40%	55%	55%	55%	55%	55%	40%	20%	5%	5%	5%	5%	5%	5.00	260
Holiday	5%	5%	5%	5%	5%	5%	5%	5%	10%	10%	40%	40%	55%	55%	55%	55%	55%	40%	20%	5%	5%	5%	5%	5%	5.00	55
Total Equivalent Full Load Hours of Operation per Year																										3,454

Schedule Name: Retail Receptacle Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	5%	5%	5%	5%	5%	5%	5%	20%	50%	90%	90%	90%	90%	90%	90%	90%	90%	90%	60%	60%	50%	20%	5%	5%	11.15	2,788
Saturday	5%	5%	5%	5%	5%	5%	5%	10%	30%	60%	90%	90%	90%	90%	90%	90%	90%	90%	50%	30%	30%	10%	5%	5%	9.85	512
Sunday	5%	5%	5%	5%	5%	5%	5%	5%	10%	10%	40%	40%	55%	55%	55%	55%	55%	40%	20%	5%	5%	5%	5%	5%	5.00	260
Holiday	5%	5%	5%	5%	5%	5%	5%	5%	10%	10%	40%	40%	55%	55%	55%	55%	55%	40%	20%	5%	5%	5%	5%	5%	5.00	55
Total Equivalent Full Load Hours of Operation per Year																										3,615

Schedule Name: Retail DHW Schedule

	12-1AM	1-2AM	2-3AM	3-4AM	4-5AM	5-6AM	6-7AM	7-8AM	8-9 AM	9-10AM	10-11AM	1AM-12PM	12-1PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	7-8PM	8-9PM	9-10PM	10-11PM	11-12PM	EFLH/day	EFLH/year
Weekday	4%	5%	5%	4%	4%	4%	4%	15%	23%	32%	41%	57%	62%	61%	50%	45%	46%	47%	42%	34%	33%	23%	13%	8%	6.62	1,655
Saturday	11%	10%	8%	6%	6%	6%	7%	20%	24%	27%	42%	54%	59%	60%	49%	48%	47%	46%	44%	36%	29%	22%	16%	13%	6.90	359
Sunday	7%	7%	7%	6%	6%	6%	7%	10%	12%	14%	29%	31%	36%	36%	34%	35%	37%	34%	25%	27%	21%	16%	10%	6%	4.59	239
Holiday	7%	7%	7%	6%	6%	6%	7%	10%	12%	14%	29%	31%	36%	36%	34%	35%	37%	34%	25%	27%	21%	16%	10%	6%	4.59	50
Total Equivalent Full Load Hours of Operation per Year																										2,303

Report the modeled Receptacle Equipment and Appliances Equivalent Full Load Hours of Operation in the Schedules tab before referring to the table below. The Equivalent Full Load Hours of Operation is used to calculate the equipment power density for resdential dwelling units that must be modeled based on the building equipment reported for the building. After confirming the Equivalent Full Load Hours of Operation in the schedules tab, use the values below for the Baseline and Proposed Miscellaneous Equipment Loads in the Dwelling Units. These loads include 0.5 Watts per square foot of electric miscellaneous equipment load with a 0.9 sensible ratio and 0.1 latent ratio in addition to the equipment load sources selected above.

Building ID	Equivalent Full Load Hours of Dwelling Unit Miscellaneous Equipment Operation Per Year	Total Area of Dwelling Units (square feet)		Electric Miscellaneous Loads in Dwelling Unit (including appliances and equipment listed above)							Natural Gas Miscellaneous Loads in Dwelling Unit (including appliances and equipment listed above)							Dwelling Unit Equipment Hot Water Loads	
				Baseline			Proposed				Baseline			Proposed					
				Equipment Power Density (Watts/ sq ft)	Sensible Ratio	Latent Ratio	Equipment Power Density (Watts/ sq ft)	Sensible Ratio	Latent Ratio		Equipment Power Density (Btu/ sq ft)	Sensible Ratio	Latent Ratio	Equipment Power Density (Btu/ sq ft)	Sensible Ratio	Latent Ratio		Base	Proposed
135 Dudley St Cor	2,117	122250		1.38	0.64	0.11	1.31	0.63	0.11		0.00			0.00				334934.80	210664.40

Appendix B.2

135 Dudley St Apartment, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Multifamily Home Details

Complete the table for each building in the project. Input the number of units and the average floor area for units with the corresponding bedroom number.

Building Unit summary

Building ID	Studio		1 Bedroom		2 Bedrooms		3 Bedrooms		4 Bedrooms		5 Bedrooms		6 Bedrooms		7 Bedrooms		8 Bedrooms	
	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq	Qty	Average Floor Area (sq
135 Dudley St Apartment			18	700	29	1,000	8	1,400										
Total number of units																		55
Total number of bedrooms																		100
Total Area of Dwelling Units (square feet)																		52,800

Building ID	Total Number of Units	Total Number of Bedrroms	Total Area of Dwelling Units (square feet)	Average Number of Bedrooms Per Unit	Average Floor Area per Unit (square feet)	Average Floor Area Per Unit for Reference Building (square feet)
135 Dudley St Apartment	55	100	52,800	1.82	960	1,430

Homes Dwelling Unit Equipment Calculator

Enter the appliances and equipment that is present in the residential dwelling units for the project. For clothes washers and dryers, enter the quantity of each unit installed within the project scope of work. For fans, enter the total supply volume for all fans installed for the project.

Building ID	Load Source	Quantity (or sum total fan volume [cfm] for fans)	Energy Star Eqp?	Average bedrooms per dwelling unit		Electric Loads					Natural Gas Loads					Annual Service Hot Water Load (gallons/year)			
						Annual Consumption (kWh/year)		Sensible Ratio	Latent Ratio		Annual Consumption (therms/year)		Sensible Ratio	Latent Ratio		Baseline Per Equipment	Proposed Per Equipment	Baseline Total	Proposed Total
						Baseline	Proposed				Baseline	Proposed							
135 Dudley St Ap	Refrigerator	55	Yes	1.818182		29095	23265	1	0		0	0	0.00	0.00		0.00	0.00	0.00	0
135 Dudley St Ap	Dishwasher	55	Yes	1.818182		11330	9020	0.6	0.15		0	0	0.00	0.00		1290.00	860.00	70950.00	47300
135 Dudley St Ap	Cooking (electric stove/range)	55	Yes	1.818182		33220	33220	0.4	0.3		0	0	0.00	0.00		0.00	0.00	0.00	0
135 Dudley St Ap	Clothes Dryer (In-unit electric)	55	Yes	1.818182		36890	36890	0.15	0.05		0	0	0.00	0.00		0.00	0.00	0.00	0
135 Dudley St Aps	Bath / Utility Fan, 10 to 89 cfm	1575	Yes	1.818182		958	821	0	0		0	0	0.00	0.00		0.00	0.00	0.0	0.0
135 Dudley St Aps	Bath / Utility Fan, 10 to 89 cfm	2750	Yes	1.818182		1,673	1,434	0	0		0	0	0.00	0.00		0.00	0.00	0.0	0.0
135 Dudley St Aps	Clothes Washer (In-unit)	55	Yes	1.818182		4,455	3,135	0.8	0		0	0	0.00	0.00		2,435.80	1,127.40	133,969.0	62,007.0

Homes Service Water Heating Load Summary

Residential Usage Profile Dependent on Project Demographics		Baseline Residential Usage per person Excluding Clothes / Dish Washers	
Low	Demographics such as all occupants working, seniors, middle income, and higher population density.	12	gallons/day
Medium	Demographics such as mixture of working / non-working occupants, mixture of age groups, medium population densities.	25	gallons/day
High	Demographics such high percentages of children, low income, public assistance, or no occupants working.	44	gallons/day

Report the modeled Service Water Heating Full Load Hours of Operation in the Schedules tab before referring to the table below. The Equivalent Full Load Hours of Operation is used to calculate the DHW modeled peak residential flow a the DHW Heater that must be modeled to be consistent with the annual hot water consumption calculated here. After confirming the Equivalent Full Load Hours of Operation in the schedules tab,Identify the residential service water heating usage profile, and the average fixture flows for sink and shower fixtures. Supply temperature at fixture point of use shall be 120 degrees F. If the modeled supply DHW temperature from the DHW heater is higher than this, indicate the supply DHW temperature from the DHW heater and the average cold water input temperature below.

This information along with the appliance information entered above and the schedule data from the schedules tab is used to determine the DHW modeled Peak Flow at DHW heater,which should be input into the energy model.

Building ID	Residential Usage Profile	Average Fixture Flows (gallons/minute)		DHW Temperature Settings (degrees F)			DHW Sink and Shower Fixture Loads at Point of Use (gallons / year)		DHW In-Unit Appliance Loads at Point of Use (gallons / year)		DHW Laundry Room Equipment Loads at Point of Use (gallons / year)		DHW Total Residential Loads at Point of Use (gallons / year)		DHW Total Residential Loads at DHW Heater (gallons / year)		DHW Equivalent Full Load Hours of Operation	DHW Modeled Peak Residential Flow at DHW Heater (gallons / minute)	
		Showers	Sinks	DHW Supply Temp	Average Cold Water Temp	DHW Temp at Fixture Point of Use	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed	Baseline	Proposed		Baseline	Proposed
135 Dudley St Aps	High	1.50	0.50	135.0	50.0	120.0	1,606,000	1,135,004	204,313	109,307	0	0	1,810,313	1,244,311	1,431,345	1,024,727	2,446	10.164	6.384

Appendix B.2

135 Dudley St Apartment, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

RESULTS

Print Results

58,647 kWh/Year*

System output may range from 56,290 to 60,782 kWh per year near this location.

Click HERE for more information.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)	Value ($)
January	3.14	3,570	532
February	3.95	4,012	598
March	4.66	5,179	772
April	5.51	5,656	843
May	5.60	5,864	874
June	6.06	6,040	901
July	6.54	6,642	990
August	5.96	6,076	906
September	5.27	5,281	787
October	3.98	4,239	632
November	2.94	3,149	469
December	2.61	2,938	438
Annual	4.69	58,646	$ 8,742

Appendix B.2

135 Dudley St Apartment, Roxbury, MA

PNF Application Preliminary Energy Model Analysis

Location and Station Identification	
Requested Location	135 Dudley St, Roxbury, MA
Weather Data Source	Lat, Lon: 42.33, -71.1 0.8 mi
Latitude	42.33° N
Longitude	71.1° W

APPENDIX C – RESPONSES TO COB ACCESSIBILITY GUIDELINES

Appendix C. Response to Article 80 | ACCESSIBILTY CHECKLIST
135 Dudley Street, Roxbury

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

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

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

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

Accessibility Analysis Information Sources:

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

Glossary of Terms:

1. ***Accessible Route*** – A continuous and unobstructed path of travel that meets or exceeds the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 20
2. ***Accessible Group 2 Units*** – Residential units with additional floor space that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 9.4
3. ***Accessible Guestrooms*** – Guestrooms with additional floor space, that meet or exceed the dimensional and inclusionary requirements set forth by MAAB 521 CMR: Section 8.4
4. ***Inclusionary Development Policy (IDP)*** – Program run by the BPDA that preserves access to affordable housing opportunities, in the City. For more information visit: http://www.bostonplans.org/housing/overview
5. ***Public Improvement Commission (PIC)*** – The regulatory body in charge of managing the public right of way. For more information visit: https://www.boston.gov/pic
6. ***Visitability*** – A place's ability to be accessed and visited by persons with disabilities that cause functional limitations; where architectural barriers do not inhibit access to entrances/doors and bathrooms.

Appendix C. Response to Article 80 | ACCESSIBILTY CHECKLIST
135 Dudley Street, Roxbury

1. Project Information:
If this is a multi-phased or multi-building project, fill out a separate Checklist for each phase/building.

Project Name:	135 Dudley Street
Primary Project Address:	135 Dudley Street, Roxbury
Total Number of Phases/Buildings:	2 Buildings 1 Phase
Primary Contact (Name / Title / Company / Email / Phone):	John B. Cruz III, President Daniel Cruz, Jr., Vice President Tel: 617-445-6901
Owner / Developer:	Cruz Development Corporation One John Eliot Square Roxbury, MA 02119 John B. Cruz III, President Daniel Cruz, Jr., Vice President Armond McCoy, Project Manager amccoy@cruzcompanies.com Tel: 617-445-6901
Architect:	The Architectural Team 50 Commandants Way at Admiral Hill Chelsea, MA 02150 Tel: 617-889-4402 Robert Verrier FAIA, NCARB rverrier@architecturalteam.com Alexander Paul Donovan adonovan@architecturalteam.com Jeffrey Sargis jsargis@architecturalteam.com Michael Washington Architects 891 Centre Street, Suite 401 Jamaica Plain, MA 02130 Tel: 617-390-5515 Michael Washington mwashington@mwaboston.com Elvin Phillips ephillips@mwaboston.com

Appendix C. Response to Article 80 | ACCESSIBILTY CHECKLIST
135 Dudley Street, Roxbury

Civil Engineer:	Bryant Associates 90 Canal Street Suite 301 Boston, MA 02114 Tel: 617-248-0300 T. Brayton Tbrayton@bryant-engrs.com Jim Comeau Jcomeau@bryant-engrs.com		
Landscape Architect:	Verdant Landscape Architecture 318 Harvard Street, Suite 25 Brookline, MA 02446 Tel: 617-735-1180 Katya Podsiadlo kp@verdantla.com Blair Hines, Principal bh@verdantla.com		
Permitting:	Mitchell L. Fischman Consulting ("MLF Consulting") LLC 41 Brush Hill Road Newton, MA 02461 Mitchell Fischman mitchfischman@gmail.com Tel: 781-760-1726 Yvette Niwa yvetteniwa.mlfconsulting@gmail.com Tel : 818-426-8157		
Construction Management:	John B. Cruz Construction Company One John Eliot Square Roxbury, MA 02119 John B. Cruz, III		
At what stage is the project at time of this questionnaire? Select below:			
	PNF / Expanded PNF Submitted		

Appendix C. Response to Article 80 | ACCESSIBILTY CHECKLIST
135 Dudley Street, Roxbury

Do you anticipate filing for any variances with the Massachusetts Architectural Access Board (MAAB)? ***If yes,*** identify and explain.	Yes; we anticipate filing for relief from 521 CMR 43.3.2 – Sink Depth for Group 1 market rate units.

2. Building Classification and Description:

This section identifies preliminary construction information about the project including size and uses.

What are the dimensions of the project?

Site Area:	*69,835 SF*	Building Area:	*346,716 GSF*
Building Height:	*65 FT. & 95 FT.*	Number of Stories:	*6 & 9 Flrs.*
First Floor Elevation:		Is there below grade space:	*No*

What is the Construction Type? (Select most appropriate type)

	Wood Frame	~~Masonry~~	Steel Frame	~~Concrete~~

What are the principal building uses? (IBC definitions are below – select all appropriate that apply)

		Residential - Multi-unit, Four +		
	Business	Mercantile		
List street-level uses of the building:	*Group A (Assembly) Group B (Business) Group M (Mercantile)*			

3. Assessment of Existing Infrastructure for Accessibility:

This section explores the proximity to accessible transit lines and institutions, such as (but not limited to) hospitals, elderly & disabled housing, and general neighborhood resources. Identify how the area surrounding the development is accessible for people with mobility impairments and analyze the existing condition of the accessible routes through sidewalk and pedestrian ramp reports.

Provide a description of the neighborhood where this development is located and its identifying topographical characteristics:	The project site is located in the center of Dudley Square, between the Boston Police Area B Substation and the Dudley branch of the Boston Public Library. There is a very slight rise to the site from the western edge to the eastern boundary. From north to south, the site rises approximately 12'
List the surrounding accessible MBTA transit lines and their proximity to development site: commuter rail / subway stations, bus stops:	Dudley Square Station is located across Dudley Street from the proposed project site; approximately 150' away.

Appendix C. Response to Article 80 | ACCESSIBILTY CHECKLIST
135 Dudley Street, Roxbury

List the surrounding institutions: hospitals, public housing, elderly and disabled housing developments, educational facilities, others:	The proposed project is adjacent to the Boston Police Area B Substation on the East and the Boston Public Library, Dudley branch, on the West. Northwest of the development is Roxbury Municipal Courthouse. The Yawkey Boys and Girls Club is just beyond the Courthouse, along Warren Street.
List the surrounding government buildings: libraries, community centers, recreational facilities, and other related facilities:	See above.
4. Surrounding Site Conditions – Existing: *This section identifies current condition of the sidewalks and pedestrian ramps at the development site.*	
Is the development site within a historic district? ***If yes,*** identify which district:	The project is located in close proximity to the Dudley Station Historic District.
Are there sidewalks and pedestrian ramps existing at the development site? ***If yes***, list the existing sidewalk and pedestrian ramp dimensions, slopes, materials, and physical condition at the development site:	There is currently an existing sidewalk along Dudley and Washington Streets. This sidewalk is in moderate condition and varies in width from approximately 8'-0" to 12'-0" over the length of the project site. It is anticipated that there will be two curb ramps at the Dudley / Washington Street intersection, similar to the existing curb ramps.
Are the sidewalks and pedestrian ramps existing-to-remain? ***If yes,*** have they been verified as ADA / MAAB compliant (with yellow composite detectable warning surfaces, cast in concrete)? ***If yes,*** provide description and photos:	It is undetermined at this time.
5. Surrounding Site Conditions – Proposed *This section identifies the proposed condition of the walkways and pedestrian ramps around the development site. Sidewalk width contributes to the degree of comfort walking along a street. Narrow sidewalks do not support lively pedestrian activity, and may create dangerous conditions that force people to walk in the street. Wider sidewalks allow people to walk side by side and pass each other comfortably walking alone, walking in pairs, or using a wheelchair.*	

Appendix C. Response to Article 80 | ACCESSIBILTY CHECKLIST
135 Dudley Street, Roxbury

Are the proposed sidewalks consistent with the Boston Complete Street Guidelines? ***If yes***, choose which Street Type was applied: Downtown Commercial, Downtown Mixed-use, Neighborhood Main, Connector, Residential, Industrial, Shared Street, Parkway, or Boulevard.	It is expected that the new sidewalks will be fully consistent with a Neighborhood Main Street-type use in the Boston Complete Street Guidelines.
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 10 feet for the Frontage and Pedestrian zones. We expect a 2'-0" to 3'-0" wide planting zone. to comply with the Guidelines.
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? ***If yes,*** what are the proposed dimensions of the sidewalk café or furnishings and what will the remaining right-of-way clearance be?	We are anticipating a public sidewalk café adjacent to the Boston Public Library. The final design has not yet been completed, but we expect a minimum width of 8'-0" for pedestrian access beyond the projection of the café furnishing area.
If the pedestrian right-of-way is on private property, will the proponent seek a pedestrian easement with the Public Improvement Commission (PIC)?	This is undetermined at this time.
Will any portion of the Project be going through the PIC? ***If yes,*** identify PIC actions and provide details.	We believe a portion of the total development project will require PIC review.
6. Accessible Parking: *See Massachusetts Architectural Access Board Rules and Regulations 521 CMR Section 23.00 regarding accessible parking requirement counts and the Massachusetts Office of Disability – Disabled Parking Regulations*.	
What is the total number of parking spaces provided at the development site? Will these be in a parking lot or garage?	It is anticipated that 270 parking spaces within a parking garage are being constructed.

Appendix C. Response to Article 80 | ACCESSIBILTY CHECKLIST
135 Dudley Street, Roxbury

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 270 spaces, a minimum of 7 spaces will be designated accessible. The first floor of the parking structure has been designed to a 14'-0" minimum to allow for a minimum of 1 van accessible space.
Will any on-street accessible parking spaces be required? ***If yes,*** has the proponent contacted the Commission for Persons with Disabilities regarding this need?	No on-street parking spaces are expected to be provided at this time.
Where is the accessible visitor parking located?	Visitor Accessible parking is expected to be located on the first floor of the parking garage.
Has a drop-off area been identified? ***If yes,*** will it be accessible?	An Accessible Drop-off will be provided within the first floor of the parking garage.
7. Circulation and Accessible Routes: *The primary objective in designing smooth and continuous paths of travel is to create universal access to entryways and common spaces, which accommodates persons of all abilities and allows for visitability with neighbors.*	
Describe accessibility at each entryway: Example: Flush Condition, Stairs, Ramp, Lift or Elevator:	All entryways will be a flush condition. Access to the upper floors of each building will be via elevator.
Are the accessible entrances and standard entrance integrated? ***If yes,*** *describe.* ***If no,*** what is the reason?	Yes; the standard entrances will be accessible.
If project is subject to Large Project Review/Institutional Master Plan, describe the accessible routes way-finding / signage package.	The project will provide wayfinding signage as required by 521 CMR.
8. Accessible Units (Group 2) and Guestrooms: (If applicable) *In order to facilitate access to housing and hospitality, this section addresses the number of accessible units that are proposed for the development site that remove barriers to housing and hotel rooms.*	

Appendix C. Response to Article 80 | ACCESSIBILTY CHECKLIST
135 Dudley Street, Roxbury

What is the total number of proposed housing units or hotel rooms for the development?	The project is providing (160) residential dwelling units.
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?	The project is providing (55) rental units and (105) for-sale condominium units. The developer will provide the breakdown of market value vs IDP units.
If a residential development, how many accessible Group 2 units are being proposed?	(3) Group 2 Designated Accessible rental units are being provided.
If a residential development, how many accessible Group 2 units will also be IDP units? ***If none***, describe reason.	Developer will provide the number of IDP units.
If a hospitality development, how many accessible units will feature a wheel-in shower? Will accessible equipment be provided as well? ***If yes,*** provide amount and location of equipment.	N/A
Do standard units have architectural barriers that would prevent entry or use of common space for persons with mobility impairments? Example: stairs / thresholds at entry, step to balcony, others. ***If yes***, provide reason.	No barriers are anticipated.
Are there interior elevators, ramps or lifts located in the development for access around architectural barriers and/or to separate floors? ***If yes***, describe:	Yes; elevators are being provided at both buildings to provide and Accessible Route to all Dwelling Units.
9. Community Impact: *Accessibility and inclusion extend past required compliance with building codes. Providing an overall scheme that allows full and equal participation of persons with disabilities makes the development an asset to the surrounding community.*	
Is this project providing any funding or improvements to the surrounding neighborhood? Examples: adding extra street trees, building or refurbishing a local park, or supporting other community-based initiatives?	The project anticipates it will be providing street trees along Dudley Street. Additionally, we are providing a Community Park adjacent to the Boston Public Library building.

Appendix C. Response to Article 80 | ACCESSIBILTY CHECKLIST
135 Dudley Street, Roxbury

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 Community Park. On the interior; accessible features and common amenities will be provided as required by 521 CMR.
Are any restrooms planned in common public spaces? ***If yes,*** will any be single-stall, ADA compliant and designated as "Family"/ "Companion" restrooms? ***If no***, explain why not.	Restrooms will be provided in the public spaces. 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? ***If yes,*** did they approve? ***If no,*** 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? ***If no,*** 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.
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 Figures C-1 thru C-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.	

Appendix C. Response to Article 80 | ACCESSIBILTY CHECKLIST
135 Dudley Street, Roxbury

Provide any additional drawings, diagrams, photos, or any other material that describes the inclusive and accessible elements of this project.

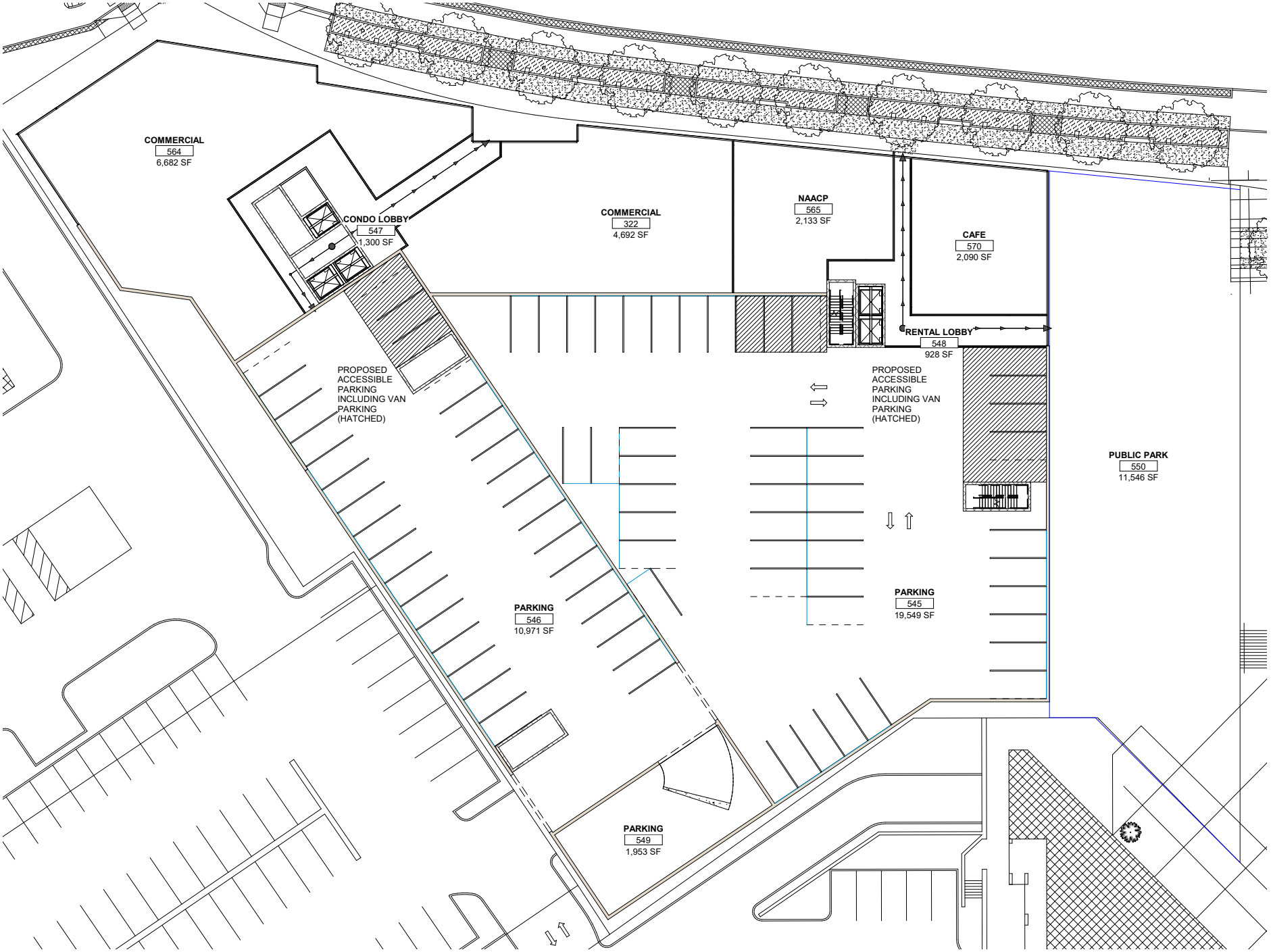
This completes the Article 80 Accessibility Checklist required for your project. Prior to and during the review process, Commission staff are able to provide technical assistance and design review, in order to help achieve ideal accessibility and to ensure that all buildings, sidewalks, parks, and open 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



135 Dudley Street

Boston, MA | September 19, 2019 | 18143 |

Figure C-1
Proposed Site Accessibility

CRUZ DEVELOPMENT tat

135 Dudley Street

Boston, MA | September 19, 2019 | 18143 | © The Architectural Team, Inc.

Figure C-2
Elevated Courtyard Access

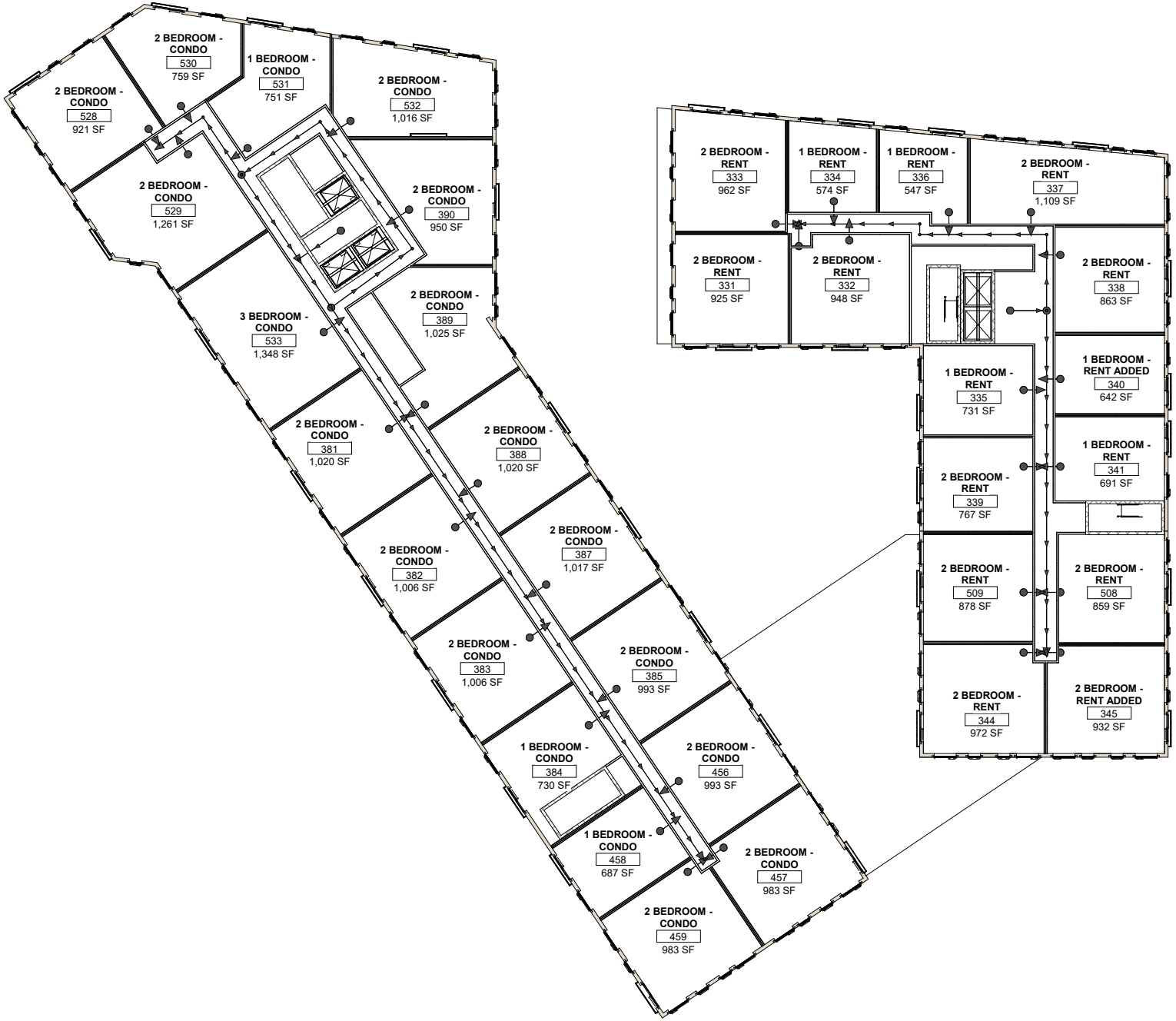
CRUZ DEVELOPMENT tat

135 Dudley Street

Boston, MA | September 19, 2019 | 18143 |

Figure C-3
Typical Lower Residential Floor Plan Access

CRUZ DEVELOPMENT tat



135 Dudley Street

Boston, MA | September 19, 2019 | 18143 |

Figure C-4
Typical Upper Residential Floor Plan Access

CRUZ DEVELOPMENT tat

APPENDIX D – RESPONSE TO BPDA BROADBAND QUESTIONNAIRE

Appendix D

Broadband Ready Buildings Questionnaire

135 Dudley Street, Roxbury

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.

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: **135 Dudley Street**
- Project Address Primary: **135 Dudley Street, Roxbury, MA**
- Project Address Additional: **N/A**
- Project Contact: Daniel Cruz, Jr, Vice President, 617-445-6901
- Expected completion date: **2023-2025**

Team Description

- Owner / Developer: **Cruz Development Corporation**
- Architect: **The Architectural Team (TAT)**
- Engineer (building systems): **TBD**
- Permitting: **Mitchell L. Fischman Consulting (“MLF Consulting”) LLC**
- Construction Management: **Cruz Construction**

Appendix D
Broadband Ready Buildings Questionnaire
135 Dudley Street, Roxbury

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: **Unknown**
- Locations of Points of Entry: **Warren Street and Dudley Street**
- Quantity and size of conduits: **Unknown**
- Location where conduits connect (e.g. building-owned manhole, carrier-specific manhole or stubbed at property line): **Unknown**
- Other information/comments: **Unknown**

#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: **Unknown**
- Distance between risers (if more than one): **Unknown**
- Dimensions of riser closets: **Unknown**
- Riser or conduit will reach to top floor: **Unknown**
- Number and size of conduits or sleeves within each riser: **Unknown**
- Proximity to other utilities (e.g. electrical, heating): **Unknown**
- Other information/comments: **Unknown**

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 D
Broadband Ready Buildings Questionnaire
135 Dudley Street, Roxbury

#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? **Unknown**
- Describe the electrical capacity of the telecom room (i.e. # and size of electrical circuits) **Unknown**

- Will the telecom room be located in an area of the building containing one or more load bearing walls? **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**

- Will the telecom room be single use (telecom only) or shared with other utilities?
- Telecom only
- Shared with other utilities
- U**nknown**

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**

Appendix D
Broadband Ready Buildings Questionnaire
135 Dudley Street, Roxbury

#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. **Unknown**

#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. **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.

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**

Appendix D
Broadband Ready Buildings Questionnaire
135 Dudley Street, Roxbury

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.

#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'.

TO BE COMPLETED DURING DESIGN DEVELOPMENT STAGE

- Comcast - enter contact info
- RCN - enter contact info
- Verizon - enter contact info
- Wicked Broadband - enter contact info
- WebPass
- Starry
- Level 3
- Cogent
- Lightower
- XO Communications
- AT&T
- Zayo
- Other(s) - please specify - enter contact info

Appendix D
Broadband Ready Buildings Questionnaire
135 Dudley Street, Roxbury

#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. **Some of these questions are difficult to respond to at this point in the design process.**

APPENDIX E – RESPONSE TO BPDA SMART UTILITIES CHECKLIST

Appendix E. Response to Boston Smart Utilities Checklist 135 Dudley Street, Roxbury

Date Submitted:	**09/27/19**
Submitted by:	**MLF 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

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	135 Dudley Street, Roxbury
1.2 Project Address	Same
1.3 Building Size (square feet)	346,716 gsf

Appendix E. Response to Boston Smart Utilities Checklist 135 Dudley Street, Roxbury

**For a multi-building development, enter total development size (square feet)*

1.4 Filing Stage	PNF
1.5 Filing Contact Information	
1.5a Name	Mitchell Fischman
1.5b Company	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	John B. Cruz, III
1.6b Architect	The Architectural Team
1.6c Permitting	MLF Consulting LLC
1.6d Construction Management	Cruz Construction

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.

Appendix E. Response to Boston Smart Utilities Checklist 135 Dudley Street, Roxbury

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

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)	

Appendix E. Response to Boston Smart Utilities Checklist 135 Dudley Street, Roxbury

2.6 Additional Information	

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

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	

Appendix E. Response to Boston Smart Utilities Checklist 135 Dudley Street, Roxbury

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)	
3.7 Additional Information	

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)	Bryant Associates, Inc. will be assessing/designing portions of green infrastructure

Appendix E. Response to Boston Smart Utilities Checklist 135 Dudley Street, Roxbury

4.2 Date Green Infrastructure Map/Diagram was submitted	See Response to Item 4.3 below.
4.3 Types of Green Infrastructure included in the project (select all that apply)	It is too early to define type LLCs of Green Infrastructure and to determine if any are possible or feasible for this site until we are in design development.
4.4 Total impervious area of the development (in square inches)	7,246,368 square inches (See graphic of pervious and impervious areas that follows based on the architect's conceptual design plans contained in the PNF)
4.5 Volume of stormwater that will be retained (in cubic inches)* **Note: Should equal to at least "Total impervious area (entered in section 4.4)" times "1.25 inches"*	9,057,960 cubic inches
4.6 Which of the following have you had engagement/review meetings with regarding Green Infrastructure? (select all that apply)	No meetings to date.
4.7 What engagement meetings have you had with utilities and/or other agencies (i.e., State agencies) regarding Green Infrastructure? (Optional: include dates)	No meetings to date.
4.8 Additional Information	

Appendix E. Response to Boston Smart Utilities Checklist 135 Dudley Street, Roxbury

Part 5 - Adaptive Signal Technology (AST)

Fill out this section if as part of your project BTD 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. **TO BE DETERMINED AT TIME OF DPIR**

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	
5.4 Describe the components of the AST system (including system design and	

Appendix E. Response to Boston Smart Utilities Checklist 135 Dudley Street, Roxbury

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)	
5.7 Additional Information	

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. **TO BE DETERMINED AT TIME OF DPIR**

Please email submission to manuel.esquivel@boston.gov

6.1 Consultant Assessing/Designing Smart Street Lights (if applicable)	

Appendix E. Response to Boston Smart Utilities Checklist 135 Dudley Street, Roxbury

6.2 Date Smart Street Lights Map/Diagram was submitted	
6.3 Which of the following have you had engagement/review meetings with regarding Smart Street Lights? (select all that apply)	
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)	
6.5 Additional Information	

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).

Appendix E. Response to Boston Smart Utilities Checklist

135 Dudley Street, Roxbury

TO BE DETERMINED AT TIME OF DPIR

Please email submission to manuel.esquivel@boston.gov

7.1 Date Cross Section Diagram(s) was submitted	
7.2 Date Lateral Diagram(s) was submitted	
7.3 Additional Information	

APPENDIX F – TRANSPORTATION APPENDIX

Appendix F – Transportation

Vehicle, Pedestrian, and Bicycle Counts
Seasonal Adjustment Factors
Trip Generation
Synchro Intersection Level of Service Reports

- Existing Condition
- No-Build (2026) Condition
- Build (2026) Condition

Vehicle, Pedestrian, and Bicycle Counts

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

N/S: Warren Street
W: Boys and Girls Club Driveway
City, State: Boston, MA
Client: Parsons Brinckerhoff/S. Srinivas

File Name : 165327 B
Site Code : 52606
Start Date : 10/13/2016
Page No : 1

Groups Printed- Cars - Buses - Heavy Vehicles

	Warren Street From North			Warren Street From South			Boys and Girls Club Driveway From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	1	141	1	289	6	8	3	1	0	450
07:15 AM	3	126	0	315	9	1	5	0	0	459
07:30 AM	4	116	1	293	2	0	1	1	0	418
07:45 AM	3	137	1	286	7	0	3	2	0	439
Total	11	520	3	1183	24	9	12	4	0	1766
08:00 AM	10	153	1	314	12	0	3	5	0	498
08:15 AM	11	134	0	248	12	5	2	3	0	415
08:30 AM	14	131	0	295	18	1	5	5	0	469
08:45 AM	8	147	0	230	17	3	7	2	0	414
Total	43	565	1	1087	59	9	17	15	0	1796
Grand Total	54	1085	4	2270	83	18	29	19	0	3562
Apprch %	4.7	94.9	0.3	95.7	3.5	0.8	60.4	39.6	0	
Total %	1.5	30.5	0.1	63.7	2.3	0.5	0.8	0.5	0	
Cars	51	872	2	2020	81	16	28	16	0	3086
% Cars	94.4	80.4	50	89	97.6	88.9	96.6	84.2	0	86.6
Buses	1	93	0	111	1	1	1	0	0	208
% Buses	1.9	8.6	0	4.9	1.2	5.6	3.4	0	0	5.8
Heavy Vehicles	2	120	2	139	1	1	0	3	0	268
% Heavy Vehicles	3.7	11.1	50	6.1	1.2	5.6	0	15.8	0	7.5

	Warren Street From North				Warren Street From South				Boys and Girls Club Driveway From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	3	137	1	141	286	7	0	293	3	2	0	5	439
08:00 AM	10	153	1	164	314	12	0	326	3	5	0	8	498
08:15 AM	11	134	0	145	248	12	5	265	2	3	0	5	415
08:30 AM	14	131	0	145	295	18	1	314	5	5	0	10	469
Total Volume	38	555	2	595	1143	49	6	1198	13	15	0	28	1821
% App. Total	6.4	93.3	0.3		95.4	4.1	0.5		46.4	53.6	0		
PHF	.679	.907	.500	.907	.910	.681	.300	.919	.650	.750	.000	.700	.914
Cars	36	433	1	470	1027	48	5	1080	12	13	0	25	1575
% Cars	94.7	78.0	50.0	79.0	89.9	98.0	83.3	90.2	92.3	86.7	0	89.3	86.5
Buses	1	53	0	54	49	1	1	51	1	0	0	1	106
% Buses	2.6	9.5	0	9.1	4.3	2.0	16.7	4.3	7.7	0	0	3.6	5.8
Heavy Vehicles	1	69	1	71	67	0	0	67	0	2	0	2	140
% Heavy Vehicles	2.6	12.4	50.0	11.9	5.9	0	0	5.6	0	13.3	0	7.1	7.7

PRECISION
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N/S: Warren Street
W: Boys and Girls Club Driveway
City, State: Boston, MA
Client: Parsons Brinckerhoff/S. Srinivas

File Name : 165327 B
Site Code : 52606
Start Date : 10/13/2016
Page No : 1

Groups Printed- Cars

	Warren Street From North			Warren Street From South			Boys and Girls Club Driveway From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	1	113	0	243	5	7	3	0	0	372
07:15 AM	3	101	0	286	9	1	5	0	0	405
07:30 AM	3	108	1	258	2	0	1	1	0	374
07:45 AM	3	109	1	254	7	0	3	2	0	379
Total	10	431	2	1041	23	8	12	3	0	1530
08:00 AM	10	122	0	285	11	0	3	4	0	435
08:15 AM	10	101	0	222	12	4	1	3	0	353
08:30 AM	13	101	0	266	18	1	5	4	0	408
08:45 AM	8	117	0	206	17	3	7	2	0	360
Total	41	441	0	979	58	8	16	13	0	1556
Grand Total	51	872	2	2020	81	16	28	16	0	3086
Apprch %	5.5	94.3	0.2	95.4	3.8	0.8	63.6	36.4	0	
Total %	1.7	28.3	0.1	65.5	2.6	0.5	0.9	0.5	0	

	Warren Street From North				Warren Street From South				Boys and Girls Club Driveway From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	3	101	0	104	286	9	1	296	5	0	0	5	405
07:30 AM	3	108	1	112	258	2	0	260	1	1	0	2	374
07:45 AM	3	109	1	113	254	7	0	261	3	2	0	5	379
08:00 AM	10	122	0	132	285	11	0	296	3	4	0	7	435
Total Volume	19	440	2	461	1083	29	1	1113	12	7	0	19	1593
% App. Total	4.1	95.4	0.4		97.3	2.6	0.1		63.2	36.8	0		
PHF	.475	.902	.500	.873	.947	.659	.250	.940	.600	.438	.000	.679	.916

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City, State: Boston, MA
Client: Parsons Brinckerhoff/S. Srinivas

File Name : 165327 B
Site Code : 52606
Start Date : 10/13/2016
Page No : 1

Groups Printed- Buses

	Warren Street From North			Warren Street From South			Boys and Girls Club Driveway From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	0	13	0	20	0	0	0	0	0	33
07:15 AM	0	11	0	14	0	0	0	0	0	25
07:30 AM	0	3	0	17	0	0	0	0	0	20
07:45 AM	0	12	0	13	0	0	0	0	0	25
Total	0	39	0	64	0	0	0	0	0	103
08:00 AM	0	14	0	12	1	0	0	0	0	27
08:15 AM	1	15	0	12	0	1	1	0	0	30
08:30 AM	0	12	0	12	0	0	0	0	0	24
08:45 AM	0	13	0	11	0	0	0	0	0	24
Total	1	54	0	47	1	1	1	0	0	105
Grand Total	1	93	0	111	1	1	1	0	0	208
Apprch %	1.1	98.9	0	98.2	0.9	0.9	100	0	0	
Total %	0.5	44.7	0	53.4	0.5	0.5	0.5	0	0	

	Warren Street From North				Warren Street From South				Boys and Girls Club Driveway From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	0	12	0	12	13	0	0	13	0	0	0	0	25
08:00 AM	0	14	0	14	12	1	0	13	0	0	0	0	27
08:15 AM	1	15	0	16	12	0	1	13	1	0	0	1	30
08:30 AM	0	12	0	12	12	0	0	12	0	0	0	0	24
Total Volume	1	53	0	54	49	1	1	51	1	0	0	1	106
% App. Total	1.9	98.1	0		96.1	2	2		100	0	0		
PHF	.250	.883	.000	.844	.942	.250	.250	.981	.250	.000	.000	.250	.883

PRECISION
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Groups Printed- Heavy Vehicles

	Warren Street From North			Warren Street From South			Boys and Girls Club Driveway From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
07:00 AM	0	15	1	26	1	1	0	1	0	45
07:15 AM	0	14	0	15	0	0	0	0	0	29
07:30 AM	1	5	0	18	0	0	0	0	0	24
07:45 AM	0	16	0	19	0	0	0	0	0	35
Total	1	50	1	78	1	1	0	1	0	133
08:00 AM	0	17	1	17	0	0	0	1	0	36
08:15 AM	0	18	0	14	0	0	0	0	0	32
08:30 AM	1	18	0	17	0	0	0	1	0	37
08:45 AM	0	17	0	13	0	0	0	0	0	30
Total	1	70	1	61	0	0	0	2	0	135
Grand Total	2	120	2	139	1	1	0	3	0	268
Apprch %	1.6	96.8	1.6	98.6	0.7	0.7	0	100	0	
Total %	0.7	44.8	0.7	51.9	0.4	0.4	0	1.1	0	

	Warren Street From North				Warren Street From South				Boys and Girls Club Driveway From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	0	16	0	16	19	0	0	19	0	0	0	0	35
08:00 AM	0	17	1	18	17	0	0	17	0	1	0	1	36
08:15 AM	0	18	0	18	14	0	0	14	0	0	0	0	32
08:30 AM	1	18	0	19	17	0	0	17	0	1	0	1	37
Total Volume	1	69	1	71	67	0	0	67	0	2	0	2	140
% App. Total	1.4	97.2	1.4		100	0	0		0	100	0		
PHF	.250	.958	.250	.934	.882	.000	.000	.882	.000	.500	.000	.500	.946

PRECISION
D A T A
INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

N/S: Warren Street
W: Boys and Girls Club Driveway
City, State: Boston, MA
Client: Parsons Brinckerhoff/S. Srinivas

File Name : 165327 B
Site Code : 52606
Start Date : 10/13/2016
Page No : 1

Groups Printed- Peds and Bicycles

	Warren Street From North				Warren Street From South				Boys and Girls Club Driveway From West				
Start Time	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	Int. Total
07:00 AM	0	1	0	0	4	0	5	0	0	0	20	5	35
07:15 AM	0	0	1	0	4	0	1	1	0	0	14	4	25
07:30 AM	0	1	0	0	4	0	1	0	0	0	9	2	17
07:45 AM	0	1	0	0	2	0	6	0	0	0	18	0	27
Total	0	3	1	0	14	0	13	1	0	0	61	11	104
08:00 AM	0	0	0	1	1	0	2	1	0	0	12	5	22
08:15 AM	0	0	0	0	2	0	2	1	0	0	13	1	19
08:30 AM	0	0	0	0	5	0	2	2	0	0	14	2	25
08:45 AM	0	0	1	0	0	0	2	2	0	0	35	4	44
Total	0	0	1	1	8	0	8	6	0	0	74	12	110
Grand Total	0	3	2	1	22	0	21	7	0	0	135	23	214
Apprch %	0	50	33.3	16.7	44	0	42	14	0	0	85.4	14.6	
Total %	0	1.4	0.9	0.5	10.3	0	9.8	3.3	0	0	63.1	10.7	

	Warren Street From North					Warren Street From South					Boys and Girls Club Driveway From West					
Start Time	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 08:00 AM																
08:00 AM	0	0	0	1	1	1	0	2	1	4	0	0	12	5	17	22
08:15 AM	0	0	0	0	0	2	0	2	1	5	0	0	13	1	14	19
08:30 AM	0	0	0	0	0	5	0	2	2	9	0	0	14	2	16	25
08:45 AM	0	0	1	0	1	0	0	2	2	4	0	0	35	4	39	44
Total Volume	0	0	1	1	2	8	0	8	6	22	0	0	74	12	86	110
% App. Total	0	0	50	50		36.4	0	36.4	27.3		0	0	86	14		
PHF	.000	.000	.250	.250	.500	.400	.000	1.00	.750	.611	.000	.000	.529	.600	.551	.625

PRECISION
D A T A
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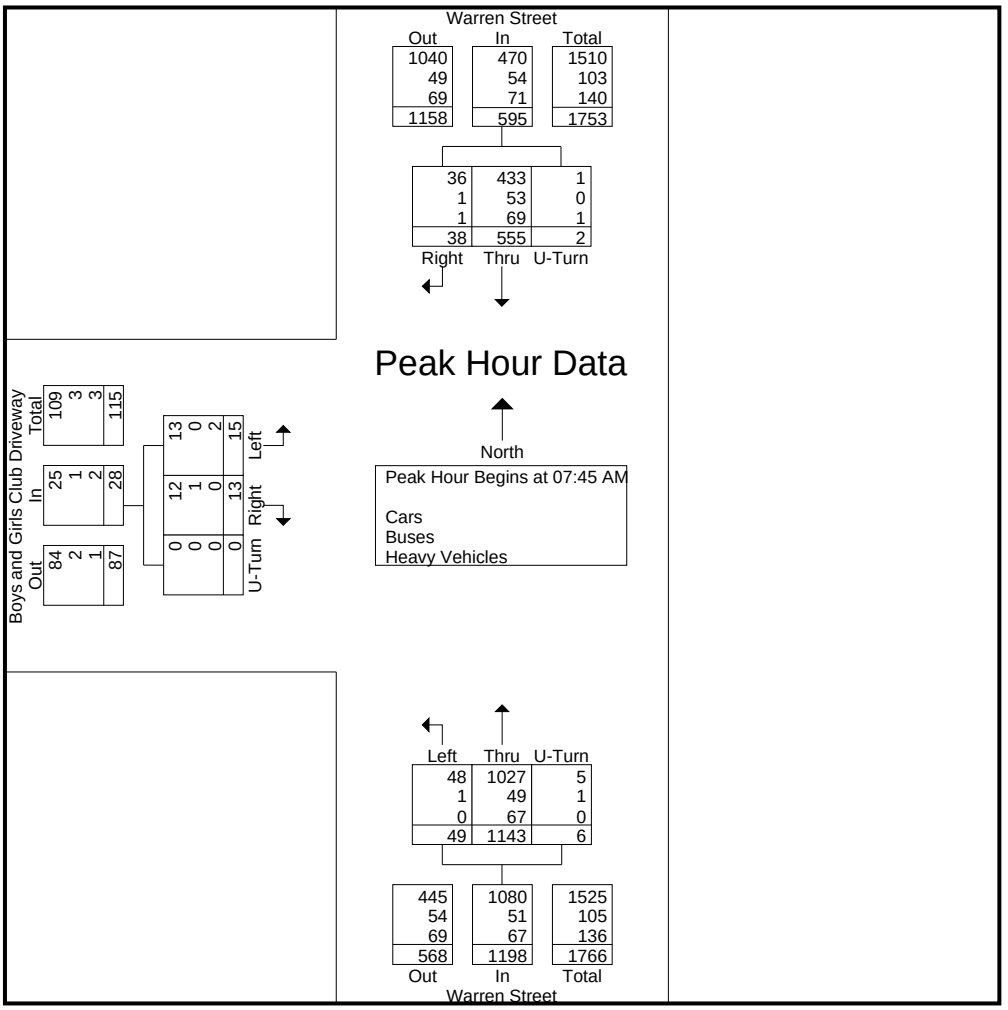
N/S: Warren Street
W: Boys and Girls Club Driveway
City, State: Boston, MA
Client: Parsons Brinckerhoff/S. Srinivas

File Name : 165327 B
Site Code : 52606
Start Date : 10/13/2016
Page No : 1

	Warren Street From North				Warren Street From South				Boys and Girls Club Driveway From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	3	137	1	141	286	7	0	293	3	2	0	5	439
08:00 AM	10	153	1	164	314	12	0	326	3	5	0	8	498
08:15 AM	11	134	0	145	248	12	5	265	2	3	0	5	415
08:30 AM	14	131	0	145	295	18	1	314	5	5	0	10	469
Total Volume	38	555	2	595	1143	49	6	1198	13	15	0	28	1821
% App. Total	6.4	93.3	0.3		95.4	4.1	0.5		46.4	53.6	0		
PHF	.679	.907	.500	.907	.910	.681	.300	.919	.650	.750	.000	.700	.914
Cars	36	433	1	470	1027	48	5	1080	12	13	0	25	1575
% Cars	94.7	78.0	50.0	79.0	89.9	98.0	83.3	90.2	92.3	86.7	0	89.3	86.5
Buses	1	53	0	54	49	1	1	51	1	0	0	1	106
% Buses	2.6	9.5	0	9.1	4.3	2.0	16.7	4.3	7.7	0	0	3.6	5.8
Heavy Vehicles	1	69	1	71	67	0	0	67	0	2	0	2	140
% Heavy Vehicles	2.6	12.4	50.0	11.9	5.9	0	0	5.6	0	13.3	0	7.1	7.7



PRECISION
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N/S: Warren Street
W: Boys and Girls Club Driveway
City, State: Boston, MA
Client: Parsons Brinckerhoff/S. Srinivas

File Name : 165327 BB
Site Code : 52606
Start Date : 10/13/2016

Groups Printed- Cars - Buses - Heavy Vehicles

	Warren Street From North			Warren Street From South			Boys and Girls Club Driveway From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	6	234	0	225	11	5	18	5	0	504
04:15 PM	12	261	0	238	10	4	14	11	0	550
04:30 PM	11	227	0	215	10	1	32	14	0	510
04:45 PM	8	234	0	217	12	2	33	14	0	520
Total	37	956	0	895	43	12	97	44	0	2084
05:00 PM	12	232	0	210	12	2	19	5	0	492
05:15 PM	10	220	0	221	14	3	14	4	0	486
05:30 PM	10	237	0	216	17	4	19	9	0	512
05:45 PM	8	197	0	210	14	3	16	13	0	461
Total	40	886	0	857	57	12	68	31	0	1951
Grand Total	77	1842	0	1752	100	24	165	75	0	4035
Apprch %	4	96	0	93.4	5.3	1.3	68.8	31.2	0	
Total %	1.9	45.7	0	43.4	2.5	0.6	4.1	1.9	0	
Cars	77	1647	0	1500	98	24	163	72	0	3581
% Cars	100	89.4	0	85.6	98	100	98.8	96	0	88.7
Buses	0	89	0	124	1	0	2	2	0	218
% Buses	0	4.8	0	7.1	1	0	1.2	2.7	0	5.4
Heavy Vehicles	0	106	0	128	1	0	0	1	0	236
% Heavy Vehicles	0	5.8	0	7.3	1	0	0	1.3	0	5.8

	Warren Street From North				Warren Street From South				Boys and Girls Club Driveway From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	6	234	0	240	225	11	5	241	18	5	0	23	504
04:15 PM	12	261	0	273	238	10	4	252	14	11	0	25	550
04:30 PM	11	227	0	238	215	10	1	226	32	14	0	46	510
04:45 PM	8	234	0	242	217	12	2	231	33	14	0	47	520
Total Volume	37	956	0	993	895	43	12	950	97	44	0	141	2084
% App. Total	3.7	96.3	0		94.2	4.5	1.3		68.8	31.2	0		
PHF	.771	.916	.000	.909	.940	.896	.600	.942	.735	.786	.000	.750	.947
Cars	37	826	0	863	760	41	12	813	95	41	0	136	1812
% Cars	100	86.4	0	86.9	84.9	95.3	100	85.6	97.9	93.2	0	96.5	86.9
Buses	0	61	0	61	67	1	0	68	2	2	0	4	133
% Buses	0	6.4	0	6.1	7.5	2.3	0	7.2	2.1	4.5	0	2.8	6.4
Heavy Vehicles	0	69	0	69	68	1	0	69	0	1	0	1	139
% Heavy Vehicles	0	7.2	0	6.9	7.6	2.3	0	7.3	0	2.3	0	0.7	6.7

PRECISION
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N/S: Warren Street
W: Boys and Girls Club Driveway
City, State: Boston, MA
Client: Parsons Brinckerhoff/S. Srinivas

File Name : 165327 BB
Site Code : 52606
Start Date : 10/13/2016
Page No : 1

Groups Printed- Cars

	Warren Street From North			Warren Street From South			Boys and Girls Club Driveway From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	6	201	0	193	11	5	18	5	0	439
04:15 PM	12	221	0	208	9	4	13	10	0	477
04:30 PM	11	193	0	175	9	1	31	14	0	434
04:45 PM	8	211	0	184	12	2	33	12	0	462
Total	37	826	0	760	41	12	95	41	0	1812
05:00 PM	12	208	0	173	12	2	19	5	0	431
05:15 PM	10	206	0	187	14	3	14	4	0	438
05:30 PM	10	220	0	190	17	4	19	9	0	469
05:45 PM	8	187	0	190	14	3	16	13	0	431
Total	40	821	0	740	57	12	68	31	0	1769
Grand Total	77	1647	0	1500	98	24	163	72	0	3581
Apprch %	4.5	95.5	0	92.5	6	1.5	69.4	30.6	0	
Total %	2.2	46	0	41.9	2.7	0.7	4.6	2	0	

	Warren Street From North				Warren Street From South				Boys and Girls Club Driveway From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	6	201	0	207	193	11	5	209	18	5	0	23	439
04:15 PM	12	221	0	233	208	9	4	221	13	10	0	23	477
04:30 PM	11	193	0	204	175	9	1	185	31	14	0	45	434
04:45 PM	8	211	0	219	184	12	2	198	33	12	0	45	462
Total Volume	37	826	0	863	760	41	12	813	95	41	0	136	1812
% App. Total	4.3	95.7	0		93.5	5	1.5		69.9	30.1	0		
PHF	.771	.934	.000	.926	.913	.854	.600	.920	.720	.732	.000	.756	.950

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N/S: Warren Street
W: Boys and Girls Club Driveway
City, State: Boston, MA
Client: Parsons Brinckerhoff/S. Srinivas

File Name : 165327 BB
Site Code : 52606
Start Date : 10/13/2016
Page No : 1

Groups Printed- Buses

	Warren Street From North			Warren Street From South			Boys and Girls Club Driveway From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	0	16	0	15	0	0	0	0	0	31
04:15 PM	0	19	0	14	1	0	1	0	0	35
04:30 PM	0	16	0	20	0	0	1	0	0	37
04:45 PM	0	10	0	18	0	0	0	2	0	30
Total	0	61	0	67	1	0	2	2	0	133
05:00 PM	0	12	0	19	0	0	0	0	0	31
05:15 PM	0	5	0	17	0	0	0	0	0	22
05:30 PM	0	8	0	12	0	0	0	0	0	20
05:45 PM	0	3	0	9	0	0	0	0	0	12
Total	0	28	0	57	0	0	0	0	0	85
Grand Total	0	89	0	124	1	0	2	2	0	218
Apprch %	0	100	0	99.2	0.8	0	50	50	0	
Total %	0	40.8	0	56.9	0.5	0	0.9	0.9	0	

	Warren Street From North				Warren Street From South				Boys and Girls Club Driveway From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	0	16	0	16	15	0	0	15	0	0	0	0	31
04:15 PM	0	19	0	19	14	1	0	15	1	0	0	1	35
04:30 PM	0	16	0	16	20	0	0	20	1	0	0	1	37
04:45 PM	0	10	0	10	18	0	0	18	0	2	0	2	30
Total Volume	0	61	0	61	67	1	0	68	2	2	0	4	133
% App. Total	0	100	0		98.5	1.5	0		50	50	0		
PHF	.000	.803	.000	.803	.838	.250	.000	.850	.500	.250	.000	.500	.899

PRECISION
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N/S: Warren Street
W: Boys and Girls Club Driveway
City, State: Boston, MA
Client: Parsons Brinckerhoff/S. Srinivas

File Name : 165327 BB
Site Code : 52606
Start Date : 10/13/2016
Page No : 1

Groups Printed- Heavy Vehicles

	Warren Street From North			Warren Street From South			Boys and Girls Club Driveway From West			
Start Time	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	Int. Total
04:00 PM	0	17	0	17	0	0	0	0	0	34
04:15 PM	0	21	0	16	0	0	0	1	0	38
04:30 PM	0	18	0	20	1	0	0	0	0	39
04:45 PM	0	13	0	15	0	0	0	0	0	28
Total	0	69	0	68	1	0	0	1	0	139
05:00 PM	0	12	0	18	0	0	0	0	0	30
05:15 PM	0	9	0	17	0	0	0	0	0	26
05:30 PM	0	9	0	14	0	0	0	0	0	23
05:45 PM	0	7	0	11	0	0	0	0	0	18
Total	0	37	0	60	0	0	0	0	0	97
Grand Total	0	106	0	128	1	0	0	1	0	236
Apprch %	0	100	0	99.2	0.8	0	0	100	0	
Total %	0	44.9	0	54.2	0.4	0	0	0.4	0	

	Warren Street From North				Warren Street From South				Boys and Girls Club Driveway From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	0	17	0	17	17	0	0	17	0	0	0	0	34
04:15 PM	0	21	0	21	16	0	0	16	0	1	0	1	38
04:30 PM	0	18	0	18	20	1	0	21	0	0	0	0	39
04:45 PM	0	13	0	13	15	0	0	15	0	0	0	0	28
Total Volume	0	69	0	69	68	1	0	69	0	1	0	1	139
% App. Total	0	100	0		98.6	1.4	0		0	100	0		
PHF	.000	.821	.000	.821	.850	.250	.000	.821	.000	.250	.000	.250	.891

PRECISION
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N/S: Warren Street
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Client: Parsons Brinckerhoff/S. Srinivas

File Name : 165327 BB
Site Code : 52606
Start Date : 10/13/2016
Page No : 1

Groups Printed- Peds and Bicycles

	Warren Street From North				Warren Street From South				Boys and Girls Club Driveway From West				
Start Time	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	Int. Total
04:00 PM	0	2	2	0	5	0	10	4	0	0	7	17	47
04:15 PM	0	1	0	0	1	0	2	2	0	0	11	20	37
04:30 PM	0	2	1	1	1	0	5	3	0	0	3	19	35
04:45 PM	0	1	0	0	2	0	7	2	0	0	5	8	25
Total	0	6	3	1	9	0	24	11	0	0	26	64	144
05:00 PM	0	0	0	0	1	0	4	2	0	0	17	16	40
05:15 PM	0	4	0	0	1	0	4	2	0	0	14	12	37
05:30 PM	0	3	0	0	2	0	3	2	0	0	9	10	29
05:45 PM	0	2	0	0	0	0	5	6	0	0	9	24	46
Total	0	9	0	0	4	0	16	12	0	0	49	62	152
Grand Total	0	15	3	1	13	0	40	23	0	0	75	126	296
Apprch %	0	78.9	15.8	5.3	17.1	0	52.6	30.3	0	0	37.3	62.7	
Total %	0	5.1	1	0.3	4.4	0	13.5	7.8	0	0	25.3	42.6	

	Warren Street From North					Warren Street From South					Boys and Girls Club Driveway From West					
Start Time	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 05:00 PM																
05:00 PM	0	0	0	0	0	1	0	4	2	7	0	0	17	16	33	40
05:15 PM	0	4	0	0	4	1	0	4	2	7	0	0	14	12	26	37
05:30 PM	0	3	0	0	3	2	0	3	2	7	0	0	9	10	19	29
05:45 PM	0	2	0	0	2	0	0	5	6	11	0	0	9	24	33	46
Total Volume	0	9	0	0	9	4	0	16	12	32	0	0	49	62	111	152
% App. Total	0	100	0	0		12.5	0	50	37.5		0	0	44.1	55.9		
PHF	.000	.563	.000	.000	.563	.500	.000	.800	.500	.727	.000	.000	.721	.646	.841	.826

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Site Code : 52606
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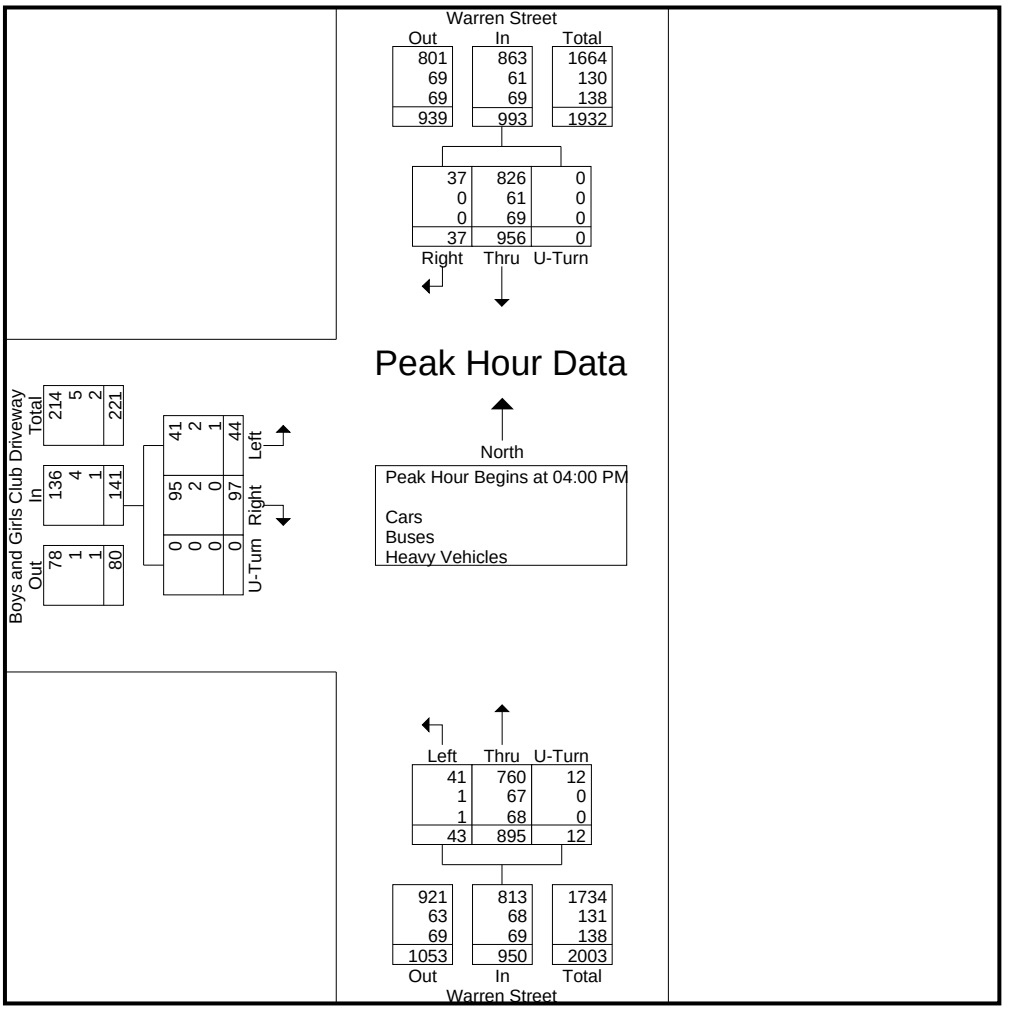
	Warren Street From North				Warren Street From South				Boys and Girls Club Driveway From West				
Start Time	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	6	234	0	240	225	11	5	241	18	5	0	23	504
04:15 PM	12	261	0	273	238	10	4	252	14	11	0	25	550
04:30 PM	11	227	0	238	215	10	1	226	32	14	0	46	510
04:45 PM	8	234	0	242	217	12	2	231	33	14	0	47	520
Total Volume	37	956	0	993	895	43	12	950	97	44	0	141	2084
% App. Total	3.7	96.3	0		94.2	4.5	1.3		68.8	31.2	0		
PHF	.771	.916	.000	.909	.940	.896	.600	.942	.735	.786	.000	.750	.947
Cars	37	826	0	863	760	41	12	813	95	41	0	136	1812
% Cars	100	86.4	0	86.9	84.9	95.3	100	85.6	97.9	93.2	0	96.5	86.9
Buses	0	61	0	61	67	1	0	68	2	2	0	4	133
% Buses	0	6.4	0	6.1	7.5	2.3	0	7.2	2.1	4.5	0	2.8	6.4
Heavy Vehicles	0	69	0	69	68	1	0	69	0	1	0	1	139
% Heavy Vehicles	0	7.2	0	6.9	7.6	2.3	0	7.3	0	2.3	0	0.7	6.7



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.

Trip Generation - Proposed Program

135 Dudley Street
Trip Generation Assessment

HOWARD STEIN HUDSON
29-Aug-2019

Land Use	Size	Category	Directional Split	Average Trip Rate	Unadjusted Vehicle Trips	Assumed National Vehicle Occupancy Rate[1]	Unadjusted Person-Trips	Transit Share[3]	Transit Person-Trips	Walk/Bike/ Other Share[3]	Walk/ Bike/ Other Trips	Auto Share[3]	Auto Person-Trips	% Taxi/ TNC[4]	Taxi/TNC Person-Trips	Assumed Local Auto Occupancy Rate for Taxis[5]	Private Auto Person-Trips	Primary Auto-Person Trips	Assumed Local Auto Occupancy Rate[5]	Taxi/TNC Auto Trips	Primary AutoTrips	Total Auto Trips (Private + TNC)
Daily Peak Hour																						
Multifamily Housing (Low Rise)[6]	160	Total		7.320	1,172	1.18	**1,382**	17%	**234**	27%	**374**	56%	**774**	5%	38	1.18	736	736	1.18	**64**	**624**	**688**
	units	In	50%	3.660	586	1.18	**691**	17%	**117**	27%	**187**	56%	**387**	5%	19	1.18	368	368	1.18	**32**	**312**	**344**
		Out	50%	3.660	586	1.18	**691**	17%	**117**	27%	**187**	56%	**387**	5%	19	1.18	368	368	1.18	**32**	**312**	**344**
Shopping Center[7]	15.512	Total		37.750	586	1.82	**1,066**	12%	**128**	35%	**374**	53%	**564**	5%	28	1.82	536	536	1.82	**32**	**294**	**326**
	KSF	In	50%	18.875	293	1.82	**533**	12%	**64**	35%	**187**	53%	**282**	5%	14	1.82	268	268	1.82	**16**	**147**	**163**
		Out	50%	18.875	293	1.82	**533**	12%	**64**	35%	**187**	53%	**282**	5%	14	1.82	268	268	1.82	**16**	**147**	**163**
Parking Garage[8]	270	Total			0	2.10	**0**	0%	**0**	0%	**0**	100%	**0**	0%	0	1.00	0	0	1.00	**0**	**0**	**0**
	KSF	In	50%	0.000	0	2.10	**0**	0%	**0**	0%	**0**	100%	**0**	0%	0	1.00	0	0	1.00	**0**	**0**	**0**
		Out	50%	0.000	0	2.10	**0**	0%	**0**	0%	**0**	100%	**0**	0%	0	1.00	0	0	1.00	**0**	**0**	**0**
Total		Total			**1,758**		**2,448**		**362**		**748**		**1,338**							**96**	**918**	**1,014**
		In			**879**		**1,224**		**181**		**374**		**669**							**48**	**459**	**507**
		Out			**879**		**1,224**		**181**		**374**		**669**							**48**	**459**	**507**
AM Peak Hour																						
Multifamily Housing (Low Rise)[6]	160	Total		0.460	74	1.18	**87**		**23**		**23**		**41**	5%	3	1.18	39	39	1.18	**8**	**33**	**41**
	units	In	23%	0.106	17	1.18	**20**	19%	**4**	27%	**5**	54%	**11**	5%	1	1.18	10	10	1.18	**4**	**8**	**12**
		Out	77%	0.354	57	1.18	**67**	29%	**19**	27%	**18**	44%	**30**	5%	2	1.18	29	29	1.18	**4**	**25**	**29**
Shopping Center[7]	15.512	Total		0.94	15	1.82	**27**		**4**		**10**		**13**	5%	0	1.82	13	13	1.82	**0**	**7**	**7**
	KSF	In	62%	0.583	9	1.82	**16**	13%	**2**	36%	**6**	51%	**8**	5%	0	1.82	8	8	1.82	**0**	**4**	**4**
		Out	38%	0.357	6	1.82	**11**	21%	**2**	37%	**4**	42%	**5**	5%	0	1.82	5	5	1.82	**0**	**3**	**3**
Parking Garage[8]	270	Total			0	2.10	**0**							5%	0	1.00	0	0	2.10	**0**	**30**	**30**
	Spaces	In			0	2.10	**0**	0%		0%		100%		5%	0	1.00	0	0	2.10	**0**	**25**	**25**
		Out			0	2.10	**0**	0%		0%		100%		5%	0	1.00	0	0	2.10	**0**	**5**	**5**
Total		Total			**89**		**114**		**27**		**33**		**54**							**8**	**70**	**78**
		In			**26**		**36**		**6**		**11**		**19**							**4**	**37**	**41**
		Out			**63**		**78**		**21**		**22**		**35**							**4**	**33**	**37**
PM Peak Hour																						
Multifamily Housing (Low Rise)[6]	160	Total		0.560	89	1.18	**105**		**26**		**29**		**50**	5%	2	1.18	48	48	1.18	**4**	**41**	**45**
	units	In	63%	0.353	56	1.18	**66**	29%	**19**	27%	**18**	44%	**29**	5%	1	1.18	28	28	1.18	**2**	**24**	**26**
		Out	37%	0.207	33	1.18	**39**	19%	**7**	27%	**11**	54%	**21**	5%	1	1.18	20	20	1.18	**2**	**17**	**19**
Shopping Center[7]	15.512	Total		3.81	59	1.82	**107**		**18**		**39**		**50**	5%	2	1.82	48	48	1.82	**4**	**26**	**30**
	KSF	In	48%	1.829	28	1.82	**51**	21%	**11**	37%	**19**	42%	**21**	5%	1	1.82	20	20	1.82	**2**	**11**	**13**
		Out	52%	1.981	31	1.82	**56**	13%	**7**	36%	**20**	51%	**29**	5%	1	1.82	28	28	1.82	**2**	**15**	**17**
Parking Garage[8]	270	Total			0	2.10	**0**		**0**		**0**		**0**	5%	0	1.00	0	0	2.10	**0**	**30**	**30**
	KSF	In			0	2.10	**0**	0%	**0**	0%	**0**	100%	**0**	5%	0	1.00	0	0	2.10	**0**	**5**	**5**
		Out			0	2.10	**0**	0%	**0**	0%	**0**	100%	**0**	5%	0	1.00	0	0	2.10	**0**	**25**	**25**
Total		Total			**148**		**212**		**44**		**68**		**100**							**8**	**97**	**105**
		In			**84**		**117**		**30**		**37**		**50**							**4**	**40**	**44**
		Out			**64**		**95**		**14**		**31**		**50**							**4**	**57**	**61**

1. 2017 National vehicle occupancy rates - 1.18:home to work; 1.82: family/personal business; 1.82: shopping; 2.1 social/recreational
2. Based on ITE Trip Generation Handbook, 3rd Edition method
3. Mode shares based on peak-hour BTD Data for Area 15
4. Assumed Taxi/TNC percentage
5. Local vehicle occupancy rates based on 2009 National vehicle occupancy rates
6. ITE Trip Generation Manual, 10th Edition, LUC 220 (Multifamily Housing Low-Rise (1-2 floors), average rate
7. ITE Trip Generation Manual, 10th Edition, LUC 820 (Shopping Center), average rate
8. Based on trips redirected from existing site driveway

Synchro Intersection Level of Service Reports

- Existing (2019) Condition

Lane Group	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	7	12	1	29	1098	2	446	19
Future Volume (vph)	7	12	1	29	1098	2	446	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	0%				0%		4%	
Storage Length (ft)	0	0		95		0		0
Storage Lanes	1	0		1		0		0
Taper Length (ft)	25			25		25		
Lane Util. Factor	1.00	1.00	0.95	1.00	0.95	0.95	0.95	0.95
Ped Bike Factor	0.97			0.86			0.99	
Frt	0.915						0.994	
Flt Protected	0.982			0.950				
Satd. Flow (prot)	1538	0	0	1805	3406	0	3106	0
Flt Permitted	0.982			0.463			0.953	
Satd. Flow (perm)	1536	0	0	754	3406	0	2960	0
Right Turn on Red		Yes						Yes
Satd. Flow (RTOR)	17						12	
Link Speed (mph)	30				30		30	
Link Distance (ft)	392				450		200	
Travel Time (s)	8.9				10.2		4.5	
Confl. Peds. (#/hr)	2	14		86				86
Peak Hour Factor	0.70	0.70	0.92	0.92	0.92	0.92	0.91	0.91
Heavy Vehicles (%)	0%	13%	0%	0%	6%	50%	12%	3%
Adj. Flow (vph)	10	17	1	32	1193	2	490	21
Shared Lane Traffic (%)								
Lane Group Flow (vph)	27	0	0	33	1193	0	513	0
Turn Type	Prot		Perm	Perm	NA	Perm	NA	
Protected Phases	4				2		6	
Permitted Phases			2	2		6		
Detector Phase	4		2	2	2	6	6	
Switch Phase								
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (s)	21.0		89.0	89.0	89.0	89.0	89.0	
Total Split (%)	19.1%		80.9%	80.9%	80.9%	80.9%	80.9%	
Maximum Green (s)	17.0		85.0	85.0	85.0	85.0	85.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5		0.5	0.5	0.5	0.5	0.5	
Lost Time Adjust (s)	0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.0			4.0	4.0		4.0	
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None		C-Max	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	5.0		5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0		0	0	0	0	0	
Act Effct Green (s)	6.7			100.7	100.7		100.7	
Actuated g/C Ratio	0.06			0.92	0.92		0.92	
v/c Ratio	0.25			0.05	0.38		0.19	
Control Delay	33.3			1.3	1.6		1.0	
Queue Delay	0.0			0.0	0.4		0.0	
Total Delay	33.3			1.3	2.0		1.0	
LOS	C			A	A		A	
Approach Delay	33.3				1.9		1.0	
Approach LOS	C				A		A	
90th %ile Green (s)	8.8		93.2	93.2	93.2	93.2	93.2	
90th %ile Term Code	Gap		Coord	Coord	Coord	Coord	Coord	
70th %ile Green (s)	7.3		94.7	94.7	94.7	94.7	94.7	
70th %ile Term Code	Gap		Coord	Coord	Coord	Coord	Coord	
50th %ile Green (s)	6.2		95.8	95.8	95.8	95.8	95.8	
50th %ile Term Code	Gap		Coord	Coord	Coord	Coord	Coord	
30th %ile Green (s)	0.0		106.0	106.0	106.0	106.0	106.0	
30th %ile Term Code	Skip		Coord	Coord	Coord	Coord	Coord	
10th %ile Green (s)	0.0		106.0	106.0	106.0	106.0	106.0	
10th %ile Term Code	Skip		Coord	Coord	Coord	Coord	Coord	
Queue Length 50th (ft)	7			2	55		16	
Queue Length 95th (ft)	24			7	90		25	
Internal Link Dist (ft)	312				370		120	
Turn Bay Length (ft)				95				
Base Capacity (vph)	252			690	3119		2711	
Starvation Cap Reductn	0			0	1265		0	
Spillback Cap Reductn	0			0	0		0	
Storage Cap Reductn	0			0	0		0	
Reduced v/c Ratio	0.11			0.05	0.64		0.19	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTU, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.38
Intersection Signal Delay: 2.2 Intersection LOS: A
Intersection Capacity Utilization 44.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 38: Warren St & Driveway

Lane Group	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	44	97	12	43	908	971	37
Future Volume (vph)	44	97	12	43	908	971	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Grade (%)	0%				0%	4%	
Storage Length (ft)	0	0		95			0
Storage Lanes	1	0		1			0
Taper Length (ft)	25			25			
Lane Util. Factor	1.00	1.00	0.95	1.00	0.95	0.95	0.95
Ped Bike Factor	0.95			0.94		0.99	
Frt	0.907					0.994	
Flt Protected	0.985			0.950			
Satd. Flow (prot)	1612	0	0	1777	3343	3246	0
Flt Permitted	0.985			0.241			
Satd. Flow (perm)	1612	0	0	423	3343	3246	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)	79					11	
Link Speed (mph)	30				30	30	
Link Distance (ft)	392				450	200	
Travel Time (s)	8.9				10.2	4.5	
Confl. Peds. (#/hr)		28		111			111
Confl. Bikes (#/hr)							9
Peak Hour Factor	0.75	0.75	0.94	0.94	0.94	0.91	0.91
Heavy Vehicles (%)	1%	0%	0%	2%	8%	7%	0%
Adj. Flow (vph)	59	129	13	46	966	1067	41
Shared Lane Traffic (%)							
Lane Group Flow (vph)	188	0	0	59	966	1108	0
Turn Type	Prot		Perm	Perm	NA	NA	
Protected Phases	4				2	6	
Permitted Phases			2	2			
Detector Phase	4		2	2	2	6	
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0		20.0	20.0	20.0	20.0	
Total Split (s)	21.0		89.0	89.0	89.0	89.0	
Total Split (%)	19.1%		80.9%	80.9%	80.9%	80.9%	
Maximum Green (s)	17.0		85.0	85.0	85.0	85.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5		0.5	0.5	0.5	0.5	
Lost Time Adjust (s)	0.0			0.0	0.0	0.0	
Total Lost Time (s)	4.0			4.0	4.0	4.0	
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	
Recall Mode	None		C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	5.0		5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0		0	0	0	0	
Act Effct Green (s)	12.4			89.6	89.6	89.6	
Actuated g/C Ratio	0.11			0.81	0.81	0.81	
v/c Ratio	0.75			0.17	0.36	0.42	
Control Delay	44.6			2.8	2.0	3.4	
Queue Delay	0.1			0.0	0.2	0.0	
Total Delay	44.7			2.8	2.1	3.4	
LOS	D			A	A	A	
Approach Delay	44.7				2.2	3.4	
Approach LOS	D				A	A	
90th %ile Green (s)	17.0		85.0	85.0	85.0	85.0	
90th %ile Term Code	Max		Coord	Coord	Coord	Coord	
70th %ile Green (s)	15.9		86.1	86.1	86.1	86.1	
70th %ile Term Code	Gap		Coord	Coord	Coord	Coord	
50th %ile Green (s)	13.1		88.9	88.9	88.9	88.9	
50th %ile Term Code	Gap		Coord	Coord	Coord	Coord	
30th %ile Green (s)	10.2		91.8	91.8	91.8	91.8	
30th %ile Term Code	Gap		Coord	Coord	Coord	Coord	
10th %ile Green (s)	6.0		96.0	96.0	96.0	96.0	
10th %ile Term Code	Gap		Coord	Coord	Coord	Coord	
Queue Length 50th (ft)	74			5	42	81	
Queue Length 95th (ft)	109			m10	m54	m141	
Internal Link Dist (ft)	312				370	120	
Turn Bay Length (ft)				95			
Base Capacity (vph)	315			344	2721	2644	
Starvation Cap Reductn	0			0	772	0	
Spillback Cap Reductn	4			0	0	169	
Storage Cap Reductn	0			0	0	0	
Reduced v/c Ratio	0.60			0.17	0.50	0.45	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 6.2 Intersection LOS: A
Intersection Capacity Utilization 53.7% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 37: Warren St & Driveway

- No-Build (2026) Condition

Lane Group	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	7	12	1	30	1155	2	477	20
Future Volume (vph)	7	12	1	30	1155	2	477	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	0%				0%		4%	
Storage Length (ft)	0	0		95		0		0
Storage Lanes	1	0		1		0		0
Taper Length (ft)	25			25		25		
Lane Util. Factor	1.00	1.00	0.95	1.00	0.95	0.95	0.95	0.95
Ped Bike Factor	0.97			0.87			0.99	
Frt	0.915						0.994	
Flt Protected	0.982			0.950				
Satd. Flow (prot)	1538	0	0	1805	3406	0	3107	0
Flt Permitted	0.982			0.447			0.953	
Satd. Flow (perm)	1536	0	0	735	3406	0	2961	0
Right Turn on Red		Yes						Yes
Satd. Flow (RTOR)	17						12	
Link Speed (mph)	30				30		30	
Link Distance (ft)	392				450		200	
Travel Time (s)	8.9				10.2		4.5	
Confl. Peds. (#/hr)	2	14		86				86
Peak Hour Factor	0.70	0.70	0.92	0.92	0.92	0.92	0.91	0.91
Heavy Vehicles (%)	0%	13%	0%	0%	6%	50%	12%	3%
Adj. Flow (vph)	10	17	1	33	1255	2	524	22
Shared Lane Traffic (%)								
Lane Group Flow (vph)	27	0	0	34	1255	0	548	0
Turn Type	Prot		Perm	Perm	NA	Perm	NA	
Protected Phases	4				2		6	
Permitted Phases			2	2		6		
Detector Phase	4		2	2	2	6	6	
Switch Phase								
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (s)	21.0		89.0	89.0	89.0	89.0	89.0	
Total Split (%)	19.1%		80.9%	80.9%	80.9%	80.9%	80.9%	
Maximum Green (s)	17.0		85.0	85.0	85.0	85.0	85.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5		0.5	0.5	0.5	0.5	0.5	
Lost Time Adjust (s)	0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.0			4.0	4.0		4.0	
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None		C-Max	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	5.0		5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0		0	0	0	0	0	
Act Effct Green (s)	6.7			100.7	100.7		100.7	
Actuated g/C Ratio	0.06			0.92	0.92		0.92	
v/c Ratio	0.25			0.05	0.40		0.20	
Control Delay	33.3			1.3	1.6		1.0	
Queue Delay	0.0			0.0	0.4		0.0	
Total Delay	33.3			1.3	2.1		1.0	
LOS	C			A	A		A	
Approach Delay	33.3				2.0		1.0	
Approach LOS	C				A		A	
90th %ile Green (s)	8.8		93.2	93.2	93.2	93.2	93.2	
90th %ile Term Code	Gap		Coord	Coord	Coord	Coord	Coord	
70th %ile Green (s)	7.3		94.7	94.7	94.7	94.7	94.7	
70th %ile Term Code	Gap		Coord	Coord	Coord	Coord	Coord	
50th %ile Green (s)	6.2		95.8	95.8	95.8	95.8	95.8	
50th %ile Term Code	Gap		Coord	Coord	Coord	Coord	Coord	
30th %ile Green (s)	0.0		106.0	106.0	106.0	106.0	106.0	
30th %ile Term Code	Skip		Coord	Coord	Coord	Coord	Coord	
10th %ile Green (s)	0.0		106.0	106.0	106.0	106.0	106.0	
10th %ile Term Code	Skip		Coord	Coord	Coord	Coord	Coord	
Queue Length 50th (ft)	7			2	60		17	
Queue Length 95th (ft)	24			7	97		26	
Internal Link Dist (ft)	312				370		120	
Turn Bay Length (ft)				95				
Base Capacity (vph)	252			673	3119		2712	
Starvation Cap Reductn	0			0	1227		0	
Spillback Cap Reductn	0			0	0		0	
Storage Cap Reductn	0			0	0		0	
Reduced v/c Ratio	0.11			0.05	0.66		0.20	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTU, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.40
Intersection Signal Delay: 2.2 Intersection LOS: A
Intersection Capacity Utilization 45.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 38: Warren St & Driveway

Lane Group	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	44	97	12	45	961	1022	38
Future Volume (vph)	44	97	12	45	961	1022	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Grade (%)	0%				0%	4%	
Storage Length (ft)	0	0		95			0
Storage Lanes	1	0		1			0
Taper Length (ft)	25			25			
Lane Util. Factor	1.00	1.00	0.95	1.00	0.95	0.95	0.95
Ped Bike Factor	0.95			0.95		0.99	
Frt	0.907					0.995	
Flt Protected	0.985			0.950			
Satd. Flow (prot)	1612	0	0	1777	3343	3250	0
Flt Permitted	0.985			0.225			
Satd. Flow (perm)	1612	0	0	398	3343	3250	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)	71					11	
Link Speed (mph)	30				30	30	
Link Distance (ft)	392				450	200	
Travel Time (s)	8.9				10.2	4.5	
Confl. Peds. (#/hr)		28		111			111
Confl. Bikes (#/hr)							9
Peak Hour Factor	0.75	0.75	0.92	0.94	0.94	0.91	0.91
Heavy Vehicles (%)	1%	0%	0%	2%	8%	7%	0%
Adj. Flow (vph)	59	129	13	48	1022	1123	42
Shared Lane Traffic (%)							
Lane Group Flow (vph)	188	0	0	61	1022	1165	0
Turn Type	Prot		Perm	Perm	NA	NA	
Protected Phases	4				2	6	
Permitted Phases			2	2			
Detector Phase	4		2	2	2	6	
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0		20.0	20.0	20.0	20.0	
Total Split (s)	21.0		89.0	89.0	89.0	89.0	
Total Split (%)	19.1%		80.9%	80.9%	80.9%	80.9%	
Maximum Green (s)	17.0		85.0	85.0	85.0	85.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5		0.5	0.5	0.5	0.5	
Lost Time Adjust (s)	0.0			0.0	0.0	0.0	
Total Lost Time (s)	4.0			4.0	4.0	4.0	
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	
Recall Mode	None		C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	5.0		5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0		0	0	0	0	
Act Effct Green (s)	12.9			89.1	89.1	89.1	
Actuated g/C Ratio	0.12			0.81	0.81	0.81	
v/c Ratio	0.75			0.19	0.38	0.44	
Control Delay	46.9			3.1	2.1	3.7	
Queue Delay	0.1			0.0	0.2	0.0	
Total Delay	47.0			3.1	2.3	3.7	
LOS	D			A	A	A	
Approach Delay	47.0				2.4	3.7	
Approach LOS	D				A	A	
90th %ile Green (s)	17.0		85.0	85.0	85.0	85.0	
90th %ile Term Code	Max		Coord	Coord	Coord	Coord	
70th %ile Green (s)	16.4		85.6	85.6	85.6	85.6	
70th %ile Term Code	Gap		Coord	Coord	Coord	Coord	
50th %ile Green (s)	13.6		88.4	88.4	88.4	88.4	
50th %ile Term Code	Gap		Coord	Coord	Coord	Coord	
30th %ile Green (s)	10.7		91.3	91.3	91.3	91.3	
30th %ile Term Code	Gap		Coord	Coord	Coord	Coord	
10th %ile Green (s)	6.6		95.4	95.4	95.4	95.4	
10th %ile Term Code	Gap		Coord	Coord	Coord	Coord	
Queue Length 50th (ft)	80			5	47	91	
Queue Length 95th (ft)	115			m11	m60	154	
Internal Link Dist (ft)	312				370	120	
Turn Bay Length (ft)				95			
Base Capacity (vph)	309			322	2709	2635	
Starvation Cap Reductn	0			0	738	0	
Spillback Cap Reductn	3			0	0	163	
Storage Cap Reductn	0			0	0	0	
Reduced v/c Ratio	0.61			0.19	0.52	0.47	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 6.5 Intersection LOS: A
Intersection Capacity Utilization 55.1% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 37: Warren St & Driveway

- Build (2026) Condition

Lane Group	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	32	24	1	47	1155	2	477	44
Future Volume (vph)	32	24	1	47	1155	2	477	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)	0%				0%		4%	
Storage Length (ft)	0	0		95		0		0
Storage Lanes	1	0		1		0		0
Taper Length (ft)	25			25		25		
Lane Util. Factor	1.00	1.00	0.95	1.00	0.95	0.95	0.95	0.95
Ped Bike Factor	0.98			0.87			0.97	
Frt	0.943						0.987	
Flt Protected	0.972			0.950				
Satd. Flow (prot)	1622	0	0	1805	3406	0	3054	0
Flt Permitted	0.972			0.436			0.953	
Satd. Flow (perm)	1619	0	0	722	3406	0	2910	0
Right Turn on Red		Yes						Yes
Satd. Flow (RTOR)	25						27	
Link Speed (mph)	30				30		30	
Link Distance (ft)	392				450		200	
Travel Time (s)	8.9				10.2		4.5	
Confl. Peds. (#/hr)	2	14		86				86
Peak Hour Factor	0.95	0.95	0.92	0.92	0.92	0.92	0.91	0.91
Heavy Vehicles (%)	0%	13%	0%	0%	6%	50%	12%	3%
Adj. Flow (vph)	34	25	1	51	1255	2	524	48
Shared Lane Traffic (%)								
Lane Group Flow (vph)	59	0	0	52	1255	0	574	0
Turn Type	Prot		Perm	Perm	NA	Perm	NA	
Protected Phases	4				2		6	
Permitted Phases			2	2		6		
Detector Phase	4		2	2	2	6	6	
Switch Phase								
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0		20.0	20.0	20.0	20.0	20.0	
Total Split (s)	21.0		89.0	89.0	89.0	89.0	89.0	
Total Split (%)	19.1%		80.9%	80.9%	80.9%	80.9%	80.9%	
Maximum Green (s)	17.0		85.0	85.0	85.0	85.0	85.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5		0.5	0.5	0.5	0.5	0.5	
Lost Time Adjust (s)	0.0			0.0	0.0		0.0	
Total Lost Time (s)	4.0			4.0	4.0		4.0	
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None		C-Max	C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	5.0		5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0		0	0	0	0	0	
Act Effct Green (s)	8.0			96.7	96.7		96.7	
Actuated g/C Ratio	0.07			0.88	0.88		0.88	
v/c Ratio	0.42			0.08	0.42		0.22	
Control Delay	39.8			1.9	2.3		1.5	
Queue Delay	0.0			0.0	0.6		0.0	
Total Delay	39.8			1.9	2.8		1.5	
LOS	D			A	A		A	
Approach Delay	39.8				2.8		1.5	
Approach LOS	D				A		A	
90th %ile Green (s)	11.5		90.5	90.5	90.5	90.5	90.5	
90th %ile Term Code	Gap		Coord	Coord	Coord	Coord	Coord	
70th %ile Green (s)	9.3		92.7	92.7	92.7	92.7	92.7	
70th %ile Term Code	Gap		Coord	Coord	Coord	Coord	Coord	
50th %ile Green (s)	7.7		94.3	94.3	94.3	94.3	94.3	
50th %ile Term Code	Gap		Coord	Coord	Coord	Coord	Coord	
30th %ile Green (s)	6.2		95.8	95.8	95.8	95.8	95.8	
30th %ile Term Code	Gap		Coord	Coord	Coord	Coord	Coord	
10th %ile Green (s)	0.0		106.0	106.0	106.0	106.0	106.0	
10th %ile Term Code	Skip		Coord	Coord	Coord	Coord	Coord	
Queue Length 50th (ft)	23			4	70		21	
Queue Length 95th (ft)	63			12	121		43	
Internal Link Dist (ft)	312				370		120	
Turn Bay Length (ft)				95				
Base Capacity (vph)	271			634	2993		2560	
Starvation Cap Reductn	0			0	1192		0	
Spillback Cap Reductn	0			0	0		0	
Storage Cap Reductn	0			0	0		0	
Reduced v/c Ratio	0.22			0.08	0.70		0.22	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTU, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.42
Intersection Signal Delay: 3.5 Intersection LOS: A
Intersection Capacity Utilization 53.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 38: Warren St & Driveway

Lane Group	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	78	124	12	53	961	1022	74
Future Volume (vph)	78	124	12	53	961	1022	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Grade (%)	0%				0%	4%	
Storage Length (ft)	0	0		95			0
Storage Lanes	1	0		1			0
Taper Length (ft)	25			25			
Lane Util. Factor	1.00	1.00	0.95	1.00	0.95	0.95	0.95
Ped Bike Factor	0.96			0.95		0.97	
Frt	0.917					0.990	
Flt Protected	0.981			0.950			
Satd. Flow (prot)	1631	0	0	1776	3343	3200	0
Flt Permitted	0.981			0.212			
Satd. Flow (perm)	1631	0	0	376	3343	3200	0
Right Turn on Red		Yes					Yes
Satd. Flow (RTOR)	62					21	
Link Speed (mph)	30				30	30	
Link Distance (ft)	392				450	200	
Travel Time (s)	8.9				10.2	4.5	
Confl. Peds. (#/hr)		28		111			111
Confl. Bikes (#/hr)							9
Peak Hour Factor	0.95	0.95	0.94	0.94	0.94	0.91	0.91
Heavy Vehicles (%)	1%	0%	0%	2%	8%	7%	0%
Adj. Flow (vph)	82	131	13	56	1022	1123	81
Shared Lane Traffic (%)							
Lane Group Flow (vph)	213	0	0	69	1022	1204	0
Turn Type	Prot		Perm	Perm	NA	NA	
Protected Phases	4				2	6	
Permitted Phases			2	2			
Detector Phase	4		2	2	2	6	
Switch Phase							
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0	
Minimum Split (s)	20.0		20.0	20.0	20.0	20.0	
Total Split (s)	21.0		89.0	89.0	89.0	89.0	
Total Split (%)	19.1%		80.9%	80.9%	80.9%	80.9%	
Maximum Green (s)	17.0		85.0	85.0	85.0	85.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5	
All-Red Time (s)	0.5		0.5	0.5	0.5	0.5	
Lost Time Adjust (s)	0.0			0.0	0.0	0.0	
Total Lost Time (s)	4.0			4.0	4.0	4.0	
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	
Recall Mode	None		C-Max	C-Max	C-Max	C-Max	
Walk Time (s)	5.0		5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0		11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0		0	0	0	0	
Act Effct Green (s)	14.4			87.6	87.6	87.6	
Actuated g/C Ratio	0.13			0.80	0.80	0.80	
v/c Ratio	0.80			0.23	0.38	0.47	
Control Delay	54.3			3.7	2.4	4.2	
Queue Delay	0.2			0.0	0.2	0.0	
Total Delay	54.4			3.7	2.5	4.3	
LOS	D			A	A	A	
Approach Delay	54.4				2.6	4.3	
Approach LOS	D				A	A	
90th %ile Green (s)	17.0		85.0	85.0	85.0	85.0	
90th %ile Term Code	Max		Coord	Coord	Coord	Coord	
70th %ile Green (s)	17.0		85.0	85.0	85.0	85.0	
70th %ile Term Code	Max		Coord	Coord	Coord	Coord	
50th %ile Green (s)	16.0		86.0	86.0	86.0	86.0	
50th %ile Term Code	Gap		Coord	Coord	Coord	Coord	
30th %ile Green (s)	13.1		88.9	88.9	88.9	88.9	
30th %ile Term Code	Gap		Coord	Coord	Coord	Coord	
10th %ile Green (s)	8.7		93.3	93.3	93.3	93.3	
10th %ile Term Code	Gap		Coord	Coord	Coord	Coord	
Queue Length 50th (ft)	103			6	50	121	
Queue Length 95th (ft)	#200			m12	m61	166	
Internal Link Dist (ft)	312				370	120	
Turn Bay Length (ft)				95			
Base Capacity (vph)	304			299	2663	2553	
Starvation Cap Reductn	0			0	726	0	
Spillback Cap Reductn	3			0	0	159	
Storage Cap Reductn	0			0	0	0	
Reduced v/c Ratio	0.71			0.23	0.53	0.50	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 7.8 Intersection LOS: A
Intersection Capacity Utilization 58.1% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 37: Warren St & Driveway

135 Dudley Street, Roxbury

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